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NIED Seismic Moment Tensor Catalogue January – December, 1997

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Abstract

We have routinely estimated the moment tensors of earthquakes occurring in and around Japanese islands. This report compiles all the moment tensor solutions we have estimated in 1997. In these computations, we used the FREESIA/KIBAN broadband seismic network developed by NIED (National Research Institute for Earth Science and Disaster Prevention) and STA (Science and Technology Agency). We mainly used STS-1 broadband seismometer records. VSE311 strong motion velocity-meter was additionally used in cases when STS-1 waveforms were unavailable. Moment tensor estimation is triggered by the JMA (Japan Meteorological Agency) e-mail of emergent hypocenter location information. This catalogue includes most M >4.0 earthquakes and some M >3.5 earthquakes. However, due to either incomplete station distribution or the quality of available data, our catalog missed several earthquakes that had been detected by JMA.

Key words: Seismic moment tensor, Earthquake catalogue

1. Method

Below is a brief description of the method used here to determine seismic moment tensors and their centroid depths. Fukuyama et al. (1998) describes the method and it would be helpful to refer to this in more details. All the information concerning this catalogue is also displayed at the World Wide Web page[1]. We already published the seismic moment tensor catalogue for 1998 (Fukuyama et al., 1999) and for 1999 (Fukuyama et al., 2000).

Moment tensor analysis is triggered by the JMA (Japan Meteorological Agency) emergency hypocenter report received by e-mail. The following information is used from the

[1]http://argent.geo.bosai.go.jp

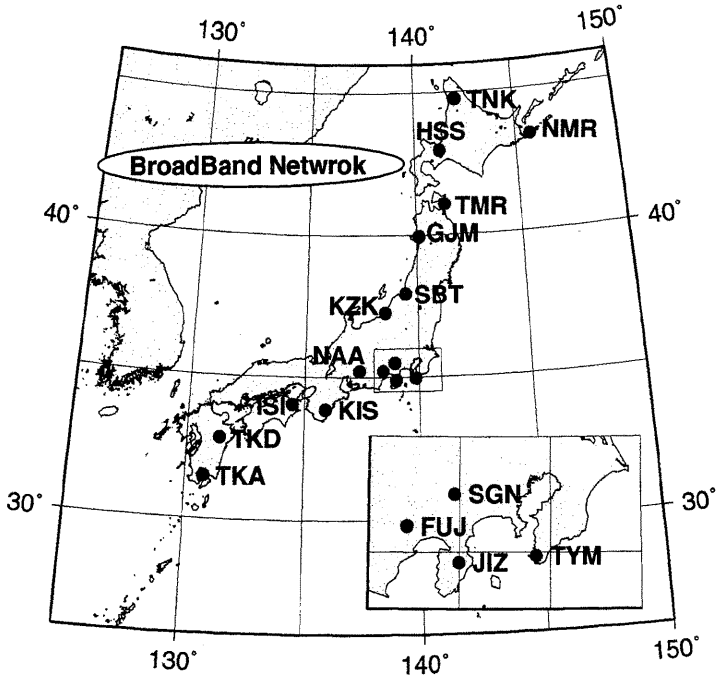

Fig. 1: Broadband station distribution used in the analysis.

report: origin time (in minutes), epicentral location (in 0.1 degree), depth (in 10km) and magnitude. This e-mail is dispatched for earthquakes with a maximum JMA scale intensity greater than 1 in the Kanto-Shinetsu-Chubu region (central part of Japan) and its surroundings. For other regions, the e-mail is dispatched only for earthquakes with a maximum intensity 3 or more. This information covers most M >3.5 earthquakes. However, it sometimes misses off shore or deep M >3.5 earthquakes, thus we used the information from the JWA (Japan Weather Association) World Wide Web page[2] as a supplement. We also took into account the relocated hypocenter information produced by JMA.

All the stations used in this analysis are shown in Fig. 1 and Table 1. Three stations at most are used for the moment tensor estimation. Filter coefficients and minimum epicentral distance are chosen according to the JMA magnitude (see Table 2). The JMA magnitude is used only for this purpose. The criterion for choosing stations is based on its epicentral distance. The closest three stations within the epicentral distance range are chosen as a first (automatic) trial. We then update it manually by examining station combinations, adjusting origin time offsets, or adjusting source depth. This is because if the waveforms are contaminated by long period noise, the solution is no more reliable. Manual operation is mainly employed to remove these noisy records. If the dataset is well examined, the moment tensor solution can be determined stably and uniquely by adjusting origin time offset and its source depth. In this catalogue, all solutions have been inspected and re-computed as final solutions.

Filtered displacement waveforms are used for the moment tensor inversion. The filter

[2]http://tenki.or.jp/quake.html

Table 1: Locations of stations used in the analysis.

Station Name	Station Code	Latitude (^oN)	Longitude (^oE)	Height (m)	Cooperative Organization	Funding Project
Fujigawa	FUJ	35.2267	138.4217	640	Tokyo U.	FREESIA
Gojyome	GJM	39.9517	140.1167	105	Tohoku U.	KIBAN
Sapporo	HSS	42.9647	141.2328	230	Hokkaido U.	FREESIA
Tokushima	ISI	34.0572	134.4580	27	Kyoto U.	FREESIA
Nakaizu	JIZ	34.9129	138.9972	263	—	FREESIA
Kiwa	KIS	33.8627	135.8933	70	Kyoto U.	FREESIA
Kashiwazaki	KZK	37.2951	138.5156	220	Tokyo U.	FREESIA
Asahi	NAA	35.2217	137.3650	200	Nagoya U.	FREESIA
Nemuro	NMR	43.3650	145.7430	20	Hokkaido U.	FREESIA
Shibata	SBT	37.9656	139.4538	160	Tohoku U.	KIBAN
Tsuru-Sugeno	SGN	35.5054	138.9475	800	—	FREESIA
Takakuma	TKA	31.5125	130.7853	535	Kagoshima U.	FREESIA
Takeda	TKD	32.8140	131.3900	751	Kyushu U.	FREESIA
Tomari	TMR	41.0990	141.3868	120	Hirosaki U.	KIBAN
Nakagawa	TNK	44.7757	142.0830	60	Hokkaido U.	FREESIA
Tateyama	TYM	34.9708	139.8481	30	Geogr. Surv. Jpn.	FREESIA

Table 2: Minimum epicentral distance, filter coefficients, and data length for initial magnitude reported by JMA

Magnitude range	Epicentral Dist. (km)	Frequency range (Hz)	Data length ($seconds$)
3.5 <M <5.0	>50	0.02 – 0.05	120
5.0 <M <6.5	>100	0.01 – 0.05	120
6.5 <M <7.5	>300	0.01 – 0.05	150
7.5 <M	>600	0.005 – 0.02	180

coefficients vary according to JMA magnitude (Table 2). 1 Hz sampling displacement data produced from the original 20Hz data stream (VBB components) are used in order to reduce the latency caused by packeting during the transmission from each station.

The moment tensor estimation consists of two steps, an automatic process and a manual one with human inspections. In the automatic stage, by using JMA e-mail, three stations are chosen automatically to prepare the waveform dataset. Using these waveforms, a moment tensor inversion is conducted with several trial depths within ±30km from the JMA hypocenter depth. Assumed depth points are shown in Table 3. In the manual determination stage, the combination of stations, optimum zero offset and depth have been examined by the operator in a Monte Carlo manner. At this point, the error function is set to variance

Table 3: Assumed source depths in km used in the analysis.

5 8 11 14 17 20 23 26 29 32 35 38 41 44 47 50 53 56 59 62 65 68
71 74 77 80 83 86 89 92 95 98 101 104 107 110 113 116 119 122
125 130 135 140 145 150 155 160 165 170 175 180 185 190 195 200
210 220 230 240 250 260 270 280 290 300 320 340 360 380 400

Table 4: Velocity structure for Green's functions.

Depth (km)	Thickness (km)	P Velocity (km/s)	S Velocity (km/s)	Density (kg/m^3)	Q_P	Q_S
0	3	5.50	3.14	2300	600	300
3	15	6.00	3.55	2400	600	300
18	15	6.70	3.83	2800	600	300
33	67	7.80	4.46	3200	600	300
100	125	8.00	4.57	3300	600	300
225	100	8.40	4.80	3400	600	300
325	100	8.60	4.91	3500	600	300
425	–	9.30	5.31	3700	600	300

reduction ($VarRed$) defined as follows:

$$VarRed = 100 \times \sum_i w_i \int \left(1 - \frac{(s_i(t) - o_i(t))^2}{|s_i(t)||o_i(t)|}\right) dt \ \ [\%] \tag{1}$$

where $s_i(t)$ and $o_i(t)$ are synthetic and observed waveforms respectively. w_i is a weighting function proportional to the hypocentral distance.

The velocity structure used for Green's function is shown in Table 4. This structure is constructed by referring to Ukawa et al. (1984) for the shallower part and Fukao (1977) for the deeper part. Green's function is computed by using the discrete wavenumber method developed by Saikia (1994). The program named *tdmt_inv* is used for the moment tensor estimation which is developed by Pasyanos et al. (1996). *tdmt_sched.pl* is a Perl script developed here and used in the routine process. *tdmt_sched.pl* controls the automatic procedure. *tdmt_manual.pl* then supports the human inspection of the automatic moment tensor solution by referring to the automatic solution. In this inversion, since the time offset is shifted either automatically or manually, the centroid location is not estimated. This offset adjustment corrects both velocity structure misfit and the misfit between hypocenter and centroid location. As shown in Fukuyama et al. (1998), the shape of Green's function does not change for slight epicentral distance change, so that the above procedure works.

2. Results

The results are shown in Table 5, Figs. 2 and 3. In Table 5, origin times, latitudes, longitudes and region names are provided by JMA e-mail. Other parameters such as D (depth), Mw (moment magnitude) etc., are determined by this analysis. VarRed represents variance reduction, shown as percentages. (Str1, Dip1, Rak1) and (Str2, Dip2, Rak2) are two fault planes. Str, Dip, and Rak indicate strike, dip and rake angles, respectively. M_{xx}, M_{xy}, M_{xz}, M_{yy}, M_{yz}, and M_{zz} are the moment tensor components normalized by M_o (total scalar moment). In Fig. 2, moment tensors with the best fit double couples are shown in addition to their epicentral locations. The numerals appearing above each moment tensor represent the event ID shown in Table 5. In Fig 3, moment tensors are shown with lower hemisphere projection. P- and T- axes are also shown. Superscripted numerals again indicate event ID.

3. Conclusion

We have estimated 315 seismic moment tensors and their centroid depths by using FREESIA /KIBAN broadband waveforms.

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NIED 地震モーメントテンソルカタログ 1997年1月－12月

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要旨

我々は，日本及びその周辺で発生する地震のモーメントテンソルを定常的に決めている．このレポートは、1997年に決められたすべての地震のモーメントテンソル解をコンパイルしたものである．防災科学技術研究所及び科学技術庁により整備された広帯域地震観測網のデータを用いて計算を行った．解析には主にSTS-1型広帯域地震計の波形を用いたが，利用できない場合は，VSE311型速度型強震計を用いた．気象庁から発信される緊急震源情報を含んだ電子メールにより解析を開始させた．本カタログは，ほとんどのマグニチュード4以上の地震といくつかのマグニチュード3.5以上の地震をカバーしている．しかしながら，観測点分布の偏りや，波形データのノイズ状況により，気象庁により検知された地震のいくつかは解が決まらず，カタログからは洩れている．

キーワード：モーメントテンソル，地震カタログ

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Table 5: Estimated moment tensors. A detailed explanation is given in the text.

No.	Origin Time(UT)	Lat(N)	Lon(E)	D(km)	Mw	Mo(Nm)	VarRed	Region name	Str1	Dip1	Rak1	Str2	Dip2	Rak2	Mxx	Mxy	Mxz	Myy	Myz	Mzz	used Stations		
1	1997/01/04,12:31	33.8	131.2	8	3.8	5.69e14	79.70	Suonada Setonaikai	312	78	52	207	40	161	0.4206	-0.1964	-0.6575	-0.7359	-0.3496	0.3152	TKD	ISI	
2	1997/01/11,05:50	31.6	131.9	26	5.4	1.36e17	77.39	Hyuganada region	16	53	91	195	37	89	-0.1233	0.2228	0.0857	-0.8738	-0.2493	0.9971	TKA	TKD	
3	1997/01/14,08:48	33.2	132.4	26	3.5	1.95e14	62.82	Bungo channel	252	76	134	356	45	19	0.1121	0.6244	-0.6725	-0.4387	0.0243	0.3266	TKD	ISI	
4	1997/01/14,14:46	30.5	131.5	41	4.5	7.08e15	59.69	E off Tanegashima island	27	49	96	197	41	83	-0.0361	0.4104	0.1144	-0.8860	-0.1077	0.9221	TKA	TKD	
5	1997/01/16,06:10	31.7	131.8	23	3.9	7.29e14	86.31	Hyuganada region	23	85	90	208	5	95	-0.0647	0.0448	0.3850	-0.1307	-0.9058	0.1954	TKD		
6	1997/01/27,06:41	33.7	132.0	65	4.0	1.22e15	68.32	Iyonada Setonaikai	29	69	55	272	40	146	-0.5887	0.4279	0.0381	0.0343	-0.7116	0.5543	TKD	ISI	
7	1997/02/02,20:28	30.4	131.4	8	4.4	4.14e15	66.77	E off Tanegashima island	242	81	-130	141	41	-14	0.6851	0.2699	0.5654	-0.4513	-0.4973	-0.2338	TKA	TKD	
8	1997/02/16,20:22	35.6	140.1	86	4.7	1.28e16	87.71	central Chiba pref	174	88	-88	321	3	-123	0.4192	-0.0336	-0.0925	-0.1229	-0.9943	-0.2963	SGN	FUJ	KZK
9	1997/02/17,09:52	35.4	140.5	56	4.0	1.07e15	86.89	Kujukuri coast Boso pen	116	61	-37	226	59	-145	0.8397	-0.2129	-0.1313	-0.3880	-0.6677	-0.4517	TYM	SGN	JIZ
10	1997/02/19,01:04	35.6	140.1	71	4.5	6.11e15	85.32	central Chiba pref	335	67	81	176	24	110	0.1423	-0.2926	-0.3086	-0.7421	-0.6236	0.5998	SGN	FUJ	KZK
11	1997/02/19,20:22	37.4	141.2	92	5.4	1.67e17	78.83	E off Fukushima pref	215	80	-77	341	17	-142	-0.0158	0.0318	0.6027	0.4238	-0.6948	-0.4080	KZK	SGN	FUJ
12	1997/02/20,07:55	41.8	142.9	47	6.0	1.07e18	75.25	S off Urakawa	38	66	91	215	24	87	-0.2780	0.3294	0.4154	-0.4907	-0.5239	0.7687	HSS	NMR	
13	1997/02/21,08:16	35.8	141.2	29	4.0	1.15e15	71.03	near Choshi city	118	56	-71	266	39	-116	0.9115	0.2043	-0.2265	-0.0342	-0.3250	-0.8773	TYM	FUJ	
14	1997/02/28,19:46	35.4	140.4	23	4.0	1.24e15	78.96	Kujukuri coast Boso pen	62	73	87	253	17	100	-0.4712	0.1767	0.7272	-0.0995	-0.3997	0.5706	SGN	KZK	
15	1997/03/03,04:27	34.9	139.1	8	3.8	6.00e14	88.99	central Izu peninsula	164	82	29	69	62	171	0.4717	0.7008	0.3311	-0.5213	0.4061	0.0497	SGN	TYM	FUJ
16	1997/03/03,05:20	35.0	139.1	5	4.0	1.27e15	88.01	E off Izu peninsula	341	83	-34	75	57	-172	0.5534	0.7101	0.1629	-0.3580	0.4957	-0.1954	SGN	FUJ	TYM
17	1997/03/03,08:45	35.0	139.1	5	4.2	2.09e15	87.80	E off Izu peninsula	341	84	-35	75	55	-173	0.5215	0.7176	0.2115	-0.3228	0.5066	-0.1987	SGN	FUJ	TYM
18	1997/03/03,11:11	35.0	139.1	8	4.7	1.27e16	76.33	E off Izu peninsula	174	80	21	80	69	169	0.2927	0.8594	0.3930	-0.1289	0.3835	-0.1638	SGN	FUJ	TYM
19	1997/03/03,13:39	36.5	140.7	50	4.1	1.81e15	80.27	northern Ibaraki pref	16	70	100	167	22	63	-0.0025	0.0057	0.2786	-0.6524	-0.7083	0.6549	TYM	SGN	KZK
20	1997/03/03,14:09	35.0	139.1	5	5.2	6.98e16	80.07	E off Izu peninsula	264	81	-153	170	64	-10	0.4304	0.8643	0.3832	-0.1408	-0.0385	-0.2896	NAA	KZK	KIS
21	1997/03/03,14:27	35.0	139.1	5	4.2	1.97e15	78.30	E off Izu peninsula	338	77	-40	79	51	-163	0.5641	0.6402	0.0745	-0.2598	0.5864	-0.3043	SGN	FUJ	TYM
22	1997/03/03,15:30	35.0	139.2	5	5.0	3.60e16	81.42	E off Izu peninsula	264	80	-147	168	57	-12	0.3898	0.7947	0.4891	-0.1577	-0.1415	-0.2321	NAA	KZK	KIS
23	1997/03/04,01:24	35.0	139.2	5	3.5	1.94e14	87.44	E off Izu peninsula	57	66	153	159	65	27	0.4973	0.4714	0.5305	-0.7857	0.1712	0.2884	SGN	FUJ	
24	1997/03/04,03:51	34.9	139.1	5	5.5	2.09e17	77.93	central Izu peninsula	160	87	19	69	71	177	0.6401	0.7256	0.2162	-0.5566	0.2764	-0.0835	NAA	KZK	KIS
25	1997/03/04,11:59	35.0	139.1	5	3.9	7.16e14	88.57	E off Izu peninsula	338	86	-40	71	50	-175	0.5504	0.5968	0.2511	-0.4313	0.5780	-0.1192	SGN	FUJ	TYM
26	1997/03/04,14:28	35.0	139.1	5	4.3	2.79e15	85.46	E off Izu peninsula	340	80	-42	79	49	-167	0.4928	0.6394	0.1135	-0.2620	0.6281	-0.2308	SGN	FUJ	TYM
27	1997/03/04,21:17	35.0	139.1	11	3.5	2.32e14	69.46	E off Izu peninsula	1	80	-10	93	80	-170	0.1197	0.9837	-0.0842	0.2351	0.0859	-0.3548	SGN	FUJ	TYM
28	1997/03/05,10:23	35.0	139.1	8	3.7	3.46e14	78.09	E off Izu peninsula	166	76	25	69	65	164	0.4577	0.6952	0.5128	-0.4475	0.3586	-0.0102	SGN	FUJ	TYM
29	1997/03/05,13:43	35.0	139.1	5	4.7	1.39e16	85.47	E off Izu peninsula	346	80	-31	82	59	-168	0.4417	0.8187	0.0817	-0.1575	0.4495	-0.2842	SGN	FUJ	TYM
30	1997/03/05,16:04	35.0	139.1	5	3.6	2.83e14	67.37	E off Izu peninsula	328	80	-55	72	37	-163	0.5785	0.4251	0.3613	-0.2936	0.6680	-0.2849	SGN	TYM	
31	1997/03/05,19:01	35.0	139.1	5	3.7	4.19e14	84.27	E off Izu peninsula	333	69	-30	75	62	-156	0.8322	0.6774	-0.0011	-0.3549	0.2900	-0.4773	SGN	FUJ	TYM
32	1997/03/06,04:25	34.9	139.2	5	4.4	3.90e15	90.43	E off Izu peninsula	104	83	-156	11	66	-8	-0.3651	0.8166	-0.4285	0.4083	0.0497	-0.0431	TYM	SGN	FUJ
33	1997/03/06,06:50	40.7	139.4	11	4.9	2.77e16	69.93	W off Aomori pref	197	81	101	327	14	41	-0.0227	-0.1106	-0.3276	-0.3415	0.8751	0.3643	KZK		
34	1997/03/06,10:12	34.9	139.2	5	4.0	1.33e15	89.08	E off Izu peninsula	331	82	-20	64	70	-172	0.8554	0.5518	0.0837	-0.6673	0.3069	-0.1881	TYM	SGN	FUJ
35	1997/03/06,17:36	35.0	139.1	5	4.4	4.12e15	84.79	E off Izu peninsula	347	81	-32	83	58	-170	0.3642	0.7968	-0.0087	-0.1933	0.5172	-0.1709	SGN	FUJ	TYM
36	1997/03/06,20:23	34.9	139.2	17	4.0	1.10e15	90.25	E off Izu peninsula	343	89	105	76	15	3	-0.1366	-0.2253	-0.2815	0.1155	-0.9280	0.0211	SGN		
37	1997/03/06,22:24	35.0	139.1	44	4.0	1.21e15	85.13	E off Izu peninsula	163	79	41	64	50	166	0.3882	0.5544	0.3026	-0.6393	0.5446	0.2510	SGN		
38	1997/03/06,22:30	35.0	139.1	8	3.8	5.51e14	85.39	E off Izu peninsula	169	83	22	76	68	172	0.3761	0.8350	0.2704	-0.3445	0.3478	-0.0316	SGN	FUJ	NAA
39	1997/03/06,23:56	35.0	139.1	5	3.8	5.39e14	89.89	E off Izu peninsula	166	89	18	76	72	178	0.5058	0.8408	0.1699	-0.3798	0.2794	-0.1259	SGN	FUJ	NAA
40	1997/03/07,01:20	34.8	139.2	5	4.8	1.95e16	83.81	near Izu-Oshima island	172	82	35	77	55	170	0.2119	0.7644	0.0354	-0.4724	0.5265	0.2605	TYM	SGN	FUJ
41	1997/03/07,07:33	34.9	139.1	5	4.9	2.49e16	88.70	central Izu peninsula	346	88	-32	77	58	-178	0.4210	0.7594	0.1733	-0.3303	0.5058	-0.0908	SGN	TYM	FUJ
42	1997/03/07,12:35	35.0	139.2	5	4.6	8.97e15	86.34	E off Izu peninsula	346	78	-16	79	75	-168	0.5125	0.8630	-0.0908	-0.3020	0.2432	-0.2105	TYM	SGN	FUJ
43	1997/03/07,15:01	35.0	139.2	5	3.7	3.76e14	72.11	E off Izu peninsula	306	61	-96	138	29	-80	0.4524	0.5374	0.4440	0.3167	0.2902	-0.7692	SGN	FUJ	NAA
44	1997/03/08,03:18	35.0	139.1	5	3.8	5.48e14	88.55	E off Izu peninsula	171	89	17	81	73	179	0.2701	0.9093	0.0372	-0.3307	0.2831	0.0606	SGN	FUJ	NAA
45	1997/03/16,05:51	34.9	137.5	41	5.6	2.97e17	83.20	NE Aichi pref	302	58	-104	147	34	-69	0.4498	0.4307	0.4516	0.4465	0.1105	-0.8963	SGN	KIS	KZK
46	1997/03/16,06:37	34.9	137.5	17	3.7	3.53e14	60.90	NE Aichi pref	332	68	-59	93	38	-142	0.5269	0.5408	0.1428	0.0590	0.6133	-0.5859	FUJ	JIZ	
47	1997/03/20,08:58	34.2	139.3	17	3.3	9.58e13	71.80	near Niijima island	275	81	171	7	81	9	-0.1612	0.9490	-0.1672	0.2327	-0.2040	-0.0715	JIZ	SGN	
48	1997/03/22,04:53	35.4	140.4	65	3.7	3.59e14	74.19	Kujukuri coast Boso pen	11	85	97	134	9	34	-0.0181	-0.1010	0.2008	-0.1729	-0.9578	0.1909	SGN	FUJ	KZK
49	1997/03/23,02:55	35.4	140.4	53	3.8	5.57e14	89.36	Kujukuri coast Boso pen	5	68	103	154	25	61	0.0581	-0.1420	0.1370	-0.7133	-0.7001	0.6552	SGN	FUJ	KZK
50	1997/03/23,05:59	36.0	140.1	68	5.1	4.77e16	94.06	southern Ibaraki pref	360	68	88	184	22	94	0.1453	0.0263	-0.0056	-0.7547	-0.7303	0.6094	SGN	FUJ	KZK
51	1997/03/26,08:31	32.0	130.4	8	6.1	1.40e18	91.17	NW Kagoshima pref	103	88	-9	193	81	-178	0.5344	-0.8845	-0.1479	-0.3501	-0.0247	-0.1843	TKA	TKD	
52	1997/03/26,09:05	32.0	130.4	8	4.6	9.53e15	76.72	NW Kagoshima pref	9	88	174	100	84	2	0.4854	-0.9377	0.1109	-0.1571	-0.1090	-0.3283	TKA	TKD	
53	1997/03/26,12:15	32.0	130.0	14	4.2	2.64e15	86.16	W off Amakusa island	120	87	-18	211	72	-177	0.8893	-0.4436	-0.2641	-0.7928	-0.1641	-0.0966	TKA	TKD	
54	1997/03/26,13:24	32.0	130.4	8	4.7	1.12e16	91.76	NW Kagoshima pref	253	75	-42	357	50	-160	-0.0257	-0.7601	0.5280	0.4171	-0.1119	-0.3914	TKA	TKD	
55	1997/03/26,20:19	32.0	130.4	14	4.1	1.39e15	60.82	NW Kagoshima pref	102	89	-5	192	85	-179	0.3464	-0.9088	-0.0732	-0.4602	-0.0486	0.1138	TKA	TKD	
56	1997/03/26,20:43	32.0	130.3	5	3.8	4.93e14	74.77	NW Kagoshima pref	97	77	32	359	59	165	0.0081	-0.8164	0.5210	-0.1905	-0.1733	0.1825	TKD		
57	1997/03/27,12:26	32.0	130.3	5	4.0	1.19e15	86.62	NW Kagoshima pref	37	76	100	181	17	55	-0.0040	0.1779	0.5577	-0.4608	-0.6674	0.4648	TKD		
58	1997/03/27,17:51	32.0	130.3	5	4.0	1.24e15	76.46	NW Kagoshima pref	105	73	-47	212	45	-156	0.8025	-0.4626	-0.5374	-0.3668	-0.2138	-0.4357	TKA	TKD	
59	1997/03/27,18:56	32.0	130.4	5	4.0	1.16e15	88.48	NW Kagoshima pref	106	87	-41	198	49	-176	0.3774	-0.6523	-0.5857	-0.3758	-0.3351	-0.0016	TKA	TKD	
60	1997/03/28,00:54	36.2	139.8	62	3.7	4.40e14	77.12	SW Ibaraki pref	164	73	-71	295	25	-136	0.3230	0.3228	-0.0593	0.2758	-0.8026	-0.5988	SGN	FUJ	KZK
61	1997/03/28,10:14	36.2	139.8	62	3.9	9.06e14	94.28	SW Ibaraki pref	330	83	59	229	32	167	0.3759	0.1907	-0.5028	-0.5750	-0.6761	0.1991	SGN	FUJ	KZK
62	1997/03/28,10:40	32.0	130.4	5	3.7	4.04e14	88.72	NW Kagoshima pref	5	80	134	104	45	14	0.0772	-0.6539	0.2548	-0.2904	-0.6717	0.2133	TKD		
63	1997/03/28,12:32	32.0	130.4	5	3.6	2.72e14	84.66	NW Kagoshima pref	1	79	154	96	65	12	0.0547	-0.8714	0.2190	-0.1584	-0.4188	0.1037	TKD		
64	1997/03/29,14:13	36.2	139.8	68	3.7	3.48e14	85.85	SW Ibaraki pref	155	79	-78	287	17	-137	0.2238	0.2766	-0.3416	0.1517	-0.8359	-0.3755	SGN	FUJ	
65	1997/03/31,00:04	32.0	130.3	8	3.8	6.37e14	73.24	NW Kagoshima pref	117	86	-13	208	77	-176	0.8855	-0.5533	-0.1813	-0.7203	-0.1073	-0.1652	TKA	TKD	
66	1997/03/31,04:33	32.0	130.4	8	3.8	4.92e14	93.27	NW Kagoshima pref	199	84	-149	106	59	-7	0.5500	-0.7054	0.0929	-0.4227	-0.4940	-0.1273	TKD		
67	1997/03/31,07:51	32.0	130.0	14	3.7	3.42e14	94.40	W off Amakusa island	121	87	-9	212	81	-177	0.8035	-0.4487	-0.1006	-0.9450	-0.1652	0.1415	TKD		
68	1997/03/31,14:45	33.4	132.4	41	3.4	1.63e14	65.24	Bungo channel	59	82	-39	156	51	-170	-0.5183	-0.4726	-0.5356	0.7236	0.2733	-0.2053	TKD	ISI	
69	1997/03/31,15:51	33.4	132.4	44	4.7	1.48e16	87.69	Bungo channel	195	63	-85	4	28	-100	0.1292	-0.0898	0.2043	0.7392	-0.5507	-0.8684	TKD	ISI	TKA
70	1997/03/31,17:14	32.0	130.4	8	3.7	4.53e14	92.17	NW Kagoshima pref	4	84	162	96	72	6	0.2271	-0.9251	0.2305	-0.0742	-0.3181	-0.1529	TKD		

