

NIED Seismic Moment Tensor Catalogue January-December, 1998 (Revised)

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NIED Seismic Moment Tensor Catalogue January – December, 1998 (Revised)

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Abstract

We have routinely estimated the moment tensors of earthquakes occurring in and around Japanese islands. As for all the moment tensor solutions of earthquakes occurring in 1998, we have already published as “NIED Moment Tensor Catalogue January – December, 1998” (Fukuyama et al., 1999). This report is the revision of Fukuyama et al. (1999). The major improvement is that in the previous report we have used the Japan Meteorological Agency (JMA) emergency intensity notification as hypocentral data, and in this report the hypocenters are based on the unified hypocenter catalog (the Seismological and Volcanological Bulletin of Japan) maintained by JMA. This tremendously increases the number of solutions (from 284 to 592). Here we have added new solutions to the previous catalogue as well as we re-examined the previous solutions. 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, now called the Ministry of Education, Culture, Sports, Science and Technology). We mainly used STS-1 broadband seismometer records. VSE311/VSE355 strong motion velocity-meter was additionally used in cases when STS-1 waveforms were unavailable. 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 catalogue missed several earthquakes that had been detected by JMA.

Key words: Seismic moment tensor, Earthquake catalogue

1. Introduction

This report is the revision of the previous report of the NIED seismic moment tensor catalogue in 1998 (Fukuyama et al., 1999). The major improvement is that this catalogue used the unified hypocenter catalog of Hi-net, University group, and Japan Meteorological

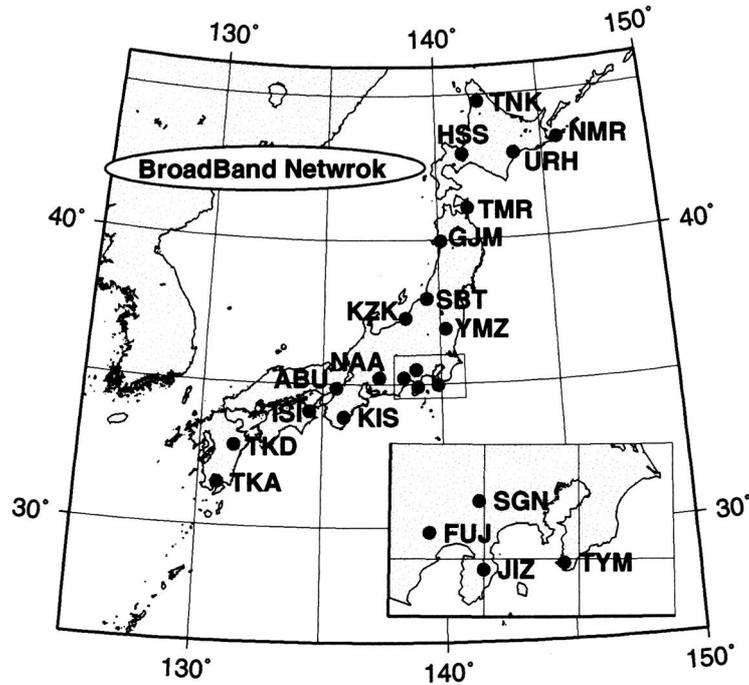


Fig. 1: Broadband station distribution used in the analysis.

Agency (JMA) data maintained by JMA (Japan Meteorological Agency, 1998). This makes the number of estimated moment tensors twice (from 284 to 592). Because of a plenty of moment tensor solutions appended to the catalogue, we decided to show all the moment tensors as a single volume whose earthquake occurred in 1998. This makes the quality of the catalogue equivalent to those already published (Fukuyama et al., 2000a; 2000b; 2001).

2. Method

Below is a brief description of the method used here to determine seismic moment tensors and their centroid depths. Fukuyama et al. (1998) described the method and it would be helpful to refer to this in more details. All the informations concerning this catalogue as well as the updated information are also displayed at the World Wide Web page¹.

Moment tensor analysis is based on the unified hypocenter catalog (Japan Meteorological Agency, 1998). The following information is used from the catalog: origin time (in minutes), epicentral location (in 0.1 degree), depth (in 10km) and magnitude. We have analyzed the earthquakes whose magnitude was greater than 3.5 in the unified catalog. Of course the unified catalog includes more accurate information, however, we did not use them but we keep the same quality of information that we routinely employed. Note that this procedure never affects the final results because we use long period waveforms observed at distant stations.

All the stations used in this analysis are shown in Fig. 1 and Table 1. Three stations at

¹<http://argent.geo.bosai.go.jp>

Table 1: Locations of stations used in the analysis.

Station Name	Station Code	Latitude ($^{\circ}N$)	Longitude ($^{\circ}E$)	Height (m)	Cooperative Organization	Funding Project
Abuyama	ABU	34.8603	135.5734	138	Kyoto U.	KIBAN
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
TsuruSugeno	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
Urahoru	URH	42.9270	143.6746	75	Hokkaido U.	KIBAN
Yamizo	YMZ	36.9241	140.2479	555	Tohoku U.	KIBAN

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 basically 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 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 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 the unified hypocenter catalog, three stations are chosen automatically to prepare the waveform dataset. Using these waveforms, a moment tensor inversion is conducted with several trial depths within ± 30 km of 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

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

Magnitude range	Epicentral Dist. (<i>km</i>)	Frequency range (<i>Hz</i>)	Data length (<i>seconds</i>)
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

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							

to variance reduction (*VarRed*) defined as follows:

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

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 centroid location misfit. As shown in Fukuyama et al. (1998), the shape of Green's function does not change for slightly different distance, so that the above procedure works.

3. Results

The results are shown in Table 4, Figs. 2 and 3. In Table 3, 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

Table 4: Velocity structure for Green's functions.

Depth (<i>km</i>)	Thickness (<i>km</i>)	P Velocity (<i>km/s</i>)	S Velocity (<i>km/s</i>)	Density (<i>kg/m³</i>)	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, showing 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, the moment tensors are shown with their epicentral locations. The numerals appearing above each focal mechanism 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.

4. Conclusion

We have estimated 592 seismic moment tensors and their centroid depths by using FREESIA /KIBAN broadband waveforms.

Acknowledgments

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City, Japan Marine Science and Technology Center, and Japan Meteorological Agency.

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NIED 地震モーメントテンソルカタログ

1998年1月－12月(改定版)

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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。1998年に発生した地震のモーメントテンソル解に関しては、すでに「NIED 地震モーメントテンソルカタログ 1998年1月-12月」(Fukuyama et al., 1999)として出版済みである。本報告はFukuyama et al. (1999)の改定版である。一番の改善点は、前回の報告においては気象庁の緊急震度情報にある震源情報を用いていたのに対し、本報告では、気象庁一元化震源情報に基づいて解析を行った。これにより、解析した地震数が284個から592個へとほぼ2倍に増加した。ここでは、新しく解析した地震とともに前回の報告で掲載した地震もカタログに再掲している。解析は防災科学技術研究所及び科学技術庁(現文部科学省)により整備された広帯域地震観測網のデータを用いて行った。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(一部はその後継機種種のVSE355型に置き換えられている)を用いた。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	M0(Nm)	VarRed	Region_name	Str1	Dip1	Rak1	Str2	Dip2	Rak2	Mxx	Mxy	Mxz	Myy	Myz	Mzz	used Stations
1	1998/01/02,15:29	42.4	144.7	25	4.2	1.91e15	76.05	SE off Tokachi District	25	76	69	263	25	146	-0.3373	0.3940	0.2690	-0.0893	-0.7906	0.4266	NMR HSS
2	1998/01/02,17:09	33.0	137.1	33	4.1	1.58e15	83.13	far S off Tokai District	300	76	139	42	50	19	-0.9934	0.1896	-0.4585	0.5958	-0.2523	0.3766	NAA HSS
3	1998/01/02,18:54	42.6	139.1	31	3.9	3.39e14	84.61	SW off Hokkaido	21	58	105	174	36	67	0.4064	0.1270	0.2743	-0.9163	0.8699	0.2523	NAA GJM
4	1998/01/02,18:20	42.9	145.5	47	5.0	3.69e16	58.47	off Nemuro peninsula	31	63	71	249	33	123	-0.4547	0.4804	0.1575	-0.3028	0.7574	0.8015	HSS NMR
5	1998/01/03,18:42	41.9	142.8	50	4.0	1.03e15	76.58	S off Urakawa	33	68	94	203	22	81	-0.2784	0.4238	0.4122	-0.5231	0.8729	0.8015	HSS HSS
6	1998/01/03,18:42	43.3	147.4	47	4.3	3.71e15	82.94	E off Hokkaido	57	61	86	246	30	98	-0.2523	0.3351	0.4122	-0.3195	0.8729	0.8015	NMR HSS
7	1998/01/08,02:11	28.1	130.7	32	4.9	2.32e16	80.44	near Amami-Oshima island	209	92	72	31	34	40	0.4646	0.0974	0.2336	-0.0974	-0.5620	0.8330	NAA SGN
8	1998/01/08,14:46	37.8	137.7	35	4.0	1.01e15	85.33	Sadogahama is reg	182	59	122	18	38	37	-0.1655	0.2714	0.1093	0.8495	-0.4592	-0.5707	FUJ KZK
9	1998/01/09,04:46	34.4	139.2	138	3.9	7.20e14	86.26	near Nijima island	157	66	122	18	38	37	-0.2515	-0.5353	-0.5353	-0.3498	-0.5707	0.8330	FUJ KZK
10	1998/01/09,12:08	38.1	140.4	5	4.0	1.28e15	86.30	southern Yamagata pref	157	66	122	18	38	111	-0.0935	-0.1011	0.3449	-0.6861	-0.5789	0.7796	FUJ KZK
11	1998/01/10,05:02	31.8	130.3	17	4.4	4.41e15	80.22	NW Kagoshima pref	194	85	173	285	83	5	0.4604	-0.8652	-0.1134	-0.4996	0.0892	0.0892	TKA TKD
12	1998/01/11,15:25	43.5	140.7	161	4.8	1.57e16	88.50	Ishikari bay region	161	68	-99	3	23	-69	-0.1199	0.1483	-0.2658	0.7380	-0.6687	-0.6181	HSS TKD
13	1998/01/12,05:51	33.0	136.8	291	8.7	1.96e15	65.71	SE off Kii peninsula	291	87	-151	199	61	-3	-0.5711	0.6323	0.4942	0.5674	0.0839	0.0037	HSS NAA
14	1998/01/13,17:43	39.1	139.6	195	6.6	1.05e15	69.70	W off Yamagata pref	319	66	66	63	33	133	-0.3730	0.3678	0.1162	-0.8687	0.6908	0.7017	GJM SBT
15	1998/01/13,17:43	35.6	140.3	71	4.9	2.28e16	80.02	central Chiba pref	319	88	-24	50	66	-178	0.1935	0.1473	0.2498	-0.5865	0.5210	0.9230	FUJ KZK
16	1998/01/15,03:30	42.3	143.0	53	3.8	5.39e14	89.79	Hidaka mountains region	58	68	104	201	26	60	-0.2441	0.3327	0.6283	-0.4793	-0.3081	0.7234	HSS HSS
17	1998/01/15,14:11	43.5	147.5	80	4.7	1.41e16	86.47	E off Hokkaido	58	69	100	213	23	67	-0.3328	0.3998	0.6418	-0.3093	-0.3485	0.6421	NMR HSS
18	1998/01/15,14:11	43.5	147.5	80	4.7	1.41e16	86.47	E off Hokkaido	58	69	100	213	23	67	-0.3328	0.3998	0.6418	-0.3093	-0.3485	0.6421	NMR HSS
19	1998/01/16,01:58	35.2	140.3	5	3.8	5.36e15	86.36	Kujukuri coast Boso pen	177	79	-150	272	60	-12	0.2612	-0.8460	0.0689	-0.9590	0.4765	0.4765	NIZ SGN
20	1998/01/16,16:57	34.1	135.3	177	6.1	9.52e14	87.80	NW Wakayama pref	177	61	95	346	29	80	-0.0921	-0.1162	-0.0218	-0.2641	0.5454	0.5454	FUJ KIS
21	1998/01/17,16:16	35.6	130.0	11	4.1	1.84e15	89.16	sea of Japan	195	81	164	87	75	10	0.4768	-0.8070	-0.2358	-0.5298	-0.2100	0.0530	HSS TKD
22	1998/01/20,08:38	41.5	141.3	92	4.0	1.08e15	53.45	Tsugaru Strait region	351	89	-80	90	10	-172	0.2283	0.1290	0.0962	-0.0917	0.9849	-0.1366	HSS GJM
23	1998/01/20,11:24	33.3	140.7	56	4.5	5.88e15	69.56	E off Hachijojima island	344	77	56	236	36	158	-0.2847	0.3609	-0.2847	-0.6503	-0.6874	0.3546	SGN TYM
24	1998/01/20,15:21	43.6	146.8	50	5.7	3.76e17	90.44	E off Hokkaido	51	58	83	245	32	101	-0.6388	0.3818	0.3053	-0.3373	0.9034	0.9034	TKN TYM
25	1998/01/21,20:11	36.5	140.6	53	3.7	3.71e14	72.39	northern Ibaraki pref	25	70	98	183	21	69	-0.0701	0.1186	0.3798	-0.5911	-0.6693	0.6612	SGN YMZ
26	1998/01/22,20:53	34.1	139.1	52	5.8	3.60e14	85.63	near Nijima island	52	58	99	195	37	-120	0.1968	-0.5200	0.4225	0.6158	-0.1317	-0.8125	FUJ SGN
27	1998/01/23,21:32	34.2	135.1	50	3.8	8.99e14	85.69	NW Wakayama pref	212	51	118	352	47	60	0.0273	0.2084	-0.3887	-0.9140	-0.1022	0.8868	ISI KIS
28	1998/01/23,23:39	43.5	147.0	50	4.8	1.62e16	89.43	E off Hokkaido	262	81	-77	27	16	-144	0.2573	0.2626	0.9177	-0.4040	-0.3022	0.8668	SGN YMZ
29	1998/01/26,02:16	35.9	139.6	20	3.8	1.96e14	62.02	eastern Saitama pref	259	74	108	30	24	44	-0.4466	0.4221	-0.7828	-0.0190	0.1192	0.4656	SGN KZK
30	1998/01/27,16:19	35.9	141.5	62	4.1	1.45e15	74.12	far E off Ibaraki pref	9	87	77	267	14	167	-0.0033	0.2259	0.1720	-0.0643	-0.9510	0.0676	SGN HSS
31	1998/01/29,07:44	41.0	140.2	170	3.9	9.13e14	82.45	Tsugaru peninsula region	50	77	-162	315	72	-14	1.0774	0.0730	-0.0868	-0.8069	-0.2705	-0.2705	TMR HSS
32	1998/01/30,15:50	41.4	142.1	62	5.6	2.45e17	74.96	E off Aomori pref	26	71	87	111	19	98	-0.1510	0.2739	0.3287	-0.4658	-0.7124	0.6124	GJM HSS
33	1998/01/31,00:48	44.6	142.1	8	4.1	1.48e15	75.31	Soya region	26	68	111	135	30	48	-0.0902	-0.3435	0.0905	-0.7025	-0.6656	0.6124	HSS TMR
34	1998/02/01,02:42	43.6	147.2	285	50	8.44	58	E off Hokkaido	229	50	84	58	41	97	-0.6396	0.3079	-0.0607	-0.4078	0.1706	1.0473	NMR GJM
35	1998/02/01,06:46	40.6	143.0	26	4.7	1.08e16	87.40	E off Aomori pref	285	62	-112	146	35	-55	-0.5692	0.5079	0.5320	-0.1832	-0.4580	-0.7523	GJM GJM
36	1998/02/04,11:34	41.9	142.3	59	4.6	9.90e15	69.80	S off Urakawa	20	68	73	240	28	127	-0.2046	-0.4862	0.1683	-0.4215	-0.6640	0.6261	HSS NMR
37	1998/02/05,06:35	46.0	142.6	34	4.0	1.16e15	72.25	south Sakhalin	320	49	66	174	46	115	-0.0701	-0.3986	-0.2851	-0.8277	0.0578	0.8978	HSS NMR
38	1998/02/05,10:48	43.2	145.8	44	5.0	4.08e16	84.19	off Nemuro peninsula	54	85	-112	316	22	-9	0.4214	0.1192	-0.7083	-0.2899	-0.5986	-0.1316	HSS TNK
39	1998/02/05,20:23	42.0	142.3	47	3.7	4.05e14	83.23	S off Urakawa	170	85	-49	266	41	-172	0.2263	0.6395	-0.0786	-0.0881	-0.7385	-0.1361	HSS HSS
40	1998/02/06,03:01	35.4	140.5	26	5.2	7.50e16	82.36	SE off Aomori	46	57	95	217	33	82	-0.3814	0.4859	0.3231	-0.5095	-0.2339	0.8909	NMR HSS
41	1998/02/06,05:40	33.6	141.2	53	3.2	3.71e14	66.65	Kujukuri coast Boso pen	65	76	93	233	14	78	-0.3638	0.2521	-0.8021	-0.0771	-0.3617	0.4409	JIZ SGN
42	1998/02/06,11:43	35.1	135.4	8	3.4	1.41e14	75.85	E off Hachijojima island	213	60	135	330	52	39	0.6383	0.0783	-0.2253	-1.1711	0.1407	0.6328	FUJ JIZ
43	1998/02/06,12:22	41.1	143.3	35	4.2	2.15e15	84.38	mid Kyoto pref	283	69	233	185	68	158	0.1910	0.7889	-0.4676	-0.3297	0.3253	0.1387	ISI SGN
44	1998/02/07,02:43	35.9	142.0	11	4.8	1.99e16	65.46	far E off Ibaraki pref	48	80	109	165	21	29	-0.1353	0.2074	0.6932	-0.4530	-0.5584	0.3177	GJM GJM
45	1998/02/08,18:17	36.1	141.9	20	4.3	2.98e15	66.87	far E off Ibaraki pref	126	81	-112	16	24	-22	-0.1736	0.2270	-0.7577	-0.4686	-0.4560	-0.2949	KZK KZK
46	1998/02/09,16:03	36.5	140.6	53	3.3	1.10e14	66.14	northern Ibaraki pref	40	90	-117	149	27	-1	-0.3298	0.3963	0.6694	-0.2521	-0.6283	-0.0777	SGN YMZ
47	1998/02/09,16:20	35.7	137.1	8	4.1	6.35e15	92.57	SE Gifu pref	334	85	22	242	68	175	-0.7029	0.5333	-0.2003	-0.8172	-0.6884	0.4578	SGN SGN
48	1998/02/11,14:34	31.9	132.2	56	5.0	3.56e16	81.14	S off Urakawa	21	82	81	228	20	116	-0.1489	0.3288	0.2408	-0.4226	-0.7571	0.5715	HSS HSS
49	1998/02/12,23:16	33.2	138.3	320	4.5	7.08e15	92.02	southern Miyazaki pref	146	87	134	238	44	4	0.6615	-0.2588	0.3448	0.6102	0.6414	0.0514	TKD ISI
50	1998/02/13,16:21	36.3	141.4	20	4.0	9.78e14	87.02	far E off Ibaraki pref	14	71	77	231	23	124	-0.0403	0.3863	0.1598	-0.4941	-0.7588	0	

Table 5: Estimated moment tensors (continued).

No.	Origin Time(UT)	Lat(N)	Lon(E)	D(km)	Mw	M0(Nm)	VarRed	Region name	Str1	Dip1	Raki	Str2	Dip2	Rak2	Mxx	Mxy	Mxz	Myx	Myy	Mzz	used Stations
71	1998/02/26:01:44	35.7	141.2	26	4.2	2.62e15	81.07	near Choshi city	203	85	7	112	83	174	-0.6171	0.6974	0.0610	0.7702	0.1874	-0.1531	KZK SGN YMZ
72	1998/02/26:06:56	35.4	140.4	35	3.8	2.62e15	79.92	Kujukuri coast Boso pen	68	75	106	199	22	43	-0.2338	0.3928	0.7934	-0.2079	0.2701	-0.4417	JIZ SGN YMZ
73	1998/02/26:13:20	29.6	130.4	65	4.1	1.79e15	77.81	near Amami-Oshima island	16	77	44	274	47	163	-0.3898	0.0654	0.0554	0.0797	-0.9305	0.3102	TKD YMZ KZK
74	1998/02/27:02:05	36.2	141.4	23	4.2	3.09e15	71.35	far E off Ibaraki pref	252	86	110	152	20	-11	0.2529	0.2944	0.0265	-0.1915	-0.3745	-0.1694	SGN HSS
75	1998/02/27:08:56	42.4	145.8	23	4.4	2.31e15	56.33	off Nemuro peninsula	49	78	122	156	37	21	0.3451	0.1597	0.7861	-0.6925	-0.3127	-0.3474	NMR HSS
76	1998/02/27:18:56	43.2	147.1	29	4.6	1.81e15	70.47	E off Hokkaido	82	65	101	237	27	67	-0.4852	0.2272	0.6535	-0.3589	0.2065	-0.8096	NMR
77	1998/02/28:17:39	33.5	138.5	300	5.7	4.62e17	76.86	far S off Tokai District	341	80	-41	79	50	-167	0.6178	0.5660	-0.1170	-0.3589	0.7387	-0.1263	JIZ FUJ KIS
78	1998/03/01:20:51	40.2	142.5	42	3.9	9.24e14	79.68	NE off Iwate pref	22	72	97	181	19	70	-0.0177	0.1198	0.3417	-0.5755	-0.7266	0.5932	FUJ HSS
79	1998/03/02:11:11	43.2	147.2	34	4.7	1.07e16	92.01	E off Hokkaido	242	89	-123	152	33	-1	0.4792	0.2749	0.7646	-0.4682	-0.0110	-0.0110	TMR HSS
81	1998/03/02:11:58	29.9	130.6	47	5.2	7.45e16	73.59	near Amami-Oshima island	207	70	78	58	24	119	-0.2868	0.3819	-0.2803	-0.3460	0.6869	0.6363	TKA TKD
82	1998/03/02:15:02	29.9	130.6	56	4.0	1.02e15	80.75	near Amami-Oshima island	205	74	84	177	109	109	-0.1992	0.3215	-0.3275	-0.3460	0.7787	0.5452	TKD TKD
83	1998/03/02:23:30	31.8	130.3	11	3.9	7.28e14	95.20	NW Kagoshima pref	103	87	94	193	83	-177	0.3832	0.2933	-0.1136	-0.4717	0.0945	0.0879	TKD TKD
84	1998/03/03:00:19	42.6	144.1	62	4.1	1.87e14	92.51	S off Tokachi	69	77	92	244	19	86	-0.5124	0.2144	0.7319	-0.1229	-0.2764	0.6354	HSS
85	1998/03/03:07:39	31.9	130.3	8	4.0	9.07e14	96.75	NW Kagoshima pref	201	76	30	193	61	164	0.3861	-0.6850	-0.5322	-0.5605	0.0910	0.1744	TKD TKD
86	1998/03/03:21:02	34.9	135.4	5	3.8	5.02e14	74.09	SE off Iwate pref	245	77	143	159	54	16	0.5471	-0.4032	-0.4345	-0.7626	0.4090	0.2151	ISL NAA
87	1998/03/05:21:44	33.9	135.6	5	3.8	7.28e14	73.59	NE Ehime pref	245	59	132	159	56	39	0.3368	0.5345	0.5345	-0.9083	0.0772	0.5718	ISL NAA
88	1998/03/08:21:53	38.1	147.3	30	3.3	7.72e15	79.57	E off Iwate pref	266	74	-132	161	48	-22	0.5349	0.6896	0.5509	-0.1286	0.1041	-0.4063	GJM TMR
89	1998/03/08:00:02	38.1	147.3	35	4.3	3.74e15	91.57	Kazusan region	26	70	90	205	20	89	-0.1255	0.2397	0.3353	-0.5236	-0.6903	0.6491	SGN YMZ
90	1998/03/08:04:46	36.1	139.8	53	4.5	1.98e15	91.61	SW Ibaraki pref	52	71	83	253	20	110	-0.4828	0.2630	0.6020	-0.1148	-0.5167	0.5977	KZK SGN
91	1998/03/10:05:32	35.8	140.2	77	3.7	4.30e14	78.98	northern Chiba pref	344	71	85	180	20	105	0.3010	-0.2142	-0.2052	-0.7570	-0.7493	0.4560	SGN FUJ
92	1998/03/11:19:27	37.7	142.3	32	4.9	2.70e16	91.46	SE off Miyagi pref	47	61	136	158	50	31	0.3772	0.2845	0.5888	-0.8687	-0.0953	0.4915	YMZ GJM
93	1998/03/11:20:52	37.3	141.9	35	4.2	2.24e15	82.68	E off Fukushima pref	71	67	106	221	33	63	-0.5966	0.4695	0.5203	-0.1911	-0.0558	0.7878	YMZ GJM
94	1998/03/13:15:03	36.9	141.8	26	3.8	5.09e16	78.86	E off Fukushima pref	129	55	102	289	36	74	-0.7176	-0.4332	0.2003	-0.1852	0.2996	0.9028	KZK KZK
95	1998/03/14:11:46	37.2	143.0	14	5.0	3.09e16	80.33	far E off Fukushima pref	19	56	86	207	34	96	-0.0511	0.3917	0.0992	-0.8180	-0.3674	0.8691	YMZ SBT
96	1998/03/16:23:03	37.0	141.3	50	4.6	8.25e15	94.59	E off Fukushima pref	32	68	89	214	22	92	-0.2489	0.3271	0.3725	-0.4846	-0.6103	0.7336	GJM KZK
97	1998/03/17:07:52	36.0	141.1	14	3.9	7.61e14	65.20	E off Ibaraki pref	354	69	59	234	37	144	0.4041	-0.2489	-0.2990	-0.6169	-0.6283	0.5768	SGN YMZ
98	1998/03/19:02:54	43.2	147.4	62	4.8	1.63e16	77.87	E off Hokkaido	279	85	104	28	15	19	-0.2389	0.2015	-0.9409	0.0788	-0.1673	0.1601	NMR GJM
99	1998/03/21:14:01	37.6	143.0	20	3.6	3.12e14	62.21	far E off Fukushima pref	24	49	98	193	41	81	0.1070	0.3596	0.1201	-0.9353	-0.1018	0.9183	GJM GJM
100	1998/03/22:01:02	37.4	143.0	14	4.4	4.87e15	85.06	far E off Fukushima pref	26	66	92	200	24	85	-0.0123	0.3341	0.2982	-0.6642	-0.5965	0.6765	YMZ SBT
101	1998/03/23:09:37	36.4	141.2	35	5.4	1.28e17	83.07	E off Ibaraki pref	5	87	75	263	16	167	0.1466	0.3038	0.1594	-0.1719	-0.9459	0.0253	KZK SGN
102	1998/03/23:19:18	35.9	137.7	20	4.2	1.17e15	84.96	western Kagano pref	174	83	-10	262	80	-173	0.1606	0.2912	0.1122	-0.0842	0.1908	0.0139	SGN YMZ
103	1998/03/26:02:33	43.3	147.1	52	5.1	5.99e15	86.59	E off Hokkaido	277	78	-72	259	96	-132	0.6694	0.3673	0.7219	-0.5852	-0.5852	0.5852	NMR
104	1998/03/26:08:00	37.5	143.1	17	4.4	4.79e15	86.59	far E off Fukushima pref	27	58	94	216	32	82	-0.0545	0.3857	0.2194	-0.7851	-0.3843	0.8402	YMZ SBT
105	1998/03/26:10:08	37.5	143.0	20	4.7	4.06e14	89.09	far E off Fukushima pref	27	57	84	216	32	99	0.2044	0.4392	0.1266	-0.6845	-0.3841	0.8891	YMZ SBT
106	1998/03/26:18:36	37.3	143.0	17	4.1	3.98e15	81.54	far E off Fukushima pref	20	63	93	199	27	84	-0.0233	0.3611	0.2793	-0.7142	-0.5421	0.7375	YMZ SBT
107	1998/03/26:18:36	37.3	143.0	20	4.7	1.58e15	81.54	far E off Fukushima pref	20	63	93	203	27	92	0.0000	0.3438	0.1935	-0.7485	-0.5447	0.7484	YMZ SBT
108	1998/03/27:05:02	37.5	143.2	14	4.2	1.08e15	79.96	far E off Fukushima pref	25	55	95	196	36	83	-0.0240	0.3395	0.1726	-0.8693	-0.2837	0.8732	YMZ SBT
109	1998/03/27:08:02	37.5	143.9	14	4.0	1.08e15	79.96	far E off Fukushima pref	25	57	93	197	33	85	-0.0240	0.3395	0.1723	-0.8403	-0.2837	0.8732	YMZ SBT
110	1998/03/27:08:30	31.9	130.4	17	4.4	4.20e15	62.45	NW Kagoshima pref	259	84	-9	349	81	-174	-0.4343	-0.9061	0.1991	0.3051	0.0957	0.1292	TKA TKD
111	1998/03/27:20:19	37.6	143.0	14	3.8	5.34e14	79.99	far E off Fukushima pref	5	65	78	211	28	114	0.0259	0.2698	-0.0112	-0.7476	0.6257	0.7217	SBT GJM
112	1998/03/28:11:37	33.3	132.4	35	4.0	9.65e14	89.33	Bungo channel	61	51	-87	237	40	-93	0.7017	-0.3359	-0.1845	0.3535	0.0622	-1.0552	ISI SBT
113	1998/03/28:14:50	36.7	140.9	23	3.9	9.30e14	79.47	E off Ibaraki pref	60	74	81	217	19	119	-0.0898	0.1993	0.0338	-0.4668	-0.8323	0.5565	KZK SGN
114	1998/03/28:17:44	43.4	146.8	23	4.1	1.67e15	90.59	E off Hokkaido	279	79	102	157	21	-34	0.0947	0.2046	0.8179	-0.3085	-0.4041	0.4032	NMR KZK
115	1998/03/29:15:36	36.4	141.1	41	3.8	5.69e14	88.94	E off Ibaraki pref	279	79	-108	157	21	-34	0.2653	0.3351	0.8773	-0.1115	0.0731	-0.3768	SGN YMZ
116	1998/03/30:01:04	37.3	143.0	14	3.7	4.42e16	81.66	far E off Fukushima pref	23	60	84	215	30	100	-0.1352	0.4287	0.1651	-0.6804	-0.4761	0.8156	YMZ GJM
117	1998/03/30:04:56	37.3	143.0	11	3.7	4.46e14	65.45	far E off Fukushima pref	28	57	99	191	34	76	-0.1073	0.3382	0.2489	-0.8439	-0.3171	0.8612	YMZ GJM
118	1998/03/31:15:37	41.0	142.0	50	3.7	3.80e14	60.75	far E off Aomori pref	30	70	116	155	33	40	0.2923	0.1063	0.4045	-0.8436	-0.5349	0.5513	TMR GJM
119	1998/04/01:06:11	37.8	142.6	35	3.7	3.51e14	74.02	far E off Fukushima pref	22	53	113	167	43	63	-0.1872	0.1040	0.2572	-1.0334	-0.1500	0.8462	YMZ GJM
120	1998/04/01:10:05	34.4	140.5	30	3.6	2.43e14	51.69	far S off Boso peninsula	330	77	44	228	48	162	0.5017	0.2553	-0.5583	-0.7706	-0.4220	0.2688	SGN KZK
121	1998/04/03:16:40	37.5	138.4	20	4.6	7.90e15	78.43	off S Niigata pref	34	57	94	207	34	85	-0.2159	0.4308					

Table 5: Estimated moment tensors (continued).

