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NOTES AND CORRESPONDENCE

Source Parameters of Regional Earthquakes in Taiwan: January-December, 2001

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ABSTRACT

We report source parameters of 127 earthquakes that occurred between January and December 2001 in the Taiwan region. The improved CMT inversion algorithm by Kao et al. (1998) is used to overcome the generally higher background noise as well as the heterogeneous velocity structure resulting from the complex tectonic interactions near Taiwan. To make the results more accessible and useful to the academic community, both the table that summarizes the reported source parameters and the complete set of inversion results are available electronically from the BATS worldwide web site at http://bats.earth.sinica.edu.tw/CMT_Solutions/cmtF2001.html.

(Key words: Broadband Array in Taiwan for Seismology, Earthquake source parameters, Waveform inversion, Taiwan)

Successful development of the centroid-moment-tensor (CMT) inversion technique in the early 1980's has enabled the systematic determination of source parameters for global large and moderately-sized earthquakes (e.g., Dziewonski et al. 1981; Kawakatsu et al. 1995; Sipkin 1982). Later, the CMT inversion technique was successfully applied to regional earthquakes because of the increasing knowledge in detailed velocity structures on a regional scale and the establishment of regional broadband networks (e.g., Dreger and Helmberger 1993; Fan and Wallace 1995; Lay et al. 1994; Thio and Kanamori 1995; Zhao and Helmberger 1994). Consequently, routine report of CMT solutions for smaller, regional earthquakes has become standard practice for many regional broadband seismographic networks (e.g., Zhu and Helmberger 1996; Pasysnos et al. 1996).

Establishment of the "Broadband Array in Taiwan for Seismology (BATS)" has enabled the systematic determination of reliable source parameters for regional earthquakes in Taiwan through the CMT technique (Kao et al. 1998). The network began its test operation in late

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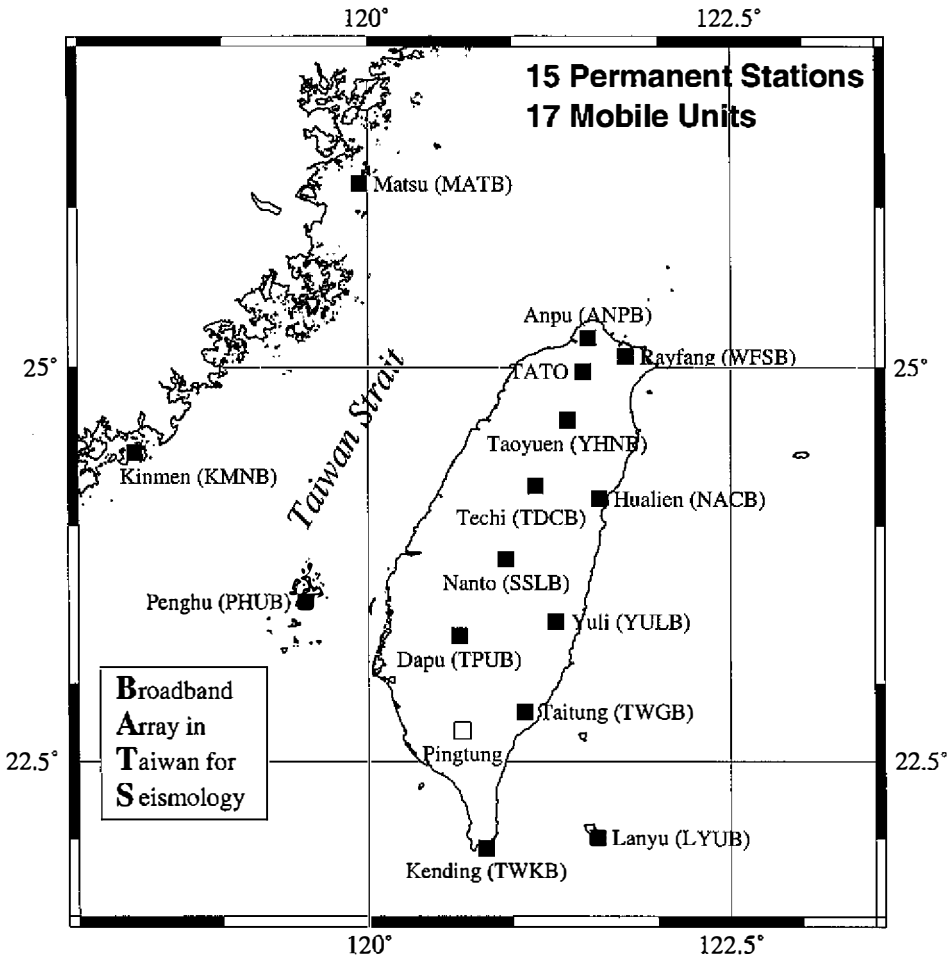


Fig. 1. Map of the "Broadband Array in Taiwan for Seismology (BATS)". Solid and gray squares show stations currently in operation and under construction, respectively. In addition to the permanent stations, BATS includes 17 portable stations that can be deployed for specific research tasks.

1994 (Fig. 1). A brief description of BATS configuration and operation can be found in Kao et al. (1998, 2001) and Kao and Jian (1999, 2001). The Data Management Center of the Institute of Earth Sciences (DMC-IES), Academia Sinica is responsible for BATS data archiving and distribution. Meanwhile, one copy of BATS data is contributed to the Data Management Center of the Incorporated Research Institutions for Seismology (DMC, IRIS) for the same purpose. Interested readers can obtain updated information at BATS worldwide web site (http://bats.earth.sinica.edu.tw).

Our CMT algorithm begins with a background-noise evaluation that determines the frequency band used in the inversion. The cut-off frequency of the lower corner is usually at ~0.02 Hz, which is determined by comparing the power spectra of waveform windows 300 s

before and after the P first arrival (Kao et al. 1998). We also utilize a two-step procedure to allow different velocity models for different station-source pairs. This is to mimic the effect of heterogeneous velocity structures in the Taiwan region. For more technical details, readers are referred to our previous reports (Kao et al.1998; Kao and Jian 1999).