Table 5: Estimated moment tensors (continued).

No.	Origin Time(UT)	Lat(N)	Lon(E)	D(km)	Mw	Mo(Nm)	VarRed	Region name	Str1	Dip1	Rak1	Str2	Dip2	Rak2	Mxx	Mxy	Mxz	Myy	Myz	Mzz	used Stations		
71	1997/04/01,12:55	33.4	132.4	38	3.7	4.51e14	78.45	Bungo channel	170	73	-98	17	18	-65	0.0406	-0.0503	-0.1957	0.5336	-0.8088	-0.5742	TKD	ISI	
72	1997/04/02,11:49	32.0	130.3	14	3.6	2.50e14	79.05	NW Kagoshima pref	214	86	142	307	52	6	0.7058	-0.2869	-0.4624	-0.7479	0.4295	0.0422	TKD		
73	1997/04/02,11:57	32.0	130.4	11	3.7	3.46e14	81.80	NW Kagoshima pref	201	87	169	292	79	3	0.7344	-0.7139	-0.1549	-0.6053	0.1470	-0.1290	TKD		
74	1997/04/02,19:33	32.0	130.3	14	5.4	1.33e17	93.86	NW Kagoshima pref	99	89	-8	189	82	-179	0.3359	-0.9414	-0.1381	-0.2754	-0.0348	-0.0605	TKD		
75	1997/04/02,21:47	33.4	132.4	44	5.0	3.89e16	94.15	Bungo channel	175	75	-88	345	15	-99	0.2023	0.0555	-0.0574	0.3914	-0.8652	-0.5936	TKD	ISI	
76	1997/04/03,17:33	32.0	130.4	5	4.7	1.14e16	94.33	NW Kagoshima pref	198	76	-156	102	67	-15	0.5924	-0.8046	-0.0193	-0.2830	-0.3276	-0.3094	TKA	TKD	
77	1997/04/05,04:24	32.0	130.4	8	5.0	3.11e16	94.76	NW Kagoshima pref	195	86	-167	104	77	-4	0.5783	-0.8626	0.0636	-0.3331	-0.1939	-0.2452	TKA	TKD	
78	1997/04/05,10:44	33.4	132.4	41	3.5	1.81e14	75.15	Bungo channel	180	62	114	317	36	53	-0.0360	-0.3476	-0.2058	-0.7345	0.5157	0.7704	ISI		
79	1997/04/05,19:42	32.0	130.3	11	3.6	3.25e14	80.13	NW Kagoshima pref	306	67	42	196	52	150	0.3470	-0.5281	-0.3969	-0.8814	-0.1243	0.5344	TKD		
80	1997/04/07,17:05	33.4	132.4	41	4.1	1.54e15	95.80	Bungo channel	176	72	-86	343	19	-102	0.1278	0.0939	-0.0292	0.5251	-0.7986	-0.6528	TKD	KIS	
81	1997/04/08,08:21	32.0	130.4	5	3.9	7.04e14	76.57	NW Kagoshima pref	106	67	-25	207	67	-155	0.7427	-0.6160	-0.1806	-0.4259	-0.4130	-0.3168	TKA	TKD	
82	1997/04/08,21:04	32.0	130.4	8	3.6	2.82e14	76.38	NW Kagoshima pref	297	67	31	193	61	154	0.3427	-0.5981	-0.5318	-0.6722	0.1657	0.3295	TKD		
83	1997/04/09,03:50	33.2	140.6	56	4.7	1.15e16	66.87	E off Hachijojima island	175	73	92	348	17	84	-0.0853	-0.0696	0.0645	-0.5061	0.8308	0.5914	JIZ	SGN	FUJ
84	1997/04/09,14:20	32.0	130.4	8	4.8	2.04e16	94.41	NW Kagoshima pref	191	81	-167	99	77	-9	0.4639	-0.9190	-0.0464	-0.1912	-0.1741	-0.2727	TKA	TKD	
85	1997/04/09,14:23	32.0	130.4	11	4.6	1.01e16	86.50	NW Kagoshima pref	358	85	166	89	76	5	0.0648	-0.9515	0.1972	0.2096	-0.2884	-0.2744	TKA	TKD	
86	1997/04/09,19:46	32.0	130.4	14	3.5	2.13e14	91.12	NW Kagoshima pref	14	88	176	104	86	2	0.4746	-0.8779	0.0459	-0.4740	-0.0672	-0.0006	TKD		
87	1997/04/10,04:43	35.1	140.0	71	4.0	1.21e15	68.77	southern Boso peninsula	309	58	-88	125	32	-93	0.5780	0.4226	0.3245	0.3330	0.2821	-0.9110	SGN	FUJ	KZK
88	1997/04/10,23:30	36.4	140.6	62	4.3	3.21e15	86.18	northern Ibaraki pref	232	70	129	344	43	30	0.2863	0.4322	-0.5328	-0.7918	0.2411	0.5055	SGN	KZK	FUJ
89	1997/04/13,15:55	32.0	130.4	14	3.5	2.22e14	68.49	NW Kagoshima pref	277	86	19	186	71	176	0.2624	-0.9143	-0.3515	-0.1772	0.0997	-0.0852	TKD		
90	1997/04/17,20:11	35.2	140.2	26	3.4	1.60e14	63.59	southern Boso peninsula	238	72	112	5	28	41	-0.0687	0.3411	-0.7262	-0.4957	0.2823	0.5644	SGN	FUJ	KZK
91	1997/04/18,12:42	35.7	140.9	29	3.7	4.02e14	75.76	near Choshi city	152	59	-73	302	35	-116	0.3444	0.5575	-0.1055	0.4604	-0.4449	-0.8048	SGN	FUJ	KZK
92	1997/04/20,05:04	35.3	140.4	59	3.9	8.59e14	80.15	Kujukuri coast Boso pen	17	88	104	116	14	9	0.2454	-0.1266	0.2378	-0.2634	-0.9369	0.0180	SGN	FUJ	KZK
93	1997/04/23,01:24	32.7	130.6	29	4.3	3.34e15	91.23	NW Kumamoto pref	234	80	-167	142	77	-10	0.9715	0.2528	0.0687	-0.8863	-0.2524	-0.0852	TKD	ISI	
94	1997/04/23,16:44	30.8	131.5	29	4.6	1.00e16	74.83	SE off Osumi pen	67	72	112	194	28	40	-0.1850	0.4033	0.7607	-0.3773	-0.1586	0.5623	TKA	TKD	
95	1997/04/28,11:07	37.3	141.3	56	4.4	5.01e15	84.85	E off Fukushima pref	235	78	89	61	12	96	-0.3020	0.1030	-0.7397	-0.1795	0.5249	0.4815	KZK	SGN	FUJ
96	1997/04/28,16:22	36.1	139.9	44	3.9	7.06e14	56.49	SW Ibaraki pref	50	66	81	251	26	109	-0.5776	0.3477	0.4561	-0.1614	-0.4677	0.7391	JIZ	KZK	
97	1997/04/28,17:22	31.2	130.5	145	4.7	1.42e16	81.78	Satsuma peninsula region	353	71	65	229	31	142	0.2305	0.3359	-0.1125	-0.7255	-0.6954	0.4951	TKD		
98	1997/04/30,05:32	34.4	139.3	5	3.8	4.79e14	79.36	near Niijima island	185	82	26	91	64	171	-0.1128	0.8711	0.1826	0.0874	0.4628	0.0254	JIZ	FUJ	SGN
99	1997/05/01,07:19	32.0	130.4	11	3.6	3.00e14	81.01	NW Kagoshima pref	18	76	154	115	64	16	0.5067	-0.6338	0.4434	-0.6148	-0.3213	0.1082	TKD		
100	1997/05/01,19:35	30.6	131.2	29	4.8	1.94e16	67.51	near Tanegashima island	210	89	107	302	17	3	0.4044	0.0338	-0.3684	-0.3231	0.8916	-0.0813	TKA	TKD	
101	1997/05/02,10:34	36.2	140.1	74	3.5	1.83e14	58.12	SW Ibaraki pref	240	54	72	88	40	113	-0.8563	0.2205	-0.1439	-0.0993	0.3368	0.9557	SGN	KZK	
102	1997/05/02,23:59	32.0	130.3	17	3.6	2.65e14	78.21	NW Kagoshima pref	205	85	-174	114	84	-5	0.8395	-0.6560	-0.0264	-0.6577	-0.0941	-0.1818	TKD		
103	1997/05/06,23:06	36.8	137.2	5	3.8	5.43e14	90.94	Toyama pref	57	63	107	204	32	61	-0.3065	0.5218	0.5162	-0.4371	-0.2178	0.7436	KZK	FUJ	SGN
104	1997/05/09,17:23	35.8	141.1	35	4.7	1.44e16	82.34	near Choshi city	206	85	98	327	9	31	-0.0086	-0.0890	-0.4546	-0.2116	0.8663	0.2201	SGN	FUJ	KZK
105	1997/05/09,23:35	33.4	140.9	50	3.8	6.40e14	79.90	E off Hachijojima island	317	78	56	210	36	159	0.4062	-0.1812	-0.5509	-0.7424	-0.5044	0.3362	JIZ	SGN	
106	1997/05/11,22:59	37.1	141.3	47	5.5	2.28e17	85.54	E off Fukushima pref	26	76	89	211	14	95	-0.0838	0.2283	0.3848	-0.3788	-0.7881	0.4626	KZK	SGN	FUJ
107	1997/05/12,00:31	35.5	141.2	47	4.4	4.79e15	65.72	near Choshi city	347	56	72	197	37	114	-0.1989	0.0596	-0.3504	-0.7982	-0.3213	0.9971	SGN	FUJ	KZK
108	1997/05/12,03:13	35.3	139.7	50	3.8	6.22e14	75.86	Tokyo bay region	79	72	71	307	26	135	-0.5590	-0.2001	0.7315	-0.0555	-0.3213	0.6145	SGN	KZK	
109	1997/05/13,05:38	31.9	130.3	11	6.0	1.22e18	95.30	NW Kagoshima pref	191	88	-175	101	85	-2	0.3391	-0.9183	-0.0283	-0.4286	-0.1084	0.0895	TKD		
110	1997/05/13,23:32	31.9	130.3	5	4.9	2.21e16	88.57	NW Kagoshima pref	91	87	-37	184	53	-176	0.0787	-0.7873	-0.6040	-0.0282	-0.0946	-0.0506	TKA	TKD	
111	1997/05/17,21:24	32.4	130.6	11	4.6	8.47e15	92.40	southern Kumamoto pref	275	86	11	185	79	176	0.1035	-0.9679	-0.1770	-0.2273	0.0242	0.1238	TKD	TKA	
112	1997/05/18,12:11	32.4	130.6	11	3.8	5.90e14	77.50	southern Kumamoto pref	274	89	4	184	86	179	0.0427	-0.9891	-0.0662	-0.2280	-0.0025	0.1853	TKD		
113	1997/05/20,04:21	34.0	140.0	86	4.8	1.65e16	84.29	far S off Boso peninsula	128	65	-138	17	53	-32	-0.3524	0.4384	-0.4754	0.8733	-0.0409	-0.5209	TYM	JIZ	SGN
114	1997/05/20,10:23	32.0	132.2	8	4.2	2.15e15	91.48	Hyuganada region	165	72	-75	304	23	-129	0.1951	0.3297	-0.1203	0.3790	-0.7866	-0.5741	TKD		
115	1997/05/21,23:11	34.2	139.2	5	5.1	4.44e16	80.40	near Niijima island	3	80	-39	101	52	-167	-0.1300	0.7796	0.0921	0.4816	0.5438	-0.3516	TYM	FUJ	SGN
116	1997/05/22,11:29	32.1	132.0	29	4.3	3.29e15	93.82	Hyuganada region	40	71	87	229	19	99	-0.2567	0.3881	0.4983	-0.2995	-0.6152	0.5563	TKD	ISI	
117	1997/05/23,17:50	34.4	137.6	14	5.5	1.80e17	73.73	Ensyunada	310	80	-15	43	76	-170	0.8628	-0.1255	0.0632	-0.9950	0.3867	0.1322	FUJ	JIZ	
118	1997/05/24,05:16	33.6	142.1	8	5.1	5.87e16	70.37	far E off Izu Islands	153	53	-124	21	49	-54	-0.1690	0.0549	-0.4231	0.9762	-0.0421	-0.8072	TYM	JIZ	SGN
119	1997/05/24,21:10	32.0	130.3	5	4.3	3.50e15	85.91	NW Kagoshima pref	16	84	-155	284	65	-7	0.5365	-0.7996	-0.0967	-0.3430	0.3830	-0.1936	TKA	TKD	
120	1997/05/26,05:33	36.0	140.2	95	4.2	1.97e15	81.90	southern Ibaraki pref	169	63	-123	44	41	-43	-0.2390	-0.3421	-0.2469	0.8927	-0.4374	-0.6537	SGN	FUJ	KZK
121	1997/05/26,16:09	37.3	141.7	44	4.9	2.35e16	89.39	E off Fukushima pref	26	63	94	197	27	82	-0.0374	0.3219	0.2829	-0.7197	-0.5225	0.7571	KZK	SGN	FUJ
122	1997/05/28,05:00	32.0	132.0	32	3.6	3.33e14	79.67	Hyuganada region	42	67	120	165	37	39	0.1874	0.2380	0.5599	-0.8006	-0.3189	0.6132	TKD	ISI	
123	1997/06/01,15:51	32.0	130.4	5	3.7	4.42e14	61.07	NW Kagoshima pref	290	90	7	200	83	180	0.7041	-0.7682	-0.1261	-0.5521	-0.0117	-0.1520	TKA	TKD	
124	1997/06/06,07:19	36.5	137.5	11	3.6	2.60e14	80.82	Hida mountains region	143	89	-17	234	73	-179	1.1561	0.3181	-0.3332	-0.6603	-0.0950	-0.4959	KZK	FUJ	SGN
125	1997/06/06,09:09	36.1	139.9	59	3.9	8.24e14	82.68	SW Ibaraki pref	37	67	67	264	32	132	-0.6077	0.2778	0.2064	-0.1133	-0.6776	0.7210	KZK		
126	1997/06/08,09:36	35.4	139.0	17	3.6	2.42e14	69.21	eastern Yamanashi pref	23	69	40	276	53	153	-0.5997	0.6676	-0.0424	0.1465	-0.5143	0.4532	JIZ	FUJ	NAA
127	1997/06/08,20:46	28.2	130.4	32	4.9	2.64e16	81.26	near Amami-Oshima island	217	73	42	112	50	157	-0.8094	0.3515	-0.1416	0.4445	0.6053	0.3649	TKA		
128	1997/06/10,20:22	36.1	139.9	50	3.9	6.85e14	89.66	SW Ibaraki pref	63	62	79	266	30	110	-0.7848	0.2177	0.4416	-0.0379	-0.3320	0.8227	SGN	FUJ	KZK
129	1997/06/11,04:41	34.0	139.0	14	4.6	9.43e15	76.71	near Niijima island	36	89	-10	126	80	-179	-0.8628	0.2968	-0.0754	1.0173	0.1521	-0.1545	JIZ	TYM	FUJ
130	1997/06/11,04:48	34.0	139.0	5	3.7	4.53e14	69.24	near Niijima island	19	75	-54	129	38	-155	-0.3647	0.2985	-0.2810	0.7753	0.6260	-0.4106	JIZ	TYM	FUJ
131	1997/06/11,21:38	32.0	130.3	5	3.6	3.13e14	95.78	NW Kagoshima pref	281	82	11	190	79	172	0.2786	-0.9119	-0.1736	-0.4268	0.0675	0.1481	TKD		
132	1997/06/12,00:38	36.4	141.0	41	4.3	2.75e15	81.34	E off Ibaraki pref	267	54	130	32	52	49	-0.6914	0.6094	-0.2131	-0.0252	-0.3083	0.7166	TYM	SGN	KZK
133	1997/06/12,01:24	34.9	135.4	14	3.5	2.18e14	91.01	SE Hyogo pref	143	89	5	53	85	179	0.9641	0.2682	0.0583	-0.9595	0.0600	-0.0045	KIS	ISI	NAA
134	1997/06/14,11:38	35.2	139.8	80	3.6	2.81e14	90.33	Tokyo bay region	197	86	81	85	10	158	-0.1165	0.1579	-0.2660	-0.0225	0.9442	0.1389	JIZ	SGN	FUJ
135	1997/06/15,04:54	43.0	144.2	92	5.2	6.06e16	75.92	Kushiro region	19	75	-160	283	71	-16	0.6296	-0.7933	0.0940	-0.3445	0.2829	-0.2851	NMR		
136	1997/06/17,16:35	31.4	132.9	29	4.3	3.40e15	73.77	far E off Miyazaki pref	192	75	118	308	31	30	0.1435	-0.3198	-0.2952	-0.5874	0.7265	0.4439	ISI		
137	1997/06/22,04:36	33.8	132.0	56	4.2	2.08e15	96.12	Iyonada Setonaikai	181	77	-69	301	25	-148	-0.0081	0.3460	0.1041	0.4092	-0.8385	-0.4012	TKD	ISI	
138	1997/06/22,22:14	35.9	140.7	26	3.5	1.75e14	78.32	southern Ibaraki pref	8	86	81	256	10	158	0.0350	0.1821	0.1422	-0.1207	-0.9709	0.0857	SGN	FUJ	KZK
139	1997/06/23,11:47	32.0	141.2	47	5.0	3.29e16	81.03	E off Hachijojima island	350	65	44	239	51	148	0.2272	0.5523	-0.3128	-0.7635	-0.3758	0.5362	TYM	JIZ	NAA
140	1997/06/25,09:50	34.4	131.7	8	5.8	5.66e17	88.21	Yamaguchi pref	319	89	14	229	76	179	1.0524	0.1498	-0.2248	-0.8647	-0.1234	-0.1877	TKD	ISI	TKA

Table 5: Estimated moment tensors (continued).