No.	Origin-time(UT)	Lat(N)	Lon(E)	D(km)	Mw	M0(Nm)	VarTcd	Region name	Str1	Dip1	Rak1	Str2	Dip2	Rak2	Mxx	Mxy	Mxz	Myy	Myz	Mzz	used Stations
141	1998/04/16,12:51	31.6	131.8	8	3.7	2.18e15	79.65	Huynanada region	181	90	-90	332	0	-119	0.0122	0.0028	0.0129	0.0040	-1.0021	-0.0161	TKD
142	1998/04/16,12:52	31.6	131.8	11	3.7	4.36e14	56.73	Huynanada region	32	87	10	136	0	14	0.1469	-0.0401	0.5261	-0.2407	0.8236	0.0939	TKD
143	1998/04/17,06:41	36.5	141.0	56	3.8	5.80e14	57.62	E off Ibaraki pref	274	62	142	24	58	34	0.5947	0.6382	-0.3212	0.0954	-0.4283	0.0939	SGN
144	1998/04/17,06:41	36.5	141.0	56	3.9	7.63e14	57.62	NW Kagoshima pref	284	87	21	193	69	177	0.4802	-0.8246	-0.3839	-0.3796	-0.4003	-0.1007	TKD
145	1998/04/17,18:27	33.7	134.0	26	3.9	8.55e14	76.90	SE Kochi pref	61	61	75	61	32	115	-0.4354	0.4659	-0.1743	-0.0353	0.5017	0.8165	ISI
146	1998/04/18,23:59	40.0	142.4	23	3.5	1.68e14	54.96	NE off lwate pref	116	88	91	177	2	71	-0.0724	0.0263	0.2836	-0.9019	-0.9576	0.1093	HSS
147	1998/04/19,09:40	39.8	138.7	11	4.5	6.44e15	86.90	E off Akita pref	196	46	86	23	45	94	0.0421	0.3367	0.0420	-0.9019	-0.9576	0.1093	KZK
148	1998/04/19,12:03	31.9	131.6	23	3.9	7.56e14	77.65	Huynanada region	190	73	-131	326	23	-131	-0.0241	0.1595	0.3277	-0.5963	-0.7605	-0.5722	TKA
149	1998/04/19,21:51	34.1	130.5	92	3.8	5.98e14	92.80	far S off Boso peninsula	73	70	-136	325	49	-26	0.7565	0.4441	-0.4479	0.3233	-0.4332	-0.4332	JIZ
150	1998/04/20,01:49	32.0	130.5	5	4.3	3.58e15	93.60	NW Kagoshima pref	266	72	38	9	54	-158	0.3013	0.8057	0.4690	0.1011	0.1115	-0.4024	TKA
151	1998/04/20,09:53	42.3	143.1	56	4.3	2.69e15	87.89	Hidaka mountains region	41	61	90	220	29	89	-0.3363	0.4654	0.3400	-0.4901	-0.3925	0.8263	HSS
152	1998/04/21,01:55	35.0	139.1	8	3.4	1.57e14	71.94	E off Izu peninsula	334	89	31	65	59	-179	0.6867	0.5597	0.2634	-0.6143	0.4487	-0.0724	FUJ
153	1998/04/21,04:58	37.4	141.2	68	4.5	6.35e15	80.62	E off Fukushima pref	180	55	119	316	44	55	0.0061	-0.4005	-0.2711	-0.8261	0.2982	0.8199	SGN
154	1998/04/21,05:11	35.0	139.1	8	3.7	4.17e14	88.69	E off Izu peninsula	187	89	26	66	64	174	0.7149	0.6373	0.3513	-0.5403	0.3463	-0.1746	FUJ
155	1998/04/21,09:16	35.0	139.2	8	3.6	2.85e14	89.08	E off Izu peninsula	339	84	-12	71	78	-174	0.7696	0.7555	0.0394	-0.4821	0.1613	-0.2876	FUJ
156	1998/04/21,10:27	34.9	139.2	5	4.4	4.41e15	95.70	E off Izu peninsula	328	70	-32	70	60	157	0.8644	0.5283	0.0306	-0.4645	0.4169	-0.4000	SGN
157	1998/04/21,11:10	35.0	139.2	5	3.7	3.40e14	92.05	E off Izu peninsula	329	87	-177	1.0082	4.728	1.454	0.7068	0.1388	-0.4000	-0.3443	-0.5318	-0.5318	NAA
158	1998/04/21,11:45	34.9	139.2	5	3.8	6.42e14	92.75	E off Izu peninsula	331	63	-88	81	57	-147	0.7718	0.6670	0.0485	-0.2200	0.3443	-0.5318	NAA
159	1998/04/21,12:31	35.0	139.2	5	3.5	2.19e14	89.09	E off Izu peninsula	51	82	169	142	80	8	0.9488	0.2211	0.2441	-0.9448	0.0028	-0.0039	SGN
160	1998/04/21,14:41	35.0	139.2	8	3.8	6.21e14	94.97	E off Izu peninsula	334	86	-176	85	73	-176	0.2796	0.9497	-0.0959	-0.0462	0.2992	-0.2334	SGN
161	1998/04/21,16:16	34.9	139.2	5	3.7	4.63e14	90.90	E off Izu peninsula	326	78	-23	61	68	-167	0.9782	0.4415	0.1018	-0.6626	0.2873	-0.3156	SGN
162	1998/04/21,19:41	34.9	139.2	5	4.2	2.56e15	95.74	E off Izu peninsula	355	81	-22	88	68	-171	0.2501	0.9357	0.0353	-0.0736	0.3050	-0.3228	NAA
163	1998/04/21,20:06	33.3	140.9	47	3.8	6.02e14	89.31	E off Hachiojima island	80	80	167	142	78	10	0.8558	0.1939	0.2139	-0.0439	-0.0145	0.1881	JIZ
164	1998/04/21,21:03	35.0	139.2	5	3.5	2.18e14	89.56	E off Izu peninsula	334	89	-22	64	68	-179	0.7672	0.5837	0.2107	-0.6694	0.3212	-0.0978	FUJ
165	1998/04/21,21:55	32.0	131.8	38	4.2	2.29e15	94.38	Huynanada region	210	82	-78	333	15	-147	-0.0750	0.0290	0.5187	-0.3729	-0.7850	-0.2980	TKD
166	1998/04/22,01:21	35.0	139.2	8	3.6	3.10e14	89.47	E off Izu peninsula	342	82	-14	74	76	-172	0.6975	0.8081	0.0154	-0.3964	0.1813	-0.3011	NAA
167	1998/04/22,01:26	35.0	139.2	8	3.5	2.25e14	89.13	E off Izu peninsula	168	88	16	77	74	178	0.5024	0.8692	0.0145	-0.3040	-0.2458	-0.1984	SGN
168	1998/04/22,01:41	35.0	139.1	5	4.1	1.79e15	88.58	E off Izu peninsula	323	89	-13	53	77	-179	0.9977	0.2845	0.1596	-0.8667	0.1564	-0.1310	SGN
169	1998/04/22,08:50	35.0	139.1	5	4.1	1.79e15	88.96	E off Izu peninsula	327	85	-67	84	175	-175	0.9675	0.4037	0.0026	-0.8395	0.1167	-0.1279	SGN
170	1998/04/22,10:35	34.9	139.2	5	3.9	7.98e14	96.46	E off Izu peninsula	339	79	-28	75	63	-167	0.6437	0.7272	0.0500	-0.3856	0.4080	-0.2581	NAA
171	1998/04/22,10:52	36.3	137.2	290	5.5	5.72e15	93.28	Toyama, Gifu border reg	303	51	-74	99	42	-108	0.9245	0.4533	0.0912	-0.7669	0.1850	-0.8479	NAA
172	1998/04/22,11:32	35.2	136.6	5	5.2	6.74e16	90.28	Shiga Gifu border region	24	67	108	163	29	53	0.0746	-0.0392	0.3955	-0.5547	0.6923	0.8479	KZK
173	1998/04/22,14:46	35.2	136.6	5	3.2	8.18e13	63.57	Shiga Gifu border region	19	68	115	146	33	43	0.2908	-0.0991	0.2786	-0.8686	-0.5861	0.5778	ABU
174	1998/04/22,20:28	34.9	139.2	5	3.9	9.18e14	96.71	E off Izu peninsula	341	82	-15	73	75	-172	0.6643	0.7887	0.0050	-0.4464	0.2343	-0.2179	SGN
175	1998/04/22,20:34	35.2	136.6	20	3.3	8.84e13	64.14	Shiga Gifu border region	54	81	120	160	31	18	0.2821	-0.3721	0.6501	-0.5429	-0.4848	-0.2607	ABU
176	1998/04/22,22:19	35.0	139.2	5	4.0	9.82e14	92.85	E off Izu peninsula	329	85	-23	61	65	-174	0.8842	0.4842	0.2389	-0.6633	0.3222	-0.2209	SGN
177	1998/04/23,02:03	35.0	139.2	8	3.7	3.49e14	87.60	E off Izu peninsula	68	83	162	161	42	7	0.6341	0.7050	0.3596	-0.6055	0.0762	-0.0287	SGN
178	1998/04/23,02:26	35.2	136.5	11	3.5	2.34e14	74.55	Shiga Gifu border region	168	50	74	12	43	0.8	0.0110	0.0500	0.2143	-0.9758	0.1165	0.9048	NAA
179	1998/04/23,15:00	38.0	139.0	11	3.5	1.85e14	57.22	off N Niigata pref	3	50	95	176	40	85	-0.1237	-0.0077	0.0721	-0.9205	-0.1711	1.0443	KZK
180	1998/04/23,20:45	35.0	139.2	5	3.8	5.55e14	66.57	E off Izu peninsula	299	53	-82	124	37	-86	0.6923	0.3834	0.2631	-0.2995	0.1097	-0.9918	SGN
181	1998/04/24,16:51	34.9	139.1	5	3.7	4.21e14	93.28	central Izu peninsula	346	79	-29	92	62	-168	0.4237	0.8206	-0.0048	-0.1909	0.4438	-0.2328	FUJ
182	1998/04/24,18:44	35.1	137.3	35	3.6	2.95e14	86.83	central Aichi pref	338	75	-104	202	21	-48	-0.2900	0.1077	0.2915	0.6762	0.7802	-0.3862	FUJ
183	1998/04/24,22:40	34.9	139.2	14	3.4	1.26e14	74.03	E off Izu peninsula	88	89	-173	357	83	53	0.2569	0.9899	-0.1155	0.0793	-0.0375	-0.3362	FUJ
184	1998/04/24,23:36	35.0	139.2	8	4.2	7.79e13	77.80	E off Izu peninsula	316	75	-103	126	31	-67	0.9644	0.2117	0.2826	-0.6021	0.4246	-0.3623	SGN
185	1998/04/25,04:35	43.0	147.0	8	4.9	2.16e16	87.02	E off Hokkaido	279	62	-103	126	31	-67	0.7004	0.2960	0.5600	-0.1316	-0.0381	-0.8320	NMR
186	1998/04/25,09:34	35.0	139.1	5	4.1	1.75e15	94.82	E off Izu peninsula	355	82	-26	89	65	-171	1.263	0.8782	-0.1493	-0.0761	0.4446	-0.0501	SGN
187	1998/04/25,11:25	31.2	131.9	38	4.3	2.80e15	73.95	SE off Osumi pen	337	79	59	229	33	159	0.2719	0.2599	-0.4541	-0.6005	-0.6789	0.3285	TKA
188	1998/04/25,16:08	38.5	142.7	29	3.9	7.16e14	83.90	E off Miyagi pref	16	58	83	210	32	102	0.0742	0.3592	0.0689	-0.7813	-0.4420	0.8555	GJM
189	1998/04/25,22:37	35.0	139.1	5	3.5	3.42e16	87.33	E off Izu peninsula	346	85	-33	79	57	-174	0.3963	0.7592	0.0713	-0.2987	0.5406	-0.0976	SGN
190	1998/04/25,23:57	35.0	139.1	5	3.5	2.23e14	88.28	E off Izu peninsula	332	73	-34	73	57	-160	0.7487	0.5887	0.0432	-0.4053	0.4844	-0.3434	FUJ
191	1998/04/26,01:27	34.3	139.2																		

Table 5: Estimated moment tensors (continued).

No.	Origin Time (UT)	Lat(N)	Lon(E)	D(km)	Mw	M0(Nm)	VarRed	Region name	Str1	Dip1	Rak1	Str2	Dip2	Rak2	Mxx	Myy	Mzz	Mxy	Mxz	Myz	Mzz	used Stations
211	1998/04/20 06:19	34.9	139.2	8	3.7	4.13e14	92.97	E off Izu peninsula	88	86	175	69	85	80	0.2148	0.1010	0.1143	0.5876	0.1254	0.1923	-0.3158	SGN
212	1998/04/20 06:19	34.9	139.2	8	3.8	5.03e14	92.69	E off Izu peninsula	154	90	162	64	88	180	0.8815	-0.6737	0.0248	0.6285	0.0316	-0.8229	-0.2077	SGN
213	1998/05/01 12:35	36.4	141.1	35	3.5	1.69e14	85.45	E off Ibaraki pref	109	78	76	342	18	140	-0.0555	-0.3157	0.0509	0.2904	0.0940	0.1300	0.3712	KZK
214	1998/05/03 01:59	35.0	139.2	5	4.3	3.24e15	94.69	E off Izu peninsula	350	87	-25	82	65	-54	0.8749	0.5901	-0.4684	0.5591	-0.4684	-0.2189	-0.7807	FUJ
215	1998/05/03 01:59	35.0	139.2	5	4.3	2.35e17	87.96	E off Izu peninsula	165	85	74	82	175	176	0.3684	0.1537	0.3847	0.8749	0.1717	0.1273	-0.1547	SGN
216	1998/05/03 02:09	35.0	139.2	5	5.5	2.35e17	87.96	E off Izu peninsula	165	85	74	82	175	176	0.3684	0.1537	0.3847	0.8749	0.1717	0.1273	-0.1547	KZK
217	1998/05/03 21:40	34.4	136.4	380	4.6	9.50e15	96.53	Shima peninsula region	160	73	55	47	38	152	0.3034	0.2609	0.3793	0.9099	-0.0461	0.3269	-0.4573	SGN
218	1998/05/03 17:44	35.0	139.2	5	4.2	1.91e15	96.71	E off Izu peninsula	352	82	-21	85	70	-171	0.2954	0.9099	-0.0461	0.3269	-0.1212	0.1749	-0.1742	SGN
219	1998/05/03 22:06	34.9	139.2	8	4.0	1.24e15	96.19	E off Izu peninsula	358	79	-22	93	69	-168	0.1049	0.9290	-0.0803	0.1749	0.3000	-0.2799	-0.1878	SGN
220	1998/05/03 23:16	34.9	139.2	8	3.7	3.58e14	86.25	E off Izu peninsula	358	88	-18	88	72	-178	0.1427	0.9496	0.0644	0.9496	0.0644	0.0451	-0.1878	FUJ
221	1998/05/04 09:28	41.5	146.7	8	4.8	1.94e16	83.50	far SE off Hokkaido	267	49	-68	56	45	-113	0.9248	-0.3683	0.1345	-0.3683	0.1345	0.1923	-0.8791	NMR
222	1998/05/04 20:59	40.4	142.2	68	3.4	1.51e14	62.59	NE off Iwate pref	29	83	96	166	9	47	-0.1275	-0.1168	0.5152	-0.1168	0.5152	-0.8229	0.3521	TMR
223	1998/05/05 05:25	34.9	139.2	5	3.1	5.43e13	69.07	E off Izu peninsula	152	73	21	56	70	162	0.6738	0.4236	0.9405	0.4236	0.9405	0.1300	0.2667	SGN
224	1998/05/05 08:25	34.9	139.2	8	4.1	1.97e15	96.34	E off Izu peninsula	358	84	-12	89	78	-174	0.1575	0.9810	-0.0348	0.0614	0.1754	-0.2189	-0.7807	FUJ
225	1998/05/05 09:26	34.9	139.2	5	3.8	5.91e14	92.51	E off Izu peninsula	193	78	35	99	56	166	-0.3756	0.7840	-0.0114	0.7840	-0.0114	0.5286	0.2615	SGN
226	1998/05/05 10:53	42.8	146.5	5	4.3	2.67e15	79.14	off Nemuro peninsula	294	75	-101	152	18	-54	0.2569	0.2961	0.8022	0.2961	0.8022	0.3037	-0.4882	NMR
227	1998/05/05 14:02	34.9	139.2	5	3.9	8.66e14	93.70	E off Izu peninsula	280	89	154	10	64	1	-0.4696	0.8346	-0.4470	0.8346	-0.4470	0.2831	0.0839	FUJ
228	1998/05/05 19:49	34.9	139.2	8	3.5	1.88e14	84.85	E off Izu peninsula	68	88	-177	338	87	-2	0.8794	0.7111	-0.0263	0.7111	-0.0263	-0.5304	0.0148	SGN
229	1998/05/05 22:58	33.3	135.8	20	4.3	3.71e15	85.43	S off Kii peninsula	23	77	66	265	27	150	-0.2502	0.5199	-0.1044	0.5199	-0.1044	0.7450	0.3546	ABU
230	1998/05/06 09:34	34.9	139.2	5	3.2	6.20e13	72.06	E off Izu peninsula	107	89	158	198	68	2	-0.4234	0.7740	0.3158	0.7740	0.3158	0.5939	-0.1705	SGN
231	1998/05/06 11:19	34.2	135.3	5	3.6	3.01e14	93.73	NW Wakayama pref	0	47	102	164	45	78	0.0766	-0.1598	0.1213	-0.1598	0.1213	-0.0499	0.9418	KIS
232	1998/05/07 03:28	34.8	138.2	35	3.7	3.83e14	58.23	SW Shizuoka pref	314	83	132	52	42	11	-0.7486	-0.0442	0.4443	-0.0442	0.4443	-0.5869	0.1821	KIS
233	1998/05/07 20:02	32.2	138.3	5	3.5	2.30e14	51.00	far S off Tokai District	70	51	55	298	50	125	-0.9366	-0.0814	0.4037	-0.0814	0.4037	0.1120	-0.4672	KIS
234	1998/05/08 20:14	41.6	142.1	53	4.8	1.58e16	81.71	off Amori pref	23	72	90	202	18	89	-0.0839	0.2025	0.3180	0.2025	0.3180	-0.4967	-0.7495	ABU
235	1998/05/08 20:47	30.6	131.1	8	4.4	3.92e15	68.76	near Tanegashima island	38	78	76	267	19	138	-0.4253	0.1660	0.4581	0.1660	0.4581	-0.3877	-0.7587	HSS
236	1998/05/09 05:53	33.6	139.4	8	3.7	4.72e14	65.68	near Miyakejima island	175	66	352	24	-93	-0.2022	0.1170	-0.0544	0.1170	-0.0544	0.8473	-0.6545	-0.6452	FUJ
237	1998/05/09 15:25	35.2	136.5	5	3.6	2.70e14	69.57	Shiga Gifu border region	9	54	100	173	37	77	0.0349	0.0212	0.1455	0.0212	0.1455	-0.9672	-0.2793	KIS
238	1998/05/11 18:46	42.3	143.1	50	4.2	1.92e15	79.88	Hidaka mountains region	40	59	88	223	31	93	-0.4039	0.4019	0.2938	0.4019	0.2938	-0.4949	0.8989	ABU
239	1998/05/12 03:02	37.1	142.2	23	3.9	9.26e14	70.02	E off Fukushima pref	11	65	142	119	56	30	0.2574	-0.5881	0.3649	-0.5881	0.3649	-0.3219	0.4784	KZK
240	1998/05/12 12:23	35.4	140.3	26	3.5	2.34e14	71.26	Kujukuri coast Boso pen	72	71	87	262	19	99	-0.6038	0.1556	0.7510	0.1556	0.7510	-0.3508	0.5852	SGN
241	1998/05/13 21:30	33.4	135.0	14	3.4	1.49e14	79.99	S off Kii peninsula	126	67	-144	119	57	-28	-0.4026	0.3903	-0.6473	0.3903	-0.6473	0.7721	0.0895	ISI
242	1998/05/14 09:12	42.7	143.6	18	3.9	4.74e14	78.85	Tokachi region	336	81	-90	157	9	-89	0.1120	0.0630	0.3808	0.0630	0.3808	-0.3449	-0.3695	SGN
243	1998/05/14 10:53	40.3	143.5	23	5.3	1.07e17	82.03	far E off Sanriku	22	64	91	199	26	88	-0.0352	0.2277	0.5338	0.2277	0.5338	-0.7147	-0.5647	HSS
244	1998/05/14 18:56	40.2	143.6	20	5.9	1.9e17	72.04	far E off Sanriku	37	79	103	165	17	39	0.1739	0.2976	0.5338	0.2976	0.5338	-0.4462	-0.2723	TMR
245	1998/05/14 20:57	40.2	143.5	14	4.0	1.2e15	51.80	far E off Sanriku	183	82	87	344	9	-109	0.0555	0.1583	0.2631	0.1583	0.2631	-0.9578	-0.3186	GJM
246	1998/05/15 17:22	36.5	142.3	17	3.9	6.74e14	66.05	far E off Ibaraki pref	327	74	-70	200	25	141	0.2186	-0.0355	-0.4680	-0.0355	-0.4680	0.6649	-0.4462	TMR
247	1998/05/15 18:45	35.0	139.9	71	4.7	4.9e16	97.43	southern Boso peninsula	209	69	30	107	62	156	-0.7782	0.5829	0.0844	0.5829	0.0844	0.4163	0.4438	SGN
248	1998/05/15 18:45	34.9	139.9	71	4.7	4.70e16	70.37	southern Boso peninsula	209	69	30	107	62	156	-0.7782	0.5829	0.0844	0.5829	0.0844	0.4163	0.4438	JIZ
249	1998/05/16 14:15	36.5	142.3	17	4.1	1.35e15	63.23	far E off Ibaraki pref	354	55	90	174	35	90	-0.0324	-0.0865	-0.0332	-0.0865	-0.0332	-0.9201	-0.3453	SGN
250	1998/05/16 15:59	36.5	142.4	23	4.1	1.35e15	60.28	far E off Ibaraki pref	349	61	50	229	48	140	0.2465	-0.2987	-0.8882	-0.2987	-0.8882	0.6417	0.9525	YMZ
251	1998/05/17 03:39	36.4	141.1	35	3.8	5.62e14	86.66	E off Ibaraki pref	18	72	82	222	20	113	-0.0890	0.3017	0.2149	0.3017	0.2149	-0.4650	-0.7740	SGN
252	1998/05/17 03:39	35.2	136.6	5	3.7	3.83e14	89.56	Shiga Gifu border region	14	70	115	140	31	40	0.1127	-0.2222	0.3361	-0.2222	0.3361	-0.6978	-0.6476	SGN
253	1998/05/17 07:06	36.4	140.7	50	3.8	5.42e14	78.81	northern Ibaraki pref	17	77	100	161	16	54	0.0685	-0.0042	0.2974	-0.0042	0.2974	-0.5022	-0.8304	ABU
254	1998/05/17 23:28	37.3	142.1	35	3.6	3.07e14	71.32	E off Fukushima pref	295	81	69	183	23	156	0.0307	-0.3589	-0.8149	-0.3589	-0.8149	-0.3154	-0.3420	KZK
255	1998/05/18 02:40	34.9	139.2	8	3.5	1.87e14	75.46	E off Izu peninsula	266	88	-154	196	66	-20	-0.4696	0.6184	0.5180	0.6184	0.5180	0.6457	-0.1597	SGN
256	1998/05/18 15:40	43.3	147.6	8	4.5	7.30e15	79.74	E off Hokkaido	266	88	90	88	2	93	-0.0827	0.0068	-0.9942	0.0068	-0.9942	0.0754	0.0553	NMR
257	1998/05/18 15:40	43.3	141.0	62	4.1	1.76e15	66.81	E off Boso peninsula	162	58	-62	297	41	-127	0.2512	0.6346	0.5010	0.6346	0.5010	-0.4084	-0.7522	JIZ
258	1998/05/18 18:16	35.0	139.9	23	3.8	6.45e14	74.10	southern Boso peninsula	204	72	30	104	61	160	-0.6223	0.6383	0.1208					

Table 5: Estimated moment tensors (continued).

No.	Origin Time(UT)	Lat(N)	Lon(E)	D(km)	Mw	M0(Nm)	Varied	Region name	Str1	Dip1	Rak1	Str2	Dip2	Rak2	Mxx	Mxy	Mxz	Myy	Myz	Mzz	used Stations
281	1998/05/31 18:45	39.1	143.7	14	4.1	1.84e15	84.74	far E off Sanriku	34	62	105	184	32	64	0.0107	0.3229	0.3352	-0.7819	-0.3352	0.7712	GJM YMZ SBT
282	1998/05/31 22:05	29.6	128.8	8	4.2	1.61e15	80.74	NW off Amami-Oshima is	98	69	101	200	61	-155	0.5258	-0.6991	-0.3529	-0.2151	-0.4212	-0.3107	TKA
283	1998/06/01 01:21	39.1	143.4	17	5.1	4.91e15	85.94	far E off Sanriku	19	70	90	198	20	91	0.0553	0.2734	0.2166	-0.4868	-0.7409	0.5782	GJM SBT
284	1998/06/01 02:24	39.2	143.4	14	4.4	4.67e15	84.54	far E off Sanriku	29	74	94	195	16	77	0.0346	0.2034	0.4093	-0.3496	-0.3821	0.4520	GJM SBT
285	1998/06/01 11:57	29.6	128.8	10	4.1	4.00e15	78.84	NW off Amami-Oshima is	102	68	131	204	62	-155	0.6804	-0.6726	-0.2823	-0.2387	-0.3043	TKA	
286	1998/06/01 12:03	39.2	143.7	20	4.1	1.75e15	53.71	far E off Sanriku	264	84	-166	173	77	-6	0.2044	0.9400	0.2270	-0.2387	-0.1526	0.3043	YMZ
287	1998/06/01 18:26	39.1	143.8	11	4.3	2.05e15	86.86	far E off Sanriku	19	56	88	203	34	93	-0.0947	0.3810	0.1025	-0.8195	-0.3586	0.9142	GJM YMZ
288	1998/06/01 22:55	39.2	143.7	20	4.5	5.45e15	84.76	far E off Sanriku	28	57	99	191	34	76	0.0331	0.3810	0.2433	-0.8535	-0.3389	0.8204	GJM YMZ
289	1998/06/01 23:02	39.1	143.9	17	4.6	9.35e15	86.07	far E off Sanriku	24	56	92	194	34	82	0.0122	0.3469	0.1845	-0.8715	-0.3293	0.8593	GJM YMZ
290	1998/06/02 01:54	44.4	149.9	32	5.1	4.33e16	76.64	SE off Etorofu	227	54	-32	320	58	-173	0.7949	-0.0983	0.4552	-0.8784	-0.2825	-0.0835	NMR
291	1998/06/02 11:56	39.2	143.8	14	4.9	2.62e16	86.91	far E off Sanriku	14	59	85	204	32	98	0.0067	0.3263	0.0815	-0.8392	-0.4473	0.8325	GJM SGN
292	1998/06/02 21:00	35.3	138.5	14	3.5	1.28e14	77.56	Mt. Fuji region	276	53	122	50	48	55	-0.9031	0.3398	-0.1913	0.0924	-0.3382	0.8107	JIZ
293	1998/06/02 21:06	39.1	143.9	11	4.8	1.67e16	80.85	far E off Sanriku	17	55	97	185	36	80	0.1377	0.2443	-0.1411	-0.9617	-0.3082	0.8440	TMR
294	1998/06/04 10:11	34.3	139.2	5	3.8	5.15e14	77.18	near Nijijima island	183	56	80	229	40	-120	-0.0956	0.2906	0.2057	0.9198	-0.8243	0.7470	JIZ
295	1998/06/05 07:55	36.5	141.1	4	3.7	4.00e14	78.64	E off Ibaraki pref	21	70	-87	329	22	117	0.1268	0.3784	0.2352	-0.4535	-0.7270	0.3604	SBT
296	1998/06/06 12:38	35.4	140.5	62	4.1	1.81e15	85.97	Kujukuri coast Boso pen	7	85	101	123	12	26	0.1678	-0.1367	0.0986	-0.2921	-0.3626	0.1161	SGN
297	1998/06/07 09:19	33.0	136.4	380	4.1	1.66e15	87.04	SE off Kii peninsula	47	81	-119	301	30	-18	0.1700	-0.0838	-0.5418	-0.3412	0.6443	KIS	
298	1998/06/07 12:28	31.9	129.3	5	3.8	6.65e14	91.72	SW off Kyushu	223	72	-129	112	43	-27	0.8321	-0.3198	0.3186	-0.4987	-0.3392	-0.2493	KIS
299	1998/06/07 23:02	36.1	139.9	53	4.0	1.23e15	92.88	SW Ibaraki pref	50	70	89	232	40	92	-0.3957	0.2947	0.5720	-0.3791	-0.4716	0.6716	KZK
300	1998/06/08 07:48	37.0	141.1	62	4.2	2.22e15	93.18	E off Fukushima pref	187	70	92	360	20	83	0.0349	0.4043	-0.1019	-0.6653	-0.7527	0.6305	SGN
301	1998/06/09 12:14	32.8	135.0	5	4.4	4.99e15	64.40	S off Kii peninsula	104	58	140	218	57	39	0.8637	0.4446	0.1652	0.2787	0.4373	0.5850	KIS
302	1998/06/10 07:17	33.9	135.4	59	4.4	3.88e15	84.97	central Wakayama pref	318	72	-82	114	20	-113	0.3691	0.3820	0.5063	-0.1786	-0.6078	-0.5476	ABU
303	1998/06/11 02:01	36.8	139.5	8	3.8	6.54e14	67.17	northern Tochigi pref	56	80	138	155	49	14	0.5089	0.3967	0.5738	-0.7578	-0.2487	0.2487	KZK
304	1998/06/11 02:03	36.8	139.5	5	4.0	9.50e14	74.92	northern Tochigi pref	56	80	124	160	36	18	0.3233	0.3130	0.7152	-0.6139	-0.3308	0.2906	KZK
305	1998/06/11 20:26	39.0	143.7	11	4.1	1.80e15	83.35	far E off Sanriku	24	55	95	194	35	82	0.0113	0.3448	0.1757	-0.8730	-0.2938	0.8842	GJM YMZ
306	1998/06/12 12:12	33.4	141.1	53	4.3	2.75e15	91.88	E off Hachijojima island	354	50	63	212	47	119	0.0961	0.2540	-0.2667	-0.9611	-0.1285	0.8650	JIZ
307	1998/06/12 17:02	37.8	138.5	8	3.8	4.91e14	85.09	Sadogahama is reg	242	65	130	358	46	35	0.0290	0.5281	-0.6098	-0.0600	-0.1503	0.5770	KZK
308	1998/06/13 04:15	36.0	140.1	67	3.6	3.13e14	71.13	southern Ibaraki pref	28	78	94	188	13	71	0.2112	0.3359	0.3993	-0.4560	-0.8122	0.2448	SGN
309	1998/06/14 10:58	42.9	145.4	47	4.1	1.34e15	79.64	off Nemuro peninsula	36	58	80	234	33	105	0.4136	0.4425	0.1873	-0.4386	-0.4134	0.8922	TNK
310	1998/06/14 13:17	35.4	140.8	26	5.7	3.58e17	80.27	E off Boso peninsula	218	60	-83	24	31	-102	0.2079	-0.4122	0.3517	-0.4386	-0.4134	-0.8442	JIZ
311	1998/06/16 03:11	33.9	138.8	8	4.0	1.25e14	84.80	near Nijijima island	52	89	-77	142	89	-179	-0.8608	-0.2300	-0.0179	1.0874	0.0068	-0.2966	FUJ
312	1998/06/16 17:37	36.1	141.4	29	3.7	3.00e14	72.37	far E off Ibaraki pref	181	88	-77	280	13	-171	0.1464	0.2288	0.0765	-0.0024	-0.9632	-0.1440	YMZ
313	1998/06/16 20:10	34.7	139.7	125	4.6	8.90e15	95.99	Sagaminada	15	90	95	176	5	2	0.0385	-0.0648	0.4297	-0.0300	-0.8990	0.0213	FUJ
314	1998/06/17 23:57	36.2	141.1	29	3.5	1.86e14	59.85	E off Ibaraki pref	26	87	-104	218	14	-11	0.0985	-0.2393	-0.2776	-0.0616	-0.9259	0.0680	SGN
315	1998/06/19 17:35	34.4	136.1	5	3.8	4.70e13	62.98	southern Mie pref	127	83	58	27	32	167	0.3799	-0.1796	0.7421	-0.3871	-0.4002	0.2073	ABU
316	1998/06/20 17:55	37.0	142.3	23	3.8	4.80e14	78.99	E off Fukushima pref	122	82	45	24	46	168	0.4961	-0.3853	0.6384	-0.6926	-0.2397	1.9665	KZK
317	1998/06/21 21:23	36.4	141.1	29	4.1	1.77e15	85.96	near Amami-Oshima island	1	82	69	251	22	158	0.0915	0.3678	0.6384	-0.5946	-0.2000	0.2200	KZK
318	1998/06/22 07:07	28.2	129.5	41	5.5	1.77e15	73.04	northern Mie pref	244	78	-53	349	39	-160	-0.1903	-0.3402	0.6386	-0.2742	-0.3303	0.3003	TKA
319	1998/06/23 13:54	34.6	136.1	41	4.5	5.04e15	95.03	northern Mie pref	35	68	-80	189	24	-114	0.0925	-0.2354	-0.4702	0.6087	-0.7032	-0.3303	ABU
320	1998/06/23 16:12	33.5	141.0	50	4.6	8.90e15	88.70	E off Hachijojima island	334	57	62	198	43	126	0.1711	-0.0808	-0.3773	-0.9747	-0.1962	0.8035	SGN
321	1998/06/23 18:37	36.2	136.1	41	3.8	4.98e14	90.60	northern Mie pref	36	62	-78	193	31	-111	0.1571	-0.2896	-0.4130	0.6950	-0.8521	-0.8521	ABU
322	1998/06/24 14:52	34.6	140.1	71	4.8	1.92e16	94.39	SW Ibaraki pref	5	68	97	167	23	73	0.0545	-0.0486	0.1023	-0.7140	-0.7209	0.6596	KIS
323	1998/06/24 21:30	40.2	139.2	23	4.7	1.09e16	66.88	near Nijijima island	271	62	135	26	51	37	0.6658	0.6757	-0.3354	0.0638	-0.2121	0.6020	KIS
324	1998/06/25 05:59	42.5	144.1	8	4.4	3.87e15	67.18	far E off Sanriku	199	45	92	16	45	88	0.0123	0.3382	0.0274	-0.9532	0.0084	0.9409	SGN
325	1998/06/27 06:49	42.5	143.1	77	4.8	2.08e16	58.76	Hidaka mountains region	228	70	111	360	29	46	0.0527	0.4624	-0.5398	-0.5988	0.4402	0.5461	HSS
326	1998/06/27 23:37	31.5	131.9	20	4.2	2.39e15	53.48	Hyananada region	211	69	55	93	40	146	0.5971	0.6240	-0.2548	0.0662	-0.5168	0.5309	TKD
327	1998/06/29 06:16	32.1	140.4	89	3.8	3.44e14	68.60	E off Hachijojima island	41	68	-124	282	40	-36	0.8087	-0.5107	-0.3396	-0.2543	-0.4223	-0.5544	JIZ
328	1998/06/29 14:32	37.3	142.1	24	3.7	3.45e14	78.18	E off Fukushima pref	253	72	79	106	21	121	-0.6186	-0.0047	-0.7343	0.0224	0.2996	0.5962	SGN
329	1998/06/29 14:46	34.8	140.1	50	4.1	1.51e15	95.42	SE off Boso peninsula	13	74	29	275	63	162	-0.3931	0.8143	-0.1289	0.1336	-0.4442	0.2595	JIZ
330	1998/06/29 17:22	36.6	138.0	8	5.0	3.79e16	93.37	northern Nagano pref	354	71	46	244	47	153	0.1429	-0.5883	-0.2865	-0.5969	-0.5314	0.4540	KZK
331	1998/06/30 18:03																				

