



US Army Corps  
of Engineers  
Waterways Experiment  
Station

Miscellaneous Paper CERC-96-4  
June 1996

# 1994 Annual Index of Wind Wave Directional Spectra Measured at Harvest Platform

by Charles E. Long

19960730 070

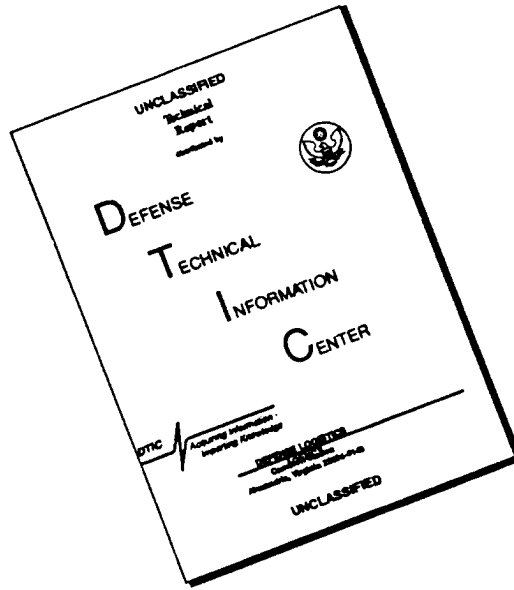
Approved For Public Release; Distribution Is Unlimited

19960730 070

19960730 070

Prepared for Headquarters, U.S. Army Corps of Engineers

# DISCLAIMER NOTICE



**THIS DOCUMENT IS BEST  
QUALITY AVAILABLE. THE COPY  
FURNISHED TO DTIC CONTAINED  
A SIGNIFICANT NUMBER OF  
PAGES WHICH DO NOT  
REPRODUCE LEGIBLY.**

The contents of this report are not to be used for advertising, publication, or promotional purposes. Citation of trade names does not constitute an official endorsement or approval of the use of such commercial products.



PRINTED ON RECYCLED PAPER

# **1994 Annual Index of Wind Wave Directional Spectra Measured at Harvest Platform**

by Charles E. Long

U.S. Army Corps of Engineers  
Waterways Experiment Station  
3909 Halls Ferry Road  
Vicksburg, MS 39180-6199

**Final report**

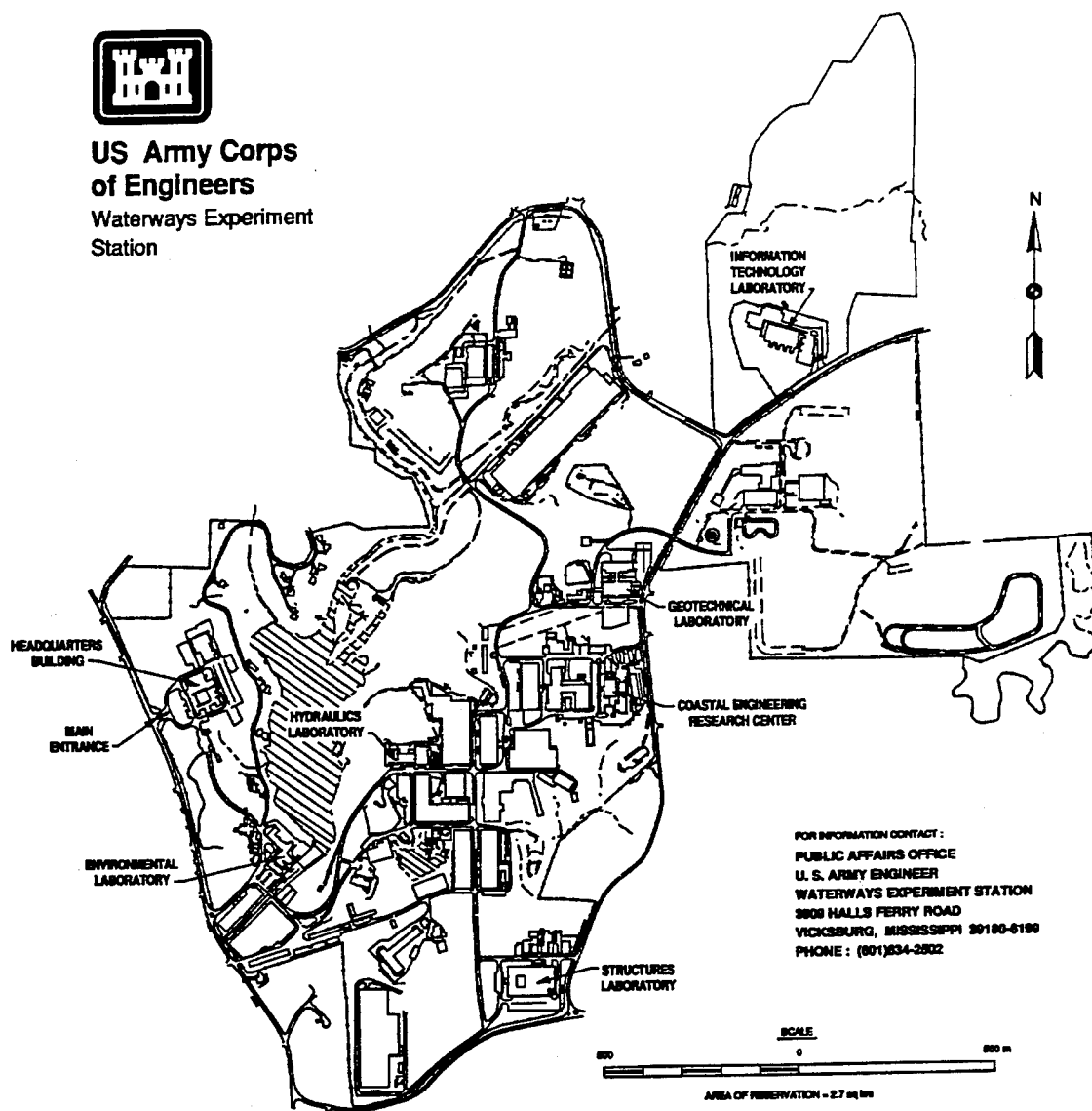
Approved for public release; distribution is unlimited

Prepared for U.S. Army Corps of Engineers  
Washington, DC 20314-1000

Under Civil Works Research Work Unit 32484



**US Army Corps  
of Engineers**  
Waterways Experiment  
Station



**Waterways Experiment Station Cataloging-in-Publication Data**

Long, Charles E.

1994 annual index of wind wave directional spectra measured at Harvest Platform / by Charles E. Long ; prepared for U.S. Army Corps of Engineers.

118 p. : ill. ; 28 cm. — (Miscellaneous paper ; CERC-96-4)

Includes bibliographic references.

1. Wind waves — California — Point Conception — Statistics. 2. Water waves — California — Point Conception — Statistics. 3. Ocean waves — California — Point Conception — Statistics. 4. Frequency spectra. I. United States. Army. Corps of Engineers. II. U.S. Army Engineer Waterways Experiment Station. III. Coastal Engineering Research Center (U.S. Army Engineer Waterways Experiment Station) IV. Title. V. Series: Miscellaneous paper (U.S. Army Engineer Waterways Experiment Station) ; CERC-96-4.  
TA7 W34m no.CERC-96-4

# Contents

---

|                                                                 |    |
|-----------------------------------------------------------------|----|
| Preface .....                                                   | v  |
| 1—Introduction .....                                            | 1  |
| 2—Directional Gauge .....                                       | 3  |
| Gauge Location and Array Geometry .....                         | 3  |
| Pressure Gauges and Data Path .....                             | 3  |
| Collection Schedule and Data Set Size .....                     | 4  |
| 3—Primary Data Analysis .....                                   | 6  |
| Error Checking .....                                            | 6  |
| Frequency-Direction Spectra .....                               | 9  |
| 4—Characterizing Parameters .....                               | 14 |
| Wave Height, Peak Frequency, and Peak Direction .....           | 14 |
| Circular Moment Parameters .....                                | 15 |
| Quartile Parameters .....                                       | 16 |
| Summary of Parameters .....                                     | 17 |
| 5—Accessing Spectra .....                                       | 19 |
| 6—Summary .....                                                 | 20 |
| References .....                                                | 21 |
| Appendix A: Table of Collection Times and Bulk Parameters ..... | A1 |
| Appendix B: Time Series Graphs of Bulk Parameters .....         | B1 |
| Appendix C: Listing of FORTRAN Computer Program .....           | C1 |
| Appendix D: Listing of Sample Data File .....                   | D1 |

|                            |    |
|----------------------------|----|
| Appendix E: Notation ..... | E1 |
|----------------------------|----|

SF 298

# Preface

---

This report indexes parameters of and describes means of access to a series of wind wave frequency-direction spectral observations made with a six-element, high-resolution directional wave gauge at Texaco Oil Company's Harvest Platform. The work was motivated by a need to publicize these results so they can be used by all investigators interested in natural wind wave energy distributions at a deepwater site near the exposed California coast. This effort was authorized by Headquarters, U.S. Army Corps of Engineers (HQUSACE), under Civil Works Coastal Navigation Hydrodynamics Program Research Work Unit 32484, "Directionality of Waves in Shallow Water." Funds were provided through the Coastal Engineering Research Center (CERC), U.S. Army Engineer Waterways Experiment Station (WES), under the program management of Ms. Carolyn M. Holmes, CERC. Messrs. John H. Lockhart, Jr., Charles Chesnutt, and Barry W. Holliday were HQUSACE Technical Monitors.

This report was prepared by Dr. Charles E. Long, under the direct supervision of Mr. William A. Birkemeier, Chief, Field Research Facility (FRF), CERC, and Mr. Thomas W. Richardson, Chief, Engineering Development Division (EDD), CERC. General supervision was provided by Dr. James R. Houston and Mr. Charles C. Calhoun, Jr., Director and Assistant Director, CERC, respectively.

Mr. David D. McGehee, Prototype Measurement and Analysis Branch, EDD, CERC, was instrumental in coordinating the efforts of CERC and the State of California in data archiving and gauge maintenance by the Coastal Data Information Program (CDIP) at Scripps Institution of Oceanography (SIO). Data transfer between SIO and the FRF was coordinated under the direction of Dr. Richard J. Seymour, CDIP, with particularly helpful assistance from Ms. Julianna Thomas, CDIP. Ms. Judy H. Roughton, FRF, produced Figure 1 of this report. The contributions of all these individuals are gratefully acknowledged.

At the time of publication of this report, Director of WES was Dr. Robert W. Whalin. Commander was COL Bruce K. Howard, EN.

*The contents of this report are not to be used for advertising, publication, or promotional purposes. Citation of trade names does not constitute an official endorsement or approval of the use of such commercial products.*

# 1 Introduction

---

In late December 1992, a high-resolution directional wave measuring system became fully operational on Texaco Oil Company's Harvest Platform to make long-term observations of the deep-ocean wind wave climate in the vicinity of the Southern California Bight (Figure 1). Such observations are necessary to provide

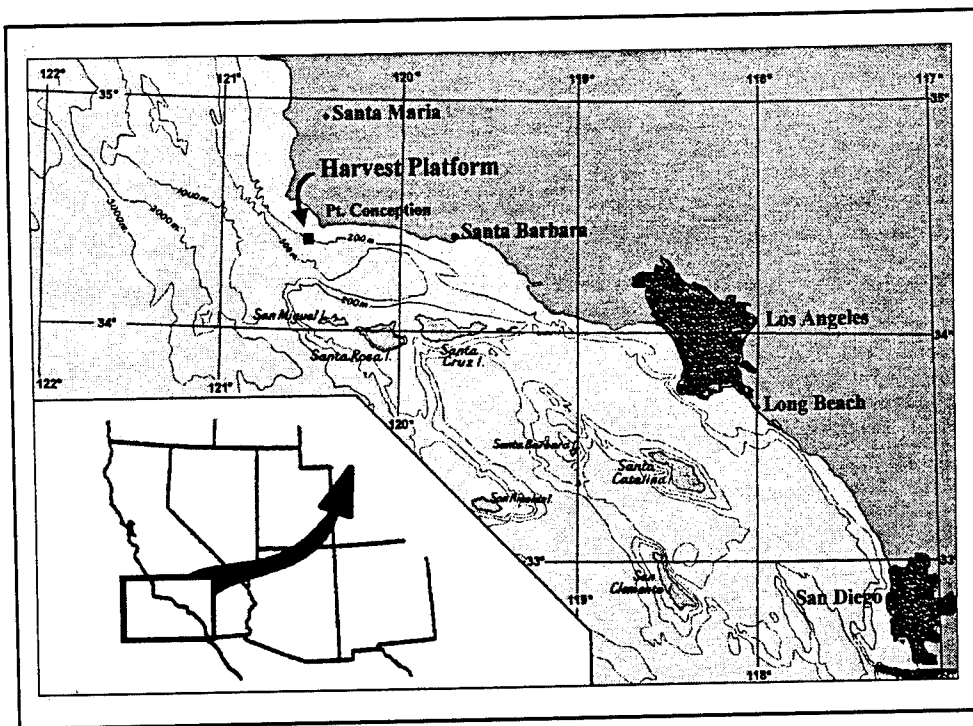


Figure 1. Southern California Bight and location of Harvest Platform

ground truth for interpreting satellite imagery of the ocean surface, test evolution and propagation models of open-ocean wind waves, and establish seaward boundary conditions for models of wave propagation and transformation from deep water to coastal regions. The purpose of this report is to encourage broad use of these observations by parametrically describing 2,320 wind wave frequency-direction spectral estimates obtained in calendar year 1994, and identifying a means whereby an investigator can access these spectra. These results are from the second year of collection. Results from the first year are described by Long (1995a).

For completeness, this report briefly describes the directional gauge geometry and data collection scheme (Chapter 2), error checking procedures and basic directional estimation algorithm (Chapter 3), and definitions of parameters used to characterize the observations (Chapter 4). Appendix A contains a table of these characterizing parameters, and acts as an index for the 1994 database. Time series graphs of these parameters are presented in Appendix B. Chapter 5 describes how data can be obtained as well as the data format and file-naming scheme.

## 2 Directional Gauge

---

### Gauge Location and Array Geometry

As indicated in Figure 1, Harvest Platform is located about 20 km (10.8 n.m.) west of Point Conception, California, in water with a mean depth of 202 m (663 ft). Waves originating in the greater Pacific Ocean can reach the platform via relatively unobstructed paths from the north, west, and south. The mean water depth ensures deepwater wave conditions for waves with lengths shorter than about 400 m (1,312 ft), or frequencies higher than about 0.06 Hz. Spectra reported herein are processed at frequencies between 0.04 and 0.16 Hz, so it is likely that directional spectra for frequencies between 0.04 and 0.06 Hz are affected somewhat by refraction.

Directional wave detection is achieved with a spatial array of six subsurface pressure gauges mounted on the Harvest Platform framework. Figure 2 shows a plan view of relative gauge positions, and the array orientation in a geophysical reference frame. Gauge spacing takes advantage of the maximum horizontal dimensions of Harvest Platform, and allows directional estimation for waves in the frequency band noted in the previous paragraph. All gauges are mounted at a depth of 15.72 m (51.57 ft) below mean sea level, which ensures they will not protrude through the sea surface under extreme wave conditions that have been observed at this site.<sup>1</sup> To avoid aliasing in directional estimation, the lower resolution wavelength limit is two times the shortest lag spacing of the array. In the Harvest Platform array, this limit is 45.4 m (149.0 ft), which corresponds to a wave frequency of about 0.18 Hz. Signal analysis used in this report was limited further to 0.16 Hz to be conservatively clear of aliasing effects.

### Pressure Gauges and Data Path

Individual sensors were Model TJE absolute pressure sensors manufactured by Sensotec Transducer Company with operating ranges of 0 to 100 psia (0 to 689.5 kPa), and a manufacturer's stated accuracy of  $\pm 0.1$  percent of full scale. The six gauges on Harvest Platform were sampled simultaneously at 1 Hz,

---

<sup>1</sup> Personal communication, 1991, Dr. R. J. Seymour, Coastal Data Information Program (CDIP), Scripps Institution of Oceanography (SIO).

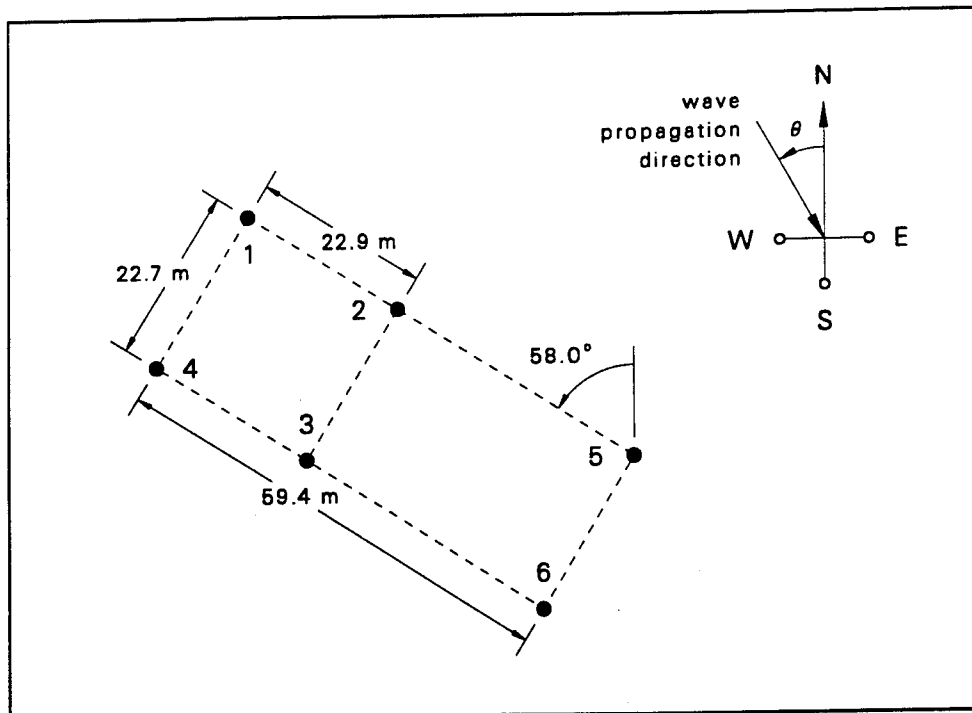


Figure 2. Dimensions and orientation of the Harvest Platform array

digitized, and then fed to a concentrator where the set of samples was buffered. Buffered signals were periodically transmitted to shore through a telephone connection, and ultimately stored as collection files on the main computer of the CDIP, Ocean Engineering Research Group, SIO, La Jolla, CA. Each collection time series is 8,192 sec (2 hr 16 min 32 sec) in length.

Data processing for results presented in this report was not performed at the CDIP site, and so is independent of the processing done and published by that group (*Monthly reports*, Coastal Data Information Program). Data collections were transferred to the Field Research Facility (FRF) of the U.S. Army Engineer Waterways Experiment Station's Coastal Engineering Research Center for processing by high-resolution techniques that are different from those used by CDIP. Data transfer was accomplished over an electronic network.

## Collection Schedule and Data Set Size

Collections were made eight times daily, at approximately 3-hr intervals. Nominal collection start times were 0200, 0500, 0800, 1100, 1400, 1700, 2000, and 2300 GMT. Actual collection start times varied by several minutes on either side of these nominal start times because the amount of time required to establish a phone link varied from collection to collection. There are several periods of several days duration where collections are virtually continuous. These occur when CDIP shifts to a collection mode intended to detect tsunami waves, and result in 12 directional spectral estimates daily instead of the normal eight.

Of the possible 2,920 collections during calendar year 1994 (assuming eight collections per day), a total of 2,320 collections were acquired and processed as frequency-direction spectra. A number of collections were lost because of the inability to establish or maintain electrically clean phone links to the concentrator on Harvest Platform. An additional number of collections were not processed because data did not satisfy error-checking constraints described in Chapter 3 of this report.

## 3 Primary Data Analysis

---

Primary data processing was done by checking data quality through a series of spectral intercomparisons, and, for data of sufficient quality, computing frequency-direction spectra. All steps rely on Fourier analysis of pressure gauge time series data, and subsequent computation of cross-spectral densities. A discussion of error-checking procedures then leads logically to the subsequent steps involved in frequency-direction spectral computation.

### Error Checking

The first step in data processing is computation of discrete estimates of frequency autospectra of pressure signals, and surface-corrected cross-spectral densities of signals from all pairs of gauges. Cross spectra are denoted in complex form as  $C_{ij}(f_n) - iQ_{ij}(f_n)$ , where  $C_{ij}(f_n)$  is the coincident spectrum,  $Q_{ij}(f_n)$  is the quadrature spectrum,  $i$  and  $j$  (as subscripts) are indices ranging in value from 1 to 6 that refer to the gauge numbers shown in Figure 2, and  $f_n$  is the  $n^{\text{th}}$  of a set of  $N$  discrete frequencies.<sup>1</sup> Frequency autospectra are denoted  $S(f_n)$ , and, if surface corrected with the linear wave pressure response functions (Dean and Dalrymple 1984), are identically equal to  $C_{ii}(f_n)$ . All spectra are computed using Welch's method (Welch 1967) with standard Fourier analysis techniques (Bendat and Piersol 1971).

In a collection, the 8,192-sec time series from each gauge is analyzed in 15 half-lapped segments of 1,024 sec duration. Each segment is demeaned, tapered with a variance-preserving window, and converted to the frequency domain with a discrete Fourier transform. At this point, the analysis is split into two parts: estimates of pressure autospectra from each gauge at depth, and estimates of surface-corrected cross spectra of sea surface displacement. Raw cross-spectral estimates are formed for all gauge pairs using temporally corresponding transformed segments of pressure data corrected to represent sea surface displacement. Raw autospectral estimates are formed for each of the 15 transform segments for each individual gauge. At the error-checking stage, autospectral estimates are not surface corrected.

---

<sup>1</sup> For convenience, symbols and abbreviations are listed in the notation (Appendix E).

For both autospectra and cross spectra, smooth estimates are formed by averaging raw estimates over all 15 segments, and averaging results over 10 adjacent frequency bands. Final resolution frequency bandwidth is  $\Delta f = 0.00977$  Hz, and the pass band of frequencies ranges from 0.044 to 0.162 Hz, which corresponds to ( $N =$ ) 13 discrete frequency bands. Degrees of freedom for spectral estimates range from 160 to about 200, depending on the extent to which the second halves of time series segments are correlated with the first halves (Welch 1967).

### Autospectral intercomparisons

One part of error checking is a graphic intercomparison of signal means and autospectra, an example of which is shown in the lower left graph of Figure 3. Frequency autospectral estimates of data from all six pressure gauges are plotted on the same set of axes from the first resolvable frequency band out to the temporal Nyquist frequency. If a pressure gauge is malfunctioning, its autospectrum will deviate obviously from the main group of curves.

The small inset graph in the lower left graph of Figure 3 is an analysis of signal means. The closely packed group of symbols of nearly constant value represents the deviations of the segment means from the median of the set of segment means for each of the 15 segments. If a gauge develops signal drift problems, it will be obvious as a symbol that deviates from the main group of symbols. Triangle symbols in the small inset graph show the deviation of the indicated water surface from mean sea level (gauge height off the bottom plus median of gauge mean depths for each segment minus the total long-term mean ocean depth of 202 m), and is therefore an indication of tide stage at Harvest Platform for each of the 15 segments in a collection.

### Coherence and phase comparisons

The next step in error checking is computation of a dimensionless cross spectrum  $M_{ij}(f_n)$ , defined by

$$M_{ij}(f_n) = \frac{C_{ij}(f_n) - iQ_{ij}(f_n)}{\sqrt{C_{ii}(f_n)} \sqrt{C_{jj}(f_n)}} \quad (1)$$

Equation 1 is used in error checking in the form of coherence and phase estimates. Coherence of signals from gauges  $i$  and  $j$  at discrete frequency  $f_n$  is

$$\Gamma_{ij}^2(f_n) = |M_{ij}(f_n)|^2 \quad (2)$$

Signal phase difference of gauge  $i$  relative to gauge  $j$  at frequency  $f_n$  is

$$\phi_{ij}(f_n) = \tan^{-1} \left( \frac{\text{Im}[M_{ij}(f_n)]}{\text{Re}[M_{ij}(f_n)]} \right) \quad (3)$$

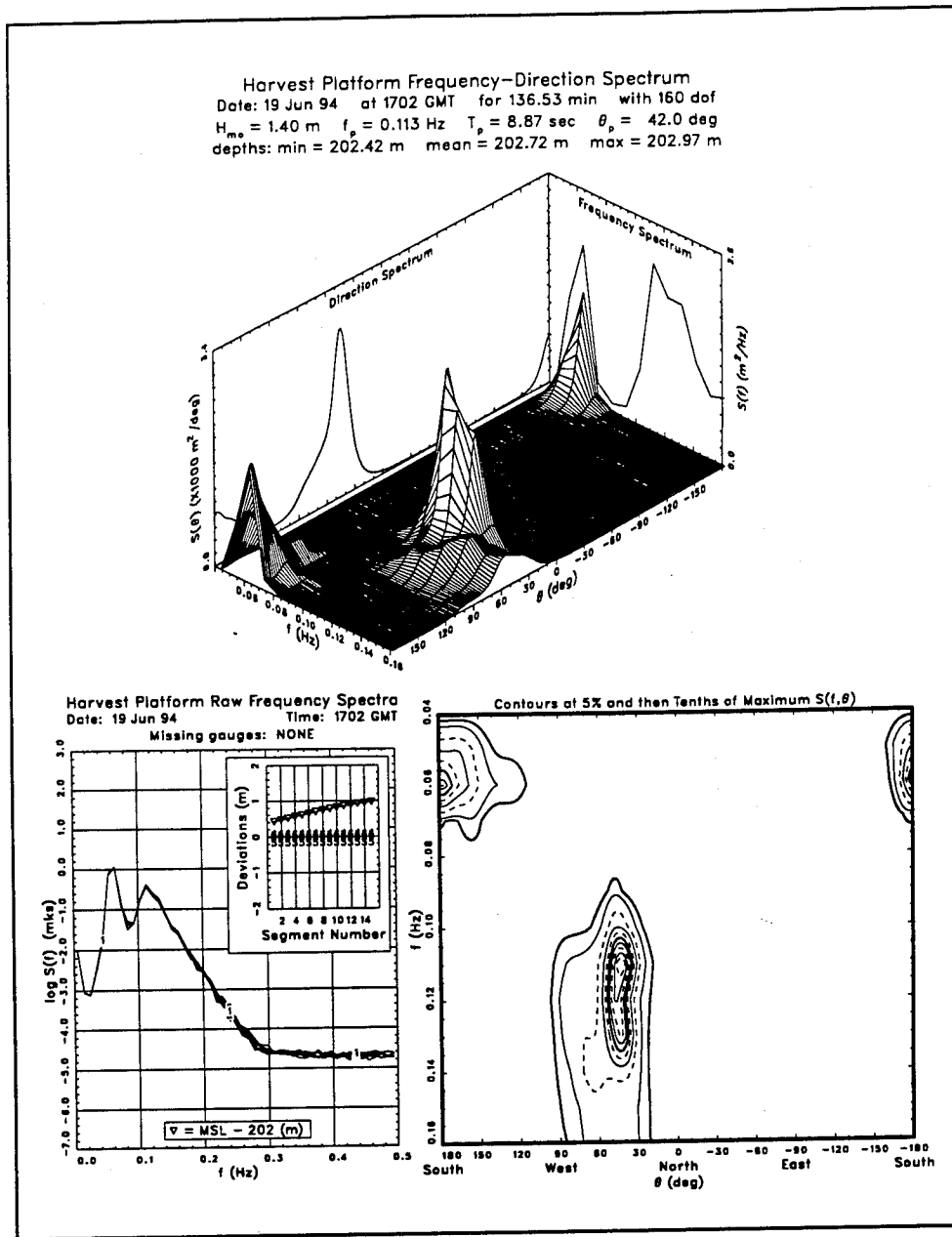


Figure 3. Autospectral intercomparison and frequency-direction spectral estimate

where  $\text{Re}[\ ]$  and  $\text{Im}[\ ]$  are the real and imaginary parts, respectively, of the entity contained in square brackets.

Signals from multiple pairs of gauges having redundant lag (or spatial separation) vectors in a uniform wave field are expected to have identical cross spectra. In the Harvest Platform array there are several such sets of pairs as can be seen in Figure 2. In terms of coherences and phases, one would expect

$$\Gamma_{14}(f_n) = \Gamma_{23}(f_n) = \Gamma_{56}(f_n) \quad \phi_{14}(f_n) = \phi_{23}(f_n) = \phi_{56}(f_n) \quad (4)$$

as well as

$$\Gamma_{12}(f_n) = \Gamma_{43}(f_n) \quad \phi_{12}(f_n) = \phi_{43}(f_n) \quad (5)$$

and

$$\Gamma_{15}(f_n) = \Gamma_{46}(f_n) \quad \phi_{15}(f_n) = \phi_{46}(f_n) \quad (6)$$

Figure 4 is an example of coherence and phase comparisons, showing graphs of the functions named in Equations 4, 5, and 6 (upper, middle, and lower sets of graphs in Figure 4, respectively). This type of error checking is useful for isolating cases where a data point is dropped during telephone transmission from the data buffer, resulting in an apparent temporal shift of data from one gauge relative to data from the other gauges. Such a shift causes a significant phase error in cross spectra, and is readily apparent in a graphic display like Figure 4.

The combined effects of intercomparing frequency autospectra and coherence and phase functions for the pressure gauge array on Harvest Platform provide clear indications of faulty or suspect data. When such conditions are detected in a collection, frequency-direction spectra are not computed. Such rigorous examination of the data ensures that only high-quality time series are used in directional estimation.

## Frequency-Direction Spectra

Estimates of frequency-direction spectra are made using the iterative maximum likelihood estimator (IMLE) developed by Pawka (1983). Estimates are made by iterative approximations of directional distribution functions  $D(f_n, \theta_m)$ , which are related to corresponding frequency-direction spectra  $S(f_n, \theta_m)$  by

$$D(f_n, \theta_m) = \frac{S(f_n, \theta_m)}{S(f_n)} \quad (7)$$

where  $\theta_m$  is a discrete angle indicating the direction from which wave energy arrives, measured counterclockwise from true north (Figure 2), and  $S(f_n)$  is the (surface-corrected) frequency spectrum. The direction index  $m$  ranges from  $m = 1$  to  $m = M = 181$ , while direction ranges from  $\theta_1 = -180$  deg to  $\theta_{181} = 180$  deg in steps of  $d\theta = 2$  deg. The directional distribution function has the property

$$\sum_{m=1}^M D(f_n, \theta_m) d\theta = 1 \quad (8)$$

which must be satisfied in all estimates.

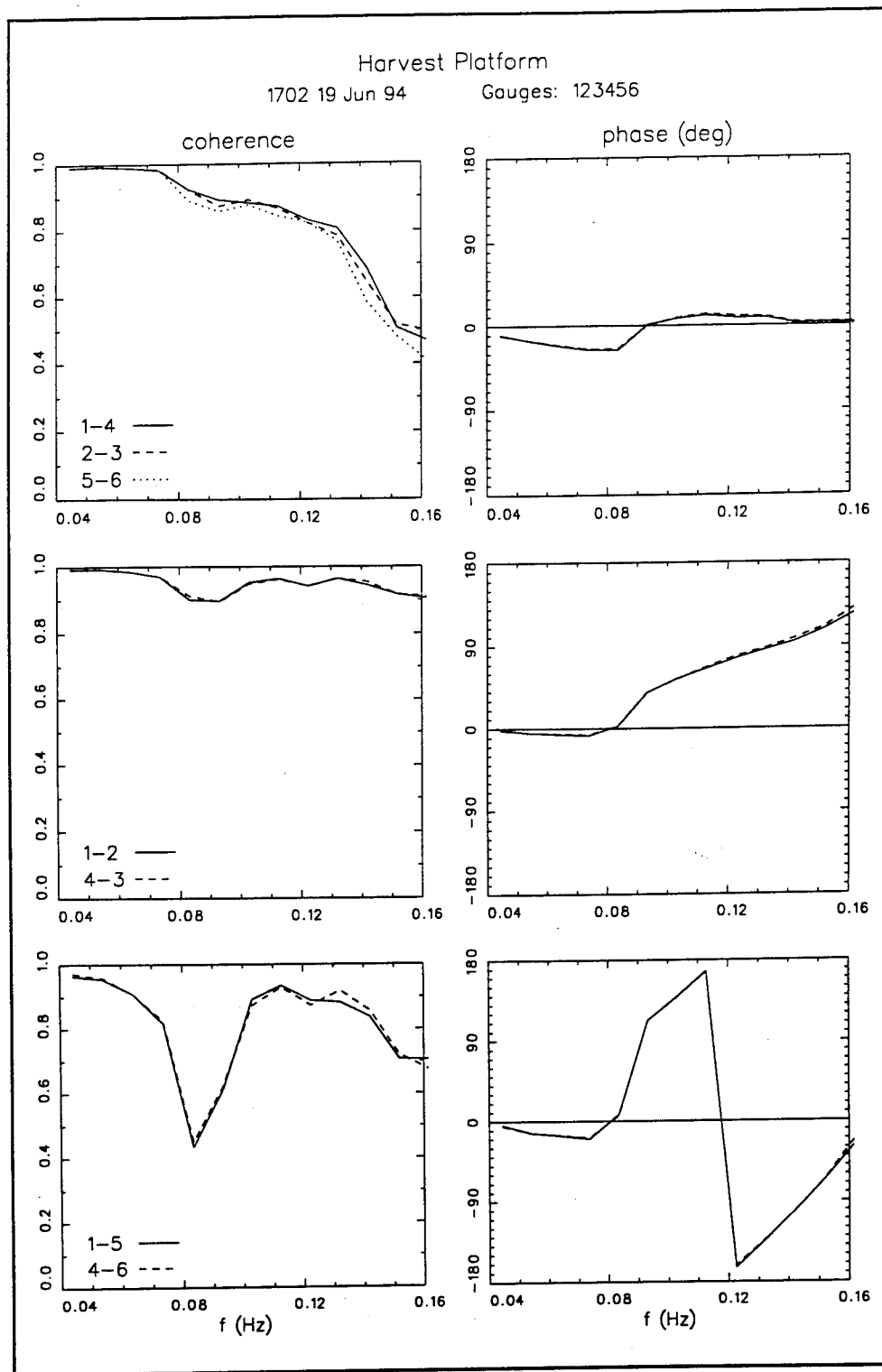


Figure 4. Sample coherence and phase function comparisons

The lowest order estimate is the maximum likelihood estimate described by Davis and Regier (1977), which takes the form

$$D_0(f_n, \theta_m) = \frac{a_0}{d\theta \sum_{i=1}^I \sum_{j=1}^I M_{ij}^{-1}(f_n) e^{i\vec{k}_n(\theta_m)(\vec{x}_i - \vec{x}_j)}} \quad (9)$$

where  $a_0$  is a factor of order 1 that is used to satisfy Equation 8,  $I$  is the number of gauges, the  $M_{ij}^{-1}(f_n)$  are elements of the inverse of the dimensionless cross-spectral matrix defined by Equation 1,  $\vec{k}_n(\theta_m)$  is the wave number vector, and  $\vec{x}_i$  and  $\vec{x}_j$  are coordinate position vectors of gauges  $i$  and  $j$ , respectively. The wave number vector  $\vec{k}_n(\theta_m)$  is

$$\vec{k}_n(\theta_m) = k_n \cos \theta_m \hat{e}_x + k_n \sin \theta_m \hat{e}_y \quad (10)$$

where  $\hat{e}_x$  and  $\hat{e}_y$  are spatial coordinate unit vectors in the  $x$ - and  $y$ -directions, respectively, and  $k_n$  is wave number vector magnitude, which is related with gravitational acceleration  $g$  to frequency  $f_n$  and water depth  $d$  through the linear wave dispersion relation

$$4 \pi^2 f_n^2 = g k_n \tanh k_n d \quad (11)$$

As used in this report, horizontal coordinates are such that  $x$  increases to the north, and  $y$  increases to the west.

An IMLE result is achieved by iterating through several computational steps. At the  $r^{th}$  iteration, an estimate  ${}^rM_{ij}(f_n)$  of the observed cross-spectral matrix  $M_{ij}(f_n)$  is computed from the previous directional distribution function estimate  $D_{r-1}(f_n, \theta_m)$  by

$${}^rM_{ij}(f_n) = \sum_{m=1}^M D_{r-1}(f_n, \theta_m) e^{i\vec{k}_n(\theta_m)(\vec{x}_i - \vec{x}_j)} d\theta \quad (12)$$

A new intermediate directional distribution function estimate  $D_r'(f_n, \theta_m)$  is computed using the cross-spectral matrix of Equation 12 in the expression

$$D_r'(f_n, \theta_m) = \frac{a_r}{d\theta \sum_{i=1}^I \sum_{j=1}^I {}^rM_{ij}^{-1}(f_n) e^{i\vec{k}_n(\theta_m)(\vec{x}_i - \vec{x}_j)}} \quad (13)$$

where  $a_r$  is adjusted so that Equation 8 is satisfied for  $D_r'(f_n, \theta_m)$ . A correction is found for  $D_r'(f_n, \theta_m)$  by first computing

$$\lambda_r(f_n, \theta_m) = 1 - \frac{D_r'(f_n, \theta_m)}{D_0(f_n, \theta_m)} \quad (14)$$

and then finding a new directional distribution function estimate  $D_r(f_n, \theta_m)$  from

$$D_r(f_n, \theta_m) = D_r'(f_n, \theta_m) \left[ 1 + \frac{|\lambda_r(f_n, \theta_m)|^{\beta+1}}{\gamma \lambda_r(f_n, \theta_m)} \right] \quad (15)$$

The parameters  $\beta$  and  $\gamma$  in Equation 15 control the rate of convergence of the estimator. As used by Pawka (1983), the values  $\beta = 1$  and  $\gamma = 5$  were used for all estimates discussed in this report.

In each iterative loop, a convergence check  $\epsilon_r$  is computed as the sum of the squares of the magnitudes of the differences of elements of the estimated cross spectrum of Equation 12 and the measured cross spectrum of Equation 1. This takes the form

$$\epsilon_r = \sum_{i=1}^I \sum_{j=1}^I |M_{ij}(f_n) - M_{ij}'(f_n)|^2 \quad (16)$$

Iteration continues as long as  $\epsilon_r$  decreases between successive iterations, or until an upper limit  $R$  of iterations has been completed. In computations reported herein,  $R = 30$ .

Equations 9 to 16 form the basis of the IMLE technique. For the iteration  $r$  that satisfies the convergence check, the frequency-direction spectrum at frequency  $f_n$  is formed from

$$S(f_n, \theta_m) = S(f_n) D_r(f_n, \theta_m) \quad (17)$$

The complete frequency-direction spectrum is formed when Equations 9 through 17 are evaluated for all frequencies.

An example of such a spectrum is illustrated in Figure 3. The upper graph is a three-dimensional plot of  $S(f_n, \theta_m)$ , and the lower right graph is a contour plot of the spectrum. The right panel in the three-dimensional plot is a linear graph of the discrete frequency spectrum  $S(f_n)$ , which is related to the frequency-direction spectrum through Equations 7 and 8 by

$$S(f_n) = \sum_{m=1}^M S(f_n, \theta_m) d\theta \quad (18)$$

The left panel in the three-dimension plot is a linear graph of the direction spectrum  $S(\theta_m)$ , which is the directional analog of the frequency spectrum. The direction spectrum is defined by

$$S(\theta_m) = \sum_{n=1}^N S(f_n, \theta_m) df \quad (19)$$

Because  $S(\theta_m)$  represents total wave energy in each direction bin, it is a particularly useful function from which to derive direction-sensitive characterizing parameters for a given frequency-direction spectrum as a whole. A set of such characterizing parameters is defined in Chapter 4.

## 4 Characterizing Parameters

---

To effect a summary description of the Harvest Platform database, frequency-direction spectra are characterized with a set of parameters. These descriptors are called bulk parameters because they are derived from extremal or integral properties of spectra, and so represent only part of the frequently more complicated directional structure of the wind wave field. A more exhaustive treatment of directional spectral structure at Harvest Platform is given by Long (1995b). For the purposes of the present report, nine parameters are used. These parameters are: characteristic wave height, peak frequency, two measures of characteristic direction, two measures of directional spread, two measures of asymmetry of directionally distributed wave energy, and a measure of kurtosis of directional distributions. This chapter contains the mathematical definitions of these parameters.

### Wave Height, Peak Frequency, and Peak Direction

Characteristic wave height  $H_{mo}$  is defined using the conventional definition of four times the standard deviation of sea surface displacement.  $H_{mo}$  can be defined in terms of the full frequency-direction spectrum, the frequency spectrum defined by Equation 18, or the direction spectrum defined by Equation 19. A definition that relates all of these entities is

$$\frac{H_{mo}^2}{16} = \sum_{m=1}^M \sum_{n=1}^N S(f_n, \theta_m) df d\theta = \sum_{n=1}^N S(f_n) df = \sum_{m=1}^M S(\theta_m) d\theta \quad (20)$$

It should be noted that  $H_{mo}$  reported herein is lower than what would be found in conventional analysis because directional computations were truncated at 0.16 Hz instead of the nominal 0.3-Hz limit for wind waves. Consequently, contributions to  $H_{mo}$  from high-frequency parts of wind wave spectra are not represented.

Peak frequency  $f_p$  is defined as the discrete frequency at which the frequency spectrum  $S(f_n)$  is maximum. This definition is conventional, in that it is the usual characteristic frequency defined for nondirectional gauges. For convenience, Appendix A lists both  $f_p$  and its inverse, peak period  $T_p$  ( $= 1/f_p$ ).

Peak direction  $\theta_p$  is defined as the direction of maximum variance density in the directional distribution associated with the peak frequency. In symbols,  $\theta_p$  is the discrete direction at which  $S(f_p, \theta_m)$  is a maximum. It is interpreted as the direction of the most energetic waves at the frequency containing the greatest overall energy.

## Circular Moment Parameters

Kuik, van Vledder, and Holthuijsen (1988) proposed a useful set of parameters that define mean wave direction, directional spread, skewness, and kurtosis based on circular moments of directional distribution functions. Though derived for directional distributions at individual frequencies, the definitions can be applied to any directional distribution function. For the purposes of characterizing a frequency-direction spectrum as a whole, the direction spectrum  $S(\theta_m)$ , as defined by Equation 19, is used herein because it represents total wave energy in any given direction arc.

To define a directional distribution function (one that integrates to unit area) from the direction spectrum,  $S(\theta_m)$  must be normalized by its own area. By Equation 20, this area is identically  $\frac{1}{16} H_{mo}^2$ , so the appropriate directional distribution function is

$$D(\theta_m) = \frac{16}{H_{mo}^2} S(\theta_m) \quad m = 1, 2, \dots, M \quad (21)$$

Circular moments in terms of  $D(\theta_m)$  adapted from definitions by Kuik, van Vledder, and Holthuijsen (1988) are

$$m_1 = \sum_{m=1}^M \cos(\theta_m - \theta_0) D(\theta_m) d\theta \quad (22)$$

$$n_1 = \sum_{m=1}^M \sin(\theta_m - \theta_0) D(\theta_m) d\theta \quad (23)$$

$$m_2 = \sum_{m=1}^M \cos(2\theta_m - 2\theta_0) D(\theta_m) d\theta \quad (24)$$

$$n_2 = \sum_{m=1}^M \sin(2\theta_m - 2\theta_0) D(\theta_m) d\theta \quad (25)$$

where  $\theta_0$  is the mean direction defined by requiring  $n_1 = 0$ . With this constraint, Equation 23 can be solved to find

$$\theta_0 = \tan^{-1} \left[ \frac{\sum_{m=1}^M D(\theta_m) \sin \theta_m d\theta}{\sum_{m=1}^M D(\theta_m) \cos \theta_m d\theta} \right] \quad (26)$$

With  $\theta_0$  determined by Equation 26, moments  $m_1$ ,  $m_2$ , and  $n_2$  can be computed from Equations 22, 24, and 25, respectively.

Kuik, van Vledder, and Holthuijsen (1988) define a measure of directional spread (herein called *circular width*)  $\sigma$  as

$$\sigma = (2 - 2 m_1)^{1/2} \quad (27)$$

a measure of asymmetry of a directional distribution (*circular skewness*)  $\gamma$  as

$$\gamma = \frac{-n_2}{\left(\frac{1}{2} - \frac{1}{2} m_2\right)^{3/2}} \quad (28)$$

and a measure of the flatness of a directional distribution (*circular kurtosis*)  $\delta$  as

$$\delta = \frac{6 - 8 m_1 + 2 m_2}{(2 - 2 m_1)^2} \quad (29)$$

## Quartile Parameters

Two parameters that are modestly more intuitive than the corresponding circular parameters, and are also useful for characterizing spread and asymmetry in directional distribution function are the *quartile spread*  $\Delta\theta$  and *quartile asymmetry*  $A$  used by Long and Oltman-Shay (1991). The concept is based on the fact that any directional distribution function integrates to unity such that an integral from the direction of minimum energy  $\theta_{m_{min}}$  (where  $m_{min}$  is the discrete direction index at which minimum energy occurs) to any arbitrary angle creates a function  $I(\theta_m - \theta_{m_{min}})$  that increases monotonically from zero to an upper limit of unity.

The directions at which this integral (interpolated as necessary from discrete data) has the values  $\frac{1}{4}$ ,  $\frac{1}{2}$ , and  $\frac{3}{4}$  are the first quartile, median, and third quartile directions of the directional distribution, respectively. Differences among these directions then provide information about the spread and asymmetry of the distribution.

Using  $D(\theta_m)$  as a representative directional distribution function, the integral function is

$$I(\theta_m - \theta_{m_{\min}}) = \sum_{l=m_{\min}}^m D(\theta_l) d\theta \quad (30)$$

where the cyclic nature of the distribution function is employed if necessary. Quartile directions satisfy

$$I(\theta_{25\%} - \theta_{m_{\min}}) = 0.25 \quad (31)$$

$$I(\theta_{50\%} - \theta_{m_{\min}}) = 0.50 \quad (32)$$

and

$$I(\theta_{75\%} - \theta_{m_{\min}}) = 0.75 \quad (33)$$

A measure of directional spread  $\Delta\theta$  is the span of the two middle quartiles

$$\Delta\theta = \theta_{75\%} - \theta_{25\%} \quad (34)$$

and has the specific interpretation that it is the arc subtending the central 50 percent of the energy distribution.

A measure of asymmetry of a distribution is the ratio of the directional width of the third quartile to that of the second quartile. By taking the natural logarithm of this ratio, a symmetric distribution has an asymmetry parameter  $A$  near zero, and that for a skewed distribution acquires a positive or negative sign if the skewness is toward larger or smaller angles, respectively. The asymmetry parameter is thus defined as

$$A = \ln \left[ \frac{\theta_{75\%} - \theta_{50\%}}{\theta_{50\%} - \theta_{25\%}} \right] \quad (35)$$

## Summary of Parameters

The nine bulk parameters ( $H_{m0}$ ,  $f_p$ ,  $\theta_p$ ,  $\theta_0$ ,  $\sigma$ ,  $\gamma$ ,  $\delta$ ,  $\Delta\theta$ , and  $A$ ) defined here are useful for classifying general wind wave energy distributions. For reference as an index of processed data from the 1994 collection year, these parameters are listed in Appendix A, and plotted as time series in Appendix B. Graphs in Appendix B provide an overview of the directional wave climate at Harvest Plat-

form, and specific parametric values can be determined from the listing in Appendix A. An evaluation of the accuracy of these parameters, relationships among these parameters, and examples of frequency-direction spectra classified by ranges of these parameters are given by Long (1995b).

## 5 Accessing Spectra

---

Frequency-direction spectra computed from Harvest Platform data are currently stored on electro-optical media in binary, unformatted form, and so are not "on line" in the sense of common data networks. Nonetheless, an individual interested in obtaining these spectra can readily do so by communicating with the FRF via:

Surface mail                      Chief, Field Research Facility  
                                         1261 Duck Road  
                                         Kitty Hawk, NC 27949-4472

Telephone                        (919) 261-3511

FAX                                (919) 261-4432

or any of the following internet addresses:

C.Long@duck.wes.army.mil  
C.Baron@duck.wes.army.mil  
W.Birkemeier@duck.wes.army.mil

On request, all or part of the spectral database can be converted to 80-column ASCII format and copied either to portable magnetic tape media or to an anonymous file transfer protocol (ftp) account that is accessible through common computer networks. Data will be in the form of a set of files with one spectral estimate per file. Files will be named HP`yymmddhhmm`.ASC, where `yymmdd` represents year, month, and day, and `hhmm` represents hour and minute (GMT) of a collection start time from which a spectrum is estimated. For convenience, dates and times of parameter listings in Appendix A are in the `yymmdd` and `hhmm` mnemonic forms.

On receipt by a user, spectral data files can be read using the format statements shown in the sample FORTRAN program listed in Appendix C. The header of the FORTRAN program listing identifies all the variables contained in a data file. For reference, Appendix D is a listing of a sample data file, and shows locations of variables within the file.

## 6 Summary

---

This is the second of a series of reports describing results from a high-resolution directional wave gauge installed on the Texaco Oil Company Harvest Platform. The purpose of this gauge is long-term monitoring of the directional wind wave climate at a deepwater site that can be used to represent open ocean conditions for waves approaching the coast of southern California. This report indexes parameters of and describes a means of access to 2,320 frequency-direction spectral observations made during calendar year 1994.

The primary intent of this report is to publicize these observations so that they can be used by researchers interested in seaward boundary conditions in coastal wave propagation models, studies of ocean wave evolution, comparison studies with locally deployed low-resolution directional wave gauges, and ground truth in remote sensing research. Improved knowledge resulting from such studies will enhance abilities to model the physics of open ocean wave processes, and the consequent nearshore wave climate required in coastal engineering computations as such waves propagate landward.

# References

---

- Bendat, J. S., and Piersol, A. G. (1971). *Random data: Analysis and measurement procedures*. Wiley-Interscience, New York.
- Davis, R. E., and Regier, L. A. (1977). "Methods for estimating directional wave spectra from multi-element arrays," *Journal of Marine Research* 35, 453-77.
- Dean, R. G., and Dalrymple, R. A. (1984). *Water wave mechanics for engineers and scientists*. Prentice-Hall, Englewood Cliffs, NJ.
- Kuik, A. J., van Vledder, G. Ph., and Holthuijsen, L. H. (1988). "A method for the routine analysis of pitch-and-roll buoy wave data," *Journal of Physical Oceanography* 18, 1020-34.
- Long, C. E. (1995a). "1993 annual index of wind wave directional spectra measured at Harvest Platform," Miscellaneous Paper CERC-95-6, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.
- Long, C. E. (1995b). "Directional wind wave characteristics at Harvest Platform," Technical Report CERC-95-4, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.
- Long, C. E., and Oltman-Shay, J. M. (1991). "Directional characteristics of waves in shallow water," Technical Report CERC-91-1, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.
- Monthly reports*. Coastal Data Information Program, Scripps Institution of Oceanography, University of California, San Diego, CA.
- Pawka, S. S. (1983). "Island shadows in wave directional spectra," *Journal of Geophysical Research* 88, 2579-91.
- Welch, P. D. (1967). "The use of fast Fourier transform for the estimation of power spectra: A method based on time averaging over short, modified periodograms," *IEEE Transactions on Audio and Electroacoustics* AU-15, 70-3.

# Appendix A

## Table of Collection Times and Bulk Parameters

| Table A1<br>Collection Times and Bulk Parameters |          |               |             |              |                   |                   |          |          |          |                       |       |
|--------------------------------------------------|----------|---------------|-------------|--------------|-------------------|-------------------|----------|----------|----------|-----------------------|-------|
| Date                                             | Time GMT | $H_{mo}$<br>m | $f_p$<br>Hz | $T_p$<br>sec | $\theta_p$<br>deg | $\theta_o$<br>deg | $\sigma$ | $\gamma$ | $\delta$ | $\Delta\theta$<br>deg | A     |
| 940101                                           | 0159     | 1.92          | 0.074       | 13.6         | 58                | 78                | 0.56     | 0.64     | 4.05     | 43                    | 0.32  |
| 940101                                           | 0459     | 1.97          | 0.074       | 13.6         | 56                | 75                | 0.55     | 0.62     | 4.32     | 40                    | 0.21  |
| 940101                                           | 0759     | 1.91          | 0.074       | 13.6         | 60                | 74                | 0.54     | 0.72     | 4.42     | 38                    | 0.49  |
| 940101                                           | 1059     | 1.84          | 0.083       | 12.0         | 62                | 78                | 0.52     | 0.65     | 4.81     | 36                    | 0.38  |
| 940101                                           | 1659     | 1.70          | 0.074       | 13.6         | 58                | 78                | 0.56     | 0.50     | 4.06     | 43                    | 0.18  |
| 940101                                           | 1959     | 1.55          | 0.083       | 12.0         | 56                | 75                | 0.59     | 0.64     | 4.34     | 42                    | 0.14  |
| 940102                                           | 0159     | 1.62          | 0.083       | 12.0         | 58                | 74                | 0.53     | 0.73     | 5.13     | 34                    | 0.05  |
| 940102                                           | 0459     | 1.81          | 0.083       | 12.0         | 58                | 75                | 0.51     | 0.71     | 5.08     | 35                    | 0.10  |
| 940103                                           | 0054     | 2.48          | 0.064       | 15.6         | 72                | 75                | 0.44     | 0.34     | 6.35     | 28                    | 0.15  |
| 940103                                           | 0459     | 3.01          | 0.064       | 15.6         | 70                | 71                | 0.37     | 0.59     | 10.36    | 15                    | 0.24  |
| 940103                                           | 0759     | 3.04          | 0.064       | 15.6         | 68                | 71                | 0.37     | 0.35     | 10.17    | 15                    | 0.30  |
| 940103                                           | 1100     | 2.99          | 0.074       | 13.6         | 68                | 72                | 0.41     | 0.83     | 8.47     | 18                    | 0.24  |
| 940103                                           | 1400     | 2.87          | 0.064       | 15.6         | 72                | 74                | 0.42     | 0.53     | 7.43     | 22                    | 0.13  |
| 940103                                           | 1704     | 2.78          | 0.064       | 15.6         | 70                | 72                | 0.42     | 0.59     | 8.14     | 20                    | 0.23  |
| 940103                                           | 2000     | 2.90          | 0.064       | 15.6         | 68                | 70                | 0.40     | 0.71     | 8.53     | 20                    | 0.19  |
| 940104                                           | 0802     | 2.84          | 0.064       | 15.6         | 74                | 72                | 0.45     | 0.54     | 6.78     | 25                    | -0.14 |
| 940104                                           | 1100     | 2.55          | 0.064       | 15.6         | 72                | 72                | 0.48     | 0.58     | 5.82     | 28                    | -0.12 |
| 940104                                           | 1358     | 2.48          | 0.064       | 15.6         | 72                | 74                | 0.47     | 0.51     | 5.57     | 28                    | 0.09  |
| 940104                                           | 1713     | 2.42          | 0.064       | 15.6         | 74                | 73                | 0.48     | 0.65     | 5.50     | 29                    | 0.05  |
| 940104                                           | 1956     | 2.39          | 0.074       | 13.6         | 60                | 73                | 0.47     | 0.66     | 5.66     | 28                    | 0.26  |
| 940105                                           | 0158     | 2.41          | 0.074       | 13.6         | 54                | 70                | 0.53     | 0.61     | 4.76     | 36                    | 0.33  |
| 940105                                           | 0501     | 2.50          | 0.074       | 13.6         | 56                | 63                | 0.52     | 0.39     | 4.69     | 33                    | 0.28  |
| 940105                                           | 0758     | 2.59          | 0.064       | 15.6         | 80                | 62                | 0.55     | 0.26     | 4.02     | 40                    | -0.17 |
| 940105                                           | 1100     | 2.41          | 0.074       | 13.6         | 58                | 64                | 0.54     | 0.46     | 4.23     | 38                    | -0.01 |
| 940105                                           | 1359     | 2.58          | 0.074       | 13.6         | 56                | 62                | 0.51     | 0.51     | 4.30     | 36                    | 0.23  |
| 940105                                           | 1951     | 3.62          | 0.123       | 8.2          | 56                | 55                | 0.46     | 0.16     | 4.27     | 34                    | -0.09 |
| 940106                                           | 0200     | 2.89          | 0.113       | 8.9          | 54                | 57                | 0.47     | 0.59     | 5.27     | 31                    | 0.12  |
| 940106                                           | 0500     | 2.45          | 0.113       | 8.9          | 48                | 57                | 0.46     | 0.77     | 5.78     | 31                    | 0.32  |
| 940106                                           | 1400     | 2.23          | 0.083       | 12.0         | 56                | 58                | 0.42     | 0.70     | 7.11     | 27                    | 0.05  |

(Sheet 1 of 45)

Table A1 (Continued)

| Date   | Time<br>GMT | $H_{mo}$<br>m | $f_p$<br>Hz | $T_p$<br>sec | $\theta_p$<br>deg | $\theta_o$<br>deg | $\sigma$ | $\gamma$ | $\delta$ | $\Delta\theta$<br>deg | A     |
|--------|-------------|---------------|-------------|--------------|-------------------|-------------------|----------|----------|----------|-----------------------|-------|
| 940106 | 1704        | 2.28          | 0.083       | 12.0         | 50                | 59                | 0.44     | 0.72     | 6.50     | 31                    | 0.24  |
| 940107 | 0804        | 1.68          | 0.093       | 10.7         | 50                | 51                | 0.49     | 1.08     | 6.78     | 28                    | 0.01  |
| 940107 | 1057        | 1.55          | 0.093       | 10.7         | 50                | 52                | 0.48     | 1.44     | 7.00     | 22                    | 0.03  |
| 940107 | 1401        | 1.38          | 0.093       | 10.7         | 52                | 55                | 0.50     | 1.40     | 6.40     | 25                    | -0.01 |
| 940107 | 1707        | 1.39          | 0.103       | 9.7          | 54                | 55                | 0.51     | 1.12     | 5.63     | 29                    | -0.03 |
| 940107 | 1958        | 1.27          | 0.093       | 10.7         | 48                | 55                | 0.51     | 1.34     | 6.10     | 28                    | 0.39  |
| 940108 | 0503        | 1.01          | 0.103       | 9.7          | 56                | 61                | 0.60     | 1.49     | 5.15     | 30                    | 0.24  |
| 940108 | 0801        | 0.87          | 0.103       | 9.7          | 54                | 65                | 0.67     | 1.22     | 4.21     | 41                    | 0.61  |
| 940108 | 1403        | 0.88          | 0.113       | 8.9          | 56                | 64                | 0.63     | 1.87     | 4.96     | 31                    | 0.37  |
| 940108 | 1703        | 0.80          | 0.074       | 13.6         | 58                | 65                | 0.67     | 1.33     | 3.89     | 40                    | 0.52  |
| 940108 | 2001        | 0.76          | 0.074       | 13.6         | 54                | 71                | 0.73     | 1.09     | 3.26     | 49                    | 0.57  |
| 940109 | 0203        | 1.05          | 0.162       | 6.2          | 26                | 52                | 0.61     | 0.98     | 4.12     | 46                    | 0.07  |
| 940109 | 0503        | 1.09          | 0.162       | 6.2          | 50                | 56                | 0.59     | 1.08     | 4.53     | 40                    | 0.31  |
| 940109 | 0803        | 1.27          | 0.162       | 6.2          | 54                | 59                | 0.52     | 1.14     | 6.36     | 27                    | 0.23  |
| 940109 | 1101        | 1.79          | 0.064       | 15.6         | 58                | 59                | 0.49     | 1.01     | 7.02     | 20                    | -0.02 |
| 940109 | 1353        | 2.67          | 0.074       | 13.6         | 60                | 61                | 0.38     | 0.61     | 10.14    | 15                    | 0.02  |
| 940109 | 1704        | 3.02          | 0.064       | 15.6         | 64                | 61                | 0.38     | 0.41     | 8.64     | 19                    | -0.12 |
| 940109 | 2003        | 2.99          | 0.074       | 13.6         | 54                | 60                | 0.43     | 0.76     | 8.42     | 22                    | 0.11  |
| 940110 | 0159        | 2.92          | 0.074       | 13.6         | 56                | 58                | 0.43     | 0.49     | 7.56     | 23                    | 0.11  |
| 940110 | 0459        | 2.81          | 0.074       | 13.6         | 56                | 58                | 0.42     | 0.40     | 7.89     | 22                    | 0.06  |
| 940110 | 0759        | 2.76          | 0.074       | 13.6         | 56                | 58                | 0.45     | 0.74     | 7.10     | 25                    | 0.14  |
| 940110 | 1056        | 2.42          | 0.083       | 12.0         | 52                | 60                | 0.48     | 0.97     | 6.76     | 27                    | 0.47  |
| 940110 | 1645        | 1.96          | 0.083       | 12.0         | 58                | 62                | 0.52     | 1.04     | 5.95     | 28                    | 0.29  |
| 940111 | 0159        | 1.64          | 0.093       | 10.7         | 62                | 69                | 0.53     | 1.30     | 5.78     | 28                    | 0.32  |
| 940111 | 0459        | 1.54          | 0.093       | 10.7         | 58                | 67                | 0.52     | 1.24     | 5.86     | 28                    | 0.45  |
| 940111 | 0759        | 1.51          | 0.093       | 10.7         | 54                | 63                | 0.55     | 1.36     | 5.48     | 28                    | 0.50  |
| 940111 | 1111        | 1.41          | 0.103       | 9.7          | 56                | 66                | 0.57     | 1.46     | 5.51     | 30                    | 0.40  |
| 940111 | 1351        | 1.48          | 0.103       | 9.7          | 60                | 65                | 0.60     | 1.26     | 4.99     | 31                    | 0.29  |
| 940111 | 1722        | 1.46          | 0.152       | 6.6          | 58                | 62                | 0.59     | 1.39     | 5.30     | 31                    | 0.12  |
| 940111 | 1959        | 1.53          | 0.152       | 6.6          | 64                | 62                | 0.50     | 1.05     | 6.36     | 27                    | -0.18 |
| 940112 | 0159        | 1.55          | 0.064       | 15.6         | 56                | 63                | 0.54     | 1.14     | 5.60     | 32                    | 0.08  |
| 940112 | 0459        | 1.49          | 0.064       | 15.6         | 66                | 63                | 0.53     | 1.45     | 6.69     | 27                    | -0.08 |
| 940112 | 0759        | 1.48          | 0.064       | 15.6         | 54                | 61                | 0.58     | 1.53     | 5.81     | 31                    | 0.22  |
| 940112 | 1105        | 1.65          | 0.074       | 13.6         | 56                | 64                | 0.53     | 1.66     | 6.87     | 24                    | 0.45  |
| 940112 | 1409        | 1.76          | 0.074       | 13.6         | 58                | 63                | 0.48     | 1.48     | 7.84     | 23                    | 0.27  |
| 940112 | 1708        | 1.88          | 0.074       | 13.6         | 60                | 63                | 0.49     | 1.45     | 7.61     | 24                    | 0.14  |
| 940112 | 2003        | 1.68          | 0.074       | 13.6         | 58                | 61                | 0.51     | 1.75     | 7.23     | 22                    | 0.23  |
| 940113 | 0202        | 1.55          | 0.074       | 13.6         | 54                | 59                | 0.55     | 1.43     | 5.79     | 28                    | 0.30  |
| 940113 | 0504        | 1.52          | 0.083       | 12.0         | 52                | 60                | 0.58     | 1.55     | 5.79     | 31                    | 0.34  |
| 940113 | 0804        | 1.42          | 0.083       | 12.0         | 58                | 61                | 0.57     | 2.05     | 6.53     | 22                    | 0.16  |
| 940113 | 1403        | 1.39          | 0.054       | 18.5         | 52                | 63                | 0.62     | 1.78     | 5.35     | 29                    | 0.23  |
| 940113 | 1703        | 1.42          | 0.054       | 18.5         | 68                | 65                | 0.57     | 1.72     | 5.88     | 26                    | 0.03  |
| 940113 | 2003        | 1.43          | 0.064       | 15.6         | 64                | 66                | 0.60     | 1.65     | 5.41     | 28                    | -0.03 |
| 940114 | 0205        | 1.55          | 0.064       | 15.6         | 66                | 68                | 0.48     | 1.43     | 7.60     | 18                    | 0.09  |
| 940114 | 0505        | 1.42          | 0.064       | 15.6         | 70                | 69                | 0.54     | 1.31     | 6.11     | 27                    | -0.17 |
| 940114 | 0805        | 1.32          | 0.064       | 15.6         | 70                | 72                | 0.54     | 1.51     | 6.34     | 27                    | -0.04 |
| 940114 | 1102        | 1.41          | 0.064       | 15.6         | 62                | 69                | 0.56     | 1.31     | 5.87     | 31                    | 0.29  |
| 940114 | 1410        | 1.49          | 0.064       | 15.6         | 64                | 68                | 0.53     | 1.25     | 6.19     | 29                    | 0.16  |
| 940114 | 1712        | 1.58          | 0.064       | 15.6         | 68                | 68                | 0.46     | 1.28     | 7.37     | 26                    | -0.09 |
| 940114 | 2004        | 1.61          | 0.064       | 15.6         | 70                | 70                | 0.49     | 1.33     | 6.60     | 27                    | 0.12  |
| 940115 | 0204        | 1.61          | 0.064       | 15.6         | 70                | 73                | 0.49     | 1.04     | 6.71     | 23                    | 0.15  |

(Sheet 2 of 45)

| Table A1 (Continued) |          |               |             |              |                   |                   |          |          |          |                       |       |
|----------------------|----------|---------------|-------------|--------------|-------------------|-------------------|----------|----------|----------|-----------------------|-------|
| Date                 | Time GMT | $H_{mo}$<br>m | $f_p$<br>Hz | $T_p$<br>sec | $\theta_p$<br>deg | $\theta_o$<br>deg | $\sigma$ | $\gamma$ | $\delta$ | $\Delta\theta$<br>deg | A     |
| 940115               | 0504     | 1.58          | 0.064       | 15.6         | 70                | 74                | 0.52     | 1.04     | 5.77     | 31                    | 0.15  |
| 940115               | 0804     | 1.46          | 0.064       | 15.6         | 58                | 72                | 0.52     | 0.92     | 5.80     | 32                    | 0.21  |
| 940115               | 1104     | 1.59          | 0.064       | 15.6         | 68                | 74                | 0.54     | 1.04     | 5.53     | 33                    | 0.25  |
| 940115               | 1359     | 1.73          | 0.064       | 15.6         | 68                | 75                | 0.50     | 0.76     | 5.99     | 31                    | 0.31  |
| 940115               | 1700     | 1.85          | 0.064       | 15.6         | 74                | 74                | 0.46     | 0.81     | 6.51     | 29                    | 0.02  |
| 940115               | 1959     | 1.71          | 0.064       | 15.6         | 72                | 75                | 0.51     | 0.92     | 5.51     | 32                    | 0.11  |
| 940116               | 0200     | 1.93          | 0.074       | 13.6         | 56                | 70                | 0.50     | 0.63     | 5.09     | 34                    | 0.31  |
| 940116               | 0800     | 1.91          | 0.074       | 13.6         | 56                | 68                | 0.50     | 0.68     | 5.73     | 32                    | 0.16  |
| 940116               | 1100     | 1.90          | 0.074       | 13.6         | 58                | 67                | 0.50     | 0.91     | 5.59     | 30                    | 0.44  |
| 940116               | 1956     | 1.83          | 0.074       | 13.6         | 54                | 67                | 0.54     | 1.20     | 5.01     | 36                    | 0.90  |
| 940117               | 0200     | 1.58          | 0.083       | 12.0         | 56                | 79                | 0.59     | 0.59     | 3.83     | 47                    | 0.39  |
| 940119               | 0205     | 1.82          | 0.064       | 15.6         | 84                | 86                | 0.49     | 0.44     | 6.16     | 25                    | 0.06  |
| 940119               | 0505     | 1.82          | 0.064       | 15.6         | 82                | 85                | 0.50     | 0.48     | 5.50     | 29                    | 0.17  |
| 940119               | 0802     | 1.70          | 0.064       | 15.6         | 86                | 86                | 0.51     | 0.60     | 5.70     | 30                    | -0.01 |
| 940119               | 1106     | 1.73          | 0.064       | 15.6         | 82                | 87                | 0.50     | 0.51     | 5.18     | 32                    | 0.16  |
| 940119               | 1704     | 1.55          | 0.064       | 15.6         | 84                | 88                | 0.57     | 0.33     | 4.07     | 41                    | -0.06 |
| 940119               | 1959     | 1.42          | 0.074       | 13.6         | 56                | 89                | 0.65     | 0.51     | 3.39     | 54                    | -0.12 |
| 940120               | 0201     | 1.35          | 0.074       | 13.6         | 90                | 91                | 0.62     | 0.29     | 3.51     | 50                    | 0.08  |
| 940120               | 0503     | 1.29          | 0.074       | 13.6         | 88                | 85                | 0.59     | 0.73     | 4.43     | 40                    | 0.07  |
| 940120               | 0805     | 1.18          | 0.074       | 13.6         | 94                | 86                | 0.62     | 0.45     | 3.77     | 45                    | -0.19 |
| 940120               | 1103     | 1.16          | 0.074       | 13.6         | 58                | 91                | 0.64     | 0.39     | 3.36     | 53                    | -0.18 |
| 940120               | 1407     | 1.10          | 0.074       | 13.6         | 92                | 93                | 0.63     | 0.50     | 3.61     | 50                    | 0.13  |
| 940120               | 1703     | 1.06          | 0.074       | 13.6         | 56                | 90                | 0.66     | 0.42     | 3.04     | 57                    | -0.10 |
| 940120               | 2008     | 1.04          | 0.083       | 12.0         | 56                | 91                | 0.67     | 0.36     | 2.99     | 57                    | -0.20 |
| 940121               | 0206     | 0.98          | 0.083       | 12.0         | 94                | 94                | 0.66     | 0.43     | 3.23     | 50                    | -0.01 |
| 940121               | 0507     | 0.95          | 0.083       | 12.0         | 68                | 93                | 0.65     | 0.35     | 3.35     | 52                    | 0.14  |
| 940121               | 0807     | 0.95          | 0.083       | 12.0         | 74                | 93                | 0.66     | 0.33     | 3.34     | 51                    | 0.25  |
| 940121               | 1108     | 1.08          | 0.054       | 18.5         | 70                | 87                | 0.60     | 0.85     | 4.08     | 38                    | 0.33  |
| 940121               | 1407     | 1.30          | 0.064       | 15.6         | 68                | 85                | 0.60     | 0.76     | 4.05     | 39                    | 0.39  |
| 940121               | 1705     | 1.57          | 0.064       | 15.6         | 68                | 83                | 0.51     | 0.60     | 5.11     | 34                    | 0.27  |
| 940121               | 2008     | 1.74          | 0.064       | 15.6         | 62                | 81                | 0.54     | 0.60     | 4.57     | 40                    | 0.60  |
| 940122               | 0205     | 1.84          | 0.064       | 15.6         | 64                | 80                | 0.53     | 0.72     | 4.54     | 37                    | 0.79  |
| 940122               | 0507     | 1.85          | 0.064       | 15.6         | 64                | 77                | 0.52     | 0.95     | 5.02     | 33                    | 1.04  |
| 940122               | 0806     | 1.97          | 0.064       | 15.6         | 64                | 74                | 0.52     | 1.02     | 5.38     | 29                    | 0.75  |
| 940122               | 1106     | 2.10          | 0.064       | 15.6         | 62                | 72                | 0.50     | 1.04     | 5.46     | 29                    | 0.82  |
| 940122               | 1406     | 2.04          | 0.064       | 15.6         | 64                | 71                | 0.55     | 1.03     | 4.94     | 34                    | 0.55  |
| 940122               | 1707     | 2.03          | 0.074       | 13.6         | 50                | 70                | 0.57     | 0.91     | 4.24     | 41                    | 0.65  |
| 940122               | 2007     | 2.00          | 0.074       | 13.6         | 56                | 69                | 0.55     | 1.13     | 4.98     | 36                    | 0.83  |
| 940123               | 0207     | 1.95          | 0.074       | 13.6         | 48                | 73                | 0.58     | 0.70     | 3.83     | 47                    | 0.27  |
| 940123               | 0507     | 1.90          | 0.074       | 13.6         | 80                | 75                | 0.57     | 0.52     | 4.28     | 42                    | -0.08 |
| 940123               | 0805     | 1.97          | 0.074       | 13.6         | 52                | 74                | 0.54     | 0.56     | 4.45     | 41                    | 0.19  |
| 940123               | 1107     | 2.21          | 0.074       | 13.6         | 54                | 73                | 0.56     | 0.69     | 4.55     | 40                    | 0.21  |
| 940123               | 1407     | 2.11          | 0.074       | 13.6         | 52                | 75                | 0.57     | 0.58     | 4.09     | 45                    | 0.26  |
| 940123               | 1707     | 2.01          | 0.074       | 13.6         | 54                | 76                | 0.59     | 0.48     | 3.76     | 48                    | 0.24  |
| 940123               | 2007     | 2.07          | 0.074       | 13.6         | 54                | 76                | 0.56     | 0.52     | 3.72     | 45                    | 0.25  |
| 940124               | 0203     | 2.13          | 0.083       | 12.0         | 58                | 76                | 0.56     | 0.47     | 4.20     | 43                    | 0.17  |
| 940124               | 0506     | 2.05          | 0.083       | 12.0         | 54                | 78                | 0.54     | 0.39     | 3.98     | 43                    | -0.05 |
| 940124               | 0759     | 1.96          | 0.083       | 12.0         | 64                | 80                | 0.54     | 0.42     | 4.23     | 41                    | 0.15  |
| 940124               | 1108     | 1.89          | 0.083       | 12.0         | 90                | 85                | 0.50     | 0.30     | 5.47     | 31                    | -0.14 |
| 940124               | 1423     | 2.25          | 0.083       | 12.0         | 74                | 79                | 0.50     | 0.64     | 4.89     | 33                    | 0.21  |
| 940124               | 1710     | 2.43          | 0.093       | 10.7         | 78                | 78                | 0.51     | 0.46     | 4.44     | 37                    | 0.00  |
| 940124               | 2006     | 2.56          | 0.074       | 13.6         | 56                | 73                | 0.51     | 0.77     | 4.39     | 37                    | 0.60  |

(Sheet 3 of 45)

