

AD-A121 558

NONRANDOM BEHAVIOR IN FIELD WAVE SPECTRA AND ITS EFFECT
ON GROUPING OF HIGH WAVES(U) COASTAL ENGINEERING
RESEARCH CENTER FORT BELVOIR VA E F THOMPSON AUG 82
CERC-TR-82-2 F/G 8/3 NL

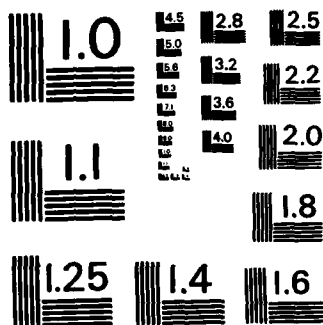
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MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS - 1963 - A

After completion of SMOOTH, the times and elevations of major peaks and valleys are stored in the first ITEMS elements of EXTIM. The value of ITEMS has been reduced in accordance with the number of small peaks and valleys eliminated. Since the smoothing algorithm cannot work properly at the end of a record, the last few points are usually accepted regardless of whether or not they satisfy the acceptance criteria. Thus, the last six elements in EXTIM may not represent major peaks or valleys and should either be checked or categorically eliminated.

A complete list of subroutine SMOOTH with comments is provided in Figure C-2.

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SUBROUTINE SMOOTH (FURST, ITEMS)

C      SUBROUTINE SMOOTH TAKES A RECORD OF PEAKS AND VALLEYS AND
C      ELIMINATES UNCONSEQUENTIAL PEAKS AND VALLEYS. THE ELIMINATION
C      CRITERIA ARE A MINIMUM DIFFERENCE BETWEEN PEAK AND VALLEY
C      ELEVATIONS (CMP) AND A MINIMUM HORIZONTAL SPACING (BE IT
C      TIME, POSITION, ETC) BETWEEN PEAK AND VALLEY (CMP).
C      INPUT PARAMETERS ARE DEFINED AS FOLLOWS:
C      FURST = STARTING TIME
C      ITEMS = TOTAL NUMBER OF EXTREME VALUES (INCLUDES TIME AND
C              ELEVATION VALUES)
C      CMP = CRITICAL HALF PERIOD
C      WMIN = MINIMUM HEIGHT TO BE CONSIDERED
C      EXTIM(ODD) = TIME
C      EXTIM(EVEN) = EXTREME ELEVATION ASSOCIATED WITH EXTIM(EVEN+1) VALUE
C              OF TIME
C      COMMON /SMOOTH/ EXTIM(100)
C      SET VALUES OF CMP AND WMIN TO BE USED
C      DATA CMP, WMIN / 0.000 3.0 /
C      INITIALIZE VARIABLES AND FIND STARTING POINT FOR PROCESSING
1503 ITEMS=ITEMS
    J=1
    ITEM7=ITEMS-7
    DO 1507 I=1,ITEMS,2
      IS=I*2
      IF(EXTIM(I).GE.FURST) GO TO 1504
      J=J+2
      ITEMS=ITEMS-2
1502 CONTINUE
1504 ISTART=IS+I

C.....

C      BEGIN MAIN PROCESSING LOOP
DO 1520 I=ISTART,ITEM7,2
  L=I
  IF(ISTART.GT.ITEM7)GO TO 1520
  IF(EXTIM(I)+CMP.GT.EXTIM(I+2))GO TO 1511
  IF(ABS(EXTIM(I+1)-EXTIM(I+3)).LT.WMIN)GO TO 1511
C      IF NO TRANSFER, THIS EXTREME ACCEPTED
  EXTIM(J)=EXTIM(I)
  EXTIM(J+1)=EXTIM(I+1)
  J=J+2
  GO TO 1520
C      WHEN THE NEXT INSTRUCTION IS REACHED, ONE HIGH AND ONE LOW WILL
C      BE DELETED
1511 IF(EXTIM(I+1).GT.EXTIM(I+3))GO TO 1510
C      IF NEXT INSTRUCTION IS USED, THIS IS A LOW
  IF(EXTIM(I+5).GT.EXTIM(I+1))GO TO 1512
  IF(EXTIM(I+3).GT.EXTIM(I+1))GO TO 1513
  GO TO 1517
1512 IF(EXTIM(I+3).GT.EXTIM(I+7))GO TO 1510
  GO TO 1516
C      WHEN NEXT INSTRUCTION IS USED, THIS IS A HIGH
1514 IF(EXTIM(I+5).GT.EXTIM(I+1))GO TO 1515
  IF(EXTIM(I+7).GT.EXTIM(I+1))GO TO 1510
  GO TO 1510
1515 IF(EXTIM(I+3).GT.EXTIM(I+1))GO TO 1517
  GO TO 1510
C      SET THE VALUE OF ICASE
1510 ICASE=1
  GO TO 1521
1517 ICASE=2
  GO TO 1521

```

Figure C-2. List of subroutine SMOOTH (from Thompson, 1980).

```

1518 ICASE=3
      GO TO 1521
1519 ICASE=4
1521 J1=I-2
      J2=I+7
C     DELETE ONE HIGH AND ONE LOW ACCORDING TO THE VALUE OF ICASE
      GO TO(1522,1523,1524,1525)ICASE.
C     STORAGE PLAN A
1522 EXTIM(J-2)=EXTIM(I-2)
      EXTIM(J-1)=EXTIM(I-1)
      EXTIM(J)=EXTIM(I)
      EXTIM(J+1)=EXTIM(I+1)
      EXTIM(J+2)=EXTIM(I+6)
      EXTIM(J+3)=EXTIM(I+7)
      GO TO 1526
C     STORAGE PLAN B
1523 EXTIM(J-2)=EXTIM(I-2)
      EXTIM(J-1)=EXTIM(I-1)
      EXTIM(J)=EXTIM(I+4)
      EXTIM(J+1)=EXTIM(I+5)
      EXTIM(J+2)=EXTIM(I+6)
      EXTIM(J+3)=EXTIM(I+7)
      GO TO 1526
C     STORAGE PLAN C
1524 EXTIM(J-2)=EXTIM(I+2)
      EXTIM(J-1)=EXTIM(I+3)
      EXTIM(J)=EXTIM(I+4)
      EXTIM(J+1)=EXTIM(I+5)
      EXTIM(J+2)=EXTIM(I+6)
      EXTIM(J+3)=EXTIM(I+7)
      GO TO 1526
C     STORAGE PLAN D
1525 EXTIM(I+6)=EXTIM(I+2)
      EXTIM(I+7)=EXTIM(I+3)
      EXTIM(J-2)=EXTIM(I-2)
      EXTIM(J-1)=EXTIM(I-1)
      EXTIM(J)=EXTIM(I)
      EXTIM(J+1)=EXTIM(I+1)
      EXTIM(J+2)=EXTIM(I+2)
      EXTIM(J+3)=EXTIM(I+3)
      K1=I+4
      K2=I+10
1526 J1=J-2
      J2=J+3
      ITEMS=ITEMS-4
      ISKIP=I+8
      J=J+4
      GO TO 1504
1520 CONTINUE
C     END MAIN PROCESSING LOOP
C*****
      J=J-1
      IF(I=2.EQ.ITEM7)L=I
1530 IF(L.GT.ITEM7)GO TO 1540
      J=J+1
      EXTIM(J)=EXTIM(L)
      L=L+1
      GO TO 1530
1540 CONTINUE
      ITEMS=J
C     IF THERE WERE ANY DELETIONS IN THIS PASS REPROCESS ALL REMAINING
C     HIGHS AND LOWS TO MAKE FURTHER DELETIONS IF NEEDED.