Table 5: Estimated moment tensors (continued).

No.	Origin Time(UT)	Lat(N)	Lon(E)	D(km)	Mw	M0(Nm)	VarRed	Region name	Str1	Dipl	Raki	Str2	Dip2	Rak2	Mxx	Mxy	Mxz	Myy	Myz	Mzz	used Stations
351	1998/07/16,20:18	32.7	130.9	8	4.4	4.43e15	89.60	southern Kumamoto pref	255	83	-92	93	7	-72	0.2332	-0.0219	0.9385	0.0045	-0.2533	-0.2376	IST
352	1998/07/18,16:18	35.7	140.7	56	4.9	2.61e16	89.72	near Choshi city	358	70	95	163	21	76	0.0697	-0.1046	0.9385	0.0045	-0.2533	-0.2376	KZK
353	1998/07/20,08:11	39.3	142.2	89	3.5	1.85e14	55.52	E off Iwate pref	218	77	155	314	66	14	0.7890	-0.1106	0.9385	0.0045	-0.2533	-0.2376	SGN
354	1998/07/21,03:14	37.0	140.4	89	4.1	1.75e15	91.61	mid Fukushima pref	216	68	70	229	37	119	0.3076	-0.4755	0.9385	0.0045	-0.2533	-0.2376	SGN
355	1998/07/21,05:02	39.9	143.7	47	3.7	4.06e15	75.44	far E off Sanriku	15	58	80	229	37	119	0.3076	-0.4755	0.9385	0.0045	-0.2533	-0.2376	SGN
356	1998/07/21,18:50	40.1	142.5	47	3.7	4.24e14	79.70	NE off Iwate pref	23	69	70	229	37	119	0.3076	-0.4755	0.9385	0.0045	-0.2533	-0.2376	SGN
357	1998/07/22,11:45	41.3	143.3	32	3.6	3.22e14	64.27	E off Aomori pref	347	65	-53	106	43	-142	0.2932	0.5851	0.9385	0.0045	-0.2533	-0.2376	SGN
358	1998/07/22,13:26	41.3	143.3	32	3.9	8.99e14	73.88	E off Aomori pref	338	60	-59	107	42	-132	0.4492	0.4913	0.9385	0.0045	-0.2533	-0.2376	SGN
359	1998/07/23,10:58	42.1	143.7	23	4.0	1.19e15	74.39	SE off Tokachi	47	66	90	237	24	90	0.5164	0.3336	0.9385	0.0045	-0.2533	-0.2376	SGN
360	1998/07/23,11:07	31.7	132.0	44	4.4	4.36e15	64.37	Hyuganada region	40	47	91	218	43	88	0.5071	0.5507	0.9385	0.0045	-0.2533	-0.2376	SGN
361	1998/07/23,15:18	32.6	140.4	95	3.9	8.49e14	55.03	E off Hachijojima island	345	87	72	246	19	171	0.1084	0.2651	0.9385	0.0045	-0.2533	-0.2376	SGN
362	1998/07/23,25:26	40.8	142.1	61	3.5	1.73e14	56.96	NE off Iwate pref	23	73	108	254	25	43	0.1235	0.4089	0.9385	0.0045	-0.2533	-0.2376	SGN
363	1998/07/25,21:16	37.4	141.4	62	3.4	1.47e14	71.00	E off Fukushima pref	175	54	109	281	20	17	0.1017	0.3283	0.9385	0.0045	-0.2533	-0.2376	SGN
364	1998/07/26,08:50	42.3	143.0	155	3.8	5.47e14	94.77	Hida mountains region	208	77	103	303	48	46	0.0245	0.3853	0.9385	0.0045	-0.2533	-0.2376	SGN
365	1998/07/26,15:28	44.6	147.2	155	4.4	1.95e15	92.06	near Etorofu island	208	74	137	303	48	46	0.0245	0.3853	0.9385	0.0045	-0.2533	-0.2376	SGN
366	1998/07/27,05:33	33.1	132.3	11	3.6	2.00e14	85.24	Bungo channel	139	63	147	342	27	14	0.7280	0.0681	0.9385	0.0045	-0.2533	-0.2376	SGN
367	1998/07/27,17:05	37.1	141.8	29	3.0	3.04e14	67.42	E off Fukushima pref	189	63	147	342	27	14	0.7280	0.0681	0.9385	0.0045	-0.2533	-0.2376	SGN
368	1998/07/27,20:20	31.9	141.1	14	3.7	3.50e14	77.61	near Tokushima is	285	62	-18	245	15	124	0.0293	0.7049	0.9385	0.0045	-0.2533	-0.2376	SGN
369	1998/07/28,05:41	42.1	144.0	44	3.8	4.86e14	65.50	SE off Tokachi	31	72	81	245	15	124	0.2377	0.2581	0.9385	0.0045	-0.2533	-0.2376	SGN
370	1998/07/28,02:44	42.1	144.0	47	4.0	1.17e15	83.37	SE off Tokachi	34	68	80	240	24	114	0.3650	0.3683	0.9385	0.0045	-0.2533	-0.2376	SGN
371	1998/07/28,21:21	31.1	131.6	26	4.0	1.17e15	59.63	SE off Osumi pen	20	67	87	208	23	98	0.1475	0.2245	0.9385	0.0045	-0.2533	-0.2376	SGN
372	1998/07/29,22:32	34.3	139.3	17	3.8	6.07e14	59.85	near Nijijima island	130	66	150	233	63	27	-1.0094	-0.0494	0.9385	0.0045	-0.2533	-0.2376	SGN
373	1998/07/30,09:42	43.6	149.3	65	4.9	2.30e16	72.83	SE off Etorofu	255	51	-113	110	45	-64	0.10256	0.0468	0.9385	0.0045	-0.2533	-0.2376	SGN
374	1998/07/31,01:12	35.5	140.2	62	4.0	1.30e15	87.62	central Chiba pref	162	81	-28	257	63	-170	0.0853	0.7222	0.9385	0.0045	-0.2533	-0.2376	SGN
375	1998/07/31,19:12	34.6	136.1	44	3.5	2.16e14	55.50	northern Mie pref	25	58	-85	196	33	-98	0.0853	-0.3153	0.9385	0.0045	-0.2533	-0.2376	SGN
376	1998/08/02,02:55	34.5	139.2	5	3.8	4.83e14	90.59	near Nijijima island	120	83	-135	23	46	-10	0.4773	0.4225	0.9385	0.0045	-0.2533	-0.2376	SGN
377	1998/08/03,11:09	37.2	140.0	5	5.1	4.99e16	86.37	mid Fukushima pref	167	67	81	8	25	109	0.0729	-0.0517	0.9385	0.0045	-0.2533	-0.2376	SGN
378	1998/08/05,20:55	43.4	147.0	38	3.9	8.50e14	87.35	E off Hokkaido	267	69	-84	71	22	-105	0.6730	0.1311	0.9385	0.0045	-0.2533	-0.2376	SGN
379	1998/08/06,06:05	40.2	144.4	35	3.6	2.94e14	77.47	far E off Sanriku	184	70	-78	333	23	-119	0.1343	0.1372	0.9385	0.0045	-0.2533	-0.2376	SGN
380	1998/08/07,05:47	36.2	137.7	5	4.1	1.71e15	93.66	Hida mountains region	82	86	161	174	71	5	0.1516	0.9190	0.9385	0.0045	-0.2533	-0.2376	SGN
381	1998/08/07,06:55	36.2	137.7	5	4.0	9.06e14	91.40	Hida mountains region	261	88	-155	171	65	-2	0.2410	0.8650	0.9385	0.0045	-0.2533	-0.2376	SGN
382	1998/08/07,07:52	42.9	145.2	47	4.1	1.74e15	66.17	off Nemuro peninsula	33	71	174	254	24	128	0.3422	0.4889	0.9385	0.0045	-0.2533	-0.2376	SGN
383	1998/08/07,12:02	36.2	137.6	5	4.1	1.67e15	94.80	Hida mountains region	272	87	-152	181	62	-4	0.0436	0.8843	0.9385	0.0045	-0.2533	-0.2376	SGN
384	1998/08/07,13:02	36.2	137.7	5	4.3	2.96e15	95.24	Hida mountains region	273	85	-153	182	63	-2	-0.0960	0.8793	0.9385	0.0045	-0.2533	-0.2376	SGN
385	1998/08/07,13:12	36.2	137.6	5	3.8	6.06e14	90.60	Hida mountains region	85	87	161	176	21	3	0.1315	0.3317	0.9385	0.0045	-0.2533	-0.2376	SGN
386	1998/08/07,19:21	39.9	142.6	35	3.8	4.80e14	72.88	E off Iwate pref	16	89	121	194	61	88	0.0983	0.1856	0.9385	0.0045	-0.2533	-0.2376	SGN
387	1998/08/08,10:32	36.2	137.6	5	4.2	3.73e15	91.90	Hida mountains region	262	85	-153	180	62	-5	0.1785	0.8362	0.9385	0.0045	-0.2533	-0.2376	SGN
388	1998/08/09,05:45	36.2	137.7	5	4.0	2.97e15	84.77	Hida mountains region	283	89	-188	192	57	-93	0.3193	0.8362	0.9385	0.0045	-0.2533	-0.2376	SGN
389	1998/08/10,16:13	33.1	136.8	11	3.9	7.90e14	60.94	E off Hokkaido	283	50	-88	199	35	-93	0.1613	0.1868	0.9385	0.0045	-0.2533	-0.2376	SGN
390	1998/08/11,01:09	33.2	131.5	98	4.6	8.24e15	73.77	northern Ota pref	88	50	-104	287	42	-73	0.9763	0.1094	0.9385	0.0045	-0.2533	-0.2376	SGN
391	1998/08/11,11:33	40.3	142.6	24	3.8	5.02e14	87.80	NE off Iwate pref	26	75	100	172	17	57	0.0334	0.0856	0.9385	0.0045	-0.2533	-0.2376	SGN
392	1998/08/11,21:57	36.6	141.5	29	3.6	2.62e14	87.59	E off Ibaraki pref	6	88	80	266	10	170	0.0083	0.1792	0.9385	0.0045	-0.2533	-0.2376	SGN
393	1998/08/12,00:40	36.2	137.7	5	4.5	6.65e15	94.92	Hida mountains region	267	89	-146	178	58	-1	0.0994	0.8430	0.9385	0.0045	-0.2533	-0.2376	SGN
394	1998/08/12,06:13	36.2	137.7	5	4.9	2.25e16	93.92	Hida mountains region	84	84	146	178	56	7	0.0576	0.8190	0.9385	0.0045	-0.2533	-0.2376	SGN
395	1998/08/13,18:54	36.4	141.1	44	3.5	2.06e14	77.85	E off Ibaraki pref	50	75	104	185	21	48	0.0247	0.3657	0.9385	0.0045	-0.2533	-0.2376	SGN
396	1998/08/14,05:06	36.2	137.6	5	4.2	2.35e15	60.57	Hida mountains region	82	84	169	174	79	6	0.1715	0.9501	0.9385	0.0045	-0.2533	-0.2376	SGN
397	1998/08/14,10:36	36.3	137.6	8	4.8	1.52e16	87.09	Hida mountains region	187	83	162	180	72	8	-0.0515	0.9407	0.9385	0.0045	-0.2533	-0.2376	SGN
398	1998/08/14,12:32	36.3	137.6	5	4.1	1.50e15	94.44	Hida mountains region	187	78	-17	93	73	167	-0.1770	0.9073	0.9385	0.0045	-0.2533	-0.2376	SGN
399	1998/08/14,14:48	36.3	137.6	8	3.7	4.10e14	89.91	Hida mountains region	274	89	-166	184	76	-1	-0.1898	0.9570	0.9385	0.0045	-0.2533	-0.2376	SGN
400	1998/08/14,14:52	36.3	137.6	5	3.9	7.74e14	92.12	Hida mountains region	271	88	-152	181	62	-2	0.0008	0.8830	0.9385	0.0045	-0.2533	-0.2376	SGN
401	1998/08/14,15:16	36.7	1																		

Table 5: Estimated moment tensors (continued).

No.	Origin_Time(UT)	Lat(N)	Lon(E)	D(km)	Mw	M0(Nm)	VarRed	Str1	Dip1	Rak1	Str2	Dip2	Rak2	Mxx	Mxy	Mxz	Myy	Myy	Mzz	used Stations
421	1998/08/21 18:44	36.2	137.7	5	4.2	2.58e15	93.16	264	82	-150	170	60	-10	0.2387	0.4811	-0.1793	-0.2633	-0.0594	NAA FUJ SGN	
422	1998/08/21 18:55	36.2	137.6	5	4.6	4.92e15	83.56	75	89	171	165	81	16	0.4724	0.1605	-0.4926	-0.0321	0.0202	NAA FUJ SGN	
423	1998/08/21 19:08	36.2	137.7	5	4.0	1.33e15	92.71	84	85	145	178	55	6	0.0529	0.8068	0.0145	0.1066	0.5862	NAA FUJ SGN	
424	1998/08/24 09:57	34.3	139.2	17	4.1	3.81e15	65.87	233	57	40	118	57	140	0.1933	0.1133	0.0375	0.4071	0.4832	TYM FUJ SGN	
425	1998/08/24 09:18	34.3	139.2	17	4.3	3.18e15	82.48	229	78	167	136	74	167	0.10493	-0.0755	-0.0616	0.8453	0.2040	TYM FUJ SGN	
426	1998/08/24 14:20	37.7	141.8	68	4.3	3.08e15	88.97	329	51	57	195	49	124	0.2490	-0.1868	-0.3070	0.0209	0.7921	YMZ SBT GJM	
427	1998/08/26 01:54	43.3	147.7	8	4.6	8.09e15	72.20	117	79	95	272	12	65	0.3375	-0.0279	0.8077	-0.0907	0.4282	NMR TYM SGN	
428	1998/08/26 12:42	43.3	147.0	29	4.2	1.98e15	98.42	67	84	118	168	29	12	0.1835	0.3944	-0.8171	-0.2801	0.1813	NMR TYM SGN	
429	1998/08/26 13:46	36.7	140.8	41	3.7	3.51e14	54.21	327	63	69	187	34	125	0.1734	-0.2928	-0.8764	-0.3959	0.7029	YMZ SBT SGN	
430	1998/08/26 16:24	36.7	141.3	38	3.6	3.19e14	77.60	20	88	82	276	8	165	0.1038	0.3392	-0.0299	-0.9290	0.0739	YMZ SBT SGN	
431	1998/08/26 16:24	36.3	137.6	11	3.7	4.09e14	82.96	265	88	-154	174	64	-2	0.0758	0.8818	-0.2186	-0.2112	0.1428	NAA KZK FUJ	
432	1998/08/26 20:17	36.3	137.6	8	3.8	5.90e14	86.86	81	84	152	174	63	7	0.1166	0.8674	-0.4315	-0.0634	0.1914	NAA KZK FUJ	
433	1998/08/26 20:13	35.0	139.2	5	3.4	1.32e14	71.46	130	78	31	33	60	166	0.7177	-0.2485	0.5139	-0.8862	0.1686	TYM SBT SGN	
434	1998/08/28 05:13	36.3	137.6	11	4.0	1.11e15	87.58	182	87	149	173	59	3	0.1534	0.8392	-0.0946	-0.0946	0.1038	NAA KZK FUJ	
435	1998/08/28 15:50	34.3	141.3	65	5.1	4.82e16	66.57	117	67	74	260	28	-123	0.8248	-0.2231	-0.5779	-0.2215	-0.6033	JIZ TYM SGN	
436	1998/08/28 23:46	35.6	140.0	16	5.3	1.20e15	91.94	213	66	-151	111	64	-27	0.8519	-0.4906	-0.1072	-0.4799	-0.3720	SGN KZK SGN	
437	1998/08/29 11:52	34.3	139.2	14	4.0	1.20e15	69.93	308	63	121	75	40	44	-0.9220	-0.2955	-0.2872	0.2556	-0.4458	JIZ TYM SGN	
438	1998/08/30 10:33	33.8	135.4	47	3.6	3.01e14	61.25	110	59	128	201	38	2	-0.4450	0.4443	0.7556	-0.4084	0.2339	ISL ABU NAA	
439	1998/08/30 17:47	38.7	142.2	47	3.9	8.99e14	79.67	19	59	90	198	31	90	-0.0673	0.2743	0.1491	-0.4388	0.8744	SBT YMZ TMR	
440	1998/08/31 14:30	36.2	137.7	11	3.6	2.98e14	86.78	85	82	139	181	50	11	-0.0863	0.7790	0.6116	-0.0314	0.2186	NAA FUJ SGN	
441	1998/09/01 01:21	34.4	140.3	65	4.1	1.61e15	85.36	228	77	98	15	15	57	-0.0936	0.2342	-0.6887	-0.3176	0.4112	TYM SGN SGN	
442	1998/09/02 17:27	36.2	142.1	20	3.7	4.71e14	83.89	21	69	91	198	21	87	0.0257	0.2682	-0.6422	-0.5727	0.6816	SBT SGN SGN	
443	1998/09/03 05:28	39.8	141.7	5	3.6	2.74e14	65.07	301	64	-51	59	46	-142	0.9668	0.0049	0.2075	-0.4584	-0.6153	YMZ SBT SGN	
444	1998/09/03 07:58	39.8	141.0	5	5.9	7.53e17	76.65	360	52	61	217	44	118	-0.0371	0.3103	-0.2800	-0.6328	0.8982	GJM TMR SBT	
445	1998/09/03 12:25	39.8	141.0	5	3.7	4.42e14	77.31	354	51	77	194	41	105	0.1330	0.0592	-0.0940	-0.1753	1.0339	GJM TMR SBT	
446	1998/09/03 12:57	39.8	140.9	8	3.7	3.66e14	88.47	130	56	62	334	43	125	0.0422	0.6308	-0.0940	-0.7147	0.7569	GJM TMR SBT	
447	1998/09/03 21:46	35.6	141.2	38	4.0	1.08e15	53.78	133	64	-101	338	28	-68	-0.2084	0.4521	-0.4832	-0.3681	-0.7326	GJM TMR SBT	
448	1998/09/03 23:02	32.0	131.9	23	4.7	1.42e16	87.83	188	79	-83	336	13	-121	-0.0555	0.0532	0.1444	-0.3092	-0.3556	TKD TKA ISI	
449	1998/09/04 08:15	35.2	136.5	5	3.6	2.50e14	85.44	122	54	110	161	41	65	0.0060	-0.0670	0.2831	-0.9309	0.9250	NAA ABU KIS	
450	1998/09/05 01:08	36.4	137.6	8	4.8	1.76e16	91.42	354	82	15	261	75	172	0.1452	0.9277	-0.0926	-0.3718	0.2666	KZK NAA FUJ	
451	1998/09/05 03:02	36.4	137.6	8	4.9	2.59e16	91.04	355	84	14	264	76	174	0.1068	0.9516	-0.0607	-0.2159	0.1797	NAA FUJ SGN	
452	1998/09/05 03:30	39.5	138.5	14	4.4	4.51e15	87.28	320	75	18	226	72	164	0.8015	0.0969	-0.0587	-0.5077	0.2601	GJM SBT KZK	
453	1998/09/05 23:03	43.4	146.0	74	4.1	1.36e15	84.49	231	80	65	120	27	157	-0.6021	-0.6328	0.3079	-0.2943	0.2943	TKN HSS	
454	1998/09/06 14:20	43.7	147.2	44	3.7	3.91e14	81.22	269	68	-141	162	54	-27	0.4592	0.7093	-0.3126	-0.3126	-0.4300	NMR	
455	1998/09/06 20:49	43.1	146.1	62	4.4	2.8e15	90.73	237	87	-155	146	65	-4	0.8568	0.3504	0.3143	-0.2759	-0.0391	HSS	
456	1998/09/07 06:38	34.6	135.7	38	3.7	4.60e14	85.67	17	67	-79	170	25	-114	0.0588	-0.0164	-0.2963	0.6911	-0.7494	ABU KIS FUJ	
457	1998/09/07 07:53	36.2	137.7	11	4.1	1.54e15	92.51	90	86	145	183	55	5	-0.1659	0.8197	0.5628	-0.0092	0.1967	NAA FUJ SGN	
458	1998/09/07 23:40	35.9	140.8	11	4.6	8.65e15	77.67	13	70	90	192	20	89	-0.0431	0.1274	0.1681	-0.6084	0.6514	TYM SGN KZK	
459	1998/09/09 18:58	40.1	142.3	38	3.8	5.79e14	73.29	298	77	-118	184	31	-27	-0.1049	0.4924	0.7053	-0.3263	-0.3766	TMR GJM HSS	
460	1998/09/10 18:44	36.1	142.2	11	4.2	2.46e15	61.46	55	78	113	170	25	28	0.1147	0.2707	0.7545	-0.4059	0.3744	YMZ SBT SGN	
461	1998/09/12 23:07	39.9	143.6	14	4.1	1.80e15	79.30	16	64	83	212	27	104	-0.1068	0.3105	0.1184	-0.6667	0.7736	TMR GJM SGN	
462	1998/09/14 10:50	35.8	140.1	35	3.7	3.85e14	69.85	86	78	102	219	17	44	-0.3319	0.2254	0.9004	-0.0754	0.4073	TYM SGN YMZ	
463	1998/09/14 11:11	35.8	140.1	35	3.9	7.24e14	82.15	83	76	100	228	17	56	-0.4619	0.2364	0.8623	-0.0807	0.4299	TYM SGN YMZ	
464	1998/09/14 12:21	44.2	148.8	32	4.2	1.90e15	86.15	33	70	125	150	39	33	0.2841	0.0081	0.5664	-0.3906	0.5468	NMR	
465	1998/09/14 23:16	32.6	132.2	38	4.4	4.30e15	80.67	346	48	-87	162	42	-93	0.2691	0.1826	-0.0173	0.8323	-1.1014	TKD TKA ISI	
466	1998/09/15 05:10	34.2	139.1	11	3.7	4.07e14	66.11	213	88	26	122	64	177	-0.8091	0.3578	-0.1708	0.8333	0.4189	TKD TKA ISI	
467	1998/09/15 07:18	38.3	140.8	8	3.6	2.95e14	78.80	221	55	132	344	53	47	0.2510	0.234	-0.4416	-0.9513	0.2023	SBT YMZ SGN	
468	1998/09/15 07:24	38.3	140.8	8	5.0	3.19e16	91.91	37	54	99	202	37	78	-0.2164	0.4254	0.2587	-0.7122	0.9287	GJM SGN	
469	1998/09/17 04:02	29.5	130.6	26	4.9	2.55e16	65.17	29	51	88	212	39	93	-0.1209	0.5755	0.0901	-0.7448	0.8657	TKA TKD KZK	
470	1998/09/17 23:49	35.7	140.7	50	3.6	3.30e14	77.03	52	83	166	144	76	7	0.8322	0.2667	-0.1953	-1.0393	0.2071	YMZ SGN SGN	
471	1998/09/18 03:51	43.0	147.8	20	4.9	2.20e16	61.02	315	71	-28	54	64	-159	1.0192	0.1432	0.0749	-0.6949	-0.3243	NMR	
472	1998/09/18 08:16	36.3	137.7	5	4.7	1.12e16	62.02	266	83	-166	174	77	-7	0.1878	0.9456	-0.2264	-0.1359	-0.0638	NAA KZK FUJ	
473	1998/09/18 21:19	36.3	137.7	8	3.8	6.65e14	83.95	291	82	-167	199	77	-8	-0.4668	0.7480	0.1605	-0.7976	-0.3308	NAA KZK FUJ	
474	1998/09/19 06:34	37.5	141.3	26	3.6	9.01e14	77.37	258	76	-153	161	64	-16	0.3651	0.3701	0.3451	-0.2805	-0.2350	JIZ SBT SGN	
475	1998/09/19 08:43	33.7	138.1	11	3.6	2.96e14	72.25	58	66	100	215	26	69	-0.3924	0.4748	0.5961	-0.3658	0.7582	SBT YMZ SGN	
476	1998/09/19 21:53	36.4	137.6	8	4.5	5.75e15	95.78	180	83	-13	271	77	-173	0.0244	0.9644	0.1418	-0.0089	0.0333	NAA FUJ SGN	
477	1998/09/24 06:02	32.0	140.8	53	4.3	3.69e15	76.13	334	68	76	187	26	120	-0.0377	-0.1250	-0.3846	-0.7215	-0.5849	JIZ SBT SGN	
478	1998/09/24 08:03	33.4	134.6	29	4.2	1.91e15	91.34	308	75	162	43	72	16	-0.9852	0.1501	-0.0605	0.8277	-0.3692	ISL ABU	
479	1998/09/24 10:30	32.1	140.8	62	4.6	8.08e15	94.97	332	67	91	148	23	87	-0.1638	-0.3343	-0.3159	-0.5501	0.7139	JIZ SBT SGN	
480	1998/09/24 21:59	37.5	141.3	66	4.8	1.52e16	84.93	242	52	-95	71	38	-83	0.8194	-0.3552	0.1929	-1.4444	-0.9638	YMZ SBT KZK	
481	1998/09/26 23:43	31.8	132.0	29	4.3	3.58e15	56.15	41	66	107	1									

Table 5: Estimated moment tensors (continued).

