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GROUND TRUTH DATABASE: ILPA/MAIO HANDBOOK

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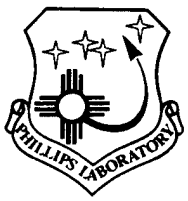

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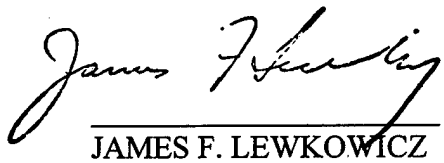

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The objective of this project has been to retrieve useful seismic waveform data from an unwieldy format and create an easy-to-use data set for seismic research. The results are over 250 "event directories" for regional events in and near Iran. Each "event directory" is a stand-alone data product including short-period seismic waveforms and CSS3.0 database tables containing the auxiliary information necessary and useful to read and interpret the waveforms. These data are available to interested researchers through an anonymous FTP account. The waveform data are from two seismic stations located in Iran and operating in the late 70's: The Iranian Long-Period Array (ILPA), located near Tehran, and MAIO, (Mashhad, Iran), located 800 km east of ILPA. Over 1700 phases were timed and identified on the ILPA and MAIO waveforms. This report focuses on how the data set was constructed and presents some analysis observations. An appendix lists the seismic bulletin summarizing all parameters related to each event. Information derived from this data set by researchers such as Sweeney, Baumgardt and Alexander and others, will certainly be critical to the understanding of propagation of regional seismic phases in and near Iran. Results based on the ILPA/MAIO should be part of the knowledge base currently being constructed by the DOE.

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SUMMARY

The objective of this project has been to retrieve useful seismic waveform data from an unwieldy format and create an easy-to-use data set for seismic research. The results are over 250 "event directories" for regional events in and near Iran. Each "event directory" is a stand-alone data product including short-period seismic waveforms and CSS3.0 database tables containing the auxiliary information necessary and useful to read and interpret the waveforms. These data are available to interested researchers through an anonymous FTP account.

The waveform data are from two seismic stations located in Iran and operating in the late 70's. The Iranian Long-Period Array (ILPA), located near Tehran, consisted of seven stations, arranged in a hexagonal pattern of about 50 km aperature. ILPA recorded both long-period (1 samp/sec) and short-period (20 samp/sec) continuous data on Teledyne Geotech KS-36000 instruments. Although we do not have confirmed source type for most of these events, we pursued this data set as the first of the Ground Truth Database (GTDB) because of the location of the ILPA array.

Events to be extracted from the continuous ILPA waveforms were selected from the USGS/ISC bulletin based on query boundaries of: within 20 degrees of ILPA; between 16 May 1978 and 10 October 1979; no restriction on depth or magnitude. Another 21 events, which fell outside the query boundries, but which were used in an earlier study, were added to the list. A previous data set of 100 ILPA events created by Rodgers *et al.* (1994) excluded events with no magnitude estimate. One reason for re-segmenting the ILPA data for this project was to emphasize regional waveforms by extracting more of the smaller events. A Datascope program was used to compare the 635 targeted origins with the existing ILPA waveforms and extract event segments. Event-directories resulted for 273 events. Although ILPA data are continuous, long gaps (on the order of days) exist.

Station MAIO, (Mashhad, Iran), was operated by Albuquerque Seismological Lab between 3 October 1975 and 11 October 1978, employing a Teledyne Geotech KS-36000 borehole seismometer. The overlap between the segmented MAIO waveforms, obtained from IRIS, and the available continuous ILPA data was 84 days (July-October, 1978). For 61 of the ILPA events, we were able to add waveforms from station MAIO.

Events were grouped into eight regions and analyzed region-by-region. Over 1700 phases were timed and identified on the ILPA and MAIO waveforms.

This report focuses on how the data set was constructed and presents some analysis observations. An appendix lists the seismic bulletin summarizing all parameters related to each event.

BACKGROUND INFORMATION

Briefly, the goal of the Ground Truth Database (GTDB) is to combine information about seismic events with seismic waveforms to produce research-ready data products. Over time, we will build up a collection of various data sets that are easily available and in one consistent format. The hope is that the GTDB will enable researchers to spend less time capturing, re-formatting, and documenting data. As part of the GTDB project, we are concurrently collecting data by several different methods:

- Historical data sets of special interest
- Current events of known type
- Event clusters verified by in-country sources
- Data sets resulting from other research projects

The ILPA/MAIO data set is in the first category. Because these events occurred almost 20 years ago, confirmation of the source type from in-country contacts will not be possible and information can only be inferred. In that sense then, these are not really "ground-truth" events for which we know the cause of the event and precise location. However, because of the unique location of the ILPA array and interest to a number of researchers, we have pursued this data set as the first of the GTDB. Furthermore, the careful and consistent analysis performed on this data set provides references and insight into the phases observed in the area.

The objective of this project has been to retrieve important seismic waveform data from an unwieldy format and do the ground-work to make these data available and easy to use for seismic research. The results of our work are over 250 "event directories" for regional events in and near Iran. Each "event directory" is a stand-alone data product including short-period seismic waveforms and CSS3.0 (Anderson *et al.* 1990) database tables containing the auxiliary information necessary and useful to read and interpret the waveforms.

There are three major sections of this report. The section titled "Constructing the ILPA/MAIO Data Set" explains all the steps taken to produce the data set from the continuous waveforms on tape to the final event directories. The section titled "Analysis Observations" is meant to give an idea of the types of observations made and show examples of various observations. The appendix is the complete seismic bulletin for the data set which lists origin information, arrival information and the remarks related to each event.

The ILPA/MAIO data set is available by anonymous FTP at es2.multimax.com. The procedure for getting the data is described in the subsection "Getting the ILPA/MAIO Data Set". Documentation similar to this report is also available on the GTDB Web Page at http://www.multimax.com/~gtdb.

CONSTRUCTING THE ILPA/MAIO DATA SET

Throughout the processing of the database tables, we have worked with ASCII flat-files. This has been possible through the availability of both **geotool** and IRIS' JSPC Datascope Seismic Analysis Package. As a result, the data set can be easily obtained from Multimax's anonymous FTP server (es2.multimax.com). The procedure for getting the data set is described in the section titled "Getting the ILPA/MAIO Data Set", on page 22.

Although each event-directory is a stand-alone product, the identification numbers in the database tables are unique, allowing any number of these event-directories to be merged into one large data set. For example, the complete set of ILPA tables have been delivered to LLNL and loaded into their ORACLE database.

Construction of this data set required four steps:

- process continuous data into waveform segments;
- perform seismic waveform analysis and waveform QC;
- create and/or correct the database tables so that they are both stand-alone event directories and ready to be merged into larger databases;
- install completed data on the FTP site and install related documentation on GTDB Web Page.

The remainder of this section gives details of these steps.

Station Descriptions

The Iranian Long-Period Array (ILPA) was operational in the late 70's near Tehran. Seven stations, arranged in a hexagonal pattern of about 50 km aperature, recorded both long-period (1 samp/sec) and short-period (20 samp/sec) continuous data on Teledyne Geotech KS-36000 instruments. Figure 1 shows the ILPA site map. Sites 1 and 7 were equipped with 3-component sensors. Based on previous experience (Rodgers *et al.*, 1996), data were excluded from sites 5 and 6 because all traces were flat.

Station MAIO (Mashhad, Iran) was operated by Albuquerque Seismological Lab between 3 October 1975 and 11 October 1978, employing a Teledyne Geotech KS-36000 borehole seismometer. MAIO is located approximately 800 km east of ILPA.

Processing Continuous Data Into Event Segments

Input Waveform Data

Copies of the ILPA data tapes were obtained from Ricardo Perez at the Center for Monitoring Research (CMR). These tapes had previously been processed into CSS3.0 data files

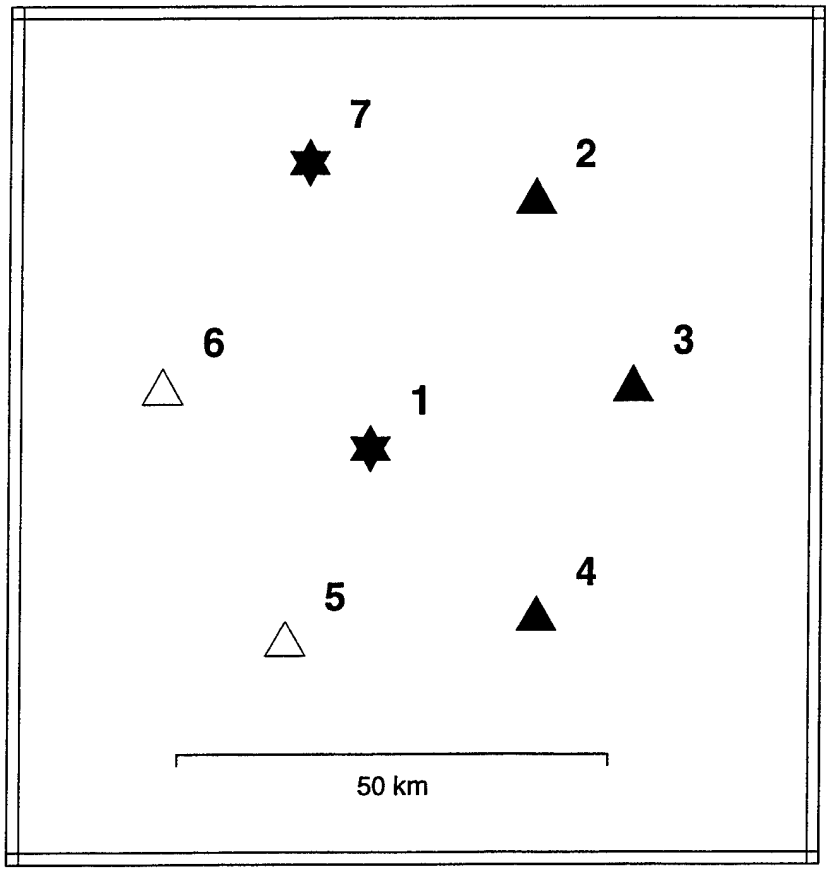


Figure 1: ILPA Site Map. Seven stations, arranged in a hexagonal pattern of about 50 km aperture recorded both long-period (1 samp/sec) and short-period (20 samp/sec) continuous data on Teledyne Geotech KS-36000 instruments. Sites 1 and 7 were equipped with 3-component sensors. Based on previous experience (Rodgers *et al.*, 1996), data were excluded from sites 5 and 6 because all traces were flat.

by Barbara Ruben of Teledyne Geotech. [1] Each file is approximately one day's worth of data sampled at 20 samples per second on each of 11 channels. The original data cover days between 16 May 1978 and 10 October 1979. However, because we could not read the first tape in the series (of nine tapes), our data set covers 15 July 1978 to 10 October 1979.

Event Windows

Event segments were extracted from the continuous ILPA data with codes obtained from the JSPC. These codes are a collection of tools, called Datascope, for processing CSS3.0 flat files. The "dbwfexcerpt" program reads CSS3.0 *wfdisc* files and extracts event segments based on an input *origin* table. The following rules were used to window the segments:

```
start time:    70 seconds before the first expected P
  end time:    expected S time PLUS (p-s) * 7.0
```

Input Origin Table

We selected events from the USGS/ISC bulletin on-line at CMR based on query boundaries including all events within approximately 20 degrees of the ILPA:

- on or after 16 May 1978 (1978136)
- on or before 10 October 1979 (1979283)
- latitude between 14.4N and 55.5N
- longitude between 30.7E and 70.7E
- without restriction on depth or magnitude.

That query returned 614 events. We added another 21 events which fell outside the above query boundaries but which were used by Rodgers *et al.* (1996) in an earlier study utilizing the ILPA data. The original data set of 100 events had excluded events with no magnitude estimates. A key reason for resegmenting the ILPA data for this project was to include more of the smaller events. The total number of target events in the input *origin* table was 635. However, 79 of these were on the first tape in the series which we could not read.

[1] The complete continuous ILPA data are now available at the IRIS DMC.

Results

Out of the 635 events in the input *origin* table, 273 event directories resulted. The locations of these 273 events are plotted in Figure 2. Note that we extracted the time segments from the continuous data without regard to event magnitude, so some of these time windows will not have signals at ILPA. As shown in the histogram in Figure 2, the ISC/USGS bulletin listed an undetermined mb for 93 of the segmented events.

About 50% of the input origins were successfully recovered. This low success rate is due to gaps in the waveform coverage of the short-period ILPA channels. Although ILPA data are continuous, long gaps (on the order of days) exist. Coverage statistics were computed using Datascope's "dbplotcov". As shown in Figure 3, the coverage between 15 July 1978 and 31 December 1978 was about 68%. Figure 4 shows that between 1 January 1979 and 10 October 1979, the coverage was only 31%. ILPA deteriorated over time until it was turned off in late 1978.

Merging MAIO Event Segments with ILPA Event Directories

All available MAIO data had been previously retrieved from the IRIS DMC in SEED format. The 1978 MAIO data consists of triggered segments of short-period vertical waveforms. The "rdseed" program was used to convert to CSS3.0 format.

We targeted the 273 origins of the ILPA data set for extraction of event windows from the MAIO segments. The overlap between operation times of ILPA and MAIO was 84 days in 1978 (July - October) and included 93 of the ILPA origins.

```
Dates of the 1978 continuous ILPA waveforms      1978200-1978365
Dates of the 1978 triggered MAIO waveforms       1978001-1978284
Dates of overlap between MAIO and ILPA           1978200-1978284
```

The following rules were used to extract triggered MAIO event segments:

```
start time:    120 seconds before the first expected P
  end time:    1 km/sec PLUS 60 seconds
```

Note however, that since the MAIO data are triggered event segments, the above limits are just the minimum and maximum time for the event windows and will rarely be the actual windows. If the segments are short, it is noted in the *remark* table associated with the event.

Of the 93 ILPA events between 1978200-1978284, MAIO event windows were successfully extraced for 66 events. Five of the 66 events were deemed useless during analysis because the segments were too short, leaving a total of 61 ILPA events with Mashhad data. Figure 5 shows the locations of the 61 events successfully extracted from the Mashhad tapes using the ILPA *origin* table. Of these, 58 were large enough to see at least one arrival at Mashhad.

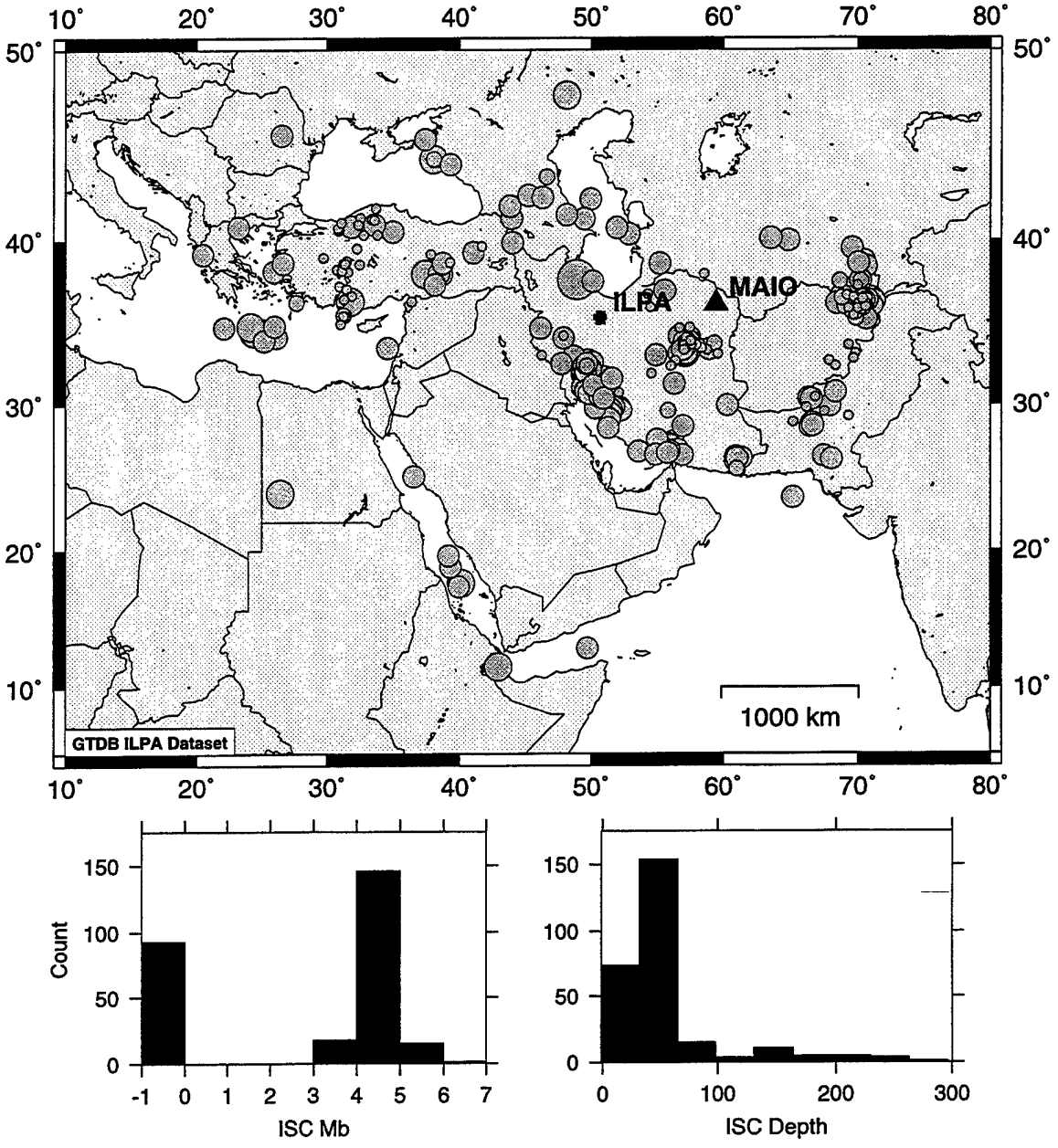


Figure 2: Location map of GTDB ILPA data set showing 273 events extracted from the continuous ILPA waveform data. ILPA is located south of the Caspian Sea. Locations, depths and magnitude estimates are from the USGS/ISC bulletin. Event symbols are scaled to mb. The 93 events with undetermined magnitude are plotted with the smallest symbol on the map and are represented as -1 in the histogram.

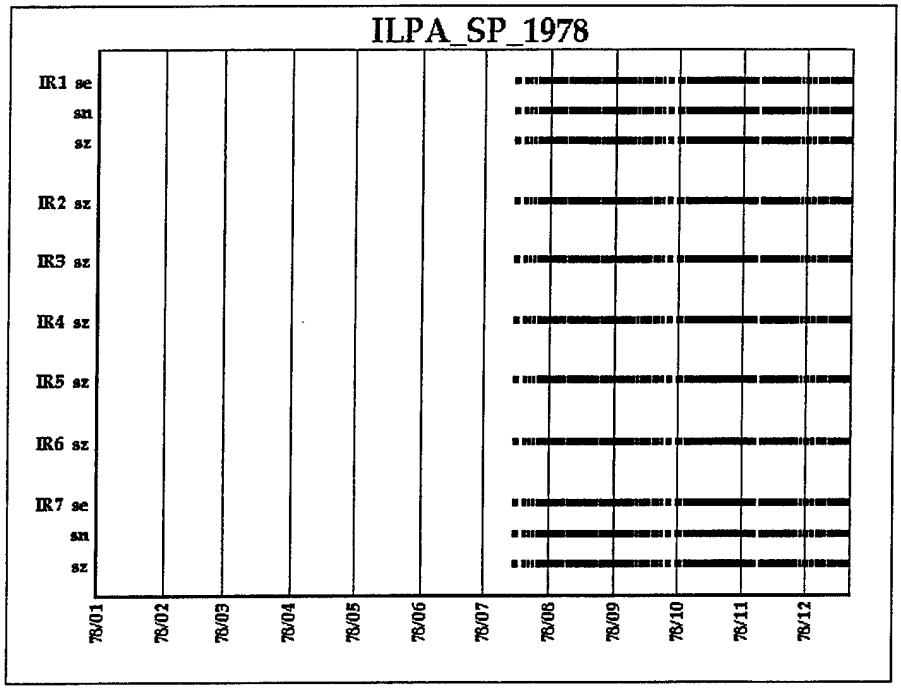


Figure 3: Waveform coverage for ILPA 1978 SP data. Over the time period 15 July 1978 (1978196) - 31 December 1978 (1978356) the coverage is 68%.

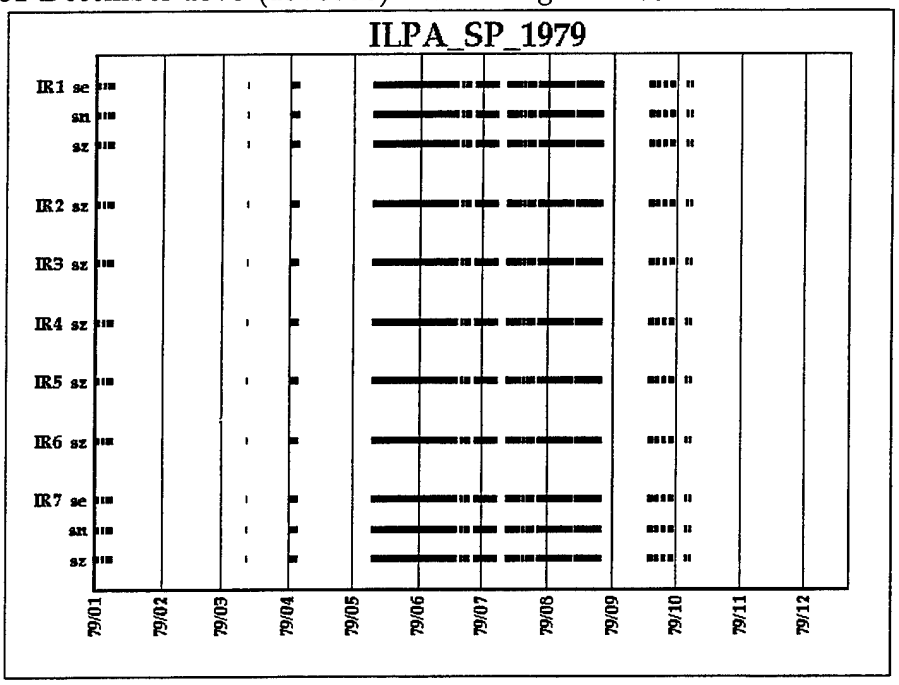


Figure 4: Waveform coverage for ILPA 1979 SP data. Over the time period 1 January 1979 (1979001) - 10 October 1979 (1979283) the coverage is 31%.

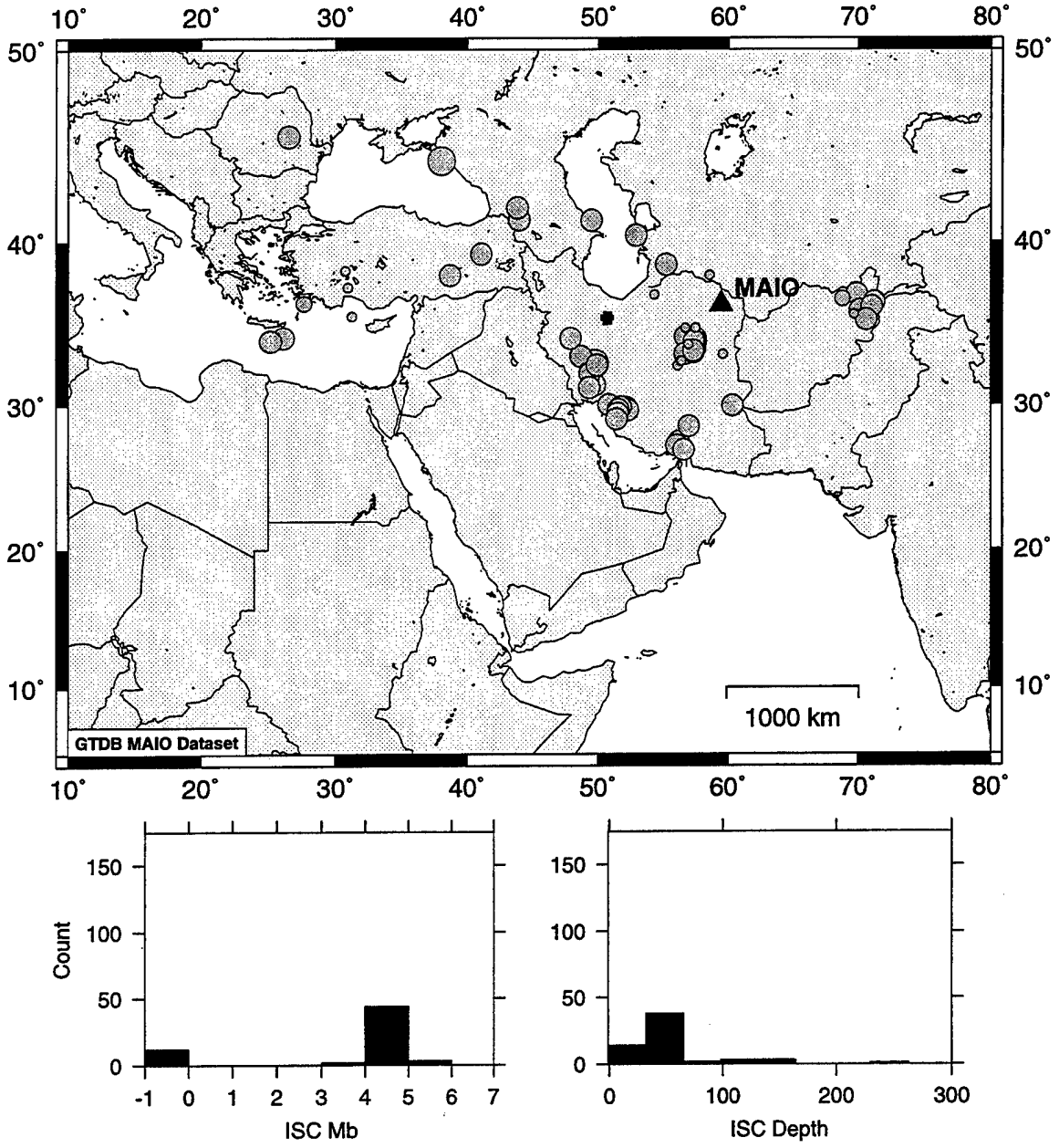


Figure 5: Location map of GTDB MAIO data set. ILPA is located south of the Caspian Sea; MAIO is approximately 800 km east. MAIO and ILPA waveforms are were successfuly segmented for the 61 events shown. Locations, depths and magnitude estimates are from the USGS/ISC bulletin.

Analysis and QC

Included with the ILPA/MAIO data set are arrival time picks and identifications of the standard phases. Amplitude and period of the phases were not measured, and no data processing was performed on the arrivals. The purpose in doing this seismic waveform analysis is two-fold. First, it provides reference time points on the waveforms for users who have routines that depend on arrival times. Second, it gives us a chance to review the data for quality control and to verify the time windows. More importantly, it provides a reference data set for events at regional distances around Iran for which the phases have been carefuly and consistently timed and identified. Many examples of the observations are included in the section "Analysis Observations", beginning on page 23.

Analysis Approach

Our approach to analysis is to look at events grouped by geographic region rather than chronologically. The eight geographic regions outlined on the map in Figure 6 were otherwise arbitrarily drawn to aid analysis. This approach results in consistent analysis in which an understanding of one event can be applied to nearby events. The guidelines below were followed during analysis of the ILPA/MAIO data set.

- Phases with indistinct and/or ambiguous arrivals were not added.
- Real but unknown arrivals were not added with generic names.
- Phases were timed on unfiltered traces whenever possible. Otherwise, phase picks were added after applying band-pass filters to optimize enhancement of the phase of interest.
- Phases identified as Lg, Rg and LR were timed on vertical channels.
- Phases identified as Sn were timed on horizontal channels if available, otherwise on well recorded vertical channels.
- Due to its large aperture (50 km), ILPA was not treated as an array.

During analysis, comments about the event are noted in the file called "Comments" which has been converted to the *remark* table. These remarks are linked to the *origin* table by the commid key which, in the case of the ILPA data set, is equal to the origin id (orid).

The 195 events plotted in Figure 6 have at least one signal recorded on either ILPA or MAIO waveforms. Figure 7 shows the station-to-event distance and azimuth from these events to ILPA. Figure 8 shows the distribution of phases for each of the 8 regions analyzed. Standard regional phases Pn, Pg, Sn, Lg, and Rg are observed in regions 2, 3, 5, and 7, where average distances are between 5 and 10 degrees. P and S are observed in regions 1, 3, 6, and 8, where the average distances are between 15 and 20 degrees, or for deep events. Figures 9 and 10 show the paths of the observed phases at ILPA and MAIO, respectively.

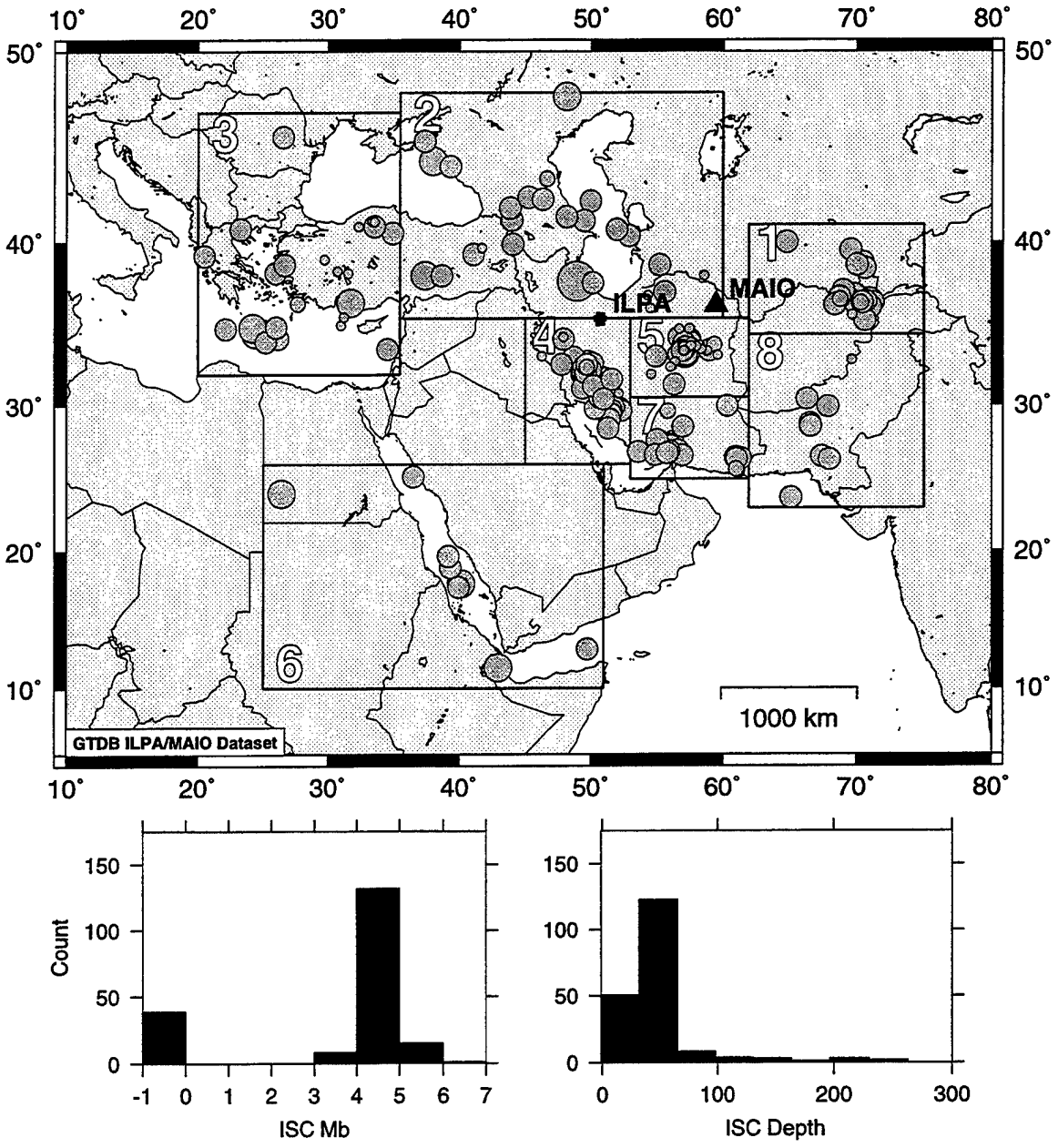


Figure 6: Location map of GTDB ILPA/MAIO data set. ILPA is located south of the Caspian Sea; MAIO is approximately 800 km east. For each of the 195 events shown on the map, there is at least one signal recorded on either ILPA or MAIO.

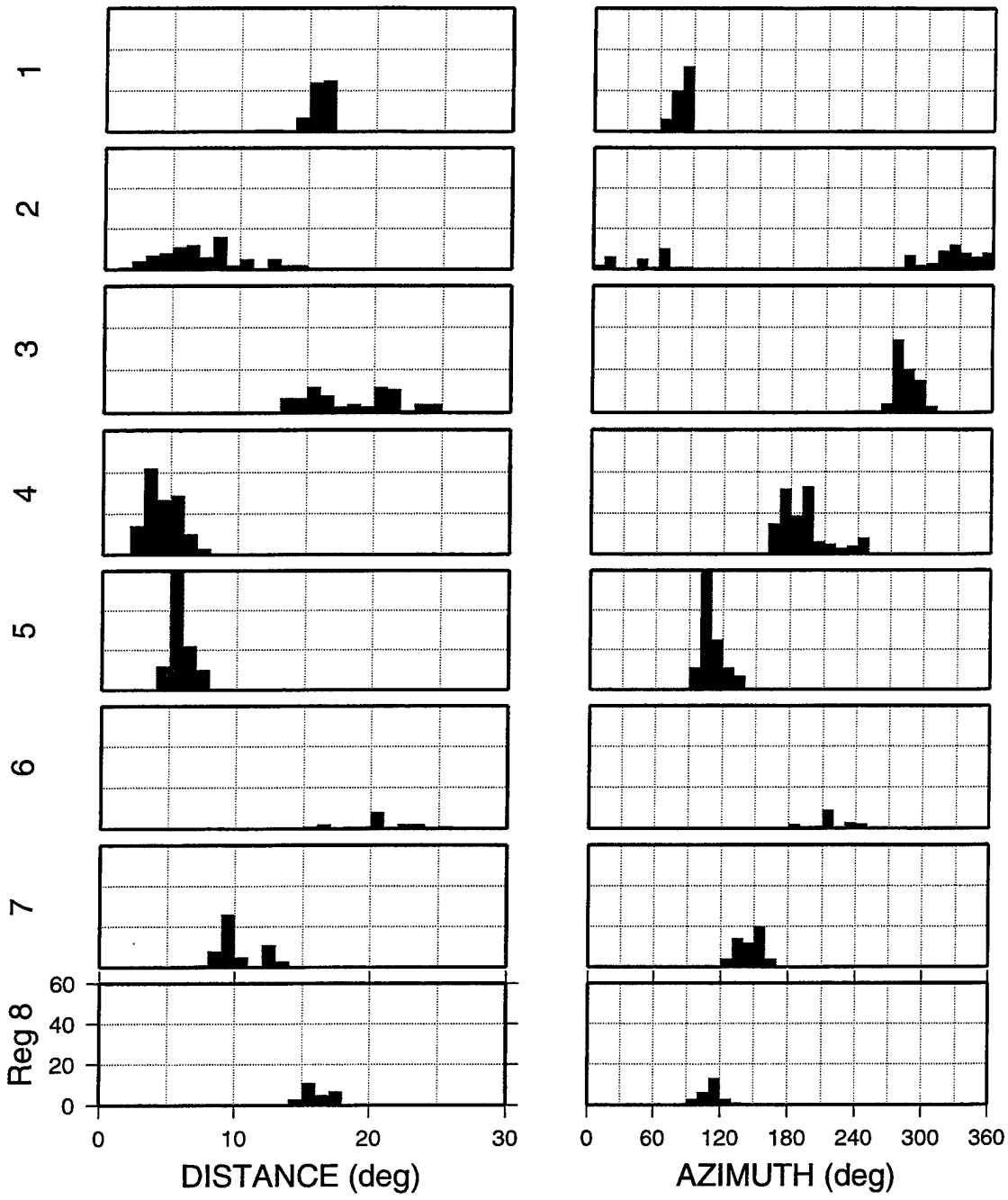


Figure 7: Distance and azimuth of phases recorded on ILPA for each region. Out of a total of 1543 phases, only the 606 unique station-event paths are represented here. Due to its large aperture (50 km) ILPA was not treated as an array in timing phases.

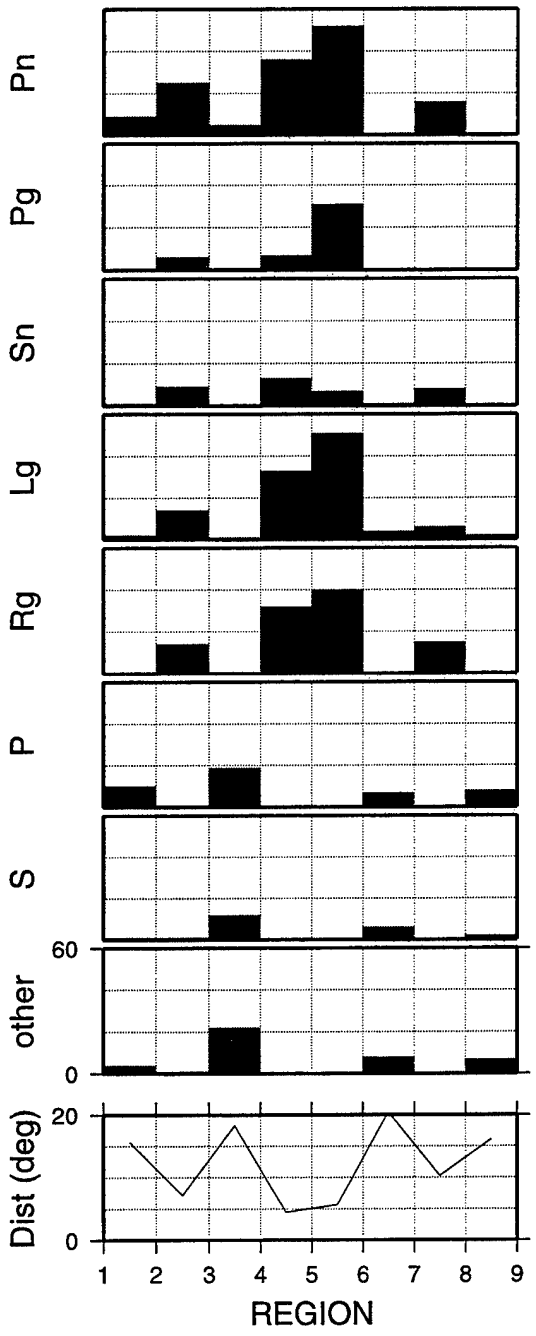


Figure 8: ILPA observed phase types by region. The top 8 plots are histograms number of phases in each region. At the bottom is an x-y plot of average station-to-event distance in each region. "Other" phases include LR (32); LQ (6); 4 core phases (PcP, ScP and PcS); and 2 depth phases (pP).

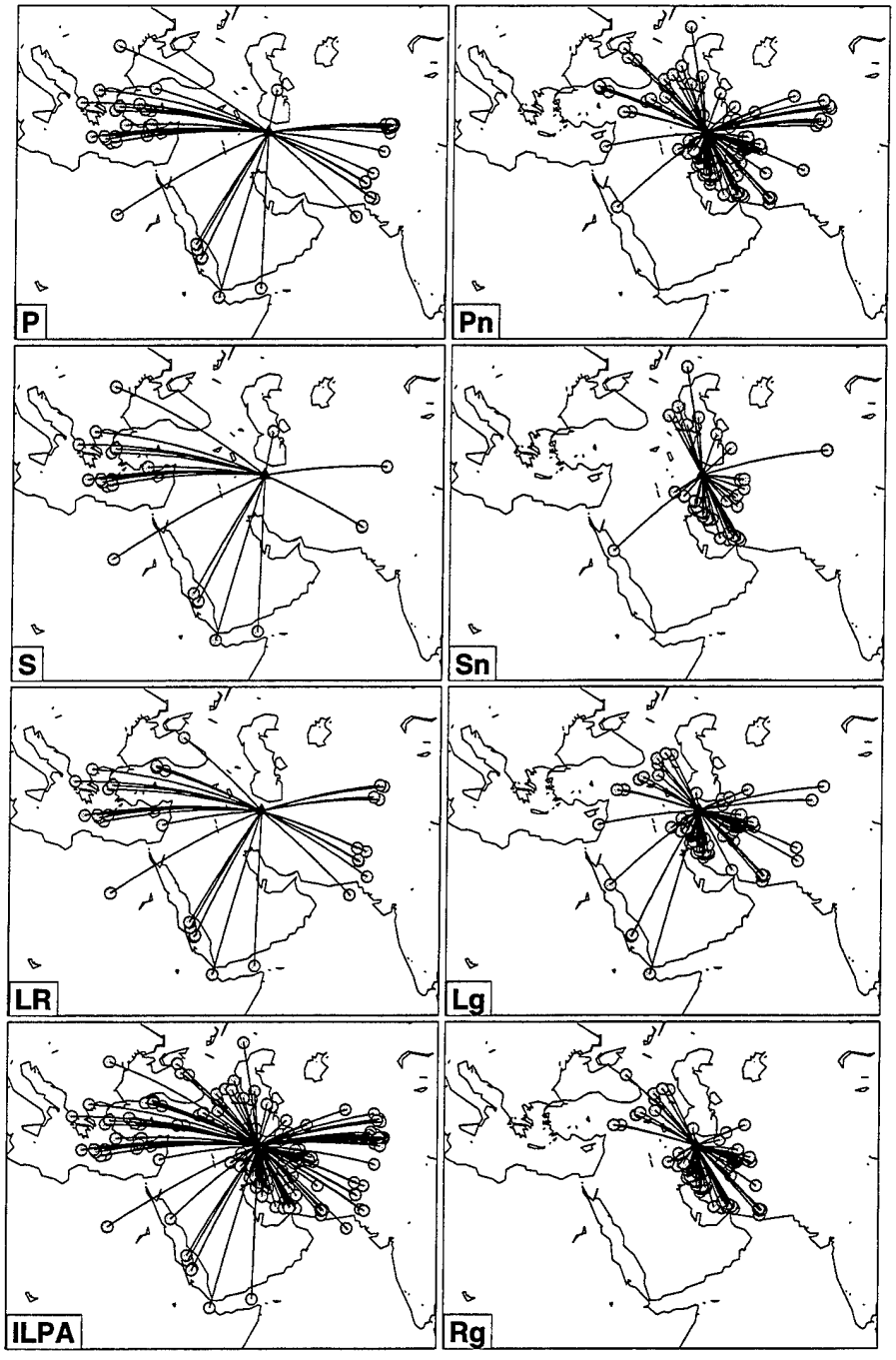


Figure 9: Paths of observed phases at ILPA. The map at bottom left shows all 1543 phases observed at ILPA. Map borders are the same as in Figure 6.

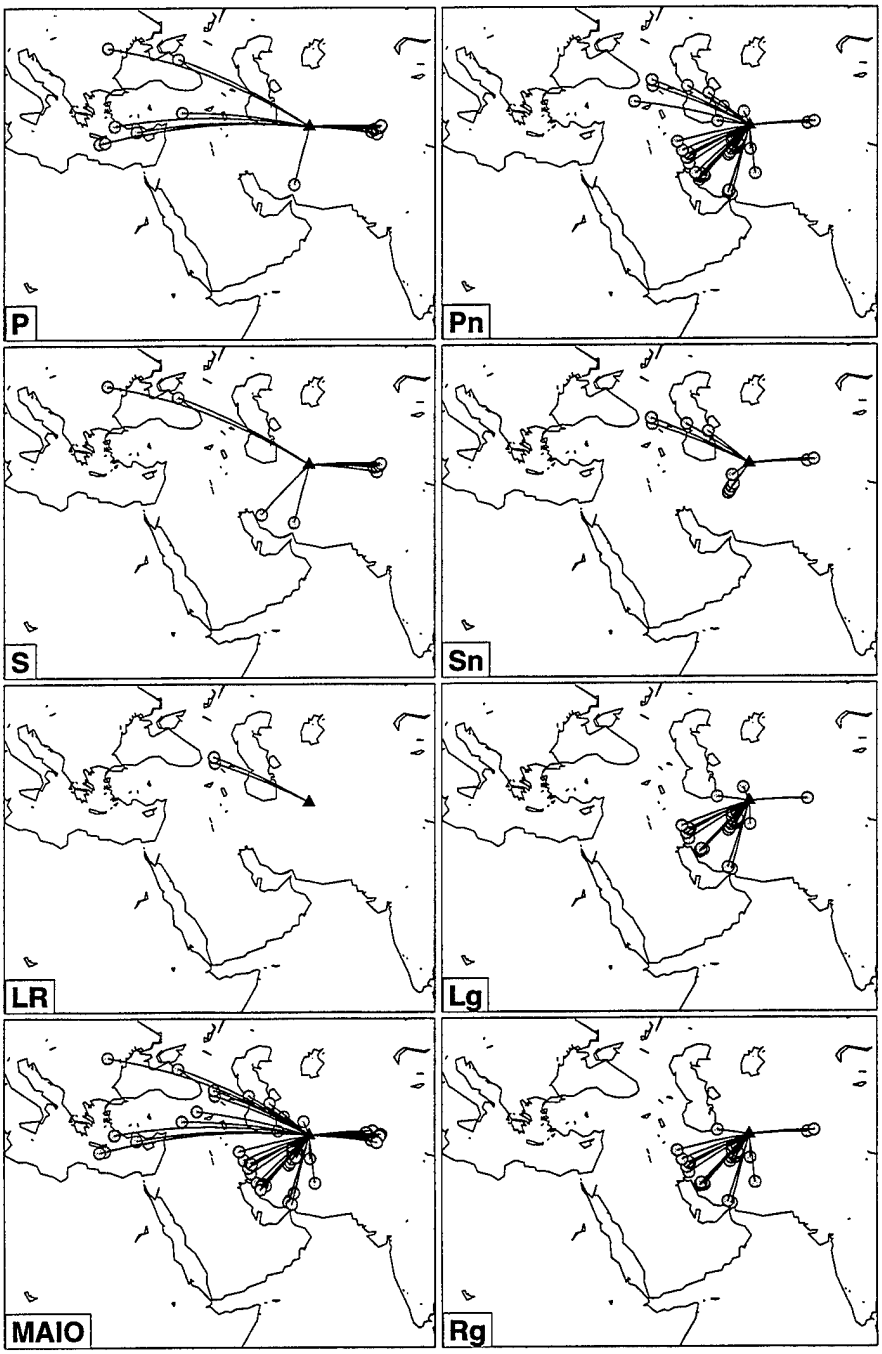


Figure 10: Paths of observed phases at MAIO. The map at bottom left shows all 159 phases observed at MAIO. Map borders are the same as in Figure 6.

Waveform Quality Control

We have chosen to leave all the waveforms in the database and let the user make the quality decisions. The exception to this rule is that we excluded all data from Sites 5 and 6. Data from these stations were found to be flat for all events studied by Rodgers *et al.* (1996) and so we did not extract data from those sites from the continuous waveforms.

The results of a visual quality control of the waveforms were stored in the QC.dat files in each event directory. We provide this information to aid the user in selecting events with the appropriate level of data quality for their application.

