F_1 are identical respectively with the zones I, II and III in Pl. I, while A is nearly identical with the zone V.

From Pl. I and Pl. II it will be seen that the earthquake origins in the central and eastern portions of Honshiu are distributed in two systems of zones ; one nearly in the direction ESE—WNW and the other in the direction NEN—SWS. The former may be regarded as being radial and the latter concentric, or parallel, to the arc formed by the group of the Japanese Islands.

The division into seven groups, I to VII, of the 220 earthquakes given in Table I, which is in accordance with the geographical distribution of the origins as indicated in Pl. I, is as follows.—

Group	I.	Local earthquakes, recorded only in Tokyo.
,,	II.	Earthquakes which originated in zone II.
,,	III.	,, ,, ,, ,, III.
,,	IV.	,, ,, ,, ,, IV.
,,	V.	,, ,, ,, ,, V.
,,	VI.	,, ,, ,, ,, VI.
,,	VII.	,, of miscellaneous origins.

3. Origins and Areas of Disturbance of the different earthquakes.

In Table II, I give the data relating to the position of the origins and the areas of disturbance of the different earthquakes, arranged in the following order.—

(1) Earthquake Number and Group.

(2) Intensity of motion at epicentre, or, in case of a submarine origin, that at the most strongly shaken district ; the intensity for non-destructive earthquakes being distinguished as *strong*, *weak* or *slight*.*

* See the *Publications*, No. 10, p. iii.

(3) Latitude and longitude of the earthquake centre inferred in each case from the isoseismal lines.

(4) Semi-major and semi-minor axes of the area of disturbance, which is generally more or less elliptical. In case of the area being nearly circular, the mean radius is given.*

(5) The direction of the major axis of the area of disturbance.

(6) Distance and direction of the earthquake origin from Tokyo.

(7) *Remark*, giving short notes on the area of disturbance.

The earthquakes not given in Table II are those recorded only in Tokyo.

The *area* means here the area within which the seismic motion was sufficiently intense to be felt.

TABLE II.—ORIGINS AND AREAS OF

Earthquake.		Intensity.	Position of earthq. origin.		Area of disturbance.		Direction of the major axis.
No.	Group.		Lat. N.	Long. E.	Semi-major axis. (km)	Semi-minor axis. (km)	
10	IV	*Weak.*	35° 30′	140° 16′	85	41	E–W.
11	IV	*Slight.*	35 25	139 46	27	16	N 25° E–S 25° W.
13	V	*Violent.*	35 33	141 10	—	—	——
14	III	*Weak.*	35 45	140 20	68	33	N 20° E–S 20° W.
15	V	,,	36 45	141 24	—	—	——
17	III	,,	36 7	139 3	103	74	N 63° E–S 63° W.
18	IV	*Slight.*	35 33	140 9	43	36	N 60° W–S 60° E.
19	V	*Strong.*	35 55	141 7	—	—	——
20	II	*Weak.*	36 23	140 2	96	96	——
21	IV	,,	35 28	139 52	100	84	N 65° W–S 65° E.
23	V	,,	35 55	141 30	—	—	——
28	II	,,	36 9	139 58	200	110	N 78° E–S 78° W.
29	II	*Slight.*	36 8	140 0	60	60	——
30	II	*Weak.*	36 16	140 13	92	92	——
34	IV	,,	35 36	140 15	43	43	——

DISTURBANCE OF THE EARTHQUAKES.

Distance and direction of earthquake origin from Tokyo.	REMARK.
49 km, S 71° E	——
26 ,, S	Observed only in Tokyo and at Kamakura.
125 ,, S 85° E	This was an extensive earthquake, the northward and the westward radii of the land area being respectively 400 and 360 km. The *strong* motion area was a sector of 110° and of radius 154 km with the origin at the Inubozaki, while the *violent* motion area was a similar sector of radius 60 km.
52 ,, N 77° E	——
190 ,, N 52° E	A moderately extensive earthquake, the northward and the WSW′ ward radii of the land area being respectively 200 and 190 km; Tokyo on the SW corner of the area.
80 ,, N 50° W	——
37 ,, S 74° E	——
125 ,, N 77° E	A moderately extensive earthquake, the northward and the WSW′ ward radii of the land area being respectively 230 and 140 km; Tokyo on the WSW edge. Motion felt *strongly* in a sector of 110° and of radius 49 km, with Inubozaki as centre.
85 ,, N 20° E	The area was nearly circular.
22 ,, S 30° E	——
160 ,, N 78° E	The NNW and W radii of the land area were respectively 240 and 230 km.
60 ,, S 21° W	——
55 ,, N 23° E	The area was nearly circular.
78 ,, N 29° E	,, ,, ,,
43 ,, S 72° E	,, ,, ,,

