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Title: *Microearthquake Measurements Near South Sebec, Maine, 1989-90*

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Microearthquake Measurements Near South Sebec, Maine, 1989-90

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INTRODUCTION

Earthquake monitoring in Maine since 1975 by the ten-station Weston Observatory network indicates a high concentration of earthquakes between the towns of Milo and Dover-Foxcroft. This regional network is capable of detecting events having magnitudes greater than 2.0 with a nominal location resolution of 3-5 km. Earlier literature reports and sparser networks indicate that the area has been active since at least the early 1800's. As a result of these observations, an array of portable seismographs was deployed in the epicentral region during the summers of 1989 and 1990. It was anticipated that this deployment would capture a number of events (including many below the threshold of the regional network) and would better characterize the seismicity of the area. Specifically, we sought to determine the locations, depths, and focal mechanisms for a number of events. During the study, 73 earthquakes were identified and for 28 of these there was sufficient data to calculate a hypocenter. In this report, we present a compilation of our observations. Analysis of these results are published elsewhere (Doll et al., in preparation).

DESCRIPTION OF THE NETWORK

Locations of field stations which were occupied during the 1989 and/or 1990 deployments are listed in Table 1 and are shown in Figure 1.

Between May 31 and September 30, 1989 (125 days), five MEQ-800 vertical component smoked paper seismographs and three PDR-2 three-component digital seismographs were used.

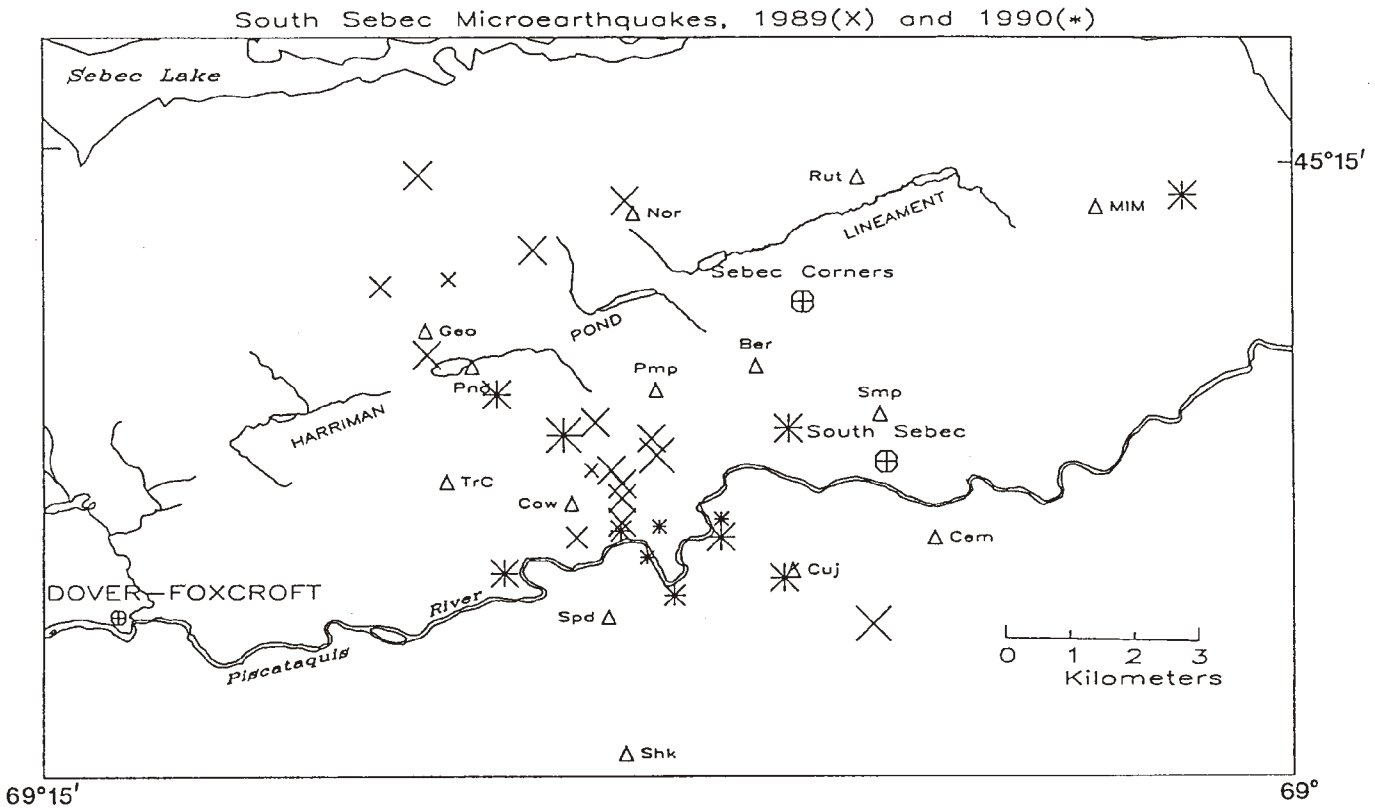

Figure 1: Map of epicenters and seismograph stations. Portable seismograph stations are indicated with a triangle, 1989 epicenters are plotted with an X, and 1990 epicenters are represented by an asterisk (*).

TABLE 1: PORTABLE SEISMOGRAPH SITES

STATION	LATITUDE	LONGITUDE
Cow	45.2016602	69.1436081
Nor	45.2419396	69.1318664
Ber	45.2210808	69.1072082
MIM	45.2436	69.0403
Spd	45.1858368	69.1359024
Shk	5.1669998	69.1320877
Cem	45.1975365	69.0715942
Cuj	5.1927300	69.0995025
Pmp	45.2175675	69.1268692
Pnd	5.2204170	69.1637802
TrC	45.2044068	69.1684341
Geo	5.2252579	69.1731033
Rut	45.2473717	69.0874939
Smp	5.2146340	69.0826645

One of the PDRs had a read board and was generally kept at the base of operations at Colby College to monitor data quality and event locations. In addition to the temporary stations, the Weston Observatory station MIM, west of Milo, was monitored with a helicorder or digital recorder during most of the study duration. During the first two months of the 1989 field season, the PDRs and MEQs were co-located at stations Ber, Nor, and TrB. The PDR from station TrB was moved to station Cow in August. Because the results of the 1989 deployment indicated that we needed more and better data for depth control and focal mechanism calculations, the 1990 deployment involved more instruments, most of which were digital. Five PDR-2 three-component seismographs, six TerraTech DCS-302 three-component digital seismographs, and three MEQ-800 vertical component seismographs were used. This array was maintained between May 20, 1990 and August 20, 1990, for a period of 90 days. The MEQs were co-located with PDRs at stations Ber and Cow, and with a TerraTech at station Cuj. Following a September 9, 1990 magnitude 2.1 event, four PDR-2 seismographs were deployed at stations Ber, Cow, Cuj, and Pnd. These instruments were maintained through the month of October, and detected one additional event.

RESULTS

In all, 73 events were identified during the two field seasons. Thirty-six of these occurred during the first four-month deployment, while all but one of the others occurred during the three-month summer 1990 deployment. Only one event was recorded during the September-October, 1990 PDR deployment. Table 2 lists the critical data for each of these events, including

the observed P- and S- wave arrival times and coda duration at each station.

Coda durations are often used to determine the magnitude of microearthquakes. In New England, the empirical equation of Rosario (1979) is used:

$$M_c = 2.23\ log(D) + 0.12\ log(X) - 2.36$$

where *D* is the coda duration in seconds, and *X* is the distance from the epicenter to the instrument in kilometers. The coda magnitude may be estimated for events with small S-P times that were only recorded on one or two instruments by neglecting the term involving the distance, *X*. Because the digital instruments recorded the first ten seconds or so for most events, and not the entire waveform, we are unable to report coda durations for most of the events which were recorded on digital instruments.