No.	Origin Time (UT)	Lat(N)	Lon(E)	D(km)	Mw	MG(Nm)	VarRed	Region name	Str1	Dipl	Raki	Str2	Dip2	Rak2	Mxx	Mxy	Mxz	Myy	Myz	Mzz	used Stations
491	1998/10/04.17:40	35.1	138.2	23	3.3	1.07e14	88.21	central Shizuoka pref	183	81	-100	50	13	-44	-0.0940	-0.1964	-0.0537	0.3476	-0.9376	-0.2535	JIZ NAA SGN
492	1998/10/06.23:09	41.7	142.0	23	3.7	3.38e14	56.86	E off Aomori pref	185	58	-122	324	44	-50	0.6467	0.4547	-0.4195	0.1380	-0.7846	-0.7846	TMR HSS SGN
493	1998/10/11.49	39.4	143.5	17	4.0	1.37e15	86.41	far E off Sanriku	35	59	101	195	33	73	-0.0932	0.3277	0.3277	-0.7449	-0.8381	-0.8381	TMR GJM SBT
494	1998/10/10.12:10	39.4	143.6	17	4.4	3.27e15	91.13	far E off Sanriku	27	58	94	200	32	84	-0.0707	0.3749	0.2233	-0.3894	-0.8468	-0.8468	TMR GJM SBT
495	1998/10/12.12:30	32.7	141.1	29	3.6	3.01e14	55.24	E off Hachijojima island	289	94	14	199	76	180	0.6088	-0.7690	-0.2424	-0.5697	-0.0565	-0.0391	JIZ TMR
496	1998/10/13.03:36	43.0	145.1	20	3.9	2.04e14	74.67	E off Nemuro peninsula	21	63	68	241	34	125	-0.2705	0.5430	0.0603	-0.5426	-0.7331	-0.7331	HSS TMR
497	1998/10/13.17:06	35.3	141.2	32	3.8	6.65e14	77.77	E off Boso peninsula	67	81	-132	327	43	-13	0.6310	0.3958	-0.5883	-0.4345	-0.2065	-0.2065	TMR GJM
498	1998/10/13.20:41	40.0	143.6	26	5.5	1.76e17	71.77	far E off Sanriku	23	56	91	202	34	89	-0.1267	0.3584	0.1586	-0.7870	-0.9138	-0.9138	HSS SGN
499	1998/10/16.18:05	36.2	137.6	107	5.1	4.06e14	66.98	Hida mountains region	107	51	-76	266	41	-106	0.9817	0.1240	-0.1342	-0.0382	-0.9435	-0.9435	NAA FUJ YMZ
500	1998/10/18.23:17	35.7	139.3	107	4.2	2.04e15	66.98	Tokyo pref	115	50	-73	270	43	-109	0.9817	0.1240	-0.1342	-0.0382	-0.9435	-0.9435	NAA FUJ YMZ
501	1998/10/18.23:35	42.3	143.0	50	3.9	7.42e14	79.14	Hidaka mountains region	49	59	94	220	31	83	-0.4546	0.3637	0.3811	-0.4815	-0.9200	-0.9200	HSS TMR
502	1998/10/20.23:13	35.1	141.6	26	4.4	4.72e15	78.47	E off Boso peninsula	268	84	50	171	48	171	-0.1900	-0.6293	-0.3516	0.0855	0.9365	0.9365	HSS TMR
503	1998/10/21.07:38	38.0	139.3	35	3.6	3.21e14	85.96	NE Nigata pref	21	55	106	174	38	68	0.0942	0.1397	0.2574	-0.9509	-0.8587	-0.8587	KZK YMZ
504	1998/10/21.07:38	43.0	146.9	35	4.4	5.14e15	80.06	E off Hokkaido	299	98	-82	97	23	-109	0.6544	-0.4449	-0.7929	0.2117	-0.8681	-0.8681	NMR
505	1998/10/23.17:12	41.3	142.8	26	3.7	4.0e14	80.06	E off Aomori pref	293	70	79	144	23	119	-0.3981	-0.4859	-0.4268	-0.2204	-0.9281	-0.9281	HSS
506	1998/10/24.08:44	34.0	137.3	17	3.6	2.70e14	70.64	Ensyunada	336	63	-35	143	89	-146	-0.5539	0.0231	0.0697	-0.7566	0.1609	0.1609	JIZ SGN
507	1998/10/24.08:44	34.2	135.5	62	3.5	2.02e14	64.66	NE Wakayama pref	336	87	-48	166	82	-177	0.1052	0.0570	-0.2306	-0.7566	0.1609	0.1609	KIS ABU
508	1998/10/27.10:21	42.0	142.5	36	3.6	2.82e14	74.26	S off Utsunomiya	262	82	-146	166	82	-177	0.1052	0.0570	-0.2306	-0.7566	0.1609	0.1609	HSS ABU
509	1998/10/27.10:23	34.7	140.5	32	3.7	4.09e14	66.62	SE off Boso peninsula	139	74	-51	248	42	-155	0.7236	0.2585	-0.2824	-0.3568	-0.4158	-0.4158	TYM JIZ
510	1998/10/27.11:33	33.5	142.0	5	5.5	2.07e17	72.39	far E off Izu Islands	148	63	-83	23	41	137	-0.2093	-0.0784	-0.4978	-0.8937	-0.9280	-0.9280	TYM JIZ SGN
511	1998/10/31.18:01	36.4	140.6	50	4.0	1.05e15	69.43	northern Ibaraki pref	19	67	93	191	24	83	0.0564	0.2415	0.2375	-0.7268	0.6412	0.6412	TYM SGN
512	1998/10/31.21:21	35.2	139.8	89	4.0	1.34e15	92.69	Tokyo bay region	191	72	70	60	27	136	-0.1999	0.3702	-0.0025	-0.3844	0.7754	0.7754	SGN YMZ NAA
513	1998/11/01.09:02	37.6	137.3	11	3.5	2.34e14	76.11	E off Noto peninsula	244	56	121	18	45	53	-0.3227	0.5672	-0.4121	-0.4841	-0.1339	-0.8069	KZK SBT
514	1998/11/01.10:45	35.4	140.4	23	3.8	5.85e14	76.47	Kujukuri coast Boso pen	71	74	85	270	17	108	0.0979	0.0979	0.7936	0.0194	-0.2932	0.5154	SGN YMZ GJM
515	1998/11/01.19:13	41.9	141.5	107	4.3	3.00e15	87.50	S off Tomakomai	212	77	125	320	37	21	48.16	0.0033	-0.3691	-0.8222	0.6219	0.3406	TMR HSS FUJ
516	1998/11/02.02:46	41.5	142.7	14	3.6	3.01e14	69.21	E off Aomori pref	285	45	65	178	35	160	-0.0249	-0.5351	-0.7803	-0.2956	-0.0807	0.3205	URH SGN
517	1998/11/02.16:49	36.8	141.8	26	3.9	7.53e14	91.21	E off Fukushima pref	4	65	79	209	27	112	0.0903	0.2529	-0.0046	-0.7882	0.6240	0.6980	URH SGN
518	1998/11/02.23:11	43.5	147.5	53	5.1	4.35e15	83.37	E off Hokkaido	48	74	112	173	29	38	0.0708	0.2488	0.6702	-0.5826	-0.4317	0.5118	URH YMZ
519	1998/11/03.04:13	34.9	141.4	23	4.0	1.25e15	70.21	E off Boso peninsula	352	72	68	225	27	139	0.2688	0.2742	-0.1049	-0.7237	-0.4783	-0.4783	NMR JIZ
520	1998/11/03.07:48	37.9	141.7	86	4.1	1.53e15	76.60	E off Miyagi pref	192	58	-110	47	37	-61	0.2126	-0.3932	-0.1247	0.6607	-0.4619	-0.8732	TYM SBT GJM
521	1998/11/03.09:05	43.5	147.0	50	4.2	2.46e15	87.48	E off Hokkaido	39	62	143	148	58	33	0.5048	0.0912	0.4659	-0.1044	-0.0423	0.5097	URH
522	1998/11/04.21:44	36.5	140.6	50	3.9	7.22e14	74.79	northern Ibaraki pref	52	52	128	182	51	51	-0.1058	0.4315	0.4787	-0.6840	0.2339	0.7899	SGN
523	1998/11/05.22:26	35.0	139.2	8	3.9	5.95e14	93.36	E off Izu peninsula	77	84	156	170	66	77	0.3316	0.8324	0.4245	-0.3765	0.0404	0.0448	SGN SBT
524	1998/11/05.23:19	42.0	141.2	110	4.1	1.85e15	77.79	S off Tomakomai	172	87	33	80	58	176	0.2275	0.7923	0.0135	-0.3814	0.5261	0.0454	SGN URH
525	1998/11/07.05:35	34.8	142.1	38	5.1	5.01e16	77.79	E off Aomori pref	24	72	88	210	18	96	-0.1604	0.2143	-0.3121	-0.4355	-0.7473	-0.6059	TMR URH
526	1998/11/07.06:49	41.6	142.5	38	3.5	2.06e14	55.00	Hamanako lake region	286	99	157	25	68	23	-0.6677	0.6472	-0.2117	-0.4471	-0.4513	-0.2209	FUJ JIZ
527	1998/11/07.14:12	28.3	129.3	20	4.6	1.01e16	68.29	near Amanohashima island	243	76	138	346	49	89	0.3123	-0.3672	-0.8913	-0.6489	0.1749	0.3558	TKY
528	1998/11/07.14:12	42.7	143.4	40	3.9	7.98e14	86.82	Tokachi region	1	51	94	175	39	83	-0.1239	0.0584	0.0942	-0.8400	-0.1718	0.7898	KZK NAA
529	1998/11/08.12:40	35.6	140.0	71	4.7	1.30e15	91.26	central Chiba pref	6	60	100	170	53	73	0.0964	0.0092	0.3594	-0.8600	-0.5200	-0.8600	URH
530	1998/11/08.21:26	41.6	142.6	50	4.1	1.69e15	63.06	E off Aomori pref	6	60	106	156	53	64	-0.1098	0.1442	0.2413	-0.8779	-0.4740	0.8977	TMR
531	1998/11/09.00:12	34.8	137.1	32	3.8	5.01e14	72.33	Mikawa bay region	130	86	162	221	72	4	-0.9472	0.1485	0.1816	0.9278	0.2556	0.0194	NAA FUJ ABU
532	1998/11/10.02:21	33.2	132.8	35	4.2	2.15e15	84.72	SW Kochi pref	187	52	-75	344	41	-08	-0.2660	0.0991	0.1088	1.1002	-0.1991	-0.8342	TKD ISI KIS
533	1998/11/10.17:59	43.6	147.3	53	4.1	1.63e15	68.53	E off Hokkaido	70	58	129	194	49	45	-0.2853	0.6201	0.4369	-0.4233	0.2166	-0.7086	NMR URH
534	1998/11/11.06:47	34.7	140.6	47	4.1	1.57e15	89.97	SE off Boso peninsula	147	74	-42	251	50	-159	0.7333	0.3912	-0.0690	-0.4161	-0.6686	-0.3172	TYM JIZ SGN
535	1998/11/11.07:17	34.7	140.6	29	3.6	3.20e14	82.90	near Tanegashima island	29	75	104	164	20	47	0.3159	0.2579	0.3536	-0.6500	-0.7602	0.3341	TYM JIZ SGN
536	1998/11/12.18:30	30.4	131.2	30	4.0	1.12e15	71.50	E off Fukushima pref	197	68	-126	80	42	-35	0.3691	-0.5876	-0.0747	0.1983	-0.6276	-0.5876	TKD KZK
537	1998/11/13.05:31	37.0	141.3	59	3.8	5.61e14	82.81	E off Ibaraki pref	23	68	94	192	22	80	-0.0503	0.1999	0.3039	-0.6301	-0.6612	0.6805	SGN
538	1998/11/14.07:32	36.8	140.9	59	3.7	3.73e14	74.71	E off Ibaraki pref	194	56	86	22	34	96	-0.1772	0.2347	-0.0443	-0.7979	0.3781	0.9752	SGN
539	1998/11/15.18:54	32.0	140.8	59	4.1	1.51e15	74.65	E off Hachijojima island	313	74	53	203	40	154	0.3454	-0.2342	-0.6212	-0.7713	-0.3343	0.4259	JIZ
540	1998/11/15.21:33	35.6	140.1	74	3.8	5.32e14	89.28	central Chiba pref	6	72	99	161	20	65	0.017						

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
561	1998/12/02/02:02	35.4	136.6	41	3.6	2.65e14	92.86	northern Mje pref	180	65	-68	316	33	-129	0.11328	0.30983	0.23119	0.6415	-0.6078	-0.7543	NAA ABU KIS
562	1998/12/02/20:11	38.0	140.4	61	4.4	3.87e15	90.41	central Chiba pref	217	69	-142	111	54	-26	0.8458	-0.4001	0.0512	-0.4362	-0.5473	-0.4096	YMZ KZK
563	1998/12/04/07:35	38.0	140.4	29	4.5	5.52e15	67.12	E off Boso peninsula	83	71	125	190	33	32	-0.3868	0.5859	0.6573	-0.1258	0.0987	0.5126	SGN YMZ
564	1998/12/04/16:15	38.0	140.4	47	3.9	8.54e14	79.09	SW Ibaraki pref	80	73	75	271	33	129	-0.5615	0.1809	0.5497	-0.0206	-0.5839	0.5821	SGN YMZ
565	1998/12/04/16:38	38.5	135.1	31	4.1	1.50e15	93.30	S Part of Kii channel	324	77	-97	171	15	-63	0.0185	0.2126	0.5390	0.3980	0.7073	-0.4165	KIS ISI ABU
566	1998/12/05/09:36	41.9	144.3	20	4.4	4.07e15	68.73	SE off Tokachi	323	79	56	277	36	160	-0.4424	0.5024	0.2161	0.1219	0.7371	0.3205	URH NMR
567	1998/12/09/13:12	38.1	143.1	38	3.7	3.81e14	68.27	E off Miyagi pref	24	64	95	192	26	80	-0.0607	0.2366	0.2833	-0.7157	-0.5512	0.7764	GJM
568	1998/12/09/15:56	42.3	143.1	58	4.9	2.18e16	91.99	Hidaka mountains region	40	65	85	231	25	100	-0.3853	0.3866	0.3928	-0.3663	-0.5191	0.7516	NMR
569	1998/12/11/23:14	34.1	141.6	62	3.9	8.49e14	58.53	far SE off Boso pen	328	84	57	229	33	170	0.4197	0.1849	-0.5219	-0.5855	0.1657	0.6499	YMZ
570	1998/12/12/17:21	32.8	130.1	11	3.5	2.18e14	69.03	near Unzendake	135	83	-32	229	58	-172	0.9018	0.0662	-0.2908	-0.7810	-0.4394	-0.1209	TKD
571	1998/12/12/19:11	35.6	140.1	62	3.5	2.11e14	56.08	central Chiba pref	15	66	101	169	26	66	-0.0393	0.0073	0.2707	-0.7186	-0.6200	0.7579	TYM SGN
572	1998/12/15/10:49	37.0	142.1	32	3.6	3.25e14	53.20	E off Fukushima pref	290	60	135	46	52	39	-0.8508	0.2665	-0.2388	-0.2531	-0.5671	0.5977	YKZ
573	1998/12/16/00:18	31.3	131.6	35	6.1	1.85e18	76.53	SE off Osumi pen	10	70	-73	147	26	-130	-0.0773	0.1647	-0.2224	0.6855	0.7059	-0.6083	TKD
574	1998/12/17/12:49	36.1	141.4	26	5.1	4.37e16	78.25	far E off Ibaraki pref	8	85	67	267	24	168	0.0686	0.4508	0.2257	-0.1512	-0.8787	0.0825	SGN SBT
575	1998/12/17/20:48	43.4	147.0	65	4.0	9.88e14	77.44	E off Hokkaido	217	88	-65	311	25	-175	-0.3430	0.1554	0.6138	0.4326	-0.6730	-0.0895	URH
576	1998/12/18/01:27	36.4	141.0	41	4.0	1.30e15	84.13	E off Ibaraki pref	10	80	84	221	12	121	0.1826	0.2263	0.1774	-0.4133	-0.9158	0.2307	YKZ
577	1998/12/18/10:08	30.2	130.0	116	4.7	1.16e16	80.42	near Tokara Islands	35	57	-75	189	36	-112	0.1281	-0.3023	-0.3591	0.7802	0.2230	-0.9083	TKD
578	1998/12/19/02:09	35.5	139.0	23	3.7	3.78e14	73.83	eastern Yamanashi pref	228	48	87	153	42	93	-0.5894	0.5194	-0.0465	-0.3861	0.0840	0.9735	FUJ
579	1998/12/19/14:24	29.7	129.5	210	4.8	1.59e16	57.85	near Tokara Islands	27	71	107	163	25	49	0.1261	0.0669	0.4175	-0.6969	-0.6340	0.5708	TKA
580	1998/12/20/16:18	38.8	140.7	5	4.0	1.07e15	87.64	northern Miyagi pref	174	66	101	328	26	66	0.0269	-0.2725	0.0132	-0.7172	0.6612	0.6904	GJM SBT
581	1998/12/22/06:20	31.1	130.6	145	4.3	3.33e15	93.51	Satsuma peninsula region	210	88	34	118	56	177	-0.7255	0.4472	-0.2486	0.6737	0.4992	0.0519	TKD
582	1998/12/22/10:23	36.1	140.6	50	4.3	2.70e15	77.27	southern Ibaraki pref	330	63	-41	181	54	-146	0.7075	0.5496	-0.1085	-0.1871	0.5295	-0.5204	TYM SGN
583	1998/12/22/15:18	34.6	128.9	11	4.0	1.20e15	80.19	far SE off Kyushu pen	221	88	-98	119	8	-12	0.1664	-0.0523	0.6475	-0.1097	-0.7505	-0.0567	TKD
584	1998/12/23/07:15	34.0	141.3	38	4.3	5.03e15	89.46	far SE off Boso pen	196	84	-72	304	19	-167	-0.0023	0.2660	0.3647	0.2612	-0.8688	-0.2590	SGN FUJ
585	1998/12/23/09:08	32.0	131.9	68	4.3	2.95e15	70.72	Hyuganada region	149	75	65	290	29	147	-0.6862	0.2329	0.5469	0.2494	-0.5395	0.4368	TKD ISI
586	1998/12/23/07:02	40.8	142.7	58	3.5	2.33e14	71.60	E off Aomori pref	59	61	72	273	34	119	-0.8180	0.2102	0.3454	-0.0039	-0.4035	0.8220	TMR
587	1998/12/25/10:39	37.4	139.4	17	3.8	6.38e14	87.61	western Fukushima pref	65	87	153	157	63	114	0.5958	0.6066	0.4077	-0.7083	-0.1919	0.1125	KZK YMZ
588	1998/12/26/03:46	34.3	141.9	17	4.3	3.45e15	63.20	far SE off Boso pen	295	68	81	138	24	111	-0.4888	-0.4815	-0.6406	-0.1148	-0.2795	0.6036	JIZ
589	1998/12/27/08:43	36.6	141.6	35	3.7	3.38e14	78.33	E off Ibaraki pref	44	87	103	147	13	13	0.2069	0.1366	0.6469	-0.2492	-0.7232	0.0423	YKZ
590	1998/12/27/23:45	43.2	143.0	135	4.3	2.93e15	78.15	Taisetsu mountains reg	134	84	88	332	6	109	-0.0730	-0.1083	0.7079	-0.1341	0.6715	0.2071	URH NMR
591	1998/12/28/02:55	37.9	142.9	11	3.9	7.76e14	86.60	far E off Miyagi pref	31	86	160	123	70	4	0.8801	-0.4224	0.3064	-0.7833	-0.2272	-0.0968	YKZ SBT
592	1998/12/28/17:48	42.9	146.3	35	4.0	9.98e14	92.19	off Nemuro peninsula	49	75	86	244	15	104	-0.3313	0.2926	0.6582	-0.1110	-0.5730	0.4423	GJM

Jan, 1, 1998 - Jan, 31, 1998 (UT)

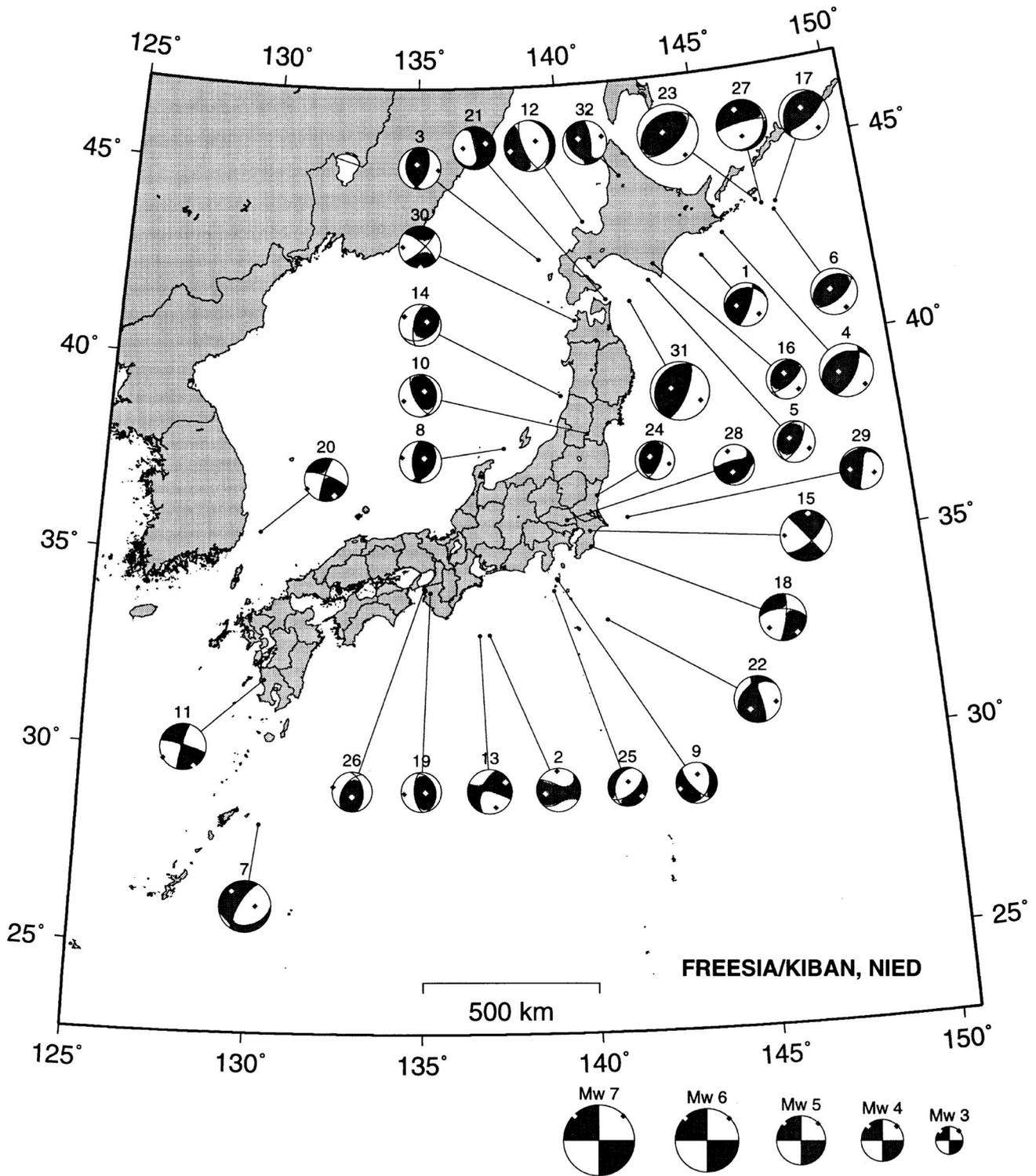


Fig. 2: Estimated moment tensors plotted with epicentral locations. Two special maps are prepared for the Off Ito swarm activity in April - June, 1998 and the Hida swarm activity in April - October, 1998 and are shown at the end. In both figures, hypocentral locations are based on the unified hypocenter catalog maintained by JMA (Japan Meteorological Agency, 1998).

Feb, 1,1998 - Feb,28,1998 (UT)

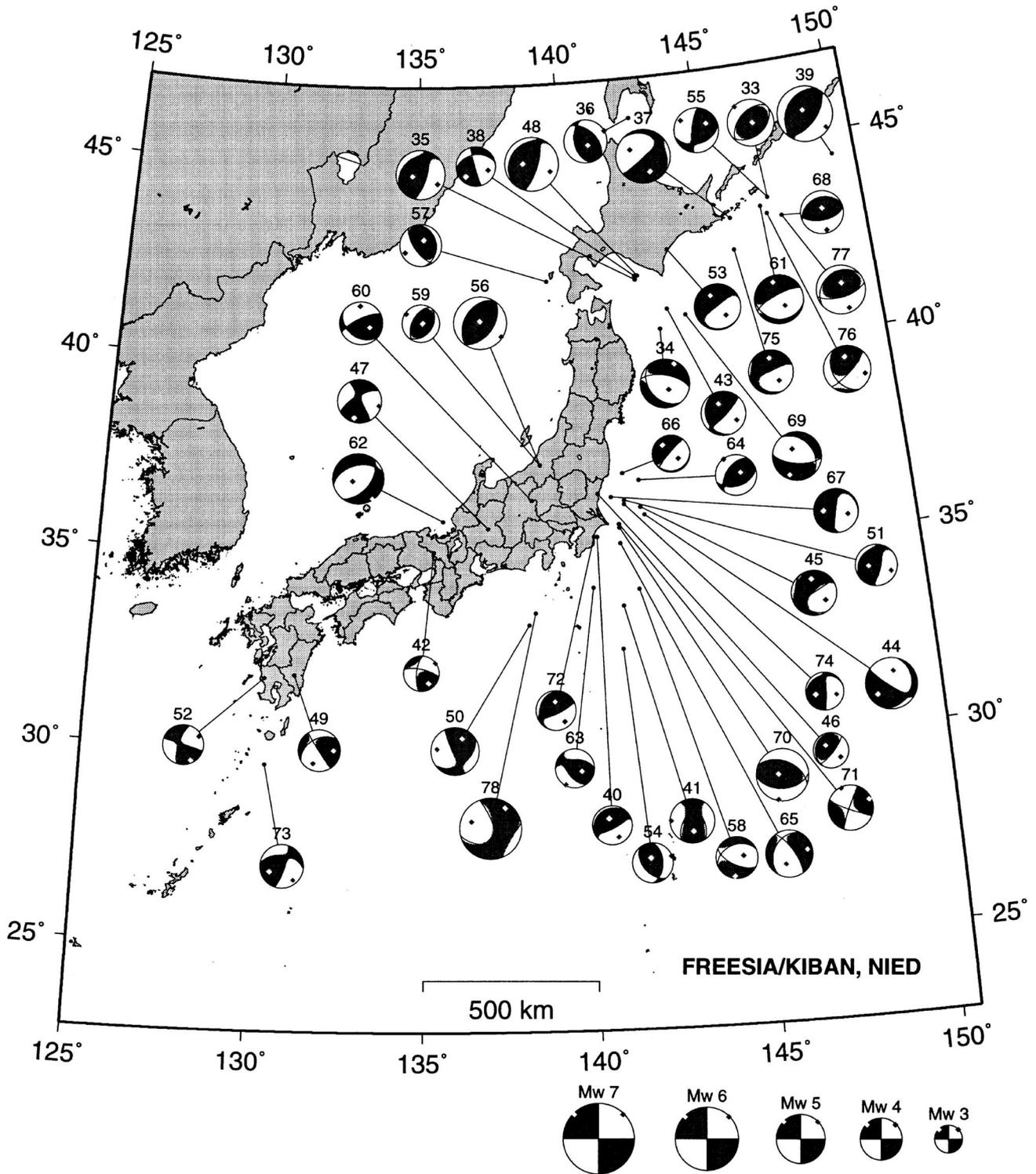


Fig. 2: Estimated moment tensors plotted with epicentral locations (continued).

Mar, 1, 1998 - Mar, 31, 1998 (UT)

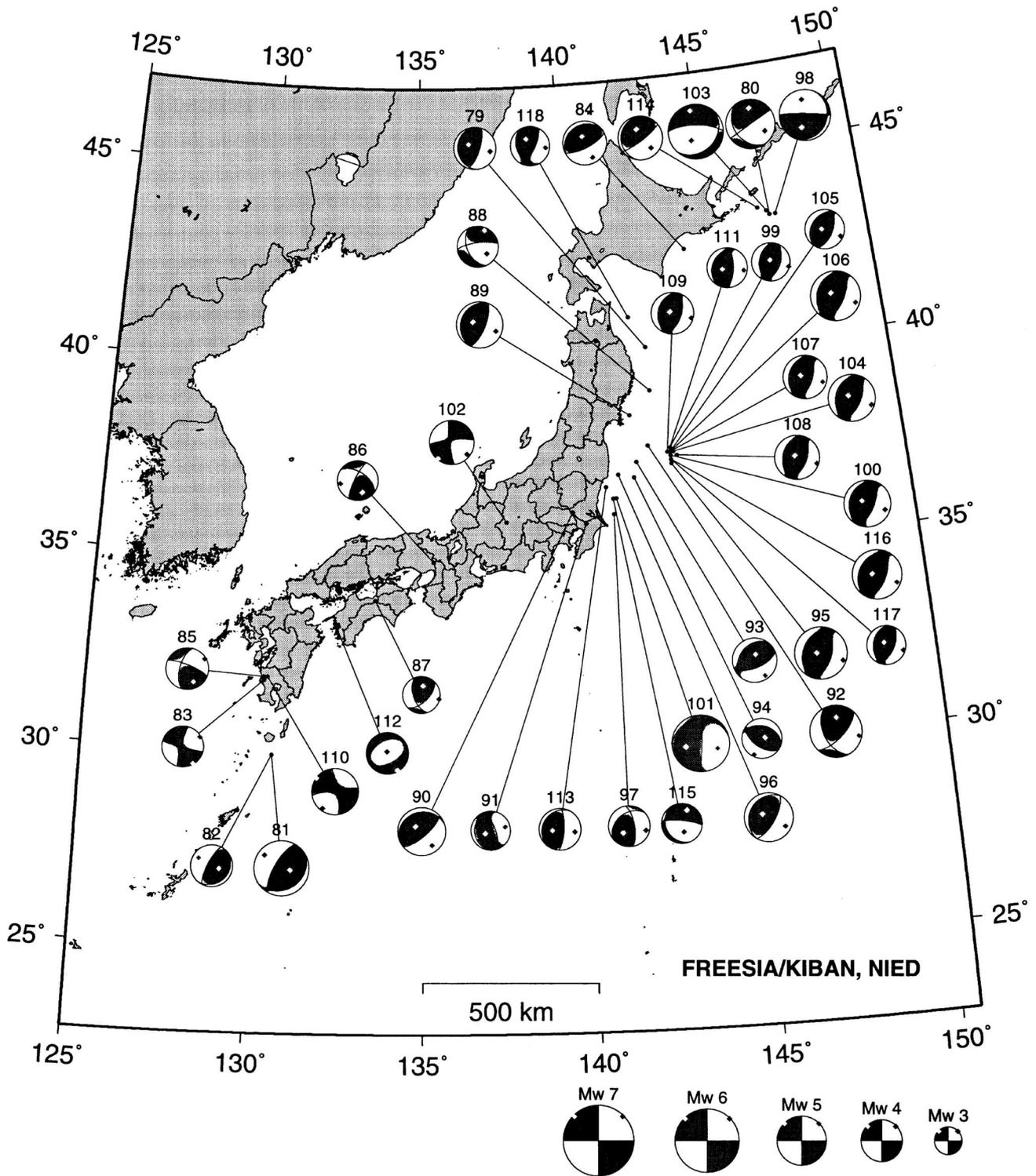


Fig. 2: Estimated moment tensors plotted with epicentral locations (continued).

