

National Radio Astronomy Observatory

**Seismicity and Seismic Hazard
at MMA site, Antofagasta, Chile**

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Introduction

Chile, because of its location along the convergent margin between Nazca and South American plates, presents not only high rates of earthquake activity but also has been the site of the largest earthquakes worldwide. This makes seismicity one of the most important factors contributing to general natural hazards in this region.

Ideally, to estimate future ground motion at any given place it would be optimum to have records of the ground motion at the same site in the past, and have certainty on the recurrence periods of the earthquakes that give rise to those accelerations.

Unfortunately, in most cases there are only estimations of recurrence of large earthquakes based on one or two intervals. An exceptional case occurs in central and southern Chile because these regions have been inhabited for longer times therefore up to four intervals between large earthquakes can be determined. The other major disadvantage is the lack of records of ground motion at all places within Chile. At most, there are records only at few selected sites.

The lack of proper records at the desired site forces us to use a probabilistic approach, which is based on earthquake rates and laws of attenuation of ground motion calculated for generic zones, instead for the particular region of interest. It is necessary to make use of methods and techniques which allow estimation of ground motion based on records at other sites and magnitude-frequency distributions of earthquake production occurring within the region of interest.

Method

The general technique used in this work is the same as that proposed by Cornell (1972) and Algermissen and Perkins (1976) which later Barrientos (1980) and Martin (1990) adapted for Chile. In the probabilistic approach, the estimation of maximum acceleration at a given site within a certain time period involves three steps:

- 1.- Delineation of source areas,
- 2.- Analysis of statistical characteristics of historical earthquakes in each seismic source area, and
- 3.- Calculation of the extreme cumulative probability $F_{\max,t}(a)$ of acceleration for some time t .

Seismogenetic areas

The first step is to determine the size and location of the area containing epicenters of earthquakes that could affect MMA installations. A region of 250 km of radius centered at the MMA site was selected. Earthquake catalogs were collected and those events with epicenters located between latitudes 21°-25.5°S and longitudes 65°-73°W (Figure 1, Appendix I) were selected. Based on this figure, two major conclusions can be drawn: a) seismicity is mainly constrained to the Wadati-Benioff zone (inclined plane dipping east from the trench) b) no shallow activity is present near the MMA site (solid star)

According to these observations, the characterization of seismicity will include only one region: the Wadati-Benioff zone.

Large earthquakes in the area

Along the subduction zone on which Chile is located, the largest earthquakes take place along the boundary between the oceanic Nazca plate and the overriding South America plate. The coupling region between these two plates is constrained to the shallowest 50 km (Tichelaar and Ruff, 1992). This region includes roughly the area between the trench and the coast. One example of these type of earthquakes is the July 30, 1995, $M_w = 8.1$ earthquake. The rupture extension associated with this earthquake is roughly 180 km long by 60-70 km wide with an average displacement of approximately 5 m.

On Dec. 1950, a large $M_w = 8.0$ event took place down-dip along the plate subduction (Kausel and Campos, 1992). This event has been interpreted as rupturing completely the subducting lithosphere and probably, along with the large thrust earthquakes along the coast, represent the major threat to MMA installations in the area. This event produced an intensity VII-VIII in Modified Mercalli scale (IV in the old Chilean intensity scale) as shown in Appendix II. Kausel (1991) suggests that normal faults in Chile produce relatively larger intensities than those associated with equivalent thrust events.

Seismicity from catalogs

Fig. 2a shows the number of events, independent of magnitude, as a function of time. First reports of seismicity began on 1910, corresponding to an earthquake $M = 7.3$ at 120 km depth. Since then, only the largest earthquakes were reported until mid-1920's when the threshold in magnitude was lowered due to the expansion in number and quality of seismological observatories around the world. The most significant change came in the early 60's, when the U.S. Geological Survey deployed more than 100 seismological stations around the world under a program named World Wide Standardized Seismographic Network (WWSSN). These stations, consisting of 3-component instruments of both short and long period bands, allowed the detection of even lower magnitude events around the world. Errors in epicenter locations easily reach one degree (about 110 km) for the older events but this number decreases to about 20 km in longitude and no more than 10 km in latitude in the latter part of the catalog.

The highest peak in the number of events, occurring in 1995, is due to aftershocks of the $M_w = 8.1$ earthquake of July 30. Previous relative higher peaks also coincide with a large $M_s = 7.0$ event in March, 1987.

Because recurrence times of large earthquakes are longer than those for smaller events, different time periods are needed to establish their regular rate of occurrence. This is evident, on one end, when magnitude 5 earthquakes are considered; these events have been detected regularly only during the last few years, due to increased capabilities of seismological observatories, therefore only the last few years should be considered to establish the rate of earthquake production. If the interval is long enough, periods with no reports of earthquakes for this magnitude range will be included, making the rate decrease artificially. On the other end, at extreme of large earthquakes, a longer interval is needed to include those events reported at the beginning of the catalogs, which have longer recurrence times.

$$\text{Log } N = a - bM \quad (1)$$

in which the N is the cumulative number of events with magnitude greater or equal magnitude M . In this case, $a = 4.03 \pm 0.34$, $b = 0.83 \sim 0.5$, with a regression coefficient of 0.98; note that the coefficient a has been normalized by unit area (one degree of latitude by one degree of longitude) and represents the number of earthquakes with magnitudes greater or equal to 0 per year in an area of one degree by one degree; in this case, according to the least squares estimation, there are more than 10700 earthquakes with magnitude greater or equal than 0 per degree square.

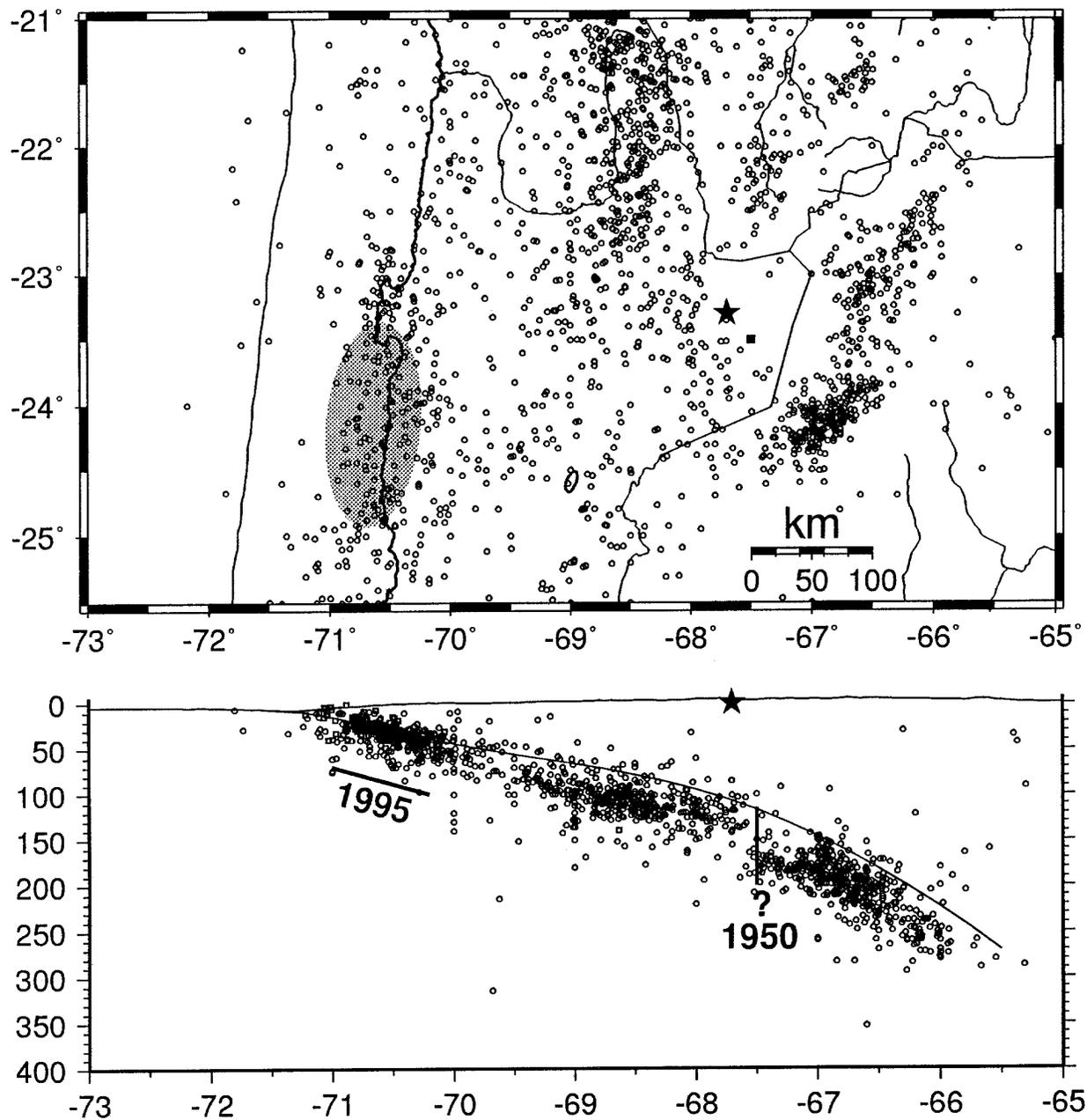


Fig 1. Map (above) and cross-section (bottom) view of the seismicity of the area of Interest. The NRAO site is represented by a solid star. The Wadati-Benioff (plate interface) plane is represented by the solid line. The two largest events in the region are the 1950 (epicenter is the solid square) and 1995 (ellipse shows the approximate rupture region) earthquakes.

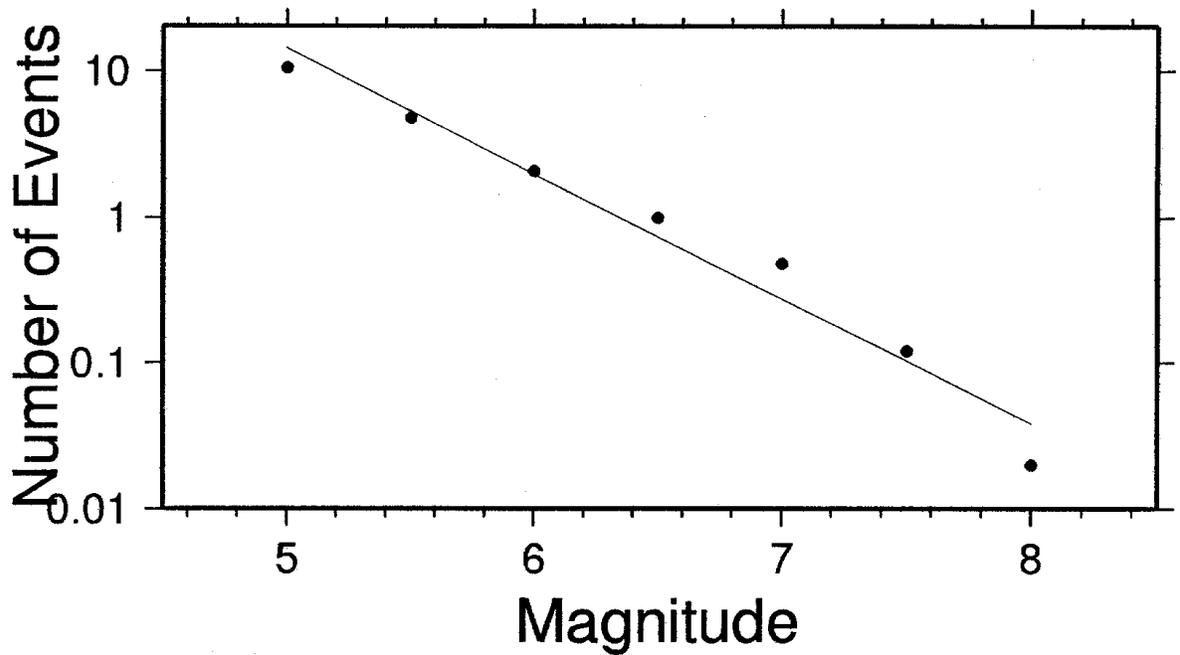
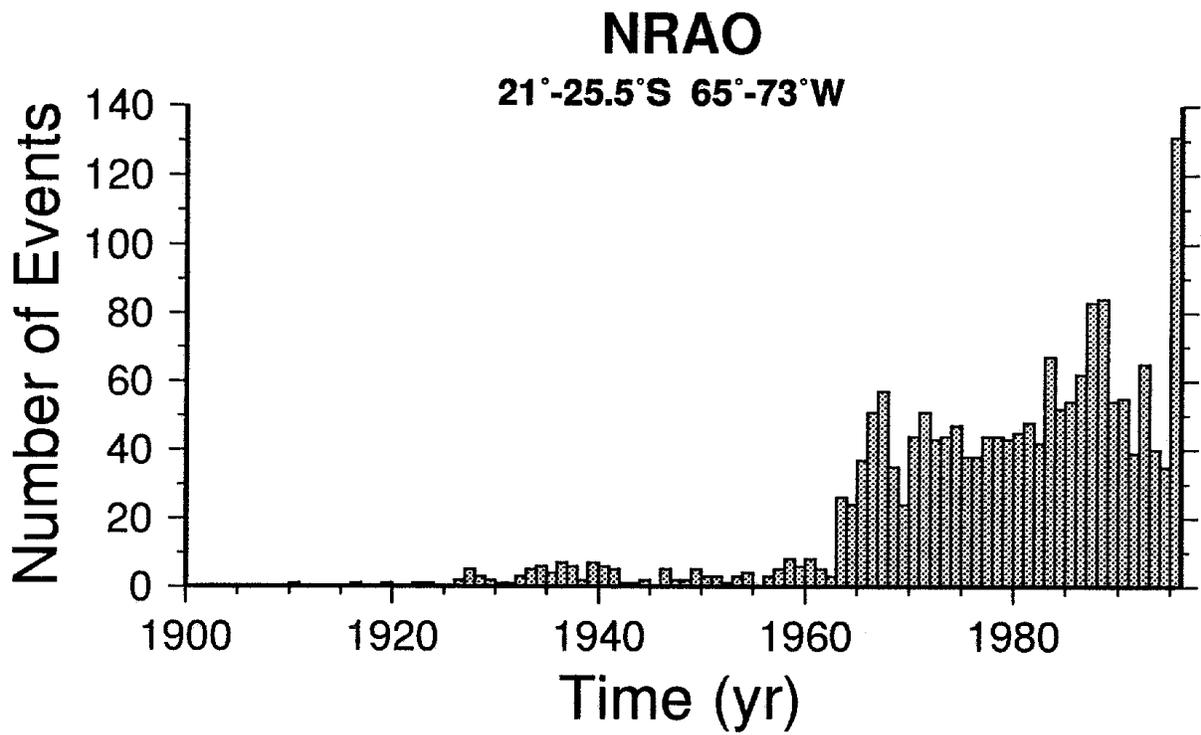


Fig. 2. Time distribution (above) of earthquakes within the region of interest. There is a significant improvement in capabilities of earthquake location in 1964 due to the deployment of the WWSSN stations. The cumulative magnitude distribution (bottom) is best represented by $Lo' N = 4.03 - 0.83 M$.

We have used M_s (calculated magnitude from surface waves) in all calculations and, when not available, we have transformed it from m_b (calculated magnitude from body waves) using the relationship

$$M_s = (m_b - 3.29) / 0.4 \quad (2)$$

found by Martin (1990) based on all earthquakes, which occurred in Chile, showing both types of magnitude.

Attenuation of ground motion with distance

To determine the contribution of each of the sources to the seismic hazard it is essential to estimate how the parameter (peak acceleration or Mercalli intensity) decreases with distance. Horizontal peak acceleration decays as a function of distance according to:

$$a = \frac{71.3e^{0.83M_s}}{(R + 60)^{1.03}} \quad (3)$$

in which M_s is earthquake magnitude and R is the hypocentral distance (Martin, 1990).

This attenuation relationship has the same form but the coefficients are slightly different to those proposed by Saragoni and Schasd (1989), calculated considering the total number of peak accelerations generated by the 1985 Central Chile earthquake and represents the decay of acceleration for medium soils (basement or consolidated sediments). Fig. 3 shows the decay for several magnitudes of interest.

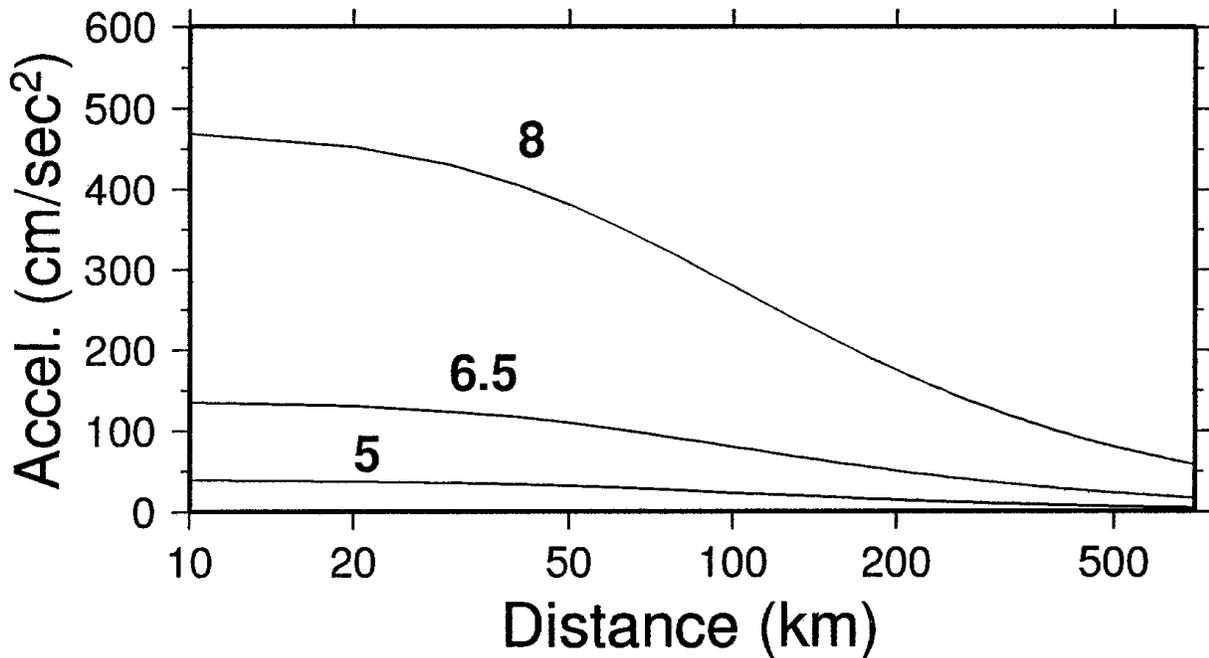


Fig. 3. Horizontal strong ground motion (acceleration) attenuation for three sources with different magnitudes based on eq. (2). Their depths have been set at 40 km.

