ERTA ALE

2003 Tremor Experiment

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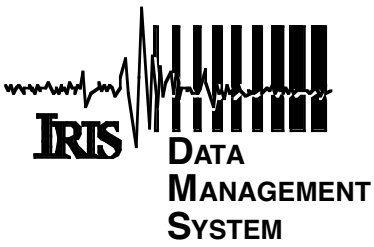
Assembled Data Set 04-014



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Erta Ale
2003 Tremor Experiment

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Mobilization Date: 20 October 2003
Demobilization Date: 15 January 2004
Number of Stations: 8

I. Summary

Eight IRIS PASSCAL seismic instruments were deployed around the active crater of Erta ‘Ale volcano, Afar province, Ethiopia, from 21 November to 7 December 2003. Two stations used Reftek 6-channel DAS, with Mark Products L22 (3 component) sensors on channels 1 through 3, and acoustic and thermal sensors on the remaining three channels. The other six stations used Reftek 3-channel DAS. Of these stations, four used Mark Products L22 sensors, while the remaining two used Guralp CMG-40T broadband instruments. The L22 is a geophone with f_0 □ 2 Hz and a sensitivity of 88 V/m/s. The CMG-40T has a natural period of t_0 = 30 seconds and a sensitivity of 800 V/m/s. All instruments were deployed outdoors, powered by 60 Ah Yuasa lead-acid batteries. Power to broadband and multiparameter stations was supplemented by 20W solar panels. This report covers continuous seismic recording at all IRIS PASSCAL stations.

II. Data Collection

All seismic data were recorded continuously in uncompressed 32-bit data format, sampling at 100 Hz. Table 1 documents station coordinates and parameter settings. Acquisition was stopped only to swap batteries and download data. Table 2 documents station uptimes and downtimes, listing all data gaps >10 ms. The data are presented in 5 and 10 minute SEGY format records.

A station map is shown in Figure 1.

III. Amount of Data

A total of 9.6 GB of data were recorded. Data are archived on DVD and external hard drive.

IV. Known Problems

A serious problem was discovered with both 6-channel DAS after recording was completed. The 16-bit channels (1-3) of both 6-channel DAS do not record data in the usual channel order. On these stations, channel 1 corresponds to N, channel 2 is E, and channel 3 is Z. This was confirmed in the PNSN instrument shop with a signal generator. It is unknown how many other 6-channel Reftek DAS have this problem, but we strongly suggest checking all other 6-channel Reftek DAS in the IRIS PASSCAL fleet.

Station EA8 recorded only high-frequency noise on the vertical channel. This suggests that the L22 sensor had a bad vertical component.

The following is a chronicle of all known problems with this data, listed by station name. All times are given in GMT.

EA1
27-29 Nov: No data was recorded due to a bad power connector.

EA2
No serious problems.

EA3
1 Dec: Problems with an external voltage regulator interrupted continuous recording for approximately three hours. Complete removal of the voltage regulator rectified the problem.
4 Dec: A full disk interrupted recording for approximately two hours. Recording resumed when the disk was swapped.

EA4
No serious problems.

EA5
29 Nov: A serious problem with an external voltage regulator resulted in a power surge that physically destroyed the hard drive. All data from 26 November 04:59 through 29 November 14:13 were unrecoverably obliterated. The DAS was completely replaced, and the Guralp CMG-40T sensor was replaced with a short period Mark Products L22. The replacement functioned properly until the station was removed.

EA6
29 Nov: A bad voltage regulator overloaded the DAS, destroying a fuse and interrupting recording until the morning of 30 November. After replacing the blown fuse, the station sensor was swapped for a CMG-40T broadband sensor. The voltage regulator was also replaced.
29 Nov - 2 Dec: Data from this period is extremely suspect and subject to numerous glitches, due to a bad voltage regulator. The regulator was removed on 2 December, and the instrument recorded good data for the remainder of the experiment.

EA7
No serious problems

EA8
Recorded no good vertical component data due to a bad sensor.