Apr, 1, 1998 - Apr, 21, 1998 (UT)

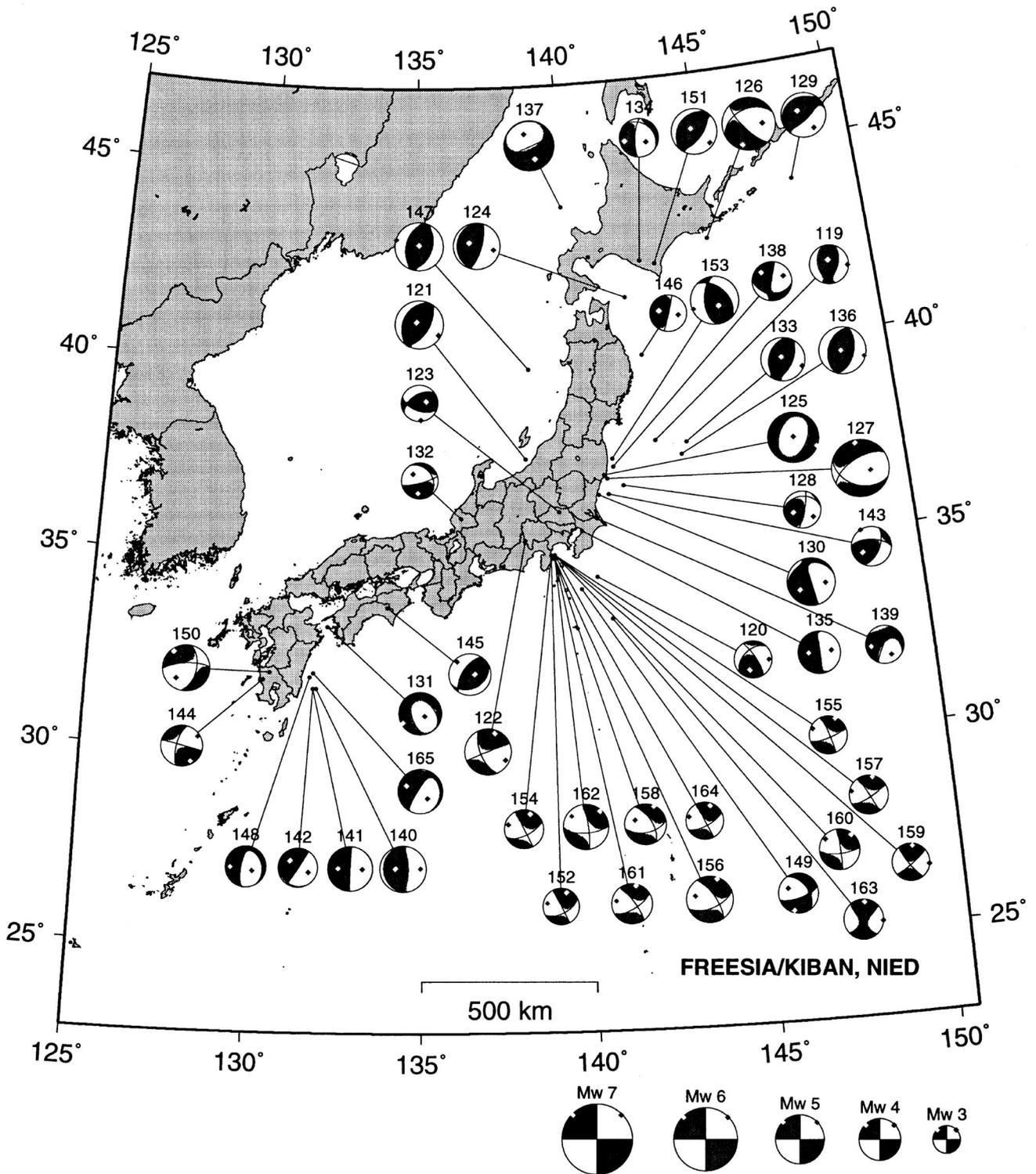


Fig. 2: Estimated moment tensors plotted with epicentral locations (continued).

Apr,22,1998 - Apr,30,1998 (UT)

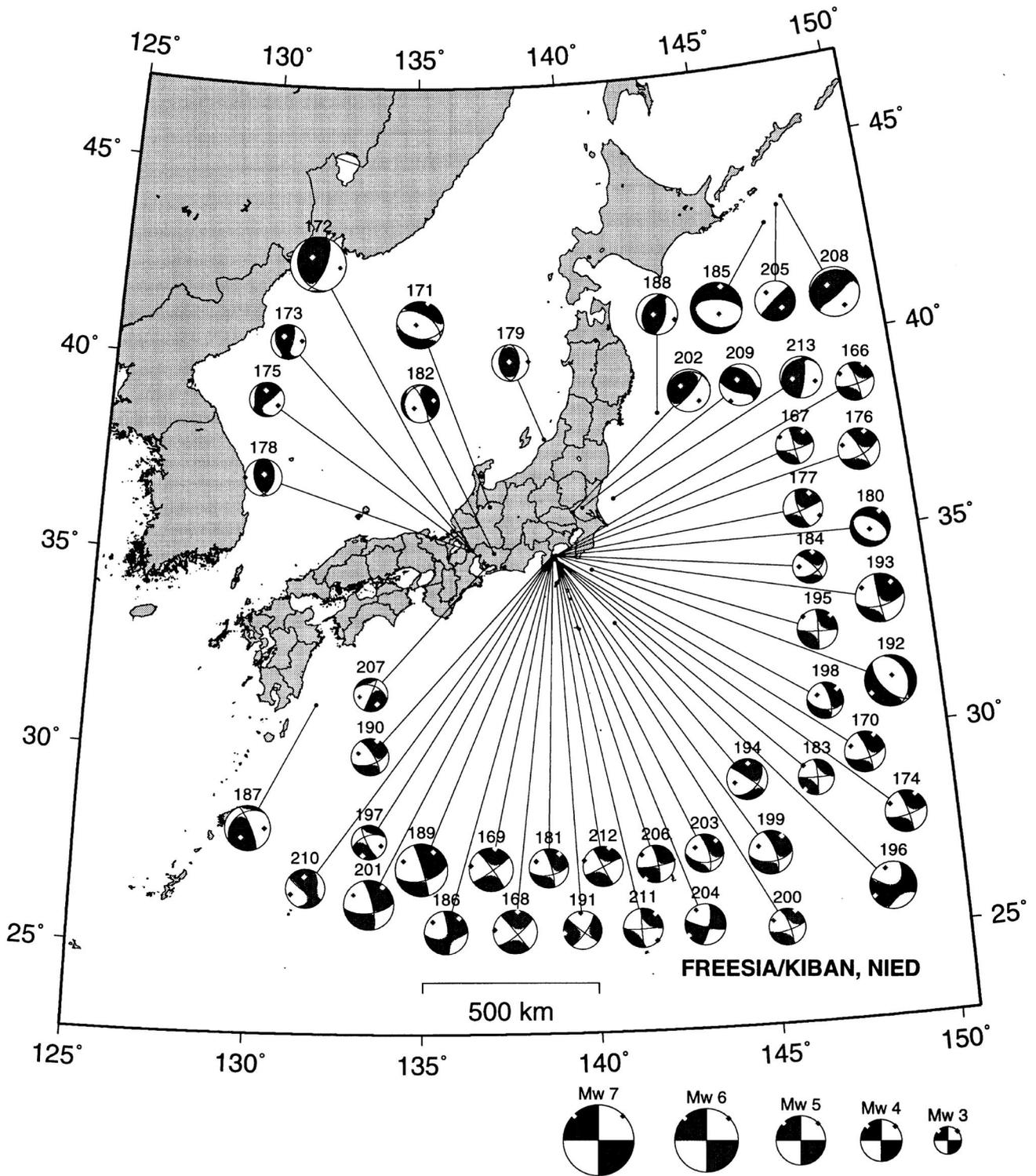


Fig. 2: Estimated moment tensors plotted with epicentral locations (continued).

May, 1, 1998 - May, 31, 1998 (UT)

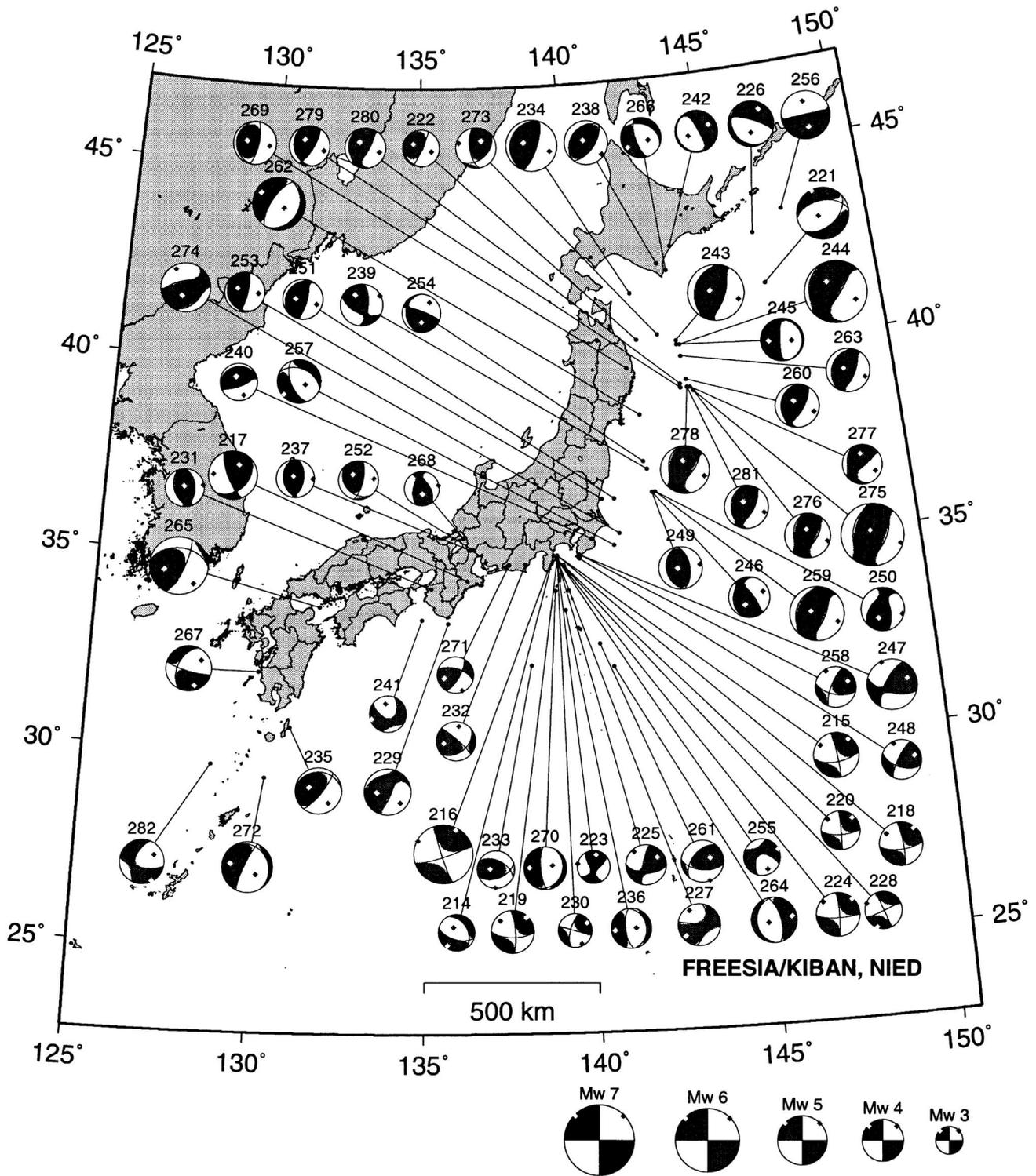


Fig. 2: Estimated moment tensors plotted with epicentral locations (continued).

Jun, 1, 1998 - Jun, 30, 1998 (UT)

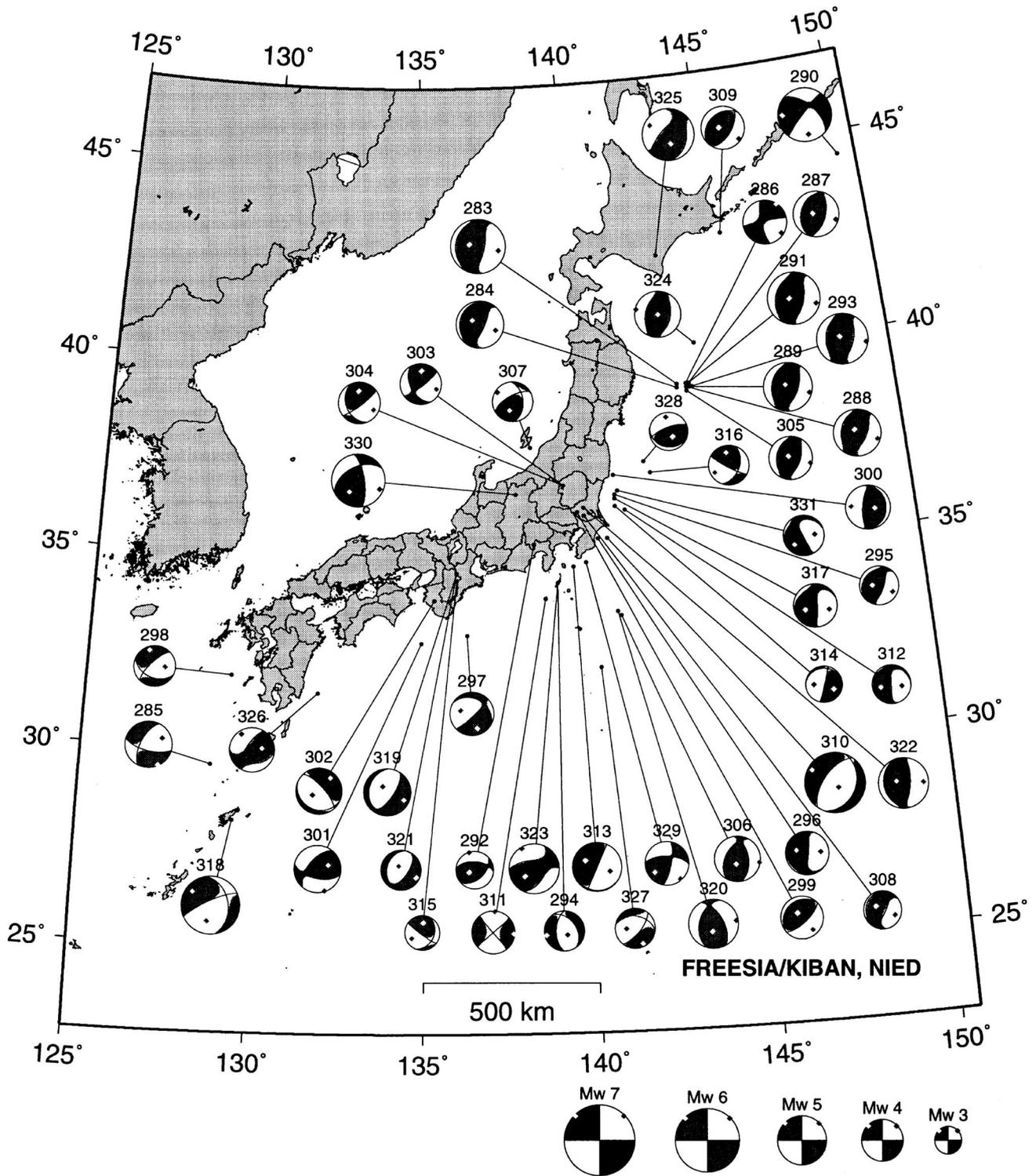


Fig. 2: Estimated moment tensors plotted with epicentral locations (continued).

Jul, 1,1998 - Jul,31,1998 (UT)

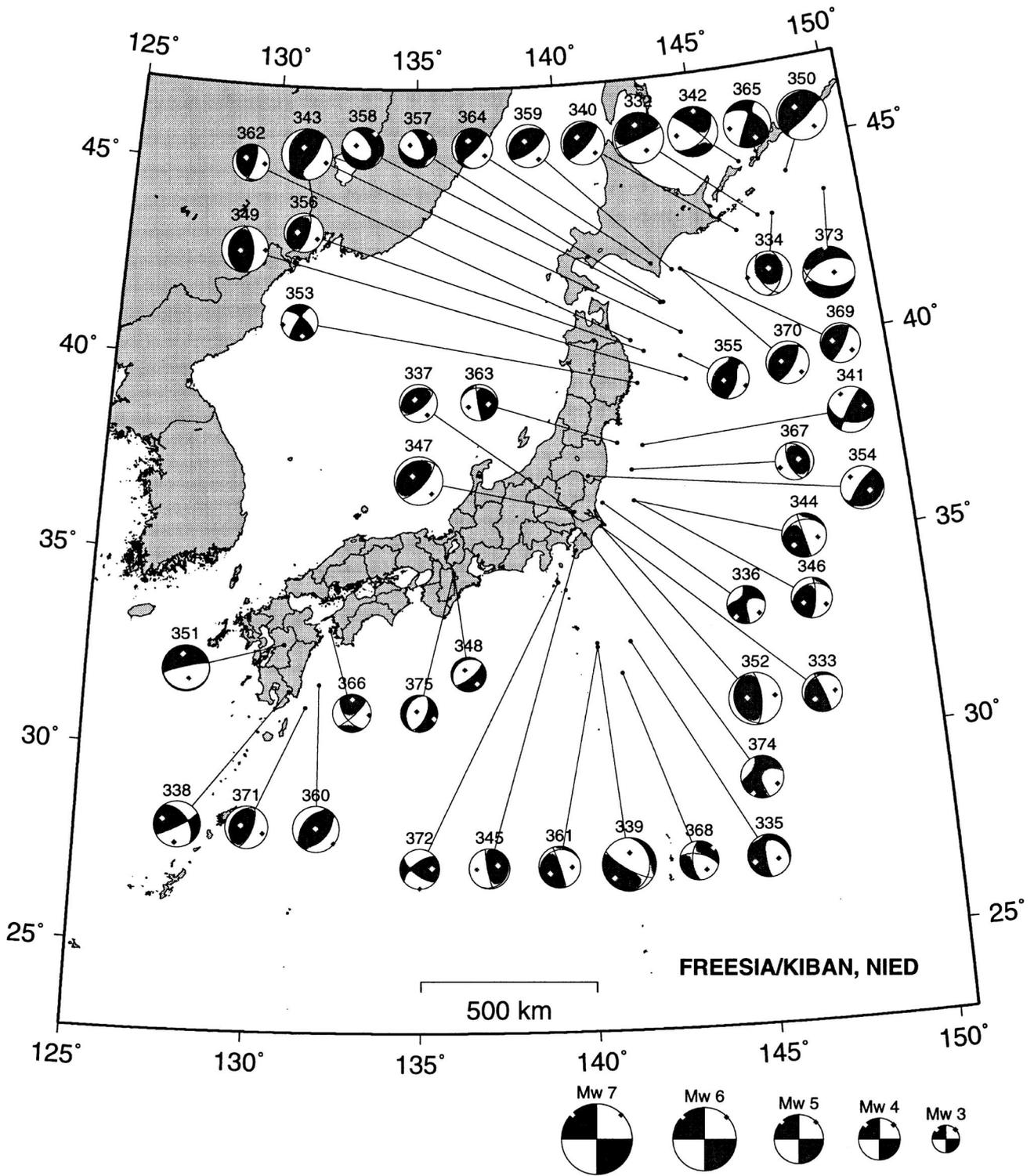


Fig. 2: Estimated moment tensors plotted with epicentral locations (continued).

Aug, 1, 1998 - Aug, 31, 1998 (UT)

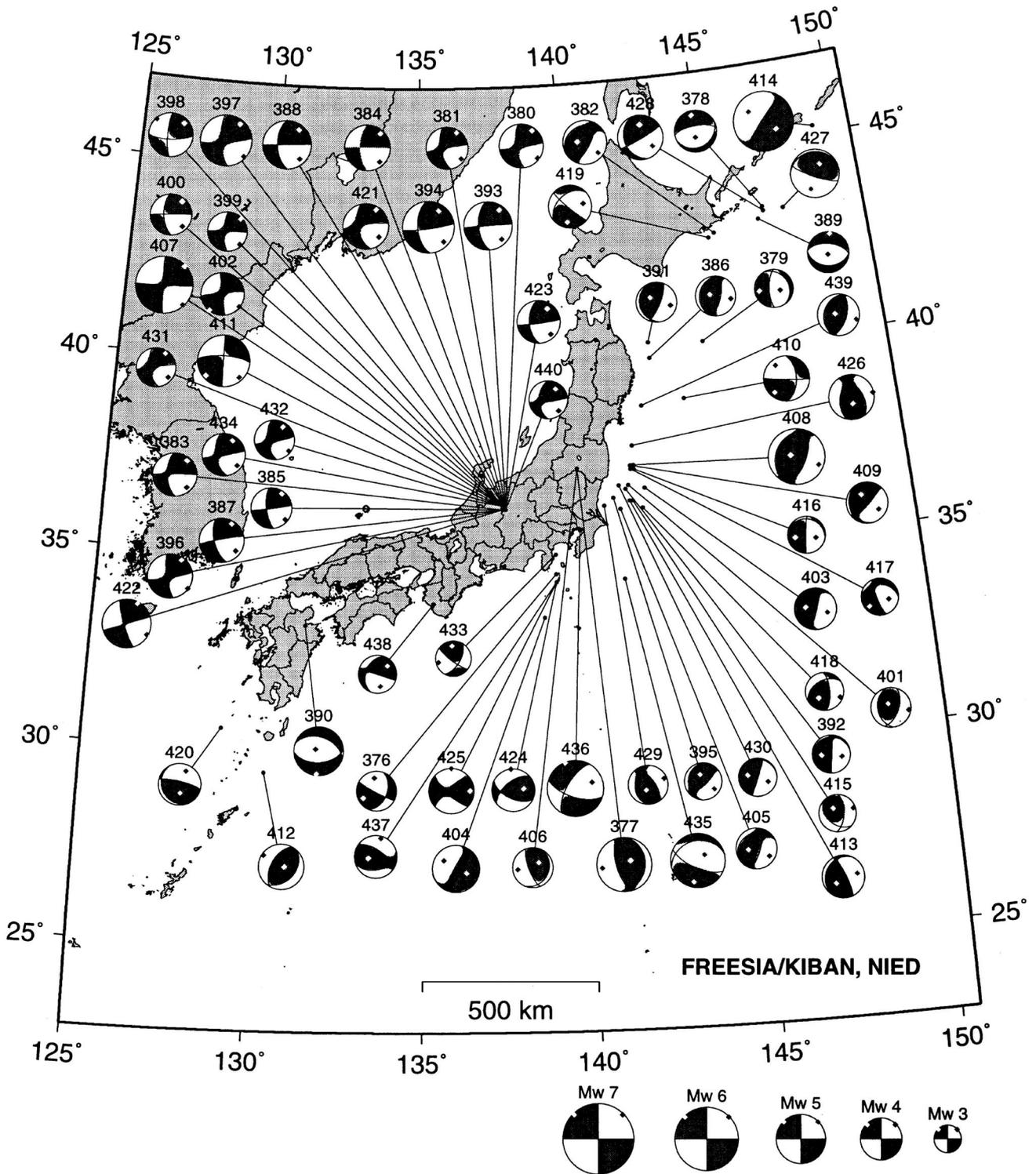


Fig. 2: Estimated moment tensors plotted with epicentral locations (continued).

Sep, 1, 1998 - Sep, 30, 1998 (UT)

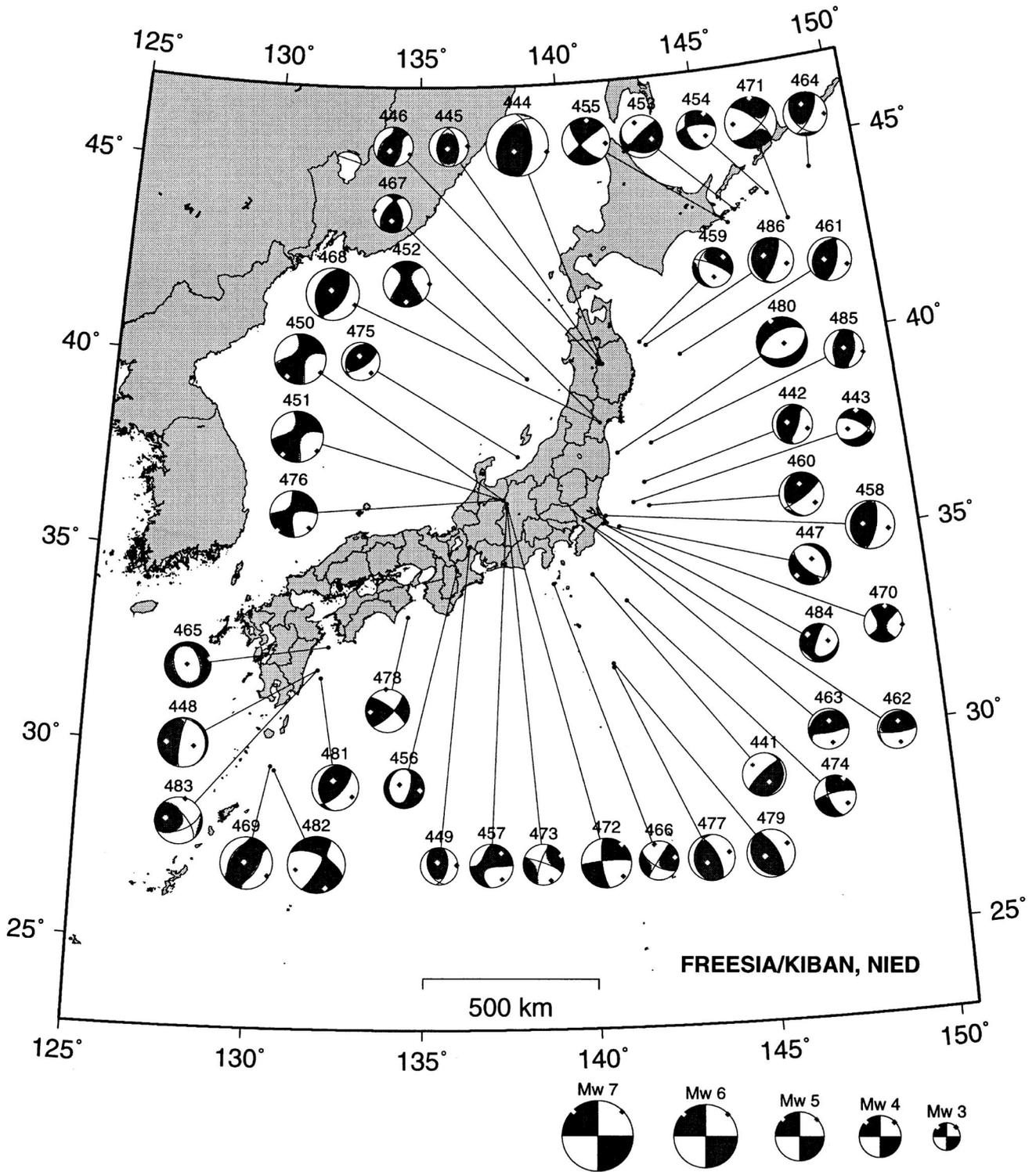


Fig. 2: Estimated moment tensors plotted with epicentral locations (continued).

Oct, 1, 1998 - Oct, 31, 1998 (UT)

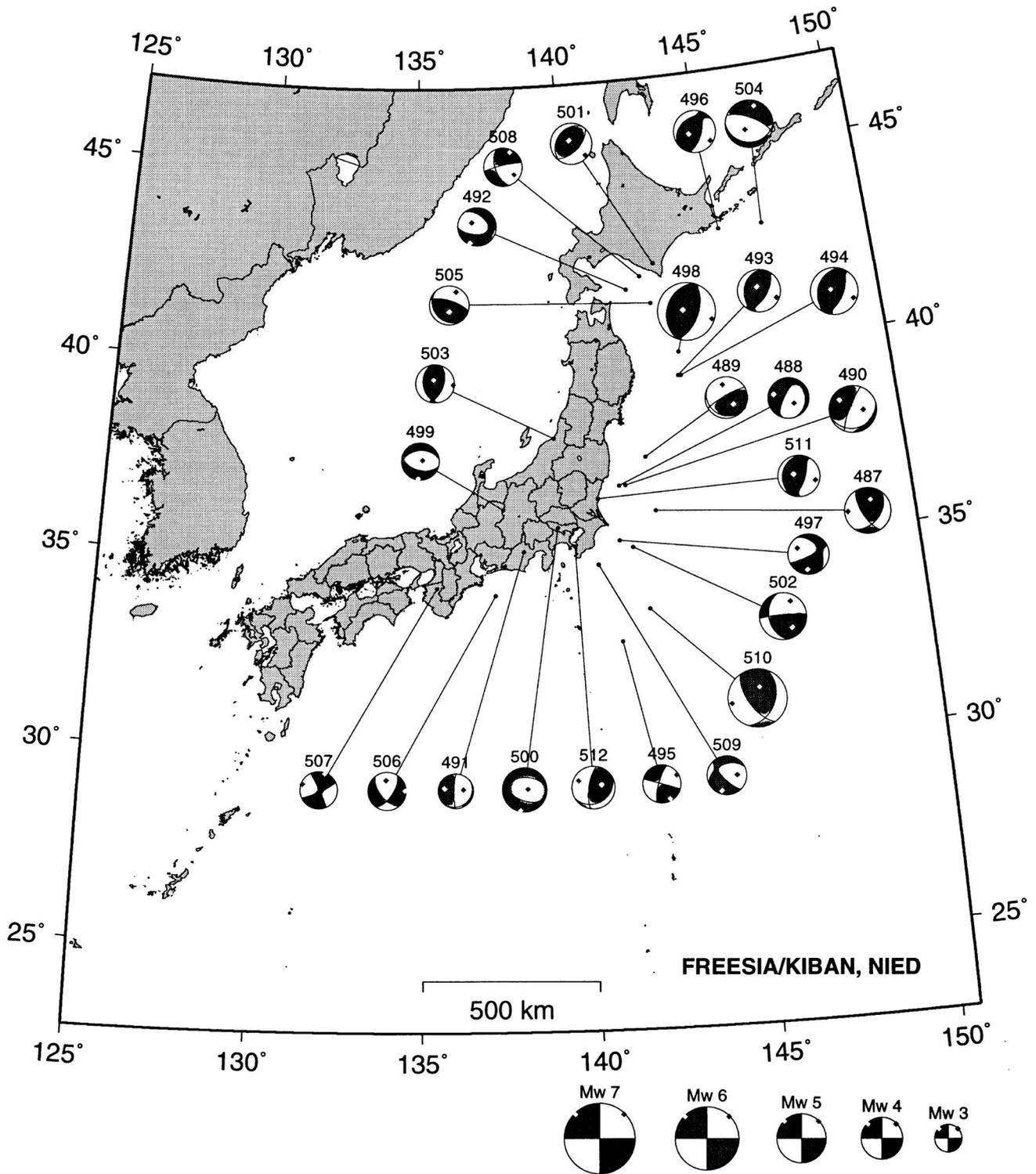


Fig. 2: Estimated moment tensors plotted with epicentral locations (continued).