Unlike the *remark* table, in which the comments are free-form, the QC.dat files are formatted. We used the following categories:

- clipped
- bad event
- flat- trace is all zeroes
- very glitchy - not just one glitch but many
- unknown problem with instrument
- noisy
- dc offset
- no signal- event too small, too distant, gain problems

The QC.dat file for event 228938 from region 5 looks like this:

```
228938 flat          IR2 SHZ --- ---  Dec-6-16:20:16
228938 glitch        IR3 SHZ --- ---  Dec-6-16:20:23
228938 flat          IR4 SHZ --- ---  Dec-6-16:20:32
228938 nosignal      IR7 --- --- SHE  Dec-6-16:20:36
```

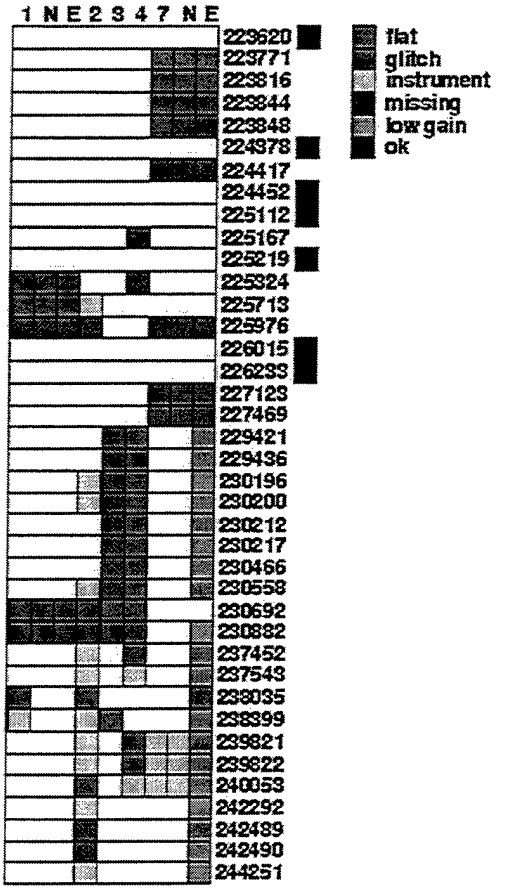
For this event, the vertical traces at IR2 and IR4 are useless for all applications while the problems at IR3 and IR7 may only affect some applications.

These QC.dat files were converted to the *wfedit* table following the Datascope extensions to the CSS3.0 schema. The *wfedit* table has the following definition:

wfedit describes a waveform edit; specifies a time slice for which a specified waveform has a problem, identified by the probtype field.

***wfedit* attributes:** sta chan edid time endtime probtype auth commid lddate

Figure 11 is a graphical summary of all *wfedit* tables from region 4. Each square in the plot represents a line in the *wfedit* table. The horizontal axis is channel and the vertical axis is evid. The earliest event is at the top and the latest event is at the bottom. The deterioration of the array over time is evident in this plot. For example, a problem identified as "low gain, no signal" was observed at IR7 SHE at event 229421 (11/30/1978) and persisted through event 244251 (9/24/1979). Events with a black square the right of the evid are those for which no problems were observed on any of the ILPA waveforms. A plot like this for each region is included in the ILPA Home Page (http://www.multimax.com/~gtdb/ilpa). The plots are more meaningful in color. A summary of the *wfedit* table for all ILPA/MAIO events is presented in Figure 12. The "low gain, no signal" problem also is apparent in Figure 12 which shows that IR7 SHE had this problem on 156 waveforms, overall.



This plot is a graphical summary of the quality of the waveforms for each event in the region you have selected.

The horizontal axis is channel:

```
IR1 IR1 IR1 IR2 IR3 IR4 IR7 IR7 IR7
SHZ SHN SHE SHZ SHZ SHZ SHZ SHN SHE
```

Waveform data for IR5 and IR6 are not available in the ILPA Dataset. No data were extracted for these stations because previous experience with ILPA (Rodgers et al., 1996) indicated that no useable data came from either of those two stations. All data from IR5 and IR6 were flat.

The vertical axis is event id (evid).

What we have plotted here are the comments from the QC.dat files created by Flori Ryall during analysis. First, the QC.dat files were converted to *wfedit* tables in which we coded each character string in the probtype field as an integer in the edid field so that we could make these plots. *Wfedit* is a Datascope extension to the CSS 3.0 schema. Both Flori's original QC.dat file and the *wfedit* table are distributed with the event directories.

The probtype fields have the following definitions:

- flat - trace is all zeroes
- glitch- trace has many, many glitches
- instrument - unidentified problem with the instrument
- missing - trace not available for this event
- low-gain - no signal visible on trace; may be a gain problem with instrument
- ok- no problems noted for any channel on this event

The "OK" comment (boxes to the right of the evid) means that no problems were observed (or recorded) for any of the waveforms for that particular event. So an "OK" indicates the best events in terms of waveform data quality but not necessarily in terms of signal quality.

Since evids are in time order, the patterns of the probtypes are related to the status of the array. Note that, in general, the array has degraded over time. Later evids, at the bottom of the plot, have more problems. For example, after a certain day, the channel at IR7 SHE had a low-gain problem for almost every event. Conversely, most of the events with the "OK" tag are early in the ILPA short-period deployment.

Figure 11: Waveform QC plot for Region 4. This plot is an example of how the *wfedit* tables can be plotted to show trends in waveform quality for ILPA data.

Summary of *wfedit* table by channel and probtype

Channel	#	flat	#	glitch	#	instrument	# missing	#	low-gain; no signal
IR1 SHZ:	18		10		15		0	0	
IR1 SHN:	16		11		11		0	0	
IR1 SHE:	16		11		11		0	0	
IR2 SHZ:	22		42		90		0	0	
IR3 SHZ:	19		54		5		0	0	
IR4 SHZ:	109		20		9		0	0	
IR7 SHZ:	14		27		18		5	0	
IR7 SHN:	14		27		15		0	0	
IR7 SHE:	17		27		9		0	156	

Summary of *wfedit* table by total problems per channel

IR1 SHZ	IR1 SHN	IR1 SHE	IR2 SHZ	IR3 SHZ	IR4 SHZ	IR1 SHZ	IR7 SHN	IR7 SHE
43	38	38	154	78	138	64	56	219

Figure 12: Summary of the *wfedit* tables for all ILPA/MAIO events.

Database Organization

To facilitate analysis and processing, GTDB data sets are grouped into geographic regions. Regions comprise data for several events, each stored as an "event-directory" in Unix compressed tar format. Each event-directory includes short-period and/or broadband seismic waveforms and CSS3.0 database table-files.

We chose to work with this structure for several reasons:

1. Compatability with analysis and database tools (**geotool** and Datascope);
2. Disk space can be conserved by unpacking only a few events at a time;
3. These are regular files and can be delivered via anonymous ftp without interaction with a RDBMS (Relational Database Management System, *e.g.*, ORACLE).

For each event, we have produced a compressed tar directory (*e.g.*, ev1.tar.Z) which unpacks into the following directory tree structure:

```
ev1
/
ev1.wfdisc  ev1.origin  wf
                        /
                    *.SHZ *.SHN *.SHE
```

The name of the top-level directory and the prefix of the files in the second-level directory are named after the event ID (evid).

With a few exceptions, the files in the second level down are ASCII-formatted flat files conforming to the CSS3.0 database schema (Anderson *et al.*, 1990). The waveform data files

are stored in the **wf** directories in the third level. The naming convention for the waveform files is yyyydoyhhmm.nn.sta.chan where yyyy is year, doy is julian day, hh and mm are hour and minute of the origin time, nn is an arbitrary number, sta is the site and chan is the component. All of the waveforms are stored in t4 format (Sun IEEE 4-byte single precision real numbers).

Event Directories: What You Get with Each Event

The file ev223834.tar.Z is offered as an example event directory. This file unpacks into a directory named ev223834 with the following contents:

`Comments`	`ev223834.event`	`ev223834.site`	`ev223834.wftag`
`QC.dat`	`ev223834.origin`	`ev223834.sitechan`	`wf`
`ev223834.arrival`	`ev223834.remark`	`ev223834.wfdisc`	
`ev223834.assoc`	`ev223834.sensor`	`ev223834.wfedit`	

The Comments file was written during seismic waveform analysis. This information has been converted into the *remark* table. The QC.dat file contains information about waveform quality and has been converted to the *wfedit* table. More information and examples of these two files is found under the heading "Analysis and QC", on page 10.

With the exception of ev223834.wfedit, all other files with the prefix of ev223834 are CSS3.0 formatted table-files. The *wfedit* table is an extension to the CSS3.0 schema made by the developers of Datascope.

The seismic waveforms are in the **wf** directory. For this event, there are 10 waveform files:

`19782091435.49.MAIO.SHZ`	`19782091436.05.IR1.SHN`	`19782091436.08.IR7.SHN`
`19782091436.02.IR3.SHZ`	`19782091436.05.IR1.SHZ`	`19782091436.08.IR7.SHZ`
`19782091436.02.IR4.SHZ`	`19782091436.05.IR2.SHZ`	
`19782091436.05.IR1.SHE`	`19782091436.08.IR7.SHE`	

Sizes of the event directories vary with the distance between event location and the seismic stations. This example event includes 804 kb of waveforms. The whole event directory is 825 kb (224 kb compressed).

Departures from CSS3.0 Schema

While we have made an effort to ensure that the tables presented with this data set conform to CSS3.0 Schema (Anderson *et al.*, 1990), we have allowed several exceptions. Some of departures were necessary in order to represent most accurately the information, and some were made to simplify building the identification numbers in the tables.

All of the known departures are listed below and organized by the key table that is affected. [The Schema is composed of a series of relations (tables) which are in turn defined by attributes (fields). When we refer to the *origin*.arid, this means the arid attribute of the *origin* relation. Table names are in italics.]

- *origin*.dtype - depth determination flag. CSS3.0 calls for f, d, r, g but we left them unchanged from the USGS definitions of depth quality flag (A,G,N, etc.)
- *origin*.ndef and *origin*.nass - we followed the Datascope modifications for catalogs where arrivals are not available. We use ndef as the number of phases used to locate the event in the original catalog and nass to be the number of arrivals in the current database that are associated with this event.
- *origin*.etype - GTDB extensions (Grant *et al.*, 1993) to allow etype to be more descriptive of event type. For the ILPA data set, most events are of unknown type, "u". One exception is event 230364 of region 2 which was a nuclear blast, "nu". Other exceptions include an aftershock series in Region 5 ("eq").
- *arrival*.iphase - initial phase ID (often made by automatic processing system) is not applicable since no automatic processing was performed on the ILPA/MAIO arrivals. We let *arrival*.iphase=*assoc*.phase for this data set.
- *origin*.evid=*origin*.orid=*origin*.commid
- orids - all ILPA/MAIO orids match the orids in the "events" account at CMR.
- *remark*.lineno - since the *remark* table does not have an author field, the first ten lines are reserved for comments by the analyst.
- *wfedit* table - Datascope extension. However, instead of using the edid attribute as a unique id, we used it to indicate the type problem, which is spelled out in the probtype attribute.
- NULL values - Following Datascope modifications, we corrected NULL values and allowed some null values where the CSS3.0 disallowed them.

Getting the ILPA/MAIO Data Set

The final step in completing the ILPA/MAIO data set was to document its construction and describe results of analysis. A Web page was designed for this purpose. It includes maps, seismic bulletins and references to other research employing the ILPA/MAIO data set. The URL is http://www.multimax.com/~gtdb. Interested researchers can use the page as a tool to decide which, if any, of the data set would be useful to their particular research.

Individual event directories are easily down-loaded directly from the page by selecting an evid from the seismic bulletin. If, however, the researcher is interested in downloading a larger subset -or all- of the ILPA/MAIO data set, the anonymous FTP site is the recommended method. To download all events from region 2, for example:

```
ftp es2.multimax.com
(username is anonymous; password is your e-mail address)
cd pub/gtdb/ilpa/reg2
bin
prompt
mget *.Z
quit
```

Another useful purpose of this Web page is to make updates and corrections to the tables. This allows the most current and complete information relating to the ILPA/MAIO data set to be available from the Web. Updates are announced in the area of the ILPA Home page titled "News".

ANALYSIS OBSERVATIONS

This section summarizes and illustrates some of the observations made during analysis. For a list of analysis guidelines, refer to page 10.

Fundamental-mode Rayleigh Wave

On a number of recordings, a short-period (8-12 sec) fundamental-mode Rayleigh wave was observed, and this phase has been read as "Rg", following Press and Ewing (1952) and Ewing *et al.* (1957). It has been suggested that to avoid confusion with the higher-frequency phase observed at relatively short regional distances and also called "Rg", a new name should be found for this crustal Rayleigh wave. Possibilities that have been suggested include "RG" and "Rc", but a final decision on a new name is beyond the scope of the present study.

Higher Mode Rayleigh Wave

Also of interest in this data set, is the recording at both ILPA and MAIO of the higher mode Rayleigh wave M_2 (Oliver and Ewing, 1958). The period is about the same or slightly longer than Rg. This phase was noticed predominantly in regions 4, 5 and 7. To avoid confusion with the standard regional phases, it was not picked as an arrival and is not listed in the bulletin. The plot in Figure 13 displays three waveforms, one from each region where this phase records. The top trace is from Region 5, middle from Region 4, and bottom from Region 7. The traces are band-pass filtered at 0.030 to 0.100 Hz.

Illustrations of Observed ILPA/MAIO Phases

The remaining figures in this section are examples of analysis results. The figures illustrate various points about the way phases were timed and identified on the ILPA/MAIO waveforms:

Clear-Cut Examples The figures in this section illustrate typical waveforms and phase observations. These are clear-cut examples with unambiguous arrivals of regional phases Sn and Lg. This section also illustrates the use of band-pass filtering to isolate and thereby better time the arrivals of regional phases.

Examples of Sn and Lg Recordings for Different Regions Around ILPA The figures in this section show sample recordings of Sn and Lg phases at regional distances to ILPA and MAIO. Regions 1 and 8 record mostly teleseismic phases, P and S, and are not shown as examples.

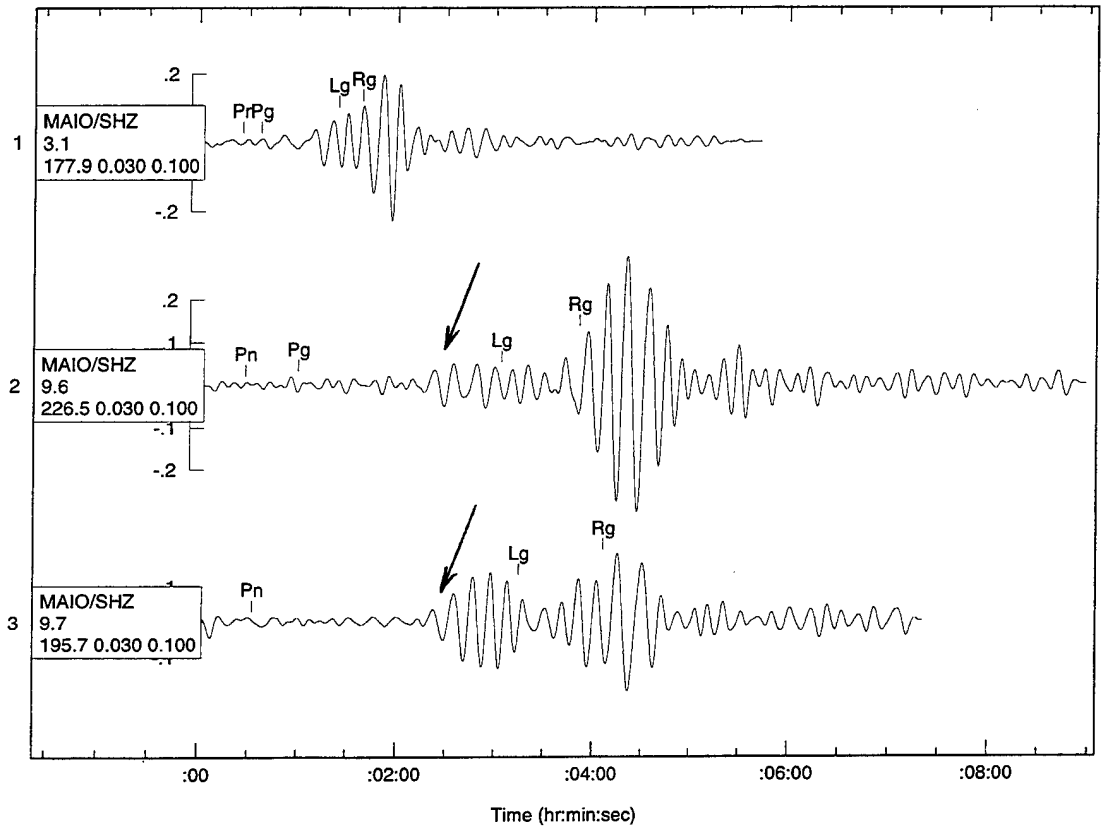


Figure 13: Sample traces from regions 5, 4, and 7 showing low-frequency phase which was not added to the database.

Depth Phases and Core Reflections on Far-Regional Recordings A few events from region 3 recorded depth phases on ILPA.

Use of Theoretical Travel Times to Identify Timing or Location Errors Two examples indicate that the ISC/USGS solutions we have used for these events may have relatively large errors for smaller events.

Events in Same Area with Different Characteristics This group of figures illustrates the variation in signals from one geographic region as recorded on ILPA and MAIO. Figures also illustrate variations of signals from one event across the array.

Mixed Events Mixed events are those in which phases from more than one event arrive simultaneously. This often confuses routines which automatically associate phases with events.

Figure 14 explains how to read the waveform tags in the following plots. Information in the waveform tags lists: STA/CHAN (top line); station-to-event distance in degrees (second line); station-to-event azimuth and the high and low pass corners of a zero-phase band pass filter (third line). When the low and high corners are shown as 0.0, no filter was applied. For each event shown, we also list the evid, the region number, and the USGS/ISC mb and depth (h) (*e.g.* ev237393-6 (mb 4.8, h 10)).

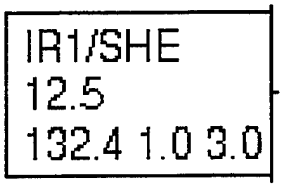
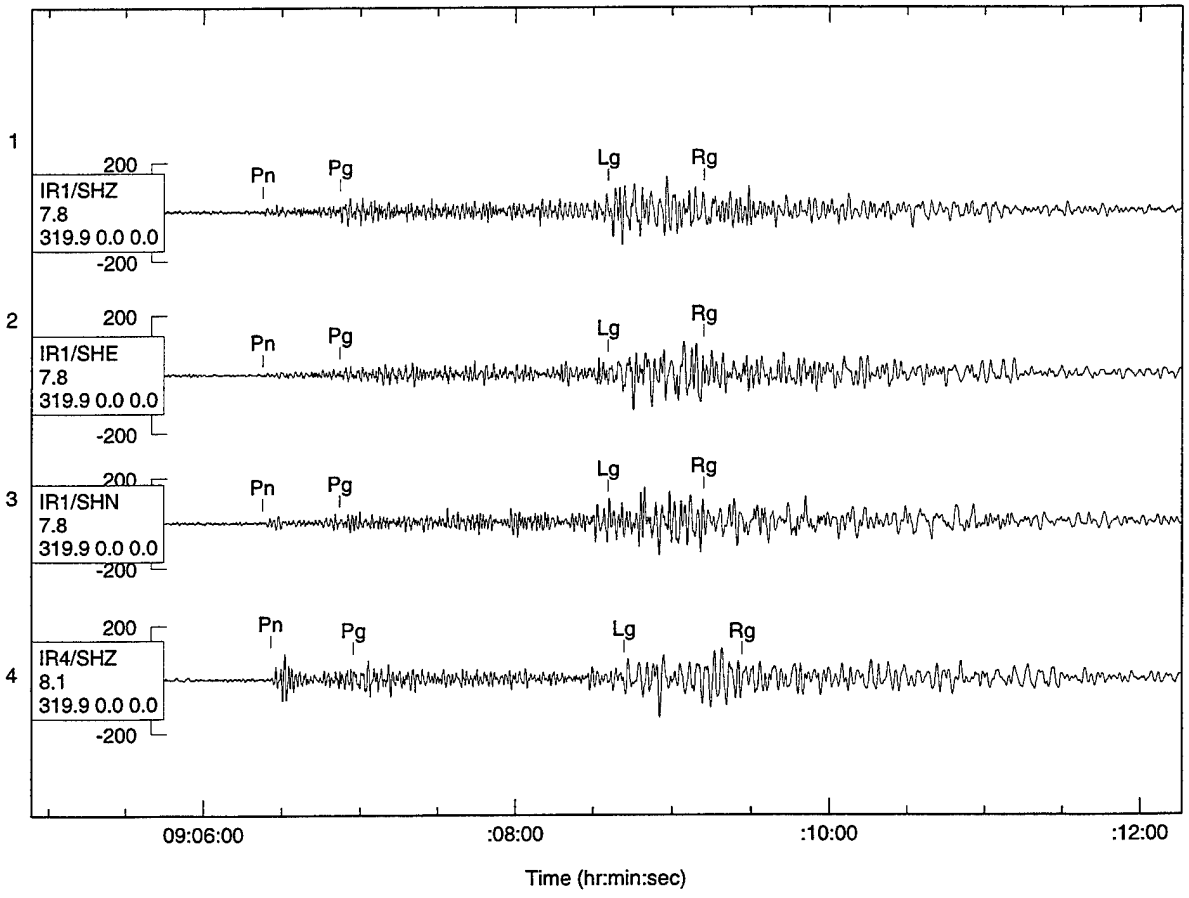


Figure 14: Key to waveform tags on plots in this section. On the first line of the tag are the station and channel name. On the second line is the event-to-station distance in degrees. The third line includes station-to-event azimuth and the low and high-cut corners of the zero-phase band-pass filter that was applied. If the filter corners are 0.0 and 0.0, then no filter was applied.

CLEAR-CUT EXAMPLES

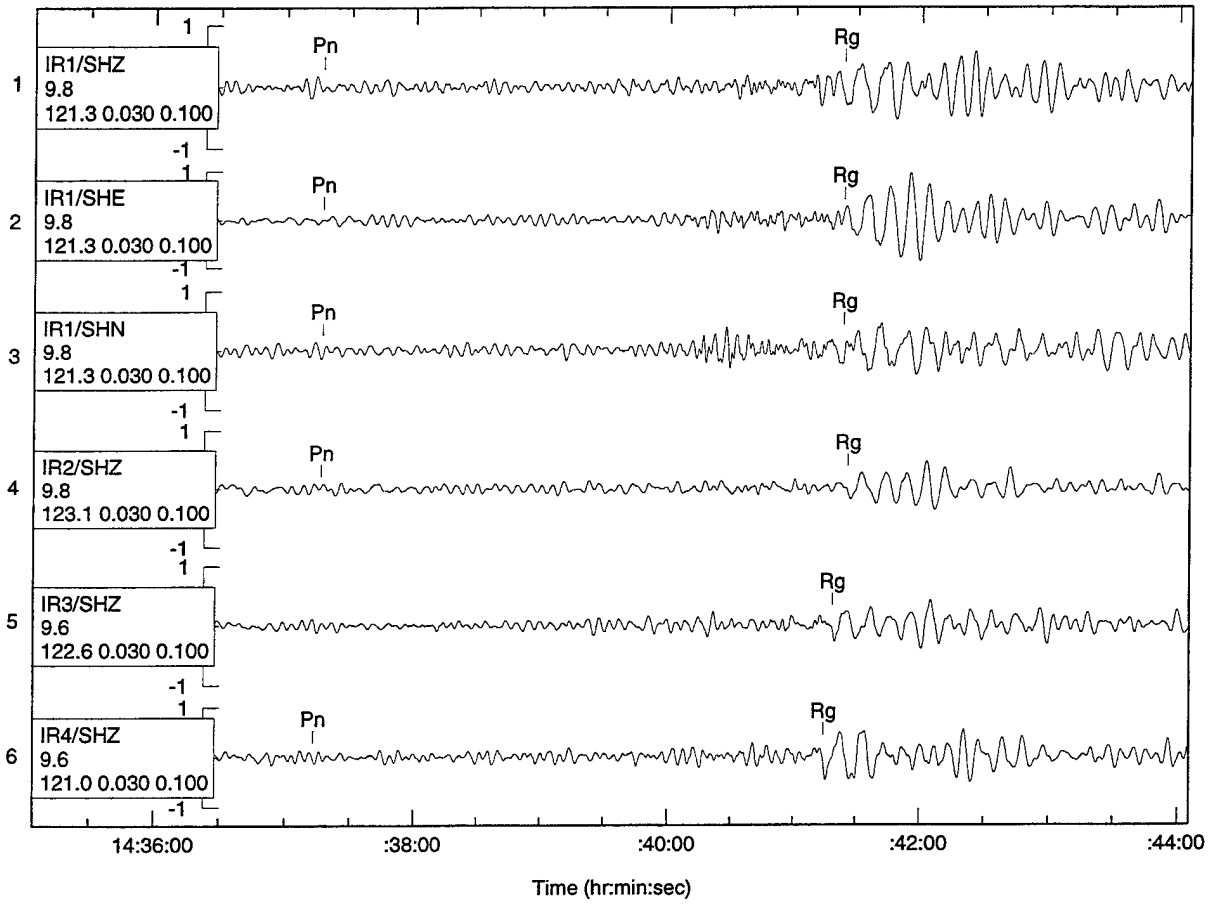
A clear cut example: No Sn.



Time scale: one minute = two tick marks.

Figure 15: Event ev224602-2 (mb 4.7, h 8) with no observed Sn.

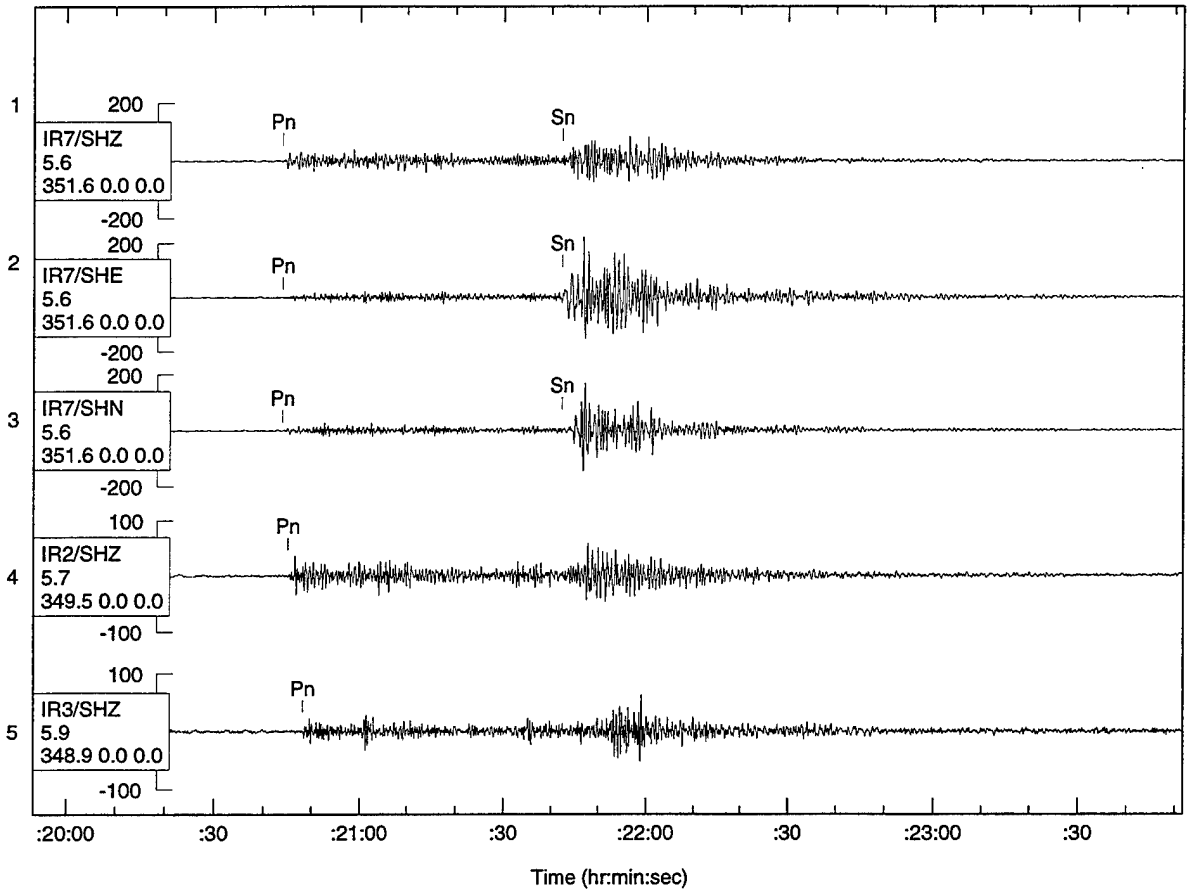
Sample Rg Phase from Region 7



Time scale: one minute = two tick marks.

Figure 16: Event ev223834-7 (mb 4.1, h 25). Rg is timed on 0.03-0.1 Hz band.

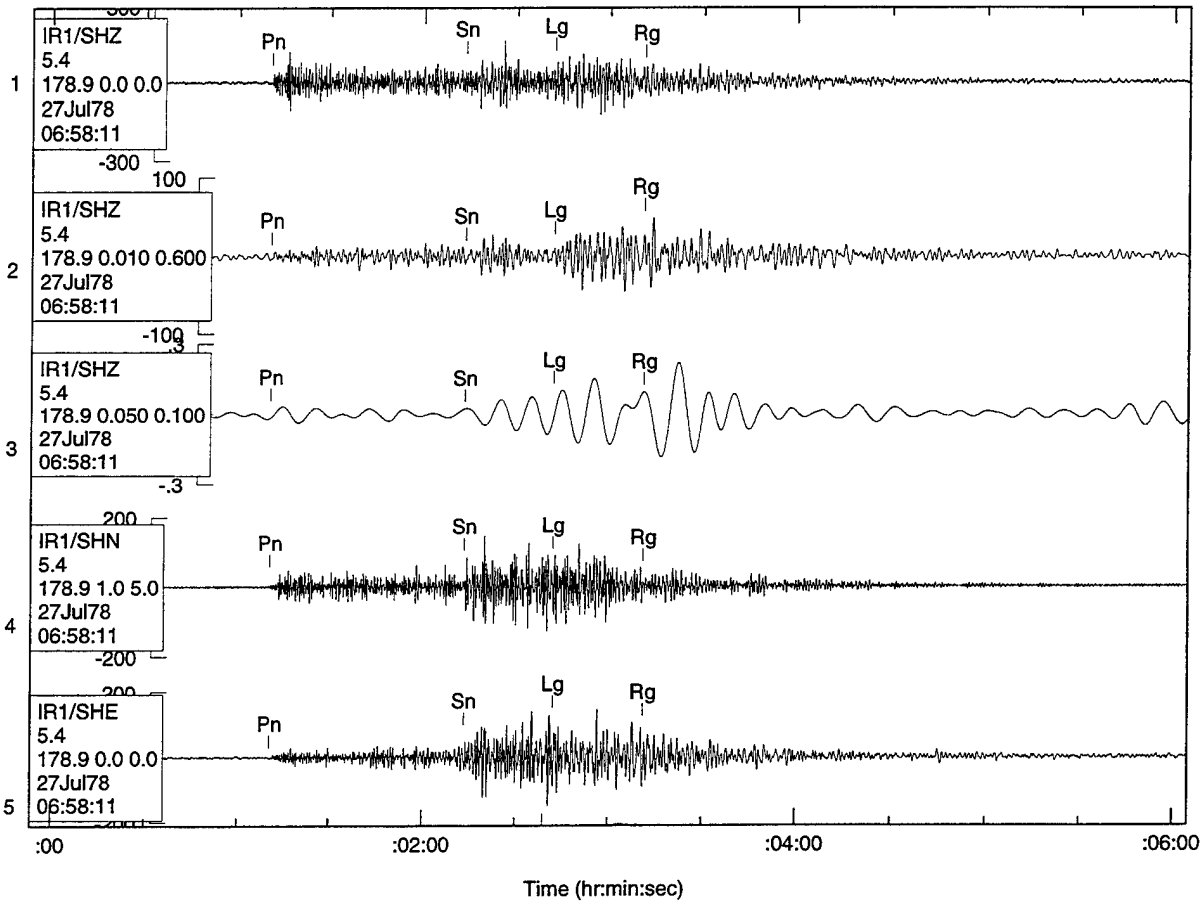
Clear-cut Example: No Lg.



Time scale: one minute = six tick marks.

Figure 17: Event ev225194-2 (mb 4.4, h 0) with no observed Lg.

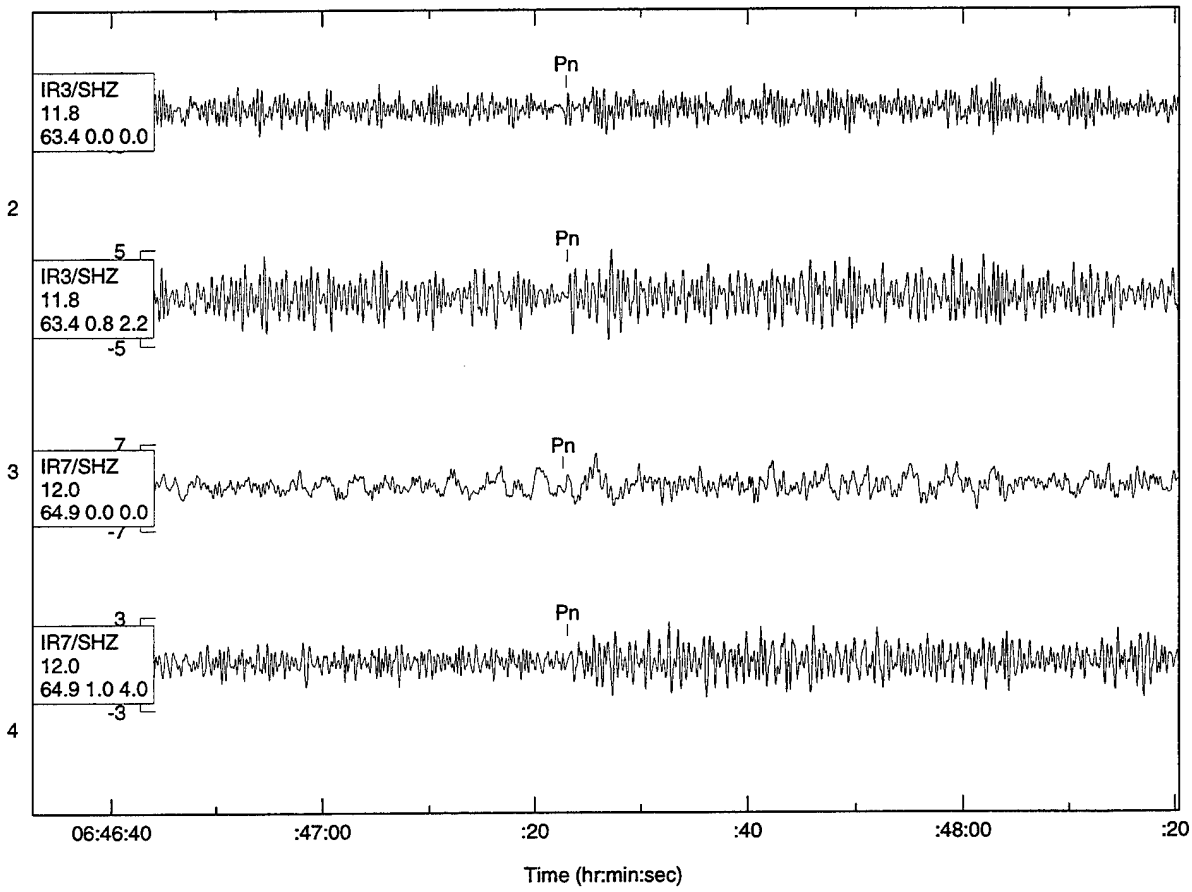
Effect of Filtering on Different Phases



Time scale: one minute = two tick marks.

Figure 18: Event ev223771-4 (mb 4.3, h 33). Traces are filtered as follows: 1) SHZ (unfiltered) shows Pn best; 2) SHZ (0.01-0.6) shows Lg best; 3) SHZ (0.05-0.1) shows Rg best; 4) SHN (1.0-5.0) shows Sn best; 5) SHE (unfiltered).

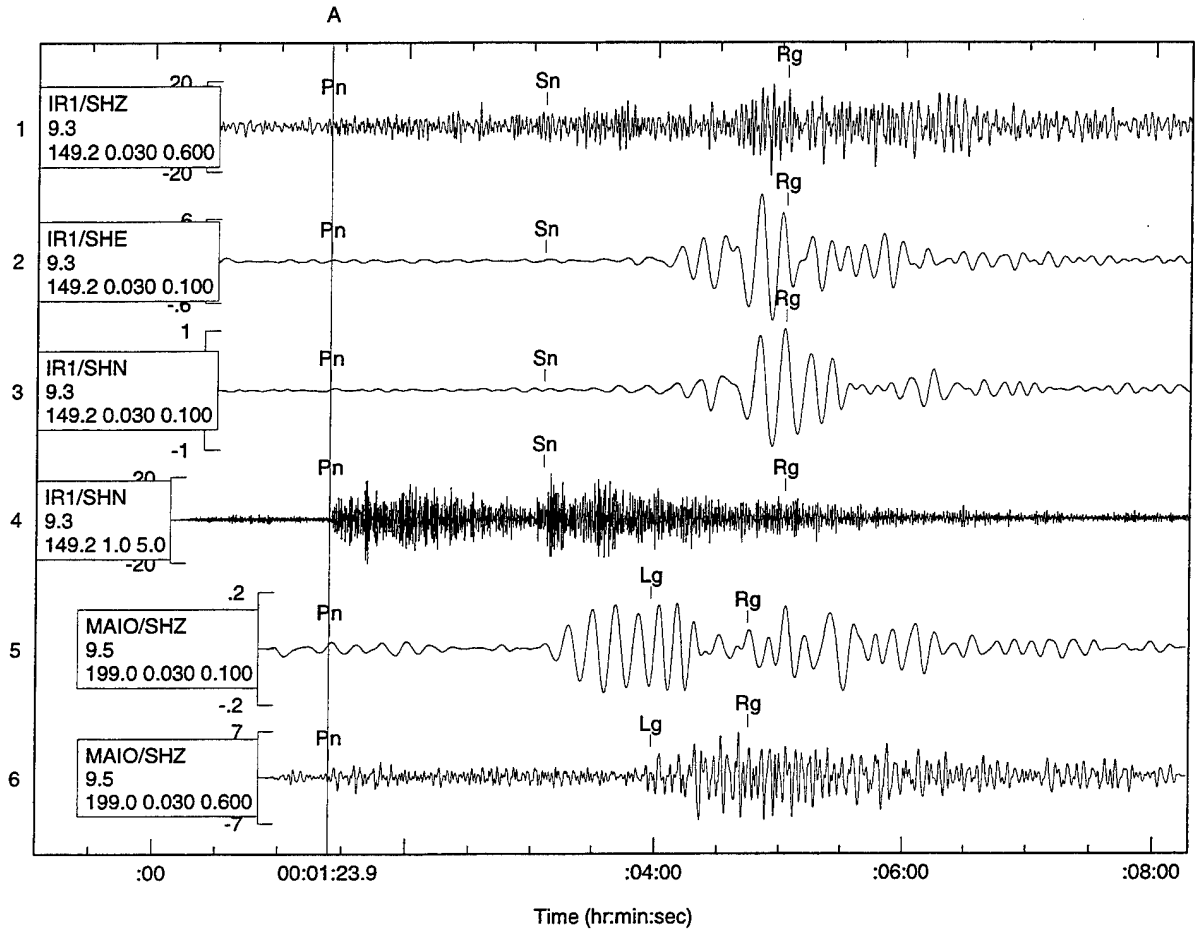
Use of Different Filters to Time Pn Arrival



Time scale: one minute = six tick marks.

Figure 19: Event ev238694-1 (mb 4.1, h 33). Traces are filtered as follows: 1) IR3 SHZ (unfiltered); 2) IR3 SHZ (0.80 - 2.2) shows Pn best; 3) IR7 SHZ (unfiltered); 4) IR7 SHZ (0.03 - 0.1) shows Pn best.

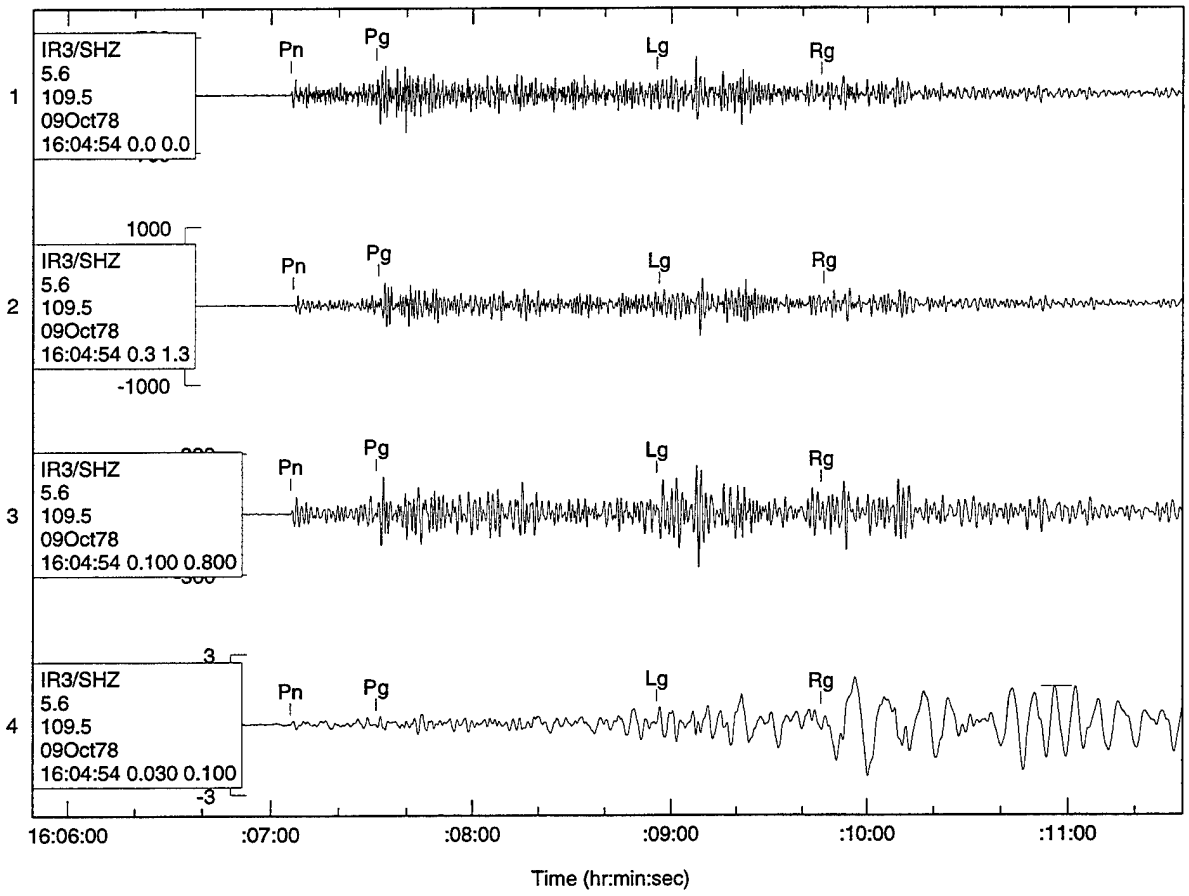
LP Arrival at MAIO



Time scale: one minute = two tick marks.

Figure 20: Event ev225158-7 (mb 4.6, h 32). Note long-period arrival at predicted Sn time on MAIO waveform. See Figure 13 and text for explanation.

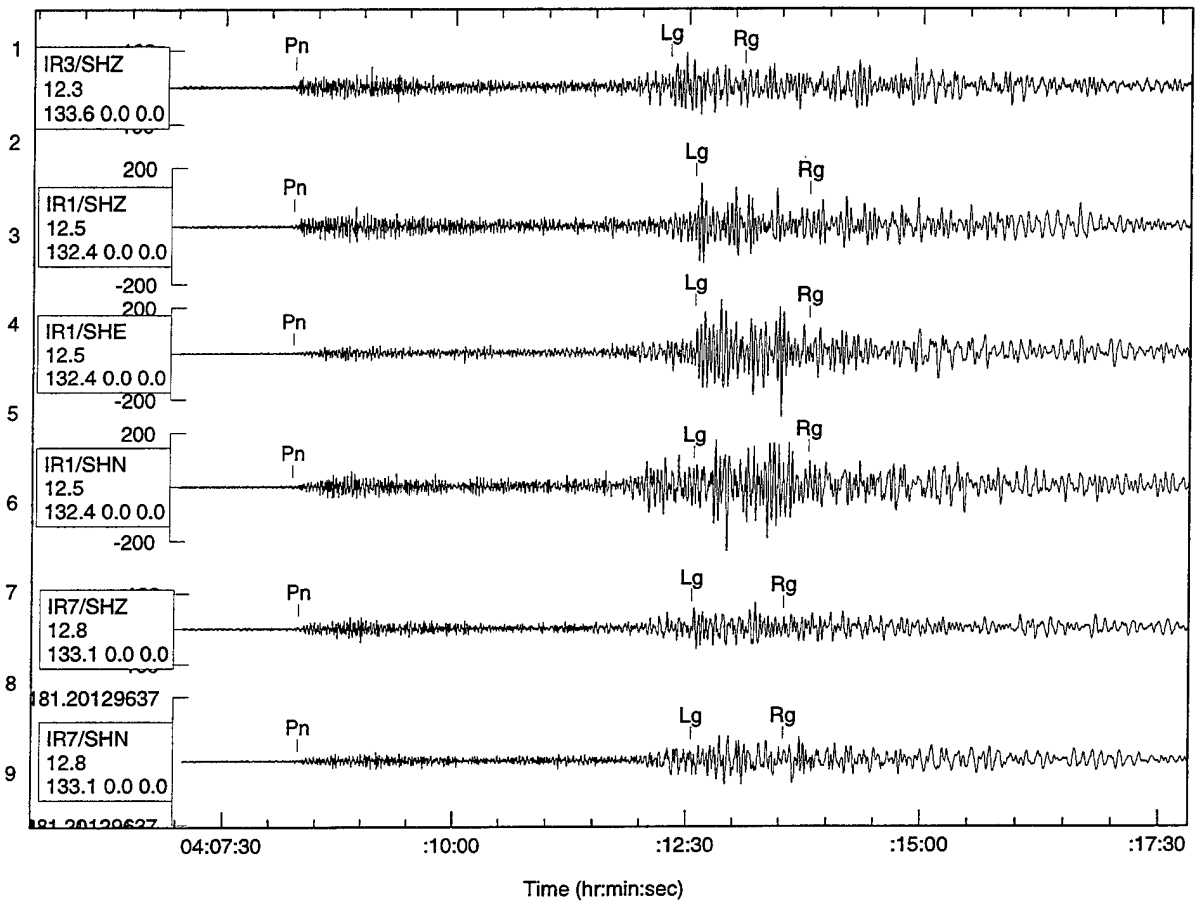
Effect of Filtering on Different Phases



Time scale: one minute = three tick marks.

Figure 21: Event ev227122-5 (mb 4.6 h 32). Traces are filtered as follows: 1) SHZ (unfiltered) shows Pn best; 2) SHZ (0.3 1.3) shows Pg best; 3) SHZ (0.1 0.8) shows Lg best; 4) SHZ (0.03 0.1) shows Rg best.