To characterize the quality of inversion, each inversion result is classified by a combination of a letter (A-F) and a digit (1-4), depending on two parameters: the waveform misfit (E) and the amount of CLVD component (ε), respectively. The derivations of E and ε are presented in our previous reports (Kao et al. 1998; Kao and Jian 1999) and listed in Table 1.

Following the criteria defined in Kao and Jian (1999), we report source parameters only if they meet the following criteria: (1) 3-component waveforms from at least three stations are used in the inversion, and (2) the quality of inversion must be higher than C4. A total of 127 earthquakes that satisfy these conditions are listed in Table 2. The corresponding moment-tensor solutions and focal depths are plotted in Fig. 2.

Owing to practical concerns, the inversion results are presented as an electronic appendix to this report. Interested readers can download the complete set from BATS worldwide web site at http://bats.earth.sinica.edu.tw/CMT_Solutions/cmtF2001.html. To make the results more accessible and useful to the academic community, Table 2 as well as the tables in our previous reports showing source parameters of earthquakes between 1995 and 2000 (Kao and Jian 1999; Kao et al. 2001, 2002a, 2002b) are also available in our web site (http://bats.earth.sinica.edu.tw/CMT_Solutions).

Table 1. Quality classification of inversion results.

Class	Criteria
	Average Waveform Misfit (E)
A	$0 \le E < 0.3$
B	$0.3 < E \le 0.5$
C	$0.5 < E \le 0.7$
D	$0.7 < E \le 0.9$
E	$0.9 < E \le 1.1$
F	$E > 1.1$
	CLVD component (ε)
1	$< \varepsilon \le 0.1$
2	$0.1 < \varepsilon \le 0.25$
3	$0.25 < \varepsilon \le 0.4$
4	$\varepsilon > 0.4$

Table 2. Source parameters of studied earthquakes

No	Origin Time	Lat.[1]	Long.[1]	dep.	M_{xx}[2]	M_{yy}[2]	M_{zz}[2]	M_{xy}[2]	M_{xz}[2]	M_{yz}[2]	M_w[2]	Strike[3]	Dip[3]	Rake[3]	E[4]	ε[4]	Class
1	01/01/02/22:54:58.13	24.35	121.77	30±8	-130.79	39.08	21.59	44.56	227.75	-155.88	4.25±0.21	297±3	15±10	152±7	0.586	31.33	C3
2	01/01/05/15:22:01.29	22.81	121.31	16±4	-59.08	-4.91	43.65	16.32	-20.36	26.41	3.81±0.19	93±13	35±7	122±8	0.472	0.17	B1
3	01/01/09/19:16:27.47	23.96	121.78	62±9	-52.90	-917.12	973.58	344.16	-148.28	350.94	4.62±0.23	18±3	35±3	88±3	0.579	11.85	C2
4	01/01/11/08:36:59.23	24.08	120.99	25±4	50.24	591.41	-801.47	-297.09	-104.12	350.20	4.56±0.23	207±6	32±3	-84±8	0.516	5.91	C1
5	01/01/11/09:09:10.47	24.09	120.98	34±6	-16.69	150.07	-144.99	-37.81	-25.09	377.72	4.34±0.22	203±12	11±10	-72±15	0.513	8.45	C1
6	01/01/14/17:18:23.59	24.31	122.07	30±4	-42.84	20.09	28.35	1.78	7.06	-22.65	3.71±0.19	301±10	51±4	144±8	0.592	0.43	C1
7	01/01/16/01:43:06.67	24.25	121.19	14±5	277.48	-49.07	-337.92	122.28	-54.71	110.63	4.30±0.22	309±5	48±4	-59±11	0.562	1.85	C1
8	01/01/17/19:52:17.23	24.19	121.69	11±5	-19.27	-96.65	134.97	84.24	77.55	-19.27	4.08±0.20	191±10	38±8	55±5	0.639	8.50	C1
9	01/01/22/23:27:18.27	24.32	122.13	24±5	-268.75	122.20	312.39	-293.77	-37.58	-328.72	4.42±0.22	84±11	45±7	29±6	0.488	0.14	B1
10	01/01/24/22:10:09.14	23.58	121.65	26±5	7.83	-37.60	18.12	4.64	-16.14	6.30	3.63±0.18	335±3	47±4	40±7	0.516	8.41	C1
11	01/02/04/23:54:15.01	24.25	121.71	25±5	-54.07	-9.60	73.64	31.42	43.97	-14.99	3.89±0.19	238±3	29±8	81±6	0.518	6.50	C1
12	01/02/05/08:37:33.39	24.25	121.72	29±5	-58.37	-122.38	137.21	82.23	-28.02	-41.08	4.08±0.20	230±4	44±7	114±8	0.549	1.74	C1
13	01/02/05/15:13:59.70	22.16	121.41	76±4	-82.49	-3.85	89.95	-130.66	-2.47	129.11	4.14±0.21	271±6	45±8	26±6	0.381	0.02	B1
14	01/02/08/17:34:09.32	23.42	120.63	19±4	-9.06	-217.64	207.64	-37.23	-8.72	65.42	4.17±0.21	345±9	37±3	82±8	0.418	1.80	B1
15	01/02/11/12:43:25.78	23.92	120.75	16±5	-6.40	48.07	-31.18	0.74	19.95	-13.00	3.72±0.19	334±7	43±3	-132±9	0.429	2.16	B1
16	01/02/14/13:17:50.13	23.58	120.71	16±5	4.81	-4.58	-7.59	54.00	7.96	-21.09	3.78±0.19	269±3	69±3	-170±11	0.437	5.95	B1
17	01/02/14/22:25:42.68	23.58	120.72	20±8	54.91	-35.44	-26.08	34.92	4.63	-34.51	3.83±0.19	250±4	61±7	-156±4	0.512	2.34	C1
18	01/02/16/23:13:09.08	24.46	122.76	97±9	-5908.68	4099.60	1919.87	273.48	1923.70	3319.15	5.15±0.26	229±3	53±6	18±5	0.457	5.94	B1
19	01/02/18/20:25:10.88	23.59	120.72	15±5	358.38	-362.52	-75.26	218.45	-89.48	93.66	4.37±0.22	330±3	73±6	-7±6	0.523	9.67	C1
20	01/02/20/01:41:22.08	23.59	120.73	25±6	4.99	-13.13	3.21	38.58	-26.39	1.12	3.72±0.19	355±4	56±5	6±8	0.377	3.42	B1
21	01/02/23/19:18:26.46	23.56	121.64	37±6	144.34	-161.75	7.54	23.73	17.41	32.58	4.07±0.20	50±3	77±3	-179±3	0.364	16.30	B2
22	01/02/24/01:19:09.87	24.69	121.21	13±6	-53.00	34.62	3.06	10.94	-12.25	-19.02	3.74±0.19	41±3	64±9	12±3	0.541	0.07	C1
23	01/02/25/05:01:17.81	23.93	122.50	26±5	-288.09	13.28	317.84	71.42	494.24	-84.73	4.45±0.22	254±3	16±4	85±3	0.481	4.81	B1
24	01/03/01/11:56:01.00	22.53	120.81	17±8	-11.15	3.34	15.69	40.27	6.97	-51.98	3.82±0.19	271±12	37±6	168±5	0.521	8.51	C1