Nov, 1,1998 - Nov,30,1998 (UT)

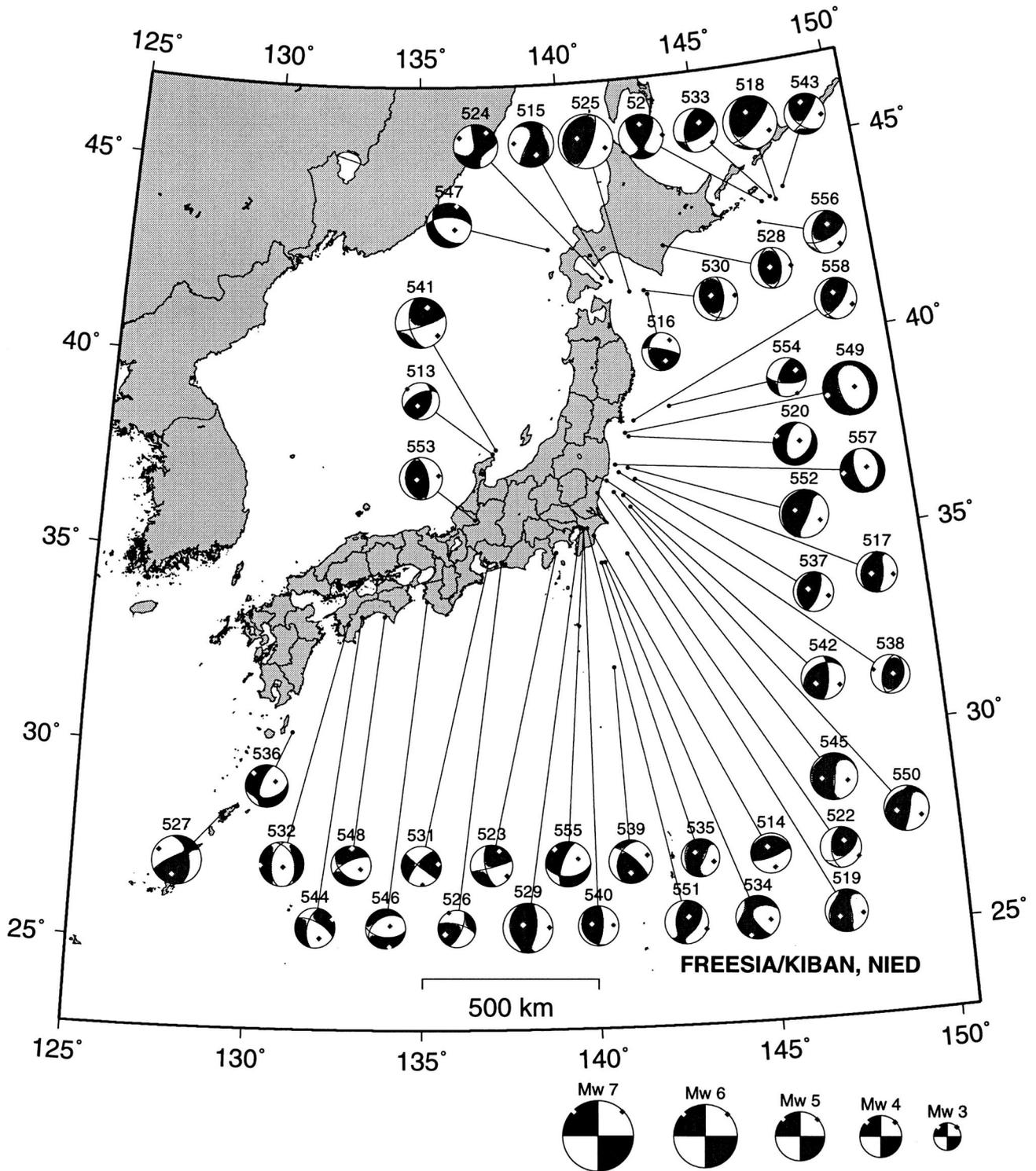


Fig. 2: Estimated moment tensors plotted with epicentral locations (continued).

Dec, 1, 1998 - Dec, 31, 1998 (UT)

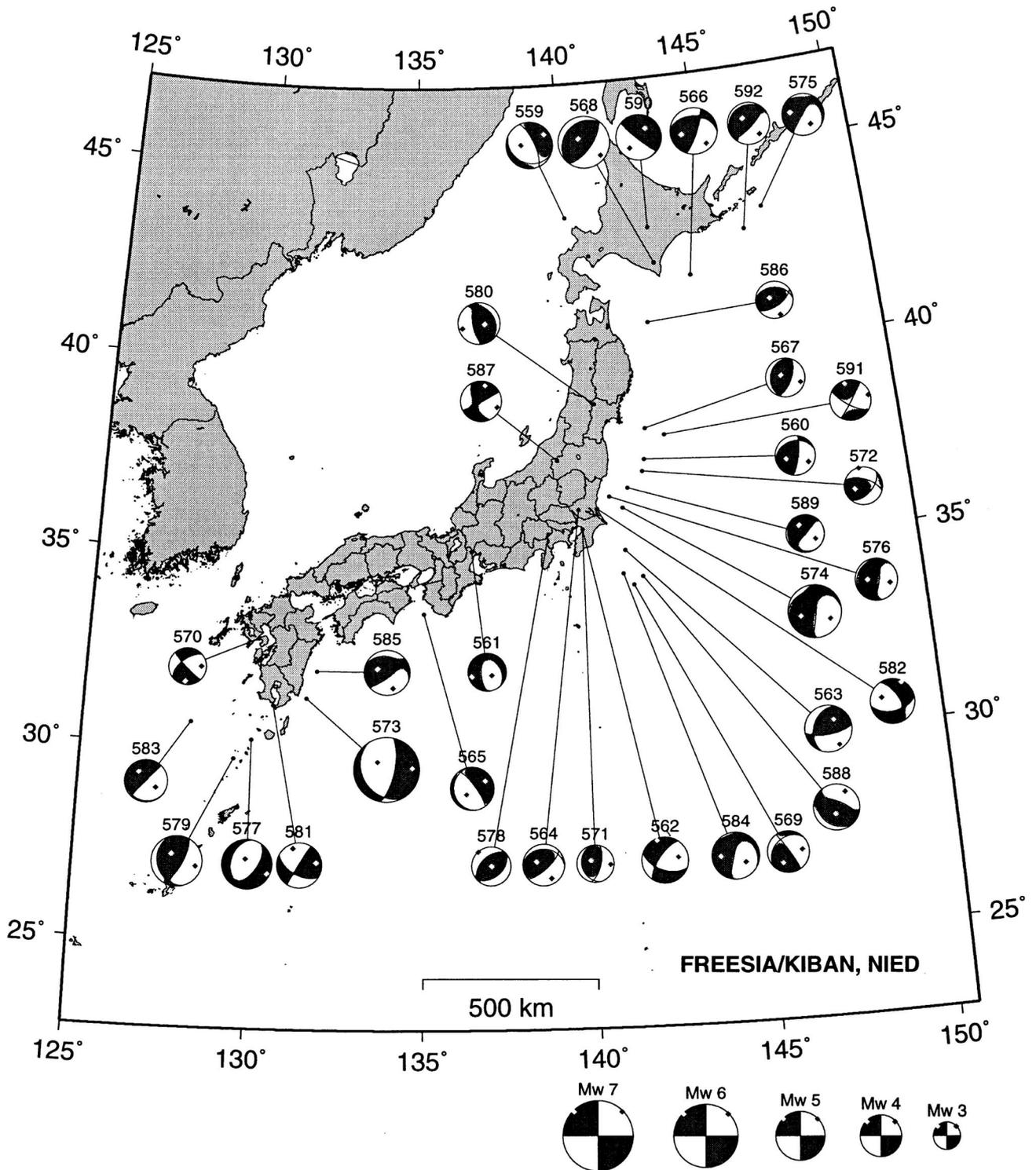


Fig. 2: Estimated moment tensors plotted with epicentral locations (continued).

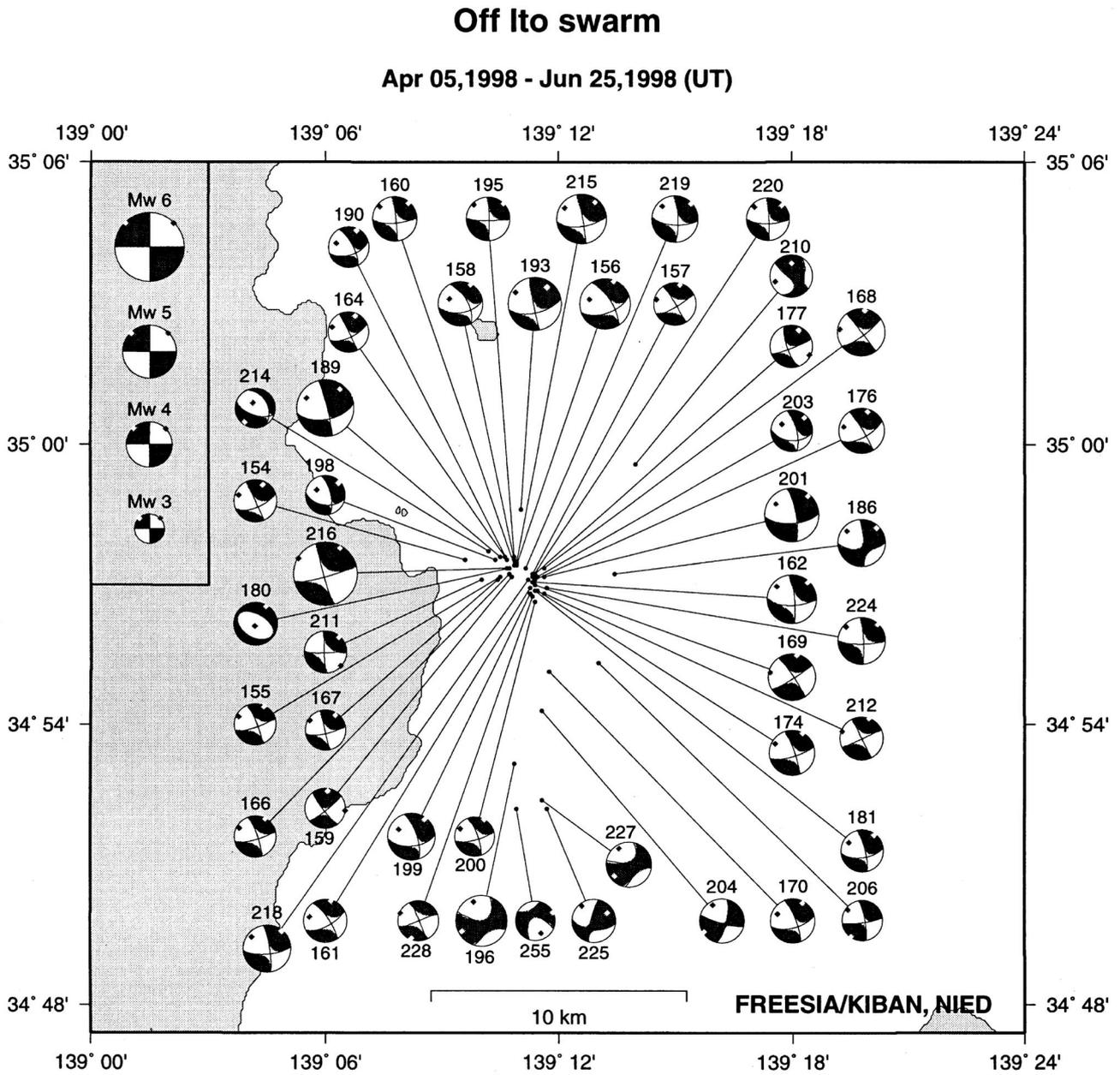


Fig. 2: Estimated moment tensors plotted with epicentral locations (continued).

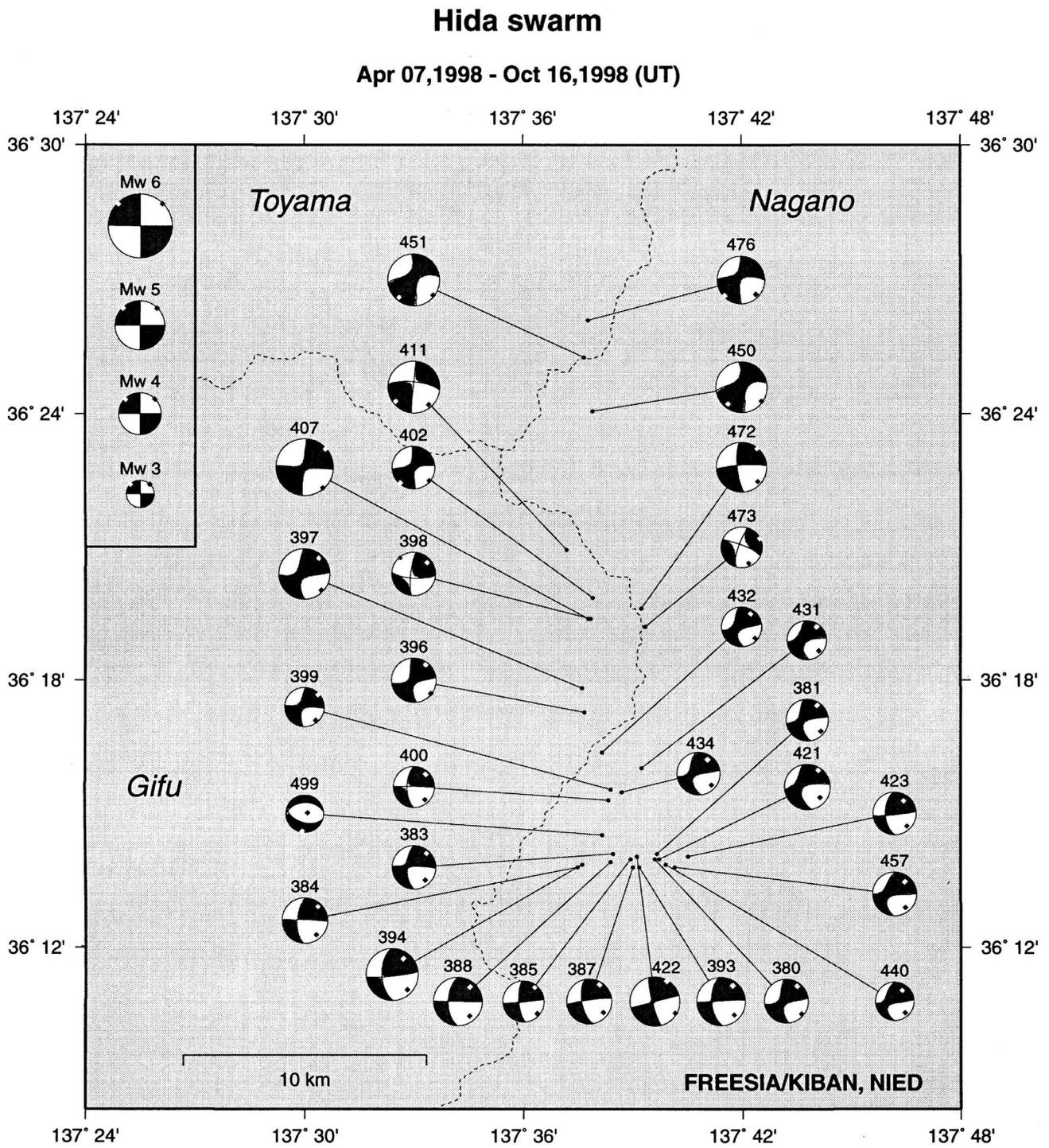


Fig. 2: Estimated moment tensors plotted with epicentral locations (continued).

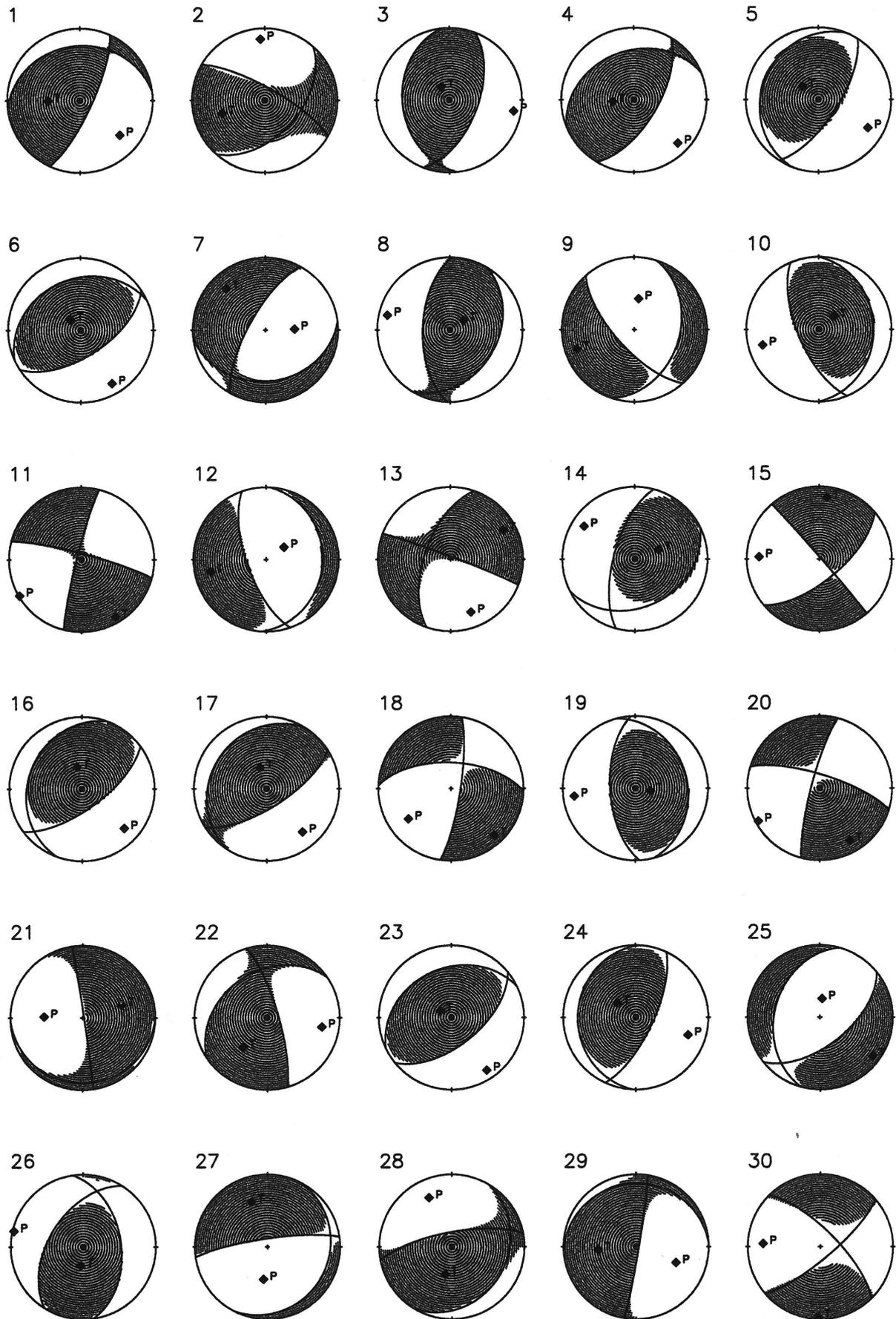


Fig. 3: Estimated moment tensors plotted to the lower hemisphere. P- and T- axes are also plotted.

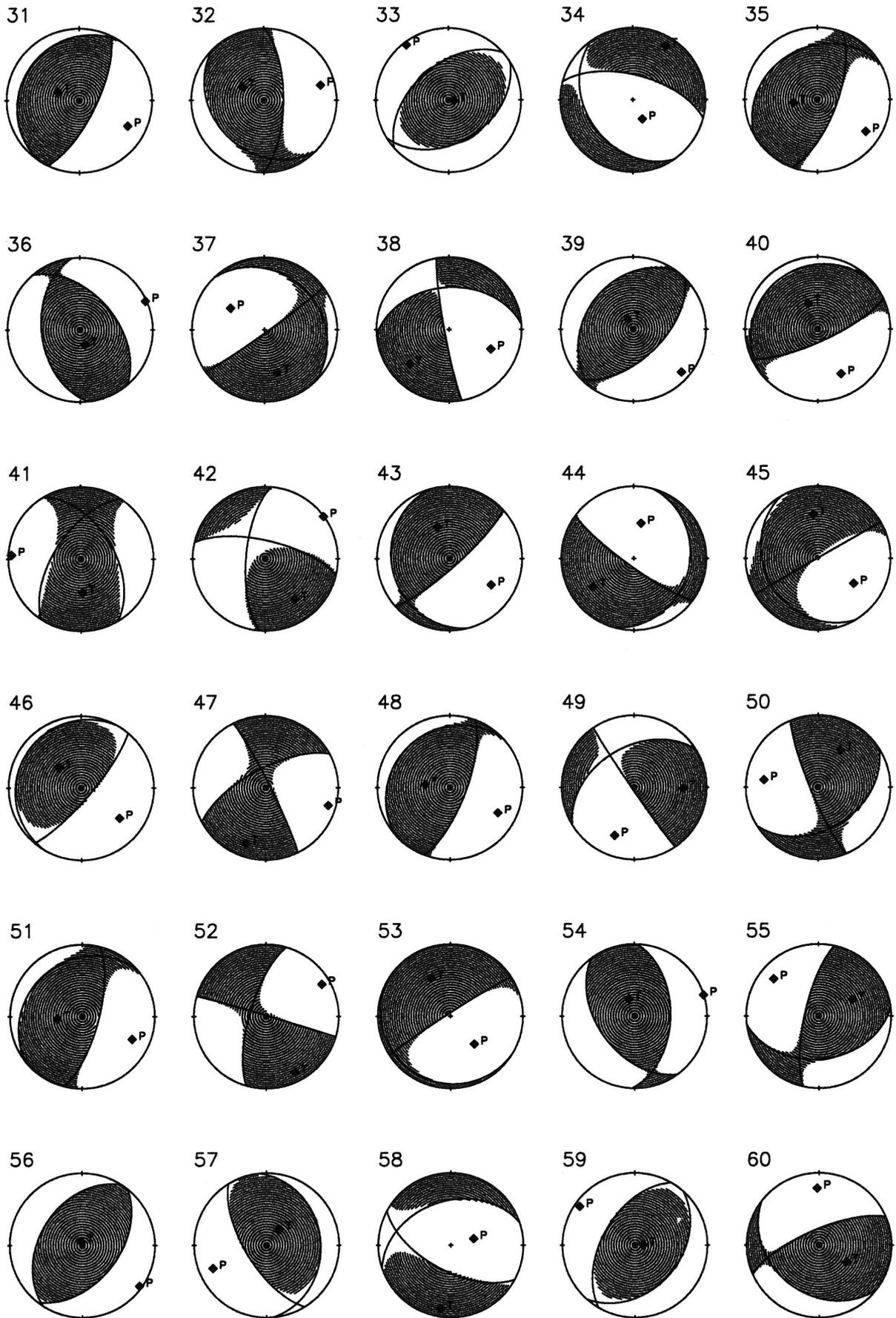


Fig. 3: Estimated moment tensors plotted to the lower hemisphere (continued).

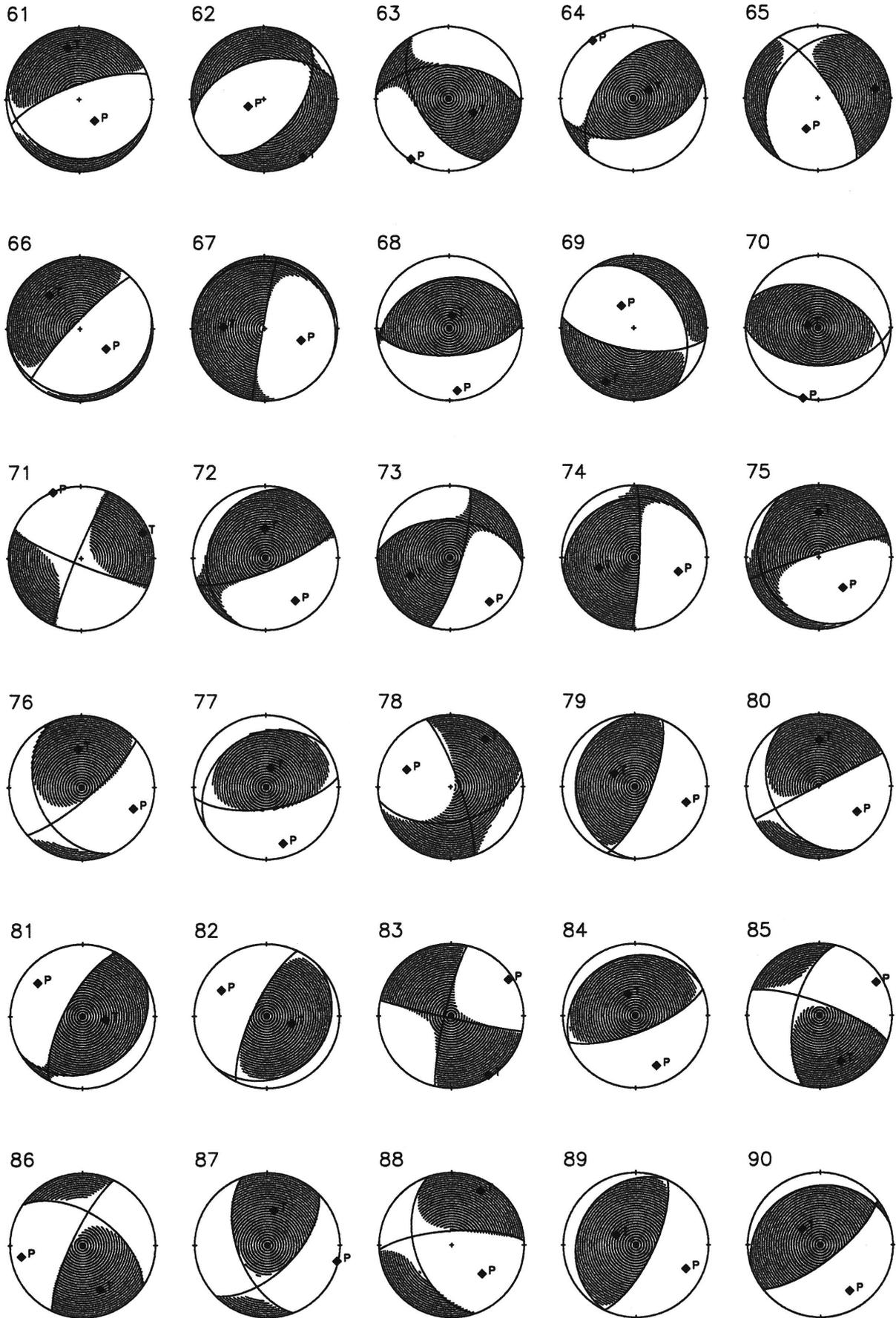


Fig. 3: Estimated moment tensors plotted to the lower hemisphere (continued).

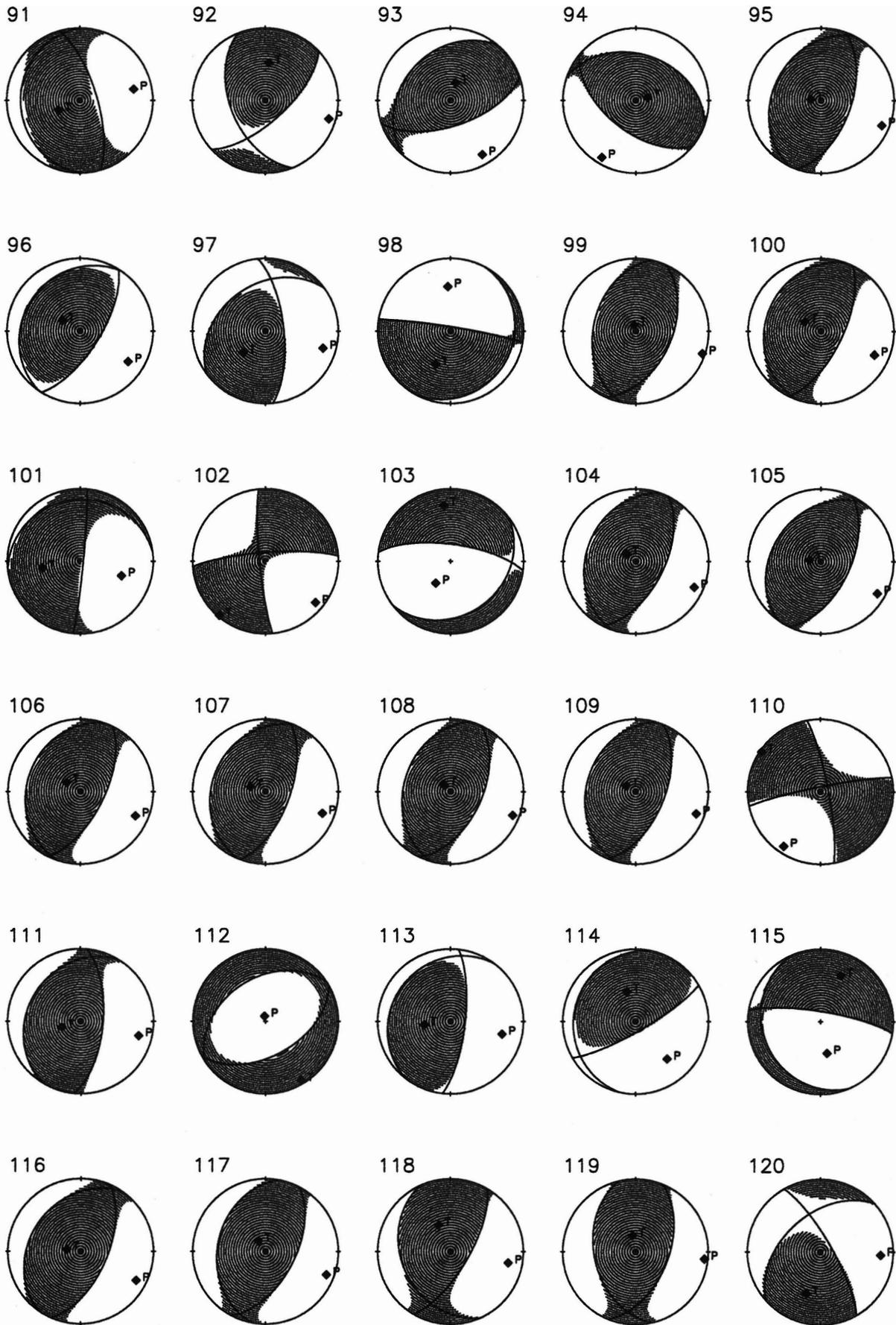


Fig. 3: Estimated moment tensors plotted to the lower hemisphere (continued).