In order to calculate the location, depth, and time of occurrence of an event, the event must be recorded at three or more stations, and there must be at least four pieces of independent information about the event (P-wave arrival time, S-wave arrival time, or the time separating P- and S- wave arrivals). When more information is available, a more reliable solution is calculated. Calculations were made using the a version of the program HYPO78, which was provided by one of us (Ebel) and is routinely used for locating New England earthquakes. We used a layered model as follows:

Layer 1: $V_p = 5.7$, h = 1.0
Layer 2: $V_p = 6.0$, h = 4.5
Layer 3: $V_p = 6.3$, h = 15.5
Layer 4: $V_p = 6.7$, h = 16.0
Layer 5: $V_p = 8.1$

where P-wave velocities, V_p, are given in km/sec, and thicknesses, *h*, are given in kilometers. Because the located events were so shallow, only the top two layers were important in our calculations. Table 3 is a complete listing of epicenter calculations for each of the 28 locatable events. These are plotted along with station locations in Figure 1.

There are two notable trends in these epicenters. The majority of the events follow a north-northwest trend which passes about 1.0 km east of station Cow and seems to parallel streams and fracture patterns in the rocks. A smaller group of four events, recorded in 1989, lie subparallel to and about 1.5 km north of the Harriman Pond lineament (Fig. 1), a line of streams, lakes, and bogs which has recently been identified as a fault zone (Marvinney, 1991, Ebel et al., 1991). An event which was located near station MIM on June 28, 1990 is isolated from most of the other events, and substantially increases the diameter of the active region. Data rechecking, and discussions with persons who would know of blasting in the area have confirmed that the event is natural, rather than artificial, and that it is well-located.

ACKNOWLEDGMENTS

We would like to thank the Maine Geological Survey (MGS), Lawrence Livermore National Laboratory (LLNL), the New England Consortium for Undergraduate Education, and MIT for funding and equipment loans which made this study possible. In particular, we would like to express gratitude to Bob Marvinney of MGS who spent many hours in the field with us (and sometimes without us), and to Don Rock of LLNL who helped to keep the PDRs operational. We would like to thank Keith Brugger and Ted Lambrecht who assisted in maintaining the network. Finally, we would like to express our gratitude to the landowners who allowed us to place instruments on their land, particularly Robert and Richard Varnum, Wayne Bosowicz, Leon Vincent, Georgianna Crockett, Alec Navickis, and Charles Fitzgerald.

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89JUN01 (152)

Ber	P	02:08:22.8	2	MEQ
Ber	S	02:08:23.3		

TABLE 2: EVENT DATA LISTING

Seventy-three earthquakes are listed below. For each event, the Julian day is given in parentheses next to the date. Coda durations are given in seconds. The times which are listed for each phase are as accurate as could be determined from our data. However, significant errors occur in some of the times, especially during the first 6 weeks of the study. These are generally due to poor reception of a WWV radio time code. Later phase arrival times reflect improvements which were made by using synchronizing with a precision master clock or with a satellite clock. Between July 1, 1989 and July 21, 1989, MEQ phase arrival times for station Ber are in error because the internal oscillator was running slow by a factor of about .826. S-P times and coda durations are reliable for these arrivals, but the absolute times are generally in error. Arrivals which have been affected by this problem are indicated with an asterisk (*)

STATION	P/S/S-P	HR:MN:SEC	CODA	INST
TrA	P	02:08:22.5	2	MEQ
TrB	S	02:08:22.85		
Riv	P	02:08:23.05	NA	MEQ
Nor	S-P	0.6	2	MEQ
89JUN06 (157)				
Riv	P	11:48:56.1	17	MEQ
Riv	S	11:48:56.8		
Ber	P	11:48:55.7	19	MEQ
Ber	S	11:48:56.0		
Geo	P	11:48:56.0	43	MEQ
Geo	S	11:48:56.55		
Nor	P	11:48:56.4	4	MEQ
Nor	S	11:48:56.9		
89JUN21 (172)				
Ber	P	08:39:23.6	25	MEQ
Ber	S	08:39:23.9		
Nor	S-P	0.8	20	MEQ
Riv	P	08:38:43.6	35	MEQ
Riv	S	08:38:44.4		
Geo	P	08:39:22.2	65	MEQ
Geo	S	08:39:22.8		
89JUN24 (175)				
TrB	P	05:17:47.9	2	MEQ
TrB	S	05:17:48.1		
89JUN28 (179)				
Ber	P	14:00:21.25	3	MEQ
Ber	S	14:00:21.65		
Riv	P	14:00:22.35	2	MEQ
Riv	S	14:00:22.95		
TrB	P	14:00:20.45	5	MEQ
TrB	S	14.00:20.65		
89JUN28 (179)				
Ber	P	19:37:22.85	15	MEQ
Ber	S	19:37:23.35		
Riv	P	19:37:23.95	4	MEQ
Riv	S	19:37:24.55		
Nor	P	19:38:22.3	17	MEQ
Nor	S	19:38:22.9		
TrB	P	19:37:22.75	20	MEQ
TrB	S	19:37:23.1		
89JUN28 (179)				
Ber	P	19:49:37.4	5	MEQ
Ber	S	19:49:37.95		
Nor	P	19:50:36.85	17	MEQ
Nor	S	19:50:37.5		
Riv	P	19:49:38.5	4	MEQ
Riv	S	19:49:39.1		
TrB	P	19:49:36.8	20	MEQ
TrB	S	19:49:37.1		
89JUN28 (179)				
Ber	P	21:05:52.5	4	MEQ
Ber	S	21:05:52.95		
TrB	P	21:05:51.75	17	MEQ
TrB	S	21:05:52.0		
Nor	P	21:06:50.85	14	MEQ
Nor	S	21:06:51.5		
Riv	P	21:05:53.5	NA	MEQ
Riv	S	21:05:54.05		
89JUN30 (181)				
Ber	P	15:17:05.2	29	MEQ
Ber	S	15:17:05.5		
TrB	P	15:17:04.6	31	MEQ
TrB	S	15:17:05.0		
Nor	P	15:17:04.040		MEQ
Nor	S	15:17:04.65		
89JUL06 (187)				
Ber*	S-P	0.5		
TrB	P	08:22:58.1	23	MEQ
TrB	S	08:22:58.6		
Nor	P	08:22:57.7	27	MEQ
Nor	S	08:22:58.2		
Nor	P	08:22:58.60	14	PDR
Nor	S	08:22:59.1493		
Swp	S	08:22:58.75		MEQ
89JUL08 (189)				
Ber*	P	21:46:49.4	43	MEQ
Ber*	S	21:46:50.0		
TrB	P	21:59:40.4	35	MEQ
TrB	S	21:59:40.8		
89JUL08 (189)				
Ber*	P	21:47:47.7	2	MEQ
Ber*	S	21:47:48.25		
TrB	P	22:00:38.8	1	MEQ
89JUL08 (189)				
Ber*	P	22:13:45.22	21	MEQ
Ber*	S	22:13:50.22		
TrB			25	MEQ
Nor	P	22:29:10.25	18	MEQ
Nor	S	22:29:10.9		
89JUL08 (189)				
Ber*	P	22:15:11.2	4	MEQ
Ber*	S	22:15:11.7		
TrB	P	22:28:02.0	3	MEQ
TrB	S	22:28:02.35		
89JUL09 (190)				
TrB	P	14:49:51.15	15	MEQ
TrB	S	14:49:51.6		