Table A1 (Continued)

| Date   | Time<br>GMT | $H_{mo}$<br>m | $f_p$<br>Hz | $T_p$<br>sec | $\theta_p$<br>deg | $\theta_o$<br>deg | $\sigma$ | $\gamma$ | $\delta$ | $\Delta\theta$<br>deg | A     |
|--------|-------------|---------------|-------------|--------------|-------------------|-------------------|----------|----------|----------|-----------------------|-------|
| 940125 | 0209        | 3.24          | 0.083       | 12.0         | 54                | 70                | 0.49     | 0.85     | 5.52     | 32                    | 0.16  |
| 940125 | 0510        | 4.18          | 0.064       | 15.6         | 64                | 66                | 0.44     | 0.81     | 6.73     | 24                    | 0.06  |
| 940125 | 1110        | 4.06          | 0.064       | 15.6         | 58                | 64                | 0.43     | 0.98     | 8.02     | 23                    | 0.23  |
| 940125 | 1410        | 3.79          | 0.064       | 15.6         | 62                | 66                | 0.43     | 1.08     | 7.51     | 23                    | 0.28  |
| 940125 | 1710        | 3.41          | 0.064       | 15.6         | 60                | 66                | 0.45     | 1.21     | 7.48     | 21                    | 0.39  |
| 940125 | 2010        | 3.30          | 0.074       | 13.6         | 60                | 67                | 0.46     | 1.17     | 7.10     | 23                    | 0.57  |
| 940126 | 0207        | 3.82          | 0.074       | 13.6         | 62                | 64                | 0.40     | 1.04     | 8.41     | 20                    | 0.13  |
| 940126 | 0510        | 3.64          | 0.074       | 13.6         | 54                | 63                | 0.42     | 1.23     | 8.15     | 21                    | 0.33  |
| 940126 | 0810        | 3.00          | 0.083       | 12.0         | 56                | 64                | 0.46     | 1.04     | 7.24     | 25                    | 0.41  |
| 940126 | 1109        | 3.08          | 0.074       | 13.6         | 54                | 63                | 0.42     | 0.98     | 7.84     | 24                    | 0.36  |
| 940126 | 1413        | 2.81          | 0.074       | 13.6         | 52                | 63                | 0.44     | 0.93     | 6.80     | 28                    | 0.32  |
| 940126 | 1711        | 2.55          | 0.074       | 13.6         | 54                | 64                | 0.45     | 1.08     | 6.74     | 26                    | 0.55  |
| 940126 | 2009        | 2.54          | 0.083       | 12.0         | 54                | 63                | 0.45     | 1.21     | 6.65     | 24                    | 0.64  |
| 940127 | 0210        | 2.51          | 0.083       | 12.0         | 52                | 63                | 0.47     | 0.77     | 5.48     | 31                    | 0.49  |
| 940127 | 0510        | 2.26          | 0.083       | 12.0         | 50                | 63                | 0.49     | 0.71     | 5.11     | 34                    | 0.36  |
| 940127 | 0808        | 2.10          | 0.093       | 10.7         | 52                | 63                | 0.48     | 0.74     | 5.99     | 30                    | 0.28  |
| 940127 | 1122        | 2.01          | 0.083       | 12.0         | 54                | 67                | 0.49     | 0.57     | 6.09     | 30                    | 0.16  |
| 940127 | 1413        | 2.22          | 0.113       | 8.9          | 68                | 65                | 0.44     | 0.60     | 7.46     | 24                    | -0.12 |
| 940127 | 1714        | 2.56          | 0.054       | 18.5         | 68                | 65                | 0.40     | 0.41     | 8.46     | 21                    | -0.38 |
| 940127 | 2009        | 2.68          | 0.054       | 18.5         | 66                | 63                | 0.44     | 0.50     | 7.40     | 23                    | -0.12 |
| 940128 | 0207        | 3.16          | 0.064       | 15.6         | 62                | 63                | 0.40     | 0.72     | 9.55     | 18                    | -0.02 |
| 940128 | 0509        | 2.81          | 0.064       | 15.6         | 64                | 62                | 0.39     | 0.55     | 9.42     | 19                    | -0.23 |
| 940128 | 0805        | 2.78          | 0.064       | 15.6         | 64                | 62                | 0.39     | 0.83     | 9.76     | 18                    | -0.20 |
| 940128 | 1101        | 2.77          | 0.064       | 15.6         | 62                | 60                | 0.41     | 0.84     | 8.69     | 20                    | -0.14 |
| 940128 | 1425        | 2.99          | 0.064       | 15.6         | 52                | 58                | 0.39     | 0.89     | 8.97     | 21                    | 0.03  |
| 940128 | 1718        | 2.81          | 0.064       | 15.6         | 52                | 58                | 0.42     | 0.92     | 8.33     | 23                    | 0.06  |
| 940128 | 2007        | 2.66          | 0.074       | 13.6         | 58                | 59                | 0.41     | 0.90     | 8.55     | 22                    | 0.00  |
| 940129 | 0210        | 2.02          | 0.074       | 13.6         | 52                | 58                | 0.47     | 1.70     | 8.51     | 18                    | 0.28  |
| 940129 | 0509        | 1.71          | 0.083       | 12.0         | 52                | 60                | 0.51     | 1.88     | 7.71     | 22                    | 0.50  |
| 940129 | 0809        | 1.58          | 0.093       | 10.7         | 50                | 60                | 0.55     | 1.82     | 6.59     | 26                    | 0.74  |
| 940129 | 1109        | 1.51          | 0.074       | 13.6         | 52                | 61                | 0.51     | 1.77     | 7.32     | 22                    | 0.57  |
| 940129 | 1409        | 1.45          | 0.074       | 13.6         | 52                | 61                | 0.51     | 1.66     | 6.88     | 25                    | 0.62  |
| 940129 | 1709        | 1.45          | 0.074       | 13.6         | 50                | 58                | 0.54     | 1.95     | 6.56     | 25                    | 0.51  |
| 940129 | 2009        | 1.42          | 0.083       | 12.0         | 50                | 59                | 0.53     | 2.11     | 7.26     | 22                    | 0.29  |
| 940130 | 0209        | 1.19          | 0.083       | 12.0         | 56                | 65                | 0.60     | 2.01     | 5.68     | 26                    | 0.49  |
| 940130 | 0509        | 1.11          | 0.074       | 13.6         | 54                | 63                | 0.59     | 1.91     | 5.54     | 28                    | 0.59  |
| 940130 | 0809        | 1.17          | 0.054       | 18.5         | 52                | 61                | 0.59     | 1.87     | 5.81     | 28                    | 0.10  |
| 940130 | 1109        | 1.10          | 0.074       | 13.6         | 52                | 61                | 0.61     | 1.95     | 5.42     | 29                    | 0.39  |
| 940130 | 1407        | 0.96          | 0.054       | 18.5         | 48                | 70                | 0.73     | 1.52     | 3.64     | 45                    | 0.64  |
| 940130 | 1709        | 1.01          | 0.054       | 18.5         | 48                | 71                | 0.68     | 1.42     | 3.85     | 39                    | 0.11  |
| 940130 | 2009        | 1.05          | 0.054       | 18.5         | 72                | 73                | 0.68     | 1.56     | 4.12     | 33                    | 0.00  |
| 940131 | 0207        | 1.00          | 0.054       | 18.5         | 58                | 76                | 0.68     | 1.38     | 4.07     | 38                    | 0.17  |
| 940131 | 0504        | 1.19          | 0.054       | 18.5         | 76                | 76                | 0.64     | 1.34     | 4.06     | 37                    | 0.14  |
| 940131 | 1115        | 1.55          | 0.064       | 15.6         | 72                | 77                | 0.56     | 1.37     | 5.73     | 25                    | 0.33  |
| 940131 | 1422        | 1.74          | 0.064       | 15.6         | 80                | 89                | 0.84     | 2.98     | 4.18     | 37                    | 0.61  |
| 940131 | 1713        | 1.86          | 0.064       | 15.6         | 80                | 86                | 0.72     | 1.84     | 5.14     | 31                    | 0.45  |
| 940131 | 2009        | 1.91          | 0.064       | 15.6         | 82                | 83                | 0.59     | 0.78     | 5.85     | 28                    | 0.04  |
| 940131 | 2309        | 1.98          | 0.064       | 15.6         | 80                | 86                | 0.51     | 0.80     | 5.90     | 27                    | 0.46  |
| 940201 | 0209        | 1.89          | 0.064       | 15.6         | 82                | 88                | 0.53     | 0.92     | 5.87     | 29                    | 0.40  |
| 940201 | 0509        | 1.83          | 0.074       | 13.6         | 82                | 90                | 0.61     | 1.13     | 4.95     | 37                    | 0.33  |
| 940201 | 0807        | 1.94          | 0.064       | 15.6         | 78                | 87                | 0.70     | 1.74     | 4.80     | 38                    | 0.62  |
| 940201 | 1122        | 1.83          | 0.074       | 13.6         | 72                | 94                | 0.91     | 2.26     | 3.29     | 60                    | 0.72  |
| 940201 | 1430        | 1.87          | 0.074       | 13.6         | 76                | 93                | 0.90     | 2.16     | 3.39     | 58                    | 0.91  |

(Sheet 4 of 45)

| Table A1 (Continued) |          |            |          |           |                |                |          |          |          |                    |       |
|----------------------|----------|------------|----------|-----------|----------------|----------------|----------|----------|----------|--------------------|-------|
| Date                 | Time GMT | $H_{mo}$ m | $f_p$ Hz | $T_p$ sec | $\theta_p$ deg | $\theta_o$ deg | $\sigma$ | $\gamma$ | $\delta$ | $\Delta\theta$ deg | A     |
| 940201               | 1722     | 1.80       | 0.074    | 13.6      | 78             | 91             | 0.76     | 1.76     | 4.07     | 42                 | 0.89  |
| 940201               | 2009     | 1.76       | 0.054    | 18.5      | 72             | 87             | 0.71     | 1.61     | 4.07     | 40                 | 1.09  |
| 940202               | 0209     | 1.87       | 0.054    | 18.5      | 72             | 86             | 0.62     | 1.27     | 4.44     | 35                 | 0.88  |
| 940202               | 0509     | 1.98       | 0.054    | 18.5      | 74             | 86             | 0.68     | 1.45     | 4.03     | 35                 | 0.98  |
| 940202               | 0809     | 2.11       | 0.054    | 18.5      | 76             | 90             | 0.65     | 1.51     | 3.85     | 34                 | 0.89  |
| 940202               | 1121     | 1.95       | 0.064    | 15.6      | 78             | 91             | 0.66     | 1.38     | 3.76     | 40                 | 0.78  |
| 940202               | 1406     | 2.00       | 0.064    | 15.6      | 78             | 93             | 0.62     | 1.17     | 4.10     | 38                 | 0.59  |
| 940202               | 1709     | 2.04       | 0.064    | 15.6      | 80             | 90             | 0.61     | 1.01     | 3.93     | 40                 | 0.30  |
| 940202               | 2009     | 2.33       | 0.064    | 15.6      | 72             | 85             | 0.55     | 1.72     | 5.41     | 25                 | 0.66  |
| 940203               | 0210     | 2.40       | 0.064    | 15.6      | 72             | 84             | 0.57     | 1.60     | 5.15     | 29                 | 0.57  |
| 940203               | 0809     | 2.00       | 0.064    | 15.6      | 74             | 89             | 0.64     | 1.28     | 3.91     | 40                 | 0.65  |
| 940203               | 1110     | 1.90       | 0.064    | 15.6      | 74             | 90             | 0.64     | 1.60     | 4.00     | 37                 | 0.99  |
| 940203               | 1409     | 1.91       | 0.074    | 13.6      | 74             | 93             | 0.62     | 1.16     | 3.92     | 40                 | 0.47  |
| 940203               | 1711     | 1.78       | 0.074    | 13.6      | 64             | 95             | 0.73     | 0.91     | 2.82     | 59                 | 0.52  |
| 940203               | 2009     | 1.72       | 0.074    | 13.6      | 60             | 97             | 0.95     | 1.48     | 2.59     | 90                 | 1.08  |
| 940204               | 0209     | 2.64       | 0.152    | 6.6       | -170           | -171           | 1.13     | -1.25    | 1.87     | 147                | -0.83 |
| 940204               | 0509     | 2.52       | 0.152    | 6.6       | -112           | 171            | 1.19     | -0.43    | 1.45     | 157                | -0.47 |
| 940204               | 0809     | 2.28       | 0.054    | 18.5      | 70             | 115            | 1.12     | 1.20     | 1.84     | 123                | 1.04  |
| 940204               | 1112     | 2.07       | 0.054    | 18.5      | 70             | 112            | 0.97     | 0.91     | 2.15     | 100                | 0.89  |
| 940204               | 1409     | 2.11       | 0.054    | 18.5      | 74             | 123            | 0.83     | -0.08    | 1.78     | 89                 | -0.48 |
| 940204               | 1718     | 1.92       | 0.064    | 15.6      | 168            | 121            | 0.84     | -0.05    | 1.78     | 90                 | -0.10 |
| 940204               | 2009     | 1.82       | 0.064    | 15.6      | 82             | 115            | 0.84     | 0.06     | 1.92     | 87                 | 0.21  |
| 940205               | 0209     | 1.66       | 0.064    | 15.6      | 64             | 90             | 0.76     | 1.19     | 2.82     | 62                 | 1.22  |
| 940205               | 0509     | 1.71       | 0.064    | 15.6      | 72             | 91             | 0.69     | 1.23     | 3.38     | 46                 | 0.97  |
| 940205               | 0806     | 1.58       | 0.064    | 15.6      | 74             | 91             | 0.71     | 1.43     | 3.42     | 45                 | 0.97  |
| 940205               | 1109     | 1.58       | 0.074    | 13.6      | 70             | 92             | 0.77     | 1.16     | 2.78     | 61                 | 0.82  |
| 940205               | 1409     | 1.50       | 0.074    | 13.6      | 88             | 103            | 0.79     | 0.63     | 2.41     | 71                 | 0.46  |
| 940205               | 1709     | 1.39       | 0.074    | 13.6      | 62             | 96             | 0.78     | 0.86     | 2.51     | 70                 | 0.74  |
| 940205               | 2009     | 1.50       | 0.064    | 15.6      | 74             | 95             | 0.73     | 0.89     | 2.77     | 60                 | 1.04  |
| 940206               | 0209     | 1.52       | 0.064    | 15.6      | 64             | 90             | 0.76     | 1.08     | 2.75     | 63                 | 1.25  |
| 940206               | 0507     | 1.47       | 0.064    | 15.6      | 60             | 91             | 0.75     | 1.01     | 2.72     | 66                 | 0.90  |
| 940206               | 0809     | 1.40       | 0.074    | 13.6      | 60             | 92             | 0.75     | 0.92     | 2.68     | 68                 | 0.81  |
| 940206               | 1109     | 1.35       | 0.074    | 13.6      | 80             | 101            | 0.80     | 0.69     | 2.43     | 71                 | 0.62  |
| 940206               | 1410     | 1.24       | 0.074    | 13.6      | 56             | 101            | 0.82     | 0.58     | 2.24     | 78                 | 0.24  |
| 940206               | 1709     | 1.45       | 0.074    | 13.6      | 60             | 101            | 0.73     | 0.49     | 2.73     | 64                 | 0.06  |
| 940206               | 2013     | 1.75       | 0.074    | 13.6      | 62             | 102            | 0.82     | 0.80     | 2.58     | 74                 | 0.42  |
| 940207               | 0509     | 2.99       | 0.123    | 8.2       | 148            | 155            | 0.92     | 0.47     | 2.20     | 74                 | 0.14  |
| 940207               | 0809     | 2.75       | 0.123    | 8.2       | 176            | 142            | 0.92     | 0.16     | 2.27     | 78                 | -0.18 |
| 940207               | 1110     | 2.21       | 0.123    | 8.2       | 174            | 140            | 0.81     | -0.28    | 2.39     | 73                 | -0.29 |
| 940207               | 1400     | 2.14       | 0.123    | 8.2       | 168            | 133            | 0.77     | -0.41    | 2.52     | 70                 | -0.43 |
| 940207               | 1710     | 2.18       | 0.123    | 8.2       | 168            | 125            | 0.76     | -0.20    | 2.32     | 73                 | -0.24 |
| 940207               | 2009     | 2.47       | 0.123    | 8.2       | 166            | 119            | 0.70     | -0.15    | 2.34     | 68                 | -0.14 |
| 940208               | 0209     | 2.51       | 0.113    | 8.9       | 168            | 125            | 0.70     | -0.28    | 2.41     | 67                 | -0.25 |
| 940208               | 0809     | 2.83       | 0.103    | 9.7       | 138            | 109            | 0.66     | -0.22    | 2.69     | 58                 | -0.17 |
| 940208               | 1106     | 3.18       | 0.113    | 8.9       | 58             | 92             | 0.70     | 0.10     | 2.35     | 66                 | 0.10  |
| 940208               | 1408     | 3.65       | 0.093    | 10.7      | 46             | 82             | 0.71     | 0.34     | 2.10     | 72                 | 0.41  |
| 940208               | 1708     | 3.85       | 0.093    | 10.7      | 52             | 78             | 0.63     | 0.48     | 2.45     | 59                 | 0.57  |
| 940208               | 2008     | 3.55       | 0.093    | 10.7      | 50             | 77             | 0.59     | 0.29     | 2.74     | 54                 | 0.17  |
| 940209               | 0208     | 3.57       | 0.093    | 10.7      | 50             | 62             | 0.49     | 1.04     | 4.88     | 32                 | 0.56  |
| 940209               | 0509     | 3.11       | 0.083    | 12.0      | 50             | 61             | 0.48     | 1.28     | 5.46     | 28                 | 0.77  |
| 940209               | 0808     | 2.79       | 0.093    | 10.7      | 50             | 62             | 0.50     | 1.15     | 5.19     | 32                 | 0.74  |
| 940209               | 1109     | 2.61       | 0.093    | 10.7      | 44             | 60             | 0.53     | 1.15     | 4.90     | 36                 | 0.75  |

(Sheet 5 of 45)

Table A1 (Continued)

| Date   | Time<br>GMT | $H_{mo}$<br>m | $f_p$<br>Hz | $T_p$<br>sec | $\theta_p$<br>deg | $\theta_o$<br>deg | $\sigma$ | $\gamma$ | $\delta$ | $\Delta\theta$<br>deg | A     |
|--------|-------------|---------------|-------------|--------------|-------------------|-------------------|----------|----------|----------|-----------------------|-------|
| 940209 | 1409        | 2.64          | 0.093       | 10.7         | 42                | 59                | 0.52     | 1.17     | 5.00     | 33                    | 0.40  |
| 940209 | 1715        | 2.47          | 0.103       | 9.7          | 46                | 58                | 0.53     | 1.36     | 5.11     | 32                    | 0.65  |
| 940210 | 0208        | 1.98          | 0.064       | 15.6         | 50                | 61                | 0.56     | 1.11     | 4.94     | 37                    | 0.42  |
| 940210 | 0509        | 1.72          | 0.074       | 13.6         | 50                | 63                | 0.58     | 1.10     | 4.63     | 37                    | 0.40  |
| 940210 | 0808        | 1.68          | 0.074       | 13.6         | 54                | 66                | 0.59     | 1.06     | 4.31     | 39                    | 0.65  |
| 940210 | 1108        | 1.69          | 0.074       | 13.6         | 52                | 63                | 0.58     | 1.39     | 4.90     | 34                    | 0.74  |
| 940210 | 1403        | 1.66          | 0.074       | 13.6         | 52                | 65                | 0.57     | 1.04     | 4.66     | 40                    | 0.63  |
| 940211 | 0209        | 1.77          | 0.162       | 6.2          | 48                | 57                | 0.56     | 0.85     | 4.37     | 41                    | 0.56  |
| 940211 | 0509        | 2.47          | 0.132       | 7.6          | 50                | 51                | 0.50     | 0.85     | 4.72     | 37                    | 0.09  |
| 940211 | 0809        | 2.66          | 0.123       | 8.2          | 48                | 55                | 0.42     | 1.27     | 7.03     | 24                    | 0.40  |
| 940211 | 1107        | 2.80          | 0.113       | 8.9          | 48                | 55                | 0.41     | 1.27     | 7.96     | 22                    | 0.37  |
| 940211 | 1409        | 3.04          | 0.074       | 13.6         | 48                | 53                | 0.40     | 1.27     | 8.35     | 22                    | 0.36  |
| 940212 | 1357        | 1.86          | 0.083       | 12.0         | 48                | 56                | 0.63     | 1.70     | 6.78     | 21                    | 0.48  |
| 940213 | 0209        | 1.55          | 0.083       | 12.0         | 50                | 61                | 0.55     | 2.21     | 6.70     | 27                    | 0.61  |
| 940213 | 0509        | 1.77          | 0.083       | 12.0         | 50                | 58                | 0.53     | 1.71     | 6.94     | 27                    | 0.53  |
| 940213 | 1407        | 1.81          | 0.054       | 18.5         | 66                | 63                | 0.55     | 1.56     | 6.57     | 27                    | -0.16 |
| 940213 | 1709        | 1.96          | 0.054       | 18.5         | 68                | 65                | 0.49     | 1.55     | 7.58     | 21                    | -0.57 |
| 940213 | 2009        | 2.10          | 0.054       | 18.5         | 70                | 68                | 0.45     | 2.20     | 9.76     | 11                    | -0.33 |
| 940214 | 0209        | 1.83          | 0.054       | 18.5         | 54                | 65                | 0.55     | 1.76     | 6.31     | 27                    | 0.14  |
| 940214 | 0509        | 2.29          | 0.074       | 13.6         | 46                | 62                | 0.51     | 1.39     | 6.18     | 32                    | 0.66  |
| 940214 | 0809        | 2.54          | 0.074       | 13.6         | 50                | 59                | 0.46     | 1.41     | 7.73     | 24                    | 0.60  |
| 940214 | 2004        | 2.90          | 0.074       | 13.6         | 60                | 61                | 0.38     | 1.57     | 12.20    | 13                    | -0.02 |
| 940215 | 0809        | 2.71          | 0.064       | 15.6         | 58                | 60                | 0.42     | 1.60     | 9.80     | 17                    | 0.06  |
| 940215 | 1108        | 2.58          | 0.074       | 13.6         | 56                | 61                | 0.45     | 1.38     | 8.69     | 19                    | 0.37  |
| 940215 | 1409        | 2.66          | 0.074       | 13.6         | 58                | 61                | 0.44     | 1.52     | 8.86     | 19                    | 0.14  |
| 940215 | 2007        | 2.72          | 0.074       | 13.6         | 52                | 58                | 0.46     | 1.63     | 8.00     | 19                    | 0.41  |
| 940216 | 0208        | 2.03          | 0.074       | 13.6         | 52                | 61                | 0.51     | 1.70     | 7.36     | 23                    | 0.72  |
| 940216 | 1406        | 1.71          | 0.074       | 13.6         | 56                | 66                | 0.53     | 1.54     | 6.38     | 27                    | 0.50  |
| 940216 | 1709        | 1.54          | 0.083       | 12.0         | 52                | 65                | 0.58     | 1.55     | 5.23     | 34                    | 0.68  |
| 940217 | 0209        | 1.03          | 0.083       | 12.0         | 56                | 94                | 1.16     | 1.98     | 2.17     | 135                   | 1.10  |
| 940217 | 0509        | 1.27          | 0.162       | 6.2          | -100              | 173               | 1.25     | -0.17    | 1.39     | 163                   | -0.01 |
| 940218 | 0509        | 4.06          | 0.093       | 10.7         | 78                | 86                | 0.51     | 0.23     | 3.92     | 38                    | 0.23  |
| 940218 | 0809        | 3.86          | 0.083       | 12.0         | 84                | 83                | 0.51     | 0.36     | 4.31     | 37                    | -0.08 |
| 940218 | 1107        | 3.63          | 0.083       | 12.0         | 78                | 82                | 0.53     | 0.39     | 4.08     | 41                    | 0.14  |
| 940218 | 1405        | 3.29          | 0.083       | 12.0         | 80                | 82                | 0.55     | 0.48     | 4.07     | 42                    | 0.10  |
| 940218 | 1657        | 3.01          | 0.083       | 12.0         | 58                | 78                | 0.59     | 0.77     | 3.79     | 46                    | 0.50  |
| 940218 | 2306        | 3.13          | 0.083       | 12.0         | 54                | 72                | 0.54     | 0.70     | 4.20     | 40                    | 0.36  |
| 940219 | 0208        | 3.20          | 0.083       | 12.0         | 54                | 72                | 0.52     | 0.88     | 4.83     | 38                    | 0.44  |
| 940219 | 0505        | 2.96          | 0.083       | 12.0         | 58                | 74                | 0.53     | 0.82     | 4.64     | 38                    | 0.48  |
| 940219 | 0810        | 2.89          | 0.083       | 12.0         | 54                | 70                | 0.53     | 1.16     | 5.00     | 36                    | 0.68  |
| 940219 | 1110        | 2.66          | 0.083       | 12.0         | 56                | 70                | 0.53     | 1.09     | 4.95     | 36                    | 0.65  |
| 940219 | 1406        | 2.32          | 0.083       | 12.0         | 54                | 72                | 0.60     | 1.10     | 4.13     | 43                    | 0.76  |
| 940219 | 1710        | 2.09          | 0.083       | 12.0         | 54                | 73                | 0.63     | 1.35     | 4.17     | 44                    | 0.93  |
| 940219 | 2010        | 2.15          | 0.093       | 10.7         | 52                | 75                | 0.61     | 1.14     | 4.04     | 45                    | 0.50  |
| 940219 | 2310        | 2.60          | 0.093       | 10.7         | 56                | 88                | 0.68     | 0.70     | 2.75     | 59                    | 0.36  |
| 940220 | 0210        | 2.48          | 0.142       | 7.0          | 58                | 92                | 0.72     | 0.58     | 2.55     | 64                    | 0.37  |
| 940220 | 0510        | 2.33          | 0.132       | 7.6          | 52                | 88                | 0.71     | 0.46     | 2.47     | 65                    | 0.18  |
| 940220 | 0810        | 2.08          | 0.093       | 10.7         | 52                | 83                | 0.72     | 0.61     | 2.72     | 62                    | 0.38  |
| 940220 | 1110        | 2.05          | 0.093       | 10.7         | 54                | 76                | 0.70     | 0.97     | 3.01     | 55                    | 0.59  |

(Sheet 6 of 45)

| Table A1 (Continued) |             |               |             |              |                   |                   |          |          |          |                       |       |
|----------------------|-------------|---------------|-------------|--------------|-------------------|-------------------|----------|----------|----------|-----------------------|-------|
| Date                 | Time<br>GMT | $H_{m0}$<br>m | $f_p$<br>Hz | $T_p$<br>sec | $\theta_p$<br>deg | $\theta_0$<br>deg | $\sigma$ | $\gamma$ | $\delta$ | $\Delta\theta$<br>deg | A     |
| 940220               | 1410        | 2.24          | 0.093       | 10.7         | 54                | 76                | 0.64     | 0.87     | 3.32     | 48                    | 0.17  |
| 940220               | 1715        | 2.27          | 0.103       | 9.7          | 56                | 73                | 0.60     | 0.86     | 3.73     | 44                    | 0.38  |
| 940220               | 2010        | 2.53          | 0.093       | 10.7         | 58                | 68                | 0.57     | 0.88     | 4.16     | 40                    | 0.34  |
| 940221               | 0210        | 2.47          | 0.093       | 10.7         | 56                | 68                | 0.59     | 0.81     | 4.00     | 43                    | 0.40  |
| 940221               | 0507        | 2.39          | 0.083       | 12.0         | 58                | 67                | 0.54     | 1.04     | 4.70     | 34                    | 0.54  |
| 940221               | 0810        | 2.08          | 0.093       | 10.7         | 50                | 67                | 0.60     | 1.33     | 4.60     | 40                    | 0.68  |
| 940221               | 1110        | 2.21          | 0.093       | 10.7         | 50                | 64                | 0.54     | 1.46     | 5.35     | 34                    | 0.70  |
| 940221               | 1410        | 2.16          | 0.093       | 10.7         | 52                | 62                | 0.53     | 1.34     | 5.30     | 33                    | 0.50  |
| 940221               | 1710        | 2.08          | 0.093       | 10.7         | 54                | 64                | 0.57     | 1.09     | 4.42     | 40                    | 0.47  |
| 940221               | 2010        | 1.88          | 0.093       | 10.7         | 50                | 64                | 0.60     | 1.13     | 4.31     | 44                    | 0.39  |
| 940222               | 0202        | 1.73          | 0.093       | 10.7         | 56                | 64                | 0.56     | 0.90     | 4.46     | 37                    | 0.18  |
| 940222               | 0510        | 1.62          | 0.093       | 10.7         | 50                | 63                | 0.56     | 1.06     | 4.73     | 37                    | 0.42  |
| 940222               | 0759        | 1.82          | 0.093       | 10.7         | 48                | 59                | 0.50     | 1.20     | 5.66     | 31                    | 0.65  |
| 940222               | 1112        | 2.41          | 0.093       | 10.7         | 44                | 55                | 0.45     | 1.33     | 5.91     | 28                    | 0.82  |
| 940222               | 1409        | 2.66          | 0.083       | 12.0         | 42                | 51                | 0.45     | 1.36     | 5.91     | 25                    | 0.63  |
| 940222               | 1714        | 2.85          | 0.074       | 13.6         | 44                | 50                | 0.44     | 1.49     | 7.32     | 20                    | 0.41  |
| 940222               | 2009        | 2.65          | 0.074       | 13.6         | 46                | 54                | 0.47     | 1.13     | 6.03     | 28                    | 0.55  |
| 940223               | 0209        | 2.19          | 0.074       | 13.6         | 44                | 53                | 0.45     | 1.29     | 7.07     | 26                    | 0.48  |
| 940223               | 0509        | 2.21          | 0.083       | 12.0         | 50                | 53                | 0.45     | 1.17     | 7.15     | 23                    | 0.15  |
| 940223               | 0809        | 2.07          | 0.083       | 12.0         | 46                | 54                | 0.45     | 1.48     | 7.51     | 23                    | 0.65  |
| 940223               | 1112        | 2.04          | 0.083       | 12.0         | 42                | 54                | 0.47     | 1.29     | 6.55     | 29                    | 0.68  |
| 940223               | 1409        | 1.96          | 0.083       | 12.0         | 40                | 53                | 0.49     | 1.24     | 6.44     | 31                    | 0.28  |
| 940223               | 1713        | 1.80          | 0.083       | 12.0         | 50                | 54                | 0.50     | 1.22     | 6.16     | 30                    | 0.16  |
| 940223               | 2009        | 1.61          | 0.083       | 12.0         | 48                | 57                | 0.53     | 1.63     | 6.35     | 27                    | 0.63  |
| 940224               | 0209        | 1.42          | 0.093       | 10.7         | 54                | 61                | 0.51     | 1.60     | 6.77     | 27                    | 0.28  |
| 940224               | 0508        | 1.34          | 0.074       | 13.6         | 50                | 62                | 0.55     | 1.70     | 5.75     | 30                    | 0.39  |
| 940224               | 1410        | 1.45          | 0.064       | 15.6         | 58                | 60                | 0.56     | 1.70     | 5.54     | 30                    | 0.12  |
| 940224               | 1707        | 1.34          | 0.064       | 15.6         | 54                | 64                | 0.61     | 1.59     | 4.52     | 36                    | 0.30  |
| 940224               | 2002        | 1.28          | 0.064       | 15.6         | 54                | 77                | 0.84     | 0.82     | 2.72     | 65                    | 0.48  |
| 940225               | 0247        | 1.30          | 0.074       | 13.6         | 54                | 71                | 0.68     | 1.43     | 3.65     | 43                    | 0.76  |
| 940225               | 0809        | 1.26          | 0.074       | 13.6         | 54                | 69                | 0.71     | 1.50     | 3.33     | 45                    | 0.81  |
| 940225               | 1128        | 1.04          | 0.074       | 13.6         | 50                | 80                | 0.83     | 1.21     | 2.51     | 78                    | 1.32  |
| 940226               | 0208        | 0.98          | 0.074       | 13.6         | 44                | 91                | 0.87     | 0.47     | 1.90     | 95                    | 0.50  |
| 940226               | 0510        | 0.98          | 0.074       | 13.6         | 148               | 94                | 0.84     | 0.38     | 1.97     | 88                    | 0.52  |
| 940226               | 1410        | 1.08          | 0.074       | 13.6         | 64                | 101               | 0.84     | 0.57     | 2.03     | 86                    | 0.88  |
| 940226               | 1708        | 1.26          | 0.074       | 13.6         | 60                | 88                | 0.78     | 1.07     | 2.52     | 71                    | 1.02  |
| 940226               | 2010        | 1.44          | 0.074       | 13.6         | 80                | 85                | 0.67     | 0.97     | 3.26     | 42                    | 0.31  |
| 940227               | 0850        | 1.51          | 0.074       | 13.6         | 64                | 80                | 0.67     | 0.96     | 3.54     | 44                    | 0.38  |
| 940227               | 1109        | 1.55          | 0.074       | 13.6         | 58                | 82                | 0.69     | 0.84     | 3.10     | 53                    | 0.37  |
| 940227               | 1409        | 1.70          | 0.074       | 13.6         | 70                | 79                | 0.61     | 0.78     | 3.72     | 40                    | 0.17  |
| 940227               | 1709        | 1.79          | 0.074       | 13.6         | 60                | 71                | 0.60     | 0.94     | 4.18     | 37                    | 0.29  |
| 940227               | 2009        | 1.71          | 0.083       | 12.0         | 54                | 74                | 0.64     | 0.84     | 3.53     | 46                    | 0.09  |
| 940228               | 0207        | 1.92          | 0.083       | 12.0         | 60                | 70                | 0.57     | 0.52     | 3.91     | 43                    | 0.02  |
| 940228               | 0509        | 1.92          | 0.083       | 12.0         | 56                | 69                | 0.58     | 0.65     | 3.83     | 45                    | 0.32  |
| 940228               | 0809        | 1.93          | 0.083       | 12.0         | 54                | 65                | 0.57     | 1.04     | 4.33     | 39                    | 0.42  |
| 940228               | 1413        | 1.95          | 0.083       | 12.0         | 54                | 67                | 0.58     | 0.89     | 3.85     | 41                    | 0.45  |
| 940228               | 1715        | 1.95          | 0.083       | 12.0         | 56                | 69                | 0.58     | 0.56     | 3.82     | 45                    | 0.28  |
| 940228               | 2009        | 1.91          | 0.083       | 12.0         | 68                | 66                | 0.58     | 0.44     | 3.86     | 43                    | -0.08 |
| 940301               | 0211        | 1.85          | 0.083       | 12.0         | 60                | 69                | 0.57     | 0.46     | 4.22     | 39                    | 0.12  |
| 940301               | 0511        | 1.83          | 0.093       | 10.7         | 60                | 68                | 0.54     | 0.56     | 4.63     | 38                    | 0.17  |
| 940301               | 0811        | 2.01          | 0.093       | 10.7         | 52                | 62                | 0.57     | 0.77     | 4.29     | 42                    | 0.28  |

(Sheet 7 of 45)

Table A1 (Continued)

| Date   | Time<br>GMT | $H_{mo}$<br>m | $f_p$<br>Hz | $T_p$<br>sec | $\theta_p$<br>deg | $\theta_o$<br>deg | $\sigma$ | $\gamma$ | $\delta$ | $\Delta\theta$<br>deg | A     |
|--------|-------------|---------------|-------------|--------------|-------------------|-------------------|----------|----------|----------|-----------------------|-------|
| 940301 | 1121        | 1.90          | 0.093       | 10.7         | 62                | 62                | 0.58     | 0.57     | 4.14     | 40                    | -0.05 |
| 940301 | 1409        | 2.01          | 0.064       | 15.6         | 64                | 67                | 0.58     | 0.62     | 4.16     | 37                    | 0.36  |
| 940301 | 1708        | 1.97          | 0.064       | 15.6         | 70                | 67                | 0.57     | 0.52     | 4.34     | 35                    | -0.25 |
| 940301 | 2006        | 2.07          | 0.064       | 15.6         | 68                | 66                | 0.55     | 0.78     | 4.79     | 36                    | 0.09  |
| 940302 | 0209        | 2.28          | 0.074       | 13.6         | 62                | 65                | 0.50     | 0.92     | 6.44     | 25                    | 0.08  |
| 940302 | 0509        | 2.26          | 0.074       | 13.6         | 60                | 65                | 0.53     | 0.75     | 5.42     | 33                    | 0.17  |
| 940302 | 1109        | 2.15          | 0.083       | 12.0         | 64                | 65                | 0.53     | 0.62     | 5.00     | 34                    | -0.03 |
| 940302 | 1406        | 2.10          | 0.083       | 12.0         | 64                | 67                | 0.50     | 0.79     | 6.11     | 29                    | 0.09  |
| 940302 | 1709        | 2.04          | 0.083       | 12.0         | 64                | 70                | 0.51     | 0.77     | 5.70     | 30                    | 0.13  |
| 940302 | 2009        | 2.07          | 0.083       | 12.0         | 58                | 67                | 0.56     | 0.53     | 4.53     | 41                    | 0.03  |
| 940303 | 0509        | 1.84          | 0.083       | 12.0         | 62                | 74                | 0.54     | 0.96     | 5.32     | 37                    | 0.27  |
| 940303 | 0804        | 2.00          | 0.083       | 12.0         | 56                | 70                | 0.53     | 0.76     | 4.82     | 39                    | 0.45  |
| 940303 | 1107        | 1.98          | 0.083       | 12.0         | 56                | 71                | 0.55     | 0.94     | 4.91     | 37                    | 0.20  |
| 940303 | 1408        | 2.00          | 0.083       | 12.0         | 84                | 74                | 0.51     | 0.82     | 5.56     | 33                    | -0.04 |
| 940303 | 1708        | 1.83          | 0.083       | 12.0         | 62                | 77                | 0.57     | 0.81     | 4.56     | 41                    | 0.57  |
| 940303 | 2006        | 1.79          | 0.083       | 12.0         | 54                | 72                | 0.58     | 0.78     | 4.36     | 42                    | 0.21  |
| 940304 | 0209        | 2.51          | 0.074       | 13.6         | 60                | 69                | 0.48     | 1.00     | 6.42     | 27                    | 0.40  |
| 940304 | 0508        | 2.53          | 0.074       | 13.6         | 56                | 69                | 0.50     | 1.12     | 6.01     | 31                    | 0.58  |
| 940304 | 0808        | 2.34          | 0.083       | 12.0         | 70                | 71                | 0.54     | 0.79     | 5.11     | 33                    | 0.10  |
| 940304 | 1120        | 2.20          | 0.083       | 12.0         | 62                | 68                | 0.55     | 0.93     | 5.28     | 34                    | 0.24  |
| 940304 | 1408        | 2.09          | 0.083       | 12.0         | 60                | 71                | 0.58     | 0.90     | 4.44     | 40                    | 0.29  |
| 940304 | 1715        | 1.98          | 0.083       | 12.0         | 54                | 75                | 0.60     | 0.94     | 4.26     | 44                    | 0.32  |
| 940304 | 2011        | 1.95          | 0.083       | 12.0         | 60                | 72                | 0.61     | 0.71     | 3.75     | 45                    | 0.15  |
| 940305 | 0810        | 1.72          | 0.093       | 10.7         | 58                | 78                | 0.70     | 1.07     | 3.29     | 53                    | 0.45  |
| 940305 | 1110        | 1.73          | 0.083       | 12.0         | 58                | 79                | 0.69     | 0.94     | 3.32     | 53                    | 0.34  |
| 940305 | 1410        | 1.86          | 0.083       | 12.0         | 50                | 78                | 0.66     | 0.82     | 3.17     | 53                    | 0.17  |
| 940305 | 1710        | 2.08          | 0.083       | 12.0         | 58                | 77                | 0.64     | 0.91     | 3.51     | 47                    | 0.30  |
| 940305 | 2008        | 1.93          | 0.083       | 12.0         | 60                | 73                | 0.63     | 1.14     | 3.87     | 42                    | 0.51  |
| 940306 | 0210        | 2.08          | 0.083       | 12.0         | 56                | 67                | 0.57     | 1.43     | 4.79     | 33                    | 0.70  |
| 940306 | 0510        | 2.02          | 0.083       | 12.0         | 48                | 67                | 0.60     | 1.25     | 4.09     | 44                    | 0.91  |
| 940306 | 0810        | 2.26          | 0.083       | 12.0         | 48                | 62                | 0.59     | 1.63     | 4.85     | 36                    | 0.88  |
| 940306 | 1110        | 2.58          | 0.083       | 12.0         | 46                | 63                | 0.60     | 1.72     | 4.81     | 38                    | 0.71  |
| 940306 | 1410        | 2.99          | 0.083       | 12.0         | 52                | 58                | 0.48     | 1.10     | 5.68     | 29                    | 0.21  |
| 940306 | 1710        | 2.90          | 0.083       | 12.0         | 46                | 56                | 0.58     | 1.68     | 5.23     | 34                    | 0.67  |
| 940306 | 2008        | 2.27          | 0.083       | 12.0         | 44                | 62                | 0.62     | 1.76     | 4.89     | 37                    | 0.61  |
| 940307 | 0210        | 2.66          | 0.083       | 12.0         | 44                | 55                | 0.55     | 1.56     | 5.56     | 33                    | 0.43  |
| 940307 | 0510        | 2.68          | 0.083       | 12.0         | 44                | 52                | 0.51     | 1.89     | 6.78     | 25                    | 0.62  |
| 940307 | 1125        | 2.24          | 0.083       | 12.0         | 44                | 55                | 0.52     | 1.61     | 6.05     | 30                    | 0.61  |
| 940308 | 0208        | 1.74          | 0.093       | 10.7         | 44                | 56                | 0.54     | 1.61     | 5.89     | 33                    | 0.81  |
| 940308 | 0511        | 1.68          | 0.093       | 10.7         | 40                | 55                | 0.53     | 1.67     | 5.76     | 33                    | 0.74  |
| 940308 | 0811        | 1.37          | 0.093       | 10.7         | 40                | 56                | 0.61     | 1.82     | 4.99     | 36                    | 0.94  |
| 940308 | 1109        | 1.39          | 0.093       | 10.7         | 38                | 57                | 0.57     | 1.53     | 5.22     | 38                    | 0.68  |
| 940308 | 1410        | 1.49          | 0.103       | 9.7          | 40                | 52                | 0.56     | 1.68     | 5.39     | 32                    | 0.64  |
| 940308 | 1716        | 1.23          | 0.103       | 9.7          | 38                | 57                | 0.61     | 1.67     | 4.89     | 40                    | 0.92  |
| 940308 | 2010        | 1.02          | 0.103       | 9.7          | 34                | 56                | 0.67     | 1.88     | 4.25     | 43                    | 0.88  |
| 940309 | 0210        | 0.94          | 0.113       | 8.9          | 44                | 62                | 0.63     | 1.87     | 4.63     | 36                    | 0.33  |
| 940309 | 0510        | 0.89          | 0.123       | 8.2          | 44                | 65                | 0.68     | 1.72     | 4.11     | 40                    | 0.32  |
| 940309 | 0810        | 0.87          | 0.113       | 8.9          | 42                | 62                | 0.68     | 2.13     | 4.46     | 37                    | 0.49  |
| 940309 | 1104        | 0.80          | 0.064       | 15.6         | 38                | 68                | 0.76     | 1.66     | 3.42     | 49                    | 0.29  |
| 940309 | 1410        | 0.94          | 0.064       | 15.6         | 76                | 74                | 0.71     | 1.65     | 3.78     | 38                    | -0.15 |
| 940309 | 1705        | 0.94          | 0.064       | 15.6         | 72                | 74                | 0.71     | 1.56     | 3.68     | 37                    | 0.15  |
| 940309 | 2008        | 1.15          | 0.074       | 13.6         | 54                | 73                | 0.67     | 1.53     | 4.18     | 41                    | 0.40  |

(Sheet 8 of 45)

Table A1 (Continued)

| Date   | Time<br>GMT | $H_{mo}$<br>m | $f_p$<br>Hz | $T_p$<br>sec | $\theta_p$<br>deg | $\theta_o$<br>deg | $\sigma$ | $\gamma$ | $\delta$ | $\Delta\theta$<br>deg | A     |
|--------|-------------|---------------|-------------|--------------|-------------------|-------------------|----------|----------|----------|-----------------------|-------|
| 940310 | 0210        | 1.11          | 0.074       | 13.6         | 60                | 75                | 0.68     | 1.84     | 4.24     | 35                    | 0.52  |
| 940310 | 0510        | 1.01          | 0.074       | 13.6         | 54                | 79                | 0.74     | 1.47     | 3.40     | 46                    | 0.21  |
| 940310 | 1109        | 1.03          | 0.074       | 13.6         | 56                | 86                | 0.80     | 1.34     | 2.82     | 57                    | 0.52  |
| 940310 | 1409        | 1.25          | 0.083       | 12.0         | 82                | 80                | 0.71     | 1.36     | 3.52     | 43                    | -0.14 |
| 940310 | 1707        | 1.20          | 0.083       | 12.0         | 56                | 76                | 0.71     | 1.81     | 3.80     | 41                    | 0.50  |
| 940310 | 2010        | 1.15          | 0.083       | 12.0         | 48                | 75                | 0.79     | 1.70     | 3.13     | 54                    | 0.96  |
| 940311 | 0508        | 2.02          | 0.142       | 7.0          | 50                | 57                | 0.61     | 1.48     | 4.82     | 41                    | 0.45  |
| 940311 | 0810        | 2.69          | 0.132       | 7.6          | 48                | 52                | 0.55     | 1.51     | 5.71     | 34                    | 0.22  |
| 940311 | 1059        | 2.52          | 0.074       | 13.6         | 52                | 59                | 0.51     | 1.86     | 6.79     | 25                    | 0.38  |
| 940311 | 1350        | 2.73          | 0.123       | 8.2          | 48                | 59                | 0.51     | 1.37     | 5.87     | 32                    | 0.40  |
| 940311 | 1700        | 2.81          | 0.123       | 8.2          | 54                | 58                | 0.54     | 1.28     | 5.62     | 35                    | 0.12  |
| 940312 | 0203        | 2.99          | 0.083       | 12.0         | 50                | 62                | 0.54     | 1.56     | 5.81     | 32                    | 0.51  |
| 940312 | 0509        | 2.73          | 0.074       | 13.6         | 54                | 62                | 0.57     | 1.57     | 5.58     | 34                    | 0.42  |
| 940312 | 0809        | 2.53          | 0.074       | 13.6         | 52                | 65                | 0.66     | 1.90     | 4.64     | 37                    | 0.78  |
| 940313 | 0209        | 1.98          | 0.083       | 12.0         | 56                | 77                | 0.71     | 1.40     | 3.46     | 47                    | 0.52  |
| 940313 | 0509        | 1.73          | 0.074       | 13.6         | 52                | 86                | 0.82     | 0.90     | 2.56     | 67                    | 0.34  |
| 940313 | 1108        | 1.55          | 0.064       | 15.6         | 56                | 88                | 0.82     | 0.85     | 2.41     | 71                    | 0.53  |
| 940313 | 1408        | 1.54          | 0.064       | 15.6         | 54                | 89                | 0.77     | 0.76     | 2.74     | 61                    | 0.18  |
| 940313 | 1704        | 1.55          | 0.064       | 15.6         | 60                | 98                | 0.88     | 0.49     | 2.08     | 88                    | 0.48  |
| 940313 | 2008        | 1.65          | 0.064       | 15.6         | 78                | 97                | 0.85     | 0.83     | 2.19     | 83                    | 1.04  |
| 940314 | 0209        | 1.86          | 0.074       | 13.6         | 62                | 87                | 0.75     | 1.10     | 2.82     | 60                    | 0.94  |
| 940314 | 0509        | 2.03          | 0.074       | 13.6         | 62                | 87                | 0.78     | 1.22     | 2.81     | 58                    | 0.72  |
| 940314 | 0808        | 1.98          | 0.074       | 13.6         | 56                | 84                | 0.83     | 1.24     | 2.53     | 73                    | 1.17  |
| 940314 | 1108        | 2.05          | 0.074       | 13.6         | 56                | 82                | 0.79     | 1.43     | 2.82     | 58                    | 0.94  |
| 940314 | 1408        | 2.11          | 0.074       | 13.6         | 56                | 93                | 0.84     | 0.97     | 2.34     | 77                    | 0.55  |
| 940314 | 1708        | 1.96          | 0.083       | 12.0         | 58                | 84                | 0.81     | 1.46     | 2.79     | 57                    | 0.64  |
| 940314 | 2008        | 1.95          | 0.083       | 12.0         | 70                | 92                | 0.82     | 0.91     | 2.45     | 67                    | 0.66  |
| 940315 | 0209        | 1.85          | 0.083       | 12.0         | 58                | 89                | 0.75     | 1.00     | 2.80     | 58                    | 0.20  |
| 940315 | 0500        | 1.80          | 0.083       | 12.0         | 56                | 86                | 0.77     | 1.07     | 2.78     | 56                    | 0.10  |
| 940315 | 0808        | 1.55          | 0.083       | 12.0         | 52                | 92                | 0.87     | 0.94     | 2.22     | 90                    | 0.61  |
| 940315 | 1108        | 1.71          | 0.083       | 12.0         | 66                | 94                | 0.79     | 0.69     | 2.49     | 67                    | 0.40  |
| 940315 | 1408        | 1.64          | 0.093       | 10.7         | 68                | 92                | 0.78     | 0.91     | 2.64     | 59                    | 0.35  |
| 940315 | 1713        | 1.54          | 0.074       | 13.6         | 96                | 92                | 0.80     | 0.65     | 2.44     | 69                    | -0.06 |
| 940315 | 2005        | 1.52          | 0.074       | 13.6         | 94                | 96                | 0.80     | 0.68     | 2.39     | 72                    | 0.30  |
| 940316 | 0205        | 1.68          | 0.083       | 12.0         | 104               | 97                | 0.72     | 0.83     | 2.92     | 51                    | -0.11 |
| 940316 | 0509        | 1.69          | 0.083       | 12.0         | 62                | 92                | 0.72     | 0.77     | 2.89     | 54                    | 0.02  |
| 940316 | 0808        | 2.01          | 0.054       | 18.5         | 62                | 86                | 0.69     | 1.06     | 3.29     | 47                    | 0.44  |
| 940316 | 1108        | 2.14          | 0.054       | 18.5         | 62                | 83                | 0.71     | 1.16     | 3.10     | 53                    | 0.87  |
| 940316 | 1409        | 2.40          | 0.064       | 15.6         | 58                | 76                | 0.65     | 1.52     | 3.98     | 44                    | 1.43  |
| 940316 | 1708        | 2.65          | 0.064       | 15.6         | 64                | 74                | 0.58     | 1.57     | 5.04     | 29                    | 0.86  |
| 940316 | 2008        | 2.42          | 0.064       | 15.6         | 60                | 78                | 0.66     | 1.29     | 3.94     | 42                    | 0.73  |
| 940317 | 0209        | 2.37          | 0.074       | 13.6         | 58                | 73                | 0.65     | 1.33     | 3.84     | 45                    | 1.11  |
| 940317 | 0508        | 2.78          | 0.064       | 15.6         | 60                | 67                | 0.56     | 1.50     | 5.08     | 28                    | 0.46  |
| 940317 | 0805        | 2.69          | 0.074       | 13.6         | 50                | 63                | 0.58     | 1.78     | 5.22     | 31                    | 0.52  |
| 940317 | 1108        | 2.72          | 0.074       | 13.6         | 54                | 63                | 0.57     | 1.83     | 5.67     | 29                    | 0.33  |
| 940317 | 1421        | 2.87          | 0.074       | 13.6         | 50                | 62                | 0.53     | 2.03     | 6.75     | 27                    | 0.58  |
| 940317 | 2152        | 2.60          | 0.074       | 13.6         | 54                | 63                | 0.60     | 1.99     | 5.56     | 31                    | 0.27  |
| 940318 | 0208        | 2.23          | 0.074       | 13.6         | 52                | 60                | 0.58     | 2.91     | 6.57     | 22                    | 0.64  |
| 940318 | 0509        | 2.17          | 0.074       | 13.6         | 50                | 68                | 0.67     | 2.09     | 4.56     | 39                    | 0.64  |
| 940318 | 0808        | 2.08          | 0.074       | 13.6         | 50                | 66                | 0.70     | 1.79     | 4.12     | 42                    | 0.72  |
| 940318 | 1100        | 1.91          | 0.083       | 12.0         | 48                | 62                | 0.71     | 2.45     | 4.45     | 37                    | 0.85  |
| 940318 | 2009        | 1.97          | 0.083       | 12.0         | 54                | 67                | 0.66     | 2.25     | 4.65     | 33                    | 0.59  |

(Sheet 9 of 45)

Table A1 (Continued)

| Date   | Time<br>GMT | $H_{mo}$<br>m | $f_p$<br>Hz | $T_p$<br>sec | $\theta_p$<br>deg | $\theta_o$<br>deg | $\sigma$ | $\gamma$ | $\delta$ | $\Delta\theta$<br>deg | A     |
|--------|-------------|---------------|-------------|--------------|-------------------|-------------------|----------|----------|----------|-----------------------|-------|
| 940319 | 0209        | 2.09          | 0.083       | 12.0         | 52                | 62                | 0.58     | 2.54     | 6.15     | 26                    | 0.55  |
| 940319 | 0809        | 1.95          | 0.083       | 12.0         | 58                | 66                | 0.62     | 2.85     | 5.78     | 24                    | 0.62  |
| 940319 | 1108        | 1.80          | 0.083       | 12.0         | 50                | 67                | 0.74     | 2.53     | 4.26     | 38                    | 0.94  |
| 940319 | 1408        | 2.15          | 0.083       | 12.0         | 50                | 61                | 0.59     | 2.93     | 6.26     | 23                    | 0.77  |
| 940319 | 1708        | 2.47          | 0.083       | 12.0         | 50                | 61                | 0.52     | 2.12     | 6.70     | 25                    | 0.63  |
| 940319 | 2008        | 2.77          | 0.074       | 13.6         | 48                | 57                | 0.51     | 2.32     | 7.47     | 23                    | 0.43  |
| 940319 | 2304        | 2.90          | 0.074       | 13.6         | 50                | 57                | 0.48     | 2.08     | 7.83     | 23                    | 0.45  |
| 940320 | 0208        | 3.19          | 0.074       | 13.6         | 52                | 58                | 0.43     | 2.39     | 9.64     | 18                    | 0.43  |
| 940320 | 0509        | 3.52          | 0.074       | 13.6         | 48                | 58                | 0.47     | 2.07     | 7.95     | 23                    | 0.71  |
| 940320 | 0808        | 3.56          | 0.074       | 13.6         | 50                | 58                | 0.48     | 2.12     | 7.88     | 23                    | 0.69  |
| 940320 | 1108        | 3.22          | 0.074       | 13.6         | 48                | 56                | 0.46     | 2.40     | 9.07     | 21                    | 0.48  |
| 940320 | 1408        | 3.20          | 0.074       | 13.6         | 52                | 58                | 0.42     | 2.33     | 10.47    | 16                    | 0.39  |
| 940320 | 1708        | 2.90          | 0.074       | 13.6         | 48                | 56                | 0.48     | 2.62     | 8.89     | 19                    | 0.67  |
| 940320 | 2008        | 2.55          | 0.074       | 13.6         | 50                | 59                | 0.53     | 2.44     | 7.29     | 24                    | 0.59  |
| 940321 | 0208        | 2.56          | 0.074       | 13.6         | 50                | 58                | 0.45     | 2.99     | 10.07    | 16                    | 0.52  |
| 940321 | 0509        | 2.40          | 0.074       | 13.6         | 52                | 61                | 0.53     | 2.61     | 7.29     | 22                    | 0.51  |
| 940321 | 0808        | 2.47          | 0.074       | 13.6         | 52                | 60                | 0.48     | 2.08     | 8.02     | 24                    | 0.41  |
| 940321 | 1108        | 2.13          | 0.083       | 12.0         | 50                | 59                | 0.52     | 2.88     | 7.82     | 23                    | 0.47  |
| 940321 | 1408        | 1.99          | 0.083       | 12.0         | 50                | 58                | 0.55     | 3.30     | 7.40     | 20                    | 0.69  |
| 940321 | 1709        | 1.75          | 0.083       | 12.0         | 52                | 65                | 0.65     | 2.51     | 5.20     | 31                    | 0.64  |
| 940321 | 2008        | 1.97          | 0.083       | 12.0         | 52                | 62                | 0.61     | 1.96     | 5.58     | 30                    | 0.28  |
| 940322 | 0158        | 2.94          | 0.083       | 12.0         | 46                | 53                | 0.52     | 2.27     | 7.19     | 24                    | 0.49  |
| 940322 | 0509        | 3.43          | 0.074       | 13.6         | 48                | 54                | 0.45     | 1.69     | 8.45     | 22                    | 0.34  |
| 940322 | 0807        | 3.98          | 0.074       | 13.6         | 52                | 53                | 0.48     | 1.08     | 7.11     | 26                    | 0.03  |
| 940322 | 1408        | 3.40          | 0.074       | 13.6         | 50                | 55                | 0.45     | 1.56     | 8.40     | 21                    | 0.31  |
| 940322 | 1709        | 3.58          | 0.074       | 13.6         | 52                | 58                | 0.47     | 1.78     | 8.04     | 21                    | 0.35  |
| 940323 | 0213        | 3.83          | 0.064       | 15.6         | 56                | 57                | 0.41     | 1.16     | 9.44     | 19                    | 0.07  |
| 940323 | 0513        | 3.58          | 0.064       | 15.6         | 56                | 57                | 0.41     | 1.80     | 10.57    | 14                    | -0.03 |
| 940323 | 0811        | 3.55          | 0.064       | 15.6         | 56                | 59                | 0.44     | 1.84     | 9.12     | 17                    | 0.33  |
| 940323 | 1112        | 3.41          | 0.074       | 13.6         | 52                | 58                | 0.44     | 1.50     | 8.38     | 21                    | 0.36  |
| 940323 | 1413        | 3.53          | 0.074       | 13.6         | 52                | 57                | 0.48     | 1.72     | 7.85     | 23                    | 0.30  |
| 940323 | 1702        | 3.23          | 0.074       | 13.6         | 50                | 55                | 0.47     | 1.85     | 8.13     | 21                    | 0.36  |
| 940323 | 2013        | 2.78          | 0.074       | 13.6         | 54                | 58                | 0.51     | 1.55     | 6.60     | 27                    | 0.19  |
| 940324 | 0213        | 2.22          | 0.074       | 13.6         | 52                | 64                | 0.57     | 1.72     | 5.54     | 32                    | 0.35  |
| 940324 | 0511        | 1.78          | 0.074       | 13.6         | 48                | 70                | 0.69     | 1.55     | 3.89     | 43                    | 0.43  |
| 940324 | 0813        | 1.50          | 0.083       | 12.0         | 50                | 77                | 0.82     | 1.51     | 3.06     | 57                    | 0.68  |
| 940324 | 1201        | 2.09          | 0.162       | 6.2          | -106              | -176              | 1.18     | -1.25    | 1.85     | 151                   | -0.87 |
| 940324 | 1409        | 2.78          | 0.152       | 6.6          | -180              | 171               | 1.12     | -0.59    | 1.73     | 138                   | -0.49 |
| 940324 | 1714        | 3.14          | 0.132       | 7.6          | 74                | 131               | 0.97     | 0.28     | 1.96     | 97                    | -0.11 |
| 940324 | 2013        | 2.94          | 0.123       | 8.2          | 60                | 110               | 0.86     | 0.36     | 1.98     | 92                    | 0.05  |
| 940325 | 0213        | 2.85          | 0.083       | 12.0         | 54                | 82                | 0.74     | 1.07     | 2.75     | 66                    | 1.15  |
| 940325 | 0513        | 3.36          | 0.074       | 13.6         | 56                | 77                | 0.71     | 1.29     | 3.17     | 54                    | 1.11  |
| 940325 | 0813        | 3.10          | 0.074       | 13.6         | 56                | 80                | 0.72     | 1.24     | 3.02     | 58                    | 0.95  |
| 940325 | 1113        | 2.72          | 0.083       | 12.0         | 58                | 81                | 0.73     | 1.18     | 3.04     | 58                    | 0.96  |
| 940325 | 1411        | 2.52          | 0.083       | 12.0         | 60                | 84                | 0.72     | 0.82     | 2.91     | 58                    | 0.48  |
| 940325 | 1712        | 2.24          | 0.083       | 12.0         | 60                | 91                | 0.72     | 0.62     | 2.65     | 63                    | 0.62  |
| 940325 | 2003        | 2.17          | 0.064       | 15.6         | 60                | 87                | 0.73     | 0.88     | 2.75     | 63                    | 1.06  |
| 940326 | 0202        | 2.11          | 0.064       | 15.6         | 58                | 81                | 0.72     | 1.21     | 2.96     | 61                    | 1.37  |
| 940326 | 0503        | 2.14          | 0.074       | 13.6         | 56                | 79                | 0.71     | 1.01     | 2.88     | 61                    | 1.05  |
| 940326 | 0803        | 2.17          | 0.074       | 13.6         | 54                | 75                | 0.68     | 1.18     | 3.32     | 52                    | 0.90  |
| 940326 | 1103        | 2.15          | 0.074       | 13.6         | 56                | 74                | 0.65     | 1.28     | 3.82     | 42                    | 0.63  |
| 940326 | 1403        | 2.21          | 0.074       | 13.6         | 54                | 70                | 0.66     | 1.46     | 4.05     | 37                    | 0.25  |
| 940326 | 1702        | 2.04          | 0.044       | 22.5         | 76                | 78                | 0.74     | 1.35     | 3.25     | 43                    | 0.22  |

(Sheet 10 of 45)

| Table A1 (Continued) |          |            |          |           |                |                |          |          |          |                    |       |
|----------------------|----------|------------|----------|-----------|----------------|----------------|----------|----------|----------|--------------------|-------|
| Date                 | Time GMT | $H_{mo}$ m | $f_p$ Hz | $T_p$ sec | $\theta_p$ deg | $\theta_o$ deg | $\sigma$ | $\gamma$ | $\delta$ | $\Delta\theta$ deg | A     |
| 940327               | 0203     | 2.19       | 0.054    | 18.5      | 68             | 72             | 0.63     | 1.98     | 4.79     | 21                 | 0.27  |
| 940327               | 1924     | 1.91       | 0.064    | 15.6      | 68             | 83             | 0.87     | 1.39     | 2.50     | 81                 | 1.48  |
| 940328               | 0200     | 2.40       | 0.064    | 15.6      | 66             | 76             | 0.67     | 2.09     | 4.29     | 26                 | 0.74  |
| 940328               | 0759     | 2.14       | 0.064    | 15.6      | 64             | 77             | 0.71     | 2.16     | 3.94     | 30                 | 0.87  |
| 940328               | 1103     | 1.82       | 0.064    | 15.6      | 64             | 84             | 0.84     | 1.75     | 2.90     | 63                 | 1.70  |
| 940328               | 1411     | 1.89       | 0.064    | 15.6      | 68             | 81             | 0.75     | 1.61     | 3.28     | 40                 | 1.08  |
| 940328               | 1713     | 1.73       | 0.064    | 15.6      | 66             | 79             | 0.77     | 1.85     | 3.23     | 46                 | 0.93  |
| 940328               | 2009     | 1.72       | 0.074    | 13.6      | 70             | 87             | 0.80     | 1.17     | 2.61     | 71                 | 1.41  |
| 940329               | 0213     | 1.62       | 0.074    | 13.6      | 60             | 85             | 0.78     | 1.12     | 2.60     | 68                 | 1.06  |
| 940329               | 0513     | 1.33       | 0.074    | 13.6      | 46             | 90             | 0.86     | 0.82     | 2.28     | 85                 | 0.50  |
| 940329               | 0813     | 1.31       | 0.074    | 13.6      | 64             | 92             | 0.83     | 1.05     | 2.35     | 80                 | 1.11  |
| 940329               | 1113     | 1.30       | 0.074    | 13.6      | 82             | 100            | 0.77     | 0.29     | 2.53     | 65                 | 0.58  |
| 940329               | 1411     | 1.25       | 0.074    | 13.6      | 60             | 90             | 0.74     | 0.89     | 2.80     | 59                 | 0.49  |
| 940329               | 1711     | 1.28       | 0.074    | 13.6      | 88             | 96             | 0.75     | 0.52     | 2.45     | 66                 | 0.30  |
| 940329               | 2013     | 1.28       | 0.074    | 13.6      | 60             | 93             | 0.74     | 0.80     | 2.60     | 63                 | 0.43  |
| 940330               | 0213     | 1.58       | 0.083    | 12.0      | 72             | 88             | 0.63     | 0.92     | 3.71     | 42                 | 0.39  |
| 940330               | 0511     | 1.69       | 0.083    | 12.0      | 68             | 83             | 0.60     | 0.94     | 3.99     | 40                 | 0.46  |
| 940330               | 0813     | 2.01       | 0.083    | 12.0      | 82             | 75             | 0.59     | 0.60     | 4.10     | 37                 | -0.31 |
| 940330               | 1116     | 2.15       | 0.093    | 10.7      | 56             | 73             | 0.59     | 0.74     | 3.79     | 43                 | 0.48  |
| 940330               | 1415     | 2.28       | 0.103    | 9.7       | 54             | 71             | 0.61     | 0.71     | 3.42     | 49                 | 0.63  |
| 940330               | 1714     | 2.49       | 0.142    | 7.0       | 52             | 67             | 0.59     | 0.68     | 3.78     | 46                 | 0.26  |
| 940330               | 2013     | 2.93       | 0.132    | 7.6       | 58             | 59             | 0.53     | 0.69     | 4.37     | 40                 | 0.07  |
| 940331               | 0211     | 2.73       | 0.132    | 7.6       | 56             | 58             | 0.55     | 1.01     | 4.56     | 39                 | 0.10  |
| 940331               | 0513     | 2.68       | 0.123    | 8.2       | 50             | 63             | 0.56     | 1.10     | 4.55     | 40                 | 0.39  |
| 940331               | 0813     | 2.47       | 0.113    | 8.9       | 56             | 62             | 0.55     | 1.37     | 5.38     | 33                 | 0.35  |
| 940331               | 1113     | 2.35       | 0.064    | 15.6      | 56             | 63             | 0.57     | 1.52     | 5.16     | 31                 | 0.40  |
| 940331               | 1413     | 2.42       | 0.074    | 13.6      | 52             | 59             | 0.58     | 1.46     | 5.21     | 29                 | 0.55  |
| 940331               | 1713     | 2.50       | 0.074    | 13.6      | 56             | 65             | 0.58     | 1.14     | 4.73     | 33                 | 0.54  |
| 940331               | 2013     | 2.84       | 0.074    | 13.6      | 54             | 65             | 0.55     | 1.21     | 5.09     | 35                 | 0.29  |
| 940401               | 0211     | 2.65       | 0.074    | 13.6      | 56             | 66             | 0.54     | 1.60     | 5.82     | 28                 | 0.50  |
| 940401               | 0511     | 2.64       | 0.074    | 13.6      | 54             | 62             | 0.55     | 1.40     | 5.42     | 32                 | 0.49  |
| 940401               | 0813     | 2.36       | 0.074    | 13.6      | 54             | 66             | 0.55     | 1.25     | 5.07     | 36                 | 0.58  |
| 940401               | 1114     | 2.38       | 0.083    | 12.0      | 56             | 68             | 0.57     | 1.47     | 5.13     | 35                 | 0.64  |
| 940401               | 1415     | 2.48       | 0.054    | 18.5      | 78             | 72             | 0.56     | 1.20     | 5.12     | 32                 | -0.53 |
| 940401               | 2011     | 2.99       | 0.054    | 18.5      | 78             | 74             | 0.49     | 0.99     | 6.29     | 22                 | -0.55 |
| 940402               | 0513     | 3.24       | 0.064    | 15.6      | 74             | 74             | 0.48     | 0.91     | 6.44     | 24                 | -0.02 |
| 940402               | 0811     | 3.55       | 0.064    | 15.6      | 76             | 76             | 0.46     | 1.08     | 7.15     | 20                 | -0.07 |
| 940402               | 1113     | 3.45       | 0.064    | 15.6      | 76             | 75             | 0.47     | 1.21     | 7.20     | 20                 | -0.21 |
| 940402               | 1413     | 3.21       | 0.064    | 15.6      | 76             | 75             | 0.47     | 0.95     | 6.38     | 22                 | -0.19 |
| 940402               | 1711     | 3.31       | 0.064    | 15.6      | 70             | 75             | 0.48     | 0.88     | 5.98     | 24                 | 0.36  |
| 940402               | 2013     | 3.15       | 0.064    | 15.6      | 74             | 72             | 0.47     | 0.98     | 6.48     | 25                 | -0.19 |
| 940403               | 0211     | 3.00       | 0.064    | 15.6      | 56             | 70             | 0.53     | 0.92     | 4.81     | 34                 | 0.16  |
| 940403               | 0511     | 3.02       | 0.074    | 13.6      | 58             | 66             | 0.51     | 0.96     | 5.49     | 31                 | 0.18  |
| 940403               | 0813     | 3.08       | 0.074    | 13.6      | 58             | 69             | 0.51     | 0.73     | 4.71     | 34                 | 0.22  |
| 940403               | 1110     | 3.15       | 0.074    | 13.6      | 60             | 64             | 0.49     | 0.96     | 5.32     | 28                 | 0.27  |
| 940403               | 1410     | 2.91       | 0.074    | 13.6      | 58             | 64             | 0.54     | 1.00     | 4.64     | 32                 | 0.23  |
| 940403               | 1713     | 2.81       | 0.074    | 13.6      | 56             | 64             | 0.55     | 1.24     | 4.61     | 33                 | 0.43  |
| 940403               | 2010     | 2.66       | 0.074    | 13.6      | 56             | 61             | 0.56     | 1.01     | 4.63     | 38                 | 0.24  |
| 940404               | 0211     | 2.82       | 0.074    | 13.6      | 56             | 61             | 0.57     | 1.04     | 4.14     | 38                 | 0.09  |
| 940404               | 0513     | 2.82       | 0.083    | 12.0      | 54             | 61             | 0.49     | 1.27     | 5.61     | 28                 | 0.28  |
| 940404               | 0816     | 2.60       | 0.083    | 12.0      | 54             | 61             | 0.49     | 0.96     | 5.42     | 33                 | 0.22  |
| 940404               | 1113     | 2.58       | 0.083    | 12.0      | 58             | 59             | 0.50     | 1.14     | 5.68     | 31                 | 0.00  |

(Sheet 11 of 45)

Table A1 (Continued)

| Date   | Time<br>GMT | $H_{mo}$<br>m | $f_p$<br>Hz | $T_p$<br>sec | $\theta_p$<br>deg | $\theta_0$<br>deg | $\sigma$ | $\gamma$ | $\delta$ | $\Delta\theta$<br>deg | A     |
|--------|-------------|---------------|-------------|--------------|-------------------|-------------------|----------|----------|----------|-----------------------|-------|
| 940404 | 1413        | 2.44          | 0.093       | 10.7         | 54                | 56                | 0.55     | 1.11     | 4.75     | 37                    | 0.13  |
| 940404 | 1708        | 2.14          | 0.083       | 12.0         | 58                | 59                | 0.54     | 1.10     | 5.05     | 33                    | -0.01 |
| 940404 | 2013        | 2.02          | 0.083       | 12.0         | 48                | 59                | 0.53     | 1.24     | 5.25     | 33                    | 0.47  |
| 940405 | 0213        | 2.35          | 0.093       | 10.7         | 30                | 57                | 0.53     | 0.74     | 4.21     | 43                    | 0.12  |
| 940405 | 0508        | 2.38          | 0.093       | 10.7         | 60                | 55                | 0.49     | 0.84     | 5.20     | 35                    | -0.08 |
| 940405 | 0813        | 2.27          | 0.093       | 10.7         | 46                | 54                | 0.49     | 1.14     | 5.66     | 33                    | 0.41  |
| 940405 | 1146        | 2.23          | 0.093       | 10.7         | 46                | 55                | 0.49     | 1.09     | 5.78     | 33                    | 0.42  |
| 940405 | 1413        | 2.17          | 0.103       | 9.7          | 32                | 53                | 0.51     | 1.16     | 5.54     | 36                    | 0.33  |
| 940405 | 1713        | 2.16          | 0.103       | 9.7          | 54                | 54                | 0.53     | 1.01     | 5.17     | 36                    | 0.04  |
| 940406 | 0213        | 2.07          | 0.054       | 18.5         | 80                | 61                | 0.57     | 0.66     | 4.23     | 45                    | -0.19 |
| 940406 | 0511        | 2.32          | 0.054       | 18.5         | 80                | 61                | 0.58     | 0.77     | 4.00     | 46                    | -0.24 |
| 940406 | 0805        | 2.14          | 0.064       | 15.6         | 76                | 66                | 0.55     | 0.54     | 4.37     | 40                    | -0.52 |
| 940406 | 1115        | 2.20          | 0.064       | 15.6         | 70                | 69                | 0.54     | 0.99     | 5.09     | 28                    | -0.41 |
| 940406 | 1416        | 2.24          | 0.064       | 15.6         | 72                | 70                | 0.58     | 0.82     | 4.08     | 35                    | -0.65 |
| 940406 | 1716        | 2.32          | 0.064       | 15.6         | 74                | 69                | 0.58     | 0.94     | 4.40     | 31                    | -0.81 |
| 940406 | 2013        | 2.40          | 0.064       | 15.6         | 72                | 69                | 0.58     | 1.26     | 4.78     | 25                    | -0.62 |
| 940407 | 0213        | 2.28          | 0.064       | 15.6         | 70                | 78                | 0.55     | 1.57     | 5.12     | 22                    | 0.63  |
| 940407 | 0512        | 2.14          | 0.064       | 15.6         | 70                | 77                | 0.58     | 1.65     | 5.03     | 24                    | 0.48  |
| 940407 | 0816        | 2.39          | 0.074       | 13.6         | 70                | 73                | 0.62     | 1.30     | 3.88     | 36                    | 0.18  |
| 940407 | 1109        | 2.28          | 0.074       | 13.6         | 68                | 75                | 0.63     | 1.20     | 3.76     | 37                    | 0.22  |
| 940407 | 1411        | 2.21          | 0.074       | 13.6         | 66                | 74                | 0.63     | 1.59     | 4.07     | 30                    | 0.36  |
| 940407 | 1710        | 2.47          | 0.074       | 13.6         | 66                | 68                | 0.59     | 1.40     | 4.48     | 29                    | -0.02 |
| 940407 | 2012        | 2.49          | 0.074       | 13.6         | 62                | 70                | 0.68     | 1.09     | 3.30     | 42                    | 0.11  |
| 940408 | 0213        | 2.52          | 0.074       | 13.6         | 58                | 74                | 0.63     | 1.33     | 3.69     | 38                    | 0.34  |
| 940408 | 0513        | 2.46          | 0.074       | 13.6         | 60                | 70                | 0.62     | 1.45     | 4.14     | 35                    | 0.37  |
| 940408 | 0813        | 2.46          | 0.074       | 13.6         | 56                | 71                | 0.63     | 1.54     | 4.12     | 35                    | 0.60  |
| 940408 | 1109        | 2.18          | 0.074       | 13.6         | 56                | 73                | 0.67     | 1.26     | 3.54     | 41                    | 0.43  |
| 940408 | 1426        | 2.10          | 0.074       | 13.6         | 54                | 74                | 0.66     | 1.37     | 3.53     | 42                    | 0.52  |
| 940408 | 1729        | 1.98          | 0.083       | 12.0         | 64                | 79                | 0.67     | 1.05     | 3.09     | 50                    | 0.88  |
| 940408 | 2013        | 1.73          | 0.083       | 12.0         | 56                | 86                | 0.75     | 0.84     | 2.52     | 68                    | 0.79  |
| 940409 | 0213        | 1.59          | 0.083       | 12.0         | 62                | 79                | 0.67     | 1.17     | 3.37     | 48                    | 0.77  |
| 940409 | 0513        | 1.50          | 0.083       | 12.0         | 66                | 83                | 0.72     | 0.99     | 2.86     | 56                    | 0.88  |
| 940409 | 0813        | 1.50          | 0.083       | 12.0         | 60                | 85                | 0.76     | 0.99     | 2.74     | 61                    | 0.81  |
| 940409 | 1110        | 1.65          | 0.093       | 10.7         | 60                | 78                | 0.67     | 1.36     | 3.53     | 44                    | 0.80  |
| 940409 | 1413        | 1.91          | 0.093       | 10.7         | 60                | 73                | 0.64     | 1.23     | 3.63     | 42                    | 0.47  |
| 940409 | 1713        | 2.00          | 0.093       | 10.7         | 52                | 68                | 0.61     | 1.19     | 3.94     | 42                    | 0.29  |
| 940409 | 2013        | 2.58          | 0.142       | 7.0          | 60                | 62                | 0.55     | 1.02     | 4.52     | 39                    | 0.04  |
| 940410 | 0213        | 2.95          | 0.103       | 9.7          | 52                | 60                | 0.50     | 1.15     | 5.16     | 33                    | 0.23  |
| 940410 | 0513        | 2.63          | 0.093       | 10.7         | 52                | 62                | 0.52     | 0.95     | 5.01     | 37                    | -0.01 |
| 940410 | 0813        | 2.38          | 0.093       | 10.7         | 62                | 63                | 0.55     | 1.38     | 5.21     | 31                    | -0.04 |
| 940410 | 1113        | 2.31          | 0.093       | 10.7         | 58                | 64                | 0.53     | 1.76     | 5.89     | 27                    | 0.36  |
| 940410 | 1413        | 2.37          | 0.093       | 10.7         | 62                | 61                | 0.56     | 1.21     | 4.93     | 35                    | -0.16 |
| 940410 | 1713        | 2.63          | 0.093       | 10.7         | 62                | 62                | 0.57     | 0.96     | 4.36     | 40                    | -0.03 |
| 940410 | 2013        | 2.55          | 0.093       | 10.7         | 60                | 60                | 0.52     | 1.36     | 5.77     | 32                    | -0.01 |
| 940411 | 0213        | 2.28          | 0.103       | 9.7          | 56                | 65                | 0.53     | 1.86     | 6.37     | 30                    | 0.36  |
| 940411 | 0513        | 2.29          | 0.103       | 9.7          | 76                | 69                | 0.54     | 1.17     | 5.49     | 33                    | -0.10 |
| 940411 | 0813        | 2.04          | 0.103       | 9.7          | 54                | 72                | 0.62     | 1.49     | 4.51     | 37                    | 0.10  |
| 940411 | 1103        | 1.95          | 0.103       | 9.7          | 54                | 71                | 0.61     | 1.60     | 4.84     | 38                    | 0.40  |
| 940411 | 1403        | 1.89          | 0.103       | 9.7          | 54                | 68                | 0.67     | 1.44     | 3.93     | 48                    | 0.66  |
| 940411 | 1703        | 1.78          | 0.074       | 13.6         | 62                | 69                | 0.68     | 1.16     | 4.20     | 40                    | 0.21  |
| 940411 | 2003        | 1.66          | 0.074       | 13.6         | 66                | 70                | 0.72     | 1.19     | 3.68     | 37                    | 0.23  |
| 940412 | 0203        | 1.44          | 0.074       | 13.6         | 62                | 79                | 0.77     | 1.52     | 3.15     | 53                    | 1.23  |