TABLE II. (*Continued.*)

Earthquake.		Intensity.	Position of earthq. origin.		Area of disturbance.		Direction of the major axis.
No.	Group.		Lat. N.	Long. E.	Semi-major axis. (km)	Semi-minor axis. (km)	
37	II	*Slight.*	36° 5′	140° 10′	68	68	——
38	II	*Weak.*	36 22	139 55	93	58	N 24° E–S 24° W
39	V	,,	36 0	141 25	—	—	——
42	V	,,	35 15	140 38	82	32	N 50° W–S 50° E
43	V	*Strong.*	36 5	140 49	—	—	——
44	V	*Weak.*	36 10	141 12	150	120	N–S
45	V	*Slight.*	36	141	—	—	——
46	V	*Strong.*	36 6	141 8	—	—	——
48	VI	,,	41 30	143 0	—	—	——
49	III	*Weak.*	35 46	140 5	34	34	——
50	II	,,	35 58	140 19	84	84	——
53	II	*Slight.*	36 4	139 45	58	45	N 14° W–S 14° E
54	V	*Weak.*	35 16	140 43	93	30	N 65° W–S 65° E
55	V	*Slight.*	35 41	141 11	—	—	——
56	VI	*Strong.*	38 30	142 30	—	—	——

Distance and direction of earthquake origin from Tokyo.	REMARK.
68 km, N 40° E	The area was nearly circular.
80 „ N 13° E	——
150 „ N 75° E	The area was moderately extensive.
90 „ S 62° E	——
107 „ N 65° E	The land area of *strong* motion was nearly a semi-circle of radius 71 km and included Shimosa, southern part of Hitachi and eastern portion of Musashi, Tokyo being on the WSW edge. The N and WSW radii of the area of disturbance were respectively 290 and 220 km.
140 „ N 67° E	——
— —	——
130 „ N 69° E	The N and W radii of the area of disturbance were respectively 250 and 200 km. The area of *strong* motion was nearly a semi-circle of radius 43 km and included the SE part of Hitachi and NE portion of Shimosa. This earthquake was much similar to, but slightly smaller than, Eqke. No. 43.
600 „ N 27° E	This was a very extensive earthquake, which shook the whole NE Japan, from Hokkaido down to the boundary of Echigo and eastern portion of Kotsuke and of Musashi, the radius on SWS being 600 km. The motion was felt *strongly* in Hidaka, E portion of Iburi, E portion of Oshima, E half of Mutsu, Rikuchu, and NE portion of Rikuzen.
32 „ N 68° E	The area of disturbance was nearly circular.
60 „ N 54° E	„ „ „
44 „ N	——
95 „ S 65° E	——
130 „ E	The land area of disturbance was a circular sector of radius 80 km, whose angle was 120°.
390 „ N 38° E	This was a very extensive earthquake, which shook the whole of NE Japan, from the SE part of Hokkaido down to the boundary of Echigo and the eastern portions of Kotsuke and Musashi. The motion was felt strongly in the SE portion of Rikuchu, in Rikuzen and in the NE corner of Iwaki. The SWS radius of the area of disturbance was 390 km.