Lg Timed on Unfiltered Record

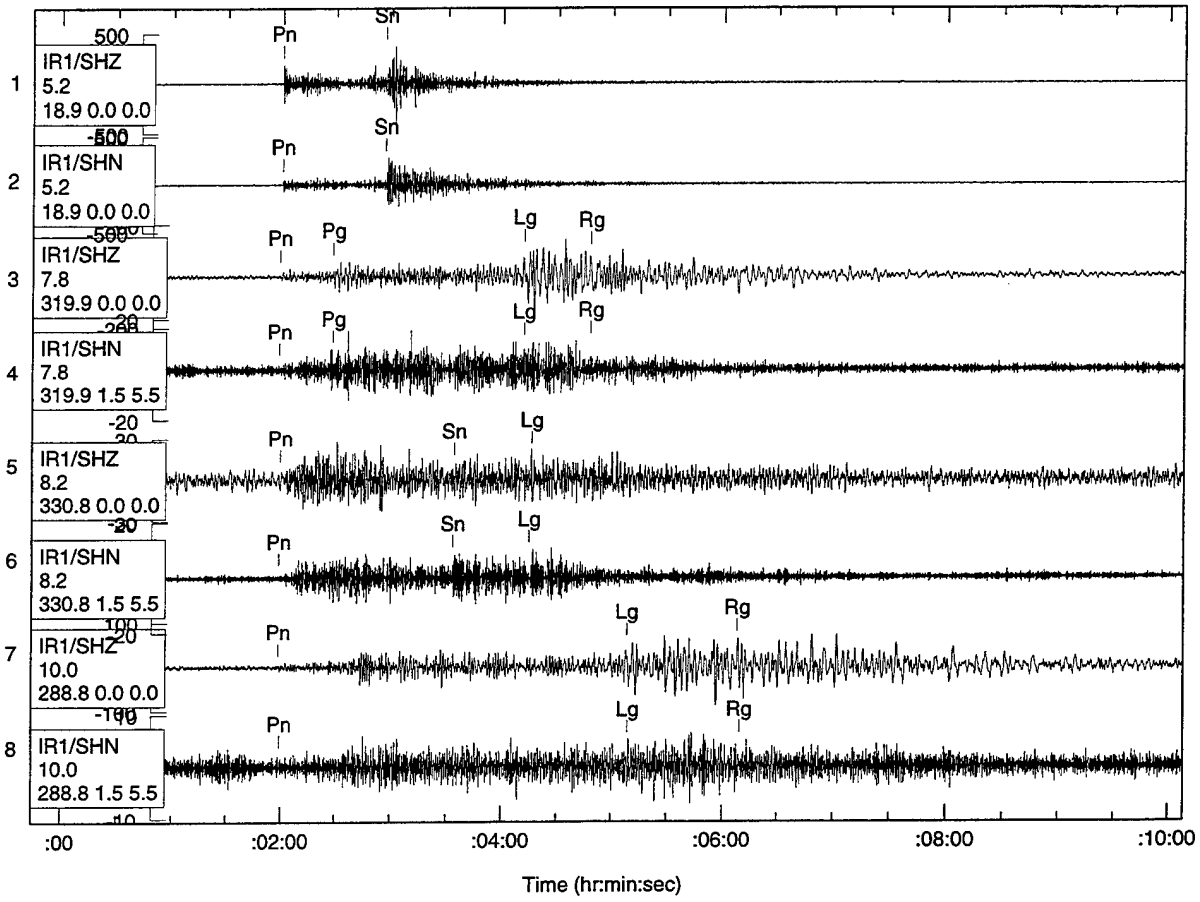


Time scale: one minute = two tick marks.

Figure 22: Event ev235443-7 (mb 4.7 h 3). The Lg phase is best timed on the unfiltered records in this example.

EXAMPLES OF Sn AND Lg RECORDINGS

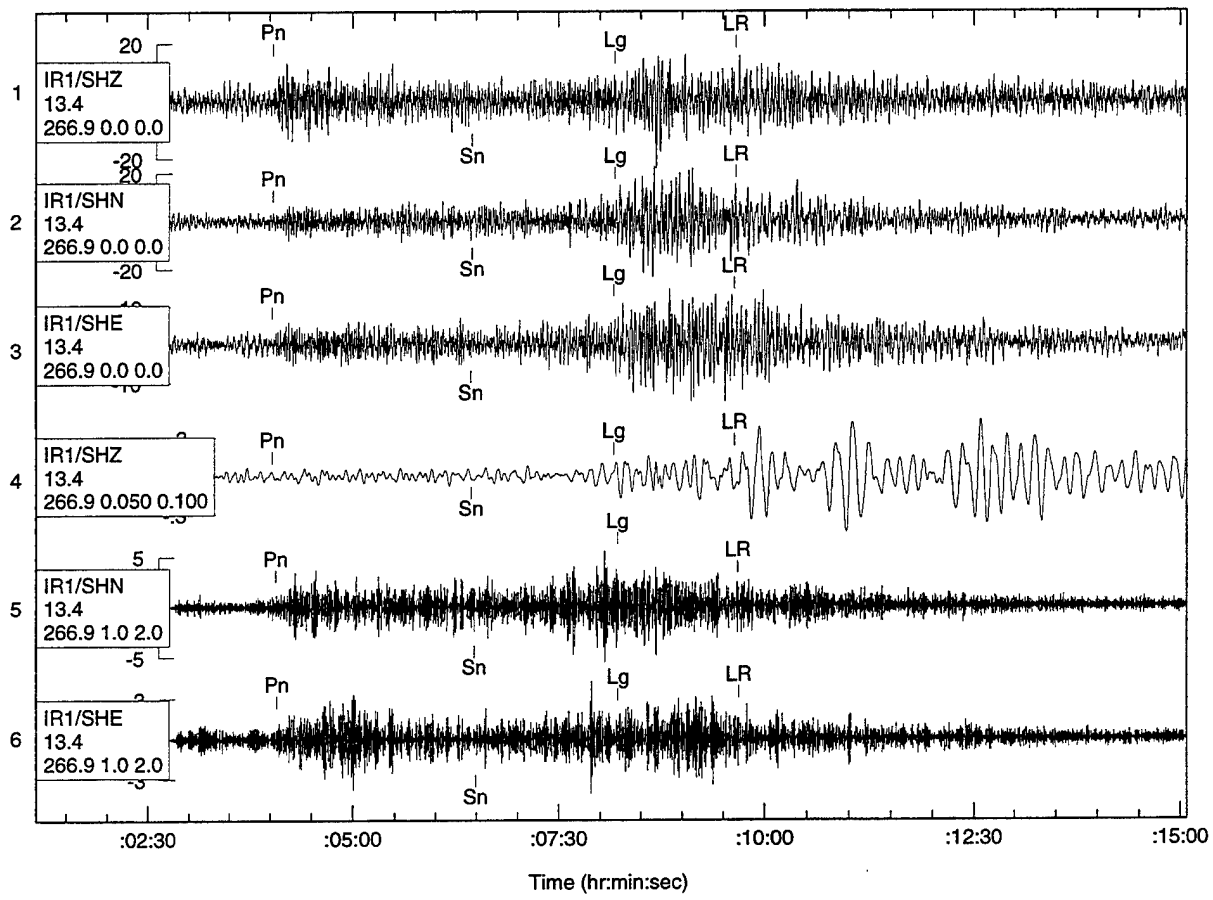
Region 2 Examples



Time scale: one minute = two tick marks.

Figure 23: Region 2 examples. IR1 SHZ and SHN traces are shown for four events. Traces are: 1-2) ev223981-2 (mb 4.3, h 33) good Sn; 3-4) ev224602-2 (mb 4.7, h 8) ambiguous Sn; 5-6) ev228167-2 (mb 4.4, h 33) good Sn; 7-8) ev226282-2 (mb 4.6, h 30) no Sn.

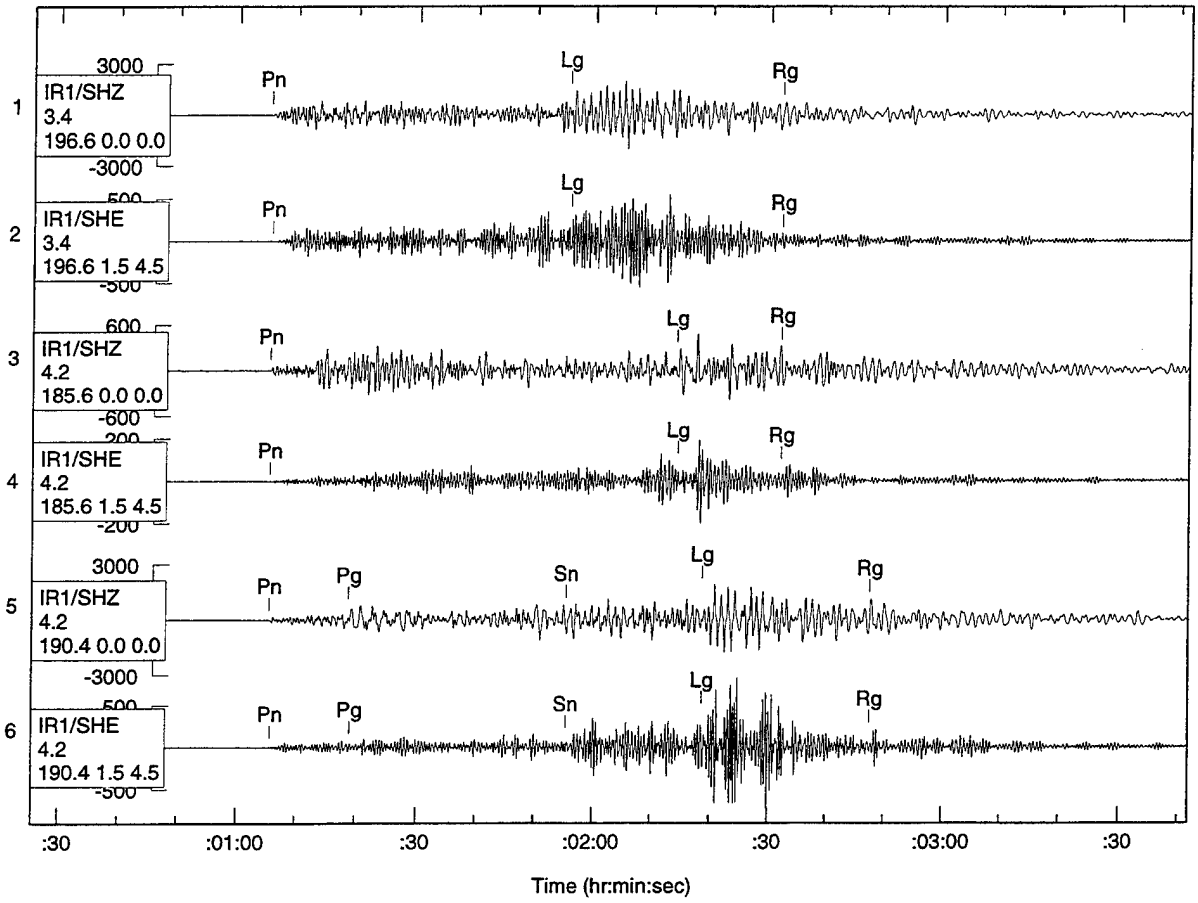
Region 3 Example



Time scale: one minute = two tick marks.

Figure 24: Region 3 example. Event ev242237-3 (mb 4.3, h 10) with no Sn at predicted time. Predicted arrivals are plotted beneath the waveforms.

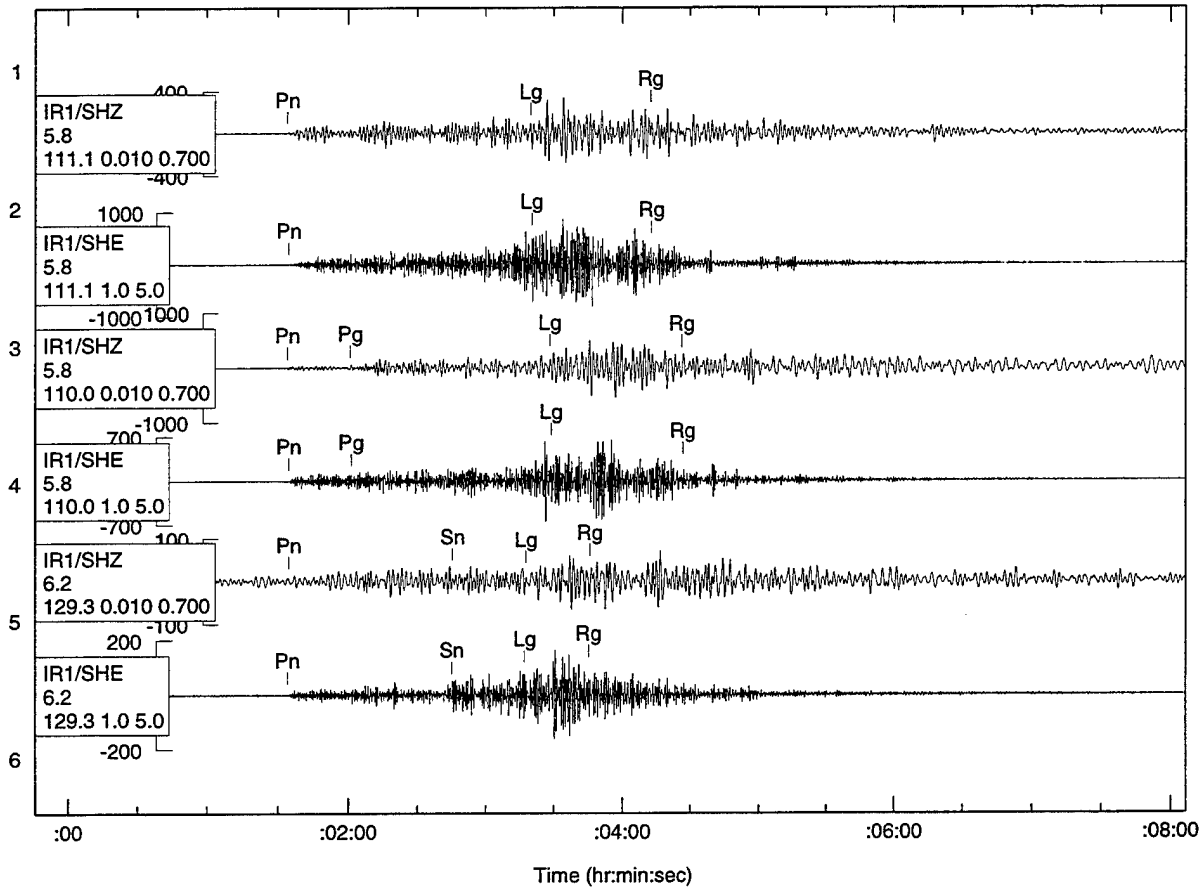
Region 4 Examples



Time scale: one minute = six tick marks.

Figure 25: Region 4 examples. IR1 SHZ and SHE traces are shown for three events. Traces are: 1-2) ev230217-4 (mb 4.7, h 46) poor Sn; 3-4) ev242489-4 (mb 4.4, h 86) no Sn; 5-6) ev223816-4 (mb 4.3, h 54) fair Sn.

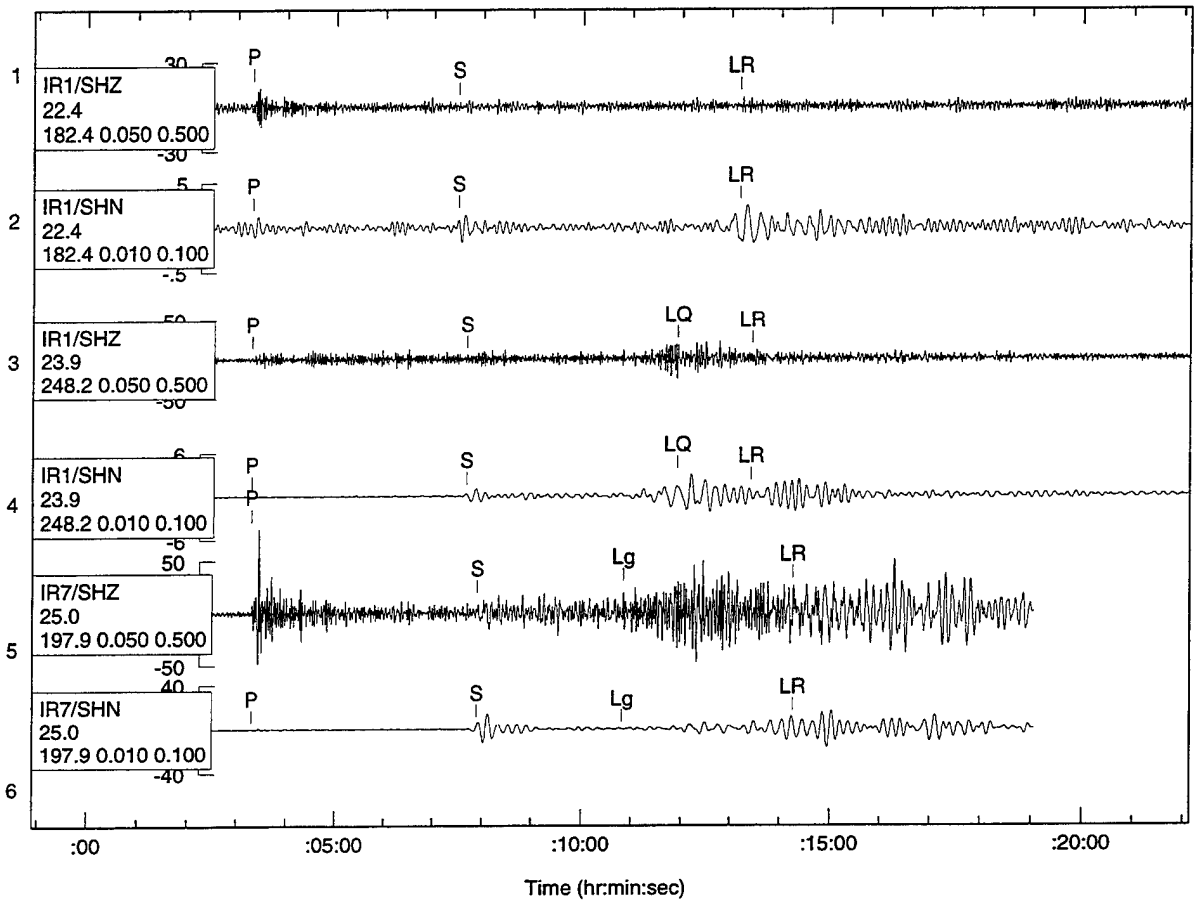
Region 5 Example



Time scale: one minute = two tick marks.

Figure 26: Region 5 examples. IR1 SHZ and SHE traces are shown for three events: 1-2) ev229819-5 (mb 4.7, h 33) no Sn; 3-4) ev238094-5 (mb 4.6, h 11) questionable Sn; 5-6) ev228088-5 (mb 4.1, h 33) good Sn.

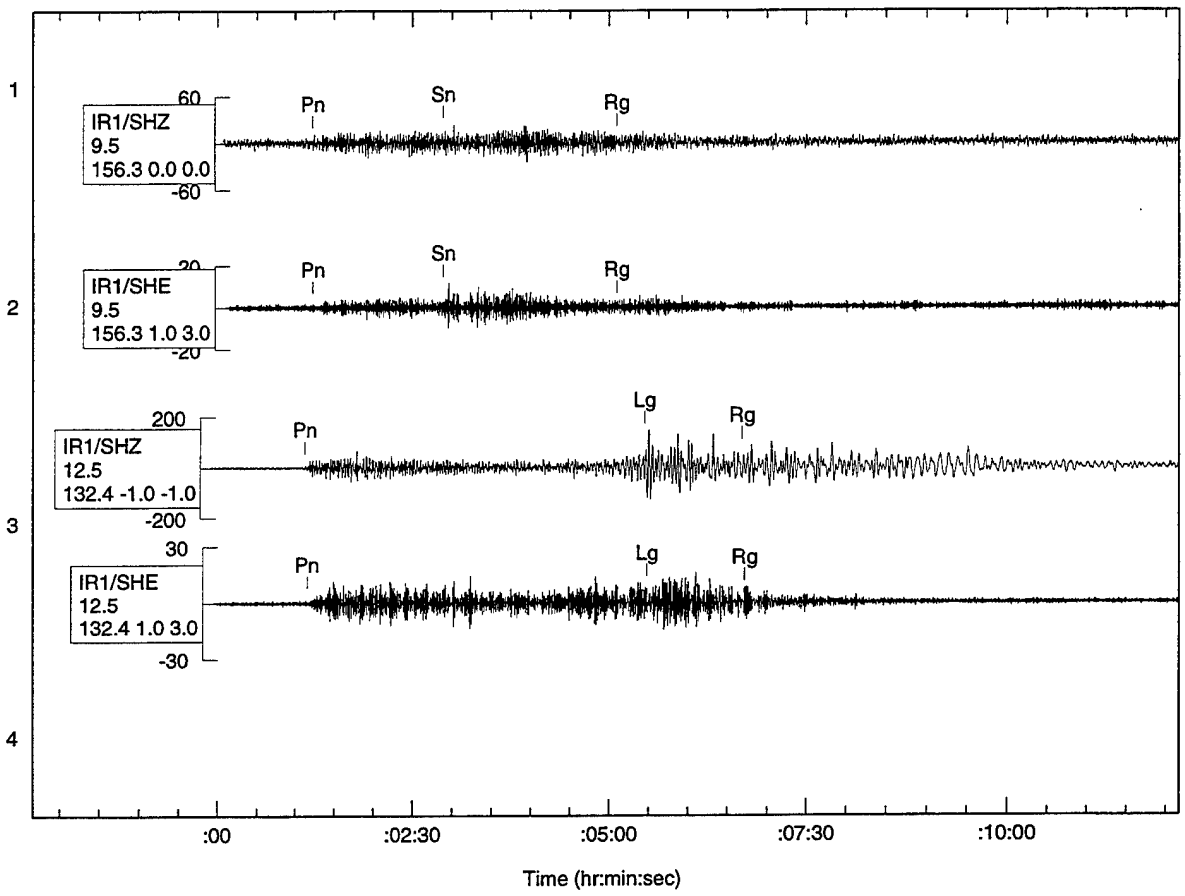
Region 6 Examples



Time scale: one minute = one tick mark.

Figure 27: Region 6 examples. IR1 SHZ and SHN traces are shown for three events. Traces are: 1-2) ev229872-6 (mb 4.3, h 10) no Lg; 3-4) ev229960-6 (mb 5.2, h 33) questionable Lg; 5-6) ev230492-6 (mb 5.1, h 17) good Lg.

Region 7 Examples

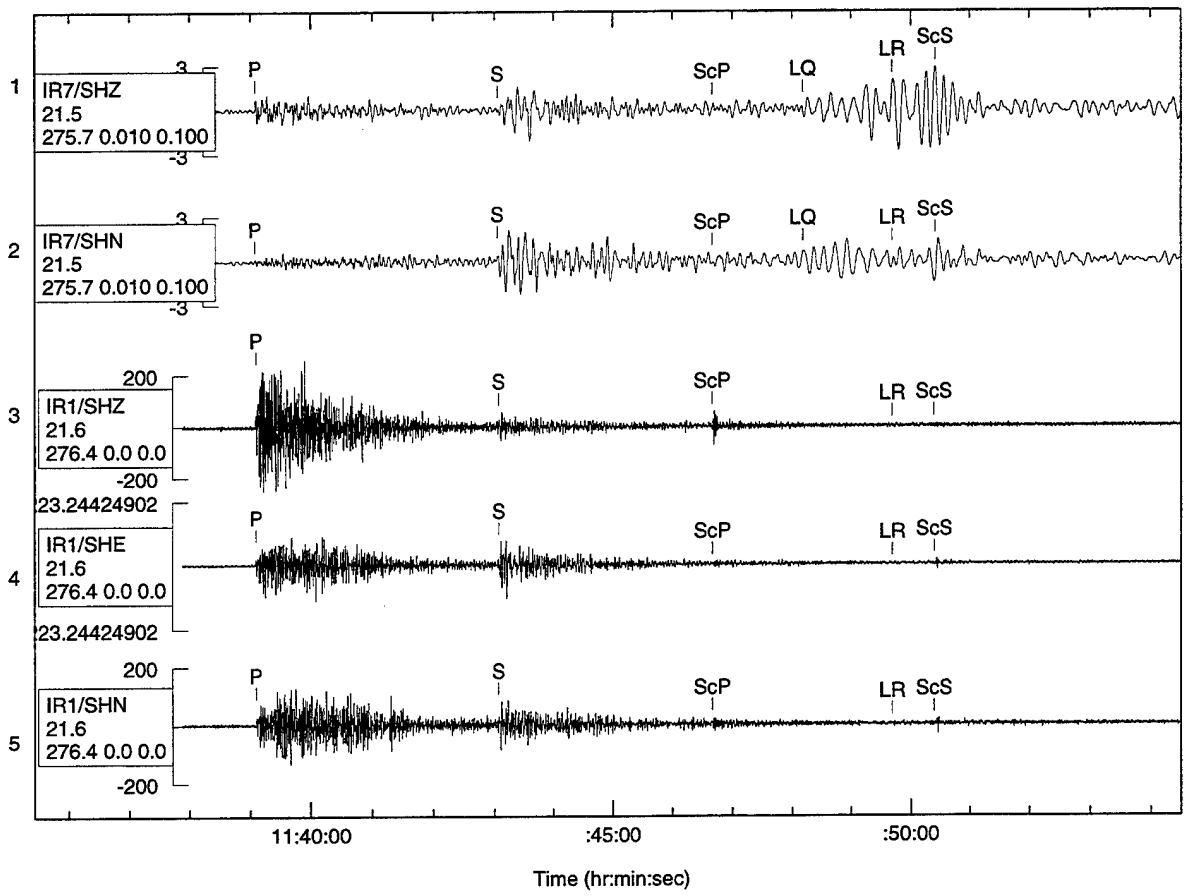


Time scale: one minute = two tick marks.

Figure 28: Region 7 examples. IR1 SHZ and SHE traces are shown for two events: 1-2) ev239085-7 (mb 4.5, h 33) no Lg, good Sn; 3-4) ev235443-7 (mb 4.7, h 3) good Lg, very questionable Sn.

DEPTH PHASES AND CORE REFLECTIONS ON FAR-REGIONAL RECORDINGS

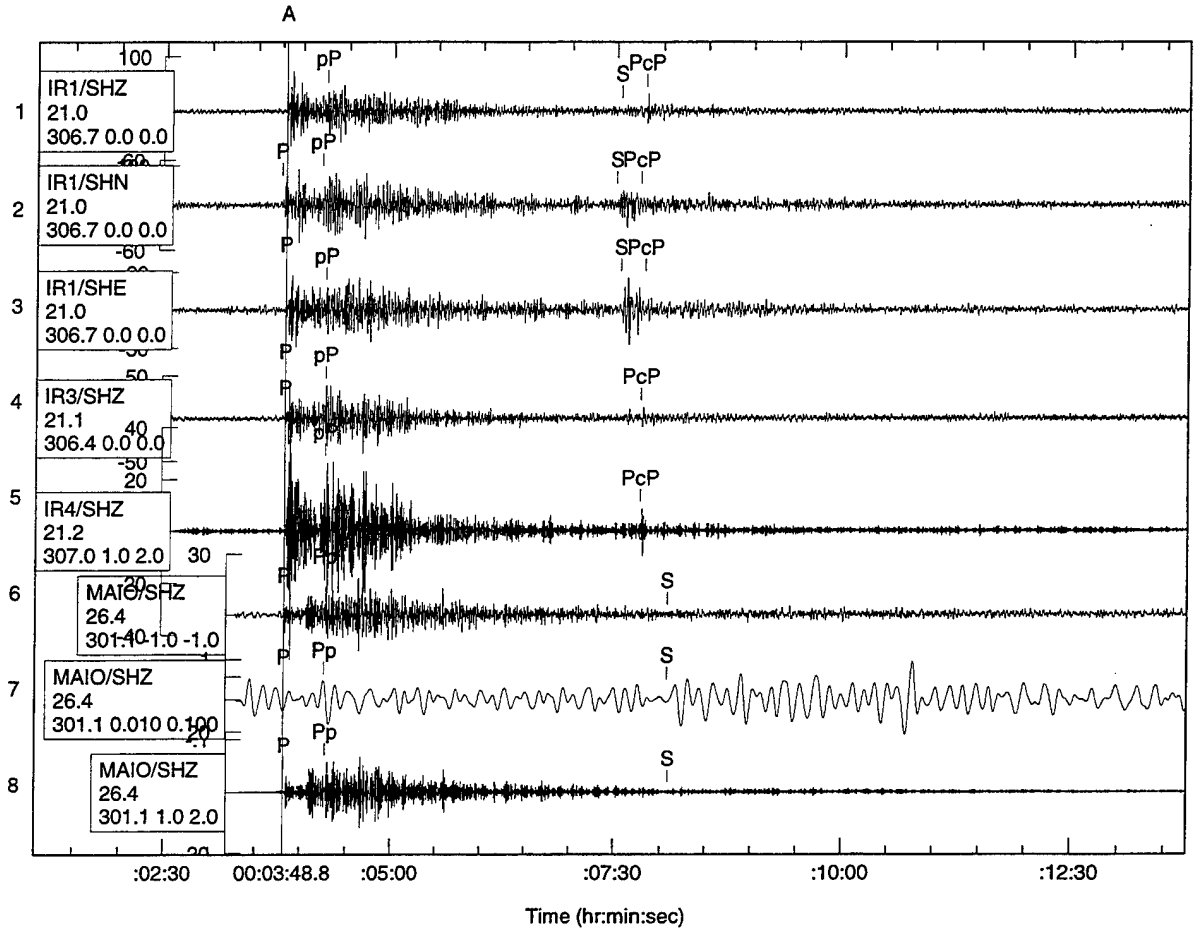
Core Reflections - Mediterranean Event



Time scale: one minute = one tick mark.

Figure 29: Event ev239139-3 (mb 5.5, h 41). Core reflections ScP and ScS are observed at ILPA for this region 3 event.

A Deep Romanian Event

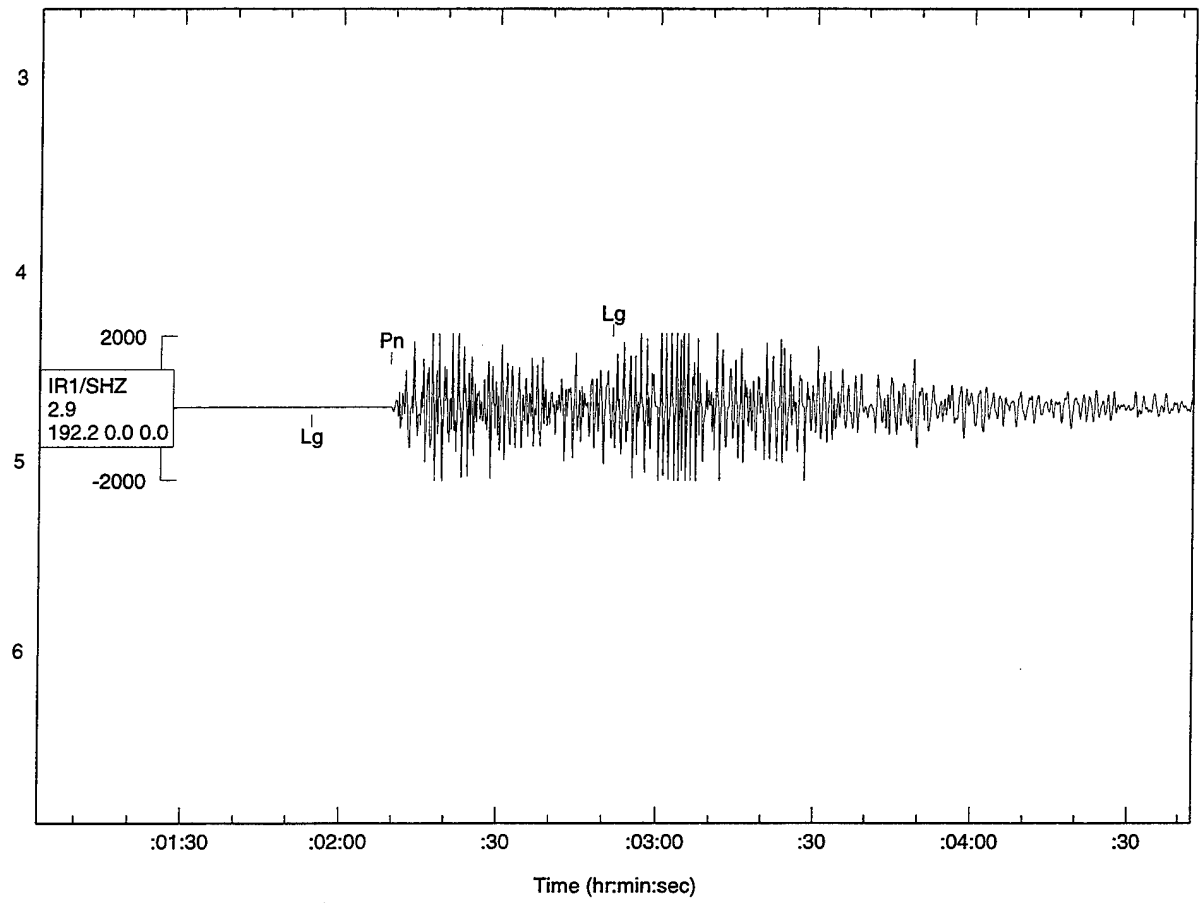


Time scale: one minute = two tick marks.

Figure 30: Event ev226766-3 (mb 4.9, h 161). Core reflections (PcP) and depth phases (pP) are observed for this region 3 event.

USE OF THEORETICAL TRAVEL TIMES TO IDENTIFY TIMING OR LOCATION ERRORS

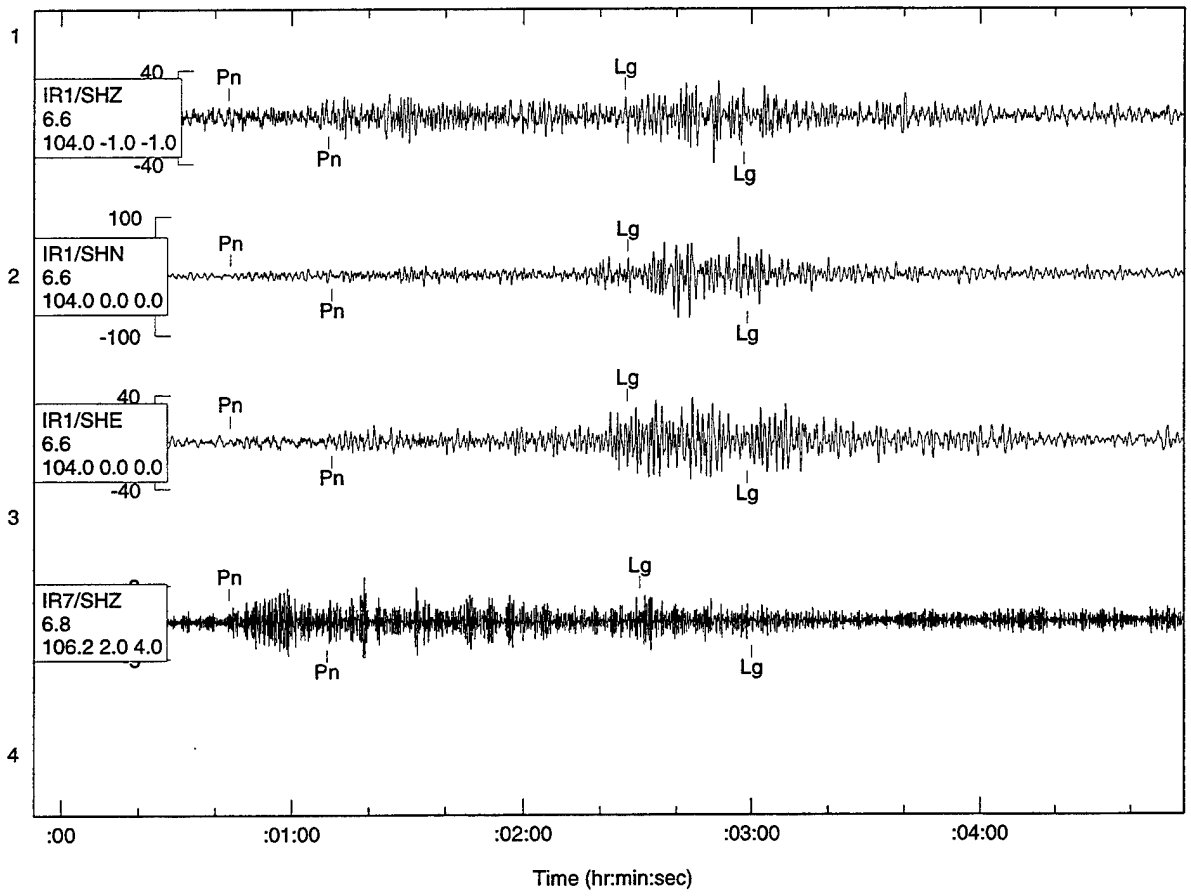
Timing Error?



Time scale: one minute = six tick marks.

Figure 31: Event ev227123-4 (mb 4.7, h 48). Predicted Lg phase is approximately 1 minute early.

Mislocated Event?

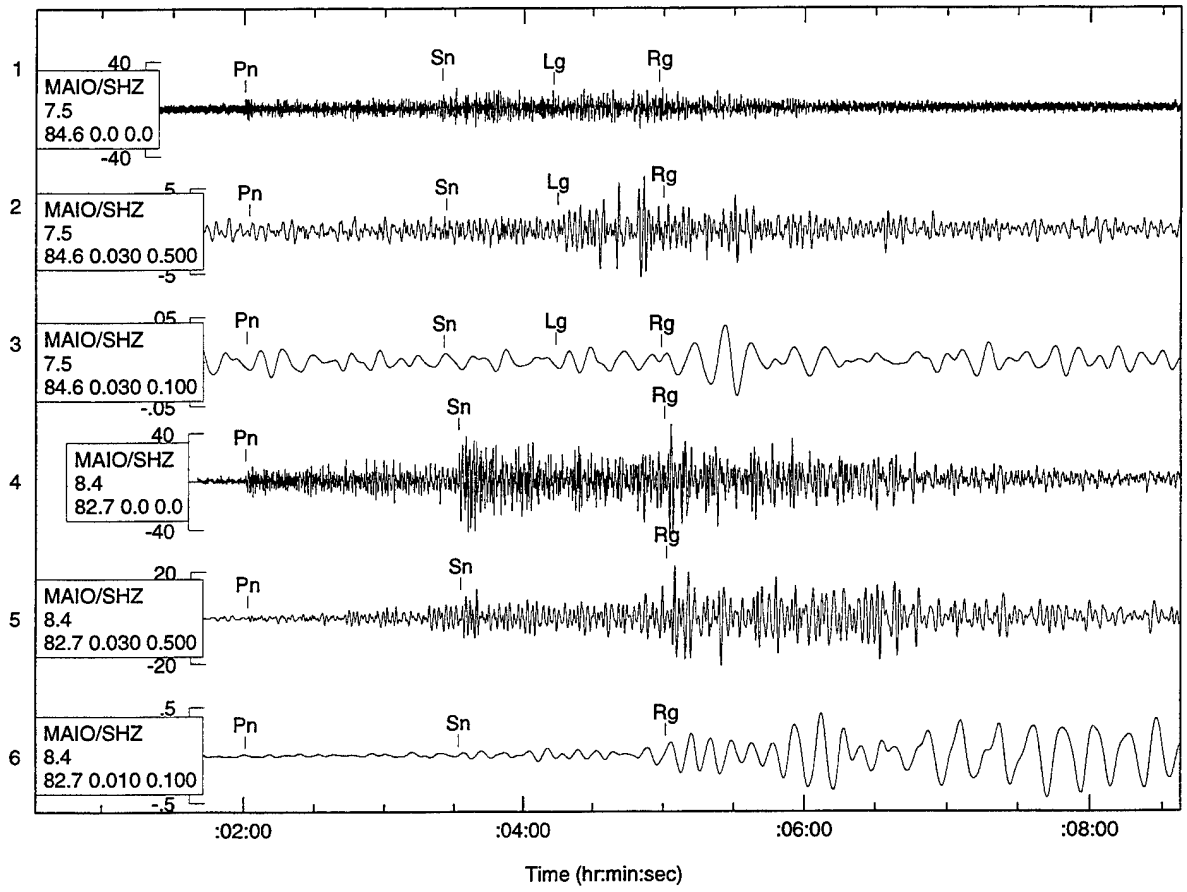


Time scale: one minute = three tick marks.

Figure 32: Event ev229527-5 (mb undetermined, h 33). Mislocated event. Predicted Pn is approximately 26 seconds late. Predicted arrivals are plotted beneath the waveforms.

EVENTS IN SAME AREA WITH DIFFERENT CHARACTERISTICS

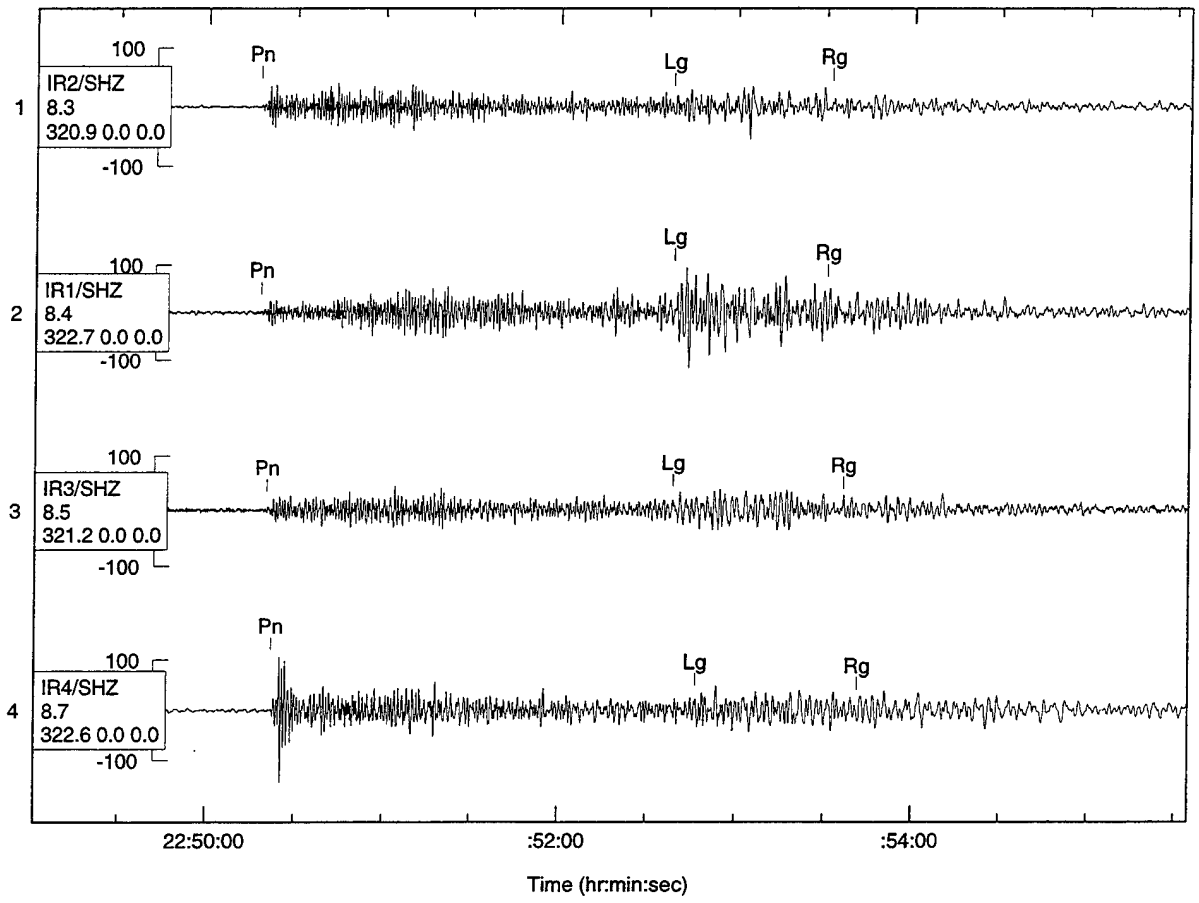
Nearby Events with Different Observed Phases



Time scale: one minute = two tick marks.

Figure 33: Sample events recorded at MAIO illustrate that nearby events can record different phases. Traces are: 1-3) ev224710-1 (mb 3.7, h 33); 4-6) ev223775-1 (mb 4.7, h 16).

Variation in Lg/Pn Ratio Across the ILPA Array

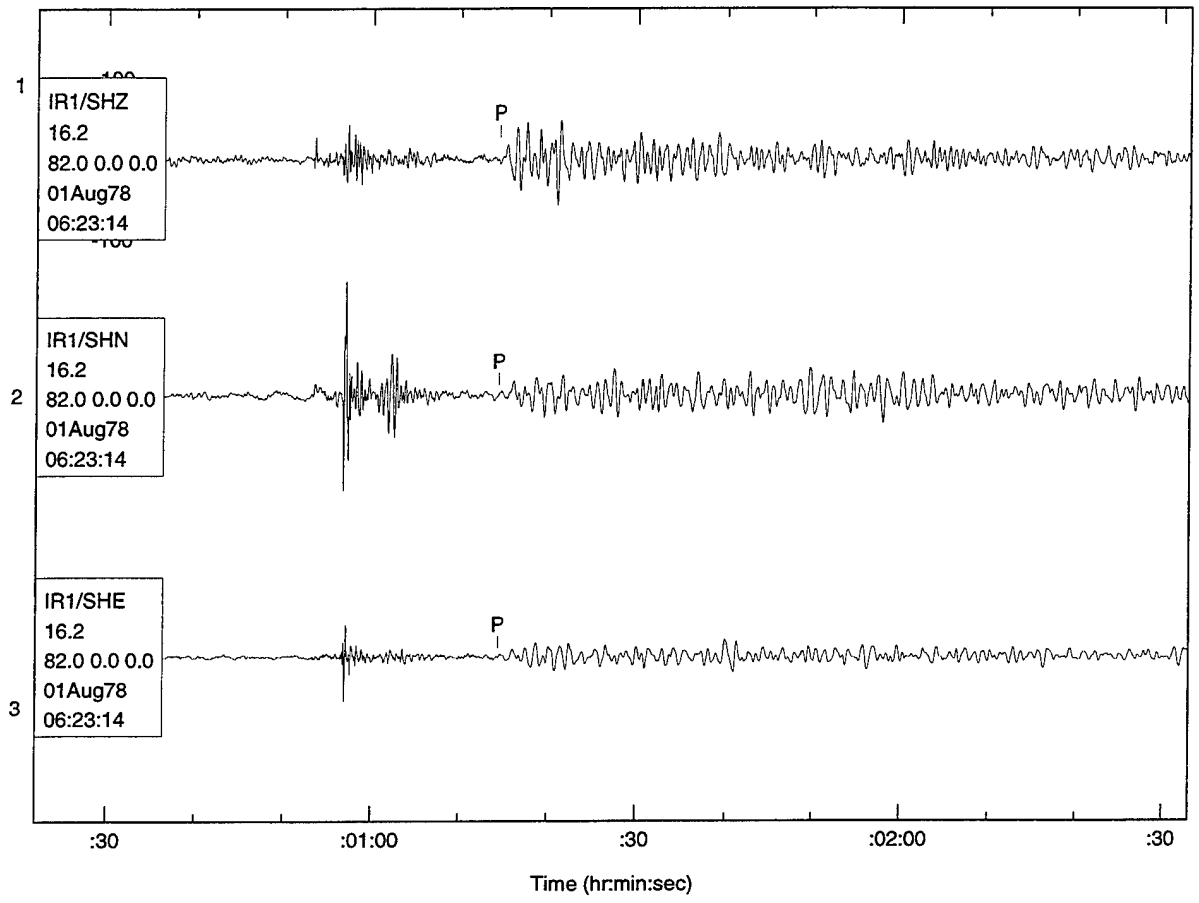


Time scale: one minute = two tick marks.

Figure 34: Event ev224943-2 (mb 4.8, h 4) shown at 4 ILPA sites: 1) IR2 SHZ; 2) IR1 SHZ; 3) IR3 SHZ; 4) IR4 SHZ.