(Sheet 12 of 45)

| Table A1 (Continued) |          |               |             |              |                   |                   |          |          |          |                       |       |
|----------------------|----------|---------------|-------------|--------------|-------------------|-------------------|----------|----------|----------|-----------------------|-------|
| Date                 | Time GMT | $H_{mo}$<br>m | $f_p$<br>Hz | $T_p$<br>sec | $\theta_p$<br>deg | $\theta_o$<br>deg | $\sigma$ | $\gamma$ | $\delta$ | $\Delta\theta$<br>deg | A     |
| 940412               | 0503     | 1.42          | 0.074       | 13.6         | 64                | 78                | 0.75     | 1.74     | 3.49     | 38                    | 0.64  |
| 940412               | 0803     | 1.38          | 0.064       | 15.6         | 62                | 75                | 0.74     | 1.63     | 3.50     | 40                    | 0.50  |
| 940412               | 1103     | 1.47          | 0.074       | 13.6         | 66                | 79                | 0.75     | 1.25     | 2.94     | 52                    | 1.00  |
| 940412               | 1359     | 1.35          | 0.074       | 13.6         | 58                | 80                | 0.80     | 1.50     | 2.99     | 53                    | 0.84  |
| 940412               | 1702     | 1.38          | 0.074       | 13.6         | 66                | 77                | 0.65     | 1.39     | 4.06     | 35                    | 0.50  |
| 940412               | 2003     | 1.42          | 0.074       | 13.6         | 64                | 75                | 0.67     | 1.87     | 4.26     | 31                    | 0.49  |
| 940413               | 0159     | 1.51          | 0.083       | 12.0         | 58                | 68                | 0.67     | 2.01     | 4.41     | 34                    | 0.26  |
| 940413               | 0503     | 1.53          | 0.083       | 12.0         | 60                | 69                | 0.71     | 1.89     | 3.97     | 39                    | 0.41  |
| 940413               | 0803     | 1.72          | 0.083       | 12.0         | 66                | 63                | 0.64     | 1.75     | 4.90     | 34                    | -0.10 |
| 940413               | 1102     | 1.76          | 0.083       | 12.0         | 58                | 61                | 0.61     | 1.74     | 5.23     | 32                    | 0.10  |
| 940413               | 1358     | 1.93          | 0.132       | 7.6          | 56                | 58                | 0.56     | 2.02     | 6.34     | 26                    | 0.06  |
| 940413               | 1703     | 2.10          | 0.132       | 7.6          | 56                | 54                | 0.55     | 1.24     | 6.01     | 34                    | -0.11 |
| 940413               | 2003     | 2.37          | 0.123       | 8.2          | 68                | 56                | 0.56     | 0.87     | 5.27     | 38                    | -0.23 |
| 940414               | 0203     | 2.25          | 0.083       | 12.0         | 52                | 56                | 0.55     | 1.70     | 6.18     | 28                    | 0.10  |
| 940414               | 1103     | 2.57          | 0.093       | 10.7         | 52                | 57                | 0.52     | 1.62     | 6.72     | 30                    | 0.11  |
| 940414               | 1406     | 2.36          | 0.083       | 12.0         | 48                | 57                | 0.56     | 2.30     | 6.50     | 28                    | 0.41  |
| 940414               | 1659     | 2.14          | 0.083       | 12.0         | 52                | 55                | 0.61     | 2.23     | 5.87     | 31                    | 0.21  |
| 940414               | 2006     | 2.14          | 0.093       | 10.7         | 52                | 54                | 0.63     | 1.89     | 5.31     | 38                    | 0.07  |
| 940415               | 0156     | 2.02          | 0.093       | 10.7         | 48                | 58                | 0.60     | 2.65     | 5.95     | 27                    | 0.31  |
| 940415               | 0506     | 1.90          | 0.103       | 9.7          | 44                | 63                | 0.66     | 2.03     | 4.59     | 38                    | 0.52  |
| 940415               | 0806     | 1.74          | 0.093       | 10.7         | 64                | 70                | 0.71     | 1.91     | 4.00     | 36                    | 0.19  |
| 940415               | 1106     | 1.83          | 0.093       | 10.7         | 58                | 68                | 0.71     | 2.25     | 4.12     | 34                    | 0.30  |
| 940415               | 2006     | 1.36          | 0.093       | 10.7         | 48                | 73                | 0.83     | 1.70     | 2.98     | 58                    | 0.89  |
| 940415               | 2306     | 1.50          | 0.093       | 10.7         | 58                | 71                | 0.80     | 2.01     | 3.38     | 42                    | 0.83  |
| 940416               | 0206     | 1.57          | 0.074       | 13.6         | 48                | 68                | 0.76     | 2.47     | 3.65     | 36                    | 1.05  |
| 940416               | 0506     | 1.46          | 0.074       | 13.6         | 50                | 69                | 0.78     | 2.43     | 3.59     | 41                    | 1.20  |
| 940416               | 0803     | 1.37          | 0.074       | 13.6         | 52                | 73                | 0.78     | 2.15     | 3.38     | 45                    | 0.99  |
| 940416               | 1106     | 1.51          | 0.074       | 13.6         | 46                | 69                | 0.81     | 2.16     | 3.26     | 48                    | 0.97  |
| 940416               | 1706     | 1.52          | 0.083       | 12.0         | 54                | 70                | 0.75     | 2.37     | 3.79     | 36                    | 1.01  |
| 940416               | 2007     | 1.54          | 0.083       | 12.0         | 66                | 77                | 0.75     | 1.72     | 3.36     | 40                    | 0.56  |
| 940417               | 0204     | 1.49          | 0.083       | 12.0         | 50                | 70                | 0.77     | 2.25     | 3.68     | 39                    | 0.63  |
| 940417               | 0751     | 1.38          | 0.083       | 12.0         | 50                | 76                | 0.81     | 1.69     | 2.92     | 55                    | 0.76  |
| 940417               | 1103     | 1.32          | 0.083       | 12.0         | 58                | 77                | 0.75     | 1.79     | 3.20     | 45                    | 1.08  |
| 940417               | 1403     | 1.28          | 0.083       | 12.0         | 58                | 78                | 0.74     | 1.68     | 3.26     | 44                    | 0.93  |
| 940417               | 1701     | 1.28          | 0.083       | 12.0         | 60                | 77                | 0.76     | 1.63     | 3.15     | 48                    | 1.02  |
| 940418               | 0501     | 0.92          | 0.083       | 12.0         | 48                | 90                | 0.90     | 0.83     | 1.92     | 99                    | 1.33  |
| 940418               | 0808     | 0.92          | 0.074       | 13.6         | 60                | 92                | 0.88     | 0.64     | 1.99     | 93                    | 0.96  |
| 940418               | 1148     | 0.93          | 0.093       | 10.7         | 68                | 87                | 0.82     | 1.11     | 2.54     | 73                    | 1.15  |
| 940418               | 1407     | 0.97          | 0.083       | 12.0         | 60                | 83                | 0.83     | 1.14     | 2.56     | 71                    | 1.14  |
| 940418               | 2005     | 1.53          | 0.162       | 6.2          | 62                | 66                | 0.70     | 1.22     | 3.69     | 41                    | -0.03 |
| 940419               | 1012     | 2.96          | 0.074       | 13.6         | 70                | 59                | 0.58     | 0.62     | 4.72     | 37                    | -0.46 |
| 940419               | 1401     | 3.09          | 0.083       | 12.0         | 74                | 62                | 0.54     | 0.34     | 4.61     | 36                    | -0.39 |
| 940419               | 1705     | 3.06          | 0.083       | 12.0         | 64                | 60                | 0.53     | 0.71     | 5.56     | 32                    | -0.15 |
| 940419               | 2002     | 2.97          | 0.083       | 12.0         | 66                | 60                | 0.51     | 0.73     | 5.52     | 32                    | -0.14 |
| 940420               | 0203     | 2.69          | 0.132       | 7.6          | 60                | 58                | 0.51     | 1.23     | 5.91     | 30                    | -0.17 |
| 940420               | 0503     | 2.64          | 0.123       | 8.2          | 64                | 64                | 0.49     | 1.21     | 6.07     | 29                    | -0.10 |
| 940420               | 0803     | 2.37          | 0.132       | 7.6          | 60                | 65                | 0.53     | 1.73     | 6.30     | 30                    | 0.20  |
| 940420               | 1406     | 2.34          | 0.132       | 7.6          | 60                | 61                | 0.52     | 1.34     | 6.22     | 30                    | -0.01 |
| 940420               | 1710     | 2.24          | 0.132       | 7.6          | 64                | 63                | 0.52     | 1.02     | 5.90     | 28                    | -0.11 |
| 940420               | 2006     | 2.14          | 0.132       | 7.6          | 58                | 63                | 0.50     | 1.11     | 5.70     | 29                    | 0.22  |
| 940421               | 0203     | 1.89          | 0.132       | 7.6          | 64                | 64                | 0.54     | 0.98     | 5.19     | 33                    | -0.02 |

(Sheet 13 of 45)

Table A1 (Continued)

| Date   | Time<br>GMT | $H_{mo}$<br>m | $f_p$<br>Hz | $T_p$<br>sec | $\theta_p$<br>deg | $\theta_o$<br>deg | $\sigma$ | $\gamma$ | $\delta$ | $\Delta\theta$<br>deg | A     |
|--------|-------------|---------------|-------------|--------------|-------------------|-------------------|----------|----------|----------|-----------------------|-------|
| 940421 | 0503        | 1.86          | 0.142       | 7.0          | 62                | 62                | 0.55     | 1.05     | 5.22     | 34                    | 0.03  |
| 940421 | 0836        | 1.63          | 0.152       | 6.6          | 58                | 64                | 0.57     | 1.58     | 5.14     | 32                    | 0.28  |
| 940421 | 1106        | 1.34          | 0.152       | 6.6          | 56                | 66                | 0.64     | 1.55     | 4.18     | 39                    | 0.48  |
| 940421 | 1406        | 1.17          | 0.162       | 6.2          | 62                | 71                | 0.67     | 1.37     | 3.92     | 40                    | 0.30  |
| 940421 | 1711        | 1.19          | 0.162       | 6.2          | 66                | 72                | 0.66     | 1.35     | 4.05     | 37                    | 0.36  |
| 940421 | 2006        | 1.40          | 0.162       | 6.2          | 62                | 66                | 0.61     | 1.33     | 4.57     | 34                    | 0.32  |
| 940422 | 0204        | 2.45          | 0.123       | 8.2          | 66                | 61                | 0.48     | 0.92     | 5.74     | 33                    | -0.24 |
| 940422 | 0506        | 2.33          | 0.123       | 8.2          | 76                | 66                | 0.50     | 1.08     | 5.79     | 32                    | -0.18 |
| 940422 | 0806        | 2.42          | 0.074       | 13.6         | 74                | 66                | 0.47     | 1.06     | 6.63     | 27                    | -0.32 |
| 940422 | 1106        | 2.48          | 0.074       | 13.6         | 64                | 66                | 0.46     | 1.28     | 7.35     | 25                    | 0.03  |
| 940422 | 1406        | 2.61          | 0.074       | 13.6         | 76                | 70                | 0.44     | 0.77     | 7.00     | 25                    | -0.17 |
| 940422 | 1702        | 2.36          | 0.074       | 13.6         | 70                | 68                | 0.49     | 0.84     | 6.08     | 27                    | -0.07 |
| 940422 | 2002        | 2.16          | 0.074       | 13.6         | 64                | 69                | 0.50     | 1.29     | 6.74     | 25                    | 0.09  |
| 940423 | 0202        | 2.48          | 0.083       | 12.0         | 68                | 71                | 0.48     | 1.02     | 6.44     | 25                    | 0.03  |
| 940423 | 0502        | 2.45          | 0.083       | 12.0         | 68                | 70                | 0.45     | 1.17     | 7.88     | 20                    | 0.08  |
| 940423 | 0802        | 2.34          | 0.083       | 12.0         | 66                | 69                | 0.45     | 1.84     | 8.49     | 18                    | 0.10  |
| 940423 | 1102        | 2.12          | 0.083       | 12.0         | 62                | 69                | 0.52     | 1.75     | 6.61     | 24                    | 0.32  |
| 940423 | 1402        | 1.85          | 0.083       | 12.0         | 68                | 72                | 0.55     | 1.47     | 5.57     | 27                    | 0.12  |
| 940423 | 1702        | 1.69          | 0.083       | 12.0         | 74                | 75                | 0.61     | 1.26     | 4.89     | 25                    | 0.01  |
| 940423 | 2002        | 1.54          | 0.083       | 12.0         | 68                | 76                | 0.59     | 1.93     | 5.36     | 23                    | 0.46  |
| 940424 | 0202        | 2.17          | 0.083       | 12.0         | 74                | 70                | 0.51     | 0.95     | 5.57     | 30                    | -0.20 |
| 940424 | 0502        | 2.25          | 0.093       | 10.7         | 70                | 68                | 0.52     | 0.78     | 4.98     | 33                    | -0.14 |
| 940424 | 0802        | 2.35          | 0.093       | 10.7         | 56                | 66                | 0.54     | 1.12     | 5.08     | 35                    | 0.14  |
| 940424 | 1102        | 2.53          | 0.093       | 10.7         | 58                | 68                | 0.52     | 1.10     | 5.21     | 33                    | 0.16  |
| 940424 | 1359        | 2.73          | 0.093       | 10.7         | 78                | 69                | 0.53     | 0.89     | 4.84     | 36                    | -0.08 |
| 940424 | 1702        | 2.79          | 0.093       | 10.7         | 52                | 66                | 0.56     | 0.87     | 4.39     | 44                    | 0.18  |
| 940424 | 2000        | 2.68          | 0.093       | 10.7         | 56                | 67                | 0.58     | 1.05     | 4.76     | 37                    | 0.15  |
| 940425 | 0159        | 2.33          | 0.093       | 10.7         | 58                | 70                | 0.55     | 1.40     | 5.15     | 34                    | 0.38  |
| 940425 | 0459        | 2.20          | 0.064       | 15.6         | 56                | 73                | 0.63     | 1.48     | 4.20     | 40                    | 0.58  |
| 940425 | 0803        | 1.99          | 0.093       | 10.7         | 64                | 77                | 0.69     | 1.31     | 3.69     | 44                    | 0.60  |
| 940425 | 1102        | 2.15          | 0.074       | 13.6         | 60                | 76                | 0.63     | 1.25     | 3.82     | 40                    | 0.65  |
| 940425 | 1403        | 2.28          | 0.074       | 13.6         | 60                | 77                | 0.63     | 1.02     | 3.71     | 45                    | 0.52  |
| 940425 | 1703        | 2.27          | 0.113       | 8.9          | 76                | 78                | 0.60     | 1.01     | 4.27     | 34                    | 0.06  |
| 940425 | 2002        | 2.24          | 0.113       | 8.9          | 70                | 75                | 0.60     | 1.32     | 4.73     | 28                    | 0.20  |
| 940425 | 2302        | 2.55          | 0.093       | 10.7         | 58                | 70                | 0.57     | 1.63     | 5.07     | 30                    | 0.33  |
| 940426 | 0202        | 3.61          | 0.074       | 13.6         | 54                | 65                | 0.49     | 1.44     | 5.95     | 29                    | 0.66  |
| 940426 | 0502        | 4.06          | 0.074       | 13.6         | 52                | 64                | 0.50     | 1.38     | 5.73     | 31                    | 0.65  |
| 940426 | 0802        | 3.95          | 0.064       | 15.6         | 68                | 67                | 0.51     | 1.16     | 6.12     | 27                    | -0.01 |
| 940426 | 1102        | 3.83          | 0.074       | 13.6         | 58                | 65                | 0.49     | 1.35     | 6.69     | 25                    | 0.20  |
| 940426 | 1403        | 4.03          | 0.064       | 15.6         | 56                | 65                | 0.50     | 1.15     | 6.35     | 29                    | 0.31  |
| 940426 | 1703        | 3.87          | 0.064       | 15.6         | 58                | 67                | 0.54     | 1.36     | 5.58     | 30                    | 0.34  |
| 940426 | 2003        | 3.46          | 0.074       | 13.6         | 52                | 65                | 0.54     | 1.31     | 5.64     | 32                    | 0.12  |
| 940427 | 0203        | 3.62          | 0.074       | 13.6         | 56                | 64                | 0.50     | 1.32     | 6.12     | 28                    | 0.37  |
| 940427 | 0503        | 3.72          | 0.083       | 12.0         | 64                | 67                | 0.49     | 1.09     | 6.19     | 29                    | 0.08  |
| 940427 | 1010        | 3.22          | 0.083       | 12.0         | 58                | 62                | 0.54     | 1.45     | 5.97     | 31                    | 0.18  |
| 940427 | 1354        | 3.18          | 0.083       | 12.0         | 54                | 60                | 0.55     | 1.36     | 5.20     | 35                    | 0.28  |
| 940427 | 1652        | 3.27          | 0.083       | 12.0         | 48                | 62                | 0.59     | 1.18     | 4.40     | 44                    | 0.85  |
| 940427 | 1952        | 3.08          | 0.093       | 10.7         | 56                | 59                | 0.57     | 1.43     | 5.22     | 35                    | 0.05  |
| 940428 | 0152        | 3.07          | 0.093       | 10.7         | 42                | 57                | 0.53     | 1.37     | 5.50     | 35                    | 0.42  |
| 940428 | 0453        | 3.01          | 0.093       | 10.7         | 56                | 64                | 0.55     | 1.27     | 5.04     | 37                    | 0.54  |
| 940428 | 0752        | 2.46          | 0.093       | 10.7         | 54                | 65                | 0.58     | 1.18     | 4.87     | 40                    | 0.47  |
| 940429 | 0158        | 1.46          | 0.103       | 9.7          | 58                | 66                | 0.68     | 1.34     | 3.77     | 45                    | 0.31  |

(Sheet 14 of 45)

Table A1 (Continued)

| Date   | Time<br>GMT | $H_{mo}$<br>m | $f_p$<br>Hz | $T_p$<br>sec | $\theta_p$<br>deg | $\theta_0$<br>deg | $\sigma$ | $\gamma$ | $\delta$ | $\Delta\theta$<br>deg | A     |
|--------|-------------|---------------|-------------|--------------|-------------------|-------------------|----------|----------|----------|-----------------------|-------|
| 940429 | 0458        | 1.35          | 0.103       | 9.7          | 58                | 70                | 0.71     | 0.85     | 3.07     | 56                    | 0.17  |
| 940429 | 0758        | 1.18          | 0.103       | 9.7          | 94                | 76                | 0.73     | 0.75     | 2.92     | 55                    | -0.26 |
| 940429 | 1147        | 1.02          | 0.103       | 9.7          | 88                | 79                | 0.72     | 1.00     | 3.24     | 48                    | -0.02 |
| 940429 | 1658        | 1.11          | 0.162       | 6.2          | 98                | 86                | 0.72     | 0.60     | 2.73     | 53                    | -0.38 |
| 940429 | 1958        | 1.22          | 0.152       | 6.6          | 98                | 77                | 0.69     | 0.60     | 2.91     | 54                    | -0.09 |
| 940430 | 0158        | 1.19          | 0.162       | 6.2          | 58                | 72                | 0.67     | 0.94     | 3.65     | 45                    | 0.24  |
| 940430 | 0458        | 1.24          | 0.162       | 6.2          | 58                | 75                | 0.65     | 0.69     | 3.45     | 45                    | 0.14  |
| 940430 | 0758        | 1.39          | 0.152       | 6.6          | 56                | 71                | 0.65     | 0.64     | 3.31     | 49                    | 0.27  |
| 940430 | 1058        | 1.36          | 0.162       | 6.2          | 84                | 74                | 0.64     | 0.95     | 3.73     | 43                    | 0.00  |
| 940430 | 1358        | 1.32          | 0.074       | 13.6         | 82                | 77                | 0.59     | 0.92     | 4.29     | 36                    | -0.09 |
| 940430 | 1658        | 1.34          | 0.074       | 13.6         | 58                | 76                | 0.64     | 0.45     | 3.49     | 43                    | 0.06  |
| 940430 | 1958        | 1.55          | 0.074       | 13.6         | 64                | 71                | 0.60     | 0.35     | 3.91     | 42                    | 0.03  |
| 940501 | 0458        | 1.82          | 0.083       | 12.0         | 52                | 62                | 0.54     | 0.86     | 4.70     | 37                    | 0.37  |
| 940501 | 0758        | 1.82          | 0.162       | 6.2          | 52                | 60                | 0.55     | 0.70     | 4.18     | 40                    | 0.33  |
| 940501 | 1058        | 1.72          | 0.083       | 12.0         | 56                | 66                | 0.52     | 0.84     | 5.25     | 36                    | 0.19  |
| 940501 | 1358        | 1.71          | 0.083       | 12.0         | 58                | 65                | 0.52     | 0.95     | 5.32     | 32                    | 0.30  |
| 940501 | 1658        | 1.92          | 0.162       | 6.2          | 54                | 64                | 0.56     | 0.53     | 3.75     | 43                    | 0.48  |
| 940501 | 1958        | 2.33          | 0.142       | 7.0          | 54                | 60                | 0.55     | 0.47     | 3.80     | 42                    | 0.21  |
| 940502 | 0158        | 2.28          | 0.132       | 7.6          | 58                | 57                | 0.46     | 0.74     | 5.82     | 32                    | -0.07 |
| 940502 | 0458        | 2.21          | 0.123       | 8.2          | 52                | 58                | 0.48     | 0.90     | 5.45     | 31                    | 0.22  |
| 940502 | 0758        | 2.29          | 0.123       | 8.2          | 52                | 60                | 0.46     | 0.74     | 5.66     | 29                    | 0.25  |
| 940502 | 1058        | 2.22          | 0.123       | 8.2          | 52                | 60                | 0.47     | 0.66     | 5.45     | 34                    | 0.56  |
| 940502 | 1405        | 2.19          | 0.142       | 7.0          | 54                | 59                | 0.48     | 0.75     | 5.50     | 33                    | 0.25  |
| 940502 | 1658        | 2.05          | 0.152       | 6.6          | 50                | 53                | 0.52     | 0.85     | 4.63     | 38                    | 0.14  |
| 940503 | 0158        | 2.32          | 0.132       | 7.6          | 52                | 52                | 0.47     | 0.73     | 4.85     | 33                    | 0.09  |
| 940503 | 0458        | 1.94          | 0.142       | 7.0          | 50                | 55                | 0.50     | 0.69     | 4.58     | 35                    | 0.12  |
| 940503 | 0758        | 1.69          | 0.152       | 6.6          | 48                | 58                | 0.54     | 0.77     | 4.34     | 41                    | 0.66  |
| 940503 | 1054        | 1.56          | 0.152       | 6.6          | 46                | 57                | 0.53     | 1.08     | 4.88     | 34                    | 0.75  |
| 940503 | 1652        | 1.32          | 0.093       | 10.7         | 56                | 63                | 0.55     | 0.94     | 4.88     | 34                    | 0.43  |
| 940503 | 1953        | 1.32          | 0.103       | 9.7          | 52                | 64                | 0.56     | 0.93     | 4.91     | 36                    | 0.81  |
| 940504 | 0141        | 1.84          | 0.152       | 6.6          | 56                | 56                | 0.48     | 0.84     | 5.16     | 29                    | -0.06 |
| 940505 | 1921        | 1.34          | 0.064       | 15.6         | 66                | 68                | 0.53     | 1.47     | 6.81     | 27                    | 0.22  |
| 940506 | 0146        | 1.49          | 0.064       | 15.6         | 70                | 72                | 0.50     | 1.15     | 5.91     | 26                    | 0.26  |
| 940506 | 0452        | 1.38          | 0.064       | 15.6         | 66                | 76                | 0.58     | 1.28     | 4.81     | 33                    | 0.40  |
| 940506 | 0752        | 1.50          | 0.064       | 15.6         | 68                | 74                | 0.57     | 1.55     | 5.34     | 29                    | 0.44  |
| 940506 | 1652        | 1.77          | 0.103       | 9.7          | 64                | 72                | 0.51     | 1.20     | 6.10     | 27                    | 0.46  |
| 940506 | 1950        | 1.71          | 0.074       | 13.6         | 64                | 75                | 0.59     | 1.35     | 5.00     | 34                    | 0.68  |
| 940507 | 0152        | 1.64          | 0.103       | 9.7          | 60                | 73                | 0.57     | 1.16     | 4.79     | 38                    | 0.77  |
| 940507 | 0452        | 1.67          | 0.103       | 9.7          | 62                | 74                | 0.57     | 1.03     | 4.71     | 38                    | 0.50  |
| 940507 | 0752        | 1.76          | 0.103       | 9.7          | 62                | 78                | 0.56     | 0.84     | 4.29     | 42                    | 0.60  |
| 940507 | 1052        | 1.75          | 0.103       | 9.7          | 58                | 80                | 0.60     | 0.89     | 4.02     | 46                    | 0.34  |
| 940507 | 1352        | 1.72          | 0.113       | 8.9          | 108               | 83                | 0.61     | 0.48     | 3.57     | 51                    | -0.09 |
| 940507 | 1652        | 1.61          | 0.113       | 8.9          | 106               | 84                | 0.62     | 0.33     | 3.56     | 49                    | -0.32 |
| 940507 | 1952        | 1.58          | 0.103       | 9.7          | 62                | 80                | 0.62     | 0.71     | 3.73     | 48                    | 0.42  |
| 940508 | 0152        | 1.21          | 0.103       | 9.7          | 56                | 80                | 0.67     | 1.03     | 3.56     | 49                    | 0.26  |
| 940508 | 0453        | 1.23          | 0.093       | 10.7         | 56                | 76                | 0.71     | 1.01     | 3.38     | 52                    | 0.63  |
| 940508 | 0752        | 1.12          | 0.103       | 9.7          | 56                | 78                | 0.69     | 1.07     | 3.52     | 48                    | 0.35  |
| 940508 | 1042        | 1.20          | 0.093       | 10.7         | 52                | 76                | 0.72     | 1.37     | 3.29     | 53                    | 1.08  |
| 940508 | 1345        | 1.28          | 0.093       | 10.7         | 62                | 76                | 0.63     | 1.21     | 4.09     | 42                    | 0.74  |
| 940508 | 1652        | 1.26          | 0.064       | 15.6         | 66                | 74                | 0.65     | 1.11     | 3.91     | 43                    | 0.58  |
| 940508 | 1945        | 1.27          | 0.064       | 15.6         | 62                | 70                | 0.64     | 1.21     | 4.26     | 38                    | 0.74  |

(Sheet 15 of 45)

Table A1 (Continued)

| Date   | Time<br>GMT | $H_{mo}$<br>m | $f_p$<br>Hz | $T_p$<br>sec | $\theta_p$<br>deg | $\theta_o$<br>deg | $\sigma$ | $\gamma$ | $\delta$ | $\Delta\theta$<br>deg | A    |
|--------|-------------|---------------|-------------|--------------|-------------------|-------------------|----------|----------|----------|-----------------------|------|
| 940509 | 0152        | 1.93          | 0.074       | 13.6         | 56                | 60                | 0.59     | 1.40     | 4.87     | 34                    | 0.25 |
| 940509 | 0452        | 1.78          | 0.074       | 13.6         | 56                | 68                | 0.61     | 1.17     | 4.22     | 40                    | 0.58 |
| 940509 | 0752        | 1.70          | 0.074       | 13.6         | 60                | 69                | 0.63     | 0.91     | 3.79     | 48                    | 0.54 |
| 940509 | 1052        | 1.68          | 0.074       | 13.6         | 56                | 76                | 0.65     | 0.74     | 3.36     | 52                    | 0.87 |
| 940509 | 1353        | 1.60          | 0.074       | 13.6         | 54                | 79                | 0.68     | 0.74     | 3.13     | 57                    | 0.53 |
| 940509 | 1653        | 1.38          | 0.083       | 12.0         | 54                | 76                | 0.67     | 1.02     | 3.48     | 51                    | 0.71 |
| 940509 | 1953        | 1.31          | 0.074       | 13.6         | 54                | 75                | 0.70     | 1.42     | 3.72     | 41                    | 0.43 |
| 940510 | 0152        | 1.66          | 0.064       | 15.6         | 62                | 76                | 0.62     | 1.43     | 4.22     | 37                    | 0.88 |
| 940510 | 0452        | 1.82          | 0.074       | 13.6         | 62                | 75                | 0.59     | 1.58     | 4.90     | 31                    | 0.74 |
| 940510 | 0758        | 1.83          | 0.074       | 13.6         | 68                | 73                | 0.54     | 1.81     | 6.04     | 19                    | 0.41 |
| 940510 | 1052        | 1.88          | 0.074       | 13.6         | 64                | 75                | 0.58     | 1.43     | 4.66     | 31                    | 0.91 |
| 940510 | 1352        | 1.89          | 0.074       | 13.6         | 64                | 71                | 0.58     | 1.48     | 4.98     | 27                    | 0.46 |
| 940510 | 1652        | 2.05          | 0.074       | 13.6         | 60                | 73                | 0.60     | 1.67     | 5.07     | 32                    | 0.19 |
| 940510 | 1944        | 1.92          | 0.074       | 13.6         | 62                | 72                | 0.62     | 1.82     | 4.85     | 30                    | 0.34 |
| 940511 | 0152        | 1.74          | 0.083       | 12.0         | 56                | 76                | 0.72     | 1.38     | 3.32     | 47                    | 0.76 |
| 940511 | 0452        | 1.95          | 0.083       | 12.0         | 68                | 77                | 0.66     | 1.50     | 3.97     | 36                    | 0.27 |
| 940511 | 0753        | 2.15          | 0.083       | 12.0         | 60                | 67                | 0.64     | 1.86     | 4.58     | 36                    | 0.10 |
| 940511 | 1350        | 2.11          | 0.162       | 6.2          | 62                | 68                | 0.69     | 1.41     | 3.58     | 47                    | 0.27 |
| 940511 | 1652        | 2.22          | 0.132       | 7.6          | 52                | 63                | 0.65     | 1.19     | 3.93     | 47                    | 0.40 |
| 940512 | 0153        | 2.37          | 0.123       | 8.2          | 40                | 61                | 0.65     | 1.97     | 4.51     | 39                    | 0.34 |
| 940512 | 0453        | 2.36          | 0.123       | 8.2          | 46                | 58                | 0.66     | 2.28     | 4.86     | 36                    | 0.53 |
| 940512 | 0754        | 2.18          | 0.123       | 8.2          | 42                | 66                | 0.71     | 1.93     | 3.77     | 45                    | 0.59 |
| 940512 | 1053        | 2.00          | 0.123       | 8.2          | 50                | 66                | 0.75     | 1.89     | 3.62     | 50                    | 0.79 |
| 940512 | 1358        | 2.20          | 0.123       | 8.2          | 48                | 67                | 0.75     | 1.85     | 3.57     | 49                    | 0.76 |
| 940512 | 1719        | 2.26          | 0.113       | 8.9          | 48                | 64                | 0.75     | 1.79     | 3.59     | 48                    | 0.56 |
| 940512 | 1957        | 2.66          | 0.113       | 8.9          | 46                | 56                | 0.63     | 2.13     | 5.06     | 35                    | 0.44 |
| 940513 | 0458        | 3.01          | 0.103       | 9.7          | 50                | 58                | 0.55     | 1.65     | 5.55     | 34                    | 0.27 |
| 940513 | 0759        | 3.31          | 0.103       | 9.7          | 60                | 60                | 0.52     | 1.42     | 6.02     | 32                    | 0.03 |
| 940513 | 1057        | 3.12          | 0.103       | 9.7          | 58                | 62                | 0.52     | 1.24     | 5.65     | 33                    | 0.19 |
| 940513 | 1703        | 3.76          | 0.083       | 12.0         | 58                | 63                | 0.49     | 1.13     | 6.34     | 30                    | 0.10 |
| 940513 | 2000        | 3.54          | 0.093       | 10.7         | 52                | 59                | 0.52     | 1.42     | 6.30     | 31                    | 0.29 |
| 940513 | 2300        | 3.46          | 0.093       | 10.7         | 54                | 59                | 0.50     | 1.29     | 6.51     | 32                    | 0.18 |
| 940514 | 0200        | 3.03          | 0.103       | 9.7          | 58                | 62                | 0.52     | 1.37     | 6.16     | 30                    | 0.28 |
| 940514 | 0500        | 3.09          | 0.103       | 9.7          | 58                | 63                | 0.53     | 1.14     | 5.46     | 32                    | 0.40 |
| 940514 | 2301        | 2.23          | 0.132       | 7.6          | 50                | 60                | 0.58     | 1.95     | 5.70     | 32                    | 0.43 |
| 940515 | 0500        | 2.01          | 0.093       | 10.7         | 56                | 65                | 0.67     | 1.56     | 4.10     | 44                    | 0.50 |
| 940515 | 0802        | 1.76          | 0.093       | 10.7         | 58                | 68                | 0.66     | 1.43     | 4.00     | 43                    | 0.54 |
| 940515 | 1101        | 1.54          | 0.093       | 10.7         | 60                | 77                | 0.73     | 1.63     | 3.60     | 44                    | 0.92 |
| 940515 | 1401        | 1.65          | 0.064       | 15.6         | 58                | 73                | 0.78     | 1.62     | 3.30     | 49                    | 0.74 |
| 940515 | 1701        | 1.74          | 0.074       | 13.6         | 64                | 72                | 0.68     | 1.82     | 4.34     | 32                    | 0.55 |
| 940515 | 2001        | 1.83          | 0.074       | 13.6         | 64                | 68                | 0.62     | 1.55     | 5.03     | 30                    | 0.14 |
| 940515 | 2302        | 1.90          | 0.162       | 6.2          | 62                | 66                | 0.62     | 1.51     | 4.81     | 34                    | 0.12 |
| 940516 | 0501        | 2.19          | 0.142       | 7.0          | 58                | 68                | 0.55     | 1.17     | 5.03     | 32                    | 0.26 |
| 940516 | 0805        | 2.60          | 0.083       | 12.0         | 58                | 63                | 0.47     | 1.54     | 6.94     | 22                    | 0.38 |
| 940516 | 1056        | 2.48          | 0.083       | 12.0         | 56                | 62                | 0.49     | 1.84     | 7.00     | 23                    | 0.38 |
| 940516 | 1401        | 2.38          | 0.083       | 12.0         | 58                | 63                | 0.52     | 1.32     | 5.93     | 27                    | 0.22 |
| 940516 | 1957        | 2.09          | 0.093       | 10.7         | 52                | 61                | 0.56     | 1.60     | 5.71     | 31                    | 0.44 |
| 940517 | 0157        | 1.92          | 0.093       | 10.7         | 58                | 66                | 0.57     | 2.19     | 6.03     | 26                    | 0.43 |
| 940517 | 1955        | 2.21          | 0.103       | 9.7          | 64                | 75                | 0.53     | 1.16     | 5.32     | 31                    | 0.38 |
| 940518 | 0154        | 1.97          | 0.093       | 10.7         | 58                | 74                | 0.61     | 1.34     | 4.41     | 42                    | 0.97 |
| 940518 | 0756        | 2.16          | 0.103       | 9.7          | 54                | 69                | 0.58     | 1.53     | 5.11     | 37                    | 0.74 |

(Sheet 16 of 45)

| Table A1 (Continued) |          |               |             |              |                   |                   |          |          |          |                       |      |
|----------------------|----------|---------------|-------------|--------------|-------------------|-------------------|----------|----------|----------|-----------------------|------|
| Date                 | Time GMT | $H_{mo}$<br>m | $f_p$<br>Hz | $T_p$<br>sec | $\theta_p$<br>deg | $\theta_o$<br>deg | $\sigma$ | $\gamma$ | $\delta$ | $\Delta\theta$<br>deg | A    |
| 940519               | 0200     | 2.06          | 0.103       | 9.7          | 60                | 71                | 0.65     | 1.94     | 4.49     | 33                    | 0.60 |
| 940519               | 0801     | 1.74          | 0.064       | 15.6         | 58                | 69                | 0.69     | 2.38     | 4.44     | 33                    | 0.73 |
| 940519               | 1121     | 1.76          | 0.064       | 15.6         | 62                | 66                | 0.66     | 2.00     | 4.57     | 31                    | 0.35 |
| 940519               | 1402     | 1.54          | 0.074       | 13.6         | 58                | 71                | 0.80     | 2.12     | 3.41     | 45                    | 0.81 |
| 940519               | 1706     | 1.63          | 0.074       | 13.6         | 58                | 76                | 0.80     | 1.57     | 2.87     | 59                    | 1.20 |
| 940519               | 2004     | 1.73          | 0.074       | 13.6         | 58                | 66                | 0.69     | 2.62     | 4.54     | 24                    | 0.44 |
| 940519               | 2258     | 1.66          | 0.074       | 13.6         | 56                | 67                | 0.69     | 2.82     | 4.63     | 24                    | 0.74 |
| 940520               | 0204     | 1.49          | 0.074       | 13.6         | 56                | 70                | 0.77     | 2.25     | 3.61     | 35                    | 1.10 |
| 940520               | 0504     | 1.43          | 0.074       | 13.6         | 54                | 73                | 0.78     | 1.91     | 3.25     | 49                    | 1.28 |
| 940520               | 0817     | 1.46          | 0.074       | 13.6         | 54                | 75                | 0.74     | 1.51     | 3.20     | 52                    | 1.12 |
| 940520               | 1125     | 1.42          | 0.074       | 13.6         | 52                | 71                | 0.75     | 2.01     | 3.62     | 43                    | 0.79 |
| 940520               | 1406     | 1.42          | 0.074       | 13.6         | 52                | 71                | 0.74     | 1.72     | 3.42     | 45                    | 0.76 |
| 940520               | 1711     | 1.62          | 0.162       | 6.2          | 50                | 65                | 0.72     | 1.71     | 3.80     | 44                    | 0.68 |
| 940520               | 2001     | 1.82          | 0.162       | 6.2          | 54                | 63                | 0.69     | 1.94     | 4.34     | 37                    | 0.26 |
| 940520               | 2304     | 1.80          | 0.152       | 6.6          | 56                | 62                | 0.68     | 1.74     | 4.33     | 39                    | 0.30 |
| 940521               | 0204     | 1.79          | 0.142       | 7.0          | 56                | 63                | 0.70     | 1.97     | 4.14     | 39                    | 0.31 |
| 940521               | 0504     | 1.68          | 0.142       | 7.0          | 56                | 63                | 0.68     | 2.20     | 4.57     | 35                    | 0.20 |
| 940521               | 0802     | 1.83          | 0.142       | 7.0          | 48                | 63                | 0.67     | 1.97     | 4.52     | 38                    | 0.29 |
| 940521               | 1102     | 1.96          | 0.132       | 7.6          | 46                | 59                | 0.61     | 2.28     | 5.44     | 33                    | 0.43 |
| 940521               | 1405     | 1.84          | 0.142       | 7.0          | 52                | 58                | 0.65     | 2.26     | 5.05     | 34                    | 0.21 |
| 940521               | 1702     | 1.68          | 0.142       | 7.0          | 54                | 57                | 0.74     | 2.52     | 4.27     | 38                    | 0.09 |
| 940521               | 2004     | 1.83          | 0.142       | 7.0          | 50                | 58                | 0.70     | 2.19     | 4.34     | 37                    | 0.37 |
| 940521               | 2304     | 1.96          | 0.142       | 7.0          | 54                | 58                | 0.63     | 1.74     | 4.97     | 37                    | 0.10 |
| 940522               | 0204     | 1.82          | 0.142       | 7.0          | 56                | 57                | 0.60     | 1.87     | 5.29     | 35                    | 0.03 |
| 940522               | 0504     | 1.61          | 0.142       | 7.0          | 50                | 58                | 0.68     | 2.29     | 4.59     | 37                    | 0.39 |
| 940522               | 0804     | 1.48          | 0.142       | 7.0          | 50                | 61                | 0.72     | 2.14     | 3.96     | 43                    | 0.62 |
| 940522               | 1104     | 1.45          | 0.142       | 7.0          | 48                | 63                | 0.73     | 2.20     | 3.93     | 42                    | 0.82 |
| 940522               | 1420     | 1.41          | 0.142       | 7.0          | 52                | 62                | 0.70     | 2.05     | 4.21     | 39                    | 0.60 |
| 940522               | 1704     | 1.38          | 0.152       | 6.6          | 50                | 67                | 0.75     | 1.79     | 3.50     | 46                    | 0.87 |
| 940522               | 2004     | 1.33          | 0.142       | 7.0          | 48                | 68                | 0.81     | 1.88     | 3.10     | 54                    | 1.22 |
| 940522               | 2304     | 1.26          | 0.152       | 6.6          | 54                | 69                | 0.79     | 1.86     | 3.20     | 48                    | 0.84 |
| 940523               | 1130     | 1.54          | 0.132       | 7.6          | 44                | 71                | 0.78     | 1.62     | 3.10     | 55                    | 0.97 |
| 940523               | 1429     | 1.49          | 0.064       | 15.6         | 44                | 68                | 0.78     | 1.62     | 3.12     | 55                    | 1.13 |
| 940523               | 1704     | 1.61          | 0.064       | 15.6         | 50                | 65                | 0.75     | 2.04     | 3.56     | 44                    | 1.05 |
| 940523               | 2002     | 1.90          | 0.064       | 15.6         | 58                | 61                | 0.66     | 2.18     | 4.78     | 27                    | 0.13 |
| 940524               | 0204     | 1.98          | 0.064       | 15.6         | 46                | 62                | 0.68     | 1.79     | 4.05     | 42                    | 0.62 |
| 940524               | 0504     | 2.07          | 0.074       | 13.6         | 50                | 60                | 0.67     | 2.39     | 4.71     | 32                    | 0.78 |
| 940524               | 0804     | 2.32          | 0.074       | 13.6         | 50                | 57                | 0.61     | 2.69     | 5.72     | 25                    | 0.41 |
| 940524               | 1103     | 2.53          | 0.113       | 8.9          | 46                | 54                | 0.54     | 2.77     | 7.02     | 20                    | 0.41 |
| 940524               | 1403     | 2.33          | 0.113       | 8.9          | 42                | 54                | 0.63     | 2.88     | 5.70     | 27                    | 0.81 |
| 940524               | 1700     | 2.39          | 0.074       | 13.6         | 52                | 56                | 0.61     | 2.06     | 5.31     | 33                    | 0.35 |
| 940524               | 2003     | 2.22          | 0.103       | 9.7          | 58                | 65                | 0.63     | 2.31     | 5.22     | 28                    | 0.26 |
| 940525               | 0203     | 1.78          | 0.074       | 13.6         | 52                | 61                | 0.67     | 2.19     | 4.71     | 31                    | 0.61 |
| 940525               | 0503     | 1.68          | 0.074       | 13.6         | 48                | 63                | 0.71     | 1.95     | 4.14     | 39                    | 1.24 |
| 940525               | 1329     | 1.77          | 0.113       | 8.9          | 42                | 58                | 0.69     | 2.32     | 4.49     | 40                    | 1.35 |
| 940525               | 1711     | 1.83          | 0.103       | 9.7          | 50                | 58                | 0.67     | 1.97     | 4.51     | 39                    | 0.62 |
| 940525               | 1957     | 1.66          | 0.103       | 9.7          | 48                | 61                | 0.70     | 2.23     | 4.32     | 36                    | 0.98 |
| 940526               | 0201     | 1.69          | 0.093       | 10.7         | 46                | 63                | 0.74     | 2.07     | 3.83     | 44                    | 1.26 |
| 940526               | 0447     | 1.69          | 0.074       | 13.6         | 50                | 61                | 0.65     | 2.30     | 4.70     | 32                    | 0.64 |
| 940526               | 2001     | 2.21          | 0.093       | 10.7         | 48                | 55                | 0.55     | 2.23     | 6.28     | 23                    | 0.38 |
| 940527               | 1755     | 2.09          | 0.093       | 10.7         | 44                | 55                | 0.59     | 2.28     | 5.69     | 31                    | 0.69 |

(Sheet 17 of 45)

Table A1 (Continued)

| Date   | Time<br>GMT | $H_{mo}$<br>m | $f_p$<br>Hz | $T_p$<br>sec | $\theta_p$<br>deg | $\theta_o$<br>deg | $\sigma$ | $\gamma$ | $\delta$ | $\Delta\theta$<br>deg | A     |
|--------|-------------|---------------|-------------|--------------|-------------------|-------------------|----------|----------|----------|-----------------------|-------|
| 940528 | 0158        | 1.91          | 0.093       | 10.7         | 44                | 55                | 0.55     | 2.49     | 6.58     | 21                    | 0.63  |
| 940528 | 0458        | 1.76          | 0.093       | 10.7         | 44                | 56                | 0.55     | 2.07     | 5.84     | 28                    | 0.81  |
| 940528 | 0758        | 1.92          | 0.093       | 10.7         | 46                | 55                | 0.52     | 1.86     | 6.60     | 27                    | 0.79  |
| 940528 | 1058        | 2.00          | 0.093       | 10.7         | 50                | 56                | 0.49     | 1.89     | 7.08     | 25                    | 0.32  |
| 940528 | 1701        | 2.14          | 0.093       | 10.7         | 48                | 56                | 0.50     | 2.01     | 6.90     | 23                    | 0.58  |
| 940529 | 0201        | 1.94          | 0.113       | 8.9          | 50                | 57                | 0.49     | 2.18     | 7.63     | 21                    | 0.48  |
| 940529 | 0458        | 2.13          | 0.113       | 8.9          | 50                | 56                | 0.48     | 2.56     | 8.26     | 17                    | 0.43  |
| 940529 | 0801        | 2.00          | 0.113       | 8.9          | 46                | 56                | 0.50     | 2.22     | 7.47     | 23                    | 0.70  |
| 940529 | 1100        | 1.91          | 0.123       | 8.2          | 44                | 55                | 0.54     | 2.02     | 6.55     | 29                    | 0.79  |
| 940530 | 0158        | 1.44          | 0.123       | 8.2          | 48                | 62                | 0.67     | 2.23     | 4.50     | 34                    | 0.92  |
| 940530 | 0458        | 1.65          | 0.123       | 8.2          | 46                | 62                | 0.65     | 2.05     | 4.87     | 40                    | 1.29  |
| 940530 | 0758        | 1.70          | 0.103       | 9.7          | 48                | 65                | 0.63     | 1.67     | 4.73     | 41                    | 0.95  |
| 940530 | 1058        | 1.93          | 0.103       | 9.7          | 46                | 59                | 0.60     | 1.47     | 5.09     | 39                    | 0.55  |
| 940530 | 1355        | 1.97          | 0.093       | 10.7         | 50                | 59                | 0.54     | 1.90     | 6.48     | 29                    | 0.46  |
| 940530 | 1658        | 2.16          | 0.093       | 10.7         | 50                | 63                | 0.54     | 2.18     | 6.97     | 29                    | 0.49  |
| 940530 | 1955        | 2.29          | 0.093       | 10.7         | 48                | 62                | 0.52     | 1.80     | 6.80     | 32                    | 0.59  |
| 940531 | 0158        | 1.96          | 0.083       | 12.0         | 50                | 61                | 0.61     | 3.36     | 6.40     | 24                    | 0.50  |
| 940531 | 0455        | 1.74          | 0.083       | 12.0         | 52                | 66                | 0.63     | 2.94     | 5.49     | 26                    | 0.72  |
| 940531 | 1358        | 1.84          | 0.083       | 12.0         | 52                | 64                | 0.62     | 2.23     | 5.45     | 32                    | 0.36  |
| 940531 | 1658        | 1.76          | 0.093       | 10.7         | 48                | 62                | 0.61     | 2.35     | 5.78     | 34                    | 0.60  |
| 940601 | 0501        | 1.36          | 0.093       | 10.7         | 58                | 60                | 0.64     | 1.78     | 4.98     | 37                    | 0.05  |
| 940601 | 0801        | 1.69          | 0.152       | 6.6          | 60                | 58                | 0.57     | 1.37     | 5.43     | 36                    | -0.05 |
| 940601 | 1059        | 2.02          | 0.132       | 7.6          | 60                | 57                | 0.51     | 0.85     | 5.93     | 34                    | -0.11 |
| 940601 | 1701        | 2.39          | 0.132       | 7.6          | 46                | 49                | 0.50     | 0.68     | 5.33     | 37                    | 0.08  |
| 940601 | 2001        | 2.52          | 0.132       | 7.6          | 48                | 51                | 0.50     | 0.77     | 5.42     | 36                    | 0.08  |
| 940602 | 0202        | 2.48          | 0.083       | 12.0         | 52                | 54                | 0.45     | 0.72     | 6.87     | 28                    | -0.06 |
| 940602 | 0502        | 2.48          | 0.132       | 7.6          | 52                | 54                | 0.44     | 0.78     | 7.10     | 27                    | -0.03 |
| 940602 | 0759        | 2.66          | 0.132       | 7.6          | 50                | 54                | 0.45     | 0.72     | 6.38     | 30                    | 0.21  |
| 940602 | 1056        | 2.65          | 0.123       | 8.2          | 50                | 55                | 0.43     | 0.54     | 6.36     | 31                    | 0.12  |
| 940602 | 1411        | 2.60          | 0.123       | 8.2          | 54                | 55                | 0.44     | 0.32     | 6.07     | 32                    | 0.02  |
| 940602 | 1703        | 2.70          | 0.132       | 7.6          | 58                | 51                | 0.48     | 0.43     | 5.48     | 37                    | -0.21 |
| 940602 | 2001        | 2.69          | 0.132       | 7.6          | 64                | 51                | 0.48     | 0.36     | 5.13     | 38                    | -0.08 |
| 940603 | 0159        | 2.59          | 0.123       | 8.2          | 50                | 49                | 0.46     | 0.63     | 5.29     | 35                    | -0.06 |
| 940603 | 0502        | 2.28          | 0.123       | 8.2          | 58                | 51                | 0.46     | 0.54     | 5.48     | 34                    | -0.02 |
| 940603 | 0802        | 2.10          | 0.123       | 8.2          | 34                | 52                | 0.46     | 0.60     | 5.53     | 36                    | 0.06  |
| 940603 | 1403        | 1.90          | 0.142       | 7.0          | 28                | 53                | 0.49     | 0.47     | 4.94     | 41                    | -0.14 |
| 940603 | 1657        | 2.01          | 0.142       | 7.0          | 28                | 47                | 0.49     | 0.71     | 4.86     | 37                    | 0.22  |
| 940603 | 2001        | 1.90          | 0.142       | 7.0          | 24                | 49                | 0.51     | 0.59     | 4.55     | 41                    | 0.09  |
| 940604 | 0202        | 1.79          | 0.142       | 7.0          | 20                | 50                | 0.53     | 0.53     | 4.14     | 44                    | -0.38 |
| 940604 | 0502        | 1.54          | 0.152       | 6.6          | 26                | 49                | 0.52     | 0.92     | 5.10     | 38                    | 0.08  |
| 940604 | 0801        | 1.37          | 0.142       | 7.0          | 28                | 52                | 0.53     | 0.96     | 5.29     | 38                    | 0.11  |
| 940604 | 1101        | 1.14          | 0.162       | 6.2          | 24                | 53                | 0.60     | 0.90     | 4.71     | 44                    | 0.05  |
| 940604 | 1401        | 1.14          | 0.162       | 6.2          | 66                | 60                | 0.61     | 0.75     | 4.34     | 44                    | -0.08 |
| 940604 | 1701        | 1.10          | 0.162       | 6.2          | 56                | 54                | 0.58     | 0.95     | 4.54     | 41                    | -0.02 |
| 940604 | 2001        | 1.12          | 0.162       | 6.2          | 64                | 61                | 0.56     | 0.88     | 5.08     | 34                    | -0.10 |
| 940605 | 0202        | 1.38          | 0.162       | 6.2          | 52                | 56                | 0.52     | 0.85     | 5.29     | 36                    | 0.06  |
| 940605 | 0459        | 1.29          | 0.152       | 6.6          | 54                | 54                | 0.52     | 0.82     | 5.18     | 36                    | 0.02  |
| 940605 | 0802        | 1.25          | 0.162       | 6.2          | 56                | 57                | 0.52     | 0.92     | 5.83     | 34                    | -0.02 |
| 940605 | 1101        | 1.16          | 0.162       | 6.2          | 60                | 63                | 0.57     | 1.12     | 5.21     | 35                    | 0.05  |
| 940605 | 1359        | 1.23          | 0.162       | 6.2          | 64                | 65                | 0.59     | 1.21     | 4.80     | 34                    | 0.05  |
| 940605 | 1659        | 1.17          | 0.162       | 6.2          | 60                | 69                | 0.63     | 1.12     | 3.79     | 37                    | 0.43  |
| 940605 | 2001        | 0.97          | 0.093       | 10.7         | 52                | 63                | 0.68     | 1.49     | 4.17     | 38                    | 0.35  |

(Sheet 18 of 45)

Table A1 (Continued)

| Date   | Time<br>GMT | $H_{m0}$<br>m | $f_p$<br>Hz | $T_p$<br>sec | $\theta_p$<br>deg | $\theta_0$<br>deg | $\sigma$ | $\gamma$ | $\delta$ | $\Delta\theta$<br>deg | A     |
|--------|-------------|---------------|-------------|--------------|-------------------|-------------------|----------|----------|----------|-----------------------|-------|
| 940606 | 0202        | 0.81          | 0.103       | 9.7          | 68                | 74                | 0.68     | 1.10     | 3.71     | 43                    | 0.28  |
| 940606 | 0502        | 0.77          | 0.103       | 9.7          | 64                | 75                | 0.72     | 1.04     | 3.11     | 50                    | 0.48  |
| 940606 | 0756        | 0.75          | 0.113       | 8.9          | 66                | 74                | 0.77     | 0.91     | 2.79     | 61                    | 0.39  |
| 940606 | 1103        | 0.77          | 0.113       | 8.9          | 56                | 77                | 0.78     | 0.70     | 2.53     | 69                    | 0.57  |
| 940606 | 1359        | 1.19          | 0.162       | 6.2          | 62                | 69                | 0.64     | 0.63     | 3.51     | 48                    | 0.17  |
| 940606 | 1703        | 1.90          | 0.162       | 6.2          | 56                | 59                | 0.54     | 0.64     | 4.45     | 42                    | 0.06  |
| 940606 | 1959        | 2.08          | 0.142       | 7.0          | 28                | 52                | 0.51     | 0.86     | 4.77     | 39                    | 0.17  |
| 940607 | 0201        | 2.79          | 0.123       | 8.2          | 56                | 53                | 0.46     | 0.81     | 4.81     | 33                    | 0.03  |
| 940607 | 0502        | 2.93          | 0.123       | 8.2          | 56                | 58                | 0.42     | 0.52     | 5.22     | 30                    | 0.09  |
| 940607 | 0802        | 2.84          | 0.113       | 8.9          | 54                | 59                | 0.44     | 0.36     | 4.89     | 35                    | 0.06  |
| 940607 | 1103        | 2.70          | 0.123       | 8.2          | 52                | 59                | 0.46     | 0.73     | 5.13     | 32                    | 0.15  |
| 940607 | 1403        | 2.70          | 0.123       | 8.2          | 50                | 59                | 0.48     | 0.66     | 5.19     | 34                    | 0.33  |
| 940607 | 1701        | 3.03          | 0.113       | 8.9          | 50                | 60                | 0.45     | 0.48     | 4.86     | 34                    | 0.21  |
| 940607 | 2001        | 3.05          | 0.103       | 9.7          | 46                | 56                | 0.43     | 0.65     | 5.06     | 33                    | 0.37  |
| 940608 | 0202        | 3.22          | 0.103       | 9.7          | 50                | 56                | 0.39     | 0.51     | 5.88     | 28                    | 0.25  |
| 940608 | 0502        | 2.81          | 0.113       | 8.9          | 52                | 56                | 0.43     | 0.61     | 5.65     | 32                    | 0.16  |
| 940608 | 0802        | 2.40          | 0.113       | 8.9          | 48                | 56                | 0.45     | 0.65     | 6.06     | 33                    | 0.12  |
| 940608 | 1101        | 2.23          | 0.113       | 8.9          | 54                | 61                | 0.45     | 1.02     | 6.41     | 26                    | 0.16  |
| 940608 | 1359        | 2.31          | 0.113       | 8.9          | 56                | 64                | 0.50     | 0.62     | 5.38     | 34                    | 0.13  |
| 940608 | 1701        | 2.22          | 0.123       | 8.2          | 46                | 61                | 0.51     | 0.60     | 4.58     | 39                    | 0.46  |
| 940608 | 2001        | 2.15          | 0.123       | 8.2          | 64                | 65                | 0.48     | 0.38     | 5.25     | 34                    | -0.02 |
| 940609 | 0201        | 2.16          | 0.113       | 8.9          | 50                | 60                | 0.46     | 1.14     | 6.77     | 29                    | 0.40  |
| 940609 | 0459        | 2.21          | 0.113       | 8.9          | 56                | 63                | 0.48     | 1.02     | 6.75     | 29                    | 0.19  |
| 940609 | 0801        | 2.07          | 0.113       | 8.9          | 46                | 62                | 0.50     | 1.33     | 6.22     | 33                    | 0.31  |
| 940609 | 1402        | 2.09          | 0.123       | 8.2          | 62                | 71                | 0.55     | 0.76     | 4.70     | 39                    | 0.11  |
| 940609 | 1701        | 1.85          | 0.123       | 8.2          | 50                | 69                | 0.57     | 1.16     | 4.67     | 39                    | 0.05  |
| 940609 | 2003        | 1.69          | 0.113       | 8.9          | 70                | 68                | 0.59     | 1.25     | 4.94     | 37                    | -0.15 |
| 940610 | 0201        | 1.39          | 0.113       | 8.9          | 56                | 76                | 0.68     | 1.24     | 3.76     | 43                    | 0.28  |
| 940610 | 0502        | 1.49          | 0.113       | 8.9          | 54                | 73                | 0.68     | 1.54     | 3.73     | 40                    | 0.47  |
| 940610 | 0801        | 1.42          | 0.113       | 8.9          | 56                | 76                | 0.72     | 1.08     | 3.20     | 46                    | 0.14  |
| 940610 | 1059        | 1.37          | 0.074       | 13.6         | 54                | 79                | 0.78     | 1.11     | 2.80     | 53                    | 0.59  |
| 940610 | 1701        | 1.51          | 0.083       | 12.0         | 46                | 77                | 0.75     | 1.35     | 3.11     | 50                    | 0.10  |
| 940610 | 2002        | 1.43          | 0.074       | 13.6         | 58                | 81                | 0.78     | 1.28     | 2.76     | 59                    | 0.83  |
| 940611 | 0202        | 1.32          | 0.074       | 13.6         | 56                | 86                | 0.78     | 1.19     | 2.58     | 78                    | 1.33  |
| 940611 | 0501        | 1.36          | 0.083       | 12.0         | 52                | 81                | 0.79     | 1.39     | 2.77     | 62                    | 0.87  |
| 940611 | 0759        | 1.34          | 0.083       | 12.0         | 56                | 91                | 0.89     | 0.82     | 2.04     | 95                    | 1.04  |
| 940611 | 1101        | 1.32          | 0.083       | 12.0         | 48                | 82                | 0.86     | 1.27     | 2.41     | 86                    | 1.07  |
| 940611 | 1401        | 1.44          | 0.083       | 12.0         | 52                | 81                | 0.83     | 1.38     | 2.54     | 80                    | 1.23  |
| 940611 | 1702        | 1.34          | 0.093       | 10.7         | 52                | 88                | 0.85     | 1.13     | 2.20     | 94                    | 1.30  |
| 940611 | 2001        | 1.21          | 0.064       | 15.6         | 62                | 99                | 0.87     | 0.65     | 1.80     | 96                    | 1.31  |
| 940612 | 0159        | 1.27          | 0.064       | 15.6         | 56                | 97                | 0.90     | 0.67     | 1.78     | 98                    | 1.23  |
| 940612 | 0502        | 1.25          | 0.064       | 15.6         | 54                | 87                | 0.87     | 1.16     | 2.22     | 94                    | 1.33  |
| 940612 | 0801        | 1.30          | 0.064       | 15.6         | 54                | 84                | 0.86     | 1.28     | 2.28     | 95                    | 1.52  |
| 940612 | 1101        | 1.22          | 0.064       | 15.6         | 56                | 89                | 0.87     | 1.15     | 2.18     | 95                    | 1.64  |
| 940612 | 1359        | 1.37          | 0.083       | 12.0         | 52                | 76                | 0.78     | 1.77     | 3.10     | 52                    | 1.04  |
| 940612 | 1702        | 1.80          | 0.123       | 8.2          | 52                | 71                | 0.71     | 1.90     | 3.61     | 39                    | 0.54  |
| 940612 | 2001        | 1.76          | 0.113       | 8.9          | 54                | 67                | 0.66     | 1.97     | 4.35     | 34                    | 0.47  |
| 940613 | 0201        | 1.95          | 0.123       | 8.2          | 44                | 58                | 0.61     | 2.02     | 5.40     | 33                    | 0.22  |
| 940613 | 0502        | 1.97          | 0.123       | 8.2          | 48                | 60                | 0.57     | 2.00     | 5.79     | 31                    | 0.32  |
| 940613 | 0802        | 1.77          | 0.132       | 7.6          | 44                | 61                | 0.62     | 2.39     | 5.26     | 33                    | 0.41  |
| 940613 | 1102        | 1.56          | 0.132       | 7.6          | 56                | 60                | 0.59     | 2.16     | 5.84     | 30                    | 0.04  |
| 940613 | 1403        | 1.53          | 0.132       | 7.6          | 42                | 58                | 0.62     | 2.07     | 5.21     | 34                    | 0.36  |
| 940613 | 1703        | 1.87          | 0.142       | 7.0          | 40                | 57                | 0.57     | 1.22     | 5.01     | 39                    | 0.04  |

(Sheet 19 of 45)

Table A1 (Continued)

| Date   | Time<br>GMT | $H_{mo}$<br>m | $f_p$<br>Hz | $T_p$<br>sec | $\theta_p$<br>deg | $\theta_o$<br>deg | $\sigma$ | $\gamma$ | $\delta$ | $\Delta\theta$<br>deg | A     |
|--------|-------------|---------------|-------------|--------------|-------------------|-------------------|----------|----------|----------|-----------------------|-------|
| 940613 | 2003        | 1.79          | 0.142       | 7.0          | 34                | 58                | 0.56     | 1.08     | 5.26     | 39                    | 0.00  |
| 940614 | 0202        | 2.12          | 0.123       | 8.2          | 44                | 52                | 0.48     | 1.22     | 6.46     | 31                    | 0.23  |
| 940614 | 0459        | 2.17          | 0.123       | 8.2          | 50                | 55                | 0.45     | 1.66     | 8.24     | 24                    | 0.23  |
| 940614 | 0801        | 2.18          | 0.123       | 8.2          | 48                | 57                | 0.45     | 2.25     | 8.70     | 22                    | 0.45  |
| 940614 | 1102        | 2.34          | 0.113       | 8.9          | 48                | 58                | 0.47     | 1.85     | 7.34     | 25                    | 0.45  |
| 940614 | 1358        | 2.37          | 0.113       | 8.9          | 48                | 55                | 0.45     | 1.37     | 7.45     | 25                    | 0.42  |
| 940614 | 1710        | 2.70          | 0.103       | 9.7          | 48                | 58                | 0.46     | 1.24     | 6.72     | 29                    | 0.66  |
| 940614 | 2001        | 3.00          | 0.103       | 9.7          | 48                | 59                | 0.43     | 0.94     | 6.80     | 29                    | 0.37  |
| 940615 | 0202        | 3.03          | 0.103       | 9.7          | 48                | 57                | 0.40     | 1.19     | 8.31     | 25                    | 0.51  |
| 940615 | 0502        | 3.04          | 0.103       | 9.7          | 50                | 59                | 0.40     | 1.13     | 8.32     | 24                    | 0.45  |
| 940615 | 0801        | 3.09          | 0.093       | 10.7         | 52                | 61                | 0.41     | 1.05     | 7.48     | 26                    | 0.42  |
| 940615 | 1101        | 3.12          | 0.103       | 9.7          | 54                | 60                | 0.40     | 0.79     | 7.60     | 27                    | 0.17  |
| 940615 | 1401        | 2.82          | 0.093       | 10.7         | 52                | 59                | 0.41     | 0.76     | 7.42     | 26                    | 0.23  |
| 940615 | 1703        | 2.75          | 0.093       | 10.7         | 50                | 59                | 0.42     | 0.70     | 6.74     | 29                    | 0.35  |
| 940615 | 2001        | 2.86          | 0.093       | 10.7         | 52                | 57                | 0.43     | 0.71     | 6.70     | 29                    | 0.22  |
| 940616 | 0204        | 2.59          | 0.113       | 8.9          | 48                | 54                | 0.44     | 0.84     | 5.96     | 30                    | 0.37  |
| 940616 | 0504        | 2.31          | 0.113       | 8.9          | 52                | 59                | 0.45     | 0.96     | 6.36     | 29                    | 0.48  |
| 940616 | 0807        | 2.10          | 0.123       | 8.2          | 52                | 60                | 0.42     | 1.29     | 8.12     | 25                    | 0.60  |
| 940616 | 1104        | 2.13          | 0.123       | 8.2          | 52                | 58                | 0.43     | 1.51     | 8.77     | 23                    | 0.38  |
| 940616 | 1401        | 1.95          | 0.123       | 8.2          | 48                | 56                | 0.45     | 1.33     | 7.33     | 26                    | 0.47  |
| 940616 | 1704        | 2.15          | 0.132       | 7.6          | 50                | 57                | 0.46     | 0.68     | 6.21     | 30                    | 0.36  |
| 940616 | 2004        | 2.19          | 0.132       | 7.6          | 54                | 55                | 0.46     | 0.37     | 5.82     | 29                    | 0.10  |
| 940617 | 0204        | 2.00          | 0.123       | 8.2          | 48                | 52                | 0.48     | 0.78     | 5.75     | 31                    | 0.16  |
| 940617 | 0454        | 1.95          | 0.123       | 8.2          | 48                | 54                | 0.46     | 0.94     | 6.23     | 29                    | 0.28  |
| 940617 | 0805        | 2.03          | 0.123       | 8.2          | 50                | 54                | 0.43     | 0.92     | 7.16     | 25                    | 0.21  |
| 940617 | 1049        | 2.17          | 0.123       | 8.2          | 54                | 55                | 0.41     | 0.70     | 6.83     | 27                    | 0.02  |
| 940617 | 1400        | 1.96          | 0.123       | 8.2          | 52                | 57                | 0.44     | 0.97     | 7.12     | 26                    | 0.24  |
| 940617 | 1700        | 1.92          | 0.123       | 8.2          | 52                | 58                | 0.45     | 1.06     | 7.22     | 27                    | 0.27  |
| 940617 | 1956        | 2.05          | 0.123       | 8.2          | 54                | 57                | 0.46     | 0.90     | 7.05     | 25                    | 0.19  |
| 940618 | 0202        | 2.22          | 0.113       | 8.9          | 52                | 52                | 0.46     | 1.18     | 6.54     | 25                    | -0.06 |
| 940618 | 0502        | 2.15          | 0.113       | 8.9          | 50                | 54                | 0.47     | 1.79     | 7.30     | 23                    | 0.29  |
| 940618 | 0803        | 2.28          | 0.113       | 8.9          | 48                | 56                | 0.49     | 1.80     | 6.72     | 27                    | 0.51  |
| 940618 | 1052        | 2.33          | 0.123       | 8.2          | 48                | 59                | 0.51     | 1.38     | 5.65     | 34                    | 0.49  |
| 940618 | 1351        | 2.29          | 0.113       | 8.9          | 46                | 60                | 0.54     | 1.42     | 5.22     | 35                    | 0.43  |
| 940618 | 1702        | 1.98          | 0.123       | 8.2          | 48                | 57                | 0.59     | 1.64     | 5.23     | 32                    | 0.37  |
| 940618 | 2002        | 1.92          | 0.123       | 8.2          | 42                | 55                | 0.59     | 1.73     | 5.21     | 35                    | 0.46  |
| 940619 | 0202        | 1.68          | 0.123       | 8.2          | 46                | 61                | 0.70     | 1.92     | 3.86     | 41                    | 0.62  |
| 940619 | 0502        | 1.55          | 0.123       | 8.2          | 46                | 65                | 0.72     | 1.78     | 3.47     | 45                    | 0.79  |
| 940619 | 0802        | 1.44          | 0.123       | 8.2          | 48                | 70                | 0.76     | 1.84     | 3.37     | 43                    | 0.38  |
| 940619 | 1102        | 1.40          | 0.123       | 8.2          | 44                | 69                | 0.80     | 1.77     | 2.95     | 53                    | 0.89  |
| 940619 | 1359        | 1.40          | 0.123       | 8.2          | 42                | 77                | 0.86     | 1.32     | 2.32     | 96                    | 1.26  |
| 940619 | 1702        | 1.40          | 0.113       | 8.9          | 44                | 74                | 0.88     | 1.64     | 2.46     | 93                    | 1.64  |
| 940619 | 2001        | 1.34          | 0.123       | 8.2          | 46                | 76                | 0.88     | 1.43     | 2.34     | 99                    | 1.72  |
| 940620 | 0201        | 1.38          | 0.064       | 15.6         | 42                | 78                | 0.87     | 1.18     | 2.20     | 104                   | 1.38  |
| 940620 | 0457        | 1.39          | 0.064       | 15.6         | 42                | 80                | 0.92     | 1.09     | 1.94     | 112                   | 1.51  |
| 940620 | 0802        | 1.30          | 0.064       | 15.6         | 40                | 83                | 0.95     | 0.94     | 1.86     | 112                   | 1.31  |
| 940620 | 1111        | 1.27          | 0.064       | 15.6         | 38                | 91                | 0.95     | 0.60     | 1.63     | 114                   | 0.97  |
| 940620 | 1405        | 1.24          | 0.064       | 15.6         | 170               | 97                | 0.96     | 0.38     | 1.55     | 114                   | 0.77  |
| 940620 | 1703        | 1.16          | 0.064       | 15.6         | 44                | 95                | 0.96     | 0.55     | 1.62     | 113                   | 0.94  |
| 940620 | 2003        | 1.18          | 0.064       | 15.6         | 42                | 93                | 0.99     | 0.60     | 1.63     | 116                   | 0.96  |
| 940621 | 0203        | 1.48          | 0.152       | 6.6          | 48                | 76                | 0.85     | 1.36     | 2.54     | 67                    | 0.83  |
| 940621 | 0500        | 1.56          | 0.142       | 7.0          | 44                | 70                | 0.84     | 1.79     | 2.81     | 59                    | 1.06  |

(Sheet 20 of 45)