No.	Origin Time(UT)	Lat(N)	Lon(E)	D(km)	Mw	Mo(Nm)	VarRed	Region name	Str1	Dip1	Rak1	Str2	Dip2	Rak2	Mxx	Mxy	Mxz	Myy	Myz	Mzz	used Stations		
141	1997/06/26,02:45	34.4	131.7	5	3.9	8.26e14	82.09	Yamaguchi pref	234	76	-160	139	71	-15	1.0009	0.2174	0.1078	-0.7979	-0.3240	-0.2029	TKD	ISI	
142	1997/06/26,21:35	36.8	141.3	41	4.4	4.01e15	62.79	E off Ibaraki pref	4	86	71	262	20	167	-0.0421	0.3388	0.0324	-0.0991	-0.9321	0.1412	KZK	SGN	FUJ
143	1997/06/30,02:57	35.5	140.2	59	4.2	2.00e15	74.77	central Chiba pref	211	49	93	26	41	86	0.0561	0.6790	-0.0773	-0.8383	0.1091	0.7822	SGN	JIZ	KZK
144	1997/07/01,03:40	42.6	144.7	56	5.0	3.84e16	86.81	SE off Tokachi	28	77	-102	249	18	-50	0.2569	-0.2890	-0.3622	0.1866	0.7979	-0.4435	NMR		
145	1997/07/01,09:00	36.1	139.9	32	4.0	1.19e15	77.33	SW Ibaraki pref	55	57	77	258	35	109	-0.7558	0.2925	0.2453	-0.1800	-0.3529	0.9358	TYM	JIZ	FUJ
146	1997/07/05,06:27	35.0	138.3	8	3.9	8.29e14	64.04	central Shizuoka pref	174	73	-108	42	25	-45	0.0440	-0.2371	-0.2198	0.5363	-0.7688	-0.5803	JIZ	SGN	
147	1997/07/05,19:28	38.0	139.3	5	3.7	4.18e14	73.86	NE Niigata pref	205	53	108	357	41	68	0.0199	0.1961	-0.2737	-0.9395	0.1555	0.9196	KZK	SGN	
148	1997/07/05,20:18	38.0	139.3	5	3.5	2.20e14	72.84	NE Niigata pref	183	52	91	2	38	89	0.0191	0.0503	-0.0196	-0.9805	0.2387	0.9614	KZK	FUJ	
149	1997/07/05,22:09	38.0	139.3	5	4.1	1.35e15	81.85	NE Niigata pref	22	56	100	185	35	76	-0.0183	0.2253	0.2260	-0.8832	-0.3160	0.9015	KZK	FUJ	NAA
150	1997/07/08,23:39	32.0	132.1	35	3.6	2.74e14	71.17	Hyuganada region	192	79	-60	300	32	-160	-0.1751	0.3843	0.2778	0.4895	-0.7668	-0.3143	TKD	ISI	
151	1997/07/09,09:36	35.6	140.1	86	5.0	3.63e16	91.46	central Chiba pref	351	74	83	195	18	112	0.1117	0.0145	-0.1425	-0.6004	-0.8239	0.4887	SGN	JIZ	FUJ
152	1997/07/14,13:32	35.6	139.9	23	4.0	9.74e14	93.73	Tokyo bay region	354	84	119	96	29	13	-0.0884	-0.4908	-0.0443	-0.1059	-0.8534	0.1943	SGN	JIZ	FUJ
153	1997/07/18,08:13	37.0	137.2	5	3.7	3.66e14	67.19	Toyama bay region	22	72	60	264	34	147	-0.4151	0.4922	0.1019	-0.0986	-0.7250	0.5137	KZK	NAA	
154	1997/07/22,14:16	34.0	139.5	5	4.0	1.28e15	85.97	near Miyakejima island	329	90	-157	239	67	-0	-0.8249	-0.4336	0.2342	0.7925	0.3231	0.0325	JIZ	FUJ	NAA
155	1997/07/24,04:59	35.9	136.6	20	3.5	2.01e14	63.04	Fukui Gifu border region	134	65	36	27	58	150	0.5523	-0.3101	0.2557	-1.1070	0.0928	0.5547	FUJ	KIS	ISI
156	1997/07/26,09:36	32.0	130.4	5	4.3	3.12e15	83.27	NW Kagoshima pref	92	78	-24	187	66	-167	0.1501	-0.8700	-0.4053	-0.0909	-0.2782	-0.0592	TKA	TKD	
157	1997/07/29,01:56	33.4	140.7	50	4.2	2.30e15	82.52	E off Hachijojima island	52	79	124	158	35	19	0.3433	0.5068	0.4780	-0.6270	-0.5929	0.2836	TYM	JIZ	SGN
158	1997/07/30,06:31	32.7	130.0	14	3.9	7.10e14	85.36	near Unzendake	113	88	-54	205	36	-177	0.4967	-0.3565	-0.7651	-0.4508	-0.2628	-0.0459	TKD		
159	1997/07/30,08:18	36.4	137.6	5	4.0	1.23e15	59.92	Hida mountains region	171	81	-14	263	76	-171	0.2680	0.9207	0.1268	-0.2415	-0.2656	-0.0265	NAA	FUJ	SGN
160	1997/08/04,13:04	36.4	140.0	77	3.7	4.23e14	80.07	southern Tochigi pref	3	65	87	191	25	97	-0.0646	0.0851	0.0024	-0.7309	-0.6413	0.7955	SGN	KZK	FUJ
161	1997/08/08,20:34	35.9	139.5	65	5.0	3.36e16	89.69	eastern Saitama pref	267	74	106	42	22	47	-0.5192	0.2972	-0.8144	0.0406	-0.0054	0.4787	SGN	TYM	JIZ
162	1997/08/15,01:29	33.5	132.4	35	3.9	7.76e14	72.23	Iyonada Setonaikai	269	72	-84	71	19	-107	0.5654	-0.1014	0.8071	0.0311	0.0250	-0.5965	ISI		
163	1997/08/20,20:54	35.0	139.1	8	3.6	2.78e14	82.47	E off Izu peninsula	5	82	-14	97	76	-171	-0.0877	0.9492	-0.0973	0.3128	0.1905	-0.2251	SGN	FUJ	TYM
164	1997/08/21,20:01	36.4	140.6	50	3.9	8.73e14	85.22	northern Ibaraki pref	45	88	103	144	13	10	0.2123	0.1201	0.6673	-0.2359	-0.7076	0.0236	SGN	KZK	FUJ
165	1997/08/22,08:11	36.2	140.1	62	4.4	4.39e15	94.53	SW Ibaraki pref	360	62	92	175	28	85	0.0135	-0.0384	0.0175	-0.8254	-0.5722	0.8119	SGN	FUJ	KZK
166	1997/08/22,10:43	33.4	131.8	80	3.9	7.75e14	78.27	Iyonada Setonaikai	271	68	110	48	30	51	-0.7243	0.3194	-0.6595	0.0984	-0.0942	0.6259	ISI		
167	1997/08/24,10:40	31.4	131.5	32	3.7	4.58e14	84.68	SE off Osumi pen	331	65	151	74	64	28	-0.7788	-0.5795	0.1505	0.3908	-0.4323	0.3880	TKD		
168	1997/08/28,22:48	34.9	139.4	8	3.4	1.57e14	61.65	Sagaminada	211	82	40	115	51	170	-0.7088	0.4058	-0.1897	0.5625	0.6160	0.1462	SGN	FUJ	NAA
169	1997/08/29,11:23	34.2	139.2	5	4.5	6.69e15	74.84	near Niijima island	355	56	-104	198	36	-71	-0.0551	-0.1118	0.1554	0.9387	0.3625	-0.8836	JIZ	TYM	FUJ
170	1997/09/03,20:12	35.3	133.4	8	4.3	3.63e15	96.53	western Tottori pref	321	86	21	229	69	175	0.9342	0.1743	-0.3483	-0.8770	-0.2004	-0.0572	ISI	KIS	TKD
171	1997/09/03,20:16	35.3	133.4	5	5.2	6.83e16	96.23	western Tottori pref	325	89	33	234	57	178	0.7921	0.2864	-0.3545	-0.7887	-0.4118	-0.0034	ISI	KIS	TKD
172	1997/09/05,00:51	36.2	141.3	5	4.0	1.01e15	78.54	far E off Ibaraki pref	114	82	48	15	42	168	0.3207	-0.5131	0.6973	-0.5307	0.1973	0.2100	SGN	KZK	FUJ
173	1997/09/05,04:04	37.4	134.3	8	4.3	3.38e15	83.21	sea of Japan	315	68	40	208	53	153	0.4632	-0.1838	-0.6443	-0.8648	-0.0908	0.4016	NAA	ISI	KZK
174	1997/09/06,17:19	35.0	135.5	17	4.0	1.17e15	95.95	Kyoto Osaka border reg	223	84	-157	131	67	-6	0.9530	-0.0985	0.2015	-0.8610	-0.3358	-0.0920	KIS	ISI	
175	1997/09/06,17:46	30.1	131.4	26	4.6	8.56e15	57.18	E off Tanegashima island	183	67	77	35	26	119	0.0924	0.2711	0.0169	-0.7288	0.6825	0.6364	TKA	TKD	
176	1997/09/07,23:40	35.6	140.0	101	5.2	6.62e16	90.53	central Chiba pref	50	71	41	305	52	156	-0.9434	0.0629	0.2463	0.5481	-0.5112	0.3953	FUJ	KZK	NAA
177	1997/09/08,04:06	36.3	141.0	38	3.8	6.39e14	87.15	E off Ibaraki pref	5	77	68	246	26	149	-0.1056	0.3873	-0.0375	-0.3122	-0.8421	0.4177	SGN	KZK	FUJ
178	1997/09/14,05:33	34.4	139.3	17	4.2	2.66e15	66.20	near Niijima island	218	89	2	128	88	179	-1.0625	0.2412	-0.0002	0.8773	0.0275	0.1852	JIZ	TYM	FUJ
179	1997/09/15,01:08	34.3	141.4	53	4.5	7.26e15	73.08	far SE off Boso pen	136	85	-59	234	32	-171	0.5900	0.0566	-0.5113	-0.4378	-0.6779	-0.1521	TYM	JIZ	SGN
180	1997/09/15,03:03	31.1	131.5	29	4.8	1.56e16	66.98	SE off Osumi pen	20	75	97	176	16	67	-0.0014	0.0630	0.3209	-0.5046	-0.8027	0.5059	TKA	TKD	
181	1997/09/16,05:28	34.7	136.0	11	3.6	3.00e14	69.68	northern Nara pref	35	47	111	186	47	69	-0.0630	0.3529	0.2370	-0.8695	0.0808	0.9325	KIS	NAA	
182	1997/09/23,22:02	35.6	138.9	8	3.8	6.39e14	60.81	eastern Yamanashi pref	31	68	121	154	37	39	0.3683	0.1202	0.3644	-0.9340	-0.4698	0.5657	FUJ	JIZ	TYM
183	1997/09/26,14:12	34.4	138.2	11	4.1	1.79e15	88.35	Ensyunada	111	52	86	298	38	96	-0.8047	-0.3520	0.2350	-0.1755	0.0345	0.9802	JIZ	FUJ	NAA
184	1997/09/27,05:22	36.2	140.9	41	3.8	6.51e14	53.26	E off Ibaraki pref	10	72	77	226	22	124	-0.1463	0.2727	0.0459	-0.4635	-0.7893	0.6099	SGN	KZK	
185	1997/09/28,15:57	36.2	139.8	41	3.5	1.90e14	56.40	SW Ibaraki pref	52	53	103	211	39	74	-0.4037	0.5299	0.2775	-0.5147	-0.0559	0.9185	SGN	JIZ	KZK
186	1997/09/28,18:54	36.1	140.9	50	3.7	4.46e14	70.13	E off Ibaraki pref	328	49	72	173	44	109	-0.1348	-0.2858	-0.2716	-0.8490	0.0011	0.9837	TYM	SGN	JIZ
187	1997/09/29,14:46	35.7	140.7	44	4.5	7.37e15	83.87	near Choshi city	11	58	98	176	33	77	-0.1036	0.0317	0.1754	-0.8429	-0.4139	0.9465	TYM	SGN	JIZ
188	1997/09/30,22:24	42.1	142.3	38	4.1	1.43e15	71.44	S off Urakawa	151	80	163	244	73	11	-0.9090	-0.5635	0.0281	0.6394	0.2401	0.2696	HSS	NMR	
189	1997/10/01,16:49	29.3	130.6	44	4.8	1.60e16	83.92	near Amami-Oshima island	198	75	87	31	15	103	-0.0788	0.1940	-0.2577	-0.4125	0.8315	0.4912	TKD		
190	1997/10/01,17:21	42.4	142.4	11	3.7	4.51e14	82.74	Hidaka region	109	77	49	4	43	160	0.0650	-0.6504	0.6447	-0.4170	0.1334	0.3521	HSS	TNK	
191	1997/10/02,12:06	37.8	138.8	20	3.6	2.86e14	73.65	NE Niigata pref	209	56	77	52	36	109	-0.3423	0.5316	-0.0814	-0.5310	0.3692	0.8733	KZK	SGN	FUJ
192	1997/10/03,04:46	42.5	144.8	62	5.0	3.99e16	70.65	SE off Tokachi	23	80	67	270	25	155	-0.1930	0.5290	0.3970	-0.0592	-0.7508	0.2523	NMR	HSS	TNK
193	1997/10/03,18:33	32.8	129.2	5	3.6	2.55e14	85.40	Goto Islands region	359	74	103	138	21	51	0.2340	-0.2597	-0.0348	-0.6298	-0.8229	0.3958	TKD		
194	1997/10/03,18:51	34.5	139.1	5	3.3	9.99e13	73.26	near Niijima island	26	83	-23	119	67	-172	-0.7675	0.5372	-0.4081	0.6724	0.2627	0.0952	FUJ	SGN	NAA
195	1997/10/05,23:49	44.5	149.9	38	4.7	1.27e16	69.53	SE off Etorofu	57	69	109	193	28	50	-0.1635	0.4379	0.6323	-0.4600	-0.2972	0.6236	NMR		
196	1997/10/06,08:48	34.8	140.1	62	3.6	2.94e14	80.92	SE off Boso peninsula	164	65	-59	290	39	-138	0.2126	0.6639	-0.0468	0.4077	-0.5358	-0.6203	JIZ	SGN	FUJ
197	1997/10/06,09:18	42.0	142.3	68	4.0	9.52e14	76.57	S off Urakawa	118	49	-107	324	44	-71	0.5558	0.4302	-0.2406	0.4420	0.1394	-0.9978	HSS		
198	1997/10/06,12:28	34.4	141.8	17	3.7	3.57e14	65.93	far SE off Boso pen	53	85	143	146	53	6	0.7074	0.2599	0.5176	-0.8045	-0.2959	0.0971	JIZ	SGN	
199	1997/10/07,01:19	32.0	130.4	11	3.8	6.24e14	96.22	NW Kagoshima pref	290	88	15	200	75	178	0.6221	-0.7375	-0.2494	-0.6292	-0.0605	0.0071	TKD		
200	1997/10/08,08:47	36.4	142.7	8	4.6	7.53e15	74.30	far E off Kanto	356	58	59	224	43	129	0.0198	0.3554	-0.3282	-0.8119	-0.3550	0.7920	SGN	KZK	
201	1997/10/08,10:06	34.9	136.9	20	3.2	8.25e13	62.86	Mikawa bay region	99	80	26	4	64	169	0.1544	-0.8573	0.4459	-0.2716	-0.1068	0.1172	NAA	KIS	
202	1997/10/08,16:22	36.5	142.6	8	4.6	7.84e15	67.77	far E off Kanto	351	55	54	222	48	130	0.1490	0.3442	-0.3580	-0.9061	-0.2150	0.7572	SGN	KZK	JIZ
203	1997/10/08,19:30	35.1	139.2	8	3.3	1.07e14	90.64	E off Izu peninsula	93	67	110	230	30	51	-0.7521	0.2928	0.6532	0.1187	0.1204	0.6334	SGN		
204	1997/10/08,21:20	41.9	145.1	8	6.0	1.19e18	83.24	SE off Tokachi	201	85	75	93	16	161	-0.1564	0.2718	-0.3403	0.0105	0.8896	0.1459	NMR		
205	1997/10/09,03:29	41.9	145.0	5	5.1	5.33e16	80.54	SE off Tokachi	16	61	40	264	56	144	-0.4172	0.8133	-0.1394	-0.1717	-0.2976	0.5890	NMR		
206	1997/10/09,04:00	41.9	145.0	8	5.3	9.45e16	81.48	SE off Tokachi	205	79	58	98	34	160	-0.3986	0.5516	-0.3532	0.0971	0.6860	0.3015	NMR		
207	1997/10/09,08:19	34.8	140.1	65	4.2	2.49e15	96.90	SE off Boso peninsula	164	66	-71	304	30	-126	0.1940	0.4528	-0.0666	0.4955	-0.6438	-0.6896	JIZ	SGN	FUJ
208	1997/10/09,20:42	41.9	138.9	11	5.3	1.17e17	91.34	SW off Hokkaido	26	62	137	139	53	36	0.3837	-0.1828	0.4970	-0.9488	-0.1892	0.5652	HSS		
209	1997/10/10,00:56	40.7	142.6	47	4.7	1.35e16	63.41	E off Aomori pref	329	52	-60	106	47	-122	0.5714	0.5592	-0.1560	0.2716	0.3335	-0.8430	HSS	NMR	
210	1997/10/10,05:37	31.7	131.8	32	4.0	1.07e15	83.96	Hyuganada region	12	66	101	166	27	67	-0.0279	-0.0276	0.2254	-0.7445	-0.6119	0.7724	TKD		

Table 5: Estimated moment tensors (continued).