Table 1: Detailed Station Information

Station	*Latitude*	*Longitude*	*Elevation (m A.S.L)*	*Gain*	*DAS Number*	*Sensor Type*
EA1	13.60275	40.664617	567	32	0227	L22
EA2	13.60745	40.664383	575	1	7297	CMG-40T
EA3	13.602683	40.663167	565	32	0362	L22
EA4	13.604383	40.666583	548	1	7292	L22
EA5 (1)	13.597867	40.666833	511	1	7438	CMG-40T
EA5 (2)	13.597867	40.666833	511	1	7346	L22
EA6 (1)	13.603867	40.662167	565	1	7299	L22
EA6 (2)	13.603867	40.662167	565	1	7299	CMG-40T
EA7	13.605183	40.662167	565	1	7321	L22
EA8	13.605017	40.659733	575	1	7284	L22

(1) Information is correct up to Julian Day 333
(2) Information is correct beginning Julian Day 333

Table 2: Station Recording Times (GMT)

Jdy	**EA1**	**EA2**	**EA3**	**EA4**	**EA5**	**EA6**	**EA7**
326	**I** 15:20	**X**	**X**	**X**	**X**	**X**	**X**
327	**D** 06:49 **U** 07:04	**I** 06:32 **D** 06:42 **U** 06:42	**I** 09:34	**I** 14:30 **D** 14:30 **U** 14:30	**X**	**X**	**X**
328	**OK**	**OK**	**D** 14:23 **U** 14:36	**D** 13:50 **U** 13:50	**I** 06:28 **D** 06:38 **U** 06:38	**I** 07:44 **D** 07:54 **U** 07:54	**I** 08:30
329	**D** 05:15 **U** 05:43	**D** 05:53 **U** 06:12	**OK**	**D** 07:47 **U** 07:58 **D** 23:48 **U** 23:48	**OK**	**OK**	**D** 07:33 **U** 07:42
330	**OK**	**OK**	**OK**	**D** 11:48 **U** 11:48	**D** 04:59	**D** 13:47 **U** 13:52	**D** 13:14 **U** 13:21
331	**D** 06:30 **U** 07:04 **D** 07:09 **U** 07:28 **D** 07:48	**OK**	**OK**	**D** 06:16 **U** 07:46 **D** 11:46 **U** 11:46	**X**	**D** 09:52 **U** 09:52 **D** 11:42 **U** 11:42 **D** 13:52 **U** 13:52	**OK**
332	**X**	**D** 13:53 **U** 14:07	**D** 13:21 **U** 13:37	**D** 10:46 **U** 10:46 **D** 13:56 **U** 13:56	**X**	**D** 13:42 **U** 13:42	**OK**
333	**X**	**D** 12:57 **U** 13:25	**OK**	**D** 09:46 **U** 09:46 **D** 13:46 **U** 13:46	**U** 14:13 **D** 14:23 **U** 14:23	**D** 07:22 **U** 07:40 **D** 07:40 **U** 07:50 **D** 08:04	**OK**
334	**U** 07:43	**OK**	**D** 07:26 **U** 08:03	**D** 07:47 **U** 07:47 **D** 14:26 **U** 14:43	**OK**	**U** 08:29 **D** 08:29 **U** 08:30 **D** 12:50 **U** 12:50	**D** 08:36 **U** 08:51 **D** 09:01 **U** 09:01
335	**OK**	**D** 14:15	**D** 02:50 **U** 05:25 **D** 05:40 **U** 05:40	**D** 07:44 **U** 07:44 **D** 12:44 **U** 12:44 **D** 21:44 **U** 21:44	**OK**	**D** 00:00 **U** 00:00 **D** 00:23 **U** 00:23 **D** 00:43 **U** 00:43 **D** 11:43 **U** 11:43 **D** 13:44 **U** 13:44 **D** 17:30	**D** 12:44 **U** 12:59 **D** 13:19 **U** 13:19

Table 2: Station Recording Times (Continued)

Jdy	**EA1**	**EA2**	**EA3**	**EA4**	**EA5**	**EA6**	**EA7**
336	**D** 05:20 **U** 05:46 **D** 06:06 **U** 06:06	**U** 15:12	**D** 05:52 **U** 06:29 **D** 06:44 **U** 06:44	**D** 12:54 **U** 12:54	**OK**	**U** 07:26 **D** 07:27 **U** 07:27 **D** 07:28 **U** 08:35 **D** 08:45 **U** 08:45 **D** 11:45 **U** 11:45 **D** 13:45 **U** 13:45	**OK**
337	**OK**	**D** 03:22 **U** 03:46	**OK**	**D** 01:54 **U** 01:54 **D** 06:32 **U** 07:05 **D** 07:15 **U** 07:15 **D** 11:45 **U** 11:45	**OK**	**D** 11:46 **U** 11:46	**OK**
338	**D** 05:21 **U** 05:35	**D** 16:47 **U** 16:47	**D** 03:50 **U** 05:43 **D** 05:43 **U** 06:03 **D** 06:10	**D** 04:55 **U** 04:55 **D** 15:45 **U** 15:45	**R** 02:44	**OK**	**OK**
339	**D** 05:42 **U** 05:47 **R** 10:17	**R** 13:17	**U** 05:19 **D** 05:29 **U** 05:29 **R** 13:55	**D** 00:55 **U** 00:55 **D** 05:41 **U** 06:25 **R** 06:25	**X**	**D** 11:46 **U** 11:46 **D** 13:17 **U** 13:17 **R** 13:17	**D** 05:50 **U** 07:04 **R** 07:06