      IF(ITEMS.GT.ITEM7)GO TO 1503
      RETURN
      END

```

Figure C-2. List of subroutine SMOOTH (from Thompson, 1980).--Continued

APPENDIX D

PLOTS OF PHASE VERSUS FREQUENCY FROM MRS ANALYSIS

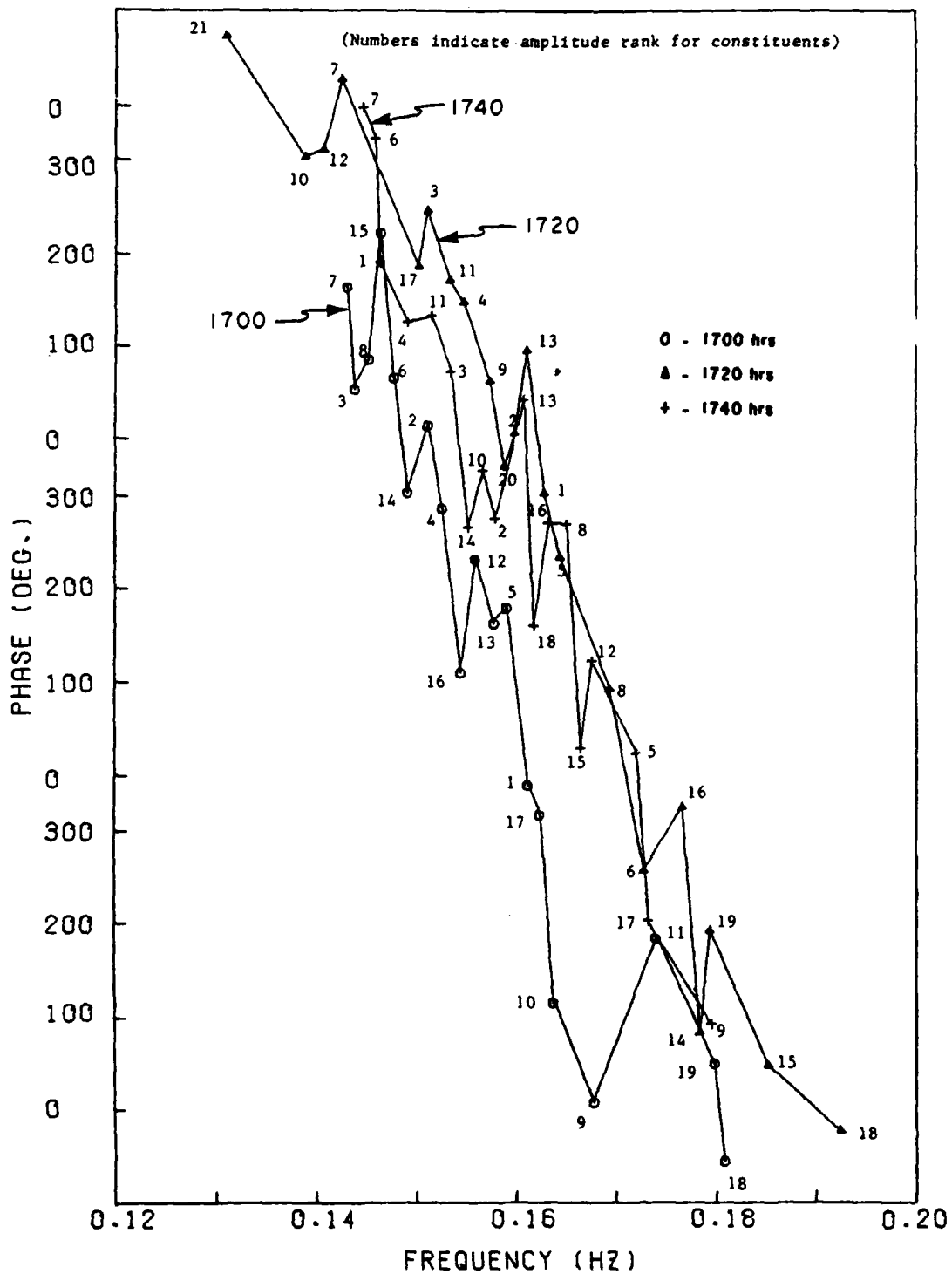


Figure D-1. South Haven, 1700 to 1800 e.s.t., 1,024-second records analyzed. Starting time of record is noted beside each curve.

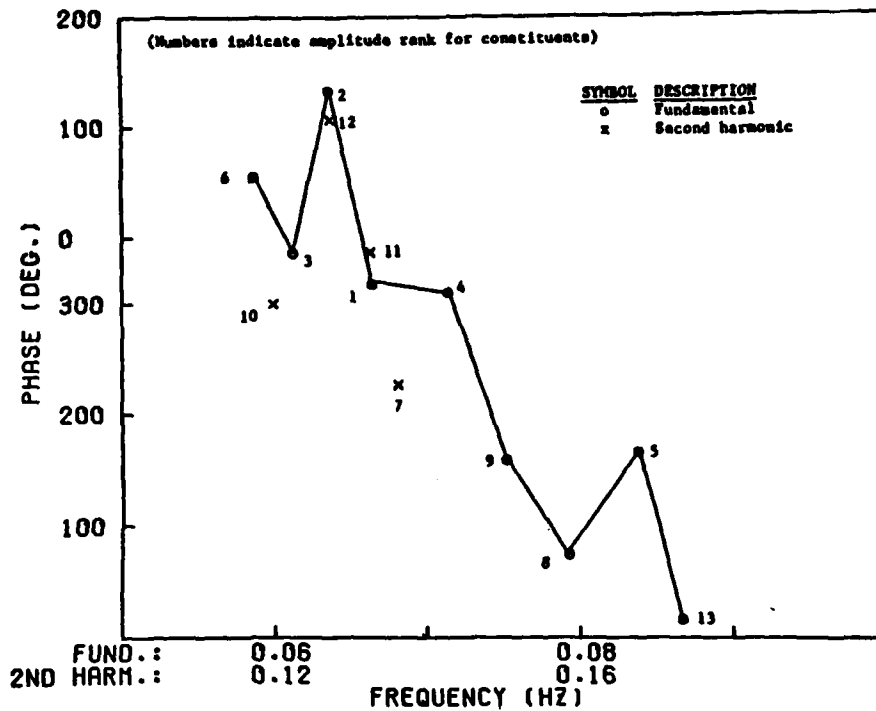


Figure D-2. Columbia Light, 1300 to 1308.5 P.d.t., 512-second record analyzed.

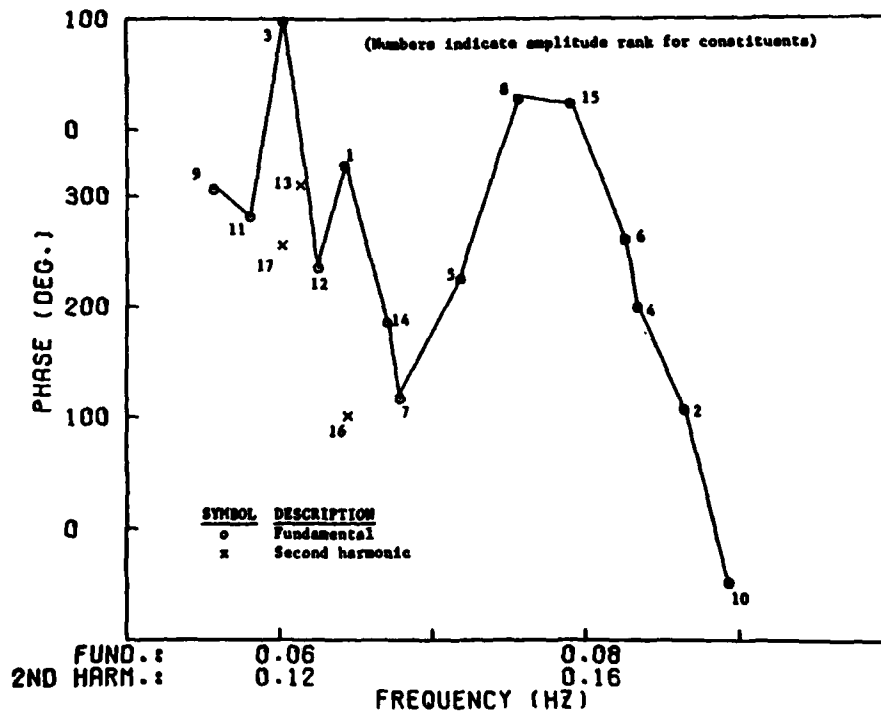


Figure D-3. Columbia Light, 1308.5 to 1317 P.d.t., 512-second record analyzed.