No.	Origin Time(UT)	Lat(N)	Lon(E)	D(km)	Mw	Mo(Nm)	VarRed	Region name	Str1	Dip1	Rak1	Str2	Dip2	Rak2	Mxx	Mxy	Mxz	Myy	Myz	Mzz	used Stations		
211	1997/10/11,05:44	34.4	138.2	11	5.0	3.38e16	87.66	Ensyunada	112	52	81	307	39	102	-0.7284	-0.4139	0.2592	-0.2395	-0.0085	0.9680	JIZ	FUJ	NAA
212	1997/10/11,08:24	34.0	135.3	8	3.5	2.03e14	70.64	NW Wakayama pref	325	73	49	217	43	155	0.4386	0.0275	-0.5311	-0.8573	-0.4060	0.4187	KIS	ISI	NAA
213	1997/10/11,09:45	38.9	142.2	47	5.2	8.05e16	88.92	Kinkazan region	30	74	118	148	32	32	0.3487	0.0391	0.4094	-0.8007	-0.6011	0.4521	KZK		
214	1997/10/11,19:39	42.0	145.0	8	5.4	1.43e17	81.69	SE off Tokachi	207	85	76	97	15	159	-0.1980	0.2542	-0.4375	0.0414	0.8493	0.1565	NMR		
215	1997/10/11,20:52	42.0	145.0	5	4.3	2.77e15	77.59	SE off Tokachi	207	84	86	65	7	128	-0.0624	0.1603	-0.4431	-0.1043	0.8711	0.1667	NMR		
216	1997/10/13,07:55	35.0	139.1	8	3.3	1.16e14	85.01	E off Izu peninsula	197	78	24	101	67	167	-0.4929	0.7926	0.0886	0.3474	0.4199	0.1455	SGN	FUJ	NAA
217	1997/10/16,19:00	43.5	146.4	38	4.5	7.07e15	86.58	near Kunashiri island	252	80	32	156	59	168	-0.6277	-0.6303	-0.4211	0.4756	0.3239	0.1522	NMR	TNK	
218	1997/10/16,21:38	29.1	130.2	38	4.8	1.74e16	82.63	near Amami-Oshima island	29	73	90	209	17	89	-0.0783	0.2903	0.4007	-0.4452	-0.7185	0.5235	TKA		
219	1997/10/18,10:26	41.8	141.4	160	4.2	2.54e15	89.36	S off Tomakomai	90	63	-97	286	28	-77	0.7489	0.1046	-0.5819	0.1101	0.0686	-0.8590	HSS		
220	1997/10/20,06:42	43.2	146.7	113	5.1	5.58e16	73.85	off Nemuro peninsula	285	88	140	17	50	2	-0.4240	0.6497	-0.6107	0.3850	-0.2002	0.0389	NMR		
221	1997/10/20,14:12	36.3	140.9	38	4.4	4.53e15	88.38	E off Ibaraki pref	4	82	62	260	29	164	-0.0116	0.4811	0.0364	-0.2055	-0.8533	0.2171	SGN	KZK	FUJ
222	1997/10/21,07:46	32.7	131.9	53	3.8	6.60e14	72.45	Hyuganada region	188	82	-77	308	15	-148	-0.1829	0.1564	0.1080	0.3820	-0.9321	-0.1991	ISI	KIS	
223	1997/10/21,10:55	35.1	138.2	29	4.2	2.47e15	90.69	central Shizuoka pref	199	81	-73	318	19	-150	-0.2092	0.0920	0.3085	0.4812	-0.8511	-0.2721	NAA	SGN	KZK
224	1997/10/22,06:41	36.0	140.1	62	3.9	7.34e14	84.48	southern Ibaraki pref	346	63	63	214	38	132	0.1248	0.1838	-0.3490	-0.8579	-0.4473	0.7331	SGN	FUJ	
225	1997/10/22,09:55	44.5	146.5	145	5.6	2.42e17	64.21	near Kunashiri island	40	67	-141	292	54	-29	0.8604	-0.3389	-0.0228	-0.4143	0.5748	-0.4461	NMR	TNK	
226	1997/10/22,18:54	42.0	142.5	56	3.8	6.65e14	83.95	S off Urakawa	265	76	-146	166	57	-17	0.4005	0.7652	0.4802	-0.1412	-0.2446	-0.2593	HSS		
227	1997/10/23,17:18	34.7	135.2	11	3.4	1.67e14	68.65	SE Hyogo pref	25	60	56	258	44	134	-0.4957	0.5808	-0.0674	-0.2170	-0.5040	0.7127	ISI	KIS	NAA
228	1997/10/23,19:59	33.6	141.1	98	4.0	1.33e15	87.09	E off Hachijojima island	24	78	86	222	12	107	-0.2455	0.0896	0.3514	-0.2422	-0.8454	0.4877	TYM	JIZ	FUJ
229	1997/10/24,00:38	32.5	132.3	26	3.6	3.14e14	96.93	Hyuganada region	184	69	-62	309	34	-140	-0.0661	0.3816	0.2166	0.6671	-0.6358	-0.6010	TKD		
230	1997/10/24,08:03	43.2	147.2	47	4.0	1.08e15	66.17	E off Hokkaido	82	71	83	281	20	109	-0.5887	-0.0271	0.7707	-0.0441	-0.1617	0.6327	NMR		
231	1997/10/25,19:14	41.9	142.8	62	4.1	1.48e15	87.84	S off Urakawa	115	76	-98	325	16	-61	0.2886	0.2959	-0.7998	0.1471	-0.3504	-0.4357	HSS		
232	1997/10/25,23:00	43.5	147.9	17	4.6	8.63e15	64.77	E off Hokkaido	48	74	121	162	35	28	0.2308	0.2299	0.6857	-0.6858	-0.3424	0.4550	NMR		
233	1997/10/26,19:06	39.3	140.6	130	5.4	1.43e17	86.99	southern Akita pref	91	49	100	257	42	79	-0.9983	0.1027	0.1228	0.0299	0.1083	0.9684	KZK		
234	1997/10/27,13:53	34.3	139.2	20	3.8	5.95e14	60.12	near Niijima island	295	63	142	45	57	33	-1.0594	0.2667	-0.1596	0.5101	-0.3132	0.5493	TYM	FUJ	NAA
235	1997/10/28,15:25	44.1	148.7	29	4.0	9.89e14	60.38	SE off Etorofu	221	89	-137	130	47	-2	0.7557	-0.1492	0.4937	-0.6871	-0.4671	-0.0686	NMR		
236	1997/10/29,10:18	34.2	139.2	41	4.0	1.29e15	72.92	near Niijima island	135	86	165	226	75	4	-1.0099	-0.0149	0.1448	0.9147	0.2085	0.0952	TYM	FUJ	
237	1997/10/30,06:10	41.3	142.6	32	4.1	1.48e15	71.37	E off Aomori pref	123	55	52	356	50	131	-0.0762	-0.5228	0.4309	-0.6783	-0.1648	0.7545	HSS		
238	1997/11/01,02:34	41.9	142.7	74	4.3	2.67e15	74.67	S off Urakawa	320	77	100	103	16	54	-0.3252	-0.2584	-0.5452	-0.0890	-0.7035	0.4142	HSS		
239	1997/11/01,11:37	35.3	139.1	8	4.1	1.59e15	84.94	Hakone region	40	75	84	243	16	112	-0.2779	0.3301	0.5434	-0.1766	-0.6698	0.4545	FUJ	NAA	KZK
240	1997/11/01,22:13	36.1	139.9	47	4.3	3.76e15	88.84	SW Ibaraki pref	44	61	71	259	34	119	-0.6731	0.3826	0.2210	-0.1548	-0.4728	0.8280	SGN	JIZ	FUJ
241	1997/11/02,18:19	41.5	141.8	53	3.9	6.89e14	83.53	E off Aomori pref	85	79	130	188	41	16	-0.0765	0.6020	0.7576	-0.1789	0.2147	0.2554	HSS		
242	1997/11/02,21:00	36.0	141.4	14	3.9	8.94e14	68.38	far E off Ibaraki pref	12	81	67	262	24	158	-0.0871	0.4372	0.1745	-0.1590	-0.8600	0.2461	SGN	JIZ	FUJ
243	1997/11/02,21:40	43.0	145.4	53	3.9	6.82e14	82.00	off Nemuro peninsula	237	80	-154	142	65	-11	0.9199	0.2911	0.2515	-0.7651	-0.3530	-0.1549	HSS		
244	1997/11/03,08:35	36.0	140.1	62	3.9	7.35e14	78.61	southern Ibaraki pref	16	59	72	229	35	118	-0.3079	0.3680	-0.0842	-0.5885	-0.5031	0.8964	SGN	JIZ	FUJ
245	1997/11/04,01:31	35.2	139.1	8	4.0	1.21e15	76.35	Hakone region	56	68	84	251	23	104	-0.5752	0.4031	0.5822	-0.0302	-0.4138	0.6055	FUJ	NAA	KZK
246	1997/11/04,19:22	34.9	135.2	14	3.6	2.44e14	75.15	SE Hyogo pref	3	53	95	174	37	83	0.0857	-0.0265	0.0558	-1.0027	-0.2781	0.9170	ISI	KIS	
247	1997/11/05,03:26	31.1	131.7	32	4.2	1.99e15	52.39	SE off Osumi pen	19	73	82	224	19	114	-0.2265	0.2237	0.2078	-0.3878	-0.7933	0.6143	TKA	TKD	
248	1997/11/05,09:44	36.6	141.2	41	4.6	1.00e16	85.63	E off Ibaraki pref	23	79	90	201	11	88	0.0759	0.2114	0.3596	-0.3612	-0.8599	0.2854	SGN	KZK	JIZ
249	1997/11/05,13:00	32.2	139.7	32	4.3	2.84e15	50.96	near Hachijojima island	227	87	170	317	80	3	0.8835	0.0741	-0.1139	-1.0840	0.1043	0.2005	JIZ	SGN	
250	1997/11/05,13:49	40.7	142.6	50	4.1	1.48e15	61.80	E off Aomori pref	111	72	90	292	18	91	-0.5502	-0.2514	0.7477	-0.0065	0.2865	0.5566	HSS	NMR	
251	1997/11/05,20:04	43.0	144.4	116	4.9	2.19e16	90.83	Kushiro region	245	87	-89	41	3	-114	0.0662	-0.0666	0.9050	0.0046	-0.4164	-0.0707	NMR	HSS	TNK
252	1997/11/06,05:27	31.7	131.9	14	3.9	7.51e14	80.37	Hyuganada region	198	79	-96	47	13	-62	0.1746	-0.1575	0.2445	0.2571	-0.8841	-0.4317	TKD		
253	1997/11/06,15:18	34.7	134.4	5	3.4	1.34e14	70.37	Harimanada Setonaikai	153	74	-34	253	58	-161	0.7049	0.5801	0.0094	-0.4216	-0.5387	-0.2833	ISI		
254	1997/11/07,07:06	33.2	141.1	53	4.0	1.23e15	81.78	E off Hachijojima island	326	65	57	202	41	139	0.2614	-0.1368	-0.4774	-0.9133	-0.3124	0.6519	JIZ	SGN	FUJ
255	1997/11/07,17:46	36.4	137.6	5	4.0	1.29e15	92.75	Hida mountains region	178	82	-9	270	81	-172	-0.0286	0.9711	0.1825	-0.1046	-0.1982	0.1332	KZK	NAA	FUJ
256	1997/11/08,02:16	36.7	141.5	47	3.8	4.97e14	58.68	E off Ibaraki pref	237	66	132	351	47	34	0.1677	0.4940	-0.5682	-0.7255	0.0393	0.5578	SGN	KZK	
257	1997/11/08,05:16	36.5	140.6	62	3.8	5.07e14	63.32	northern Ibaraki pref	27	82	108	140	19	24	0.2825	-0.0067	0.3894	-0.4882	-0.8265	0.2057	SGN	KZK	FUJ
258	1997/11/08,18:41	36.2	140.8	50	3.9	7.57e14	63.52	E off Ibaraki pref	348	56	62	211	43	125	-0.0868	0.1543	-0.4772	-0.8100	-0.2676	0.8968	SGN	JIZ	KZK
259	1997/11/09,21:37	33.5	140.9	41	3.9	7.05e14	66.39	E off Hachijojima island	52	71	114	179	30	41	0.0255	0.3919	0.6320	-0.5824	-0.3506	0.5570	JIZ	SGN	FUJ
260	1997/11/11,15:40	38.1	142.6	32	3.5	1.94e14	81.76	E off Miyagi pref	197	86	76	93	15	165	-0.1485	0.2408	-0.2731	0.0204	0.9219	0.1281	KZK		
261	1997/11/11,19:59	43.4	146.9	44	4.8	1.66e16	86.48	E off Hokkaido	261	72	142	5	54	22	-0.1035	0.7540	-0.5572	-0.2285	-0.2019	0.3320	NMR		
262	1997/11/11,23:58	32.9	131.0	5	4.4	4.27e15	77.02	NE Kumamoto pref	123	70	-44	231	49	-153	1.0391	-0.0366	-0.3554	-0.5484	-0.3220	-0.4907	TKA	ISI	
263	1997/11/12,22:03	43.2	137.8	270	4.9	2.19e16	88.10	eastern sea of Japan	118	60	-127	354	46	-44	0.0410	0.9046	-0.1954	0.5911	-0.1945	-0.6321	HSS	TNK	
264	1997/11/13,03:21	43.4	146.2	59	4.8	1.53e16	92.69	near Kunashiri island	197	51	74	42	42	109	-0.2500	0.3977	0.1400	-0.7257	0.2413	0.9756	TNK		
265	1997/11/13,17:56	33.7	139.9	110	4.8	1.73e16	93.36	far S off Boso peninsula	185	84	56	85	35	169	-0.0611	0.5716	-0.0399	-0.1196	0.8054	0.1807	JIZ	FUJ	SGN
266	1997/11/13,23:01	34.5	137.4	300	4.5	5.52e15	65.20	Ensyunada	201	76	106	332	21	43	-0.0728	-0.1355	-0.4555	-0.4803	0.7394	0.5531	NAA	SGN	ISI
267	1997/11/15,04:42	36.9	141.5	53	4.8	1.98e16	84.26	E off Fukushima pref	45	88	87	275	4	140	-0.1194	-0.0624	0.7016	-0.0274	-0.7079	0.1468	KZK	SGN	FUJ
268	1997/11/15,07:05	43.6	145.1	130	6.1	1.34e18	87.61	Nemuro region	72	87	94	199	5	37	-0.0330	0.0625	0.9469	-0.1062	-0.2963	0.1392	TNK	HSS	
269	1997/11/15,13:23	36.9	141.5	56	3.7	4.56e14	74.06	E off Fukushima pref	45	86	112	144	22	10	0.3286	0.1276	0.6246	-0.4177	-0.6777	0.0891	KZK	SGN	FUJ
270	1997/11/15,23:42	29.9	130.9	44	4.6	1.02e16	66.19	near Amami-Oshima island	253	81	26	158	64	170	-0.3789	-0.6894	-0.3609	0.5782	0.5704	-0.1993	TKA	TKD	
271	1997/11/16,02:51	32.4	142.0	8	4.3	3.41e15	89.45	far E off Izu Islands	53	65	122	177	40	41	0.0042	0.3282	0.6709	-0.6884	-0.0607	0.6842	JIZ		
272	1997/11/17,08:29	33.3	141.6	5	4.1	1.65e15	75.93	E off Hachijojima island	61	86	119	158	29	8	0.3320	0.2755	0.7924	-0.4592	-0.3653	0.1272	JIZ	SGN	FUJ
273	1997/11/18,12:49	41.0	142.0	68	3.8	6.29e14	71.44	E off Aomori pref	142	62	58	15	41	135	0.1108	-0.1690	0.5755	-0.8376	0.1878	0.7268	HSS		
274	1997/11/19,17:07	34.3	141.1	38	4.7	1.16e16	78.25	far SE off Boso pen	61	75	-161	325	72	-16	0.9308	0.4055	-0.1102	-0.7323	0.3311	-0.1985	JIZ	SGN	FUJ
275	1997/11/19,17:24	34.3	141.1	35	4.2	1.93e15	74.44	far SE off Boso pen	65	73	-155	327	66	-19	0.8703	0.4548	-0.1942	-0.6279	0.3855	-0.2424	JIZ	SGN	FUJ
276	1997/11/20,01:56	41.0	142.7	44	4.9	2.75e16	85.34	E off Aomori pref	241	71	-142	137	54	-24	0.9463	0.2379	0.3047	-0.5432	-0.4162	-0.4032	TMR	HSS	
277	1997/11/21,04:59	30.3	131.0	59	4.2	2.27e15	79.29	near Tanegashima island	23	70	61	261	34	143	-0.3937	0.5372	0.1323	-0.1622	-0.6695	0.5558	TKD		
278	1997/11/21,15:10	36.4	141.1	44	3.8	5.92e14	70.41	E off Ibaraki pref	197	65	-42	308	53	-147	-0.3055	0.3989	0.4993	0.8058	-0.3178	-0.5002	SGN	KZK	FUJ
279	1997/11/22,09:10	38.5	143.6	35	4.4	3.80e15	53.66	far E off Miyagi pref	350	61	-36	100	59	-146	0.2553	0.7883	-0.2759	0.2713	0.3202	-0.5266	GJM	TMR	
280	1997/11/22,10:26	34.3	139.2	20	3.5	1.72e14	80.82	near Niijima island	314	75	161	49	72	15	-1.0295	-0.0581	-0.0376	0.8200	-0.3247	0.2095	JIZ	TYM	FUJ

Table 5: Estimated moment tensors (continued).

No.	Origin Time(UT)	Lat(N)	Lon(E)	D(km)	Mw	Mo(Nm)	VarRed	Region name	Str1	Dip1	Rak1	Str2	Dip2	Rak2	Mxx	Mxy	Mxz	Myy	Myz	Mzz	used Stations		
281	1997/11/23,03:50	40.0	138.8	8	5.5	2.25e17	81.48	W off Akita pref	12	51	87	197	39	94	-0.0102	0.2524	0.0130	-0.9390	-0.2261	0.9491	TMR	KZK	
282	1997/11/23,09:49	40.0	138.9	11	3.8	5.64e14	74.30	W off Akita pref	38	74	124	150	37	27	0.3262	0.0519	0.6008	-0.7645	-0.4443	0.4383	TMR		
283	1997/11/25,06:36	40.4	142.2	53	3.8	5.00e14	88.34	NE off Iwate pref	23	73	98	178	19	66	-0.0096	0.0956	0.3571	-0.5584	-0.7398	0.5680	TMR	GJM	HSS
284	1997/11/28,04:46	33.0	137.2	20	3.3	1.17e14	71.90	far S off Tokai District	110	82	-167	18	77	-8	-0.5595	0.7619	-0.2465	0.6150	0.0611	-0.0555	KIS		
285	1997/11/29,00:39	36.0	139.9	56	4.5	6.96e15	62.73	SW Ibaraki pref	41	73	66	278	29	143	-0.6121	0.2746	0.3912	0.0812	-0.6648	0.5309	SGN	FUJ	KZK
286	1997/12/01,18:17	40.0	138.9	8	4.7	1.26e16	88.29	W off Akita pref	50	67	117	178	35	43	-0.0027	0.3164	0.6420	-0.6768	-0.2037	0.6795	GJM	TMR	HSS
287	1997/12/02,05:18	34.0	136.4	400	4.6	8.57e15	58.70	SE off Kii peninsula	205	88	71	110	19	175	-0.1894	0.2833	-0.4375	0.1765	0.8392	0.0129	NAA	FUJ	SGN
288	1997/12/02,18:47	40.0	138.9	8	3.9	9.25e14	66.08	W off Akita pref	216	56	88	39	34	93	-0.3248	0.4729	-0.2055	-0.5822	0.3183	0.9069	GJM	TMR	HSS
289	1997/12/05,23:57	34.3	139.1	11	3.9	7.78e14	82.19	near Niijima island	310	86	149	42	59	4	-0.8660	0.1137	-0.3463	0.8197	-0.3934	0.0463	JIZ	FUJ	SGN
290	1997/12/06,06:40	35.7	140.1	32	4.7	1.31e16	89.42	northern Chiba pref	269	68	-29	10	64	-155	0.2686	-0.7910	0.3864	0.0178	0.3852	-0.2864	SGN	FUJ	KZK
291	1997/12/06,23:02	35.7	140.1	32	4.2	1.95e15	87.33	northern Chiba pref	16	69	-133	265	46	-29	0.3890	-0.6081	0.1615	0.0821	0.6539	-0.4711	SGN	FUJ	KZK
292	1997/12/07,03:50	37.7	141.8	83	5.4	1.25e17	89.18	E off Fukushima pref	192	50	-96	21	40	-83	0.1048	-0.2628	-0.0335	0.8947	-0.1801	-0.9995	GJM	KZK	SGN
293	1997/12/09,06:49	37.7	141.1	65	3.7	4.67e14	51.38	E off Fukushima pref	131	88	154	222	64	2	-0.8470	0.1388	0.2601	0.9174	0.3860	-0.0704	KZK	SGN	FUJ
294	1997/12/09,19:21	36.5	141.1	44	4.3	3.51e15	88.70	E off Ibaraki pref	88	74	127	198	39	25	-0.4052	0.6088	0.6768	-0.0105	0.0754	0.4157	SGN	KZK	FUJ
295	1997/12/13,06:45	39.6	142.4	71	4.6	8.77e15	85.23	E off Iwate pref	254	65	-102	101	28	-65	0.6386	0.0575	0.5579	0.2657	-0.3588	-0.9043	TMR	GJM	SBT
296	1997/12/16,11:34	40.5	140.0	165	4.3	3.39e15	83.86	western Aomori pref	148	66	-28	250	65	-153	0.8333	0.5211	0.1435	-0.4704	-0.4327	-0.3629	GJM	SBT	HSS
297	1997/12/19,13:07	36.3	136.2	8	4.3	3.22e15	86.56	central Fukui pref	202	58	71	55	36	118	-0.1885	0.6407	-0.0845	-0.5624	0.4069	0.7509	NAA	SGN	KIS
298	1997/12/21,21:03	43.1	146.4	44	5.1	5.46e16	70.49	off Nemuro peninsula	326	46	-81	134	45	-99	0.4068	0.4977	-0.0821	0.5816	0.0757	-0.9884	TNK		
299	1997/12/22,16:31	40.2	142.5	47	5.3	1.19e17	91.30	NE off Iwate pref	22	70	94	191	20	81	-0.0980	0.1479	0.3023	-0.5774	-0.6953	0.6754	TMR	GJM	HSS
300	1997/12/22,19:08	43.0	143.5	113	5.1	4.62e16	77.23	Tokachi region	290	87	-62	25	28	-175	0.3863	-0.3293	0.8247	-0.3117	0.2948	-0.0746	NMR	TMR	
301	1997/12/23,06:18	36.2	140.9	38	4.3	3.32e15	89.43	E off Ibaraki pref	340	77	56	232	36	158	0.3119	0.2999	-0.3763	-0.6624	-0.6610	0.3505	SGN	KZK	FUJ
302	1997/12/23,11:08	41.0	139.3	17	3.9	7.38e14	91.48	W off Aomori pref	2	89	-121	270	31	-2	0.0377	-0.5207	-0.0078	-0.0065	0.8523	-0.0313	GJM	TMR	
303	1997/12/24,08:08	43.6	147.3	35	3.8	5.98e14	71.64	E off Hokkaido	114	73	134	220	47	24	-0.8766	0.2906	0.4734	0.4597	0.3516	0.4169	NMR		
304	1997/12/24,11:30	31.1	127.9	14	4.4	4.96e15	88.62	east China sea region	227	87	-131	133	41	-5	0.7081	-0.0245	0.5364	-0.6162	-0.5176	-0.0919	TKA	TKD	
305	1997/12/24,12:31	34.8	140.1	50	3.5	1.72e14	74.06	SE off Boso peninsula	27	82	49	287	41	168	-0.5691	0.4426	0.2047	0.3659	-0.7152	0.2031	SGN	FUJ	
306	1997/12/24,15:17	31.8	130.3	11	4.0	9.89e14	96.77	NW Kagoshima pref	290	80	15	197	75	169	0.5618	-0.7548	-0.3193	-0.5764	0.1033	0.0146	TKD		
307	1997/12/26,04:26	33.2	132.2	41	3.7	4.08e14	85.77	Bungo channel	63	72	28	324	64	160	-0.9056	-0.3829	0.2175	0.6290	-0.4016	0.2766	TKD	ISI	KIS
308	1997/12/26,17:29	40.6	144.1	11	4.3	3.18e15	76.24	far E off Sanriku	30	56	105	185	37	69	0.0186	0.3282	0.2797	-0.8812	-0.2441	0.8626	TMR	GJM	
309	1997/12/27,01:08	34.1	135.1	8	3.8	5.03e14	91.73	NW Wakayama pref	338	52	64	196	44	119	0.1424	-0.0580	-0.3149	-1.0038	-0.1197	0.8614	ISI	KIS	NAA
310	1997/12/28,05:13	40.6	144.0	8	4.6	1.00e16	51.93	far E off Sanriku	35	56	101	197	36	75	-0.1826	0.3559	0.3011	-0.7478	-0.2328	0.9304	TMR	GJM	HSS
311	1997/12/28,23:31	36.1	138.6	190	4.0	1.06e15	89.86	eastern Nagano pref	9	88	-48	100	42	-177	-0.1599	0.6359	-0.2054	0.1880	0.7235	-0.0280	SGN	FUJ	NAA
312	1997/12/29,00:13	42.8	145.5	53	4.0	1.02e15	81.09	off Nemuro peninsula	241	85	-161	149	71	-5	0.8273	0.4820	0.2369	-0.7925	-0.2359	-0.0348	HSS		
313	1997/12/29,16:11	35.7	140.8	47	4.1	1.40e15	89.99	near Choshi city	345	66	92	160	24	85	-0.0259	-0.2393	-0.1679	-0.6939	-0.6503	0.7198	SGN	FUJ	KZK
314	1997/12/31,01:16	43.3	146.7	98	5.4	1.49e17	80.18	off Nemuro peninsula	283	83	138	19	48	10	-0.4739	0.6299	-0.6134	0.3114	-0.2389	0.1625	NMR		
315	1997/12/31,22:27	34.1	135.2	5	3.5	2.32e14	66.07	NW Wakayama pref	14	57	114	155	40	58	0.1479	-0.1006	0.2856	-0.9731	-0.2944	0.8253	ISI	KIS	NAA