Table A1 (Continued)

| Date   | Time<br>GMT | $H_{m0}$<br>m | $f_p$<br>Hz | $T_p$<br>sec | $\theta_p$<br>deg | $\theta_0$<br>deg | $\sigma$ | $\gamma$ | $\delta$ | $\Delta\theta$<br>deg | A     |
|--------|-------------|---------------|-------------|--------------|-------------------|-------------------|----------|----------|----------|-----------------------|-------|
| 940621 | 0801        | 1.59          | 0.152       | 6.6          | 46                | 63                | 0.77     | 2.31     | 3.61     | 43                    | 0.95  |
| 940621 | 1102        | 1.67          | 0.142       | 7.0          | 44                | 61                | 0.76     | 2.41     | 3.73     | 45                    | 1.28  |
| 940621 | 1402        | 1.57          | 0.142       | 7.0          | 44                | 65                | 0.79     | 2.19     | 3.41     | 48                    | 0.84  |
| 940621 | 1716        | 1.68          | 0.142       | 7.0          | 44                | 61                | 0.77     | 2.12     | 3.64     | 47                    | 0.61  |
| 940621 | 2000        | 1.57          | 0.142       | 7.0          | 48                | 64                | 0.84     | 2.35     | 3.27     | 44                    | 0.80  |
| 940622 | 0200        | 1.53          | 0.132       | 7.6          | 44                | 72                | 0.89     | 1.56     | 2.46     | 86                    | 1.37  |
| 940622 | 0500        | 1.62          | 0.132       | 7.6          | 50                | 70                | 0.81     | 1.44     | 2.88     | 55                    | 0.43  |
| 940622 | 0814        | 1.64          | 0.132       | 7.6          | 34                | 68                | 0.88     | 1.63     | 2.56     | 69                    | 0.87  |
| 940622 | 1114        | 1.53          | 0.142       | 7.0          | 42                | 68                | 0.89     | 1.79     | 2.61     | 77                    | 1.44  |
| 940622 | 1704        | 1.39          | 0.152       | 6.6          | 34                | 77                | 0.94     | 1.21     | 2.08     | 113                   | 1.19  |
| 940622 | 2004        | 1.30          | 0.142       | 7.0          | 42                | 72                | 0.94     | 1.44     | 2.21     | 110                   | 1.56  |
| 940623 | 0201        | 1.55          | 0.132       | 7.6          | 38                | 65                | 0.81     | 1.72     | 3.07     | 53                    | 0.46  |
| 940623 | 0504        | 1.70          | 0.132       | 7.6          | 40                | 59                | 0.69     | 2.58     | 4.45     | 38                    | 0.72  |
| 940623 | 0808        | 1.73          | 0.132       | 7.6          | 42                | 57                | 0.69     | 2.94     | 4.72     | 32                    | 0.70  |
| 940623 | 1108        | 1.72          | 0.123       | 8.2          | 42                | 61                | 0.70     | 2.14     | 4.19     | 41                    | 0.66  |
| 940623 | 1406        | 1.75          | 0.132       | 7.6          | 40                | 59                | 0.72     | 2.09     | 3.96     | 46                    | 0.88  |
| 940623 | 1712        | 1.93          | 0.132       | 7.6          | 42                | 56                | 0.62     | 1.79     | 4.86     | 40                    | 0.66  |
| 940623 | 2004        | 1.96          | 0.132       | 7.6          | 44                | 56                | 0.60     | 2.32     | 5.84     | 33                    | 0.50  |
| 940624 | 0201        | 2.09          | 0.123       | 8.2          | 42                | 56                | 0.55     | 1.71     | 5.62     | 37                    | 0.66  |
| 940624 | 0501        | 2.10          | 0.113       | 8.9          | 38                | 58                | 0.52     | 1.73     | 6.26     | 35                    | 0.25  |
| 940624 | 0801        | 2.05          | 0.123       | 8.2          | 44                | 58                | 0.54     | 1.74     | 6.13     | 34                    | 0.51  |
| 940624 | 1103        | 1.96          | 0.123       | 8.2          | 42                | 57                | 0.57     | 2.08     | 5.85     | 33                    | 0.25  |
| 940624 | 1406        | 2.04          | 0.123       | 8.2          | 42                | 54                | 0.55     | 2.12     | 6.17     | 30                    | 0.36  |
| 940624 | 1702        | 2.38          | 0.123       | 8.2          | 46                | 52                | 0.48     | 1.58     | 7.21     | 28                    | 0.18  |
| 940625 | 0150        | 2.30          | 0.113       | 8.9          | 44                | 52                | 0.51     | 2.26     | 7.37     | 25                    | 0.49  |
| 940625 | 0502        | 2.25          | 0.113       | 8.9          | 44                | 55                | 0.57     | 2.32     | 5.86     | 31                    | 0.44  |
| 940625 | 0802        | 2.14          | 0.113       | 8.9          | 44                | 57                | 0.55     | 2.31     | 6.14     | 29                    | 0.58  |
| 940625 | 1101        | 2.12          | 0.113       | 8.9          | 40                | 53                | 0.53     | 2.28     | 6.83     | 28                    | 0.64  |
| 940625 | 1401        | 2.44          | 0.113       | 8.9          | 38                | 49                | 0.54     | 2.05     | 6.38     | 31                    | 0.45  |
| 940625 | 1658        | 2.79          | 0.113       | 8.9          | 52                | 50                | 0.52     | 1.77     | 6.34     | 31                    | 0.00  |
| 940625 | 2004        | 2.65          | 0.113       | 8.9          | 44                | 52                | 0.53     | 2.79     | 7.41     | 24                    | 0.32  |
| 940626 | 0202        | 2.49          | 0.113       | 8.9          | 42                | 50                | 0.52     | 2.85     | 7.62     | 23                    | 0.53  |
| 940626 | 0502        | 2.19          | 0.113       | 8.9          | 44                | 53                | 0.58     | 2.89     | 6.32     | 26                    | 0.41  |
| 940626 | 0804        | 2.21          | 0.113       | 8.9          | 50                | 57                | 0.58     | 2.74     | 6.29     | 25                    | 0.34  |
| 940626 | 1102        | 2.02          | 0.113       | 8.9          | 48                | 57                | 0.59     | 2.35     | 5.84     | 30                    | 0.36  |
| 940626 | 1401        | 2.04          | 0.123       | 8.2          | 48                | 56                | 0.60     | 2.47     | 5.98     | 29                    | 0.20  |
| 940626 | 1704        | 1.85          | 0.123       | 8.2          | 40                | 54                | 0.64     | 2.09     | 5.03     | 36                    | 0.35  |
| 940626 | 2004        | 1.76          | 0.113       | 8.9          | 50                | 58                | 0.59     | 2.51     | 5.74     | 26                    | 0.37  |
| 940627 | 0204        | 1.61          | 0.123       | 8.2          | 48                | 59                | 0.62     | 2.23     | 5.19     | 30                    | 0.49  |
| 940627 | 0504        | 1.33          | 0.123       | 8.2          | 38                | 61                | 0.69     | 1.92     | 4.16     | 44                    | 0.58  |
| 940627 | 0823        | 1.28          | 0.132       | 7.6          | 52                | 63                | 0.65     | 2.14     | 4.73     | 34                    | 0.47  |
| 940627 | 1410        | 1.32          | 0.123       | 8.2          | 60                | 64                | 0.64     | 1.89     | 4.55     | 37                    | 0.15  |
| 940627 | 1704        | 1.38          | 0.132       | 7.6          | 58                | 61                | 0.61     | 1.93     | 5.16     | 33                    | 0.10  |
| 940627 | 2004        | 1.46          | 0.142       | 7.0          | 44                | 54                | 0.58     | 1.88     | 5.66     | 32                    | 0.32  |
| 940628 | 0205        | 1.43          | 0.132       | 7.6          | 52                | 55                | 0.59     | 2.29     | 6.03     | 26                    | 0.05  |
| 940628 | 0504        | 1.41          | 0.142       | 7.0          | 56                | 57                | 0.59     | 2.02     | 5.85     | 29                    | 0.07  |
| 940628 | 0801        | 1.35          | 0.142       | 7.0          | 46                | 58                | 0.60     | 2.02     | 5.48     | 31                    | 0.62  |
| 940628 | 1407        | 1.17          | 0.152       | 6.6          | 48                | 60                | 0.66     | 2.12     | 4.82     | 34                    | 0.49  |
| 940628 | 1703        | 1.15          | 0.152       | 6.6          | 44                | 63                | 0.70     | 1.76     | 4.12     | 45                    | 0.62  |
| 940628 | 2004        | 1.26          | 0.162       | 6.2          | 46                | 57                | 0.60     | 1.77     | 5.25     | 36                    | 0.41  |
| 940629 | 0204        | 1.56          | 0.142       | 7.0          | 52                | 53                | 0.52     | 1.73     | 6.53     | 27                    | -0.02 |
| 940629 | 0504        | 2.00          | 0.123       | 8.2          | 46                | 50                | 0.49     | 2.05     | 7.54     | 23                    | 0.20  |

(Sheet 21 of 45)

Table A1 (Continued)

| Date   | Time<br>GMT | $H_{mo}$<br>m | $f_p$<br>Hz | $T_p$<br>sec | $\theta_p$<br>deg | $\theta_o$<br>deg | $\alpha$ | $\gamma$ | $\delta$ | $\Delta\theta$<br>deg | A    |
|--------|-------------|---------------|-------------|--------------|-------------------|-------------------|----------|----------|----------|-----------------------|------|
| 940629 | 0813        | 2.31          | 0.123       | 8.2          | 42                | 49                | 0.44     | 1.61     | 7.97     | 24                    | 0.48 |
| 940629 | 1107        | 2.31          | 0.113       | 8.9          | 42                | 48                | 0.41     | 1.52     | 8.64     | 23                    | 0.40 |
| 940629 | 1410        | 2.12          | 0.113       | 8.9          | 40                | 47                | 0.45     | 1.95     | 8.03     | 22                    | 0.51 |
| 940629 | 2001        | 2.47          | 0.113       | 8.9          | 42                | 52                | 0.43     | 0.87     | 6.15     | 31                    | 0.44 |
| 940630 | 0159        | 2.06          | 0.113       | 8.9          | 42                | 50                | 0.40     | 1.74     | 9.21     | 22                    | 0.47 |
| 940630 | 0502        | 2.11          | 0.113       | 8.9          | 40                | 48                | 0.44     | 1.55     | 7.92     | 24                    | 0.44 |
| 940630 | 0803        | 2.02          | 0.113       | 8.9          | 40                | 48                | 0.44     | 1.61     | 8.34     | 24                    | 0.44 |
| 940630 | 1100        | 1.93          | 0.113       | 8.9          | 42                | 49                | 0.44     | 2.21     | 9.32     | 20                    | 0.41 |
| 940630 | 1400        | 2.09          | 0.113       | 8.9          | 44                | 47                | 0.39     | 2.08     | 11.78    | 16                    | 0.32 |
| 940630 | 1704        | 2.00          | 0.113       | 8.9          | 46                | 53                | 0.43     | 1.81     | 9.29     | 22                    | 0.43 |
| 940630 | 2001        | 2.15          | 0.113       | 8.9          | 46                | 52                | 0.42     | 1.76     | 9.64     | 21                    | 0.50 |
| 940701 | 0204        | 1.94          | 0.113       | 8.9          | 44                | 51                | 0.45     | 2.19     | 8.98     | 21                    | 0.47 |
| 940701 | 0804        | 1.81          | 0.113       | 8.9          | 50                | 57                | 0.46     | 2.66     | 9.87     | 19                    | 0.63 |
| 940701 | 1100        | 1.75          | 0.113       | 8.9          | 46                | 54                | 0.52     | 2.26     | 7.80     | 25                    | 0.52 |
| 940701 | 1403        | 1.72          | 0.123       | 8.2          | 42                | 49                | 0.50     | 2.14     | 8.03     | 24                    | 0.44 |
| 940701 | 2001        | 1.93          | 0.123       | 8.2          | 48                | 53                | 0.49     | 1.07     | 6.80     | 31                    | 0.03 |
| 940702 | 0202        | 1.91          | 0.132       | 7.6          | 42                | 50                | 0.49     | 1.32     | 6.77     | 32                    | 0.13 |
| 940702 | 1059        | 1.77          | 0.123       | 8.2          | 42                | 51                | 0.48     | 2.86     | 9.30     | 21                    | 0.55 |
| 940702 | 1403        | 1.88          | 0.123       | 8.2          | 42                | 49                | 0.48     | 2.79     | 9.34     | 19                    | 0.46 |
| 940702 | 2002        | 1.70          | 0.113       | 8.9          | 46                | 57                | 0.62     | 2.73     | 6.11     | 28                    | 0.36 |
| 940703 | 0202        | 1.61          | 0.123       | 8.2          | 42                | 56                | 0.74     | 3.28     | 4.77     | 34                    | 0.58 |
| 940703 | 0502        | 1.69          | 0.132       | 7.6          | 38                | 56                | 0.73     | 2.84     | 4.72     | 36                    | 0.34 |
| 940703 | 0802        | 1.66          | 0.142       | 7.0          | 42                | 57                | 0.77     | 3.01     | 4.24     | 37                    | 0.58 |
| 940703 | 1359        | 1.46          | 0.132       | 7.6          | 50                | 72                | 0.77     | 1.87     | 3.57     | 45                    | 0.46 |
| 940703 | 2002        | 1.69          | 0.113       | 8.9          | 48                | 68                | 0.74     | 2.23     | 3.95     | 40                    | 0.47 |
| 940704 | 0202        | 1.72          | 0.113       | 8.9          | 44                | 64                | 0.71     | 2.37     | 4.39     | 36                    | 0.31 |
| 940704 | 0502        | 1.77          | 0.103       | 9.7          | 44                | 66                | 0.74     | 2.01     | 3.80     | 41                    | 0.29 |
| 940704 | 0802        | 1.80          | 0.103       | 9.7          | 40                | 61                | 0.70     | 1.97     | 4.31     | 38                    | 0.23 |
| 940704 | 1101        | 1.90          | 0.113       | 8.9          | 42                | 62                | 0.67     | 1.97     | 4.50     | 38                    | 0.32 |
| 940704 | 1400        | 2.07          | 0.103       | 9.7          | 44                | 65                | 0.67     | 1.70     | 4.26     | 42                    | 0.50 |
| 940704 | 1703        | 2.03          | 0.103       | 9.7          | 46                | 68                | 0.68     | 1.64     | 4.16     | 42                    | 0.27 |
| 940704 | 2002        | 1.84          | 0.103       | 9.7          | 40                | 65                | 0.73     | 1.75     | 3.74     | 45                    | 0.45 |
| 940705 | 0202        | 1.65          | 0.113       | 8.9          | 40                | 60                | 0.73     | 2.53     | 4.22     | 40                    | 0.71 |
| 940705 | 0503        | 1.83          | 0.113       | 8.9          | 44                | 60                | 0.69     | 2.49     | 4.45     | 35                    | 0.54 |
| 940705 | 0802        | 1.69          | 0.103       | 9.7          | 42                | 61                | 0.76     | 2.58     | 3.80     | 41                    | 1.25 |
| 940705 | 1102        | 1.73          | 0.103       | 9.7          | 46                | 61                | 0.74     | 2.66     | 4.01     | 38                    | 1.05 |
| 940705 | 2005        | 1.62          | 0.103       | 9.7          | 46                | 61                | 0.75     | 2.82     | 4.13     | 35                    | 0.89 |
| 940706 | 0157        | 1.74          | 0.103       | 9.7          | 46                | 58                | 0.70     | 3.07     | 4.78     | 31                    | 0.88 |
| 940706 | 0834        | 1.59          | 0.093       | 10.7         | 46                | 59                | 0.69     | 2.82     | 4.72     | 31                    | 0.72 |
| 940706 | 1104        | 1.78          | 0.093       | 10.7         | 42                | 55                | 0.65     | 3.17     | 5.55     | 27                    | 0.76 |
| 940706 | 1402        | 1.63          | 0.103       | 9.7          | 46                | 59                | 0.66     | 2.62     | 4.94     | 30                    | 0.75 |
| 940706 | 1702        | 1.54          | 0.093       | 10.7         | 44                | 57                | 0.67     | 2.75     | 5.01     | 32                    | 0.93 |
| 940706 | 2003        | 1.43          | 0.103       | 9.7          | 46                | 62                | 0.69     | 2.54     | 4.63     | 33                    | 0.69 |
| 940707 | 0202        | 1.37          | 0.103       | 9.7          | 48                | 60                | 0.63     | 2.77     | 5.36     | 27                    | 0.65 |
| 940707 | 0502        | 1.27          | 0.103       | 9.7          | 44                | 61                | 0.68     | 2.04     | 4.34     | 37                    | 0.81 |
| 940707 | 0802        | 1.24          | 0.093       | 10.7         | 46                | 66                | 0.71     | 1.85     | 3.77     | 42                    | 0.77 |
| 940707 | 1102        | 1.18          | 0.093       | 10.7         | 46                | 66                | 0.73     | 2.11     | 3.74     | 39                    | 0.73 |
| 940707 | 1402        | 1.18          | 0.093       | 10.7         | 46                | 64                | 0.74     | 2.27     | 3.89     | 39                    | 0.96 |
| 940707 | 1702        | 1.07          | 0.103       | 9.7          | 44                | 71                | 0.81     | 1.64     | 2.86     | 58                    | 1.01 |
| 940707 | 2002        | 1.07          | 0.103       | 9.7          | 58                | 74                | 0.82     | 1.58     | 2.88     | 58                    | 0.98 |
| 940708 | 0202        | 1.23          | 0.103       | 9.7          | 50                | 69                | 0.73     | 1.69     | 3.31     | 42                    | 0.80 |

(Sheet 22 of 45)

| Table A1 (Continued) |          |            |          |           |                |                |          |          |          |                    |      |
|----------------------|----------|------------|----------|-----------|----------------|----------------|----------|----------|----------|--------------------|------|
| Date                 | Time GMT | $H_{mo}$ m | $f_p$ Hz | $T_p$ sec | $\theta_p$ deg | $\theta_o$ deg | $\sigma$ | $\gamma$ | $\delta$ | $\Delta\theta$ deg | A    |
| 940708               | 0459     | 1.24       | 0.103    | 9.7       | 50             | 67             | 0.76     | 1.61     | 3.25     | 47                 | 0.68 |
| 940708               | 0826     | 1.08       | 0.103    | 9.7       | 60             | 76             | 0.82     | 1.18     | 2.60     | 71                 | 1.03 |
| 940708               | 1102     | 1.18       | 0.103    | 9.7       | 48             | 78             | 0.87     | 1.14     | 2.25     | 91                 | 1.44 |
| 940708               | 1405     | 1.07       | 0.103    | 9.7       | 46             | 78             | 0.89     | 1.07     | 2.14     | 100                | 1.62 |
| 940708               | 1702     | 1.07       | 0.064    | 15.6      | 44             | 81             | 0.89     | 1.05     | 2.11     | 101                | 1.25 |
| 940708               | 2002     | 0.99       | 0.064    | 15.6      | 48             | 96             | 0.93     | 0.31     | 1.54     | 106                | 0.80 |
| 940709               | 0202     | 0.88       | 0.064    | 15.6      | 44             | 101            | 0.93     | 0.14     | 1.69     | 101                | 0.24 |
| 940709               | 0759     | 1.03       | 0.064    | 15.6      | 44             | 98             | 0.95     | 0.26     | 1.51     | 109                | 0.67 |
| 940709               | 1102     | 0.96       | 0.064    | 15.6      | 46             | 98             | 0.95     | 0.31     | 1.63     | 104                | 0.65 |
| 940709               | 1402     | 1.00       | 0.064    | 15.6      | 42             | 93             | 0.96     | 0.47     | 1.53     | 111                | 0.99 |
| 940709               | 1702     | 1.14       | 0.103    | 9.7       | 38             | 77             | 0.97     | 1.15     | 1.89     | 116                | 1.70 |
| 940709               | 2002     | 1.08       | 0.064    | 15.6      | 52             | 86             | 0.91     | 0.83     | 1.91     | 97                 | 1.46 |
| 940710               | 0202     | 0.93       | 0.064    | 15.6      | 154            | 102            | 0.96     | 0.20     | 1.54     | 106                | 0.40 |
| 940710               | 1059     | 1.01       | 0.074    | 13.6      | 48             | 83             | 0.95     | 1.02     | 1.97     | 106                | 1.31 |
| 940710               | 1359     | 1.04       | 0.074    | 13.6      | 40             | 82             | 0.97     | 1.01     | 1.90     | 110                | 1.28 |
| 940711               | 0502     | 0.94       | 0.113    | 8.9       | 40             | 66             | 0.86     | 2.27     | 3.03     | 66                 | 1.46 |
| 940711               | 0802     | 0.98       | 0.113    | 8.9       | 40             | 64             | 0.89     | 2.35     | 2.94     | 74                 | 1.64 |
| 940711               | 1103     | 1.00       | 0.113    | 8.9       | 42             | 62             | 0.87     | 2.47     | 3.12     | 59                 | 1.35 |
| 940711               | 1703     | 1.06       | 0.113    | 8.9       | 40             | 66             | 0.84     | 2.26     | 3.19     | 50                 | 0.58 |
| 940711               | 2002     | 0.99       | 0.113    | 8.9       | 52             | 67             | 0.85     | 2.51     | 3.33     | 43                 | 0.72 |
| 940712               | 0202     | 0.96       | 0.113    | 8.9       | 48             | 68             | 0.86     | 2.07     | 3.00     | 51                 | 0.76 |
| 940712               | 0502     | 1.03       | 0.113    | 8.9       | 40             | 65             | 0.86     | 2.24     | 3.01     | 55                 | 0.93 |
| 940712               | 0806     | 1.12       | 0.113    | 8.9       | 38             | 60             | 0.76     | 2.57     | 3.85     | 40                 | 0.64 |
| 940712               | 1103     | 1.22       | 0.113    | 8.9       | 42             | 60             | 0.76     | 2.61     | 3.93     | 38                 | 0.55 |
| 940712               | 1402     | 1.27       | 0.113    | 8.9       | 42             | 60             | 0.79     | 2.60     | 3.77     | 39                 | 0.83 |
| 940712               | 2002     | 1.29       | 0.113    | 8.9       | 40             | 59             | 0.79     | 2.55     | 3.67     | 42                 | 0.89 |
| 940713               | 0503     | 1.32       | 0.113    | 8.9       | 42             | 62             | 0.78     | 2.36     | 3.58     | 41                 | 0.72 |
| 940713               | 0802     | 1.34       | 0.103    | 9.7       | 42             | 63             | 0.77     | 2.21     | 3.51     | 48                 | 1.20 |
| 940713               | 1102     | 1.41       | 0.103    | 9.7       | 42             | 61             | 0.74     | 2.23     | 3.73     | 44                 | 1.14 |
| 940713               | 1402     | 1.41       | 0.103    | 9.7       | 42             | 62             | 0.78     | 2.38     | 3.65     | 41                 | 1.05 |
| 940713               | 1702     | 1.57       | 0.103    | 9.7       | 44             | 59             | 0.66     | 2.35     | 4.74     | 37                 | 0.80 |
| 940713               | 2002     | 1.41       | 0.103    | 9.7       | 48             | 62             | 0.72     | 2.18     | 4.03     | 38                 | 0.66 |
| 940714               | 0200     | 1.26       | 0.103    | 9.7       | 48             | 66             | 0.73     | 2.13     | 3.74     | 37                 | 0.79 |
| 940714               | 0816     | 1.53       | 0.113    | 8.9       | 42             | 60             | 0.65     | 2.23     | 4.61     | 40                 | 1.06 |
| 940714               | 1101     | 1.40       | 0.123    | 8.2       | 44             | 66             | 0.72     | 1.89     | 3.78     | 45                 | 0.50 |
| 940714               | 1404     | 1.58       | 0.103    | 9.7       | 48             | 65             | 0.69     | 2.18     | 4.18     | 36                 | 0.55 |
| 940714               | 1702     | 1.70       | 0.103    | 9.7       | 42             | 61             | 0.68     | 2.31     | 4.47     | 39                 | 1.16 |
| 940714               | 2002     | 1.66       | 0.103    | 9.7       | 44             | 60             | 0.71     | 2.82     | 4.52     | 36                 | 1.08 |
| 940715               | 0202     | 1.50       | 0.103    | 9.7       | 48             | 66             | 0.74     | 2.42     | 3.85     | 37                 | 1.08 |
| 940715               | 0502     | 1.53       | 0.103    | 9.7       | 46             | 68             | 0.72     | 1.94     | 3.69     | 40                 | 0.61 |
| 940715               | 0802     | 1.44       | 0.103    | 9.7       | 42             | 67             | 0.77     | 2.14     | 3.48     | 45                 | 0.86 |
| 940715               | 1059     | 1.61       | 0.103    | 9.7       | 42             | 59             | 0.70     | 2.69     | 4.34     | 36                 | 1.24 |
| 940715               | 1758     | 2.03       | 0.093    | 10.7      | 42             | 53             | 0.62     | 3.13     | 5.73     | 23                 | 0.92 |
| 940715               | 1959     | 1.90       | 0.093    | 10.7      | 42             | 55             | 0.66     | 2.89     | 5.10     | 29                 | 1.00 |
| 940716               | 0202     | 1.80       | 0.093    | 10.7      | 42             | 56             | 0.67     | 3.19     | 4.99     | 24                 | 1.09 |
| 940716               | 0802     | 1.54       | 0.093    | 10.7      | 40             | 61             | 0.74     | 2.46     | 3.87     | 40                 | 1.38 |
| 940716               | 1105     | 1.54       | 0.103    | 9.7       | 40             | 61             | 0.76     | 2.33     | 3.75     | 41                 | 1.17 |
| 940716               | 1355     | 1.51       | 0.103    | 9.7       | 40             | 60             | 0.75     | 2.46     | 3.81     | 44                 | 1.47 |
| 940716               | 1659     | 1.34       | 0.103    | 9.7       | 42             | 70             | 0.83     | 1.65     | 2.78     | 70                 | 1.44 |
| 940716               | 2006     | 1.36       | 0.103    | 9.7       | 40             | 67             | 0.84     | 1.77     | 2.86     | 60                 | 1.20 |
| 940717               | 1359     | 1.18       | 0.093    | 10.7      | 40             | 71             | 0.87     | 1.43     | 2.41     | 90                 | 1.79 |

(Sheet 23 of 45)

Table A1 (Continued)

| Date   | Time<br>GMT | $H_{mo}$<br>m | $f_p$<br>Hz | $T_p$<br>sec | $\theta_p$<br>deg | $\theta_o$<br>deg | $\sigma$ | $\gamma$ | $\delta$ | $\Delta\theta$<br>deg | A     |
|--------|-------------|---------------|-------------|--------------|-------------------|-------------------|----------|----------|----------|-----------------------|-------|
| 940717 | 1702        | 1.07          | 0.103       | 9.7          | 40                | 83                | 0.94     | 0.82     | 1.84     | 108                   | 1.09  |
| 940718 | 0202        | 1.08          | 0.103       | 9.7          | 42                | 84                | 0.91     | 0.97     | 2.05     | 101                   | 0.97  |
| 940718 | 0502        | 1.08          | 0.113       | 8.9          | 38                | 80                | 0.90     | 1.03     | 2.08     | 101                   | 0.96  |
| 940718 | 0802        | 1.07          | 0.113       | 8.9          | 38                | 83                | 0.89     | 0.81     | 1.99     | 100                   | 0.66  |
| 940718 | 1059        | 1.01          | 0.113       | 8.9          | 38                | 76                | 0.90     | 1.11     | 2.14     | 98                    | 1.19  |
| 940718 | 1358        | 1.00          | 0.113       | 8.9          | 38                | 76                | 0.92     | 1.12     | 2.10     | 103                   | 1.07  |
| 940718 | 1702        | 0.98          | 0.113       | 8.9          | 34                | 85                | 0.97     | 0.68     | 1.67     | 116                   | 0.85  |
| 940718 | 2002        | 1.00          | 0.113       | 8.9          | 38                | 89                | 0.98     | 0.63     | 1.64     | 116                   | 0.92  |
| 940719 | 0201        | 0.90          | 0.064       | 15.6         | 36                | 103               | 0.95     | 0.13     | 1.53     | 109                   | 0.37  |
| 940719 | 0502        | 0.96          | 0.064       | 15.6         | 44                | 92                | 0.93     | 0.55     | 1.68     | 105                   | 0.91  |
| 940719 | 0754        | 0.96          | 0.064       | 15.6         | 180               | 111               | 0.96     | -0.08    | 1.46     | 109                   | -0.27 |
| 940719 | 1102        | 0.97          | 0.064       | 15.6         | 36                | 99                | 0.99     | 0.37     | 1.53     | 116                   | 0.81  |
| 940719 | 1659        | 0.95          | 0.064       | 15.6         | 180               | 124               | 0.99     | -0.52    | 1.51     | 119                   | -1.02 |
| 940720 | 0203        | 0.87          | 0.074       | 13.6         | -174              | 116               | 0.95     | -0.04    | 1.53     | 111                   | -0.28 |
| 940720 | 0502        | 0.86          | 0.074       | 13.6         | 62                | 118               | 0.94     | -0.15    | 1.59     | 104                   | -0.70 |
| 940720 | 0755        | 0.96          | 0.083       | 12.0         | 56                | 106               | 0.91     | 0.17     | 1.62     | 98                    | 0.28  |
| 940720 | 1100        | 1.02          | 0.074       | 13.6         | 48                | 96                | 0.95     | 0.54     | 1.69     | 106                   | 0.88  |
| 940720 | 1659        | 1.33          | 0.083       | 12.0         | 56                | 79                | 0.78     | 1.48     | 2.76     | 76                    | 1.69  |
| 940720 | 2001        | 1.34          | 0.083       | 12.0         | 62                | 74                | 0.71     | 1.67     | 3.52     | 36                    | 0.53  |
| 940721 | 0501        | 1.30          | 0.083       | 12.0         | 52                | 74                | 0.76     | 1.78     | 3.18     | 49                    | 1.03  |
| 940721 | 0802        | 1.27          | 0.083       | 12.0         | 54                | 77                | 0.78     | 1.61     | 2.83     | 69                    | 1.66  |
| 940721 | 1101        | 1.34          | 0.083       | 12.0         | 52                | 79                | 0.78     | 1.35     | 2.72     | 72                    | 1.30  |
| 940721 | 1403        | 1.30          | 0.083       | 12.0         | 50                | 80                | 0.74     | 1.11     | 2.82     | 55                    | 0.40  |
| 940721 | 1702        | 1.28          | 0.083       | 12.0         | 52                | 82                | 0.77     | 1.01     | 2.52     | 76                    | 1.01  |
| 940721 | 2002        | 1.28          | 0.083       | 12.0         | 52                | 82                | 0.80     | 1.22     | 2.46     | 83                    | 1.36  |
| 940722 | 0202        | 1.22          | 0.083       | 12.0         | 50                | 83                | 0.84     | 1.18     | 2.26     | 90                    | 1.56  |
| 940722 | 0502        | 1.26          | 0.083       | 12.0         | 54                | 78                | 0.76     | 1.59     | 2.98     | 57                    | 1.03  |
| 940722 | 1101        | 1.18          | 0.083       | 12.0         | 50                | 86                | 0.83     | 1.04     | 2.21     | 89                    | 1.22  |
| 940722 | 1358        | 1.22          | 0.083       | 12.0         | 52                | 78                | 0.83     | 1.57     | 2.67     | 77                    | 1.50  |
| 940722 | 1702        | 1.25          | 0.083       | 12.0         | 48                | 82                | 0.86     | 1.21     | 2.26     | 92                    | 1.36  |
| 940722 | 2002        | 1.20          | 0.083       | 12.0         | 50                | 75                | 0.80     | 1.74     | 2.92     | 63                    | 1.45  |
| 940723 | 0202        | 1.29          | 0.093       | 10.7         | 52                | 85                | 0.75     | 1.19     | 2.84     | 57                    | 0.55  |
| 940723 | 0502        | 1.31          | 0.093       | 10.7         | 52                | 88                | 0.79     | 0.95     | 2.38     | 76                    | 0.61  |
| 940723 | 0802        | 1.27          | 0.093       | 10.7         | 52                | 91                | 0.87     | 0.90     | 2.04     | 99                    | 1.09  |
| 940723 | 1102        | 1.20          | 0.093       | 10.7         | 54                | 86                | 0.82     | 1.07     | 2.36     | 84                    | 1.10  |
| 940723 | 1402        | 1.23          | 0.093       | 10.7         | 48                | 88                | 0.86     | 0.87     | 2.08     | 94                    | 0.78  |
| 940723 | 1659        | 1.24          | 0.093       | 10.7         | 44                | 86                | 0.84     | 0.74     | 2.13     | 89                    | 0.49  |
| 940723 | 2002        | 1.21          | 0.093       | 10.7         | 56                | 98                | 0.89     | 0.55     | 1.74     | 103                   | 1.10  |
| 940724 | 0202        | 1.16          | 0.093       | 10.7         | 54                | 100               | 0.88     | 0.42     | 1.70     | 99                    | 0.89  |
| 940724 | 0502        | 1.16          | 0.074       | 13.6         | 168               | 103               | 0.96     | 0.24     | 1.48     | 113                   | 0.76  |
| 940724 | 0802        | 1.01          | 0.093       | 10.7         | 52                | 92                | 0.92     | 0.73     | 1.90     | 102                   | 0.92  |
| 940724 | 1101        | 1.04          | 0.074       | 13.6         | 156               | 101               | 0.92     | 0.30     | 1.68     | 101                   | 0.70  |
| 940724 | 1402        | 1.04          | 0.074       | 13.6         | 40                | 97                | 0.95     | 0.36     | 1.58     | 110                   | 0.71  |
| 940724 | 1701        | 1.04          | 0.074       | 13.6         | 56                | 89                | 0.96     | 0.69     | 1.79     | 110                   | 1.03  |
| 940724 | 2001        | 1.18          | 0.162       | 6.2          | 58                | 73                | 0.89     | 1.29     | 2.39     | 84                    | 1.02  |
| 940725 | 0159        | 1.15          | 0.162       | 6.2          | 54                | 66                | 0.89     | 1.66     | 2.65     | 75                    | 0.79  |
| 940725 | 0502        | 1.17          | 0.162       | 6.2          | 50                | 68                | 0.90     | 1.52     | 2.43     | 94                    | 1.41  |
| 940725 | 0801        | 1.18          | 0.162       | 6.2          | 54                | 78                | 0.93     | 1.11     | 1.98     | 108                   | 1.58  |
| 940725 | 1059        | 1.14          | 0.162       | 6.2          | 56                | 65                | 0.84     | 1.90     | 2.99     | 60                    | 0.65  |
| 940725 | 1402        | 1.18          | 0.152       | 6.6          | 52                | 62                | 0.86     | 2.01     | 2.88     | 67                    | 0.96  |
| 940725 | 1701        | 1.13          | 0.162       | 6.2          | 32                | 60                | 0.86     | 1.81     | 2.84     | 70                    | 1.00  |
| 940725 | 1959        | 1.12          | 0.162       | 6.2          | 22                | 58                | 0.87     | 1.85     | 2.90     | 68                    | 0.75  |

(Sheet 24 of 45)

Table A1 (Continued)

| Date   | Time<br>GMT | $H_{mo}$<br>m | $f_p$<br>Hz | $T_p$<br>sec | $\theta_p$<br>deg | $\theta_0$<br>deg | $\sigma$ | $\gamma$ | $\delta$ | $\Delta\theta$<br>deg | A    |
|--------|-------------|---------------|-------------|--------------|-------------------|-------------------|----------|----------|----------|-----------------------|------|
| 940726 | 0202        | 0.90          | 0.162       | 6.2          | 50                | 72                | 0.89     | 1.36     | 2.40     | 88                    | 1.30 |
| 940726 | 0502        | 0.88          | 0.162       | 6.2          | 54                | 73                | 0.90     | 1.25     | 2.26     | 94                    | 1.30 |
| 940726 | 0827        | 0.86          | 0.162       | 6.2          | 44                | 81                | 0.95     | 1.01     | 1.94     | 107                   | 1.35 |
| 940726 | 1102        | 0.84          | 0.162       | 6.2          | 50                | 77                | 0.90     | 1.27     | 2.24     | 98                    | 1.55 |
| 940726 | 1402        | 1.07          | 0.162       | 6.2          | 28                | 61                | 0.81     | 1.90     | 3.15     | 59                    | 0.83 |
| 940726 | 1702        | 1.35          | 0.152       | 6.6          | 26                | 55                | 0.77     | 2.06     | 3.56     | 49                    | 0.54 |
| 940726 | 2002        | 1.70          | 0.142       | 7.0          | 26                | 43                | 0.62     | 2.39     | 5.65     | 30                    | 0.15 |
| 940727 | 0205        | 1.73          | 0.132       | 7.6          | 44                | 49                | 0.57     | 2.75     | 6.70     | 23                    | 0.20 |
| 940727 | 0505        | 1.81          | 0.123       | 8.2          | 42                | 47                | 0.58     | 2.92     | 6.40     | 22                    | 0.19 |
| 940727 | 0802        | 1.87          | 0.132       | 7.6          | 44                | 48                | 0.60     | 2.38     | 5.59     | 27                    | 0.08 |
| 940727 | 1101        | 1.86          | 0.132       | 7.6          | 44                | 46                | 0.59     | 2.55     | 6.20     | 28                    | 0.10 |
| 940727 | 1405        | 1.72          | 0.123       | 8.2          | 46                | 53                | 0.63     | 2.50     | 5.50     | 29                    | 0.36 |
| 940727 | 1659        | 1.88          | 0.132       | 7.6          | 38                | 54                | 0.64     | 1.64     | 4.41     | 44                    | 0.68 |
| 940727 | 1959        | 2.02          | 0.123       | 8.2          | 48                | 53                | 0.58     | 1.56     | 5.33     | 33                    | 0.28 |
| 940728 | 0201        | 1.69          | 0.123       | 8.2          | 48                | 50                | 0.59     | 2.22     | 6.13     | 29                    | 0.10 |
| 940728 | 0502        | 1.60          | 0.132       | 7.6          | 42                | 54                | 0.65     | 2.26     | 4.87     | 34                    | 0.84 |
| 940728 | 0802        | 1.65          | 0.123       | 8.2          | 36                | 55                | 0.62     | 1.93     | 5.09     | 37                    | 0.50 |
| 940728 | 1102        | 1.75          | 0.123       | 8.2          | 46                | 55                | 0.59     | 1.79     | 5.25     | 36                    | 0.37 |
| 940728 | 1402        | 1.70          | 0.123       | 8.2          | 44                | 55                | 0.58     | 2.30     | 5.85     | 28                    | 0.59 |
| 940728 | 1659        | 1.73          | 0.123       | 8.2          | 44                | 53                | 0.57     | 1.83     | 5.71     | 32                    | 0.61 |
| 940728 | 2001        | 1.88          | 0.123       | 8.2          | 46                | 50                | 0.57     | 1.60     | 5.49     | 33                    | 0.15 |
| 940729 | 0202        | 1.71          | 0.132       | 7.6          | 44                | 51                | 0.64     | 2.74     | 5.75     | 26                    | 0.47 |
| 940729 | 0459        | 1.77          | 0.123       | 8.2          | 40                | 49                | 0.60     | 2.53     | 5.90     | 26                    | 0.51 |
| 940729 | 0802        | 1.56          | 0.123       | 8.2          | 42                | 56                | 0.62     | 2.35     | 5.31     | 33                    | 1.02 |
| 940729 | 1058        | 1.55          | 0.132       | 7.6          | 44                | 63                | 0.65     | 1.52     | 4.13     | 50                    | 1.21 |
| 940729 | 1358        | 1.52          | 0.123       | 8.2          | 40                | 61                | 0.64     | 1.78     | 4.39     | 45                    | 1.19 |
| 940729 | 1651        | 1.38          | 0.123       | 8.2          | 42                | 64                | 0.69     | 1.93     | 4.09     | 45                    | 0.95 |
| 940729 | 2001        | 1.33          | 0.123       | 8.2          | 44                | 63                | 0.68     | 1.93     | 4.21     | 44                    | 0.87 |
| 940730 | 0202        | 1.29          | 0.123       | 8.2          | 48                | 67                | 0.72     | 2.06     | 3.95     | 44                    | 1.05 |
| 940730 | 0502        | 1.33          | 0.123       | 8.2          | 46                | 66                | 0.72     | 2.19     | 4.09     | 44                    | 0.98 |
| 940730 | 0802        | 1.33          | 0.132       | 7.6          | 44                | 67                | 0.71     | 1.82     | 3.92     | 47                    | 0.91 |
| 940730 | 1101        | 1.28          | 0.132       | 7.6          | 44                | 67                | 0.69     | 2.03     | 4.24     | 43                    | 0.78 |
| 940730 | 1401        | 1.13          | 0.142       | 7.0          | 46                | 72                | 0.73     | 1.77     | 3.74     | 47                    | 0.69 |
| 940730 | 1701        | 1.20          | 0.123       | 8.2          | 46                | 67                | 0.71     | 2.05     | 4.11     | 43                    | 0.83 |
| 940731 | 1059        | 1.42          | 0.113       | 8.9          | 42                | 64                | 0.71     | 1.76     | 3.55     | 47                    | 1.02 |
| 940731 | 1402        | 1.23          | 0.113       | 8.9          | 44                | 70                | 0.77     | 1.72     | 3.26     | 53                    | 0.96 |
| 940731 | 1701        | 1.44          | 0.113       | 8.9          | 40                | 67                | 0.79     | 2.02     | 3.30     | 50                    | 0.92 |
| 940731 | 1959        | 1.51          | 0.103       | 9.7          | 42                | 63                | 0.72     | 2.20     | 3.87     | 41                    | 1.11 |
| 940801 | 0159        | 1.40          | 0.074       | 13.6         | 44                | 69                | 0.74     | 1.86     | 3.30     | 46                    | 0.96 |
| 940801 | 0502        | 1.27          | 0.074       | 13.6         | 44                | 74                | 0.78     | 1.32     | 2.78     | 65                    | 0.92 |
| 940801 | 0801        | 1.39          | 0.074       | 13.6         | 44                | 69                | 0.73     | 1.57     | 3.33     | 48                    | 0.69 |
| 940801 | 1051        | 1.37          | 0.162       | 6.2          | 42                | 70                | 0.74     | 1.47     | 3.13     | 48                    | 0.51 |
| 940801 | 1357        | 1.33          | 0.162       | 6.2          | 42                | 67                | 0.76     | 1.91     | 3.38     | 46                    | 0.70 |
| 940801 | 1657        | 1.31          | 0.162       | 6.2          | 58                | 70                | 0.80     | 1.50     | 3.06     | 54                    | 0.61 |
| 940801 | 1958        | 1.40          | 0.162       | 6.2          | 56                | 70                | 0.75     | 1.58     | 3.20     | 44                    | 0.60 |
| 940802 | 0155        | 1.62          | 0.152       | 6.6          | 54                | 64                | 0.69     | 1.57     | 3.91     | 41                    | 0.23 |
| 940802 | 0458        | 1.86          | 0.132       | 7.6          | 38                | 57                | 0.65     | 1.91     | 4.38     | 40                    | 0.56 |
| 940802 | 0758        | 1.82          | 0.132       | 7.6          | 46                | 58                | 0.67     | 1.97     | 4.30     | 37                    | 0.26 |
| 940802 | 1112        | 1.78          | 0.132       | 7.6          | 44                | 58                | 0.64     | 2.02     | 4.63     | 36                    | 0.29 |
| 940802 | 1358        | 1.83          | 0.132       | 7.6          | 44                | 59                | 0.66     | 2.04     | 4.40     | 37                    | 0.42 |
| 940802 | 1658        | 1.74          | 0.132       | 7.6          | 40                | 57                | 0.72     | 2.08     | 3.87     | 42                    | 0.61 |
| 940802 | 1958        | 1.63          | 0.142       | 7.0          | 24                | 56                | 0.74     | 1.99     | 3.68     | 44                    | 0.19 |

(Sheet 25 of 45)

Table A1 (Continued)

| Date   | Time<br>GMT | $H_{mo}$<br>m | $f_p$<br>Hz | $T_p$<br>sec | $\theta_p$<br>deg | $\theta_o$<br>deg | $\sigma$ | $\gamma$ | $\delta$ | $\Delta\theta$<br>deg | A     |
|--------|-------------|---------------|-------------|--------------|-------------------|-------------------|----------|----------|----------|-----------------------|-------|
| 940803 | 0155        | 1.62          | 0.142       | 7.0          | 26                | 55                | 0.71     | 1.94     | 3.80     | 44                    | 0.15  |
| 940803 | 0458        | 1.68          | 0.132       | 7.6          | 42                | 56                | 0.71     | 2.13     | 3.88     | 39                    | 0.42  |
| 940803 | 0758        | 1.77          | 0.132       | 7.6          | 34                | 57                | 0.71     | 2.23     | 3.95     | 41                    | 0.46  |
| 940803 | 1058        | 2.00          | 0.132       | 7.6          | 34                | 57                | 0.62     | 1.63     | 4.47     | 43                    | 0.25  |
| 940803 | 1355        | 1.95          | 0.132       | 7.6          | 34                | 57                | 0.62     | 1.63     | 4.50     | 42                    | 0.33  |
| 940803 | 1655        | 1.81          | 0.132       | 7.6          | 38                | 58                | 0.66     | 1.95     | 4.31     | 37                    | 0.21  |
| 940803 | 1959        | 1.81          | 0.132       | 7.6          | 62                | 55                | 0.63     | 1.79     | 4.76     | 35                    | -0.10 |
| 940804 | 0200        | 1.75          | 0.132       | 7.6          | 48                | 58                | 0.62     | 2.43     | 5.07     | 29                    | 0.24  |
| 940804 | 0500        | 1.83          | 0.123       | 8.2          | 54                | 57                | 0.60     | 2.13     | 5.16     | 31                    | 0.08  |
| 940804 | 0800        | 1.80          | 0.132       | 7.6          | 44                | 57                | 0.65     | 2.56     | 4.81     | 31                    | 0.48  |
| 940804 | 1059        | 1.87          | 0.132       | 7.6          | 54                | 56                | 0.60     | 2.36     | 5.47     | 27                    | 0.05  |
| 940804 | 1358        | 2.12          | 0.132       | 7.6          | 48                | 53                | 0.58     | 2.57     | 5.89     | 27                    | 0.11  |
| 940804 | 1659        | 2.10          | 0.132       | 7.6          | 46                | 52                | 0.53     | 2.18     | 6.53     | 26                    | 0.24  |
| 940804 | 1959        | 2.13          | 0.123       | 8.2          | 42                | 49                | 0.53     | 2.26     | 6.88     | 26                    | 0.06  |
| 940805 | 0156        | 1.88          | 0.123       | 8.2          | 48                | 53                | 0.52     | 2.41     | 7.09     | 25                    | 0.24  |
| 940805 | 0459        | 1.87          | 0.123       | 8.2          | 44                | 54                | 0.53     | 2.65     | 7.18     | 25                    | 0.52  |
| 940805 | 0801        | 1.79          | 0.123       | 8.2          | 42                | 54                | 0.53     | 2.85     | 7.59     | 25                    | 0.55  |
| 940805 | 1058        | 1.81          | 0.123       | 8.2          | 46                | 55                | 0.55     | 3.01     | 7.07     | 23                    | 0.37  |
| 940805 | 1359        | 1.74          | 0.132       | 7.6          | 42                | 53                | 0.55     | 2.84     | 6.91     | 24                    | 0.59  |
| 940805 | 1708        | 1.90          | 0.123       | 8.2          | 42                | 50                | 0.51     | 2.54     | 7.67     | 24                    | 0.33  |
| 940805 | 1958        | 1.94          | 0.123       | 8.2          | 44                | 50                | 0.49     | 2.15     | 7.91     | 26                    | 0.12  |
| 940806 | 0200        | 1.64          | 0.123       | 8.2          | 48                | 52                | 0.58     | 2.34     | 6.20     | 28                    | 0.15  |
| 940806 | 0500        | 1.56          | 0.123       | 8.2          | 44                | 55                | 0.63     | 2.90     | 5.77     | 31                    | 0.45  |
| 940806 | 0759        | 1.64          | 0.113       | 8.9          | 42                | 55                | 0.60     | 3.14     | 6.39     | 28                    | 0.46  |
| 940806 | 1059        | 1.59          | 0.123       | 8.2          | 48                | 57                | 0.58     | 3.08     | 6.62     | 26                    | 0.39  |
| 940806 | 1357        | 1.59          | 0.113       | 8.9          | 44                | 57                | 0.64     | 3.50     | 6.17     | 26                    | 0.84  |
| 940806 | 1659        | 1.61          | 0.103       | 9.7          | 48                | 58                | 0.62     | 3.31     | 6.23     | 25                    | 0.45  |
| 940806 | 1959        | 1.61          | 0.103       | 9.7          | 48                | 58                | 0.65     | 3.02     | 5.74     | 28                    | 0.35  |
| 940807 | 0159        | 1.72          | 0.113       | 8.9          | 50                | 63                | 0.66     | 2.69     | 5.18     | 34                    | 0.42  |
| 940807 | 0500        | 1.70          | 0.113       | 8.9          | 54                | 65                | 0.65     | 2.99     | 5.35     | 28                    | 0.41  |
| 940807 | 0800        | 1.60          | 0.113       | 8.9          | 48                | 63                | 0.68     | 3.01     | 5.05     | 31                    | 0.67  |
| 940807 | 1059        | 1.60          | 0.113       | 8.9          | 50                | 64                | 0.65     | 3.01     | 5.51     | 28                    | 0.66  |
| 940807 | 1359        | 1.61          | 0.113       | 8.9          | 50                | 62                | 0.65     | 3.17     | 5.64     | 28                    | 0.67  |
| 940807 | 1659        | 1.66          | 0.113       | 8.9          | 40                | 56                | 0.63     | 2.61     | 5.50     | 33                    | 0.70  |
| 940807 | 1958        | 1.55          | 0.113       | 8.9          | 46                | 60                | 0.67     | 2.84     | 5.08     | 32                    | 0.63  |
| 940808 | 0456        | 1.56          | 0.123       | 8.2          | 46                | 62                | 0.68     | 2.52     | 4.83     | 37                    | 0.48  |
| 940808 | 0755        | 1.61          | 0.123       | 8.2          | 46                | 61                | 0.70     | 2.98     | 4.81     | 33                    | 0.41  |
| 940808 | 1101        | 1.40          | 0.123       | 8.2          | 54                | 67                | 0.73     | 2.49     | 4.12     | 31                    | 0.28  |
| 940808 | 2005        | 1.78          | 0.113       | 8.9          | 40                | 57                | 0.62     | 2.38     | 5.48     | 36                    | 0.64  |
| 940809 | 0205        | 1.72          | 0.113       | 8.9          | 54                | 65                | 0.67     | 2.16     | 4.62     | 36                    | 0.27  |
| 940809 | 0502        | 1.64          | 0.123       | 8.2          | 42                | 61                | 0.66     | 2.23     | 4.76     | 37                    | 0.21  |
| 940809 | 1110        | 1.60          | 0.123       | 8.2          | 64                | 62                | 0.68     | 1.97     | 4.64     | 36                    | -0.01 |
| 940809 | 1406        | 1.54          | 0.123       | 8.2          | 56                | 62                | 0.65     | 2.09     | 4.88     | 35                    | 0.15  |
| 940809 | 1718        | 1.44          | 0.132       | 7.6          | 56                | 61                | 0.63     | 2.18     | 5.02     | 34                    | 0.15  |
| 940809 | 2003        | 1.34          | 0.132       | 7.6          | 56                | 62                | 0.67     | 2.33     | 4.63     | 36                    | 0.24  |
| 940810 | 0206        | 1.13          | 0.142       | 7.0          | 72                | 70                | 0.79     | 1.50     | 3.15     | 48                    | -0.14 |
| 940810 | 0506        | 1.13          | 0.142       | 7.0          | 32                | 69                | 0.79     | 1.72     | 3.10     | 49                    | 0.22  |
| 940810 | 0806        | 1.15          | 0.152       | 6.6          | 28                | 61                | 0.76     | 1.76     | 3.50     | 52                    | 0.11  |
| 940810 | 1107        | 1.17          | 0.142       | 7.0          | 52                | 64                | 0.77     | 2.33     | 3.70     | 41                    | 0.34  |
| 940810 | 1702        | 1.07          | 0.152       | 6.6          | 54                | 73                | 0.84     | 2.12     | 3.08     | 52                    | 0.75  |
| 940810 | 2005        | 1.28          | 0.142       | 7.0          | 50                | 62                | 0.70     | 3.03     | 4.73     | 31                    | 0.53  |
| 940811 | 0505        | 1.12          | 0.152       | 6.6          | 50                | 59                | 0.80     | 2.59     | 3.71     | 39                    | 0.44  |

(Sheet 26 of 45)

Table A1 (Continued)

| Date   | Time<br>GMT | $H_{mo}$<br>m | $f_p$<br>Hz | $T_p$<br>sec | $\theta_p$<br>deg | $\theta_o$<br>deg | $\sigma$ | $\gamma$ | $\delta$ | $\Delta\theta$<br>deg | A    |
|--------|-------------|---------------|-------------|--------------|-------------------|-------------------|----------|----------|----------|-----------------------|------|
| 940811 | 0805        | 1.26          | 0.152       | 6.6          | 52                | 60                | 0.80     | 2.62     | 3.65     | 40                    | 0.40 |
| 940811 | 1106        | 1.43          | 0.142       | 7.0          | 56                | 58                | 0.74     | 2.62     | 4.24     | 35                    | 0.04 |
| 940811 | 1406        | 1.62          | 0.132       | 7.6          | 48                | 54                | 0.65     | 3.06     | 5.72     | 25                    | 0.12 |
| 940811 | 2000        | 1.58          | 0.132       | 7.6          | 54                | 54                | 0.65     | 2.67     | 5.26     | 29                    | 0.06 |
| 940812 | 1118        | 1.70          | 0.132       | 7.6          | 52                | 60                | 0.64     | 2.63     | 5.43     | 29                    | 0.17 |
| 940812 | 1401        | 1.47          | 0.132       | 7.6          | 54                | 72                | 0.77     | 2.50     | 3.76     | 33                    | 0.44 |
| 940812 | 2006        | 1.57          | 0.132       | 7.6          | 68                | 68                | 0.66     | 2.03     | 4.56     | 31                    | 0.00 |
| 940813 | 0500        | 1.74          | 0.132       | 7.6          | 54                | 60                | 0.66     | 1.91     | 4.89     | 34                    | 0.10 |
| 940813 | 0803        | 1.51          | 0.132       | 7.6          | 46                | 58                | 0.69     | 2.71     | 4.79     | 29                    | 0.38 |
| 940813 | 1106        | 1.37          | 0.132       | 7.6          | 56                | 65                | 0.81     | 2.47     | 3.53     | 34                    | 0.32 |
| 940813 | 1703        | 1.36          | 0.142       | 7.0          | 52                | 65                | 0.83     | 2.05     | 3.15     | 44                    | 0.40 |
| 940813 | 2006        | 1.19          | 0.142       | 7.0          | 56                | 74                | 0.88     | 1.68     | 2.65     | 87                    | 1.33 |
| 940814 | 0203        | 1.12          | 0.152       | 6.6          | 56                | 77                | 0.94     | 1.33     | 2.22     | 101                   | 1.75 |
| 940814 | 0506        | 1.18          | 0.152       | 6.6          | 58                | 71                | 0.94     | 1.67     | 2.41     | 104                   | 1.43 |
| 940814 | 0806        | 1.37          | 0.142       | 7.0          | 54                | 64                | 0.83     | 2.71     | 3.46     | 42                    | 0.53 |
| 940814 | 1406        | 1.36          | 0.074       | 13.6         | 52                | 85                | 1.06     | 1.56     | 1.95     | 131                   | 1.98 |
| 940814 | 1703        | 1.31          | 0.142       | 7.0          | 56                | 80                | 0.97     | 2.11     | 2.46     | 110                   | 2.09 |
| 940815 | 0206        | 1.36          | 0.142       | 7.0          | 58                | 71                | 0.94     | 2.07     | 2.71     | 89                    | 1.55 |
| 940815 | 0506        | 1.49          | 0.132       | 7.6          | 50                | 64                | 0.82     | 2.57     | 3.70     | 38                    | 0.63 |
| 940815 | 0807        | 1.46          | 0.142       | 7.0          | 56                | 63                | 0.86     | 2.17     | 3.33     | 45                    | 0.35 |
| 940815 | 1107        | 1.46          | 0.132       | 7.6          | 52                | 61                | 0.84     | 2.80     | 3.69     | 37                    | 0.49 |
| 940815 | 1712        | 1.55          | 0.142       | 7.0          | 52                | 66                | 0.92     | 2.36     | 2.90     | 55                    | 0.89 |
| 940815 | 2007        | 1.72          | 0.142       | 7.0          | 54                | 62                | 0.86     | 2.39     | 3.34     | 41                    | 0.27 |
| 940816 | 1104        | 1.71          | 0.123       | 8.2          | 52                | 61                | 0.73     | 2.81     | 4.53     | 29                    | 0.41 |
| 940816 | 1405        | 1.69          | 0.132       | 7.6          | 48                | 62                | 0.77     | 3.01     | 4.22     | 32                    | 0.79 |
| 940816 | 1707        | 1.61          | 0.123       | 8.2          | 48                | 62                | 0.81     | 2.93     | 3.83     | 35                    | 0.97 |
| 940816 | 2007        | 1.43          | 0.123       | 8.2          | 50                | 65                | 0.89     | 2.08     | 3.03     | 49                    | 1.07 |
| 940817 | 0204        | 1.57          | 0.113       | 8.9          | 50                | 67                | 0.78     | 2.56     | 3.69     | 36                    | 1.15 |
| 940817 | 0505        | 1.68          | 0.123       | 8.2          | 42                | 64                | 0.85     | 2.68     | 3.30     | 49                    | 1.38 |
| 940817 | 0807        | 1.55          | 0.113       | 8.9          | 48                | 67                | 0.85     | 2.71     | 3.35     | 45                    | 1.34 |
| 940817 | 1110        | 1.49          | 0.113       | 8.9          | 48                | 70                | 0.93     | 2.21     | 2.69     | 97                    | 2.01 |
| 940817 | 1402        | 1.48          | 0.113       | 8.9          | 48                | 75                | 0.91     | 1.94     | 2.58     | 99                    | 2.06 |
| 940817 | 1709        | 1.60          | 0.123       | 8.2          | 44                | 64                | 0.83     | 2.62     | 3.45     | 42                    | 0.98 |
| 940818 | 0810        | 1.34          | 0.113       | 8.9          | 42                | 91                | 1.05     | 0.70     | 1.55     | 125                   | 1.27 |
| 940818 | 1412        | 1.36          | 0.113       | 8.9          | 46                | 77                | 0.95     | 1.57     | 2.24     | 109                   | 1.69 |
| 940819 | 0205        | 1.54          | 0.113       | 8.9          | 40                | 62                | 0.84     | 2.27     | 3.23     | 50                    | 0.98 |
| 940819 | 0816        | 1.50          | 0.123       | 8.2          | 46                | 64                | 0.85     | 2.37     | 3.21     | 50                    | 0.89 |
| 940819 | 1104        | 1.43          | 0.113       | 8.9          | 44                | 66                | 0.86     | 2.35     | 3.09     | 55                    | 1.14 |
| 940819 | 1405        | 1.49          | 0.113       | 8.9          | 46                | 67                | 0.78     | 2.45     | 3.64     | 41                    | 1.05 |
| 940819 | 1704        | 1.74          | 0.123       | 8.2          | 44                | 59                | 0.68     | 2.96     | 4.93     | 31                    | 0.56 |
| 940819 | 2004        | 1.98          | 0.123       | 8.2          | 44                | 57                | 0.62     | 2.58     | 5.62     | 29                    | 0.55 |
| 940820 | 0204        | 2.15          | 0.123       | 8.2          | 40                | 52                | 0.57     | 2.46     | 6.39     | 27                    | 0.51 |
| 940820 | 0504        | 2.36          | 0.123       | 8.2          | 38                | 50                | 0.56     | 2.53     | 6.80     | 29                    | 0.42 |
| 940820 | 0757        | 2.04          | 0.113       | 8.9          | 42                | 54                | 0.64     | 3.57     | 5.77     | 24                    | 0.72 |
| 940820 | 1107        | 2.00          | 0.113       | 8.9          | 50                | 63                | 0.63     | 2.74     | 5.35     | 27                    | 0.57 |
| 940820 | 1400        | 2.07          | 0.123       | 8.2          | 50                | 63                | 0.62     | 2.67     | 5.55     | 27                    | 0.56 |
| 940820 | 1703        | 2.11          | 0.123       | 8.2          | 46                | 59                | 0.62     | 2.33     | 5.30     | 31                    | 0.29 |
| 940820 | 2001        | 2.38          | 0.113       | 8.9          | 44                | 53                | 0.59     | 2.66     | 6.37     | 26                    | 0.30 |
| 940821 | 0240        | 2.18          | 0.113       | 8.9          | 46                | 59                | 0.60     | 2.11     | 5.72     | 31                    | 0.38 |
| 940821 | 0504        | 2.17          | 0.113       | 8.9          | 44                | 57                | 0.60     | 2.72     | 5.91     | 29                    | 0.56 |

(Sheet 27 of 45)

Table A1 (Continued)

| Date   | Time<br>GMT | $H_{mo}$<br>m | $f_p$<br>Hz | $T_p$<br>sec | $\theta_p$<br>deg | $\theta_o$<br>deg | $\sigma$ | $\gamma$ | $\delta$ | $\Delta\theta$<br>deg | A     |
|--------|-------------|---------------|-------------|--------------|-------------------|-------------------|----------|----------|----------|-----------------------|-------|
| 940821 | 0804        | 2.09          | 0.123       | 8.2          | 42                | 58                | 0.66     | 2.82     | 5.18     | 31                    | 0.63  |
| 940821 | 1401        | 1.69          | 0.123       | 8.2          | 52                | 72                | 0.71     | 2.31     | 4.22     | 33                    | 0.41  |
| 940821 | 1701        | 1.66          | 0.123       | 8.2          | 52                | 70                | 0.73     | 2.40     | 3.98     | 33                    | 0.40  |
| 940821 | 2004        | 1.89          | 0.123       | 8.2          | 64                | 66                | 0.66     | 2.55     | 4.80     | 28                    | -0.02 |
| 940822 | 0204        | 1.47          | 0.132       | 7.6          | 56                | 77                | 0.83     | 1.48     | 2.81     | 59                    | 0.83  |
| 940822 | 0501        | 1.70          | 0.132       | 7.6          | 52                | 66                | 0.79     | 2.08     | 3.55     | 41                    | 0.43  |
| 940822 | 0804        | 1.60          | 0.132       | 7.6          | 50                | 70                | 0.83     | 1.83     | 2.99     | 53                    | 0.72  |
| 940822 | 1101        | 1.48          | 0.132       | 7.6          | 50                | 73                | 0.81     | 1.92     | 3.27     | 46                    | 0.48  |
| 940822 | 1403        | 1.29          | 0.132       | 7.6          | 52                | 87                | 0.92     | 1.18     | 2.16     | 104                   | 1.38  |
| 940822 | 1703        | 1.26          | 0.132       | 7.6          | 52                | 90                | 0.97     | 0.85     | 1.81     | 112                   | 1.27  |
| 940822 | 1959        | 1.33          | 0.142       | 7.0          | 62                | 80                | 0.91     | 1.31     | 2.17     | 107                   | 1.41  |
| 940823 | 0802        | 1.14          | 0.054       | 18.5         | 62                | 96                | 1.01     | 0.52     | 1.60     | 115                   | 1.24  |
| 940823 | 1057        | 1.19          | 0.054       | 18.5         | 180               | 101               | 1.03     | 0.28     | 1.46     | 119                   | 0.93  |
| 940823 | 1655        | 1.27          | 0.132       | 7.6          | 56                | 91                | 0.96     | 0.84     | 1.79     | 110                   | 1.21  |
| 940823 | 2000        | 1.24          | 0.064       | 15.6         | 44                | 93                | 0.99     | 0.64     | 1.61     | 118                   | 1.14  |
| 940824 | 0201        | 1.15          | 0.162       | 6.2          | 56                | 82                | 0.94     | 1.12     | 2.12     | 106                   | 1.43  |
| 940824 | 0501        | 1.26          | 0.162       | 6.2          | 50                | 76                | 0.88     | 1.51     | 2.49     | 90                    | 1.37  |
| 940824 | 0801        | 1.17          | 0.162       | 6.2          | 56                | 82                | 0.92     | 1.17     | 2.10     | 107                   | 1.35  |
| 940824 | 1101        | 1.08          | 0.064       | 15.6         | 62                | 99                | 0.99     | 0.40     | 1.57     | 113                   | 1.07  |
| 940824 | 1406        | 1.21          | 0.064       | 15.6         | 48                | 85                | 0.95     | 0.95     | 1.90     | 113                   | 1.26  |
| 940824 | 1658        | 1.30          | 0.162       | 6.2          | 56                | 69                | 0.88     | 1.49     | 2.72     | 62                    | 0.43  |
| 940824 | 2000        | 1.47          | 0.162       | 6.2          | 26                | 61                | 0.81     | 1.85     | 3.21     | 52                    | 0.26  |
| 940825 | 0200        | 1.54          | 0.152       | 6.6          | 66                | 67                | 0.72     | 1.99     | 3.98     | 36                    | 0.07  |
| 940825 | 0500        | 1.45          | 0.142       | 7.0          | 50                | 67                | 0.74     | 2.09     | 3.80     | 37                    | 0.36  |
| 940825 | 0800        | 1.45          | 0.132       | 7.6          | 58                | 64                | 0.75     | 1.86     | 3.66     | 40                    | 0.17  |
| 940825 | 1058        | 1.40          | 0.142       | 7.0          | 40                | 61                | 0.79     | 2.12     | 3.52     | 44                    | 0.39  |
| 940825 | 1702        | 1.35          | 0.113       | 8.9          | 26                | 65                | 0.82     | 1.59     | 2.88     | 58                    | 0.16  |
| 940825 | 2001        | 1.28          | 0.113       | 8.9          | 36                | 63                | 0.83     | 1.79     | 3.05     | 55                    | 0.48  |
| 940826 | 0201        | 1.17          | 0.064       | 15.6         | 36                | 82                | 0.91     | 0.87     | 1.99     | 104                   | 0.94  |
| 940826 | 0501        | 1.18          | 0.162       | 6.2          | 68                | 73                | 0.81     | 1.54     | 2.93     | 55                    | 0.44  |
| 940826 | 0803        | 1.29          | 0.152       | 6.6          | 32                | 66                | 0.80     | 1.67     | 3.07     | 53                    | 0.35  |
| 940826 | 1102        | 1.29          | 0.162       | 6.2          | 34                | 65                | 0.85     | 1.80     | 2.82     | 63                    | 0.83  |
| 940826 | 1410        | 1.17          | 0.162       | 6.2          | 56                | 77                | 0.93     | 1.15     | 2.11     | 106                   | 1.30  |
| 940826 | 1700        | 1.25          | 0.162       | 6.2          | 50                | 76                | 0.88     | 1.31     | 2.36     | 92                    | 1.33  |
| 940826 | 2000        | 1.14          | 0.162       | 6.2          | 34                | 82                | 0.95     | 1.05     | 1.93     | 111                   | 1.32  |
| 940827 | 0203        | 0.94          | 0.064       | 15.6         | 162               | 117               | 0.96     | -0.56    | 1.58     | 112                   | -1.24 |
| 940827 | 0503        | 0.88          | 0.064       | 15.6         | 150               | 121               | 0.94     | -0.52    | 1.75     | 104                   | -1.18 |
| 940827 | 0803        | 0.86          | 0.064       | 15.6         | -176              | 116               | 0.98     | -0.26    | 1.56     | 112                   | -0.59 |
| 940827 | 1101        | 0.89          | 0.064       | 15.6         | 154               | 129               | 0.92     | -0.74    | 1.92     | 100                   | -1.17 |
| 940827 | 1402        | 0.78          | 0.064       | 15.6         | -180              | 125               | 0.92     | -0.49    | 1.84     | 104                   | -0.73 |
| 940827 | 1702        | 0.78          | 0.064       | 15.6         | 152               | 126               | 0.92     | -0.54    | 1.84     | 104                   | -1.01 |
| 940827 | 2005        | 0.91          | 0.064       | 15.6         | -178              | 109               | 0.97     | 0.08     | 1.52     | 111                   | 0.08  |
| 940827 | 2301        | 0.87          | 0.064       | 15.6         | 150               | 110               | 0.92     | -0.02    | 1.61     | 99                    | -0.18 |
| 940828 | 0159        | 0.89          | 0.064       | 15.6         | 154               | 114               | 0.91     | -0.20    | 1.61     | 100                   | -0.55 |
| 940828 | 0458        | 0.87          | 0.064       | 15.6         | 150               | 114               | 0.89     | -0.16    | 1.73     | 94                    | -0.43 |
| 940828 | 0801        | 0.86          | 0.064       | 15.6         | 152               | 105               | 0.90     | 0.10     | 1.76     | 92                    | 0.56  |
| 940828 | 1401        | 1.03          | 0.054       | 18.5         | 150               | 105               | 0.95     | -0.11    | 1.55     | 104                   | -0.32 |
| 940829 | 0201        | 1.71          | 0.152       | 6.6          | 26                | 60                | 0.75     | 1.53     | 3.21     | 53                    | 0.39  |
| 940829 | 0501        | 1.86          | 0.142       | 7.0          | 28                | 62                | 0.75     | 1.57     | 3.10     | 52                    | 0.35  |
| 940829 | 0801        | 1.84          | 0.142       | 7.0          | 46                | 57                | 0.73     | 1.92     | 3.61     | 47                    | 0.63  |
| 940829 | 1101        | 1.89          | 0.132       | 7.6          | 48                | 59                | 0.73     | 1.80     | 3.38     | 48                    | 0.66  |
| 940829 | 1401        | 1.79          | 0.142       | 7.0          | 30                | 56                | 0.73     | 2.09     | 3.76     | 44                    | 0.62  |

(Sheet 28 of 45)

Table A1 (Continued)

| Date   | Time<br>GMT | $H_{m0}$<br>m | $f_p$<br>Hz | $T_p$<br>sec | $\theta_p$<br>deg | $\theta_0$<br>deg | $\sigma$ | $\gamma$ | $\delta$ | $\Delta\theta$<br>deg | A     |
|--------|-------------|---------------|-------------|--------------|-------------------|-------------------|----------|----------|----------|-----------------------|-------|
| 940829 | 2001        | 1.75          | 0.142       | 7.0          | 48                | 65                | 0.74     | 1.44     | 3.21     | 49                    | 0.59  |
| 940830 | 0201        | 1.54          | 0.132       | 7.6          | 62                | 76                | 0.73     | 1.17     | 2.79     | 54                    | 0.54  |
| 940830 | 0458        | 1.89          | 0.123       | 8.2          | 56                | 68                | 0.68     | 1.65     | 3.59     | 42                    | 0.45  |
| 940830 | 0801        | 2.26          | 0.123       | 8.2          | 38                | 60                | 0.57     | 1.60     | 5.05     | 36                    | 0.19  |
| 940830 | 1101        | 2.30          | 0.123       | 8.2          | 56                | 61                | 0.58     | 1.71     | 5.04     | 34                    | 0.11  |
| 940830 | 1401        | 2.05          | 0.123       | 8.2          | 62                | 66                | 0.63     | 1.69     | 4.36     | 33                    | -0.01 |
| 940830 | 1708        | 1.71          | 0.123       | 8.2          | 68                | 67                | 0.69     | 1.59     | 3.78     | 38                    | -0.03 |
| 940830 | 2001        | 1.73          | 0.132       | 7.6          | 68                | 66                | 0.61     | 1.73     | 4.65     | 31                    | -0.27 |
| 940831 | 0201        | 1.51          | 0.123       | 8.2          | 56                | 68                | 0.63     | 2.12     | 4.66     | 29                    | 0.27  |
| 940831 | 0459        | 1.65          | 0.123       | 8.2          | 46                | 62                | 0.62     | 2.45     | 5.00     | 29                    | 0.54  |
| 940831 | 0800        | 1.65          | 0.123       | 8.2          | 46                | 61                | 0.62     | 2.47     | 4.92     | 28                    | 0.61  |
| 940831 | 1059        | 1.57          | 0.113       | 8.9          | 46                | 62                | 0.65     | 2.61     | 4.69     | 29                    | 0.93  |
| 940831 | 1958        | 1.68          | 0.113       | 8.9          | 42                | 58                | 0.63     | 2.63     | 5.22     | 28                    | 0.36  |
| 940901 | 0158        | 1.31          | 0.113       | 8.9          | 44                | 62                | 0.69     | 2.39     | 4.32     | 36                    | 0.80  |
| 940901 | 0457        | 1.30          | 0.123       | 8.2          | 46                | 68                | 0.77     | 1.82     | 3.14     | 50                    | 0.96  |
| 940901 | 0752        | 1.37          | 0.142       | 7.0          | 44                | 61                | 0.71     | 2.71     | 4.25     | 35                    | 1.12  |
| 940901 | 1059        | 1.40          | 0.123       | 8.2          | 42                | 61                | 0.76     | 2.42     | 3.71     | 41                    | 0.92  |
| 940901 | 1358        | 1.30          | 0.132       | 7.6          | 44                | 64                | 0.75     | 2.07     | 3.64     | 47                    | 1.37  |
| 940901 | 1651        | 1.32          | 0.064       | 15.6         | 46                | 67                | 0.78     | 2.06     | 3.22     | 49                    | 1.18  |
| 940901 | 1956        | 1.25          | 0.064       | 15.6         | 46                | 67                | 0.80     | 2.04     | 3.31     | 46                    | 0.83  |
| 940902 | 0156        | 1.21          | 0.113       | 8.9          | 44                | 65                | 0.79     | 2.16     | 3.25     | 51                    | 1.42  |
| 940902 | 0459        | 1.51          | 0.113       | 8.9          | 38                | 58                | 0.66     | 2.38     | 4.64     | 37                    | 0.74  |
| 940902 | 0759        | 1.65          | 0.123       | 8.2          | 44                | 58                | 0.63     | 3.15     | 5.92     | 27                    | 0.29  |
| 940902 | 1358        | 1.55          | 0.113       | 8.9          | 50                | 63                | 0.64     | 2.58     | 5.06     | 29                    | 0.68  |
| 940902 | 1703        | 1.72          | 0.123       | 8.2          | 46                | 59                | 0.60     | 2.62     | 5.69     | 30                    | 0.73  |
| 940903 | 0153        | 2.10          | 0.123       | 8.2          | 40                | 56                | 0.50     | 2.21     | 7.24     | 30                    | 0.33  |
| 940903 | 0456        | 1.77          | 0.123       | 8.2          | 42                | 59                | 0.59     | 2.34     | 5.74     | 34                    | 0.55  |
| 940903 | 0759        | 1.72          | 0.123       | 8.2          | 48                | 62                | 0.57     | 1.99     | 5.85     | 31                    | 0.33  |
| 940903 | 1059        | 1.66          | 0.132       | 7.6          | 44                | 59                | 0.60     | 2.12     | 5.49     | 33                    | 0.52  |
| 940903 | 1359        | 1.58          | 0.132       | 7.6          | 48                | 61                | 0.62     | 1.98     | 5.28     | 34                    | 0.42  |
| 940903 | 1653        | 1.51          | 0.142       | 7.0          | 46                | 57                | 0.65     | 2.04     | 5.10     | 36                    | 0.49  |
| 940903 | 1959        | 1.60          | 0.142       | 7.0          | 48                | 59                | 0.66     | 2.32     | 5.14     | 30                    | 0.02  |
| 940904 | 0151        | 1.44          | 0.132       | 7.6          | 52                | 66                | 0.68     | 2.40     | 4.78     | 29                    | 0.17  |
| 940904 | 0759        | 1.50          | 0.132       | 7.6          | 56                | 72                | 0.66     | 2.56     | 4.80     | 27                    | 0.26  |
| 940904 | 1359        | 1.55          | 0.132       | 7.6          | 54                | 69                | 0.65     | 2.41     | 4.82     | 27                    | 0.16  |
| 940904 | 1659        | 1.58          | 0.132       | 7.6          | 56                | 68                | 0.62     | 2.84     | 5.52     | 24                    | 0.45  |
| 940905 | 0157        | 1.43          | 0.093       | 10.7         | 54                | 71                | 0.73     | 2.19     | 3.89     | 32                    | 0.33  |
| 940905 | 0459        | 1.50          | 0.103       | 9.7          | 54                | 69                | 0.73     | 2.25     | 4.01     | 34                    | 0.41  |
| 940905 | 0759        | 1.50          | 0.093       | 10.7         | 64                | 71                | 0.72     | 2.23     | 3.96     | 31                    | 0.28  |
| 940905 | 1100        | 1.52          | 0.093       | 10.7         | 54                | 72                | 0.74     | 2.15     | 3.74     | 34                    | 0.44  |
| 940905 | 1659        | 1.75          | 0.093       | 10.7         | 54                | 66                | 0.61     | 2.62     | 5.44     | 26                    | 0.44  |
| 940905 | 1959        | 1.56          | 0.093       | 10.7         | 52                | 69                | 0.70     | 2.04     | 4.01     | 34                    | 0.34  |
| 940906 | 0459        | 1.57          | 0.103       | 9.7          | 66                | 70                | 0.72     | 1.74     | 3.66     | 38                    | 0.02  |
| 940906 | 0759        | 1.56          | 0.103       | 9.7          | 64                | 72                | 0.76     | 1.68     | 3.22     | 43                    | 0.29  |
| 940906 | 1547        | 1.34          | 0.113       | 8.9          | 34                | 70                | 0.80     | 1.66     | 3.03     | 52                    | 0.34  |
| 940906 | 1730        | 1.30          | 0.103       | 9.7          | 64                | 78                | 0.83     | 1.31     | 2.67     | 63                    | 0.59  |
| 940906 | 1959        | 1.22          | 0.103       | 9.7          | 68                | 86                | 0.91     | 0.97     | 2.05     | 100                   | 1.11  |
| 940907 | 0151        | 1.14          | 0.113       | 8.9          | 70                | 91                | 0.93     | 0.82     | 1.87     | 100                   | 1.35  |
| 940907 | 0459        | 1.06          | 0.054       | 18.5         | 70                | 105               | 0.92     | 0.41     | 1.64     | 100                   | 1.30  |
| 940907 | 0800        | 1.08          | 0.064       | 15.6         | 68                | 105               | 0.93     | 0.42     | 1.59     | 103                   | 1.27  |
| 940907 | 1356        | 1.07          | 0.074       | 13.6         | 54                | 107               | 0.99     | 0.30     | 1.51     | 112                   | 0.78  |