MIXED EVENTS

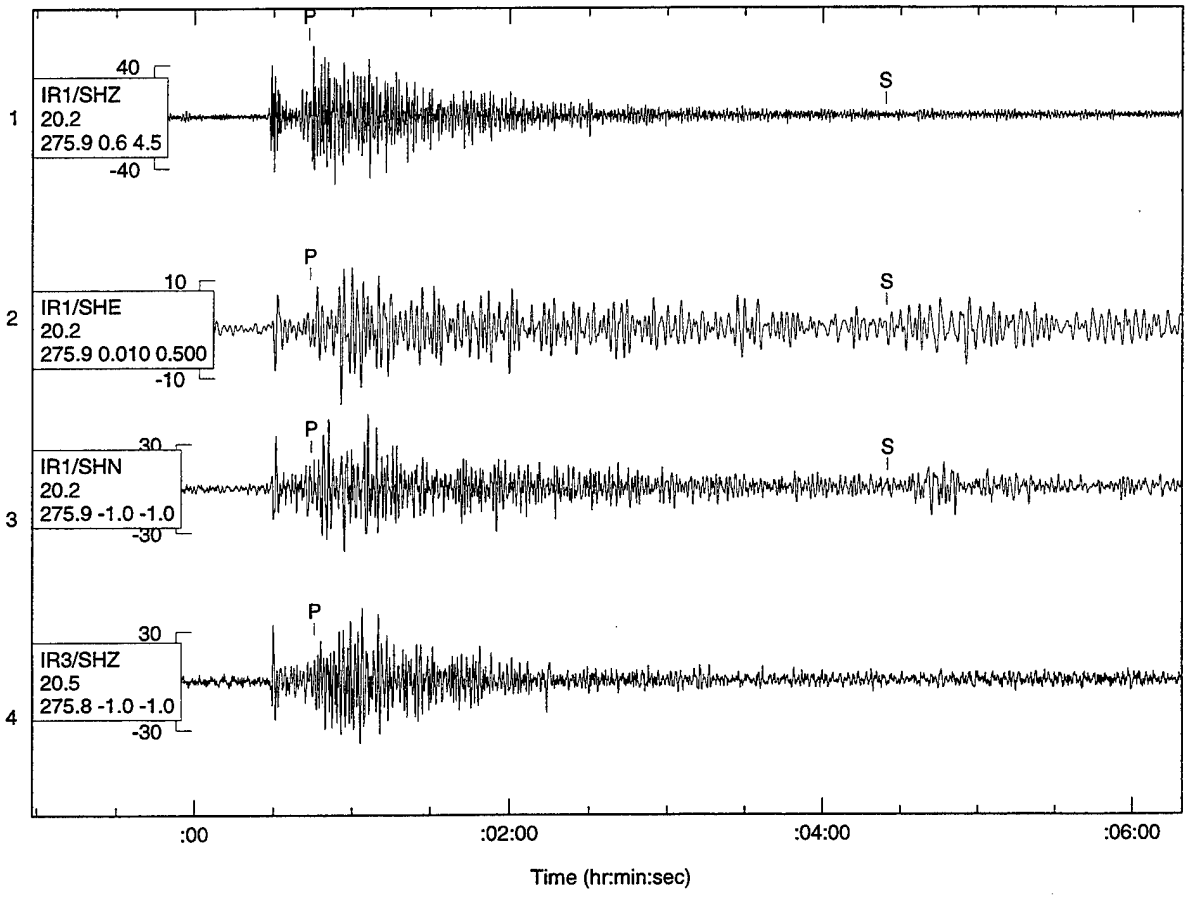
Mixed Event



Time scale: one minute = six tick marks.

Figure 35: Event ev224006-1 (mb 5.0, h 89) is preceded by a local event.

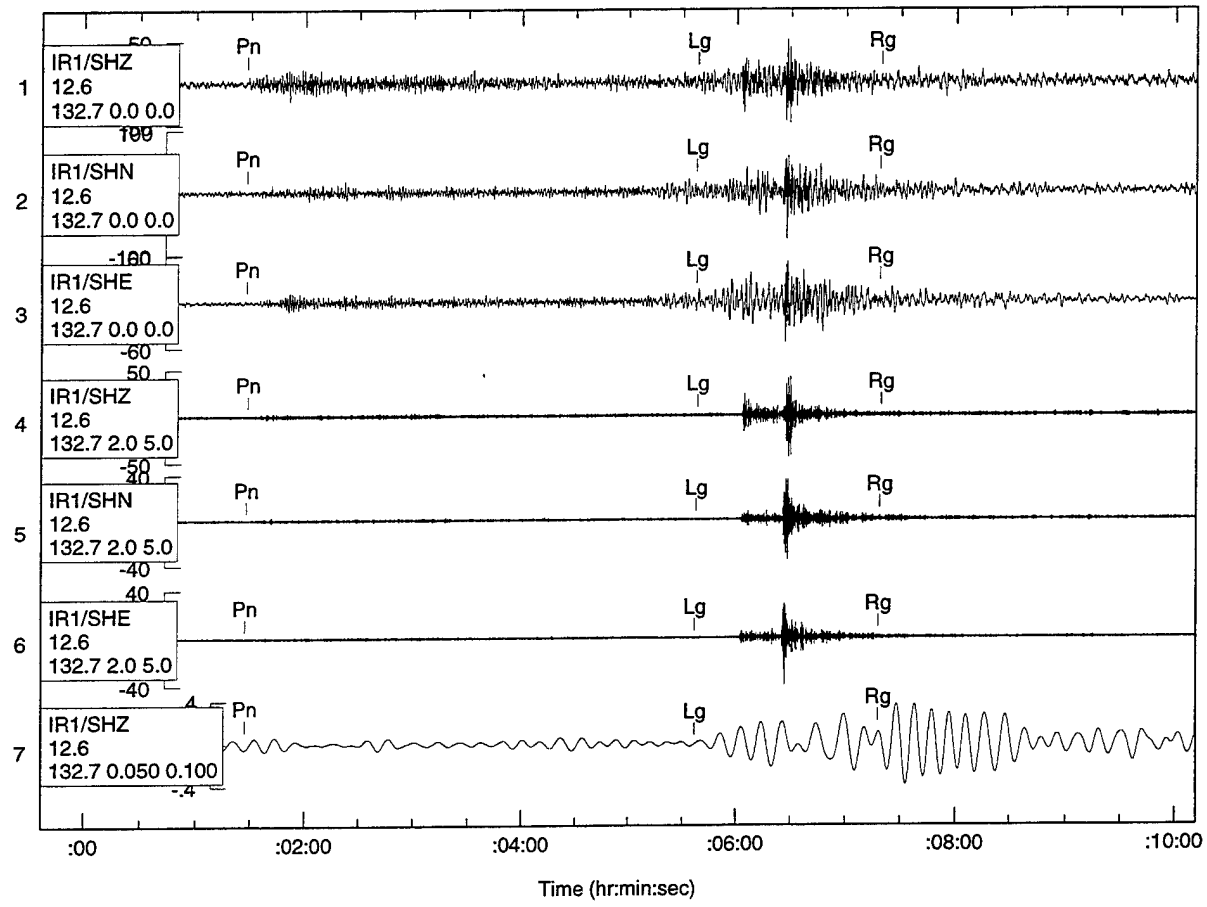
Mixed Event



Time scale: one minute = two tick marks.

Figure 36: Event ev227506-3 (mb 4.5, h 10) is preceded by another event. Traces are: 1) IR1 SHZ (0.60 - 4.5); 2) IR1 SHE (0.01 - 0.5); 3) IR1 SHN (unfiltered); 4) IR3 SHZ (unfiltered).

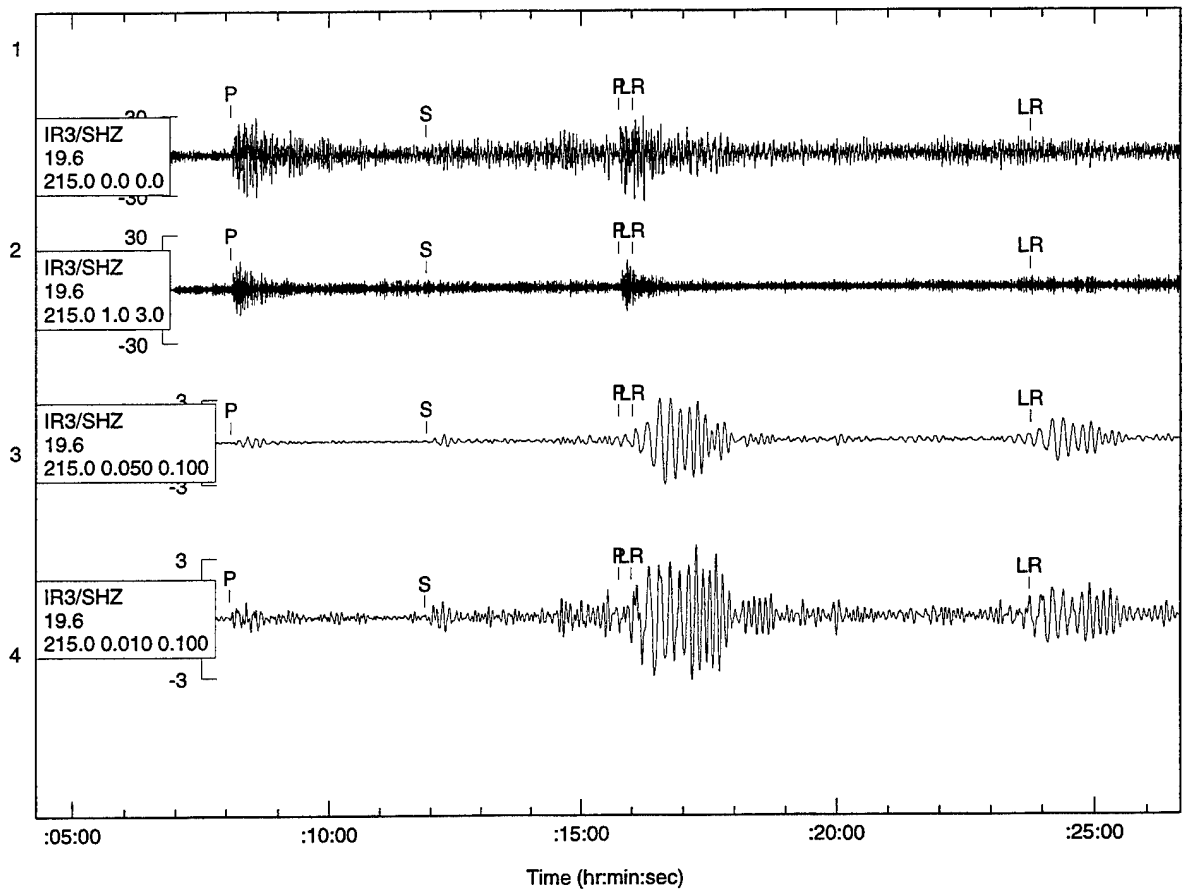
Mixed Event



Time scale: one minute = two tick marks.

Figure 37: Event ev235445-3 (mb 4.3, h 33) with a small local event recording between Lg and Rg arrivals.

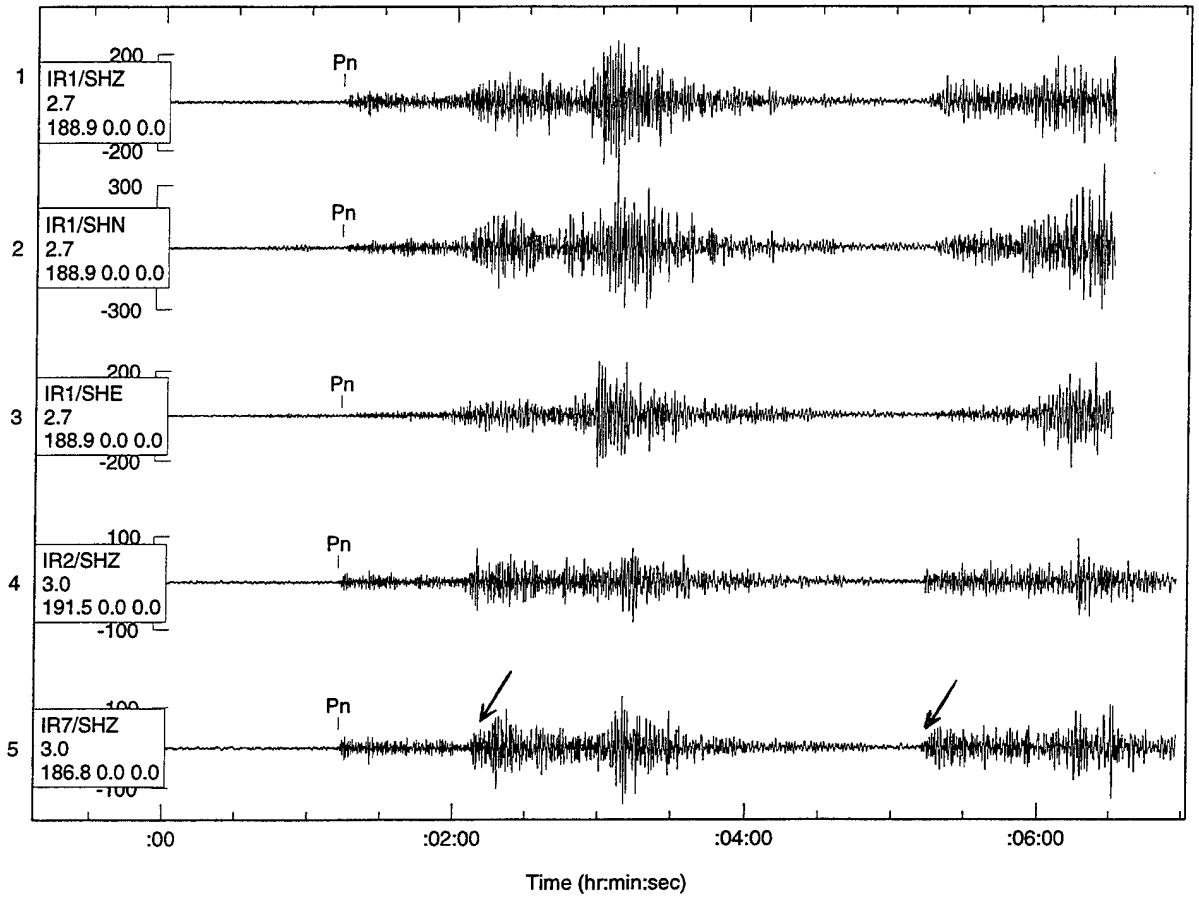
Double Event



Time scale: one minute = one tick mark.

Figure 38: Events ev237393-6 (mb 4.8, h 10) and ev237394-6 (mb 4.5, h 33) overlap. The LR arrival of the first event coincides with the P arrival of the first.

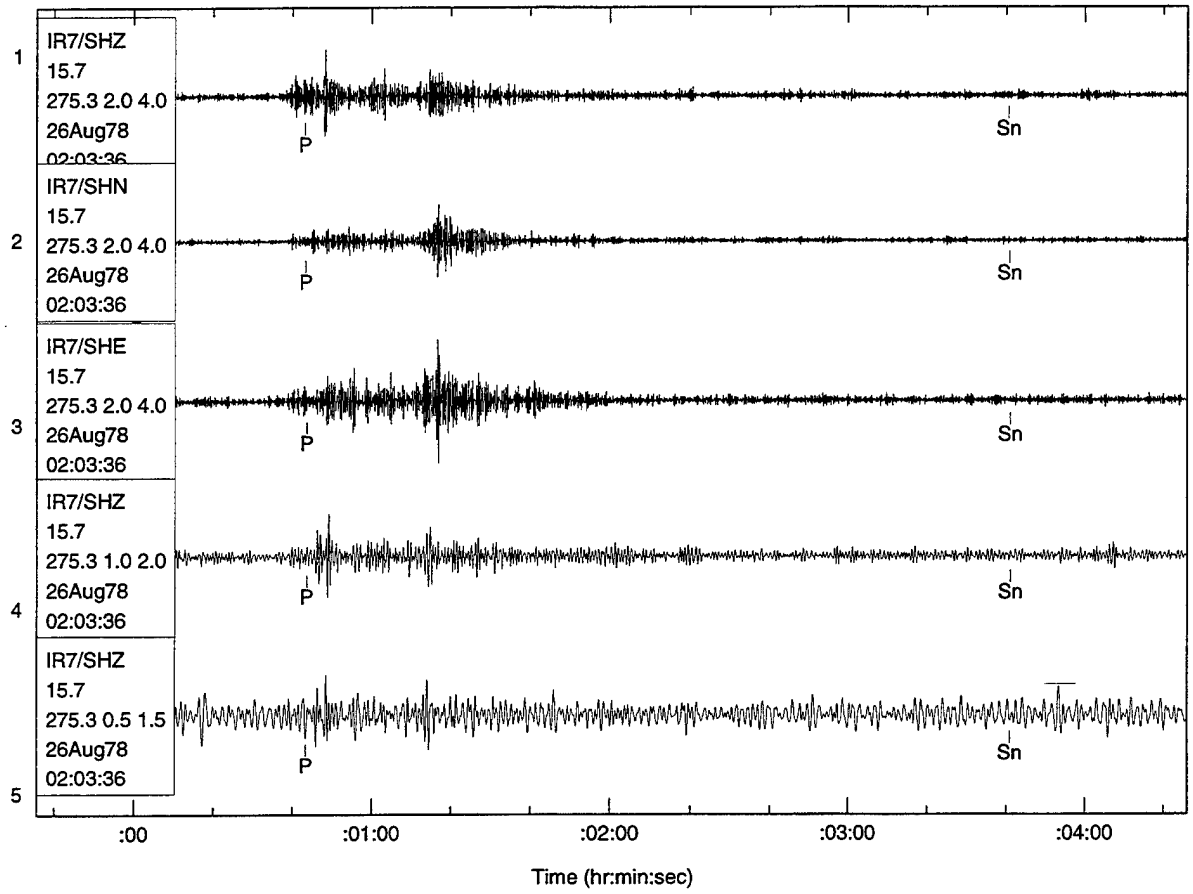
Triple Event



Time scale: one minute = two tick marks.

Figure 39: Event ev230212-4 (mb 4.3, h 0) is followed by two other near regionals.

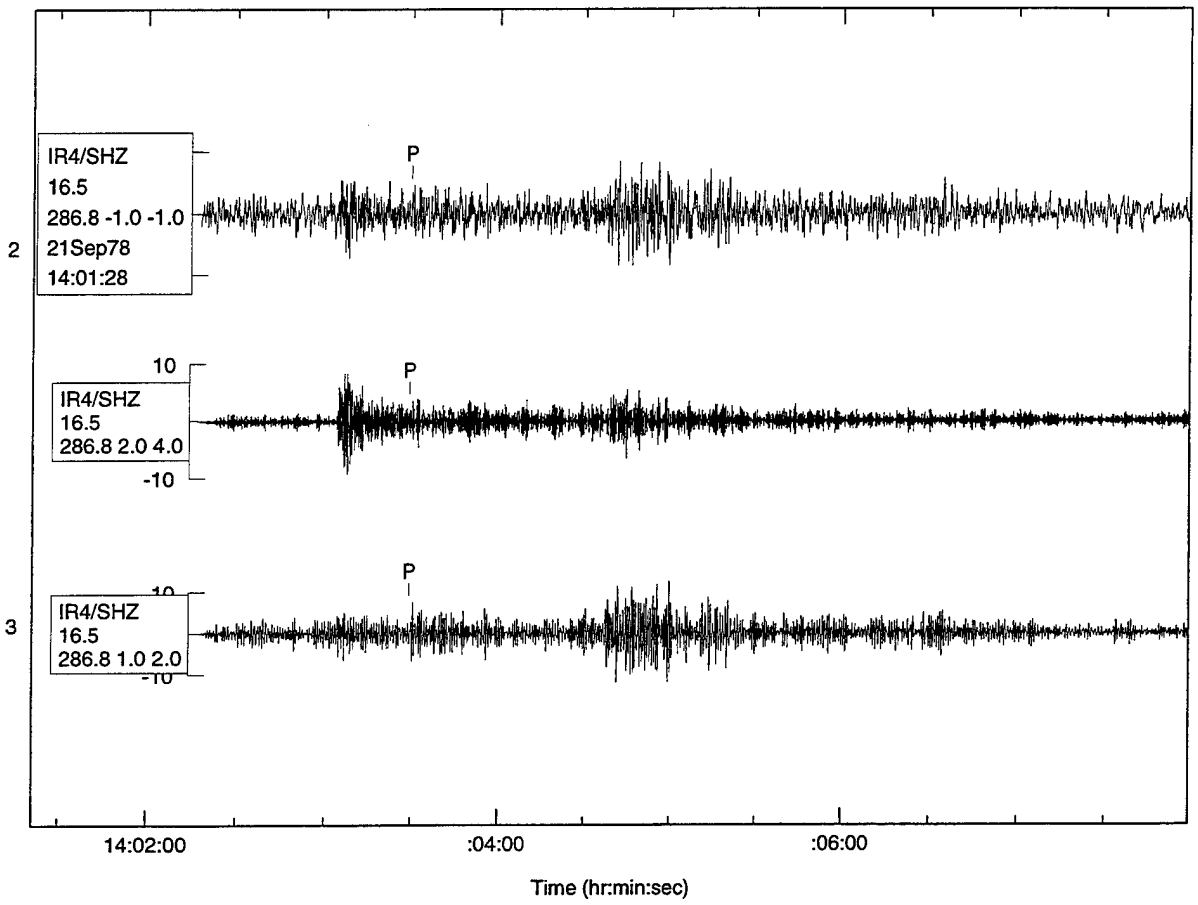
Mixed Event



Time scale: one minute = three tick marks.

Figure 40: Event ev225083-3 (mb undetermined, h 10). Arrivals were not associated with this event because the predicted P arrives at same time as a near regional event. Predicted arrivals are plotted beneath the waveforms.

Mixed Event



Time scale: one minute = two tick marks.

Figure 41: Event ev226284-3 (mb undetermined, h 1). The P arrival from this event records in the P coda of a regional event.

CONCLUSIONS and RECOMMENDATIONS

The ILPA/MAIO data set was constructed with the goal of providing a research-ready group of regional seismic events with high-confidence phase identificaitons associated with the waveforms. Two papers presented at the Spring 1996 meeting of the Seismological Society of America were based on findings from the ILPA/MAIO data set (Sweeney, 1996, and Baumgardt, 1996a). ILPA events have been used in research on improved depth determination (Alexander and Yang *et al.*, 1996) and in a study of spectral nulls from explosions (Gupta and Zhang *et al.*, 1996).

The rapid use of this data set in seismic research on diverse topics verifies its to the relevance CTBT research and development program, the ease with which researchers have been able to access the data and the confidence in the analysis.

Updates/feedback/corrections will continue to be an important part of the maintenance of GTDB data sets. Two researchers have already helped make the GTDB better by contributing new information and suggestions after using the ILPA/MAIO dataset. Jerry Sweeney has identified 4 of the events in region 5 as "aftershocks of the Ms 7.4 Tabas-e-Golshan earthquake of 9/16/1978" based on a paper by Berberian (1982). We have updated the locations of those 4 events and identified them as "known earthquakes" (*origin*.etype=eq) in the origin table-file. After loading the whole ILPA Dataset into his ORACLE database, Doug Baumgardt made several helpful comments, one of which led to the classification of event 230364, from region 2 as a nuclear explosion (based on its presence in the "nuclear" account at CMR.)

Information derived from this data set by AFTAC, DOE and other researchers contributes to the understanding of propagation of regional seismic phases in the Middle East. Results based on the ILPA/MAIO should be part of the knowledge base currently being constructed by the DOE.

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Appendix: Seismic Event Bulletins

This appendix is from the GTDB Web Page (http://www.multimax.com/~gtdb). All information listed in these bulletins is included in the ILPA/MAIO event directories in the form of CSS3.0 formatted flat files. See page 20 for a description of the event directories. The event bulletins listed in this section are different from standard bulletins because the origin information listed for the event is *not* derived from the arrival information listed for the event. In other words, we did not re-locate the events based on the new arrival picks added to the ILPA and MAIO waveforms. The parameter, ndef, listed with the origin information represents the number of defining phases in the original ISC/USGS bulletin. The parameter, nass, is the number of GTDB phases associated with the event.

The comments listed below each event are the contents of the *remark* table. Most of these comments were written to the database by the analyst regarding waveform quality or analysis observations.

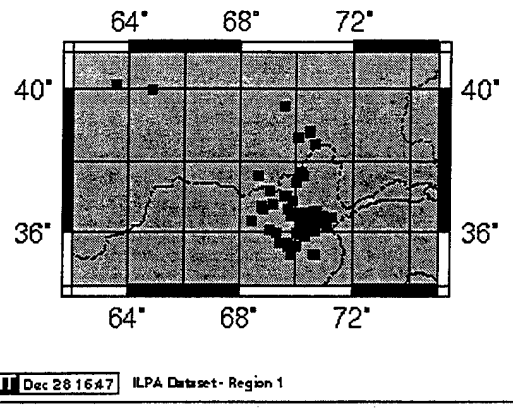
The GTDB Web Page provides one way to retrieve the ILPA/MAIO data set. Another way is to go directly to the FTP site and download entire regions of data at once. See page 22 for instructions.

REGION 1

GTDB: ILPA Dataset: Region 1

Region 1 comprises 52 events from the Hindu-Kush area. Distances from ILPA are between 11.8 and 16.7 degrees. Magnitudes range between 3.3 and 5.6 Mb.

Out of 52 events analysed from this region, only 12 were large enough to record at least one phase at the ILPA array. Events with no phase information are labeled by the comment "Too small to read" in the bulletin below.



About this Page | Waveform QC Plot | Sample Event Plots: 228785 240987 | Event List

To download individual event directories, select event id (evid) from the bulletin below.

GTDB: ILPA Dataset: Bulletin: Region 1

```
origin time                      lat    lon   dep  d  mb ndef nass etype  evid  auth
1978200  7/19/1978 17:50:19.930  35.70  69.68 104  F -9.0   5    1    u  223328 USGS/

      sta   delta seaz  phase    arrival time             arid
     MAIO    8.26  91.13 P       7/19/1978 17:52:11.214   7075

   Too small to read at ILPA
   Segment ends 1 min 53 sec after P arrival at MAIO.
   An unidentified arrival records 10.17 sec after P at MAIO.

origin time                      lat    lon   dep  d  mb ndef nass etype  evid  auth
1978208  7/27/1978  8:15:13.010  36.92  69.89  16  F  4.7  53   10    u  223775 USGS/

      sta   delta seaz  phase    arrival time             arid
     MAIO    8.36  82.67 Pn      7/27/1978  8:17:14.051   7076
     MAIO    8.36  82.67 Sn      7/27/1978  8:18:45.101   7077
     MAIO    8.36  82.67 Rg      7/27/1978  8:20:14.081   7078
      IR3   15.27  79.03 Pn      7/27/1978  8:18:49.275   5003
      IR3   15.27  79.03 LR      7/27/1978  8:25:56.869   5001
      IR2   15.33  79.70 Pn      7/27/1978  8:18:48.823   5002
      IR2   15.33  79.70 LR      7/27/1978  8:26:00.971   5006
      IR4   15.41  78.19 Pn      7/27/1978  8:18:50.523   5004
      IR1   15.54  78.82 Pn      7/27/1978  8:18:54.217   5005
      IR1   15.54  78.82 LR      7/27/1978  8:26:30.816   5000

   Poor Pn onset time on IR1.
   Another event follows about 16 mins past Pn arrivals at ILPA.
   An unidentified phase observed with .01 to .5 zero phase filter
   records 1 min 15 sec after Pn arrival at MAIO.
```

```
origin time                        lat    lon   dep  d  mb ndef nass etype  evid  auth
1978209  7/28/1978 19:23:44.220  37.63  70.22  33  A  3.8   5   0    u  223843 USGS/

   Too small to read.
   An event included in region 4 follows about 6m 13s
   past predicted Pn arrivals.

origin time                        lat    lon   dep  d  mb ndef nass etype  evid  auth
1978213  8/01/1978  6:20:42.370  36.04  70.61  89  F  5.0  72   7    u  224006 USGS/

      sta   delta seaz  phase    arrival time             arid
     MAIO    8.97  88.36 P        8/01/1978  6:22:48.573    7082
     MAIO    8.97  88.36 S        8/01/1978  6:24:25.097    7083
      IR3   15.88  82.22 P        8/01/1978  6:24:25.229    5009
      IR2   15.96  82.85 P        8/01/1978  6:24:26.222    5008
      IR4   16.01  81.38 P        8/01/1978  6:24:27.101    5010
      IR1   16.16  81.95 P        8/01/1978  6:24:28.162    5007
      IR7   16.18  82.92 P        8/01/1978  6:24:29.922    5011

   P arrivals are preceeded about 22 sec earlier by a
   small local event (~30 Km distant from IR1) at ILPA.

origin time                        lat    lon   dep  d  mb ndef nass etype  evid  auth
1978215  8/03/1978  2:25:14.170  36.44  71.25 249  F  4.3  64   7    u  224103 USGS/

      sta   delta seaz  phase    arrival time             arid
     MAIO    9.46  85.66 P        8/03/1978  2:27:24.415    7084
     MAIO    9.46  85.66 S        8/03/1978  2:29:10.100    7085
      IR3   16.37  80.68 P        8/03/1978  2:28:52.036    5014
      IR2   16.44  81.29 P        8/03/1978  2:28:52.588    5013
      IR4   16.51  79.88 P        8/03/1978  2:28:53.866    5015
      IR1   16.65  80.44 P        8/03/1978  2:28:55.416    5012
      IR7   16.67  81.37 P        8/03/1978  2:28:55.534    5016

   This event part of Rodgers, Ni, Hearn dataset

origin time                        lat    lon   dep  d  mb ndef nass etype  evid  auth
1978219  8/07/1978  8:29:39.000  36.00  70.30 160  A -9.0  -1   0    u  224277 USGS/

   Too small to read.

origin time                        lat    lon   dep  d  mb ndef nass etype  evid  auth
1978223  8/11/1978 12:47:09.300  35.96  70.12  91  F  4.6  37   5    u  224446 USGS/

      sta   delta seaz  phase    arrival time             arid
     MAIO    8.59  89.15 P        8/11/1978 12:49:10.828  7086
     MAIO    8.59  89.15 S        8/11/1978 12:50:40.691  7087
      IR2   15.57  83.27 P        8/11/1978 12:50:46.401  5018
      IR4   15.62  81.77 P        8/11/1978 12:50:46.248  5019
      IR1   15.77  82.36 P        8/11/1978 12:50:48.469  5017

   Very small local event preceeds
   P arrivals by about 21 sec at IR1, IR4, and IR7.
   This event part of Rodgers, Ni, Hearn dataset

origin time                        lat    lon   dep  d  mb ndef nass etype  evid  auth
1978224  8/12/1978  1:07:40.560  37.04  69.61  33  A  4.1   7   0    u  224464 USGS/

   Too small to read.

origin time                        lat    lon   dep  d  mb ndef nass etype  evid  auth
```

```
1978224  8/12/1978 16:36:08.000  36.80  69.20  96  A -9.0  -1   0    u  224482 USGS/
```

Too small to read.

```
origin time                      lat    lon   dep  d  mb ndef nass etype  evid  auth
1978225  8/13/1978  2:24:47.830  36.18  71.08 135  F  4.0  14   7    u  224495 USGS/

      sta   delta seaz  phase    arrival time             arid
     MAIO    9.34  87.31 P        8/13/1978  2:26:58.906    7089
     MAIO    9.34  87.31 S        8/13/1978  2:28:36.986    7090
      IR3   16.24  81.64 P        8/13/1978  2:28:35.112    5022
      IR2   16.32  82.25 P        8/13/1978  2:28:36.026    5021
      IR4   16.38  80.82 P        8/13/1978  2:28:37.776    5023
      IR1   16.52  81.38 P        8/13/1978  2:28:39.558    5020
      IR7   16.55  82.32 P        8/13/1978  2:28:38.407    5024
```

Poor P onset times at ILPA.
This event part of Rodgers, Ni, Hearn dataset

```
origin time                      lat    lon   dep  d  mb ndef nass etype  evid  auth
1978229  8/17/1978  1:29:19.980  36.10  69.04 140  F  3.7   7   0    u  224674 USGS/
```

Too small to read.

```
origin time                      lat    lon   dep  d  mb ndef nass etype  evid  auth
1978230  8/18/1978  8:43:47.670  36.65  68.79  33  A  3.7  13   4    u  224710 USGS/

      sta   delta seaz  phase    arrival time             arid
     MAIO    7.48  84.57 Pn       8/18/1978  8:45:35.087    7091
     MAIO    7.48  84.57 Sn       8/18/1978  8:46:59.595    7092
     MAIO    7.48  84.57 Lg       8/18/1978  8:47:48.148    7093
     MAIO    7.48  84.57 Rg       8/18/1978  8:48:33.020    7094
```

Too small to read at ILPA.

```
origin time                      lat    lon   dep  d  mb ndef nass etype  evid  auth
1978232  8/20/1978 19:28:03.000  35.70  69.40  96  A -9.0  -1   0    u  224836 USGS/
```

Too small to read

```
origin time                      lat    lon   dep  d  mb ndef nass etype  evid  auth
1978232  8/20/1978 22:30:56.680  36.26  70.61 242  F  3.3   8   0    u  224847 USGS/
```

Too small to read.

```
origin time                      lat    lon   dep  d  mb ndef nass etype  evid  auth
1978237  8/25/1978 11:33:57.500  35.62  69.98 176  F -9.0   5   0    u  225059 USGS/
```

Too small to read.

```
origin time                      lat    lon   dep  d  mb ndef nass etype  evid  auth
1978241  8/29/1978  4:46:48.620  35.38  70.62 159  F  4.0   9   4    u  225202 USGS/

      sta   delta seaz  phase    arrival time             arid
     MAIO    9.06  92.53 P        8/29/1978  4:48:55.333    7097
     MAIO    9.06  92.53 S        8/29/1978  4:50:32.430    7098
      IR2   16.03  85.22 P        8/29/1978  4:50:31.215    5025
      IR7   16.26  85.26 P        8/29/1978  4:50:34.553    5026


origin time                      lat    lon   dep  d  mb ndef nass etype  evid  auth
```

```
1978243  8/31/1978  8:07:21.280  38.83  70.46  24  F  4.2  20   1    u  225307 USGS/

      sta   delta seaz  phase    arrival time              arid
      IR7  16.07  72.86 Pn       8/31/1978  8:11:07.083    5027


origin time                      lat    lon   dep  d  mb ndef nass etype  evid  auth
1978278 10/05/1978  8:41:27.000  36.30  70.70  -9  _ -9.0  -1   0    u  226888 USGS/

   Too small to read.

origin time                      lat    lon   dep  d  mb ndef nass etype  evid  auth
1978296 10/23/1978  8:07:31.600  36.48  70.95 183  F  5.6 353   3    u  227674 USGS/

      sta   delta seaz  phase    arrival time              arid
      IR3  16.13  80.60 P        10/23/1978  8:11:09.763    5030
      IR2  16.20  81.21 P        10/23/1978  8:11:11.485    5029
      IR1  16.41  80.35 P        10/23/1978  8:11:13.430    5028

   Waveform data is available for 2m 40s past P arrivals only.
   This event part of Rodgers, Ni, Hearn dataset

origin time                      lat    lon   dep  d  mb ndef nass etype  evid  auth
1978299 10/26/1978 17:42:57.850  36.57  70.08 279  F -9.0   5   0    u  227815 USGS/

   Too small to read.

origin time                      lat    lon   dep  d  mb ndef nass etype  evid  auth
1978301 10/28/1978  4:32:39.460  36.67  69.68 183  F -9.0   5   0    u  227872 USGS/

   Incorrect waveform segment - starts about 18 mins
   past predicted P arrival times.

origin time                      lat    lon   dep  d  mb ndef nass etype  evid  auth
1978306 11/02/1978 15:34:10.670  36.51  70.60 204  F  3.9  13   0    u  228117 USGS/

   Too small to read.

origin time                      lat    lon   dep  d  mb ndef nass etype  evid  auth
1978306 11/02/1978 18:05:55.140  36.15  70.42  71  F -9.0   6   0    u  228120 USGS/

   Too small to read.

origin time                      lat    lon   dep  d  mb ndef nass etype  evid  auth
1978308 11/04/1978  2:17:29.670  35.39  69.83 195  F  3.5  10   0    u  228178 USGS/

   Too small to read.

origin time                      lat    lon   dep  d  mb ndef nass etype  evid  auth
1978320 11/16/1978 22:27:54.000  36.60  70.60 190  A -9.0  -1   0    u  228755 USGS/

   Too small to read.

origin time                      lat    lon   dep  d  mb ndef nass etype  evid  auth
1978321 11/17/1978 12:59:31.370  38.49  70.64   0  A  4.9 100   9    u  228785 USGS/

      sta   delta seaz  phase    arrival time              arid
      IR2  15.97  73.94 Pn       11/17/1978 13:03:22.137   5038
      IR2  15.97  73.94 Lg       11/17/1978 13:08:02.469   5034
      IR2  15.97  73.94 LR       11/17/1978 13:10:15.537   5032
      IR7  16.19  74.13 Pn       11/17/1978 13:03:21.538   5039
```

```
      IR7  16.19  74.13 Sn      11/17/1978 13:06:41.087    5036
      IR7  16.19  74.13 Lg      11/17/1978 13:08:09.625    5035
      IR7  16.19  74.13 LR      11/17/1978 13:10:24.476    5033
      IR1  16.20  73.17 Pn      11/17/1978 13:03:23.463    5037
      IR1  16.20  73.17 LR      11/17/1978 13:10:17.638    5031

origin time                     lat    lon   dep  d  mb ndef nass etype  evid  auth
1978321 11/17/1978 18:14:10.000  36.60  70.70 160  A -9.0  -1   0    u  228792 USGS/

   Too small to read.
   An event not in the ISC/NEIS listing records at about 12 mins
   past predicted P arrivals for this event.

origin time                     lat    lon   dep  d  mb ndef nass etype  evid  auth
1978321 11/17/1978 22:05:02.000  36.60  70.70 160  A -9.0  -1   0    u  228805 USGS/

   Too small to read.

origin time                     lat    lon   dep  d  mb ndef nass etype  evid  auth
1978322 11/18/1978  4:30:19.000  36.30  70.10 160  A -9.0  -1   0    u  228816 USGS/

   Too small to read.

origin time                     lat    lon   dep  d  mb ndef nass etype  evid  auth
1978326 11/22/1978  9:47:32.000  35.60  69.70 160  A -9.0  -1   0    u  228999 USGS/

   Too small to read.

origin time                     lat    lon   dep  d  mb ndef nass etype  evid  auth
1978328 11/24/1978 22:32:04.000  35.90  70.30  96  A -9.0  -1   0    u  229117 USGS/

   Too small to read.

origin time                     lat    lon   dep  d  mb ndef nass etype  evid  auth
1978332 11/28/1978 19:40:11.000  36.30  70.60  96  A -9.0  -1   0    u  229311 USGS/

   Too small to read.

origin time                     lat    lon   dep  d  mb ndef nass etype  evid  auth
1978347 12/13/1978 18:14:48.000  36.00  70.00  96  A -9.0  -1   0    u  230176 USGS/

   Too small to read.

origin time                     lat    lon   dep  d  mb ndef nass etype  evid  auth
1978353 12/19/1978 21:47:00.940  36.09  70.59 145  F -9.0   6   0    u  230430 USGS/

   Too small to read.

origin time                     lat    lon   dep  d  mb ndef nass etype  evid  auth
1978354 12/20/1978 21:57:39.000  36.00  69.30 223  A -9.0  -1   0    u  230478 USGS/

   Too small to read.

origin time                     lat    lon   dep  d  mb ndef nass etype  evid  auth
1978362 12/28/1978 21:50:11.000  37.40  70.00  96  A -9.0  -1   0    u  230881 USGS/

   Too small to read.

origin time                     lat    lon   dep  d  mb ndef nass etype  evid  auth
1979008  1/08/1979 17:05:17.000  36.56  70.35 160  A -9.0   5   0    u  231361 USGS/
```

sta	delta	seaz	phase	arrival time	arid
IR1	14.36	81.16	Pn	6/07/1979 13:50:07.537	5056
IR7	14.39	82.26	Pn	6/07/1979 13:50:08.242	5057

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1979177 6/26/1979 7:39:41.970	40.13	63.55	52	F	4.1	19	0	u	239805	USGS/

Too small to read.

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1979194 7/13/1979 0:12:19.300	36.47	70.69	33	A	3.7	4	0	u	240590	USGS/

Too small to read.

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1979202 7/21/1979 4:59:46.930	36.52	70.69	235	F	4.6	92	6	u	240987	USGS/

sta	delta	seaz	phase	arrival time	arid
IR3	15.92	80.46	P	7/21/1979 5:03:21.077	5063
IR4	16.06	79.64	P	7/21/1979 5:03:22.201	5061
IR1	16.20	80.22	P	7/21/1979 5:03:24.579	5060
IR1	16.20	80.22	S	7/21/1979 5:06:23.690	5058
IR7	16.22	81.18	P	7/21/1979 5:03:24.631	5062
IR7	16.22	81.18	S	7/21/1979 5:06:21.454	5059

Poor P onset time on IR3.

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1979220 8/08/1979 3:22:09.140	36.46	70.44	202	F	4.3	31	3	u	241888	USGS/

sta	delta	seaz	phase	arrival time	arid
IR4	15.86	79.88	P	8/08/1979 3:25:45.990	5065
IR1	16.00	80.47	P	8/08/1979 3:25:47.727	5064
IR7	16.02	81.45	P	8/08/1979 3:25:46.100	5066

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1979226 8/14/1979 11:46:11.610	36.42	70.32	226	F	3.8	12	3	u	242225	USGS/

sta	delta	seaz	phase	arrival time	arid
IR4	15.76	80.02	P	8/14/1979 11:49:45.884	5068
IR1	15.90	80.62	P	8/14/1979 11:49:47.237	5067
IR7	15.92	81.60	P	8/14/1979 11:49:43.944	5069

Poor P onset times.

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1979226 8/14/1979 20:50:09.920	38.68	70.06	44	F	4.1	21	6	u	242243	USGS/

sta	delta	seaz	phase	arrival time	arid
IR4	15.66	71.65	Pn	8/14/1979 20:53:51.362	5071
IR4	15.66	71.65	LR	8/14/1979 21:01:13.490	5074
IR7	15.75	73.31	Pn	8/14/1979 20:53:52.758	5072
IR7	15.75	73.31	LR	8/14/1979 21:01:15.545	5075
IR1	15.77	72.32	Pn	8/14/1979 20:53:55.374	5070
IR1	15.77	72.32	LR	8/14/1979 21:01:17.547	5073

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1979227 8/15/1979 20:04:52.910	36.02	70.40	238	F	3.5	9	0	u	242290	USGS/

sta	delta	seaz	phase	arrival time	arid
IR1	14.36	81.16	Pn	6/07/1979 13:50:07.537	5056
IR7	14.39	82.26	Pn	6/07/1979 13:50:08.242	5057

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1979177 6/26/1979 7:39:41.970	40.13	63.55	52	F	4.1	19	0	u	239805	USGS/

Too small to read.

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1979194 7/13/1979 0:12:19.300	36.47	70.69	33	A	3.7	4	0	u	240590	USGS/

Too small to read.

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1979202 7/21/1979 4:59:46.930	36.52	70.69	235	F	4.6	92	6	u	240987	USGS/

sta	delta	seaz	phase	arrival time	arid
IR3	15.92	80.46	P	7/21/1979 5:03:21.077	5063
IR4	16.06	79.64	P	7/21/1979 5:03:22.201	5061
IR1	16.20	80.22	P	7/21/1979 5:03:24.579	5060
IR1	16.20	80.22	S	7/21/1979 5:06:23.690	5058
IR7	16.22	81.18	P	7/21/1979 5:03:24.631	5062
IR7	16.22	81.18	S	7/21/1979 5:06:21.454	5059

Poor P onset time on IR3.

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1979220 8/08/1979 3:22:09.140	36.46	70.44	202	F	4.3	31	3	u	241888	USGS/

sta	delta	seaz	phase	arrival time	arid
IR4	15.86	79.88	P	8/08/1979 3:25:45.990	5065
IR1	16.00	80.47	P	8/08/1979 3:25:47.727	5064
IR7	16.02	81.45	P	8/08/1979 3:25:46.100	5066

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1979226 8/14/1979 11:46:11.610	36.42	70.32	226	F	3.8	12	3	u	242225	USGS/

sta	delta	seaz	phase	arrival time	arid
IR4	15.76	80.02	P	8/14/1979 11:49:45.884	5068
IR1	15.90	80.62	P	8/14/1979 11:49:47.237	5067
IR7	15.92	81.60	P	8/14/1979 11:49:43.944	5069

Poor P onset times.

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1979226 8/14/1979 20:50:09.920	38.68	70.06	44	F	4.1	21	6	u	242243	USGS/

sta	delta	seaz	phase	arrival time	arid
IR4	15.66	71.65	Pn	8/14/1979 20:53:51.362	5071
IR4	15.66	71.65	LR	8/14/1979 21:01:13.490	5074
IR7	15.75	73.31	Pn	8/14/1979 20:53:52.758	5072
IR7	15.75	73.31	LR	8/14/1979 21:01:15.545	5075
IR1	15.77	72.32	Pn	8/14/1979 20:53:55.374	5070
IR1	15.77	72.32	LR	8/14/1979 21:01:17.547	5073

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1979227 8/15/1979 20:04:52.910	36.02	70.40	238	F	3.5	9	0	u	242290	USGS/

Too small to read.

```
origin time                      lat    lon   dep  d  mb ndef nass etype  evid  auth
1979231  8/19/1979  9:13:54.180  37.63  68.65  33  A  3.6    4    0     u  242474 USGS/
```

Too small to read.

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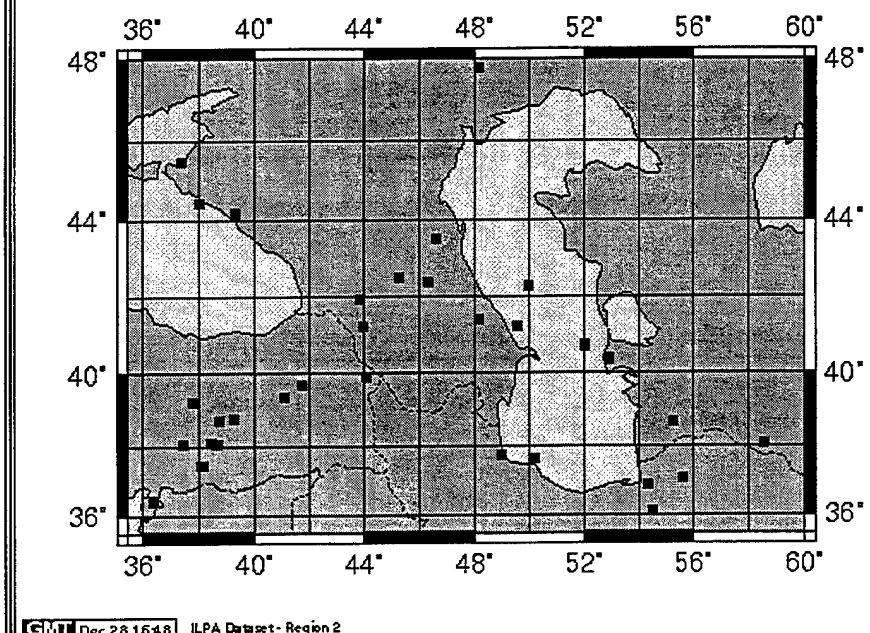
REGION 2

GTDB: ILPA Dataset Region 2

Events in this region range from 2 to 14 degrees from ILPA.

Magnitudes range from 3.3 to 6.0 Mb.

The event north of the Caspian Sea (230364) is a nuclear explosion.



About this Page | Waveform QC Plot | Sample Event Plots: 225194 229684 | Event List

GTDB: ILPA Dataset: Bulletin: Region 2

```
origin time                      lat    lon   dep  d  mb ndef nass etype  evid  auth
1978201  7/20/1978 10:20:24.760  38.66  55.24  33  A  4.3   9   8    u  223356 USGS/

      sta   delta seaz  phase    arrival time              arid
     MAIO   4.12 306.30 Pn       7/20/1978 10:21:26.527    7054
      IR2   4.58  47.79 Pn       7/20/1978 10:21:32.104    5111
      IR3   4.63  45.30 Pn       7/20/1978 10:21:32.680    5112
      IR7   4.73  49.89 Pn       7/20/1978 10:21:33.155    5114
      IR7   4.73  49.89 Sn       7/20/1978 10:22:28.459    5116
      IR4   4.87  44.08 Pn       7/20/1978 10:21:35.542    5113
      IR1   4.87  46.87 Pn       7/20/1978 10:21:37.291    5110
      IR1   4.87  46.87 Sn       7/20/1978 10:22:30.612    5115

   Possible mixed coda at MAIO - Pn only read.

origin time                      lat    lon   dep  d  mb ndef nass etype  evid  auth
1978202  7/21/1978  2:20:12.400  38.73  39.28  -9  _ -9.0  -1   0    u  223388 USGS/

   Event is too small to read.

origin time                      lat    lon   dep  d  mb ndef nass etype  evid  auth
1978212  7/31/1978 16:37:14.840  40.37  52.91  33  A  4.3  32   7    u  223981 USGS/
```

sta	delta	seaz	phase	arrival time	arid
IR2	4.97	18.03	Pn	7/31/1978 16:38:28.603	5119
IR3	5.12	16.37	Pn	7/31/1978 16:38:30.850	5120
IR1	5.26	18.84	Pn	7/31/1978 16:38:32.879	5118
IR1	5.26	18.84	Sn	7/31/1978 16:39:29.643	5117
IR4	5.37	16.61	Pn	7/31/1978 16:38:34.702	5121
MAIO	6.57	310.27	Pn	7/31/1978 16:38:49.961	7055
MAIO	6.57	310.27	Sn	7/31/1978 16:39:57.782	7056

This event may be deep - true phase ID's may be P and S.