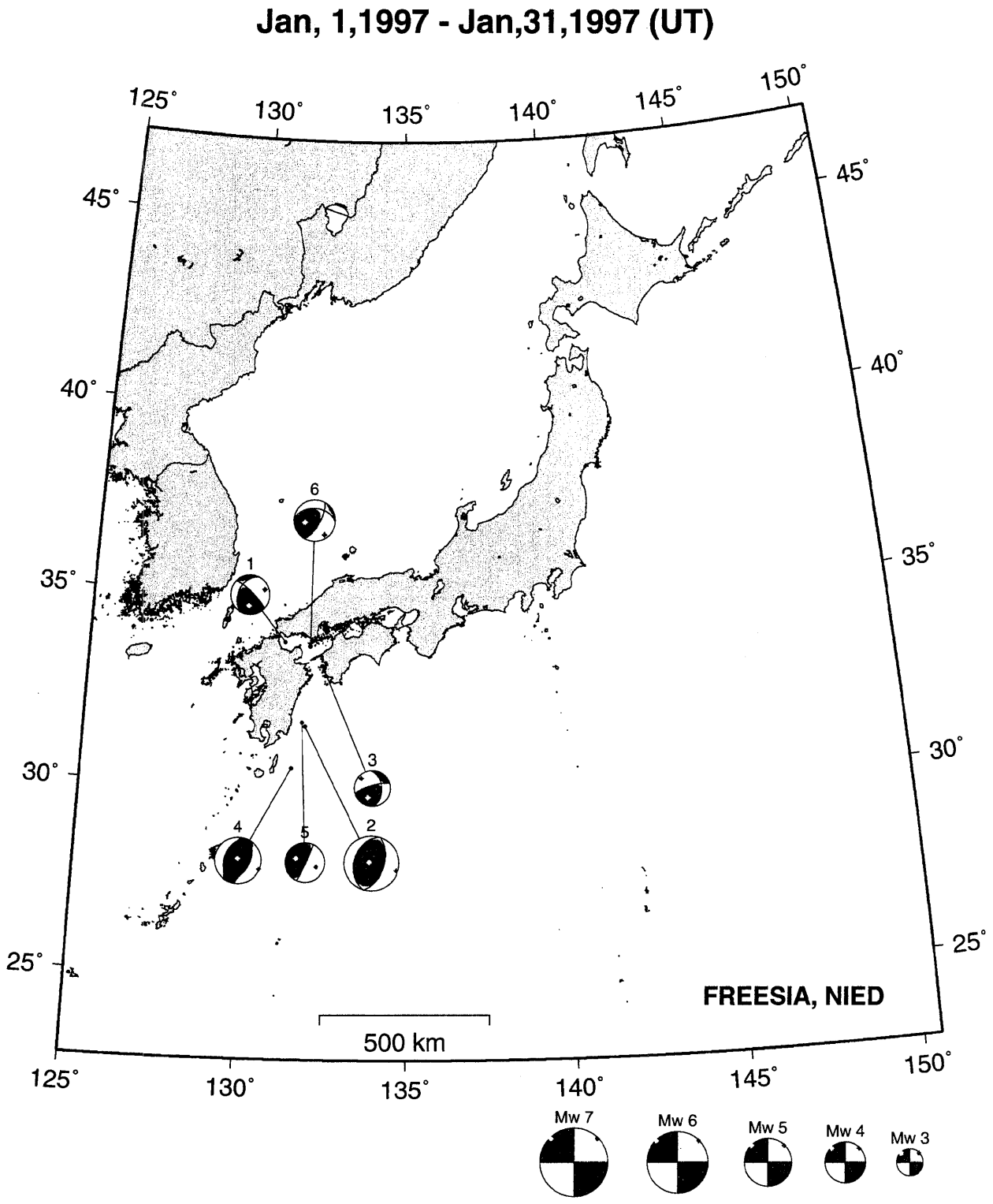

Fig. 2: Estimated moment tensors plotted with epicentral locations.

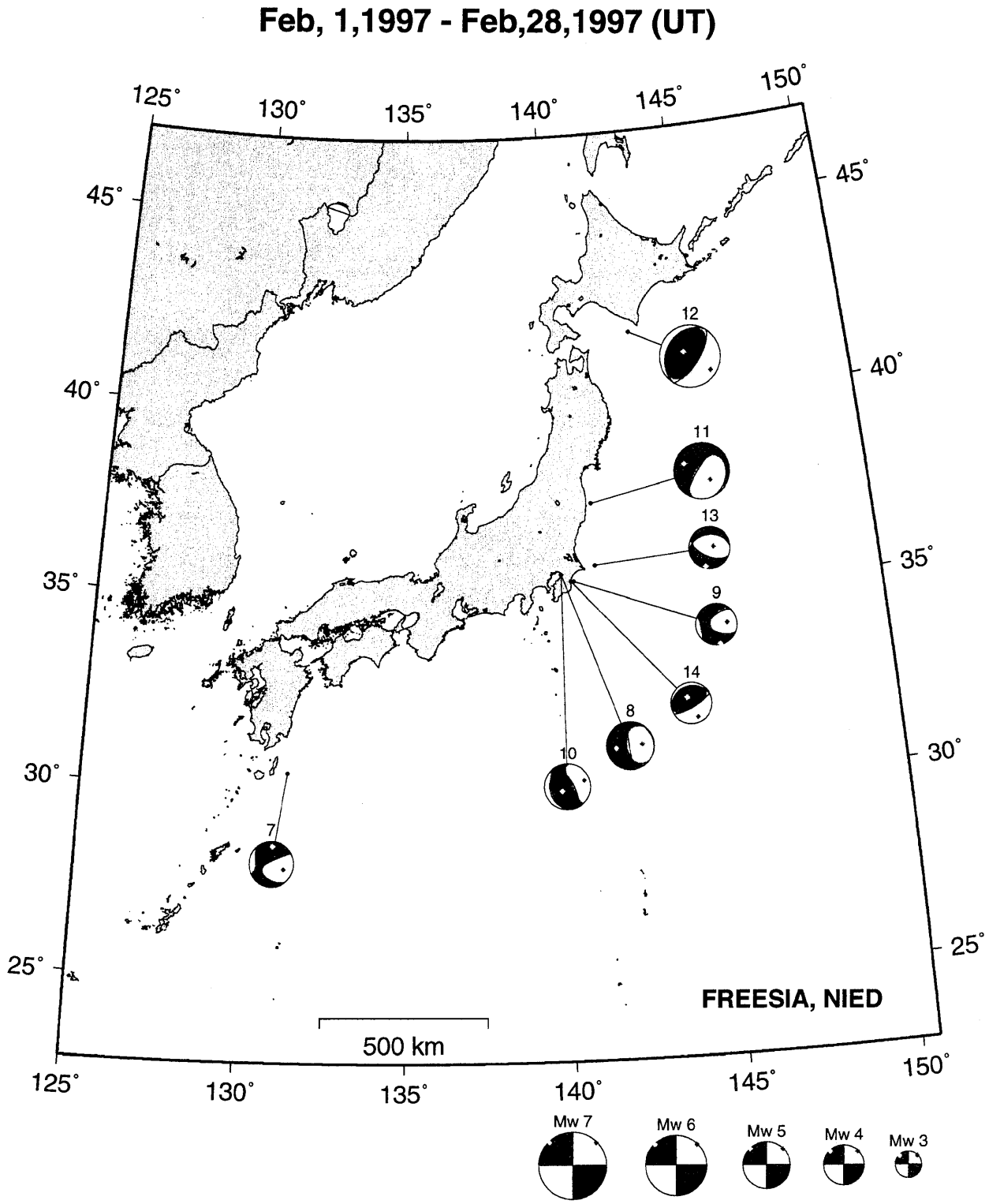

Fig. 2: Estimated moment tensors plotted with epicentral locations (continued).

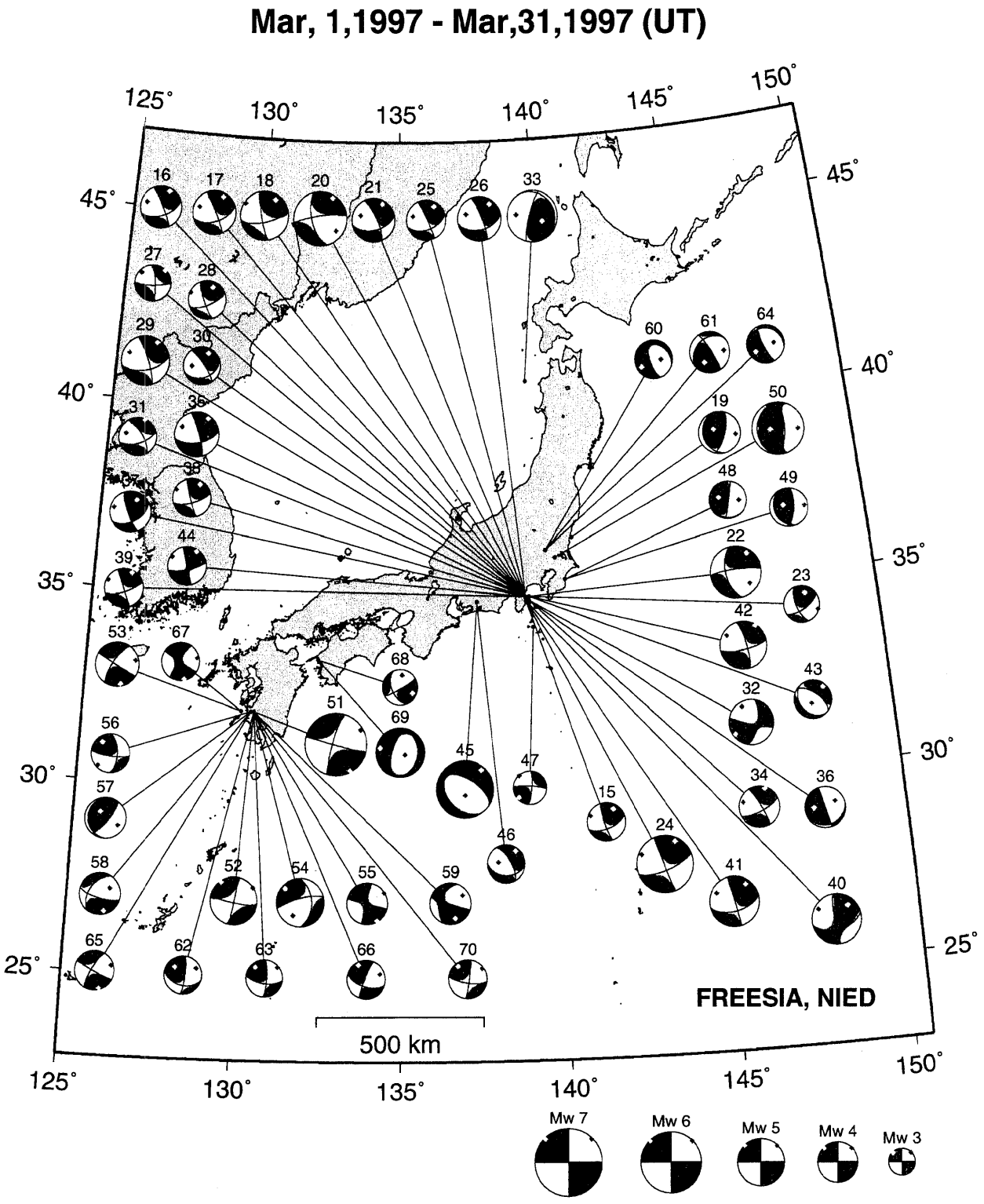

Fig. 2: Estimated moment tensors plotted with epicentral locations (continued).

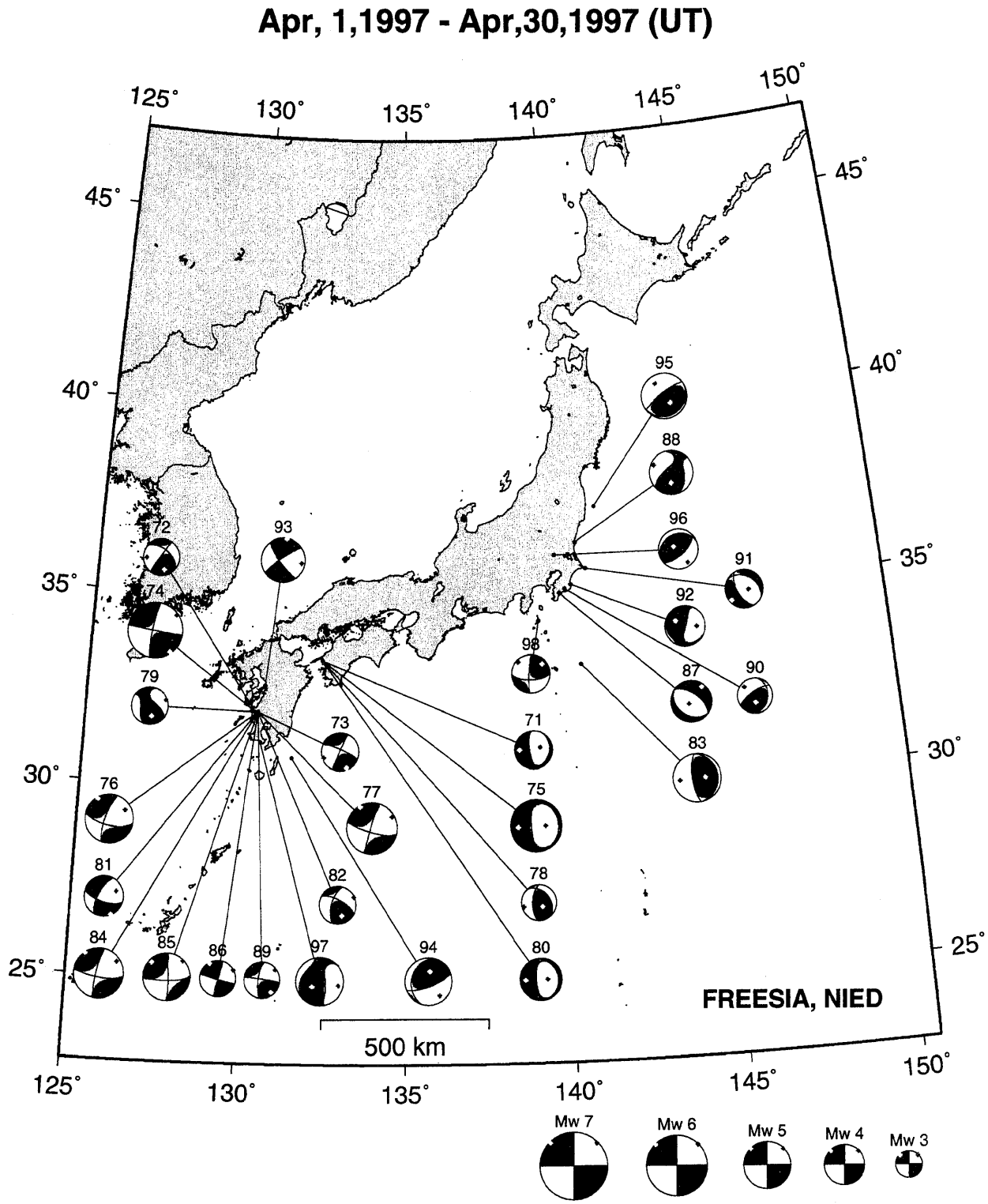

Fig. 2: Estimated moment tensors plotted with epicentral locations (continued).

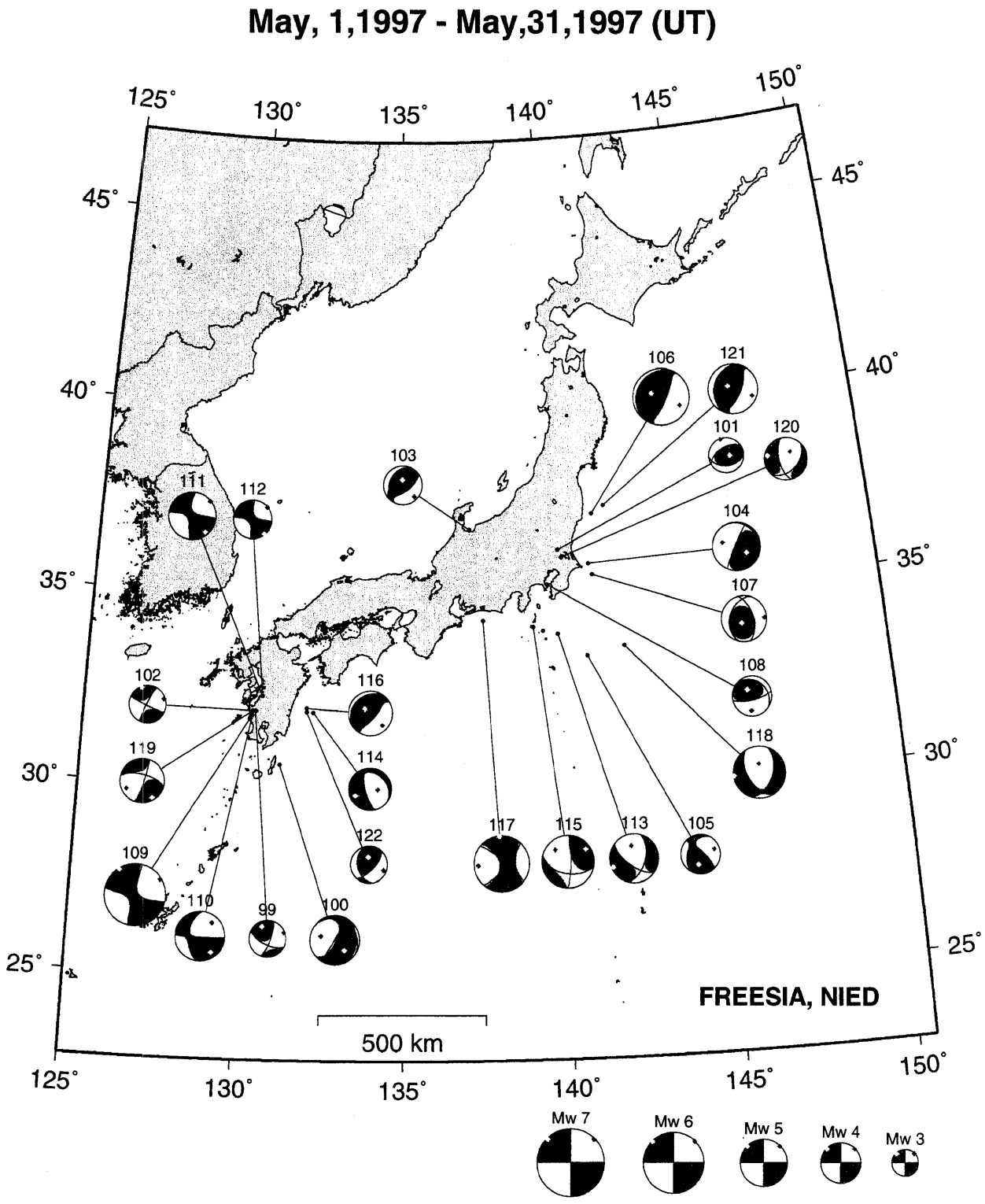

Fig. 2: Estimated moment tensors plotted with epicentral locations (continued).