Key

OK Continuous data exist for this full day
X No data exist from this full day
I Station install time
U Station up as of this time
D Station down as of this time
R Station removal time

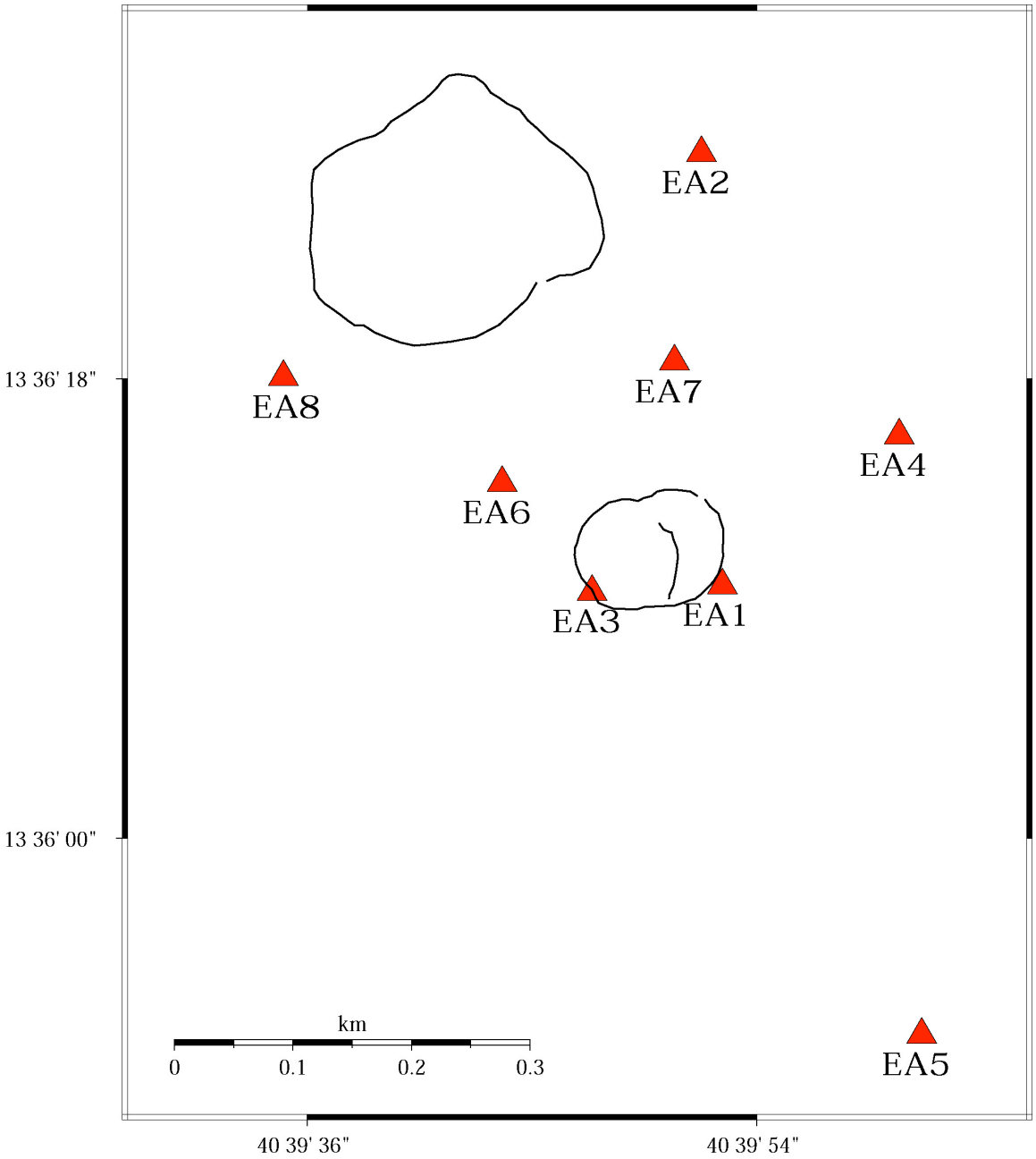

Figure 1. Station geometry for Erta Ale 2003 Tremor Experiment. Red triangles represent seismic stations. Location of active crater (center) and old crater (upper left) are indicated by solid lines.