TABLE 2: CONTINUED

STATION	P/S/S-P	HR:MN:SEC	CODA	INST
Ber	P	14:49:51.7395	4	PDR
Ber	S	14:49:52.1719		
89JUL09 (190)				
TrB	P	14:50:52.0	10	MEQ
TrB	S	14:50:52.35		
Ber	P	14:50:52.5838	2	PDR
Ber	S	14:50:53.0184		
89JUL13 (194)				
Nor	P	02:23:30.2	25	MEQ
Nor	S	02:23:31.05		
Ber*	P	02:17:59.49	33	MEQ
Ber*	S	02:18:00.16		
89JUL14 (195)				
Nor	P	08:34:28.8	12	MEQ
Nor	S	08:34:29.4		
Ber*	P	08:34:27.86	9	MEQ
Ber*	S	08:34:28.34		
Ber	P	08:34:30.3580	—	PDR
Ber	S	08:34:30.8352		
89JUL14 (195)				
Nor	P	16:57:31.0	4	MEQ
Nor	S	16:57:31.1		
Ber*	S	16:57:42.5	NA	MEQ
89JUL16 (197)				
Nor	P	12:46:14.8	2	MEQ
Nor	S	12:46:15.0		
89JUL16 (197)				
TrB	P	15:09:47.5	20	MEQ
TrB	S	15:09:48.0		
Nor	P	15:09:48.1	15	MEQ
Nor	S	15:09:48.3		
Ber	P	15:09:48.5217	—	PDR
Ber	S	15:09:49.0525		
Ber*	S-P	0.6	17	MEQ
89JUL17 (198)				
TrB	P	22:07:22.6	NA	MEQ
TrB	S	22:07:23.0		
Ber*	P	22:07:41.05	3	MEQ
Ber*	S	22:07:41.5		
89JUL17 (198)				
TrB	P	23:29:27.35	2	MEQ
TrB	S	23:29:27.65		
Ber*	P	23:29:50.8	2	MEQ
Ber*	S	23:29:51.15		
89JUL19 (200)				
Nor	P	21:41:18.65	25	MEQ
Nor	S	21:41:19.1		
Riv	P	21:40:35.05	7	MEQ
Riv	S	21:40:35.75		
Smp	P	21:39:50.2	13	MEQ
Smp	S	21:39:50.65		
Ber*	P	21:40:30.8	23	MEQ
Ber*	S	21:40:31.4		
89JUL21 (202)				
TrB	P	04:37:42.55	6	MEQ
TrB	S	04:37:43.05		
Ber*	P	04:48:43.1	10	MEQ
Ber*	S	04:48:43.7		
Nor	P	04:25:09.95	5	MEQ
Nor	S	04:25:10.55		
89AUG06 (218)				
Ber	P	23:47:53.7	3.0	MEQ
Ber	S	23:47:54.2		
89AUG07 (219)				
Ber	P	04:33:12.6	7	MEQ
Ber	S	04:33:13.15		
TrB	P	04:33:12.45	3	MEQ
TrB	S	04:33:12.95		
89AUG09 (221)				
Ber	P	00:59:42.7	15	MEQ
Ber	S	00:59:43.25		
Ber	P	00:59:42.2780	—	PDR
Ber	S	00:59:42.5825		
TrB	P	00:59:42.3	15	MEQ
TrB	S	00:59:42.55		
89AUG10 (222)				
Ber	P	17:30:38.85	7	MEQ
Ber	S	17:30:39.45		
89AUG24 (236)				
TrB	P	11:14:44.5	5	MEQ
TrB	S	11:14:44.8		
Ber	P	11:14:44.8	8	MEQ
Ber	S	11:14:45.25		
Riv	S	11:14:45.95	NA	MEQ
89AUG24 (236)				
TrB	P	13:11:19.95	18	MEQ
TrB	S	13:11:20.3		
Ber	P	13:11:20.2	25	MEQ
Ber	S	13:11:20.85		
Riv	S	13:11:21.3	NA	MEQ
Geo	P	13:11:19.25	16	MEQ
Geo	S	13:11:19.9		
89SEP05 (248)				
TrB	P	10:52:44.05	25	MEQ
TrB	S	10:52:44.35		
89SEP10 (253)				
Ber	P	19:07:02.0	3	MEQ
Ber	S	19:07:02.4		
89SEP15 (258)				
Ber	P	07:22:16.5931	33	PDR
Ber	S	07:22:17.1772		
Cow	P	07:22:16.7347	—-	PDR
Cow	S	07:22:17.4212		
Nor	P	07:22:17.1675	—-	PDR
Nor	S	07:22:18.0944		
MIM	P	07:22:17.00	21	HEL
MIM	S	07:22:18.20		
TrB	P	07:22:17.1	42	MEQ
TrB	S	07:22:18.0		

TABLE 2: CONTINUED

STATION	P/S/S-P	HR:MN:SEC	CODA	INST
Rut	S-P	1.0	49	MEQ
Geo			73	MEQ
89SEP23 (266)				
Rut	P	23:45:23.9	5	MEQ
Rut	S	23:45:24.0		
89SEP29 (272)				
Ber	P	09:28:00.80	15	MEQ
Ber	S	09:28:01.15		
TrB	P	09:28:00.60	14	MEQ
TrB	S	09:28:01.05		
Geo	P	09:28:00.85	13	MEQ
Geo	S	09:28:01.45		
Rut	P	09:28:01.20	15	MEQ
Rut	S	09:28:01.85		
----------1990 EVENTS----------				
90JUN02	(153)			
Cow	P	21:17:09.1	27	MEQ
Cow	S	21:17:09.3		
Spd	P	21:17:09.1528	—-	PDR
Spd	S	21:17:09.4086		
Ber	P	21:17:09.6	25	MEQ
Ber	S	21:17:10.1		
Cem	P	21:17:09.6176	—-	PDR
Cem	S	21:17:10.1650		
MIM	P	21:17:11.4	5	HEL
MIM	S	21:17:11.8/11.95		
90JUN03 (154)				
Ber	P	09:56:02.0	18	MEQ
Ber	S	09:56:02.4		
Cow	P	09:56:02.1	19	MEQ
Cow	S	09:56:02.7		
Cem	P	09:56:02.6050		PDR
Cem	S	09:56:03.1415		
MIM	P	09:56:02.0	3	HEL
MIM	S	09:56:04.0		
90JUN06 (157)				
Ber	P	22:53:56.0	11	MEQ
Ber	S	22:53:56.7		
Cow	P	22:53:55.8	21	MEQ
Cow	S	22:53:56.0		
Cem	P	22:53:56.5255	—	PDR
Cem	S	22:53:57.4469		
90JUN06 (157)				
Ber	P	22:54:45.3	9	MEQ
Ber	S	22:54:45.7		
Cow	P	22:54:45.0	22	MEQ
Cow	S	22:54:45.2		
90JUN07 (158)				
Cow	P	08:07:20.0	4	MEQ
Cow	S	08:07:20.3		
90JUN12 (163)				
Cow	P	06:20:41.6	7	MEQ
Cow	S	06:20:41.9		
Cuj	P	06:19:19.17*		
Cuj	S	06:19:19.25*		
90JUN13 (164)				
Cow	P	04:23:30.0	7	MEQ
Cow	S	04:23:30.4		
Ber	P	04:23:30.05	1	MEQ
Ber	S	04:23:30.55		
90JUN15 (166)				
Ber	P	13:27:47.35	3	MEQ
Ber	S	13:27:47.55		
Ber	P	13:27:11.5237	2	PDR
Ber	S	13:27:11.7382		
Cow	P	13:27:47.5	7	MEQ
Cow	S	13:27:47.85		
90JUN18 (169)				
MIM	P	21:00:44.4	6	HEL
MIM	S	21:00:45.2		
Cujo: 1.7s P to Rg, 8s coda, low ampl.				
Ber: 1.2s S-P time, 20s coda, low ampl.				
Cow: 0.9s S-P time, 35s coda, high ampl.				
This looks like the events which we have identified as blasts. If this isn't a blast, then there are more events like it.				
90JUN21 (172)				
Ber	P	02:53:05.5	2	MEQ
Ber	S	02:53:05.9		
Cuj	P	02:53:05.7	4	MEQ
Cuj	S	02:53:06.0		
Cow	P	02:53:06.6	6	MEQ
Cow	S	02:53:07.0		
90JUN23 (174)				
Cow	P	00:47:19.3	3	MEQ
Cow	S	00:47:19.5		
90JUN23 (174)				
Cow	P	04:59:42.9	2	MEQ
Cow	S	04:59:43.2		
90JUN28 (179)				
Ber	P	20:12:12.5	27	MEQ
Ber	S	20:12:13.75		
Cuj	P	20:12:13.15	6	MEQ
Cuj	S	20:12:14.15		
Cem	P	20:12:12.8763		PDR
Cem	S	20:12:13.7015		
Cow	P	20:12:13.5073		PDR
Cow	S	20:12:14.7834		
MIM	P	20:12:12.14	18	DIG
MIM	S	20:12:12.38		
MIM			5	HEL
90JUN29 (180)				
Ber	P	01:37:12.2	12	MEQ
Ber	S	01:37:12.5		
Ber	P	01:37:12.2539	—	PDR
Ber	S	01:37:12.6843		
Cow	P	01:37:11.9	17	MEQ
Cow	S	01:37:12.1		
Cow	P	01:37:11.8929	—	PDR
Cow	S	01:37:12.1047		
90JUL01 (182)				
Cow	P	05:27:01.3671	—	PDR