(Table 2. continued)

25	01/03/01/16:37:50.19	23.84	121.00	18±8	315.21	-3841.13	2739.66	961.60	-1383.58	1009.57	5.00±0.25	351±3	39±7	56±5	0.455	18.09	B2
26	01/03/11/18:24:06.91	23.58	120.73	18±5	29.01	-57.28	5.95	60.57	-46.63	-5.63	3.90±0.20	346±3	61±6	14±9	0.450	18.15	B2
27	01/03/12/01:47:54.05	23.58	120.71	16±6	4.51	3.56	1.25	68.34	9.27	-23.68	3.85±0.19	271±3	71±7	-173±4	0.363	11.14	B2
28	01/03/19/00:55:37.40	24.77	122.27	15±6	43.24	-52.22	-8.62	-20.04	9.27	-16.57	3.77±0.19	123±3	70±8	-3±3	0.578	4.75	C1
29	01/03/23/01:03:16.00	22.77	121.34	26±6	176.93	-118.51	-33.52	-73.24	-9.71	-81.73	4.12±0.21	118±3	68±3	-20±3	0.437	3.35	B1
30	01/04/10/21:31:46.07	23.93	122.41	19±8	-67.48	42.65	57.38	-24.58	73.79	-45.73	3.97±0.20	316±10	34±9	154±6	0.576	1.73	C1
31	01/04/24/08:26:37.88	24.78	122.18	80±7	-31.81	-84.60	115.77	78.78	7.73	71.44	4.05±0.20	57±3	38±3	125±3	0.278	9.34	A1
32	01/04/24/14:24:49.77	23.80	120.93	14±5	-12.23	1.95	17.22	16.56	-17.89	-2.70	3.58±0.18	24±6	39±3	33±10	0.366	18.05	B2
33	01/04/27/02:02:33.02	23.63	121.04	11±5	1007.79	-1119.69	-236.43	690.10	-180.85	242.95	4.68±0.23	331±4	77±5	-7±3	0.490	8.67	B1
34	01/04/29/06:37:12.02	23.57	120.71	20±5	-5.50	3.58	-7.76	64.99	8.30	-39.01	3.86±0.19	274±9	59±3	-174±6	0.444	8.71	B1
35	01/05/01/21:55:59.42	24.25	121.10	16±5	-32.92	64.10	-50.86	62.62	-44.13	33.81	3.95±0.20	117±10	58±5	-151±8	0.470	6.65	B1
36	01/05/08/18:54:13.60	23.30	121.65	32±5	36.57	1.01	-23.39	-20.57	-29.20	44.50	3.81±0.19	275±11	25±3	-36±15	0.396	6.46	B1
37	01/05/10/04:06:35.59	23.99	121.70	18±5	14.47	63.24	-72.78	77.73	14.99	-41.79	3.97±0.20	294±6	47±3	-137±4	0.361	34.24	B3
38	01/05/11/18:00:04.17	23.23	121.42	18±4	-10.81	-61.49	52.75	46.54	-37.99	10.58	3.89±0.19	5±13	40±7	49±18	0.277	23.65	A2
39	01/05/13/14:57:03.92	23.94	121.07	18±6	-2.41	52.88	1.33	24.71	-125.38	-89.34	4.07±0.20	20±10	13±7	-16±8	0.454	8.39	B1
40	01/05/13/23:38:06.43	24.45	121.86	23±5	20.98	31.88	-58.14	-59.11	-26.04	-38.90	3.91±0.20	73±4	51±7	-40±5	0.428	6.26	B1
41	01/05/23/15:05:14.53	24.05	121.79	14±8	-36.83	-144.48	133.82	135.15	268.27	-161.43	4.31±0.22	186±18	21±8	41±25	0.556	16.34	C2
42	01/05/27/04:30:55.84	24.43	121.93	28±5	-24.90	-2.61	23.50	14.83	12.68	-20.58	3.65±0.18	266±8	31±6	129±5	0.569	8.60	C1
43	01/05/30/22:36:52.95	23.85	120.99	19±6	6.88	-31.20	35.26	0.28	-8.74	13.79	3.65±0.18	346±9	35±3	66±12	0.480	6.12	B1
44	01/06/04/06:02:31.80	23.22	121.08	11±4	103.65	-16.26	-64.77	98.82	-15.83	82.18	4.07±0.20	84±3	54±3	-151±3	0.451	1.50	B1
45	01/06/05/04:06:19.44	23.94	122.25	23±7	-20.02	28.16	-1.83	-4.40	28.75	-26.34	3.71±0.19	322±11	32±7	-174±10	0.583	5.65	C1
46	01/06/06/03:27:24.79	23.22	121.08	13±7	21.75	22.03	-18.76	71.13	38.03	-14.94	3.89±0.19	175±11	59±10	-20±25	0.497	8.99	B1
47	01/06/10/21:26:17.55	23.20	121.08	26±6	5.78	66.59	23.80	313.89	153.37	-45.24	4.30±0.22	181±3	65±4	-7±3	0.461	18.75	B2
48	01/06/10/21:51:10.08	23.19	121.08	20±5	-126.31	75.49	138.95	234.43	101.57	94.16	4.26±0.21	197±6	62±3	24±4	0.552	9.75	C1
49	01/06/13/13:17:54.15	24.38	122.61	62±6	4143.78	-9561.92	4564.19	7165.54	4884.72	11756.50	5.42±0.27	61±3	37±7	162±10	0.399	0.68	B1
50	01/06/14/02:35:25.78	24.42	121.93	28±8	15280.90	7376.07	-16826.90	-31207.20	-5575.21	-27292.00	5.71±0.29	85±12	48±3	-25±21	0.460	5.78	B1
51	01/06/14/06:24:10.28	24.39	121.91	27±5	0.57	9.85	-3.54	-27.68	-6.79	-15.98	3.62±0.18	82±3	60±3	-13±9	0.419	7.25	B1