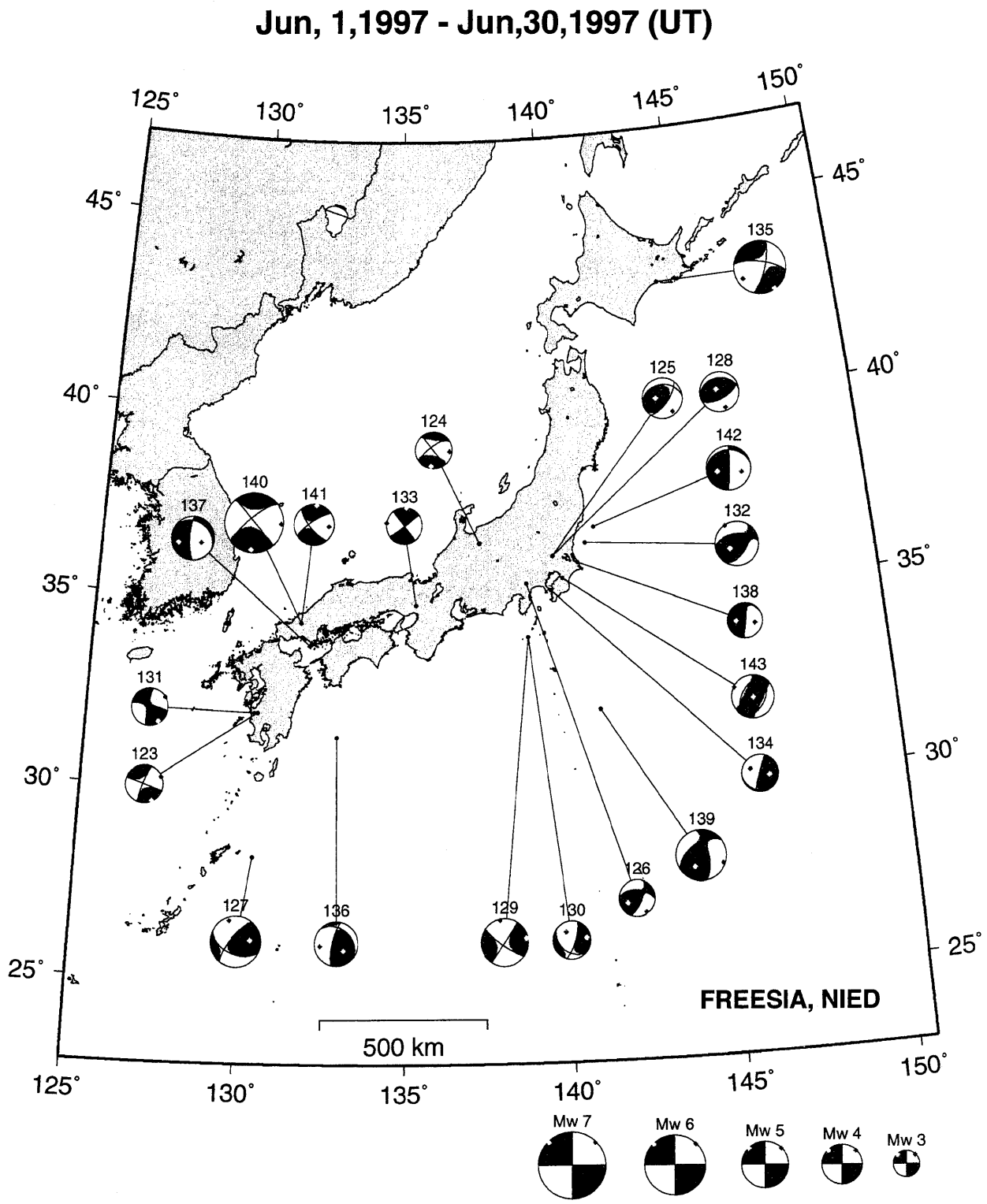

Fig. 2: Estimated moment tensors plotted with epicentral locations (continued).

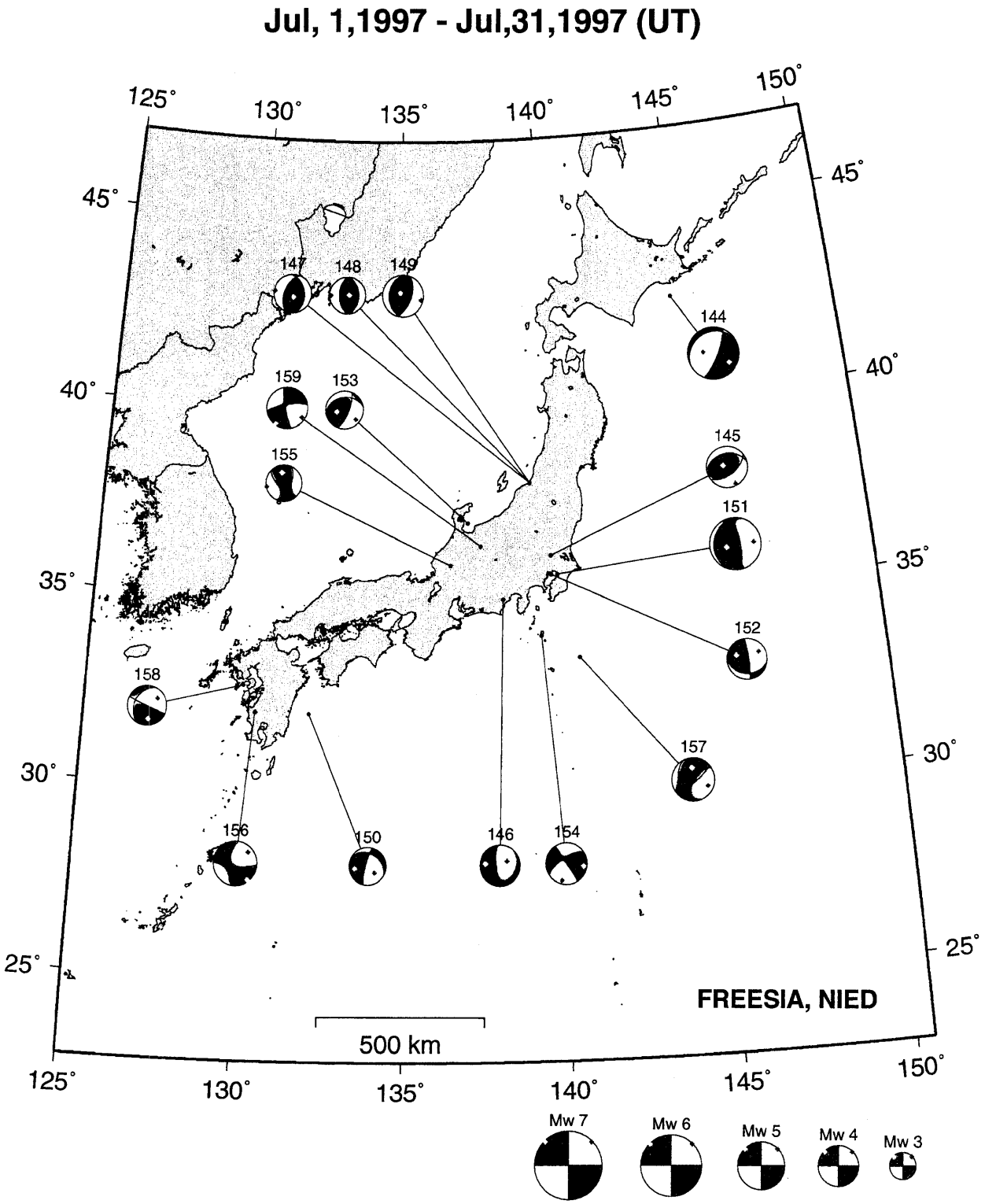

Fig. 2: Estimated moment tensors plotted with epicentral locations (continued).

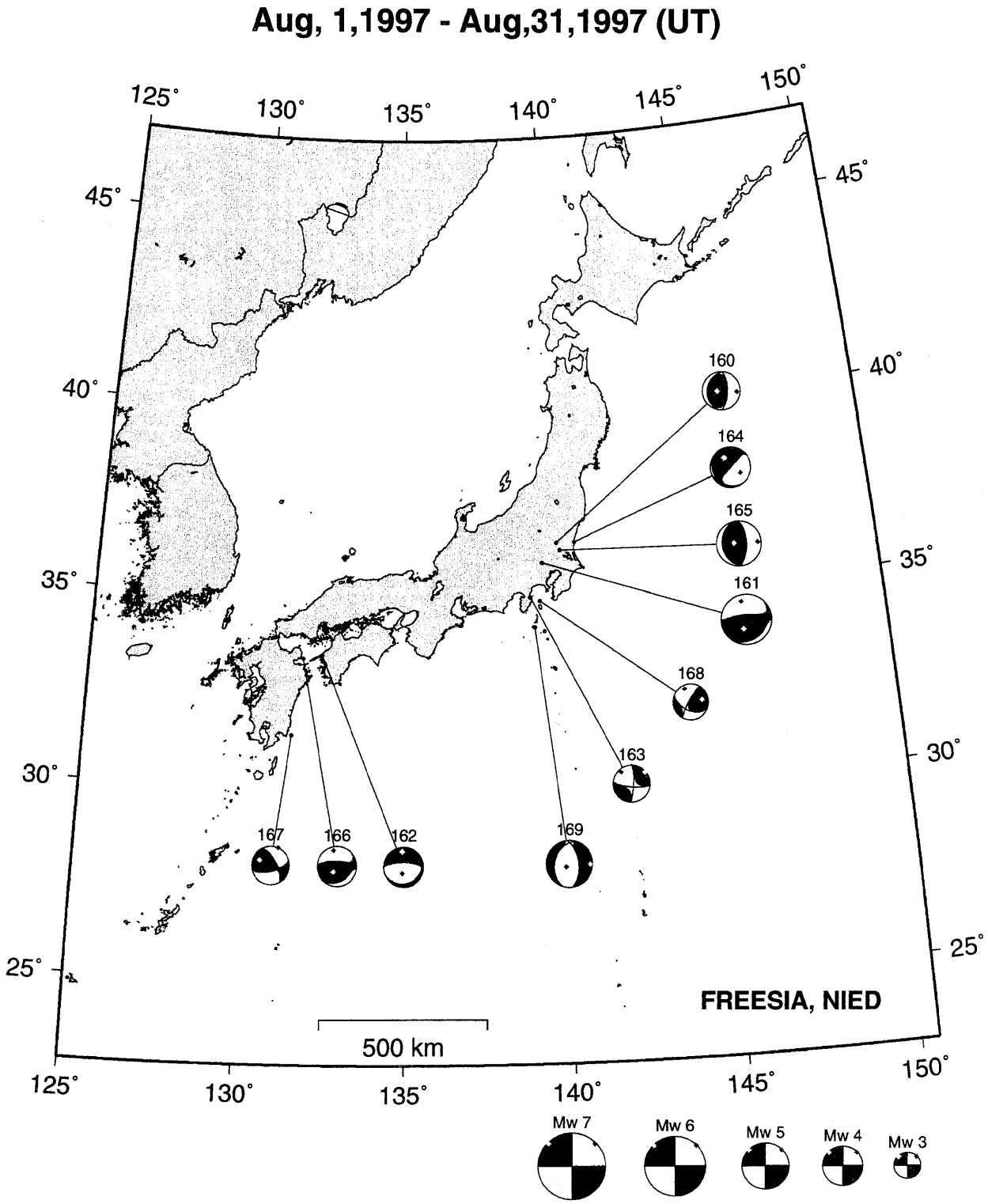

Fig. 2: Estimated moment tensors plotted with epicentral locations (continued).

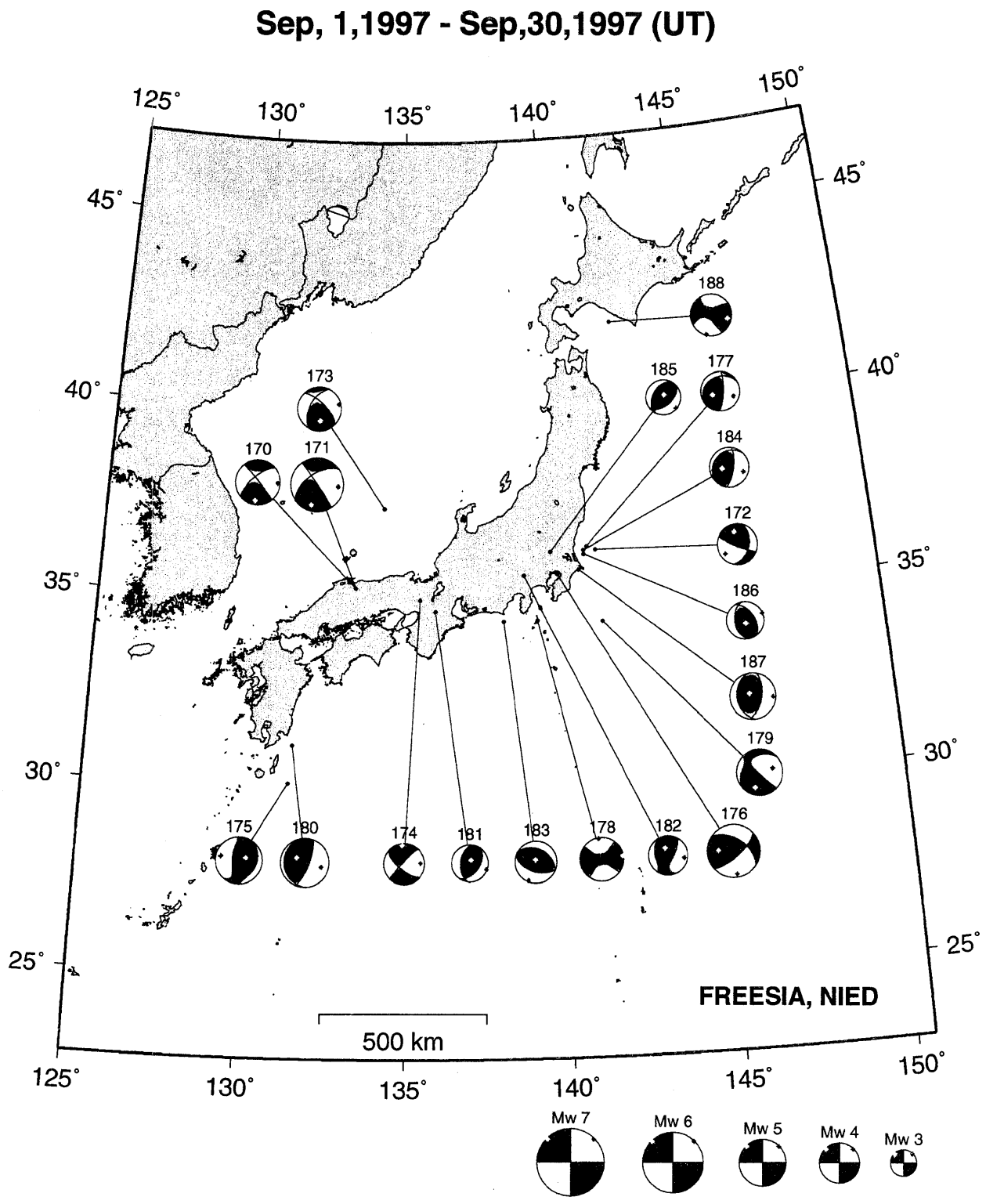

Fig. 2: Estimated moment tensors plotted with epicentral locations (continued).

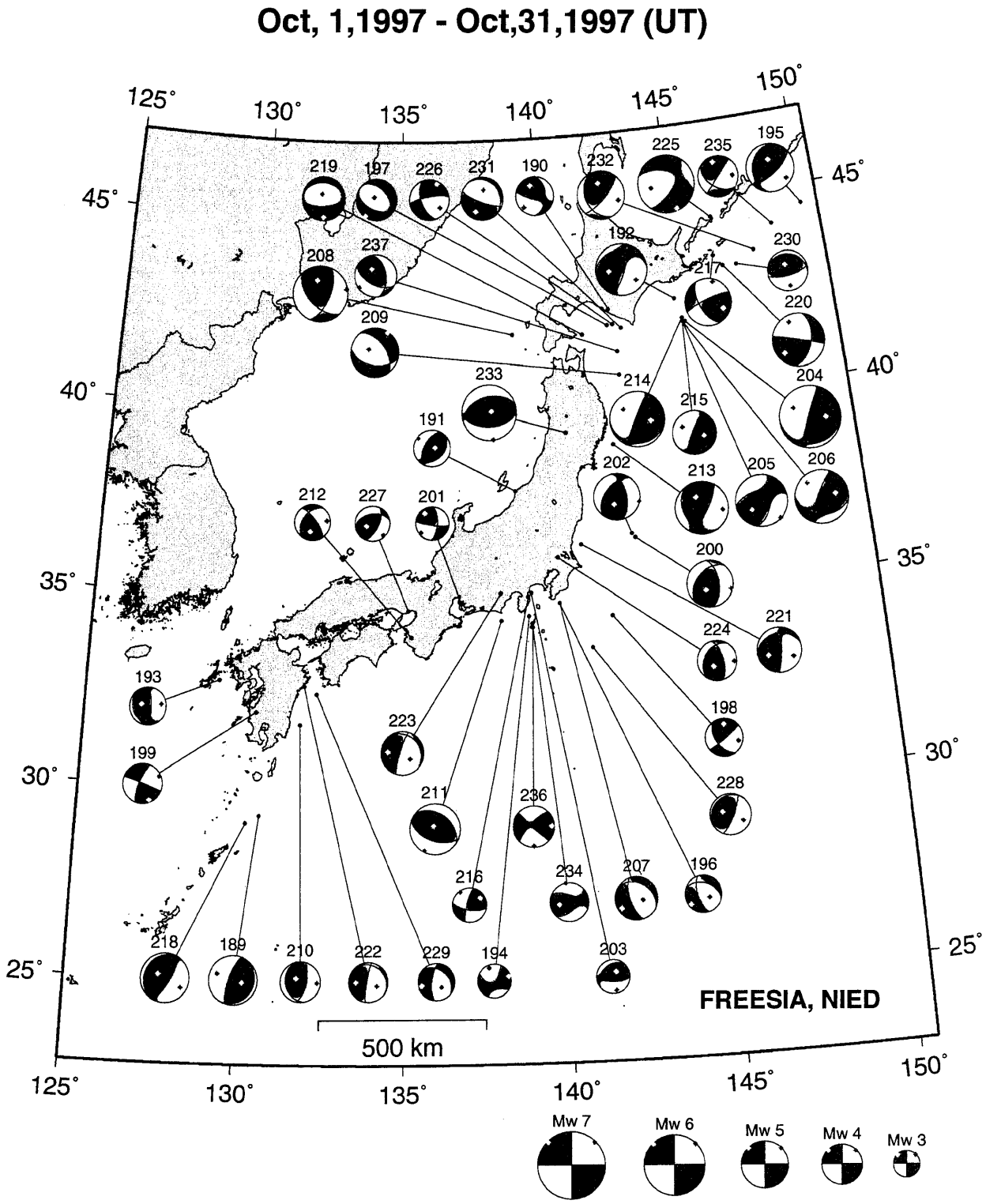

Fig. 2: Estimated moment tensors plotted with epicentral locations (continued).

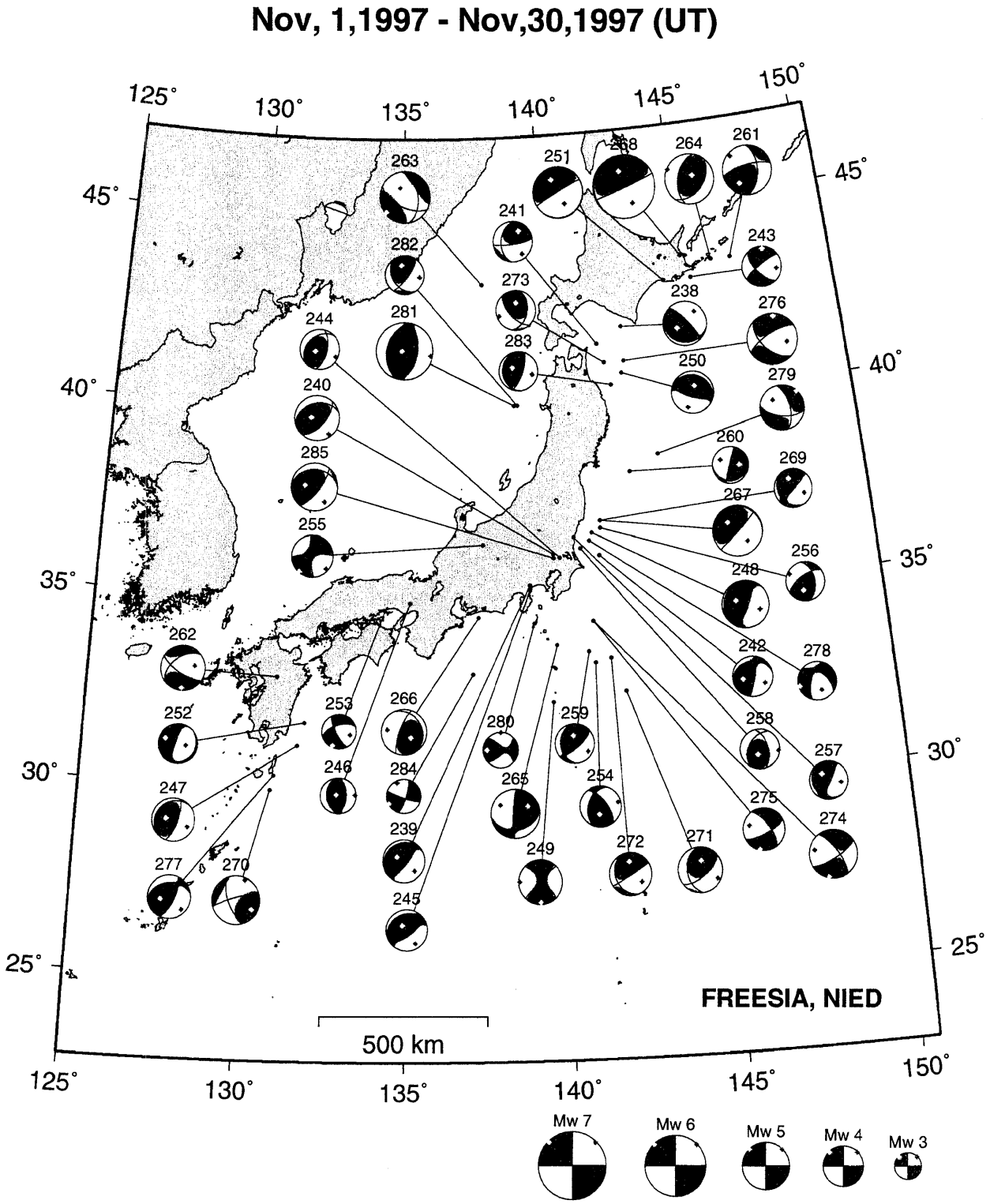

Fig. 2: Estimated moment tensors plotted with epicentral locations (continued).