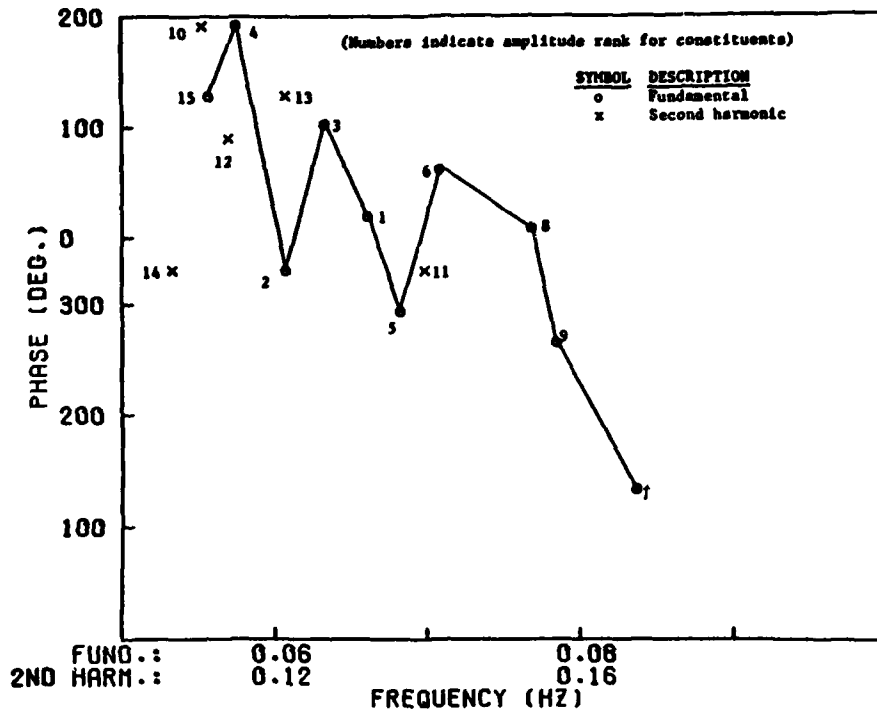


Figure D-4. Columbia Light, 1408.5 to 1417 P.d.t., 512-second record analyzed.

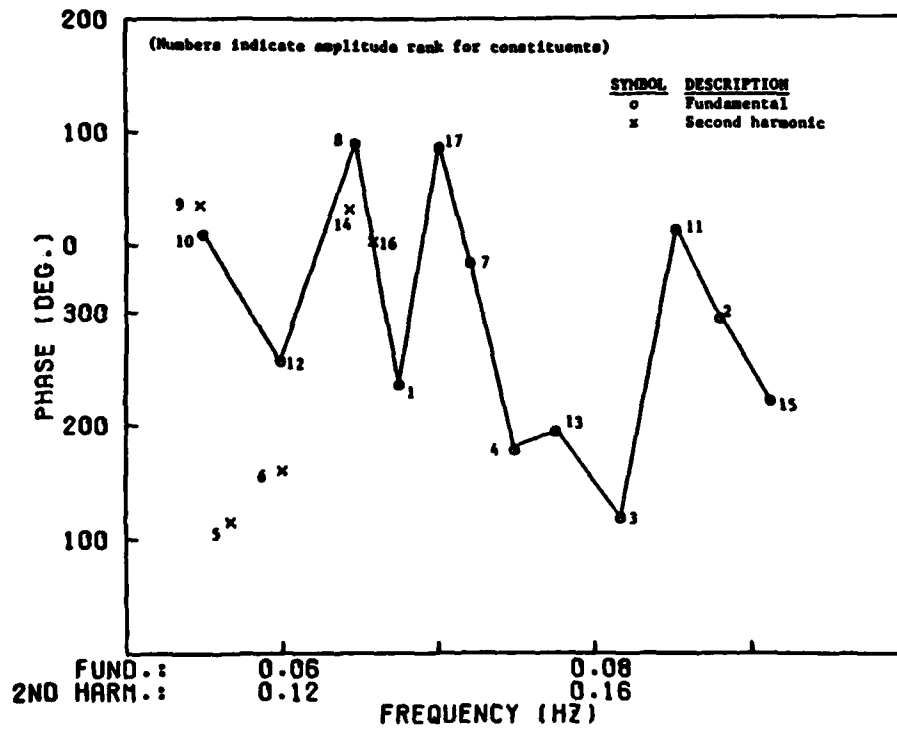


Figure D-5. Columbia Light, 1500 to 1508.5 P.d.t., 512-second record analyzed.

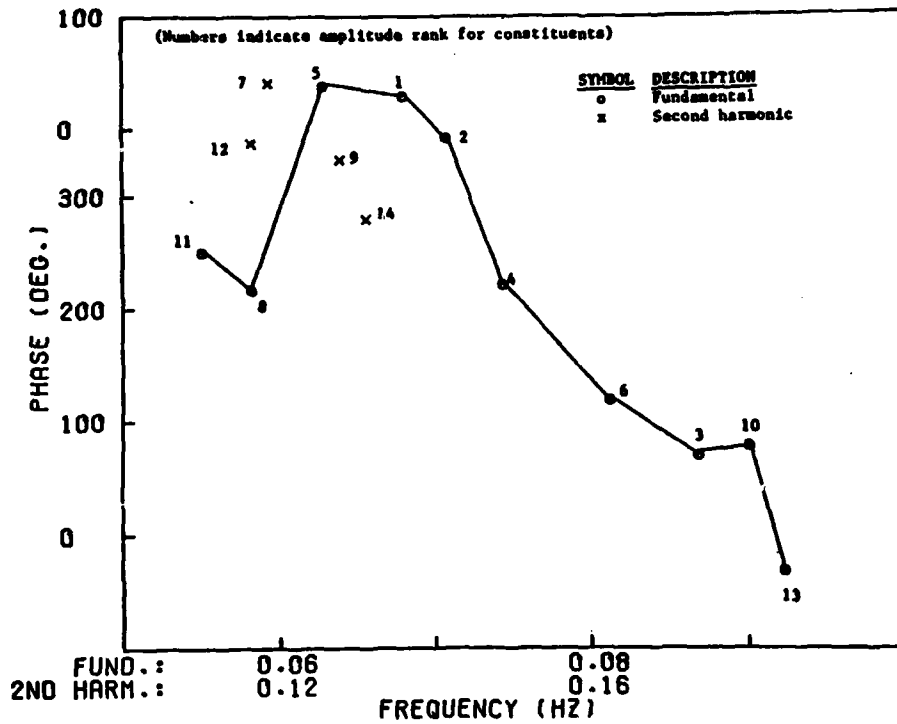


Figure D-6. Columbia Light, 1508.5 to 1517 P.d.t., 512-second record analyzed.