(Table 2. continued)

52	01/06/15/08:15:33.36	22.33	122.30	29±7	689.24	-640.72	-235.31	6.35	156.00	204.68	4.51±0.23	47±4	67±3	-170±3	0.491	28.87	B3
53	01/06/16/21:07:03.99	23.20	121.07	11±5	24.52	9.09	-9.86	76.26	48.15	-10.47	3.92±0.20	174±5	57±3	-11±15	0.394	5.41	B1
54	01/06/17/16:02:02.46	23.97	122.36	19±5	-30.45	12.16	22.97	-2.44	13.10	-14.72	3.63±0.18	303±7	42±4	141±3	0.552	6.38	C1
55	01/06/19/05:16:15.46	23.18	121.08	11±5	1857.54	-806.97	207.11	3442.62	1271.26	-363.86	5.00±0.25	169±5	70±9	-3±3	0.528	4.89	C1
56	01/06/19/05:34:07.79	23.21	121.08	14±5	44.45	-13.69	-7.73	88.23	17.75	-37.94	3.95±0.20	264±3	70±3	-165±8	0.458	6.00	B1
57	01/06/19/05:43:39.17	23.20	121.10	12±4	1780.18	-471.15	-587.06	1466.60	165.09	-897.84	4.83±0.24	257±3	62±3	-156±3	0.471	19.14	B2
58	01/06/19/14:15:22.59	23.19	121.10	31±6	-8.19	-16.67	42.11	34.06	17.61	17.99	3.76±0.19	71±4	53±6	134±3	0.519	2.97	C1
59	01/06/26/18:46:27.44	22.83	120.67	23±8	-10.77	-179.32	226.83	114.15	58.97	118.22	4.22±0.21	49±3	40±3	127±3	0.497	7.41	B1
60	01/06/29/14:17:55.61	22.82	121.52	17±5	22.46	-34.70	26.38	16.05	20.56	6.19	3.70±0.19	50±3	59±4	145±3	0.398	1.64	B1
61	01/06/29/22:41:48.97	23.88	121.72	45±6	-71.04	200.21	-143.08	17.34	98.18	-125.85	4.19±0.21	327±7	36±7	-142±5	0.418	7.95	B1
62	01/06/30/04:07:37.73	24.06	121.54	26±5	-392.21	-277.34	585.61	400.24	35.42	274.60	4.51±0.23	69±4	42±5	121±3	0.475	3.68	B1
63	01/07/01/17:13:54.34	23.22	121.07	22±6	34.81	-8.51	8.30	178.48	-114.19	-7.53	4.16±0.21	357±9	58±7	2±20	0.564	13.49	C2
64	01/07/09/15:20:47.63	24.01	121.77	41±5	80.36	-669.71	700.93	190.86	-397.37	-714.75	4.63±0.23	215±8	29±10	137±10	0.495	23.15	B2
65	01/07/13/11:33:24.28	24.43	120.99	17±7	-30.29	39.47	24.63	108.96	73.78	14.55	4.03±0.20	190±12	56±6	5±9	0.451	6.46	B1
66	01/07/14/17:09:02.32	24.20	120.92	24±4	18.91	-41.54	18.44	6.88	-20.71	-13.45	3.69±0.18	222±3	50±3	152±5	0.398	0.68	B1
67	01/07/15/02:07:47.30	23.05	120.56	16±5	-17.66	-311.98	461.62	-58.29	7.38	104.57	4.35±0.22	348±5	38±7	88±4	0.414	23.56	B2
68	01/07/16/07:20:14.25	23.51	120.88	18±6	7.82	-3.60	8.16	29.33	-24.79	-0.79	3.67±0.18	357±3	51±5	7±17	0.455	7.64	B1
69	01/07/17/02:44:59.20	21.74	121.01	36±7	79.10	-198.57	117.66	-9.22	99.92	-132.69	4.19±0.21	145±7	35±5	32±3	0.592	14.93	C2
70	01/07/23/12:15:16.59	23.56	121.38	36±5	-121.33	40.88	65.27	116.80	-7.20	122.12	4.13±0.21	100±7	49±4	158±4	0.479	4.92	B1
71	01/07/26/02:19:41.59	24.06	121.51	26±4	-99.71	-10.35	144.34	90.96	24.17	74.52	4.09±0.20	83±10	48±3	130±7	0.497	6.92	B1
72	01/07/30/03:59:31.85	24.24	121.90	24±4	26.64	-21.90	-9.71	-4.58	33.94	-50.24	3.82±0.19	121±11	22±8	-8±16	0.481	18.75	B2
73	01/08/06/14:18:55.34	24.12	121.82	17±5	-16.29	-4.34	28.08	11.94	20.19	-21.21	3.67±0.18	249±8	22±5	110±5	0.477	2.12	B1
74	01/08/07/17:27:41.02	24.15	120.96	32±6	4.93	2.01	-1.63	15.83	-3.02	2.68	3.42±0.17	356±3	76±10	-12±10	0.521	23.65	C2
75	01/08/11/01:02:23.33	23.19	121.09	20±6	67.44	-74.18	23.41	115.61	-38.13	-28.98	4.04±0.20	252±4	74±10	167±3	0.536	0.48	C1
76	01/08/19/01:58:26.44	22.37	121.58	19±5	119.47	-148.57	59.57	1.73	74.37	38.18	4.08±0.20	40±7	58±4	161±6	0.531	5.81	C1
77	01/08/20/16:57:59.36	23.98	121.59	16±5	-121.66	-80.98	266.21	137.68	3.51	105.54	4.23±0.21	66±3	40±3	117±6	0.473	5.95	B1
78	01/08/31/11:33:16.81	24.14	121.66	17±5	-179.19	-77.86	229.06	151.36	122.24	20.22	4.24±0.21	215±5	39±4	59±7	0.497	6.90	B1