(Sheet 29 of 45)

Table A1 (Continued)

| Date   | Time GMT | $H_{mo}$<br>m | $f_p$<br>Hz | $T_p$<br>sec | $\theta_p$<br>deg | $\theta_o$<br>deg | $\sigma$ | $\gamma$ | $\delta$ | $\Delta\theta$<br>deg | A     |
|--------|----------|---------------|-------------|--------------|-------------------|-------------------|----------|----------|----------|-----------------------|-------|
| 940907 | 1710     | 1.09          | 0.074       | 13.6         | 62                | 105               | 0.97     | 0.47     | 1.59     | 114                   | 1.02  |
| 940907 | 1959     | 1.07          | 0.074       | 13.6         | 68                | 110               | 0.95     | 0.25     | 1.52     | 108                   | 0.82  |
| 940908 | 0159     | 1.24          | 0.083       | 12.0         | 54                | 86                | 0.93     | 1.23     | 2.00     | 104                   | 1.98  |
| 940908 | 0459     | 1.35          | 0.083       | 12.0         | 52                | 90                | 0.94     | 0.97     | 1.83     | 107                   | 1.52  |
| 940908 | 0756     | 1.39          | 0.093       | 10.7         | 52                | 81                | 0.86     | 1.68     | 2.61     | 87                    | 1.47  |
| 940908 | 1116     | 1.23          | 0.093       | 10.7         | 60                | 95                | 0.95     | 1.03     | 1.90     | 109                   | 1.67  |
| 940908 | 1359     | 1.29          | 0.093       | 10.7         | 56                | 85                | 0.92     | 1.52     | 2.20     | 106                   | 2.04  |
| 940908 | 1659     | 1.20          | 0.064       | 15.6         | 58                | 90                | 0.90     | 1.26     | 2.15     | 97                    | 1.69  |
| 940908 | 1957     | 1.16          | 0.093       | 10.7         | 58                | 91                | 0.90     | 1.14     | 2.10     | 98                    | 1.54  |
| 940909 | 0159     | 1.20          | 0.093       | 10.7         | 58                | 86                | 0.89     | 1.13     | 2.21     | 96                    | 1.45  |
| 940909 | 0459     | 1.30          | 0.162       | 6.2          | 50                | 73                | 0.84     | 1.56     | 2.66     | 68                    | 1.44  |
| 940909 | 0757     | 1.27          | 0.162       | 6.2          | 50                | 71                | 0.83     | 2.02     | 2.99     | 53                    | 1.15  |
| 940909 | 1059     | 1.33          | 0.162       | 6.2          | 52                | 70                | 0.77     | 2.26     | 3.55     | 38                    | 0.81  |
| 940909 | 1400     | 1.42          | 0.152       | 6.6          | 50                | 74                | 0.78     | 1.46     | 3.11     | 56                    | 0.93  |
| 940909 | 1700     | 1.72          | 0.142       | 7.0          | 50                | 63                | 0.64     | 1.53     | 4.16     | 40                    | 0.58  |
| 940909 | 2000     | 1.95          | 0.142       | 7.0          | 44                | 57                | 0.58     | 1.59     | 5.21     | 34                    | 0.31  |
| 940909 | 2257     | 1.74          | 0.142       | 7.0          | 52                | 60                | 0.65     | 1.73     | 4.60     | 36                    | 0.32  |
| 940910 | 0158     | 1.96          | 0.132       | 7.6          | 48                | 58                | 0.64     | 1.58     | 4.58     | 35                    | 0.59  |
| 940910 | 0458     | 2.10          | 0.132       | 7.6          | 50                | 58                | 0.56     | 1.44     | 5.26     | 31                    | 0.60  |
| 940910 | 0800     | 2.07          | 0.132       | 7.6          | 50                | 56                | 0.55     | 1.62     | 5.54     | 31                    | 0.29  |
| 940910 | 1101     | 1.98          | 0.132       | 7.6          | 50                | 56                | 0.53     | 1.97     | 6.38     | 26                    | 0.37  |
| 940910 | 1400     | 2.07          | 0.132       | 7.6          | 52                | 60                | 0.53     | 1.81     | 6.47     | 26                    | 0.45  |
| 940910 | 1657     | 2.42          | 0.132       | 7.6          | 56                | 61                | 0.52     | 1.41     | 6.12     | 29                    | 0.35  |
| 940910 | 1956     | 2.25          | 0.142       | 7.0          | 54                | 60                | 0.57     | 1.03     | 4.42     | 40                    | 0.46  |
| 940910 | 2300     | 2.06          | 0.132       | 7.6          | 58                | 61                | 0.57     | 1.49     | 5.35     | 31                    | 0.25  |
| 940911 | 0157     | 2.07          | 0.132       | 7.6          | 50                | 63                | 0.56     | 1.43     | 5.06     | 36                    | 0.72  |
| 940911 | 0459     | 1.94          | 0.123       | 8.2          | 54                | 64                | 0.53     | 1.13     | 5.73     | 34                    | 0.47  |
| 940911 | 0800     | 1.67          | 0.142       | 7.0          | 50                | 64                | 0.58     | 1.30     | 5.04     | 40                    | 0.88  |
| 940911 | 1058     | 1.55          | 0.142       | 7.0          | 50                | 69                | 0.58     | 1.29     | 4.96     | 41                    | 0.60  |
| 940911 | 1400     | 1.40          | 0.142       | 7.0          | 56                | 75                | 0.59     | 1.33     | 5.22     | 38                    | 0.12  |
| 940911 | 2000     | 1.28          | 0.162       | 6.2          | 98                | 76                | 0.65     | 0.85     | 3.74     | 47                    | 0.11  |
| 940911 | 2257     | 1.32          | 0.152       | 6.6          | 100               | 75                | 0.65     | 0.73     | 3.52     | 51                    | 0.06  |
| 940912 | 0200     | 1.36          | 0.152       | 6.6          | 52                | 75                | 0.63     | 0.81     | 3.76     | 50                    | 0.24  |
| 940912 | 0500     | 1.29          | 0.152       | 6.6          | 56                | 74                | 0.63     | 0.92     | 4.08     | 44                    | 0.29  |
| 940912 | 0758     | 1.12          | 0.152       | 6.6          | 94                | 73                | 0.69     | 1.06     | 3.61     | 49                    | 0.04  |
| 940912 | 1052     | 1.08          | 0.152       | 6.6          | 50                | 75                | 0.72     | 1.28     | 3.52     | 49                    | 0.15  |
| 940912 | 1412     | 1.06          | 0.152       | 6.6          | 94                | 81                | 0.69     | 1.22     | 3.59     | 44                    | -0.23 |
| 940912 | 1657     | 1.19          | 0.142       | 7.0          | 94                | 80                | 0.63     | 1.27     | 4.26     | 37                    | 0.01  |
| 940912 | 1959     | 1.18          | 0.152       | 6.6          | 98                | 83                | 0.65     | 0.71     | 3.73     | 41                    | -0.53 |
| 940912 | 2259     | 1.12          | 0.142       | 7.0          | 96                | 79                | 0.67     | 0.82     | 3.42     | 48                    | -0.62 |
| 940913 | 0200     | 1.13          | 0.132       | 7.6          | 86                | 79                | 0.69     | 0.81     | 3.20     | 49                    | -0.29 |
| 940913 | 0457     | 1.21          | 0.054       | 18.5         | 82                | 80                | 0.69     | 1.08     | 3.33     | 43                    | -0.28 |
| 940913 | 0759     | 1.33          | 0.054       | 18.5         | 88                | 81                | 0.70     | 0.79     | 3.17     | 47                    | -0.45 |
| 940913 | 1057     | 1.43          | 0.064       | 15.6         | 88                | 78                | 0.71     | 0.79     | 2.93     | 50                    | -0.29 |
| 940913 | 1413     | 1.57          | 0.064       | 15.6         | 68                | 78                | 0.68     | 0.86     | 3.19     | 48                    | 0.18  |
| 940913 | 1659     | 1.44          | 0.064       | 15.6         | 88                | 78                | 0.66     | 0.97     | 3.69     | 43                    | -0.49 |
| 940913 | 1959     | 1.71          | 0.064       | 15.6         | 76                | 80                | 0.58     | 1.27     | 4.94     | 29                    | 0.03  |
| 940913 | 2257     | 1.56          | 0.064       | 15.6         | 92                | 77                | 0.62     | 0.95     | 3.89     | 42                    | -0.26 |
| 940914 | 0159     | 1.46          | 0.074       | 13.6         | 90                | 82                | 0.64     | 0.68     | 3.71     | 42                    | -0.56 |
| 940914 | 0459     | 1.50          | 0.074       | 13.6         | 88                | 85                | 0.69     | 0.59     | 3.04     | 47                    | -0.04 |
| 940914 | 0758     | 1.47          | 0.074       | 13.6         | 90                | 78                | 0.68     | 1.04     | 3.64     | 41                    | -0.35 |
| 940914 | 1059     | 1.56          | 0.074       | 13.6         | 88                | 77                | 0.64     | 0.99     | 3.89     | 38                    | -0.08 |
| 940914 | 1357     | 1.46          | 0.074       | 13.6         | 86                | 77                | 0.72     | 1.18     | 3.42     | 43                    | -0.14 |

(Sheet 30 of 45)

| Table A1 (Continued) |             |               |             |              |                   |                   |          |          |          |                       |       |
|----------------------|-------------|---------------|-------------|--------------|-------------------|-------------------|----------|----------|----------|-----------------------|-------|
| Date                 | Time<br>GMT | $H_{mo}$<br>m | $f_p$<br>Hz | $T_p$<br>sec | $\theta_p$<br>deg | $\theta_o$<br>deg | $\sigma$ | $\gamma$ | $\delta$ | $\Delta\theta$<br>deg | A     |
| 940914               | 1701        | 1.44          | 0.074       | 13.6         | 88                | 81                | 0.73     | 0.97     | 3.22     | 44                    | -0.26 |
| 940914               | 2000        | 1.44          | 0.074       | 13.6         | 88                | 86                | 0.73     | 1.09     | 3.21     | 46                    | 0.02  |
| 940914               | 2300        | 1.28          | 0.083       | 12.0         | 58                | 78                | 0.73     | 1.47     | 3.48     | 43                    | 0.35  |
| 940915               | 0200        | 1.20          | 0.083       | 12.0         | 84                | 85                | 0.76     | 1.25     | 3.04     | 49                    | 0.13  |
| 940915               | 0757        | 1.26          | 0.083       | 12.0         | 86                | 82                | 0.72     | 1.26     | 3.31     | 41                    | -0.18 |
| 940915               | 1114        | 1.25          | 0.083       | 12.0         | 86                | 78                | 0.67     | 1.30     | 3.88     | 39                    | -0.22 |
| 940915               | 1402        | 1.15          | 0.162       | 6.2          | 56                | 78                | 0.74     | 1.60     | 3.43     | 43                    | 0.17  |
| 940915               | 1657        | 1.04          | 0.093       | 10.7         | 84                | 87                | 0.80     | 1.38     | 2.83     | 60                    | 0.65  |
| 940915               | 1951        | 0.94          | 0.074       | 13.6         | 84                | 94                | 0.84     | 0.92     | 2.41     | 82                    | 0.95  |
| 940915               | 2300        | 0.89          | 0.093       | 10.7         | 84                | 94                | 0.80     | 0.82     | 2.50     | 76                    | 0.96  |
| 940916               | 0157        | 0.99          | 0.074       | 13.6         | 60                | 87                | 0.82     | 1.24     | 2.58     | 76                    | 1.14  |
| 940916               | 0500        | 0.99          | 0.083       | 12.0         | 56                | 85                | 0.83     | 1.06     | 2.55     | 75                    | 1.11  |
| 940916               | 0757        | 1.04          | 0.083       | 12.0         | 52                | 80                | 0.81     | 1.25     | 2.78     | 66                    | 0.76  |
| 940916               | 1059        | 1.11          | 0.083       | 12.0         | 46                | 69                | 0.81     | 1.83     | 3.15     | 53                    | 0.83  |
| 940916               | 1400        | 1.05          | 0.103       | 9.7          | 48                | 77                | 0.80     | 1.53     | 2.95     | 54                    | 0.47  |
| 940916               | 1659        | 1.12          | 0.103       | 9.7          | 48                | 74                | 0.79     | 1.52     | 3.14     | 50                    | 0.26  |
| 940916               | 1959        | 1.11          | 0.093       | 10.7         | 54                | 76                | 0.74     | 1.57     | 3.36     | 43                    | 0.35  |
| 940916               | 2259        | 1.09          | 0.103       | 9.7          | 52                | 71                | 0.75     | 1.72     | 3.55     | 43                    | 0.45  |
| 940917               | 0159        | 1.05          | 0.113       | 8.9          | 48                | 72                | 0.79     | 1.83     | 3.22     | 49                    | 0.75  |
| 940917               | 0500        | 1.05          | 0.132       | 7.6          | 48                | 69                | 0.75     | 1.97     | 3.40     | 45                    | 0.82  |
| 940917               | 0800        | 1.04          | 0.103       | 9.7          | 48                | 71                | 0.78     | 1.60     | 3.07     | 52                    | 1.01  |
| 940917               | 1057        | 1.04          | 0.113       | 8.9          | 40                | 66                | 0.77     | 1.53     | 3.18     | 54                    | 1.11  |
| 940917               | 1400        | 1.01          | 0.103       | 9.7          | 38                | 74                | 0.83     | 1.04     | 2.46     | 74                    | 0.66  |
| 940917               | 1659        | 1.04          | 0.074       | 13.6         | 48                | 73                | 0.81     | 1.48     | 2.79     | 66                    | 1.20  |
| 940917               | 1959        | 1.11          | 0.074       | 13.6         | 48                | 74                | 0.80     | 1.48     | 2.82     | 69                    | 1.54  |
| 940917               | 2259        | 1.31          | 0.074       | 13.6         | 44                | 65                | 0.77     | 1.99     | 3.55     | 46                    | 1.42  |
| 940918               | 0157        | 1.41          | 0.074       | 13.6         | 46                | 64                | 0.69     | 1.84     | 3.88     | 41                    | 1.26  |
| 940918               | 0500        | 1.49          | 0.074       | 13.6         | 50                | 63                | 0.64     | 2.51     | 4.84     | 28                    | 1.26  |
| 940918               | 0759        | 1.52          | 0.074       | 13.6         | 48                | 62                | 0.64     | 2.30     | 4.81     | 32                    | 1.30  |
| 940918               | 1059        | 1.36          | 0.074       | 13.6         | 48                | 61                | 0.65     | 2.13     | 4.74     | 32                    | 1.22  |
| 940918               | 1359        | 1.38          | 0.074       | 13.6         | 46                | 67                | 0.67     | 1.23     | 3.58     | 52                    | 1.08  |
| 940918               | 1657        | 1.33          | 0.074       | 13.6         | 52                | 71                | 0.70     | 1.07     | 3.08     | 53                    | 1.10  |
| 940918               | 1959        | 1.33          | 0.074       | 13.6         | 50                | 72                | 0.66     | 1.38     | 3.75     | 44                    | 0.58  |
| 940919               | 0459        | 1.35          | 0.083       | 12.0         | 52                | 74                | 0.72     | 1.34     | 3.48     | 46                    | 0.37  |
| 940919               | 0757        | 1.32          | 0.074       | 13.6         | 50                | 70                | 0.64     | 1.61     | 4.21     | 40                    | 0.71  |
| 940919               | 1134        | 1.34          | 0.083       | 12.0         | 48                | 67                | 0.62     | 1.50     | 4.56     | 41                    | 0.83  |
| 940919               | 1400        | 1.32          | 0.083       | 12.0         | 44                | 68                | 0.70     | 1.08     | 3.29     | 53                    | 0.79  |
| 940919               | 1659        | 1.47          | 0.083       | 12.0         | 90                | 67                | 0.64     | 0.77     | 3.66     | 48                    | 0.04  |
| 940919               | 2257        | 1.56          | 0.083       | 12.0         | 48                | 63                | 0.58     | 1.43     | 5.13     | 38                    | 0.64  |
| 940920               | 0200        | 1.53          | 0.103       | 9.7          | 42                | 64                | 0.62     | 1.08     | 4.07     | 48                    | 0.66  |
| 940920               | 0458        | 1.54          | 0.103       | 9.7          | 44                | 60                | 0.59     | 1.62     | 4.85     | 42                    | 0.91  |
| 940920               | 0800        | 1.53          | 0.103       | 9.7          | 42                | 58                | 0.60     | 2.03     | 5.46     | 36                    | 0.67  |
| 940920               | 1659        | 1.43          | 0.103       | 9.7          | 44                | 59                | 0.64     | 2.11     | 5.15     | 38                    | 0.94  |
| 940920               | 2259        | 1.48          | 0.093       | 10.7         | 52                | 65                | 0.63     | 2.49     | 5.32     | 30                    | 0.46  |
| 940921               | 0159        | 1.52          | 0.103       | 9.7          | 42                | 59                | 0.61     | 1.98     | 5.44     | 37                    | 0.58  |
| 940921               | 0847        | 1.52          | 0.093       | 10.7         | 48                | 62                | 0.62     | 2.34     | 5.52     | 34                    | 0.64  |
| 940921               | 1115        | 1.53          | 0.093       | 10.7         | 46                | 61                | 0.65     | 2.25     | 5.08     | 37                    | 0.92  |
| 940921               | 1400        | 1.48          | 0.093       | 10.7         | 44                | 60                | 0.64     | 1.98     | 4.96     | 40                    | 0.89  |
| 940921               | 1646        | 1.39          | 0.093       | 10.7         | 50                | 63                | 0.66     | 2.50     | 5.05     | 34                    | 0.90  |
| 940921               | 2000        | 1.24          | 0.093       | 10.7         | 46                | 62                | 0.74     | 2.31     | 4.08     | 42                    | 0.98  |
| 940921               | 2300        | 1.38          | 0.093       | 10.7         | 42                | 64                | 0.74     | 1.79     | 3.63     | 51                    | 1.04  |
| 940922               | 0200        | 1.33          | 0.093       | 10.7         | 42                | 66                | 0.75     | 1.77     | 3.48     | 50                    | 1.19  |

(Sheet 31 of 45)

Table A1 (Continued)

| Date   | Time<br>GMT | $H_{mo}$<br>m | $f_p$<br>Hz | $T_p$<br>sec | $\theta_p$<br>deg | $\theta_o$<br>deg | $\sigma$ | $\gamma$ | $\delta$ | $\Delta\theta$<br>deg | A    |
|--------|-------------|---------------|-------------|--------------|-------------------|-------------------|----------|----------|----------|-----------------------|------|
| 940922 | 0500        | 1.30          | 0.093       | 10.7         | 44                | 72                | 0.71     | 1.62     | 3.64     | 45                    | 0.18 |
| 940922 | 0800        | 1.25          | 0.093       | 10.7         | 44                | 74                | 0.77     | 1.44     | 3.00     | 53                    | 0.41 |
| 940923 | 1028        | 1.14          | 0.074       | 13.6         | 40                | 90                | 0.87     | 0.53     | 2.00     | 92                    | 0.46 |
| 940923 | 1401        | 1.06          | 0.074       | 13.6         | 38                | 98                | 0.90     | 0.32     | 2.02     | 92                    | 0.27 |
| 940923 | 1700        | 1.06          | 0.074       | 13.6         | 78                | 98                | 0.83     | 0.49     | 2.04     | 79                    | 0.88 |
| 940923 | 2000        | 1.09          | 0.074       | 13.6         | 58                | 94                | 0.87     | 0.64     | 1.87     | 91                    | 1.02 |
| 940924 | 2000        | 1.07          | 0.074       | 13.6         | 50                | 90                | 0.87     | 0.74     | 2.06     | 90                    | 0.75 |
| 940925 | 0500        | 1.02          | 0.083       | 12.0         | 76                | 99                | 0.89     | 0.39     | 1.80     | 94                    | 0.71 |
| 940925 | 0800        | 1.06          | 0.083       | 12.0         | 48                | 93                | 0.90     | 0.68     | 1.79     | 102                   | 0.94 |
| 940925 | 1058        | 1.00          | 0.083       | 12.0         | 60                | 90                | 0.84     | 0.82     | 2.10     | 87                    | 1.15 |
| 940925 | 1700        | 1.04          | 0.083       | 12.0         | 46                | 97                | 0.91     | 0.47     | 1.76     | 101                   | 0.56 |
| 940925 | 2000        | 0.98          | 0.083       | 12.0         | 52                | 96                | 0.88     | 0.68     | 1.96     | 93                    | 0.81 |
| 940925 | 2300        | 0.92          | 0.083       | 12.0         | 52                | 97                | 0.87     | 0.52     | 1.93     | 91                    | 0.60 |
| 940926 | 0200        | 0.85          | 0.083       | 12.0         | 60                | 103               | 0.89     | 0.53     | 1.99     | 89                    | 0.60 |
| 940926 | 0500        | 0.91          | 0.083       | 12.0         | 42                | 98                | 0.89     | 0.42     | 1.94     | 92                    | 0.30 |
| 940926 | 0800        | 0.97          | 0.054       | 18.5         | 64                | 87                | 0.80     | 1.08     | 2.69     | 67                    | 1.09 |
| 940926 | 1700        | 1.40          | 0.054       | 18.5         | 62                | 80                | 0.80     | 1.91     | 3.19     | 58                    | 1.73 |
| 940926 | 2000        | 1.70          | 0.064       | 15.6         | 64                | 86                | 0.87     | 1.53     | 2.41     | 89                    | 1.98 |
| 940926 | 2300        | 1.53          | 0.064       | 15.6         | 56                | 78                | 0.84     | 2.54     | 3.14     | 61                    | 2.17 |
| 940927 | 0200        | 1.63          | 0.064       | 15.6         | 60                | 83                | 0.88     | 1.90     | 2.63     | 83                    | 2.62 |
| 940927 | 0500        | 1.53          | 0.064       | 15.6         | 58                | 95                | 1.01     | 1.11     | 1.78     | 125                   | 2.17 |
| 940927 | 0800        | 1.69          | 0.074       | 13.6         | 54                | 84                | 0.95     | 1.70     | 2.25     | 113                   | 2.30 |
| 940927 | 1100        | 1.75          | 0.074       | 13.6         | 54                | 92                | 1.03     | 1.09     | 1.81     | 130                   | 1.51 |
| 940927 | 1401        | 1.82          | 0.074       | 13.6         | 54                | 76                | 0.88     | 2.35     | 2.97     | 69                    | 1.84 |
| 940927 | 1701        | 1.88          | 0.074       | 13.6         | 48                | 92                | 0.99     | 0.99     | 1.95     | 114                   | 1.16 |
| 940927 | 2300        | 1.64          | 0.083       | 12.0         | 48                | 78                | 0.89     | 1.57     | 2.58     | 85                    | 1.25 |
| 940928 | 0200        | 1.46          | 0.083       | 12.0         | 50                | 78                | 0.91     | 1.87     | 2.59     | 88                    | 1.71 |
| 940928 | 0500        | 1.47          | 0.083       | 12.0         | 48                | 76                | 0.85     | 1.76     | 2.90     | 64                    | 0.99 |
| 940928 | 1055        | 1.40          | 0.093       | 10.7         | 48                | 72                | 0.85     | 2.15     | 2.99     | 60                    | 1.33 |
| 940928 | 1400        | 1.22          | 0.093       | 10.7         | 46                | 74                | 0.85     | 1.76     | 2.76     | 68                    | 1.27 |
| 940928 | 1700        | 1.10          | 0.093       | 10.7         | 48                | 87                | 0.93     | 0.99     | 1.99     | 105                   | 1.14 |
| 940928 | 1957        | 1.11          | 0.093       | 10.7         | 46                | 77                | 0.89     | 1.54     | 2.45     | 88                    | 1.31 |
| 940929 | 0200        | 0.98          | 0.093       | 10.7         | 48                | 86                | 0.88     | 1.19     | 2.28     | 91                    | 1.00 |
| 940929 | 0500        | 0.94          | 0.093       | 10.7         | 46                | 80                | 0.85     | 1.25     | 2.51     | 75                    | 0.89 |
| 940929 | 0757        | 0.95          | 0.093       | 10.7         | 48                | 78                | 0.82     | 1.36     | 2.64     | 65                    | 0.84 |
| 940929 | 1100        | 0.88          | 0.103       | 9.7          | 42                | 81                | 0.84     | 0.97     | 2.40     | 76                    | 0.36 |
| 940929 | 1357        | 0.81          | 0.093       | 10.7         | 48                | 88                | 0.91     | 0.78     | 2.04     | 97                    | 0.62 |
| 940929 | 1700        | 0.78          | 0.093       | 10.7         | 44                | 94                | 0.91     | 0.52     | 1.97     | 95                    | 0.27 |
| 940929 | 2000        | 0.78          | 0.064       | 15.6         | 46                | 98                | 0.92     | 0.47     | 1.87     | 101                   | 0.38 |
| 940930 | 0200        | 0.76          | 0.064       | 15.6         | 50                | 105               | 0.91     | 0.36     | 1.85     | 99                    | 0.46 |
| 940930 | 0500        | 0.82          | 0.162       | 6.2          | 54                | 93                | 0.87     | 0.66     | 2.09     | 87                    | 0.48 |
| 940930 | 0800        | 0.94          | 0.162       | 6.2          | 50                | 79                | 0.85     | 1.30     | 2.48     | 74                    | 1.20 |
| 940930 | 1400        | 1.04          | 0.162       | 6.2          | 40                | 69                | 0.90     | 1.43     | 2.46     | 82                    | 1.14 |
| 940930 | 1700        | 0.96          | 0.162       | 6.2          | 54                | 73                | 0.88     | 1.14     | 2.42     | 77                    | 0.79 |
| 940930 | 1954        | 1.10          | 0.162       | 6.2          | 42                | 57                | 0.82     | 2.30     | 3.45     | 55                    | 1.22 |
| 941001 | 0159        | 0.90          | 0.152       | 6.6          | 48                | 76                | 0.84     | 1.56     | 2.69     | 68                    | 1.33 |
| 941001 | 0459        | 0.86          | 0.152       | 6.6          | 48                | 75                | 0.87     | 1.38     | 2.55     | 74                    | 1.24 |
| 941001 | 1059        | 0.89          | 0.142       | 7.0          | 40                | 71                | 0.94     | 1.54     | 2.32     | 99                    | 1.73 |
| 941001 | 1358        | 0.91          | 0.152       | 6.6          | 42                | 72                | 0.93     | 1.63     | 2.36     | 100                   | 1.70 |
| 941001 | 1659        | 0.90          | 0.152       | 6.6          | 34                | 70                | 0.95     | 1.65     | 2.34     | 104                   | 1.66 |
| 941001 | 1959        | 0.81          | 0.064       | 15.6         | 42                | 87                | 0.99     | 0.89     | 1.80     | 115                   | 1.11 |

(Sheet 32 of 45)

| Table A1 (Continued) |             |               |             |              |                   |                   |          |          |          |                       |       |
|----------------------|-------------|---------------|-------------|--------------|-------------------|-------------------|----------|----------|----------|-----------------------|-------|
| Date                 | Time<br>GMT | $H_{mo}$<br>m | $f_p$<br>Hz | $T_p$<br>sec | $\theta_p$<br>deg | $\theta_o$<br>deg | $\sigma$ | $\gamma$ | $\delta$ | $\Delta\theta$<br>deg | A     |
| 941002               | 0159        | 0.87          | 0.123       | 8.2          | 46                | 71                | 0.87     | 2.01     | 2.74     | 77                    | 2.05  |
| 941002               | 0459        | 0.81          | 0.132       | 7.6          | 44                | 83                | 1.00     | 1.27     | 1.93     | 118                   | 2.04  |
| 941002               | 0756        | 0.75          | 0.064       | 15.6         | 46                | 101               | 1.00     | 0.42     | 1.56     | 120                   | 0.46  |
| 941002               | 1359        | 0.81          | 0.064       | 15.6         | 46                | 98                | 1.02     | 0.59     | 1.61     | 125                   | 0.64  |
| 941002               | 1658        | 0.79          | 0.074       | 13.6         | 48                | 97                | 1.01     | 0.59     | 1.60     | 116                   | 0.79  |
| 941002               | 1956        | 0.87          | 0.074       | 13.6         | 52                | 96                | 1.01     | 0.69     | 1.57     | 120                   | 1.62  |
| 941003               | 0759        | 1.05          | 0.113       | 8.9          | 46                | 69                | 0.89     | 2.37     | 2.90     | 71                    | 2.09  |
| 941003               | 1104        | 1.10          | 0.113       | 8.9          | 44                | 66                | 0.83     | 2.19     | 3.08     | 62                    | 2.03  |
| 941003               | 1345        | 1.22          | 0.113       | 8.9          | 40                | 59                | 0.79     | 2.27     | 3.52     | 52                    | 1.24  |
| 941003               | 1659        | 1.09          | 0.113       | 8.9          | 44                | 63                | 0.86     | 2.26     | 3.17     | 62                    | 1.63  |
| 941003               | 1956        | 1.18          | 0.103       | 9.7          | 46                | 70                | 0.87     | 1.92     | 2.81     | 68                    | 1.61  |
| 941003               | 2258        | 1.34          | 0.093       | 10.7         | 44                | 63                | 0.78     | 2.52     | 3.84     | 45                    | 1.76  |
| 941004               | 0159        | 1.36          | 0.093       | 10.7         | 44                | 63                | 0.72     | 2.31     | 4.02     | 41                    | 1.37  |
| 941004               | 0459        | 1.15          | 0.093       | 10.7         | 48                | 67                | 0.78     | 2.01     | 3.51     | 51                    | 1.54  |
| 941004               | 0803        | 1.17          | 0.103       | 9.7          | 48                | 72                | 0.79     | 1.73     | 3.24     | 56                    | 1.26  |
| 941004               | 0951        | 1.24          | 0.103       | 9.7          | 50                | 72                | 0.74     | 1.84     | 3.64     | 46                    | 1.19  |
| 941004               | 1151        | 1.21          | 0.103       | 9.7          | 48                | 75                | 0.74     | 1.70     | 3.58     | 49                    | 0.75  |
| 941004               | 1319        | 1.25          | 0.103       | 9.7          | 48                | 75                | 0.75     | 1.69     | 3.40     | 52                    | 0.89  |
| 941006               | 1520        | 1.34          | 0.083       | 12.0         | 54                | 79                | 0.68     | 0.78     | 3.34     | 50                    | -0.03 |
| 941006               | 1723        | 1.53          | 0.162       | 6.2          | 56                | 70                | 0.63     | 0.65     | 3.66     | 46                    | 0.30  |
| 941006               | 2123        | 1.74          | 0.083       | 12.0         | 58                | 71                | 0.59     | 0.42     | 3.66     | 45                    | 0.39  |
| 941006               | 2323        | 1.81          | 0.083       | 12.0         | 58                | 74                | 0.55     | 0.34     | 4.13     | 41                    | 0.15  |
| 941007               | 0123        | 1.82          | 0.083       | 12.0         | 58                | 73                | 0.55     | 0.50     | 4.52     | 39                    | 0.23  |
| 941007               | 0323        | 1.85          | 0.132       | 7.6          | 54                | 70                | 0.56     | 0.65     | 4.36     | 42                    | 0.36  |
| 941007               | 0523        | 1.77          | 0.083       | 12.0         | 54                | 66                | 0.55     | 0.85     | 4.85     | 39                    | 0.60  |
| 941007               | 0723        | 1.64          | 0.093       | 10.7         | 54                | 64                | 0.57     | 0.97     | 4.70     | 38                    | 0.66  |
| 941007               | 0920        | 1.53          | 0.103       | 9.7          | 52                | 64                | 0.60     | 1.12     | 4.42     | 40                    | 1.02  |
| 941007               | 1123        | 1.66          | 0.093       | 10.7         | 52                | 62                | 0.58     | 1.30     | 4.99     | 34                    | 1.02  |
| 941007               | 1323        | 1.65          | 0.093       | 10.7         | 46                | 58                | 0.58     | 1.61     | 5.34     | 32                    | 0.95  |
| 941007               | 1523        | 1.64          | 0.103       | 9.7          | 42                | 56                | 0.59     | 1.41     | 4.43     | 38                    | 0.99  |
| 941007               | 1723        | 1.74          | 0.103       | 9.7          | 42                | 55                | 0.57     | 1.32     | 4.53     | 39                    | 0.81  |
| 941007               | 1923        | 1.74          | 0.103       | 9.7          | 48                | 59                | 0.56     | 1.02     | 4.23     | 43                    | 0.79  |
| 941007               | 2120        | 1.53          | 0.103       | 9.7          | 50                | 62                | 0.59     | 1.11     | 4.49     | 40                    | 0.96  |
| 941007               | 2323        | 1.43          | 0.103       | 9.7          | 48                | 63                | 0.61     | 1.00     | 4.05     | 43                    | 0.83  |
| 941008               | 0123        | 1.36          | 0.103       | 9.7          | 50                | 61                | 0.58     | 1.22     | 4.72     | 36                    | 0.77  |
| 941008               | 0723        | 1.23          | 0.113       | 8.9          | 46                | 59                | 0.62     | 1.84     | 4.70     | 32                    | 0.89  |
| 941008               | 0923        | 1.20          | 0.103       | 9.7          | 44                | 53                | 0.58     | 2.37     | 5.81     | 25                    | 0.54  |
| 941008               | 1123        | 1.21          | 0.103       | 9.7          | 40                | 53                | 0.59     | 2.39     | 5.67     | 25                    | 0.74  |
| 941008               | 1325        | 1.26          | 0.113       | 8.9          | 40                | 53                | 0.60     | 2.29     | 5.41     | 26                    | 0.84  |
| 941008               | 1523        | 1.25          | 0.113       | 8.9          | 42                | 56                | 0.62     | 1.94     | 4.81     | 32                    | 0.98  |
| 941008               | 1723        | 1.18          | 0.123       | 8.2          | 44                | 56                | 0.63     | 1.72     | 4.41     | 37                    | 0.85  |
| 941008               | 1923        | 1.09          | 0.113       | 8.9          | 44                | 56                | 0.66     | 1.75     | 4.16     | 39                    | 0.85  |
| 941008               | 2119        | 1.02          | 0.113       | 8.9          | 46                | 57                | 0.69     | 1.64     | 3.84     | 41                    | 0.72  |
| 941008               | 2323        | 1.01          | 0.113       | 8.9          | 50                | 61                | 0.70     | 1.63     | 3.62     | 40                    | 0.88  |
| 941009               | 0123        | 1.00          | 0.074       | 13.6         | 50                | 64                | 0.69     | 1.52     | 3.56     | 42                    | 1.02  |
| 941009               | 0323        | 0.96          | 0.074       | 13.6         | 48                | 63                | 0.67     | 1.80     | 3.96     | 37                    | 1.18  |
| 941009               | 0523        | 1.02          | 0.074       | 13.6         | 44                | 63                | 0.71     | 1.76     | 3.54     | 46                    | 1.48  |
| 941009               | 0723        | 1.09          | 0.074       | 13.6         | 48                | 64                | 0.72     | 1.85     | 3.47     | 45                    | 1.31  |
| 941009               | 0920        | 1.17          | 0.074       | 13.6         | 46                | 62                | 0.74     | 1.83     | 3.39     | 47                    | 1.46  |
| 941009               | 1123        | 1.23          | 0.074       | 13.6         | 48                | 61                | 0.68     | 2.23     | 4.07     | 28                    | 1.38  |
| 941009               | 1754        | 1.20          | 0.074       | 13.6         | 50                | 65                | 0.74     | 1.58     | 3.21     | 51                    | 1.23  |
| 941009               | 2123        | 1.15          | 0.074       | 13.6         | 50                | 70                | 0.79     | 1.36     | 2.83     | 64                    | 1.21  |
| 941009               | 2323        | 1.13          | 0.074       | 13.6         | 48                | 70                | 0.78     | 1.40     | 2.84     | 66                    | 1.64  |

(Sheet 33 of 45)

Table A1 (Continued)

| Date   | Time<br>GMT | $H_{mo}$<br>m | $f_p$<br>Hz | $T_p$<br>sec | $\theta_p$<br>deg | $\theta_o$<br>deg | $\sigma$ | $\gamma$ | $\delta$ | $\Delta\theta$<br>deg | A     |
|--------|-------------|---------------|-------------|--------------|-------------------|-------------------|----------|----------|----------|-----------------------|-------|
| 941010 | 0123        | 1.18          | 0.074       | 13.6         | 50                | 71                | 0.77     | 1.33     | 2.84     | 68                    | 1.68  |
| 941010 | 0323        | 1.17          | 0.074       | 13.6         | 48                | 77                | 0.83     | 0.86     | 2.17     | 86                    | 1.84  |
| 941010 | 0523        | 1.10          | 0.083       | 12.0         | 44                | 78                | 0.82     | 0.80     | 2.18     | 86                    | 1.44  |
| 941010 | 0723        | 1.09          | 0.083       | 12.0         | 46                | 80                | 0.81     | 0.74     | 2.08     | 85                    | 1.50  |
| 941010 | 1058        | 1.08          | 0.083       | 12.0         | 50                | 92                | 0.81     | 0.36     | 1.94     | 85                    | 0.41  |
| 941010 | 1357        | 1.11          | 0.064       | 15.6         | 144               | 94                | 0.82     | 0.23     | 1.89     | 88                    | 0.47  |
| 941010 | 1657        | 1.10          | 0.064       | 15.6         | 48                | 90                | 0.84     | 0.34     | 1.92     | 90                    | 0.49  |
| 941010 | 1955        | 1.14          | 0.064       | 15.6         | 52                | 84                | 0.84     | 0.39     | 2.01     | 85                    | 0.68  |
| 941011 | 0157        | 1.28          | 0.162       | 6.2          | 52                | 72                | 0.80     | 0.90     | 2.50     | 71                    | 1.11  |
| 941011 | 0457        | 1.61          | 0.152       | 6.6          | 48                | 65                | 0.70     | 1.42     | 3.32     | 44                    | 0.71  |
| 941011 | 0757        | 1.79          | 0.142       | 7.0          | 56                | 58                | 0.63     | 1.51     | 4.28     | 38                    | 0.07  |
| 941011 | 1057        | 1.76          | 0.132       | 7.6          | 52                | 61                | 0.63     | 1.82     | 4.50     | 31                    | 0.52  |
| 941011 | 1357        | 1.60          | 0.083       | 12.0         | 52                | 63                | 0.64     | 1.96     | 4.44     | 28                    | 0.78  |
| 941011 | 1657        | 1.82          | 0.093       | 10.7         | 54                | 62                | 0.65     | 1.82     | 4.20     | 30                    | 0.41  |
| 941011 | 1956        | 2.32          | 0.093       | 10.7         | 48                | 52                | 0.54     | 1.79     | 5.91     | 27                    | 0.08  |
| 941012 | 0157        | 2.27          | 0.103       | 9.7          | 50                | 58                | 0.53     | 1.70     | 5.56     | 27                    | 0.46  |
| 941012 | 0457        | 2.28          | 0.103       | 9.7          | 52                | 58                | 0.55     | 1.52     | 5.48     | 30                    | 0.32  |
| 941012 | 0757        | 2.88          | 0.113       | 8.9          | 56                | 54                | 0.46     | 1.22     | 6.49     | 27                    | -0.14 |
| 941012 | 1057        | 3.24          | 0.113       | 8.9          | 50                | 51                | 0.42     | 1.10     | 7.01     | 26                    | 0.02  |
| 941012 | 1357        | 3.64          | 0.103       | 9.7          | 50                | 49                | 0.41     | 0.97     | 7.05     | 25                    | -0.11 |
| 941012 | 1657        | 3.46          | 0.113       | 8.9          | 48                | 47                | 0.44     | 1.02     | 6.60     | 29                    | -0.05 |
| 941012 | 1955        | 3.57          | 0.103       | 9.7          | 46                | 46                | 0.42     | 0.92     | 6.59     | 28                    | 0.06  |
| 941013 | 0158        | 3.15          | 0.113       | 8.9          | 50                | 48                | 0.45     | 0.91     | 6.06     | 30                    | -0.15 |
| 941013 | 0457        | 2.88          | 0.103       | 9.7          | 48                | 51                | 0.45     | 1.09     | 6.46     | 27                    | 0.25  |
| 941013 | 0757        | 2.81          | 0.113       | 8.9          | 48                | 50                | 0.43     | 1.56     | 8.18     | 23                    | 0.07  |
| 941013 | 1057        | 2.66          | 0.103       | 9.7          | 44                | 52                | 0.44     | 1.50     | 6.97     | 26                    | 0.36  |
| 941013 | 1355        | 2.61          | 0.103       | 9.7          | 48                | 55                | 0.44     | 1.07     | 6.50     | 28                    | 0.40  |
| 941013 | 1658        | 3.30          | 0.103       | 9.7          | 50                | 54                | 0.42     | 0.87     | 6.53     | 26                    | 0.22  |
| 941013 | 2002        | 3.35          | 0.093       | 10.7         | 48                | 51                | 0.40     | 1.14     | 7.75     | 21                    | 0.22  |
| 941014 | 0202        | 3.44          | 0.093       | 10.7         | 50                | 55                | 0.38     | 1.00     | 8.04     | 22                    | 0.22  |
| 941014 | 0502        | 3.27          | 0.093       | 10.7         | 48                | 54                | 0.38     | 1.32     | 8.98     | 20                    | 0.45  |
| 941014 | 0802        | 3.09          | 0.093       | 10.7         | 48                | 53                | 0.40     | 1.60     | 10.04    | 19                    | 0.46  |
| 941014 | 1059        | 2.51          | 0.093       | 10.7         | 50                | 55                | 0.42     | 1.60     | 8.74     | 20                    | 0.36  |
| 941014 | 1403        | 2.35          | 0.103       | 9.7          | 52                | 57                | 0.45     | 1.40     | 7.20     | 24                    | 0.39  |
| 941014 | 1700        | 2.50          | 0.103       | 9.7          | 52                | 56                | 0.44     | 0.91     | 6.50     | 27                    | 0.23  |
| 941014 | 2002        | 3.14          | 0.113       | 8.9          | 50                | 57                | 0.41     | 0.67     | 5.93     | 27                    | 0.32  |
| 941015 | 0204        | 4.38          | 0.103       | 9.7          | 52                | 52                | 0.40     | 0.42     | 4.90     | 29                    | -0.03 |
| 941015 | 0502        | 4.56          | 0.093       | 10.7         | 50                | 51                | 0.39     | 0.47     | 5.54     | 28                    | 0.03  |
| 941015 | 0805        | 4.30          | 0.083       | 12.0         | 46                | 50                | 0.37     | 0.86     | 8.03     | 21                    | 0.32  |
| 941015 | 1102        | 4.10          | 0.093       | 10.7         | 48                | 51                | 0.37     | 0.89     | 8.44     | 20                    | 0.23  |
| 941015 | 1404        | 3.96          | 0.093       | 10.7         | 46                | 52                | 0.37     | 0.71     | 6.86     | 24                    | 0.36  |
| 941015 | 1704        | 4.38          | 0.093       | 10.7         | 48                | 52                | 0.36     | 0.77     | 8.42     | 21                    | 0.30  |
| 941015 | 2002        | 4.12          | 0.093       | 10.7         | 50                | 53                | 0.37     | 0.70     | 7.98     | 22                    | 0.21  |
| 941016 | 0202        | 3.18          | 0.093       | 10.7         | 50                | 56                | 0.36     | 1.14     | 10.51    | 20                    | 0.33  |
| 941016 | 0505        | 2.91          | 0.093       | 10.7         | 48                | 55                | 0.35     | 1.45     | 11.29    | 18                    | 0.51  |
| 941016 | 0805        | 2.70          | 0.093       | 10.7         | 48                | 56                | 0.41     | 1.51     | 9.16     | 19                    | 0.59  |
| 941016 | 1104        | 2.29          | 0.093       | 10.7         | 50                | 63                | 0.50     | 1.16     | 5.84     | 33                    | 1.26  |
| 941016 | 1404        | 2.42          | 0.093       | 10.7         | 50                | 61                | 0.44     | 1.40     | 7.40     | 26                    | 1.09  |
| 941016 | 1705        | 2.09          | 0.103       | 9.7          | 50                | 58                | 0.44     | 1.56     | 7.86     | 23                    | 0.81  |
| 941016 | 2005        | 1.92          | 0.103       | 9.7          | 52                | 60                | 0.45     | 1.79     | 9.22     | 19                    | 0.62  |
| 941017 | 0205        | 1.81          | 0.083       | 12.0         | 50                | 61                | 0.48     | 1.96     | 7.40     | 22                    | 0.88  |
| 941017 | 0504        | 1.77          | 0.093       | 10.7         | 52                | 61                | 0.49     | 1.88     | 7.75     | 24                    | 0.77  |
| 941017 | 0804        | 1.62          | 0.103       | 9.7          | 52                | 62                | 0.51     | 1.58     | 6.92     | 26                    | 0.90  |

(Sheet 34 of 45)

Table A1 (Continued)

| Date   | Time<br>GMT | $H_{mo}$<br>m | $f_p$<br>Hz | $T_p$<br>sec | $\theta_p$<br>deg | $\theta_o$<br>deg | $\sigma$ | $\gamma$ | $\delta$ | $\Delta\theta$<br>deg | A     |
|--------|-------------|---------------|-------------|--------------|-------------------|-------------------|----------|----------|----------|-----------------------|-------|
| 941017 | 1057        | 1.43          | 0.103       | 9.7          | 50                | 69                | 0.59     | 1.01     | 4.38     | 43                    | 1.08  |
| 941017 | 1404        | 1.65          | 0.103       | 9.7          | 50                | 67                | 0.51     | 1.17     | 5.44     | 35                    | 0.96  |
| 941017 | 1704        | 1.50          | 0.103       | 9.7          | 54                | 65                | 0.53     | 1.66     | 6.60     | 27                    | 0.55  |
| 941017 | 2004        | 1.34          | 0.064       | 15.6         | 54                | 70                | 0.60     | 1.50     | 5.42     | 33                    | 0.38  |
| 941018 | 0202        | 1.53          | 0.064       | 15.6         | 46                | 70                | 0.61     | 1.16     | 4.53     | 41                    | 0.04  |
| 941018 | 0504        | 1.60          | 0.064       | 15.6         | 46                | 68                | 0.60     | 1.17     | 4.60     | 43                    | 0.39  |
| 941018 | 0805        | 1.53          | 0.064       | 15.6         | 50                | 71                | 0.62     | 1.43     | 4.79     | 37                    | 0.20  |
| 941018 | 1102        | 1.50          | 0.064       | 15.6         | 90                | 87                | 0.62     | 0.80     | 4.13     | 44                    | -0.09 |
| 941018 | 1404        | 1.54          | 0.074       | 13.6         | 64                | 84                | 0.58     | 1.33     | 5.05     | 36                    | -0.05 |
| 941018 | 1705        | 1.49          | 0.074       | 13.6         | 70                | 84                | 0.61     | 1.36     | 4.38     | 38                    | 0.38  |
| 941018 | 2005        | 1.34          | 0.074       | 13.6         | 98                | 88                | 0.72     | 0.88     | 3.17     | 50                    | -0.23 |
| 941019 | 0203        | 1.56          | 0.074       | 13.6         | 88                | 82                | 0.60     | 0.95     | 4.24     | 39                    | -0.41 |
| 941019 | 0505        | 1.70          | 0.083       | 12.0         | 52                | 74                | 0.69     | 1.68     | 3.94     | 44                    | 0.64  |
| 941019 | 0805        | 1.98          | 0.074       | 13.6         | 52                | 70                | 0.70     | 1.94     | 4.06     | 39                    | 0.98  |
| 941019 | 1104        | 2.13          | 0.074       | 13.6         | 48                | 68                | 0.66     | 1.88     | 4.25     | 40                    | 1.17  |
| 941019 | 1436        | 2.14          | 0.074       | 13.6         | 50                | 69                | 0.71     | 2.02     | 3.99     | 41                    | 1.04  |
| 941019 | 1702        | 2.15          | 0.074       | 13.6         | 50                | 62                | 0.64     | 2.32     | 5.16     | 31                    | 0.75  |
| 941019 | 1958        | 2.10          | 0.074       | 13.6         | 46                | 66                | 0.80     | 2.26     | 3.48     | 48                    | 1.14  |
| 941020 | 0158        | 1.88          | 0.074       | 13.6         | 46                | 67                | 0.74     | 1.94     | 3.60     | 49                    | 1.47  |
| 941020 | 0458        | 1.78          | 0.074       | 13.6         | 48                | 70                | 0.76     | 1.66     | 3.36     | 51                    | 0.88  |
| 941020 | 0759        | 1.62          | 0.074       | 13.6         | 50                | 70                | 0.82     | 2.23     | 3.22     | 51                    | 1.53  |
| 941020 | 1058        | 1.54          | 0.074       | 13.6         | 50                | 68                | 0.76     | 2.24     | 3.71     | 44                    | 1.31  |
| 941020 | 1355        | 1.45          | 0.083       | 12.0         | 48                | 68                | 0.77     | 1.81     | 3.48     | 49                    | 1.20  |
| 941020 | 1657        | 1.49          | 0.083       | 12.0         | 46                | 64                | 0.79     | 2.11     | 3.44     | 50                    | 1.39  |
| 941020 | 2004        | 1.35          | 0.083       | 12.0         | 46                | 72                | 0.87     | 1.78     | 2.82     | 65                    | 1.01  |
| 941021 | 0205        | 1.27          | 0.083       | 12.0         | 48                | 76                | 0.88     | 1.66     | 2.58     | 83                    | 1.50  |
| 941021 | 0504        | 1.24          | 0.093       | 10.7         | 48                | 71                | 0.85     | 2.11     | 2.95     | 58                    | 1.36  |
| 941021 | 0804        | 1.23          | 0.093       | 10.7         | 46                | 73                | 0.88     | 1.79     | 2.66     | 76                    | 1.47  |
| 941021 | 1101        | 1.15          | 0.093       | 10.7         | 50                | 82                | 0.92     | 1.31     | 2.27     | 100                   | 1.36  |
| 941021 | 1353        | 1.21          | 0.103       | 9.7          | 46                | 75                | 0.84     | 1.66     | 2.91     | 59                    | 0.73  |
| 941021 | 1651        | 1.22          | 0.103       | 9.7          | 44                | 66                | 0.76     | 1.79     | 3.52     | 50                    | 0.82  |
| 941021 | 1954        | 1.18          | 0.103       | 9.7          | 26                | 63                | 0.78     | 1.48     | 3.39     | 55                    | 0.05  |
| 941022 | 0153        | 1.22          | 0.074       | 13.6         | 52                | 72                | 0.75     | 1.70     | 3.56     | 45                    | 0.58  |
| 941022 | 0435        | 1.46          | 0.083       | 12.0         | 50                | 65                | 0.65     | 1.76     | 4.45     | 36                    | 0.79  |
| 941022 | 0754        | 1.49          | 0.083       | 12.0         | 50                | 61                | 0.65     | 2.24     | 5.01     | 33                    | 0.92  |
| 941022 | 1053        | 1.58          | 0.074       | 13.6         | 56                | 63                | 0.67     | 2.10     | 4.92     | 34                    | 0.53  |
| 941022 | 1353        | 1.47          | 0.074       | 13.6         | 52                | 68                | 0.64     | 1.68     | 4.86     | 37                    | 0.80  |
| 941022 | 1653        | 1.74          | 0.074       | 13.6         | 52                | 60                | 0.51     | 2.02     | 6.91     | 22                    | 0.74  |
| 941022 | 1954        | 1.86          | 0.074       | 13.6         | 52                | 57                | 0.54     | 1.65     | 6.56     | 24                    | 0.29  |
| 941023 | 0153        | 1.78          | 0.074       | 13.6         | 50                | 64                | 0.59     | 1.61     | 5.25     | 36                    | 1.09  |
| 941023 | 0453        | 1.92          | 0.074       | 13.6         | 50                | 61                | 0.52     | 1.60     | 6.50     | 28                    | 0.86  |
| 941023 | 0751        | 2.10          | 0.074       | 13.6         | 48                | 58                | 0.52     | 1.56     | 6.54     | 27                    | 0.71  |
| 941023 | 1353        | 2.01          | 0.083       | 12.0         | 54                | 63                | 0.50     | 1.65     | 7.31     | 24                    | 0.67  |
| 941023 | 1653        | 2.07          | 0.083       | 12.0         | 50                | 61                | 0.50     | 1.84     | 7.37     | 24                    | 0.36  |
| 941023 | 1954        | 1.98          | 0.074       | 13.6         | 52                | 62                | 0.56     | 1.46     | 5.49     | 32                    | 0.72  |
| 941024 | 0154        | 1.66          | 0.083       | 12.0         | 52                | 67                | 0.62     | 1.42     | 4.55     | 38                    | 1.04  |
| 941024 | 0452        | 1.72          | 0.074       | 13.6         | 52                | 69                | 0.64     | 1.28     | 4.12     | 43                    | 0.90  |
| 941024 | 0753        | 1.71          | 0.083       | 12.0         | 50                | 68                | 0.64     | 1.14     | 3.83     | 47                    | 0.94  |
| 941024 | 1054        | 1.65          | 0.074       | 13.6         | 52                | 71                | 0.66     | 1.03     | 3.65     | 48                    | 0.78  |
| 941024 | 1354        | 1.59          | 0.074       | 13.6         | 50                | 73                | 0.65     | 1.01     | 3.56     | 50                    | 0.83  |
| 941024 | 1650        | 1.50          | 0.083       | 12.0         | 50                | 74                | 0.66     | 0.72     | 3.26     | 53                    | 0.21  |
| 941024 | 1954        | 1.37          | 0.083       | 12.0         | 50                | 77                | 0.72     | 0.59     | 2.81     | 58                    | 0.03  |
| 941024 | 2254        | 1.17          | 0.093       | 10.7         | 48                | 82                | 0.81     | 0.56     | 2.33     | 73                    | 0.07  |

(Sheet 35 of 45)

| Table A1 (Continued) |             |               |             |              |                   |                   |          |          |          |                       |       |
|----------------------|-------------|---------------|-------------|--------------|-------------------|-------------------|----------|----------|----------|-----------------------|-------|
| Date                 | Time<br>GMT | $H_{mo}$<br>m | $f_p$<br>Hz | $T_p$<br>sec | $\theta_p$<br>deg | $\theta_o$<br>deg | $\sigma$ | $\gamma$ | $\delta$ | $\Delta\theta$<br>deg | A     |
| 941025               | 0154        | 1.27          | 0.074       | 13.6         | 50                | 80                | 0.73     | 0.78     | 2.77     | 59                    | 0.28  |
| 941025               | 0453        | 1.27          | 0.083       | 12.0         | 42                | 77                | 0.77     | 0.63     | 2.42     | 68                    | 0.23  |
| 941025               | 0754        | 1.18          | 0.093       | 10.7         | 46                | 80                | 0.79     | 0.72     | 2.51     | 70                    | 0.32  |
| 941025               | 1053        | 1.10          | 0.083       | 12.0         | 36                | 87                | 0.82     | 0.42     | 2.15     | 85                    | 0.37  |
| 941025               | 1354        | 1.11          | 0.074       | 13.6         | 142               | 94                | 0.82     | 0.25     | 2.23     | 81                    | 0.22  |
| 941025               | 1652        | 1.03          | 0.074       | 13.6         | 140               | 103               | 0.81     | -0.08    | 2.27     | 71                    | 0.25  |
| 941025               | 1953        | 0.97          | 0.074       | 13.6         | 146               | 104               | 0.83     | -0.10    | 2.05     | 82                    | -0.01 |
| 941025               | 2254        | 1.00          | 0.074       | 13.6         | 146               | 111               | 0.82     | -0.39    | 2.10     | 77                    | -0.36 |
| 941026               | 0154        | 1.06          | 0.064       | 15.6         | 142               | 101               | 0.85     | -0.17    | 1.90     | 87                    | -0.12 |
| 941026               | 0453        | 1.15          | 0.162       | 6.2          | 144               | 92                | 0.85     | 0.21     | 1.95     | 89                    | 0.33  |
| 941026               | 0751        | 1.28          | 0.064       | 15.6         | 142               | 93                | 0.83     | 0.07     | 1.81     | 90                    | 0.13  |
| 941026               | 1354        | 1.21          | 0.064       | 15.6         | 142               | 91                | 0.83     | 0.28     | 2.01     | 88                    | 0.39  |
| 941026               | 1648        | 1.32          | 0.064       | 15.6         | 48                | 86                | 0.81     | 0.47     | 2.08     | 87                    | 0.51  |
| 941026               | 1951        | 1.59          | 0.162       | 6.2          | 40                | 74                | 0.75     | 0.70     | 2.51     | 60                    | -0.10 |
| 941026               | 2253        | 1.56          | 0.103       | 9.7          | 76                | 83                | 0.72     | 0.73     | 2.68     | 51                    | 0.20  |
| 941027               | 0154        | 1.66          | 0.103       | 9.7          | 72                | 84                | 0.63     | 0.86     | 3.67     | 37                    | 0.27  |
| 941027               | 0454        | 1.67          | 0.103       | 9.7          | 76                | 85                | 0.61     | 0.89     | 3.77     | 38                    | 0.26  |
| 941027               | 0755        | 1.80          | 0.083       | 12.0         | 54                | 81                | 0.61     | 0.82     | 3.70     | 42                    | -0.01 |
| 941027               | 1052        | 1.96          | 0.083       | 12.0         | 54                | 77                | 0.63     | 0.94     | 3.42     | 48                    | 0.53  |
| 941027               | 1353        | 1.87          | 0.083       | 12.0         | 52                | 79                | 0.61     | 0.69     | 3.58     | 47                    | 0.01  |
| 941027               | 1653        | 2.06          | 0.083       | 12.0         | 58                | 76                | 0.60     | 0.84     | 3.86     | 42                    | 0.24  |
| 941027               | 1953        | 2.08          | 0.083       | 12.0         | 54                | 73                | 0.59     | 0.56     | 3.76     | 45                    | 0.18  |
| 941027               | 2253        | 2.11          | 0.093       | 10.7         | 54                | 73                | 0.59     | 0.58     | 3.72     | 45                    | 0.08  |
| 941028               | 0154        | 2.27          | 0.083       | 12.0         | 48                | 66                | 0.57     | 0.95     | 3.89     | 43                    | 0.61  |
| 941028               | 0454        | 2.32          | 0.093       | 10.7         | 48                | 68                | 0.57     | 0.84     | 3.84     | 45                    | 0.39  |
| 941028               | 0754        | 2.35          | 0.083       | 12.0         | 50                | 64                | 0.56     | 0.98     | 4.60     | 39                    | 0.60  |
| 941028               | 1054        | 2.43          | 0.074       | 13.6         | 52                | 62                | 0.56     | 1.05     | 4.63     | 38                    | 0.74  |
| 941028               | 1353        | 2.31          | 0.074       | 13.6         | 50                | 64                | 0.59     | 1.23     | 4.54     | 40                    | 0.88  |
| 941028               | 1705        | 2.56          | 0.074       | 13.6         | 52                | 61                | 0.51     | 1.17     | 5.79     | 31                    | 0.68  |
| 941028               | 1954        | 2.85          | 0.074       | 13.6         | 50                | 60                | 0.51     | 0.85     | 5.12     | 34                    | 0.57  |
| 941028               | 2253        | 2.95          | 0.074       | 13.6         | 50                | 58                | 0.47     | 0.93     | 5.79     | 29                    | 0.35  |
| 941029               | 0151        | 2.72          | 0.074       | 13.6         | 56                | 59                | 0.46     | 0.94     | 6.06     | 27                    | 0.19  |
| 941029               | 0453        | 2.71          | 0.074       | 13.6         | 50                | 61                | 0.50     | 1.13     | 5.90     | 32                    | 0.67  |
| 941029               | 0753        | 3.18          | 0.103       | 9.7          | 50                | 59                | 0.44     | 0.73     | 6.15     | 29                    | 0.39  |
| 941029               | 1053        | 3.04          | 0.074       | 13.6         | 48                | 56                | 0.48     | 1.10     | 5.87     | 30                    | 0.60  |
| 941029               | 1354        | 3.17          | 0.074       | 13.6         | 50                | 57                | 0.46     | 0.90     | 5.94     | 29                    | 0.42  |
| 941029               | 1653        | 3.24          | 0.093       | 10.7         | 50                | 55                | 0.46     | 0.85     | 5.91     | 29                    | 0.37  |
| 941029               | 1953        | 3.61          | 0.093       | 10.7         | 52                | 58                | 0.44     | 0.73     | 6.04     | 27                    | 0.37  |
| 941029               | 2253        | 3.58          | 0.103       | 9.7          | 52                | 56                | 0.43     | 0.63     | 5.62     | 28                    | 0.20  |
| 941030               | 0154        | 3.72          | 0.093       | 10.7         | 48                | 52                | 0.41     | 0.83     | 6.28     | 25                    | 0.19  |
| 941030               | 0451        | 3.40          | 0.093       | 10.7         | 48                | 51                | 0.44     | 0.78     | 5.85     | 29                    | 0.14  |
| 941030               | 0753        | 3.42          | 0.093       | 10.7         | 46                | 54                | 0.43     | 0.82     | 6.43     | 27                    | 0.44  |
| 941030               | 1053        | 3.14          | 0.103       | 9.7          | 48                | 55                | 0.45     | 0.62     | 5.69     | 33                    | 0.39  |
| 941030               | 1353        | 2.92          | 0.093       | 10.7         | 48                | 55                | 0.46     | 0.68     | 6.26     | 28                    | 0.34  |
| 941030               | 1654        | 2.53          | 0.103       | 9.7          | 54                | 57                | 0.48     | 0.70     | 6.37     | 29                    | 0.19  |
| 941030               | 1954        | 2.73          | 0.103       | 9.7          | 50                | 57                | 0.44     | 0.79     | 6.83     | 26                    | 0.44  |
| 941030               | 2253        | 2.52          | 0.103       | 9.7          | 50                | 59                | 0.44     | 0.67     | 6.36     | 30                    | 0.33  |
| 941031               | 0154        | 2.17          | 0.083       | 12.0         | 50                | 56                | 0.48     | 1.10     | 6.55     | 30                    | 0.46  |
| 941031               | 0451        | 2.33          | 0.093       | 10.7         | 50                | 57                | 0.48     | 0.95     | 6.18     | 29                    | 0.39  |
| 941031               | 0753        | 2.03          | 0.083       | 12.0         | 50                | 57                | 0.49     | 1.44     | 6.36     | 26                    | 0.54  |
| 941031               | 1102        | 2.02          | 0.074       | 13.6         | 54                | 61                | 0.50     | 1.15     | 5.89     | 30                    | 0.29  |
| 941031               | 1356        | 1.81          | 0.083       | 12.0         | 54                | 62                | 0.53     | 1.79     | 6.34     | 26                    | 0.51  |
| 941031               | 1652        | 1.87          | 0.083       | 12.0         | 50                | 59                | 0.51     | 1.83     | 6.84     | 25                    | 0.56  |
| 941031               | 1954        | 1.90          | 0.083       | 12.0         | 52                | 61                | 0.48     | 2.06     | 7.75     | 21                    | 0.63  |

(Sheet 36 of 45)

Table A1 (Continued)

| Date   | Time<br>GMT | $H_{m0}$<br>m | $f_p$<br>Hz | $T_p$<br>sec | $\theta_p$<br>deg | $\theta_0$<br>deg | $\sigma$ | $\gamma$ | $\delta$ | $\Delta\theta$<br>deg | A     |
|--------|-------------|---------------|-------------|--------------|-------------------|-------------------|----------|----------|----------|-----------------------|-------|
| 941031 | 2255        | 1.91          | 0.083       | 12.0         | 54                | 62                | 0.53     | 1.88     | 6.40     | 25                    | 0.63  |
| 941101 | 0155        | 1.80          | 0.083       | 12.0         | 50                | 62                | 0.57     | 1.69     | 5.39     | 35                    | 0.95  |
| 941101 | 0456        | 1.71          | 0.083       | 12.0         | 50                | 63                | 0.59     | 1.81     | 4.92     | 36                    | 1.15  |
| 941101 | 0756        | 1.55          | 0.083       | 12.0         | 52                | 65                | 0.58     | 1.83     | 5.25     | 33                    | 1.05  |
| 941101 | 1121        | 1.46          | 0.083       | 12.0         | 56                | 69                | 0.60     | 1.62     | 4.76     | 36                    | 0.97  |
| 941101 | 1701        | 1.58          | 0.093       | 10.7         | 50                | 62                | 0.64     | 1.68     | 4.34     | 40                    | 0.92  |
| 941101 | 1958        | 1.62          | 0.093       | 10.7         | 46                | 59                | 0.59     | 1.79     | 4.98     | 34                    | 1.10  |
| 941101 | 2258        | 1.63          | 0.093       | 10.7         | 48                | 61                | 0.63     | 1.59     | 4.28     | 41                    | 0.93  |
| 941102 | 0200        | 2.03          | 0.152       | 6.6          | 46                | 53                | 0.53     | 1.56     | 5.38     | 28                    | 0.47  |
| 941102 | 0457        | 3.01          | 0.123       | 8.2          | 46                | 47                | 0.45     | 1.59     | 7.04     | 24                    | 0.06  |
| 941102 | 1057        | 2.94          | 0.113       | 8.9          | 48                | 50                | 0.47     | 1.22     | 6.01     | 28                    | 0.05  |
| 941102 | 1356        | 3.04          | 0.103       | 9.7          | 48                | 50                | 0.44     | 1.28     | 6.83     | 25                    | 0.06  |
| 941102 | 1700        | 3.28          | 0.103       | 9.7          | 46                | 46                | 0.45     | 1.09     | 5.84     | 29                    | 0.01  |
| 941102 | 2000        | 3.64          | 0.103       | 9.7          | 48                | 46                | 0.45     | 0.95     | 5.16     | 31                    | -0.03 |
| 941102 | 2300        | 3.71          | 0.103       | 9.7          | 44                | 48                | 0.42     | 1.24     | 6.53     | 24                    | 0.20  |
| 941103 | 0200        | 3.30          | 0.103       | 9.7          | 46                | 51                | 0.42     | 1.17     | 7.23     | 23                    | 0.24  |
| 941103 | 0457        | 3.01          | 0.093       | 10.7         | 48                | 53                | 0.42     | 1.15     | 7.31     | 25                    | 0.28  |
| 941103 | 0757        | 2.82          | 0.093       | 10.7         | 46                | 54                | 0.46     | 0.98     | 5.75     | 29                    | 0.23  |
| 941103 | 1101        | 2.98          | 0.093       | 10.7         | 44                | 52                | 0.47     | 1.42     | 6.50     | 26                    | 0.44  |
| 941103 | 1352        | 3.00          | 0.093       | 10.7         | 46                | 51                | 0.45     | 1.11     | 6.05     | 27                    | 0.27  |
| 941103 | 1656        | 2.91          | 0.093       | 10.7         | 44                | 49                | 0.44     | 1.08     | 5.90     | 28                    | 0.24  |
| 941103 | 1955        | 2.60          | 0.093       | 10.7         | 46                | 49                | 0.46     | 1.41     | 6.85     | 24                    | 0.21  |
| 941103 | 2255        | 2.26          | 0.103       | 9.7          | 46                | 50                | 0.50     | 1.26     | 5.88     | 29                    | 0.16  |
| 941104 | 0155        | 2.09          | 0.093       | 10.7         | 44                | 53                | 0.50     | 1.28     | 5.95     | 31                    | 0.64  |
| 941104 | 0453        | 1.94          | 0.093       | 10.7         | 48                | 54                | 0.49     | 1.63     | 7.17     | 25                    | 0.35  |
| 941104 | 0755        | 1.65          | 0.093       | 10.7         | 42                | 53                | 0.55     | 2.03     | 6.00     | 27                    | 0.66  |
| 941104 | 1053        | 1.50          | 0.093       | 10.7         | 44                | 56                | 0.61     | 1.79     | 5.02     | 36                    | 1.15  |
| 941104 | 1355        | 1.63          | 0.093       | 10.7         | 50                | 57                | 0.62     | 1.76     | 5.07     | 34                    | 0.42  |
| 941104 | 1708        | 1.49          | 0.103       | 9.7          | 48                | 56                | 0.59     | 1.79     | 5.31     | 31                    | 0.32  |
| 941104 | 1955        | 1.29          | 0.103       | 9.7          | 56                | 60                | 0.67     | 1.93     | 4.50     | 38                    | 0.17  |
| 941104 | 2255        | 1.20          | 0.103       | 9.7          | 50                | 68                | 0.74     | 1.46     | 3.31     | 52                    | 0.69  |
| 941105 | 0155        | 1.11          | 0.103       | 9.7          | 50                | 71                | 0.77     | 1.61     | 3.29     | 51                    | 0.54  |
| 941105 | 0455        | 1.04          | 0.064       | 15.6         | 46                | 77                | 0.81     | 1.24     | 2.65     | 67                    | 0.79  |
| 941105 | 0755        | 0.90          | 0.064       | 15.6         | 48                | 88                | 0.92     | 0.91     | 2.22     | 90                    | 0.64  |
| 941105 | 1052        | 0.93          | 0.074       | 13.6         | 52                | 82                | 0.83     | 1.05     | 2.54     | 77                    | 1.00  |
| 941105 | 1355        | 0.99          | 0.074       | 13.6         | 56                | 78                | 0.77     | 1.69     | 3.26     | 46                    | 0.75  |
| 941105 | 1955        | 1.44          | 0.093       | 10.7         | 50                | 65                | 0.68     | 2.11     | 4.44     | 36                    | 0.80  |
| 941105 | 2255        | 1.53          | 0.093       | 10.7         | 64                | 72                | 0.67     | 1.39     | 3.93     | 42                    | 0.45  |
| 941106 | 0152        | 1.73          | 0.064       | 15.6         | 50                | 68                | 0.60     | 1.73     | 5.16     | 34                    | 0.54  |
| 941106 | 0531        | 2.10          | 0.064       | 15.6         | 56                | 68                | 0.57     | 1.78     | 5.41     | 30                    | 0.91  |
| 941106 | 0755        | 2.10          | 0.064       | 15.6         | 58                | 68                | 0.58     | 2.27     | 6.02     | 29                    | 0.78  |
| 941106 | 1055        | 2.01          | 0.074       | 13.6         | 50                | 68                | 0.63     | 2.04     | 4.97     | 34                    | 0.65  |
| 941106 | 1355        | 2.21          | 0.064       | 15.6         | 50                | 65                | 0.59     | 2.11     | 5.99     | 29                    | 0.70  |
| 941106 | 1655        | 2.55          | 0.064       | 15.6         | 54                | 62                | 0.56     | 2.84     | 6.75     | 23                    | 0.85  |
| 941106 | 1955        | 2.48          | 0.064       | 15.6         | 56                | 63                | 0.56     | 2.04     | 6.19     | 28                    | 0.46  |
| 941106 | 2255        | 2.32          | 0.074       | 13.6         | 56                | 65                | 0.64     | 2.37     | 5.24     | 33                    | 0.72  |
| 941107 | 0155        | 2.55          | 0.064       | 15.6         | 56                | 65                | 0.57     | 2.58     | 6.30     | 24                    | 0.62  |
| 941107 | 0453        | 2.62          | 0.064       | 15.6         | 54                | 61                | 0.53     | 2.39     | 7.03     | 21                    | 0.54  |
| 941107 | 0755        | 2.56          | 0.064       | 15.6         | 56                | 63                | 0.53     | 2.47     | 7.45     | 19                    | 0.43  |
| 941107 | 1053        | 2.61          | 0.064       | 15.6         | 52                | 59                | 0.49     | 2.45     | 8.13     | 18                    | 0.29  |
| 941107 | 1353        | 2.65          | 0.074       | 13.6         | 50                | 61                | 0.51     | 1.87     | 6.87     | 25                    | 0.80  |
| 941107 | 1654        | 2.69          | 0.074       | 13.6         | 52                | 66                | 0.51     | 1.53     | 6.07     | 29                    | 0.78  |
| 941107 | 1956        | 2.97          | 0.074       | 13.6         | 52                | 62                | 0.45     | 1.71     | 8.04     | 24                    | 0.50  |

(Sheet 37 of 45)