Probabilistic Estimate

Accelerations

Once the source characteristics (seismic productivity and location) and the attenuation relationship are known, it is possible to estimate the probability of exceedence of a certain level of any given acceleration. For this, the seismogenetic region is divided into several subregions (in our case, we used 25 km long (or quarter of a degree) by 25 km long sources. Since on each of the cells the frequency-magnitude distribution, given by eq. (1), is the same, we determine the number of events within that cell which do not produce accelerations greater or equal the acceleration of interest according to:

$$f(a) = \frac{\text{Expected \# of occurrences with } A \leq a \text{ and } M \leq M_{\min}}{\text{Total \# of occurrences with } M \geq M_{\min}} \quad (4)$$

This calculation is performed over a minimum magnitude M_{\min} of interest for each cell, defined in this study as 5.0

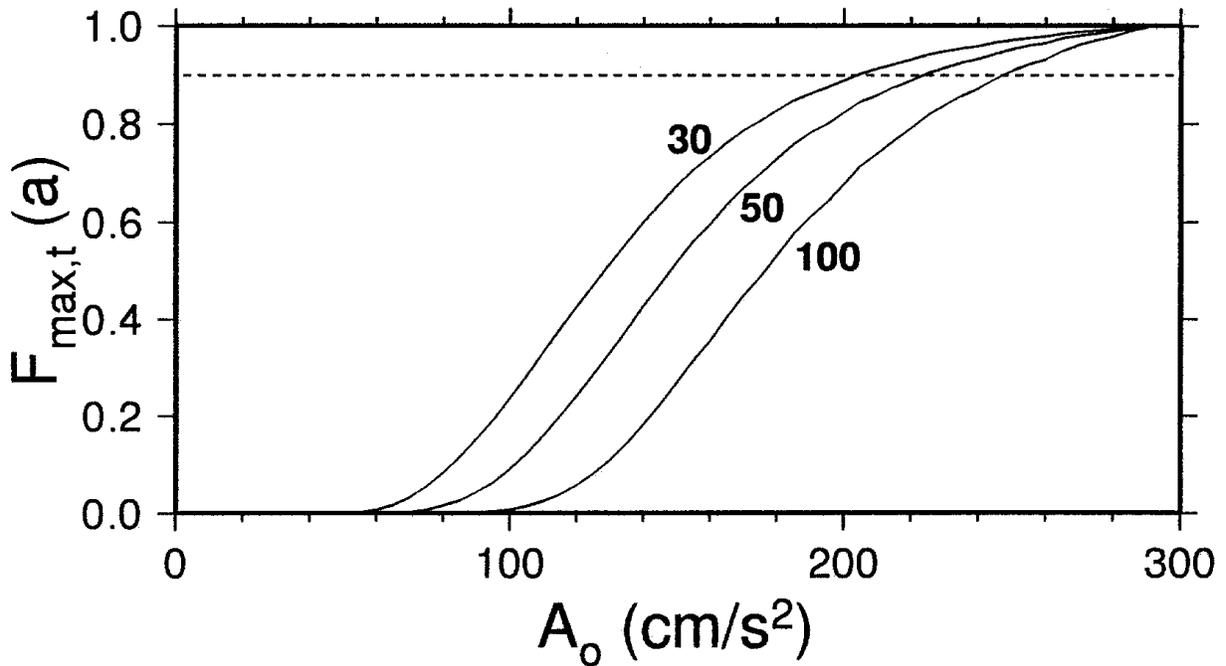


Fig. 4. $F_{\max,t}(a)$ represents the probability that a given acceleration A_0 will not be exceeded in 30, 50, or 100 years.

The temporal dependency is included by means of a mean rate of earthquake productivity θ (number of earthquakes per year per unit area with magnitude greater than M_{\min}):

$$F_{\max,t}(a) = e^{-\theta t [1-f(a)]} \quad (5)$$

which can be interpreted as the probability that a given acceleration a will not be exceeded in t years. Equivalently, the complement of $F_{\max,t}(a)$, calculated as $[1 - F_{\max,t}(a)]$, will be understood as the probability that any given acceleration a will be exceeded in t years. Curves of $F_{\max,t}(a)$, for 30, 50 and 100 years are presented in Figure 4.

These results can be interpreted in the following manner: for a period of 30 years there is a 90% chance of not exceeding 200 cm/s^2 (20% of g). If that period is expanded to 50 and 100 years, there is a 90% probability level of not exceeding 220 cm/s^2 (22% g) and 250 cm/s^2 (25% g) respectively.

Intensities

An alternative, and complementary, method of estimating future ground motion at any given site, can be performed over another variable, Intensities. These are reported by observers all along Chile and their number is much greater than those observations for accelerations. The intensity attenuation (measured in the Modified Mercalli scale) as a function of distance and magnitude (Barrientos, 1980) is well represented by $I(r) = 1.38M - 3.741 \log(r) - 0.0006r + 3.85$ (6) in which M is magnitude M_e and r is the hypocentral distance.

Following the same procedure as the one performed in the previous section over accelerations, using the same seismic sources, it is possible to estimate probability levels of not exceeding a given intensity, I_0 . The results of this analysis, shown in Fig. 5, indicate that there is a 90% probability of not exceeding intensities between VI-VII and VII for 30, 50 and 100 years.

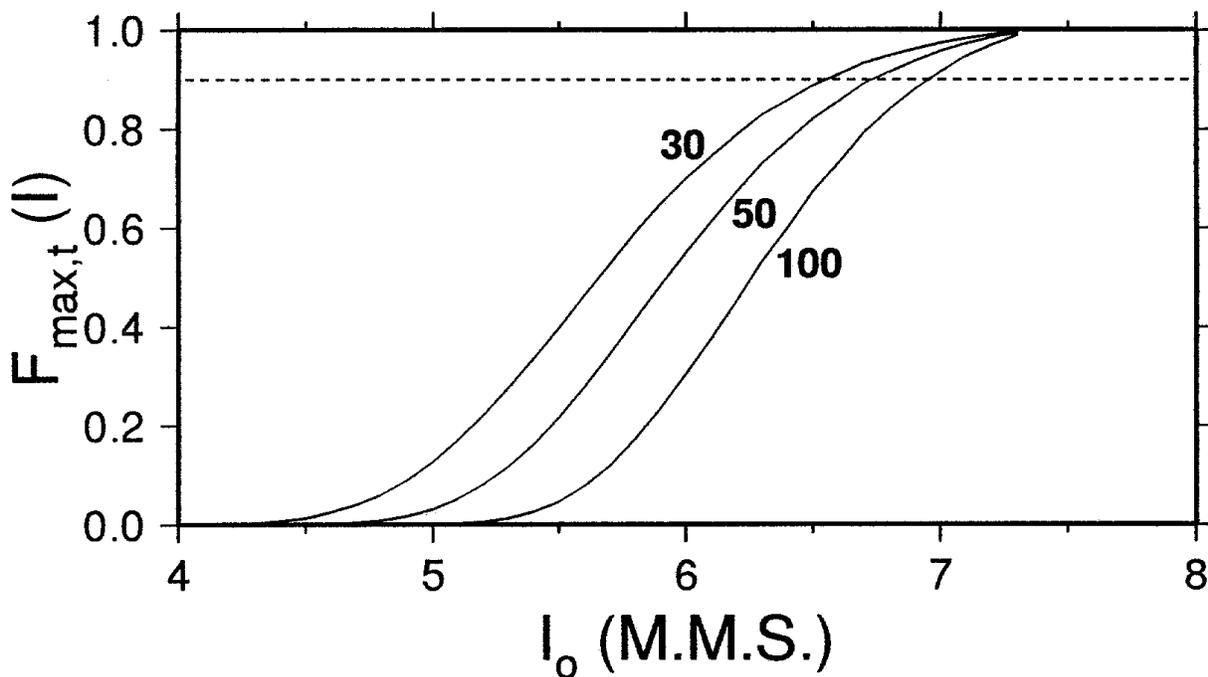


Fig. 5. $F_{\max,t}(I)$ represents the probability that a given intensity I_0 will not be exceeded in 30, 50, or 100 years.

Discussion

The MMA site near Antofagasta, Chile is exposed to mainly two types of seismic events, regarding the size of them. These are the regular thrust earthquakes, which take place along the contact of the Nazca and South American plates (usually with rupture areas located offshore, about 300 km away from the MMA site), and the tensional events which represent the fracturing of the Nazca plate itself, at nearly 100 km depth, just beneath the MMA site. While in the former the maximum magnitudes can reach values well over 8, in the latter they are expected to be around 8. Even though the associated maximum magnitudes are less than those corresponding to the thrust events, these tensional events produce higher hazard at the MMA site because of their relatively closeness. Fortunately, these events are not located close enough, they are at 100 km depth so attenuation plays an important role in decreasing wave amplitude. As the best example, one earthquake of these characteristics took place in 1950 producing the intensities shown in Appendix II. Intensity IV in the old Chilean scale corresponds to Mercalli intensity between VII and VIII. According to the relationship between acceleration and Mercalli intensity for Chilean earthquakes,

$$\text{Log } a = \frac{1}{2.9} - \frac{1}{4.5} \quad (7)$$

(Saragoni et al., 1980), an intensity 7.5 (VII-VIII) corresponds to an acceleration of 231 cm/s² (23%g). Note that this is the type of earthquake that, due to its closeness to the site and its large magnitude, is expected to represent the major threat to the site. These are maximum expected accelerations which could be slightly modified according to the local geological conditions.

Large thrust events which could affect MMA installations are repetitions of the 1868 (southern Peru-northern Chile) and 1877 (northern Chile) events. At the MMA site, the corresponding intensities were V and VI-VII (Modified Mercalli scale). These maximum intensities correspond to accelerations between 27 and 155 cm/s² (2.7-16%g). Expected accelerations, associated with the last Antofagasta earthquake of July 30, 1995, are of the order of 70 cm/s² (7.1%g), based on the attenuation relationship (3).

According to the seismic productivity levels of the region, its location along the Wadati-Benioff zone, and the ground motion attenuation relationship with distance and magnitude, it is expected that 25%g will not be exceeded within 100 years at 90% probability levels.

Lower estimates are found when using Intensities instead of accelerations, 90% probability levels of not exceeding intensities between VI-VII and VII for 30, 50 and 100 years are found. When eq. (7) is used, intensity levels of VII (for 100 years) correspond to the order of 16% g.

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Appendix I
Earthquake Catalog

Date	Depto. de Geofisica, Universidad de Chile	Origin Time	Lat (S)	Long (W)	Depth	mb	Ms
19630504		07:38:53.3	24.700	66.600	153	4.6	
19630505		15:17:02.1	24.800	69.600	53	5.4	
19630507		16:23:11.8	22.100	68.700	112	5.7	
19630525		00:14:38.1	21.000	69.100	113	4.5	
19630525		00:14:38.1	24.200	66.800	185	5.1	
19630621		11:18:21.4	24.800	67.400	269	5.2	
19630718		11:15:11.3	22.500	67.000	258	4.6	
19630814		14:32:36.7	22.300	68.700	120	5.1	
19630824		01:41:40.5	22.400	68.500	66	4.7	
19630830		00:43:19	23.300	66.300	239	4.6	
19630912		02:48:53.2	22.000	67.600	160	4.5	
19630920		07:25:11.8	21.500	68.300	125	4.7	
19630920		14:41:22.6	21.500	68.000	155	4.8	
19631006		15:01:42.1	22.000	69.400	33	4.6	
19631019		04:29:51.1	21.200	71.000	33	4.6	
19631020		01:54:12.5	23.400	68.400	118	4.5	
19631102		21:35:29.8	24.300	68.100	106	2.8	
19631127		18:57:02.5	21.000	67.900	87	4.8	
19631201		07:41:01.3	23.300	65.800	164	4.5	
19631201		16:06:14.8	21.200	68.400	61	4.5	
19631203		23:03:41.6	22.400	69.300	18	6.1	
19631214		19:13:53.3	22.800	70.500	48	4.5	
19640102		06:32:58.9	21.600	68.200	110	5.1	
19640205		21:13:19	23.700	68.800	90	4.6	
19640219		15:25:58.9	21.400	70.700	80	5.2	
19640301		13:30:28.9	22.800	66.800	219	4.5	
19640320		10:51:13.3	22.900	65.200	78	4.2	
19640508		20:36:54.1	24.200	69.300	78	4.9	
19640524		18:01:34.8	23.200	71.600	33	4.5	
19640619		15:06:07	24.400	68.700	49	4.6	
19640630		11:28:57.5	23.300	66.600	353	4.5	
19640706		14:06:32.6	24.200	69.700	128	4.5	
19640712		16:48:21.7	24.500	66.900	164	5.1	
19640817		08:42:47.5	24.000	67.000	192	4.7	
19640905		02:09:21.4	24.400	68.200	64	4.9	
19640916		16:13:23.2	21.500	66.800	233	4.7	
19640921		09:55:06.4	23.900	70.700	33	4.7	
19640921		09:55:06.4	23.900	70.700	132	5.4	
19641002		22:58:29.3	21.400	67.700	49	5.0	
19641008		16:52:06.4	21.600	69.400	33	4.7	
19641204		09:21:14.2	21.300	67.400	60	4.7	
19641220		15:45:25.3	22.200	69.100	100	4.5	
19641225		09:51:02.2	22.500	67.300	92	4.6	
19641225		17:56:40.1	25.300	68.100	101	5.0	
19650131		12:57:29.1	21.200	67.800	71	5.1	
19650131		14:57:24.9	21.100	67.800	110	4.8	
19650207		04:37:34.6	21.600	65.700	110	4.8	
19650211		21:30:33.2	22.800	68.200	33	5.2	
19650221		14:09:19.1	22.600	69.000	109	4.9	
19650225		21:26:55.9	22.800	65.300	91	4.5	
19650305		21:25:53.1	21.000	68.400	83	4.8	
19650308		23:11:31.7	24.600	67.100	168	5.4	
19650322		03:05:33.3	23.800	66.700	176	5.0	
19650322		20:46:16.2	22.400	68.100	110	5.0	
19650331		12:51:48.7	21.700	70.600	33	4.5	
19650416		16:09:09	24.700	67.800	127	5.0	
19650503		19:17:30.7	22.100	68.800	33	4.5	
19650503		21:25:12	25.200	68.500	80	4.5	
19650509		12:15:17.6	23.200	68.900	33	4.5	
19650512		16:36:25.9	21.900	65.900	283	5.1	
19650518		12:18:52	24.200	65.900	190	4.5	
19650527		06:10:31.5	23.700	66.200	122	4.7	
19650618		10:48:33.2	23.800	67.400	148	4.7	
19650623		00:28:04.4	24.000	65.900	33	4.5	

Date	Depto. de Geofisica, Universidad de Chile	Origin Time	Lat (S)	Long (W)	Depth	mb	Ms
19650630		11:12:43.4	21.200	66.100	170	5.1	4.8
19650701		04:54:51.4	23.100	67.700	85	5.1	4.5
19650720		13:38:49	22.300	68.400	123	4.5	
19650730		18:58:58.7	24.400	67.700	140	5.3	
19650812		03:57:54.6	22.200	69.100	70	4.8	
19650817		20:45:33.6	21.100	69.100	110	4.8	
19650824		14:51:53.2	22.700	66.700	283	4.3	
19650824		14:51:53.2	22.700	66.700	125	4.8	
19650925		00:20:37.3	24.300	69.200	115	4.5	
19650926		00:20:37.3	24.300	69.200	115	4.5	
19651022		18:35:54.6	25.000	71.200	115	5.1	
19651026		12:15:07.5	24.500	70.200	52	5.5	
19651031		13:47:56.7	24.800	68.900	108	5.4	
19651216		22:46:28.5	22.500	68.500	104	5.4	
19660104		06:29:23.7	22.200	70.000	27	4.5	
19660104		14:51:46.6	24.500	67.400	33	4.5	
19660105		00:23:41.9	23.300	70.100	33	4.6	
19660109		08:06:29.8	21.500	69.700	57	5.4	
19660109		08:06:29.8	21.500	69.700	117	5.3	4.7
19660207		19:56:49.1	21.800	68.400	117	5.3	
19660208		14:54:30.5	24.200	67.500	173	4.9	
19660228		10:03:16.6	21.400	66.600	227	4.9	
19660301		13:07:18.9	24.200	68.300	33	5.0	
19660305		12:21:51.7	23.400	68.100	120	4.9	
19660305		13:49:15.1	24.700	67.800	33	4.6	
19660307		21:44:52	21.600	69.200	112	4.7	
19660311		09:30:44.3	23.600	65.400	76	5.4	
19660321		13:26:10.9	21.100	68.700	128	5.2	
19660327		13:26:10.9	23.700	66.700	194	4.9	
19660425		02:10:15.2	22.000	68.400	112	4.5	
19660425		02:10:15.2	22.000	68.400	112	4.5	
19660426		21:07:32	22.800	70.300	152	5.0	
19660608		15:02:01.9	23.000	66.300	226	4.6	
19660616		20:32:25.2	21.900	67.200	190	5.5	
19660712		08:01:36.2	21.300	68.800	94	4.9	
19660714		01:49:36.4	23.200	70.300	42	4.7	
19660719		07:25:28.2	23.200	66.800	187	4.7	
19660727		04:48:59.8	24.100	70.300	33	5.5	5.6
19660822		17:00:57.5	22.500	70.300	62	4.8	
19660822		17:00:57.5	22.500	70.300	113	4.5	
19660823		22:20:34.5	22.600	68.600	112	5.3	
19660823		22:20:34.5	22.600	68.600	112	5.3	
19660823		03:58:51.3	23.400	68.700	119	3.2	
19660823		17:53:24.8	23.400	69.400	147	4.7	
19661005		23:38:21.5	23.400	69.400	147	4.7	
19661103		09:02:13	21.200	68.300	104	4.7	
19661106		08:36:05.3	24.200	67.000	184	4.5	
19661107		12:49:58.5	22.900	68.600	103	4.6	
19661129		11:50:30.6	23.900	67.700	118	5.6	
19661129		12:10:23.4	21.400	68.900	119	4.5	
19661130		14:59:16.9	23.500	68.900	85	4.8	
19661202		23:01:18.2	22.500	69.300	33	4.6	
19661210		10:38:59.6	24.200	68.000	124	5.3	
19661210		10:38:59.6	24.200	68.000	105	5.2	
19661218		10:48:50.8	22.700	68.500	125	4.8	
19661228		11:24:27.9	23.100	70.900	48	4.6	
19661228		14:38:57.8	25.400	70.600	33	4.8	
19661228		21:03:16.2	25.500	70.700	33	4.7	
19661229		00:20:01.1	25.500	70.900	33	4.7	
19661229		01:48:27.6	25.500	70.600	22	5.4	
19661229		01:48:27.6	25.500	70.600	22	5.4	
19661230		02:20:31.6	25.500	70.900	33	4.8	
19661230		03:53:36.9	24.800	70.600	45	5.2	
19661230		11:55:52.7	25.000	70.700	34	4.9	
19661230		12:30:25.6	25.000	70.700	34	4.6	
19661230		17:09:59	24.300	67.100	175	4.5	
19670101		13:45:39.7	23.100	67.200	35	4.8	
19670101		13:45:39.7	23.100	67.200	35	4.8	
19670102		06:53:18.2	25.119	70.928	37	5.1	
19670102		06:53:18.2	25.119	70.928	37	5.1	
19670106		19:04:40.6	25.321	70.314	51	4.5	
19670109		04:47:04.5	24.808	70.859	33	4.5	