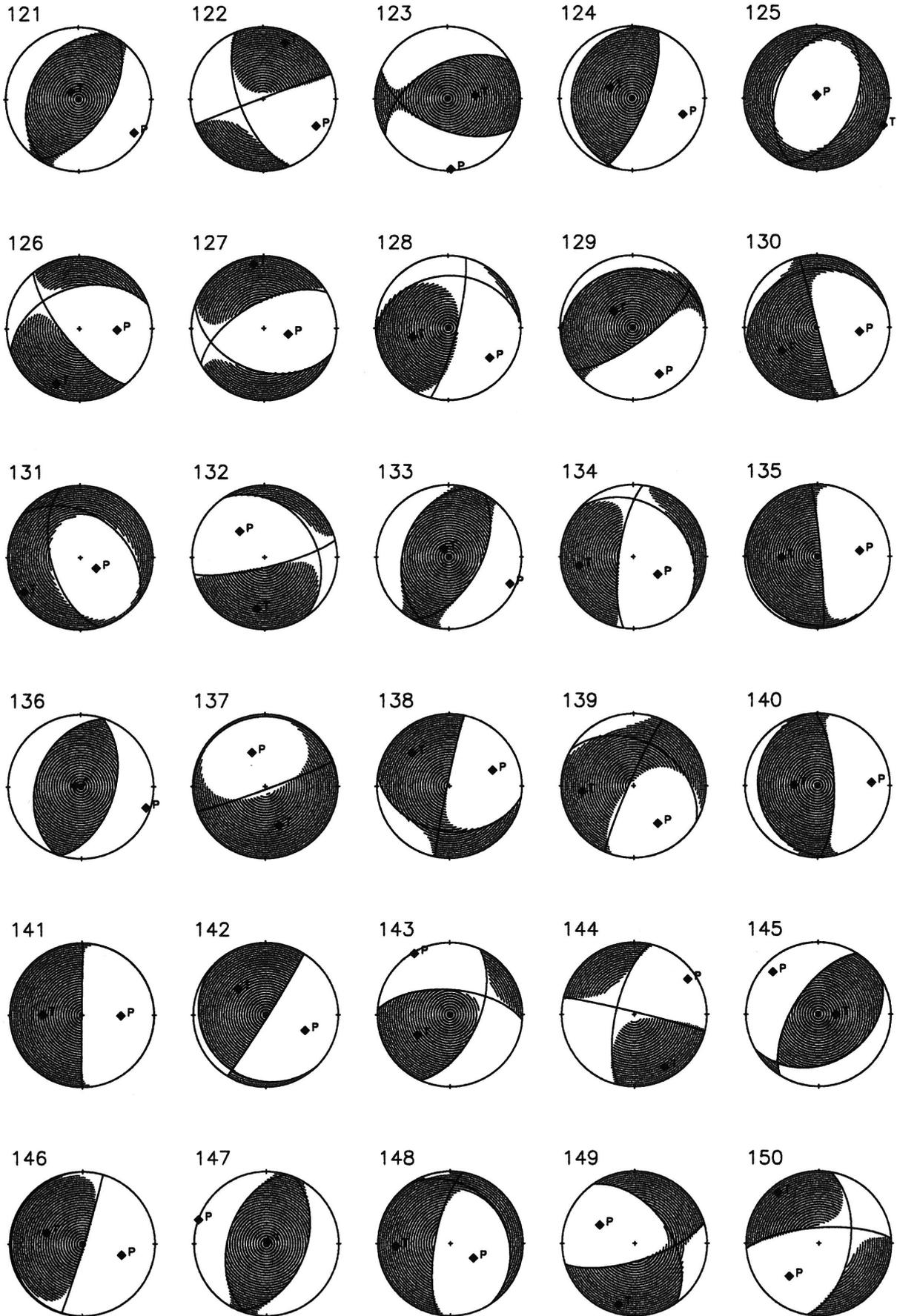


Fig. 3: Estimated moment tensors plotted to the lower hemisphere (continued).

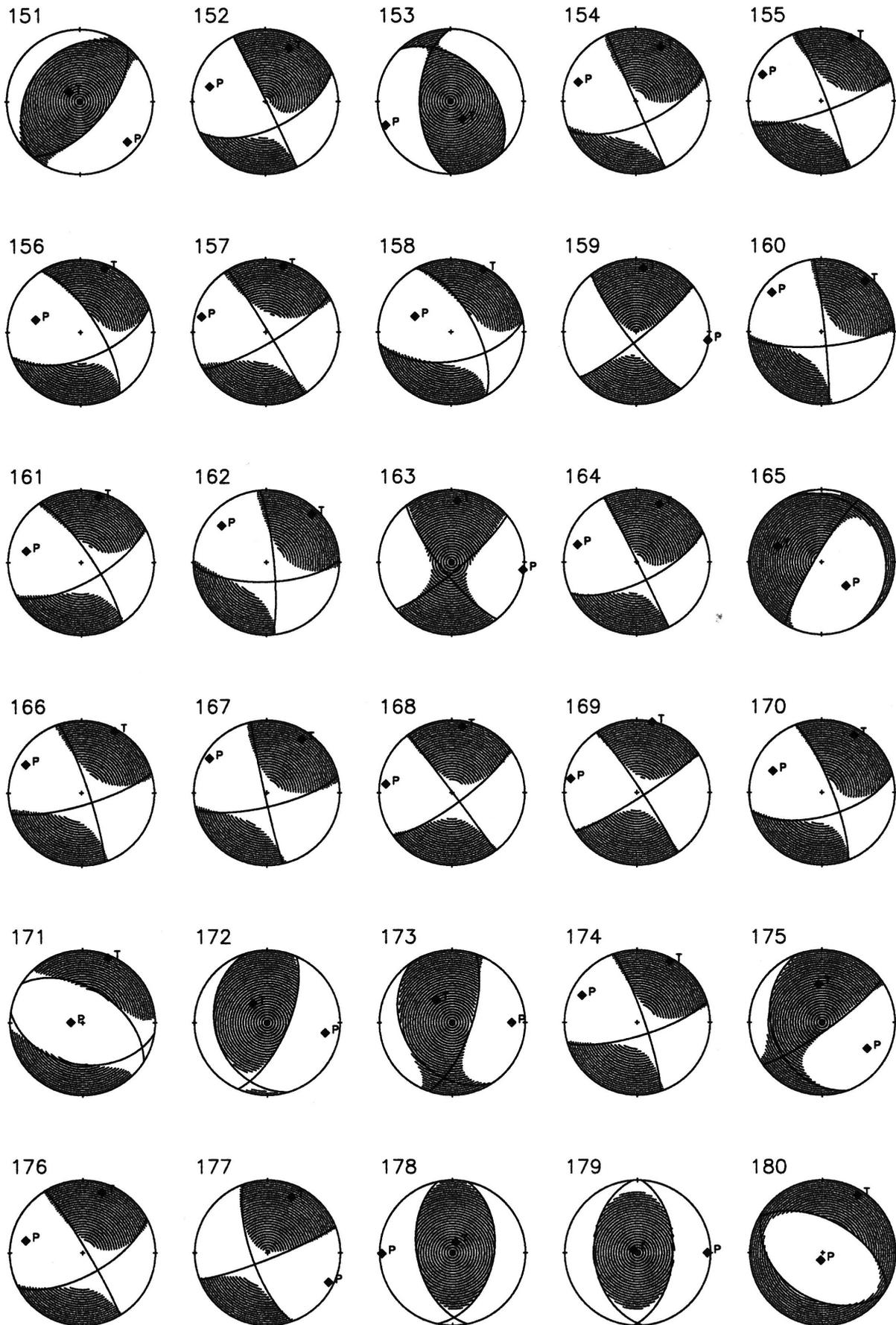


Fig. 3: Estimated moment tensors plotted to the lower hemisphere (continued).

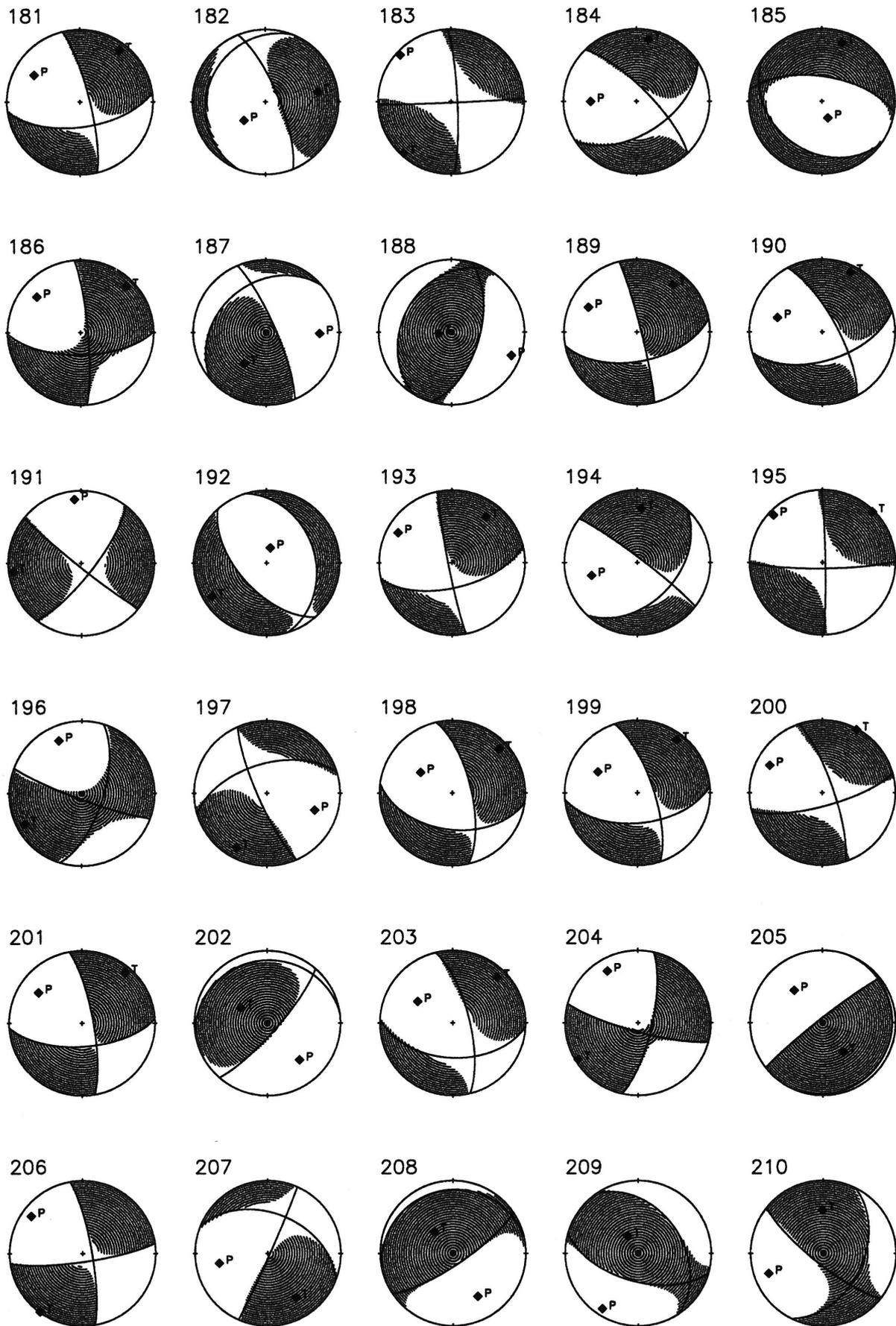


Fig. 3: Estimated moment tensors plotted to the lower hemisphere (continued).

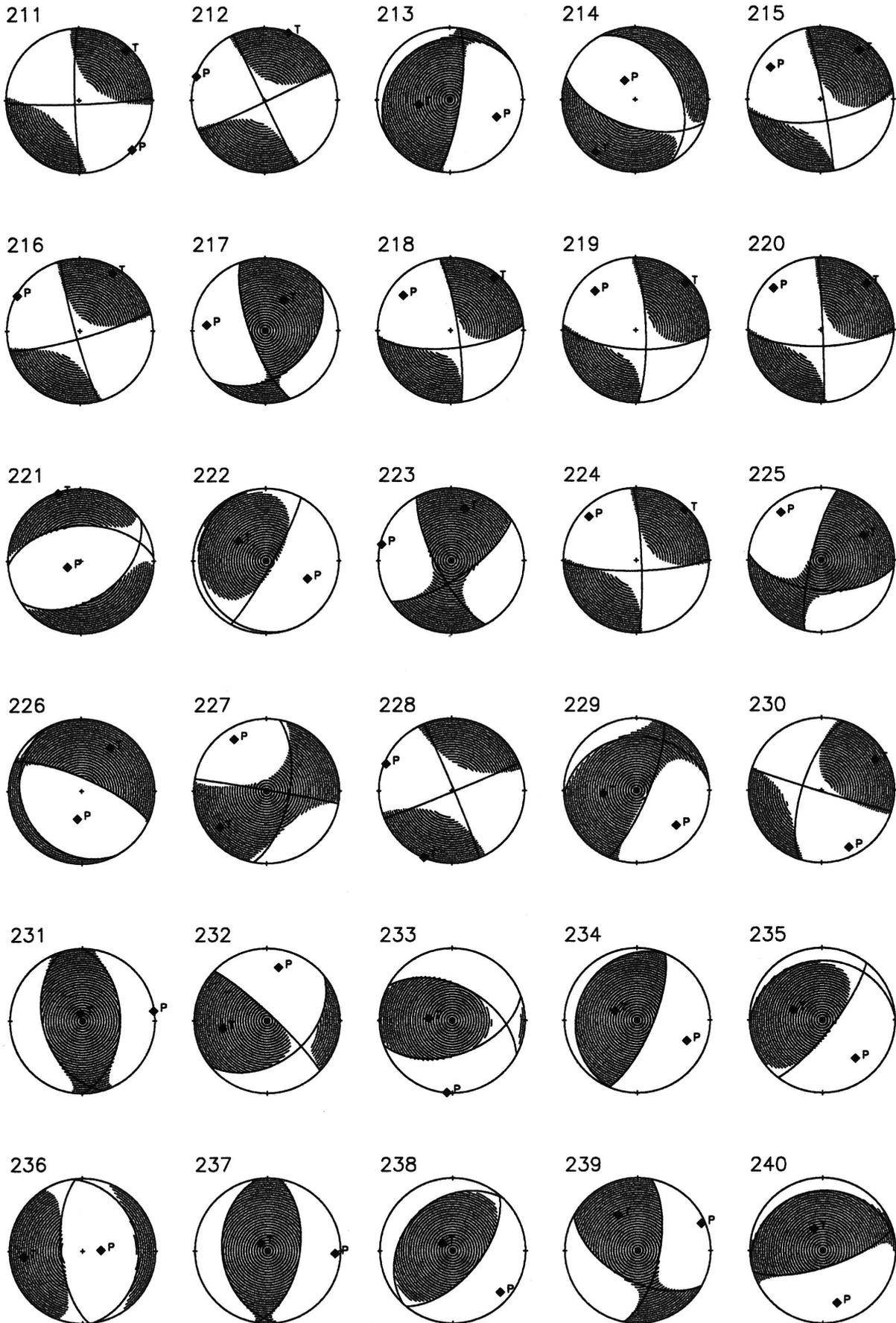


Fig. 3: Estimated moment tensors plotted to the lower hemisphere (continued).

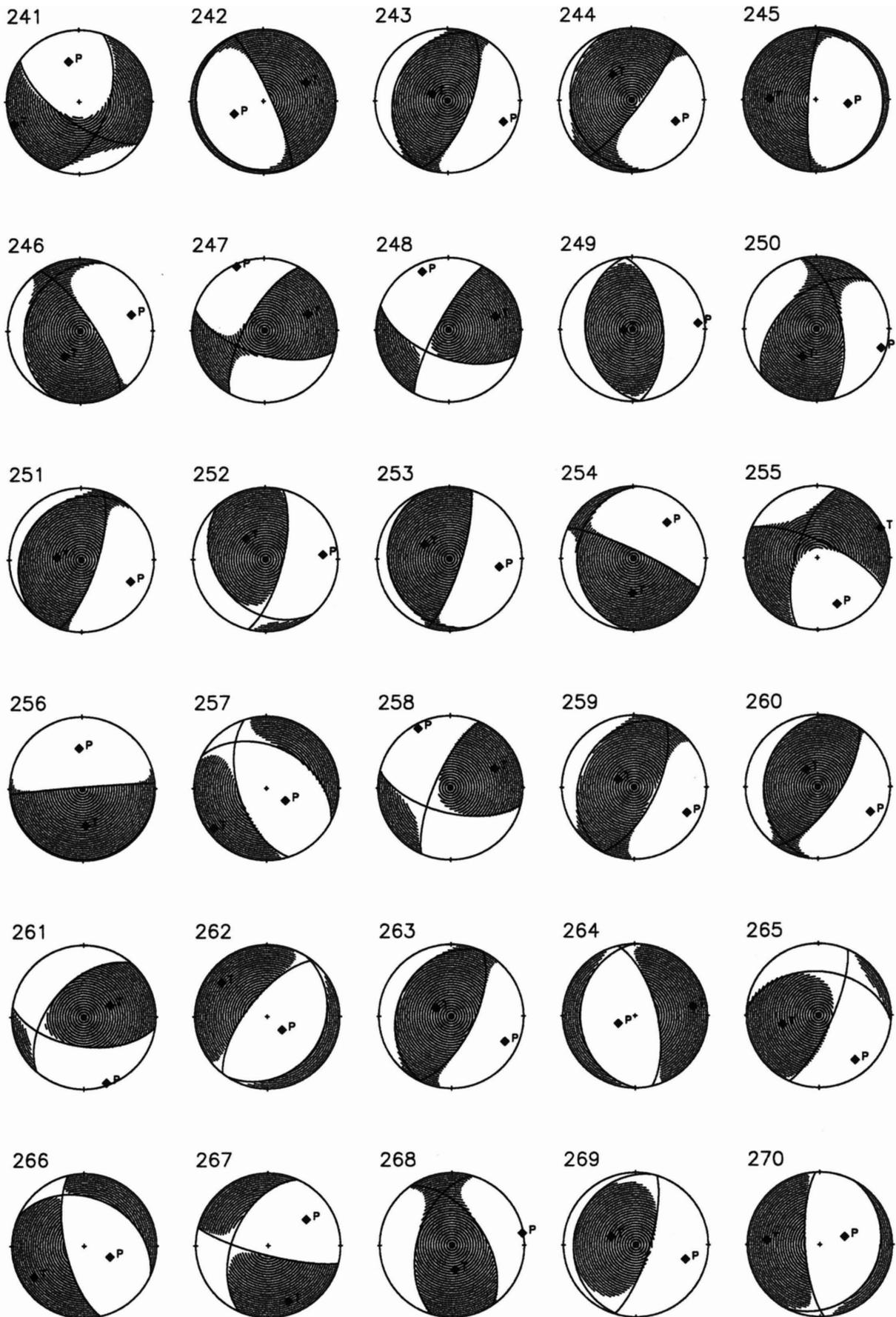


Fig. 3: Estimated moment tensors plotted to the lower hemisphere (continued).

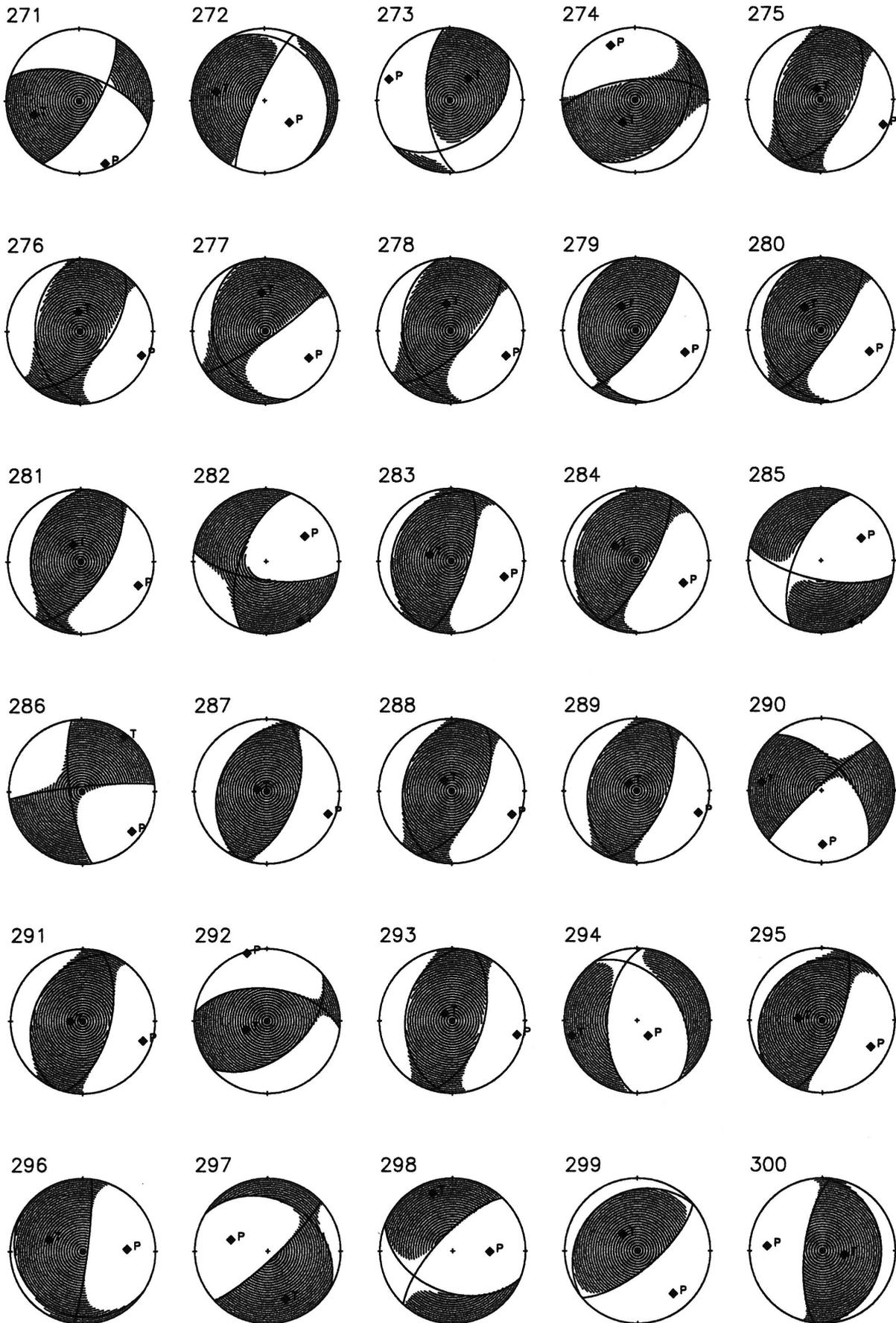


Fig. 3: Estimated moment tensors plotted to the lower hemisphere (continued).

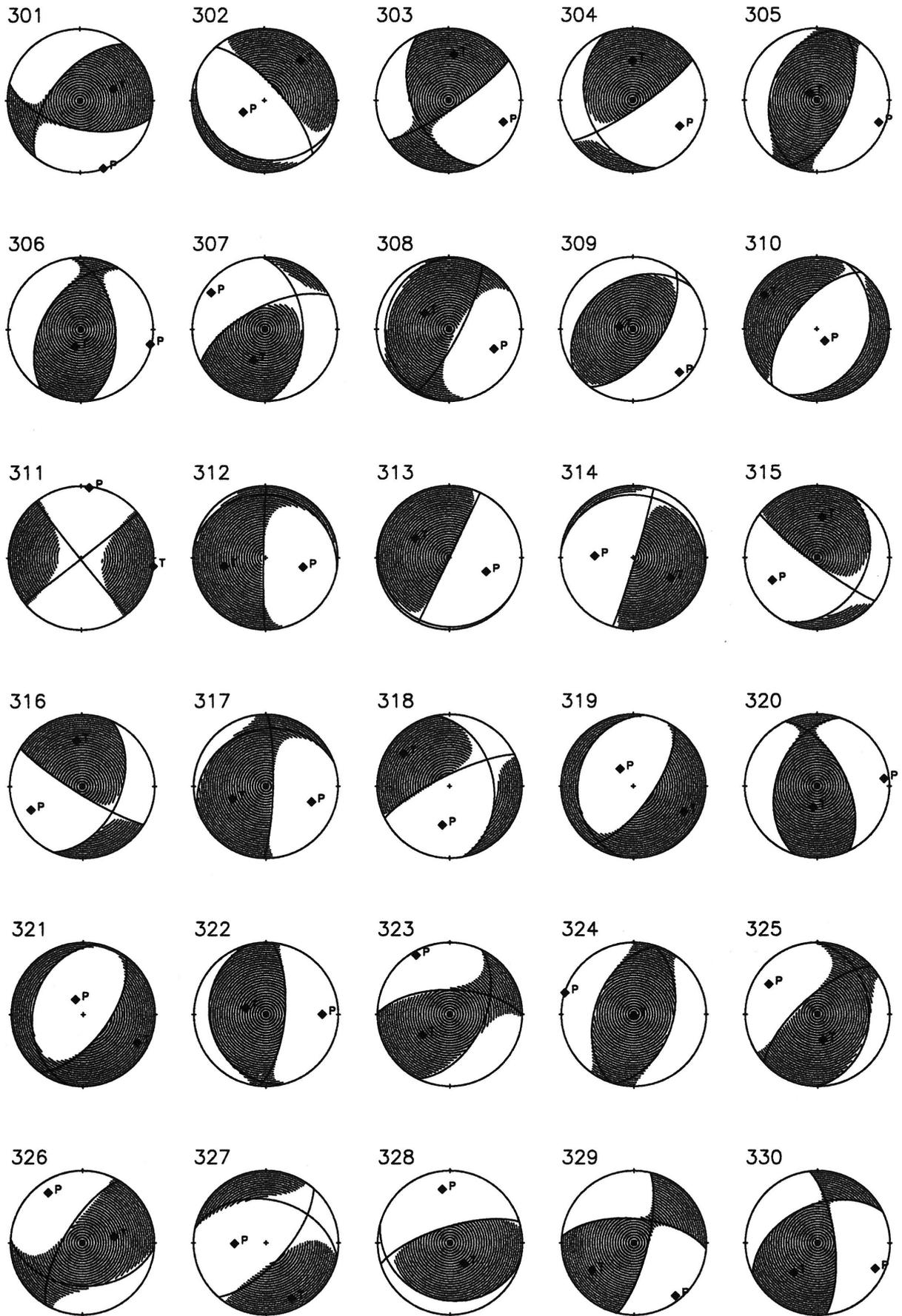


Fig. 3: Estimated moment tensors plotted to the lower hemisphere (continued).

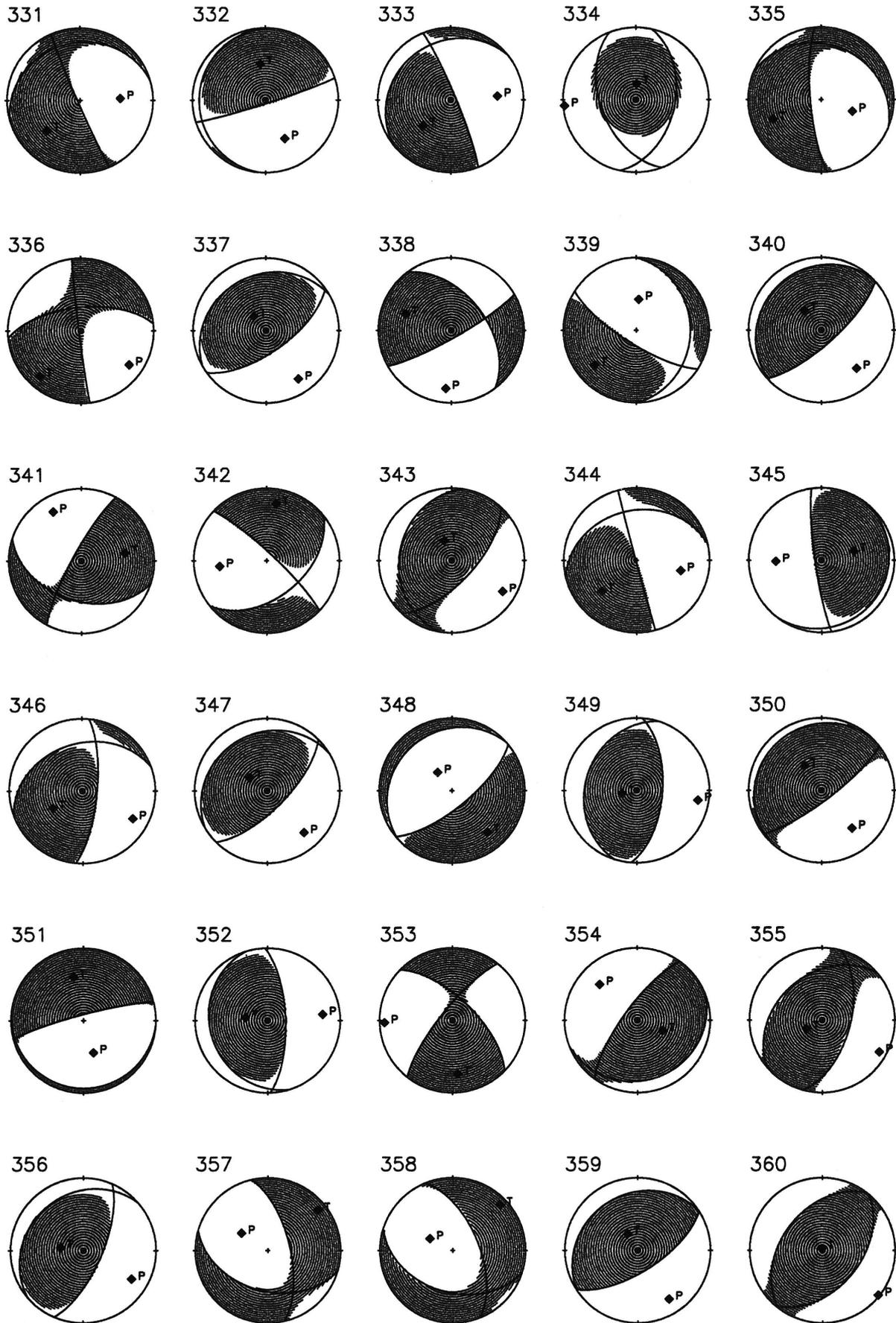


Fig. 3: Estimated moment tensors plotted to the lower hemisphere (continued).