Table A1 (Continued)

| Date   | Time<br>GMT | $H_{m0}$<br>m | $f_p$<br>Hz | $T_p$<br>sec | $\theta_p$<br>deg | $\theta_0$<br>deg | $\sigma$ | $\gamma$ | $\delta$ | $\Delta\theta$<br>deg | A     |
|--------|-------------|---------------|-------------|--------------|-------------------|-------------------|----------|----------|----------|-----------------------|-------|
| 941107 | 2253        | 2.89          | 0.074       | 13.6         | 52                | 64                | 0.49     | 1.30     | 6.14     | 29                    | 0.61  |
| 941108 | 0156        | 3.08          | 0.074       | 13.6         | 52                | 68                | 0.52     | 0.94     | 4.69     | 37                    | 0.82  |
| 941108 | 0455        | 3.22          | 0.074       | 13.6         | 54                | 70                | 0.51     | 0.89     | 4.62     | 37                    | 0.69  |
| 941108 | 0755        | 3.08          | 0.074       | 13.6         | 52                | 67                | 0.50     | 0.97     | 5.38     | 33                    | 0.58  |
| 941108 | 1056        | 2.89          | 0.074       | 13.6         | 52                | 64                | 0.52     | 1.18     | 5.18     | 34                    | 0.82  |
| 941108 | 1347        | 2.86          | 0.083       | 12.0         | 50                | 64                | 0.53     | 1.28     | 4.80     | 35                    | 1.04  |
| 941108 | 1655        | 2.68          | 0.074       | 13.6         | 52                | 63                | 0.50     | 1.25     | 5.20     | 32                    | 0.92  |
| 941108 | 1955        | 2.50          | 0.093       | 10.7         | 54                | 60                | 0.52     | 1.23     | 5.49     | 31                    | 0.42  |
| 941108 | 2256        | 2.32          | 0.083       | 12.0         | 48                | 60                | 0.56     | 1.50     | 5.00     | 35                    | 0.94  |
| 941109 | 0155        | 2.15          | 0.083       | 12.0         | 48                | 66                | 0.60     | 1.25     | 4.36     | 43                    | 0.95  |
| 941109 | 0456        | 2.03          | 0.083       | 12.0         | 48                | 66                | 0.60     | 1.53     | 4.75     | 41                    | 1.07  |
| 941109 | 0753        | 2.07          | 0.083       | 12.0         | 46                | 62                | 0.61     | 1.82     | 4.87     | 40                    | 1.04  |
| 941109 | 1054        | 1.63          | 0.083       | 12.0         | 46                | 65                | 0.70     | 1.70     | 3.99     | 47                    | 0.97  |
| 941109 | 1356        | 1.36          | 0.083       | 12.0         | 52                | 75                | 0.81     | 1.58     | 3.07     | 56                    | 0.84  |
| 941109 | 1700        | 1.16          | 0.093       | 10.7         | 54                | 93                | 0.89     | 1.07     | 2.20     | 98                    | 0.94  |
| 941109 | 1956        | 1.10          | 0.093       | 10.7         | 58                | 97                | 0.89     | 1.02     | 2.16     | 97                    | 1.05  |
| 941109 | 2256        | 2.18          | 0.083       | 12.0         | 56                | 70                | 0.58     | 2.43     | 5.85     | 28                    | 0.68  |
| 941110 | 0155        | 2.82          | 0.083       | 12.0         | 56                | 68                | 0.50     | 1.67     | 6.16     | 28                    | 0.68  |
| 941110 | 0453        | 2.90          | 0.074       | 13.6         | 56                | 67                | 0.53     | 1.66     | 6.10     | 29                    | 0.50  |
| 941110 | 0756        | 3.26          | 0.074       | 13.6         | 56                | 66                | 0.49     | 2.13     | 7.57     | 24                    | 0.34  |
| 941110 | 1105        | 3.62          | 0.074       | 13.6         | 64                | 67                | 0.45     | 1.85     | 8.56     | 20                    | 0.04  |
| 941110 | 1356        | 4.60          | 0.064       | 15.6         | 62                | 65                | 0.45     | 1.38     | 8.21     | 22                    | 0.25  |
| 941110 | 1953        | 4.49          | 0.064       | 15.6         | 60                | 63                | 0.44     | 1.67     | 8.98     | 18                    | 0.13  |
| 941110 | 2256        | 3.76          | 0.064       | 15.6         | 58                | 62                | 0.46     | 1.91     | 8.78     | 16                    | 0.34  |
| 941111 | 0156        | 3.47          | 0.064       | 15.6         | 58                | 63                | 0.51     | 2.10     | 7.58     | 20                    | 0.28  |
| 941111 | 0453        | 3.50          | 0.064       | 15.6         | 54                | 60                | 0.44     | 2.29     | 9.54     | 17                    | 0.45  |
| 941111 | 0755        | 3.23          | 0.074       | 13.6         | 54                | 60                | 0.45     | 2.08     | 9.13     | 20                    | 0.37  |
| 941111 | 1056        | 3.03          | 0.074       | 13.6         | 48                | 58                | 0.49     | 1.87     | 7.13     | 26                    | 0.70  |
| 941111 | 1356        | 3.05          | 0.074       | 13.6         | 50                | 59                | 0.56     | 2.11     | 6.74     | 27                    | 0.53  |
| 941111 | 1656        | 3.00          | 0.074       | 13.6         | 50                | 57                | 0.50     | 1.82     | 7.00     | 25                    | 0.43  |
| 941111 | 1955        | 2.74          | 0.074       | 13.6         | 46                | 57                | 0.59     | 2.29     | 6.25     | 30                    | 0.72  |
| 941111 | 2256        | 2.54          | 0.083       | 12.0         | 56                | 58                | 0.54     | 1.88     | 6.42     | 25                    | 0.01  |
| 941112 | 0153        | 2.29          | 0.083       | 12.0         | 54                | 60                | 0.55     | 1.73     | 5.96     | 28                    | 0.34  |
| 941112 | 0456        | 2.24          | 0.083       | 12.0         | 48                | 58                | 0.56     | 1.87     | 5.87     | 30                    | 0.61  |
| 941112 | 0755        | 2.17          | 0.083       | 12.0         | 42                | 57                | 0.54     | 1.63     | 5.90     | 31                    | 0.44  |
| 941112 | 1055        | 2.14          | 0.083       | 12.0         | 44                | 56                | 0.55     | 1.56     | 5.54     | 33                    | 0.44  |
| 941112 | 1355        | 2.12          | 0.083       | 12.0         | 42                | 51                | 0.55     | 1.98     | 5.96     | 28                    | 0.58  |
| 941112 | 1655        | 1.70          | 0.093       | 10.7         | 38                | 53                | 0.63     | 1.84     | 4.76     | 37                    | 0.71  |
| 941112 | 1956        | 1.69          | 0.093       | 10.7         | 50                | 58                | 0.64     | 1.69     | 4.62     | 37                    | 0.39  |
| 941112 | 2325        | 1.87          | 0.152       | 6.6          | 48                | 58                | 0.59     | 1.31     | 4.72     | 39                    | 0.34  |
| 941113 | 0155        | 2.01          | 0.132       | 7.6          | 56                | 55                | 0.55     | 1.21     | 5.28     | 34                    | -0.10 |
| 941113 | 0455        | 2.39          | 0.103       | 9.7          | 50                | 51                | 0.48     | 1.46     | 6.79     | 29                    | 0.08  |
| 941113 | 0755        | 2.61          | 0.093       | 10.7         | 48                | 50                | 0.44     | 1.69     | 8.11     | 23                    | 0.05  |
| 941113 | 1052        | 2.52          | 0.093       | 10.7         | 46                | 48                | 0.44     | 1.59     | 8.44     | 23                    | 0.00  |
| 941113 | 1356        | 2.45          | 0.103       | 9.7          | 44                | 47                | 0.47     | 1.87     | 7.93     | 24                    | 0.11  |
| 941113 | 1656        | 2.54          | 0.093       | 10.7         | 42                | 48                | 0.43     | 1.90     | 9.10     | 20                    | 0.24  |
| 941113 | 1955        | 2.31          | 0.093       | 10.7         | 42                | 46                | 0.45     | 2.08     | 8.83     | 20                    | 0.22  |
| 941113 | 2255        | 2.34          | 0.083       | 12.0         | 46                | 51                | 0.48     | 2.03     | 8.12     | 21                    | 0.31  |
| 941114 | 0155        | 2.21          | 0.093       | 10.7         | 46                | 52                | 0.47     | 2.86     | 9.36     | 17                    | 0.44  |
| 941114 | 0456        | 2.32          | 0.064       | 15.6         | 46                | 50                | 0.47     | 3.00     | 9.53     | 14                    | 0.16  |
| 941114 | 0753        | 2.27          | 0.074       | 13.6         | 44                | 52                | 0.54     | 2.44     | 7.47     | 18                    | 0.71  |
| 941114 | 1053        | 2.51          | 0.074       | 13.6         | 48                | 52                | 0.43     | 1.94     | 10.09    | 17                    | 0.29  |
| 941114 | 1355        | 2.51          | 0.083       | 12.0         | 46                | 52                | 0.45     | 2.17     | 9.84     | 18                    | 0.39  |

(Sheet 38 of 45)

| Table A1 (Continued) |          |            |          |           |                |                |          |          |          |                    |       |
|----------------------|----------|------------|----------|-----------|----------------|----------------|----------|----------|----------|--------------------|-------|
| Date                 | Time GMT | $H_{mo}$ m | $f_p$ Hz | $T_p$ sec | $\theta_p$ deg | $\theta_o$ deg | $\sigma$ | $\gamma$ | $\delta$ | $\Delta\theta$ deg | A     |
| 941114               | 1656     | 2.07       | 0.083    | 12.0      | 44             | 54             | 0.50     | 2.20     | 7.98     | 23                 | 0.55  |
| 941114               | 1955     | 1.94       | 0.074    | 13.6      | 48             | 58             | 0.51     | 2.00     | 7.17     | 23                 | 0.82  |
| 941114               | 2255     | 1.68       | 0.074    | 13.6      | 46             | 60             | 0.61     | 2.07     | 5.46     | 33                 | 1.14  |
| 941115               | 0155     | 1.84       | 0.074    | 13.6      | 48             | 58             | 0.52     | 1.84     | 6.80     | 26                 | 0.66  |
| 941115               | 0456     | 1.88       | 0.083    | 12.0      | 46             | 55             | 0.48     | 1.97     | 8.04     | 23                 | 0.71  |
| 941115               | 0833     | 1.84       | 0.083    | 12.0      | 44             | 53             | 0.50     | 2.07     | 7.05     | 21                 | 0.62  |
| 941115               | 1053     | 1.81       | 0.083    | 12.0      | 44             | 56             | 0.54     | 1.54     | 5.83     | 32                 | 1.05  |
| 941115               | 1356     | 1.61       | 0.093    | 10.7      | 46             | 65             | 0.53     | 1.13     | 5.58     | 35                 | 0.20  |
| 941115               | 1655     | 1.30       | 0.083    | 12.0      | 52             | 65             | 0.64     | 1.56     | 4.88     | 39                 | 0.44  |
| 941115               | 1956     | 1.04       | 0.083    | 12.0      | 60             | 75             | 0.68     | 1.29     | 3.75     | 40                 | 0.29  |
| 941115               | 2256     | 1.04       | 0.083    | 12.0      | 60             | 71             | 0.57     | 1.66     | 5.53     | 29                 | 0.56  |
| 941116               | 0222     | 2.29       | 0.142    | 7.0       | 56             | 67             | 0.45     | 0.40     | 5.87     | 32                 | 0.12  |
| 941116               | 0456     | 2.73       | 0.074    | 13.6      | 58             | 63             | 0.45     | 0.14     | 4.64     | 32                 | 0.08  |
| 941116               | 0756     | 3.48       | 0.074    | 13.6      | 52             | 59             | 0.42     | 0.38     | 6.08     | 27                 | 0.33  |
| 941116               | 1052     | 4.09       | 0.074    | 13.6      | 48             | 60             | 0.39     | 0.54     | 6.44     | 27                 | 0.42  |
| 941116               | 1354     | 4.80       | 0.074    | 13.6      | 50             | 59             | 0.39     | 0.46     | 6.33     | 25                 | 0.24  |
| 941116               | 1653     | 5.69       | 0.074    | 13.6      | 48             | 53             | 0.39     | 0.48     | 5.31     | 26                 | 0.28  |
| 941116               | 1955     | 5.14       | 0.074    | 13.6      | 48             | 53             | 0.41     | 0.45     | 5.25     | 26                 | 0.32  |
| 941116               | 2255     | 4.68       | 0.074    | 13.6      | 48             | 55             | 0.43     | 0.33     | 4.97     | 31                 | 0.20  |
| 941117               | 0152     | 4.13       | 0.074    | 13.6      | 46             | 55             | 0.44     | 0.36     | 4.67     | 33                 | 0.23  |
| 941117               | 0455     | 3.99       | 0.074    | 13.6      | 48             | 54             | 0.41     | 0.48     | 5.79     | 28                 | 0.23  |
| 941117               | 0755     | 3.58       | 0.074    | 13.6      | 50             | 53             | 0.38     | 0.88     | 7.34     | 22                 | 0.29  |
| 941117               | 1104     | 3.43       | 0.083    | 12.0      | 48             | 55             | 0.41     | 0.91     | 8.00     | 24                 | 0.33  |
| 941117               | 1657     | 3.85       | 0.083    | 12.0      | 46             | 52             | 0.40     | 1.02     | 7.53     | 23                 | 0.48  |
| 941117               | 1955     | 3.08       | 0.083    | 12.0      | 44             | 52             | 0.44     | 1.17     | 6.80     | 26                 | 0.47  |
| 941117               | 2252     | 3.10       | 0.074    | 13.6      | 48             | 54             | 0.44     | 1.13     | 6.92     | 23                 | 0.38  |
| 941118               | 0154     | 3.54       | 0.083    | 12.0      | 46             | 54             | 0.44     | 0.71     | 5.38     | 30                 | 0.40  |
| 941118               | 0454     | 4.36       | 0.074    | 13.6      | 48             | 50             | 0.42     | 0.59     | 5.29     | 29                 | 0.20  |
| 941118               | 0755     | 4.66       | 0.074    | 13.6      | 44             | 47             | 0.40     | 0.77     | 6.05     | 24                 | 0.15  |
| 941118               | 1052     | 4.21       | 0.074    | 13.6      | 46             | 51             | 0.41     | 0.76     | 6.53     | 26                 | 0.21  |
| 941118               | 1355     | 4.18       | 0.083    | 12.0      | 46             | 53             | 0.41     | 0.76     | 6.95     | 26                 | 0.36  |
| 941118               | 1706     | 4.35       | 0.083    | 12.0      | 48             | 52             | 0.40     | 0.69     | 7.15     | 25                 | 0.28  |
| 941118               | 1954     | 4.05       | 0.074    | 13.6      | 48             | 50             | 0.40     | 0.90     | 7.79     | 24                 | 0.17  |
| 941118               | 2255     | 3.74       | 0.083    | 12.0      | 48             | 50             | 0.40     | 0.99     | 8.21     | 22                 | 0.19  |
| 941119               | 0155     | 3.33       | 0.083    | 12.0      | 48             | 53             | 0.41     | 0.79     | 7.41     | 26                 | 0.20  |
| 941119               | 0455     | 3.12       | 0.083    | 12.0      | 48             | 51             | 0.40     | 0.98     | 8.29     | 23                 | 0.18  |
| 941119               | 0755     | 2.93       | 0.083    | 12.0      | 46             | 49             | 0.42     | 1.36     | 8.72     | 22                 | 0.13  |
| 941119               | 1052     | 2.57       | 0.083    | 12.0      | 44             | 47             | 0.45     | 1.30     | 8.30     | 24                 | 0.09  |
| 941119               | 1354     | 2.41       | 0.093    | 10.7      | 50             | 50             | 0.50     | 1.00     | 6.34     | 31                 | -0.05 |
| 941119               | 1655     | 2.09       | 0.083    | 12.0      | 44             | 49             | 0.51     | 1.22     | 6.44     | 29                 | 0.21  |
| 941119               | 1954     | 1.94       | 0.093    | 10.7      | 48             | 50             | 0.50     | 1.54     | 7.36     | 25                 | -0.01 |
| 941119               | 2255     | 1.68       | 0.093    | 10.7      | 50             | 53             | 0.57     | 1.61     | 5.90     | 31                 | 0.12  |
| 941120               | 0155     | 1.75       | 0.093    | 10.7      | 48             | 55             | 0.55     | 1.73     | 6.48     | 26                 | 0.41  |
| 941120               | 0454     | 1.79       | 0.093    | 10.7      | 46             | 51             | 0.51     | 2.01     | 7.35     | 26                 | 0.20  |
| 941120               | 0755     | 1.59       | 0.093    | 10.7      | 46             | 54             | 0.58     | 2.07     | 6.22     | 27                 | 0.36  |
| 941120               | 1054     | 1.32       | 0.093    | 10.7      | 50             | 58             | 0.63     | 2.33     | 5.71     | 26                 | 0.67  |
| 941120               | 1354     | 1.30       | 0.093    | 10.7      | 46             | 55             | 0.66     | 1.88     | 4.82     | 38                 | 0.57  |
| 941120               | 1652     | 1.19       | 0.103    | 9.7       | 56             | 59             | 0.68     | 1.65     | 4.41     | 43                 | 0.20  |
| 941120               | 2021     | 1.28       | 0.162    | 6.2       | 46             | 54             | 0.60     | 1.88     | 5.63     | 33                 | 0.16  |
| 941120               | 2254     | 1.33       | 0.152    | 6.6       | 52             | 54             | 0.61     | 1.77     | 5.30     | 34                 | 0.07  |
| 941121               | 0154     | 1.46       | 0.142    | 7.0       | 54             | 56             | 0.59     | 1.73     | 5.63     | 31                 | 0.17  |
| 941121               | 0455     | 1.30       | 0.142    | 7.0       | 48             | 55             | 0.60     | 1.39     | 5.23     | 34                 | 0.39  |
| 941121               | 0754     | 1.20       | 0.162    | 6.2       | 52             | 55             | 0.62     | 1.88     | 5.67     | 34                 | 0.16  |

(Sheet 39 of 45)

Table A1 (Continued)

| Date   | Time<br>GMT | $H_{m0}$<br>m | $f_p$<br>Hz | $T_p$<br>sec | $\theta_p$<br>deg | $\theta_0$<br>deg | $\sigma$ | $\gamma$ | $\delta$ | $\Delta\theta$<br>deg | A     |
|--------|-------------|---------------|-------------|--------------|-------------------|-------------------|----------|----------|----------|-----------------------|-------|
| 941121 | 1054        | 1.33          | 0.152       | 6.6          | 50                | 54                | 0.58     | 1.80     | 6.25     | 32                    | 0.10  |
| 941121 | 1358        | 1.44          | 0.152       | 6.6          | 48                | 52                | 0.56     | 1.40     | 5.90     | 31                    | 0.05  |
| 941121 | 1658        | 1.81          | 0.103       | 9.7          | 46                | 50                | 0.48     | 1.15     | 6.13     | 30                    | 0.06  |
| 941121 | 1954        | 2.25          | 0.103       | 9.7          | 46                | 50                | 0.44     | 1.15     | 6.84     | 26                    | 0.19  |
| 941122 | 0155        | 2.02          | 0.093       | 10.7         | 46                | 50                | 0.44     | 2.09     | 10.02    | 18                    | 0.29  |
| 941122 | 0455        | 2.18          | 0.093       | 10.7         | 46                | 51                | 0.43     | 1.52     | 8.75     | 22                    | 0.51  |
| 941122 | 0754        | 2.27          | 0.093       | 10.7         | 46                | 50                | 0.45     | 1.55     | 8.21     | 23                    | 0.40  |
| 941122 | 1055        | 2.14          | 0.093       | 10.7         | 50                | 53                | 0.51     | 1.43     | 7.09     | 27                    | 0.30  |
| 941122 | 1355        | 1.82          | 0.103       | 9.7          | 50                | 55                | 0.50     | 2.19     | 8.40     | 21                    | 0.60  |
| 941122 | 1658        | 1.71          | 0.103       | 9.7          | 50                | 57                | 0.51     | 2.28     | 7.79     | 22                    | 0.59  |
| 941122 | 1954        | 1.69          | 0.083       | 12.0         | 48                | 56                | 0.51     | 1.94     | 7.58     | 24                    | 0.52  |
| 941122 | 2255        | 1.58          | 0.083       | 12.0         | 50                | 55                | 0.52     | 2.29     | 7.64     | 21                    | 0.45  |
| 941123 | 0152        | 1.36          | 0.083       | 12.0         | 48                | 58                | 0.56     | 2.12     | 6.43     | 25                    | 0.68  |
| 941123 | 0455        | 1.37          | 0.083       | 12.0         | 48                | 59                | 0.59     | 1.98     | 6.00     | 30                    | 0.78  |
| 941123 | 0755        | 1.41          | 0.083       | 12.0         | 46                | 57                | 0.60     | 1.97     | 5.71     | 30                    | 0.51  |
| 941123 | 1054        | 1.36          | 0.093       | 10.7         | 48                | 54                | 0.57     | 1.98     | 6.25     | 30                    | 0.34  |
| 941123 | 1404        | 1.18          | 0.093       | 10.7         | 44                | 57                | 0.68     | 2.04     | 4.58     | 39                    | 0.86  |
| 941123 | 1659        | 1.08          | 0.093       | 10.7         | 46                | 63                | 0.73     | 1.77     | 3.73     | 51                    | 1.31  |
| 941123 | 1959        | 1.06          | 0.093       | 10.7         | 48                | 65                | 0.67     | 1.34     | 4.03     | 46                    | 0.64  |
| 941123 | 2259        | 1.01          | 0.103       | 9.7          | 52                | 67                | 0.71     | 1.65     | 3.93     | 43                    | 0.51  |
| 941124 | 0159        | 0.92          | 0.074       | 13.6         | 54                | 65                | 0.72     | 1.85     | 4.00     | 41                    | 0.74  |
| 941124 | 0500        | 0.98          | 0.074       | 13.6         | 48                | 68                | 0.82     | 1.93     | 3.33     | 51                    | 1.06  |
| 941124 | 0759        | 1.17          | 0.074       | 13.6         | 48                | 64                | 0.70     | 1.55     | 3.98     | 42                    | 0.45  |
| 941124 | 1051        | 1.20          | 0.074       | 13.6         | 54                | 65                | 0.72     | 1.94     | 4.20     | 36                    | 0.70  |
| 941124 | 1359        | 1.25          | 0.054       | 18.5         | 58                | 64                | 0.66     | 2.48     | 5.24     | 26                    | 0.54  |
| 941124 | 1659        | 1.61          | 0.064       | 15.6         | 54                | 61                | 0.53     | 2.62     | 7.77     | 17                    | 0.12  |
| 941124 | 1959        | 2.01          | 0.064       | 15.6         | 56                | 59                | 0.44     | 2.37     | 10.25    | 14                    | 0.12  |
| 941124 | 2259        | 2.17          | 0.064       | 15.6         | 54                | 56                | 0.43     | 2.73     | 11.02    | 13                    | 0.17  |
| 941125 | 0159        | 2.36          | 0.064       | 15.6         | 56                | 58                | 0.42     | 2.11     | 10.36    | 12                    | 0.18  |
| 941125 | 0459        | 2.18          | 0.064       | 15.6         | 54                | 56                | 0.44     | 2.41     | 10.58    | 14                    | 0.11  |
| 941125 | 0800        | 2.07          | 0.064       | 15.6         | 58                | 57                | 0.46     | 2.03     | 9.71     | 18                    | -0.17 |
| 941125 | 1056        | 2.06          | 0.074       | 13.6         | 58                | 59                | 0.48     | 1.80     | 8.49     | 20                    | 0.03  |
| 941125 | 1359        | 1.91          | 0.074       | 13.6         | 54                | 64                | 0.52     | 1.61     | 7.01     | 27                    | 0.35  |
| 941125 | 1659        | 2.07          | 0.083       | 12.0         | 54                | 65                | 0.51     | 1.44     | 6.44     | 29                    | 0.42  |
| 941125 | 2259        | 2.03          | 0.074       | 13.6         | 52                | 64                | 0.52     | 1.23     | 5.61     | 32                    | 0.58  |
| 941126 | 0159        | 2.63          | 0.093       | 10.7         | 52                | 61                | 0.45     | 1.24     | 6.69     | 26                    | 0.57  |
| 941126 | 0459        | 3.08          | 0.093       | 10.7         | 56                | 63                | 0.41     | 0.88     | 6.83     | 25                    | 0.32  |
| 941126 | 0759        | 4.00          | 0.083       | 12.0         | 52                | 62                | 0.44     | 0.41     | 4.94     | 32                    | 0.16  |
| 941126 | 1059        | 4.70          | 0.074       | 13.6         | 56                | 60                | 0.43     | 0.33     | 4.83     | 28                    | 0.01  |
| 941126 | 1359        | 4.81          | 0.074       | 13.6         | 64                | 61                | 0.44     | 0.27     | 5.35     | 26                    | -0.03 |
| 941126 | 1659        | 4.77          | 0.064       | 15.6         | 58                | 62                | 0.45     | 0.29     | 5.09     | 29                    | 0.06  |
| 941126 | 1956        | 4.86          | 0.064       | 15.6         | 64                | 60                | 0.43     | 0.28     | 5.42     | 26                    | -0.15 |
| 941126 | 2259        | 4.66          | 0.064       | 15.6         | 58                | 60                | 0.41     | 0.53     | 6.59     | 23                    | 0.18  |
| 941127 | 0159        | 4.74          | 0.064       | 15.6         | 58                | 59                | 0.39     | 0.47     | 7.35     | 21                    | 0.07  |
| 941127 | 0459        | 4.55          | 0.074       | 13.6         | 54                | 58                | 0.40     | 0.77     | 7.60     | 22                    | 0.28  |
| 941127 | 0759        | 3.75          | 0.074       | 13.6         | 54                | 59                | 0.42     | 0.71     | 7.42     | 23                    | 0.28  |
| 941127 | 1056        | 3.08          | 0.074       | 13.6         | 54                | 58                | 0.47     | 0.85     | 6.36     | 29                    | 0.20  |
| 941127 | 1359        | 3.09          | 0.083       | 12.0         | 54                | 58                | 0.45     | 0.89     | 6.53     | 24                    | 0.32  |
| 941127 | 1657        | 2.55          | 0.074       | 13.6         | 50                | 61                | 0.53     | 1.26     | 5.48     | 30                    | 0.74  |
| 941127 | 1959        | 2.61          | 0.074       | 13.6         | 54                | 61                | 0.48     | 0.75     | 6.02     | 27                    | 0.44  |
| 941127 | 2259        | 2.67          | 0.083       | 12.0         | 52                | 57                | 0.47     | 1.07     | 6.32     | 25                    | 0.39  |
| 941128 | 0159        | 2.46          | 0.083       | 12.0         | 50                | 57                | 0.48     | 1.31     | 6.62     | 23                    | 0.41  |
| 941128 | 0459        | 2.20          | 0.083       | 12.0         | 50                | 59                | 0.52     | 1.22     | 5.64     | 31                    | 0.83  |

(Sheet 40 of 45)

Table A1 (Continued)

| Date   | Time<br>GMT | $H_{mo}$<br>m | $f_p$<br>Hz | $T_p$<br>sec | $\theta_p$<br>deg | $\theta_o$<br>deg | $\sigma$ | $\gamma$ | $\delta$ | $\Delta\theta$<br>deg | A    |
|--------|-------------|---------------|-------------|--------------|-------------------|-------------------|----------|----------|----------|-----------------------|------|
| 941128 | 0759        | 2.04          | 0.083       | 12.0         | 50                | 57                | 0.52     | 1.26     | 6.00     | 27                    | 0.59 |
| 941128 | 1104        | 1.84          | 0.083       | 12.0         | 50                | 57                | 0.58     | 1.17     | 5.08     | 36                    | 0.51 |
| 941128 | 1352        | 1.75          | 0.083       | 12.0         | 46                | 55                | 0.58     | 1.13     | 4.81     | 37                    | 0.57 |
| 941128 | 1654        | 1.77          | 0.083       | 12.0         | 48                | 55                | 0.54     | 1.08     | 5.11     | 36                    | 0.30 |
| 941128 | 1954        | 1.91          | 0.093       | 10.7         | 50                | 59                | 0.53     | 0.85     | 5.12     | 36                    | 0.38 |
| 941128 | 2250        | 2.25          | 0.093       | 10.7         | 48                | 53                | 0.48     | 1.02     | 6.46     | 29                    | 0.28 |
| 941129 | 0455        | 2.43          | 0.083       | 12.0         | 50                | 54                | 0.47     | 1.52     | 7.93     | 23                    | 0.25 |
| 941129 | 0754        | 2.39          | 0.083       | 12.0         | 48                | 53                | 0.44     | 2.22     | 9.81     | 16                    | 0.43 |
| 941129 | 1054        | 2.16          | 0.074       | 13.6         | 50                | 54                | 0.47     | 1.96     | 8.65     | 16                    | 0.25 |
| 941129 | 1357        | 2.08          | 0.074       | 13.6         | 48                | 54                | 0.49     | 2.03     | 7.82     | 20                    | 0.48 |
| 941129 | 1657        | 2.10          | 0.083       | 12.0         | 48                | 55                | 0.50     | 2.23     | 7.66     | 18                    | 0.66 |
| 941129 | 1955        | 2.15          | 0.074       | 13.6         | 50                | 57                | 0.48     | 2.06     | 7.90     | 20                    | 0.72 |
| 941129 | 2255        | 1.98          | 0.083       | 12.0         | 46                | 55                | 0.50     | 2.36     | 7.76     | 20                    | 0.79 |
| 941130 | 0155        | 1.72          | 0.083       | 12.0         | 46                | 58                | 0.55     | 2.07     | 6.45     | 27                    | 0.87 |
| 941130 | 0455        | 1.44          | 0.083       | 12.0         | 50                | 60                | 0.57     | 2.15     | 6.22     | 26                    | 0.81 |
| 941130 | 0755        | 1.52          | 0.083       | 12.0         | 48                | 59                | 0.56     | 2.27     | 6.55     | 24                    | 0.98 |
| 941130 | 1054        | 1.61          | 0.083       | 12.0         | 48                | 60                | 0.57     | 1.94     | 6.11     | 32                    | 0.82 |
| 941130 | 1354        | 1.54          | 0.083       | 12.0         | 50                | 63                | 0.56     | 1.99     | 6.33     | 30                    | 0.74 |
| 941130 | 1658        | 1.52          | 0.083       | 12.0         | 50                | 68                | 0.67     | 2.08     | 4.59     | 38                    | 0.67 |
| 941130 | 1954        | 1.34          | 0.083       | 12.0         | 50                | 70                | 0.67     | 1.78     | 4.41     | 39                    | 0.55 |
| 941130 | 2253        | 1.34          | 0.083       | 12.0         | 52                | 69                | 0.64     | 1.99     | 4.75     | 34                    | 0.54 |
| 941201 | 0155        | 1.28          | 0.083       | 12.0         | 52                | 71                | 0.68     | 1.92     | 4.18     | 38                    | 0.46 |
| 941201 | 0454        | 1.25          | 0.083       | 12.0         | 50                | 67                | 0.64     | 1.99     | 4.92     | 35                    | 0.64 |
| 941201 | 0755        | 1.31          | 0.093       | 10.7         | 54                | 72                | 0.68     | 1.69     | 4.30     | 37                    | 0.49 |
| 941201 | 1055        | 1.41          | 0.093       | 10.7         | 56                | 73                | 0.65     | 1.81     | 4.65     | 35                    | 0.31 |
| 941201 | 1355        | 1.60          | 0.152       | 6.6          | 56                | 66                | 0.58     | 1.32     | 5.11     | 36                    | 0.30 |
| 941201 | 1700        | 1.50          | 0.152       | 6.6          | 54                | 67                | 0.60     | 1.57     | 5.16     | 36                    | 0.48 |
| 941201 | 1955        | 1.68          | 0.093       | 10.7         | 50                | 62                | 0.58     | 1.54     | 5.40     | 33                    | 0.44 |
| 941201 | 2255        | 1.86          | 0.083       | 12.0         | 46                | 56                | 0.55     | 1.67     | 6.03     | 31                    | 0.74 |
| 941202 | 0155        | 2.06          | 0.083       | 12.0         | 48                | 58                | 0.54     | 1.86     | 6.70     | 30                    | 0.43 |
| 941202 | 0455        | 1.99          | 0.093       | 10.7         | 48                | 59                | 0.56     | 1.92     | 6.31     | 29                    | 0.39 |
| 941202 | 0754        | 2.04          | 0.093       | 10.7         | 54                | 60                | 0.54     | 1.88     | 6.93     | 27                    | 0.08 |
| 941202 | 1057        | 2.00          | 0.083       | 12.0         | 52                | 61                | 0.52     | 1.77     | 7.57     | 26                    | 0.02 |
| 941202 | 1359        | 1.83          | 0.093       | 10.7         | 58                | 61                | 0.53     | 1.38     | 6.17     | 29                    | 0.08 |
| 941202 | 1657        | 1.71          | 0.093       | 10.7         | 56                | 62                | 0.58     | 1.52     | 5.28     | 34                    | 0.15 |
| 941202 | 1955        | 1.56          | 0.093       | 10.7         | 54                | 62                | 0.61     | 1.82     | 5.15     | 33                    | 0.36 |
| 941203 | 0154        | 1.83          | 0.074       | 13.6         | 50                | 59                | 0.56     | 1.96     | 6.07     | 27                    | 0.50 |
| 941203 | 0454        | 2.31          | 0.074       | 13.6         | 48                | 54                | 0.49     | 2.28     | 7.82     | 21                    | 0.37 |
| 941203 | 0755        | 2.49          | 0.074       | 13.6         | 46                | 54                | 0.48     | 2.35     | 8.47     | 19                    | 0.59 |
| 941203 | 1054        | 2.32          | 0.064       | 15.6         | 48                | 58                | 0.59     | 2.35     | 6.28     | 27                    | 0.61 |
| 941203 | 1354        | 2.27          | 0.074       | 13.6         | 48                | 56                | 0.57     | 2.66     | 6.83     | 24                    | 0.53 |
| 941203 | 1655        | 2.20          | 0.074       | 13.6         | 48                | 57                | 0.56     | 2.66     | 6.78     | 22                    | 0.48 |
| 941203 | 1954        | 2.17          | 0.074       | 13.6         | 50                | 58                | 0.61     | 3.14     | 6.11     | 22                    | 0.61 |
| 941203 | 2255        | 2.06          | 0.074       | 13.6         | 50                | 60                | 0.61     | 2.42     | 5.72     | 27                    | 0.77 |
| 941204 | 0154        | 2.04          | 0.074       | 13.6         | 46                | 58                | 0.57     | 2.39     | 6.27     | 27                    | 0.95 |
| 941204 | 0455        | 2.02          | 0.083       | 12.0         | 50                | 59                | 0.62     | 1.84     | 5.05     | 33                    | 0.48 |
| 941204 | 0755        | 1.76          | 0.074       | 13.6         | 50                | 63                | 0.68     | 2.13     | 4.57     | 36                    | 0.78 |
| 941204 | 1055        | 1.88          | 0.074       | 13.6         | 48                | 60                | 0.60     | 2.26     | 5.51     | 29                    | 0.81 |
| 941204 | 1355        | 2.20          | 0.093       | 10.7         | 48                | 58                | 0.51     | 1.56     | 6.51     | 28                    | 0.37 |
| 941204 | 1654        | 2.38          | 0.093       | 10.7         | 44                | 54                | 0.53     | 2.18     | 6.81     | 27                    | 0.60 |
| 941204 | 1955        | 2.23          | 0.083       | 12.0         | 50                | 56                | 0.53     | 1.47     | 5.90     | 29                    | 0.31 |
| 941204 | 2255        | 2.41          | 0.083       | 12.0         | 48                | 59                | 0.52     | 2.01     | 6.75     | 28                    | 0.65 |
| 941205 | 0152        | 2.38          | 0.093       | 10.7         | 44                | 55                | 0.52     | 2.10     | 6.81     | 27                    | 0.73 |

(Sheet 41 of 45)

Table A1 (Continued)

| Date   | Time<br>GMT | $H_{mo}$<br>m | $f_p$<br>Hz | $T_p$<br>sec | $\theta_p$<br>deg | $\theta_o$<br>deg | $\sigma$ | $\gamma$ | $\delta$ | $\Delta\theta$<br>deg | A     |
|--------|-------------|---------------|-------------|--------------|-------------------|-------------------|----------|----------|----------|-----------------------|-------|
| 941205 | 0455        | 2.41          | 0.093       | 10.7         | 44                | 56                | 0.53     | 1.81     | 6.04     | 30                    | 0.88  |
| 941205 | 0754        | 2.23          | 0.083       | 12.0         | 50                | 58                | 0.56     | 1.61     | 5.46     | 30                    | 0.53  |
| 941205 | 1052        | 1.94          | 0.093       | 10.7         | 42                | 58                | 0.63     | 1.49     | 4.40     | 41                    | 0.98  |
| 941205 | 1355        | 1.93          | 0.093       | 10.7         | 42                | 60                | 0.62     | 1.49     | 4.62     | 40                    | 0.40  |
| 941205 | 1655        | 2.15          | 0.093       | 10.7         | 42                | 61                | 0.55     | 1.29     | 4.97     | 38                    | 0.35  |
| 941205 | 1951        | 2.05          | 0.093       | 10.7         | 48                | 59                | 0.58     | 1.12     | 4.47     | 40                    | 0.42  |
| 941205 | 2254        | 1.75          | 0.093       | 10.7         | 46                | 60                | 0.63     | 1.00     | 3.69     | 47                    | 0.49  |
| 941206 | 0154        | 1.80          | 0.152       | 6.6          | 46                | 61                | 0.61     | 1.12     | 4.14     | 42                    | 0.40  |
| 941206 | 0455        | 1.76          | 0.074       | 13.6         | 56                | 60                | 0.59     | 1.20     | 4.48     | 39                    | 0.24  |
| 941206 | 0754        | 1.52          | 0.074       | 13.6         | 42                | 63                | 0.65     | 1.06     | 3.73     | 48                    | 0.23  |
| 941206 | 1054        | 1.31          | 0.074       | 13.6         | 30                | 66                | 0.72     | 0.93     | 3.22     | 56                    | 0.09  |
| 941206 | 1654        | 1.11          | 0.074       | 13.6         | 54                | 76                | 0.72     | 1.01     | 3.13     | 51                    | 0.29  |
| 941206 | 1954        | 0.97          | 0.074       | 13.6         | 56                | 82                | 0.73     | 0.73     | 2.86     | 57                    | 0.16  |
| 941206 | 2254        | 0.93          | 0.074       | 13.6         | 88                | 80                | 0.71     | 0.90     | 3.19     | 49                    | -0.07 |
| 941207 | 0154        | 1.58          | 0.162       | 6.2          | 60                | 63                | 0.59     | 1.04     | 4.64     | 39                    | 0.11  |
| 941207 | 0455        | 2.07          | 0.142       | 7.0          | 52                | 51                | 0.50     | 0.94     | 5.00     | 35                    | 0.02  |
| 941207 | 0754        | 2.17          | 0.132       | 7.6          | 50                | 53                | 0.45     | 1.04     | 6.41     | 28                    | 0.18  |
| 941207 | 1054        | 2.32          | 0.123       | 8.2          | 52                | 57                | 0.42     | 0.61     | 7.51     | 25                    | 0.13  |
| 941207 | 1353        | 2.61          | 0.064       | 15.6         | 54                | 57                | 0.43     | 0.87     | 8.44     | 21                    | 0.24  |
| 941207 | 1653        | 3.08          | 0.064       | 15.6         | 52                | 55                | 0.39     | 0.84     | 7.80     | 20                    | 0.17  |
| 941207 | 1954        | 3.35          | 0.064       | 15.6         | 54                | 56                | 0.38     | 0.65     | 8.70     | 20                    | 0.10  |
| 941207 | 2254        | 3.37          | 0.064       | 15.6         | 58                | 57                | 0.37     | 0.76     | 9.84     | 19                    | 0.02  |
| 941208 | 0153        | 3.08          | 0.064       | 15.6         | 50                | 58                | 0.41     | 1.00     | 8.31     | 20                    | 0.42  |
| 941208 | 0454        | 3.05          | 0.074       | 13.6         | 52                | 58                | 0.40     | 1.00     | 8.10     | 19                    | 0.56  |
| 941208 | 0753        | 3.00          | 0.064       | 15.6         | 52                | 57                | 0.37     | 0.88     | 9.10     | 19                    | 0.45  |
| 941208 | 1354        | 2.70          | 0.074       | 13.6         | 50                | 60                | 0.42     | 0.88     | 7.90     | 24                    | 0.59  |
| 941208 | 1653        | 2.68          | 0.074       | 13.6         | 52                | 63                | 0.44     | 0.63     | 7.07     | 27                    | 0.45  |
| 941208 | 1953        | 2.69          | 0.074       | 13.6         | 52                | 64                | 0.41     | 0.55     | 7.22     | 27                    | 0.37  |
| 941208 | 2253        | 2.69          | 0.074       | 13.6         | 56                | 60                | 0.38     | 0.47     | 8.32     | 22                    | 0.14  |
| 941209 | 0153        | 2.37          | 0.083       | 12.0         | 52                | 60                | 0.44     | 0.78     | 7.07     | 26                    | 0.46  |
| 941209 | 0454        | 2.35          | 0.083       | 12.0         | 48                | 60                | 0.44     | 0.62     | 6.49     | 29                    | 0.53  |
| 941209 | 0754        | 2.29          | 0.083       | 12.0         | 48                | 57                | 0.44     | 0.53     | 7.18     | 27                    | 0.44  |
| 941209 | 1052        | 2.19          | 0.093       | 10.7         | 48                | 56                | 0.44     | 0.49     | 6.96     | 28                    | 0.36  |
| 941209 | 1353        | 2.00          | 0.083       | 12.0         | 50                | 58                | 0.47     | 0.66     | 6.30     | 29                    | 0.49  |
| 941209 | 1653        | 1.88          | 0.083       | 12.0         | 48                | 57                | 0.49     | 0.78     | 6.31     | 29                    | 0.44  |
| 941209 | 1951        | 1.86          | 0.083       | 12.0         | 52                | 59                | 0.45     | 0.62     | 6.64     | 28                    | 0.43  |
| 941209 | 2253        | 1.61          | 0.083       | 12.0         | 50                | 59                | 0.47     | 0.74     | 6.85     | 30                    | 0.45  |
| 941210 | 0153        | 1.50          | 0.093       | 10.7         | 50                | 58                | 0.47     | 0.89     | 7.27     | 26                    | 0.40  |
| 941210 | 0454        | 1.43          | 0.103       | 9.7          | 44                | 53                | 0.52     | 1.18     | 6.28     | 30                    | 0.49  |
| 941210 | 0750        | 1.39          | 0.093       | 10.7         | 48                | 56                | 0.51     | 1.04     | 6.34     | 29                    | 0.31  |
| 941210 | 1053        | 1.29          | 0.083       | 12.0         | 46                | 56                | 0.49     | 1.20     | 6.54     | 28                    | 0.61  |
| 941210 | 1350        | 1.27          | 0.093       | 10.7         | 48                | 56                | 0.51     | 1.81     | 6.47     | 26                    | 0.77  |
| 941210 | 1650        | 1.12          | 0.083       | 12.0         | 48                | 59                | 0.56     | 1.61     | 5.68     | 30                    | 0.71  |
| 941210 | 1954        | 1.08          | 0.093       | 10.7         | 46                | 56                | 0.56     | 1.63     | 5.83     | 30                    | 0.69  |
| 941210 | 2253        | 0.90          | 0.093       | 10.7         | 44                | 55                | 0.61     | 1.38     | 4.74     | 38                    | 0.49  |
| 941211 | 0450        | 0.76          | 0.103       | 9.7          | 48                | 61                | 0.69     | 1.30     | 3.92     | 40                    | 0.55  |
| 941211 | 0754        | 0.83          | 0.103       | 9.7          | 56                | 62                | 0.63     | 1.34     | 4.66     | 34                    | 0.31  |
| 941211 | 1053        | 1.02          | 0.113       | 8.9          | 54                | 60                | 0.54     | 1.29     | 5.60     | 29                    | 0.29  |
| 941211 | 1353        | 1.30          | 0.074       | 13.6         | 50                | 60                | 0.51     | 1.38     | 5.84     | 27                    | 0.46  |
| 941211 | 1653        | 2.11          | 0.083       | 12.0         | 50                | 56                | 0.40     | 1.08     | 8.45     | 21                    | 0.39  |
| 941211 | 1953        | 2.56          | 0.083       | 12.0         | 52                | 55                | 0.44     | 1.17     | 7.32     | 23                    | 0.20  |
| 941211 | 2253        | 2.62          | 0.083       | 12.0         | 48                | 56                | 0.42     | 0.86     | 6.64     | 24                    | 0.57  |
| 941212 | 0154        | 2.21          | 0.083       | 12.0         | 50                | 55                | 0.47     | 1.14     | 6.85     | 25                    | 0.46  |

(Sheet 42 of 45)

| Table A1 (Continued) |             |               |             |              |                   |                   |          |          |          |                       |       |
|----------------------|-------------|---------------|-------------|--------------|-------------------|-------------------|----------|----------|----------|-----------------------|-------|
| Date                 | Time<br>GMT | $H_{mo}$<br>m | $f_p$<br>Hz | $T_p$<br>sec | $\theta_p$<br>deg | $\theta_o$<br>deg | $\sigma$ | $\gamma$ | $\delta$ | $\Delta\theta$<br>deg | A     |
| 941212               | 0454        | 1.78          | 0.083       | 12.0         | 50                | 58                | 0.53     | 1.27     | 6.00     | 29                    | 0.49  |
| 941212               | 0752        | 1.72          | 0.083       | 12.0         | 54                | 64                | 0.52     | 1.35     | 6.16     | 27                    | 0.26  |
| 941212               | 1055        | 1.67          | 0.093       | 10.7         | 56                | 63                | 0.50     | 1.45     | 6.68     | 27                    | 0.33  |
| 941212               | 1431        | 1.72          | 0.093       | 10.7         | 54                | 63                | 0.51     | 1.34     | 6.13     | 29                    | 0.47  |
| 941212               | 1655        | 1.78          | 0.093       | 10.7         | 56                | 64                | 0.50     | 1.14     | 6.07     | 28                    | 0.21  |
| 941212               | 1957        | 2.02          | 0.093       | 10.7         | 50                | 62                | 0.53     | 1.05     | 5.57     | 31                    | 0.47  |
| 941212               | 2256        | 2.28          | 0.093       | 10.7         | 58                | 63                | 0.47     | 1.03     | 6.78     | 26                    | 0.23  |
| 941213               | 0156        | 2.56          | 0.093       | 10.7         | 64                | 63                | 0.44     | 1.05     | 7.54     | 23                    | -0.03 |
| 941213               | 0456        | 2.64          | 0.083       | 12.0         | 56                | 62                | 0.47     | 1.74     | 7.61     | 22                    | 0.37  |
| 941213               | 1056        | 2.91          | 0.083       | 12.0         | 58                | 65                | 0.45     | 1.05     | 7.25     | 24                    | 0.16  |
| 941213               | 1355        | 2.97          | 0.083       | 12.0         | 56                | 64                | 0.45     | 1.30     | 7.74     | 23                    | 0.30  |
| 941213               | 1656        | 3.01          | 0.074       | 13.6         | 64                | 65                | 0.46     | 1.23     | 6.82     | 25                    | 0.12  |
| 941213               | 1956        | 3.18          | 0.074       | 13.6         | 58                | 68                | 0.50     | 1.06     | 5.71     | 29                    | 0.40  |
| 941213               | 2256        | 3.63          | 0.074       | 13.6         | 60                | 66                | 0.44     | 0.87     | 7.08     | 23                    | 0.08  |
| 941214               | 0156        | 3.65          | 0.074       | 13.6         | 58                | 66                | 0.44     | 0.76     | 6.87     | 26                    | 0.06  |
| 941214               | 0456        | 3.04          | 0.074       | 13.6         | 76                | 66                | 0.48     | 0.79     | 6.06     | 29                    | 0.00  |
| 941214               | 0756        | 2.99          | 0.064       | 15.6         | 74                | 69                | 0.48     | 0.51     | 5.97     | 29                    | -0.19 |
| 941214               | 1056        | 3.08          | 0.074       | 13.6         | 62                | 68                | 0.46     | 0.57     | 6.00     | 28                    | 0.22  |
| 941214               | 1739        | 2.63          | 0.074       | 13.6         | 78                | 76                | 0.49     | 0.53     | 6.17     | 25                    | -0.17 |
| 941214               | 1953        | 2.60          | 0.074       | 13.6         | 76                | 78                | 0.50     | 0.74     | 6.30     | 25                    | 0.11  |
| 941214               | 2253        | 2.46          | 0.074       | 13.6         | 72                | 76                | 0.46     | 0.86     | 7.38     | 22                    | 0.17  |
| 941215               | 0153        | 2.29          | 0.074       | 13.6         | 72                | 75                | 0.47     | 0.64     | 7.30     | 22                    | 0.03  |
| 941215               | 0451        | 2.05          | 0.074       | 13.6         | 72                | 76                | 0.53     | 0.81     | 6.19     | 25                    | 0.13  |
| 941215               | 0751        | 2.17          | 0.054       | 18.5         | 68                | 73                | 0.46     | 0.80     | 7.43     | 21                    | 0.34  |
| 941215               | 1108        | 2.36          | 0.054       | 18.5         | 70                | 70                | 0.47     | 0.72     | 6.69     | 21                    | 0.06  |
| 941215               | 1422        | 2.52          | 0.054       | 18.5         | 70                | 67                | 0.50     | 0.28     | 5.55     | 26                    | -0.26 |
| 941215               | 1655        | 2.53          | 0.054       | 18.5         | 70                | 70                | 0.48     | 0.07     | 5.70     | 22                    | 0.08  |
| 941215               | 1955        | 2.49          | 0.054       | 18.5         | 70                | 69                | 0.49     | 0.11     | 5.07     | 27                    | -0.11 |
| 941215               | 2255        | 2.58          | 0.064       | 15.6         | 66                | 69                | 0.48     | 0.14     | 5.15     | 26                    | 0.24  |
| 941216               | 0155        | 2.59          | 0.064       | 15.6         | 70                | 69                | 0.46     | 0.12     | 5.97     | 23                    | -0.13 |
| 941216               | 0455        | 2.36          | 0.064       | 15.6         | 66                | 66                | 0.48     | 0.52     | 5.60     | 29                    | -0.06 |
| 941216               | 0755        | 2.50          | 0.064       | 15.6         | 64                | 67                | 0.47     | 0.40     | 6.19     | 24                    | 0.23  |
| 941216               | 1113        | 2.55          | 0.064       | 15.6         | 68                | 69                | 0.46     | 0.37     | 5.79     | 27                    | 0.06  |
| 941216               | 1403        | 2.78          | 0.064       | 15.6         | 66                | 68                | 0.44     | 0.13     | 6.10     | 22                    | 0.16  |
| 941216               | 1700        | 2.57          | 0.064       | 15.6         | 66                | 67                | 0.45     | 0.13     | 5.79     | 24                    | 0.05  |
| 941216               | 1955        | 2.25          | 0.064       | 15.6         | 70                | 67                | 0.49     | 0.35     | 5.53     | 26                    | -0.10 |
| 941217               | 0215        | 2.97          | 0.054       | 18.5         | 68                | 68                | 0.44     | 0.30     | 7.23     | 20                    | 0.02  |
| 941217               | 0455        | 3.00          | 0.054       | 18.5         | 66                | 66                | 0.37     | 0.37     | 9.60     | 14                    | -0.03 |
| 941217               | 0753        | 2.94          | 0.064       | 15.6         | 66                | 65                | 0.40     | 0.72     | 9.91     | 14                    | -0.02 |
| 941217               | 1052        | 3.20          | 0.064       | 15.6         | 64                | 65                | 0.41     | 0.92     | 9.06     | 18                    | 0.07  |
| 941217               | 1415        | 3.07          | 0.064       | 15.6         | 66                | 66                | 0.40     | 0.39     | 8.30     | 18                    | -0.01 |
| 941217               | 1655        | 2.94          | 0.064       | 15.6         | 68                | 64                | 0.42     | 0.46     | 7.41     | 21                    | -0.30 |
| 941217               | 1955        | 2.78          | 0.064       | 15.6         | 66                | 64                | 0.41     | 0.59     | 7.88     | 20                    | -0.20 |
| 941217               | 2255        | 2.61          | 0.064       | 15.6         | 68                | 67                | 0.45     | 0.42     | 6.26     | 24                    | -0.09 |
| 941218               | 0155        | 2.46          | 0.074       | 13.6         | 66                | 68                | 0.48     | 0.53     | 5.72     | 26                    | 0.09  |
| 941218               | 0455        | 2.51          | 0.074       | 13.6         | 64                | 68                | 0.44     | 0.61     | 7.15     | 23                    | 0.24  |
| 941218               | 0755        | 2.22          | 0.074       | 13.6         | 66                | 66                | 0.44     | 0.73     | 7.44     | 22                    | -0.01 |
| 941218               | 1055        | 2.16          | 0.074       | 13.6         | 68                | 71                | 0.48     | 0.74     | 6.38     | 27                    | 0.11  |
| 941218               | 1352        | 2.21          | 0.074       | 13.6         | 76                | 72                | 0.46     | 0.59     | 6.72     | 26                    | -0.09 |
| 941218               | 1655        | 1.94          | 0.074       | 13.6         | 64                | 69                | 0.52     | 0.49     | 5.03     | 34                    | 0.19  |
| 941218               | 1955        | 2.10          | 0.074       | 13.6         | 74                | 69                | 0.51     | 0.37     | 4.70     | 35                    | -0.14 |
| 941218               | 2255        | 2.59          | 0.074       | 13.6         | 70                | 69                | 0.45     | 0.61     | 6.70     | 23                    | -0.02 |
| 941219               | 0155        | 4.29          | 0.064       | 15.6         | 72                | 71                | 0.37     | 0.04     | 8.27     | 16                    | -0.10 |

(Sheet 43 of 45)

Table A1 (Continued)

| Date   | Time<br>GMT | $H_{mo}$<br>m | $f_p$<br>Hz | $T_p$<br>sec | $\theta_p$<br>deg | $\theta_o$<br>deg | $\sigma$ | $\gamma$ | $\delta$ | $\Delta\theta$<br>deg | A     |
|--------|-------------|---------------|-------------|--------------|-------------------|-------------------|----------|----------|----------|-----------------------|-------|
| 941219 | 0455        | 4.57          | 0.064       | 15.6         | 78                | 73                | 0.41     | 0.06     | 7.35     | 23                    | -0.31 |
| 941219 | 1652        | 4.33          | 0.064       | 15.6         | 78                | 75                | 0.39     | -0.06    | 8.35     | 17                    | -0.20 |
| 941219 | 1957        | 3.78          | 0.064       | 15.6         | 76                | 74                | 0.42     | 0.07     | 7.20     | 20                    | -0.10 |
| 941219 | 2258        | 3.48          | 0.064       | 15.6         | 78                | 75                | 0.40     | 0.07     | 7.80     | 20                    | -0.29 |
| 941220 | 0158        | 3.27          | 0.064       | 15.6         | 74                | 73                | 0.42     | 0.46     | 7.26     | 21                    | -0.10 |
| 941220 | 0458        | 3.11          | 0.064       | 15.6         | 72                | 73                | 0.41     | 0.43     | 7.81     | 22                    | 0.06  |
| 941220 | 0758        | 2.98          | 0.064       | 15.6         | 72                | 72                | 0.44     | 0.74     | 7.11     | 23                    | 0.02  |
| 941220 | 1058        | 3.01          | 0.074       | 13.6         | 58                | 69                | 0.46     | 0.90     | 7.03     | 27                    | 0.16  |
| 941220 | 1355        | 3.17          | 0.074       | 13.6         | 72                | 69                | 0.42     | 0.74     | 7.65     | 23                    | -0.21 |
| 941220 | 1656        | 3.25          | 0.064       | 15.6         | 72                | 71                | 0.40     | 0.59     | 8.07     | 21                    | -0.12 |
| 941220 | 1955        | 3.36          | 0.064       | 15.6         | 76                | 73                | 0.41     | 0.44     | 7.15     | 24                    | -0.21 |
| 941220 | 2255        | 3.13          | 0.074       | 13.6         | 76                | 74                | 0.44     | 0.48     | 6.76     | 25                    | -0.17 |
| 941221 | 0157        | 3.46          | 0.074       | 13.6         | 76                | 75                | 0.41     | 0.53     | 7.74     | 22                    | -0.09 |
| 941221 | 0451        | 3.86          | 0.064       | 15.6         | 74                | 76                | 0.39     | 0.43     | 7.98     | 19                    | 0.23  |
| 941221 | 0818        | 3.92          | 0.064       | 15.6         | 74                | 77                | 0.40     | 0.40     | 8.12     | 19                    | 0.38  |
| 941222 | 0157        | 4.00          | 0.064       | 15.6         | 76                | 79                | 0.41     | 0.39     | 7.50     | 21                    | 0.25  |
| 941222 | 0458        | 3.74          | 0.064       | 15.6         | 78                | 80                | 0.44     | 0.06     | 6.05     | 28                    | 0.03  |
| 941222 | 0757        | 3.66          | 0.064       | 15.6         | 74                | 78                | 0.46     | 0.06     | 5.90     | 26                    | 0.17  |
| 941222 | 1058        | 3.67          | 0.064       | 15.6         | 70                | 76                | 0.44     | 0.36     | 6.37     | 25                    | 0.40  |
| 941222 | 1357        | 3.71          | 0.064       | 15.6         | 70                | 76                | 0.40     | 0.55     | 7.21     | 22                    | 0.55  |
| 941222 | 1750        | 3.57          | 0.064       | 15.6         | 74                | 75                | 0.41     | 0.34     | 7.28     | 20                    | 0.10  |
| 941222 | 1958        | 3.44          | 0.064       | 15.6         | 70                | 73                | 0.43     | 0.57     | 7.00     | 20                    | 0.26  |
| 941222 | 2258        | 3.90          | 0.064       | 15.6         | 70                | 73                | 0.41     | 0.59     | 7.57     | 19                    | 0.18  |
| 941223 | 0157        | 3.87          | 0.064       | 15.6         | 68                | 75                | 0.44     | 0.44     | 6.33     | 27                    | 0.30  |
| 941223 | 0457        | 3.63          | 0.064       | 15.6         | 66                | 72                | 0.44     | 0.49     | 6.08     | 27                    | 0.47  |
| 941223 | 0758        | 3.47          | 0.064       | 15.6         | 66                | 71                | 0.45     | 0.53     | 6.21     | 25                    | 0.31  |
| 941223 | 1051        | 3.62          | 0.064       | 15.6         | 64                | 69                | 0.43     | 0.84     | 7.61     | 21                    | 0.38  |
| 941223 | 1351        | 3.85          | 0.064       | 15.6         | 64                | 69                | 0.41     | 0.86     | 7.91     | 21                    | 0.25  |
| 941223 | 1657        | 3.72          | 0.064       | 15.6         | 66                | 69                | 0.41     | 1.01     | 8.53     | 17                    | 0.21  |
| 941223 | 1951        | 3.44          | 0.064       | 15.6         | 68                | 72                | 0.42     | 0.91     | 8.05     | 22                    | 0.25  |
| 941223 | 2258        | 3.19          | 0.064       | 15.6         | 72                | 74                | 0.45     | 1.30     | 8.29     | 19                    | 0.05  |
| 941224 | 0157        | 2.82          | 0.064       | 15.6         | 70                | 76                | 0.48     | 1.19     | 6.97     | 25                    | 0.40  |
| 941224 | 0457        | 2.71          | 0.074       | 13.6         | 82                | 80                | 0.50     | 0.70     | 6.29     | 26                    | -0.05 |
| 941224 | 0757        | 2.49          | 0.074       | 13.6         | 72                | 80                | 0.50     | 0.94     | 6.03     | 29                    | 0.17  |
| 941224 | 1051        | 2.52          | 0.074       | 13.6         | 76                | 81                | 0.45     | 1.47     | 7.91     | 20                    | 0.23  |
| 941224 | 1351        | 2.62          | 0.074       | 13.6         | 68                | 79                | 0.48     | 1.23     | 6.63     | 26                    | 0.63  |
| 941224 | 1658        | 2.41          | 0.074       | 13.6         | 68                | 80                | 0.51     | 0.93     | 5.74     | 31                    | 0.44  |
| 941224 | 1958        | 2.61          | 0.074       | 13.6         | 76                | 78                | 0.51     | 0.61     | 5.30     | 34                    | 0.15  |
| 941224 | 2251        | 3.10          | 0.074       | 13.6         | 80                | 72                | 0.51     | 0.20     | 4.19     | 37                    | -0.06 |
| 941225 | 0157        | 3.28          | 0.123       | 8.2          | 76                | 72                | 0.48     | 0.15     | 4.74     | 33                    | -0.09 |
| 941225 | 0457        | 3.42          | 0.093       | 10.7         | 80                | 74                | 0.48     | 0.12     | 4.13     | 36                    | -0.13 |
| 941225 | 0757        | 4.15          | 0.093       | 10.7         | 82                | 75                | 0.44     | -0.21    | 4.42     | 32                    | -0.29 |
| 941225 | 1040        | 4.39          | 0.083       | 12.0         | 82                | 75                | 0.42     | -0.29    | 5.51     | 26                    | -0.36 |
| 941225 | 1351        | 4.48          | 0.093       | 10.7         | 84                | 74                | 0.45     | -0.18    | 4.37     | 33                    | -0.35 |
| 941225 | 1658        | 4.53          | 0.083       | 12.0         | 68                | 70                | 0.47     | 0.05     | 4.33     | 34                    | -0.05 |
| 941225 | 1957        | 4.16          | 0.083       | 12.0         | 80                | 69                | 0.47     | -0.03    | 4.32     | 35                    | -0.18 |
| 941225 | 2258        | 4.18          | 0.093       | 10.7         | 72                | 68                | 0.43     | 0.14     | 5.16     | 29                    | -0.03 |
| 941226 | 0158        | 4.25          | 0.074       | 13.6         | 72                | 69                | 0.44     | 0.11     | 4.88     | 30                    | -0.07 |
| 941226 | 0457        | 4.00          | 0.083       | 12.0         | 78                | 70                | 0.43     | 0.12     | 5.37     | 31                    | -0.33 |
| 941226 | 0757        | 3.57          | 0.093       | 10.7         | 64                | 68                | 0.46     | 0.17     | 4.69     | 34                    | 0.01  |
| 941226 | 1057        | 3.15          | 0.103       | 9.7          | 62                | 66                | 0.48     | 0.22     | 4.50     | 36                    | 0.06  |
| 941226 | 1359        | 2.88          | 0.103       | 9.7          | 54                | 66                | 0.51     | 0.34     | 3.69     | 43                    | 0.44  |
| 941226 | 1658        | 2.58          | 0.083       | 12.0         | 58                | 68                | 0.52     | 0.27     | 3.78     | 43                    | 0.18  |

(Sheet 44 of 45)

Table A1 (Concluded)

| Date   | Time<br>GMT | $H_{ms}$<br>m | $f_p$<br>Hz | $T_p$<br>sec | $\theta_p$<br>deg | $\theta_o$<br>deg | $\sigma$ | $\gamma$ | $\delta$ | $\Delta\theta$<br>deg | A     |
|--------|-------------|---------------|-------------|--------------|-------------------|-------------------|----------|----------|----------|-----------------------|-------|
| 941226 | 1957        | 2.63          | 0.083       | 12.0         | 56                | 66                | 0.50     | 0.27     | 4.10     | 39                    | 0.26  |
| 941226 | 2257        | 2.56          | 0.083       | 12.0         | 60                | 64                | 0.48     | 0.37     | 4.86     | 33                    | 0.15  |
| 941227 | 0158        | 2.67          | 0.083       | 12.0         | 60                | 63                | 0.45     | 0.60     | 5.98     | 27                    | 0.22  |
| 941227 | 0458        | 2.71          | 0.074       | 13.6         | 64                | 66                | 0.46     | 0.54     | 6.08     | 28                    | 0.16  |
| 941227 | 0757        | 2.72          | 0.074       | 13.6         | 58                | 65                | 0.46     | 0.60     | 6.85     | 27                    | 0.20  |
| 941227 | 1058        | 2.98          | 0.074       | 13.6         | 70                | 67                | 0.41     | 0.35     | 7.40     | 23                    | -0.04 |
| 941227 | 1357        | 3.18          | 0.074       | 13.6         | 68                | 68                | 0.41     | 0.70     | 8.69     | 21                    | 0.03  |
| 941227 | 1657        | 3.63          | 0.074       | 13.6         | 74                | 72                | 0.39     | 0.12     | 8.29     | 21                    | -0.20 |
| 941227 | 1958        | 3.30          | 0.074       | 13.6         | 74                | 72                | 0.39     | 0.52     | 8.56     | 21                    | -0.16 |
| 941227 | 2257        | 3.28          | 0.074       | 13.6         | 78                | 75                | 0.40     | 0.24     | 7.63     | 22                    | -0.18 |
| 941228 | 0158        | 2.85          | 0.064       | 15.6         | 74                | 74                | 0.40     | 0.37     | 8.69     | 21                    | 0.03  |
| 941228 | 0458        | 3.02          | 0.074       | 13.6         | 74                | 74                | 0.40     | 0.53     | 8.73     | 21                    | -0.02 |
| 941228 | 0758        | 2.90          | 0.074       | 13.6         | 70                | 74                | 0.42     | 0.52     | 7.16     | 24                    | 0.13  |
| 941228 | 1047        | 2.74          | 0.074       | 13.6         | 74                | 73                | 0.40     | 0.51     | 7.83     | 22                    | -0.06 |
| 941228 | 1247        | 2.63          | 0.074       | 13.6         | 72                | 72                | 0.42     | 0.67     | 7.70     | 23                    | 0.01  |
| 941228 | 1455        | 2.58          | 0.083       | 12.0         | 76                | 71                | 0.45     | 0.34     | 5.86     | 28                    | -0.03 |
| 941228 | 1655        | 2.70          | 0.074       | 13.6         | 64                | 70                | 0.47     | 0.36     | 5.28     | 30                    | 0.08  |
| 941228 | 1848        | 2.75          | 0.083       | 12.0         | 66                | 70                | 0.48     | 0.40     | 5.30     | 30                    | 0.14  |
| 941228 | 2055        | 2.84          | 0.074       | 13.6         | 56                | 71                | 0.50     | 0.34     | 4.85     | 35                    | 0.17  |
| 941228 | 2255        | 2.94          | 0.083       | 12.0         | 76                | 69                | 0.48     | 0.11     | 4.73     | 34                    | -0.02 |
| 941229 | 0055        | 2.67          | 0.083       | 12.0         | 76                | 69                | 0.51     | 0.22     | 4.37     | 36                    | -0.01 |
| 941229 | 0255        | 2.65          | 0.083       | 12.0         | 76                | 71                | 0.47     | 0.38     | 5.31     | 32                    | 0.00  |
| 941229 | 0455        | 2.55          | 0.083       | 12.0         | 56                | 71                | 0.49     | 0.56     | 5.50     | 33                    | 0.17  |
| 941229 | 0655        | 2.56          | 0.093       | 10.7         | 56                | 70                | 0.48     | 0.55     | 5.56     | 32                    | 0.18  |
| 941229 | 0855        | 2.49          | 0.093       | 10.7         | 72                | 70                | 0.49     | 0.49     | 5.63     | 31                    | 0.03  |
| 941229 | 1055        | 2.39          | 0.083       | 12.0         | 60                | 69                | 0.48     | 0.66     | 6.03     | 31                    | 0.16  |
| 941229 | 1255        | 2.47          | 0.074       | 13.6         | 60                | 70                | 0.50     | 0.65     | 5.35     | 33                    | 0.18  |
| 941229 | 1510        | 2.46          | 0.093       | 10.7         | 56                | 70                | 0.54     | 0.61     | 4.62     | 39                    | 0.33  |
| 941229 | 1704        | 2.36          | 0.074       | 13.6         | 54                | 70                | 0.55     | 0.78     | 4.69     | 38                    | 0.46  |
| 941229 | 1855        | 2.34          | 0.083       | 12.0         | 54                | 70                | 0.54     | 0.68     | 4.27     | 40                    | 0.27  |
| 941229 | 2055        | 2.48          | 0.093       | 10.7         | 56                | 69                | 0.55     | 0.65     | 4.00     | 40                    | 0.41  |
| 941229 | 2255        | 2.44          | 0.093       | 10.7         | 52                | 66                | 0.53     | 0.95     | 5.07     | 36                    | 0.37  |
| 941230 | 0055        | 2.33          | 0.093       | 10.7         | 50                | 62                | 0.51     | 1.07     | 5.35     | 34                    | 0.46  |
| 941230 | 0255        | 2.16          | 0.093       | 10.7         | 56                | 65                | 0.57     | 1.12     | 4.62     | 38                    | 0.33  |
| 941230 | 0455        | 2.07          | 0.093       | 10.7         | 60                | 70                | 0.57     | 0.99     | 4.85     | 35                    | 0.14  |
| 941230 | 0655        | 2.01          | 0.103       | 9.7          | 72                | 75                | 0.59     | 0.69     | 4.18     | 40                    | 0.23  |
| 941230 | 0855        | 2.06          | 0.103       | 9.7          | 70                | 73                | 0.58     | 0.87     | 4.50     | 37                    | 0.29  |
| 941230 | 1056        | 2.07          | 0.054       | 18.5         | 70                | 72                | 0.57     | 1.10     | 4.82     | 33                    | 0.10  |
| 941230 | 1339        | 2.21          | 0.054       | 18.5         | 70                | 71                | 0.54     | 1.11     | 5.40     | 23                    | 0.02  |
| 941230 | 1440        | 2.30          | 0.054       | 18.5         | 70                | 70                | 0.52     | 1.18     | 5.87     | 21                    | -0.19 |
| 941230 | 1655        | 2.20          | 0.054       | 18.5         | 70                | 72                | 0.52     | 1.26     | 5.90     | 22                    | 0.06  |
| 941230 | 1855        | 2.26          | 0.054       | 18.5         | 68                | 73                | 0.49     | 1.46     | 6.61     | 18                    | 0.29  |
| 941230 | 2055        | 2.39          | 0.054       | 18.5         | 76                | 78                | 0.49     | 0.95     | 5.99     | 24                    | 0.08  |
| 941230 | 2255        | 2.44          | 0.054       | 18.5         | 80                | 83                | 0.51     | 0.59     | 5.18     | 29                    | 0.11  |
| 941231 | 0055        | 2.38          | 0.054       | 18.5         | 82                | 82                | 0.48     | 0.89     | 6.65     | 22                    | -0.12 |
| 941231 | 0255        | 2.35          | 0.064       | 15.6         | 78                | 85                | 0.47     | 0.61     | 6.24     | 25                    | 0.39  |
| 941231 | 0455        | 2.57          | 0.064       | 15.6         | 76                | 82                | 0.44     | 0.79     | 7.06     | 22                    | 0.36  |
| 941231 | 0655        | 2.47          | 0.064       | 15.6         | 74                | 81                | 0.46     | 1.30     | 7.53     | 17                    | 0.55  |
| 941231 | 1057        | 2.55          | 0.064       | 15.6         | 80                | 82                | 0.45     | 1.08     | 8.54     | 15                    | 0.03  |
| 941231 | 1358        | 2.48          | 0.064       | 15.6         | 76                | 84                | 0.44     | 1.02     | 7.28     | 22                    | 0.45  |
| 941231 | 1658        | 2.57          | 0.064       | 15.6         | 78                | 86                | 0.43     | 1.06     | 7.23     | 22                    | 0.43  |
| 941231 | 1955        | 2.87          | 0.064       | 15.6         | 82                | 86                | 0.41     | 0.71     | 7.19     | 20                    | 0.27  |
| 941231 | 2257        | 2.89          | 0.064       | 15.6         | 78                | 87                | 0.44     | 0.49     | 6.40     | 25                    | 0.30  |

(Sheet 45 of 45)

# **Appendix B**

## **Time Series Graphs of Bulk Parameters**

---

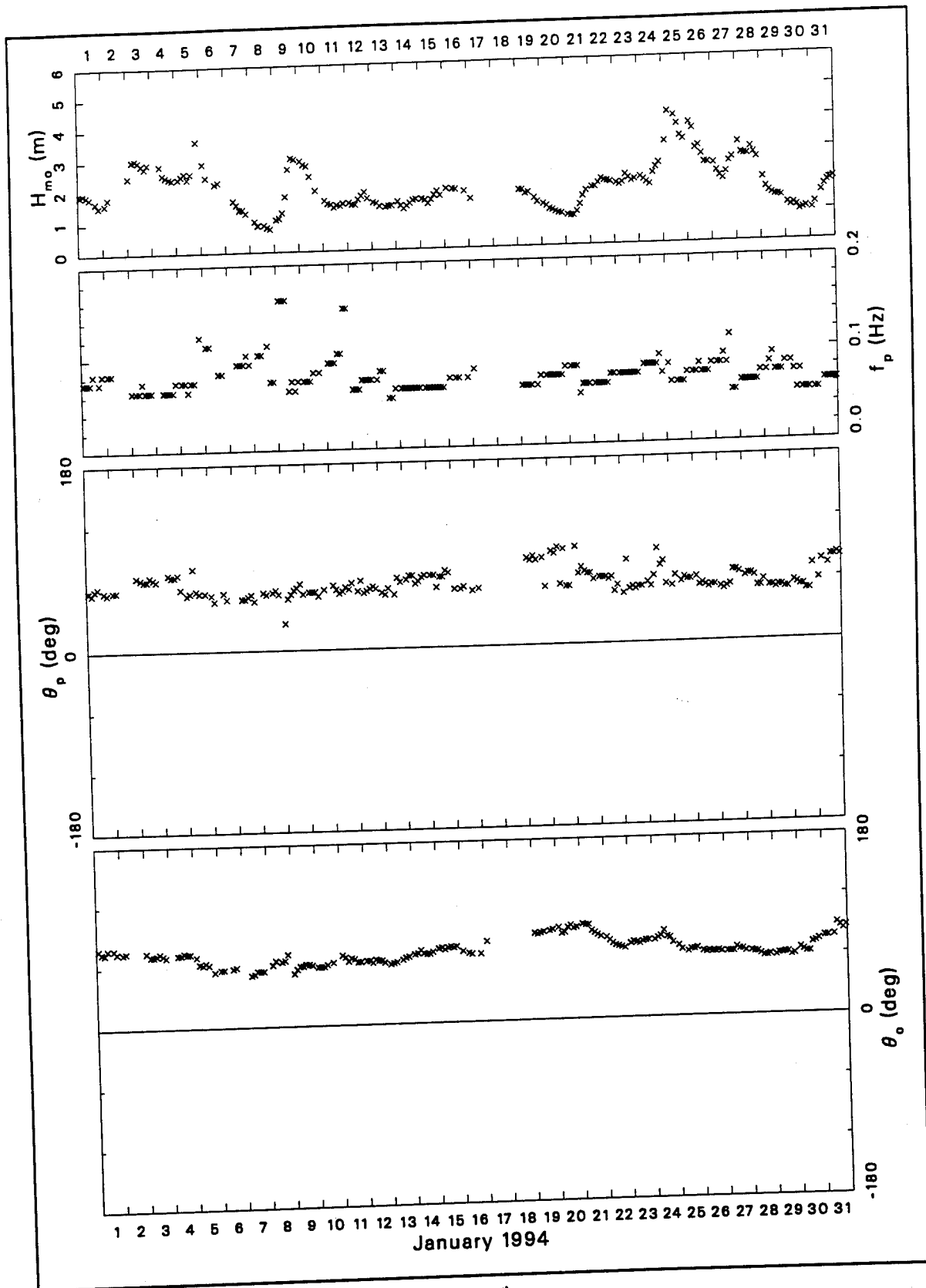


Figure B1. Bulk data for January 1994 (Continued)