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19670110		04:58:04.7	20.180	70.872	38	4.5	
19670111		22:24:26.1	25.445	70.758	33	4.8	
19670112		19:14:09.9	25.466	70.842	40	4.5	
19670113		13:03:19.9	25.254	71.400	33	4.6	
19670114		19:24:35.2	25.135	70.290	65	4.5	
19670115		07:11:12.2	24.167	66.823	188	5.4	
19670116		23:46:06	22.383	67.228	179	4.7	5.6
19670201		23:25:47.2	21.438	67.257	190	5.1	5.6
19670211		19:48:02.7	21.912	70.720	29	4.9	
19670212		14:08:13.8	21.704	70.247	71	5.3	
19670217		07:28:03.2	25.482	71.499	33	5.1	
19670301		22:18:03	22.180	67.515	187	4.5	
19670309		11:43:13.4	23.847	68.450	206	4.7	
19670312		18:56:48.5	24.870	68.857	94	4.5	
19670313		20:08:26.9	24.048	70.400	84	4.5	
19670316		13:26:33.9	25.461	71.064	33	4.4	
19670325		12:18:24.8	23.049	66.523	204	4.9	
19670408		09:30:18	21.830	68.522	123	4.9	
19670411		10:40:21	23.214	68.865	92	5.0	
19670429		16:55:03.8	24.893	70.388	00	4.8	
19670530		17:23:28.9	23.362	69.257	101	4.5	
19670531		07:45:57.7	24.556	70.655	57	4.5	
19670526		07:45:57.7	24.556	70.655	57	4.5	
19670521		20:09:28.4	25.200	70.500	23	5.7	
19670621		17:36:09.6	22.600	69.600	78	4.5	
19670703		12:43:56.6	22.800	69.000	97	4.8	
19670705		10:15:24.2	25.500	70.900	33	4.5	
19670717		09:11:04.5	21.300	66.600	234	4.8	
19670719		22:41:12.2	22.300	68.700	107	4.5	
19670802		12:13:19.3	25.200	71.100	27	4.5	
19670817		23:20:02.7	22.800	68.900	100	4.7	
19670820		03:10:39.2	22.200	62.900	172	4.5	
19670821		12:11:12.1	24.600	71.400	33	4.8	
19670902		08:53:59.3	23.400	70.700	33	5.5	
19670908		19:17:23.1	25.200	70.300	33	4.7	
19670911		11:48:45.4	24.700	71.100	35	4.6	
19670912		20:32:39.3	23.500	70.200	38	4.8	
19670914		18:41:39.6	24.100	70.300	49	5.1	
19670918		06:38:55.3	22.000	69.200	92	4.7	
19671022		00:52:10.9	22.300	65.700	259	5.2	
19671023		10:51:56.4	23.900	66.600	192	4.2	
19671117		17:43:03.1	24.300	68.200	129	4.7	
19671118		07:10:57.1	25.500	71.400	33	4.5	
19671211		03:20:47.8	24.000	69.300	53	5.1	
19671214		02:25:21.6	21.800	70.000	33	6.3	
19671221		10:41:31.6	21.500	70.400	53	5.8	
19671225		09:17:55.7	21.300	68.300	135	6.4	
19671227		09:17:55.7	21.300	68.400	115	4.7	
19680102		22:45:08.3	22.600	66.600	237	5.3	
19680104		14:48:30.3	21.500	70.700	44	4.9	
19680113		04:36:14.1	21.400	70.600	66	4.6	
19680115		16:07:04.2	24.300	66.500	192	5.7	
19680116		12:22:46.8	24.300	65.000	34	4.8	
19680130		20:15:41.7	22.000	68.500	118	5.3	
19680206		05:31:03.3	25.200	68.500	97	4.5	
19680208		10:10:07.1	21.800	68.500	119	4.8	
19680226		22:57:37.2	23.600	66.300	204	5.3	
19680309		17:26:15.7	24.200	66.800	148	4.6	
19680317		09:56:34.5	21.200	68.100	122	5.1	
19680322		04:15:52	22.300	67.900	146	4.7	
19680404		22:06:57.3	22.700	66.400	110	5.1	
19680411		17:13:40.5	22.200	66.600	225	5.2	
19680421		09:24:35.5	23.400	70.500	41	5.5	
19680503		00:18:09.4	22.948	68.024	114	4.6	
19680517		16:14:16.2	22.752	68.246	104	5.0	
19680611		11:33:50.2	21.159	69.609	22	4.7	

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19680615		21:33:22.3	21.189	65.704	283	4.9	
19680728		21:18:59.5	22.576	69.433	70	5.1	
19680812		02:15:57.9	21.135	68.721	130	4.7	
19680824		13:36:03.6	22.379	68.411	122	4.6	
19680824		19:28:57.9	23.883	67.678	118	4.8	
19680907		07:23:07.8	22.376	67.419	173	4.7	
19680922		21:52:59.2	24.131	66.912	194	5.5	
19680923		21:14:52.6	24.106	66.867	209	4.6	
19681008		14:35:38.7	23.153	66.752	251	3.9	
19681010		22:38:07	22.987	67.890	163	5.1	
19681109		06:17:24.4	22.397	67.258	185	4.6	
19681211		03:40:44.8	25.219	70.375	50	5.0	
19681229		13:56:15.9	21.637	68.364	120	4.7	
19690111		15:29:31.1	23.975	66.673	205	5.2	
19690106		00:42:57	21.651	69.520	77	4.5	
19690122		23:14:51.6	22.741	68.607	124	4.5	
19690316		04:40:43.9	22.412	67.478	176	4.7	
19690424		23:17:35.9	21.592	70.760	33	4.6	
19690425		07:42:09.9	21.316	68.374	122	4.2	
19690521		23:51:37.1	22.551	68.418	125	5.0	
19690707		02:41:07.7	24.241	66.930	168	4.5	
19690710		08:42:28.5	23.642	69.670	48	5.4	4.7
19690808		05:12:01.6	21.202	68.359	74	5.4	
19690811		03:43:49.8	23.553	68.437	105	4.7	
19690816		18:27:53.7	22.716	68.541	102	5.0	
19690830		02:14:57.4	21.868	68.164	96	4.5	
19690913		10:52:58	22.883	68.367	106	5.4	
19690919		05:00:17.2	24.672	69.886	55	4.7	
19690921		02:00:54.3	23.552	68.960	120	5.3	
19690922		19:31:21.4	22.316	68.824	111	4.7	
19691021		23:43:24.5	21.635	68.194	105	4.6	
19691021		23:43:24.5	24.328	67.120	171	4.6	
19691107		06:50:30.9	24.063	66.864	211	4.9	
19691111		05:55:32.6	24.874	70.364	39	5.1	
19691112		21:16:16.7	21.372	68.763	124	4.6	
19691114		11:46:54.6	21.601	68.403	114	4.5	
19691211		16:56:25.2	21.179	68.502	119	4.7	
19700106		16:49:54.5	21.243	71.720	28	4.5	
19700126		12:14:52.2	22.690	68.824	110	4.6	
19700203		21:23:09.9	24.413	67.834	111	4.7	
1970216		03:31:57.7	21.261	70.152	156	5.4	
19703216		23:24:00.8	24.953	70.762	34	5.1	
19700309		01:54:32.4	22.237	68.753	107	4.7	
19700313		10:22:39	21.327	68.437	129	4.5	
19700313		17:44:11.8	24.797	68.884	97	4.8	
19700329		11:41:06.7	23.826	67.841	132	4.6	
19700329		05:24:40.6	21.867	69.421	95	4.6	
19700409		07:10:35.5	23.611	68.551	99	5.2	
19700502		18:55:07.4	21.575	68.339	130	5.1	
19700507		09:03:56.9	24.982	70.766	40	4.5	
19706210		02:51:27.4	24.192	68.439	118	2.9	6.8
19706613		10:56:14.8	22.183	70.515	152	6.2	6.4
19706625		02:53:47.3	24.107	66.908	153	4.6	
19700627		21:06:10.3	23.660	67.985	115	4.9	
19700712		08:16:21.2	23.390	68.338	101	5.5	
19700807		09:18:26.9	24.259	66.990	169	5.1	
19700815		05:12:57.9	21.413	68.530	136	4.7	
19700816		16:22:52.9	23.271	68.842	100	4.8	
19700831		09:37:27.3	23.271	68.487	65	4.6	
19700904		19:17:07.2	22.688	68.859	76	4.5	
19700916		14:11:12.8	23.997	70.284	36	4.5	
19700925		23:21:51.6	24.326	68.701	99	5.0	
19700925		18:19:25.9	25.226	71.116	36	5.0	
19701005		21:05:11.1	21.653	68.152	72	4.8	
19701013		01:37:01.5	23.572	70.281	33	4.5	

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19701013		04:39:28.4	23.743	70.538	25	5.1	5.2
19701013		08:52:33	22.204	68.668	113	4.7	
19701013		12:36:05.4	23.984	66.841	186	4.6	
19701110		22:12:04.6	22.933	66.161	233	4.5	5.1
19701110		00:08:59.9	22.933	69.999	36	5.6	5.1
19701115		21:48:24.7	21.931	68.324	134	5.2	
19701115		04:12:52.6	22.170	68.734	124	4.7	
19701204		17:06:48.7	23.132	70.114	36	5.9	6.7
19701204		04:19:23.2	22.102	69.062	110	4.6	
19701216		22:55:56.5	22.128	68.524	118	4.7	
19701230		06:08:39.4	24.003	69.304	82	5.5	
19710109		11:58:00.2	24.020	69.354	104	4.6	
19710121		13:19:23.7	24.406	70.279	58	4.9	
19710124		13:04:24.2	22.052	67.093	149	5.3	
19710129		07:05:40.3	24.247	68.616	77	4.7	
19710221		10:35:20.1	23.845	67.159	169	6.3	6.8
19710306		22:13:21.4	21.254	68.273	201	5.4	
19710306		16:40:44.7	23.135	68.750	102	4.6	
19710411		00:00:18.1	21.336	68.585	128	5.3	
19710420		14:32:46.8	21.754	68.955	93	5.7	6.0
19710430		17:34:08.8	24.274	66.954	161	4.9	
19710506		12:45:35.9	24.233	66.920	170	4.5	
19710513		11:03:50.4	24.875	70.212	57	5.0	
19710528		13:27:37.1	22.814	69.760	41	5.1	
19710608		22:44:39.9	23.457	66.708	211	4.8	
19710616		13:54:10	24.153	70.373	47	5.4	
19710617		21:00:40.9	23.418	69.153	113	6.3	7.0
19710619		12:28:27.4	24.074	68.668	208	5.1	
19710624		18:15:03.6	21.170	66.234	130	4.6	
19710629		06:01:23.1	24.135	68.578	82	5.5	
19710703		15:40:59.7	23.877	66.580	197	4.7	
19710703		20:14:50.6	24.129	68.932	103	5.4	
19710717		22:10:21.5	21.527	68.238	123	5.4	
19710721		13:06:29.1	21.507	70.774	40	5.2	
19710801		11:43:36.6	22.505	68.023	87	4.4	
19710804		13:56:32.6	21.757	68.799	91	4.7	
19710804		15:34:41.4	21.952	69.570	186	5.1	
19710824		11:47:44.9	21.774	70.211	177	5.6	
19710831		10:21:48.8	23.707	66.749	198	4.5	
19710915		01:55:43.1	24.441	70.158	33	5.0	
19710920		00:29:41.7	24.121	67.035	181	4.5	
19710920		09:57:01.6	25.392	69.159	100	4.7	
19711004		10:53:36.5	24.036	70.100	58	4.9	
19711014		12:36:01.8	21.670	68.179	92	5.8	5.4
19711024		02:36:54.5	25.181	68.970	113	5.1	
19711106		02:13:54.9	24.185	69.178	69	4.8	
19711110		02:13:12.9	23.753	66.382	228	5.4	
19711121		08:51:11.9	23.295	70.726	40	4.9	
19711203		11:43:00.5	24.895	68.578	72	4.7	
19711203		14:45:01.3	22.789	70.611	37	5.1	
19711204		01:38:47.2	23.174	66.609	206	4.5	
19711208		16:05:23.2	22.912	70.757	18	5.6	5.6
19711209		13:31:05.6	22.908	70.914	21	4.6	
19711211		01:11:45.5	22.911	70.510	33	5.0	
19711218		21:27:10.4	23.018	70.604	38	5.2	4.9
19711221		09:07:41.9	22.806	70.479	30	4.6	
19720105		23:00:32.5	23.115	70.656	24	4.8	
19720112		01:14:30.1	24.353	69.422	83	4.5	
19720112		20:09:40.1	21.467	78.532	166	4.7	
19720119		08:51:04.2	22.975	66.409	265	4.7	
19720125		00:46:49.5	23.074	67.918	113	4.9	
19720203		14:14:44.3	22.502	67.523	161	4.6	
19720204		13:29:12.3	22.988	68.789	94	5.4	
19720213		03:10:17.8	21.146	68.485	138	5.1	

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19720216		12:11:29.4	22.228	67.398	142	4.9	
19720220		04:00:25	21.018	70.709	31	5.0	
19720301		21:39:44.1	24.785	70.040	61	5.5	
19720331		12:19:56.3	21.482	70.745	49	4.7	
19720506		11:40:30.5	23.222	66.163	215	4.5	
19720518		15:52:44.1	23.426	66.382	209	4.5	
19720520		05:27:49.2	23.203	68.709	135	4.5	
19720530		07:51:48.4	21.532	68.242	128	4.7	
19720533		18:42:30.0	23.350	68.804	106	4.4	
19720535		14:12:14.7	24.317	69.665	74	4.8	
19720537		11:45:37.4	22.804	67.758	118	4.8	
19720608		17:57:38.6	22.981	66.170	259	5.4	5.2
19720614		05:10:42.5	25.353	69.234	89	4.5	
19720618		14:04:15.2	24.170	66.985	146	5.3	
19720619		01:44:40.2	22.192	67.333	181	5.0	
19720624		10:36:26.4	21.489	69.136	106	4.6	
19720627		18:27:11.2	21.450	66.553	234	4.9	
19720804		13:24:42.7	22.443	78.263	68	4.7	
19720808		08:22:40.9	24.217	68.887	103	4.6	
19720825		15:47:25.4	21.576	68.428	127	4.5	
19720904		04:33:06.4	25.225	68.875	107	5.3	
19720905		11:45:01.5	25.114	69.697	62	4.7	
19721002		23:54:59.4	24.050	67.146	176	4.8	
19721008		14:38:51.7	25.232	68.894	73	4.7	
19721110		07:05:22.7	22.231	68.552	93	4.6	
19721113		23:06:36.4	21.178	68.530	131	4.8	
19721113		04:37:10.6	24.135	66.879	193	4.7	
19721113		17:16:21.7	21.921	76.825	131	4.7	
19721119		19:11:02.7	23.585	67.588	104	4.8	
19721205		22:28:57.5	23.585	67.588	104	4.8	
19721217		10:23:07.7	25.215	69.053	105	4.5	
19721225		16:21:24.8	22.812	70.534	163	5.2	
19721229		07:05:24.8	21.105	67.504	188	4.8	
19730101		09:28:57.2	22.161	65.792	205	4.8	
19730106		06:18:52.3	22.354	69.310	83	4.9	
19730119		10:33:50.4	22.721	66.123	272	4.6	
19730201		05:14:20.6	22.655	66.195	229	6.1	6.7
19730202		04:31:19.4	21.482	68.502	122	4.6	
19730316		08:26:53.4	22.477	69.012	167	5.1	
19730316		17:46:46.6	23.309	68.209	104	4.8	
19730318		04:39:47.4	22.362	68.534	121	4.8	
19730320		16:17:30.7	23.175	66.293	203	5.6	
19730324		12:10:45.3	23.315	67.985	121	4.6	
19730409		07:16:22.2	21.399	66.536	198	5.1	
19730524		08:33:06.5	21.103	68.360	125	4.5	
19730526		02:05:30.2	22.266	67.611	112	4.5	
19730529		13:43:17.7	22.341	65.854	78	4.5	
19730531		07:44:37.7	22.266	68.382	111	4.8	
19730531		09:21:28.3	22.338	65.317	263	4.6	
19730601		05:21:29.6	24.482	76.229	180	4.3	
19730621		13:38:29.6	22.487	67.244	33	4.7	
19730628		15:26:40.2	23.863	68.830	94	4.7	
19730713		23:19:08.1	22.901	70.597	40	4.6	
19730715		17:56:52.7	24.227	65.063	33	4.7	
19730723		11:16:50.3	23.439	68.262	102	5.0	
19730801		18:09:12.1	21.431	67.874	159	4.6	
19730802		22:11:25.2	21.480	68.037	89	4.8	
19730805		00:49:58.3	22.419	67.250	184	4.7	
19730816		05:42:43.5	22.812	70.222	43	5.5	
19730828		16:32:28.4	21.415	69.880	82	4.9	
19730830		02:17:52.7	22.959	66.511	215	4.7	
19730918		10:39:13.5	21.632	68.242	113	4.9	
19730920		13:22:26.3	23.358	66.330	215	4.5	
19731003		08:14:29.1	21.578	68.701	120	4.7	
19731028		08:14:29.1	21.521	67.614	173	4.9	
19731028		08:14:29.1	21.690	67.451	210	4.9	