TABLE 2: CONTINUED

STATION	P/S/S-P	HR:MN:SEC	CODA	INST
Cow	S	05:27:01.6361		
90JUL01 (182)				
Ber	P	05:38:41.0	2	MEQ
Cow	P	05:38:39.5	5	MEQ
Cow	S	05:38:39.7		
Cow	P	05:38:40.3258	—	PDR
Cow	S	05:38:40.5733		
90JUL01 (182)				
Ber	P	08:48:54.0	2	MEQ
Cow	P	08:48:54.6	9	MEQ
Cow	S	08:48:54.8		
Cow	P	08:48:54.5218	—	PDR
Cow	S	08:48:54.7638		
90JUL02 (183)				
Ber	P	06:56:58.4	14	MEQ
Ber	S	06:56:58.6		
Cow	P	06:56:58.5	23	MEQ
Cow	S	06:56:58.8		
Cow	P	06:56:58.4680	—	PDR
Cow	S	06:56:58.7334		
90JUL02 (183)				
Ber	P	06:57:53.3	2	MEQ
Cow	P	06:57:52.7	7	MEQ
Cow	S	06:57:52.9		
Cow	P	06:57:52.8215	—	PDR
Cow	S	06:57:53.0877		
90JUL03 (184)				
Ber	P	23:28:05.8	5	MEQ
Ber	S	23:28:06.1		
Ber	P	23:27:58.6413	—	PDR
Ber	S	23:27:59.1597		
Cow	P	23:28:04.2934	—	PDR
Cow	S	23:28:04.5464		
Cuj	P	23:28:04.5	10	MEQ
Cuj	S	23:28:04.7		
90JUL03 (184)				
Cow	P	23:30:18.3533	—	PDR
Cow	S	23:30:18.7005		
90JUL05 (186)				
Ber	P	01:32:06.5	2	MEQ
Ber	S	01:32:06.6		
90JUL05 (186)				
Ber	P	01:34:40.6	2	MEQ
Ber	S	01:34:40.8		
Cuj	P	01:34:40.2	2	MEQ
90JUL05 (186)				
Ber	P	01:36:43.5	2	MEQ
Ber	S	01:36:43.6		
Cuj	P	01:36:43.0	2	MEQ
90JUL07 (188)				
Ber	P	10:30:46.3	5	MEQ
Cow	P	10:30:46.2	1	MEQ
Cow	S	10:30:46.4		
90JUL07 (188)				
Ber	P	12:22:54.4	5	MEQ
Ber	S	12:22:54.8		
Cow	P	12:22:54.3	6	MEQ
Cow	S	12:22:54.5		
90JUL07 (188)				
Ber	P	12:53:03.7	2	MEQ
Ber	S-P	.3328	—	PDR
Cow	P	12:53:04.0	4	MEQ
Cow	S	12:53:04.1		
90JUL08 (189)				
Ber	P	21:20:35.9	2	MEQ
Ber	S	21:20:36.0		
90JUL10 (191)				
Ber	P	00:38:18.8	2	MEQ
Ber	S	00:38:18.9		
Cow	P	00:38:17.9	2	MEQ
90JUL10 (191)				
Cow	P	00:38:33.0	1	MEQ
Cow	S	00:38:33.5		
90JUL12 (193)				
Ber	P	02:50:18.2	2	MEQ
Ber	S	02:50:18.6		
Cow	P	02:50:17.8	2	MEQ
Cow	S	02:50:18.0		
Cuj	P	02:50:17.8	2	MEQ
Cuj	S	02:50:18.1		
90JUL21 (202)				
Ber	P	17:29:39.1	41	MEQ
Ber	S	17:29:40.1		
Ber	P	17:29:39.3735	—	PDR
Ber	S	17:29:39.7696		
Cow	P	17:29:39.3	20	MEQ
Cow	S	17:29:40.1		
Cow	P	17:29:39.0103	—	PDR
Cow	P	17:29:39.1299		
Cuj	P	17:29:38.8	23	MEQ
Cuj	S	17:29:40.0		
Cem	P	17:29:39.8193	—	PDR
Cem	S	17:29:40.6942		
TrC	P	17:29:39.63	—	TTC
TrC	S	17:29:40.25		
Pon	P	17:29:39.34/39.36		TTC
Pon	S	17:29:39.70/39.69		
Nor	P	17:29:40.77	—	TTC
Nor	S	17:29:41.39		
MIM	P	17:29:40.40	27	HEL
MIM	S	17:29:41.80		
90JUL29 (210)				
MIM	P	21:22:22.8	3	HEL
MIM	S	21:22:23.8		
Cuj	P	21:22:20.7	18	MEQ
Ber	P	21:22:21.75	18	MEQ
Ber	S	21:22:22.25		
90AUG09 (221)				
Ber	P	19:23:53.55	2	MEQ

TABLE 2: CONTINUED

STATION	P/S/S-P	HR:MN:SEC	CODA	INST
Ber	S	19:23:53.95		
Cow	P	19:23:53.5	3	MEQ
Cow	S	19:23:53.8		
Cuj	P	19:23:53.25	3	MEQ
Cuj	S	19:23:53.65		
90AUG09 (221)				
Ber	P	22:33:04.35	20	MEQ
Ber	S	22:33:04.85		
Cow	P	22:33:04.0	12	MEQ
Cow	S	22:33:04.3		
Cuj	P	22:33:04.3	30	MEQ
Cuj	S	22:33:04.8		
MIM	P	22:33:05.4	4	HEL
MIM	S	22:33:06.8		
90AUG10 (222)				
Ber	P	06:15:11.45	4	MEQ
Ber	S	06:15:12.0		
Cow	P	06:15:11.1	2	MEQ
Cuj	P	06:15:11.35	7	MEQ
Cuj	S	06:15:11.80		
90AUG10 (222)				
Cuj	P	08:06:28.0	6	MEQ
Cuj	S	08:06:28.3		
90OCT25 (298)				
Pnd	P	21:03:47.9533		PDR
Pnd	S	21:03:48.4649		
MIM	P	21:03:49.6	5	HEL
MIM	S	21:03:50.8		