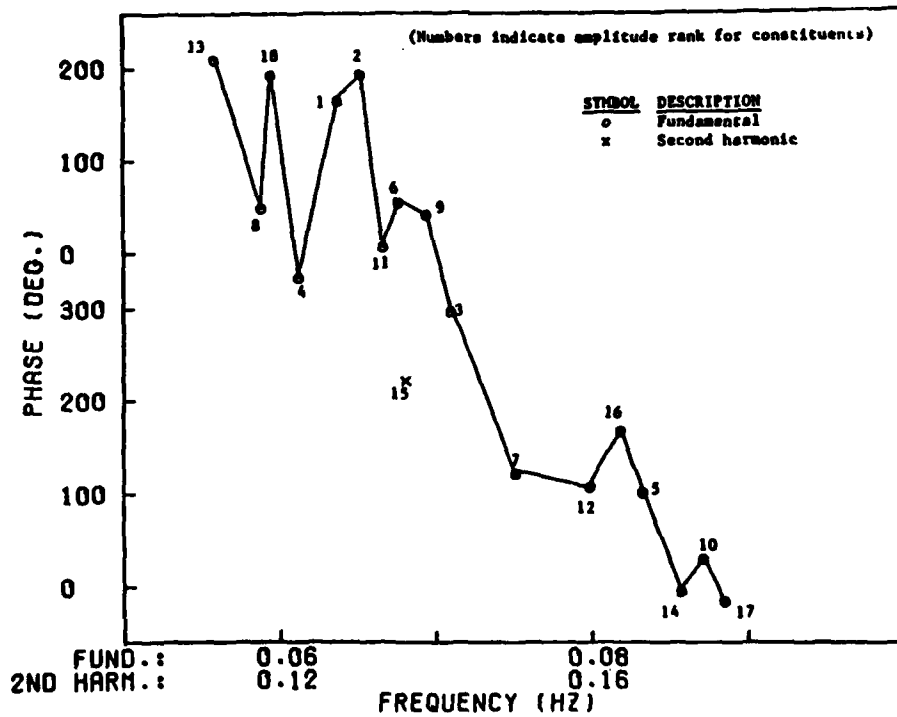


Figure D-7. Columbia Light, 1300 to 1317 P.d.t., 1,024-second record analyzed.

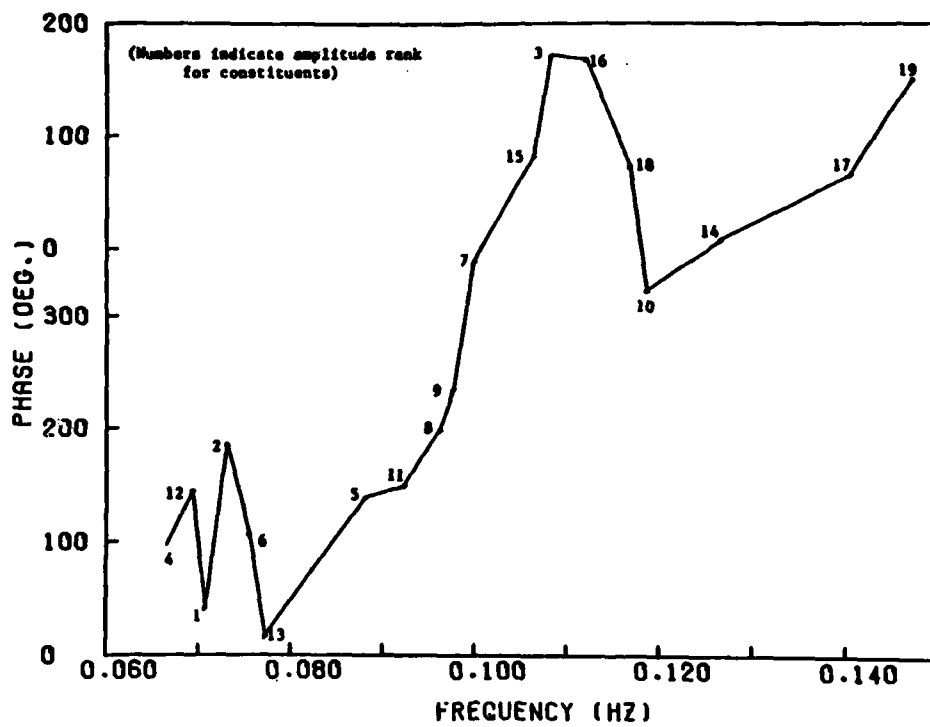


Figure D-8. South Pass, 1500 to 1510 c.d.t., 600-second record analyzed.

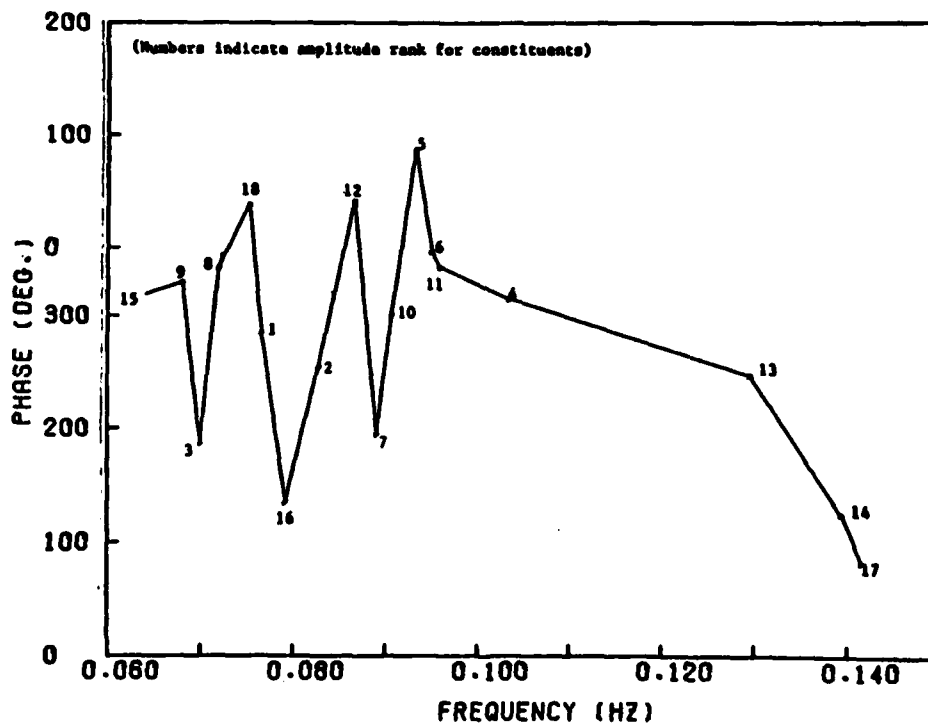


Figure D-9. South Pass, 1510 to 1520 c.d.t., 600-second record analyzed.

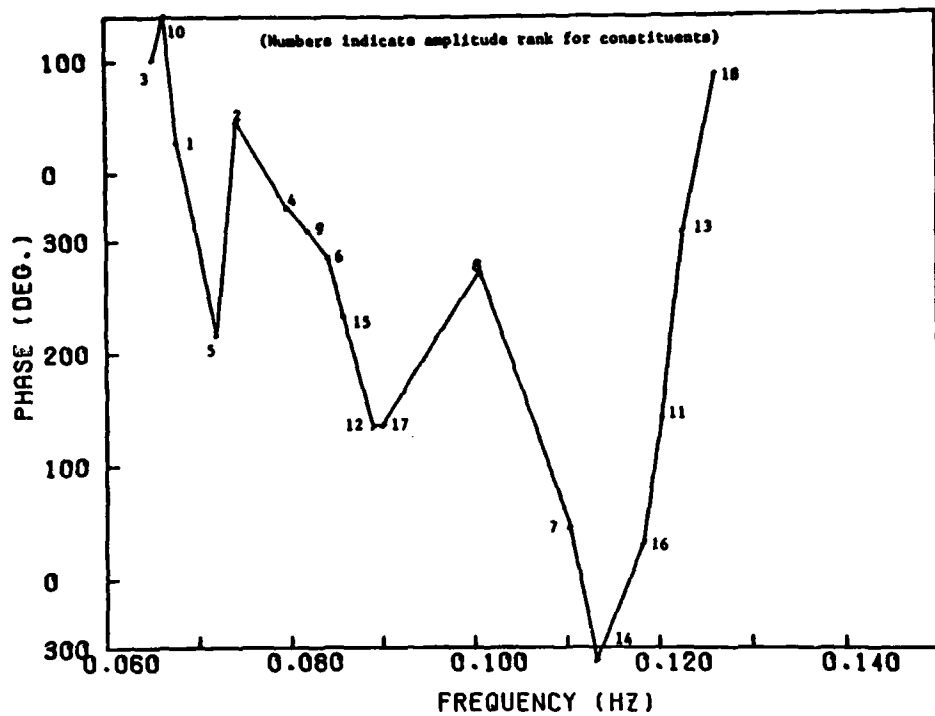


Figure D-10. South Pass, 1520 to 1530 c.d.t., 600-second record analyzed.