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978225 8/13/1978 17:20:25.130	39.33	41.07	128	F	4.3	26	10	u	224521	USGS/

sta	delta	seaz	phase	arrival time	arid
IR1	8.58	299.97	Pn	8/13/1978 17:22:31.359	5128
IR1	8.58	299.97	Lg	8/13/1978 17:25:05.736	5125
IR1	8.58	299.97	Rg	8/13/1978 17:25:33.867	5122
IR2	8.61	298.12	Pn	8/13/1978 17:22:29.674	5129
IR2	8.61	298.12	Lg	8/13/1978 17:25:04.839	5126
IR2	8.61	298.12	Rg	8/13/1978 17:25:36.360	5123
IR4	8.82	300.53	Pn	8/13/1978 17:22:29.750	5130
IR4	8.82	300.53	Lg	8/13/1978 17:25:02.936	5127
IR4	8.82	300.53	Rg	8/13/1978 17:25:42.351	5124
MAIO	14.84	287.33	Pn	8/13/1978 17:23:42.450	7057

Poor Pn onset signals. Not readable on IR3.
Event is listed with depth=128 Km, but Rg
phases look similar to other events from this region.
Event is probably shallow and not well located in
ISC/USGS listing.
Segment ends 66 sec after Pn arrival at MAIO.

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978227 8/15/1978 9:04:22.470	41.25	43.99	8	F	4.7	108	11	u	224602	USGS/

sta	delta	seaz	phase	arrival time	arid
IR1	7.85	320.02	Pn	8/15/1978 9:06:22.709	5135
IR1	7.85	320.02	Pg	8/15/1978 9:06:52.193	5137
IR1	7.85	320.02	Lg	8/15/1978 9:08:35.662	5133
IR1	7.85	320.02	Rg	8/15/1978 9:09:11.775	5131
IR4	8.09	320.01	Pn	8/15/1978 9:06:25.873	5136
IR4	8.09	320.01	Pg	8/15/1978 9:06:58.090	5138
IR4	8.09	320.01	Lg	8/15/1978 9:08:42.491	5134
IR4	8.09	320.01	Rg	8/15/1978 9:09:26.746	5132
MAIO	13.04	297.01	Pn	8/15/1978 9:07:29.996	7058
MAIO	13.04	297.01	Sn	8/15/1978 9:09:52.480	7059
MAIO	13.04	297.01	LR	8/15/1978 9:11:28.992	7060

This event part of Rodgers, Ni, Hearn dataset

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978232 8/20/1978 2:30:03.440	42.29	49.98	33	A	4.0	7	6	u	224802	USGS/

sta	delta	seaz	phase	arrival time	arid
IR7	6.61	355.97	Pn	8/20/1978 2:31:41.488	5144
IR7	6.61	355.97	Sn	8/20/1978 2:32:56.511	5140
IR2	6.67	354.16	Pn	8/20/1978 2:31:42.046	5142
IR3	6.86	353.54	Pn	8/20/1978 2:31:45.253	5143
IR1	6.90	355.64	Pn	8/20/1978 2:31:46.012	5141

	IR1	6.90	355.64	Sn	8/20/1978 2:33:02.041							5139	

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978234 8/22/1978 22:48:10.620	41.94	43.87	4	F	4.8	151	15	u	224943	USGS/

sta	delta	seaz	phase	arrival time	arid
IR2	8.32	321.03	Pn	8/22/1978 22:50:17.528	5154
IR2	8.32	321.03	Lg	8/22/1978 22:52:38.561	5150
IR2	8.32	321.03	Rg	8/22/1978 22:53:31.810	5146
IR1	8.41	322.86	Pn	8/22/1978 22:50:18.213	5153
IR1	8.41	322.86	Lg	8/22/1978 22:52:39.053	5149
IR1	8.41	322.86	Rg	8/22/1978 22:53:30.888	5145
IR3	8.53	321.36	Pn	8/22/1978 22:50:20.428	5155
IR3	8.53	321.36	Lg	8/22/1978 22:52:39.024	5151
IR3	8.53	321.36	Rg	8/22/1978 22:53:36.744	5147
IR4	8.66	322.77	Pn	8/22/1978 22:50:21.987	5156
IR4	8.66	322.77	Lg	8/22/1978 22:52:46.643	5152
IR4	8.66	322.77	Rg	8/22/1978 22:53:41.482	5148
MAIO	13.34	299.74	Pn	8/22/1978 22:51:19.878	7061
MAIO	13.34	299.74	Sn	8/22/1978 22:53:45.781	7062
MAIO	13.34	299.74	LR	8/22/1978 22:55:23.966	7063

This event part of Rodgers, Ni, Hearn dataset

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978238 8/26/1978 13:10:17.580	36.90	54.33	33	A	-9.0	9	13	u	225106	USGS/

sta	delta	seaz	phase	arrival time	arid
IR3	3.02	61.00	Pn	8/26/1978 13:11:04.390	5087
IR3	3.02	61.00	Lg	8/26/1978 13:11:56.390	5082
IR2	3.03	64.95	Pn	8/26/1978 13:11:03.774	5086
IR2	3.03	64.95	Lg	8/26/1978 13:11:56.428	5081
IR7	3.23	67.19	Pn	8/26/1978 13:11:06.346	5089
IR7	3.23	67.19	Lg	8/26/1978 13:11:59.760	5084
IR4	3.23	58.11	Pn	8/26/1978 13:11:07.394	5088
IR4	3.23	58.11	Lg	8/26/1978 13:12:05.895	5083
IR1	3.29	62.20	Pn	8/26/1978 13:11:07.809	5085
IR1	3.29	62.20	Lg	8/26/1978 13:12:05.896	5080
MAIO	4.19	279.75	Pn	8/26/1978 13:11:18.926	7065
MAIO	4.19	279.75	Lg	8/26/1978 13:12:27.475	7066
MAIO	4.19	279.75	Rg	8/26/1978 13:12:46.863	7064

Appears to be multiple mixed codas with other events
at both ILPA and MAIO. Last event records about 2 mins
past Pn arrivals at ILPA and is about 3.5 degrees
distant from the array.

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978241 8/29/1978 0:19:17.390	41.23	49.53	0	A	4.4	9	8	u	225194	USGS/

sta	delta	seaz	phase	arrival time	arid
IR7	5.59	351.61	Pn	8/29/1978 0:20:44.058	5162
IR7	5.59	351.61	Sn	8/29/1978 0:21:42.379	5158
IR2	5.67	349.50	Pn	8/29/1978 0:20:45.156	5160
IR3	5.87	348.92	Pn	8/29/1978 0:20:48.145	5161
IR1	5.89	351.44	Pn	8/29/1978 0:20:48.224	5159
IR1	5.89	351.44	Sn	8/29/1978 0:21:49.296	5157
MAIO	9.20	305.45	Pn	8/29/1978 0:21:32.718	7067
MAIO	9.20	305.45	Sn	8/29/1978 0:23:09.488	7068

Possible mixed codas at MAIO.

origin time		lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978246	9/03/1978 0:21:16.700	44.45	38.01	33	N	5.7	364	8	u	225435	USGS/

sta	delta	seaz	phase	arrival time	arid
IR7	12.99	316.16	Pn	9/03/1978 0:24:22.771	5168
IR7	12.99	316.16	LR	9/03/1978 0:29:41.068	5165
IR2	13.18	315.72	Pn	9/03/1978 0:24:24.699	5166
IR2	13.18	315.72	LR	9/03/1978 0:29:47.384	5163
IR3	13.39	316.04	Pn	9/03/1978 0:24:27.499	5167
IR3	13.39	316.04	LR	9/03/1978 0:29:54.373	5164
MAIO	18.21	303.21	P	9/03/1978 0:25:26.912	7069
MAIO	18.21	303.21	S	9/03/1978 0:28:54.333	7070

This event part of Rodgers, Ni, Hearn dataset

origin time		lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978246	9/03/1978 2:19:26.130	44.45	38.04	0	A	3.3	7	0	u	225438	USGS/

Event too small to read.

origin time		lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978250	9/07/1978 9:19:52.330	38.06	58.57	33	A	-9.0	11	16	u	225670	USGS/

sta	delta	seaz	phase	arrival time	arid
MAIO	1.91	337.57	Pn	9/07/1978 9:20:24.404	7071
MAIO	1.91	337.57	Lg	9/07/1978 9:20:51.512	7072
IR3	6.57	64.65	Pn	9/07/1978 9:21:28.674	5177
IR3	6.57	64.65	Pg	9/07/1978 9:21:57.824	5180
IR3	6.57	64.65	Lg	9/07/1978 9:23:31.458	5173
IR3	6.57	64.65	Rg	9/07/1978 9:24:55.001	5170
IR2	6.59	66.41	Pn	9/07/1978 9:21:27.220	5176
IR2	6.59	66.41	Lg	9/07/1978 9:23:32.277	5172
IR2	6.59	66.41	Rg	9/07/1978 9:25:01.054	5169
IR4	6.77	63.13	Pn	9/07/1978 9:21:33.082	5178
IR4	6.77	63.13	Pg	9/07/1978 9:22:04.549	5181
IR4	6.77	63.13	Lg	9/07/1978 9:23:47.739	5174
IR7	6.79	67.34	Pn	9/07/1978 9:21:31.211	5179
IR7	6.79	67.34	Pg	9/07/1978 9:22:03.164	5182
IR7	6.79	67.34	Lg	9/07/1978 9:23:38.745	5175
IR7	6.79	67.34	Rg	9/07/1978 9:25:13.000	5171

Very poor Pn onset signals at ILPA.
Lg is clipped at MAIO.

origin time		lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978264	9/21/1978 11:08:49.200	38.06	38.65	31	F	4.6	95	18	u	226282	USGS/

sta	delta	seaz	phase	arrival time	arid
IR7	9.85	287.40	Pn	9/21/1978 11:11:13.030	5197
IR7	9.85	287.40	Pg	9/21/1978 11:11:53.818	5199
IR7	9.85	287.40	Lg	9/21/1978 11:14:24.028	5192
IR7	9.85	287.40	Rg	9/21/1978 11:15:20.158	5187
IR1	10.00	288.89	Pn	9/21/1978 11:11:15.974	5193
IR1	10.00	288.89	Lg	9/21/1978 11:14:25.752	5188
IR1	10.00	288.89	Rg	9/21/1978 11:15:25.824	5183
IR2	10.08	287.39	Pn	9/21/1978 11:11:13.562	5194
IR2	10.08	287.39	Lg	9/21/1978 11:14:28.951	5189
IR2	10.08	287.39	Rg	9/21/1978 11:15:28.879	5184
IR4	10.22	289.63	Pn	9/21/1978 11:11:13.673	5196

IR4	10.22	289.63	Lg	9/21/1978 11:14:39.954	5191
IR4	10.22	289.63	Rg	9/21/1978 11:15:45.166	5186
IR3	10.24	288.28	Pn	9/21/1978 11:11:19.224	5195
IR3	10.24	288.28	Pg	9/21/1978 11:12:01.165	5198
IR3	10.24	288.28	Lg	9/21/1978 11:14:44.536	5190
IR3	10.24	288.28	Rg	9/21/1978 11:15:44.823	5185
MAIO	16.67	282.33	P	9/21/1978 11:12:41.313	7073

Very poor Pn onset signals at ILPA.
Segment ends 45 sec after P arrival at MAIO.
This event part of Rodgers, Ni, Hearn dataset

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978289 10/16/1978 13:26:25.600	39.23	37.79	-9	_	-9.0	-1	0	u	227408	USGS/

Event is too small to read.

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978290 10/17/1978 16:45:13.780	39.67	41.73	33	A	-9.0	5	6	u	227457	USGS/

sta	delta	seaz	phase	arrival time	arid
IR1	8.27	303.64	Pn	10/17/1978 16:47:11.196	5200
IR1	8.27	303.64	Lg	10/17/1978 16:49:35.278	5204
IR1	8.27	303.64	Rg	10/17/1978 16:50:34.192	5202
IR4	8.52	304.10	Pn	10/17/1978 16:47:12.423	5201
IR4	8.52	304.10	Lg	10/17/1978 16:49:44.964	5205
IR4	8.52	304.10	Rg	10/17/1978 16:50:44.564	5203

Poor Pn onset times.

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978307 11/03/1978 18:54:06.910	42.50	45.26	33	A	4.4	46	9	u	228167	USGS/

sta	delta	seaz	phase	arrival time	arid
IR7	7.96	330.24	Pn	11/03/1978 18:56:01.399	5212
IR7	7.96	330.24	Rg	11/03/1978 18:59:17.180	5214
IR2	8.11	329.12	Pn	11/03/1978 18:56:03.791	5210
IR2	8.11	329.12	Rg	11/03/1978 18:59:24.279	5213
IR1	8.24	330.88	Pn	11/03/1978 18:56:05.116	5209
IR1	8.24	330.88	Sn	11/03/1978 18:57:39.723	5208
IR1	8.24	330.88	Lg	11/03/1978 18:58:21.365	5206
IR3	8.33	329.25	Pn	11/03/1978 18:56:06.983	5211
IR3	8.33	329.25	Lg	11/03/1978 18:58:23.960	5207

This event part of Rodgers, Ni, Hearn dataset

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978308 11/04/1978 15:22:19.540	37.71	48.95	37	F	6.0	418	4	u	228205	USGS/

sta	delta	seaz	phase	arrival time	arid
IR7	2.41	326.94	Pn	11/04/1978 15:22:59.036	5218
IR2	2.58	323.22	Pn	11/04/1978 15:23:01.573	5216
IR1	2.69	329.16	Pn	11/04/1978 15:23:02.870	5215
IR3	2.79	323.90	Pn	11/04/1978 15:23:04.439	5217

Event waveforms are clipped.
Low gain problem with channel IR7E.

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978315 11/11/1978 2:45:55.770	38.10	38.44	40	F	4.1	37	0	u	228513	USGS/

Event is too small to read.

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978315 11/11/1978 2:47:36.930	37.44	38.11	33	A	4.5	28	0	u	228514	USGS/

Event too small to read -- coda buried in noise.

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978320 11/16/1978 5:46:09.480	43.50	46.62	33	A	3.9	10	5	u	228720	USGS/

sta	delta	seaz	phase	arrival time	arid
IR7	8.38	339.75	Pn	11/16/1978 5:48:10.015	5223
IR7	8.38	339.75	Sn	11/16/1978 5:49:39.450	5220
IR2	8.50	338.54	Pn	11/16/1978 5:48:11.878	5222
IR1	8.67	340.05	Pn	11/16/1978 5:48:13.855	5221
IR1	8.67	340.05	Sn	11/16/1978 5:49:44.821	5219

This event part of Rodgers, Ni, Hearn dataset

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978323 11/19/1978 16:11:48.530	36.44	36.37	33	A	-9.0	6	0	u	228873	USGS/

This event is too small to read -- coda is buried in noise.

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978327 11/23/1978 15:24:39.050	44.17	39.34	25	F	4.4	106	4	u	229059	USGS/

sta	delta	seaz	phase	arrival time	arid
IR7	12.08	317.93	Pn	11/23/1978 15:27:32.177	5227
IR7	12.08	317.93	Rg	11/23/1978 15:32:07.324	5225
IR1	12.34	318.64	Pn	11/23/1978 15:27:34.923	5226
IR1	12.34	318.64	Rg	11/23/1978 15:32:17.480	5224

This event part of Rodgers, Ni, Hearn dataset

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978329 11/25/1978 8:57:25.050	39.90	44.07	10	A	4.4	41	8	u	229142	USGS/

sta	delta	seaz	phase	arrival time	arid
IR7	6.66	311.06	Pn	11/25/1978 8:59:00.463	5233
IR7	6.66	311.06	Pg	11/25/1978 8:59:24.097	5235
IR7	6.66	311.06	Lg	11/25/1978 9:00:58.277	5231
IR7	6.66	311.06	Rg	11/25/1978 9:01:24.885	5229
IR1	6.89	312.54	Pn	11/25/1978 8:58:57.803	5232
IR1	6.89	312.54	Pg	11/25/1978 8:59:24.397	5234
IR1	6.89	312.54	Lg	11/25/1978 9:01:00.680	5230
IR1	6.89	312.54	Rg	11/25/1978 9:01:37.318	5228

Poor Pn onset times.
This event part of Rodgers, Ni, Hearn dataset

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978338 12/04/1978 3:12:37.650	38.07	37.43	37	F	5.0	220	7	u	229684	USGS/

sta	delta	seaz	phase	arrival time	arid
IR7	10.79	286.56	Pn	12/04/1978 3:15:14.479	5241
IR7	10.79	286.56	Pg	12/04/1978 3:15:58.562	5242
IR7	10.79	286.56	Lg	12/04/1978 3:18:35.117	5239
IR7	10.79	286.56	Rg	12/04/1978 3:19:10.980	5237
IR1	10.94	287.93	Pn	12/04/1978 3:15:12.359	5240
IR1	10.94	287.93	Lg	12/04/1978 3:18:33.990	5238

IR1 10.94 287.93 Rg 12/04/1978 3:19:10.498 5236

Phases are clipped except for Pn.
This event part of Rodgers, Ni, Hearn dataset

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978348 12/14/1978 5:08:22.610	45.49	37.36	10	A	4.7	48	3	u	230194	USGS/

sta	delta	seaz	phase	arrival time	arid
IR7	14.00	318.40	Pn	12/14/1978 5:11:50.477	5244
IR7	14.00	318.40	Pg	12/14/1978 5:12:44.841	5245
IR1	14.26	319.00	Pn	12/14/1978 5:11:51.988	5243

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978352 12/18/1978 7:59:56.340	47.78	48.14	33	N	5.9	346	4	nu	230364	USGS/

sta	delta	seaz	phase	arrival time	arid
IR7	12.22	352.13	Pn	12/18/1978 8:02:53.633	5249
IR7	12.22	352.13	Sn	12/18/1978 8:05:09.098	5247
IR1	12.51	352.06	Pn	12/18/1978 8:02:57.237	5248
IR1	12.51	352.06	Sn	12/18/1978 8:05:14.293	5246

This event part of Rodgers, Ni, Hearn dataset
Nulcear Explosion

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1979001 1/01/1979 4:25:39.430	37.64	50.18	33	A	4.0	6	3	u	231004	USGS/

sta	delta	seaz	phase	arrival time	arid
IR7	1.97	349.96	Pn	1/01/1979 4:26:06.442	5252
IR7	1.97	349.96	Lg	1/01/1979 4:26:38.377	5251
IR7	1.97	349.96	Rg	1/01/1979 4:26:47.442	5250

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1979132 5/12/1979 16:19:54.680	41.42	48.16	33	A	4.2	8	3	u	237333	USGS/

sta	delta	seaz	phase	arrival time	arid
IR7	6.03	342.20	Pn	5/12/1979 16:21:23.233	5255
IR7	6.03	342.20	Sn	5/12/1979 16:22:35.627	5253
IR3	6.35	340.17	Pn	5/12/1979 16:21:27.692	5254

This event part of Rodgers, Ni, Hearn dataset

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1979157 6/06/1979 17:30:56.220	42.39	46.32	70	F	4.0	40	13	u	238668	USGS/

sta	delta	seaz	phase	arrival time	arid
IR7	7.46	334.84	Pn	6/06/1979 17:32:36.287	5268
IR7	7.46	334.84	Sn	6/06/1979 17:34:05.269	5260
IR7	7.46	334.84	Lg	6/06/1979 17:35:08.789	5264
IR7	7.46	334.84	Rg	6/06/1979 17:36:00.782	5258
IR1	7.75	335.35	Pn	6/06/1979 17:32:42.355	5265
IR1	7.75	335.35	Sn	6/06/1979 17:34:06.586	5259
IR1	7.75	335.35	Lg	6/06/1979 17:35:10.386	5261
IR1	7.75	335.35	Rg	6/06/1979 17:36:09.560	5256
IR3	7.82	333.55	Pn	6/06/1979 17:32:41.932	5266
IR3	7.82	333.55	Lg	6/06/1979 17:35:14.876	5262
IR4	7.99	334.87	Pn	6/06/1979 17:32:46.323	5267
IR4	7.99	334.87	Lg	6/06/1979 17:35:25.383	5263

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   IR4    7.99 334.87 Rg       6/06/1979 17:36:19.519    5257
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Poor phase onset times, Pn arrivals very small and
difficult to time accurately.
This event part of Rodgers, Ni, Hearn dataset

origin time				lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1979159	6/08/1979 17:46:10.270			37.07	55.62	3	A	4.4	54	6	u	238769	USGS/

sta	delta	seaz	phase	arrival time	arid
IR7	4.26	69.74	Pn	6/08/1979 17:47:16.859	5097
IR7	4.26	69.74	Lg	6/08/1979 17:48:24.402	5095
IR7	4.26	69.74	Rg	6/08/1979 17:48:55.486	5093
IR1	4.30	65.91	Pn	6/08/1979 17:47:17.758	5096
IR1	4.30	65.91	Lg	6/08/1979 17:48:28.488	5094
IR1	4.30	65.91	Rg	6/08/1979 17:48:59.572	5092

Large P type phase following about 10 sec after Pn could
not be positively identified as Pg. Possible PmP with Pg
following in coda?

origin time				lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1979166	6/15/1979 21:15:04.090			36.12	54.52	33	A	-9.0	7	6	u	239171	USGS/

sta	delta	seaz	phase	arrival time	arid
IR1	3.19	76.18	Pn	6/15/1979 21:15:52.047	5102
IR1	3.19	76.18	Lg	6/15/1979 21:16:46.413	5100
IR1	3.19	76.18	Rg	6/15/1979 21:17:03.066	5098
IR7	3.19	81.41	Pn	6/15/1979 21:15:52.288	5103
IR7	3.19	81.41	Lg	6/15/1979 21:16:44.979	5101
IR7	3.19	81.41	Rg	6/15/1979 21:17:04.704	5099

origin time				lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1979212	7/31/1979 5:49:33.650			38.72	38.75	10	A	4.1	15	0	u	241486	USGS/

Event too small to read.
Initial Pn coda appears to be mixed with some extraneous higher
frequency signal.

origin time				lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1979232	8/20/1979 22:42:09.810			40.73	52.02	68	F	4.3	37	6	u	242544	USGS/

sta	delta	seaz	phase	arrival time	arid
IR7	5.14	11.98	P	8/20/1979 22:43:25.590	5274
IR7	5.14	11.98	S	8/20/1979 22:44:21.624	5270
IR3	5.31	8.15	P	8/20/1979 22:43:27.732	5272
IR1	5.41	10.73	P	8/20/1979 22:43:29.290	5271
IR1	5.41	10.73	S	8/20/1979 22:44:27.710	5269
IR4	5.56	8.76	P	8/20/1979 22:43:31.577	5273

This event part of Rodgers, Ni, Hearn dataset

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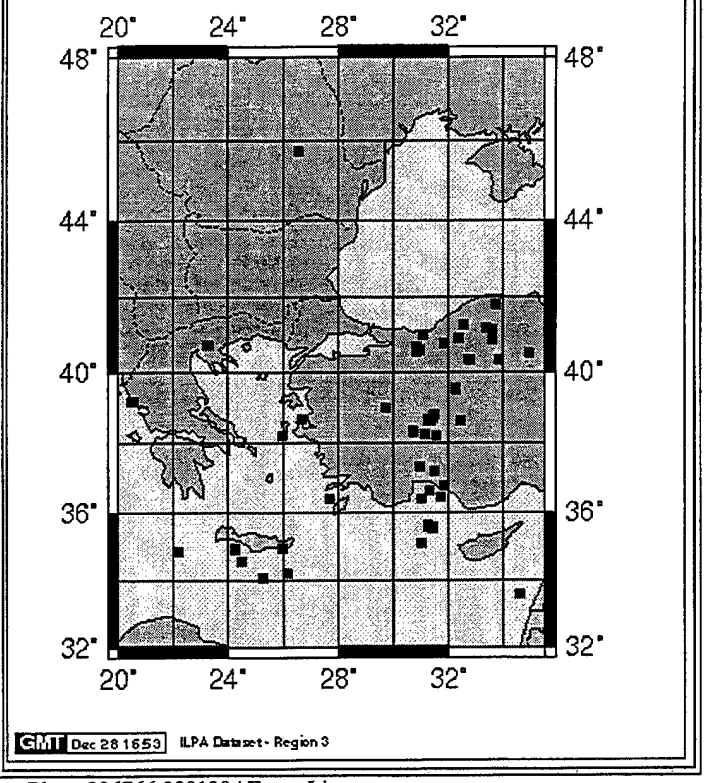
REGION 3

GTDB: ILPA Dataset: Region 3

Event locations plotted on the map at right are not representative of the seismicity in Western Turkey (more).

Of the 48 events extracted for this region, 24 have at least one arrival observed at ILPA. Mb's are between 3.9 and 5.8.

Distances range between 13 and 24 degrees from ILPA.



About this Page | Waveform QC Plot | Sample Event Plots: 226766 239139 | Event List

GTDB: ILPA Dataset: Bulletin: Region 3

origin time		lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978200	7/19/1978 16:08:33.710	34.24	26.12	46	F	4.7	97	8	u	223326	USGS/

sta	delta	seaz	phase	arrival time	arid
IR7	20.07	272.98	P	7/19/1978 16:13:06.802	6356
IR7	20.07	272.98	S	7/19/1978 16:16:50.704	6351
IR1	20.15	273.80	P	7/19/1978 16:13:07.776	6352
IR1	20.15	273.80	S	7/19/1978 16:16:57.126	6350
IR2	20.30	273.22	P	7/19/1978 16:13:09.291	6353
IR4	20.33	274.37	P	7/19/1978 16:13:09.429	6355
IR3	20.42	273.78	P	7/19/1978 16:13:10.329	6354
MAIO	27.19	275.62	P	7/19/1978 16:14:15.652	7099

Event appears to be much smaller than mb=4.7 value
listed in NEIS bulletin.
Segment ends 2 min 28 sec after P arrival at MAIO.
This event part of Rodgers, Ni, Hearn dataset

origin time		lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978210	7/29/1978 14:53:47.190	38.22	31.55	10	A	-9.0	11	3	u	223899	USGS/

sta	delta	seaz	phase	arrival time	arid
IR1	15.55	286.04	P	7/29/1978 14:57:18.594	6357
IR2	15.64	285.14	P	7/29/1978 14:57:16.650	6358
IR3	15.79	285.76	P	7/29/1978 14:57:21.866	6359

Small event - poor P onset times. Phases other than P
not readable.

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978214 8/02/1978 12:13:12.900	40.59	30.91	-9	_	-9.0	-1	0	u	224074	USGS/

Too small to read.

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978218 8/06/1978 20:49:40.500	40.57	30.84	-9	_	-9.0	-1	0	u	224260	USGS/

Too small to read.

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978222 8/10/1978 5:52:20.990	39.02	29.72	24	F	-9.0	19	3	u	224398	USGS/

sta	delta	seaz	phase	arrival time	arid
IR1	17.04	288.42	P	8/10/1978 5:56:24.196	6360
IR4	17.26	288.91	P	8/10/1978 5:56:26.483	6362
IR3	17.28	288.15	P	8/10/1978 5:56:26.420	6361

Small - phases other than P not readable.
This event part of Rodgers, Ni, Hearn dataset

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978223 8/11/1978 15:25:46.810	35.08	31.01	10	A	-9.0	10	5	u	224450	USGS/

sta	delta	seaz	phase	arrival time	arid
IR7	15.97	273.50	P	8/11/1978 15:29:36.319	6367
IR1	16.05	274.53	P	8/11/1978 15:29:36.698	6363
IR2	16.20	273.76	P	8/11/1978 15:29:39.233	6364
IR4	16.24	275.21	P	8/11/1978 15:29:39.819	6366
IR3	16.32	274.44	P	8/11/1978 15:29:40.819	6365

Small event, phases other than P not readable.

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978226 8/14/1978 1:37:57.900	40.35	33.80	10	A	-9.0	16	0	u	224542	USGS/

Too small to read.

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978234 8/22/1978 9:29:32.900	36.39	27.67	105	F	3.9	42	5	u	224916	USGS/

sta	delta	seaz	phase	arrival time	arid
IR1	18.63	279.76	P	8/22/1978 9:33:48.069	6368
IR2	18.75	279.08	P	8/22/1978 9:33:48.906	6369
IR4	18.83	280.31	P	8/22/1978 9:33:49.653	6371
IR3	18.89	279.64	P	8/22/1978 9:33:50.992	6370
MAIO	25.52	279.79	P	8/22/1978 9:34:58.811	7100

Poor P onset times at IR3 and IR4. Phases other than P
not readable at ILPA.
Segment ends 29 sec after P arrival at MAIO.
This event part of Rodgers, Ni, Hearn dataset

```
origin time                      lat    lon   dep  d  mb ndef nass etype  evid  auth
1978237  8/25/1978 12:02:08.710  34.07  25.21  10  F  4.4 147  11    u  225061 USGS/

      sta   delta seaz  phase    arrival time             arid
      IR7  20.84 272.93 P        8/25/1978 12:06:53.399    6378
      IR7  20.84 272.93 S        8/25/1978 12:10:39.781    6373
      IR7  20.84 272.93 LR       8/25/1978 12:15:23.777    6381
      IR1  20.92 273.72 P        8/25/1978 12:06:54.339    6374
      IR1  20.92 273.72 S        8/25/1978 12:10:40.121    6372
      IR1  20.92 273.72 LR       8/25/1978 12:16:24.449    6379
      IR2  21.07 273.17 P        8/25/1978 12:06:55.880    6375
      IR4  21.11 274.27 P        8/25/1978 12:06:56.339    6377
      IR4  21.11 274.27 LR       8/25/1978 12:16:42.676    6380
      IR3  21.19 273.71 P        8/25/1978 12:06:56.922    6376
     MAIO  27.96 275.66 P        8/25/1978 12:08:00.762    7101

   Segment ends about 3 mins after P arrival time at MAIO.
   Poor P onset time at MAIO.
   This event part of Rodgers, Ni, Hearn dataset

origin time                      lat    lon   dep  d  mb ndef nass etype  evid  auth
1978238  8/26/1978  2:01:04.450  35.60  31.24  10  A -9.0   8   1    u  225083 USGS/

      sta   delta seaz  phase    arrival time             arid
     MAIO  22.80 276.70 P        8/26/1978  2:06:09.131    7102

   Not read - the P arrives at approximately the same
   time as the Pn for an event about 2.5 degrees distant
   from the ILPA array.
   Segment ends 30 sec after P arrival at MAIO.
   Poor P onset time at MAIO.

origin time                      lat    lon   dep  d  mb ndef nass etype  evid  auth
1978238  8/26/1978  3:40:43.140  41.20  33.37   0  A -9.0  11   1    u  225087 USGS/

      sta   delta seaz  phase    arrival time             arid
      IR7  14.54 297.37 Pn       8/26/1978  3:44:16.146    6382

   Very small - P arrivals at stations other than
   IR7 are not readable.

origin time                      lat    lon   dep  d  mb ndef nass etype  evid  auth
1978244  9/01/1978 23:07:35.000  36.41  31.01  -9  _ -9.0  -1   0    u  225385 USGS/

   Too small to read.

origin time                      lat    lon   dep  d  mb ndef nass etype  evid  auth
1978264  9/21/1978 13:58:46.470  38.34  30.71   1  F -9.0   8   4    u  226284 USGS/

      sta   delta seaz  phase    arrival time             arid
      IR7  16.07 285.37 P        9/21/1978 14:02:35.617    6386
      IR2  16.30 285.46 P        9/21/1978 14:02:39.894    6383
      IR4  16.43 286.85 P        9/21/1978 14:02:40.475    6385
      IR3  16.45 286.05 P        9/21/1978 14:02:38.694    6384

   P arrivals for this event record between the Pn and
   Lg codas of an event about 5.5 degrees distant from
   the ILPA array.
   Too small to read at MAIO.
```

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978274 10/01/1978 14:04:53.080	37.35	30.92	8	F	-9.0	9	0	u	226715	USGS/

Too small to read at both ILPA and MAIO. An event included in region 5 records about 2 mins past predicted P times at ILPA and 20 sec past predicted P time at MAIO.

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978275 10/02/1978 20:28:52.390	45.72	26.54	161	F	4.9	238	13	u	226766	USGS/

sta	delta	seaz	phase	arrival time	arid
IR1	20.92	306.87	P	10/02/1978 20:33:27.373	6387
IR1	20.92	306.87	pP	10/02/1978 20:33:54.066	6390
IR1	20.92	306.87	S	10/02/1978 20:37:11.701	6393
IR1	20.92	306.87	PcP	10/02/1978 20:37:26.907	6394
IR3	21.10	306.51	P	10/02/1978 20:33:29.185	6388
IR3	21.10	306.51	pP	10/02/1978 20:33:55.976	6391
IR3	21.10	306.51	PcP	10/02/1978 20:37:26.979	6395
IR4	21.16	307.09	P	10/02/1978 20:33:30.062	6389
IR4	21.16	307.09	pP	10/02/1978 20:33:56.918	6392
IR4	21.16	307.09	PcP	10/02/1978 20:37:27.374	6396
MAIO	26.36	301.21	P	10/02/1978 20:34:21.167	7105
MAIO	26.36	301.21	Pp	10/02/1978 20:34:48.067	7107
MAIO	26.36	301.21	S	10/02/1978 20:38:36.872	7181

This event part of Rodgers, Ni, Hearn dataset

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978281 10/08/1978 8:53:49.680	41.28	32.53	0	A	-9.0	6	0	u	227061	USGS/

Too small to read.

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978287 10/14/1978 8:37:44.380	40.33	32.74	0	A	-9.0	4	0	u	227318	USGS/

Too small to read.

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978291 10/18/1978 23:37:05.410	34.96	25.97	10	A	4.5	116	7	u	227506	USGS/

sta	delta	seaz	phase	arrival time	arid
IR1	20.16	275.91	P	10/18/1978 23:41:45.797	6401
IR1	20.16	275.91	S	10/18/1978 23:45:26.612	6400
IR1	20.16	275.91	LR	10/18/1978 23:51:35.604	6397
IR2	20.30	275.32	P	10/18/1978 23:41:43.539	6402
IR2	20.30	275.32	LR	10/18/1978 23:51:31.294	6398
IR3	20.42	275.87	P	10/18/1978 23:41:45.077	6403
IR3	20.42	275.87	LR	10/18/1978 23:51:38.243	6399

P arrives about 16 sec into coda of a previous event - timing may not be precise.
This event part of Rodgers, Ni, Hearn dataset

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978295 10/22/1978 13:40:21.080	41.81	33.69	0	A	-9.0	6	0	u	227655	USGS/

Too small to read.

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978296 10/23/1978 22:01:51.260	37.20	31.46	10	A	-9.0	10	0	u	227692	USGS/

Too small to read. Another small event records
about 6 mins 25 sec past predicted P arrival times
for this event.

origin time		lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978307	11/03/1978 9:35:03.430	40.91	32.34	10	A	-9.0	19	3	u	228149	USGS/

sta	delta	seaz	phase	arrival time	arid
IR1	15.40	296.37	P	11/03/1978 9:38:47.926	6406
IR2	15.44	295.42	P	11/03/1978 9:38:48.288	6404
IR3	15.62	295.94	P	11/03/1978 9:38:48.304	6405

Another event about 6 degrees distant from array
follows 4 mins 45 sec past P arrivals. LR codas
are mixed.

origin time		lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978328	11/24/1978 16:06:01.910	38.64	32.42	10	A	-9.0	9	0	u	229108	USGS/

P onsets too poor to time accurately. A second event
records 7 min 30 sec past predicted P arrivals for
this event. A third event about 6 degrees distant
from array records 18 mins 18 sec later.

origin time		lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978329	11/25/1978 13:06:32.520	38.76	31.41	10	A	-9.0	9	0	u	229148	USGS/

Too small to read.

origin time		lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978329	11/25/1978 21:02:30.600	38.67	31.23	-9	_	-9.0	-1	0	u	229164	USGS/

Too small to read.

origin time		lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978340	12/06/1978 13:09:17.720	40.50	34.97	17	F	4.6	118	6	u	229789	USGS/

sta	delta	seaz	phase	arrival time	arid
IR7	13.18	296.02	Pn	12/06/1978 13:12:28.884	6412
IR7	13.18	296.02	LR	12/06/1978 13:17:28.475	6409
IR1	13.37	297.04	Pn	12/06/1978 13:12:31.117	6410
IR1	13.37	297.04	LR	12/06/1978 13:17:30.710	6407
IR2	13.41	295.91	Pn	12/06/1978 13:12:31.939	6411
IR2	13.41	295.91	LR	12/06/1978 13:17:32.351	6408

This event part of Rodgers, Ni, Hearn dataset

origin time		lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978341	12/07/1978 1:05:33.410	35.56	31.40	33	A	-9.0	6	0	u	229828	USGS/

Too small to read.

origin time		lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978347	12/13/1978 16:37:27.340	38.28	31.12	0	A	-9.0	4	0	u	230175	USGS/

Too small to read. Another event about 4 degrees distant
from array records 10 mins past predicted P arrival
times for this event.

origin time		lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1979131	5/11/1979 1:46:26.780	40.74	23.27	5	F	4.7	179	5	u	237242	USGS/

sta	delta	seaz	phase	arrival time	arid
IR7	21.97	291.51	P	5/11/1979 1:51:24.902	6417
IR7	21.97	291.51	S	5/11/1979 1:55:31.151	6415
IR7	21.97	291.51	LR	5/11/1979 2:00:16.847	6414
IR3	22.36	291.96	P	5/11/1979 1:51:29.179	6416
IR3	22.36	291.96	LR	5/11/1979 2:00:30.156	6413

A smaller event signal follows 5 mins 58 sec past P arrivals.
This event part of Rodgers, Ni, Hearn dataset

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1979132 5/12/1979 7:35:08.250	38.83	31.48	10	A	-9.0	11	0	u	237314	USGS/

Too small to read.

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1979132 5/12/1979 17:52:40.810	38.23	25.94	2	F	4.4	90	6	u	237338	USGS/

sta	delta	seaz	phase	arrival time	arid
IR7	19.81	284.68	P	5/12/1979 17:57:15.166	6423
IR7	19.81	284.68	S	5/12/1979 18:00:37.612	6421
IR7	19.81	284.68	LQ	5/12/1979 18:04:37.454	6419
IR7	19.81	284.68	LR	5/12/1979 18:05:48.692	6418
IR3	20.19	285.28	P	5/12/1979 17:57:19.537	6422
IR3	20.19	285.28	LR	5/12/1979 18:05:56.931	6420

This event part of Rodgers, Ni, Hearn dataset

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1979135 5/15/1979 6:59:22.580	34.58	24.45	43	F	5.5	392	8	u	237462	USGS/

sta	delta	seaz	phase	arrival time	arid
IR7	21.36	274.67	P	5/15/1979 7:04:07.632	6431
IR7	21.36	274.67	S	5/15/1979 7:08:02.353	6428
IR7	21.36	274.67	LR	5/15/1979 7:13:49.534	6426
IR1	21.45	275.43	P	5/15/1979 7:04:08.257	6429
IR1	21.45	275.43	S	5/15/1979 7:08:07.962	6427
IR1	21.45	275.43	LR	5/15/1979 7:14:14.526	6424
IR3	21.71	275.41	P	5/15/1979 7:04:11.612	6430
IR3	21.71	275.41	LR	5/15/1979 7:14:06.802	6425

Another event follows 10 mins 11 sec past P arrivals.
This event part of Rodgers, Ni, Hearn dataset

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1979142 5/22/1979 11:50:10.620	34.87	22.15	37	F	4.5	114	12	u	237829	USGS/

sta	delta	seaz	phase	arrival time	arid
IR7	23.16	276.33	P	5/22/1979 11:55:16.413	6443
IR7	23.16	276.33	S	5/22/1979 11:59:28.661	6439
IR7	23.16	276.33	LQ	5/22/1979 12:04:05.643	6433
IR7	23.16	276.33	LR	5/22/1979 12:05:42.991	6437
IR1	23.26	277.02	P	5/22/1979 11:55:17.637	6440
IR1	23.26	277.02	S	5/22/1979 11:59:27.598	6438
IR1	23.26	277.02	LQ	5/22/1979 12:04:10.285	6432
IR1	23.26	277.02	LR	5/22/1979 12:05:49.521	6434
IR4	23.45	277.50	P	5/22/1979 11:55:19.363	6442
IR4	23.45	277.50	LR	5/22/1979 12:06:02.397	6436
IR3	23.52	277.00	P	5/22/1979 11:55:20.075	6441

IR3	23.52	277.00	LR	5/22/1979 12:05:58.444						6435	

This event part of Rodgers, Ni, Hearn dataset

origin time				lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1979146	5/26/1979	15:58:46.800		41.15	33.57	10	A	-9.0	15	4	u	238048	USGS/

sta	delta	seaz	phase	arrival time	arid
IR3	14.79	297.79	Pn	5/26/1979 16:02:18.771	6444
IR3	14.79	297.79	LR	5/26/1979 16:07:48.541	6446
IR4	14.81	298.69	Pn	5/26/1979 16:02:17.474	6445
IR4	14.81	298.69	LR	5/26/1979 16:07:45.435	6447

Another event about 5 degrees distant from array
follows 6 mins 20 sec past P arrivls.

origin time				lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1979148	5/28/1979	9:27:33.910		36.45	31.72	111	F	5.8	448	14	u	238159	USGS/

sta	delta	seaz	phase	arrival time	arid
IR7	15.26	278.39	P	5/28/1979 9:31:05.273	6451
IR7	15.26	278.39	pP	5/28/1979 9:31:25.598	6457
IR7	15.26	278.39	S	5/28/1979 9:34:06.016	6453
IR7	15.26	278.39	ScP	5/28/1979 9:39:28.211	6461
IR1	15.37	279.43	P	5/28/1979 9:31:07.064	6448
IR1	15.37	279.43	pP	5/28/1979 9:31:27.286	6454
IR1	15.37	279.43	S	5/28/1979 9:34:05.442	6452
IR1	15.37	279.43	ScP	5/28/1979 9:39:28.503	6458
IR4	15.57	280.08	P	5/28/1979 9:31:09.564	6450
IR4	15.57	280.08	pP	5/28/1979 9:31:29.882	6456
IR4	15.57	280.08	ScP	5/28/1979 9:39:28.696	6460
IR3	15.63	279.26	P	5/28/1979 9:31:10.460	6449
IR3	15.63	279.26	pP	5/28/1979 9:31:30.888	6455
IR3	15.63	279.26	ScP	5/28/1979 9:39:28.473	6459

This event part of Rodgers, Ni, Hearn dataset

origin time				lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1979149	5/29/1979	14:23:08.550		40.89	33.58	10	A	4.1	16	7	u	238203	USGS/

sta	delta	seaz	phase	arrival time	arid
IR7	14.31	296.35	Pn	5/29/1979 14:26:40.540	6468
IR7	14.31	296.35	LR	5/29/1979 14:31:49.764	6467
IR1	14.49	297.28	Pn	5/29/1979 14:26:44.432	6462
IR1	14.49	297.28	LR	5/29/1979 14:31:54.710	6465
IR3	14.71	296.79	Pn	5/29/1979 14:26:45.846	6463
IR3	14.71	296.79	LR	5/29/1979 14:32:09.844	6466
IR4	14.73	297.70	Pn	5/29/1979 14:26:45.808	6464

origin time				lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1979152	6/01/1979	21:03:34.390		39.22	20.50	47	F	4.6	112	9	u	238384	USGS/

sta	delta	seaz	phase	arrival time	arid
IR7	24.04	287.47	P	6/01/1979 21:08:46.318	6475
IR7	24.04	287.47	S	6/01/1979 21:13:04.251	6471
IR7	24.04	287.47	LQ	6/01/1979 21:17:30.751	6470
IR7	24.04	287.47	LR	6/01/1979 21:19:22.512	6477
IR1	24.19	288.09	P	6/01/1979 21:08:48.462	6472
IR1	24.19	288.09	S	6/01/1979 21:13:11.535	6476
IR4	24.41	288.46	P	6/01/1979 21:08:50.183	6474

IR3	24.43	287.97	P	6/01/1979 21:08:50.476							6473	
IR3	24.43	287.97	LR	6/01/1979 21:19:36.958							6469	

This event part of Rodgers, Ni, Hearn dataset

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1979166 6/15/1979 11:34:16.660	34.94	24.21	41	F	5.5	310	11	u	239139	USGS/

sta	delta	seaz	phase	arrival time	arid
IR7	21.49	275.72	P	6/15/1979 11:39:04.004	6488
IR7	21.49	275.72	S	6/15/1979 11:43:02.834	6486
IR7	21.49	275.72	ScP	6/15/1979 11:46:40.212	6479
IR7	21.49	275.72	LQ	6/15/1979 11:48:10.704	6484
IR7	21.49	275.72	LR	6/15/1979 11:49:41.910	6483
IR7	21.49	275.72	ScS	6/15/1979 11:50:24.856	6481
IR1	21.58	276.47	P	6/15/1979 11:39:05.054	6487
IR1	21.58	276.47	S	6/15/1979 11:43:03.884	6485
IR1	21.58	276.47	ScP	6/15/1979 11:46:40.033	6478
IR1	21.58	276.47	LR	6/15/1979 11:49:41.296	6482
IR1	21.58	276.47	ScS	6/15/1979 11:50:24.066	6480

P coda appears clipped a few cycles past arrival.
This event part of Rodgers, Ni, Hearn dataset

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1979167 6/16/1979 18:41:59.400	38.72	26.64	12	F	4.9	254	8	u	239230	USGS/

sta	delta	seaz	phase	arrival time	arid
IR7	19.27	286.16	P	6/16/1979 18:46:27.111	6496
IR7	19.27	286.16	S	6/16/1979 18:50:12.390	6494
IR7	19.27	286.16	LQ	6/16/1979 18:53:25.551	6490
IR7	19.27	286.16	LR	6/16/1979 18:54:50.197	6492
IR1	19.42	286.93	P	6/16/1979 18:46:29.125	6495
IR1	19.42	286.93	S	6/16/1979 18:50:11.502	6493
IR1	19.42	286.93	LQ	6/16/1979 18:53:33.743	6489
IR1	19.42	286.93	LR	6/16/1979 18:54:55.112	6491

This event part of Rodgers, Ni, Hearn dataset

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1979177 6/26/1979 22:01:06.990	36.80	31.85	0	A	-9.0	4	0	u	239833	USGS/

Too small to read.
Three other events record on this segment. The first at
8 mins 28 sec past predicted P arrivals for this event.
The other two are both about 1.2 degrees distant from the
array and record 10 mins 44 sec and 13 mins 46 sec later.

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1979177 6/26/1979 22:29:20.390	40.70	30.80	10	A	-9.0	9	0	u	239834	USGS/

Too small to read.

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1979179 6/28/1979 21:22:09.410	40.78	31.85	33	N	4.7	133	0	u	239929	USGS/

NEIS lists mb=4.7 for this event, distance=16 degrees
from array. No signals were observed at any of the
stations at the predicted P arrival times.