Date	Depto. de Geofisica, Universidad de Chile	Origin time	Lat (S)	Long (W)	Depth	mb	Ms
19731104		23:264	66.551	178	5.0		
19731121		23:596	67.970	180	4.6		
19731127		16:53:19.4	24:251	67.143	180	4.5	
19731130		05:16:09.9	23:240	66.645	201	4.9	
19731208		08:43:44.8	21:900	69.106	193	4.5	
19731216		20:32:04.1	23:520	68.435	106	4.7	
19731222		16:13:39.3	25:209	68.656	114	5.4	
19731229		01:19:25.8	23:223	68.355	124	5.4	
19740102		10:42:29.9	22:538	68.397	105	6.4	6.8
19740102		13:35:49.5	22:640	68.362	199	5.3	
19740102		18:08:26.7	22:351	67.378	175	4.9	
19740107		08:14:26.7	22:351	67.378	175	4.9	
19740109		09:04:42.2	22:868	68.008	113	4.5	
19740112		23:46:44.2	22:527	68.358	102	4.7	
19740112		24:21:31.4	22:561	68.547	91	4.9	
19740124		08:21:30.8	21:934	68.319	118	4.7	
19740204		15:40:19.1	22:140	68.433	118	4.6	
19740216		01:26:59.8	21:349	69.865	74	5.3	
19740225		09:14:40	24:776	70.633	31	4.6	
19740324		16:42:56.8	23:972	68.809	156	4.6	
19740324		17:35:15.3	22:327	68.933	158	4.7	
19740319		18:05:29.3	22:327	68.933	158	4.7	
19740325		06:12:30.2	24:555	68.860	97	5.5	
19740326		10:48:39.3	23:705	67.981	109	4.7	
19740316		13:07	25:123	70.634	39	4.8	
19740318		02:35:45.9	24:167	66.828	209	4.5	
19740321		14:07:43.7	23:918	69.213	86	4.7	
19740326		11:27:26.2	21:440	68.461	116	5.1	
19740328		14:52:24.2	22:684	68.561	106	5.0	
19740313		18:11:40.2	24:629	68.832	63	4.5	
19740325		04:23:43.7	21:151	68.424	111	4.8	
19740325		07:32:57	23:993	67.132	191	4.5	
19740325		12:35:20.5	23:993	67.132	191	4.5	
19740325		17:50:58.8	23:037	67.950	127	4.5	
19740325		17:50:58.8	23:348	68.122	121	5.0	
19740720		04:56:20.5	23:954	66.561	205	4.5	
19740724		16:58:58.2	23:789	66.701	222	4.7	
19740804		04:15:27.1	22:580	68.750	109	5.4	
19740824		01:30:51.5	22:754	69.005	33	4.7	
19740828		09:53:42.5	23:178	70.298	22	4.8	
19740902		08:45:16.3	24:357	67.143	163	5.4	
19740916		04:59:35.9	23:395	68.907	286	5.1	
19740916		08:59:35.9	23:395	68.907	286	5.1	
19740917		03:25:20.1	22:555	67.320	176	4.5	
19740920		10:59:53.1	21:927	68.540	108	4.7	
19740921		17:05:15.4	23:257	68.530	106	5.3	
19740921		21:00:46.6	23:224	67.947	127	4.6	
19740927		00:05:28	23:240	66.799	218	4.9	
19740929		10:13:04.9	23:288	70.504	25	4.5	
19741114		17:57:35.8	22:389	68.347	110	4.7	
19741202		11:04:02.1	23:685	66.622	192	4.7	
19741204		10:55:11.6	22:562	70.146	53	5.1	
19741214		14:07:18.7	21:065	68.446	114	4.9	
19741215		13:35:45.2	21:253	68.951	116	4.1	
19741215		06:50:03.4	22:011	68.202	115	4.8	
19750119		02:13:27.4	23:116	66.391	209	4.8	
19750130		12:12:03.1	23:083	69.792	44	4.5	
19750223		03:53:35.9	21:727	71.356	33	5.6	4.9
19750325		02:21:45.9	21:681	69.584	57	5.1	
19750328		22:10:07.1	22:041	68.250	123	4.9	
19750329		18:30:33.3	23:713	69.647	33	4.8	
19750330		21:37:15.8	22:334	68.652	103	4.7	
19750426		04:46:03.4	24:709	68.078	95	5.3	
19750501		22:31:13.9	24:819	60.652	46	4.7	
19750526		07:13:37.2	23:756	70.571	33	4.2	
19750523		17:11:02.3	22:329	68.240	125	4.7	

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19750528		00:26:25.6	21:553	70.042	48	4.7	3.7
19750604		03:33:49	22:857	69.642	25	4.5	
19750610		06:34:13.7	23:402	70.301	49	4.6	
19750615		10:45:06.4	22:480	68.401	183	5.0	
19750622		22:53:04.3	22:396	66.377	124	5.3	
19750703		23:12:56.9	22:630	66.348	208	4.7	
19750703		22:13:59.4	23:936	66.652	191	4.7	
19750810		10:25:43.3	22:648	66.589	166	6.2	
19750813		08:23:54.7	21:431	68.172	176	4.7	
19750821		05:04:37.2	21:979	66.398	196	5.1	
19750821		19:10:08.9	21:979	66.398	196	5.1	
19750825		13:13:09.4	21:979	66.398	196	5.1	
19751010		13:13:09.4	21:979	66.398	196	5.1	
19751020		03:34:07.3	21:165	68.671	132	5.0	
19751028		07:54:22.4	22:862	70.508	38	5.9	6.3
19751028		07:54:22.4	22:620	69.964	8	5.4	
19751109		15:30:05.9	21:085	68.420	77	5.1	
19751113		15:06:33.8	24:230	66.945	160	5.2	
19751113		10:53:48.8	22:414	66.056	233	4.5	
19751206		22:47:50.4	23:824	68.823	82	5.4	
19751218		22:46:31.3	24:154	66.796	169	4.7	
19760124		22:32:49.5	23:326	66.468	275	4.7	
19760124		21:28:21.6	23:410	68.234	33	4.9	
19760204		01:31:56.6	23:004	67.346	122	4.6	
19760205		09:53:11.7	21:702	68.222	98	5.8	
19760215		16:22:45	23:904	66.555	196	4.9	
19760218		18:03:22.7	22:514	68.613	111	5.4	
19760222		22:26:02.5	22:647	68.237	113	4.7	
19760308		04:26:13.9	21:247	68.607	146	4.5	
19760409		17:56:52.2	22:754	68.650	97	4.7	
19760409		14:16:09	21:675	68.903	103	4.6	
19760505		14:37:22.4	23:895	68.420	272	5.2	
19760505		17:35:43.1	24:109	68.728	183	4.8	
19760504		23:39:36	23:101	68.542	101	5.4	
19760704		00:11:05	22:137	67.447	151	4.8	
19760731		13:30:34.2	22:726	66.131	238	4.7	
19760804		07:17:08.3	24:772	68.283	70	5.2	
19760809		10:10:31.4	25:197	68.976	88	4.9	
19760824		21:26:12.2	23:932	69.122	85	4.9	
19760906		23:58:02.2	25:326	70.694	8	5.6	5.0
19760906		06:10:56.1	21:327	66.301	188	5.5	
19760908		02:51:23.9	23:274	68.291	92	4.9	
19760912		14:18:37.9	24:200	67.765	173	5.2	4.3
19760912		03:51:55.9	23:841	66.467	193	4.6	
19760915		23:51:55.9	23:332	66.679	248	4.9	
19760915		22:17:39.2	24:325	67.295	177	4.9	
19760930		08:04:26.5	24:000	67.908	131	5.3	
19761008		13:47:33.5	22:386	65.977	220	5.1	
19761021		04:24:23.2	22:099	69.302	64	5.1	
19761123		12:46:25.9	22:923	69.281	52	4.8	
19761124		11:26:16.2	22:152	68.422	80	4.9	
19761124		22:56:31.6	21:504	67.166	266	5.1	
19761129		21:42:40	21:979	68.181	119	4.6	
19761204		07:10:42.6	22:180	68.660	103	3.9	
19761221		03:03:10.2	22:674	68.215	266	4.6	
19761228		13:51:56.9	21:144	68.588	89	5.8	6.3
19770117		07:17:12.6	24:848	68.574	33	6.3	6.5
19770125		06:11:00.7	23:598	70.119	26	4.7	
19770320		05:43:07.4	21:027	68.679	140	5.0	
19770321		06:17:27.8	25:120	67.599	15	5.0	
19770403		14:17:23.9	21:981	70.314	50	4.8	
19770415		23:35:35.6	23:101	68.706	99	5.4	
19770509		12:19:08.3	22:031	68.364	80	5.0	
19770520		24:24:07.4	24:210	66.931	178	5.0	
19770522		09:55:53.1	21:495	67.859	133	4.6	
19770531		14:21:21.9	23:183	66.557	205	4.6	

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19770605	02:46:05.9	23.865	70.155	32	5.6	5.1
19770605	06:37:56.9	24.221	66.967	188	4.6	4.8
19770606	13:05:20.1	22.041	68.696	97	4.6	4.6
19770608	13:25:15.6	22.062	67.256	144	5.4	5.4
19770609	02:53:20.3	23.998	66.949	212	4.7	4.7
19770613	08:02:11.9	22.592	68.471	149	4.7	4.7
19770614	03:28:01.6	24.371	68.932	101	4.7	4.7
19770619	05:05:01.5	24.339	66.954	110	4.9	4.9
19770629	12:39:59.9	23.867	66.468	172	4.7	4.7
19770718	08:08:18.1	21.975	68.190	78	4.8	4.8
19770725	18:39:31.2	24.544	68.817	73	4.8	4.8
19770801	16:30:28.5	22.225	68.447	97	4.9	4.9
19770804	10:53:19.3	24.612	67.383	183	4.9	4.9
19770813	05:54:15.2	22.776	67.693	130	4.7	4.7
19770816	00:53:42.7	21.033	68.636	100	4.6	4.6
19770819	03:26:28.8	22.003	68.138	138	5.1	5.1
19770823	03:12:51.9	21.317	68.226	99	5.2	5.2
19770824	05:31:03.5	22.072	68.573	207	4.9	4.9
19770831	05:31:03.7	22.450	68.352	111	4.8	4.8
19770913	20:16:39.7	23.354	68.328	114	5.3	5.3
19770920	16:23:13.3	23.295	67.146	191	4.9	4.9
19771019	20:29:18.6	24.101	66.850	195	5.0	5.0
19771021	04:56:17.7	24.006	66.545	173	5.0	5.0
19771025	10:00:15.5	23.369	68.835	114	4.6	4.6
19771029	10:40:57.8	22.006	65.930	263	4.6	4.6
19771108	13:25:59.4	21.116	67.173	152	4.8	4.8
19771116	10:31:05.8	22.589	68.594	182	5.2	5.2
19771123	01:54:21.5	24.243	67.170	181	5.1	5.1
19771204	12:51:49.2	21.523	68.351	193	4.9	4.9
19771224	05:19:24.2	22.818	66.441	134	4.8	4.8
19771224	16:41:14.4	25.270	70.310	40	5.0	5.0
19780103	20:16:51.7	24.101	66.850	195	5.0	5.0
19780104	09:25:46.3	23.654	66.819	192	4.5	4.5
19780114	01:54:07.7	23.252	66.357	138	5.2	5.2
19780118	04:15:12.9	24.289	66.821	193	4.8	4.8
19780119	20:49:28.4	21.869	68.198	150	4.8	4.8
19780122	10:21:51.6	21.484	66.818	215	4.6	4.6
19780127	18:01:18.8	23.505	66.852	207	4.5	4.5
19780131	14:24:56.9	21.863	67.761	260	4.6	4.6
19780132	07:11:12.8	24.809	68.908	119	4.2	4.2
19780220	20:48:12.7	24.197	67.739	139	5.1	5.1
19780302	09:07:05.6	21.043	69.207	194	4.6	4.6
19780305	03:27:35.6	24.197	66.983	187	4.6	4.6
19780308	20:37:35.8	22.882	68.589	157	4.9	4.9
19780417	00:27:55.3	24.085	66.776	226	4.5	4.5
19780508	01:52:06.1	22.149	68.515	110	4.8	4.8
19780527	06:28:10.2	21.135	68.505	133	4.7	4.7
19780527	23:21:05.3	23.934	67.585	132	4.5	4.5
19780529	00:05:34.1	24.147	66.814	175	4.7	4.7
19780531	14:01:56.5	23.900	67.061	218	4.7	4.7
19780531	02:21:05.1	21.554	69.165	102	5.0	5.0
19780604	02:21:05.1	21.554	69.165	102	5.0	5.0
19780604	16:30:43.3	23.132	66.599	218	4.7	4.7
19780607	14:08:46.5	23.639	67.797	114	5.3	5.3
19780617	17:01:56.6	24.418	68.230	115	5.0	5.0
19780623	12:43:20.9	22.737	69.276	88	5.0	5.0
19780626	16:15:11.3	21.610	66.837	221	4.9	4.9
19780629	06:34:12.6	21.159	68.522	127	4.9	4.9
19780713	12:37:13	21.951	69.789	30	5.2	5.2
19780722	07:50:54.2	24.266	66.823	181	4.9	4.9
19780726	02:04:58.1	21.690	68.190	86	5.2	5.2
19780731	11:34:34.5	24.861	68.291	69	5.0	5.0
19780816	06:03:43.3	24.071	67.151	134	4.9	4.9
19780821	01:34:05.1	24.562	69.323	124	4.7	4.7
19780905	04:24:18.4	21.282	69.184	119	5.2	5.2
19780911	11:19:57.1	22.269	67.458	197	4.8	4.8
19781008	16:09:00.5	24.311	68.030	120	4.7	4.7

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19781027	10:06:46.1	21.906	65.792	280	5.6	5.6
19781108	07:18:02.6	21.022	68.387	80	5.2	5.2
19781110	12:22:12.7	24.336	69.430	83	4.6	4.6
19781123	01:56:41.7	23.695	66.536	203	4.7	4.7
19781202	13:25:45.3	24.401	67.346	172	4.7	4.7
19781222	11:40:33.3	23.941	65.370	43	4.7	4.7
19790102	18:51:52.7	24.450	67.448	168	4.7	4.7
19790102	18:51:52.7	24.450	67.448	168	4.7	4.7
19790111	16:52:31.1	24.177	67.992	193	5.3	5.3
19790124	00:00:08.4	21.427	68.651	121	4.7	4.7
19790124	15:03:39.2	22.040	68.482	87	5.3	5.3
19790224	00:30:02.2	21.265	68.975	121	4.8	4.8
19790226	19:47:32.6	21.545	70.067	44	4.9	4.9
19790228	14:05:26.2	23.244	68.951	97	5.2	5.2
19790311	06:06:41.1	22.301	69.022	61	5.5	5.5
19790324	17:01:13.4	22.133	68.659	118	4.5	4.5
19790413	20:11:18.6	24.118	66.971	171	4.9	4.9
19790415	10:07:32.2	24.196	66.766	186	4.5	4.5
19790419	17:53:34.3	24.357	67.002	147	5.4	5.4
19790419	17:53:34.3	24.357	67.002	147	5.4	5.4
19790424	17:21:35.1	21.520	68.784	81	5.6	5.6
19790504	17:51:31.8	24.484	67.320	182	4.8	4.8
19790514	23:04:02.6	22.809	69.135	85	5.9	6.5
19790515	17:32:38.7	22.936	69.223	89	5.3	5.3
19790517	23:06:45.7	22.916	66.891	222	4.6	4.6
19790522	08:33:35.8	22.813	69.136	58	5.5	5.5
19790524	00:55:13.7	23.806	66.906	182	4.5	4.5
19790528	14:59:19.1	24.604	70.262	63	5.8	5.8
19790601	17:43:10.1	21.287	68.805	134	5.0	5.0
19790615	15:08:17.1	24.193	68.275	119	4.5	4.5
19790615	15:08:17.1	24.193	68.275	119	4.5	4.5
19790714	06:13:29.5	22.068	67.308	182	5.1	5.1
19790721	02:38:02.5	22.882	68.976	43	5.3	5.3
19790724	17:16:10.2	23.136	66.676	193	4.5	4.5
19790802	09:04:50.5	21.447	69.463	33	4.6	4.6
19790810	01:28:42.1	21.405	66.608	257	5.1	5.1
19790815	04:27:42.1	24.208	66.939	176	4.5	4.5
19790831	06:14:36.7	23.004	66.535	205	4.5	4.5
19790919	07:37:36.7	23.113	66.604	196	4.7	4.7
19790922	01:41:52.6	21.267	68.959	122	4.6	4.6
19791004	11:18:30.3	23.387	70.234	128	5.1	5.1
19791022	08:56:00.5	23.752	69.174	166	5.9	5.9
19791105	18:43:06.9	21.200	68.255	100	5.0	5.0
19791121	06:51:16.1	24.337	70.858	33	4.9	4.9
19791122	02:41:16.7	24.344	70.395	169	5.8	5.8
19791128	07:10:48.4	23.433	69.061	95	4.8	4.8
19791226	04:24:38.9	24.219	67.445	182	4.7	4.7
19800105	14:12:10.2	23.975	66.463	172	4.5	4.5
19800127	10:17:47.4	23.387	69.001	101	4.6	4.6
19800131	13:52:35.4	21.961	68.644	72	4.7	4.7
19800210	13:28:43.6	22.540	66.101	238	4.5	4.5
19800224	13:17:29.2	23.967	68.482	100	5.9	5.9
19800302	05:26:31.5	22.808	68.936	136	4.7	4.7
19800313	08:38:19.5	21.270	68.681	121	5.0	5.0
19800325	19:25:47.1	22.104	66.080	299	4.5	4.5
19800405	08:54:12.6	25.078	68.564	93	4.9	4.9
19800427	12:59:01.7	24.415	69.865	66	5.2	5.2
19800430	04:05:17.1	21.088	68.409	125	4.8	4.8
19800414	23:57:27.6	21.293	68.772	100	5.4	5.4
19800430	09:04:05.8	22.815	70.996	73	4.8	4.8
19800501	14:20:49.5	24.268	69.885	80	4.7	4.7
19800502	11:57:34.2	24.132	66.943	163	5.4	5.4
19800519	13:21:24.2	24.659	67.603	135	4.6	4.6
19800601	14:45:39.7	22.788	67.427	185	4.7	4.7
19800602	00:14:26.2	21.739	68.804	88	4.8	4.8
19800607	06:10:53.5	23.533	71.732	28	4.4	4.4
19800608	21:11:13.6	23.040	66.524	259	5.1	5.1