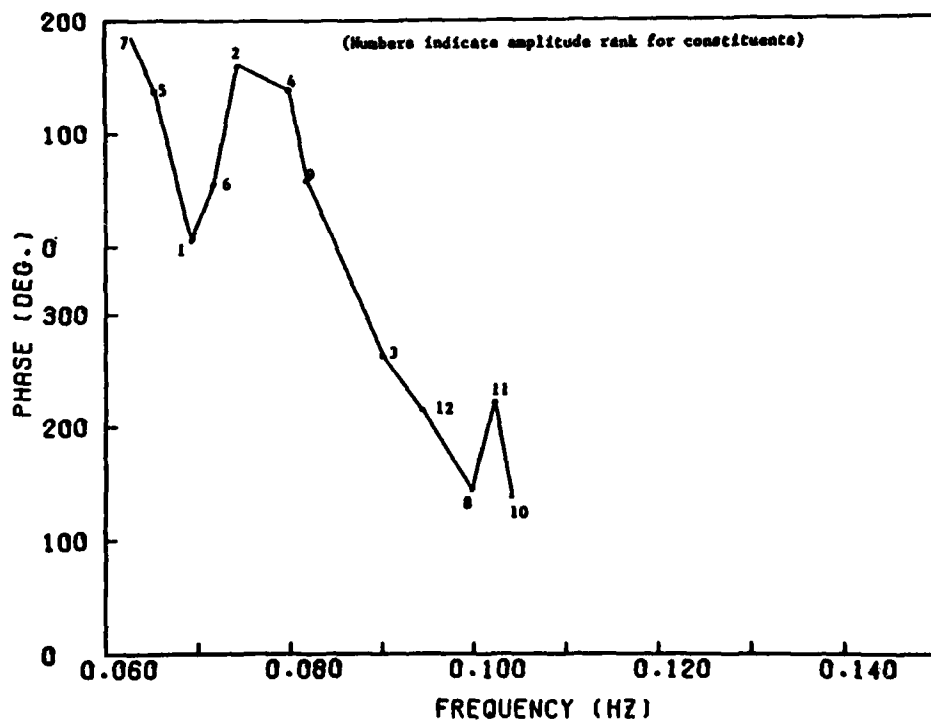


Figure D-11. South Pass, 1530 to 1540 c.d.t., 600-second record analyzed.

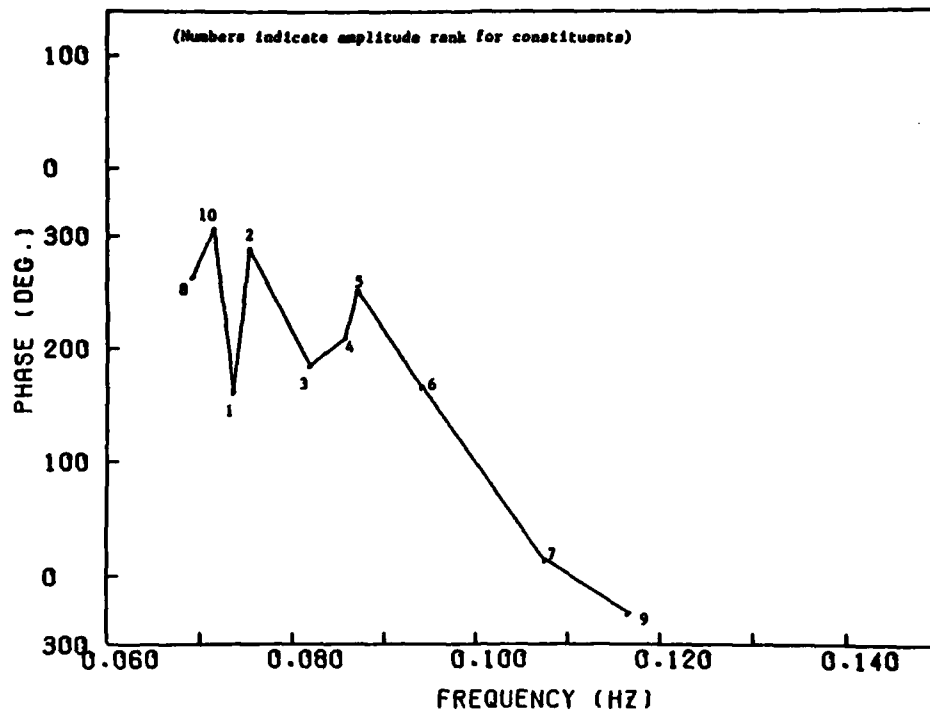


Figure D-12. South Pass, 1540 to 1550 c.d.t., 600-second record analyzed.

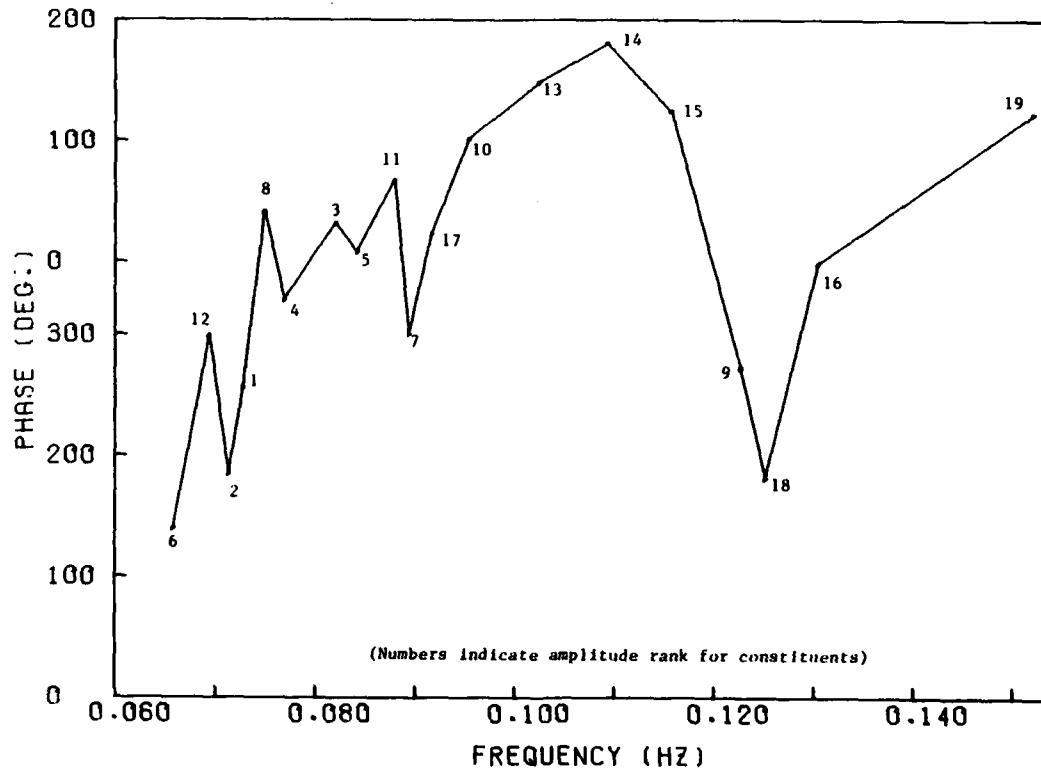


Figure D-13. South Pass, 1550 to 1600 c.d.t., 600-second record analyzed.