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth

```
1979212  7/31/1979 14:13:37.120  41.00  31.09    0  A -9.0    7    0     u  241503 USGS/
```

Too small to read

```
origin time                      lat    lon   dep  d  mb ndef nass etype  evid  auth
1979214  8/02/1979 23:41:14.970  35.63  31.23  33  A  3.9  16    0     u  241610 USGS/
```

Too small to read.

```
origin time                      lat    lon   dep  d  mb ndef nass etype  evid  auth
1979223  8/11/1979 20:19:11.380  35.61  31.22  80  F -9.0  15    1     u  242069 USGS/

      sta   delta seaz  phase    arrival time              arid
      IR7  15.73 275.35 P        8/11/1979 20:22:49.235    6497
```

Very poor P onset times. Phases other than P not readable.
Possible mixed codas with 2 other events - one occurring
8.4 sec and the other about 1 min after P arrival.
A third event records 16 mins 40 sec later.

```
origin time                      lat    lon   dep  d  mb ndef nass etype  evid  auth
1979223  8/11/1979 22:27:51.820  38.68  31.36   0  A -9.0  13    0     u  242076 USGS/
```

Too small to read. A larger event not included in
the NEIS listing and about 21 degrees distant from
array records 3 mins 20 sec past predicted P
arrivals for this event.

```
origin time                      lat    lon   dep  d  mb ndef nass etype  evid  auth
1979224  8/12/1979  1:16:50.500  36.62  31.29  -9  _ -9.0  -1    0     u  242082 USGS/
```

Too small to read. An event included in region 8
records about 9 mins past predicted P times for
this event.

```
origin time                      lat    lon   dep  d  mb ndef nass etype  evid  auth
1979226  8/14/1979 17:32:45.490  33.59  34.56  10  A  4.3  47  13     u  242237 USGS/

      sta   delta seaz  phase    arrival time              arid
      IR7  13.36 265.57 Pn       8/14/1979 17:35:54.772    6505
      IR7  13.36 265.57 Pg       8/14/1979 17:37:01.806    6506
      IR7  13.36 265.57 Lg       8/14/1979 17:40:10.195    6501
      IR7  13.36 265.57 LR       8/14/1979 17:41:24.228    6509
      IR1  13.40 266.84 Pn       8/14/1979 17:36:04.953    6502
      IR1  13.40 266.84 Lg       8/14/1979 17:40:13.850    6498
      IR1  13.40 266.84 LR       8/14/1979 17:41:41.871    6510
      IR4  13.57 267.74 Pn       8/14/1979 17:36:00.475    6504
      IR4  13.57 267.74 Lg       8/14/1979 17:40:10.195    6500
      IR4  13.57 267.74 LR       8/14/1979 17:41:41.871    6508
      IR3  13.68 266.85 Pn       8/14/1979 17:36:05.504    6503
      IR3  13.68 266.85 Lg       8/14/1979 17:40:22.377    6499
      IR3  13.68 266.85 LR       8/14/1979 17:41:38.701    6507
```

Poor Lg onset times.
This event part of Rodgers, Ni, Hearn dataset

```
origin time                      lat    lon   dep  d  mb ndef nass etype  evid  auth
1979237  8/25/1979  4:29:50.270  39.54  32.24  10  A -9.0  12    0     u  242736 USGS/
```

Too small to read.

[Region 1 | Region 2 | Region 3 | Region 4 | Region 5 | Region 6 | Region 7 | Region 8]

How to Get the ILPA Data Set

About the ILPA Array About the ILPA Dataset

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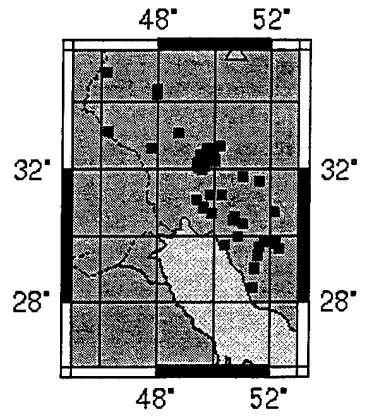
REGION 4

GTDB: ILPA Dataset: Region 4

Events from the Zagros Thrust belt. Distances from ILPA range between 2.5 and 7.3 degrees. Magnitudes range between 3.6 and 5.6 Mb.

Out of 39 events in this region 36 have at least one phase arrival identified at ILPA.



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GTDB: ILPA Dataset: Bulletin: Region 4

origin time				lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978205	7/24/1978	15:59:51.370		33.08	48.71	55	F	4.6	60	17	u	223620	USGS/

sta	delta	seaz	phase	arrival time	arid
IR4	2.82	220.64	Pn	7/24/1978 16:00:35.430	5295
IR4	2.82	220.64	Lg	7/24/1978 16:01:21.310	5290
IR4	2.82	220.64	Rg	7/24/1978 16:01:41.966	5297
IR1	2.86	215.55	Pn	7/24/1978 16:00:36.323	5292
IR1	2.86	215.55	Lg	7/24/1978 16:01:19.485	5287
IR1	2.86	215.55	Rg	7/24/1978 16:01:34.868	5285
IR7	3.06	211.40	Pn	7/24/1978 16:00:38.474	5296
IR7	3.06	211.40	Lg	7/24/1978 16:01:23.112	5291
IR3	3.07	219.24	Pn	7/24/1978 16:00:38.985	5294
IR3	3.07	219.24	Lg	7/24/1978 16:01:28.431	5289
IR2	3.16	215.58	Pn	7/24/1978 16:00:39.550	5293
IR2	3.16	215.58	Lg	7/24/1978 16:01:27.100	5288
IR2	3.16	215.58	Rg	7/24/1978 16:01:40.546	5286
MAIO	9.43	253.16	Pn	7/24/1978 16:02:08.390	7013
MAIO	9.43	253.16	Pg	7/24/1978 16:02:46.910	7182
MAIO	9.43	253.16	Lg	7/24/1978 16:04:41.451	7014
MAIO	9.43	253.16	Rg	7/24/1978 16:05:34.035	7015

Lg coda appears clipped on IR4 and IR1/sz and sn.

origin time				lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978208	7/27/1978	6:58:02.400		29.97	50.81	33	A	4.3	10	14	u	223771	USGS/

sta	delta	seaz	phase	arrival time	arid

IR4	5.26	180.82	Pn	7/27/1978 6:59:18.841	5306
IR4	5.26	180.82	Lg	7/27/1978 7:00:47.362	5302
IR4	5.26	180.82	Rg	7/27/1978 7:01:18.242	5310
IR1	5.44	178.86	Pn	7/27/1978 6:59:21.752	5303
IR1	5.44	178.86	Sn	7/27/1978 7:00:24.748	5298
IR1	5.44	178.86	Lg	7/27/1978 7:00:53.371	5299
IR1	5.44	178.86	Rg	7/27/1978 7:01:22.281	5307
IR3	5.50	181.89	Pn	7/27/1978 6:59:22.462	5305
IR3	5.50	181.89	Lg	7/27/1978 7:00:53.924	5301
IR3	5.50	181.89	Rg	7/27/1978 7:01:30.427	5309
IR2	5.69	180.73	Pn	7/27/1978 6:59:24.412	5304
IR2	5.69	180.73	Lg	7/27/1978 7:01:02.902	5300
IR2	5.69	180.73	Rg	7/27/1978 7:01:36.679	5308
MAIO	9.63	231.42	Pn	7/27/1978 7:00:20.474	7019

Segment ends 160 sec after Pn arrival at MAIO.

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978209 7/28/1978 2:42:36.820	31.25	49.80	54	F	4.3	70	20	u	223816	USGS/

sta	delta	seaz	phase	arrival time	arid
IR4	4.09	193.33	Pn	7/28/1978 2:43:38.310	5318
IR4	4.09	193.33	Pg	7/28/1978 2:43:50.742	5324
IR4	4.09	193.33	Lg	7/28/1978 2:44:47.290	5314
IR4	4.09	193.33	Rg	7/28/1978 2:45:16.949	5326
IR1	4.23	190.37	Pn	7/28/1978 2:43:40.505	5315
IR1	4.23	190.37	Pg	7/28/1978 2:43:53.775	5321
IR1	4.23	190.37	Sn	7/28/1978 2:44:30.326	5327
IR1	4.23	190.37	Lg	7/28/1978 2:44:53.446	5319
IR1	4.23	190.37	Rg	7/28/1978 2:45:22.331	5325
IR3	4.34	193.96	Pn	7/28/1978 2:43:41.967	5317
IR3	4.34	193.96	Pg	7/28/1978 2:43:58.330	5323
IR3	4.34	193.96	Lg	7/28/1978 2:44:59.632	5320
IR3	4.34	193.96	Rg	7/28/1978 2:45:25.698	5312
IR2	4.50	192.05	Pn	7/28/1978 2:43:43.788	5316
IR2	4.50	192.05	Pg	7/28/1978 2:44:00.605	5322
IR2	4.50	192.05	Lg	7/28/1978 2:44:57.498	5313
IR2	4.50	192.05	Rg	7/28/1978 2:45:31.430	5311
MAIO	9.50	240.72	Pn	7/28/1978 2:44:52.725	7020
MAIO	9.50	240.72	Lg	7/28/1978 2:47:31.389	7023
MAIO	9.50	240.72	Rg	7/28/1978 2:48:25.551	7021

Lg coda appears clipped on IR4/sz, and IR1 all components.
A second event records 6 min 29 sec after Pn arrival at MAIO.
This event part of Rodgers, Ni, Hearn dataset

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978209 7/28/1978 19:32:45.640	32.03	49.40	43	F	4.1	23	15	u	223844	USGS/

sta	delta	seaz	phase	arrival time	arid
IR4	3.44	201.71	Pn	7/28/1978 19:33:37.694	5339
IR4	3.44	201.71	Lg	7/28/1978 19:34:29.917	5335
IR4	3.44	201.71	Rg	7/28/1978 19:34:53.801	5331
IR1	3.55	197.93	Pn	7/28/1978 19:33:39.610	5336
IR1	3.55	197.93	Lg	7/28/1978 19:34:30.686	5332
IR1	3.55	197.93	Rg	7/28/1978 19:34:58.380	5328
IR3	3.70	201.86	Pn	7/28/1978 19:33:41.430	5338
IR3	3.70	201.86	Lg	7/28/1978 19:34:37.927	5334
IR3	3.70	201.86	Rg	7/28/1978 19:35:05.123	5330
IR2	3.84	199.33	Pn	7/28/1978 19:33:43.057	5337
IR2	3.84	199.33	Lg	7/28/1978 19:34:43.210	5333

IR2	3.84	199.33	Rg	7/28/1978 19:35:09.630	5329
MAIO	9.38	245.83	Pn	7/28/1978 19:34:52.538	7183
MAIO	9.38	245.83	Lg	7/28/1978 19:37:35.597	7025
MAIO	9.38	245.83	Rg	7/28/1978 19:38:24.211	7024

This event part of Rodgers, Ni, Hearn dataset

origin time				lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978209	7/28/1978	21:48:12.490		29.79	52.18	21	F	4.1	18	16	u	223848	USGS/

sta	delta	seaz	phase	arrival time	arid
IR4	5.55	168.45	Pn	7/28/1978 21:49:39.616	5347
IR4	5.55	168.45	Pg	7/28/1978 21:50:06.533	5349
IR4	5.55	168.45	Rg	7/28/1978 21:52:01.632	5343
IR1	5.76	167.00	Pn	7/28/1978 21:49:43.384	5344
IR1	5.76	167.00	Pg	7/28/1978 21:50:10.704	5350
IR1	5.76	167.00	Lg	7/28/1978 21:51:38.938	5348
IR1	5.76	167.00	Rg	7/28/1978 21:52:15.035	5340
IR3	5.77	169.96	Pn	7/28/1978 21:49:42.654	5346
IR3	5.77	169.96	Pg	7/28/1978 21:50:10.498	5351
IR3	5.77	169.96	Rg	7/28/1978 21:52:20.337	5342
IR2	5.97	169.24	Pn	7/28/1978 21:49:45.266	5345
IR2	5.97	169.24	Rg	7/28/1978 21:52:23.087	5341
MAIO	8.94	225.35	Pn	7/28/1978 21:50:24.301	7029
MAIO	8.94	225.35	Pg	7/28/1978 21:50:59.520	7188
MAIO	8.94	225.35	Lg	7/28/1978 21:53:04.944	7031
MAIO	8.94	225.35	Rg	7/28/1978 21:53:51.897	7027

This event part of Rodgers, Ni, Hearn dataset

origin time				lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978221	8/09/1978	19:32:21.920		29.61	52.30	23	F	4.1	16	21	u	224378	USGS/

sta	delta	seaz	phase	arrival time	arid
IR4	5.75	167.79	Pn	8/09/1978 19:33:47.256	5366
IR4	5.75	167.79	Pg	8/09/1978 19:34:07.083	5368
IR4	5.75	167.79	Lg	8/09/1978 19:35:36.558	5359
IR4	5.75	167.79	Rg	8/09/1978 19:36:08.016	5355
IR1	5.97	166.41	Pn	8/09/1978 19:33:50.361	5363
IR1	5.97	166.41	Sn	8/09/1978 19:34:59.984	5361
IR1	5.97	166.41	Lg	8/09/1978 19:35:41.783	5356
IR1	5.97	166.41	Rg	8/09/1978 19:36:15.545	5352
IR3	5.97	169.27	Pn	8/09/1978 19:33:50.135	5365
IR3	5.97	169.27	Lg	8/09/1978 19:35:42.288	5358
IR3	5.97	169.27	Rg	8/09/1978 19:36:13.165	5354
IR2	6.17	168.59	Pn	8/09/1978 19:33:52.279	5364
IR2	6.17	168.59	Lg	8/09/1978 19:35:50.654	5357
IR2	6.17	168.59	Rg	8/09/1978 19:36:18.345	5353
IR7	6.26	166.40	Pn	8/09/1978 19:33:53.631	5367
IR7	6.26	166.40	Pg	8/09/1978 19:34:16.320	5369
IR7	6.26	166.40	Sn	8/09/1978 19:35:04.722	5362
IR7	6.26	166.40	Lg	8/09/1978 19:35:47.165	5360
IR7	6.26	166.40	Rg	8/09/1978 19:36:21.138	5370
MAIO	9.01	224.07	Pn	8/09/1978 19:34:35.118	7033
MAIO	9.01	224.07	Rg	8/09/1978 19:37:57.298	7030

origin time				lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978222	8/10/1978	19:50:26.540		34.20	47.92	47	F	4.2	23	13	u	224417	USGS/

sta	delta	seaz	phase	arrival time	arid

IR1	2.58	242.73	Pn	8/10/1978 19:51:04.619	5378
IR1	2.58	242.73	Lg	8/10/1978 19:51:39.044	5374
IR1	2.58	242.73	Rg	8/10/1978 19:51:52.486	5371
IR4	2.66	247.96	Pn	8/10/1978 19:51:05.769	5381
IR4	2.66	247.96	Lg	8/10/1978 19:51:41.497	5377
IR4	2.66	247.96	Rg	8/10/1978 19:51:55.997	5373
IR2	2.85	240.01	Pn	8/10/1978 19:51:08.560	5379
IR2	2.85	240.01	Lg	8/10/1978 19:51:44.088	5375
IR3	2.85	244.36	Pn	8/10/1978 19:51:09.482	5380
IR3	2.85	244.36	Lg	8/10/1978 19:51:46.957	5376
IR3	2.85	244.36	Rg	8/10/1978 19:51:59.947	5372
MAIO	9.68	260.89	Pn	8/10/1978 19:52:46.220	7034
MAIO	9.68	260.89	Rg	8/10/1978 19:56:19.213	7036

Possible mixed codas event - Pn and Rg only read.
This event part of Rodgers, Ni, Hearn dataset

origin time											
1978223	8/11/1978 17:24:26.400	31.77	50.99	72	F	4.3	10	16	u	224452	USGS/

sta	delta	seaz	phase	arrival time	arid
IR4	3.47	178.72	Pn	8/11/1978 17:25:18.234	5396
IR4	3.47	178.72	Lg	8/11/1978 17:26:13.511	5391
IR4	3.47	178.72	Rg	8/11/1978 17:26:37.939	5386
IR1	3.65	175.95	Pn	8/11/1978 17:25:21.091	5393
IR1	3.65	175.95	Lg	8/11/1978 17:26:24.341	5388
IR1	3.65	175.95	Rg	8/11/1978 17:26:43.148	5383
IR3	3.71	180.42	Pn	8/11/1978 17:25:21.894	5395
IR3	3.71	180.42	Lg	8/11/1978 17:26:28.318	5390
IR3	3.71	180.42	Rg	8/11/1978 17:26:51.826	5385
IR2	3.89	178.82	Pn	8/11/1978 17:25:23.931	5394
IR2	3.89	178.82	Lg	8/11/1978 17:26:35.353	5389
IR2	3.89	178.82	Rg	8/11/1978 17:26:59.163	5384
IR7	3.94	175.26	Pn	8/11/1978 17:25:24.734	5397
IR7	3.94	175.26	Sn	8/11/1978 17:26:11.052	5382
IR7	3.94	175.26	Lg	8/11/1978 17:26:33.293	5392
IR7	3.94	175.26	Rg	8/11/1978 17:26:56.672	5387

origin time											
1978238	8/26/1978 16:23:39.740	29.82	51.77	55	F	4.6	14	13	u	225112	USGS/

sta	delta	seaz	phase	arrival time	arid
IR4	5.47	172.09	Pn	8/26/1978 16:25:00.234	5404
IR4	5.47	172.09	Lg	8/26/1978 16:26:38.355	5400
IR1	5.67	170.48	Pn	8/26/1978 16:24:59.430	5401
IR1	5.67	170.48	Lg	8/26/1978 16:26:50.524	5406
IR3	5.70	173.48	Pn	8/26/1978 16:25:02.659	5403
IR3	5.70	173.48	Lg	8/26/1978 16:26:47.715	5399
IR2	5.89	172.62	Pn	8/26/1978 16:25:04.450	5402
IR2	5.89	172.62	Lg	8/26/1978 16:26:47.362	5398
IR7	5.97	170.28	Pn	8/26/1978 16:25:06.165	5405
IR7	5.97	170.28	Rg	8/26/1978 16:27:27.087	5407
MAIO	9.16	227.14	Pn	8/26/1978 16:25:52.893	7037
MAIO	9.16	227.14	Lg	8/26/1978 16:28:23.355	7038
MAIO	9.16	227.14	Rg	8/26/1978 16:29:12.133	7039

origin time											
1978240	8/28/1978 0:07:03.580	32.62	49.77	44	F	5.2	212	13	u	225167	USGS/

sta	delta	seaz	phase	arrival time	arid
IR1	2.90	195.50	Pn	8/28/1978 0:07:50.106	5408
IR1	2.90	195.50	Lg	8/28/1978 0:08:36.185	5413
IR1	2.90	195.50	Rg	8/28/1978 0:08:55.766	5415
IR3	3.04	200.35	Pn	8/28/1978 0:07:51.879	5410
IR3	3.04	200.35	Lg	8/28/1978 0:08:38.135	5414
IR7	3.16	192.93	Pn	8/28/1978 0:07:53.460	5411
IR7	3.16	192.93	Lg	8/28/1978 0:08:40.434	5412
IR2	3.18	197.38	Pn	8/28/1978 0:07:53.536	5409
IR2	3.18	197.38	Rg	8/28/1978 0:09:03.756	5416
MAIO	8.82	248.17	Pn	8/28/1978 0:09:10.617	7042
MAIO	8.82	248.17	Pg	8/28/1978 0:09:44.424	7184
MAIO	8.82	248.17	Lg	8/28/1978 0:11:45.202	7041
MAIO	8.82	248.17	Rg	8/28/1978 0:12:33.270	7040

Event signal is clipped at ILPA
This event part of Rodgers, Ni, Hearn dataset

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978241 8/29/1978 14:11:05.670	29.66	51.59	40	F	4.9	160	24	u	225219	USGS/

sta	delta	seaz	phase	arrival time	arid
IR4	5.61	173.90	Pn	8/29/1978 14:12:29.109	5433
IR4	5.61	173.90	Pg	8/29/1978 14:12:47.797	5428
IR4	5.61	173.90	Lg	8/29/1978 14:14:14.495	5424
IR4	5.61	173.90	Rg	8/29/1978 14:14:50.626	5435
IR1	5.81	172.27	Pn	8/29/1978 14:12:32.462	5430
IR1	5.81	172.27	Sn	8/29/1978 14:13:39.968	5426
IR1	5.81	172.27	Lg	8/29/1978 14:14:21.834	5421
IR1	5.81	172.27	Rg	8/29/1978 14:14:54.839	5417
IR3	5.84	175.19	Pn	8/29/1978 14:12:32.303	5432
IR3	5.84	175.19	Lg	8/29/1978 14:14:23.359	5423
IR3	5.84	175.19	Rg	8/29/1978 14:14:54.845	5419
IR2	6.03	174.30	Pn	8/29/1978 14:12:35.092	5431
IR2	6.03	174.30	Pg	8/29/1978 14:12:57.221	5427
IR2	6.03	174.30	Lg	8/29/1978 14:14:27.883	5422
IR2	6.03	174.30	Rg	8/29/1978 14:15:02.428	5418
IR7	6.10	171.99	Pn	8/29/1978 14:12:36.369	5434
IR7	6.10	171.99	Pg	8/29/1978 14:12:58.319	5429
IR7	6.10	171.99	Lg	8/29/1978 14:14:29.583	5425
IR7	6.10	171.99	Rg	8/29/1978 14:15:08.673	5420
MAIO	9.38	227.18	Pn	8/29/1978 14:13:21.653	7043
MAIO	9.38	227.18	Pg	8/29/1978 14:14:04.413	7185
MAIO	9.38	227.18	S	8/29/1978 14:15:07.202	7186
MAIO	9.38	227.18	Lg	8/29/1978 14:16:13.284	7045
MAIO	9.38	227.18	Rg	8/29/1978 14:16:43.130	7044

This event part of Rodgers, Ni, Hearn dataset

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978243 8/31/1978 20:24:04.530	29.41	51.53	34	F	4.5	73	17	u	225324	USGS/

sta	delta	seaz	phase	arrival time	arid
IR3	6.08	175.83	Pn	8/31/1978 20:25:32.735	5444
IR3	6.08	175.83	Pg	8/31/1978 20:25:54.721	5447
IR3	6.08	175.83	Lg	8/31/1978 20:27:24.391	5441
IR3	6.08	175.83	Rg	8/31/1978 20:27:58.137	5437
IR2	6.27	174.95	Pn	8/31/1978 20:25:35.435	5443
IR2	6.27	174.95	Pg	8/31/1978 20:26:00.184	5446
IR2	6.27	174.95	Lg	8/31/1978 20:27:22.042	5440
IR2	6.27	174.95	Rg	8/31/1978 20:28:05.521	5436

	IR7	6.34	172.71	Pn	8/31/1978 20:25:36.923							5445
	IR7	6.34	172.71	Pg	8/31/1978 20:26:01.437							5448
	IR7	6.34	172.71	Sn	8/31/1978 20:26:48.243							5439
	IR7	6.34	172.71	Lg	8/31/1978 20:27:22.278							5442
	IR7	6.34	172.71	Rg	8/31/1978 20:28:11.886							5438
	MAIO	9.60	226.39	Pn	8/31/1978 20:26:22.316							7048
	MAIO	9.60	226.39	Pg	8/31/1978 20:26:54.448							7187
	MAIO	9.60	226.39	Lg	8/31/1978 20:28:58.024							7046
	MAIO	9.60	226.39	Rg	8/31/1978 20:29:45.457							7047

This event part of Rodgers, Ni, Hearn dataset

origin time												
1978251	9/08/1978 12:12:01.570				29.02	51.44	33	A	4.1	11	10	u 225713 USGS/

	sta	delta	seaz	phase	arrival time	arid
	IR4	6.23	175.65	Pn	9/08/1978 12:13:29.378	5456
	IR4	6.23	175.65	Lg	9/08/1978 12:15:19.337	5453
	IR4	6.23	175.65	Rg	9/08/1978 12:15:45.626	5450
	IR3	6.46	176.76	Pn	9/08/1978 12:13:32.932	5455
	IR3	6.46	176.76	Lg	9/08/1978 12:15:25.700	5452
	IR3	6.46	176.76	Rg	9/08/1978 12:15:53.793	5449
	IR7	6.72	173.77	Pn	9/08/1978 12:13:37.091	5457
	IR7	6.72	173.77	Lg	9/08/1978 12:15:28.623	5454
	IR7	6.72	173.77	Rg	9/08/1978 12:16:03.865	5451
	MAIO	9.94	225.22	Pn	9/08/1978 12:14:23.352	7049

Segment ends 2 min 52 sec after Pn arrival at MAIO.

origin time												
1978257	9/14/1978 14:42:29.880				32.19	49.34	33	A	4.4	17	6	u 225976 USGS/

	sta	delta	seaz	phase	arrival time	arid
	IR4	3.31	203.50	Pn	9/14/1978 14:43:22.133	5463
	IR4	3.31	203.50	Lg	9/14/1978 14:44:20.064	5461
	IR4	3.31	203.50	Rg	9/14/1978 14:44:40.380	5459
	IR3	3.57	203.52	Pn	9/14/1978 14:43:25.821	5462
	IR3	3.57	203.52	Lg	9/14/1978 14:44:30.480	5460
	IR3	3.57	203.52	Rg	9/14/1978 14:44:51.028	5458

This event part of Rodgers, Ni, Hearn dataset

origin time												
1978258	9/15/1978 11:11:24.860				33.15	46.23	33	A	-9.0	9	18	u 226015 USGS/

	sta	delta	seaz	phase	arrival time	arid
	IR1	4.32	239.62	Pn	9/15/1978 11:12:27.342	5474
	IR1	4.32	239.62	Pg	9/15/1978 11:12:42.703	5473
	IR1	4.32	239.62	Sn	9/15/1978 11:13:19.442	5481
	IR1	4.32	239.62	Lg	9/15/1978 11:13:45.146	5469
	IR1	4.32	239.62	Rg	9/15/1978 11:14:07.973	5464
	IR4	4.39	242.88	Pn	9/15/1978 11:12:28.168	5477
	IR4	4.39	242.88	Pg	9/15/1978 11:12:43.978	5479
	IR4	4.39	242.88	Rg	9/15/1978 11:14:12.912	5467
	IR7	4.42	235.95	Pn	9/15/1978 11:12:28.125	5478
	IR7	4.42	235.95	Lg	9/15/1978 11:13:47.577	5472
	IR7	4.42	235.95	Rg	9/15/1978 11:14:05.803	5468
	IR3	4.59	240.89	Pn	9/15/1978 11:12:30.489	5476
	IR3	4.59	240.89	Pg	9/15/1978 11:12:48.776	5480
	IR3	4.59	240.89	Lg	9/15/1978 11:13:51.017	5471
	IR3	4.59	240.89	Rg	9/15/1978 11:14:18.643	5466

IR2	4.59	238.16	Pn	9/15/1978	11:12:30.166						5475	
IR2	4.59	238.16	Lg	9/15/1978	11:13:49.991						5470	
IR2	4.59	238.16	Rg	9/15/1978	11:14:14.507						5465	

origin time		lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978263	9/20/1978 7:55:08.710	31.09	49.36	33	A	4.5	22	14	u	226233	USGS/

sta	delta	seaz	phase	arrival time		arid
IR4	4.34	197.71	Pn	9/20/1978	7:56:23.063	5485
IR4	4.34	197.71	Lg	9/20/1978	7:57:19.330	5494
IR4	4.34	197.71	Rg	9/20/1978	7:57:50.836	5488
IR1	4.46	194.78	Pn	9/20/1978	7:56:23.246	5482
IR1	4.46	194.78	Sn	9/20/1978	7:57:07.544	5489
IR1	4.46	194.78	Lg	9/20/1978	7:57:23.632	5491
IR3	4.60	198.06	Pn	9/20/1978	7:56:26.338	5484
IR3	4.60	198.06	Lg	9/20/1978	7:57:33.261	5493
IR3	4.60	198.06	Rg	9/20/1978	7:58:02.680	5487
IR7	4.73	193.09	Pn	9/20/1978	7:56:24.864	5486
IR7	4.73	193.09	Sn	9/20/1978	7:57:11.841	5490
IR7	4.73	193.09	Lg	9/20/1978	7:57:26.398	5495
IR2	4.75	196.12	Pn	9/20/1978	7:56:26.920	5483
IR2	4.75	196.12	Lg	9/20/1978	7:57:27.753	5492

This event appears to be recording on the coda of some previous event at both ILPA and MAIO. At MAIO. observed arrivals could not be definitively assigned to this event.

origin time		lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978282	10/09/1978 16:25:04.300	32.53	49.95	48	F	4.7	80	12	u	227123	USGS/

sta	delta	seaz	phase	arrival time	arid
IR4	2.82	196.44	Pn	10/09/1978 16:26:48.142	5499
IR4	2.82	196.44	Lg	10/09/1978 16:27:27.643	5502
IR4	2.82	196.44	Rg	10/09/1978 16:27:51.210	5505
IR1	2.95	192.12	Pn	10/09/1978 16:26:50.219	5496
IR1	2.95	192.12	Lg	10/09/1978 16:27:32.245	5500
IR3	3.08	197.04	Pn	10/09/1978 16:26:51.827	5498
IR3	3.08	197.04	Lg	10/09/1978 16:27:35.759	5501
IR3	3.08	197.04	Rg	10/09/1978 16:27:59.764	5504
IR2	3.23	194.26	Pn	10/09/1978 16:26:53.496	5497
MAIO	8.72	247.15	Pn	10/09/1978 16:27:09.031	7052
MAIO	8.72	247.15	Lg	10/09/1978 16:29:43.726	7051
MAIO	8.72	247.15	Rg	10/09/1978 16:30:31.210	7050

Event has about 1 min late timing error at ILPA but not at MAIO.

origin time		lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978290	10/17/1978 22:04:05.630	30.75	52.14	29	A	-9.0	5	11	u	227469	USGS/

sta	delta	seaz	phase	arrival time	arid
IR4	4.61	166.62	Pn	10/17/1978 22:05:14.325	5509
IR4	4.61	166.62	Lg	10/17/1978 22:06:12.003	5512
IR3	4.82	168.49	Pn	10/17/1978 22:05:18.115	5508
IR3	4.82	168.49	Lg	10/17/1978 22:06:13.862	5513
IR3	4.82	168.49	Rg	10/17/1978 22:06:39.817	5516
IR1	4.82	164.99	Pn	10/17/1978 22:05:16.929	5506
IR1	4.82	164.99	Lg	10/17/1978 22:06:12.070	5510
IR1	4.82	164.99	Rg	10/17/1978 22:06:35.944	5514

IR2	5.02	167.70	Pn	10/17/1978	22:05:19.827							5507
IR2	5.02	167.70	Lg	10/17/1978	22:06:20.645							5511
IR2	5.02	167.70	Rg	10/17/1978	22:06:47.253							5515

Event is probably mis-located. The Lg-Pn times
would place it about 1 degree closer to the network than
the location given in the ISC/USGS listing. However, the predicted
Pn arrivals fall very close to the true phase onsets.

origin time			lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978334	11/30/1978	14:05:08.890	34.34	47.93	33	A	-9.0	4	8	u	229421	USGS/

sta	delta	seaz	phase	arrival time							arid
IR1	2.51	245.43	Pn	11/30/1978	14:05:45.803						5522
IR1	2.51	245.43	Lg	11/30/1978	14:06:38.888						5519
IR1	2.51	245.43	Rg	11/30/1978	14:06:57.085						5517
IR7	2.58	238.99	Pn	11/30/1978	14:05:51.484						5524
IR7	2.58	238.99	Lg	11/30/1978	14:06:45.856						5521
IR7	2.58	238.99	Rg	11/30/1978	14:07:00.196						5518
IR2	2.77	242.36	Pn	11/30/1978	14:05:52.155						5523
IR2	2.77	242.36	Lg	11/30/1978	14:06:49.235						5520

origin time			lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978334	11/30/1978	20:59:34.710	30.58	50.70	33	A	4.4	8	10	u	229436	USGS/

sta	delta	seaz	phase	arrival time							arid
IR1	4.83	179.86	Pn	11/30/1978	21:00:47.931						5532
IR1	4.83	179.86	Sn	11/30/1978	21:01:51.720						5531
IR1	4.83	179.86	Lg	11/30/1978	21:02:21.073						5528
IR1	4.83	179.86	Rg	11/30/1978	21:02:34.581						5525
IR2	5.08	181.90	Pn	11/30/1978	21:00:50.853						5533
IR2	5.08	181.90	Lg	11/30/1978	21:02:24.690						5529
IR2	5.08	181.90	Rg	11/30/1978	21:02:47.001						5526
IR7	5.12	179.10	Pn	11/30/1978	21:00:51.374						5534
IR7	5.12	179.10	Lg	11/30/1978	21:02:26.925						5530
IR7	5.12	179.10	Rg	11/30/1978	21:02:46.544						5527

This event part of Rodgers, Ni, Hearn dataset

origin time			lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978348	12/14/1978	7:05:21.790	32.14	49.64	40	F	5.6	318	4	u	230196	USGS/

sta	delta	seaz	phase	arrival time							arid
IR1	3.39	195.22	Pn	12/14/1978	7:06:14.903						5537
IR1	3.39	195.22	Rg	12/14/1978	7:07:33.036						5535
IR7	3.65	193.01	Pn	12/14/1978	7:06:18.147						5538
IR7	3.65	193.01	Rg	12/14/1978	7:07:40.168						5536

Event signal is clipped.

origin time			lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978348	12/14/1978	7:54:45.250	32.02	49.55	46	F	5.1	17	7	u	230200	USGS/

sta	delta	seaz	phase	arrival time							arid
IR1	3.53	195.89	Pn	12/14/1978	7:55:38.544						5542
IR1	3.53	195.89	Sn	12/14/1978	7:56:17.952						5544
IR1	3.53	195.89	Lg	12/14/1978	7:56:35.877						5539
IR1	3.53	195.89	Rg	12/14/1978	7:56:47.877						5545
IR7	3.79	193.72	Pn	12/14/1978	7:55:41.559						5543
IR7	3.79	193.72	Sn	12/14/1978	7:56:27.015						5541

IR7 3.79 193.72 Lg 12/14/1978 7:56:44.429 5540

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978348 12/14/1978 12:52:08.030	32.69	50.19	0	A	4.3	4	3	u	230212	USGS/

sta	delta	seaz	phase	arrival time	arid
IR1	2.76	188.83	Pn	12/14/1978 12:52:56.585	5546
IR2	3.03	191.41	Pn	12/14/1978 12:52:59.463	5547
IR7	3.03	186.75	Pn	12/14/1978 12:52:59.882	5548

A second larger event records about 52s after Pn arrivals
and is mixed with the coda of possible later arriving
phases. A third event records about 3 mins later.

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978348 12/14/1978 15:42:54.320	32.14	49.54	46	F	4.7	45	9	u	230217	USGS/

sta	delta	seaz	phase	arrival time	arid
IR1	3.42	196.58	Pn	12/14/1978 15:43:46.895	5554
IR1	3.42	196.58	Lg	12/14/1978 15:44:37.006	5551
IR1	3.42	196.58	Rg	12/14/1978 15:45:13.358	5557
IR7	3.68	194.29	Pn	12/14/1978 15:43:49.859	5556
IR7	3.68	194.29	Lg	12/14/1978 15:44:50.289	5553
IR7	3.68	194.29	Rg	12/14/1978 15:45:18.937	5550
IR2	3.70	198.13	Pn	12/14/1978 15:43:50.289	5555
IR2	3.70	198.13	Lg	12/14/1978 15:44:52.071	5552
IR2	3.70	198.13	Rg	12/14/1978 15:45:24.361	5549

Lg coda appears clipped on all components of IR1.
Pn arrivals appear to be OK.
This event part of Rodgers, Ni, Hearn dataset

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978354 12/20/1978 14:56:44.570	32.45	49.69	33	A	3.6	8	8	u	230466	USGS/

sta	delta	seaz	phase	arrival time	arid
IR1	3.08	195.93	Pn	12/20/1978 14:57:32.760	5563
IR1	3.08	195.93	Lg	12/20/1978 14:58:22.609	5561
IR1	3.08	195.93	Rg	12/20/1978 14:58:53.146	5558
IR7	3.34	193.47	Pn	12/20/1978 14:57:35.935	5564
IR7	3.34	193.47	Lg	12/20/1978 14:58:36.609	5562
IR7	3.34	193.47	Rg	12/20/1978 14:58:59.111	5560
IR2	3.37	197.68	Pn	12/20/1978 14:57:36.104	5565
IR2	3.37	197.68	Rg	12/20/1978 14:59:00.830	5559

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978356 12/22/1978 23:26:05.110	32.45	49.48	33	A	4.4	4	5	u	230558	USGS/

sta	delta	seaz	phase	arrival time	arid
IR1	3.13	199.10	Pn	12/22/1978 23:26:53.754	5569
IR1	3.13	199.10	Lg	12/22/1978 23:27:42.701	5567
IR7	3.38	196.43	Pn	12/22/1978 23:26:56.299	5570
IR7	3.38	196.43	Lg	12/22/1978 23:27:48.932	5568
IR7	3.38	196.43	Rg	12/22/1978 23:28:18.874	5566

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978359 12/25/1978 11:08:43.010	32.27	50.01	33	A	4.3	9	3	u	230692	USGS/

sta	delta	seaz	phase	arrival time	arid
IR7	3.47	188.41	Pn	12/25/1978 11:09:40.849	5574
IR7	3.47	188.41	Lg	12/25/1978 11:10:40.690	5573
IR7	3.47	188.41	Rg	12/25/1978 11:11:04.287	5572

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978362 12/28/1978 22:45:00.480	32.10	49.64	47	F	4.4	10	3	u	230882	USGS/

sta	delta	seaz	phase	arrival time	arid
IR7	3.69	192.84	Pn	12/28/1978 22:45:57.298	5577
IR7	3.69	192.84	Lg	12/28/1978 22:46:58.939	5576
IR7	3.69	192.84	Rg	12/28/1978 22:47:17.224	5575

This event part of Rodgers, Ni, Hearn dataset

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1979135 5/15/1979 0:29:06.560	28.43	51.36	33	A	4.4	8	3	u	237452	USGS/

sta	delta	seaz	phase	arrival time	arid
IR1	7.00	175.18	Pn	5/15/1979 0:30:51.998	5578
IR3	7.05	177.62	Pn	5/15/1979 0:30:48.367	5579
IR7	7.29	174.82	Pn	5/15/1979 0:30:51.379	5580

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1979136 5/16/1979 22:20:25.060	32.64	47.77	33	A	4.4	13	9	u	237543	USGS/

sta	delta	seaz	phase	arrival time	arid
IR1	3.68	221.86	Pn	5/16/1979 22:21:21.172	5587
IR1	3.68	221.86	Sn	5/16/1979 22:22:04.537	5586
IR1	3.68	221.86	Lg	5/16/1979 22:22:20.856	5584
IR1	3.68	221.86	Rg	5/16/1979 22:22:44.397	5581
IR7	3.86	218.26	Pn	5/16/1979 22:21:22.795	5589
IR7	3.86	218.26	Lg	5/16/1979 22:22:26.095	5585
IR7	3.86	218.26	Rg	5/16/1979 22:22:50.016	5583
IR3	3.91	224.44	Pn	5/16/1979 22:21:23.882	5588
IR3	3.91	224.44	Rg	5/16/1979 22:23:03.392	5582

This event part of Rodgers, Ni, Hearn dataset

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1979146 5/26/1979 7:03:56.170	29.73	50.34	47	F	4.3	25	6	u	238035	USGS/

sta	delta	seaz	phase	arrival time	arid
IR4	5.53	185.03	Pn	5/26/1979 7:05:17.440	5591
IR4	5.53	185.03	Lg	5/26/1979 7:07:06.076	5594
IR3	5.77	185.88	Pn	5/26/1979 7:05:22.164	5590
IR3	5.77	185.88	Lg	5/26/1979 7:07:10.697	5593
IR7	5.98	182.21	Pn	5/26/1979 7:05:23.111	5592
IR7	5.98	182.21	Lg	5/26/1979 7:07:14.006	5595

Event coda is truncated about 1 min after Lg.
This event part of Rodgers, Ni, Hearn dataset

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1979153 6/02/1979 1:34:34.320	32.62	49.70	38	F	4.6	12	4	u	238399	USGS/

sta	delta	seaz	phase	arrival time	arid
IR4	2.80	201.21	Pn	6/02/1979 1:35:17.770	5598
IR4	2.80	201.21	Lg	6/02/1979 1:36:00.033	5596

IR7	3.17	194.00	Pn	6/02/1979	1:35:22.945	5599					
IR7	3.17	194.00	Lg	6/02/1979	1:36:12.539	5597					

This event part of Rodgers, Ni, Hearn dataset

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1979177 6/26/1979 15:54:15.020	30.86	49.57	33	A	4.3	17	0	u	239821	USGS/

No signal observed at any of the stations.

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1979177 6/26/1979 16:14:28.260	30.69	49.88	33	A	4.5	12	0	u	239822	USGS/

Event is probably mis-located. Not enough background segment prior to Pn arrival to add arrivals.

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1979182 7/01/1979 9:37:31.770	34.83	46.17	50	F	4.7	106	0	u	240053	USGS/

No signal was observed for this event. It is listed in the ISC/USGS bulletin with an Mb=4.7. Incorrect OT listed? Incorrect location?.

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1979227 8/15/1979 23:10:05.210	30.50	50.66	33	A	4.3	10	13	u	242294	USGS/

sta	delta	seaz	phase	arrival time	arid
IR4	4.74	182.49	Pn	8/15/1979 23:11:16.820	5611
IR4	4.74	182.49	Lg	8/15/1979 23:12:38.110	5607
IR4	4.74	182.49	Rg	8/15/1979 23:13:09.175	5602
IR1	4.92	180.27	Pn	8/15/1979 23:11:19.644	5609
IR1	4.92	180.27	Sn	8/15/1979 23:12:11.843	5604
IR1	4.92	180.27	Lg	8/15/1979 23:12:46.549	5605
IR1	4.92	180.27	Rg	8/15/1979 23:13:10.626	5600
IR3	4.98	183.59	Pn	8/15/1979 23:11:20.515	5610
IR3	4.98	183.59	Lg	8/15/1979 23:12:46.938	5606
IR3	4.98	183.59	Rg	8/15/1979 23:13:16.071	5601
IR7	5.20	179.50	Pn	8/15/1979 23:11:22.961	5612
IR7	5.20	179.50	Lg	8/15/1979 23:12:52.401	5608
IR7	5.20	179.50	Rg	8/15/1979 23:13:23.657	5603

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1979231 8/19/1979 12:14:01.810	31.24	50.21	86	F	4.4	10	12	u	242489	USGS/

sta	delta	seaz	phase	arrival time	arid
IR4	4.04	188.43	Pn	8/19/1979 12:14:54.641	5619
IR4	4.04	188.43	Lg	8/19/1979 12:15:59.813	5615
IR4	4.04	188.43	Rg	8/19/1979 12:16:19.959	5623
IR1	4.19	185.62	Pn	8/19/1979 12:14:57.250	5617
IR1	4.19	185.62	Lg	8/19/1979 12:16:05.892	5613
IR1	4.19	185.62	Rg	8/19/1979 12:16:23.704	5621
IR3	4.29	189.36	Pn	8/19/1979 12:14:58.158	5618
IR3	4.29	189.36	Lg	8/19/1979 12:16:11.477	5614
IR3	4.29	189.36	Rg	8/19/1979 12:16:31.213	5622
IR7	4.47	184.39	Pn	8/19/1979 12:15:00.658	5620
IR7	4.47	184.39	Lg	8/19/1979 12:16:12.141	5616
IR7	4.47	184.39	Rg	8/19/1979 12:16:37.762	5624

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth

1979231 8/19/1979 12:23:18.470 30.40 50.98 54 F 4.8 86 17 u 242490 USGS/

sta	delta	seaz	phase	arrival time	arid
IR4	4.84	179.20	Pn	8/19/1979 12:24:28.168	5636
IR4	4.84	179.20	Pg	8/19/1979 12:24:44.007	5640
IR4	4.84	179.20	Lg	8/19/1979 12:25:52.975	5632
IR4	4.84	179.20	Rg	8/19/1979 12:26:18.195	5627
IR1	5.02	177.14	Pn	8/19/1979 12:24:31.054	5634
IR1	5.02	177.14	Pg	8/19/1979 12:24:47.505	5638
IR1	5.02	177.14	Sn	8/19/1979 12:25:27.195	5629
IR1	5.02	177.14	Lg	8/19/1979 12:25:56.462	5631
IR1	5.02	177.14	Rg	8/19/1979 12:26:24.507	5625
IR3	5.07	180.44	Pn	8/19/1979 12:24:31.622	5635
IR3	5.07	180.44	Pg	8/19/1979 12:24:48.451	5639
IR3	5.07	180.44	Rg	8/19/1979 12:26:24.507	5626
IR7	5.31	176.55	Pn	8/19/1979 12:24:34.582	5637
IR7	5.31	176.55	Pg	8/19/1979 12:24:51.505	5641
IR7	5.31	176.55	Sn	8/19/1979 12:25:31.853	5630
IR7	5.31	176.55	Lg	8/19/1979 12:26:00.791	5633
IR7	5.31	176.55	Rg	8/19/1979 12:26:34.326	5628

This event part of Rodgers, Ni, Hearn dataset

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1979267 9/24/1979 20:33:02.000	31.66	51.60	33	A	4.0	7	12	u	244251	USGS/

sta	delta	seaz	phase	arrival time	arid
IR4	3.63	170.50	Pn	9/24/1979 20:33:52.389	5648
IR4	3.63	170.50	Lg	9/24/1979 20:34:56.109	5644
IR4	3.63	170.50	Rg	9/24/1979 20:35:23.710	5652
IR1	3.83	168.26	Pn	9/24/1979 20:33:55.956	5646
IR1	3.83	168.26	Lg	9/24/1979 20:35:04.524	5642
IR1	3.83	168.26	Rg	9/24/1979 20:35:28.711	5650
IR3	3.85	172.62	Pn	9/24/1979 20:33:55.887	5647
IR3	3.85	172.62	Lg	9/24/1979 20:35:07.765	5643
IR3	3.85	172.62	Rg	9/24/1979 20:35:30.301	5651
IR7	4.13	168.15	Pn	9/24/1979 20:33:58.932	5649
IR7	4.13	168.15	Lg	9/24/1979 20:35:12.785	5645
IR7	4.13	168.15	Rg	9/24/1979 20:35:32.853	5653

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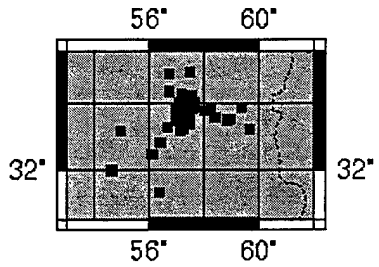
REGION 5

GTDB: ILPA Dataset Region 5

Eastern Iran. This is our smallest geographic region because event locations are tightly clustered. Even so, recordings for the same event at the various stations can appear quite different from each other (e.g. Lg/Pn ratios, complexity of P codas). Recordings also vary between events.

Four of these events are aftershocks of the Ms 7.4 Tabas-e-Golshan earthquake of 9/16/1978.

Based on USGS/ISC locations, distances to ILPA are between 4 and 8 degrees.