TABLE 3: EPICENTER DETERMINATIONS

EXPLANATION

For each located event, the following information is given in the table below:

1. ORIGIN: Origin time in hours, minutes, and seconds
2. LAT N: North latitude in degrees and minutes
3. LONG W: West longitude in degrees and minutes
4. DEPTH: Event depth in kilometers
5. GAP: Largest azimuthal separation, in degrees, between stations
6. RMS: Root mean square error of time residual in seconds
7. ERH: Standard error of epicenter in kilometers
8. ERZ: Standard error of event depth in kilometers
9. Solution quality of hypocenter
   - A: Excellent
   - B: Good
   - C: Fair
   - D: Poor
10. STN: Station code
11. DIST: Epicentral distance in kilometers
12. AZM: Azimuthal angle between epicenter to station measured from north in degrees
13. Description of onset of phase arrival
   - I: Impulsive
   - E: Emergent
14. R: Phase (First P or first S)
15. M: First motion direction (not used in this study)
16. K: Weight of arrival (0=best, 9=worst; when the P-wave is weighted at 9 and the S wave is weighted at 0-4, only the delay between the P and S waves was used.
17. HRMN: Hour and minute of phase arrival
18. SEC: Second of phase arrival
19. CAL: Calculated travel time in seconds
20. RES: Residual of station arrival
21. WT: Weight of phase used in hypocentral solution

TABLE 3: CONTINUED.

DATE	ORIGIN	LAT N	LONG W	DEPTH	MN	MC	ML	GAP	RMS	ERH	ERZ	Q
890601	2 8 21.82	45-13.95	69-10.11	0.00	0.0	0.0		247	0.17	3.0	****	C

STN	DIST	AZM	RMK	HRMN	SEC	TOBS	TCAL	RES	WT	AMX	PRX	XMAG	FMP	FMAG
Nor	3.1	70	IP 9	2 8	0.00	999.00	0.54	0.18	1.55					
			IS 0	2 8	0.60	0.60	0.96	0.18	****					
TrA	3.2	183	IP 2	2 8	22.50	0.68	0.56	0.12	0.77					
			IS 2	2 8	22.85	1.03	1.00	0.03	0.77					
Ber	5.0	105	IP 9	2 8	22.80	0.98	0.87	-0.18	1.53					
			IS 0	2 8	23.30	0.50	1.56	-0.18	****					
Riv	8.7	109	IP 3	2 8	23.05	1.23	1.53	-0.30	0.38					

DATE	ORIGIN	LAT N	LONG W	DEPTH	MN	MC	ML	GAP	RMS	ERH	ERZ	Q
890606	1148 55.21	45-12.65	69- 7.66	0.99	0.0	0.0		199	0.00	0.1	0.1	A

STN	DIST	AZM	RMK	HRMN	SEC	TOBS	TCAL	RES	WT	AMX	PRX	XMAG	FMP	FMAG
Ber	2.0	55	IP 9	1148	55.70	0.49	0.39	0.00	1.01					
			IS 1	1148	56.00	0.30	0.69	0.00	****					
Nor	3.5	355	IP 9	1148	56.40	1.19	0.63	0.01	1.00					
			IS 1	1148	56.90	0.50	1.13	0.01	****					
Geo	3.9	294	IP 9	1148	56.00	0.79	0.71	0.00	1.00					
			IS 1	1148	56.55	0.55	1.26	0.00	****					
Riv	5.0	95	IP 1	1148	56.10	0.89	0.89	0.00	1.00					
			IS 1	1148	56.80	1.59	1.59	0.00	1.00					

DATE	ORIGIN	LAT N	LONG W	DEPTH	MN	MC	ML	GAP	RMS	ERH	ERZ	Q
890619*	838 41.60	45-12.51	69- 7.60	2.84	0.0	0.0		205	0.13	0.0	0.0	A

STN	DIST	AZM	RMK	HRMN	SEC	TOBS	TCAL	RES	WT	AMX	PRX	XMAG	FMP	FMAG
Ber	2.1	48	IP 9	839	23.60	42.00	0.60	-0.16	1.01					
			IS 0	839	23.90	0.30	1.06	-0.16	****					
Nor	3.7	354	IP 9	839	0.00	18.40	0.80	0.18	1.00					
			IS 0	839	0.80	0.80	1.42	0.18	****					
Geo	4.1	297	IP 9	839	22.20	40.60	0.85	-0.06	1.00					
			IS 0	839	22.80	0.60	1.51	-0.06	****					
Riv	4.9	92	IP 9	838	43.60	2.00	0.97	0.05	1.00					
			IS 0	838	44.40	0.80	1.72	0.05	****					

DATE	ORIGIN	LAT N	LONG W	DEPTH	MN	MC	ML	GAP	RMS	ERH	ERZ	Q
890628*	1937 20.30	45-12.15	69- 8.01	1.00	0.0	0.0		190	0.10	0.0	0.0	A

STN	DIST	AZM	RMK	HRMN	SEC	TOBS	TCAL	RES	WT	AMX	PRX	XMAG	FMP	FMAG
Ber	2.9	45	IP 9	1937	22.85	2.55	0.54	0.08	1.00					
			IS 0	1937	23.35	0.50	0.96	0.08	****					
TrB	2.9	275	IP 9	1937	22.75	2.45	0.54	-0.07	1.00					
			IS 0	1937	23.10	0.35	0.97	-0.07	****					
Nor	4.4	2	IP 9	1937	22.30	2.00	0.79	-0.01	1.00					
			IS 0	1937	22.90	0.60	1.40	-0.01	****					
Riv	5.5	85	IP 9	1937	23.95	3.65	0.97	-0.16	0.99					
			IS 0	1937	24.55	0.60	1.73	-0.16	****					

DATE	ORIGIN	LAT N	LONG W	DEPTH	MN	MC	ML	GAP	RMS	ERH	ERZ	Q
890628*	1949 34.35	45-11.95	69- 8.01	0.54	0.0	0.0		199	0.11	0.0	0.0	A

STN	DIST	AZM	RMK	HRMN	SEC	TOBS	TCAL	RES	WT	AMX	PRX	XMAG	FMP	FMAG
TrA	3.0	280	IP 9	1949	36.80	2.45	0.53	-0.11	1.00					
			IS 0	1949	37.10	0.30	0.94	-0.11	****					
Ber	3.2	40	IP 9	1949	37.40	3.05	0.57	0.11	1.00					
			IS 0	1949	37.95	0.55	1.01	0.11	****					
Nor	4.8	2	IP 9	1949	36.35	2.00	0.84	-0.01	1.00					
			IS 0	1949	37.00	0.65	1.50	-0.01	****					
Riv	5.5	81	IP 9	1949	38.50	4.15	0.98	-0.16	0.99					
			IS 0	1949	39.10	0.60	1.74	-0.16	****					

DATE	ORIGIN	LAT N	LONG W	DEPTH	MN	MC	ML	GAP	RMS	ERH	ERZ	Q
890628*	21 5 48.85	45-12.27	69- 8.01	1.19	0.0	0.0		183	0.14	0.0	0.0	A

STN	DIST	AZM	RMK	HRMN	SEC	TOBS	TCAL	RES	WT	AMX	PRX	XMAG	FMP	FMAG
Ber	2.8	49	IP 9	21 5	52.50	3.65	0.52	0.04	1.00					
			IS 0	21 5	52.95	0.45	0.93	0.04	****					
TrB	2.9	270	IP 9	21 5	51.75	2.90	0.55	-0.18	1.00					
			IS 0	21 5	52.00	0.25	0.98	-0.18	****					
Nor	4.2	2	IP 9	21 5	50.85	2.00	0.75	0.06	1.00					
			IS 0	21 5	51.50	0.65	1.34	0.06	****					
Riv	5.5	87	IP 9	21 5	53.50	4.65	0.97	-0.21	0.99					
			IS 0	21 5	54.05	0.55	1.73	-0.21	****					

TABLE 3: CONTINUED.