Date	Origin Time	Lat (S)	Long (W)	Depth	mb	Ms
19800616	08:45:06.9	22.029	68.459	87	5.5	
19800624	01:59:36	23.972	67.301	177	5.1	
19800704	17:28:41.7	21.397	68.732	112	4.7	
19800730	04:50:20.5	23.857	66.507	190	4.6	
19800801	11:22:17.5	23.837	66.692	209	4.6	
19800804	20:29:59.3	23.854	66.335	179	4.6	
19800824	19:28:36.7	23.038	69.088	75	4.8	
19800828	11:40:17.1	22.763	66.274	294	4.6	
19800832	03:23:47.4	22.300	68.530	723	4.5	
19800904	09:53:18.7	24.302	69.430	776	4.9	
19800910	22:12:48.9	24.194	67.228	190	4.6	
19800925	05:44:39.2	24.093	67.064	206	4.5	
19801006	14:48:57.7	22.855	66.841	211	4.7	
19801024	07:47:05.2	22.974	66.592	186	4.5	
19801108	21:35:43.1	24.341	67.654	103	5.4	
19801122	01:58:48.5	22.493	69.403	105	4.8	
19801124	20:46:36.8	22.534	68.601	116	5.1	
19801126	11:52:00.6	23.862	68.764	110	5.0	
19801129	18:22:43.6	22.592	68.143	184	4.7	
19801131	13:11:01.1	24.552	69.555	91	4.7	6.5
19801228	17:03:16.1	25.176	70.024	54	5.0	
19810103	23:58:13.1	24.561	67.798	124	4.7	
19810107	16:25:42.5	23.754	70.622	37	5.5	5.2
19810115	23:49:04	21.821	68.605	121	4.6	
19810120	20:35:48.3	22.804	68.441	117	5.1	
19810127	14:25:44.2	23.028	68.032	125	5.4	
19810206	08:11:46.4	24.333	67.869	110	4.6	
19810208	01:13:59.4	23.929	67.716	211	4.6	
19810302	07:42:39.7	22.567	68.397	785	5.3	
19810306	10:33:42.6	22.552	66.151	265	4.8	
19810310	10:39:52.6	22.739	66.596	225	4.9	
19810318	18:09:09.2	21.114	69.169	132	4.6	
19810330	08:38:36.7	22.412	69.000	127	4.5	
19810401	13:13:07.8	21.441	69.000	201	4.8	
19810401	23:58:08.3	24.208	66.810	303	4.7	
19810405	17:49:48.8	24.284	70.748	24	4.5	
19810414	00:39:22.7	23.446	70.320	24	4.5	
19810414	18:09:22.9	24.267	67.175	184	4.6	
19810511	01:50:59.4	21.567	71.083	33	4.6	
19810520	11:41:49.2	22.580	69.264	108	4.7	
19810603	16:15:44.3	22.134	66.152	299	4.8	
19810616	05:41:49.3	21.486	68.337	76	5.4	
19810718	11:15:18.1	22.677	66.238	246	5.0	
19810721	00:41:39.4	22.228	69.018	103	4.6	
19810723	07:24:13.1	23.982	70.283	61	4.8	
19810804	18:24:17.1	21.491	68.318	101	4.8	
19810811	07:09:42.6	21.848	68.749	108	4.7	
19810813	12:11:01.1	22.638	68.651	103	4.7	
19810820	04:48:47.8	22.950	70.533	23	4.9	
19810828	01:28:34.1	24.520	67.344	175	4.8	
19810828	01:50:57.7	22.997	66.555	97	4.5	
19810828	01:50:57.7	22.997	66.555	97	4.5	
19810818	10:21:09.9	24.674	71.800	33	4.9	
19810920	10:48:20.3	23.080	66.632	234	5.1	
19810923	06:56:04.5	22.807	66.289	259	4.5	
19811011	06:39:57.3	21.503	68.902	201	5.2	
19811109	20:15:46.7	24.191	69.545	100	4.6	
19811112	23:37:19.2	22.438	67.660	136	4.6	
19811113	12:55:18.9	24.036	65.312	287	5.1	
19811124	04:08:08	22.200	65.728	268	4.7	
19811124	15:46:47.0	21.453	68.331	113	4.8	
19811202	02:53:47.2	23.351	67.704	85	4.7	
19811208	22:00:44.9	22.357	68.828	119	5.1	
19811210	12:23:37.7	24.520	65.501	184	4.8	
19811226	11:11:03.5	24.017	66.433	188	5.0	
19811226	22:02:19.2	22.690	68.408	121	4.8	
19811227	17:54:09.6	23.825	69.455	151	4.8	

Date	Origin Time	Lat (S)	Long (W)	Depth	mb	Ms
19820110	08:42:15.2	21.001	67.307	163	4.5	
19820112	08:18:58.1	24.211	66.988	169	4.5	
19820125	03:48:40.7	22.420	67.422	169	4.6	
19820203	11:06:54.0	21.760	67.033	166	5.0	
19820210	20:38:01.0	22.648	66.466	196	5.8	
19820211	03:31:47.0	22.991	66.847	283	4.8	
19820223	10:26:20.8	24.154	66.998	176	4.6	
19820326	01:21:09.2	24.191	66.809	186	4.9	
19820402	03:00:49.1	22.625	66.809	203	5.3	
19820411	12:59:18.9	22.162	71.799	96	5.0	
19820413	19:57:21.8	22.164	70.104	62	4.8	
19820414	06:43:38.4	22.989	66.325	235	4.6	
19820419	11:54:27.5	22.604	66.020	250	5.3	
19820421	13:42:30.0	23.999	66.723	206	4.8	
19820503	07:26:02.5	23.467	68.814	107	5.5	
19820513	03:09:17.8	21.120	68.851	108	4.6	
19820528	12:18:34.0	21.328	66.618	191	4.8	
19820529	03:26:58.7	22.347	68.373	116	5.2	
19820529	17:22:24.4	24.158	70.246	37	5.1	
19820610	07:42:33.7	23.168	66.541	194	4.7	
19820610	11:43:07.4	21.393	67.403	199	5.0	
19820618	18:18:38.2	22.395	68.812	121	4.9	
19820619	05:19:26.8	24.109	66.737	218	4.8	
19820719	23:52:55.2	23.949	66.738	206	5.2	
19820819	18:45:38.2	21.553	68.201	106	4.6	
19820903	20:14:30.3	23.859	66.605	182	5.5	
19820911	14:12:14.5	24.173	66.996	149	5.1	
19820911	14:27:29.6	24.185	66.985	151	5.0	
19820913	05:56:17.1	23.987	66.928	132	5.7	
19820913	07:44:52.0	23.452	68.115	121	4.8	
19821002	22:48:52.0	22.049	68.431	105	4.6	
19821024	10:43:41.1	22.265	70.082	35	5.4	4.8
19821102	16:15:43.0	22.357	68.626	104	4.8	
19821125	13:01:33.9	21.445	66.165	214	4.9	
19821129	05:05:46.8	22.329	68.815	108	5.0	
19821202	14:08:26.0	21.254	68.251	115	4.9	
19821207	03:49:02.2	21.295	68.468	136	4.9	
19821208	21:00:16.1	21.295	68.097	108	5.3	
19821216	02:33:08.4	24.286	67.119	183	4.8	
19830101	21:58:37.8	21.186	68.586	187	5.7	
19830110	08:17:34.7	22.006	68.470	121	5.6	
19830116	03:03:39.0	24.219	67.032	183	4.9	
19830121	03:03:39.0	24.219	67.138	180	4.7	
19830126	01:05:50.7	23.971	66.997	186	5.6	
19830127	19:01:35.3	24.105	66.960	188	5.2	
19830130	17:24:52.5	24.331	67.237	184	4.7	
19830201	04:22:51.1	23.030	68.796	102	5.2	
19830206	00:36:51.7	24.922	68.715	109	4.8	
19830206	14:37:29.7	21.132	69.481	94	5.3	
19830215	09:41:04.8	21.582	66.763	222	4.8	
19830216	07:46:55.2	22.168	66.541	231	5.6	
19830217	01:18:17.5	21.427	68.674	132	5.0	
19830301	05:37:00.7	21.659	70.364	333	5.1	
19830302	01:53:29.3	23.956	67.686	110	5.0	
19830316	21:07:02.1	24.242	66.766	190	4.7	
19830318	12:25:39.7	24.420	68.451	130	5.1	
19830324	14:28:27.8	21.389	68.711	123	5.1	
19830331	17:33:00.3	22.328	67.526	170	4.5	
19830407	22:00:52.6	21.397	68.320	130	4.7	
19830408	10:48:13.8	22.455	69.091	100	4.7	
19830410	10:35:25.8	21.556	66.571	230	4.6	
19830417	00:47:05.2	24.178	68.525	216	4.7	
19830425	11:09:09.0	24.278	70.235	216	5.1	4.3
19830425	05:32:23.2	21.069	69.041	138	4.7	
19830503	05:35:22.1	22.956	68.072	162	4.6	

Date	Origen Time	Lat (S)	Long (W)	Depth	mb	Ms
19830531	04:04:45.2	23.866	66.833	235	4.5	
19830601	05:34:50.8	22.757	68.388	104	4.8	
19830606	16:22:31.2	24.379	66.929	157	5.3	
19830608	05:09:49.7	24.284	67.124	186	4.5	
19830609	12:50:51.8	21.250	68.592	110	4.5	
19830610	07:46:14.5	21.256	68.547	110	5.0	
19830617	20:38:31.8	23.014	66.458	223	4.5	
19830621	06:58:21.7	22.631	66.749	227	4.9	
19830629	21:21:54.6	21.463	68.581	132	5.0	
19830701	04:33:05.8	22.095	68.492	129	4.8	
19830715	08:19:25.9	23.881	66.479	218	4.5	
19830720	05:14:25.9	23.881	66.479	218	4.5	
19830721	07:11:33.8	22.193	68.451	126	4.8	
19830730	02:59:06.0	21.553	68.380	129	4.5	
19830803	05:02:41.3	24.264	69.284	84	5.3	
19830805	00:20:48.2	24.007	69.234	92	5.0	
19830807	22:38:13.6	21.719	68.724	108	4.8	
19830814	07:40:52.2	21.752	68.528	126	4.8	
19830815	17:23:02.7	23.953	66.656	215	5.1	
19830824	09:11:24.9	23.577	66.758	224	4.6	
19830825	16:08:15.1	24.903	67.133	57	5.2	
19830813	16:08:15.1	24.903	67.133	57	5.2	
19830914	07:13:00.5	24.410	67.412	174	4.6	
19830916	09:45:00.1	21.468	68.204	95	4.5	
19830921	05:52:33.4	24.098	66.704	214	4.5	
19830922	13:52:27.1	22.770	68.416	177	4.9	
19830922	22:32:30.0	24.204	67.130	185	4.8	
19830929	08:17:09.8	22.770	66.228	260	4.6	
19831007	07:46:48.9	21.512	68.220	117	4.8	
19831016	09:15:46.5	23.681	70.129	165	5.7	
19831019	11:36:16.9	24.278	66.995	130	4.7	
19831124	03:56:42.1	23.184	66.521	230	4.7	
19831128	09:41:19.1	23.781	70.425	37	5.1	
19831203	21:45:00.6	24.300	67.139	202	4.5	
19831204	02:09:22.0	24.039	66.760	203	5.2	
19831216	02:40:06.3	21.648	68.433	127	5.1	
19840101	22:08:14.1	22.810	66.160	272	5.1	
19840105	03:55:46.2	22.535	70.648	33	4.8	
19840106	15:01:36.0	23.686	68.543	101	5.4	
19840113	19:18:09.4	24.202	67.054	188	4.8	
19840215	06:08:50.1	24.248	76.322	176	4.8	
19840221	09:23:29.6	21.690	67.495	191	4.5	
19840304	10:46:23.9	22.884	69.015	128	4.5	
19840318	06:45:50.1	24.078	66.744	213	4.5	
19840324	03:01:54.9	21.576	66.749	225	4.9	
19840402	19:15:44.7	24.226	66.767	203	5.0	
19840405	06:28:12.8	23.261	66.705	217	4.7	
19840416	16:12:24.4	21.547	68.648	100	4.8	
19840424	18:27:35.2	24.500	67.103	170	5.2	
19840510	17:40:32.7	21.353	70.089	56	5.1	
19840515	06:35:24.7	22.399	66.230	241	4.8	
19840516	10:15:11.6	21.130	68.753	208	5.0	
19840519	11:46:08.5	24.387	67.148	177	4.7	
19840620	19:55:46.6	24.101	66.955	195	5.5	
19840708	08:55:25.0	23.757	67.901	140	4.7	
19840715	00:11:33.1	21.518	70.625	35	4.9	
19840716	04:59:29.0	21.616	67.179	280	4.5	
19840803	00:38:19.5	24.252	67.423	172	4.9	
19840803	12:22:04.8	22.965	68.242	135	4.6	
19840811	17:33:41.2	23.655	68.195	141	4.5	
19840812	11:51:41.8	24.186	69.179	100	5.6	
19840821	09:50:08.5	21.794	68.703	104	5.0	
19840828	08:03:27.0	23.859	66.648	211	4.8	
19840922	05:21:59.3	25.105	68.253	119	4.5	
19840929	05:44:38.5	22.431	71.772	33	5.0	

Date	Origen Time	Lat (S)	Long (W)	Depth	mb	Ms
19841012	23:06:01.6	24.089	66.845	204	5.1	
19841020	17:59:17.0	24.072	66.832	192	6.0	
19841031	05:29:08.2	24.448	67.261	205	4.7	
19841104	10:42:41.4	21.442	69.023	148	5.3	
19841108	13:58:35.7	21.459	66.724	232	4.7	
19841109	09:23:10.3	24.139	66.751	184	4.8	
19841112	01:07:29.5	24.212	66.921	212	4.5	
19841116	08:56:02.3	21.423	66.649	237	4.7	
19841116	09:27:08.3	23.079	67.972	114	3.8	
19841116	05:25:42.3	23.963	66.517	214	4.5	
19841202	07:47:25.3	21.353	68.381	121	4.9	
19841211	23:22:19.3	22.407	68.599	191	5.7	
19841213	04:22:15.0	21.543	68.828	120	4.5	
19841214	05:21:21.5	22.221	67.521	208	4.7	
19841216	02:01:43.8	21.480	68.118	113	5.0	
19841217	04:40:34.0	24.143	66.841	198	4.5	
19841220	15:25:56.2	22.376	68.208	116	4.9	
19841229	12:37:24.3	23.512	66.693	218	4.3	
19841231	13:00:32.1	22.986	66.877	174	3.6	
19850103	16:01:11.4	21.843	67.594	103	5.0	
19850113	08:30:56.6	24.068	67.881	138	5.6	
19850220	02:51:36.1	24.181	66.808	189	4.7	
19850221	05:51:02.9	23.892	66.815	208	4.5	
19850305	17:19:38.7	21.493	68.438	139	4.8	
19850314	11:44:30.7	25.091	70.835	40	5.1	4.5
19850318	01:12:24.5	21.278	68.671	116	4.6	
19850329	02:42:46.2	23.171	66.498	228	4.7	
19850330	16:49:22.7	21.214	68.809	120	5.0	
19850412	20:58:41.1	22.466	66.849	199	5.0	
19850417	20:31:56.2	24.031	67.586	218	4.9	
19850423	13:11:40.6	23.598	66.688	239	4.5	
19850507	13:32:42.3	22.077	68.313	86	4.6	
19850527	11:32:52.0	22.710	68.574	95	4.9	
19850527	17:15:43.9	22.679	66.006	253	4.6	
19850528	19:19:36.8	21.834	68.370	150	4.5	
19850530	12:45:02.1	24.303	67.011	181	5.0	
19850603	20:41:56.6	21.612	67.025	33	4.8	
19850610	00:32:46.3	21.627	69.142	164	4.6	
19850618	01:34:03	21.903	68.422	131	4.6	
19850622	03:25:54.2	22.735	68.577	189	5.2	
19850623	07:07:39.3	24.056	67.658	180	5.0	
19850701	15:10:22.5	21.335	68.086	146	5.1	
19850720	17:54:44.2	23.048	66.391	249	4.7	
19850722	16:45:01.1	24.032	66.998	193	4.5	
19850807	02:51:04.3	22.229	67.886	207	4.5	
19850811	14:04:36.8	22.263	69.810	84	4.9	
19850819	08:20:25.1	24.137	66.828	194	4.7	
19850823	16:35:10.2	24.080	66.830	194	5.3	
19850825	04:05:28.7	23.910	67.844	125	4.6	
19850825	10:44:34.5	21.762	67.498	136	5.4	
19850826	01:11:05.5	21.482	62.588	233	4.7	
19850916	20:48:38.6	22.316	69.025	199	4.9	
19850928	17:24:29.6	24.187	66.973	192	4.5	
19850929	15:16:08.5	23.564	66.747	217	4.5	
19850930	00:37:08.2	24.952	67.919	126	5.0	
19851008	09:47:24.8	22.825	66.311	242	5.5	
19851021	01:31:19.7	22.980	69.919	76	4.5	
19851027	01:31:19.7	23.927	69.011	87	4.9	
19851029	01:00:40.2	23.456	69.345	86	5.0	
19851103	09:00:28.6	22.004	67.440	222	4.7	
19851104	06:39:39.6	23.854	66.670	206	4.7	
19851117	02:04:26.5	23.559	69.271	281	4.5	
19851118	05:45:21.1	21.444	69.583	33	5.0	
19851125	03:46:37.8	23.044	68.786	150	4.9	