TABLE II. (*Continued.*)

Earthquake.		Intensity.	Position of earthq. origin.		Area of disturbance.		Direction of the major axis.
No.	Group.		Lat. N.	Long. E.	Semi-major axis. (km)	Semi-minor axis. (km)	
59	II	*Slight.*	36° 8′	139° 43′	65	65	——
60	II	*Weak.*	36 7	139 50	67	57	N 26° W–S 26° E
61	II	,,	36 25	139 58	93	93	——
62	IV	*Strong.*	35 21	139 10	115	115	——
65	II	,,	36 15	139 57	—	—	——
69	II	*Slight.*	36 0	140 7	60	60	——
70	III	*Strong.*	35 49	139 31	—	—	——
71	V	*Weak.*	36 25	141 0	130	67	N 50° E–S 50° W
75	II	*Slight.*	36 5	139 57	59	34	N–S
76	II	*Weak.*	35 57	140 5	69	49	N 10° W–S 10° E
77	V	,,	36 7	141 0	—	—	——
78	II	*Strong.*	36 4	140 5	—	—	——
79	IV	*Weak.*	35 33	139 8	75	34	E–W
80	V	,,	35 40	141 0	—	—	——
81	IV	,,	35 33	139 27	40	32	E–W

Distance and direction of earthquake origin from Tokyo.	REMARK.
53 km, N 3° W	The area of disturbance was nearly circular.
51 „ N 9° E	This was very similar to No. 59.
89 „ N 15° E	The area of disturbance was nearly circular.
63 „ S 57° W	The area of disturbance was nearly circular; the motion was felt *strongly* in the W portion of Sagami and E portion of Suruga.
69 „ N 15° E	This was an extensive earthquake, whose ENE and WSW radii of propagation were respectively 260 and 220 km. The area of *strong* motion was roughly a circle of radius 60 km and included the central and SW parts of Hitachi, S half of Shimotsuke, E corner of Kotsuke, NE half of Musashi, and NW half of Shimosa.
52 „ N 41° E	The area of disturbance was nearly circular.
29 „ N 50° W	This was an extensive earthquake, the NEN and WSW radii of propagation being respectively 340 and 270 km. The area of *strong* motion was an ellipse whose two semi axes were respectively 130 and 87 km and the direction of whose major axis was N 34° E–S 34° W.
140 „ N 52° E	——
48 „ N 15° E	——
44 „ N 40° E	——
120 „ N 66° E	The land area of disturbance was nearly a semi-circle of radius 82 km.
56 „ S 51° W	This was a large earthquake, the SW and NEN radii of propagation being respectively 180 and 350 km. The area of *strong* motion was an ellipse, whose two semi-axis were respectively 66 and 39 km, and whose major axis was in the direction N 48° E–S 48° W.
57 „ S 78° W	——
110 „ E	——
32 „ S 68° W	——

TABLE II. (*Continued.*)

Earthquake.		Intensity.	Position of earthq. origin.		Area of disturbance.		Direction of the major axis.
No.	Group.		Lat. N.	Long. E.	Semi-major axis. (km)	Semi-minor axis. (km)	
82	IV	*Strong.*	35° 42′	139° 4′	71	45	N 70° E–S 70° W
83	II	,,	36 0	140 14	128	128	——
84	IV	,,	35 33	139 6	100	74	——
86	IV	,,	35 33	139 17	104	76	N 33° E–S 33° W
89	IV	*Weak.*	35 30	139 14	29	19	N 27° E–S 27° W
92	IV	,,	35 36	139 11	60	46	E–W
94	VII	*Strong.*	35 27	136 40	—	—	——
97	V	*Weak.*	36 0	141 15	—	—	——
102	V	,,	35 38	140 53	90	90	——
103	VI	*Strong.*	37 38	141 30	—	—	——
104	V	,,	36 17	141 0	140	140	——
113	IV		35 34	138 36	140	56	E 6° N–W 6° S
114	IV		—	—	29	16	E 60° N–W 60° S
115	III		—	—	30	19	N 50° E–S 50° W
117	V		—	—	63	38	N 40° E–S 40° W