DATE	ORIGIN	LAT N	LONG W	DEPTH	MN	MC	ML	GAP	RMS	ERH	ERZ	Q
890628*	14 0 19.45	45-12.38	69- 8.38	0.00	0.0	0.0		176	0.15	0.0	0.0	A

STN	DIST	AZM	RMK	HRMN	SEC	TOBS	TCAL	RES	WT	AMX	PRX	XMAG	FMP	FMAG
TrB	2.4	266	IP	9 14 0	20.45	1.00	0.43	-0.13	1.01					
			IS	0 14 0	20.65	0.20	0.76	-0.13	****					
Ber	3.0	57	IP	9 14 0	21.25	1.80	0.53	-0.01	1.00					
			IS	0 14 0	21.65	0.40	0.94	-0.01	****					
Riv	6.0	89	IP	9 14 0	22.35	2.90	1.04	-0.21	0.99					
			IS	0 14 0	22.95	0.60	1.86	-0.21	****					

DATE	ORIGIN	LAT N	LONG W	DEPTH	MN	MC	ML	GAP	RMS	ERH	ERZ	Q
890630*	1517 3.00	45-13.32	69-10.36	0.00	0.0	0.0		240	0.25	0.0	0.0	B

STN	DIST	AZM	RMK	HRMN	SEC	TOBS	TCAL	RES	WT	AMX	PRX	XMAG	FMP	FMAG
TrB	1.9	176	IP	9 1517	4.60	1.60	0.34	0.13	1.01					
			IS	0 1517	5.00	0.40	0.61	0.13	****					
Nor	3.9	55	IP	9 1517	4.00	1.00	0.68	0.12	1.00					
			IS	0 1517	4.65	0.65	1.22	0.12	****					
Ber	5.1	91	IP	9 1517	5.20	2.20	0.90	-0.40	0.99					
			IS	0 1517	5.50	0.30	1.61	-0.40	****					

DATE	ORIGIN	LAT N	LONG W	DEPTH	MN	MC	ML	GAP	RMS	ERH	ERZ	Q
890706	822 57.88	45-12.78	69- 8.34	2.65	0.0	0.0		159	0.00	0.1	0.1	A

STN	DIST	AZM	RMK	HRMN	SEC	TOBS	TCAL	RES	WT	AMX	PRX	XMAG	FMP	FMAG
Ber	2.7	71	IP	9 822	0.00	999.00	0.64	0.00	1.25					
			IS	0 822	0.50	0.50	1.14	0.00	****					
TrA	2.7	247	IP	9 822	58.10	0.22	0.64	0.00	1.25					
			IS	0 822	58.60	0.50	1.14	0.00	****					
Nor	3.3	10	IP	1 822	58.60	0.72	0.72	0.01	0.94					
			IS	0 822	59.15	1.27	1.27	0.00	1.25					
Swa	4.4	88	IS	3 822	58.75	0.87	0.88	-0.01	0.31					

DATE	ORIGIN	LAT N	LONG W	DEPTH	MN	MC	ML	GAP	RMS	ERH	ERZ	Q
890716	15 9 47.81	45-14.20	69- 9.11	0.00	0.0	0.0		227	0.02	0.4	48.2	C

STN	DIST	AZM	RMK	HRMN	SEC	TOBS	TCAL	RES	WT	AMX	PRX	XMAG	FMP	FMAG
Nor	1.7	70	IP	0 15 9	48.10	0.29	0.30	0.00	1.01					
			IS	0 15 9	48.30	0.49	0.53	-0.03	1.01					
TrB	3.9	202	IP	9 15 9	47.50	999.00	0.68	-0.03	1.00					
			IS	0 15 9	48.00	0.50	1.20	-0.03	****					
Ber	3.9	116	IP	0 15 9	48.52	0.71	0.69	0.02	1.00					
			IS	0 15 9	49.05	1.24	1.23	0.02	1.00					

DATE	ORIGIN	LAT N	LONG W	DEPTH	MN	MC	ML	GAP	RMS	ERH	ERZ	Q
890719*	2140 17.65	45-14.62	69- 8.01	0.00	0.0	0.0		342	0.28	0.0	0.0	B

STN	DIST	AZM	RMK	HRMN	SEC	TOBS	TCAL	RES	WT	AMX	PRX	XMAG	FMP	FMAG
Nor	0.2	145	IP	9 2140	18.65	1.00	0.04	0.42	1.00					
			IS	0 2140	19.10	0.45	0.07	0.42	****					
Ber	3.3	141	IP	9 2140	30.80	13.15	0.57	0.15	1.00					
			IS	0 2140	31.40	0.60	1.02	0.15	****					
Swa	5.1	129	IP	9 2140	50.20	32.55	0.90	-0.25	1.00					
			IS	0 2140	50.65	0.45	1.60	-0.25	****					
Riv	6.8	127	IP	9 2140	35.05	17.40	1.20	-0.24	1.00					
			IS	0 2140	35.75	0.70	2.13	-0.24	****					

DATE	ORIGIN	LAT N	LONG W	DEPTH	MN	MC	ML	GAP	RMS	ERH	ERZ	Q
890721*	437 8.95	45-13.88	69-10.92	0.00	0.0	0.0		270	0.14	0.0	0.0	A

STN	DIST	AZM	RMK	HRMN	SEC	TOBS	TCAL	RES	WT	AMX	PRX	XMAG	FMP	FMAG
TrB	3.1	163	IP	9 437	42.55	33.60	0.54	0.08	1.01					
			IS	0 437	43.05	0.50	0.97	0.08	****					
Nor	4.1	73	IP	9 437	9.95	1.00	0.72	0.04	1.00					
			IS	0 437	10.55	0.60	1.28	0.04	****					
Ber	6.0	101	IP	9 437	43.10	34.15	1.05	-0.22	0.99					
			IS	0 437	43.70	0.60	1.87	-0.22	****					

DATE	ORIGIN	LAT N	LONG W	DEPTH	MN	MC	ML	GAP	RMS	ERH	ERZ	Q
890824	1114 44.06	45-11.82	69- 8.55	0.00	0.0	0.0		211	0.05	0.0	0.0	A

STN	DIST	AZM	RMK	HRMN	SEC	TOBS	TCAL	RES	WT	AMX	PRX	XMAG	FMP	FMAG
TrB	2.4	291	IP	9 1114	44.50	0.44	0.42	-0.03	1.61					
			IS	0 1114	44.80	0.30	0.74	-0.03	****					
Ber	3.8	46	IP	2 1114	44.80	0.74	0.67	0.07	0.80					
			IS	2 1114	45.25	1.19	1.20	-0.01	0.80					
Riv	6.3	80	IS	2 1114	45.95	1.89	1.96	-0.06	0.79					

TABLE 3: CONTINUED.