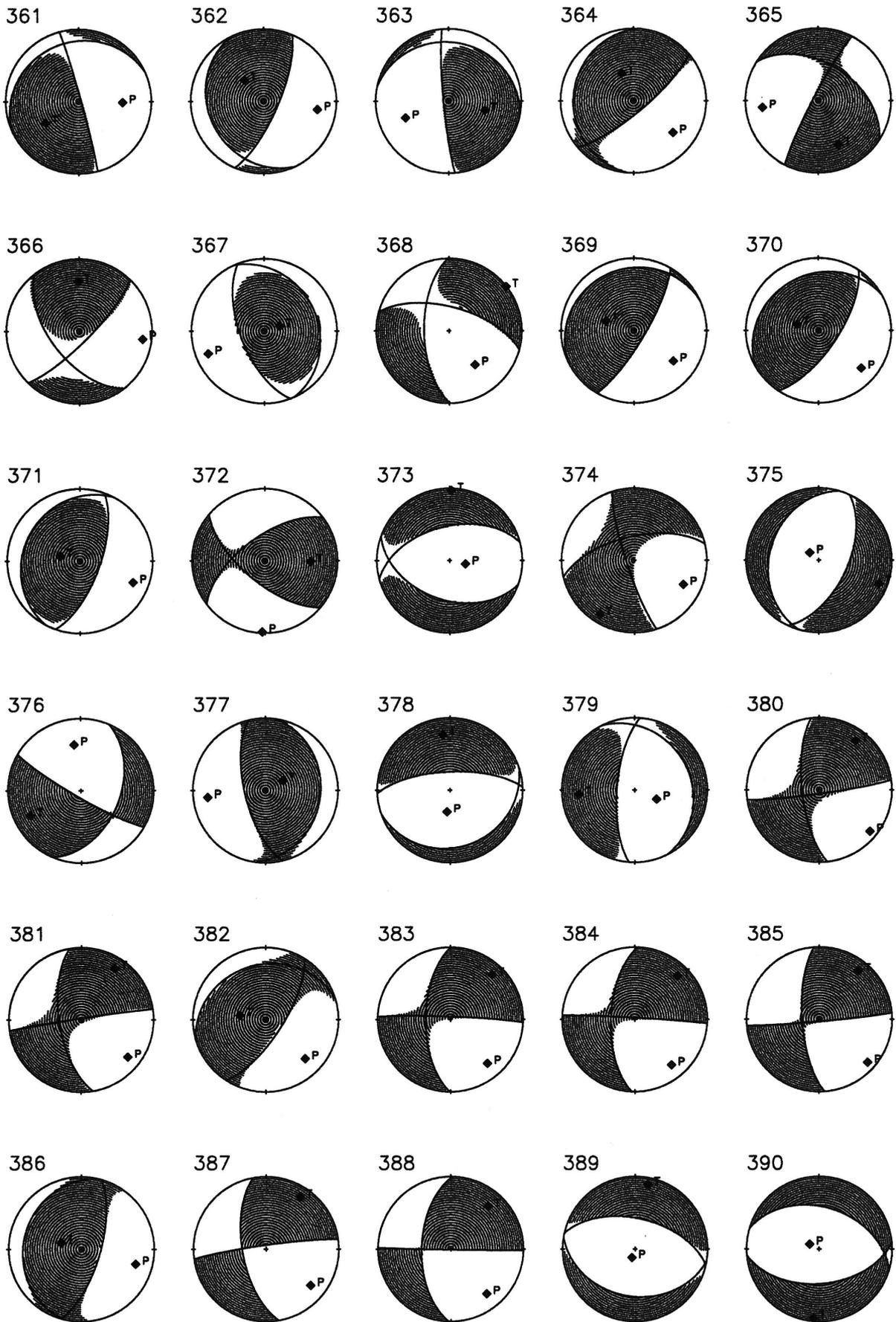


Fig. 3: Estimated moment tensors plotted to the lower hemisphere (continued).

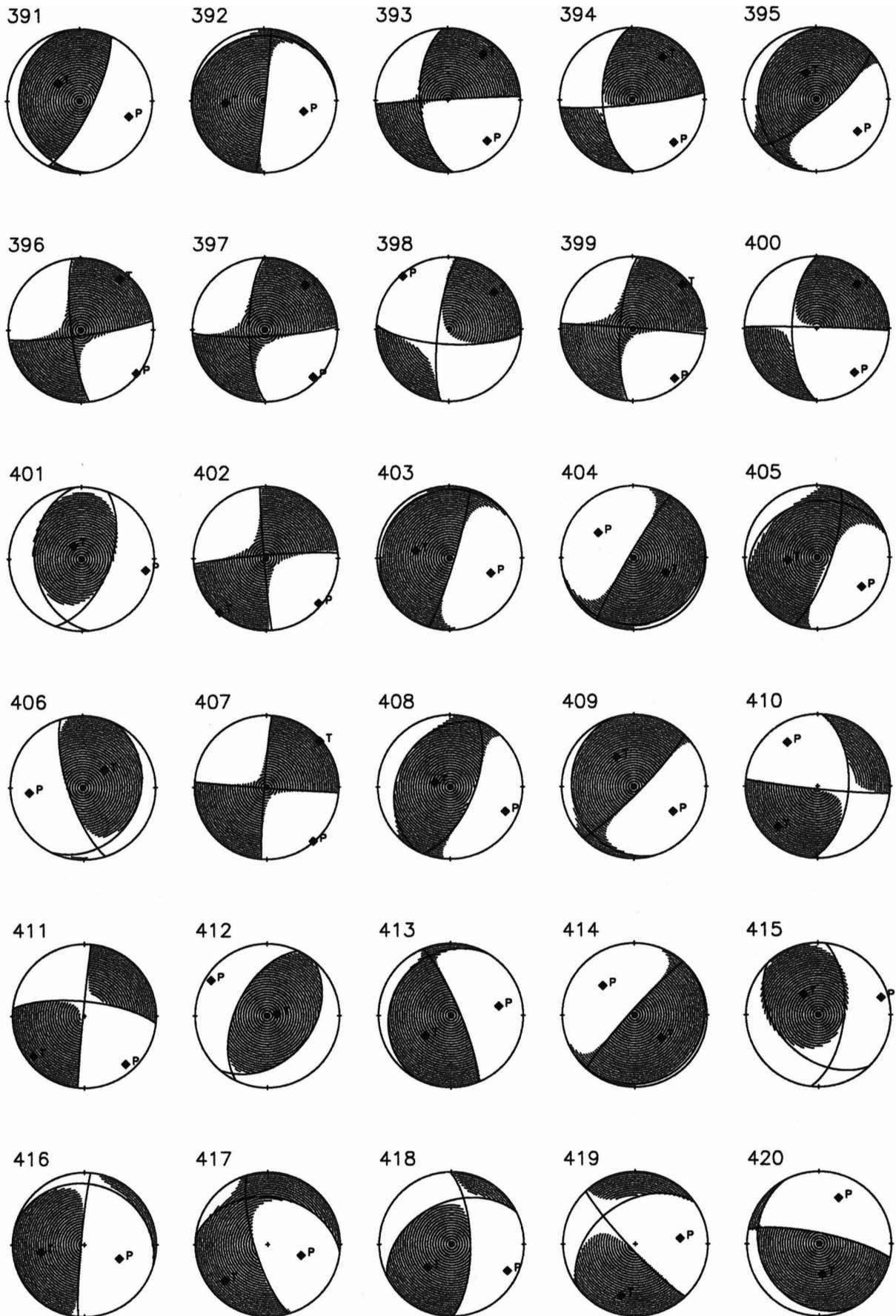


Fig. 3: Estimated moment tensors plotted to the lower hemisphere (continued).

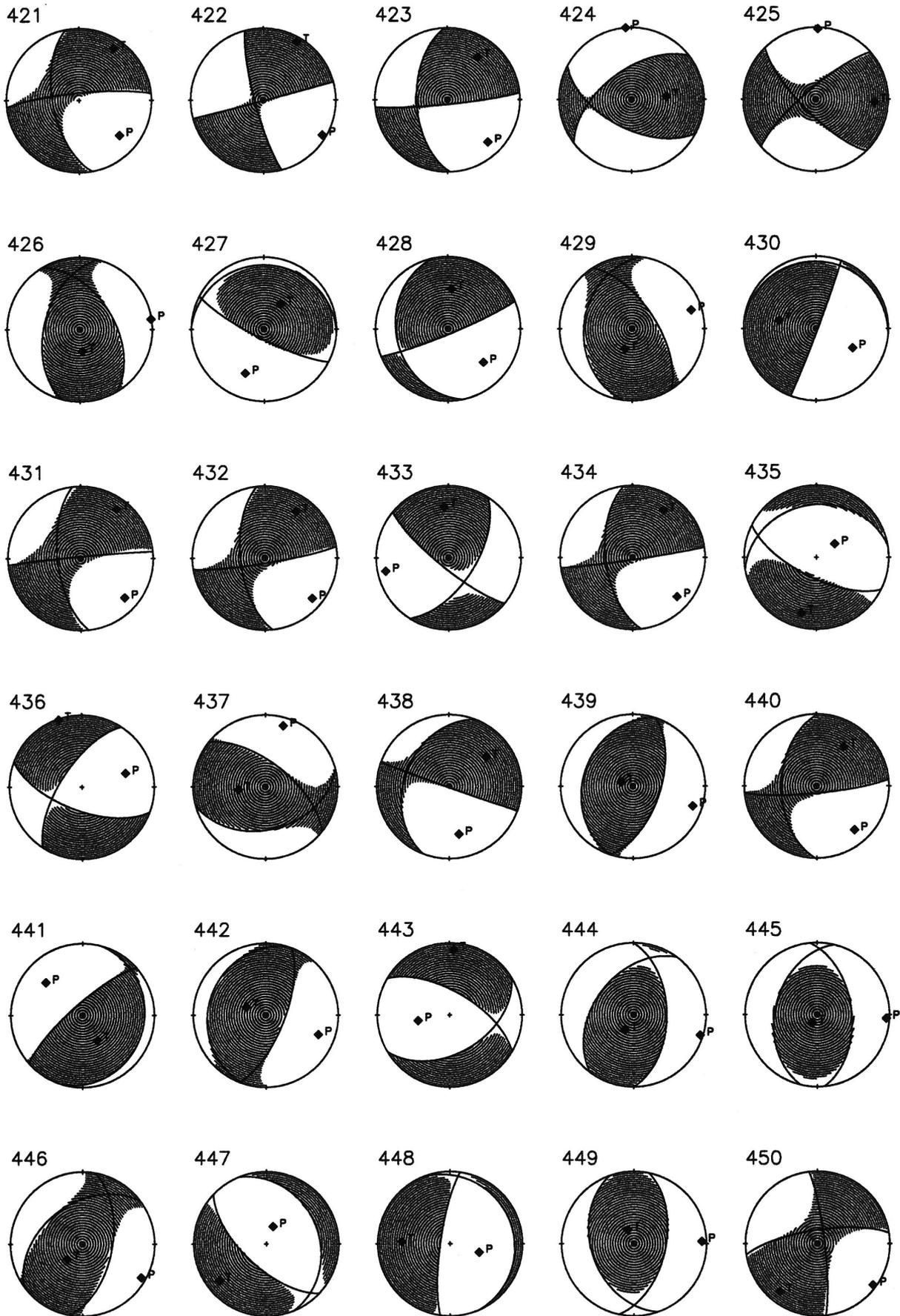


Fig. 3: Estimated moment tensors plotted to the lower hemisphere (continued).

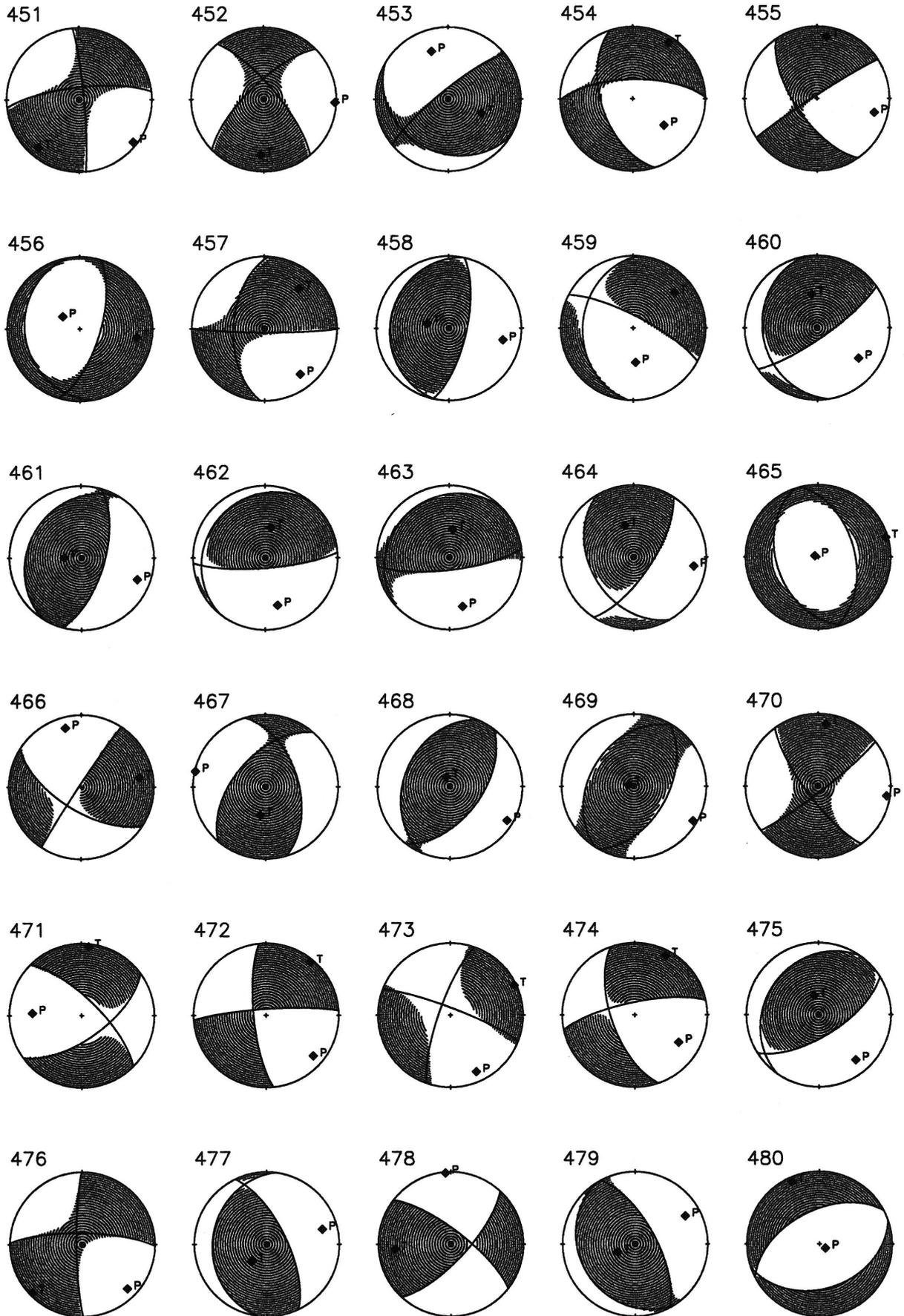


Fig. 3: Estimated moment tensors plotted to the lower hemisphere (continued).

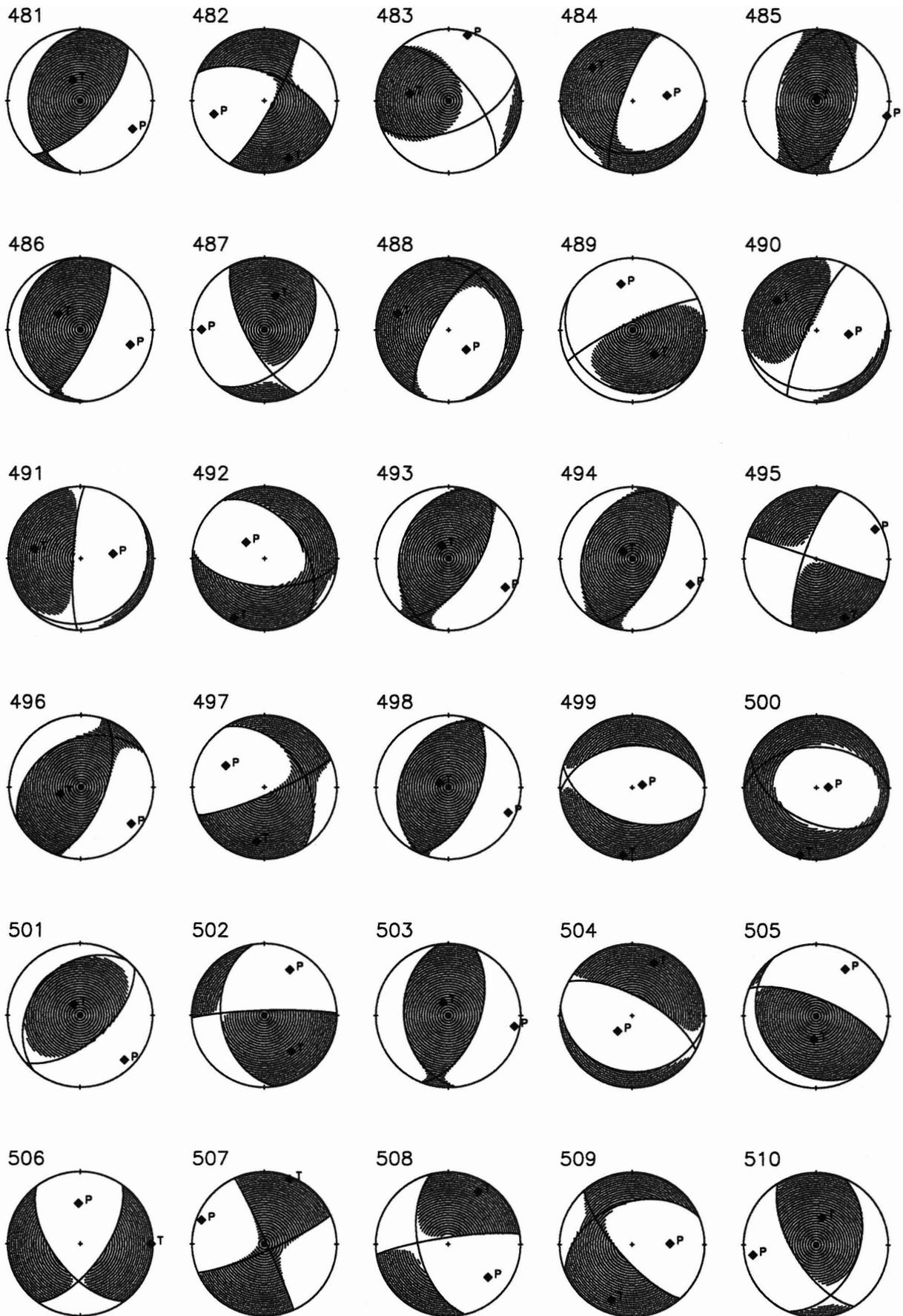


Fig. 3: Estimated moment tensors plotted to the lower hemisphere (continued).

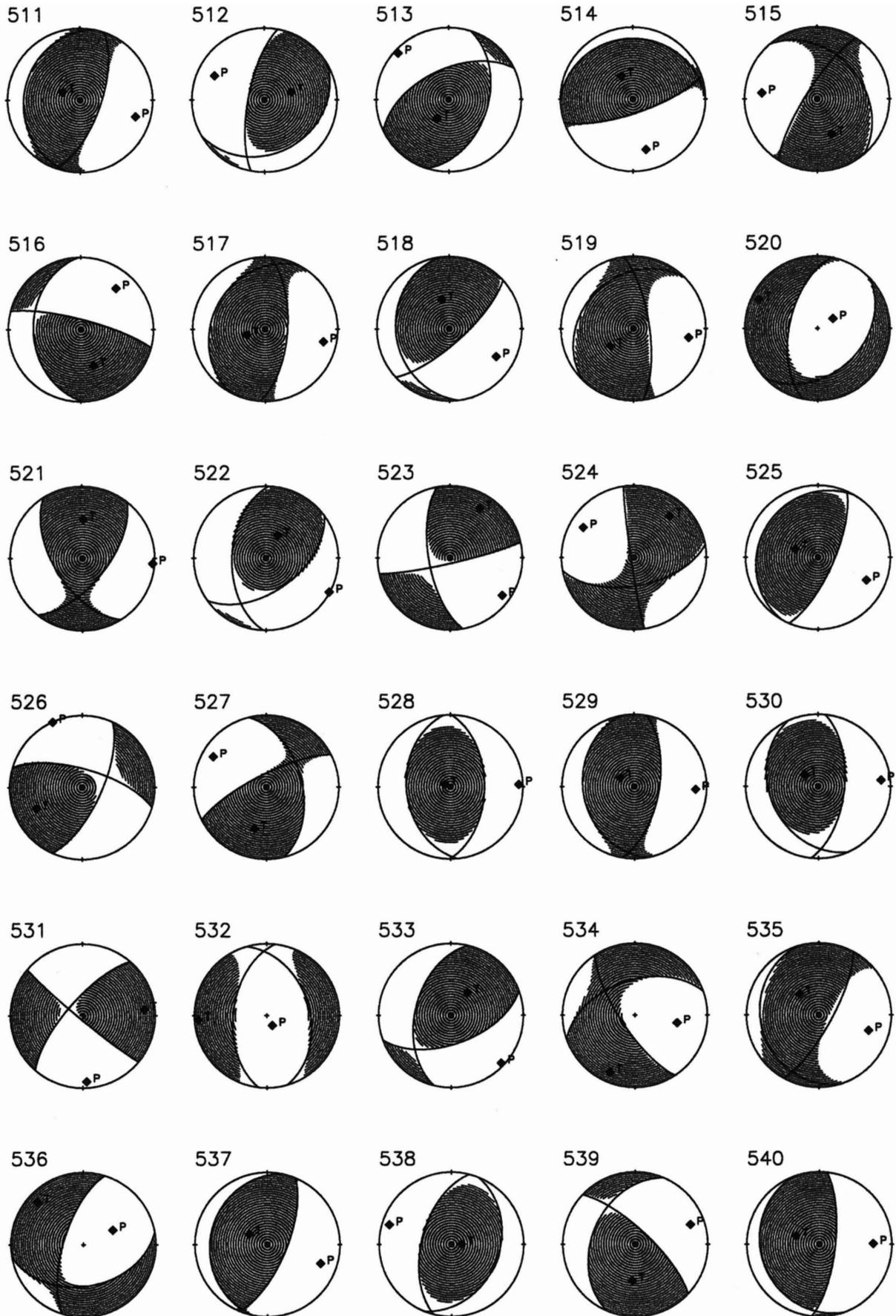


Fig. 3: Estimated moment tensors plotted to the lower hemisphere (continued).

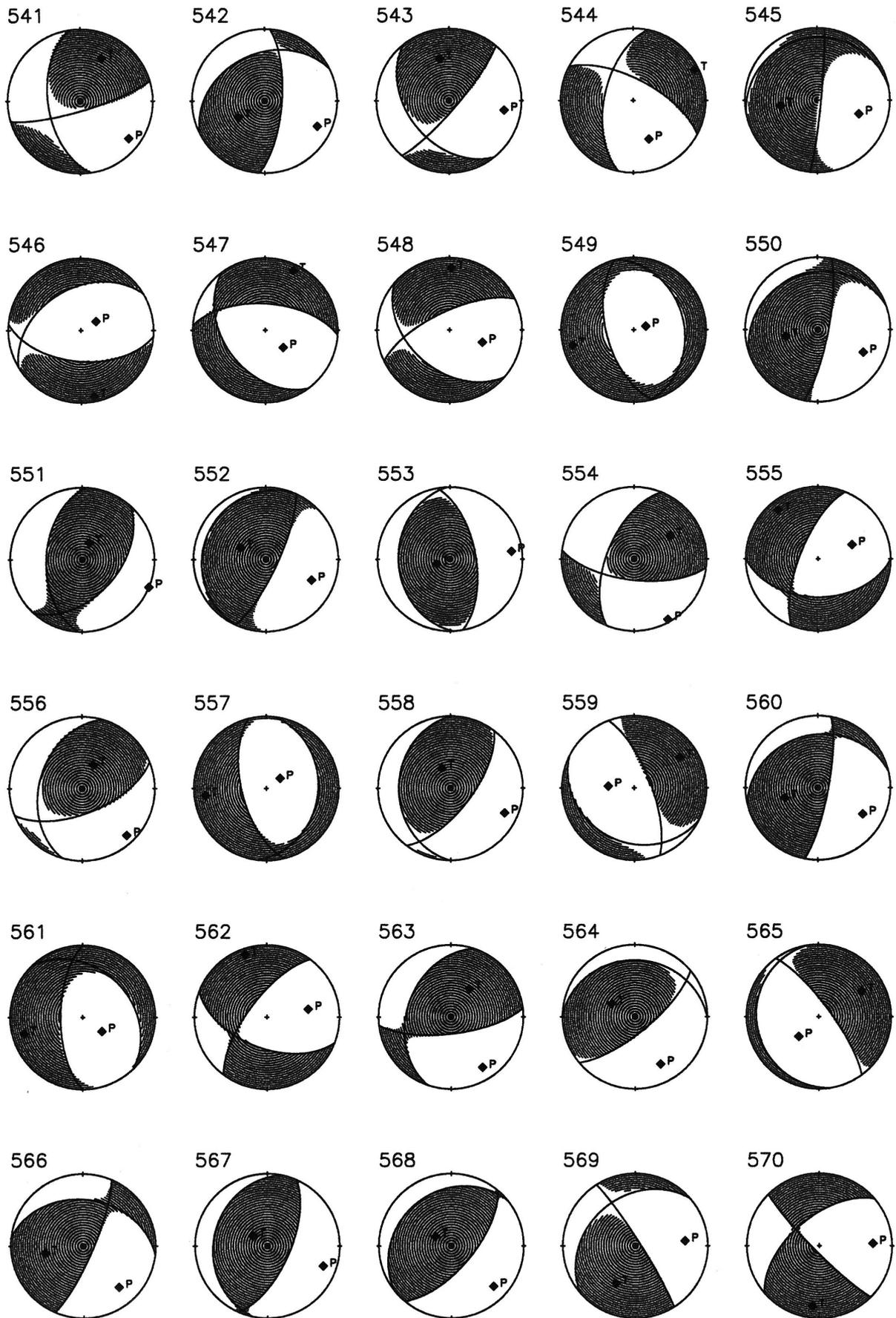


Fig. 3: Estimated moment tensors plotted to the lower hemisphere (continued).

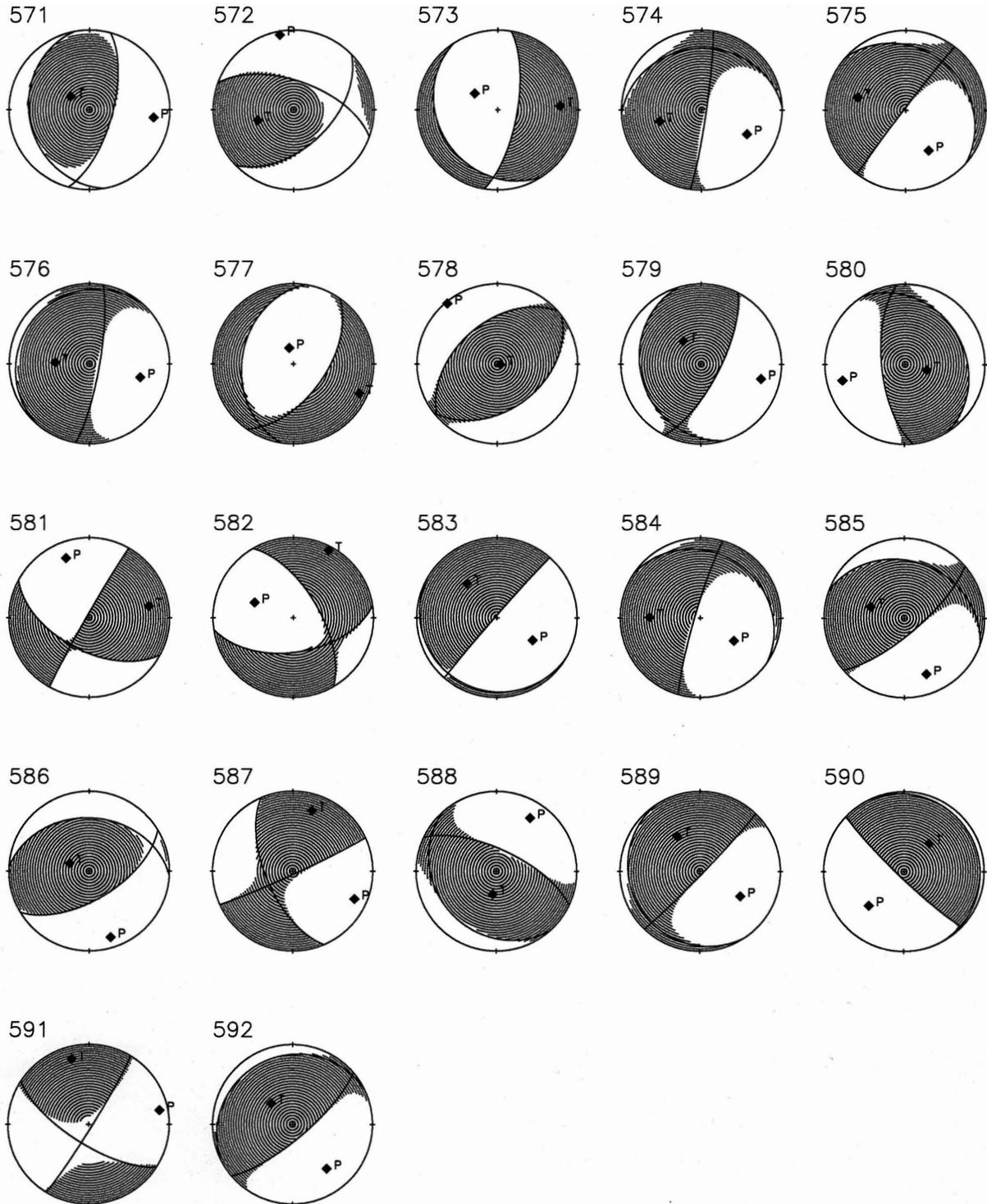


Fig. 3: Estimated moment tensors plotted to the lower hemisphere (continued).