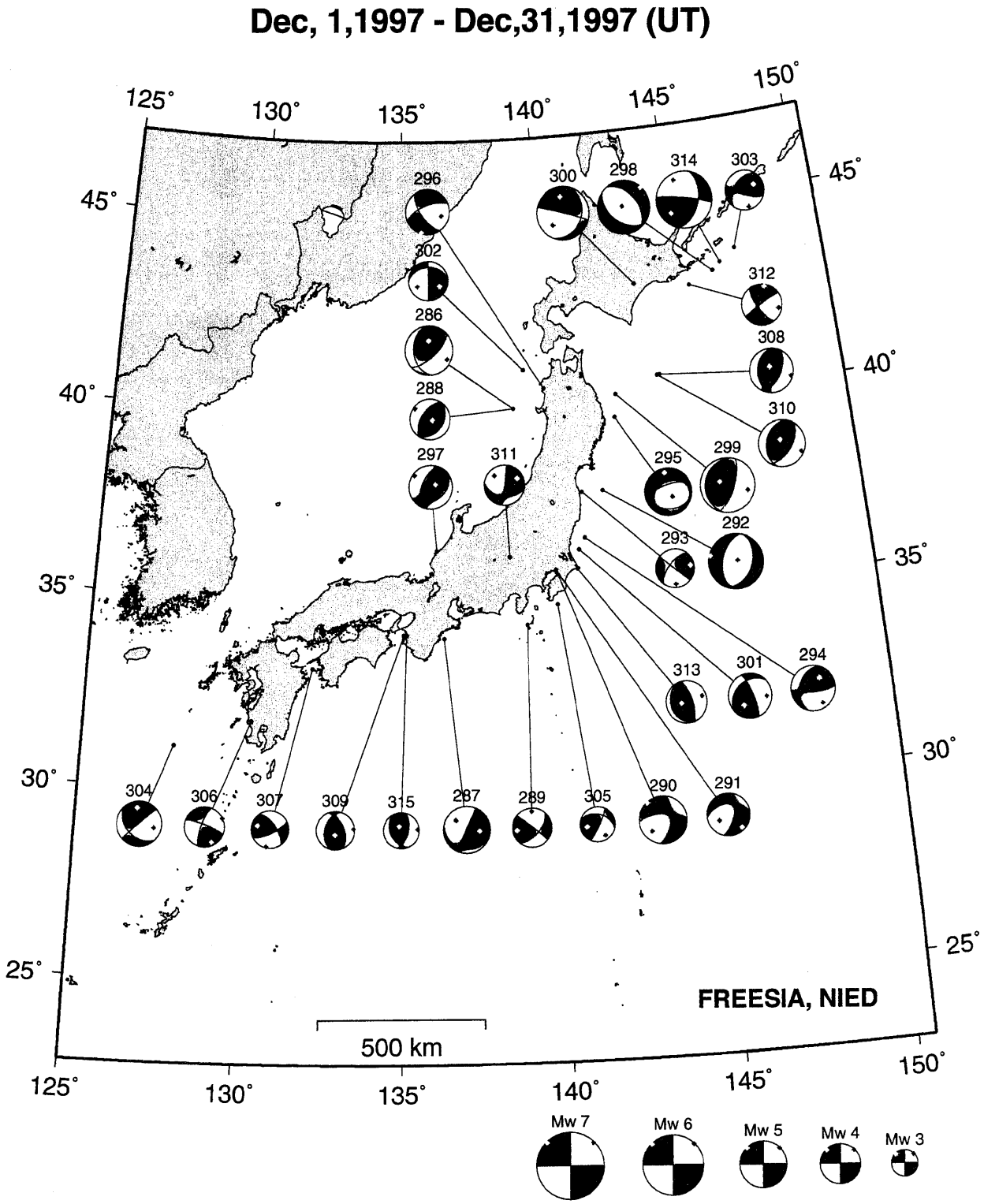

Fig. 2: Estimated moment tensors plotted with epicentral locations (continued).

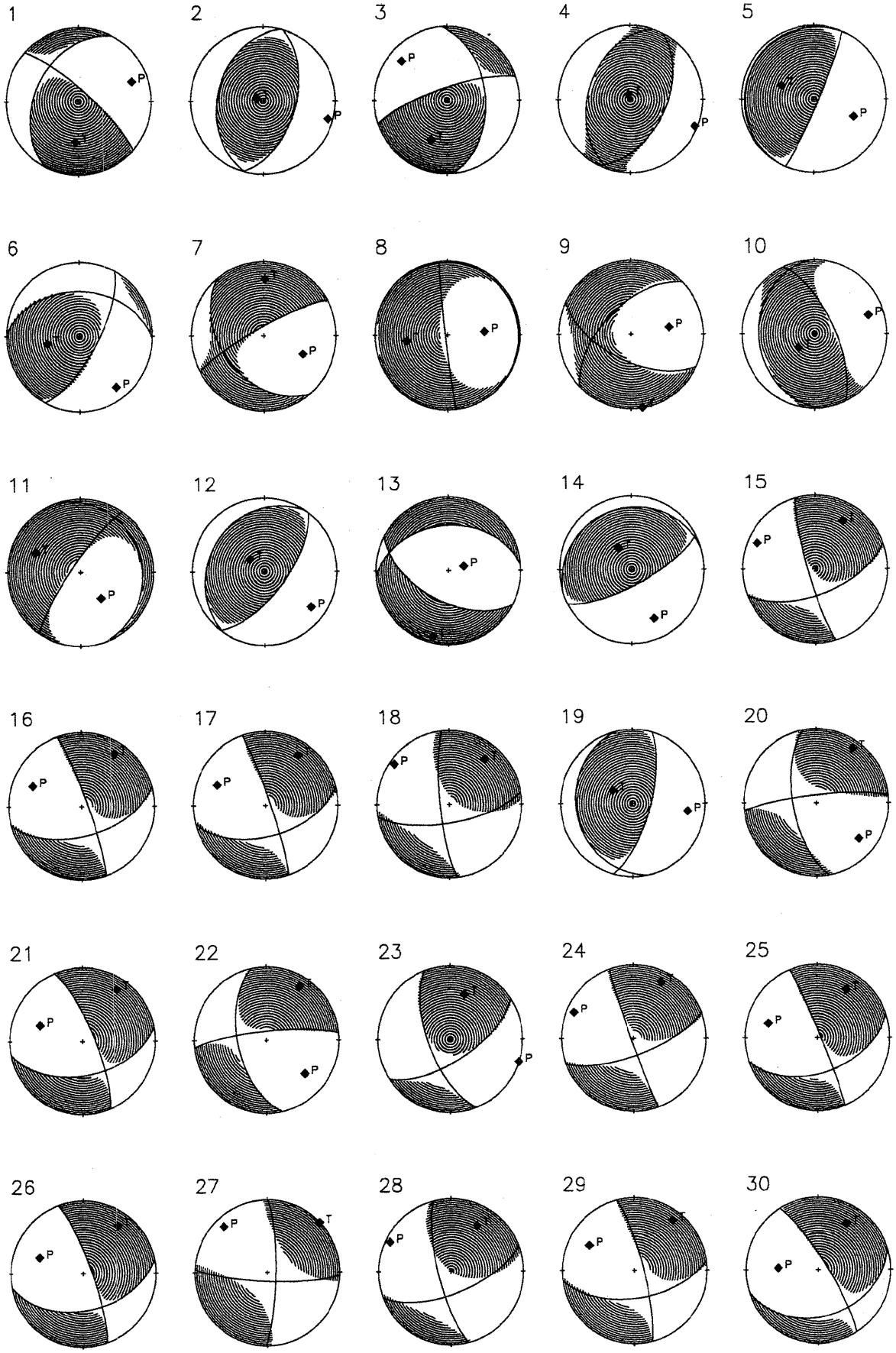

Fig. 3: Estimated moment tensors plotted in the lower hemisphere. P- and T- axes are also plotted.

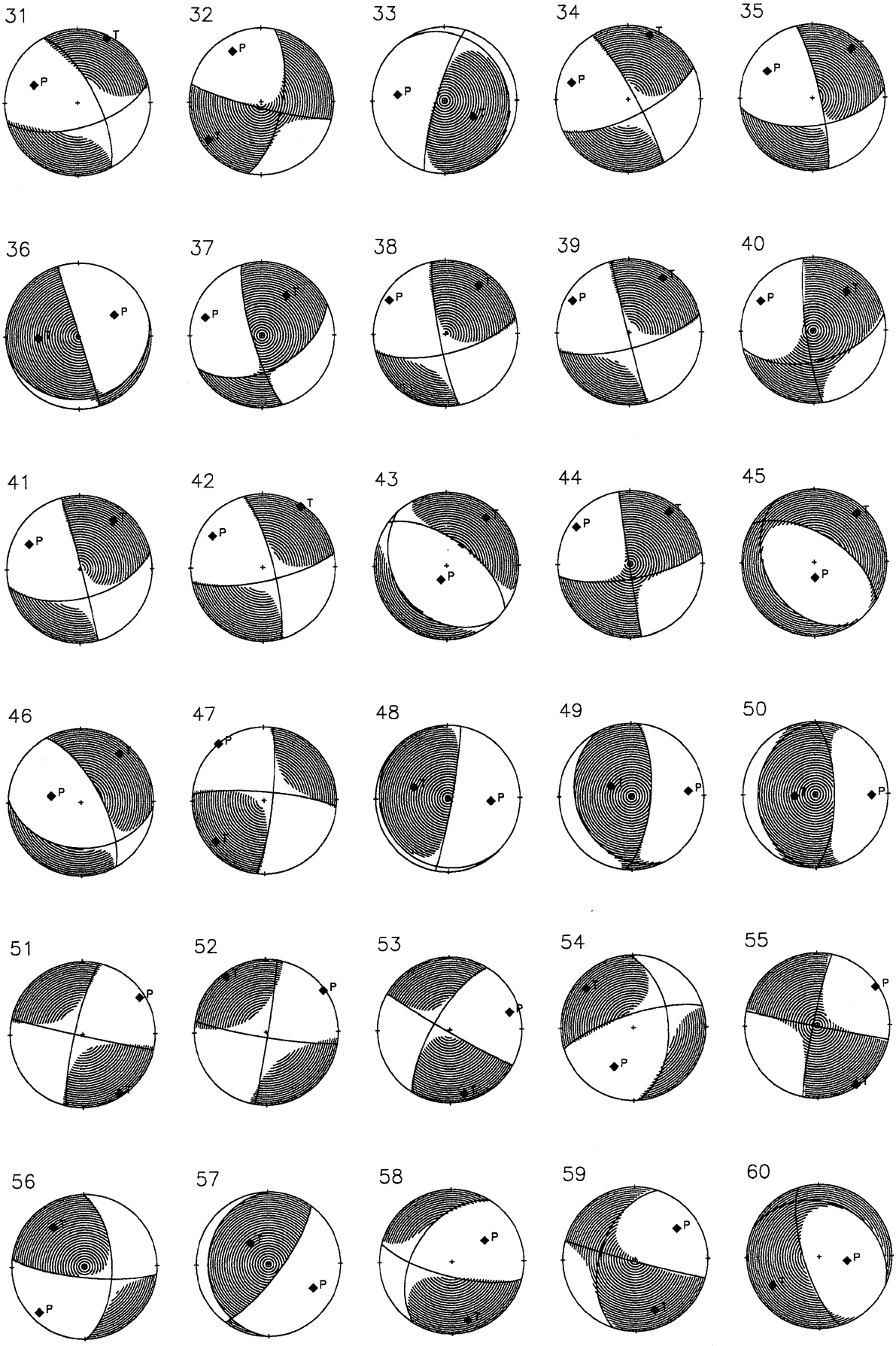

Fig. 3: Estimated moment tensors plotted to the lower hemisphere (continued).

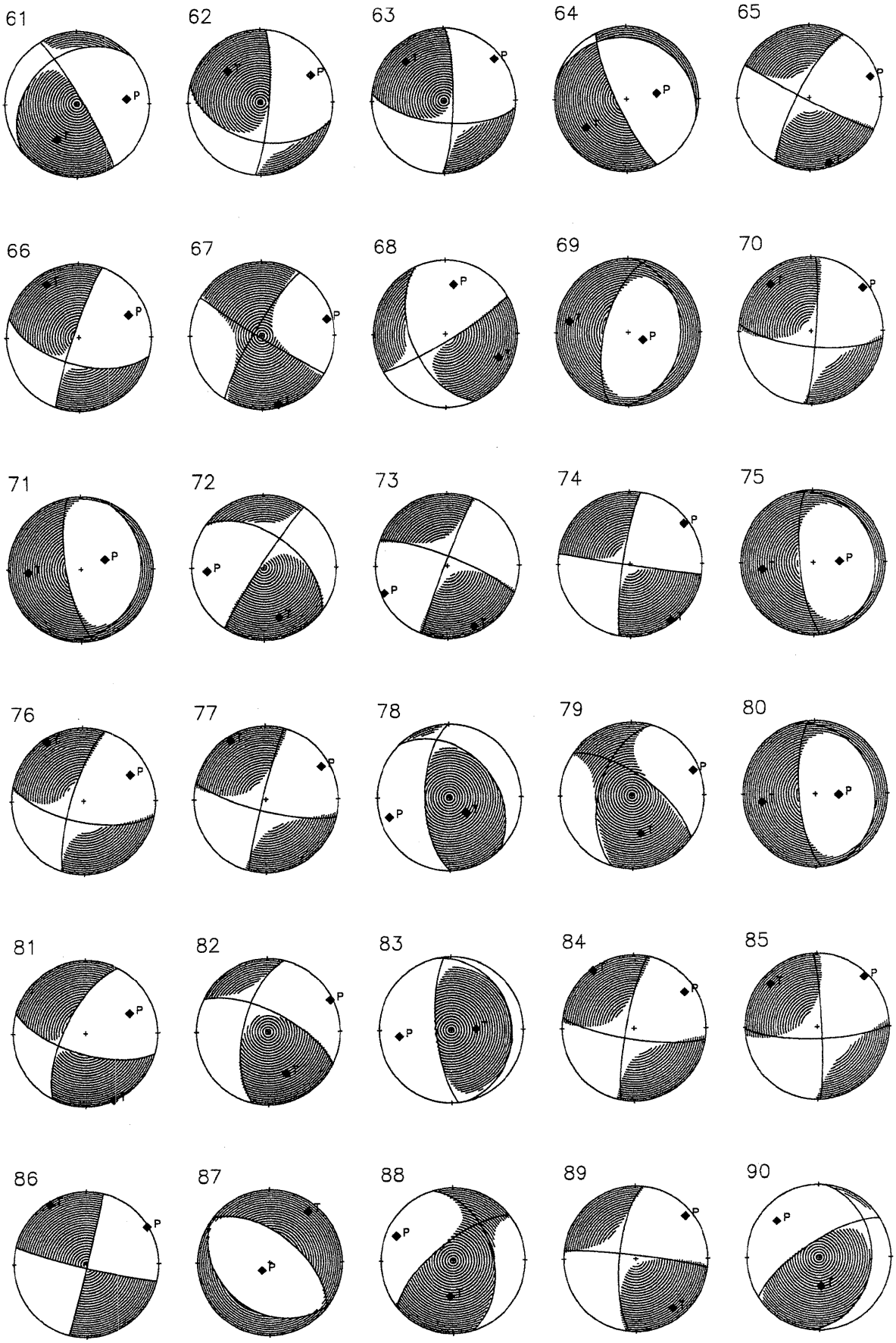

Fig. 3: Estimated moment tensors plotted to the lower hemisphere (continued).

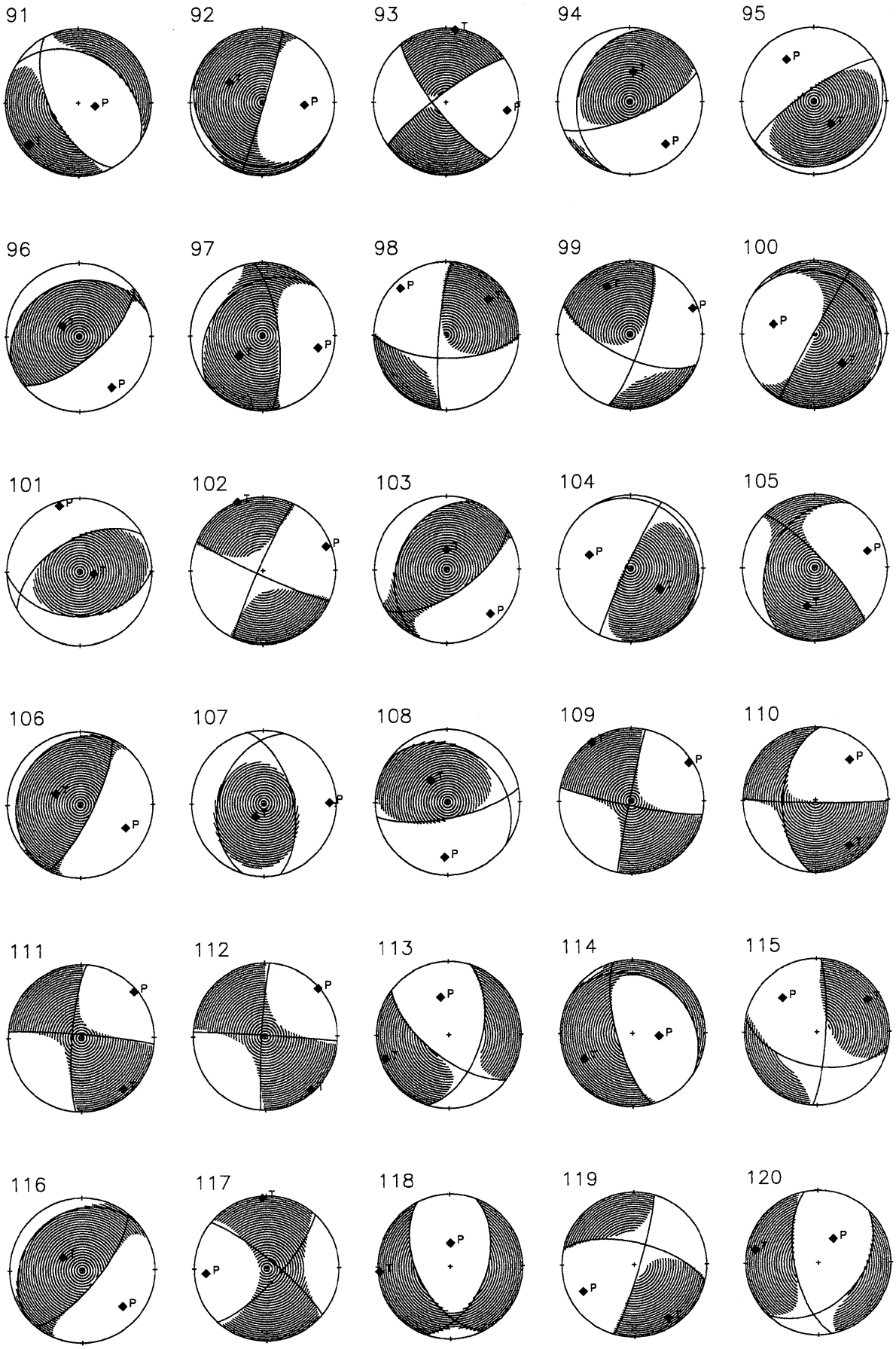

Fig. 3: Estimated moment tensors plotted to the lower hemisphere (continued).

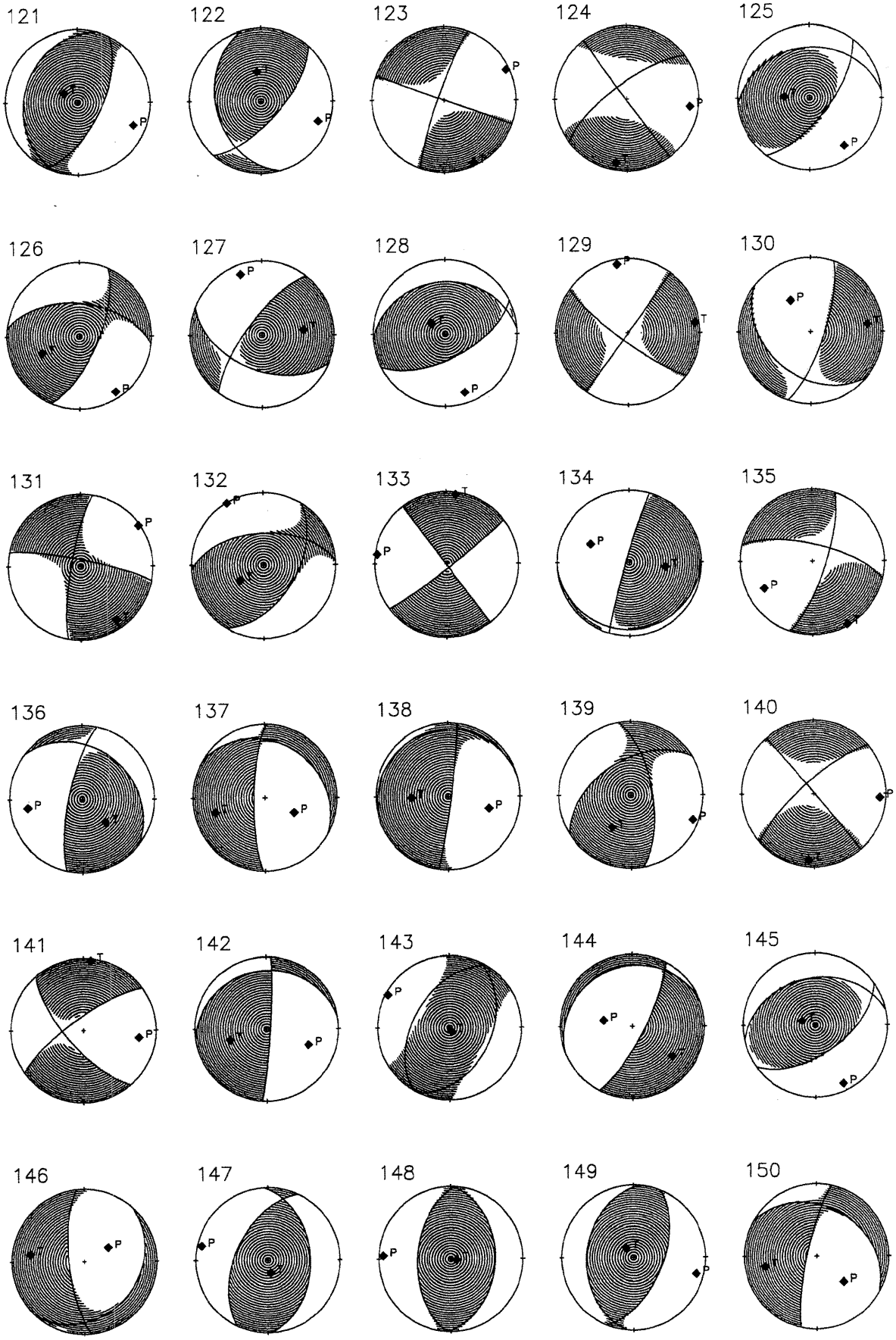

Fig. 3: Estimated moment tensors plotted to the lower hemisphere (continued).