DATE	ORIGIN	LAT N	LONG W	DEPTH	MN	MC	ML	GAP	RMS	ERH	ERZ	Q
890824	1311 17.79	45-14.81	69-10.49	0.00	0.0	0.0		300	0.25	0.0	0.0	B

STN	DIST	AZM	RMK	HRMN	SEC	TOBS	TCAL	RES	WT	AMX	PRX	XMAG	FMP	FMAG
Geo	2.4	177	IP 9	1311	19.25	1.46	0.42	0.32	1.16					
			IS 0	1311	19.90	0.65	0.75	0.32	****					
TrB	4.7	176	IP 9	1311	19.95	2.16	0.82	-0.29	1.14					
			IS 0	1311	20.30	0.35	1.47	-0.29	****					
Ber	6.0	118	IP 9	1311	20.20	2.41	1.06	-0.18	1.14					
			IS 0	1311	20.85	0.65	1.89	-0.18	****					
Riv	9.8	117	IS 2	1311	20.85	3.06	3.06	0.00	0.56					

DATE	ORIGIN	LAT N	LONG W	DEPTH	MN	MC	ML	GAP	RMS	ERH	ERZ	Q
890915	722 15.82	45-11.12	69- 5.01	0.59	0.0	0.0		260	0.05	0.5	3.6	B

STN	DIST	AZM	RMK	HRMN	SEC	TOBS	TCAL	RES	WT	AMX	PRX	XMAG	FMP	FMAG
Ber	4.4	335	IPU0	722	16.59	0.77	0.78	-0.01	1.26					
			IS 0	722	17.18	1.36	1.38	-0.02	1.26					
Cow	5.1	291	IPD0	722	16.73	0.91	0.90	0.02	1.25					
			IS 0	722	17.42	1.60	1.59	0.01	1.25					
Rut	6.9	357	IP 9	722	17.00	1.18	1.22	0.05	0.31					
			IS 3	722	18.00	1.00	2.16	0.05	****					
TrB	7.2	287	IP 9	722	17.10	1.28	1.26	-0.09	0.31					
			IS 3	722	18.00	0.90	2.25	-0.09	****					
MIM	7.3	28	IPU1	722	17.00	1.18	1.29	-0.11	0.93					
			IS 1	722	18.20	2.38	2.29	0.09	0.93					
Nor	7.4	329	IPU0	722	17.17	1.35	1.30	0.06	1.24					
			IS 0	722	18.09	2.27	2.31	-0.04	1.24					

DATE	ORIGIN	LAT N	LONG W	DEPTH	MN	MC	ML	GAP	RMS	ERH	ERZ	Q
890929	928 0.08	45-12.38	69- 8.14	2.10	0.0	0.0		212	0.09	0.8	1.1	A

STN	DIST	AZM	RMK	HRMN	SEC	TOBS	TCAL	RES	WT	AMX	PRX	XMAG	FMP	FMAG
TrB	2.8	266	IP 1	928	0.60	0.52	0.59	-0.08	1.00					
			IS 1	928	1.05	0.97	1.06	-0.09	1.00					
Ber	2.8	54	IP 1	928	0.80	0.72	0.60	0.12	1.00					
			IS 1	928	1.15	1.07	1.06	0.01	1.00					
Geo	3.6	306	IP 1	928	0.85	0.77	0.72	0.05	1.00					
			IS 1	928	1.45	1.37	1.27	0.09	1.00					
Rut	5.9	40	IP 1	928	1.20	1.12	1.07	0.04	0.99					
			IS 1	928	1.85	1.77	1.91	-0.14	0.99					

DATE	ORIGIN	LAT N	LONG W	DEPTH	MN	MC	ML	GAP	RMS	ERH	ERZ	Q
900602	2117 10.30	45-11.84	69- 7.61	0.00	0.0	0.0		120	0.05	0.8	****	C

STN	DIST	AZM	RMK	HRMN	SEC	TOBS	TCAL	RES	WT	AMX	PRX	XMAG	FMP	FMAG
Cow	1.4	290	IP 9	2117	9.10	999.00	0.25	0.01	0.89					
			IS 1	2117	9.30	0.20	0.44	0.01	****					
Spd	1.5	209	IP 9	2117	9.15	999.00	0.26	0.06	1.19					
			IS 0	2117	9.41	0.26	0.46	0.06	****					
Ber	3.1	30	IP 9	2117	9.60	999.00	0.54	0.08	0.88					
			IS 1	2117	10.10	0.50	0.95	0.08	****					
Cem	4.3	90	IP 9	2117	9.62	999.00	0.76	-0.04	1.17					
			IS 0	2117	10.17	0.55	1.35	-0.04	****					
MIM	8.5	53	IS 1	2117	11.80	1.50	1.50	0.00	0.86					

DATE	ORIGIN	LAT N	LONG W	DEPTH	MN	MC	ML	GAP	RMS	ERH	ERZ	Q
900603	956 2.89	45-12.75	69- 6.04	2.82	0.0	0.0		124	0.00	0.0	0.0	A

STN	DIST	AZM	RMK	HRMN	SEC	TOBS	TCAL	RES	WT	AMX	PRX	XMAG	FMP	FMAG
Ber	1.1	332	IP 9	956	2.00	999.00	0.51	0.00	1.01					
			IS 1	956	2.40	0.40	0.91	0.00	****					
Cem	2.8	126	IPD9	956	2.61	999.00	0.68	0.00	1.33					
			IS 0	956	3.14	0.53	1.21	0.00	****					
Cow	3.6	250	IP 9	956	2.10	999.00	0.77	0.00	1.00					
			IS 1	956	2,70	0.60	1.38	0.00	****					
MIM	5.9	54	IS 2	956	4.00	1.11	1.11	0.00	0.66					

DATE	ORIGIN	LAT N	LONG W	DEPTH	MN	MC	ML	GAP	RMS	ERH	ERZ	Q
900606	2253 55.35	45-11.51	69- 9.41	0.00	0.0	0.0		319	0.00	0.0	0.0	A

STN	DIST	AZM	RMK	HRMN	SEC	TOBS	TCAL	RES	WT	AMX	PRX	XMAG	FMP	FMAG
Cow	1.5	43	IP 9	2253	55.80	0.45	0.26	-0.01	1.01					
			IS 0	2253	56.00	0.20	0.47	-0.01	****					
Ber	5.1	50	IP 9	2253	56.00	0.65	0.89	0.01	1.00					
			IS 0	2253	56.70	0.70	1.58	0.01	****					
Cem	6.7	85	IP 0	2253	56.53	1.18	1.18	0.00	0.99					
			IS 0	2253	57.45	2.10	2.10	0.00	0.99					

TABLE 3: CONTINUED.

DATE	ORIGIN	LAT N	LONG W	DEPTH	MN	MC	ML	GAP	RMS	ERH	ERZ	Q
900621*	253 4.30	45-11.99	69- 6.82	1.81	0.0	0.0		149	0.00	0.0	0.0	A

STN	DIST	AZM	RMK	HRMN	SEC	TOBS	TCAL	RES	WT	AMX	PRX	XMAG	FMP	FMAG
Cuj	1.4	126	P 9	253	5.70	1.40	0.39	0.00	1.00					
			S 0	253	6.00	0.30	0.70	0.00	****					
Cow	2.4	275	P 9	253	6.60	2.30	0.51	0.00	1.00					
			S 0	253	7.00	0.40	0.91	0.00	****					
Ber	2.4	12	P 9	253	5.50	1.20	0.52	0.00	1.00					
			S 0	253	5.90	0.40	0.92	0.00	****					

DATE	ORIGIN	LAT N	LONG W	DEPTH	MN	MC	ML	GAP	RMS	ERH	ERZ	Q
900628	2012 11.58	45-14.72	69- 1.38	2.67	0.0	0.0		313	0.13	1.5	1.0	B

STN	DIST	AZM	RMK	HRMN	SEC	TOBS	TCAL	RES	WT	AMX	PRX	XMAG	FMP	FMAG
MIM	1.4	262	IP 1	2012	12.14	0.56	0.51	0.05	0.82					
			IS 1	2012	12.38	0.80	0.91	-0.11	0.82					
Cem	6.5	216	IPD0	2012	12.88	1.30	1.20	0.10	1.07					
			IS 0	2012	13.70	2.12	2.14	-0.02	1.07					
Ber	7.1	248	IP 9	2012	12.50	0.92	1.29	0.24	1.07					
			IS 0	2012	13.75	1.25	2.30	0.24	****					
Cuj	8.4	226	IP 9	2012	13.15	1.57	1.49	-0.16	1.06					
			IS 0	2012	14.15	1.00	2.66	-0.16	****					
Cow	10.6	243	IPD0	2012	13.51	1.93	1.86	0.07	1.05					
			IS 0	2012	14.78	3.20	3.31	-0.11	1.05					