Date	Depto. de Geofisica, Universidad de Chile	Lat (S)	Long (W)	Depth	mb	Ms
19851216	14:42:44.4	21.447	67.700	171	5.2	
19851225	15:43:56.2	23.982	66.711	187	5.5	
19860109	14:04:02.0	21.534	66.748	221	4.8	
19860114	23:14:37.8	23.418	66.704	213	4.8	
19860117	09:51:26.6	24.074	70.476	33	4.6	
19860125	01:00:32.3	23.996	72.177	33	4.9	
19860203	17:44:24.0	21.245	68.699	111	4.5	
19860211	14:44:49.2	23.883	67.061	210	4.6	
19860212	09:15:02.5	21.711	68.416	133	5.0	
19860222	01:24:48.2	21.321	67.191	188	4.9	
19860223	22:32:48.2	24.282	70.350	64	4.9	
19860305	09:15:09.5	22.504	66.150	256	4.6	
19860308	11:06:47.4	24.024	66.927	199	4.7	
19860312	22:04:19.8	24.112	66.803	206	5.3	
19860327	23:01:38.5	23.181	66.625	215	4.6	
19860331	23:57:01.1	21.113	69.221	117	4.6	
19860401	11:45:20.1	22.587	68.628	123	4.4	
19860403	03:35:30.7	21.415	67.480	204	4.5	
19860409	01:19:54.4	23.015	66.743	216	5.2	
19860412	08:31:36.9	22.654	68.518	113	5.1	
19860421	00:31:44.4	22.765	71.410	333	4.5	
19860510	02:00:23.7	23.559	67.880	130	5.2	
19860519	18:30:05.4	24.043	66.679	205	4.7	
19860529	10:32:23.4	21.767	68.600	126	4.8	
19860605	03:42:52.6	23.153	68.979	102	4.8	
19860616	21:57:38.8	21.458	69.219	220	5.0	
19860621	03:53:31.9	23.048	69.119	96	5.2	
19860709	01:26:00.8	21.906	68.899	174	4.7	
19860711	07:18:55.3	23.594	68.659	213	4.6	
19860721	01:30:34.7	21.088	68.871	134	4.7	
19860728	22:40:35.7	21.008	68.871	134	4.7	
19860803	00:39:19.3	23.365	69.098	142	4.7	
19860814	22:10:55.0	21.724	70.050	190	4.6	
19860814	22:46:31.4	24.054	67.007	158	4.5	
19860815	23:31:28.5	23.447	69.165	114	4.5	
19860821	02:58:36.8	24.244	66.935	189	4.6	
19860909	03:19:48.9	23.125	66.507	208	5.0	
19860909	23:24:04.9	21.857	68.704	106	4.7	
19860912	10:38:40.5	22.510	70.176	79	5.1	
19860913	18:00:47.7	23.032	66.405	197	4.9	
19860914	01:50:34.1	23.991	68.472	203	4.7	
19860915	04:02:54.1	23.991	67.339	189	4.5	
19860915	19:43:07.9	21.377	67.939	186	4.6	
19860923	15:18:19.4	21.309	68.950	186	4.6	
19860930	16:07:35.9	21.812	68.330	126	4.7	
19861010	06:16:00.0	23.586	68.698	85	5.1	
19861013	20:07:21.8	23.396	68.516	116	5.2	
19861015	09:53:04.8	22.111	67.449	168	4.6	
19861021	13:17:01.6	24.489	67.820	170	4.5	
19861024	02:42:51.6	25.319	70.176	50	5.6	
19861028	15:54:54.4	23.556	68.447	100	5.0	
19861103	04:15:04.2	21.406	68.240	133	4.9	
19861105	02:15:24.1	24.024	67.058	193	4.8	
19861110	07:15:24.1	24.024	67.058	193	4.8	
19861127	10:29:32.0	21.680	69.451	52	4.8	
19861129	20:11:20.4	23.250	69.381	86	5.2	
19861206	15:42:05.8	22.699	70.690	50	4.8	
19861214	04:41:13.4	22.685	67.473	197	5.0	
19861227	02:15:32.4	21.732	68.951	101	4.7	
19861227	02:29:00.6	23.823	70.060	101	5.2	
19861228	20:13:54.4	23.971	66.676	208	5.1	
19861230	08:46:31.9	24.168	66.841	201	4.6	
19870120	08:12:39.4	24.051	66.759	197	4.7	
19870124	23:51:42.0	21.403	66.493	243	4.8	
19870201	12:08:13.2	22.586	68.464	117	4.8	
19870202	19:31:33.7	24.758	68.932	129	2.7	
19870215	18:32:52.8	24.246	70.375	52	4.9	
19870224	01:36:22.7	22.046	68.339	121	5.1	

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19870227	22:18:10.6	24.111	68.069	126	4.6	
19870228	05:06:25.3	22.491	67.486	167	4.5	
19870303	12:59:18.2	23.990	66.969	192	4.6	
19870305	09:17:05.2	24.388	70.161	62	6.5	7.0
19870305	09:51:53.4	24.432	70.216	43	5.6	
19870305	09:56:08.5	24.463	70.466	48	5.6	
19870305	10:55:12.3	24.495	70.701	34	5.7	
19870305	13:05:25.3	24.568	70.631	33	4.6	
19870305	21:27:50.1	24.013	70.534	51	5.0	
19870306	07:06:42.0	24.989	70.108	43	5.9	5.5
19870306	07:54:47.7	24.149	70.118	45	5.7	5.7
19870307	13:24:28.6	24.183	70.772	33	5.2	
19870308	16:01:13.4	24.162	70.774	52	4.5	
19870308	19:33:16.7	24.340	70.626	30	4.9	4.6
19870309	05:05:26.4	24.299	70.419	38	4.8	
19870314	02:21:29.1	24.175	70.513	67	4.8	
19870315	06:03:02.2	24.285	70.557	23	5.0	5.2
19870315	05:17:51.0	24.023	69.990	205	4.8	
19870315	12:39:42.4	24.023	69.990	205	4.8	
19870315	15:23:09.8	24.023	69.990	205	4.8	
19870322	03:25:57.6	24.058	70.142	140	5.8	5.8
19870326	11:29:55.8	21.183	68.626	117	4.8	
19870329	05:17:45.1	21.322	66.922	209	4.9	
19870331	19:25:20.3	21.898	67.315	203	4.5	
19870331	01:48:08.5	22.767	66.205	248	6.1	
19870404	19:46:24.2	23.955	70.372	41	4.9	
19870404	20:05:32.2	21.326	68.714	194	5.1	
19870407	00:51:36.6	22.782	66.074	205	5.5	
19870411	02:12:24.5	24.565	69.199	166	4.6	
19870420	02:21:47.3	21.027	68.645	135	4.6	
19870427	15:23:09.8	21.372	67.979	206	4.7	
19870437	19:25:20.1	21.382	67.074	261	4.6	
19870505	13:44:05.8	22.396	68.506	122	4.7	
19870508	15:41:15.4	22.396	68.506	122	4.7	
19870510	21:39:20.1	24.282	70.548	58	5.0	
19870512	16:12:37.5	21.694	68.222	77	5.5	
19870515	21:34:48.6	24.758	70.711	15	5.2	4.0
19870529	19:37:51.8	23.917	66.628	205	5.0	
19870601	01:50:16.1	22.358	68.541	103	5.4	
19870618	08:33:06.9	21.909	68.175	33	4.6	
19870618	13:00:05.1	21.213	68.362	186	5.6	
19870629	06:23:38.4	24.948	67.842	156	4.3	
19870716	19:06:56.1	25.163	70.253	48	5.1	
19870724	21:04:26.2	24.050	67.036	211	4.8	
19870804	19:06:05.2	24.663	70.446	47	4.9	
19870804	22:52:11.4	24.843	70.631	33	4.6	
19870815	07:52:44.2	23.136	68.574	101	5.1	
19870819	09:34:47.4	24.088	66.932	152	5.5	
19870820	23:01:39.8	22.108	68.845	121	4.7	
19870826	13:45:49.0	21.449	69.037	163	4.6	
19870829	14:44:52.4	22.627	66.178	258	4.8	
19870901	04:16:02.1	23.022	66.529	199	6.3	
19870901	04:26:56.1	23.327	66.178	202	4.8	
19870911	00:24:52.1	22.329	66.984	122	5.4	
19870911	00:24:52.1	22.329	66.984	122	5.4	
19870918	08:43:29.3	24.569	69.148	96	5.5	
19870926	00:24:18.6	21.529	70.819	45	5.1	5.3
19871001	10:01:40.3	22.164	67.374	199	4.7	
19871007	00:51:36.6	22.845	68.030	106	5.6	
19871009	08:04:04.4	22.951	66.678	210	4.8	
19871011	08:05:45.2	24.638	70.520	66	4.9	
19871016	05:53:13.6	21.663	69.290	101	4.9	
19871021	23:25:51.8	21.049	69.871	174	5.3	
19871023	18:13:04.5	23.089	66.499	229	5.0	
19871027	18:32:09.2	23.247	68.722	198	4.5	
19871028	21:48:14.3	22.536	68.827	171	5.0	
19871106	11:46:18.8	22.123	69.573	43	5.4	4.8
19871109	11:46:18.8	22.123	69.573	43	5.4	4.8

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19871116		03:17:02.4	21.858	68.425	173	4.7	4.7
19871203		11:04:38.6	21.380	68.215	117	5.5	5.5
19871216		03:17:54.3	23.756	67.350	157	4.6	4.6
19871224		19:02:15.7	21.315	68.402	113	4.7	4.7
19880105		01:34:00.7	22.211	68.473	125	4.8	4.8
19880115		10:28:34.7	24.794	70.087	129	4.9	4.9
19880115		09:17:27.7	23.162	68.973	54	4.9	4.9
19880116		05:16:12.0	25.088	68.616	91	4.7	4.7
19880119		07:30:31.8	24.710	70.568	33	6.3	6.4
19880119		13:17:43.2	24.919	70.566	33	5.1	5.1
19880119		05:48:26.0	24.183	70.352	33	4.8	4.8
19880120		15:01:29.6	24.690	70.521	32	5.3	5.1
19880128		20:44:34.6	22.661	68.952	88	4.7	4.7
19880201		13:32:51.9	24.675	70.405	30	5.2	5.2
19880205		14:01:02.7	24.753	70.433	36	6.2	6.6
19880205		18:49:31.8	24.893	70.554	30	6.0	5.9
19880206		07:09:39.9	25.077	70.776	33	4.7	4.7
19880206		21:40:41.4	24.573	70.954	33	4.8	4.8
19880206		23:03:51.4	25.017	71.127	33	4.8	4.8
19880208		15:57:00.2	24.801	70.393	32	5.6	5.2
19880209		03:13:34.8	23.952	70.392	33	5.0	5.0
19880210		02:58:26.0	24.956	70.922	33	5.1	5.1
19880211		22:19:00.1	24.966	71.381	32	5.1	5.1
19880212		01:19:17.7	24.942	71.054	29	4.5	4.5
19880213		03:35:59.0	24.949	70.962	41	4.8	4.8
19880215		08:15:35.5	22.326	68.333	127	5.1	5.1
19880215		18:49:18.2	25.216	70.932	9	5.2	4.6
19880217		23:30:58.9	23.862	66.506	234	4.7	4.6
19880218		13:52:36.0	23.513	67.706	142	5.7	5.7
19880218		14:37:09.6	23.033	66.544	234	4.8	4.8
19880220		04:45:23.4	24.051	66.975	199	4.7	4.7
19880301		02:31:48.3	22.544	65.752	174	4.5	4.5
19880301		05:19:05.2	22.749	70.293	62	4.8	4.8
19880306		15:00:58.5	23.678	68.017	143	4.8	4.8
19880309		20:56:10.7	24.737	70.138	51	5.0	5.0
19880314		09:34:14.3	23.639	68.322	142	4.8	4.8
19880316		06:08:38.0	21.117	70.214	64	5.0	5.0
19880316		22:55:24.2	21.183	68.535	116	5.1	5.1
19880318		07:54:12.9	23.495	68.945	93	4.9	4.9
19880319		01:19:01.1	23.741	66.357	220	4.9	4.9
19880321		20:44:37.2	22.688	68.647	152	4.6	4.6
19880324		13:30:39.3	21.569	70.337	124	4.6	4.6
19880324		23:59:00.3	25.260	69.681	314	4.5	5.7
19880331		18:43:04.9	23.821	70.942	110	4.9	4.9
19880508		00:33:04.9	21.509	70.757	33	4.6	4.6
19880510		17:59:22.7	24.246	67.131	180	4.7	4.7
19880528		10:05:45.3	24.264	67.053	227	5.1	5.1
19880531		06:48:09.6	21.540	66.563	177	4.7	4.7
19880514		04:36:45.7	21.366	67.937	176	4.7	4.7
19880516		23:39:09.5	21.746	69.875	87	5.2	5.2
19880621		10:36:48.2	24.348	67.026	186	4.5	4.5
19880621		19:59:12.2	22.052	66.442	293	4.5	4.5
19880626		13:51:46.3	21.862	67.442	199	5.0	5.0
19880701		15:58:56.2	23.658	67.050	143	5.1	5.1
19880718		02:30:29.3	22.068	69.981	18	5.3	4.8
19880718		20:00:02.5	21.609	68.287	124	4.8	4.8
19880720		04:14:42.3	22.391	68.430	124	4.8	4.8
19880728		17:12:33.3	22.062	65.716	279	5.9	5.9
19880729		12:07:57.9	22.769	70.651	10	4.8	4.8
19880730		06:54:40.2	22.542	70.201	34	4.5	4.5
19880814		13:11:43.4	21.845	69.997	71	5.1	5.1
19880820		16:02:22.6	22.687	66.145	241	4.7	4.7
19880820		19:11:27.1	24.263	67.079	178	4.5	4.5
19880820		19:40:29.3	23.523	66.465	216	4.6	4.6
19880824		09:23:21.3	21.966	68.306	129	5.0	5.0
19880824		18:41:43.3	21.155	68.824	154	5.0	5.0
19880828		18:41:43.3	21.155	68.824	154	5.0	5.0

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19880914		21:22:59.8	21.553	68.784	172	4.8	4.8
19880914		22:14:07.5	23.424	67.997	122	5.7	5.7
19880923		04:37:53.7	22.010	68.110	138	4.7	4.7
19880925		22:23:51.8	21.016	67.503	162	4.7	4.7
19881002		06:18:08.1	22.774	66.261	238	4.9	4.9
19881014		19:11:40.9	23.208	68.178	97	5.3	5.3
19881017		20:33:25.2	24.023	69.405	75	5.3	5.3
19881018		01:08:15.3	23.565	66.618	242	4.6	4.6
19881018		01:05:49.9	22.879	66.543	246	4.7	4.7
19881018		05:17:25.9	21.297	66.758	270	4.5	4.5
19881018		09:31:21.9	21.316	68.404	121	5.2	5.2
19881020		14:37:51.5	24.269	67.076	182	4.6	4.6
19881205		17:05:43.8	24.020	69.887	49	4.9	4.9
19881216		05:05:46.8	24.122	66.920	169	5.1	5.1
19881216		12:26:35.5	22.958	66.376	220	5.2	5.2
19881218		08:58:53.4	25.395	69.244	195	4.9	4.9
19881224		04:26:54.5	22.522	66.666	193	5.7	5.7
19881230		22:31:37.6	22.835	66.408	242	5.0	5.0
19881231		04:43:56.9	22.110	67.233	183	4.6	4.6
19881231		15:12:20.4	21.324	68.675	124	5.0	5.0
19890107		07:52:12.1	21.594	68.115	122	5.5	5.5
19890114		05:25:44.8	23.197	67.269	183	4.7	4.7
19890201		03:34:15.8	24.382	67.588	180	4.7	4.7
19890202		09:52:32.3	21.051	68.210	154	4.8	4.8
19890203		13:43:16.4	24.024	66.882	190	4.8	4.8
19890207		04:03:00.2	22.087	67.223	179	5.4	5.4
19890209		22:49:02.1	22.611	66.086	247	5.2	5.2
19890217		13:43:26.6	22.175	68.410	122	4.7	4.7
19890224		01:59:54.5	24.057	66.558	204	4.8	4.8
19890227		01:09:42.4	24.147	66.889	199	4.5	4.5
19890228		06:12:20.8	23.429	66.628	133	4.9	4.9
19890301		05:31:56.0	24.115	66.472	197	4.6	4.6
19890327		08:38:44.7	24.008	67.182	178	4.8	4.8
19890428		03:54:31.8	23.523	68.008	121	4.8	4.8
19890510		22:18:46.1	23.282	68.190	195	5.3	5.3
19890517		08:24:24.1	22.872	66.306	256	4.5	4.5
19890519		11:50:54.3	24.839	70.019	52	5.5	5.5
19890529		22:22:30.7	23.897	70.337	32	5.5	4.9
19890601		20:56:00.2	23.887	70.267	43	5.2	5.2
19890619		16:00:47.9	22.113	67.559	188	5.5	5.5
19890708		21:59:44.2	22.619	68.296	218	4.7	4.7
19890806		08:13:56.1	22.157	66.321	110	5.3	5.3
19890807		08:36:59.8	24.442	66.378	173	4.8	4.8
19890808		23:44:04.4	22.723	68.478	102	5.3	5.3
19890813		20:47:52.0	25.073	71.323	33	4.6	4.6
19890824		15:43:42.9	22.372	70.967	59	4.7	4.7
19890826		05:21:45.8	22.794	68.199	148	4.7	4.7
19890836		20:10:36.1	21.960	68.423	114	5.1	5.1
19890831		02:10:58.9	24.127	66.981	190	4.6	4.6
19890909		22:47:49.5	23.023	66.019	254	4.6	4.6
19890922		16:20:57.9	21.967	68.609	33	4.6	4.6
19890927		23:46:06.7	23.194	66.631	220	4.6	4.6
19891003		14:31:52.7	23.002	68.866	189	5.2	5.2
19891005		11:02:04.5	23.362	70.327	153	4.8	4.8
19891022		11:59:21.5	22.254	70.453	165	4.8	4.8
19891102		10:12:20.8	22.310	68.426	113	5.4	5.4
19891105		22:21:49.5	22.417	69.623	214	4.7	4.7
19891108		11:23:02.2	23.711	67.755	136	5.0	5.0
19891109		10:39:45.7	22.509	70.691	100	4.5	4.5
19891110		13:42:51.1	22.772	65.936	265	5.3	5.3
19891112		10:20:45.7	21.866	68.576	148	4.7	4.7
19891113		06:59:20.2	21.879	68.904	167	4.6	4.6
19891120		18:22:14.2	22.420	67.099	190	4.6	4.6
19891214		09:24:55.2	22.526	68.709	111	4.8	4.8
19891215		23:14:47.9	21.235	68.189	94	5.3	5.3
19891225		23:14:47.9	21.235	68.189	94	5.3	5.3