Distance and direction of earthquake origin from Tokyo.	REMARK.
63 km S 85° W	Felt strongly in the E portion of Kai.
58 „ N 52° E	The land area of disturbance was nearly a semi-circle of radius 128 km with Mito for the centre. The motion was felt *strongly* in the NE part of Shimosa and S portion of Hitachi.
56 „ S 78° W	The motion was felt *strongly* in the E portion of Kai and N part of Sagami.
52 „ S 77° W	This earthquake was very similar to No. 84. The motion was felt strongly in the E portion of Kai and N part of Sagami.
21 „ S 10° W	This was a very small eathquake.
51 „ N 80° E	Tokyo was at the E end of the major axis.
280 „ W	This was an extensive earthquake, whose iso-seismals were similar to those of Mino-Owari eqke of Oct. 28th, 1891. The E, N and SW radii of propagation were respectively 220, 107 and 165 km; Tokyo being at the eastern end of the shaken area. The origin was in the NW part of Mino, and the area of *strong* motion was an irregular ellipse whose two semi-axes were respectively 74 and 34 km, the major axes being parallel to the direction N 56° W–S 56° E.
144 „ N 75° E	The land area of disturbance was 150 km in length and 90 km in breadth.
100 „ E	The area of disturbance was nearly circular, Tokyo being on the W boundary.
270 „ N 37° E	This was a large earthquake, whose disturbed land area was 410 km long and 120 km wide, and extended from the S parts of Rikuchu and Ugo to the NE part of Musashi. The area of *strong* motion included nearly the whole of Rikuzen and Iwaki and eastern portion of Iwashiro.
130 „ N 58° E	The N and W radii of propagation were respectively 210 and 190 km, Tokyo being on the WSW edge of the area. The motion was felt *strongly* at a central portion of the coast of Hitachi.
110 „ W	——
21 „ SW	——
23 „ E	——
„ NE	——

TABLE II. (*Continued.*)

Earthquake.		Intensity.	Position of earthq. origin.		Area of disturbance.		Direction of the major axis.
No.	Group.		Lat. N.	Long. E.	Semi-major axis. (km)	Semi-minor axis. (km)	
118	III	—	—	—	72	36	N 70° W–S 70° E
119	III	*Slight.*	35° 42′	140° 5	34	19	——
121	III	*Weak.*	36 6	139 11	51	38	N 12° E–S 12° W
122	V	*Strong.*	36 20	141 9	190	180	——
123	II	„	36 11	139 32	120	90	N 40° E–S 40° W
124	III	*Slight.*	35 48	140 0	32	16	N 48° E–S 48° W
125	III	*Strong.*	35 39	140 22	92	92	——
126	IV	*Weak.*	35 34	140 10	44	44	——
131	V	„	36 30	141 30	—	—	——
134	VI	*Strong.*	38 20	143 0	—	—	——
137	IV	*Weak.*	35 25	140 5	41	23	N 70° W–S 70° E
138	VI	*Strong.*	38 30	142 13	—	—	——
142	III	*Weak.*	35 54	139 31	98	68	N 70° E–S 70° W
143	II	*Strong.*	36 0	139 51	—	—	——
144	V	*Weak.*	35 20	141 5	—	—	——

Distance and direction of earthquake origin from Tokyo.	RAMARK.
68 km, E	——
30 ,, N 80° E	——
52 ,, N 12° E	——
150 ,, N 61° E	This was an earthquake of moderate extension, whose land area extended from the SE part of Rikuzen to the NE part of Sagami. The motion was felt *strongly* at Inubo-zaki and NE corner of Hitachi.
62 ,, N 22° W	The shock was felt *strongly* in a limited area in the Saitama and Osato Districts of Musashi.
26 ,, N 48° E	——
53 ,, E	The earthquake was moderately extensive, the area being an irregular circle. The motion was felt *strongly* in a narrow elliptical area whose two axes were respectively 75 and 22 km and which extended, in direction N 22° W–S 22° E, from the N part of Kazusa to the middle portion of Shimosa.
38 ,, S 75° E	The area of disturbance was nearly circular.
190 ,, N 58° E	This was a large earthquake, whose land area was 270 km long and 80 km wide, Tokyo being on the SW edge.
430 ,, N 45° E	This was a very large earthquake, whose land area was 1100 km long and 90 km wide, and extended from the middle of Hokkaido down to the eastern portion of Sagami. The motion was felt *strongly* along the coast of Rikuzen and N portion of Iwaki.
41 ,, S 45° E	——
380 ,, N 35° E	This was an extensive earthquake. whose N, WNW and SWS radii of propagation were respectively 190, 230 and 390 km, Tokyo being at the SWS extremity of the area. The motion was felt *strongly* along the coast, between Miyako and the mouth of the Abukuma-*gawa*, the width of the zone being 27 km.
29 ,, N 18° W	——
38 ,, N 8° E	This was an extensive earthquake, whose NEN, SW and WNW radii of propagation were respectively 260, 180 and 150 km. The motion was felt *strongly* in an elliptical area whose two axes were respectively 155 and 106 km and whose major axis was in the direction N 47° E–S 47° W.
126 ,, S 75° E	The land area was 140 km long and 77 km wide.