(Table 2. continued)

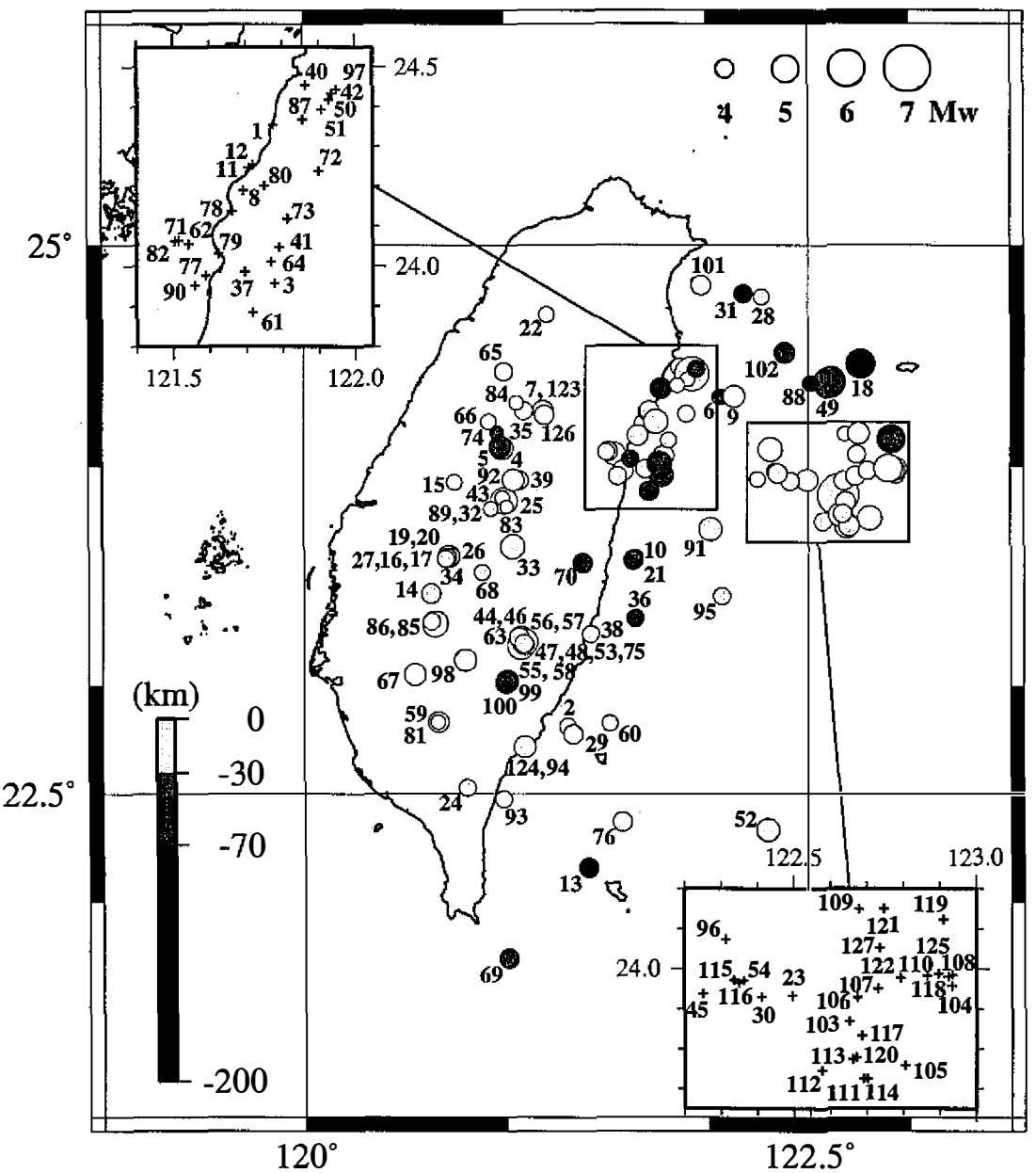
79	01/09/11/00:31:18.87	24.03	121.62	31±5	-26.67	-4.17	39.93	50.33	-9.06	-58.01	3.89±0.19	265±7	43±3	153±11	0.475	21.71	B2
80	01/09/11/08:38:58.10	24.20	121.75	14±6	115.65	48.46	-26.35	156.36	973.03	-137.63	4.60±0.23	164±17	9±3	-9±23	0.555	8.67	C1
81	01/09/11/11:06:18.89	22.83	120.67	17±6	-7.88	-12.59	30.60	14.92	-9.46	11.26	3.61±0.18	41±3	31±4	90±5	0.560	9.21	C1
82	01/09/12/01:52:33.10	24.06	121.50	23±6	-27.34	-12.09	31.47	32.41	-2.73	42.47	3.80±0.19	81±8	36±3	145±13	0.533	7.74	C1
83	01/09/15/10:05:44.09	23.81	121.01	13±5	-7.99	-11.70	23.77	9.07	-1.44	2.01	3.49±0.17	40±3	42±5	91±10	0.570	17.29	C2
84	01/09/16/12:23:34.20	24.29	121.06	17±5	-8.61	-7.56	22.93	20.85	0.67	26.97	3.66±0.18	76±20	36±3	146±13	0.630	6.45	C1
85	01/09/17/22:44:44.79	23.28	120.65	13±5	-111.44	-1878.82	2051.25	583.10	-237.60	571.26	4.82±0.24	15±7	37±4	87±3	0.486	3.83	B1
86	01/09/22/07:02:20.08	23.29	120.64	13±5	-10.19	-62.73	71.43	32.72	32.36	-27.90	3.89±0.19	193±8	32±9	69±6	0.487	6.11	B1
87	01/09/28/21:56:21.31	24.37	121.86	24±4	-12.85	-6.41	21.34	-21.50	-1.26	-24.97	3.65±0.18	100±6	38±4	35±12	0.460	1.68	B1
88	01/10/02/15:37:42.12	24.38	122.51	74±10	5.37	-29.79	23.01	16.30	11.70	20.28	3.67±0.18	52±3	41±9	143±3	0.482	3.02	B1
89	01/10/12/08:28:31.11	23.80	120.93	18±6	-8.78	-17.99	33.87	15.40	-7.56	13.16	3.63±0.18	40±3	32±3	95±6	0.460	1.33	B1
90	01/10/13/20:07:05.55	23.95	121.56	17±4	-53.29	-13.40	52.61	71.22	28.77	42.72	3.95±0.20	86±6	57±3	142±7	0.471	0.84	B1
91	01/10/26/10:42:39.76	23.71	122.02	20±5	502.11	-586.59	252.78	64.29	370.04	287.26	4.52±0.23	43±3	50±4	164±9	0.551	3.74	C1
92	10/11/04/08:45:35.08	23.94	121.04	17±6	-116.25	-510.82	472.54	130.95	-87.07	219.21	4.44±0.22	15±9	33±3	87±4	0.466	8.97	B1