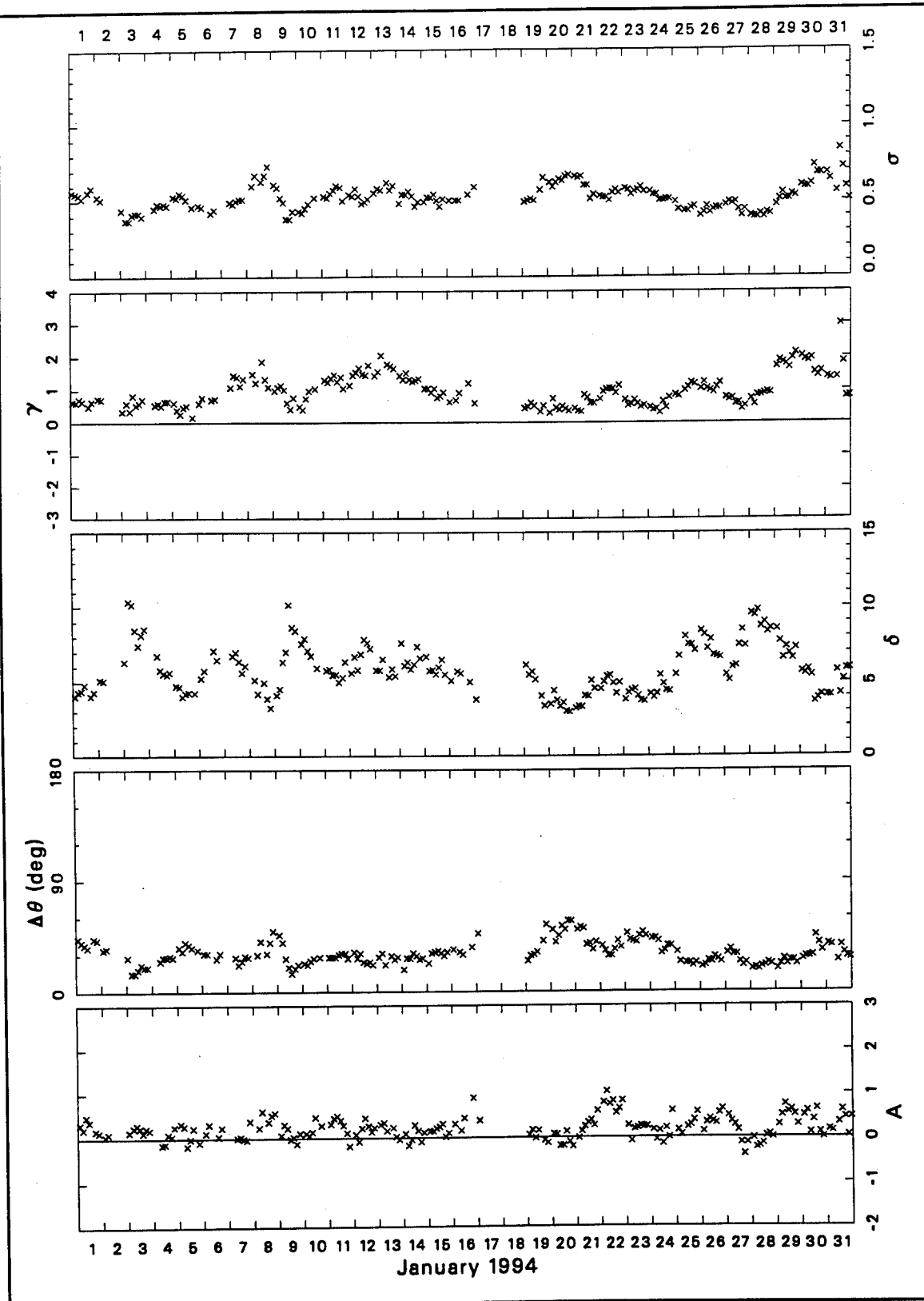


Figure B1. (Concluded)

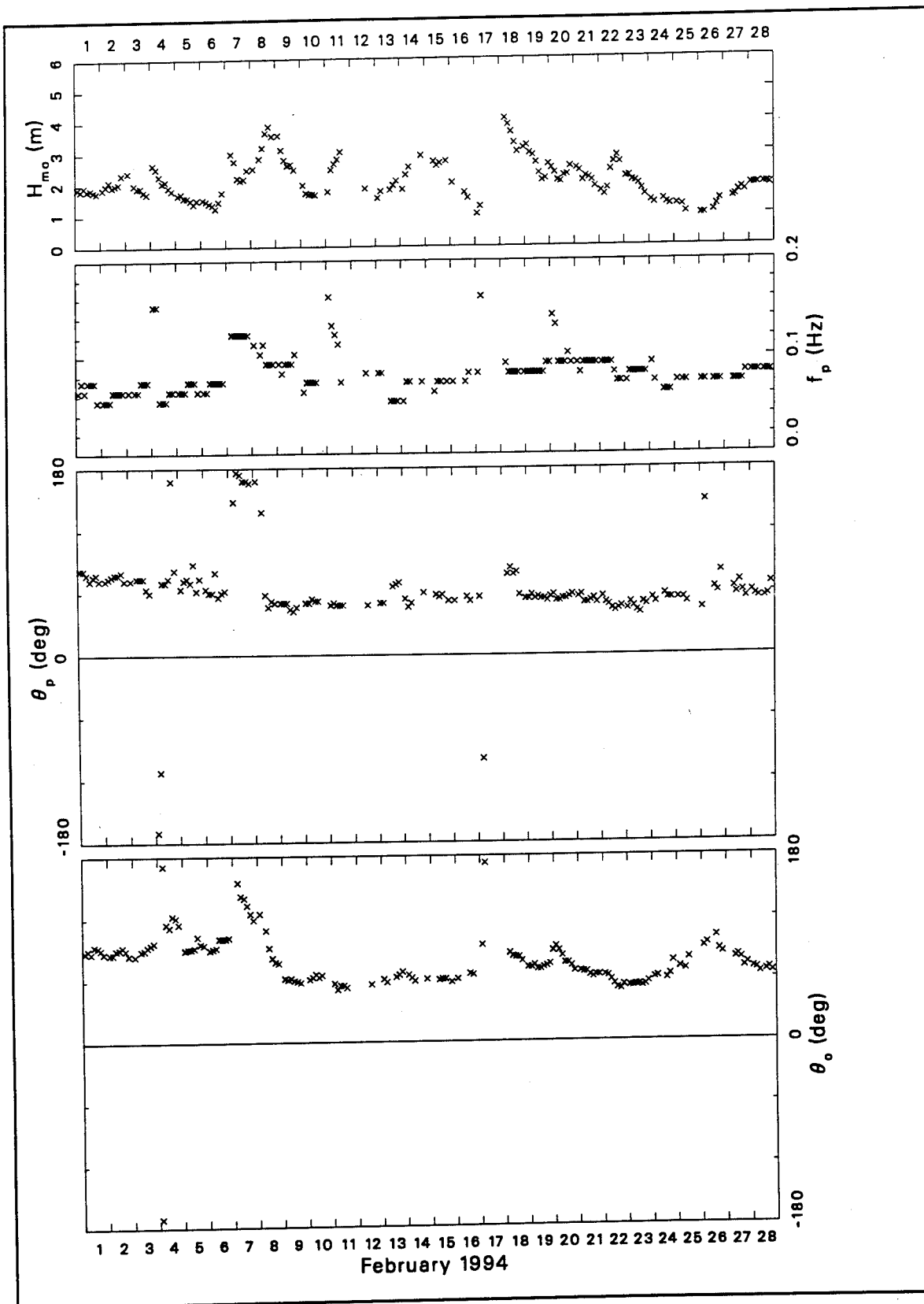


Figure B2. Bulk data for February 1994 (Continued)

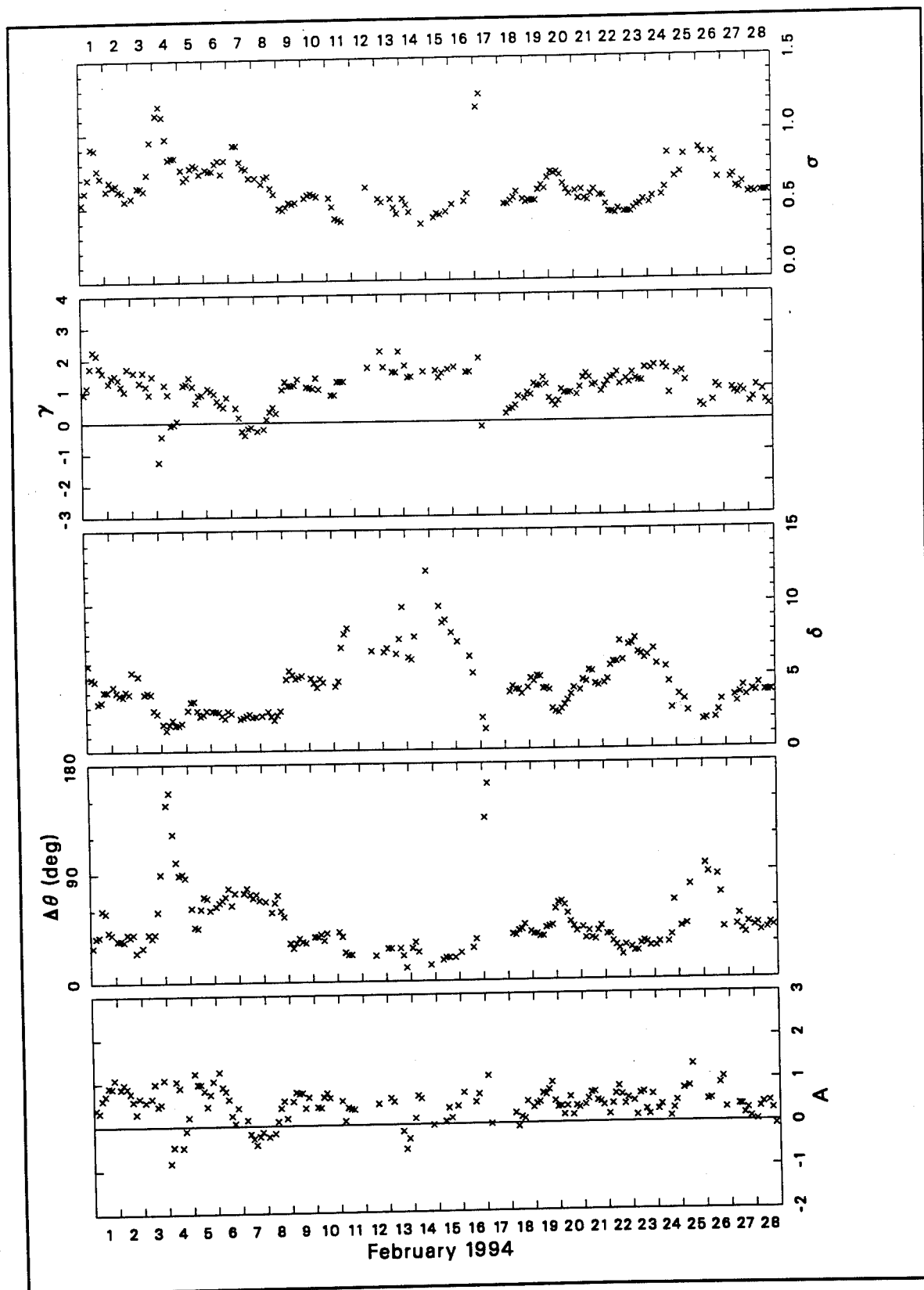


Figure B2. (Concluded)

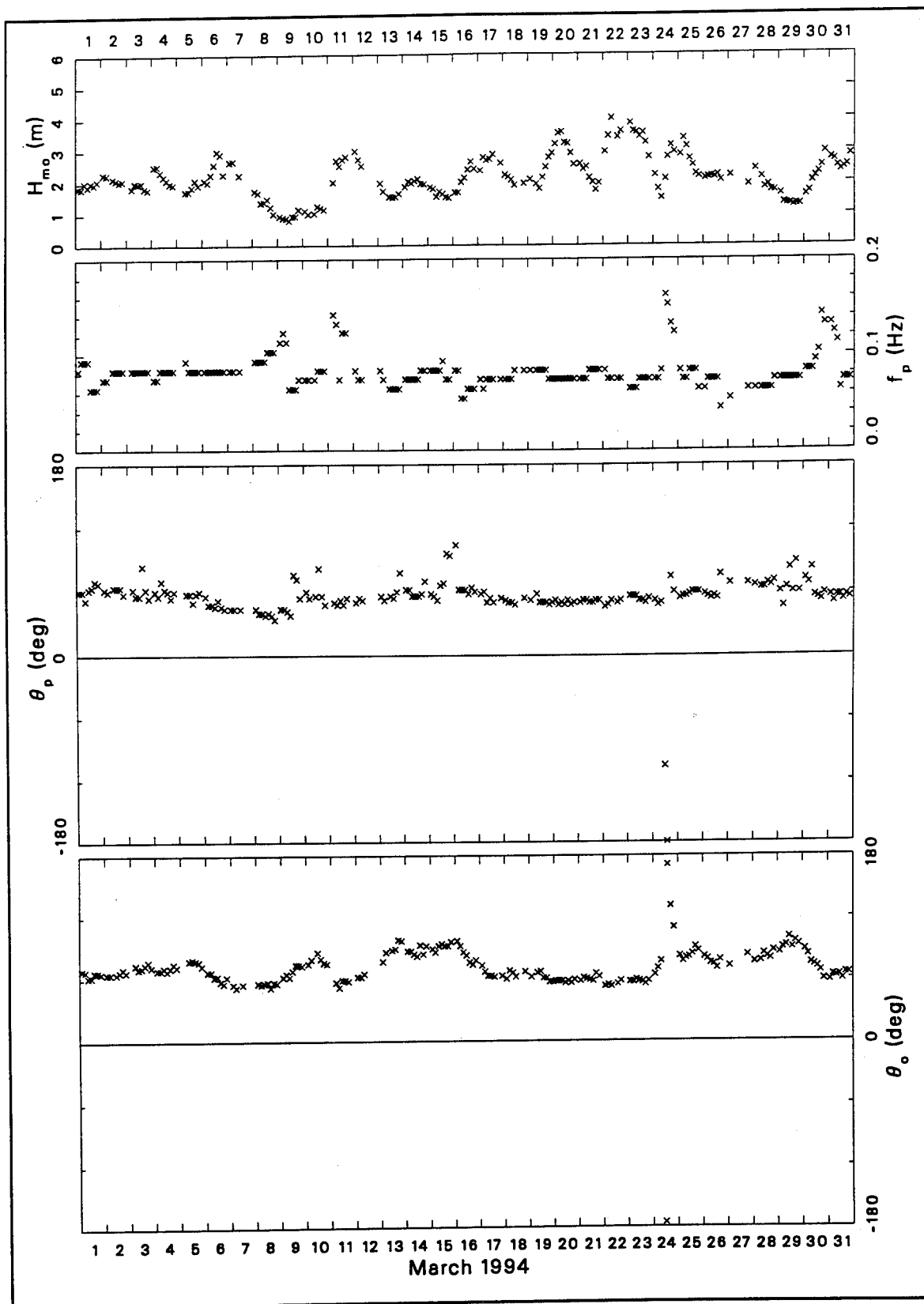


Figure B3. Bulk data for March 1994 (Continued)

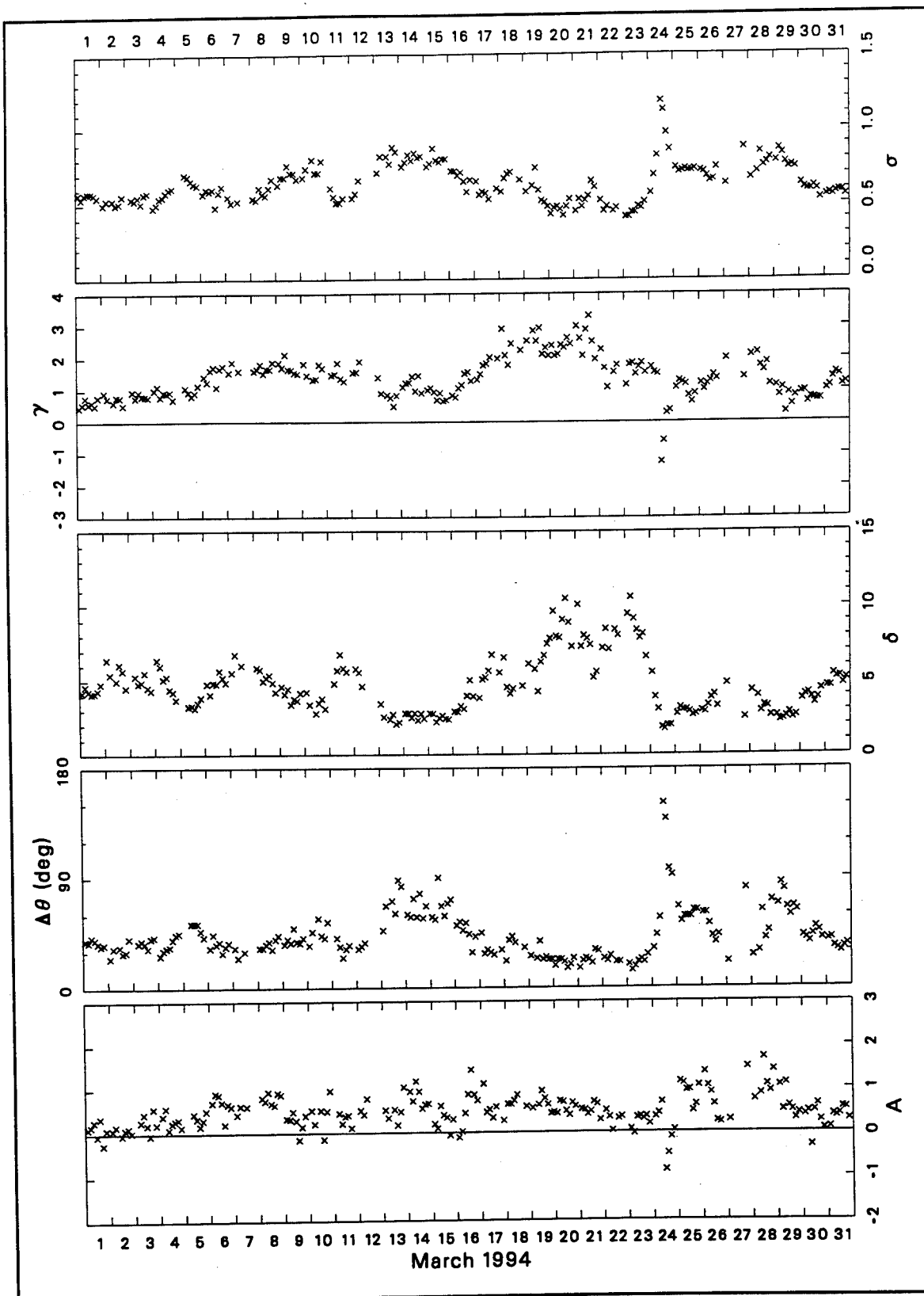


Figure B3. (Concluded)

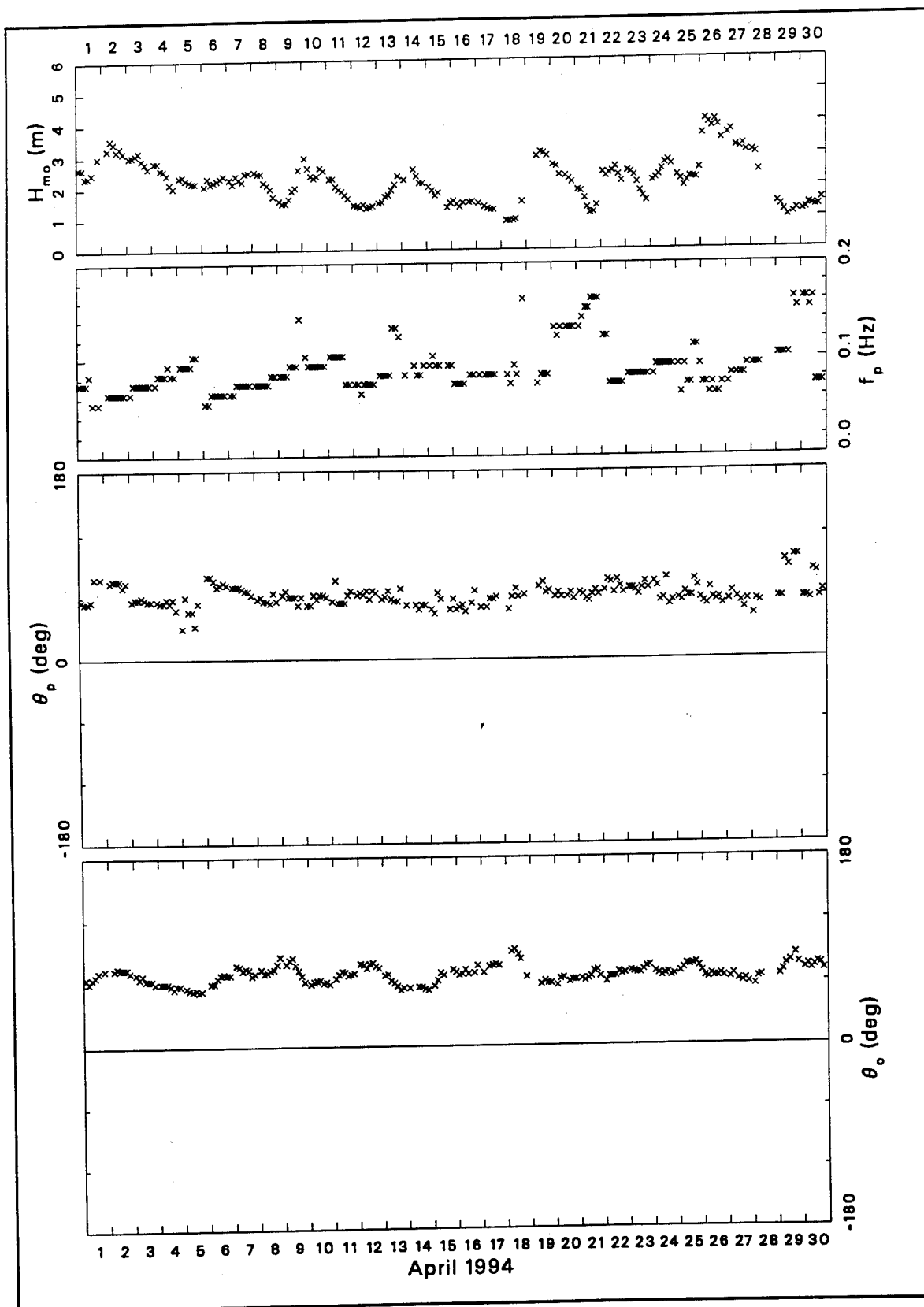


Figure B4. Bulk data for April 1994 (Continued)

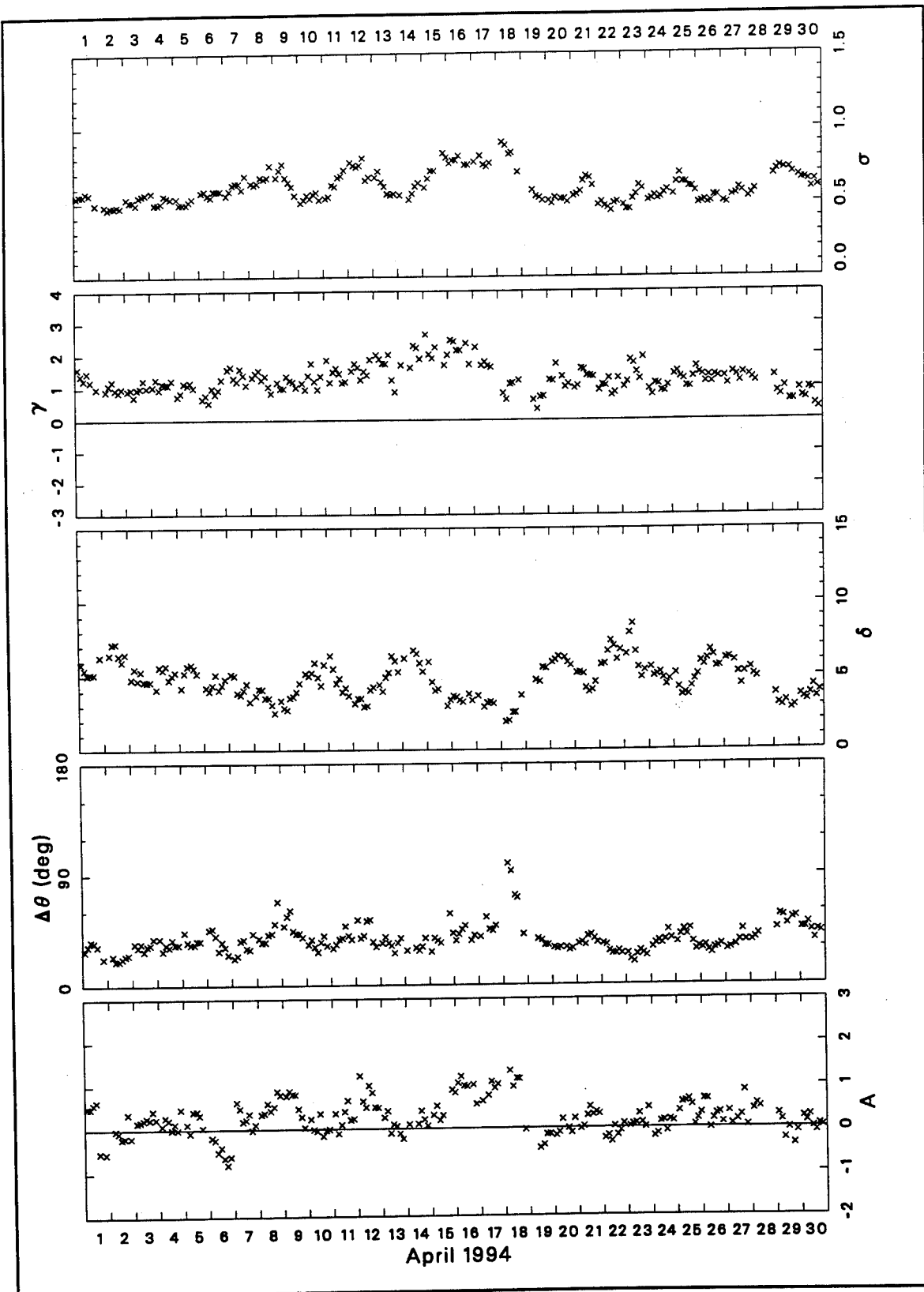


Figure B4. (Concluded)

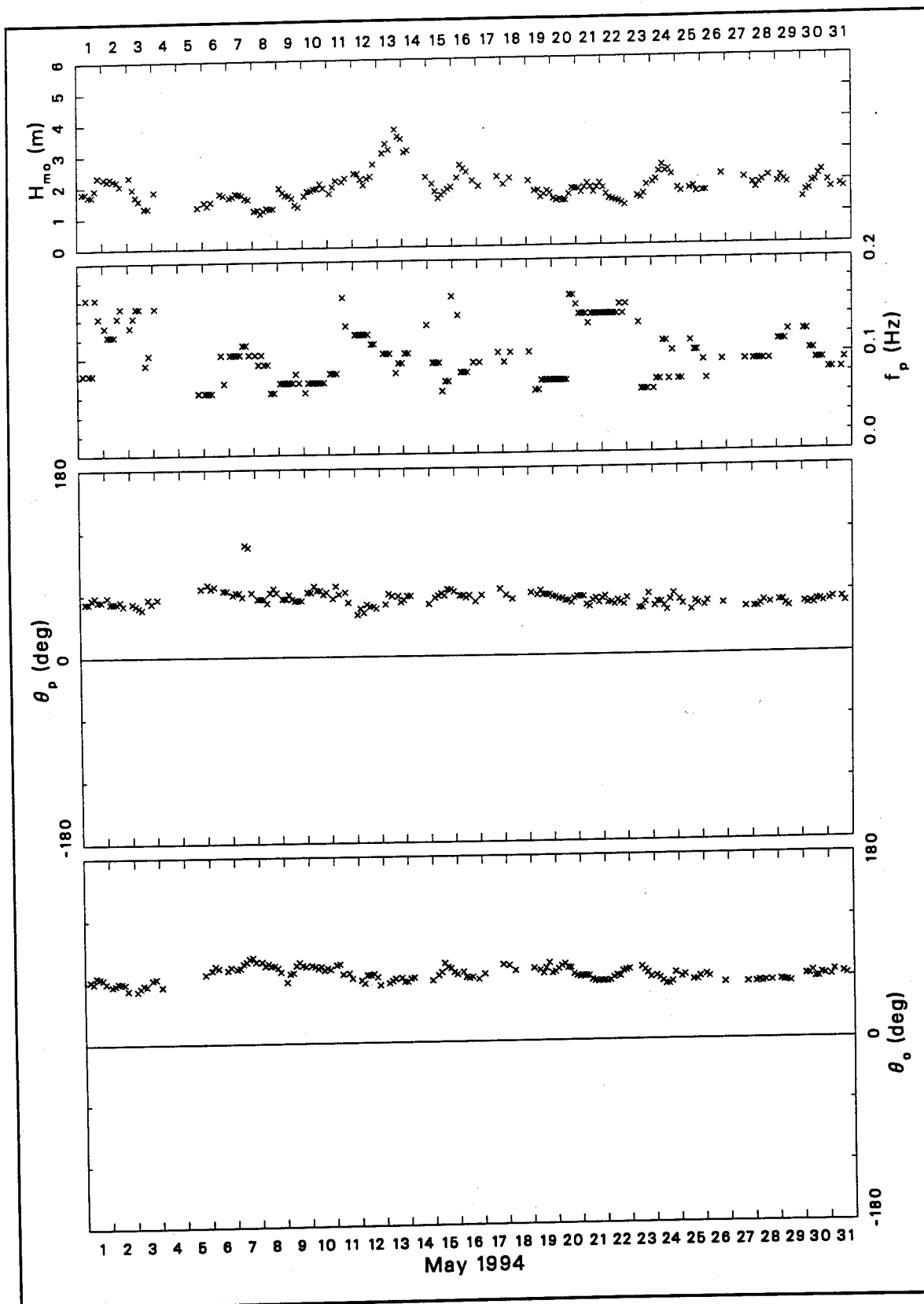


Figure B5. Bulk data for May 1994 (Continued)

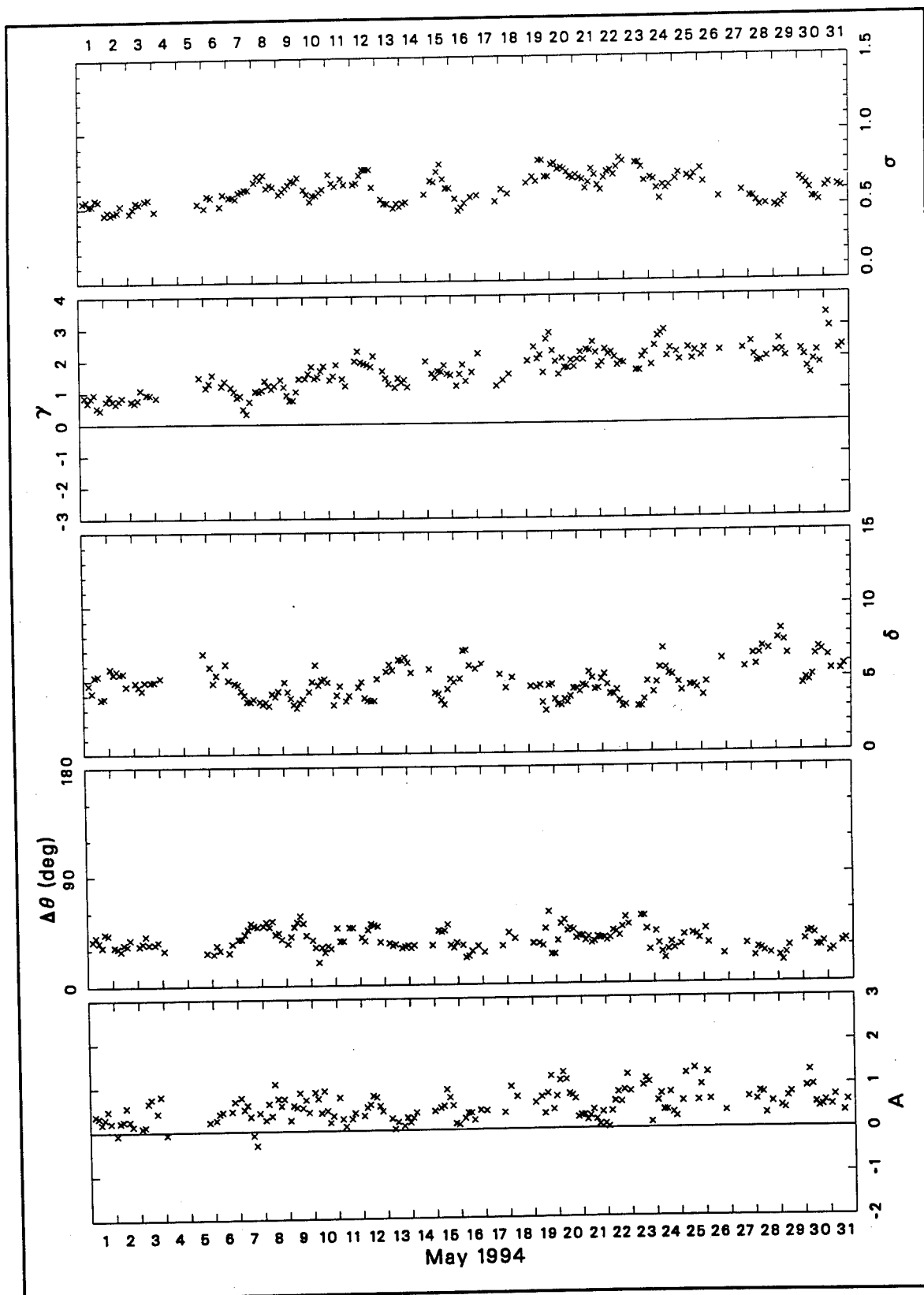


Figure B5. (Concluded)

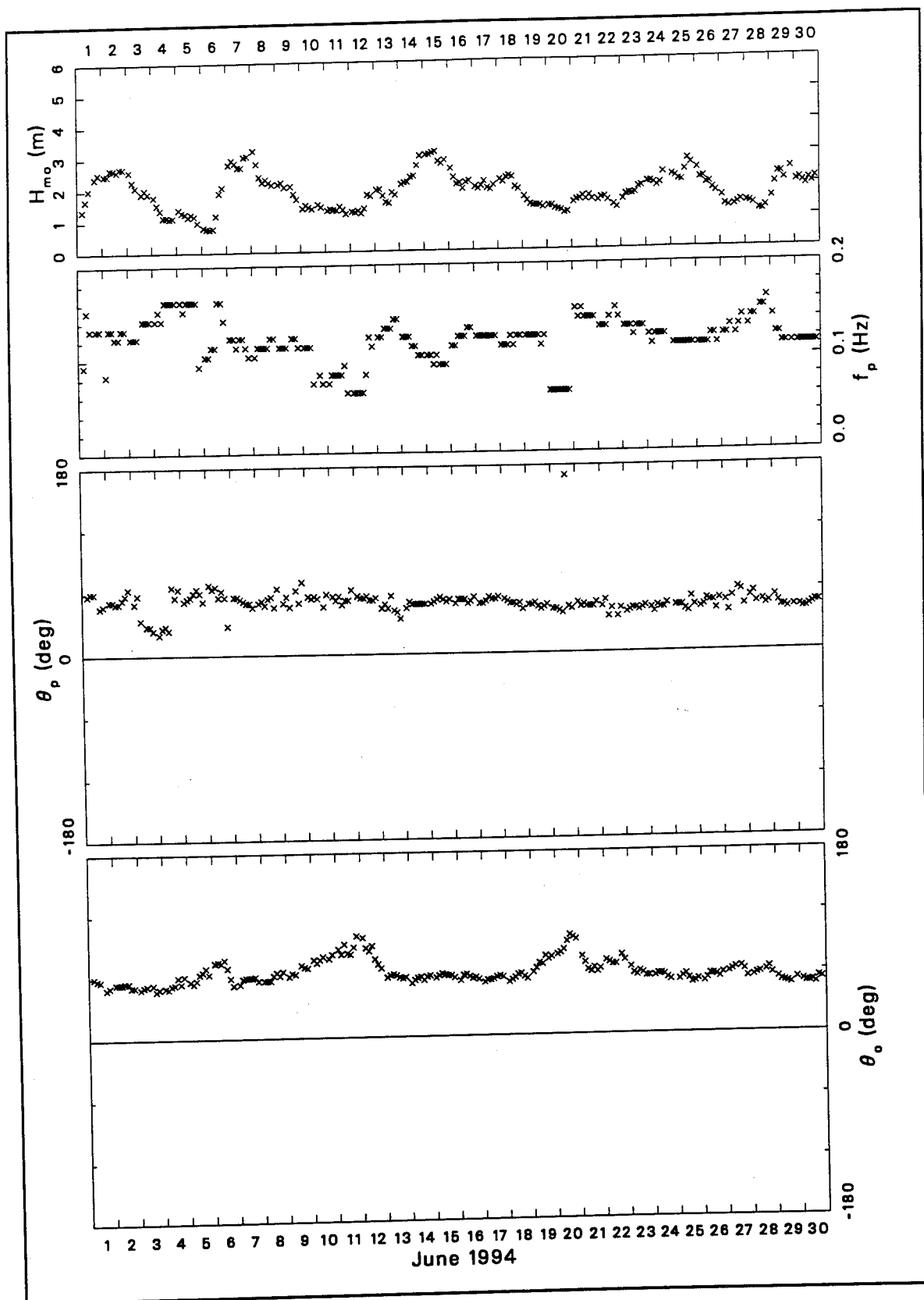


Figure B6. Bulk data for June 1994 (Continued)

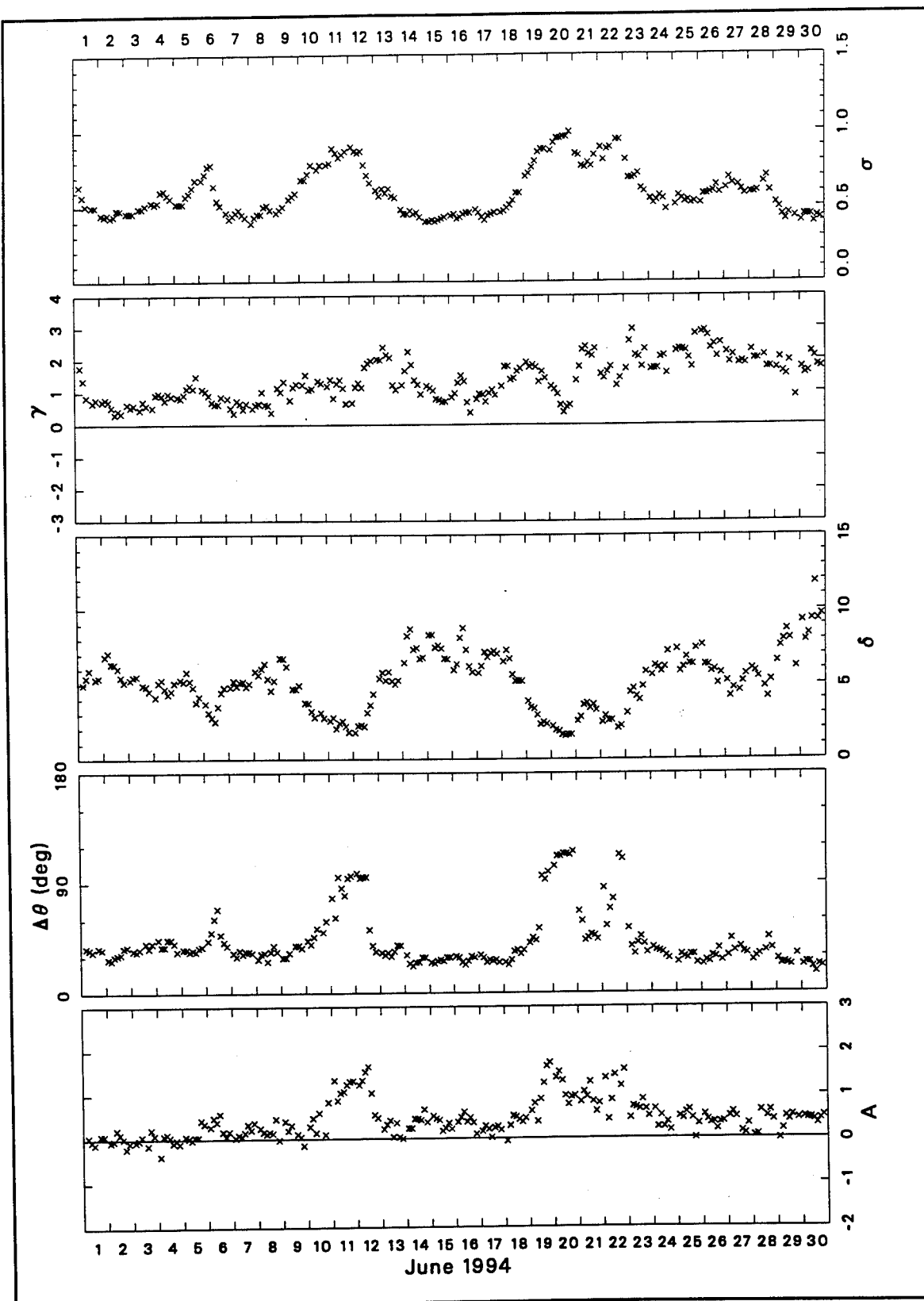


Figure B6. (Concluded)

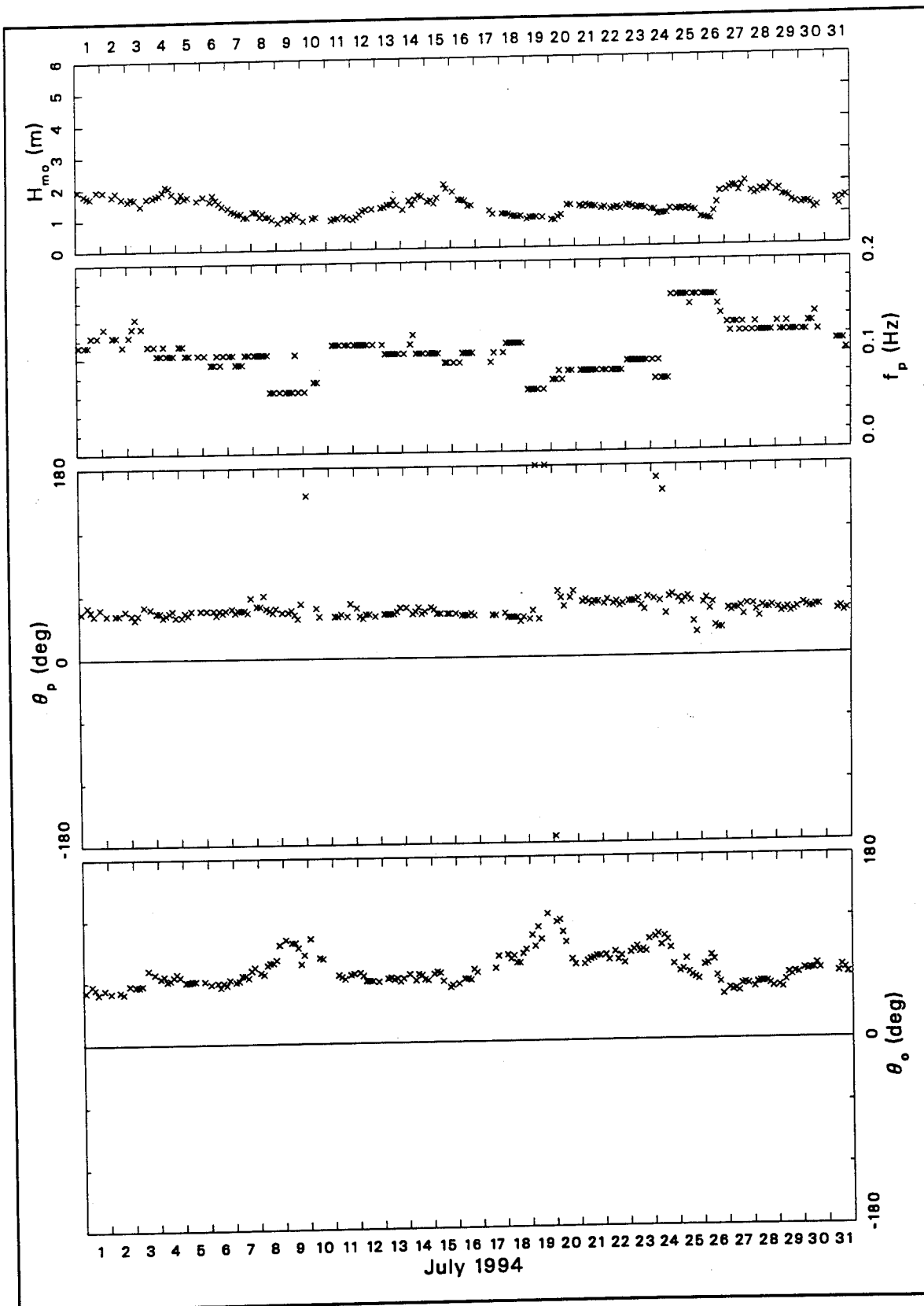


Figure B7. Bulk data for July 1994 (Continued)

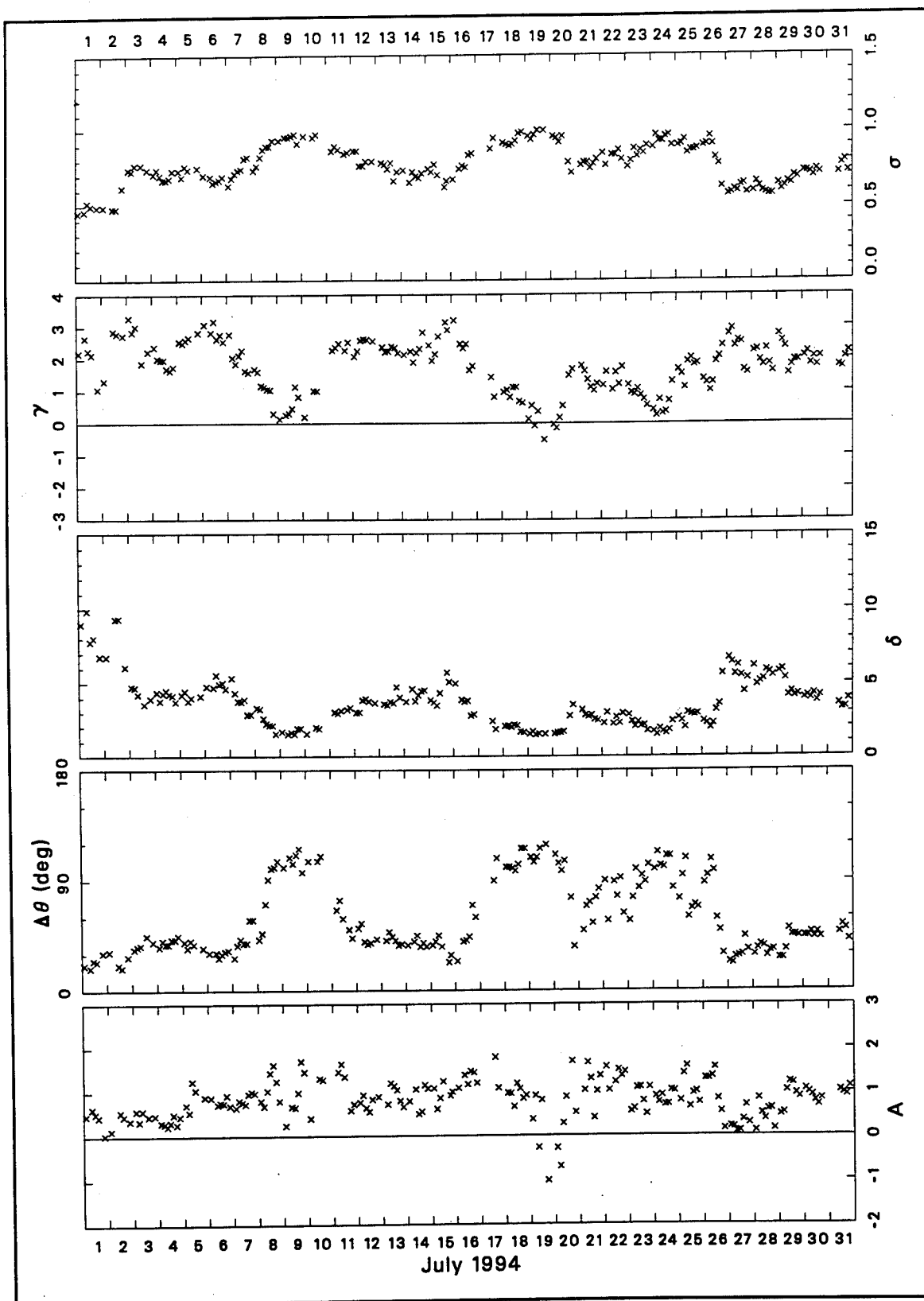


Figure B7. (Concluded)

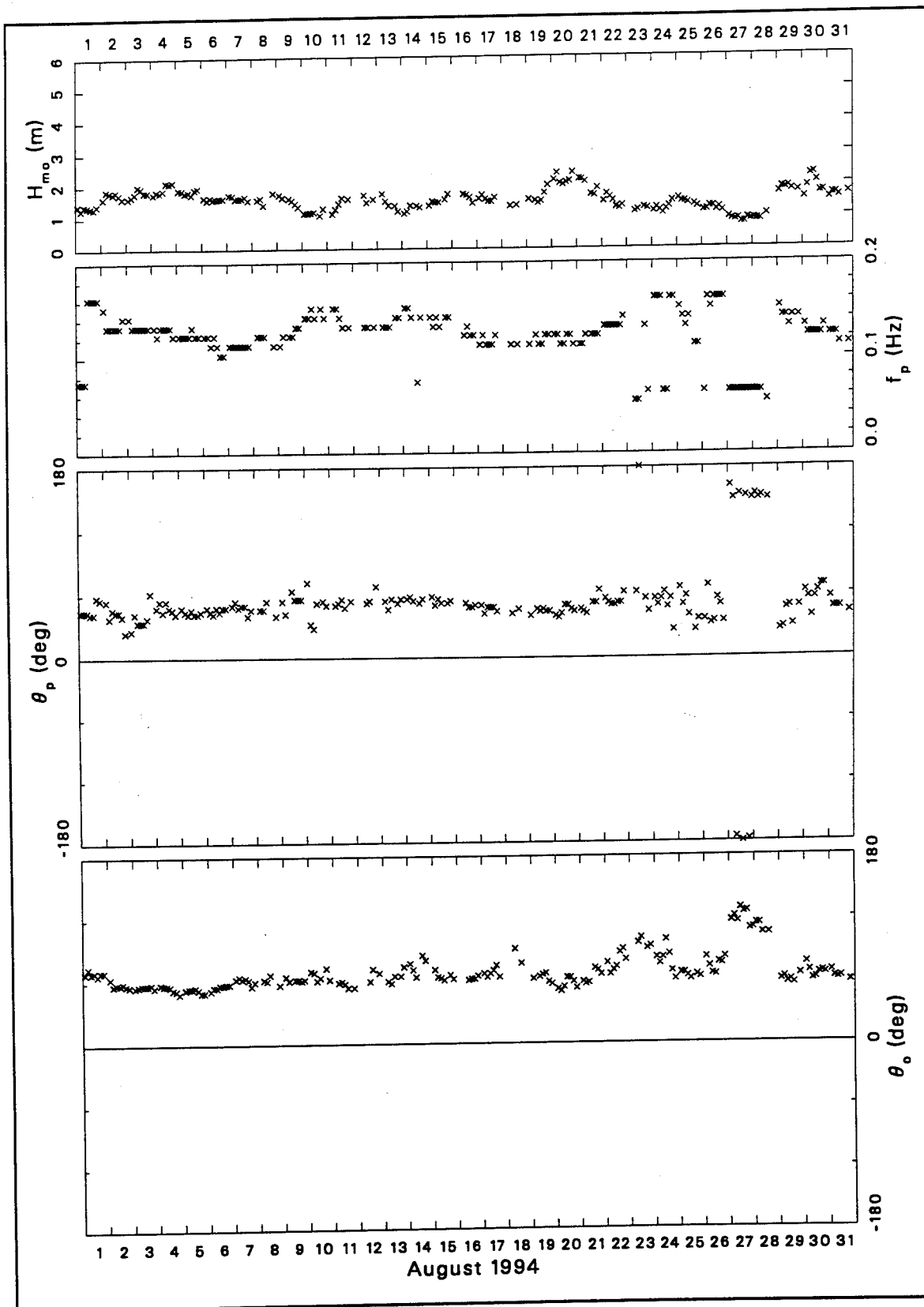


Figure B8. Bulk data for August 1994 (Continued)

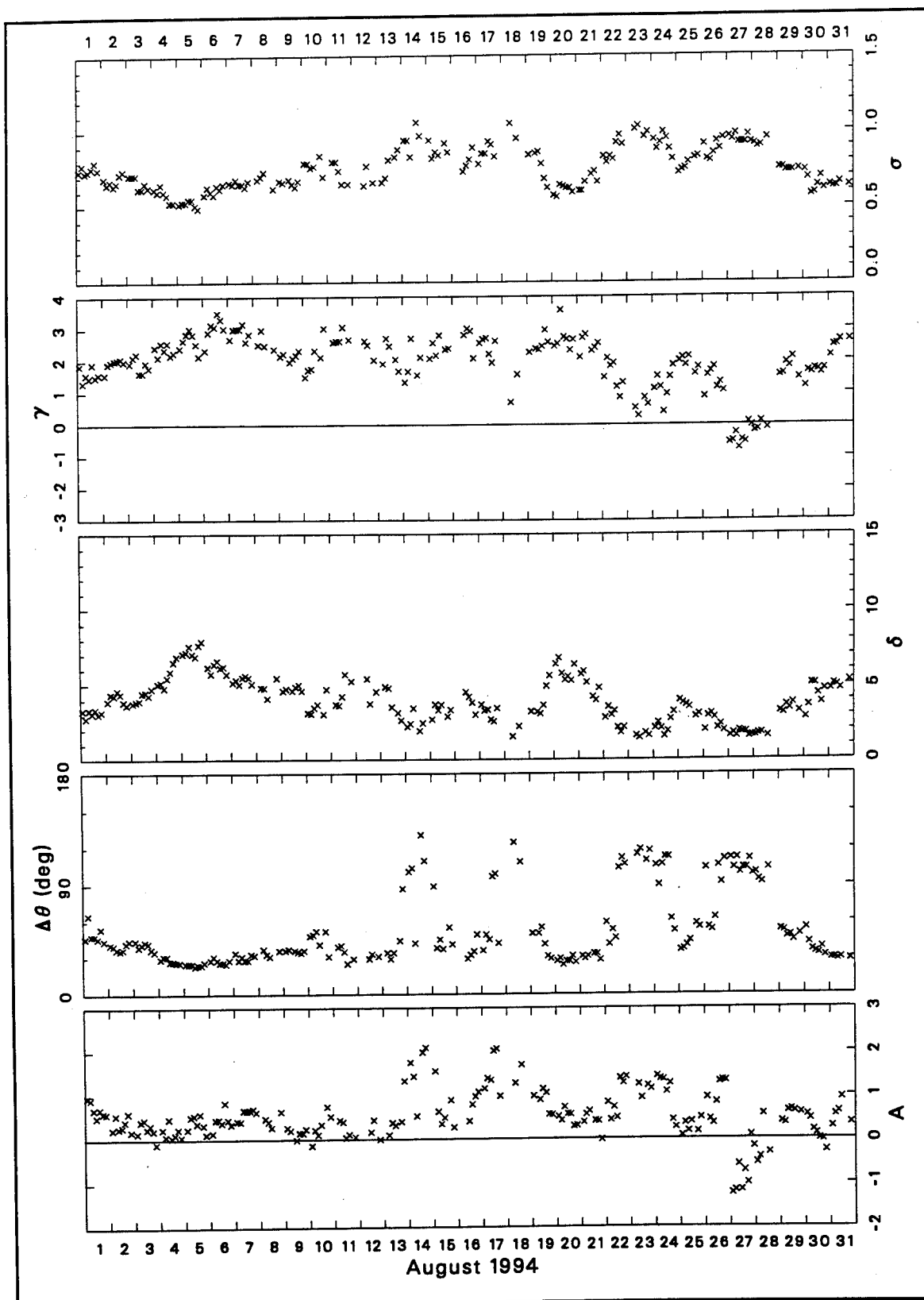


Figure B8. (Concluded)

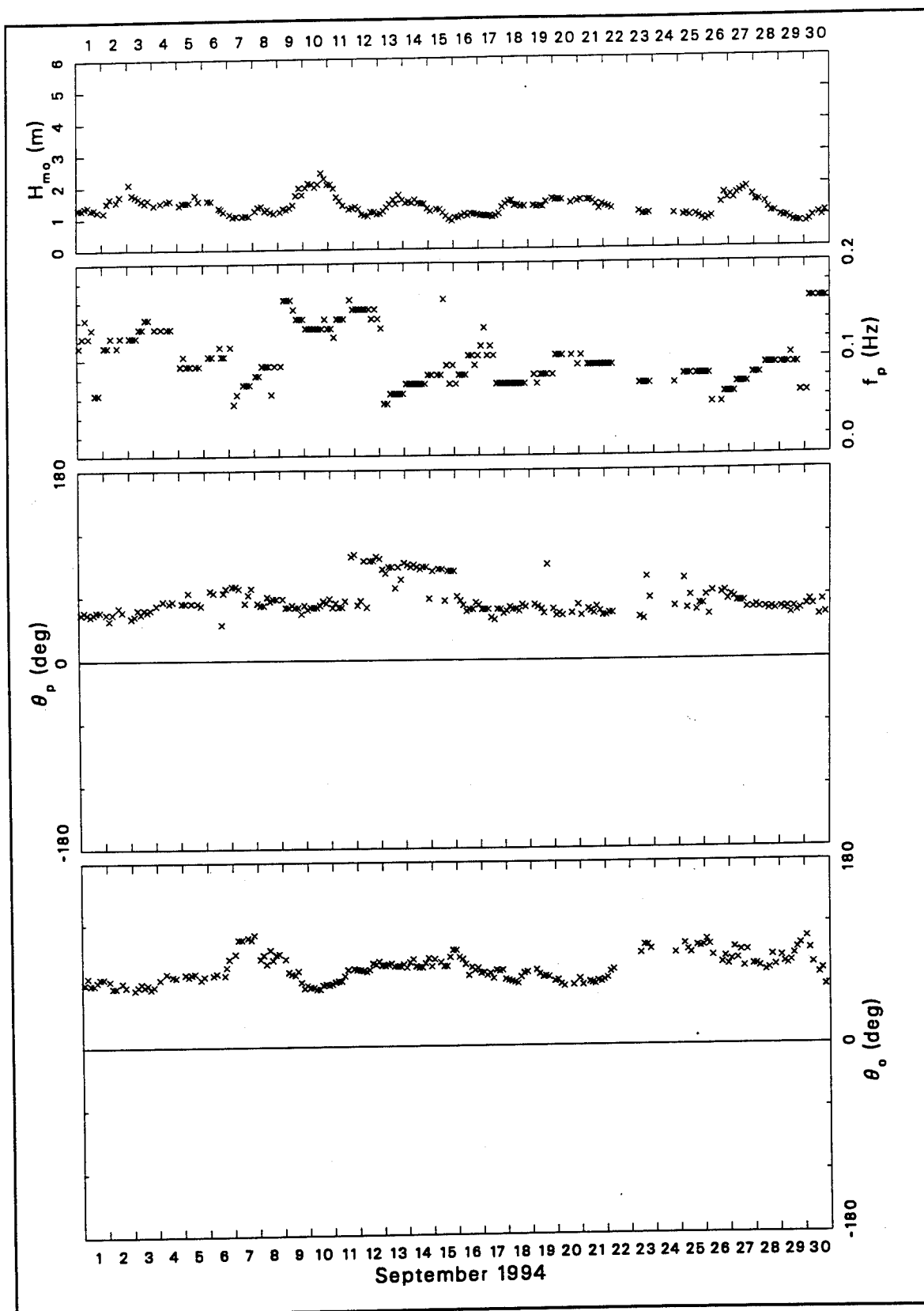


Figure B9. Bulk data for September 1994 (Continued)

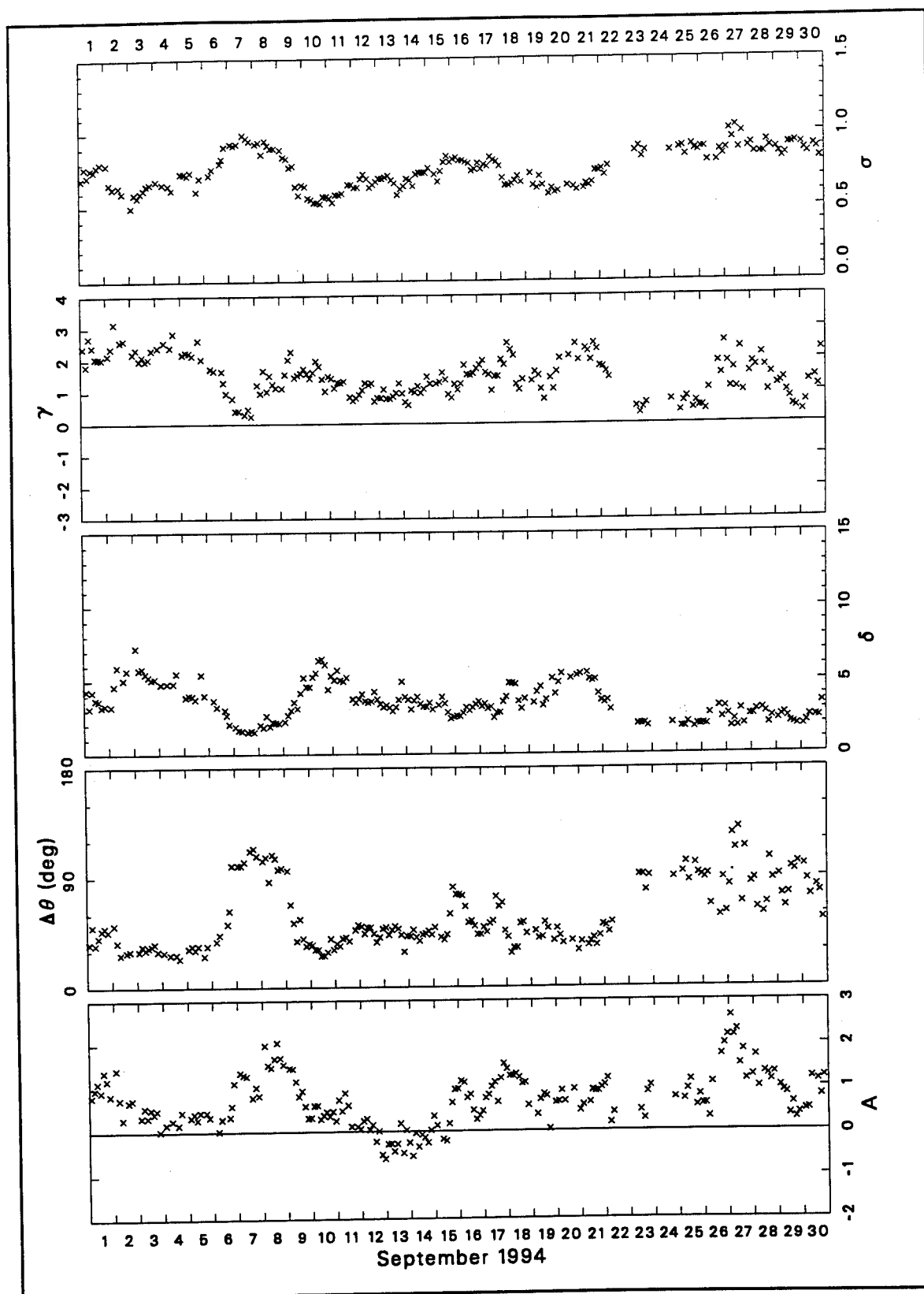


Figure B9. (Concluded)

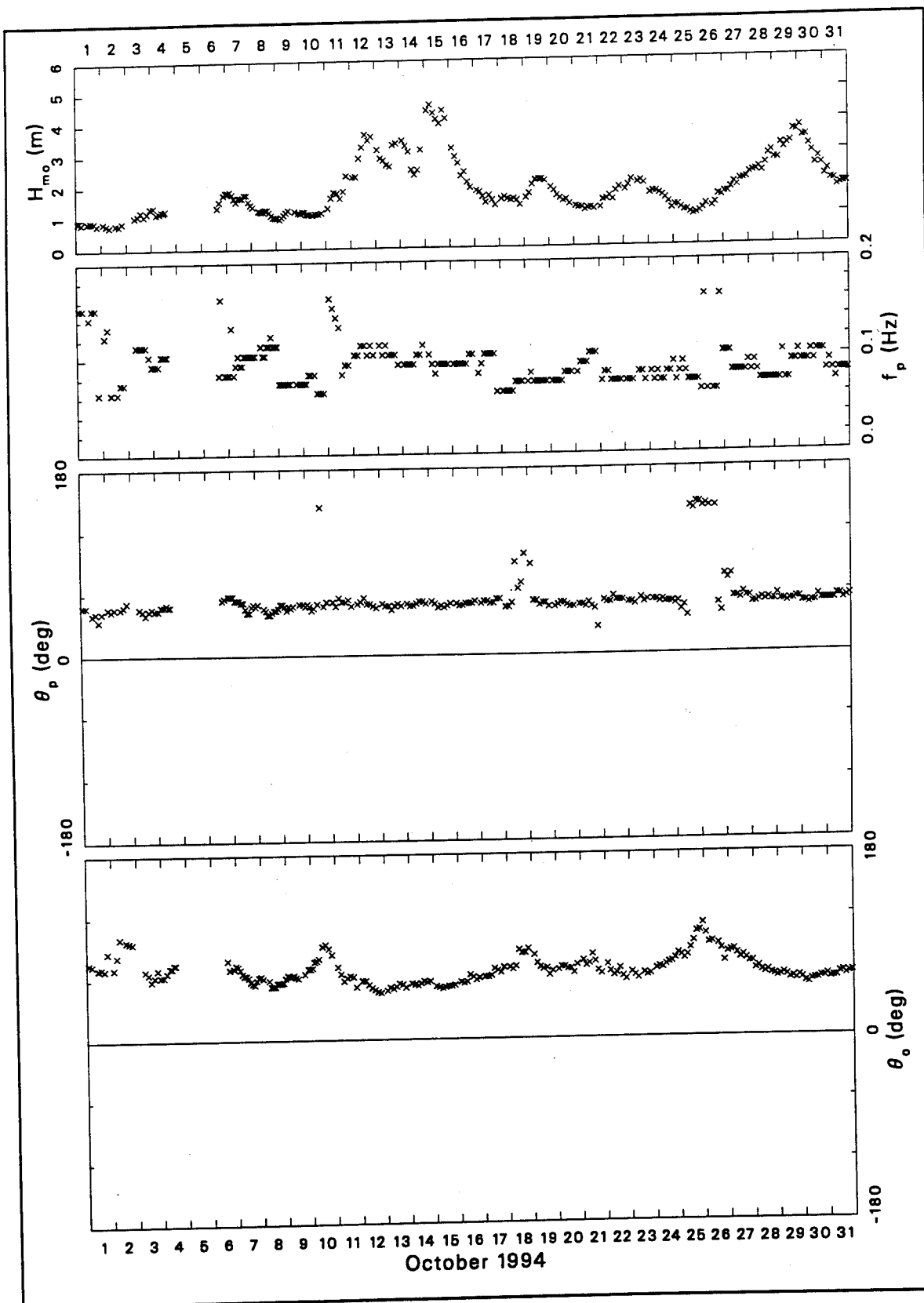


Figure B10. Bulk data for October 1994 (Continued)

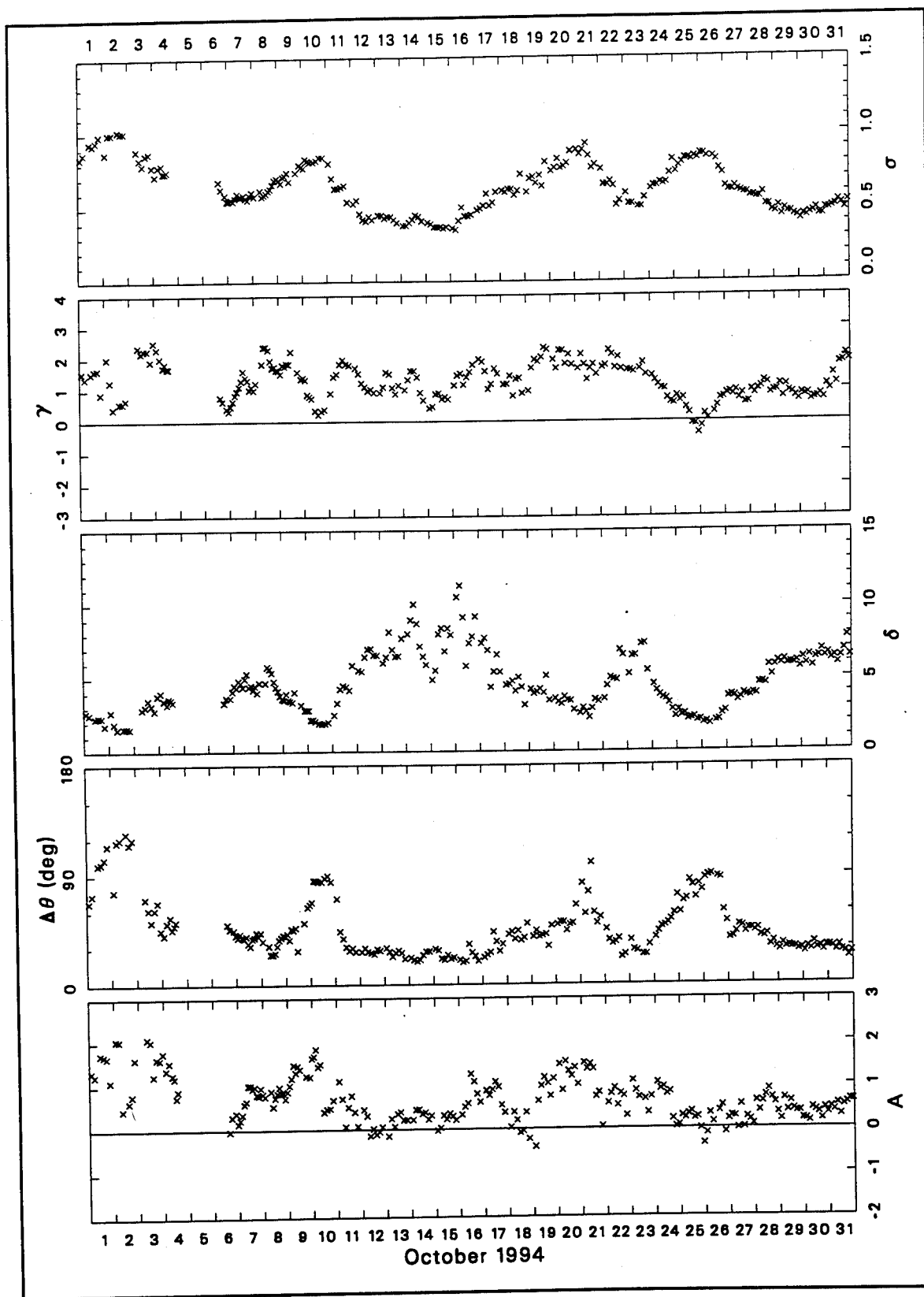


Figure B10. (Concluded)

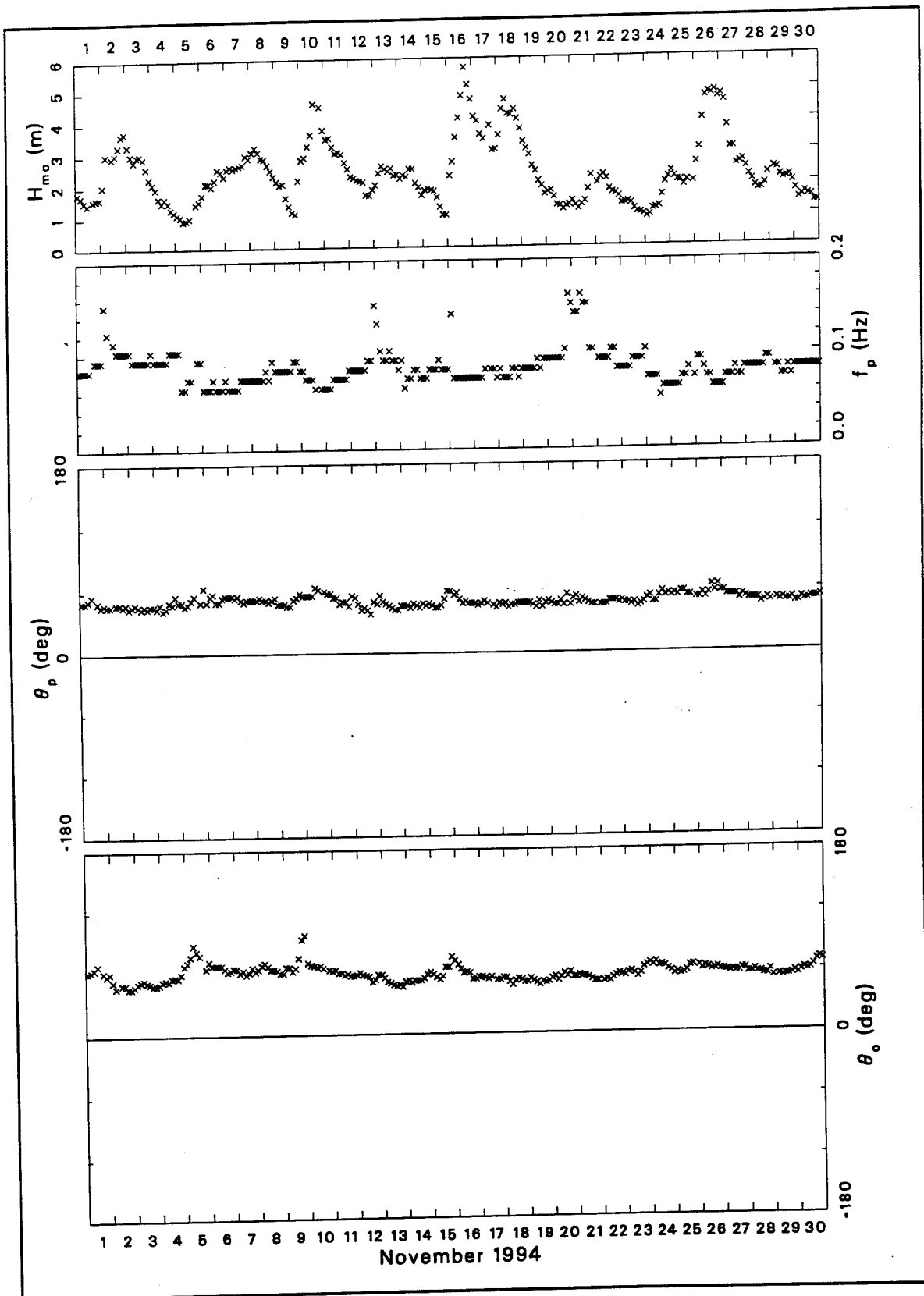


Figure B11. Bulk data for November 1994 (Continued)