About this Page | Waveform QC Plot | Sample Event Plot: 238094 | Event List

GTDB: ILPA Dataset: Bulletin: Region 5

origin time		lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978208	7/27/1978 19:41:16.780	32.49	56.13	33	A	-9.0	6	13	u	223801	USGS/

sta	delta	seaz	phase	arrival time	arid
MAIO	4.71	216.98	Pn	7/27/1978 19:42:29.629	7108
MAIO	4.71	216.98	Sn	7/27/1978 19:43:28.571	7110
MAIO	4.71	216.98	Lg	7/27/1978 19:43:57.800	7109
IR4	5.14	120.87	Pn	7/27/1978 19:42:33.827	5677
IR4	5.14	120.87	Pg	7/27/1978 19:42:53.981	5679
IR4	5.14	120.87	Lg	7/27/1978 19:44:11.111	5673
IR3	5.18	123.76	Pn	7/27/1978 19:42:35.073	5676
IR3	5.18	123.76	Pg	7/27/1978 19:42:57.638	5678
IR3	5.18	123.76	Lg	7/27/1978 19:44:12.734	5672
IR2	5.38	124.73	Pn	7/27/1978 19:42:37.027	5675
IR2	5.38	124.73	Lg	7/27/1978 19:44:14.055	5671
IR1	5.38	121.43	Pn	7/27/1978 19:42:37.028	5674
IR1	5.38	121.43	Lg	7/27/1978 19:44:18.250	5670

origin time		lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978217	8/05/1978 4:01:38.230	33.22	59.63	33	A	-9.0	6	15	u	224194	USGS/

sta	delta	seaz	phase	arrival time	arid
MAIO	3.08	177.92	Pn	8/05/1978 4:02:28.845	7111
MAIO	3.08	177.92	Pg	8/05/1978 4:02:40.524	7190
MAIO	3.08	177.92	Lg	8/05/1978 4:03:27.300	7112
MAIO	3.08	177.92	Rg	8/05/1978 4:03:42.099	7191
IR3	7.45	105.15	Pn	8/05/1978 4:03:27.346	6078
IR3	7.45	105.15	Rg	8/05/1978 4:06:23.883	6071
IR2	7.60	106.23	Pn	8/05/1978 4:03:21.488	6077
IR2	7.60	106.23	Lg	8/05/1978 4:05:47.010	6074
IR2	7.60	106.23	Rg	8/05/1978 4:06:14.291	6080
IR1	7.70	104.00	Pn	8/05/1978 4:03:25.674	6076

IR1	7.70	104.00	Lg	8/05/1978	4:05:46.387	6073
IR1	7.70	104.00	Rg	8/05/1978	4:06:17.092	6070
IR7	7.84	105.86	Pn	8/05/1978	4:03:23.815	6079
IR7	7.84	105.86	Lg	8/05/1978	4:05:46.314	6075
IR7	7.84	105.86	Rg	8/05/1978	4:06:23.883	6072

This is a small event with several Pn arrivals emergent from noise at ILPA. This location is probably not well constrained. The predicted Pn arrivals were off from true arrival times by as much as ~+7s at a couple of ILPA stations.
Possible mixed coda event at MAIO - Pn and Rg only were read.

origin	time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978218	8/06/1978 23:21:44.300	32.80	56.39	33	A	-9.0	9	20	u	224263	USGS/

sta	delta	seaz	phase	arrival time	arid
MAIO	4.34	217.05	Pn	8/06/1978 23:22:50.168	7113
MAIO	4.34	217.05	Pg	8/06/1978 23:23:06.747	7114
MAIO	4.34	217.05	Sn	8/06/1978 23:23:46.515	7116
MAIO	4.34	217.05	Lg	8/06/1978 23:24:11.467	7115
MAIO	4.34	217.05	Rg	8/06/1978 23:24:29.157	7117
IR4	5.16	116.69	Pn	8/06/1978 23:23:00.050	6083
IR4	5.16	116.69	Pg	8/06/1978 23:23:19.646	6087
IR4	5.16	116.69	Lg	8/06/1978 23:24:47.404	6090
IR4	5.16	116.69	Rg	8/06/1978 23:25:15.706	6094
IR3	5.18	119.60	Pn	8/06/1978 23:23:00.606	6082
IR3	5.18	119.60	Pg	8/06/1978 23:23:19.828	6086
IR3	5.18	119.60	Lg	8/06/1978 23:24:44.332	6089
IR2	5.37	120.72	Pn	8/06/1978 23:23:02.943	6081
IR2	5.37	120.72	Pg	8/06/1978 23:23:24.167	6085
IR2	5.37	120.72	Lg	8/06/1978 23:24:46.191	6088
IR7	5.59	119.68	Pn	8/06/1978 23:23:05.993	6084
IR7	5.59	119.68	Pg	8/06/1978 23:23:32.228	6092
IR7	5.59	119.68	Sn	8/06/1978 23:24:14.198	6093
IR7	5.59	119.68	Lg	8/06/1978 23:24:49.561	6091
IR7	5.59	119.68	Rg	8/06/1978 23:25:34.014	6095

origin	time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978260	9/17/1978 12:43:21.730	34.19	57.50	2	F	4.7	65	15	u	226103	USGS/

sta	delta	seaz	phase	arrival time	arid
MAIO	2.66	218.23	Pn	9/17/1978 12:44:09.419	7119
IR3	5.47	101.71	Pn	9/17/1978 12:44:46.469	5691
IR3	5.47	101.71	Pg	9/17/1978 12:45:09.862	5688
IR3	5.47	101.71	Lg	9/17/1978 12:46:23.627	5684
IR3	5.47	101.71	Rg	9/17/1978 12:47:18.063	5681
IR4	5.53	99.02	Pn	9/17/1978 12:44:47.402	5692
IR4	5.53	99.02	Lg	9/17/1978 12:46:29.750	5685
IR1	5.73	100.38	Pn	9/17/1978 12:44:49.833	5690
IR1	5.73	100.38	Pg	9/17/1978 12:45:16.237	5687
IR1	5.73	100.38	Lg	9/17/1978 12:46:30.743	5683
IR1	5.73	100.38	Rg	9/17/1978 12:47:23.062	5680
IR7	5.85	102.97	Pn	9/17/1978 12:44:51.509	5693
IR7	5.85	102.97	Pg	9/17/1978 12:45:16.036	5689
IR7	5.85	102.97	Lg	9/17/1978 12:46:31.814	5686
IR7	5.85	102.97	Rg	9/17/1978 12:47:36.304	5682

Lg and Pg codas appear to be clipped at ILPA.
Most of coda is also clipped at MAIO - Pn only read.
This event part of Rodgers, Ni, Hearn dataset

origin time		lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978260	9/17/1978 14:22:16.800	33.62	56.96	33	A	4.5	21	19	u	226106	USGS/

sta	delta	seaz	phase	arrival time	arid
MAIO	3.39	218.52	Pn	9/17/1978 14:23:09.379	7120
MAIO	3.39	218.52	Pg	9/17/1978 14:23:18.248	7124
MAIO	3.39	218.52	Sn	9/17/1978 14:23:51.286	7123
MAIO	3.39	218.52	Lg	9/17/1978 14:24:06.184	7122
MAIO	3.39	218.52	Rg	9/17/1978 14:24:19.392	7121
IR3	5.23	109.09	Pn	9/17/1978 14:23:33.468	5705
IR3	5.23	109.09	Pg	9/17/1978 14:24:00.182	5702
IR3	5.23	109.09	Lg	9/17/1978 14:25:21.065	5698
IR3	5.23	109.09	Rg	9/17/1978 14:25:56.862	5694
IR4	5.25	106.22	Pn	9/17/1978 14:23:33.785	5706
IR4	5.25	106.22	Lg	9/17/1978 14:25:24.267	5699
IR4	5.25	106.22	Rg	9/17/1978 14:26:03.860	5695
IR1	5.47	107.37	Pn	9/17/1978 14:23:36.670	5704
IR1	5.47	107.37	Pg	9/17/1978 14:24:02.088	5701
IR1	5.47	107.37	Lg	9/17/1978 14:25:26.422	5697
IR7	5.62	109.91	Pn	9/17/1978 14:23:39.165	5707
IR7	5.62	109.91	Pg	9/17/1978 14:24:05.210	5703
IR7	5.62	109.91	Lg	9/17/1978 14:25:37.546	5700
IR7	5.62	109.91	Rg	9/17/1978 14:26:08.626	5696

A 2nd event follows this one about 6m 36s later at ILPA.
MAIO signal records on smaller coda of a previous event
that starts 44 sec prior to Pn arrival.

origin time		lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978260	9/17/1978 15:54:39.180	34.87	57.48	33	A	-9.0	9	23	u	226115	USGS/

sta	delta	seaz	phase	arrival time	arid
MAIO	2.18	229.46	Pn	9/17/1978 15:55:32.768	7126
MAIO	2.18	229.46	Lg	9/17/1978 15:56:23.943	7129
MAIO	2.18	229.46	Rg	9/17/1978 15:56:36.197	7192
IR3	5.31	94.72	Pn	9/17/1978 15:56:04.274	6112
IR3	5.31	94.72	Pg	9/17/1978 15:56:27.941	6107
IR3	5.31	94.72	Lg	9/17/1978 15:57:48.316	6103
IR3	5.31	94.72	Rg	9/17/1978 15:58:35.291	6098
IR4	5.39	92.06	Pn	9/17/1978 15:56:04.389	6113
IR4	5.39	92.06	Pg	9/17/1978 15:56:25.930	6108
IR4	5.39	92.06	Lg	9/17/1978 15:57:48.729	6104
IR4	5.39	92.06	Rg	9/17/1978 15:58:38.570	6099
IR2	5.43	96.52	Pn	9/17/1978 15:56:06.178	6111
IR2	5.43	96.52	Lg	9/17/1978 15:57:53.578	6102
IR2	5.43	96.52	Rg	9/17/1978 15:58:49.412	6097
IR1	5.58	93.69	Pn	9/17/1978 15:56:07.625	6110
IR1	5.58	93.69	Pg	9/17/1978 15:56:34.120	6106
IR1	5.58	93.69	Sn	9/17/1978 15:57:15.003	6115
IR1	5.58	93.69	Lg	9/17/1978 15:57:47.829	6101
IR1	5.58	93.69	Rg	9/17/1978 15:58:38.693	6096
IR7	5.67	96.48	Pn	9/17/1978 15:56:10.065	6114
IR7	5.67	96.48	Pg	9/17/1978 15:56:35.118	6109
IR7	5.67	96.48	Lg	9/17/1978 15:57:59.106	6105
IR7	5.67	96.48	Rg	9/17/1978 15:58:43.030	6100

Event location appears not to be well constrained.
Predicted Pn at MAIO is 20 sec earlier that true arrival,
7 to 9 sec earlier at ILPA. Both stations record on
ending coda of some previous event.

origin time				lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978260	9/17/1978	21:39:46.260		33.80	57.10	33	A	4.6	17	12	u	226127	USGS/

sta	delta	seaz	phase	arrival time	arid
MAIO	3.18	218.86	Pn	9/17/1978 21:40:36.579	7133
MAIO	3.18	218.86	Pg	9/17/1978 21:40:46.231	7135
MAIO	3.18	218.86	Lg	9/17/1978 21:41:28.114	7134
MAIO	3.18	218.86	Rg	9/17/1978 21:41:43.312	7131
IR3	5.27	106.78	Pn	9/17/1978 21:41:04.551	6121
IR3	5.27	106.78	Pg	9/17/1978 21:41:31.488	6119
IR3	5.27	106.78	Lg	9/17/1978 21:42:37.309	6117
IR3	5.27	106.78	Rg	9/17/1978 21:43:23.917	6116
IR4	5.30	103.95	Pn	9/17/1978 21:41:04.542	6122
IR4	5.30	103.95	Pg	9/17/1978 21:41:28.245	6120
IR4	5.30	103.95	Lg	9/17/1978 21:42:34.876	6118
IR4	5.30	103.95	Rg	9/17/1978 21:43:29.078	6123

This event part of Rodgers, Ni, Hearn dataset

origin time				lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978261	9/18/1978	1:34:49.060		33.80	57.28	33	A	4.4	21	21	u	226129	USGS/

sta	delta	seaz	phase	arrival time	arid
MAIO	3.09	216.60	Pn	9/18/1978 1:35:40.389	7138
MAIO	3.09	216.60	Pg	9/18/1978 1:35:50.099	7140
MAIO	3.09	216.60	Lg	9/18/1978 1:36:30.379	7139
MAIO	3.09	216.60	Rg	9/18/1978 1:36:43.263	7137
IR3	5.41	106.28	Pn	9/18/1978 1:36:07.017	5722
IR3	5.41	106.28	Lg	9/18/1978 1:37:51.549	5715
IR3	5.41	106.28	Rg	9/18/1978 1:38:26.248	5710
IR4	5.45	103.52	Pn	9/18/1978 1:36:07.118	5723
IR4	5.45	103.52	Pg	9/18/1978 1:36:29.855	5719
IR4	5.45	103.52	Lg	9/18/1978 1:37:43.893	5716
IR4	5.45	103.52	Rg	9/18/1978 1:38:23.847	5711
IR2	5.56	107.75	Pn	9/18/1978 1:36:08.459	5721
IR2	5.56	107.75	Lg	9/18/1978 1:37:54.225	5714
IR2	5.56	107.75	Rg	9/18/1978 1:38:15.292	5709
IR1	5.66	104.74	Pn	9/18/1978 1:36:09.910	5720
IR1	5.66	104.74	Pg	9/18/1978 1:36:35.740	5718
IR1	5.66	104.74	Lg	9/18/1978 1:37:52.069	5713
IR1	5.66	104.74	Rg	9/18/1978 1:38:19.493	5708
IR7	5.80	107.26	Pn	9/18/1978 1:36:11.774	5724
IR7	5.80	107.26	Lg	9/18/1978 1:37:53.731	5717
IR7	5.80	107.26	Rg	9/18/1978 1:38:57.942	5712

Poor Lg onset time at MAIO.

origin time				lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978261	9/18/1978	3:26:10.760		34.32	56.70	33	A	4.1	22	19	u	226134	USGS/

sta	delta	seaz	phase	arrival time	arid
MAIO	3.02	229.82	Pn	9/18/1978 3:26:56.523	7144
MAIO	3.02	229.82	Pg	9/18/1978 3:27:06.344	7143
MAIO	3.02	229.82	Lg	9/18/1978 3:27:45.139	7142
MAIO	3.02	229.82	Rg	9/18/1978 3:28:00.540	7141
IR3	4.80	102.29	Pn	9/18/1978 3:27:24.379	5738
IR3	4.80	102.29	Pg	9/18/1978 3:27:44.323	5734
IR3	4.80	102.29	Lg	9/18/1978 3:29:10.337	5731
IR3	4.80	102.29	Rg	9/18/1978 3:30:02.615	5727
IR4	4.85	99.23	Pn	9/18/1978 3:27:24.898	5739

IR4	4.85	99.23	Pg	9/18/1978	3:27:44.012	5735
IR4	4.85	99.23	Lg	9/18/1978	3:29:12.057	5732
IR4	4.85	99.23	Rg	9/18/1978	3:29:54.640	5728
IR2	4.94	104.07	Pn	9/18/1978	3:27:26.472	5737
IR2	4.94	104.07	Pg	9/18/1978	3:27:47.359	5733
IR2	4.94	104.07	Lg	9/18/1978	3:29:18.018	5730
IR2	4.94	104.07	Rg	9/18/1978	3:29:59.934	5726
IR1	5.05	100.78	Pn	9/18/1978	3:27:27.662	5736
IR1	5.05	100.78	Lg	9/18/1978	3:29:22.117	5729
IR1	5.05	100.78	Rg	9/18/1978	3:30:03.484	5725

origin time			lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978261	9/18/1978	4:50:04.070	33.57	57.47	33	A	4.7	55	11	u	226140	USGS/

sta	delta	seaz	phase	arrival time		arid
MAIO	3.19	211.92	Pn	9/18/1978	4:50:53.292	7146
MAIO	3.19	211.92	Lg	9/18/1978	4:51:45.311	7148
IR3	5.64	107.89	Pn	9/18/1978	4:51:24.086	5743
IR3	5.64	107.89	Pg	9/18/1978	4:51:44.876	5748
IR3	5.64	107.89	Lg	9/18/1978	4:53:02.730	5746
IR3	5.64	107.89	Rg	9/18/1978	4:53:54.861	5740
IR4	5.67	105.23	Pn	9/18/1978	4:51:24.634	5744
IR4	5.67	105.23	Pg	9/18/1978	4:51:47.030	5741
IR4	5.67	105.23	Lg	9/18/1978	4:53:00.525	5747
IR2	5.80	109.26	Pn	9/18/1978	4:51:25.952	5742
IR2	5.80	109.26	Lg	9/18/1978	4:53:08.006	5745

Phase arrivals other than Pn appear to be clipped.
This event part of Rodgers, Ni, Hearn dataset

origin time			lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978261	9/18/1978	4:54:28.130	34.00	57.53	33	A	4.6	13	14	u	226141	USGS/

sta	delta	seaz	phase	arrival time		arid
MAIO	2.81	215.44	Pn	9/18/1978	4:55:15.849	7149
MAIO	2.81	215.44	Pg	9/18/1978	4:55:23.616	7194
MAIO	2.81	215.44	Lg	9/18/1978	4:56:06.132	7196
MAIO	2.81	215.44	Rg	9/18/1978	4:56:27.227	7152
IR3	5.55	103.60	Pn	9/18/1978	4:55:43.878	6131
IR3	5.55	103.60	Lg	9/18/1978	4:57:26.289	6127
IR3	5.55	103.60	Rg	9/18/1978	4:58:14.958	6124
IR4	5.59	100.93	Pn	9/18/1978	4:55:43.518	6132
IR4	5.59	100.93	Lg	9/18/1978	4:57:27.193	6128
IR4	5.59	100.93	Rg	9/18/1978	4:58:17.102	6133
IR2	5.69	105.11	Pn	9/18/1978	4:55:44.308	6130
IR2	5.69	105.11	Lg	9/18/1978	4:57:30.659	6126
IR1	5.80	102.20	Pn	9/18/1978	4:55:46.181	6129
IR1	5.80	102.20	Lg	9/18/1978	4:57:33.431	6125

Predicted Pn is 6 sec earlier than true arrival at MAIO and
about 6.5 sec later at ILPA.
Lg appears clipped at MAIO and has poor onset time.

origin time			lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978263	9/20/1978	4:45:59.650	33.25	56.67	50	F	4.1	44	16	u	226227	USGS/

sta	delta	seaz	phase	arrival time		arid
MAIO	3.83	218.03	Pn	9/20/1978	4:46:56.636	7154
MAIO	3.83	218.03	Pg	9/20/1978	4:47:06.067	7195
MAIO	3.83	218.03	Sn	9/20/1978	4:47:40.464	7157

MAIO	3.83	218.03	Lg	9/20/1978	4:47:55.522	7156
MAIO	3.83	218.03	Rg	9/20/1978	4:48:15.752	7153
IR3	5.17	113.90	Pn	9/20/1978	4:47:15.385	5755
IR3	5.17	113.90	Pg	9/20/1978	4:47:40.373	5758
IR3	5.17	113.90	Lg	9/20/1978	4:48:56.581	5752
IR3	5.17	113.90	Rg	9/20/1978	4:49:42.953	5749
IR4	5.17	110.98	Pn	9/20/1978	4:47:15.435	5756
IR4	5.17	110.98	Pg	9/20/1978	4:47:37.384	5759
IR4	5.17	110.98	Lg	9/20/1978	4:48:43.641	5753
IR4	5.17	110.98	Rg	9/20/1978	4:49:37.349	5750
IR2	5.34	115.21	Pn	9/20/1978	4:47:17.886	5754
IR2	5.34	115.21	Pg	9/20/1978	4:47:41.022	5757
IR2	5.34	115.21	Lg	9/20/1978	4:48:47.003	5751

This event part of Rodgers, Ni, Hearn dataset

origin	time			lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978267	9/24/1978	3:05:32.300		33.84	56.93	33	A	-9.0	11	15	u	226396	USGS/

sta	delta	seaz	phase	arrival time		arid
MAIO	3.23	221.22	Pn	9/24/1978	3:06:25.276	7161
MAIO	3.23	221.22	Lg	9/24/1978	3:07:23.102	7159
MAIO	3.23	221.22	Rg	9/24/1978	3:07:34.528	7158
IR3	5.13	106.90	Pn	9/24/1978	3:06:49.301	5770
IR3	5.13	106.90	Pg	9/24/1978	3:07:18.005	5767
IR3	5.13	106.90	Lg	9/24/1978	3:08:27.521	5764
IR3	5.13	106.90	Rg	9/24/1978	3:09:17.821	5761
IR2	5.28	108.44	Pn	9/24/1978	3:06:51.268	5769
IR2	5.28	108.44	Pg	9/24/1978	3:07:21.917	5766
IR2	5.28	108.44	Lg	9/24/1978	3:08:31.804	5763
IR2	5.28	108.44	Rg	9/24/1978	3:09:21.314	5760
IR7	5.51	107.90	Pn	9/24/1978	3:06:54.677	5771
IR7	5.51	107.90	Pg	9/24/1978	3:07:24.804	5768
IR7	5.51	107.90	Lg	9/24/1978	3:08:43.740	5765
IR7	5.51	107.90	Rg	9/24/1978	3:09:29.187	5762

Second very small event follows about 6 mins 10sec later
at ILPA.

origin	time			lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978270	9/27/1978	18:48:52.500		33.35	57.35	33	A	4.2	5	16	u	226559	USGS/

sta	delta	seaz	phase	arrival time		arid
MAIO	3.44	211.38	Pn	9/27/1978	18:49:45.166	7165
MAIO	3.44	211.38	Pg	9/27/1978	18:49:55.056	7166
MAIO	3.44	211.38	Lg	9/27/1978	18:50:40.569	7164
MAIO	3.44	211.38	Rg	9/27/1978	18:50:51.735	7163
IR3	5.64	110.38	Pn	9/27/1978	18:50:12.915	6143
IR3	5.64	110.38	Lg	9/27/1978	18:51:57.830	6139
IR3	5.64	110.38	Rg	9/27/1978	18:52:52.501	6135
IR4	5.66	107.71	Pn	9/27/1978	18:50:13.104	6144
IR4	5.66	107.71	Lg	9/27/1978	18:51:53.247	6140
IR4	5.66	107.71	Rg	9/27/1978	18:52:51.060	6136
IR2	5.80	111.68	Pn	9/27/1978	18:50:14.382	6142
IR2	5.80	111.68	Lg	9/27/1978	18:52:00.206	6138
IR2	5.80	111.68	Rg	9/27/1978	18:52:48.686	6134
IR1	5.88	108.72	Pn	9/27/1978	18:50:15.929	6141
IR1	5.88	108.72	Lg	9/27/1978	18:51:58.085	6137
IR1	5.88	108.72	Rg	9/27/1978	18:52:56.547	6145

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978274 10/01/1978 10:49:47.500	33.42	57.25	13	A	4.3	10	12	eq	226707	Berb

sta	delta	seaz	phase	arrival time	arid
MAIO	2.87	217.97	Pn	10/01/1978 10:50:44.302	7167
MAIO	2.87	217.97	Pg	10/01/1978 10:50:51.827	7170
MAIO	2.87	217.97	Lg	10/01/1978 10:51:34.923	7169
MAIO	2.87	217.97	Rg	10/01/1978 10:51:47.509	7168
IR3	5.41	103.79	Pn	10/01/1978 10:51:12.453	5779
IR3	5.41	103.79	Pg	10/01/1978 10:51:42.331	5777
IR3	5.41	103.79	Lg	10/01/1978 10:52:57.000	5775
IR3	5.41	103.79	Rg	10/01/1978 10:53:42.792	5773
IR1	5.66	102.35	Pn	10/01/1978 10:51:15.584	5778
IR1	5.66	102.35	Pg	10/01/1978 10:51:47.139	5776
IR1	5.66	102.35	Lg	10/01/1978 10:53:03.261	5774
IR1	5.66	102.35	Rg	10/01/1978 10:53:46.455	5772

New locations from Berbierian via Sweeney on 8/2/96.

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978274 10/01/1978 14:09:35.110	34.82	56.71	33	A	-9.0	5	10	u	226716	USGS/

sta	delta	seaz	phase	arrival time	arid
MAIO	2.71	237.65	Pn	10/01/1978 14:10:18.116	7173
MAIO	2.71	237.65	Pg	10/01/1978 14:10:25.191	7174
MAIO	2.71	237.65	Sn	10/01/1978 14:10:57.503	7175
MAIO	2.71	237.65	Lg	10/01/1978 14:11:09.366	7172
MAIO	2.71	237.65	Rg	10/01/1978 14:11:29.474	7171
IR3	4.69	96.42	Pn	10/01/1978 14:10:47.226	5784
IR3	4.69	96.42	Lg	10/01/1978 14:12:17.308	5782
IR1	4.96	95.19	Pn	10/01/1978 14:10:49.483	5783
IR1	4.96	95.19	Sn	10/01/1978 14:11:48.930	5780
IR1	4.96	95.19	Lg	10/01/1978 14:12:26.603	5781

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978282 10/09/1978 16:04:38.200	33.34	57.28	8	F	4.6	46	15	eq	227122	Berb

sta	delta	seaz	phase	arrival time	arid
MAIO	3.37	212.70	Pn	10/09/1978 16:05:35.415	7177
MAIO	3.37	212.70	Pg	10/09/1978 16:05:44.771	7193
MAIO	3.37	212.70	Lg	10/09/1978 16:06:34.442	7180
MAIO	3.37	212.70	Rg	10/09/1978 16:06:45.708	7176
IR3	5.57	109.62	Pn	10/09/1978 16:07:05.665	5794
IR3	5.57	109.62	Pg	10/09/1978 16:07:30.834	5792
IR3	5.57	109.62	Lg	10/09/1978 16:08:55.677	5789
IR3	5.57	109.62	Rg	10/09/1978 16:09:45.801	5786
IR4	5.59	106.92	Pn	10/09/1978 16:07:06.106	5795
IR4	5.59	106.92	Lg	10/09/1978 16:08:53.694	5790
IR4	5.59	106.92	Rg	10/09/1978 16:09:42.976	5787
IR1	5.81	107.97	Pn	10/09/1978 16:07:08.959	5793
IR1	5.81	107.97	Pg	10/09/1978 16:07:34.147	5791
IR1	5.81	107.97	Lg	10/09/1978 16:09:09.734	5788
IR1	5.81	107.97	Rg	10/09/1978 16:09:46.569	5785

The waveforms for this event are 1 min late relative to predicted phase arrival times. Possible timing error at ILPA.
New locations from Berberian via Sweeney on 08/02/96.

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978285 10/12/1978 15:01:39.420	33.36	57.33	8	F	4.9	77	14	eq	227252	Berb

sta	delta	seaz	phase	arrival time	arid
IR3	5.67	109.72	Pn	10/12/1978 15:04:06.597	5806
IR3	5.67	109.72	Pg	10/12/1978 15:04:28.115	5809
IR3	5.67	109.72	Lg	10/12/1978 15:05:48.592	5800
IR3	5.67	109.72	Rg	10/12/1978 15:06:46.507	5796
IR4	5.70	107.07	Pn	10/12/1978 15:04:06.886	5807
IR4	5.70	107.07	Pg	10/12/1978 15:04:27.733	5803
IR4	5.70	107.07	Lg	10/12/1978 15:05:47.448	5801
IR4	5.70	107.07	Rg	10/12/1978 15:06:44.988	5797
IR2	5.84	111.03	Pn	10/12/1978 15:04:08.446	5805
IR2	5.84	111.03	Pg	10/12/1978 15:04:31.347	5808
IR2	5.84	111.03	Lg	10/12/1978 15:05:53.348	5799
IR1	5.91	108.09	Pn	10/12/1978 15:04:09.813	5804
IR1	5.91	108.09	Pg	10/12/1978 15:04:33.212	5802
IR1	5.91	108.09	Lg	10/12/1978 15:05:59.197	5798

Waveforms for this event are 1 min late relative to predicted
phase arrivals. Possible timing error.
Waveforms are clipped except for Pn and initial Pg codas.
Possible depth phases (pP,sP) about 4sec after Pn arrival
on IR1.
New locations from Berberian via Sweeney on 08/02/96.

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978287 10/14/1978 13:36:11.820	33.53	56.98	45	F	-9.0	8	11	u	227326	USGS/

sta	delta	seaz	phase	arrival time	arid
IR3	5.28	109.95	Pn	10/14/1978 13:38:31.578	5817
IR3	5.28	109.95	Lg	10/14/1978 13:40:20.154	5814
IR3	5.28	109.95	Rg	10/14/1978 13:40:50.396	5811
IR4	5.30	107.11	Pn	10/14/1978 13:38:31.969	5818
IR4	5.30	107.11	Pg	10/14/1978 13:38:52.505	5820
IR4	5.30	107.11	Lg	10/14/1978 13:40:11.059	5815
IR4	5.30	107.11	Rg	10/14/1978 13:40:57.128	5812
IR1	5.52	108.21	Pn	10/14/1978 13:38:34.794	5816
IR1	5.52	108.21	Pg	10/14/1978 13:38:58.280	5819
IR1	5.52	108.21	Lg	10/14/1978 13:40:23.404	5813
IR1	5.52	108.21	Rg	10/14/1978 13:41:00.479	5810

This event appears to have a 1 min late timing error.
Pn-OT= 2m 20s, instead of about 1m 20s.

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978292 10/19/1978 14:39:56.090	33.52	57.11	12	A	-9.0	5	8	eq	227527	Berb

sta	delta	seaz	phase	arrival time	arid
IR3	5.21	101.71	Pn	10/19/1978 14:41:21.891	5827
IR4	5.26	98.89	Pn	10/19/1978 14:41:19.789	5828
IR4	5.26	98.89	Lg	10/19/1978 14:42:52.479	5823
IR2	5.35	103.36	Pn	10/19/1978 14:41:21.597	5826
IR2	5.35	103.36	Lg	10/19/1978 14:43:00.018	5822
IR1	5.47	100.33	Pn	10/19/1978 14:41:22.934	5825
IR1	5.47	100.33	Pg	10/19/1978 14:41:48.662	5824
IR1	5.47	100.33	Lg	10/19/1978 14:43:03.747	5821

Small snr on station IR3 -- low confidence Pn arrival time.
New locations from Berberian via Sweeney on 08/02/96.

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978301 10/28/1978 9:02:45.920	33.83	58.24	33	A	-9.0	6	8	u	227881	USGS/

sta	delta	seaz	phase	arrival time		arid
IR3	6.16	103.40	Pn	10/28/1978	9:04:03.049	5835
IR3	6.16	103.40	Lg	10/28/1978	9:05:40.052	5831
IR2	6.31	104.75	Pn	10/28/1978	9:04:04.353	5834
IR2	6.31	104.75	Lg	10/28/1978	9:05:47.232	5830
IR1	6.41	102.13	Pn	10/28/1978	9:04:04.499	5833
IR1	6.41	102.13	Lg	10/28/1978	9:05:54.165	5829
IR7	6.54	104.41	Pn	10/28/1978	9:04:07.099	5836
IR7	6.54	104.41	Lg	10/28/1978	9:05:59.585	5832

This location is probably not well constrained. Predicted Pn arrivals are off from true arrivals by about +13.5s.

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978304 10/31/1978 8:07:56.920	33.49	58.81	33	A	-9.0	5	8	u	228001	USGS/

sta	delta	seaz	phase	arrival time		arid
IR3	6.72	104.99	Pn	10/31/1978	8:09:14.421	5843
IR3	6.72	104.99	Lg	10/31/1978	8:10:52.041	5839
IR2	6.87	106.19	Pn	10/31/1978	8:09:14.296	5842
IR2	6.87	106.19	Lg	10/31/1978	8:10:49.059	5838
IR1	6.97	103.74	Pn	10/31/1978	8:09:15.571	5841
IR1	6.97	103.74	Lg	10/31/1978	8:11:00.044	5837
IR7	7.10	105.81	Pn	10/31/1978	8:09:17.235	5844
IR7	7.10	105.81	Lg	10/31/1978	8:11:06.207	5840

This event is small and probably mislocated.
The true Pn arrivals are about 22s earlier than the predicted times.

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978305 11/01/1978 22:53:11.550	33.60	57.28	33	A	-9.0	5	4	u	228069	USGS/

sta	delta	seaz	phase	arrival time		arid
IR3	5.48	108.19	Pn	11/01/1978	22:54:28.634	5847
IR2	5.64	109.59	Pn	11/01/1978	22:54:30.252	5846
IR1	5.73	106.59	Pn	11/01/1978	22:54:31.984	5845
IR7	5.88	109.03	Pn	11/01/1978	22:54:34.702	5848

Very small event. Phases other than Pn are buried in noise.

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978306 11/02/1978 4:16:56.820	31.32	56.33	33	A	4.1	15	29	u	228088	USGS/

sta	delta	seaz	phase	arrival time		arid
IR3	6.08	131.69	Pn	11/02/1978	4:18:25.461	5851
IR3	6.08	131.69	Lg	11/02/1978	4:20:09.460	5855
IR3	6.08	131.69	Rg	11/02/1978	4:20:37.061	5858
IR1	6.24	129.43	Pn	11/02/1978	4:18:27.733	5849
IR1	6.24	129.43	Sn	11/02/1978	4:19:38.279	5853
IR1	6.24	129.43	Lg	11/02/1978	4:20:11.138	5854
IR1	6.24	129.43	Rg	11/02/1978	4:20:38.714	5856
IR2	6.28	132.26	Pn	11/02/1978	4:18:27.634	5850
IR2	6.28	132.26	Lg	11/02/1978	4:20:11.871	5860
IR2	6.28	132.26	Rg	11/02/1978	4:20:42.846	5857
IR7	6.48	130.97	Pn	11/02/1978	4:18:31.104	5852
IR7	6.48	130.97	Lg	11/02/1978	4:20:15.176	5861
IR7	6.48	130.97	Rg	11/02/1978	4:20:54.416	5859

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth

origin time		lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978308	11/04/1978 9:08:56.780	33.62	57.48	33	A	4.0	10	16	u	228195	USGS/

sta	delta	seaz	phase	arrival time	arid
IR3	5.63	107.35	Pn	11/04/1978 9:10:17.373	6159
IR3	5.63	107.35	Pg	11/04/1978 9:10:40.889	6156
IR3	5.63	107.35	Lg	11/04/1978 9:12:08.637	6152
IR3	5.63	107.35	Rg	11/04/1978 9:13:02.501	6148
IR2	5.78	108.73	Pn	11/04/1978 9:10:19.616	6158
IR2	5.78	108.73	Pg	11/04/1978 9:10:42.981	6155
IR2	5.78	108.73	Lg	11/04/1978 9:12:13.252	6151
IR2	5.78	108.73	Rg	11/04/1978 9:12:52.799	6147
IR1	5.87	105.81	Pn	11/04/1978 9:10:20.679	6157
IR1	5.87	105.81	Pg	11/04/1978 9:10:46.983	6154
IR1	5.87	105.81	Sn	11/04/1978 9:11:35.463	6161
IR1	5.87	105.81	Lg	11/04/1978 9:12:15.180	6150
IR1	5.87	105.81	Rg	11/04/1978 9:13:02.294	6146
IR7	6.02	108.21	Pn	11/04/1978 9:10:23.194	6160
IR7	6.02	108.21	Lg	11/04/1978 9:12:22.973	6153
IR7	6.02	108.21	Rg	11/04/1978 9:13:03.739	6149

Several seconds of harmonic type noise recorded on IR7
about 7s prior to Pn arrival.

origin time		lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978308	11/04/1978 17:12:27.000	33.53	57.11	40	F	4.4	28	14	u	228212	USGS/

sta	delta	seaz	phase	arrival time	arid
IR3	5.38	109.49	Pn	11/04/1978 17:13:47.170	5874
IR3	5.38	109.49	Lg	11/04/1978 17:15:30.269	5868
IR3	5.38	109.49	Rg	11/04/1978 17:16:26.133	5864
IR2	5.54	110.88	Pn	11/04/1978 17:13:48.759	5873
IR2	5.54	110.88	Pg	11/04/1978 17:14:11.362	5871
IR2	5.54	110.88	Lg	11/04/1978 17:15:36.724	5867
IR2	5.54	110.88	Rg	11/04/1978 17:16:09.652	5863
IR1	5.62	107.80	Pn	11/04/1978 17:13:49.873	5872
IR1	5.62	107.80	Pg	11/04/1978 17:14:15.056	5870
IR1	5.62	107.80	Lg	11/04/1978 17:15:29.612	5866
IR1	5.62	107.80	Rg	11/04/1978 17:16:08.903	5862
IR7	5.77	110.26	Pn	11/04/1978 17:13:52.620	5875
IR7	5.77	110.26	Lg	11/04/1978 17:15:37.946	5869
IR7	5.77	110.26	Rg	11/04/1978 17:16:20.889	5865

This event part of Rodgers, Ni, Hearn dataset

origin time		lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978308	11/04/1978 19:30:11.450	33.85	57.62	33	A	-9.0	5	9	u	228214	USGS/

sta	delta	seaz	phase	arrival time	arid
IR3	5.66	104.76	Pn	11/04/1978 19:31:25.519	5883
IR3	5.66	104.76	Lg	11/04/1978 19:33:05.469	5878
IR2	5.81	106.20	Pn	11/04/1978 19:31:26.579	5882
IR2	5.81	106.20	Lg	11/04/1978 19:33:09.245	5877
IR1	5.91	103.34	Pn	11/04/1978 19:31:27.979	5881
IR1	5.91	103.34	Pg	11/04/1978 19:31:52.268	5880
IR1	5.91	103.34	Lg	11/04/1978 19:33:11.722	5876
IR7	6.05	105.78	Pn	11/04/1978 19:31:30.269	5884
IR7	6.05	105.78	Lg	11/04/1978 19:33:20.548	5879

origin time		lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978310	11/06/1978 16:49:54.150	33.38	57.47	7	F	4.5	60	8	u	228313	USGS/

sta	delta	seaz	phase	arrival time	arid
IR3	5.71	109.65	Pn	11/06/1978 16:51:21.661	5891
IR3	5.71	109.65	Lg	11/06/1978 16:53:03.080	5888
IR3	5.71	109.65	Rg	11/06/1978 16:54:08.741	5885
IR1	5.95	108.04	Pn	11/06/1978 16:51:24.961	5890
IR1	5.95	108.04	Lg	11/06/1978 16:53:12.629	5887
IR7	6.11	110.35	Pn	11/06/1978 16:51:26.865	5892
IR7	6.11	110.35	Lg	11/06/1978 16:53:21.340	5889
IR7	6.11	110.35	Rg	11/06/1978 16:54:22.081	5886

This event part of Rodgers, Ni, Hearn dataset

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978310 11/06/1978 23:14:09.330	33.58	57.08	34	F	4.5	10	11	u	228325	USGS/

sta	delta	seaz	phase	arrival time	arid
IR3	5.34	109.07	Pn	11/06/1978 23:15:29.856	5902
IR3	5.34	109.07	Lg	11/06/1978 23:17:12.102	5898
IR2	5.50	110.48	Pn	11/06/1978 23:15:30.522	5901
IR2	5.50	110.48	Lg	11/06/1978 23:17:16.489	5897
IR2	5.50	110.48	Rg	11/06/1978 23:17:56.243	5894
IR1	5.58	107.39	Pn	11/06/1978 23:15:32.059	5900
IR1	5.58	107.39	Lg	11/06/1978 23:17:22.048	5896
IR1	5.58	107.39	Rg	11/06/1978 23:17:58.477	5893
IR7	5.73	109.87	Pn	11/06/1978 23:15:34.568	5903
IR7	5.73	109.87	Lg	11/06/1978 23:17:19.064	5899
IR7	5.73	109.87	Rg	11/06/1978 23:18:00.710	5895

This event part of Rodgers, Ni, Hearn dataset

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978310 11/06/1978 23:46:43.240	33.16	54.97	46	F	4.6	93	12	u	228326	USGS/

sta	delta	seaz	phase	arrival time	arid
IR2	4.18	125.54	Pn	11/06/1978 23:47:45.052	5905
IR2	4.18	125.54	Pg	11/06/1978 23:47:57.201	5908
IR2	4.18	125.54	Lg	11/06/1978 23:48:53.470	5911
IR2	4.18	125.54	Rg	11/06/1978 23:49:22.551	5914
IR1	4.19	121.33	Pn	11/06/1978 23:47:45.454	5904
IR1	4.19	121.33	Pg	11/06/1978 23:47:58.284	5907
IR1	4.19	121.33	Lg	11/06/1978 23:48:55.225	5910
IR1	4.19	121.33	Rg	11/06/1978 23:49:22.601	5913
IR7	4.40	124.03	Pn	11/06/1978 23:47:48.123	5906
IR7	4.40	124.03	Pg	11/06/1978 23:48:02.129	5909
IR7	4.40	124.03	Lg	11/06/1978 23:49:02.500	5912
IR7	4.40	124.03	Rg	11/06/1978 23:49:30.235	5915

Lg codas appear to be clipped.
This event part of Rodgers, Ni, Hearn dataset

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978325 11/21/1978 5:02:00.900	33.73	57.04	33	A	-9.0	8	8	u	228938	USGS/

sta	delta	seaz	phase	arrival time	arid
IR1	5.50	106.03	Pn	11/21/1978 5:03:20.721	5922
IR1	5.50	106.03	Pg	11/21/1978 5:03:46.302	5920
IR1	5.50	106.03	Lg	11/21/1978 5:04:56.421	5918
IR1	5.50	106.03	Rg	11/21/1978 5:05:39.368	5916
IR7	5.64	108.59	Pn	11/21/1978 5:03:22.685	5923
IR7	5.64	108.59	Pg	11/21/1978 5:03:47.879	5921

IR7	5.64	108.59	Lg	11/21/1978	5:04:59.492	5919							
IR7	5.64	108.59	Rg	11/21/1978	5:05:44.291	5917							

This event part of Rodgers, Ni, Hearn dataset

origin time				lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978327 11/23/1978 12:48:42.190				33.69	57.07	55	F	4.2	20	6	u	229051	USGS/

sta	delta	seaz	phase	arrival time	arid
IR1	5.53	106.38	Pn	11/23/1978 12:50:01.622	5928
IR1	5.53	106.38	Lg	11/23/1978 12:51:40.710	5926
IR1	5.53	106.38	Rg	11/23/1978 12:52:27.325	5924
IR7	5.68	108.91	Pn	11/23/1978 12:50:03.742	5929
IR7	5.68	108.91	Lg	11/23/1978 12:51:47.646	5927
IR7	5.68	108.91	Rg	11/23/1978 12:52:30.751	5925

This event part of Rodgers, Ni, Hearn dataset

origin time				lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978327 11/23/1978 14:37:29.730				33.73	57.13	45	F	4.6	10	5	u	229056	USGS/

sta	delta	seaz	phase	arrival time	arid
IR1	5.56	105.74	Pn	11/23/1978 14:38:48.982	5933
IR1	5.56	105.74	Lg	11/23/1978 14:40:40.106	5931
IR1	5.56	105.74	Rg	11/23/1978 14:41:14.827	5930
IR7	5.71	108.27	Pn	11/23/1978 14:38:51.408	5934
IR7	5.71	108.27	Lg	11/23/1978 14:40:44.147	5932

This event part of Rodgers, Ni, Hearn dataset

origin time				lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978327 11/23/1978 23:07:57.890				32.47	56.06	33	A	-9.0	8	8	u	229075	USGS/

sta	delta	seaz	phase	arrival time	arid
IR1	5.34	121.93	Pn	11/23/1978 23:09:17.016	6162
IR1	5.34	121.93	Pg	11/23/1978 23:09:40.701	6167
IR1	5.34	121.93	Sn	11/23/1978 23:10:21.777	6169
IR1	5.34	121.93	Lg	11/23/1978 23:10:56.879	6164
IR7	5.55	124.04	Pn	11/23/1978 23:09:19.717	6163
IR7	5.55	124.04	Pg	11/23/1978 23:09:47.871	6168
IR7	5.55	124.04	Lg	11/23/1978 23:11:03.116	6165
IR7	5.55	124.04	Rg	11/23/1978 23:11:33.184	6166

This event part of Rodgers, Ni, Hearn dataset

origin time				lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978336 12/02/1978 0:44:39.900				33.57	58.38	33	A	-9.0	6	4	u	229527	USGS/

sta	delta	seaz	phase	arrival time	arid
IR1	6.61	104.05	Pn	12/02/1978 0:45:49.613	5937
IR1	6.61	104.05	Lg	12/02/1978 0:47:32.745	5935
IR7	6.74	106.22	Pn	12/02/1978 0:45:52.327	5938
IR7	6.74	106.22	Lg	12/02/1978 0:47:38.919	5936

Small event. This location is probably not well constrained.
The predicted Pn arrivals were off from true arrival times by
as much as about +26s.

origin time				lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978337 12/03/1978 23:16:48.130				33.99	57.61	33	A	-9.0	7	4	u	229669	USGS/

sta	delta	seaz	phase	arrival time	arid
IR1	5.87	102.10	Pn	12/03/1978 23:18:02.865	5941
IR1	5.87	102.10	Lg	12/03/1978 23:19:59.628	5939
IR7	6.00	104.60	Pn	12/03/1978 23:18:05.555	5942
IR7	6.00	104.60	Lg	12/03/1978 23:20:01.378	5940

Appears to be mixed coda with a separate event.

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978340 12/06/1978 17:18:12.860	33.29	57.15	19	F	5.3	184	7	u	229811	USGS/

sta	delta	seaz	phase	arrival time	arid
IR1	5.74	109.86	Pn	12/06/1978 17:19:36.331	5947
IR1	5.74	109.86	Pg	12/06/1978 17:20:07.640	5949
IR1	5.74	109.86	Lg	12/06/1978 17:21:17.054	5945
IR1	5.74	109.86	Rg	12/06/1978 17:22:06.802	5943
IR7	5.91	112.21	Pn	12/06/1978 17:19:38.581	5948
IR7	5.91	112.21	Lg	12/06/1978 17:21:20.095	5946
IR7	5.91	112.21	Rg	12/06/1978 17:22:09.076	5944

Data is clipped except for Pn arrivals.
This event part of Rodgers, Ni, Hearn dataset

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978340 12/06/1978 20:38:09.160	33.16	57.12	33	N	4.7	73	9	u	229819	USGS/

sta	delta	seaz	phase	arrival time	arid
IR2	5.71	114.18	Pn	12/06/1978 20:39:31.100	5957
IR2	5.71	114.18	Lg	12/06/1978 20:41:10.418	5954
IR2	5.71	114.18	Rg	12/06/1978 20:42:06.017	5951
IR1	5.77	111.14	Pn	12/06/1978 20:39:32.553	5956
IR1	5.77	111.14	Lg	12/06/1978 20:41:18.241	5953
IR1	5.77	111.14	Rg	12/06/1978 20:42:10.528	5950
IR7	5.94	113.45	Pn	12/06/1978 20:39:34.533	5958
IR7	5.94	113.45	Lg	12/06/1978 20:41:18.778	5955
IR7	5.94	113.45	Rg	12/06/1978 20:42:24.325	5952

Possible depth phases about 4s after Pn at stations IR2, IR1, IR7.
Lg appears to be clipped.
This event part of Rodgers, Ni, Hearn dataset

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978346 12/12/1978 19:46:52.450	33.77	57.99	33	A	-9.0	6	6	u	230139	USGS/

sta	delta	seaz	phase	arrival time	arid
IR2	6.13	105.92	Pn	12/12/1978 19:48:01.846	5963
IR2	6.13	105.92	Lg	12/12/1978 19:49:39.536	5960
IR1	6.23	103.20	Pn	12/12/1978 19:48:02.951	5962
IR1	6.23	103.20	Lg	12/12/1978 19:49:44.157	5959
IR7	6.37	105.53	Pn	12/12/1978 19:48:05.068	5964
IR7	6.37	105.53	Lg	12/12/1978 19:49:47.158	5961

This location is probably not well constrained. Predicted
Pn arrival times are off from true arrivals by about +20s.