93	01/11/25/12:44:24.34	22.47	120.99	15±5	30.90	-3.23	-2.12	69.36	28.05	-19.71	3.87±0.19	170±7	67±3	-13±6	0.459	8.58	B1
94	01/11/27/12:11:14.72	22.71	121.09	30±7	-72.78	17.53	44.12	17.03	21.64	-38.55	3.86±0.19	290±7	41±6	141±19	0.386	8.35	B1
95	01/11/28/02:53:47.08	23.41	122.07	12±5	49.21	-65.30	-5.22	32.38	5.81	13.04	3.82±0.19	60±3	78±3	-179±3	0.631	7.00	C1
96	01/11/29/07:34:12.47	24.07	122.32	26±8	-1072.12	591.79	608.15	-244.61	601.99	-544.92	4.68±0.23	314±7	44±6	154±6	0.441	8.11	B1
97	01/12/05/18:44:35.67	24.44	121.95	32±8	-19.28	-25.87	38.76	-16.28	8.22	51.42	3.81±0.19	309±3	21±9	57±8	0.500	27.11	B3
98	01/12/07/08:07:35.83	23.11	120.80	12±5	26.80	158.94	-16.75	263.17	28.14	-424.58	4.41±0.22	280±9	32±4	-171±13	0.491	6.35	B1
99	01/12/10/08:24:24.89	23.02	121.01	35±8	-300.63	188.17	169.39	298.03	-51.14	-206.44	4.38±0.22	284±10	63±9	157±5	0.549	4.14	C1
100	01/12/11/11:00:32.16	23.01	121.00	32±8	-126.26	40.25	150.31	154.65	1.40	-157.17	4.22±0.21	273±7	46±3	150±11	0.532	1.57	C1
101	01/12/12/02:36:00.72	24.82	121.98	27±6	80.47	-168.31	126.39	-71.05	-79.83	76.70	4.15±0.21	312±8	48±3	33±4	0.590	7.58	C1
102	01/12/16/01:04:55.97	24.52	122.38	53±6	-67.31	-22.29	96.80	196.50	-26.88	252.82	4.28±0.21	87±9	36±5	163±21	0.364	8.97	B1
103	01/12/18/04:03:00.75	23.87	122.65	12±5	-585406.00	940199.00	-37134.20	-233598.00	388058.00	377507.00	6.60±0.33	231±3	56±3	-9±6	0.581	1.14	C1
104	01/12/18/08:24:11.85	23.96	122.93	21±8	-9.47	45.06	-59.31	-23.92	2.79	73.04	3.92±0.20	221±4	23±9	-53±12	0.521	7.78	C1
105	01/12/18/10:34:45.59	23.76	122.81	27±5	-520.31	911.52	-286.34	-174.42	488.73	419.19	4.61±0.23	225±3	49±5	-19±5	0.497	3.22	B1

(Table 2. continued)