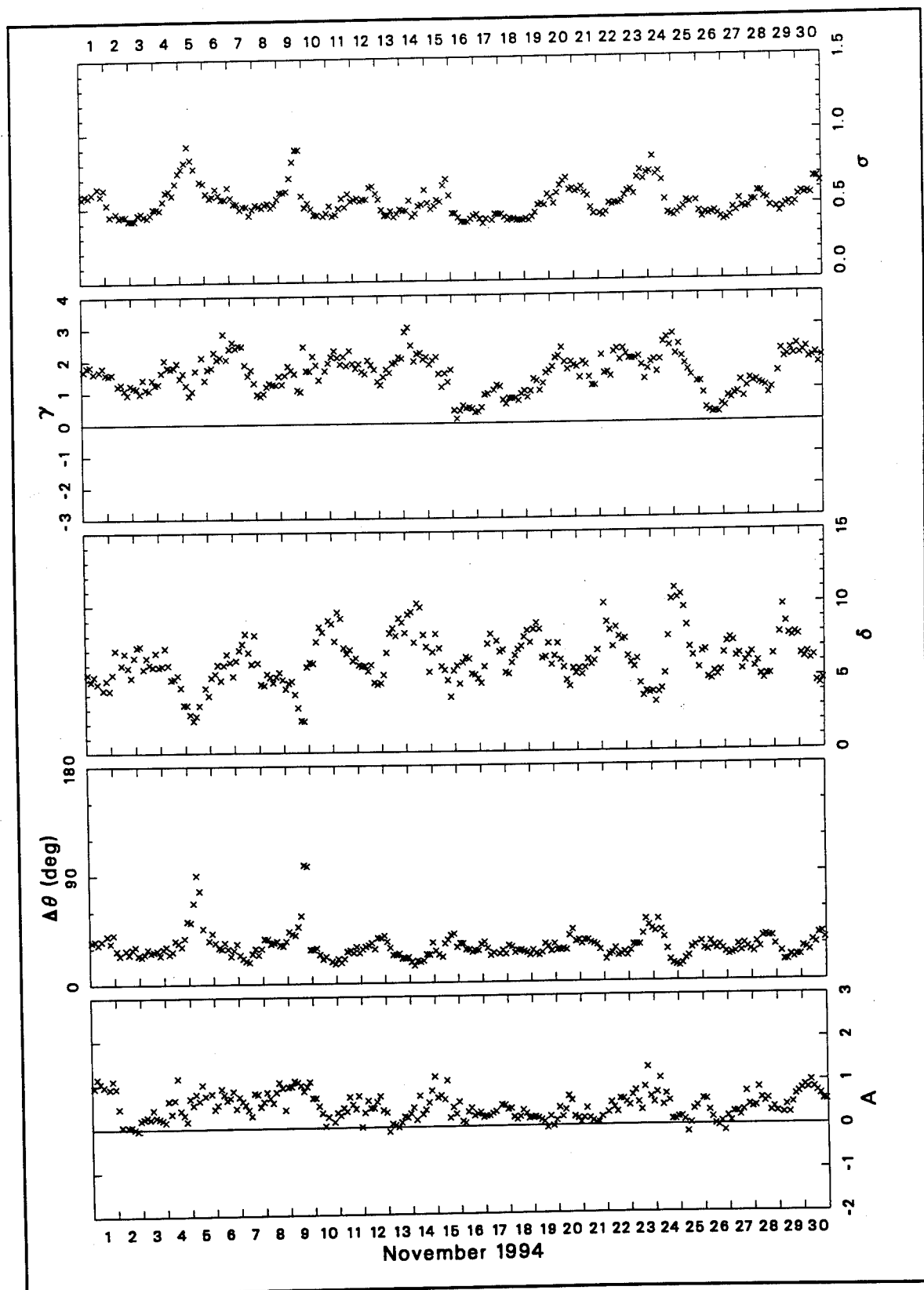


Figure B11. (Concluded)

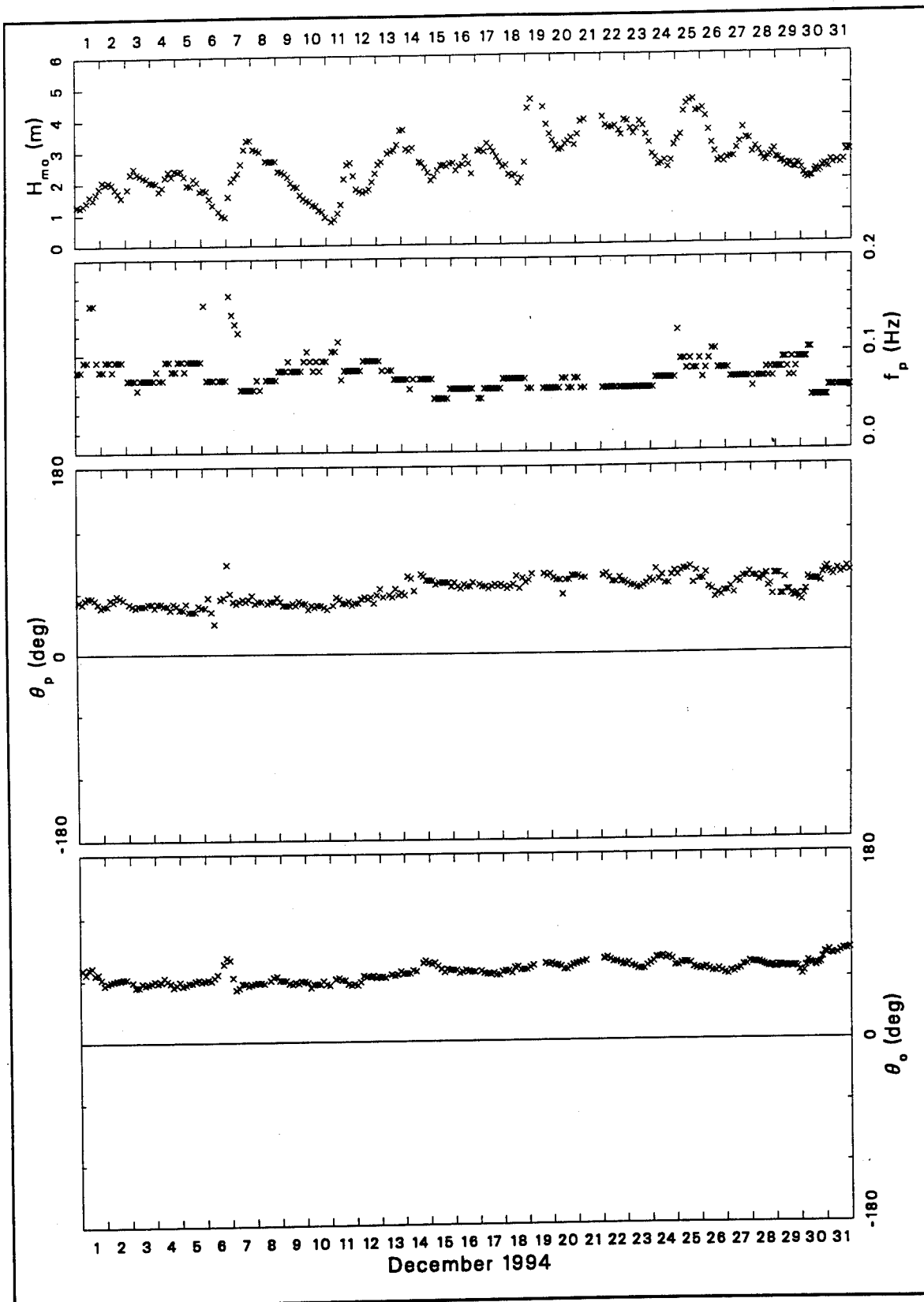


Figure B12. Bulk data for December 1994 (Continued)

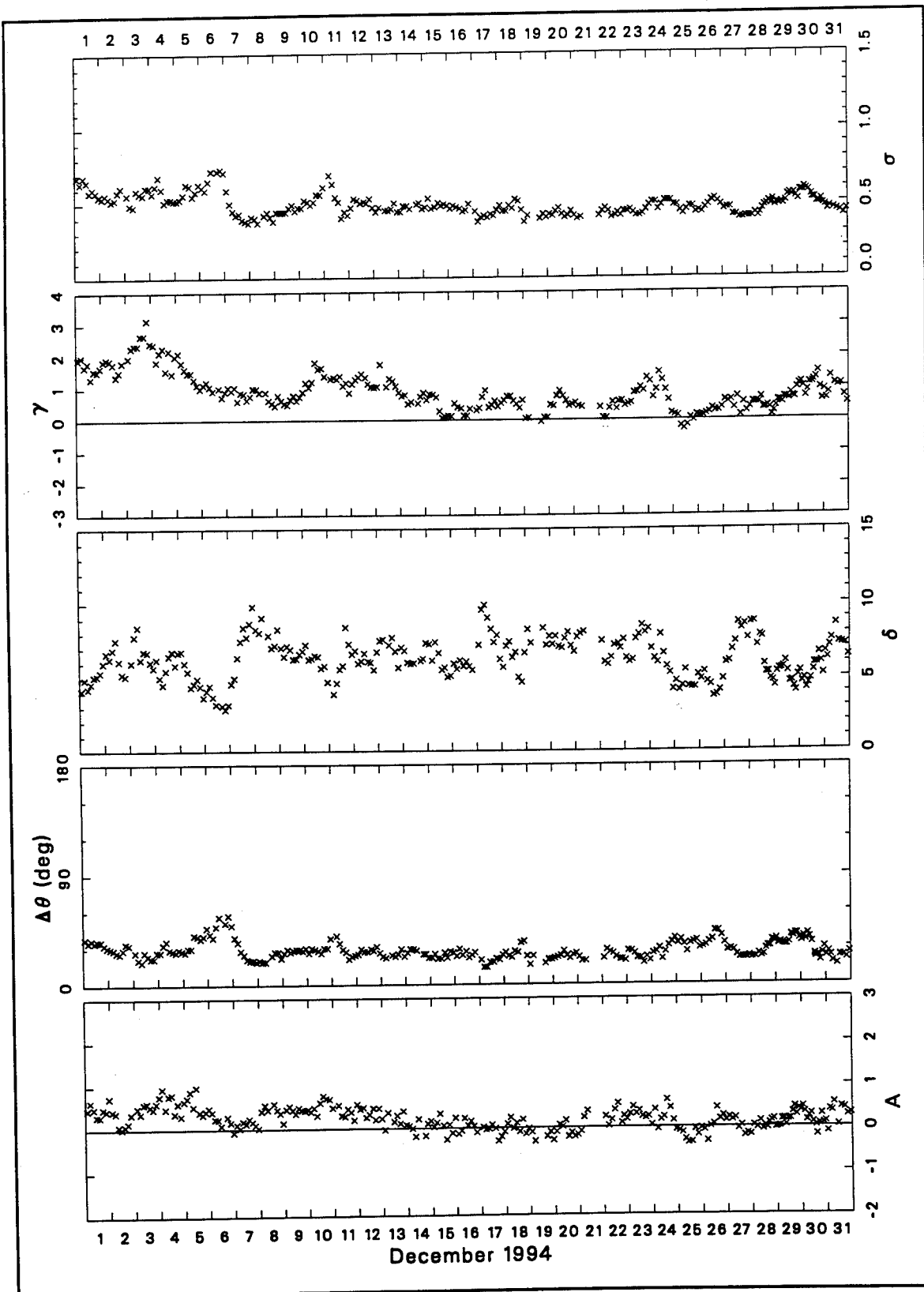


Figure B12. (Concluded)

# Appendix C

## Listing of FORTRAN Computer Program

---

```

program readascii
c
c Sample FORTRAN program containing statements necessary to read
c ASCII files of Harvest Platform frequency-direction spectra.
c This example reads a file called HPyymmddhmm.ASC, where the
c string yymmddhmm is a date/time group entered by the user.
c In other applications, the I/O statements may need modification
c to suit a user's system.
c
c Variable names, units and meanings are:
c
c=====
c
c      f(nf)..[Hz] frequency at index nf
c      angle(na)..[degrees CCW from true north] direction at index na from
c                which wave energy is arriving
c      sf(nf)..[m2/Hz] frequency spectral density at f(nf)
c
c      ddf(nf,na)..[deg-1] directional distribution function at f(nf)
c                and angle(na), which is the frequency-direction
c                spectral density at f(nf) and angle(na) normalized by
c                sf(nf)
c      fds(nf,na)..[m2/(Hz*deg)] frequency-direction spectrum at f(nf)
c                and angle(na), computed from ddf(nf,na) and sf(nf)
c
c      gpat(nf)..gauge pattern used at f(nf)
c      iter(nf)..# of IMLE iterations for convergence at f(nf)
c      datetime..[character*10] Date and Greenwich Mean Time of
c                beginning of data collection in the order year,
c                month, day, hour, minute, and in the form
c                yymmddhmm (2-digit year, no blanks in any field)
c
c      Hmo..[m] Energy-based characteristic wave height equal
c            to 4*sigma, where sigma2 is the variance of sea
c            surface displacement
c      fp..[Hz] frequency at peak of frequency spectrum
c      thp..[deg] direction at peak of directional distribution
c            at f(nf) = fp
c
c      ifimle..algorithm flag: [1]=IMLE estimate, [0]=MLE estimate
c      istot..[sec] duration of data collection
c      sfrq..[Hz] data sampling frequency

```

Figure C1. Listing of FORTRAN Computer Program (Sheet 1 of 3)

```

c      ifwindo..windowing flag: [0]=no windowing of data segments,
c              [1]=segments windowed (Kaiser-Bessel window)
c      ifdtrnd..detrending flag: [0]=no detrending, [1]=linear trend
c              removed from data segments
c      nfft..# of points in each data ensemble
c      nensb..# of half-lapped segments of cross-spectral computations
c      nband..# of raw frequency bands averaged in frequency smoothing
c      idgfr..degrees of freedom in cross-spectral computations
c              (based on contiguous segments only)
c
c      nfrq..number of output frequency bands, equals range of index
c              nf
c      delfs..[Hz] output frequency bandwidth
c      nang..number of output angle bins, equals range of index na
c      delang..[deg] output angle bin width
c
c      dmin..[m] minimum ensemble segment water depth at reference
c              gauge 'rname' during collection
c      dbar..[m] mean water depth at gauge 'rname' during collection
c      dmax..[m] maximum ensemble segment water depth at reference
c              gauge 'rname' during collection
c      rname..[character*5] reference gauge id for depth computations
c
c=====
c
c      character*5      rname
c      character*6      gpat(13)
c      character*10     indattim,      datetime
c      character*80     infile
c      dimension        f(13),        sf(13),      iter(13)
c      dimension        angle(181),    ddf(13,181),  fds(13,181)
c
c      get file-naming date/time group from user
c
c      write*,'(2x,'Enter date/time group (yymmddhhmm)...')'
c      read*,'(a10)' indattim          !date/time string
c
c      define input data file
c
c      infile='HP'//indattim(1:10)//'.ASC'
c
c      open, read, and close data file
c
c      open(10,file=infile,status='old',form='formatted')
c
c      read(10,
c      & '( a10, f10.2, f10.5, f10.1, i10, i10,
c      & f10.5, i10,/, i10, i10, i10, i10,
c      & i10, i10, f10.5, i10,/, f10.1, f10.2,
c      & f10.2, f10.2, 5x,a5)')
c      & datetime, hmo, fp, thp, ifimle, istot,
c      & sfrq, ifwindo, ifdtrnd, nfft, nensb, nband,
c      & idgfr, nfrq, delfs, nang, delang, dmin,
c      & dbar, dmax, rname
c
c      read(10,'(10f8.1)') (angle(na),na=1,nang)
c
c      do 10 nf=1,nfrq
c      read(10,
c      & '( i10, f10.5, f10.6, 4x,a6, i10)')
c      & if, f(nf), sf(nf), gpat(nf), iter(nf)
c      read(10,'(8f10.7)') (ddf(nf,na),na=1,nang)
10  continue
c
c      close(10)

```

Figure C1. (Sheet 2 of 3)

```

c
c  compute frequency-direction spectrum fds(nf,na) from ddf(nf,na)
c  and sf(nf)
c
      do 20 nf=1,nfrq
        do 25 na=1,nang
          fds(nf,na)=sf(nf)*ddf(nf,na)
25      continue
20      continue
c
c  at this point, all relevant variables are defined and arrays
c  are loaded; subsequent computations or operations can be done
c  at the user's discretion...
c
      end

```

Figure C1. (Sheet 3 of 3)

# Appendix D

## Listing of Sample Data File

|            |           |           |           |           |           |           |           |
|------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| 9406191702 | 1.40      | 0.11279   | 42.0      | 1         | 8192      | 1.00000   | 1         |
| 0          | 1024      | 15        | 10        | 160       | 13        | 0.00977   | 181       |
| 2.0        | 202.42    | 202.72    | 202.97    | 20201     |           |           |           |
| -180.0     | -178.0    | -176.0    | -174.0    | -172.0    | -170.0    | -168.0    | -166.0    |
| -160.0     | -158.0    | -156.0    | -154.0    | -152.0    | -150.0    | -148.0    | -146.0    |
| -140.0     | -138.0    | -136.0    | -134.0    | -132.0    | -130.0    | -128.0    | -126.0    |
| -120.0     | -118.0    | -116.0    | -114.0    | -112.0    | -110.0    | -108.0    | -106.0    |
| -100.0     | -98.0     | -96.0     | -94.0     | -92.0     | -90.0     | -88.0     | -86.0     |
| -80.0      | -78.0     | -76.0     | -74.0     | -72.0     | -70.0     | -68.0     | -66.0     |
| -60.0      | -58.0     | -56.0     | -54.0     | -52.0     | -50.0     | -48.0     | -46.0     |
| -40.0      | -38.0     | -36.0     | -34.0     | -32.0     | -30.0     | -28.0     | -26.0     |
| -20.0      | -18.0     | -16.0     | -14.0     | -12.0     | -10.0     | -8.0      | -6.0      |
| 0.0        | 2.0       | 4.0       | 6.0       | 8.0       | 10.0      | 12.0      | 14.0      |
| 20.0       | 22.0      | 24.0      | 26.0      | 28.0      | 30.0      | 32.0      | 34.0      |
| 40.0       | 42.0      | 44.0      | 46.0      | 48.0      | 50.0      | 52.0      | 54.0      |
| 60.0       | 62.0      | 64.0      | 66.0      | 68.0      | 70.0      | 72.0      | 74.0      |
| 80.0       | 82.0      | 84.0      | 86.0      | 88.0      | 90.0      | 92.0      | 94.0      |
| 100.0      | 102.0     | 104.0     | 106.0     | 108.0     | 110.0     | 112.0     | 114.0     |
| 120.0      | 122.0     | 124.0     | 126.0     | 128.0     | 130.0     | 132.0     | 134.0     |
| 140.0      | 142.0     | 144.0     | 146.0     | 148.0     | 150.0     | 152.0     | 154.0     |
| 160.0      | 162.0     | 164.0     | 166.0     | 168.0     | 170.0     | 172.0     | 174.0     |
| 180.0      |           |           |           |           |           |           |           |
| 1          | 0.04443   | 0.022945  | 12346     | 30        |           |           |           |
| 0.0060711  | 0.0053252 | 0.0045011 | 0.0038403 | 0.0033111 | 0.0028831 | 0.0025347 | 0.0022500 |
| 0.0020145  | 0.0018188 | 0.0016546 | 0.0015159 | 0.0013985 | 0.0012977 | 0.0012113 | 0.0011363 |
| 0.0010712  | 0.0010142 | 0.0009641 | 0.0009199 | 0.0008808 | 0.0008458 | 0.0008145 | 0.0007865 |
| 0.0007613  | 0.0007385 | 0.0007177 | 0.0006986 | 0.0006812 | 0.0006652 | 0.0006503 | 0.0006365 |
| 0.0006237  | 0.0006116 | 0.0006002 | 0.0005894 | 0.0005792 | 0.0005696 | 0.0005603 | 0.0005515 |
| 0.0005431  | 0.0005350 | 0.0005273 | 0.0005200 | 0.0005130 | 0.0005063 | 0.0004999 | 0.0004940 |
| 0.0004884  | 0.0004832 | 0.0004784 | 0.0004740 | 0.0004700 | 0.0004664 | 0.0004634 | 0.0004607 |
| 0.0004585  | 0.0004568 | 0.0004556 | 0.0004548 | 0.0004545 | 0.0004546 | 0.0004552 | 0.0004562 |
| 0.0004576  | 0.0004593 | 0.0004614 | 0.0004639 | 0.0004666 | 0.0004695 | 0.0004726 | 0.0004759 |
| 0.0004792  | 0.0004827 | 0.0004861 | 0.0004896 | 0.0004929 | 0.0004961 | 0.0004992 | 0.0005020 |
| 0.0005047  | 0.0005071 | 0.0005092 | 0.0005111 | 0.0005127 | 0.0005139 | 0.0005149 | 0.0005156 |
| 0.0005160  | 0.0005162 | 0.0005162 | 0.0005160 | 0.0005156 | 0.0005150 | 0.0005144 | 0.0005137 |
| 0.0005130  | 0.0005123 | 0.0005117 | 0.0005111 | 0.0005107 | 0.0005104 | 0.0005104 | 0.0005106 |
| 0.0005111  | 0.0005120 | 0.0005132 | 0.0005148 | 0.0005168 | 0.0005193 | 0.0005222 | 0.0005257 |
| 0.0005298  | 0.0005345 | 0.0005398 | 0.0005457 | 0.0005523 | 0.0005596 | 0.0005677 | 0.0005766 |
| 0.0005862  | 0.0005966 | 0.0006079 | 0.0006201 | 0.0006331 | 0.0006470 | 0.0006620 | 0.0006779 |
| 0.0006949  | 0.0007131 | 0.0007324 | 0.0007529 | 0.0007749 | 0.0007984 | 0.0008234 | 0.0008503 |
| 0.0008791  | 0.0009105 | 0.0009443 | 0.0009811 | 0.0010215 | 0.0010659 | 0.0011151 | 0.0011699 |
| 0.0012316  | 0.0013014 | 0.0013806 | 0.0014713 | 0.0015764 | 0.0016986 | 0.0018419 | 0.0020114 |
| 0.0022132  | 0.0024557 | 0.0027490 | 0.0031067 | 0.0035468 | 0.0040914 | 0.0047700 | 0.0056173 |
| 0.0066779  | 0.0080041 | 0.0096462 | 0.0116520 | 0.0140400 | 0.0167678 | 0.0197000 | 0.0225923 |
| 0.0250756  | 0.0267470 | 0.0272988 | 0.0265893 | 0.0247609 | 0.0221839 | 0.0192493 | 0.0163000 |
| 0.0135905  | 0.0112309 | 0.0092647 | 0.0076545 | 0.0066483 |           |           |           |

Figure D1. Listing of sample data file (Sheet 1 of 6)

| 2         | 0.05420   | 1.184537  | 123456    | 18        |
|-----------|-----------|-----------|-----------|-----------|
| 0.0193193 | 0.0184077 | 0.0170895 | 0.0153190 | 0.0133217 |
| 0.0058946 | 0.0046099 | 0.0035386 | 0.0026957 | 0.0020745 |
| 0.0008208 | 0.0006947 | 0.0006082 | 0.0005547 | 0.0005174 |
| 0.0004767 | 0.0004760 | 0.0004743 | 0.0004722 | 0.0004672 |
| 0.0004178 | 0.0003978 | 0.0003759 | 0.0003524 | 0.0003279 |
| 0.0002256 | 0.0002014 | 0.0001782 | 0.0001564 | 0.0001364 |
| 0.0000746 | 0.0000638 | 0.0000548 | 0.0000474 | 0.0000415 |
| 0.0000309 | 0.0000311 | 0.0000324 | 0.0000350 | 0.0000390 |
| 0.0000740 | 0.0000889 | 0.0001069 | 0.0001281 | 0.0001526 |
| 0.0002766 | 0.0003112 | 0.0003451 | 0.0003773 | 0.0004059 |
| 0.0004614 | 0.0004556 | 0.0004421 | 0.0004222 | 0.0003980 |
| 0.0003022 | 0.0002884 | 0.0002807 | 0.0002785 | 0.0002822 |
| 0.0003246 | 0.0003357 | 0.0003445 | 0.0003507 | 0.0003529 |
| 0.0003253 | 0.0003106 | 0.0002933 | 0.0002741 | 0.0002536 |
| 0.0001692 | 0.0001495 | 0.0001312 | 0.0001145 | 0.0000993 |
| 0.0000578 | 0.0000519 | 0.0000477 | 0.0000449 | 0.0000437 |
| 0.0000562 | 0.0000649 | 0.0000769 | 0.0000927 | 0.0001132 |
| 0.0002609 | 0.0003193 | 0.0003886 | 0.0004682 | 0.0005592 |
| 0.0010315 | 0.0011714 | 0.0013129 | 0.0014590 | 0.0016010 |
| 0.0020822 | 0.0021782 | 0.0022795 | 0.0023725 | 0.0025086 |
| 0.0038572 | 0.0045843 | 0.0055141 | 0.0067018 | 0.0081353 |
| 0.0153736 | 0.0171945 | 0.0187583 | 0.0198669 | 0.0205504 |
| 0.0204234 | 0.0202511 | 0.0203944 | 0.0200859 | 0.0197905 |
| 3         | 0.06396   | 1.906006  | 123456    | 24        |
| 0.0266505 | 0.0240051 | 0.0199338 | 0.0156902 | 0.0118319 |
| 0.0029355 | 0.0020195 | 0.0013950 | 0.0009715 | 0.0006931 |
| 0.0002563 | 0.0002242 | 0.0002057 | 0.0001973 | 0.0001957 |
| 0.0002319 | 0.0002457 | 0.0002591 | 0.0002714 | 0.0002818 |
| 0.0002931 | 0.0002871 | 0.0002781 | 0.0002661 | 0.0002517 |
| 0.0001784 | 0.0001588 | 0.0001396 | 0.0001213 | 0.0001041 |
| 0.0000515 | 0.0000427 | 0.0000354 | 0.0000296 | 0.0000251 |
| 0.0000172 | 0.0000173 | 0.0000181 | 0.0000198 | 0.0000226 |
| 0.0000498 | 0.0000626 | 0.0000786 | 0.0000983 | 0.0001219 |
| 0.0002510 | 0.0002879 | 0.0003233 | 0.0003552 | 0.0003810 |
| 0.0003856 | 0.0003603 | 0.0003282 | 0.0002926 | 0.0002570 |
| 0.0001565 | 0.0001446 | 0.0001368 | 0.0001324 | 0.0001307 |
| 0.0001361 | 0.0001380 | 0.0001392 | 0.0001397 | 0.0001394 |
| 0.0001286 | 0.0001238 | 0.0001183 | 0.0001121 | 0.0001055 |
| 0.0000764 | 0.0000690 | 0.0000619 | 0.0000550 | 0.0000486 |
| 0.0000281 | 0.0000245 | 0.0000215 | 0.0000191 | 0.0000173 |
| 0.0000162 | 0.0000177 | 0.0000202 | 0.0000241 | 0.0000301 |
| 0.0000961 | 0.0001333 | 0.0001855 | 0.0002573 | 0.0003543 |
| 0.0011224 | 0.0014354 | 0.0017974 | 0.0022041 | 0.0026385 |
| 0.0041111 | 0.0042729 | 0.0043422 | 0.0043300 | 0.0042985 |
| 0.0048808 | 0.0053739 | 0.0060164 | 0.0068127 | 0.0077325 |
| 0.0120929 | 0.0132428 | 0.0143793 | 0.0155102 | 0.0166772 |
| 0.0239779 | 0.0263410 | 0.0282539 | 0.0286674 | 0.0278960 |
| 4         | 0.07373   | 0.278954  | 123456    | 30        |
| 0.0187927 | 0.0190464 | 0.0183675 | 0.0164729 | 0.0137951 |
| 0.0038047 | 0.0025047 | 0.0016247 | 0.0010542 | 0.0006957 |
| 0.0001988 | 0.0001669 | 0.0001483 | 0.0001388 | 0.0001354 |
| 0.0001587 | 0.0001696 | 0.0001812 | 0.0001928 | 0.0002039 |
| 0.0002334 | 0.0002354 | 0.0002349 | 0.0002319 | 0.0002265 |
| 0.0001851 | 0.0001712 | 0.0001566 | 0.0001416 | 0.0001266 |
| 0.0000732 | 0.0000627 | 0.0000535 | 0.0000457 | 0.0000393 |
| 0.0000260 | 0.0000255 | 0.0000262 | 0.0000282 | 0.0000317 |
| 0.0000731 | 0.0000943 | 0.0001215 | 0.0001551 | 0.0001951 |
| 0.0003825 | 0.0004204 | 0.0004472 | 0.0004604 | 0.0004586 |
| 0.0003257 | 0.0002771 | 0.0002299 | 0.0001868 | 0.0001495 |
| 0.0000633 | 0.0000542 | 0.0000484 | 0.0000454 | 0.0000448 |
| 0.0000646 | 0.0000758 | 0.0000899 | 0.0001070 | 0.0001270 |
| 0.0002304 | 0.0002588 | 0.0002862 | 0.0003116 | 0.0003340 |
| 0.0003749 | 0.0003705 | 0.0003602 | 0.0003446 | 0.0003248 |
| 0.0002282 | 0.0002066 | 0.0001883 | 0.0001741 | 0.0001645 |
| 0.0001841 | 0.0002080 | 0.0002423 | 0.0002890 | 0.0003499 |
| 0.0007497 | 0.0008823 | 0.0010206 | 0.0011580 | 0.0012886 |

Figure D1. (Sheet 2 of 6)

|           |           |           |           |           |           |           |           |
|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| 0.0016238 | 0.0016417 | 0.0016315 | 0.0015962 | 0.0015406 | 0.0014710 | 0.0013957 | 0.0013233 |
| 0.0012640 | 0.0012283 | 0.0012298 | 0.0012818 | 0.0014097 | 0.0016472 | 0.0020501 | 0.0027031 |
| 0.0037305 | 0.0052903 | 0.0075380 | 0.0105780 | 0.0143231 | 0.0184371 | 0.0223070 | 0.0251846 |
| 0.0264517 | 0.0258812 | 0.0237446 | 0.0206977 | 0.0175358 | 0.0148847 | 0.0131475 | 0.0123664 |
| 0.0125511 | 0.0135672 | 0.0152252 | 0.0170694 | 0.0182673 |           |           |           |
| 5         | 0.08350   | 0.103069  | 123456    | 17        |           |           |           |
| 0.0073335 | 0.0070561 | 0.0065963 | 0.0060441 | 0.0054270 | 0.0047748 | 0.0041188 | 0.0034858 |
| 0.0028977 | 0.0023706 | 0.0019132 | 0.0015284 | 0.0012139 | 0.0009635 | 0.0007686 | 0.0006200 |
| 0.0005086 | 0.0004262 | 0.0003662 | 0.0003230 | 0.0002924 | 0.0002712 | 0.0002570 | 0.0002478 |
| 0.0002422 | 0.0002391 | 0.0002377 | 0.0002371 | 0.0002370 | 0.0002369 | 0.0002365 | 0.0002356 |
| 0.0002341 | 0.0002320 | 0.0002291 | 0.0002255 | 0.0002212 | 0.0002162 | 0.0002106 | 0.0002044 |
| 0.0001976 | 0.0001904 | 0.0001827 | 0.0001746 | 0.0001662 | 0.0001575 | 0.0001486 | 0.0001397 |
| 0.0001307 | 0.0001219 | 0.0001134 | 0.0001052 | 0.0000975 | 0.0000905 | 0.0000842 | 0.0000788 |
| 0.0000745 | 0.0000712 | 0.0000691 | 0.0000683 | 0.0000688 | 0.0000709 | 0.0000745 | 0.0000799 |
| 0.0000871 | 0.0000963 | 0.0001076 | 0.0001210 | 0.0001364 | 0.0001539 | 0.0001733 | 0.0001942 |
| 0.0002163 | 0.0002394 | 0.0002630 | 0.0002868 | 0.0003102 | 0.0003330 | 0.0003548 | 0.0003751 |
| 0.0003937 | 0.0004103 | 0.0004245 | 0.0004362 | 0.0004451 | 0.0004513 | 0.0004547 | 0.0004555 |
| 0.0004542 | 0.0004513 | 0.0004477 | 0.0004445 | 0.0004434 | 0.0004459 | 0.0004542 | 0.0004706 |
| 0.0004979 | 0.0005394 | 0.0005985 | 0.0006792 | 0.0007854 | 0.0009206 | 0.0010873 | 0.0012860 |
| 0.0015145 | 0.0017678 | 0.0020376 | 0.0023131 | 0.0025812 | 0.0028281 | 0.0030396 | 0.0032030 |
| 0.0033082 | 0.0033487 | 0.0033229 | 0.0032339 | 0.0030909 | 0.0029076 | 0.0027012 | 0.0024895 |
| 0.0022896 | 0.0021149 | 0.0019749 | 0.0018742 | 0.0018141 | 0.0017931 | 0.0018074 | 0.0018518 |
| 0.0019211 | 0.0020088 | 0.0021090 | 0.0022160 | 0.0023246 | 0.0024301 | 0.0025296 | 0.0026200 |
| 0.0026992 | 0.0027662 | 0.0028201 | 0.0028604 | 0.0028874 | 0.0029019 | 0.0029051 | 0.0028996 |
| 0.0028888 | 0.0028778 | 0.0028732 | 0.0028845 | 0.0029238 | 0.0030063 | 0.0031510 | 0.0033817 |
| 0.0037271 | 0.0042199 | 0.0048956 | 0.0057851 | 0.0069087 | 0.0082621 | 0.0098082 | 0.0114669 |
| 0.0131227 | 0.0146364 | 0.0158607 | 0.0166739 | 0.0169917 | 0.0167923 | 0.0161154 | 0.0150639 |
| 0.0137799 | 0.0124221 | 0.0111354 | 0.0100286 | 0.0091614 | 0.0085497 | 0.0081684 | 0.0079664 |
| 0.0078785 | 0.0078352 | 0.0077734 | 0.0076412 | 0.0074798 |           |           |           |
| 6         | 0.09326   | 0.147455  | 123456    | 30        |           |           |           |
| 0.0008755 | 0.0008897 | 0.0009024 | 0.0009057 | 0.0008983 | 0.0008792 | 0.0008484 | 0.0008063 |
| 0.0007543 | 0.0006942 | 0.0006284 | 0.0005599 | 0.0004914 | 0.0004257 | 0.0003652 | 0.0003113 |
| 0.0002651 | 0.0002267 | 0.0001956 | 0.0001711 | 0.0001523 | 0.0001383 | 0.0001279 | 0.0001206 |
| 0.0001155 | 0.0001120 | 0.0001098 | 0.0001083 | 0.0001072 | 0.0001063 | 0.0001054 | 0.0001042 |
| 0.0001028 | 0.0001011 | 0.0000990 | 0.0000965 | 0.0000937 | 0.0000906 | 0.0000871 | 0.0000835 |
| 0.0000797 | 0.0000757 | 0.0000716 | 0.0000674 | 0.0000632 | 0.0000590 | 0.0000548 | 0.0000507 |
| 0.0000467 | 0.0000428 | 0.0000391 | 0.0000356 | 0.0000322 | 0.0000292 | 0.0000263 | 0.0000238 |
| 0.0000215 | 0.0000195 | 0.0000178 | 0.0000165 | 0.0000154 | 0.0000147 | 0.0000143 | 0.0000142 |
| 0.0000146 | 0.0000153 | 0.0000166 | 0.0000185 | 0.0000212 | 0.0000248 | 0.0000295 | 0.0000356 |
| 0.0000434 | 0.0000531 | 0.0000651 | 0.0000795 | 0.0000965 | 0.0001163 | 0.0001388 | 0.0001639 |
| 0.0001915 | 0.0002211 | 0.0002525 | 0.0002850 | 0.0003181 | 0.0003512 | 0.0003837 | 0.0004149 |
| 0.0004442 | 0.0004710 | 0.0004949 | 0.0005155 | 0.0005329 | 0.0005472 | 0.0005592 | 0.0005701 |
| 0.0005820 | 0.0005977 | 0.0006217 | 0.0006602 | 0.0007226 | 0.0008233 | 0.0009862 | 0.0012513 |
| 0.0016878 | 0.0024144 | 0.0036289 | 0.0056390 | 0.0088647 | 0.0137484 | 0.0204630 | 0.0284677 |
| 0.0361113 | 0.0409808 | 0.0411608 | 0.0366926 | 0.0296047 | 0.0224047 | 0.0166240 | 0.0126025 |
| 0.0100203 | 0.0084386 | 0.0074917 | 0.0069189 | 0.0065563 | 0.0062955 | 0.0060652 | 0.0058236 |
| 0.0055473 | 0.0052261 | 0.0048608 | 0.0044582 | 0.0040292 | 0.0035867 | 0.0031455 | 0.0027193 |
| 0.0023202 | 0.0019580 | 0.0016399 | 0.0013690 | 0.0011461 | 0.0009690 | 0.0008341 | 0.0007367 |
| 0.0006726 | 0.0006379 | 0.0006298 | 0.0006470 | 0.0006888 | 0.0007554 | 0.0008469 | 0.0009633 |
| 0.0011036 | 0.0012652 | 0.0014438 | 0.0016328 | 0.0018238 | 0.0020067 | 0.0021697 | 0.0023011 |
| 0.0023893 | 0.0024251 | 0.0024026 | 0.0023213 | 0.0021866 | 0.0020097 | 0.0018068 | 0.0015960 |
| 0.0013945 | 0.0012153 | 0.0010665 | 0.0009510 | 0.0008678 | 0.0008136 | 0.0007841 | 0.0007745 |
| 0.0007803 | 0.0007968 | 0.0008199 | 0.0008454 | 0.0008641 |           |           |           |
| 7         | 0.10303   | 0.693095  | 123456    | 30        |           |           |           |
| 0.0002433 | 0.0002404 | 0.0002354 | 0.0002293 | 0.0002224 | 0.0002150 | 0.0002072 | 0.0001992 |
| 0.0001911 | 0.0001829 | 0.0001746 | 0.0001664 | 0.0001581 | 0.0001497 | 0.0001414 | 0.0001332 |
| 0.0001251 | 0.0001172 | 0.0001096 | 0.0001025 | 0.0000957 | 0.0000895 | 0.0000838 | 0.0000787 |
| 0.0000740 | 0.0000698 | 0.0000659 | 0.0000624 | 0.0000592 | 0.0000562 | 0.0000534 | 0.0000507 |
| 0.0000482 | 0.0000459 | 0.0000437 | 0.0000416 | 0.0000396 | 0.0000377 | 0.0000360 | 0.0000344 |
| 0.0000328 | 0.0000314 | 0.0000301 | 0.0000289 | 0.0000278 | 0.0000267 | 0.0000258 | 0.0000249 |
| 0.0000240 | 0.0000232 | 0.0000225 | 0.0000218 | 0.0000212 | 0.0000206 | 0.0000200 | 0.0000194 |
| 0.0000189 | 0.0000185 | 0.0000180 | 0.0000176 | 0.0000173 | 0.0000170 | 0.0000169 | 0.0000168 |
| 0.0000168 | 0.0000170 | 0.0000173 | 0.0000179 | 0.0000187 | 0.0000199 | 0.0000214 | 0.0000233 |
| 0.0000257 | 0.0000287 | 0.0000324 | 0.0000368 | 0.0000422 | 0.0000486 | 0.0000562 | 0.0000653 |
| 0.0000759 | 0.0000884 | 0.0001031 | 0.0001203 | 0.0001406 | 0.0001645 | 0.0001927 | 0.0002263 |
| 0.0002664 | 0.0003145 | 0.0003726 | 0.0004433 | 0.0005298 | 0.0006364 | 0.0007688 | 0.0009343 |
| 0.0011429 | 0.0014078 | 0.0017469 | 0.0021846 | 0.0027537 | 0.0034990 | 0.0044801 | 0.0057751 |

Figure D1. (Sheet 3 of 6)

|           |           |           |           |           |           |           |           |
|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| 0.0074806 | 0.0097054 | 0.0125507 | 0.0160685 | 0.0202028 | 0.0247232 | 0.0291852 | 0.0329370 |
| 0.0352289 | 0.0354451 | 0.0333966 | 0.0295096 | 0.0246672 | 0.0198213 | 0.0156261 | 0.0123284 |
| 0.0098846 | 0.0081272 | 0.0068762 | 0.0059843 | 0.0053438 | 0.0048801 | 0.0045425 | 0.0042957 |
| 0.0041145 | 0.0039793 | 0.0038737 | 0.0037823 | 0.0036900 | 0.0035819 | 0.0034439 | 0.0032658 |
| 0.0030429 | 0.0027787 | 0.0024847 | 0.0021781 | 0.0018772 | 0.0015974 | 0.0013486 | 0.0011351 |
| 0.0009565 | 0.0008096 | 0.0006901 | 0.0005931 | 0.0005147 | 0.0004510 | 0.0003991 | 0.0003568 |
| 0.0003220 | 0.0002933 | 0.0002696 | 0.0002500 | 0.0002338 | 0.0002204 | 0.0002095 | 0.0002006 |
| 0.0001935 | 0.0001880 | 0.0001840 | 0.0001814 | 0.0001801 | 0.0001801 | 0.0001814 | 0.0001840 |
| 0.0001878 | 0.0001928 | 0.0001989 | 0.0002060 | 0.0002136 | 0.0002214 | 0.0002289 | 0.0002355 |
| 0.0002409 | 0.0002445 | 0.0002463 | 0.0002461 | 0.0002448 |           |           |           |
| 8         | 0.11279   | 2.089863  | 123456    | 20        |           |           |           |
| 0.0000522 | 0.0000545 | 0.0000578 | 0.0000613 | 0.0000650 | 0.0000688 | 0.0000728 | 0.0000770 |
| 0.0000813 | 0.0000857 | 0.0000902 | 0.0000947 | 0.0000991 | 0.0001033 | 0.0001070 | 0.0001102 |
| 0.0001124 | 0.0001136 | 0.0001133 | 0.0001116 | 0.0001084 | 0.0001037 | 0.0000978 | 0.0000909 |
| 0.0000836 | 0.0000761 | 0.0000688 | 0.0000620 | 0.0000557 | 0.0000502 | 0.0000453 | 0.0000410 |
| 0.0000373 | 0.0000341 | 0.0000314 | 0.0000290 | 0.0000269 | 0.0000251 | 0.0000235 | 0.0000222 |
| 0.0000210 | 0.0000199 | 0.0000190 | 0.0000182 | 0.0000174 | 0.0000168 | 0.0000163 | 0.0000158 |
| 0.0000154 | 0.0000151 | 0.0000148 | 0.0000146 | 0.0000144 | 0.0000143 | 0.0000143 | 0.0000143 |
| 0.0000143 | 0.0000145 | 0.0000146 | 0.0000149 | 0.0000152 | 0.0000157 | 0.0000162 | 0.0000169 |
| 0.0000177 | 0.0000187 | 0.0000199 | 0.0000214 | 0.0000233 | 0.0000255 | 0.0000283 | 0.0000316 |
| 0.0000357 | 0.0000406 | 0.0000464 | 0.0000534 | 0.0000616 | 0.0000712 | 0.0000824 | 0.0000952 |
| 0.0001099 | 0.0001266 | 0.0001455 | 0.0001667 | 0.0001907 | 0.0002178 | 0.0002484 | 0.0002833 |
| 0.0003232 | 0.0003691 | 0.0004226 | 0.0004852 | 0.0005593 | 0.0006480 | 0.0007555 | 0.0008876 |
| 0.0010525 | 0.0012622 | 0.0015347 | 0.0018971 | 0.0023911 | 0.0030803 | 0.0040614 | 0.0054754 |
| 0.0075140 | 0.0104064 | 0.0143627 | 0.0194510 | 0.0254233 | 0.0315676 | 0.0367402 | 0.0396652 |
| 0.0394968 | 0.0362911 | 0.0310396 | 0.0251414 | 0.0197374 | 0.0153873 | 0.0121588 | 0.0098676 |
| 0.0082720 | 0.0071640 | 0.0063906 | 0.0058475 | 0.0054647 | 0.0051947 | 0.0050035 | 0.0048645 |
| 0.0047535 | 0.0046468 | 0.0045192 | 0.0043456 | 0.0041053 | 0.0037877 | 0.0033978 | 0.0029579 |
| 0.0025016 | 0.0020639 | 0.0016712 | 0.0013378 | 0.0010658 | 0.0008500 | 0.0006815 | 0.0005509 |
| 0.0004499 | 0.0003714 | 0.0003100 | 0.0002615 | 0.0002230 | 0.0001920 | 0.0001669 | 0.0001462 |
| 0.0001292 | 0.0001150 | 0.0001030 | 0.0000928 | 0.0000841 | 0.0000766 | 0.0000701 | 0.0000645 |
| 0.0000595 | 0.0000552 | 0.0000514 | 0.0000481 | 0.0000452 | 0.0000427 | 0.0000407 | 0.0000390 |
| 0.0000377 | 0.0000369 | 0.0000364 | 0.0000363 | 0.0000366 | 0.0000373 | 0.0000383 | 0.0000397 |
| 0.0000415 | 0.0000436 | 0.0000459 | 0.0000486 | 0.0000507 |           |           |           |
| 9         | 0.12256   | 1.743782  | 123456    | 30        |           |           |           |
| 0.0000549 | 0.0000598 | 0.0000669 | 0.0000747 | 0.0000833 | 0.0000925 | 0.0001023 | 0.0001127 |
| 0.0001235 | 0.0001346 | 0.0001456 | 0.0001563 | 0.0001661 | 0.0001747 | 0.0001814 | 0.0001856 |
| 0.0001867 | 0.0001844 | 0.0001786 | 0.0001694 | 0.0001575 | 0.0001437 | 0.0001289 | 0.0001141 |
| 0.0001001 | 0.0000873 | 0.0000760 | 0.0000663 | 0.0000580 | 0.0000511 | 0.0000454 | 0.0000406 |
| 0.0000366 | 0.0000332 | 0.0000304 | 0.0000280 | 0.0000260 | 0.0000243 | 0.0000227 | 0.0000214 |
| 0.0000203 | 0.0000193 | 0.0000184 | 0.0000176 | 0.0000169 | 0.0000163 | 0.0000158 | 0.0000153 |
| 0.0000149 | 0.0000146 | 0.0000143 | 0.0000141 | 0.0000139 | 0.0000138 | 0.0000137 | 0.0000137 |
| 0.0000137 | 0.0000138 | 0.0000140 | 0.0000142 | 0.0000146 | 0.0000150 | 0.0000155 | 0.0000162 |
| 0.0000170 | 0.0000180 | 0.0000192 | 0.0000207 | 0.0000226 | 0.0000249 | 0.0000278 | 0.0000314 |
| 0.0000358 | 0.0000414 | 0.0000483 | 0.0000569 | 0.0000675 | 0.0000806 | 0.0000967 | 0.0001162 |
| 0.0001398 | 0.0001679 | 0.0002011 | 0.0002398 | 0.0002844 | 0.0003354 | 0.0003929 | 0.0004573 |
| 0.0005287 | 0.0006074 | 0.0006935 | 0.0007872 | 0.0008887 | 0.0009984 | 0.0011170 | 0.0012455 |
| 0.0013862 | 0.0015430 | 0.0017229 | 0.0019370 | 0.0022034 | 0.0025495 | 0.0030166 | 0.0036650 |
| 0.0045809 | 0.0058839 | 0.0077314 | 0.0103134 | 0.0138240 | 0.0183871 | 0.0239147 | 0.0299027 |
| 0.0352759 | 0.0385390 | 0.0384481 | 0.0348974 | 0.0291317 | 0.0229248 | 0.0175610 | 0.0135010 |
| 0.0106514 | 0.0087278 | 0.0074557 | 0.0066303 | 0.0061146 | 0.0058204 | 0.0056909 | 0.0056872 |
| 0.0057777 | 0.0059286 | 0.0060951 | 0.0062163 | 0.0062167 | 0.0060227 | 0.0055930 | 0.0049464 |
| 0.0041635 | 0.0033536 | 0.0026106 | 0.0019875 | 0.0014967 | 0.0011256 | 0.0008511 | 0.0006500 |
| 0.0005027 | 0.0003941 | 0.0003134 | 0.0002526 | 0.0002062 | 0.0001704 | 0.0001425 | 0.0001203 |
| 0.0001026 | 0.0000883 | 0.0000765 | 0.0000669 | 0.0000589 | 0.0000522 | 0.0000466 | 0.0000418 |
| 0.0000378 | 0.0000345 | 0.0000316 | 0.0000293 | 0.0000274 | 0.0000259 | 0.0000247 | 0.0000239 |
| 0.0000235 | 0.0000234 | 0.0000237 | 0.0000244 | 0.0000255 | 0.0000270 | 0.0000291 | 0.0000316 |
| 0.0000347 | 0.0000384 | 0.0000427 | 0.0000477 | 0.0000519 |           |           |           |
| 10        | 0.13232   | 1.735533  | 123456    | 30        |           |           |           |
| 0.0000435 | 0.0000460 | 0.0000497 | 0.0000535 | 0.0000575 | 0.0000617 | 0.0000659 | 0.0000700 |
| 0.0000740 | 0.0000777 | 0.0000810 | 0.0000837 | 0.0000856 | 0.0000866 | 0.0000867 | 0.0000857 |
| 0.0000837 | 0.0000806 | 0.0000768 | 0.0000722 | 0.0000673 | 0.0000622 | 0.0000572 | 0.0000525 |
| 0.0000481 | 0.0000443 | 0.0000410 | 0.0000383 | 0.0000360 | 0.0000341 | 0.0000327 | 0.0000315 |
| 0.0000306 | 0.0000298 | 0.0000291 | 0.0000286 | 0.0000280 | 0.0000275 | 0.0000270 | 0.0000265 |
| 0.0000259 | 0.0000253 | 0.0000246 | 0.0000239 | 0.0000232 | 0.0000225 | 0.0000218 | 0.0000210 |
| 0.0000203 | 0.0000196 | 0.0000189 | 0.0000182 | 0.0000175 | 0.0000169 | 0.0000163 | 0.0000157 |
| 0.0000152 | 0.0000148 | 0.0000143 | 0.0000140 | 0.0000137 | 0.0000135 | 0.0000133 | 0.0000132 |

Figure D1. (Sheet 4 of 6)

|           |           |           |           |           |           |           |           |
|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| 0.0000132 | 0.0000134 | 0.0000136 | 0.0000140 | 0.0000146 | 0.0000154 | 0.0000164 | 0.0000178 |
| 0.0000195 | 0.0000217 | 0.0000246 | 0.0000281 | 0.0000326 | 0.0000383 | 0.0000453 | 0.0000541 |
| 0.0000650 | 0.0000783 | 0.0000946 | 0.0001143 | 0.0001378 | 0.0001656 | 0.0001982 | 0.0002361 |
| 0.0002797 | 0.0003295 | 0.0003861 | 0.0004504 | 0.0005233 | 0.0006063 | 0.0007014 | 0.0008116 |
| 0.0009415 | 0.0010979 | 0.0012914 | 0.0015387 | 0.0018661 | 0.0023157 | 0.0029549 | 0.0038897 |
| 0.0052807 | 0.0073510 | 0.0103594 | 0.0144950 | 0.0196725 | 0.0253112 | 0.0303223 | 0.0334761 |
| 0.0339969 | 0.0319511 | 0.0281451 | 0.0236678 | 0.0194275 | 0.0159362 | 0.0133391 | 0.0115593 |
| 0.0104330 | 0.0097883 | 0.0094782 | 0.0093838 | 0.0094106 | 0.0094815 | 0.0095311 | 0.0095013 |
| 0.0093408 | 0.0090080 | 0.0084785 | 0.0077556 | 0.0068767 | 0.0059096 | 0.0049365 | 0.0040313 |
| 0.0032426 | 0.0025892 | 0.0020664 | 0.0016565 | 0.0013382 | 0.0010909 | 0.0008978 | 0.0007456 |
| 0.0006243 | 0.0005266 | 0.0004469 | 0.0003813 | 0.0003267 | 0.0002808 | 0.0002420 | 0.0002089 |
| 0.0001805 | 0.0001561 | 0.0001351 | 0.0001169 | 0.0001012 | 0.0000877 | 0.0000761 | 0.0000662 |
| 0.0000578 | 0.0000507 | 0.0000449 | 0.0000400 | 0.0000361 | 0.0000330 | 0.0000305 | 0.0000287 |
| 0.0000275 | 0.0000267 | 0.0000264 | 0.0000264 | 0.0000269 | 0.0000277 | 0.0000289 | 0.0000304 |
| 0.0000322 | 0.0000344 | 0.0000368 | 0.0000396 | 0.0000419 |           |           |           |
| 11        | 0.14209   | 1.100230  | 123456    | 30        |           |           |           |
| 0.0000484 | 0.0000502 | 0.0000527 | 0.0000555 | 0.0000584 | 0.0000614 | 0.0000647 | 0.0000681 |
| 0.0000716 | 0.0000753 | 0.0000791 | 0.0000829 | 0.0000867 | 0.0000905 | 0.0000942 | 0.0000976 |
| 0.0001007 | 0.0001033 | 0.0001053 | 0.0001065 | 0.0001069 | 0.0001063 | 0.0001047 | 0.0001022 |
| 0.0000987 | 0.0000946 | 0.0000898 | 0.0000847 | 0.0000794 | 0.0000741 | 0.0000689 | 0.0000640 |
| 0.0000593 | 0.0000549 | 0.0000509 | 0.0000472 | 0.0000439 | 0.0000408 | 0.0000381 | 0.0000356 |
| 0.0000333 | 0.0000313 | 0.0000294 | 0.0000277 | 0.0000262 | 0.0000248 | 0.0000235 | 0.0000223 |
| 0.0000213 | 0.0000203 | 0.0000194 | 0.0000186 | 0.0000178 | 0.0000172 | 0.0000165 | 0.0000160 |
| 0.0000155 | 0.0000151 | 0.0000147 | 0.0000144 | 0.0000142 | 0.0000140 | 0.0000139 | 0.0000139 |
| 0.0000140 | 0.0000141 | 0.0000144 | 0.0000148 | 0.0000153 | 0.0000160 | 0.0000169 | 0.0000181 |
| 0.0000195 | 0.0000213 | 0.0000236 | 0.0000264 | 0.0000299 | 0.0000343 | 0.0000397 | 0.0000465 |
| 0.0000551 | 0.0000657 | 0.0000790 | 0.0000957 | 0.0001163 | 0.0001420 | 0.0001737 | 0.0002126 |
| 0.0002602 | 0.0003183 | 0.0003886 | 0.0004736 | 0.0005762 | 0.0007000 | 0.0008497 | 0.0010317 |
| 0.0012546 | 0.0015302 | 0.0018749 | 0.0023115 | 0.0028711 | 0.0035941 | 0.0045297 | 0.0057288 |
| 0.0072275 | 0.0090181 | 0.0110173 | 0.0130539 | 0.0149006 | 0.0163467 | 0.0172711 | 0.0176723 |
| 0.0176457 | 0.0173375 | 0.0169026 | 0.0164796 | 0.0161813 | 0.0160890 | 0.0162452 | 0.0166401 |
| 0.0171933 | 0.0177510 | 0.0181138 | 0.0180967 | 0.0175961 | 0.0166213 | 0.0152771 | 0.0137139 |
| 0.0120811 | 0.0104976 | 0.0090429 | 0.0077608 | 0.0066673 | 0.0057588 | 0.0050183 | 0.0044204 |
| 0.0039351 | 0.0035319 | 0.0031827 | 0.0028655 | 0.0025658 | 0.0022767 | 0.0019977 | 0.0017319 |
| 0.0014839 | 0.0012575 | 0.0010552 | 0.0008781 | 0.0007256 | 0.0005961 | 0.0004877 | 0.0003978 |
| 0.0003241 | 0.0002641 | 0.0002156 | 0.0001766 | 0.0001455 | 0.0001208 | 0.0001013 | 0.0000858 |
| 0.0000737 | 0.0000641 | 0.0000567 | 0.0000508 | 0.0000463 | 0.0000429 | 0.0000403 | 0.0000385 |
| 0.0000372 | 0.0000364 | 0.0000360 | 0.0000360 | 0.0000364 | 0.0000370 | 0.0000379 | 0.0000390 |
| 0.0000403 | 0.0000419 | 0.0000437 | 0.0000457 | 0.0000473 |           |           |           |
| 12        | 0.15186   | 0.766675  | 123456    | 30        |           |           |           |
| 0.0000492 | 0.0000525 | 0.0000574 | 0.0000632 | 0.0000698 | 0.0000772 | 0.0000854 | 0.0000941 |
| 0.0001031 | 0.0001119 | 0.0001200 | 0.0001266 | 0.0001311 | 0.0001328 | 0.0001314 | 0.0001270 |
| 0.0001198 | 0.0001106 | 0.0001001 | 0.0000891 | 0.0000785 | 0.0000686 | 0.0000598 | 0.0000522 |
| 0.0000459 | 0.0000406 | 0.0000363 | 0.0000329 | 0.0000302 | 0.0000282 | 0.0000267 | 0.0000256 |
| 0.0000250 | 0.0000247 | 0.0000248 | 0.0000252 | 0.0000259 | 0.0000269 | 0.0000282 | 0.0000297 |
| 0.0000315 | 0.0000335 | 0.0000356 | 0.0000377 | 0.0000398 | 0.0000418 | 0.0000436 | 0.0000450 |
| 0.0000460 | 0.0000466 | 0.0000468 | 0.0000466 | 0.0000460 | 0.0000451 | 0.0000439 | 0.0000426 |
| 0.0000412 | 0.0000398 | 0.0000384 | 0.0000371 | 0.0000359 | 0.0000348 | 0.0000339 | 0.0000331 |
| 0.0000326 | 0.0000322 | 0.0000321 | 0.0000322 | 0.0000326 | 0.0000332 | 0.0000342 | 0.0000356 |
| 0.0000374 | 0.0000396 | 0.0000424 | 0.0000459 | 0.0000502 | 0.0000554 | 0.0000617 | 0.0000693 |
| 0.0000785 | 0.0000897 | 0.0001032 | 0.0001196 | 0.0001397 | 0.0001642 | 0.0001943 | 0.0002316 |
| 0.0002781 | 0.0003365 | 0.0004105 | 0.0005052 | 0.0006272 | 0.0007859 | 0.0009936 | 0.0012668 |
| 0.0016266 | 0.0020991 | 0.0027137 | 0.0034989 | 0.0044725 | 0.0056280 | 0.0069179 | 0.0082467 |
| 0.0094830 | 0.0104991 | 0.0112176 | 0.0116402 | 0.0118380 | 0.0119168 | 0.0119818 | 0.0121170 |
| 0.0123803 | 0.0128062 | 0.0134097 | 0.0141863 | 0.0151075 | 0.0161128 | 0.0171046 | 0.0179503 |
| 0.0185021 | 0.0186332 | 0.0182803 | 0.0174680 | 0.0162983 | 0.0149154 | 0.0134610 | 0.0120456 |
| 0.0107394 | 0.0095765 | 0.0085651 | 0.0076987 | 0.0069635 | 0.0063430 | 0.0058211 | 0.0053826 |
| 0.0050136 | 0.0047007 | 0.0044312 | 0.0041919 | 0.0039700 | 0.0037530 | 0.0035299 | 0.0032923 |
| 0.0030357 | 0.0027596 | 0.0024677 | 0.0021675 | 0.0018683 | 0.0015802 | 0.0013123 | 0.0010716 |
| 0.0008623 | 0.0006857 | 0.0005405 | 0.0004240 | 0.0003321 | 0.0002607 | 0.0002059 | 0.0001641 |
| 0.0001322 | 0.0001080 | 0.0000896 | 0.0000756 | 0.0000649 | 0.0000567 | 0.0000504 | 0.0000457 |
| 0.0000421 | 0.0000394 | 0.0000375 | 0.0000363 | 0.0000356 | 0.0000354 | 0.0000358 | 0.0000366 |
| 0.0000378 | 0.0000396 | 0.0000419 | 0.0000448 | 0.0000473 |           |           |           |
| 13        | 0.16162   | 0.821175  | 123456    | 7         |           |           |           |
| 0.0001081 | 0.0001140 | 0.0001224 | 0.0001312 | 0.0001399 | 0.0001480 | 0.0001548 | 0.0001595 |
| 0.0001617 | 0.0001609 | 0.0001572 | 0.0001509 | 0.0001428 | 0.0001335 | 0.0001237 | 0.0001141 |
| 0.0001050 | 0.0000968 | 0.0000894 | 0.0000829 | 0.0000772 | 0.0000724 | 0.0000681 | 0.0000645 |

Figure D1. (Sheet 5 of 6)

|           |           |           |           |           |           |           |           |
|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| 0.0000613 | 0.0000586 | 0.0000562 | 0.0000541 | 0.0000523 | 0.0000508 | 0.0000495 | 0.0000484 |
| 0.0000474 | 0.0000467 | 0.0000462 | 0.0000458 | 0.0000457 | 0.0000457 | 0.0000461 | 0.0000466 |
| 0.0000475 | 0.0000486 | 0.0000500 | 0.0000518 | 0.0000538 | 0.0000560 | 0.0000584 | 0.0000608 |
| 0.0000630 | 0.0000649 | 0.0000663 | 0.0000671 | 0.0000673 | 0.0000669 | 0.0000659 | 0.0000644 |
| 0.0000626 | 0.0000606 | 0.0000585 | 0.0000565 | 0.0000546 | 0.0000529 | 0.0000514 | 0.0000502 |
| 0.0000494 | 0.0000488 | 0.0000486 | 0.0000489 | 0.0000495 | 0.0000506 | 0.0000522 | 0.0000544 |
| 0.0000572 | 0.0000608 | 0.0000652 | 0.0000707 | 0.0000775 | 0.0000857 | 0.0000956 | 0.0001077 |
| 0.0001222 | 0.0001397 | 0.0001608 | 0.0001862 | 0.0002168 | 0.0002537 | 0.0002981 | 0.0003518 |
| 0.0004170 | 0.0004963 | 0.0005933 | 0.0007124 | 0.0008594 | 0.0010414 | 0.0012677 | 0.0015496 |
| 0.0019009 | 0.0023376 | 0.0028776 | 0.0035390 | 0.0043371 | 0.0052795 | 0.0063603 | 0.0075534 |
| 0.0088095 | 0.0100597 | 0.0112281 | 0.0122521 | 0.0130998 | 0.0137782 | 0.0143272 | 0.0148053 |
| 0.0152720 | 0.0157746 | 0.0163404 | 0.0169703 | 0.0176342 | 0.0182660 | 0.0187629 | 0.0189973 |
| 0.0188423 | 0.0182143 | 0.0171133 | 0.0156352 | 0.0139437 | 0.0122162 | 0.0105969 | 0.0091740 |
| 0.0079824 | 0.0070199 | 0.0062640 | 0.0056847 | 0.0052516 | 0.0049370 | 0.0047163 | 0.0045670 |
| 0.0044679 | 0.0043971 | 0.0043316 | 0.0042476 | 0.0041230 | 0.0039409 | 0.0036936 | 0.0033854 |
| 0.0030316 | 0.0026548 | 0.0022786 | 0.0019231 | 0.0016016 | 0.0013210 | 0.0010825 | 0.0008840 |
| 0.0007211 | 0.0005890 | 0.0004825 | 0.0003972 | 0.0003291 | 0.0002748 | 0.0002315 | 0.0001970 |
| 0.0001696 | 0.0001477 | 0.0001303 | 0.0001164 | 0.0001053 | 0.0000966 | 0.0000898 | 0.0000845 |
| 0.0000806 | 0.0000778 | 0.0000761 | 0.0000752 | 0.0000753 | 0.0000761 | 0.0000778 | 0.0000804 |
| 0.0000837 | 0.0000880 | 0.0000932 | 0.0000993 | 0.0001044 |           |           |           |

Figure D1. (Sheet 6 of 6)

# Appendix E

## Notation

---

| <u>Text</u>   | <u>Appendix C</u> |                                                                                                               |
|---------------|-------------------|---------------------------------------------------------------------------------------------------------------|
| $a_0$         |                   | Normalizing coefficient in maximum likelihood estimate (MLE)                                                  |
| $a_r$         |                   | Normalizing coefficient for $r^{th}$ iteration in iterative maximum likelihood estimator (IMLE)               |
| $A$           |                   | Quartile asymmetry parameter                                                                                  |
|               | angle(na)         | Element na of an array that represents direction coordinates                                                  |
| $C_{ij}(f_n)$ |                   | Coincident spectral density between gauges $i$ and $j$ at frequency $f_n$                                     |
| $d$           |                   | Water depth                                                                                                   |
|               | datetime          | Ten-character string that contains date and time                                                              |
|               | dbar              | Mean water depth                                                                                              |
|               | ddf(nf,na)        | Array element representing the directional distribution function at frequency $f(nf)$ and direction angle(na) |
| $d\theta$     | delang            | Direction increment                                                                                           |
| $df$          | delfs             | Frequency increment                                                                                           |
|               | dmax              | Maximum segment-averaged water depth in a collection                                                          |

Text      Appendix C

|                       |             |                                                                                                                           |
|-----------------------|-------------|---------------------------------------------------------------------------------------------------------------------------|
|                       | dmin        | Minimum segment-averaged water depth in a collection                                                                      |
| $D(\theta_m)$         |             | Directional distribution function based on $S(\theta_m)$                                                                  |
| $D(f_n, \theta_m)$    |             | Directional distribution function at frequency $f_n$ and direction $\theta_m$                                             |
| $D_0(f_n, \theta_m)$  |             | MLE estimate of directional distribution function at frequency $f_n$                                                      |
| $D_r(f_n, \theta_m)$  |             | IMLE estimate of directional distribution function at frequency $f_n$ after $r^{th}$ iteration                            |
| $D'_r(f_n, \theta_m)$ |             | Intermediate, uncorrected IMLE estimate of directional distribution function at frequency $f_n$ during $r^{th}$ iteration |
| $\hat{e}_x$           |             | Unit vector in the $x$ -direction                                                                                         |
| $\hat{e}_y$           |             | Unit vector in the $y$ -direction                                                                                         |
|                       | fds(nf, na) | Array element representing the frequency-direction spectrum at frequency $f(nf)$ and direction $angle(na)$                |
| $f_n$                 |             | $n^{th}$ frequency of a set of $N$ discrete frequencies                                                                   |
|                       | f(nf)       | Element nf of an array that represents frequency                                                                          |
| $f_p$                 | fp          | Peak frequency                                                                                                            |
| $g$                   |             | Gravitational acceleration                                                                                                |
|                       | gpat(nf)    | Element nf of an array of six-character strings that represent working gauge patterns                                     |
| hhmm                  |             | Mnemonic for time of day                                                                                                  |
| $H_{mo}$              | Hmo         | Characteristic wave height                                                                                                |

TextAppendix C

|                                  |          |                                                                                                                 |
|----------------------------------|----------|-----------------------------------------------------------------------------------------------------------------|
| $i$                              |          | Complex notation $\sqrt{-1}$ [in exponent or on main equation line]                                             |
|                                  |          | Gauge index [as subscript]                                                                                      |
|                                  | idgfr    | Degrees of freedom in cross-spectral estimation                                                                 |
|                                  | ifdtrnd  | Flag indicating whether or not data have been detrended                                                         |
|                                  | ifimle   | Flag indicating if maximum likelihood or iterative maximum likelihood estimation is used                        |
|                                  | ifwindo  | Flag indicating whether or not data segments have been windowed                                                 |
|                                  | istot    | Total number of seconds duration of a time series                                                               |
|                                  | iter(nf) | Number of iterative maximum likelihood iterations used to compute directional distribution at frequency $f(nf)$ |
| $I$                              |          | Number of gauges in an array                                                                                    |
| $I(\theta_m - \theta_{m_{min}})$ |          | Cumulative distribution function                                                                                |
| $\text{Im}[ ]$                   |          | Imaginary part of complex entity contained in brackets                                                          |
| $j$                              |          | Gauge index [as subscript]                                                                                      |
| $k_n$                            |          | Magnitude of wave number vector associated with $n^{\text{th}}$ discrete frequency                              |
| $\vec{k}_n(\theta_m)$            |          | Wave number vector for wave direction $\theta_m$ at $n^{\text{th}}$ discrete frequency                          |
| $l$                              |          | Summation index                                                                                                 |
| $m$                              | na       | Index associated with discrete direction                                                                        |
| $m_1$                            |          | First cosine moment of $D(\theta_m)$                                                                            |
| $m_2$                            |          | Second cosine moment of $D(\theta_m)$                                                                           |

| <u>Text</u>            | <u>Appendix C</u> |                                                                                                                                           |
|------------------------|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| $m_{min}$              |                   | Index of discrete direction at which wave energy is minimum                                                                               |
| $M$                    | nang              | Integer number of discrete directions                                                                                                     |
| $M_{ij}(f_n)$          |                   | Element of dimensionless matrix of cross spectra between gauges $i$ and $j$ at frequency $f_n$                                            |
| $M_{ij}^{-1}(f_n)$     |                   | Element of inverse of $M_{ij}(f_n)$                                                                                                       |
| ${}^rM_{ij}(f_n)$      |                   | Estimate of element of dimensionless matrix of cross spectra between gauges $i$ and $j$ at frequency $f_n$ during $r^{th}$ IMLE iteration |
| ${}^rM_{ij}^{-1}(f_n)$ |                   | Element of inverse of ${}^rM_{ij}(f_n)$                                                                                                   |
| $n$                    | nf                | Index associated with discrete frequency                                                                                                  |
| $n_1$                  |                   | First sine moment of $D(\theta_m)$                                                                                                        |
| $n_2$                  |                   | Second sine moment of $D(\theta_m)$                                                                                                       |
|                        | nband             | Number of frequency bands averaged in spectral estimation                                                                                 |
|                        | nensb             | Number of segments into which a data record is divided during spectral estimation                                                         |
|                        | nfft              | Number of data points in a data segment                                                                                                   |
| $N$                    | nfrq              | Integer number of discrete frequencies                                                                                                    |
| $Q_{ij}(f_n)$          |                   | Quadrature spectral density between gauges $i$ and $j$ at frequency $f_n$                                                                 |
| $r$                    |                   | Iteration count for IMLE                                                                                                                  |
|                        | rname             | Five-character string denoting reference gauge                                                                                            |
| $R$                    |                   | Upper limit of IMLE iterations                                                                                                            |
| $\text{Re}[ ]$         |                   | Real part of complex entity contained in brackets                                                                                         |

Text      Appendix C

|                      |          |                                                                                  |
|----------------------|----------|----------------------------------------------------------------------------------|
|                      | $sf(nf)$ | Element $nf$ of an array that represents the frequency spectrum                  |
|                      | $sfrq$   | Sampling frequency                                                               |
| $S(f_n)$             |          | Frequency spectral density at frequency $f_n$                                    |
| $S(\theta_m)$        |          | Direction spectral density at direction $\theta_m$                               |
| $S(f_n, \theta_m)$   |          | Frequency-direction spectral density at frequency $f_n$ and direction $\theta_m$ |
|                      | $thp$    | Peak direction of directional distribution at frequency $f_p$                    |
| $T_p$                |          | Peak period                                                                      |
| $x$                  |          | Horizontal coordinate increasing northward                                       |
| $\vec{x}_i$          |          | Horizontal position vector of gauge $i$                                          |
| $\vec{x}_j$          |          | Horizontal position vector of gauge $j$                                          |
| $y$                  |          | Horizontal coordinate increasing westward                                        |
| $yymmdd$             |          | Mnemonic for date                                                                |
| $\beta$              |          | Exponential convergence rate parameter in IMLE                                   |
| $\gamma$             |          | Convergence rate coefficient in IMLE                                             |
|                      |          | Circular skewness                                                                |
| $\Gamma_{ij}^2(f_n)$ |          | Coherence of signals from gauges $i$ and $j$ at frequency $f_n$                  |
| $\delta$             |          | Circular kurtosis                                                                |
| $\Delta\theta$       |          | Quartile directional spread parameter                                            |
| $\epsilon_r$         |          | Convergence check parameter at $r^{th}$ IMLE iteration                           |

| <u>Text</u>                | <u>Appendix C</u>                                                  |
|----------------------------|--------------------------------------------------------------------|
| $\theta_0$                 | Mean direction                                                     |
| $\theta_{25\%}$            | First quartile direction of cumulative distribution function       |
| $\theta_{50\%}$            | Median direction of cumulative distribution function               |
| $\theta_{75\%}$            | Third quartile direction of cumulative distribution function       |
| $\theta_l$                 | $l^{th}$ discrete direction                                        |
| $\theta_m$                 | $m^{th}$ direction of a set of $M$ discrete directions             |
| $\theta_{min}$             | Direction of minimum energy                                        |
| $\theta_p$                 | Peak direction                                                     |
| $\lambda_r(f_n, \theta_m)$ | IMLE correction factor at the $r^{th}$ iteration                   |
| $\sigma$                   | Circular width parameter                                           |
| $\phi_{ij}(f_n)$           | Cross-spectral phase between gauges $i$ and $j$ at frequency $f_n$ |

# REPORT DOCUMENTATION PAGE

Form Approved  
OMB No. 0704-0188

Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188), Washington, DC 20503.

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                             |                                            |                                                                              |  |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------|--------------------------------------------|------------------------------------------------------------------------------|--|
| 1. AGENCY USE ONLY (Leave blank)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                             | 2. REPORT DATE<br>June 1996                | 3. REPORT TYPE AND DATES COVERED<br>Final report                             |  |
| 4. TITLE AND SUBTITLE<br>1994 Annual Index of Wind Wave Directional Spectra Measured at Harvest Platform                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                             |                                            | 5. FUNDING NUMBERS                                                           |  |
| 6. AUTHOR(S)<br>Charles E. Long                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                             |                                            |                                                                              |  |
| 7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)<br>U.S. Army Engineer Waterways Experiment Station<br>3909 Halls Ferry Road<br>Vicksburg, MS 39180-6199                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                             |                                            | 8. PERFORMING ORGANIZATION<br>REPORT NUMBER<br>Miscellaneous Paper CERC-96-4 |  |
| 9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)<br>U.S. Army Corps of Engineers<br>Washington, DC 20314-1000                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                             |                                            | 10. SPONSORING/MONITORING<br>AGENCY REPORT NUMBER                            |  |
| 11. SUPPLEMENTARY NOTES<br>Available from National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22161.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                             |                                            |                                                                              |  |
| 12a. DISTRIBUTION/AVAILABILITY STATEMENT<br>Approved for public release; distribution is unlimited.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                             |                                            | 12b. DISTRIBUTION CODE                                                       |  |
| 13. ABSTRACT (Maximum 200 words)<br><br>This report indexes characteristic parameters of and describes a means of access to 2,320 wind wave frequency-direction spectra observed at the Texaco Oil Company Harvest Platform during calendar year 1994. Located at about the 200-m depth contour approximately 20 km west of Point Conception, California, the platform supports a spatial array of six pressure gauges, data from which are processed with an iterative maximum likelihood directional estimator. Nine parameters are defined, listed, and graphed in time series form: characteristic wave height, peak frequency, peak direction, four circular moments (mean direction, width, skewness, and kurtosis), and two parameters (directional spread and asymmetry) derived from quartile points of directional spectra. This report is the second in a series. |                                                             |                                            |                                                                              |  |
| 14. SUBJECT TERMS<br>Deep water<br>Frequency-direction spectra<br>Wave climate<br>Wind waves                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                             |                                            | 15. NUMBER OF PAGES<br>118                                                   |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                             |                                            | 16. PRICE CODE                                                               |  |
| 17. SECURITY CLASSIFICATION<br>OF REPORT<br>UNCLASSIFIED                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 18. SECURITY CLASSIFICATION<br>OF THIS PAGE<br>UNCLASSIFIED | 19. SECURITY CLASSIFICATION<br>OF ABSTRACT | 20. LIMITATION OF ABSTRACT                                                   |  |