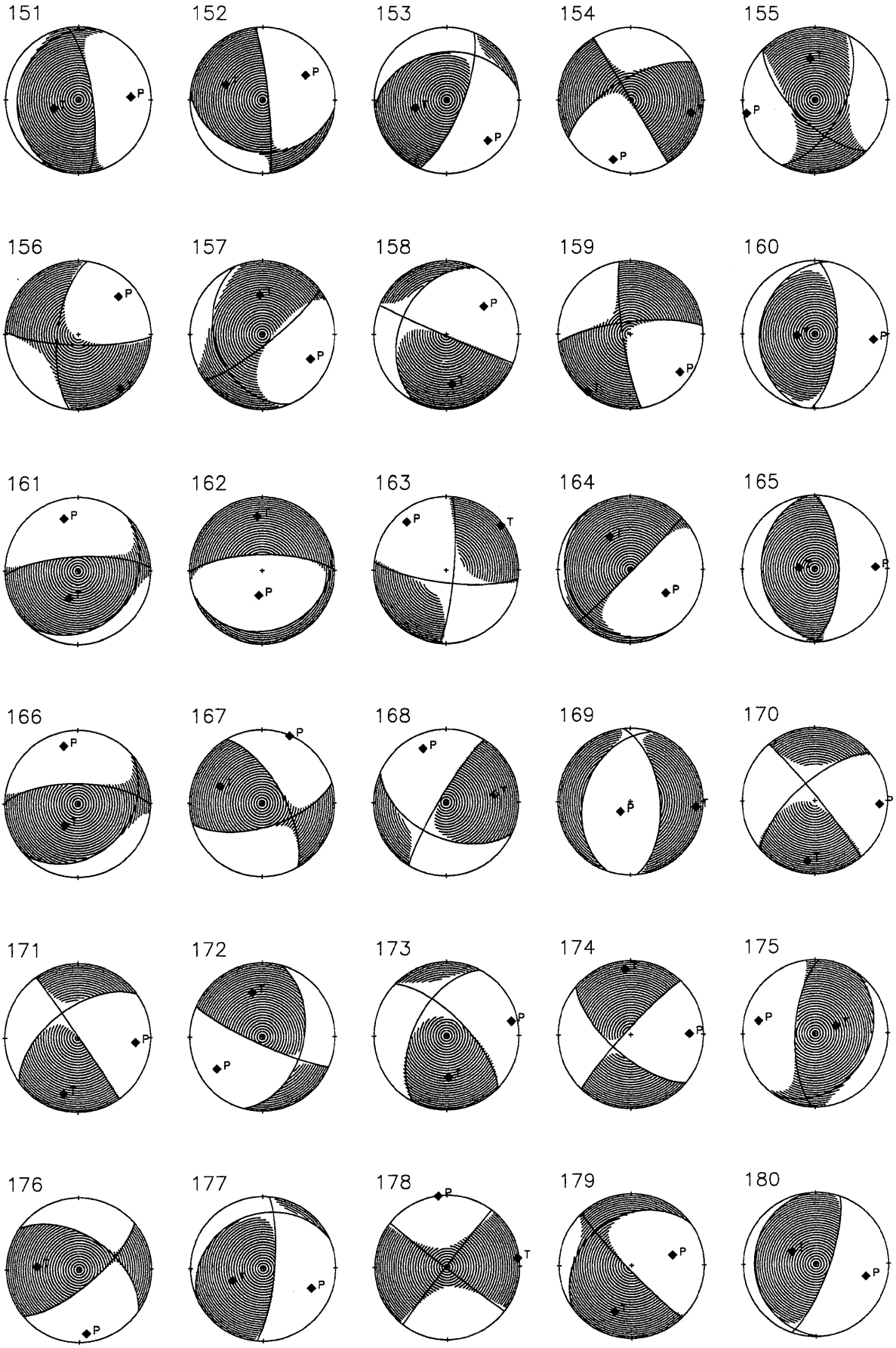

Fig. 3: Estimated moment tensors plotted to the lower hemisphere (continued).

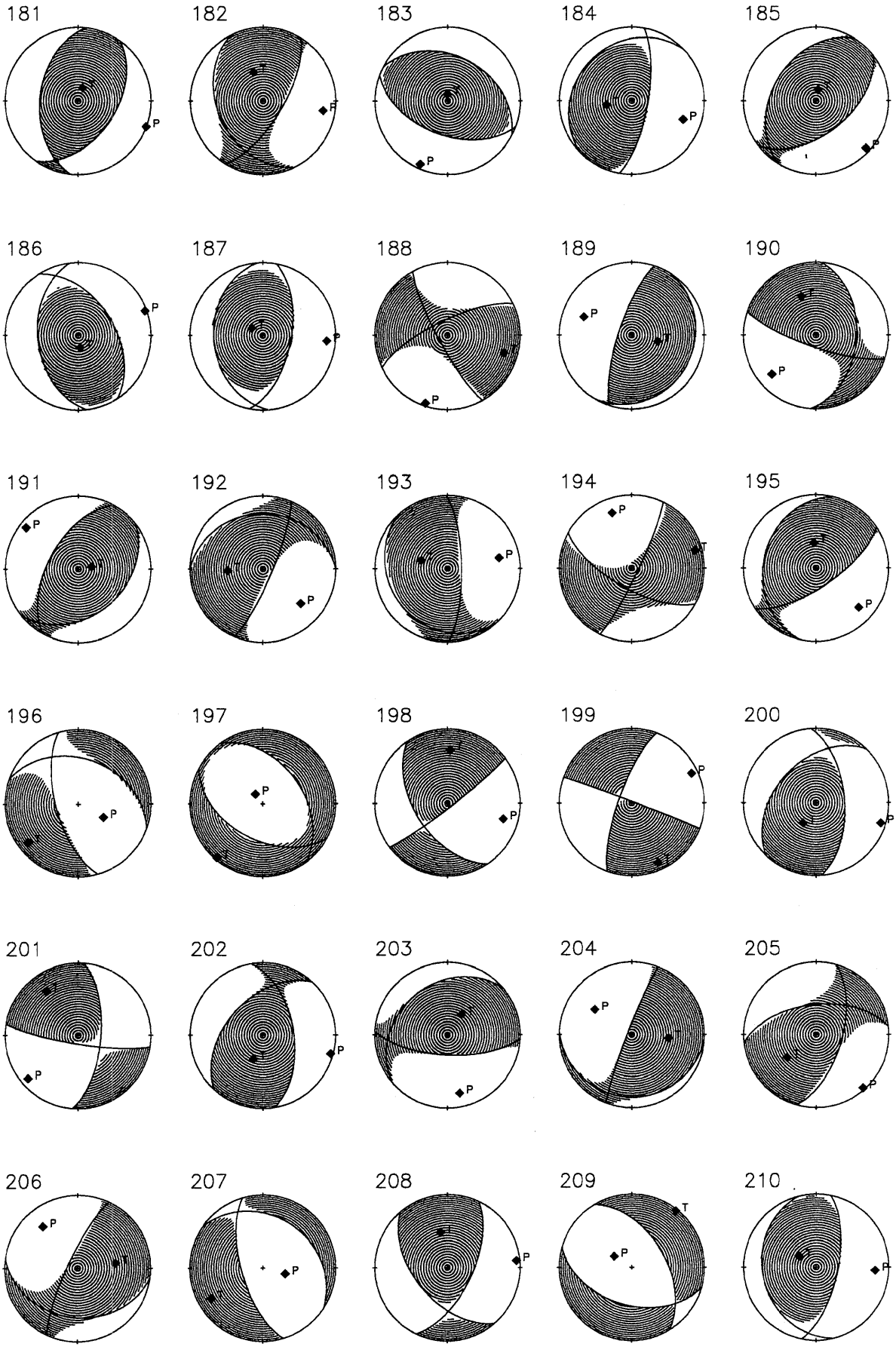

Fig. 3: Estimated moment tensors plotted to the lower hemisphere (continued).

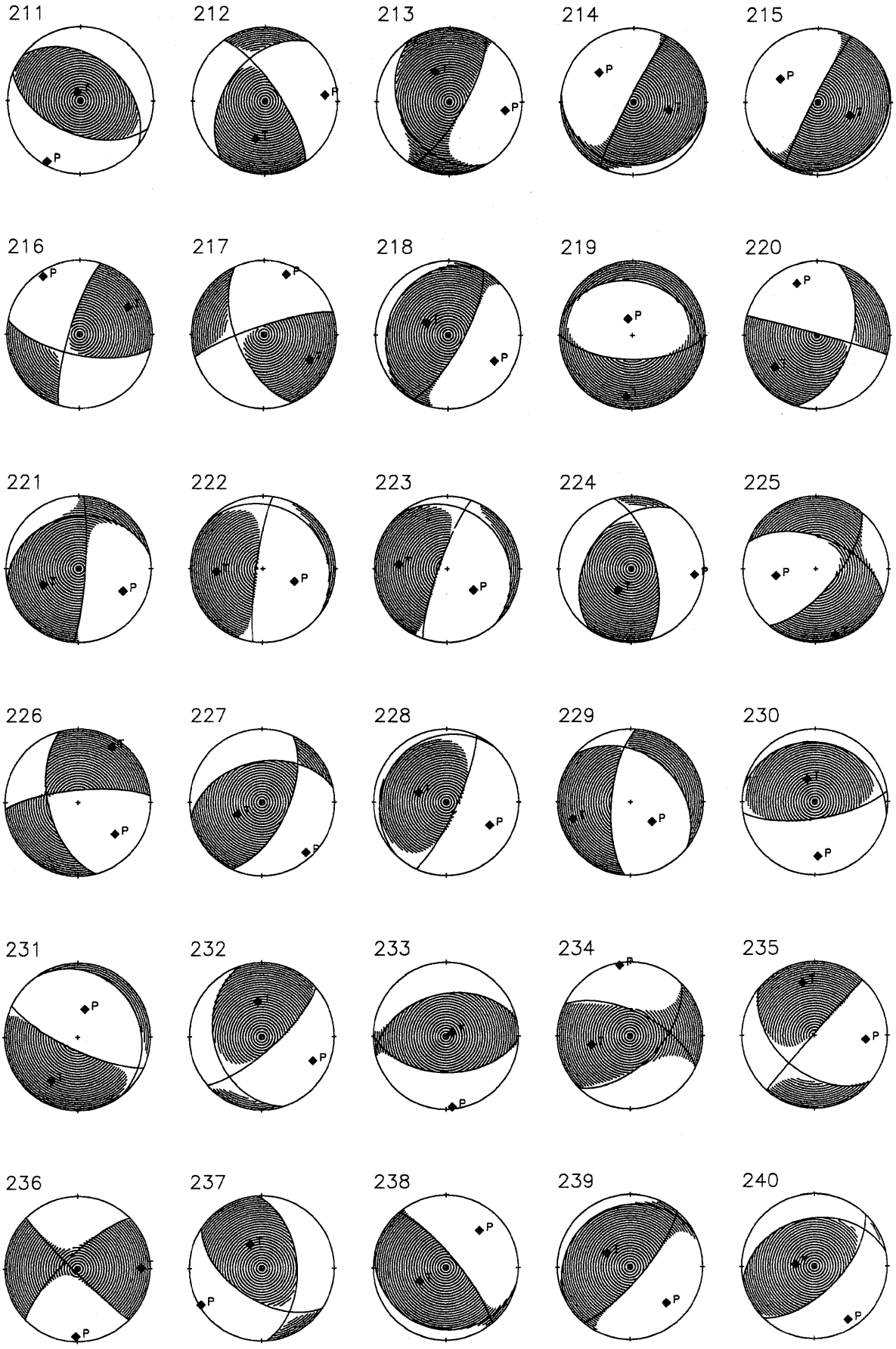

Fig. 3: Estimated moment tensors plotted to the lower hemisphere (continued).

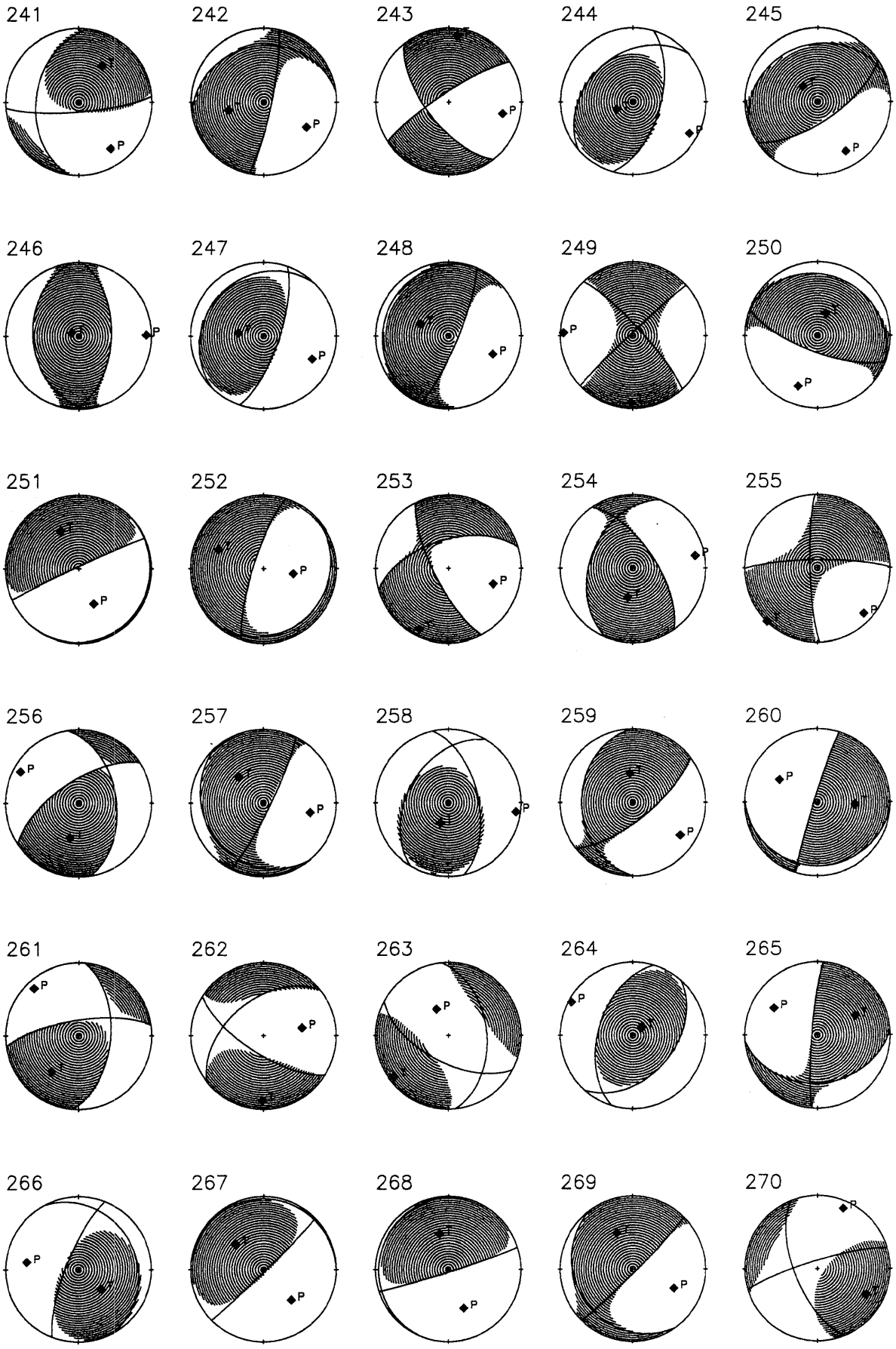

Fig. 3: Estimated moment tensors plotted to the lower hemisphere (continued).

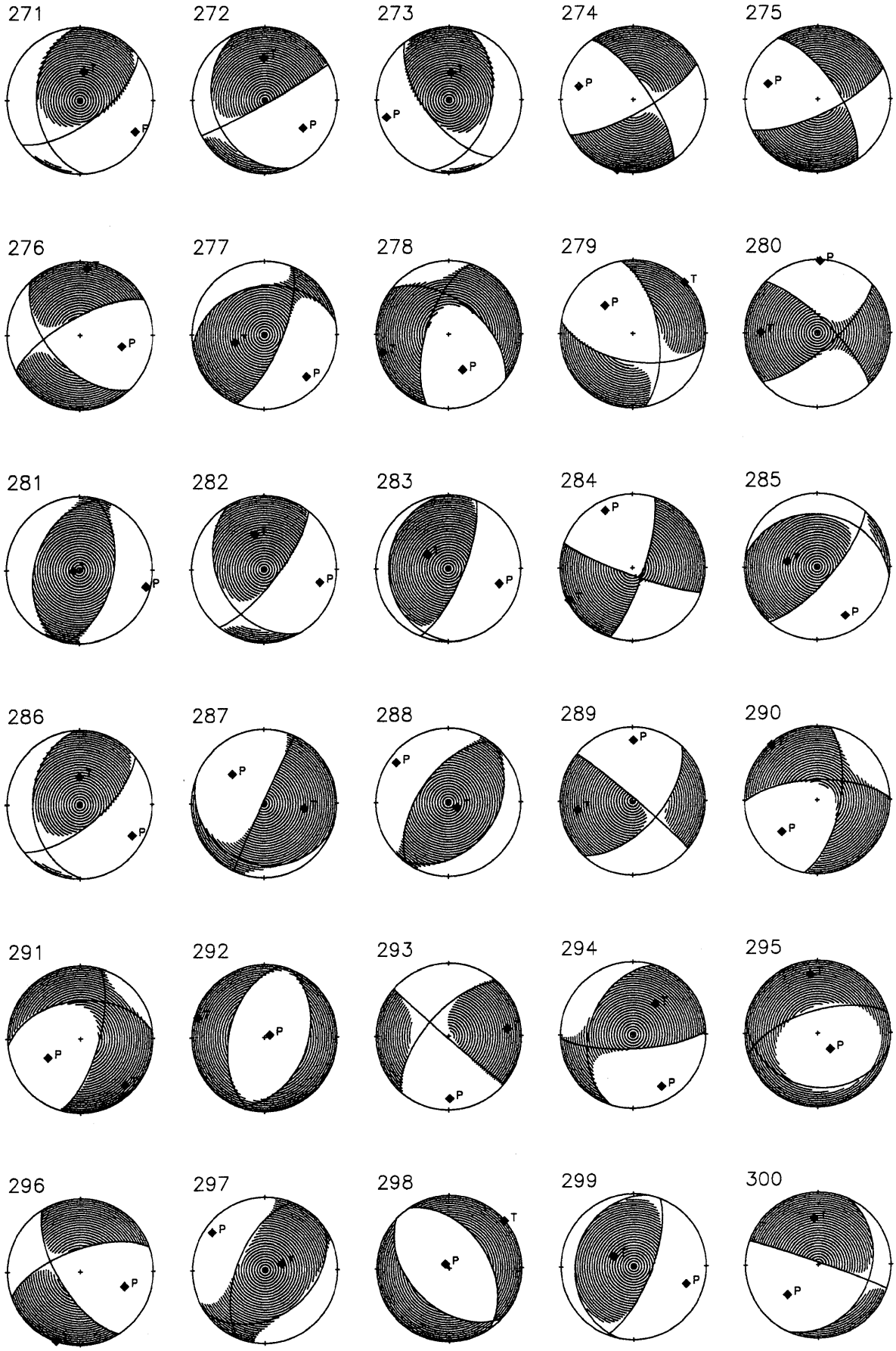

Fig. 3: Estimated moment tensors plotted to the lower hemisphere (continued).

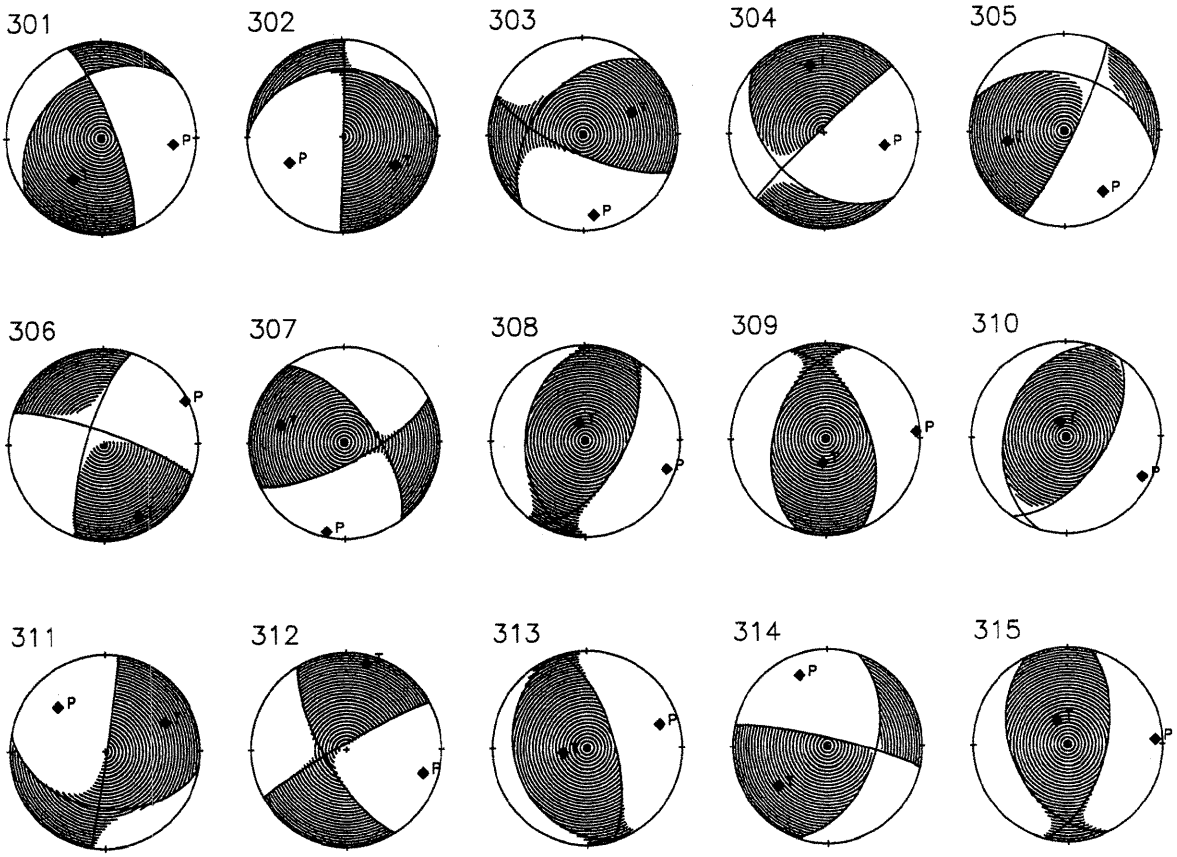

Fig. 3: Estimated moment tensors plotted to the lower hemisphere (continued).