DATE	ORIGIN	LAT N	LONG W	DEPTH	MN	MC	ML	GAP	RMS	ERH	ERZ	Q
900703	2328 3.88	45-11.34	69- 7.37	0.42	0.0	0.0		233	0.03	0.0	0.0	A

STN	DIST	AZM	RMK	HRMN	SEC	TOBS	TCAL	RES	WT	AMX	PRX	XMAG	FMP	FMAG
Cuj	1.9	78	IP 9	2328	4.50	0.62	0.34	-0.06	1.00					
			IS 0	2328	4.70	0.20	0.60	-0.06	****					
Cow	2.2	311	IP 0	2328	4.29	0.41	0.39	0.02	1.00					
			IS 0	2328	4.55	0.67	0.69	-0.02	1.00					
Ber	3.8	19	IPU9	2328	0.64	999.00	0.66	0.00	0.99					
			IS 0	2328	1.16	0.52	1.18	0.00	****					

DATE	ORIGIN	LAT N	LONG W	DEPTH	MN	MC	ML	GAP	RMS	ERH	ERZ	Q
900712*	250 16.60	45-11.92	69- 7.56	0.35	0.0	0.0		176	0.00	0.0	0.0	A

STN	DIST	AZM	RMK	HRMN	SEC	TOBS	TCAL	RES	WT	AMX	PRX	XMAG	FMP	FMAG
Cow	1.4	284	IP 9	250	17.80	1.20	0.26	0.00	1.00					
			IS 0	250	18.00	0.20	0.46	0.00	****					
Cuj	2.2	108	IP 9	250	17.80	1.20	0.39	0.00	1.00					
			IS 0	250	18.10	0.30	0.69	0.00	****					
Ber	2.9	31	IP 9	250	18.20	1.60	0.51	0.00	1.00					
			IS 0	250	18.60	0.40	0.91	0.00	****					

DATE	ORIGIN	LAT N	LONG W	DEPTH	MN	MC	ML	GAP	RMS	ERH	ERZ	Q
900721	1729 38.40	45-12.67	69- 8.72	2.62	0.0	0.0		74	0.12	1.1	0.7	B

STN	DIST	AZM	RMK	HRMN	SEC	TOBS	TCAL	RES	WT	AMX	PRX	XMAG	FMP	FMAG
Cow	1.1	173	IP 0	1729	39.01	0.61	0.48	0.13	1.07					
			IS 0	1729	39.13	0.73	0.86	-0.13	1.07					
Pon	1.8	306	IP 9	1729	39.36	0.96	0.54	-0.09	1.07					
			IS 0	1729	39.69	0.33	0.96	-0.09	****					
TrC	2.0	247	IP 9	1729	39.63	1.23	0.56	0.19	1.07					
			IS 0	1729	40.25	0.62	0.99	0.19	****					
Ber	3.2	70	IP 9	1729	39.37	0.97	0.70	-0.15	1.06					
			IS 0	1729	39.77	0.40	1.25	-0.15	****					
Nor	3.6	17	IP 9	1729	40.77	2.37	0.76	0.03	1.06					
			IS 0	1729	41.39	0.62	1.35	0.03	****					
Shk	5.0	168	IP 9	1729	39.87	1.47	0.96	-0.01	1.05					
			IS 0	1729	40.61	0.74	1.72	-0.01	****					
Cem	6.0	105	IP 9	1729	39.82	1.42	1.11	0.00	0.79					
			ES 1	1729	40.69	0.87	1.97	0.00	****					
MIM	9.0	66	IP 9	1729	40.40	2.00	1.59	0.16	0.78					
			IS 1	1729	41.80	1.40	2.83	0.16	****					

DATE	ORIGIN	LAT N	LONG W	DEPTH	MN	MC	ML	GAP	RMS	ERH	ERZ	Q
900729	2122 20.67	45-11.50	69- 6.07	0.00	0.0	0.0		239	0.05	0.0	0.0	A

STN	DIST	AZM	RMK	HRMN	SEC	TOBS	TCAL	RES	WT	AMX	PRX	XMAG	FMP	FMAG
Cuj	0.2	49	IP 2	2122	20.70	0.03	0.03	0.00	0.90					
Ber	3.3	352	IP 9	2122	21.75	1.08	0.58	0.05	0.89					
			IS 2	2122	22.25	0.50	1.03	0.05	****					
Cow	3.5	288	IP 9	2122	24.00	3.33	0.62	-0.08	0.89					
			IS 2	2122	24.40	0.40	1.10	-0.08	****					
MIM	7.5	40	IP 9	2122	22.80	2.13	1.32	-0.03	1.32					
			IS 1	2122	23.80	1.00	2.34	-0.03	****					

TABLE 3: CONTINUED.

DATE	ORIGIN	LAT N	LONG W	DEPTH	MN	MC	ML	GAP	RMS	ERH	ERZ	Q
900809*	1923 52.25	45-11.66	69- 7.70	0.00	0.0	0.0		209	0.09	0.0	0.0	A

STN	DIST	AZM	RMK	HRMN	SEC	TOBS	TCAL	RES	WT	AMX	PRX	XMAG	FMP	FMAG
Cow	1.5	304	P 9	1923	53.50	1.25	0.26	0.10	1.00					
			S 0	1923	53.80	0.30	0.45	0.10	****					
Cuj	2.3	95	P 9	1923	53.25	1.00	0.40	0.09	1.00					
			S 0	1923	53.65	0.40	0.71	0.09	****					
Ber	3.4	29	P 9	1923	53.55	1.30	0.60	-0.07	1.00					
			S 0	1923	53.95	0.40	1.06	-0.07	****					

DATE	ORIGIN	LAT N	LONG W	DEPTH	MN	MC	ML	GAP	RMS	ERH	ERZ	Q
900809	2233 3.36	45-13.00	69- 9.53	0.00	0.0	0.0		288	0.04	0.0	0.0	A

STN	DIST	AZM	RMK	HRMN	SEC	TOBS	TCAL	RES	WT	AMX	PRX	XMAG	FMP	FMAG
Cow	2.0	144	P 9	2233	4.00	0.64	0.36	0.02	1.08					
			S 0	2233	4.30	0.30	0.64	0.02	****					
Ber	4.1	83	P 9	2233	4.35	0.99	0.72	-0.06	1.07					
			S 0	2233	4.85	0.50	1.28	-0.06	****					
Cuj	5.4	120	P 0	2233	4.30	0.94	0.94	0.00	1.07					
MIM	9.8	72	IP 9	2233	5.40	2.04	1.72	0.06	0.78					
			S 1	2233	6.80	1.40	3.05	0.06	****					

DATE	ORIGIN	LAT N	LONG W	DEPTH	MN	MC	ML	GAP	RMS	ERH	ERZ	Q
900810	615 10.92	45-11.88	69- 8.02	0.00	0.0	0.0		195	0.04	0.4	84.8	C

STN	DIST	AZM	RMK	HRMN	SEC	TOBS	TCAL	RES	WT	AMX	PRX	XMAG	FMP	FMAG
Cow	0.9	297	P 1	615	11.10	0.18	0.16	0.02	0.89					
Cuj	2.7	102	P 1	615	11.35	0.43	0.48	-0.06	0.88					
			S 0	615	11.80	0.88	0.86	0.02	1.18					
Ber	3.3	39	P 1	615	11.45	0.53	0.58	-0.05	0.88					
			S 0	615	12.00	1.08	1.03	0.05	1.17					