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978359 12/25/1978 8:52:12.380	33.80	57.59	33	A	-9.0	6	3	u	230687	USGS/

sta	delta	seaz	phase	arrival time	arid
IR7	6.04	106.37	Pn	12/25/1978 8:53:34.906	5967
IR7	6.04	106.37	Pg	12/25/1978 8:53:59.040	5966

IR7 6.04 106.37 Lg 12/25/1978 8:55:22.339 5965

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978360 12/26/1978 10:35:23.430	33.63	57.24	40	F	4.4	10	3	u	230756	USGS/

sta	delta	seaz	phase	arrival time	arid
IR7	5.83	108.94	Pn	12/26/1978 10:36:46.704	5970
IR7	5.83	108.94	Lg	12/26/1978 10:38:33.429	5969
IR7	5.83	108.94	Rg	12/26/1978 10:39:18.257	5968

This event part of Rodgers, Ni, Hearn dataset

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1979092 4/02/1979 22:03:47.750	33.86	59.36	33	A	3.8	9	9	u	235364	USGS/

sta	delta	seaz	phase	arrival time	arid
IR3	7.04	100.85	Pn	4/02/1979 22:05:30.688	5979
IR3	7.04	100.85	Lg	4/02/1979 22:07:40.573	5976
IR3	7.04	100.85	Rg	4/02/1979 22:08:47.109	5973
IR2	7.18	102.08	Pn	4/02/1979 22:05:32.307	5978
IR2	7.18	102.08	Lg	4/02/1979 22:07:47.116	5975
IR2	7.18	102.08	Rg	4/02/1979 22:08:37.202	5972
IR1	7.30	99.80	Pn	4/02/1979 22:05:34.352	5977
IR1	7.30	99.80	Lg	4/02/1979 22:07:55.805	5974
IR1	7.30	99.80	Rg	4/02/1979 22:09:01.580	5971

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1979095 4/05/1979 3:45:37.330	33.67	57.22	33	A	4.6	20	12	u	235440	USGS/

sta	delta	seaz	phase	arrival time	arid
IR3	5.41	107.71	Pn	4/05/1979 3:46:53.536	5990
IR3	5.41	107.71	Pg	4/05/1979 3:47:16.010	5987
IR3	5.41	107.71	Lg	4/05/1979 3:48:34.381	5984
IR3	5.41	107.71	Rg	4/05/1979 3:49:16.090	5981
IR1	5.66	106.11	Pn	4/05/1979 3:46:56.200	5989
IR1	5.66	106.11	Pg	4/05/1979 3:47:21.344	5986
IR1	5.66	106.11	Lg	4/05/1979 3:48:42.799	5983
IR1	5.66	106.11	Rg	4/05/1979 3:49:20.166	5980
IR7	5.80	108.59	Pn	4/05/1979 3:46:58.700	5991
IR7	5.80	108.59	Pg	4/05/1979 3:47:24.385	5988
IR7	5.80	108.59	Lg	4/05/1979 3:48:50.594	5985
IR7	5.80	108.59	Rg	4/05/1979 3:49:33.101	5982

This event part of Rodgers, Ni, Hearn dataset

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1979135 5/15/1979 21:56:38.330	33.52	57.15	33	A	-9.0	9	10	u	237483	USGS/

sta	delta	seaz	phase	arrival time	arid
IR3	5.41	109.41	Pn	5/15/1979 21:57:55.345	6177
IR3	5.41	109.41	Lg	5/15/1979 21:59:40.223	6173
IR3	5.41	109.41	Rg	5/15/1979 22:00:29.848	6170
IR1	5.65	107.73	Pn	5/15/1979 21:57:58.743	6176
IR1	5.65	107.73	Lg	5/15/1979 21:59:55.755	6172
IR1	5.65	107.73	Rg	5/15/1979 22:00:29.848	6179
IR7	5.81	110.18	Pn	5/15/1979 21:58:00.770	6178
IR7	5.81	110.18	Pg	5/15/1979 21:58:28.089	6175
IR7	5.81	110.18	Lg	5/15/1979 21:59:58.875	6174
IR7	5.81	110.18	Rg	5/15/1979 22:00:49.203	6171

This event part of Rodgers, Ni, Hearn dataset

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1979135 5/15/1979 22:03:49.600	33.47	57.04	33	A	-9.0	8	8	u	237484	USGS/

sta	delta	seaz	phase	arrival time	arid
IR3	5.35	110.30	Pn	5/15/1979 22:05:08.415	5997
IR3	5.35	110.30	Lg	5/15/1979 22:06:46.673	5994
IR1	5.59	108.57	Pn	5/15/1979 22:05:11.540	5996
IR1	5.59	108.57	Lg	5/15/1979 22:06:54.325	5993
IR1	5.59	108.57	Rg	5/15/1979 22:07:39.220	6000
IR7	5.75	111.01	Pn	5/15/1979 22:05:13.991	5998
IR7	5.75	111.01	Lg	5/15/1979 22:07:06.207	5995
IR7	5.75	111.01	Rg	5/15/1979 22:08:01.809	5992

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1979143 5/23/1979 12:19:49.220	31.98	54.62	33	A	-9.0	7	9	u	237887	USGS/

sta	delta	seaz	phase	arrival time	arid
IR4	4.49	135.40	Pn	5/23/1979 12:20:54.906	6003
IR4	4.49	135.40	Lg	5/23/1979 12:22:00.414	6008
IR3	4.59	138.43	Pn	5/23/1979 12:20:56.314	6002
IR3	4.59	138.43	Lg	5/23/1979 12:22:09.898	6007
IR1	4.74	135.30	Pn	5/23/1979 12:20:58.179	6001
IR1	4.74	135.30	Sn	5/23/1979 12:21:53.484	6005
IR1	4.74	135.30	Lg	5/23/1979 12:22:16.057	6006
IR7	4.99	137.03	Pn	5/23/1979 12:21:01.339	6004
IR7	4.99	137.03	Lg	5/23/1979 12:22:16.751	6009

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1979147 5/27/1979 6:43:15.870	33.23	57.24	11	F	4.6	91	14	u	238094	USGS/

sta	delta	seaz	phase	arrival time	arid
IR3	5.60	111.85	Pn	5/27/1979 6:44:42.162	6018
IR3	5.60	111.85	Pg	5/27/1979 6:45:08.666	6022
IR3	5.60	111.85	Lg	5/27/1979 6:46:30.013	6014
IR4	5.61	109.16	Pn	5/27/1979 6:44:42.449	6019
IR4	5.61	109.16	Lg	5/27/1979 6:46:24.566	6015
IR4	5.61	109.16	Rg	5/27/1979 6:47:28.131	6011
IR1	5.83	110.12	Pn	5/27/1979 6:44:45.417	6017
IR1	5.83	110.12	Pg	5/27/1979 6:45:11.994	6021
IR1	5.83	110.12	Lg	5/27/1979 6:46:39.742	6013
IR1	5.83	110.12	Rg	5/27/1979 6:47:37.351	6010
IR7	6.00	112.43	Pn	5/27/1979 6:44:47.447	6020
IR7	6.00	112.43	Pg	5/27/1979 6:45:16.549	6023
IR7	6.00	112.43	Lg	5/27/1979 6:46:45.257	6016
IR7	6.00	112.43	Rg	5/27/1979 6:47:41.935	6012

This event part of Rodgers, Ni, Hearn dataset

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1979153 6/02/1979 17:57:30.850	33.80	57.02	3	A	4.3	19	9	u	238446	USGS/

sta	delta	seaz	phase	arrival time	arid
IR4	5.24	104.16	Pn	6/02/1979 17:58:53.476	6031
IR4	5.24	104.16	Lg	6/02/1979 18:00:28.764	6028
IR4	5.24	104.16	Rg	6/02/1979 18:01:20.113	6025
IR1	5.45	105.40	Pn	6/02/1979 17:58:56.740	6030

IR1	5.45	105.40	Lg	6/02/1979	18:00:44.711	6027					
IR1	5.45	105.40	Rg	6/02/1979	18:01:25.817	6024					
IR7	5.59	108.00	Pn	6/02/1979	17:58:58.508	6032					
IR7	5.59	108.00	Lg	6/02/1979	18:00:47.570	6029					
IR7	5.59	108.00	Rg	6/02/1979	18:01:25.714	6026					

origin time			lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1979154	6/03/1979	12:19:08.990	34.01	57.07	40	F	4.4	30	10	u	238484	USGS/

sta	delta	seaz	phase	arrival time	arid
IR4	5.22	101.89	Pn	6/03/1979 12:20:23.892	6041
IR4	5.22	101.89	Pg	6/03/1979 12:20:43.573	6039
IR4	5.22	101.89	Lg	6/03/1979 12:22:01.081	6037
IR4	5.22	101.89	Rg	6/03/1979 12:22:50.905	6034
IR1	5.43	103.22	Pn	6/03/1979 12:20:26.660	6040
IR1	5.43	103.22	Lg	6/03/1979 12:22:08.977	6036
IR1	5.43	103.22	Rg	6/03/1979 12:22:52.353	6033
IR7	5.56	105.89	Pn	6/03/1979 12:20:28.946	6042
IR7	5.56	105.89	Lg	6/03/1979 12:22:12.989	6038
IR7	5.56	105.89	Rg	6/03/1979 12:23:12.618	6035

This event part of Rodgers, Ni, Hearn dataset

origin time			lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1979176	6/25/1979	20:04:59.340	34.02	57.55	33	A	-9.0	6	0	u	239779	USGS/

This event is very small. No observable signal with any filter band pass tried.

origin time			lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1979186	7/05/1979	4:46:10.020	33.69	57.17	9	F	4.5	83	12	u	240256	USGS/

sta	delta	seaz	phase	arrival time	arid
IR3	5.37	107.70	Pn	7/05/1979 4:47:30.490	6053
IR3	5.37	107.70	Pg	7/05/1979 4:47:55.152	6050
IR3	5.37	107.70	Lg	7/05/1979 4:49:12.282	6047
IR3	5.37	107.70	Rg	7/05/1979 4:50:00.820	6044
IR1	5.61	106.09	Pn	7/05/1979 4:47:33.929	6052
IR1	5.61	106.09	Pg	7/05/1979 4:48:03.070	6049
IR1	5.61	106.09	Lg	7/05/1979 4:49:18.671	6046
IR1	5.61	106.09	Rg	7/05/1979 4:50:32.648	6043
IR7	5.76	108.60	Pn	7/05/1979 4:47:35.765	6054
IR7	5.76	108.60	Pg	7/05/1979 4:48:04.670	6051
IR7	5.76	108.60	Lg	7/05/1979 4:49:20.671	6048
IR7	5.76	108.60	Rg	7/05/1979 4:50:12.636	6045

Lg phases appear to be clipped.
This event part of Rodgers, Ni, Hearn dataset

origin time			lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1979229	8/17/1979	18:45:39.800	33.47	56.93	33	A	4.3	34	14	u	242398	USGS/

sta	delta	seaz	phase	arrival time	arid
IR3	5.26	110.72	Pn	8/17/1979 18:46:57.668	6190
IR3	5.26	110.72	Pg	8/17/1979 18:47:18.351	6186
IR3	5.26	110.72	Lg	8/17/1979 18:48:27.567	6182
IR4	5.28	107.86	Pn	8/17/1979 18:46:57.927	6191
IR4	5.28	107.86	Pg	8/17/1979 18:47:18.822	6187
IR4	5.28	107.86	Lg	8/17/1979 18:48:27.964	6183
IR4	5.28	107.86	Rg	8/17/1979 18:49:18.833	6180

IR1	5.50	108.94	Pn	8/17/1979 18:47:00.930	6189
IR1	5.50	108.94	Pg	8/17/1979 18:47:24.442	6185
IR1	5.50	108.94	Lg	8/17/1979 18:48:37.124	6181
IR1	5.50	108.94	Rg	8/17/1979 18:49:15.152	6193
IR7	5.66	111.42	Pn	8/17/1979 18:47:03.201	6192
IR7	5.66	111.42	Pg	8/17/1979 18:47:26.168	6188
IR7	5.66	111.42	Lg	8/17/1979 18:48:40.900	6184

This event part of Rodgers, Ni, Hearn dataset

origin	time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1979237	8/25/1979 13:46:25.220	33.51	58.94	15	A	4.1	10	13	u	242749	USGS/

sta	delta	seaz	phase	arrival time	arid
IR3	6.82	104.50	Pn	8/25/1979 13:48:08.852	6065
IR3	6.82	104.50	Pg	8/25/1979 13:48:44.047	6063
IR3	6.82	104.50	Lg	8/25/1979 13:50:18.732	6060
IR3	6.82	104.50	Rg	8/25/1979 13:51:08.354	6056
IR4	6.86	102.31	Pn	8/25/1979 13:48:09.311	6066
IR4	6.86	102.31	Lg	8/25/1979 13:50:19.581	6061
IR4	6.86	102.31	Rg	8/25/1979 13:51:20.010	6057
IR1	7.07	103.29	Pn	8/25/1979 13:48:12.021	6064
IR1	7.07	103.29	Lg	8/25/1979 13:50:23.676	6059
IR1	7.07	103.29	Rg	8/25/1979 13:51:21.803	6055
IR7	7.20	105.33	Pn	8/25/1979 13:48:13.754	6067
IR7	7.20	105.33	Lg	8/25/1979 13:50:24.032	6062
IR7	7.20	105.33	Rg	8/25/1979 13:51:20.907	6058

This event part of Rodgers, Ni, Hearn dataset

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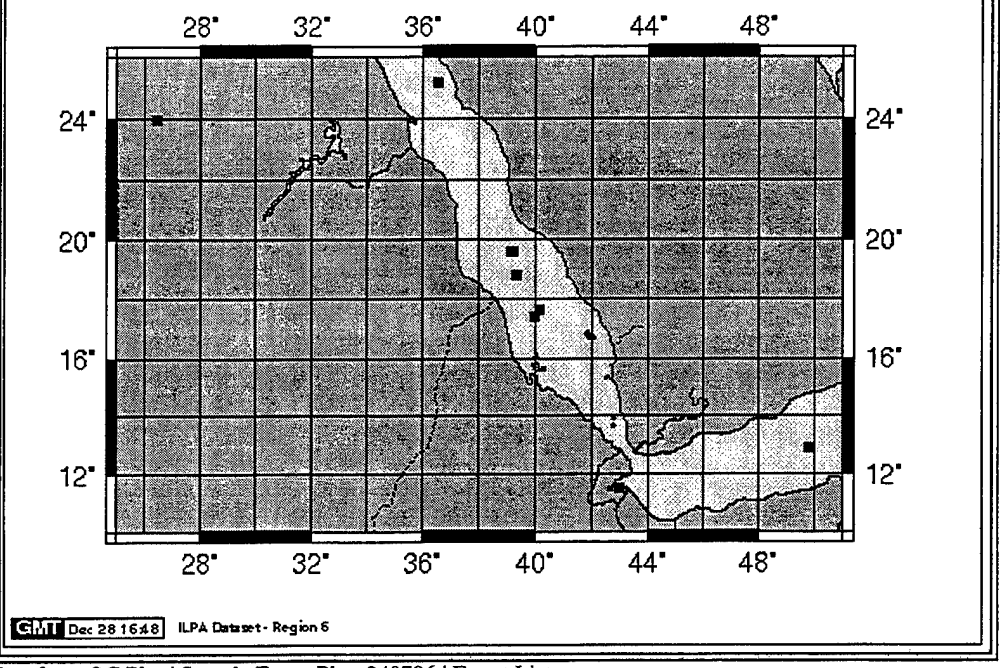
REGION 6

GTDB: ILPA Dataset: Region 6

Most of the 8 events in this region are in the Red Sea. Distances to ILPA range between 16 and 25 degrees. Mb's are between 4.1 and 5.2



About this Page | Waveform QC Plot | Sample Event Plot: 240796 | Event List

GTDB: ILPA Dataset: Bulletin: Region 6

```
origin time                      lat    lon   dep  d  mb ndef nass etype  evid  auth
1978341 12/07/1978 16:22:02.730  12.91  49.75  10  A  4.3  10   6    u  229872 USGS/

      sta   delta seaz  phase    arrival time             arid
      IR1  22.52 182.39 P       12/07/1978 16:27:02.146    6519
      IR1  22.52 182.39 S       12/07/1978 16:31:14.476    6517
      IR1  22.52 182.39 LR      12/07/1978 16:36:55.163    6515
      IR7  22.80 182.16 P       12/07/1978 16:27:05.073    6520
      IR7  22.80 182.16 S       12/07/1978 16:31:20.080    6518
      IR7  22.80 182.16 LR      12/07/1978 16:37:01.032    6516

   Another event follows 33m 20s later.
   This event part of Rodgers, Ni, Hearn dataset

origin time                      lat    lon   dep  d  mb ndef nass etype  evid  auth
1978343 12/09/1978  7:12:52.170  24.00  26.39  33  N  5.2 205   8    u  229960 USGS/

      sta   delta seaz  phase    arrival time             arid
      IR1  23.90 248.11 P       12/09/1978  7:18:07.140    6527
      IR1  23.90 248.11 S       12/09/1978  7:22:30.038    6525
```

IR1	23.90	248.11	LQ	12/09/1978	7:26:44.377	6523						
IR1	23.90	248.11	LR	12/09/1978	7:28:14.629	6521						
IR7	23.95	247.41	P	12/09/1978	7:18:08.862	6528						
IR7	23.95	247.41	S	12/09/1978	7:22:30.924	6526						
IR7	23.95	247.41	LQ	12/09/1978	7:26:46.950	6524						
IR7	23.95	247.41	LR	12/09/1978	7:28:54.911	6522						

This event part of Rodgers, Ni, Hearn dataset

origin time				lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978355	12/21/1978	4:03:53.960		11.54	42.96	16	F	5.1	145	4	u	230492	USGS/

sta	delta	seaz	phase	arrival time		arid
IR7	25.14	197.87	P	12/21/1978	4:09:16.917	6532
IR7	25.14	197.87	S	12/21/1978	4:13:53.010	6530
IR7	25.14	197.87	Lg	12/21/1978	4:16:49.035	6531
IR7	25.14	197.87	LR	12/21/1978	4:20:14.377	6529

This event part of Rodgers, Ni, Hearn dataset

origin time				lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1979133	5/13/1979	20:48:00.580		18.81	39.32	10	A	4.8	68	3	u	237393	USGS/

sta	delta	seaz	phase	arrival time		arid
IR3	19.62	214.88	P	5/13/1979	20:52:28.986	6535
IR3	19.62	214.88	S	5/13/1979	20:56:17.924	6534
IR3	19.62	214.88	LR	5/13/1979	21:00:24.646	6533

Mixed coda with next event on list.
This event part of Rodgers, Ni, Hearn dataset

origin time				lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1979133	5/13/1979	20:55:48.050		19.62	39.15	33	N	4.5	33	2	u	237394	USGS/

sta	delta	seaz	phase	arrival time		arid
IR3	18.99	216.54	P	5/13/1979	21:00:08.943	6537
IR3	18.99	216.54	LR	5/13/1979	21:08:10.508	6536

Mixed coda with previous event on list.
An event at local distance to the network follows
17m 25s later.

origin time				lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1979145	5/25/1979	17:10:58.690		25.16	36.52	33	N	4.6	51	5	u	238003	USGS/

sta	delta	seaz	phase	arrival time		arid
IR4	15.97	234.80	Pn	5/25/1979	17:14:39.637	6540
IR4	15.97	234.80	Sn	5/25/1979	17:17:43.311	6542
IR7	16.05	232.83	Pn	5/25/1979	17:14:40.119	6541
IR7	16.05	232.83	Lg	5/25/1979	17:19:21.623	6538
IR3	16.19	234.40	Pn	5/25/1979	17:14:44.768	6539

Very poor Lg onset times.
This event part of Rodgers, Ni, Hearn dataset

origin time				lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1979198	7/17/1979	17:07:04.530		17.66	40.13	51	F	5.1	84	13	u	240796	USGS/

sta	delta	seaz	phase	arrival time		arid
IR4	20.02	211.35	P	7/17/1979	17:11:33.034	6545
IR4	20.02	211.35	Lg	7/17/1979	17:17:52.862	6554

IR4	20.02	211.35	LR	7/17/1979 17:19:47.576								6549
IR1	20.08	210.57	P	7/17/1979 17:11:34.161								6543
IR1	20.08	210.57	S	7/17/1979 17:15:24.887								6551
IR1	20.08	210.57	Lg	7/17/1979 17:18:04.883								6553
IR1	20.08	210.57	LR	7/17/1979 17:19:47.022								6547
IR3	20.28	211.32	P	7/17/1979 17:11:36.197								6544
IR3	20.28	211.32	LR	7/17/1979 17:19:55.744								6548
IR7	20.30	209.98	P	7/17/1979 17:11:36.415								6546
IR7	20.30	209.98	S	7/17/1979 17:15:29.661								6552
IR7	20.30	209.98	Lg	7/17/1979 17:17:50.176								6555
IR7	20.30	209.98	LR	7/17/1979 17:19:55.392								6550

Another event follows 10m 16s later.

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1979203 7/22/1979 18:51:57.940	17.40	39.96	33	A	4.1	18	13	u	241069	USGS/

sta	delta	seaz	phase	arrival time	arid
IR4	20.32	211.44	P	7/22/1979 18:56:32.433	6566
IR4	20.32	211.44	Lg	7/22/1979 19:03:11.571	6564
IR4	20.32	211.44	LR	7/22/1979 19:04:54.023	6558
IR1	20.38	210.67	P	7/22/1979 18:56:33.732	6565
IR1	20.38	210.67	S	7/22/1979 19:00:31.102	6560
IR1	20.38	210.67	Lg	7/22/1979 19:03:17.626	6562
IR1	20.38	210.67	LR	7/22/1979 19:05:13.757	6556
IR3	20.57	211.41	P	7/22/1979 18:56:38.230	6568
IR3	20.57	211.41	Lg	7/22/1979 19:03:23.580	6563
IR3	20.57	211.41	LR	7/22/1979 19:05:22.469	6557
IR7	20.60	210.09	P	7/22/1979 18:56:35.632	6567
IR7	20.60	210.09	S	7/22/1979 19:00:34.354	6561
IR7	20.60	210.09	LR	7/22/1979 19:05:21.767	6559

Poor P onset times.

[Region 1 | Region 2 | Region 3 | Region 4 | Region 5 | Region 6 | Region 7 | Region 8]

How to Get the ILPA Data Set

About the ILPA Array About the ILPA Dataset

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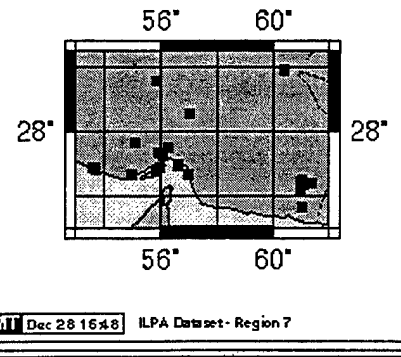
REGION 7

GTDB: ILPA Dataset: Region 7

Region 7 comprises 19 events in southeastern Iran near Bandar Abbas. Distances from ILPA are between 8 and 13 degrees. Magnitudes range between 3.7 and 4.7 Mb.

The sample plot is the unfiltered waveform data from all nine channels of event 224062. 420 seconds are plotted. The estimated magnitude is 4.5 Mb.



About this Page | Sample Event Plots: 224062 235443 239085 | Waveform QC Plot | Event List

GTDB: ILPA Dataset: Bulletin: Region 7

origin time				lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978209	7/28/1978	14:34:55.770		29.90	60.37	25	F	4.1	10	9	u	223834	USGS/

sta	delta	seaz	phase	arrival time	arid
MAIO	6.44	173.25	Pn	7/28/1978 14:36:31.869	7000
MAIO	6.44	173.25	Rg	7/28/1978 14:38:45.661	7001
IR4	9.59	121.15	Pn	7/28/1978 14:37:13.318	6206
IR4	9.59	121.15	Rg	7/28/1978 14:41:14.916	6203
IR3	9.63	122.73	Rg	7/28/1978 14:41:18.993	6202
IR2	9.82	123.24	Pn	7/28/1978 14:37:16.282	6205
IR2	9.82	123.24	Rg	7/28/1978 14:41:26.247	6201
IR1	9.83	121.39	Pn	7/28/1978 14:37:16.799	6204
IR1	9.83	121.39	Rg	7/28/1978 14:41:24.095	6200

Possible mixed coda with another event at both ILPA and MAIO.
This event part of Rodgers, Ni, Hearn dataset

origin time				lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978210	7/29/1978	8:08:38.910		27.51	56.23	29	F	4.3	23	1	u	223879	USGS/

sta	delta	seaz	phase	arrival time	arid
MAIO	9.21	198.39	Pn	7/29/1978 8:10:51.101	7002

Segment starts at incorrect time at the ILPA array - event missed.
Start of event records at MAIO, but ends 33 sec after Pn arrival.

origin time				lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978214	8/02/1978	6:54:30.730		27.33	55.89	46	F	4.5	55	12	u	224062	USGS/

sta	delta	seaz	phase	arrival time	arid
IR4	8.98	150.35	Pn	8/02/1978 6:56:38.416	6216
IR4	8.98	150.35	Rg	8/02/1978 7:00:41.035	6209
IR3	9.14	151.69	Pn	8/02/1978 6:56:41.350	6215

IR3	9.14	151.69	Rg	8/02/1978 7:00:49.064	6208
IR1	9.22	149.84	Pn	8/02/1978 6:56:41.909	6213
IR1	9.22	149.84	Sn	8/02/1978 6:58:22.613	6211
IR1	9.22	149.84	Rg	8/02/1978 7:00:35.555	6218
IR2	9.35	151.61	Pn	8/02/1978 6:56:43.747	6214
IR2	9.35	151.61	Rg	8/02/1978 7:00:57.065	6207
IR7	9.50	150.32	Pn	8/02/1978 6:56:45.682	6217
IR7	9.50	150.32	Sn	8/02/1978 6:58:37.694	6212
IR7	9.50	150.32	Rg	8/02/1978 7:00:42.688	6210

This event part of Rodgers, Ni, Hearn dataset

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978223 8/11/1978 13:59:10.930	26.86	53.62	88	F	4.0	7	7	u	224449	USGS/

sta	delta	seaz	phase	arrival time	arid
IR4	8.69	163.75	Pn	8/11/1978 14:01:09.162	6225
IR4	8.69	163.75	Rg	8/11/1978 14:04:03.551	6220
IR3	8.89	164.86	Pn	8/11/1978 14:01:12.336	6224
IR3	8.89	164.86	Rg	8/11/1978 14:04:22.954	6219
IR1	8.91	162.89	Pn	8/11/1978 14:01:11.759	6222
IR1	8.91	162.89	Sn	8/11/1978 14:02:54.182	6221
IR2	9.10	164.48	Pn	8/11/1978 14:01:14.606	6223

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978239 8/27/1978 20:18:08.600	27.24	56.04	48	F	4.3	37	16	u	225158	USGS/

sta	delta	seaz	phase	arrival time	arid
IR3	9.28	151.17	Pn	8/27/1978 20:20:21.422	6237
IR3	9.28	151.17	Lg	8/27/1978 20:23:13.338	6231
IR3	9.28	151.17	Rg	8/27/1978 20:23:48.433	6228
IR1	9.36	149.35	Pn	8/27/1978 20:20:22.606	6235
IR1	9.36	149.35	Sn	8/27/1978 20:22:04.609	6233
IR1	9.36	149.35	Rg	8/27/1978 20:24:01.106	6226
IR2	9.49	151.10	Pn	8/27/1978 20:20:24.151	6236
IR2	9.49	151.10	Lg	8/27/1978 20:23:09.023	6230
IR2	9.49	151.10	Rg	8/27/1978 20:24:05.599	6227
MAIO	9.52	198.89	Pn	8/27/1978 20:20:26.063	7003
MAIO	9.52	198.89	Lg	8/27/1978 20:22:59.965	7004
MAIO	9.52	198.89	Rg	8/27/1978 20:23:46.946	7005
IR7	9.64	149.84	Pn	8/27/1978 20:20:25.074	6238
IR7	9.64	149.84	Sn	8/27/1978 20:22:11.276	6234
IR7	9.64	149.84	Lg	8/27/1978 20:23:16.485	6232
IR7	9.64	149.84	Rg	8/27/1978 20:24:16.977	6229

This event part of Rodgers, Ni, Hearn dataset

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978249 9/06/1978 13:00:56.540	28.54	56.98	33	A	4.6	57	2	u	225641	USGS/

sta	delta	seaz	phase	arrival time	arid
MAIO	8.05	195.96	P	9/06/1978 13:02:55.971	7007
MAIO	8.05	195.96	S	9/06/1978 13:05:10.157	7008

Mb=4.6 in ISC/NEIS listing, but no signal was observed at any of the ILPA stations. Time window for segments appears to be correct.
The signal did record at MAIO. Event appears to have some depth - phases named P and S.

origin time		lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978252	9/09/1978 22:38:02.430	26.94	56.59	33	A	4.3	33	12	u	225783	USGS/

sta	delta	seaz	phase	arrival time	arid
IR4	9.61	148.07	Pn	9/09/1978 22:40:17.030	6246
IR4	9.61	148.07	Rg	9/09/1978 22:43:57.063	6241
MAIO	9.68	195.60	Pn	9/09/1978 22:40:20.466	7009
MAIO	9.68	195.60	Lg	9/09/1978 22:43:03.223	7012
MAIO	9.68	195.60	Rg	9/09/1978 22:43:54.677	7011
IR3	9.77	149.37	Pn	9/09/1978 22:40:19.575	6245
IR3	9.77	149.37	Rg	9/09/1978 22:44:02.297	6240
IR2	9.98	149.33	Pn	9/09/1978 22:40:22.071	6244
IR2	9.98	149.33	Rg	9/09/1978 22:44:09.558	6239
IR7	10.13	148.15	Pn	9/09/1978 22:40:24.524	6247
IR7	10.13	148.15	Sn	9/09/1978 22:42:27.024	6243
IR7	10.13	148.15	Rg	9/09/1978 22:44:16.069	6242

A second event records about 6m 45s later at the ILPA array but not at MAIO.
This event part of Rodgers, Ni, Hearn dataset

origin time		lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978252	9/09/1978 22:44:41.290	26.63	56.93	33	A	4.2	8	9	u	225784	USGS/

sta	delta	seaz	phase	arrival time	arid
IR4	10.04	147.40	Pn	9/09/1978 22:47:01.336	6255
IR4	10.04	147.40	Rg	9/09/1978 22:50:40.385	6250
IR3	10.19	148.65	Pn	9/09/1978 22:47:03.499	6254
IR3	10.19	148.65	Rg	9/09/1978 22:50:47.283	6249
IR2	10.40	148.63	Pn	9/09/1978 22:47:05.870	6253
IR2	10.40	148.63	Rg	9/09/1978 22:50:52.608	6248
IR7	10.56	147.50	Pn	9/09/1978 22:47:08.209	6256
IR7	10.56	147.50	Sn	9/09/1978 22:49:06.557	6252
IR7	10.56	147.50	Rg	9/09/1978 22:50:59.607	6251

origin time		lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1979095	4/05/1979 4:05:12.220	26.51	60.98	3	F	4.7	130	9	u	235443	USGS/

sta	delta	seaz	phase	arrival time	arid
IR3	12.36	133.73	Pn	4/05/1979 4:08:15.070	6264
IR3	12.36	133.73	Lg	4/05/1979 4:12:17.968	6261
IR3	12.36	133.73	Rg	4/05/1979 4:13:05.452	6258
IR1	12.52	132.49	Pn	4/05/1979 4:08:14.960	6263
IR1	12.52	132.49	Lg	4/05/1979 4:12:34.485	6260
IR1	12.52	132.49	Rg	4/05/1979 4:13:48.231	6257
IR7	12.76	133.18	Pn	4/05/1979 4:08:19.117	6265
IR7	12.76	133.18	Lg	4/05/1979 4:12:33.395	6262
IR7	12.76	133.18	Rg	4/05/1979 4:13:32.675	6259

This event part of Rodgers, Ni, Hearn dataset

origin time		lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1979095	4/05/1979 4:48:22.940	26.43	60.96	33	A	4.3	21	9	u	235445	USGS/

sta	delta	seaz	phase	arrival time	arid
IR3	12.41	134.05	Pn	4/05/1979 4:51:23.599	6272
IR3	12.41	134.05	Lg	4/05/1979 4:55:26.079	6269
IR3	12.41	134.05	Rg	4/05/1979 4:56:23.277	6266
IR1	12.57	132.82	Pn	4/05/1979 4:51:18.461	6271
IR1	12.57	132.82	Lg	4/05/1979 4:55:28.521	6268

IR1	12.57	132.82	Rg	4/05/1979	4:57:09.506	6274
IR7	12.81	133.50	Pn	4/05/1979	4:51:28.339	6273
IR7	12.81	133.50	Lg	4/05/1979	4:55:38.765	6270
IR7	12.81	133.50	Rg	4/05/1979	4:56:38.962	6267

This event has mixed signal with a small local about 2 degrees distant from network that records on Lg codas.
This event part of Rodgers, Ni, Hearn dataset

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1979133 5/13/1979 20:12:54.750	26.19	60.95	10	A	4.5	45	0	u	237392	USGS/

All stations have problems, event not done.

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1979134 5/14/1979 0:56:31.080	26.41	61.37	57	F	4.4	33	3	u	237407	USGS/

sta	delta	seaz	phase	arrival time	arid
IR3	12.67	132.83	Pn	5/14/1979 0:59:28.716	6277
IR3	12.67	132.83	Lg	5/14/1979 1:03:33.581	6276
IR3	12.67	132.83	Rg	5/14/1979 1:04:46.422	6275

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1979137 5/17/1979 6:16:19.370	25.66	61.02	33	A	3.8	4	7	u	237560	USGS/

sta	delta	seaz	phase	arrival time	arid
IR3	13.04	136.09	Lg	5/17/1979 6:23:35.600	6279
IR3	13.04	136.09	Rg	5/17/1979 6:24:26.667	6283
IR1	13.19	134.88	Pn	5/17/1979 6:19:26.706	6281
IR1	13.19	134.88	Lg	5/17/1979 6:23:45.826	6278
IR1	13.19	134.88	Rg	5/17/1979 6:25:17.655	6282
IR7	13.44	135.49	Lg	5/17/1979 6:23:43.161	6280
IR7	13.44	135.49	Rg	5/17/1979 6:24:54.140	6284

Pn arrivals on IR3 and IR7 are too poor to time with any degree of accuracy.

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1979141 5/21/1979 8:06:48.070	26.36	61.06	33	A	4.5	17	11	u	237760	USGS/

sta	delta	seaz	phase	arrival time	arid
IR4	12.44	132.80	Pn	5/21/1979 8:09:46.246	6294
IR4	12.44	132.80	Lg	5/21/1979 8:14:00.341	6290
IR3	12.53	133.96	Pn	5/21/1979 8:09:49.309	6293
IR3	12.53	133.96	Lg	5/21/1979 8:13:55.476	6289
IR3	12.53	133.96	Rg	5/21/1979 8:14:48.835	6286
IR1	12.68	132.73	Pn	5/21/1979 8:09:50.009	6292
IR1	12.68	132.73	Lg	5/21/1979 8:13:58.320	6288
IR1	12.68	132.73	Rg	5/21/1979 8:15:29.898	6285
IR7	12.93	133.41	Pn	5/21/1979 8:09:52.221	6295
IR7	12.93	133.41	Lg	5/21/1979 8:14:08.952	6291
IR7	12.93	133.41	Rg	5/21/1979 8:15:13.742	6287

This event part of Rodgers, Ni, Hearn dataset

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1979148 5/28/1979 15:12:43.200	26.88	55.95	42	F	4.7	10	6	u	238172	USGS/

sta	delta	seaz	phase	arrival time	arid
IR4	9.40	151.31	Pn	5/28/1979 15:14:56.470	6300

IR4	9.40	151.31	Rg	5/28/1979 15:18:52.300	6297
IR3	9.57	152.58	Pn	5/28/1979 15:14:58.657	6299
IR3	9.57	152.58	Rg	5/28/1979 15:18:47.642	6296
IR1	9.64	150.79	Pn	5/28/1979 15:14:59.895	6298
IR7	9.93	151.22	Pn	5/28/1979 15:15:03.526	6301

Possible noise or separate mixed coda event?

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1979152 6/01/1979 23:38:42.570	27.66	55.04	55	F	4.4	23	8	u	238392	USGS/

sta	delta	seaz	phase	arrival time	arid
IR4	8.35	153.90	Pn	6/01/1979 23:40:39.924	6308
IR4	8.35	153.90	Rg	6/01/1979 23:43:53.556	6303
IR3	8.53	155.26	Pn	6/01/1979 23:40:42.794	6307
IR3	8.53	155.26	Rg	6/01/1979 23:43:57.445	6302
IR1	8.59	153.26	Sn	6/01/1979 23:42:14.861	6305
IR7	8.88	153.67	Pn	6/01/1979 23:40:47.110	6309
IR7	8.88	153.67	Sn	6/01/1979 23:42:27.607	6306
IR7	8.88	153.67	Rg	6/01/1979 23:44:28.803	6304

This event part of Rodgers, Ni, Hearn dataset

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1979165 6/14/1979 20:53:56.670	26.66	54.92	33	A	4.5	10	6	u	239085	USGS/

sta	delta	seaz	phase	arrival time	arid
IR1	9.47	156.38	Pn	6/14/1979 20:56:09.740	6314
IR1	9.47	156.38	Sn	6/14/1979 20:57:49.291	6312
IR1	9.47	156.38	Rg	6/14/1979 21:00:01.556	6310
IR7	9.76	156.66	Pn	6/14/1979 20:56:10.081	6315
IR7	9.76	156.66	Sn	6/14/1979 20:57:56.831	6313
IR7	9.76	156.66	Rg	6/14/1979 21:00:11.160	6311

This event part of Rodgers, Ni, Hearn dataset

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1979196 7/15/1979 1:56:17.130	26.75	55.81	0	A	4.1	9	10	u	240681	USGS/

sta	delta	seaz	phase	arrival time	arid
IR4	9.47	152.29	Pn	7/15/1979 1:58:36.203	6324
IR4	9.47	152.29	Rg	7/15/1979 2:02:32.647	6318
IR3	9.63	153.54	Pn	7/15/1979 1:58:38.749	6323
IR3	9.63	153.54	Rg	7/15/1979 2:02:45.021	6317
IR1	9.71	151.76	Pn	7/15/1979 1:58:39.552	6322
IR1	9.71	151.76	Sn	7/15/1979 2:00:21.821	6320
IR1	9.71	151.76	Rg	7/15/1979 2:02:43.731	6316
IR7	9.99	152.16	Pn	7/15/1979 1:58:43.500	6325
IR7	9.99	152.16	Sn	7/15/1979 2:00:32.645	6321
IR7	9.99	152.16	Rg	7/15/1979 2:02:51.288	6319

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1979208 7/27/1979 20:46:51.450	29.59	55.84	33	A	3.7	5	1	u	241315	USGS/

sta	delta	seaz	phase	arrival time	arid
IR4	7.02	142.25	Pn	7/27/1979 20:48:40.289	6326

Too small to read except for Pn at IR4.

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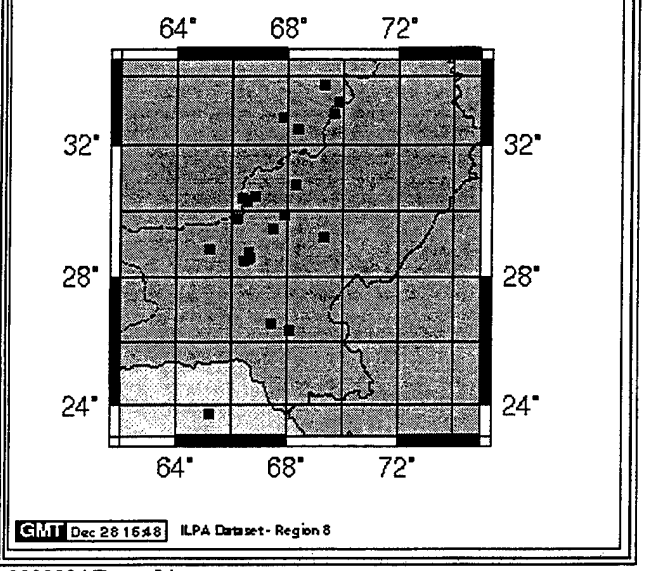
REGION 8

GTDB: ILPA Dataset Region 8

The majority of these events are in Pakistan.

Although all mb's in this area are estimated to be above 4.0, only 9 of the 21 events have at least one associated arrival.

Distances to ILPA are between 14 and 18 degrees.



About this Page | Waveform QC Plot | Sample Event Plot: 230000 | Event List

GTDB: ILPA Dataset: Bulletin: Region 8

```
origin time                      lat    lon   dep  d  mb ndef nass etype  evid  auth
1978200  7/19/1978 15:05:25.110  32.80  67.83  33  A -9.0   5    0    u  223321 USGS/

   Too small to read.

origin time                      lat    lon   dep  d  mb ndef nass etype  evid  auth
1978218  8/06/1978 21:09:41.000  29.20  69.30  33  A -9.0  -1    0    u  224261 USGS/

   Too small to read.

origin time                      lat    lon   dep  d  mb ndef nass etype  evid  auth
1978273  9/30/1978 17:24:16.900  33.23  69.82  33  A -9.0   5    0    u  226684 USGS/

   Too small to read.

origin time                      lat    lon   dep  d  mb ndef nass etype  evid  auth
1978273  9/30/1978 17:30:55.860  33.77  69.30  38  F -9.0   9    0    u  226685 USGS/

   Too small to read.

origin time                      lat    lon   dep  d  mb ndef nass etype  evid  auth
1978286 10/13/1978 15:06:41.930  32.46  68.34  33  A -9.0   5    0    u  227293 USGS/

   Too small to read.
```

```
origin time                        lat    lon   dep  d  mb ndef nass etype  evid  auth
1978289 10/16/1978 15:47:51.190  29.90  67.89    0  A  4.4  13   7    u  227409 USGS/

      sta   delta seaz  phase    arrival time              arid
      IR3  15.23 106.73 P       10/16/1978 15:51:31.780    6580
      IR3  15.23 106.73 LR      10/16/1978 15:57:51.669    6576
      IR4  15.26 105.72 P       10/16/1978 15:51:32.327    6581
      IR4  15.26 105.72 LR      10/16/1978 15:57:53.316    6577
      IR2  15.38 107.20 P       10/16/1978 15:51:33.438    6579
      IR1  15.47 106.04 P       10/16/1978 15:51:34.931    6578
      IR1  15.47 106.04 LR      10/16/1978 15:58:02.355    6575


origin time                        lat    lon   dep  d  mb ndef nass etype  evid  auth
1978313 11/09/1978 13:24:28.940  30.46  66.82  33  A -9.0   6   0    u  228456 USGS/

   Too small to read.

origin time                        lat    lon   dep  d  mb ndef nass etype  evid  auth
1978313 11/09/1978 19:18:44.410  29.79  66.15  33  A -9.0   7   0    u  228462 USGS/

   too small to read.

origin time                        lat    lon   dep  d  mb ndef nass etype  evid  auth
1978338 12/04/1978  0:18:51.630  30.39  66.35  30  F  4.3  11   6    u  229675 USGS/

      sta   delta seaz  phase    arrival time              arid
      IR1  14.06 106.50 Pn      12/04/1978  0:22:22.549    6586
      IR1  14.06 106.50 Lg      12/04/1978  0:26:44.131    6584
      IR1  14.06 106.50 LR      12/04/1978  0:28:22.637    6582
      IR7  14.20 107.47 Pn      12/04/1978  0:22:21.086    6587
      IR7  14.20 107.47 Lg      12/04/1978  0:26:48.960    6585
      IR7  14.20 107.47 LR      12/04/1978  0:28:11.977    6583

   Poor Pn onset times.

origin time                        lat    lon   dep  d  mb ndef nass etype  evid  auth
1978343 12/09/1978  1:30:03.960  28.84  65.17  33  A -9.0   8   0    u  229949 USGS/

   Too small to read.

origin time                        lat    lon   dep  d  mb ndef nass etype  evid  auth
1978344 12/10/1978  1:30:16.300  28.57  66.59  33  A  4.8 104   8    u  230000 USGS/

      sta   delta seaz  phase    arrival time              arid
      IR1  15.10 112.51 P       12/10/1978  1:33:51.689    6594
      IR1  15.10 112.51 S       12/10/1978  1:36:41.991    6592
      IR1  15.10 112.51 Lg      12/10/1978  1:38:15.054    6590
      IR1  15.10 112.51 LR      12/10/1978  1:39:35.037    6588
      IR7  15.27 113.34 P       12/10/1978  1:33:53.236    6595
      IR7  15.27 113.34 S       12/10/1978  1:36:49.100    6593
      IR7  15.27 113.34 Lg      12/10/1978  1:38:29.256    6591
      IR7  15.27 113.34 LR      12/10/1978  1:39:50.248    6589

   This event part of Rodgers, Ni, Hearn dataset

origin time                        lat    lon   dep  d  mb ndef nass etype  evid  auth
1978344 12/10/1978  2:26:57.760  28.50  66.43  33  A  4.6  17   0    u  230003 USGS/

   No signal was recorded at the predicted P arrival times.
   An event did record about 20 mins past the theoretical
```

arrival times for this one. Could be same or different
event -- not done.

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978347 12/13/1978 13:30:42.100	29.49	67.47	33	A	-9.0	4	0	u	230170	USGS/

Too small to read.

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978354 12/20/1978 6:00:35.630	28.75	66.58	33	A	4.2	13	3	u	230445	USGS/

sta	delta	seaz	phase	arrival time	arid
IR1	15.00	111.92	P	12/20/1978 6:04:10.738	6596
IR7	15.17	112.77	P	12/20/1978 6:04:12.507	6597
IR7	15.17	112.77	LR	12/20/1978 6:10:47.913	6598

Small - poorly recorded.

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1978365 12/31/1978 18:45:03.930	28.60	66.63	33	A	4.3	9	3	u	230985	USGS/

sta	delta	seaz	phase	arrival time	arid
IR7	15.29	113.18	P	12/31/1978 18:48:39.115	6601
IR7	15.29	113.18	S	12/31/1978 18:51:31.392	6600
IR7	15.29	113.18	LR	12/31/1978 18:54:31.819	6599

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1979004 1/04/1979 13:37:27.870	30.80	68.32	33	A	4.0	4	0	u	231185	USGS/

Too small to read.

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1979174 6/23/1979 9:42:11.550	32.92	69.67	33	A	-9.0	4	3	u	239651	USGS/

sta	delta	seaz	phase	arrival time	arid
IR3	15.61	94.07	P	6/23/1979 9:46:06.414	6603
IR1	15.88	93.60	P	6/23/1979 9:46:08.058	6602
IR7	15.96	94.54	P	6/23/1979 9:46:06.564	6604

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1979175 6/24/1979 13:49:03.780	30.31	66.54	38	F	4.7	71	0	u	239719	USGS/

No signal at predicted arrival times.
A different event about 3.5 degrees distant
from array records 13m 50s later.

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1979221 8/09/1979 20:02:38.620	26.54	67.43	33	A	4.1	6	4	u	241969	USGS/

sta	delta	seaz	phase	arrival time	arid
IR4	16.61	117.04	P	8/09/1979 20:06:34.646	6607
IR3	16.63	117.97	P	8/09/1979 20:06:35.306	6606
IR1	16.84	117.18	P	8/09/1979 20:06:37.760	6605
IR7	17.03	117.87	P	8/09/1979 20:06:40.233	6608

origin time	lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1979224 8/12/1979 1:25:18.030	23.71	65.16	33	N	4.6	46	8	u	242083	USGS/

sta	delta	seaz	phase	arrival time		arid
IR4	16.91	129.16	P	8/12/1979	1:29:13.737	6615
IR4	16.91	129.16	LR	8/12/1979	1:37:12.816	6611
IR3	16.98	130.04	P	8/12/1979	1:29:14.982	6614
IR3	16.98	130.04	LR	8/12/1979	1:37:16.780	6610
IR1	17.15	129.12	P	8/12/1979	1:29:16.882	6613
IR1	17.15	129.12	LR	8/12/1979	1:37:06.877	6609
IR7	17.39	129.66	P	8/12/1979	1:29:19.687	6616
IR7	17.39	129.66	LR	8/12/1979	1:37:31.573	6612

Lg coda from a previous local event preceeds P arrivals by about 50 seconds.

origin time		lat	lon	dep	d	mb	ndef	nass	etype	evid	auth
1979239	8/27/1979 1:04:12.710	26.32	68.03	33	A	4.7	15	8	u	242818	USGS/

sta	delta	seaz	phase	arrival time		arid
IR4	17.16	116.58	P	8/27/1979	1:08:12.673	6623
IR4	17.16	116.58	LR	8/27/1979	1:15:36.278	6619
IR3	17.18	117.48	P	8/27/1979	1:08:14.181	6622
IR3	17.18	117.48	LR	8/27/1979	1:15:34.362	6618
IR1	17.40	116.72	P	8/27/1979	1:08:14.307	6621
IR1	17.40	116.72	LR	8/27/1979	1:15:45.175	6617
IR7	17.59	117.39	P	8/27/1979	1:08:17.290	6624
IR7	17.59	117.39	LR	8/27/1979	1:15:52.775	6620

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