APPENDIX E

PLOTS OF MAJOR PEAKS AND VALLEYS IN LOCAL VARIANCE TIME SERIES

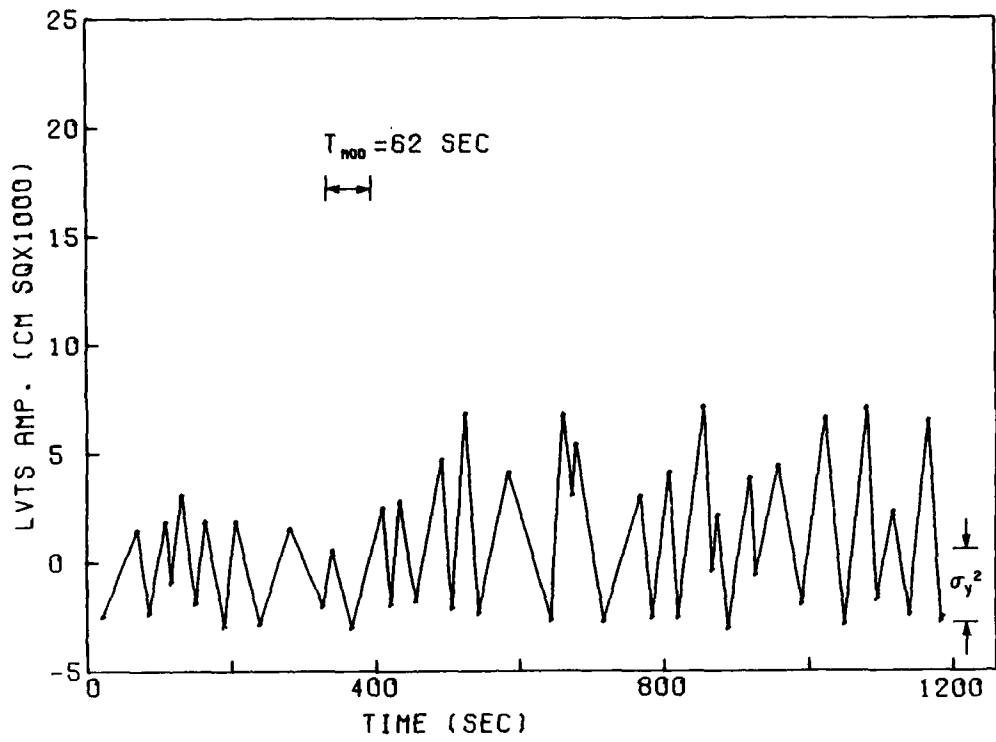


Figure E-1. South Haven, 1700 to 1720 e.s.t., I = 52, G = 0.63.

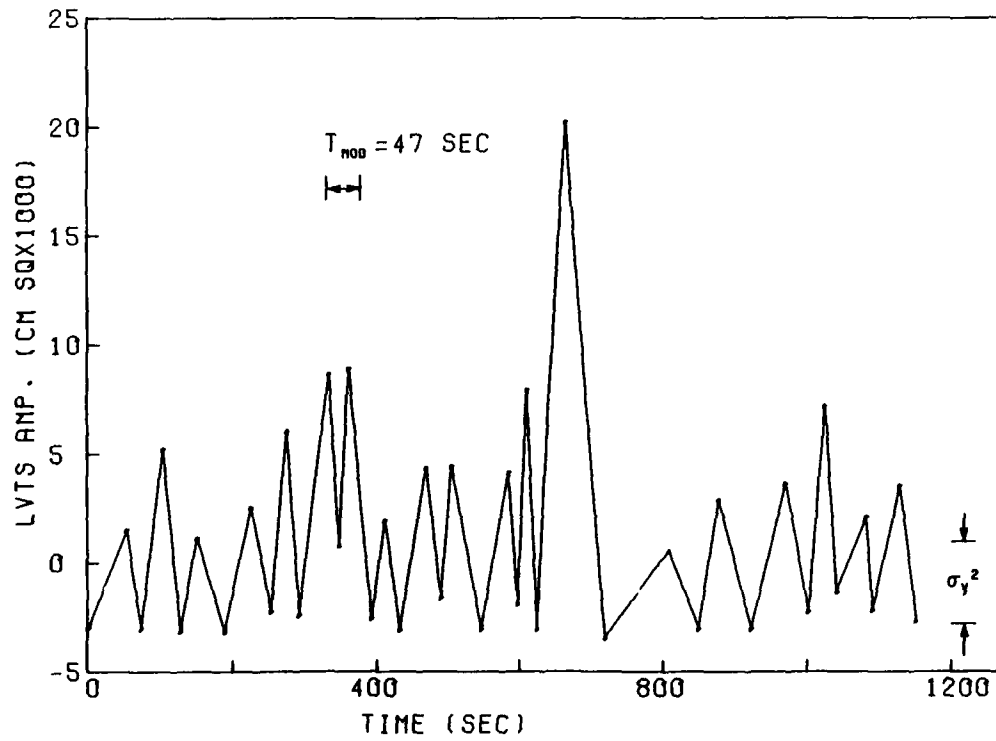


Figure E-2. South Haven, 1720 to 1740 e.s.t., I = 52, G = 0.79.

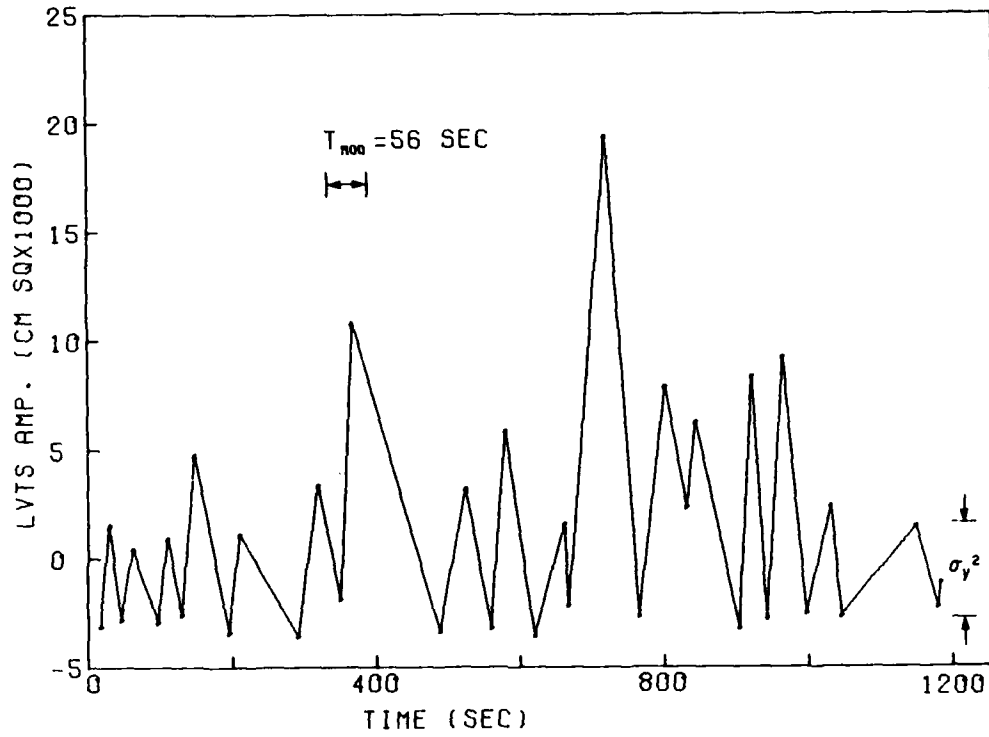


Figure E-3. South Haven, 1740 to 1800 e.s.t., $I = 52$, $G = 0.69$.