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19901230		00:22:48.1	24.132	68.958	88	4.7	4.7
19900111		16:04:07.7	23.563	69.131	87	4.7	4.7
19900112		18:21:34.6	22.228	69.916	42	5.0	5.0
19900119		20:30:54.6	21.333	68.817	125	4.6	4.6
19900121		07:49:41.9	24.090	66.830	210	4.5	4.5
19900203		07:53:54.5	23.963	70.026	10	4.7	4.7
19900204		23:52:31.4	24.255	67.110	180	4.7	4.7
19900204		06:07:01.6	22.377	70.141	59	4.7	4.7
19900204		20:28:13.1	22.374	68.423	101	5.3	5.3
19900205		12:10:04.9	24.052	66.989	395	4.6	4.6
19900215		13:30:39.2	23.974	68.221	208	5.2	5.2
19900215		02:01:45.7	21.257	68.783	137	4.9	4.9
19900226		02:01:45.7	21.257	68.783	137	4.9	4.9
19900304		13:24:06.8	21.627	67.758	199	4.6	4.6
19900308		03:59:35.2	24.625	70.263	59	4.5	4.5
19900310		02:04:13.3	22.671	68.257	123	4.8	4.8
19900315		09:07:01.1	21.143	68.748	120	4.6	4.6
19900315		12:26:07.3	21.263	68.878	117	4.5	4.5
19900319		04:59:43.5	25.027	68.730	122	5.0	5.0
19900320		13:03:47.0	22.333	69.862	60	4.7	4.7
19900322		16:33:13.1	23.090	66.172	249	4.5	4.5
19900409		09:46:31.1	21.470	68.366	128	5.0	5.0
19900421		12:53:54.1	24.087	66.791	190	4.5	4.5
19900504		23:44:52.6	23.016	68.758	104	4.7	4.7
19900530		04:02:31.6	24.149	66.745	163	4.8	4.8
19900610		03:17:44.5	24.191	66.912	158	4.7	4.7
19900618		19:02:37.3	21.835	68.438	117	5.3	5.3
19900624		23:06:23.6	21.537	68.669	131	4.5	4.5
19900703		23:01:54.3	22.985	66.760	207	4.5	4.5
19900723		23:08:32.3	22.795	69.305	85	4.8	4.8
19900724		05:34:50.8	22.911	68.726	93	5.0	5.0
19900724		20:37:16.2	24.186	62.322	93	4.6	4.6
19900801		17:46:56.4	22.824	66.556	231	4.5	4.5
19900826		21:31:28.6	21.995	69.715	90	4.9	4.9
19900830		12:36:06.7	21.710	68.390	151	4.9	4.9
19900902		09:56:31.9	23.852	70.484	43	4.7	4.7
19900907		16:09:19.6	24.260	66.997	161	5.5	5.5
19900909		04:39:42.5	21.519	68.661	118	4.9	4.9
19900914		17:59:26.5	22.123	68.644	108	4.6	4.6
19900916		05:14:31.9	22.924	66.157	257	4.6	4.6
19901007		22:53:30.9	23.620	66.578	239	4.7	4.7
19901008		23:58:00.7	21.377	67.596	144	4.8	4.8
19901012		08:59:31.4	24.059	62.745	130	4.9	4.9
19901018		07:14:18.2	24.120	66.659	202	4.7	4.7
19901109		22:48:08.5	24.157	66.861	175	4.9	4.9
19901120		16:28:26.9	24.501	69.884	58	5.1	5.1
19901121		23:23:21.7	22.900	68.709	81	4.6	4.6
19901126		18:50:40.4	21.349	68.723	124	4.5	4.5
19901202		14:37:26.9	21.823	68.333	120	5.3	5.3
19901214		02:53:18.9	25.461	70.985	33	4.7	4.7
19901219		06:16:33.0	24.053	66.985	181	4.5	4.5
19901227		16:08:34.6	22.725	70.006	83	5.1	5.1
19901227		20:58:57.7	24.018	66.474	205	4.5	4.5
19910104		13:21:26.1	23.357	66.592	282	4.6	4.6
19910113		06:55:37.4	22.472	68.072	185	4.6	4.6
19910116		22:48:55.7	23.181	69.710	79	5.0	5.0
19910118		09:03:38.3	24.450	67.639	137	4.8	4.8
19910210		13:30:19.3	22.434	68.766	120	4.5	4.5
19910225		11:44:10.2	23.238	70.476	37	4.7	4.7
19910225		21:11:54.3	23.216	70.560	40	4.9	4.9
19910308		07:55:27.7	23.025	70.408	10	4.8	4.8
19910308		12:05:24.6	24.541	69.901	55	5.5	5.5
19910314		20:44:10.9	21.724	68.576	158	4.6	4.6
19910320		01:55:10.3	23.424	68.638	144	4.6	4.6
19910327		16:46:29.1	23.275	69.139	80	4.7	4.7
19910401		17:43:26.2	23.250	69.156	77	5.1	5.1
19910330		21:41:56.8	23.250	69.076	77	5.1	5.1

Date	Depto. de Geofisica, Universidad de Chile	Origin Time	Lat (S)	Long (W)	Depth	mb	Ms
19910511		08:04:43.9	22.061	67.180	193	5.4	5.4
19910529		17:37:09.3	24.091	66.636	195	4.6	4.6
19910530		09:06:22.2	23.531	67.907	119	5.3	5.3
19910601		04:52:46.0	24.134	66.849	187	4.6	4.6
19910626		15:18:34.7	21.056	66.561	114	4.7	4.7
19910706		15:12:20.3	21.387	68.323	118	4.6	4.6
19910706		23:32:34.2	21.442	69.394	34	5.2	4.2
19910709		19:39:13.7	24.247	66.809	172	4.5	4.5
19910725		14:32:23.9	21.567	66.579	224	4.7	4.7
19910803		18:31:58.6	22.552	66.164	255	4.5	4.5
19910815		04:14:10.1	22.986	68.542	211	4.5	4.5
19910825		11:58:46.5	22.260	68.606	108	4.7	4.7
19910827		11:58:22.1	21.657	68.506	115	5.1	5.1
19910831		16:43:46.7	22.425	68.311	117	5.0	5.0
19910903		06:59:43.2	23.952	66.857	182	5.0	5.0
19911002		08:11:37.3	23.986	66.764	199	4.8	4.8
19911011		08:10:27.6	22.775	67.558	164	4.7	4.7
19911016		10:05:59.3	24.606	69.022	99	4.6	4.6
19911027		16:17:31.0	22.086	67.400	178	5.4	5.4
19911108		06:39:21.4	24.169	67.786	128	4.7	4.7
19911200		22:47:57.1	22.457	66.531	213	5.6	5.6
19911202		11:23:01.5	24.072	66.713	198	4.7	4.7
19920105		00:10:27.5	22.161	68.418	123	4.5	4.5
19920118		18:35:00.0	24.042	66.851	186	4.8	4.8
19920127		09:52:58.8	21.481	68.032	144	5.0	5.0
19920205		02:32:04.6	23.223	66.613	200	4.7	4.7
19920206		19:54:44.0	21.438	68.450	131	4.8	4.8
19920211		23:56:09.6	22.625	67.459	179	4.8	4.8
19920228		09:14:09.1	24.369	69.324	58	5.7	5.7
19920229		21:19:57.7	24.305	66.996	167	4.5	4.5
19920410		20:54:48.4	21.156	67.412	221	4.7	4.7
19920418		01:55:09.3	22.277	68.554	109	5.0	5.0
19920427		17:10:13.3	22.440	66.023	257	4.6	4.6
19920509		08:43:47.7	24.267	66.923	176	4.5	4.5
19920513		03:22:48.6	21.129	68.373	127	4.9	4.9
19920515		04:09:16.5	21.571	68.429	128	4.8	4.8
19920515		20:42:43.0	21.870	68.763	104	5.3	5.3
19920526		01:23:38.0	21.084	68.399	130	4.9	4.9
19920605		17:07:11.9	21.470	68.399	130	4.9	4.9
19920612		14:51:39.1	21.026	70.291	36	5.0	5.0
19920616		11:59:31.6	23.887	68.133	118	5.2	5.2
19920616		12:33:51.9	24.027	66.909	162	4.8	4.8
19920622		10:38:32.1	24.124	66.736	179	4.7	4.7
19920629		02:54:03.3	24.930	68.187	113	5.0	5.0
19920629		21:32:40.7	21.476	70.119	96	4.5	4.5
19920703		12:31:55.4	21.160	68.547	119	4.5	4.5
19920715		20:20:16.2	21.602	69.796	77	4.9	4.9
19920722		22:19:21.1	21.779	68.632	108	4.6	4.6
19920725		02:37:32.5	24.840	70.087	51	5.2	5.2
19920801		17:14:54.1	21.331	68.016	139	4.9	4.9
19920817		11:04:04.3	21.363	68.649	114	4.5	4.5
19920817		13:52:39.8	24.139	66.964	189	4.6	4.6
19920818		03:42:29	21.626	70.434	139	5.9	5.9
19920821		00:34:35.0	22.962	69.278	73	5.0	5.0
19920825		12:32:53.8	22.725	66.166	253	4.7	4.7
19920908		00:46:17.4	24.510	66.940	168	4.9	4.9
19920911		13:17:35.9	21.243	68.394	130	4.9	4.9
19920916		19:13:03.3	24.468	70.709	41	4.8	4.8
19920918		07:34:15.3	22.810	66.178	254	4.5	4.5
19920925		12:10:30.7	22.220	68.586	112	4.6	4.6
19920928		10:26:07.7	21.489	66.567	223	4.7	4.7
19921006		02:20:07.6	21.381	68.659	148	4.6	4.6
19921008		17:35:41.2	24.353	67.108	178	4.8	4.8
19921010		04:21:02.6	24.065	67.052	209	4.7	4.7
19921024		10:13:01.8	24.133	68.233	69	4.7	4.7

Date	Origin Time	Lat (S)	Long (W)	Depth	mb	Ms
19921026	22:44:13.7	21.459	67.872	146	5.0	
19921029	02:40:08.8	22.379	68.533	118	4.8	
19921103	15:41:28.4	23.991	70.221	31	5.2	4.3
19921108	10:22:52.9	23.636	70.380	33	5.5	5.0
19921108	10:41:23.3	23.590	70.369	28	5.3	4.6
19921108	11:12:37.4	23.675	70.283	103	5.0	
19921108	18:22:52.7	23.431	68.049	208	4.9	
19921118	07:13:38.0	21.185	68.066	147	4.7	
19921118	07:13:38.0	21.185	68.467	146	5.1	
19921119	19:07:39.1	22.102	70.005	40	5.0	
19921120	11:45:24.6	23.126	68.282	282	4.3	
19921122	02:33:58.2	22.984	68.430	224	4.6	
19921128	17:20:44.9	23.819	70.752	24	5.0	
19921204	23:58:07.4	21.420	68.468	117	5.0	
19921207	04:06:47.3	23.896	66.688	209	5.1	
19921207	17:33:30.1	24.394	69.475	85	4.8	
19921214	23:21:32.5	23.510	68.736	100	4.7	
19930210	4:43:07.8	23.147	68.143	132	4.6	
19930216	21:39:12.5	23.018	69.305	84	5.0	
19930224	22:21:37.8	24.931	68.386	119	5.8	
19930302	22:43:15.9	24.295	67.060	178	5.1	
19930307	20:26:39.7	23.896	68.876	105	4.8	
19930311	7:53:23.1	22.218	67.485	175	5.0	
19930321	20:23:08.4	23.693	70.475	70	4.5	
19930325	22:35:34.7	24.099	66.947	199	4.6	
19930326	12:48:17.6	24.260	67.319	188	4.8	
19930330	5:23:57.9	22.089	67.325	184	5.3	
19930410	21:01:26.5	22.571	68.940	116	5.1	
19930410	21:47:50.9	22.571	68.742	103	5.0	
19930422	16:08:07.6	24.261	67.302	174	4.7	
19930428	20:30:34.7	21.000	67.936	168	4.6	
19930429	12:31:46.5	21.539	70.484	137	4.9	
19930513	23:57:37.2	21.558	65.807	276	4.6	
19930524	23:51:20.8	23.238	66.631	221	6.2	
19930524	23:51:28.2	22.671	66.543	221	6.6	7.0
19930604	15:29:58.4	24.064	69.386	75	4.9	
19930613	22:44:44.8	24.248	67.056	163	4.8	
19930614	11:20:01.2	24.460	67.130	163	4.8	
19930618	7:46:04.7	22.446	66.115	238	4.5	
19930623	10:53:14.5	23.560	66.465	213	4.6	
19930711	13:36:43.2	23.551	66.178	106	5.2	6.0
19930711	13:36:43.2	23.551	66.178	133	5.3	
19930803	7:15:04.9	24.193	66.988	176	5.2	
19930825	1:27:40.4	22.785	66.211	246	4.5	
19930915	15:29:43.1	23.090	68.545	90	4.8	
19930915	20:11:41.1	22.086	68.385	114	4.9	
19930925	21:06:33.7	22.894	70.750	10	4.5	
19931001	17:27:23.7	22.869	65.930	249	4.7	
19931016	14:00:02.2	24.118	67.249	162	5.0	
19931019	4:02:22.4	22.386	66.004	278	4.8	
19931019	4:01:43.7	24.085	67.190	183	5.0	
19931104	1:59:19.9	22.657	68.620	110	5.0	
19931130	18:24:00.7	23.220	68.343	93	5.3	
19940201	12:53:57.9	21.453	70.066	52	5.1	5.0
19940202	5:03:54.0	22.557	66.738	215	4.5	
19940204	9:02:21.9	24.812	66.770	139	4.5	
19940217	4:37:28.3	23.166	66.576	223	4.9	
19940316	7:49:34.3	22.416	65.995	274	4.8	
19940317	21:22:50.0	24.220	67.036	164	4.5	
19940418	2:30:05.3	24.058	67.499	150	4.7	
19940418	8:28:38.0	22.814	69.749	49	5.2	
19940420	3:32:45.9	21.509	65.974	266	4.8	
19940420	8:22:46.3	23.226	66.508	132	4.8	
19940322	21:57:13.3	24.260	66.308	132	5.4	

Date	Origin Time	Lat (S)	Long (W)	Depth	mb	Ms
19940615	22:11:50.8	24.337	66.977	166	4.9	
19940709	7:49:32.4	22.654	66.443	230	4.5	
19940731	6:26:44.2	23.114	66.517	242	4.6	
19940802	12:12:50.8	23.018	66.524	230	4.6	
19940802	1:51:18.0	24.272	66.932	169	5.1	
19940816	2:38:31.1	24.038	66.769	182	4.6	
19940826	4:44:29.9	23.357	66.355	212	4.9	
19940831	14:31:16.3	21.385	68.127	108	4.7	
19940902	4:54:30.0	21.059	66.680	225	4.8	
19940923	13:12:56.9	23.939	67.462	180	4.6	
19941026	15:26:04.6	21.433	68.258	123	5.1	
19941108	7:10:48.3	22.375	66.078	115	4.8	
19941117	5:35:33.2	22.375	66.078	274	5.1	
19941122	12:19:49.3	23.194	69.336	67	4.9	
19941123	13:57:58.8	22.465	67.383	165	4.6	
19941127	5:24:53.2	24.496	66.544	230	4.7	
19941129	18:26:43.3	24.085	66.678	182	4.5	
19941204	19:54:40.3	24.076	66.991	204	4.6	
19941210	3:37:55.3	23.458	66.736	243	5.6	5.6
19941210	3:39:31.4	23.572	67.322	137	7.0	
19950101	14:06:55.8	24.491	69.765	169	4.8	
19950101	9:33:44.7	25.094	69.492	33	4.7	
19950103	21:13:07.2	23.038	70.283	97	4.7	
19950214	15:53:56.9	23.290	67.702	156	5.7	
19950308	7:10:55.9	22.144	68.369	114	4.9	
19950311	7:12:22.4	21.798	68.610	134	4.6	
19950321	9:11:05.7	22.779	68.506	103	5.0	
19950424	21:00:50.1	22.001	67.379	170	4.9	
19950426	4:23:36.7	22.791	69.361	171	5.0	
19950504	3:08:44.3	24.184	66.868	139	5.6	
19950504	17:47:39.7	23.897	67.259	33	4.8	
19950519	9:31:46.0	23.811	66.496	230	5.0	
19950609	5:35:49.3	23.164	68.029	192	5.2	
19950609	12:01:56.1	24.035	66.972	179	4.8	
19950614	16:12:59.3	24.754	69.984	49	5.5	4.7
19950706	9:13:06.8	22.603	68.459	109	4.6	
19950709	23:42:06.8	24.317	66.942	180	4.7	
19950730	5:11:23.5	23.364	70.312	47	6.6	7.3
19950730	5:25:06.0	23.239	70.673	33	5.7	
19950730	5:34:28.3	23.501	70.050	33	4.8	
19950730	5:50:26.1	23.723	69.370	33	5.4	
19950730	5:59:07.5	24.600	70.774	33	4.8	
19950730	6:00:08.5	24.299	70.568	33	5.3	
19950730	6:02:57.4	24.212	70.889	33	4.5	
19950730	6:08:12.2	23.663	70.597	33	4.7	
19950730	6:27:30.3	24.133	70.848	33	4.7	
19950730	6:39:28.7	24.293	70.571	33	5.1	
19950730	6:51:23.7	23.934	70.344	33	4.5	
19950730	7:04:16.4	24.389	70.362	33	4.7	
19950730	7:05:04.6	24.153	70.508	33	4.5	
19950730	7:06:55.7	24.580	70.699	33	4.6	
19950730	7:14:42.4	24.529	70.741	33	4.6	
19950730	7:33:05.7	23.531	70.865	33	4.5	
19950730	7:33:18.1	23.448	70.341	33	5.0	
19950730	7:51:22.2	23.745	70.503	33	4.6	
19950730	8:02:42.8	23.618	70.587	33	4.6	
19950730	8:17:18.0	23.987	70.242	30	5.2	
19950730	8:58:01.6	23.523	70.524	33	4.6	
19950730	9:13:49.0	24.185	70.188	32	4.6	
19950730	9:43:01.7	23.905	70.209	33	4.5	
19950730	10:35:42.5	24.392	70.691	33	5.8	5.3
19950730	10:56:11.7	23.209	70.534	33	4.3	
19950730	11:18:49.7	23.852	70.453	33	4.3	
19950730	11:32:37.9	24.281	70.574	33	4.8	
19950730	12:44:05.1	24.264	70.673	33	4.5	