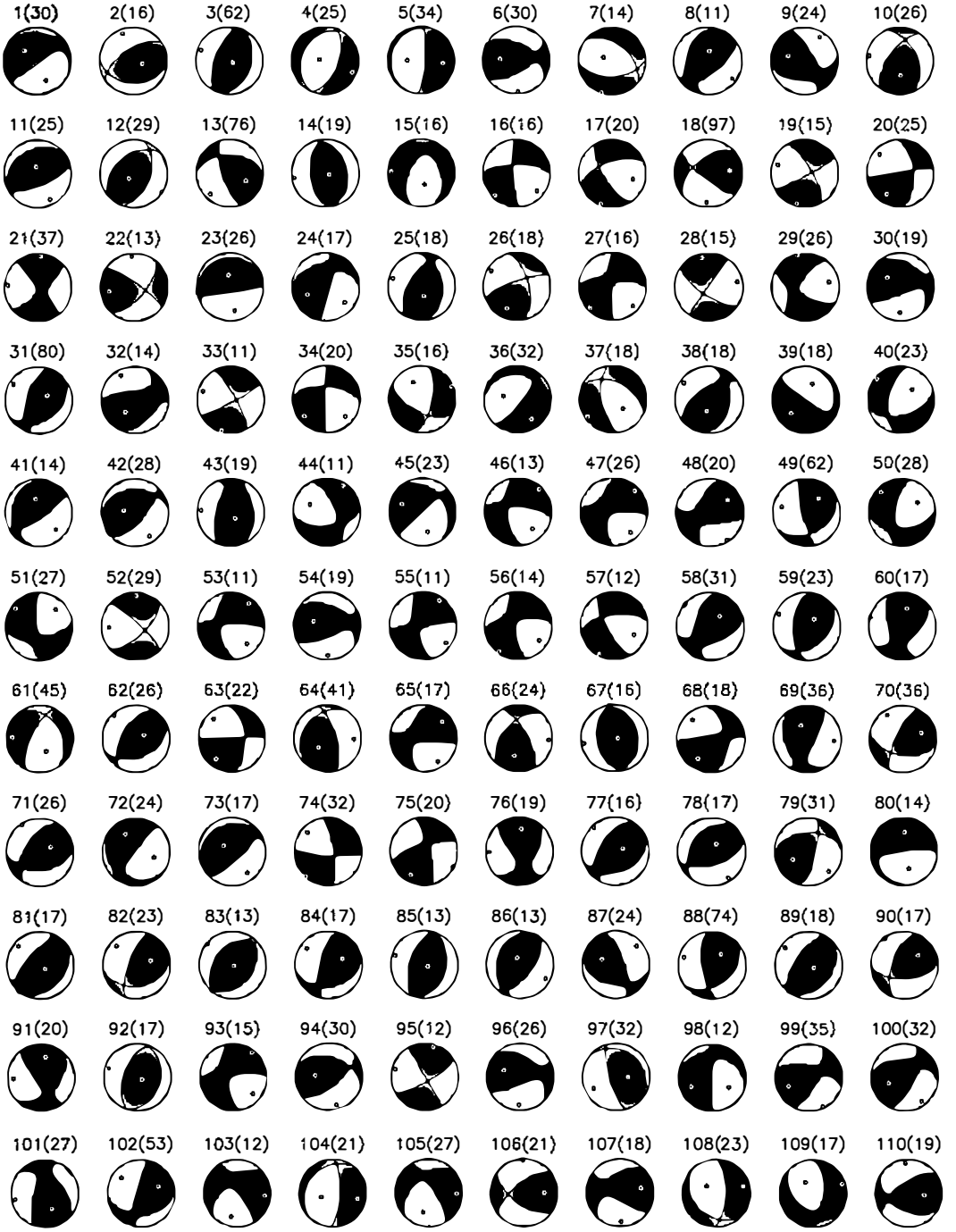
106	01/12/18/11:10:01.98	23.93	122.68	21±5	-181.14	101.30	64.19	8.29	-6.25	89.98	4.10±0.20	126±3	62±8	152±3	0.480	3.69	B1
107	01/12/18/13:21:59.32	23.95	122.73	18±4	-139.41	119.14	64.66	30.49	64.50	73.46	4.09±0.20	223±3	53±3	17±11	0.585	6.43	C1
108	01/12/18/14:44:28.71	23.98	122.94	23±8	-38.77	268.15	-274.71	140.81	-60.75	251.32	4.34±0.22	134±3	32±5	-133±4	0.492	9.23	B1
109	01/12/18/15:01:13.95	24.15	122.68	17±6	-0.03	29.95	-19.84	14.80	-10.96	13.57	3.63±0.18	129±4	45±3	-137±4	0.536	1.02	C1
110	01/12/18/15:37:16.91	23.98	122.87	19±4	-102.54	43.79	68.02	8.21	-25.56	56.33	3.97±0.20	119±6	47±6	144±5	0.471	0.20	B1
111	01/12/18/22:41:17.45	23.72	122.69	28±4	-735.19	516.82	364.65	-687.97	62.92	638.97	4.65±0.23	254±4	55±5	17±5	0.538	0.32	C1
112	01/12/19/00:42:05.81	23.75	122.58	13±6	-80.85	99.45	2.75	-38.08	43.08	70.54	4.01±0.20	236±3	50±8	-1±6	0.565	7.17	C1
113	01/12/19/18:36:23.41	23.77	122.66	26±5	-377.13	864.80	-205.90	-510.37	372.31	694.10	4.65±0.23	240±7	45±3	-15±3	0.481	5.55	B1
114	01/12/19/18:49:29.09	23.72	122.71	18±6	-250.80	224.55	59.04	-138.35	1.20	132.51	4.26±0.21	243±3	67±3	15±6	0.479	6.34	B1
115	01/12/20/06:58:58.27	23.97	122.34	20±4	-64.77	37.73	46.21	2.61	37.50	-46.08	3.89±0.19	302±5	39±4	152±3	0.513	2.80	C1
116	01/12/20/08:15:07.26	23.97	122.35	26±6	-119.03	74.91	89.61	-10.63	88.24	-77.52	4.08±0.20	307±6	37±5	152±3	0.525	5.15	C1
117	01/12/20/08:26:43.50	23.83	122.69	27±6	-151.60	103.18	-1.75	-0.54	75.72	73.56	4.09±0.20	226±3	50±3	4±6	0.519	8.83	C1
118	01/12/20/23:29:14.63	23.98	122.92	28±5	-420.39	253.69	90.01	45.97	-254.22	330.17	4.43±0.22	126±3	39±3	167±7	0.484	5.18	B1
119	01/12/22/21:40:25.84	24.12	122.91	32±4	-1469.39	2753.94	-363.04	-1179.22	4817.18	-2308.15	5.12±0.26	336±3	25±8	-173±7	0.627	16.33	C2
120	01/12/23/17:11:29.73	23.78	122.67	22±5	14.56	42.55	-60.68	-63.71	60.55	10.66	3.95±0.20	7±6	45±5	-145±4	0.557	7.81	C1
121	01/12/24/04:29:05.71	24.15	122.75	13±5	-93.42	475.49	-276.22	73.78	-202.27	27.90	4.37±0.22	144±3	54±4	-133±3	0.572	1.33	C1
122	01/12/25/10:30:38.14	23.98	122.79	23±8	-112.27	68.74	29.27	14.07	13.01	60.55	3.98±0.20	227±3	62±3	24±3	0.496	16.59	B2
123	01/12/25/14:57:36.85	24.24	121.19	11±4	18.49	-7.28	4.29	48.97	-12.38	6.89	3.75±0.19	352±4	76±10	-6±4	0.392	6.55	B1
124	01/12/27/08:34:51.16	22.72	121.10	16±5	24.94	-372.39	451.69	-109.72	84.46	-207.08	4.39±0.22	151±6	36±3	64±12	0.513	6.72	C1
125	01/12/28/00:41:39.23	23.99	122.90	20±5	326.86	2537.93	-3592.27	-1070.61	-605.05	3152.08	5.05±0.25	209±5	23±3	-77±7	0.478	8.22	B1
126	01/12/28/10:40:48.04	24.23	121.20	23±4	41.75	25.04	-11.81	176.37	-81.49	41.01	4.14±0.21	356±4	65±3	-13±18	0.495	8.05	B1
127	01/12/28/11:08:36.45	24.05	122.74	14±5	-23.01	34.58	-45.15	-23.67	-61.33	126.69	4.05±0.20	186±5	9±8	-110±11	0.599	24.78	C2