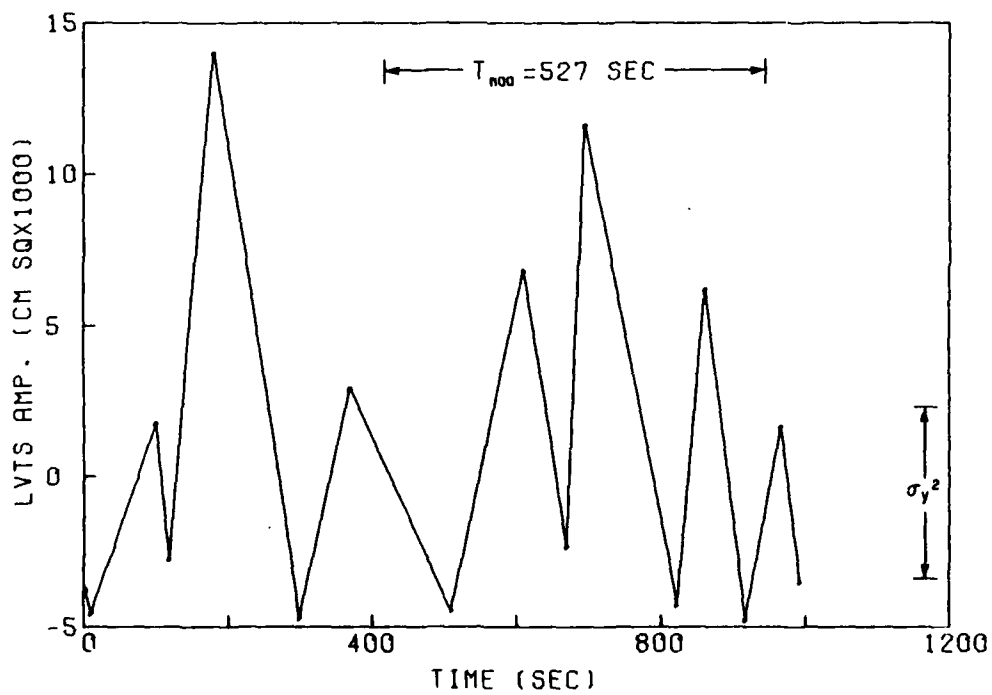


Figure E-4. Columbia Light, 1300 to 1317 P.d.t., $I = 60$, $G = 0.67$.

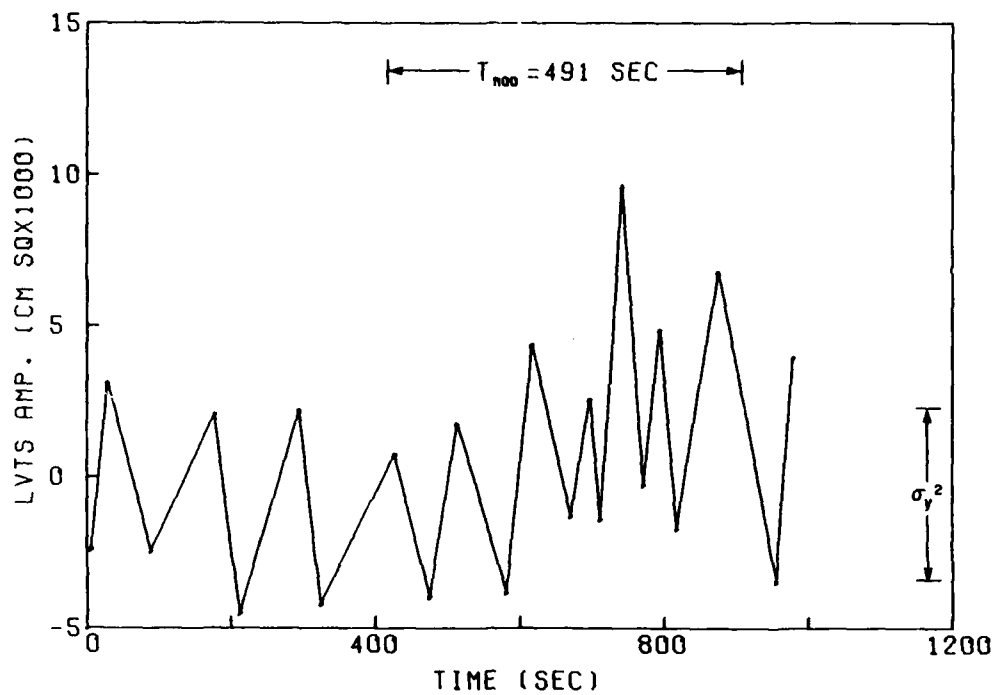


Figure E-5. Columbia Light, 1400 to 1417 P.d.t., I = 60, G = 0.50.

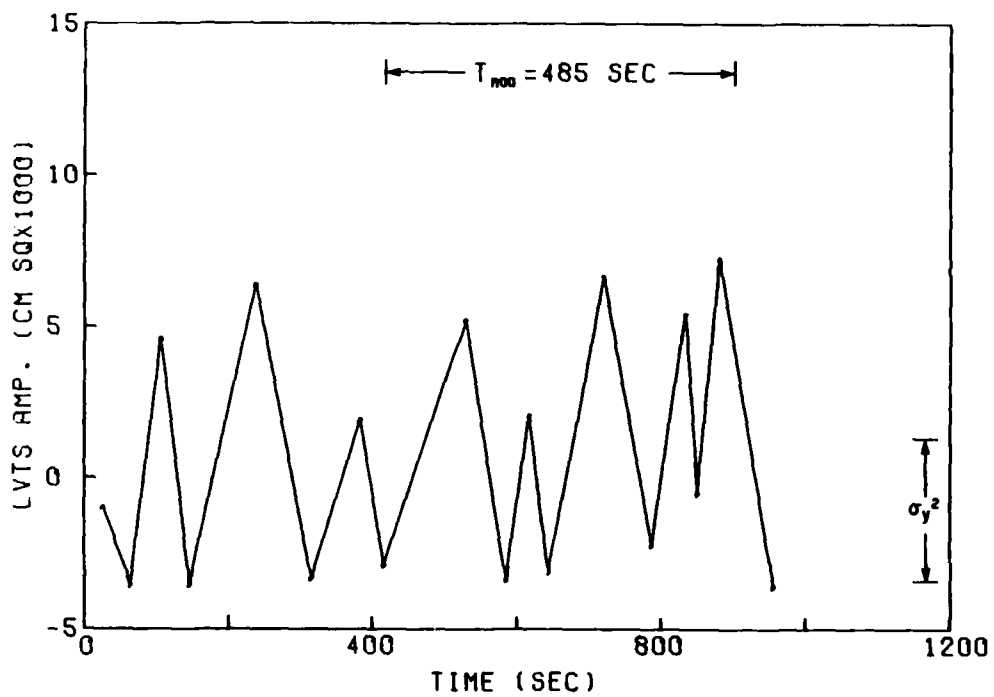


Figure E-6. Columbia Light, 1500 to 1517 P.d.t., I = 60, G = 0.60.