Date	Origen Time	Lat (S)	Long (W)	Depth	mb	Ms
19950730	12:51:37.6	24.441	70.851	33	4.6	4.6
19950730	13:27:19.8	24.143	70.274	33	4.6	4.6
19950730	13:45:56.8	23.239	70.090	33	4.7	4.7
19950730	14:09:02.6	24.718	70.479	33	4.6	4.6
19950730	14:11:33.8	24.758	70.639	33	4.7	4.7
19950730	14:44:45.9	24.114	69.989	33	4.8	4.8
19950730	12:40:17.2	24.507	70.700	33	4.2	4.2
19950730	16:11:24.3	24.863	70.698	33	5.3	4.8
19950730	17:21:53.0	23.812	70.830	33	4.6	4.6
19950730	17:59:35.4	23.889	70.155	33	4.6	4.6
19950730	18:02:45.8	24.009	70.746	33	5.0	5.0
19950730	18:26:32.0	23.650	70.632	33	4.7	4.7
19950730	19:14:03.3	24.443	70.781	33	4.5	4.5
19950730	21:05:50.6	23.317	70.590	33	5.6	5.6
19950730	22:12:41.4	24.158	70.501	33	4.5	4.5
19950730	22:27:35.0	23.270	70.058	33	4.9	4.9
19950730	22:46:44.5	24.468	70.852	33	4.8	4.8
19950730	23:18:45.0	23.536	70.537	33	4.8	4.8
19950731	1:14:47.3	24.139	70.232	33	5.0	4.8
19950731	2:07:12.6	23.108	70.431	33	4.6	4.8
19950731	6:08:35.0	23.649	70.420	33	4.6	4.6
19950731	8:20:18.3	21.255	68.348	123	4.6	4.6
19950731	9:25:32.7	23.768	70.136	44	4.8	4.8
19950801	3:21:07.8	24.828	70.741	33	4.5	4.5
19950801	4:23:20.6	24.050	66.649	199	4.8	4.8
19950801	5:10:57.4	24.942	70.886	30	5.2	4.5
19950801	6:00:37.9	24.039	70.766	33	4.7	4.7
19950801	15:44:30.5	24.701	70.792	30	5.3	4.7
19950801	21:51:43.5	23.462	70.632	33	4.6	4.6
19950802	1:14:09.6	23.152	70.578	33	5.4	5.5
19950802	2:04:38.2	23.019	70.528	33	4.6	4.6
19950802	5:22:32.6	23.098	71.077	33	4.8	4.8
19950802	11:05:39.0	23.100	70.405	33	5.2	5.1
19950802	16:27:32.8	23.336	70.477	33	5.1	5.1
19950802	18:39:37.8	23.039	70.564	33	4.5	4.5
19950802	20:20:13.6	22.977	70.568	33	5.1	4.5
19950803	1:57:21.7	23.132	70.502	33	5.4	5.9
19950803	7:20:37.9	23.519	70.475	34	5.0	4.5
19950803	13:48:26.7	23.977	70.217	33	4.6	4.5
19950803	14:03:05.8	23.065	70.520	33	4.6	4.6
19950803	14:19:04.7	22.929	70.379	33	5.2	5.1
19950803	19:07:45.0	24.007	70.745	33	4.6	4.6
19950803	19:50:36.3	23.699	70.520	33	5.0	4.3
19950803	23:07:12.4	23.317	70.700	33	4.5	4.5
19950804	11:28:50.3	24.021	70.352	32	4.5	4.5
19950805	1:32:46.1	23.195	70.701	33	4.6	4.5
19950805	1:50:13.6	23.055	70.576	33	4.7	4.3
19950805	8:12:13.3	23.212	70.584	33	4.8	4.8
19950805	27:18:10.9	23.739	69.955	33	4.6	4.6
19950808	7:20:37.6	24.451	70.147	34	4.9	4.2
19950809	8:23:01.1	23.121	70.181	35	5.3	4.7
19950810	12:48:45.5	23.668	67.693	117	4.5	4.7
19950810	18:10:37.3	23.697	70.495	33	5.4	4.7
19950811	10:14:46.5	23.368	66.577	215	4.9	4.9
19950817	18:54:32.7	23.215	70.520	33	4.9	4.9
19950818	19:44:49.9	23.826	70.662	33	4.5	4.5
19950820	3:09:05.1	23.226	70.446	33	4.5	4.5
19950829	20:16:26.3	24.371	67.031	164	4.5	4.5
19950831	22:15:04.9	23.948	70.168	33	4.5	4.5
19950907	12:53:02.4	24.848	70.502	36	4.6	4.6
19950912	18:40:43.6	23.546	70.857	33	4.8	4.8
19950919	3:31:43.6	21.298	68.740	110	5.7	5.7
19950921	22:23:07.4	23.142	70.424	32	4.7	4.7
19950924	13:59:00.2	23.176	67.888	127	4.8	4.8
19951007	3:32:57.5	23.091	70.439	33	4.7	4.7

Date	Origen Time	Lat (S)	Long (W)	Depth	mb	Ms
19951012	2:25:31.4	22.527	66.188	241	4.6	4.6
19951012	22:57:10.1	22.954	70.204	32	5.3	4.9
19951015	16:34:01.4	22.377	68.439	111	4.7	4.7
19951016	16:36:19.5	23.235	70.434	28	5.4	5.2
19951016	17:44:20.2	23.369	70.666	30	5.1	5.1
19951016	17:05:51.3	23.287	70.357	33	4.7	4.7
19951016	21:32:27.5	21.572	66.551	228	4.7	4.7
19951016	19:14:46.2	21.970	67.065	199	4.5	4.5
19951023	14:11:33.1	22.940	68.144	100	4.6	4.6
19951023	14:11:33.1	22.940	68.144	100	4.6	4.6
19951023	14:42:52.3	22.451	66.877	168	4.8	4.8
19960108	17:42:25.7	24.897	70.047	51	4.5	4.5
19960116	12:17:22.4	24.003	66.816	199	4.5	4.5
19960131	22:58:58.0	23.324	69.644	74	4.6	4.6
19960229	19:39:55.6	24.053	66.758	186	4.8	4.8
19960307	2:27:24.1	23.479	70.358	27	5.1	4.5
19960307	8:38:57.5	23.267	70.285	31	5.3	4.9
19960318	3:15:16.7	24.027	67.972	149	4.9	4.9
19960329	3:35:47.8	24.796	69.733	133	4.5	4.5
19960413	22:59:31.0	22.944	70.783	158	4.6	4.6
19960420	13:17:06.1	24.071	66.586	197	5.2	6.1
19960502	13:12:47.4	21.378	68.396	121	4.5	4.5

Appendix II

Isoseismals for Large Earthquakes

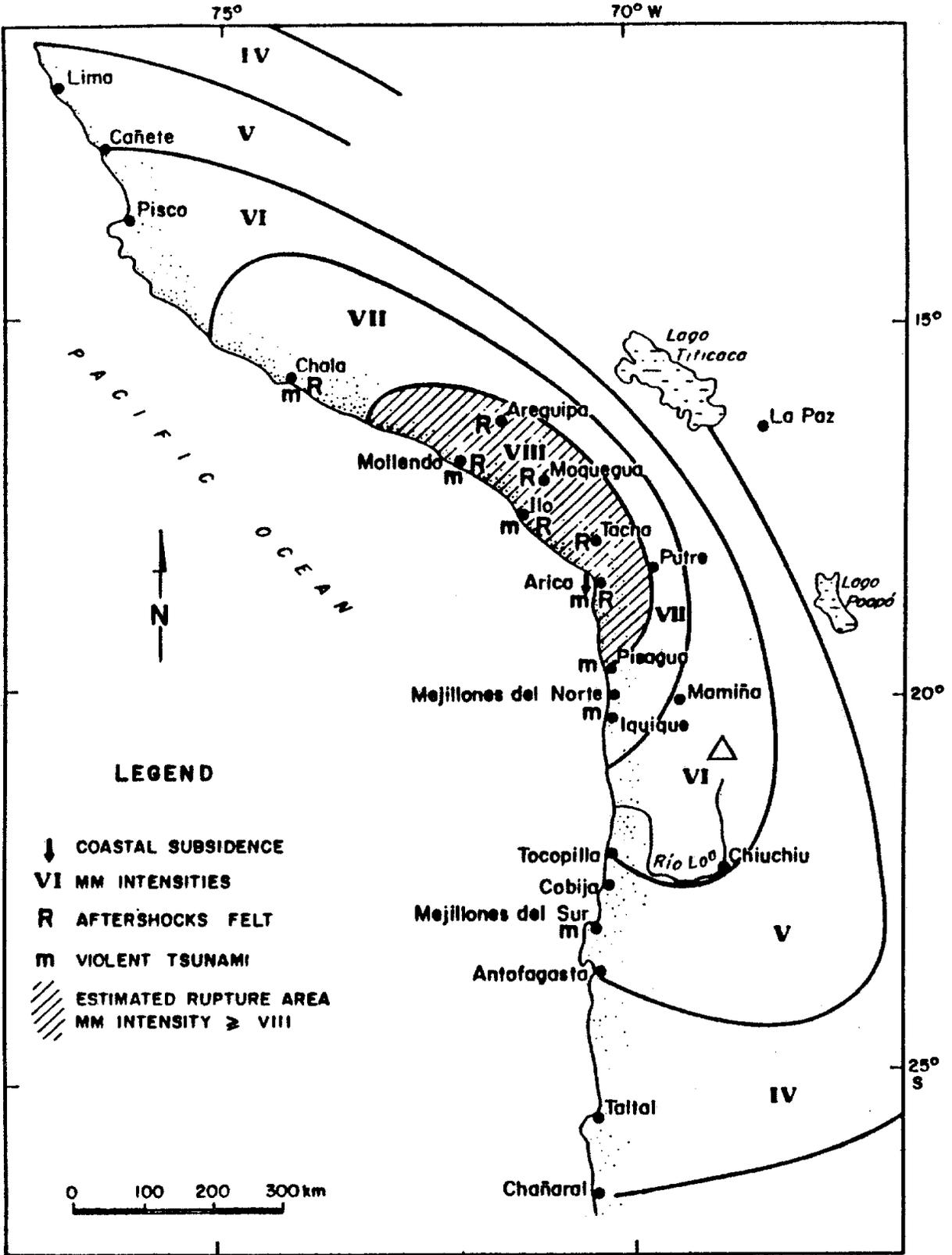


Fig. 1. Isoseismals and rupture area associated with the 1868 earthquake (southern Peru and northern Chile). The intensity at MMA site reached a value of V in the Modified Mercalli Intensity scale.

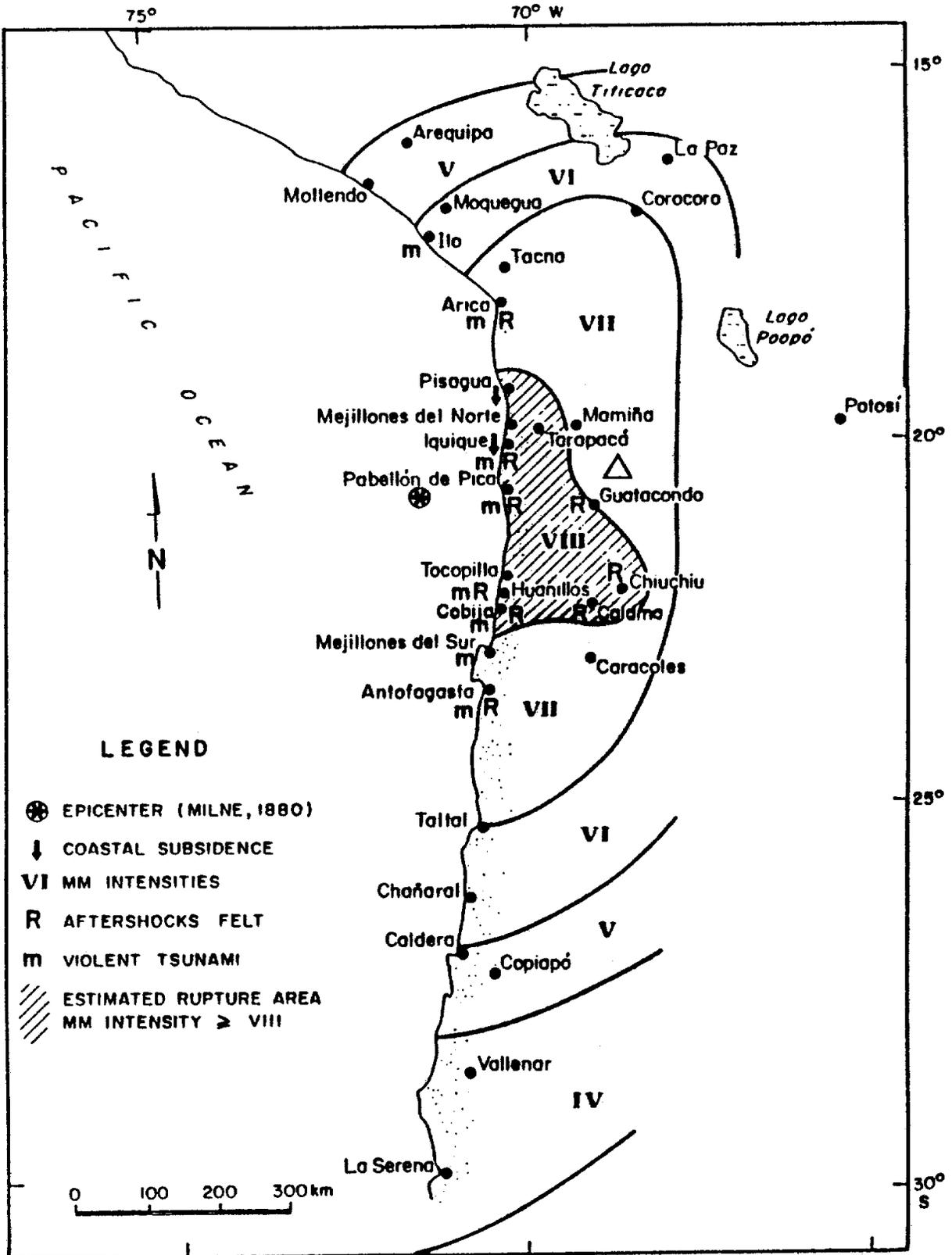


Fig. 2. Isoseismals and rupture area associated with the 1877 earthquake (northern Chile). The intensity at MMA site reached a value of VI-VII in the Modified Mercalli Intensity scale.

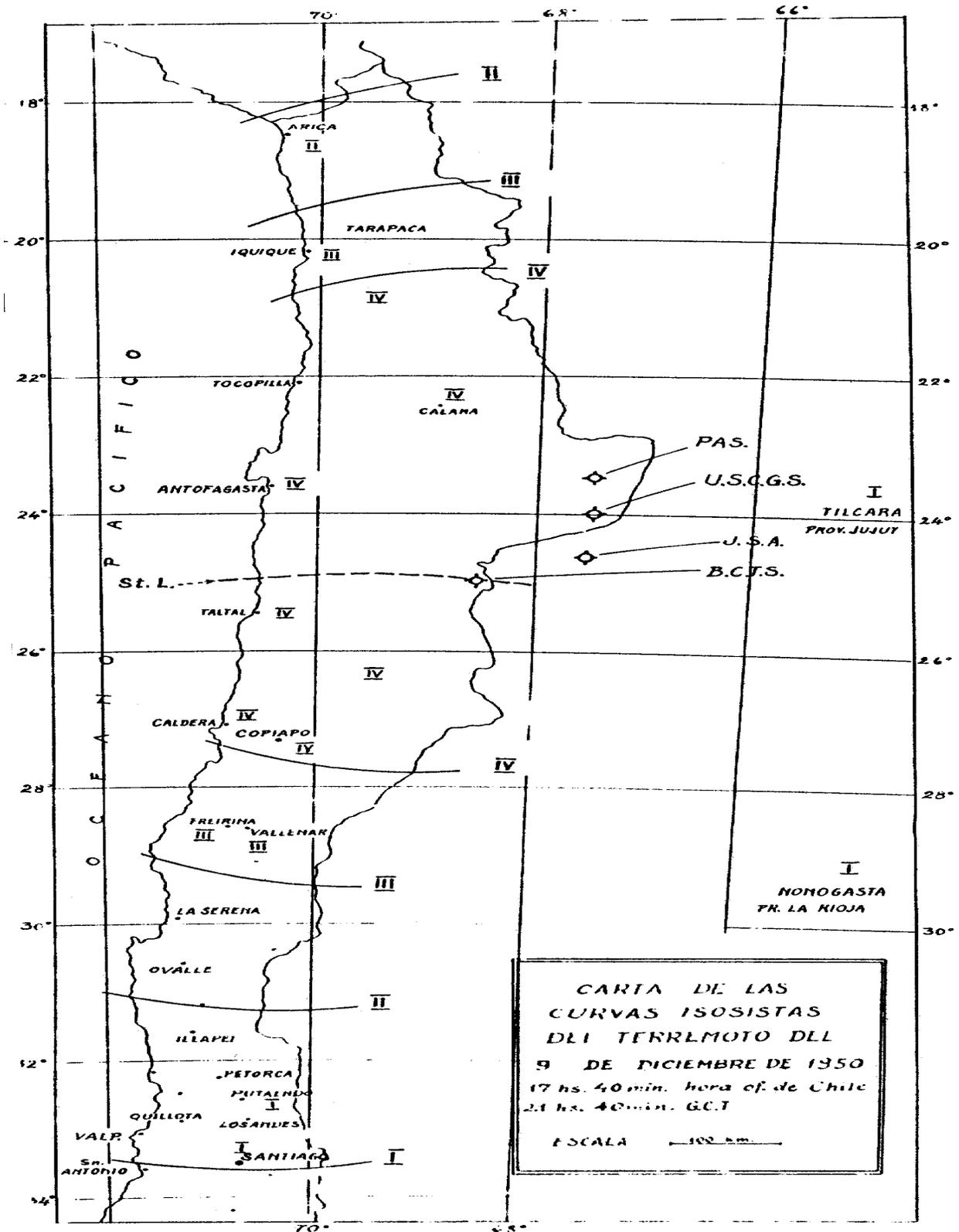


Fig. 3. Isoseismals produced by the 1950 earthquake (northern Chile). The intensity at MMA site reached a value of IV in the old Chilean scale which corresponds to VII-VIII in the Modified Mercalli Intensity scale.