[1] Origin time (Year/Month/Day/hr:min:sec) and epicentral locations (°N, °E) are reported by the Seismology Center, Central Weather Bureau, Taiwan.
[2] X, Y, Z point to north, east, and vertically down, respectively. All are in the unit of 1×10^{15} Nt m.
[3] Estimated best double-couple solutions in degrees.
[4] E and ε are defined by equations (2) and (1), respectively. ε is expressed in percent (%).

(a)


4
5
6
7 Mw
(km)
0
-30
-70
-200
25°
22.5°
120°
122.5°
24.5
24.0
121.5
122.0
122.5
123.0

(b)


1(30) 2(16) 3(62) 4(25) 5(34) 6(30) 7(14) 8(11) 9(24) 10(26)
11(25) 12(29) 13(76) 14(19) 15(16) 16(16) 17(20) 18(97) 19(15) 20(25)
21(37) 22(13) 23(26) 24(17) 25(18) 26(18) 27(16) 28(15) 29(26) 30(19)
31(80) 32(14) 33(11) 34(20) 35(16) 36(32) 37(18) 38(18) 39(18) 40(23)
41(14) 42(28) 43(19) 44(11) 45(23) 46(13) 47(26) 48(20) 49(62) 50(28)
51(27) 52(29) 53(11) 54(19) 55(11) 56(14) 57(12) 58(31) 59(23) 60(17)
61(45) 62(26) 63(22) 64(41) 65(17) 66(24) 67(16) 68(18) 69(36) 70(36)
71(26) 72(24) 73(17) 74(32) 75(20) 76(19) 77(16) 78(17) 79(31) 80(14)
81(17) 82(23) 83(13) 84(17) 85(13) 86(13) 87(24) 88(74) 89(18) 90(17)
91(20) 92(17) 93(15) 94(30) 95(12) 96(26) 97(32) 98(12) 99(35) 100(32)
101(27) 102(53) 103(12) 104(21) 105(27) 106(21) 107(18) 108(23) 109(17) 110(19)

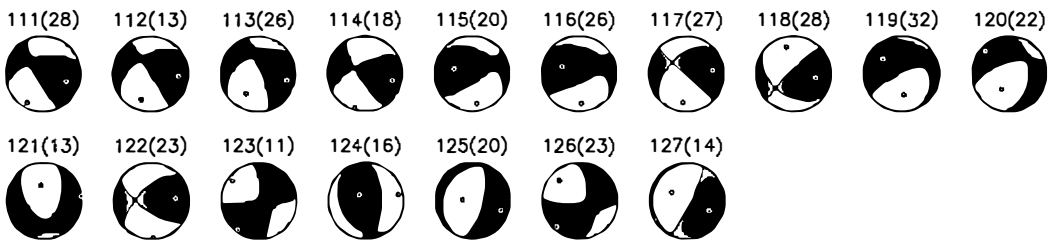


Fig. 2. Moment-tensor inversion results. (a) Map showing the epicenters of 127 studied earthquakes. The size and shade of each symbol represent the corresponding moment magnitude and focal depth, respectively, as shown by the scales. Event numbers are according to Table 2. (b) Corresponding moment-tensor solutions. Darkened areas show quadrants with compressional P-wave first motions. P and T axes are marked by small solid and open circles, respectively. The corresponding best double couple solutions are shown by pairs of solid lines. The first number above each fault plane solution is the event number, whereas the number in parenthesis is the best focal depth.

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