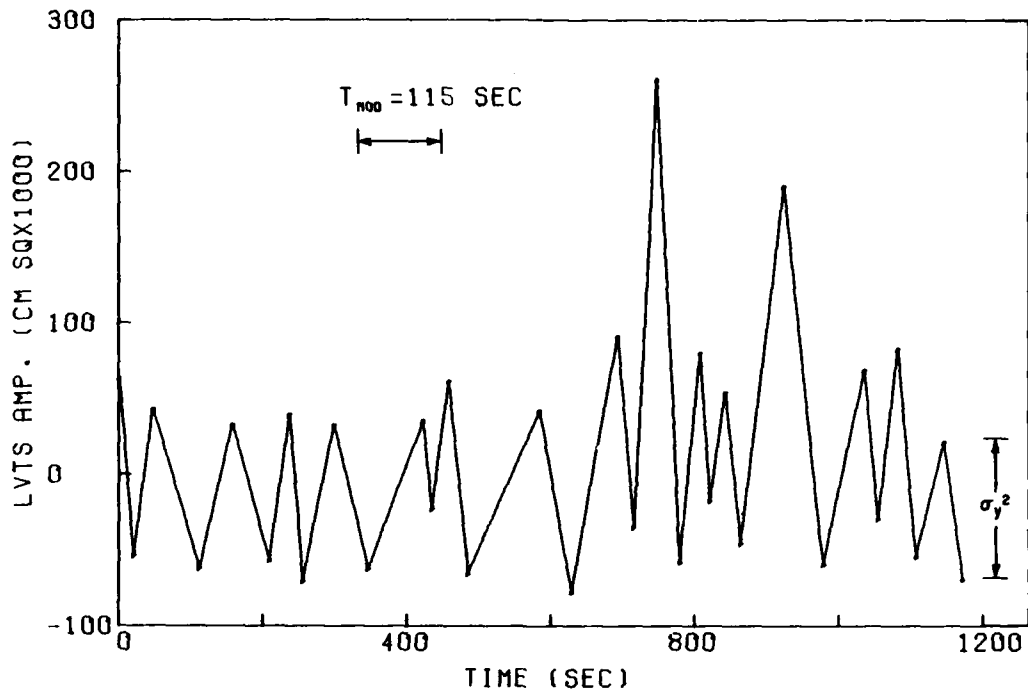


Figure E-7. South Pass, 1500 to 1520 c.d.t., I = 260, G = 0.60.

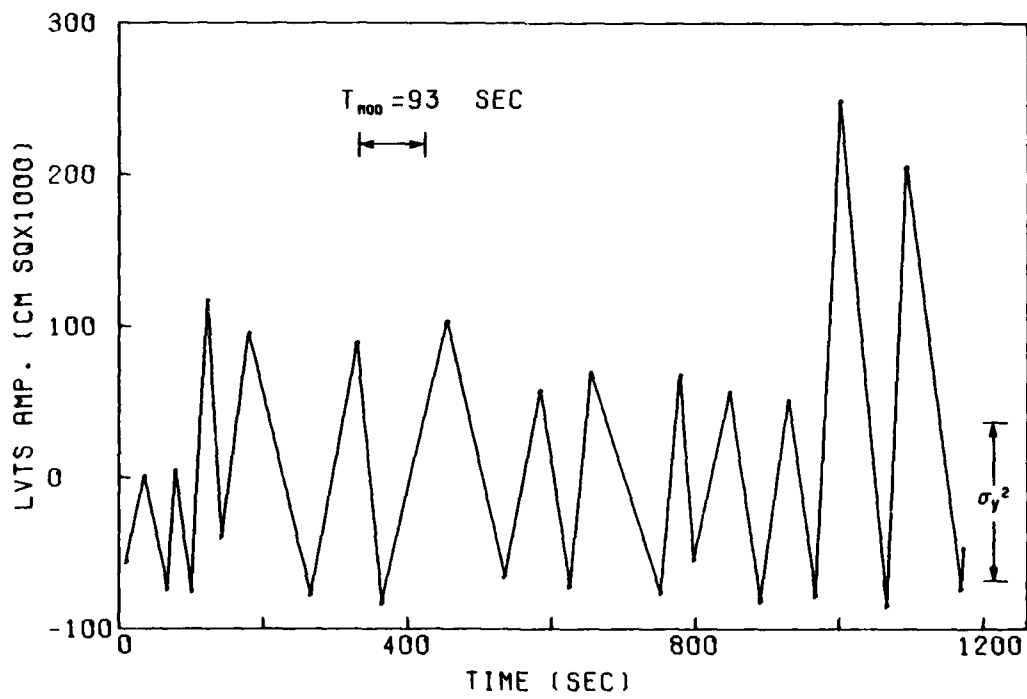


Figure E-8. South Pass, 1520 to 1540 c.d.t., I = 260, G = 0.59.

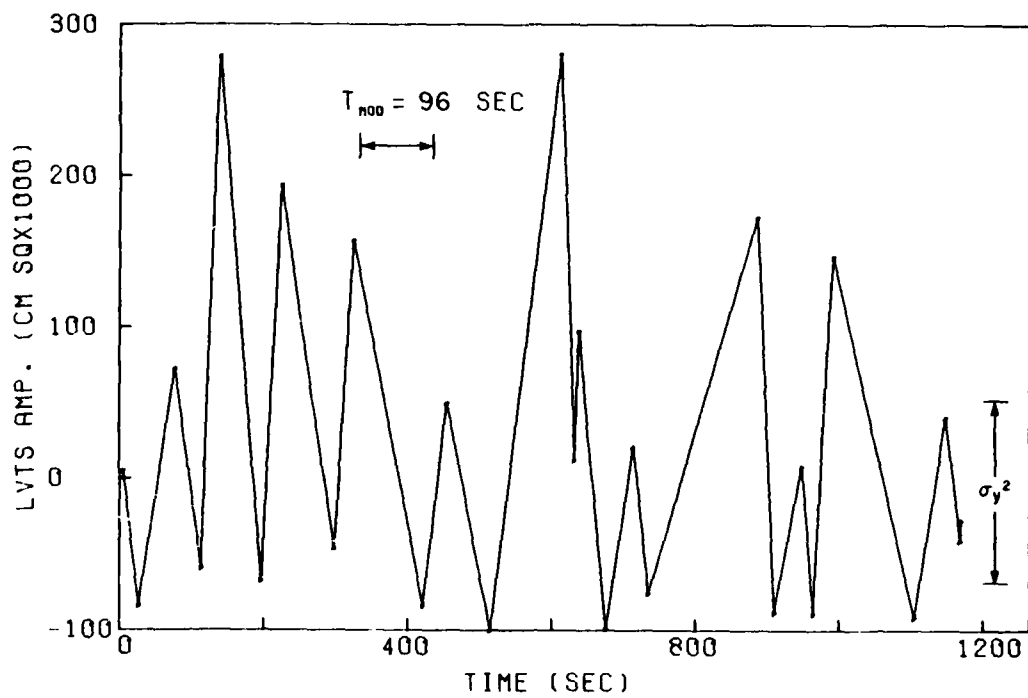


Figure E-9. South Pass, 1540 to 1600 c.d.t., I = 260, G = 0.66.

Thompson, Edward F.

Nonrandom behavior in field wave spectra and its effect on grouping of high waves / by Edward F. Thompson.--Fort Belvoir, Va. : U.S. Army Coastal Engineering Research Center ; Springfield, Va. : available from NTIS, 1982.

[110] p. : ill. : 28 cm.--(Technical report / Coastal Engineering Research Center ; no. 82-2)

Cover title.

"August 1982."

Wave measurements are examined from three relatively deepwater field sites in Lake Michigan, the Pacific Ocean, and the Gulf of Mexico. Approximately 1 hour of data representing high waves, single-peaked spectra, and nearly constant significant heights and peak spectral periods was selected for analysis. The data represent actively growing waves at two sites and swell at the third site.

1. Fourier transformations. 2. Spectral analysis. 3. Wave spectra. 4. Wave height. I. Title. II. Series: Technical report (Coastal Engineering Research Center (U.S.)); no. 82-2.

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627

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