TABLE II. (*Continued.*)

Earthquake.		Intensity.	Position of earthq. origin.		Area of disturbance.		Direction of the major axis.
No.	Group.		Lat. N.	Long. E.	Semi-major axis. (km)	Semi-minor axis. (km)	
147	V	*Weak.*	35° 44′	141° 5′	110	110	——
152	II	„	35 58	139 55	56	34	N 30° W–S 30° E
154	IV	*Strong.*	35 24	139 51	—	—	——
155	III	*Weak.*	35 58	139 30	87	87	——
156	III	*Slight.*	35 51	139 46	80	80	——
158	III	*Weak.*	36 0	139 30	80	80	——
161	IV	„	35 24	139 34	46	29	——
163	IV	*Strong.*	35 27	139 26	46	36	N 51° E–S 51° W
169	IV	*Slight.*	—	—	27	19	——
171	IV	*Strong.*	35 34	139 47	200	115	——
172	V	„	36 0	141 0	—	—	——
173	V	*Weak.*	36 0	141 30	—	—	——
174	V	*Strong.*	36 16	141 23	—	—	——
176	V	„	36 40	141 30	—	—	——
177	IV	„	35 27	139 46	150	90	N 23° W–S 23° E

Distance and direction of earthquake origin from Tokyo.	REMARK.
118 km, E	——
34 „ N 20° E	——
29 „ S 15° E	This was a large earthquake, whose NEN and WSW radii of propagation were respectively 425 and 300 km, the origin being in Tokyo Bay. The radius of the *strong* motion area was 135 km and that of the violent motion area 48 km.
40 „ N 36° W	The area was nearly circular.
21 „ N 7° W	„ „ „
44 „ N 35° W	„ „ „
35 „ S 35° W	——
41 „ S 53° W	This was a small earthquake, felt *strongly* in the E part of Sagami.
— SWS	The origin was probably in the Tokyo Bay.
— —	This was an extensive earthquake, whose SW and NE radii of propagation were respectively 100 and 300 km; the origin being in the immediate vicinity of Tokyo. The area of *strong* motion was an ellipse whose two axes were respectively 130 and 57 km, and whose major axis was in the direction N 63° E–S 63° W.
115 „ N 70° E	This was an extensive earthquake, whose NE and SW radii of propagation were each 225 km. The motion was felt *strongly* in a small elliptical area (axes 64 and 23 km) about the mouth of the Tone-*gawa*.
162 „ N 78° E	The land area was 360 km long and 180 km wide. This earthquake was much similar to No. 172, except that the *intensity* was less.
160 „ N 62° E	An extensive earthquake, whose N and SWS radii of propagation were respectively 270 and 330 km, the land area being 510 km long and 170 km wide. The area of *strong* motion was a narrow zone, 155 km long and 22 km wide, which extended from the SE corner of Iwaki down to the NE corner of Shimosa.
195 „ N 54° E	An extensive earthquake, whose N and SW radii of propagation were respectively 330 and 300 km, the land area being 450 km long and 170 km wide. The motion was *strong* in the S portion of Iwaki and in the NE portion of Shimotsuke.
23 „ S	The motion was felt *strongly* along the western coast of the Tokyo Bay between Tokyo and Yokohama.

TABLE II. (*Continued.*)

Earthquake.		Intensity.	Position of earthq. origin.		Area of disturbance.		Direction of the major axis.
No.	Group.		Lat. N.	Long. E.	Semi-major axis. (km)	Semi-minor axis. (km)	
178	IV	*Slight.*	35° 26′	139° 51′	48	28	N 70° W–S 70° E
179	II	*Weak.*	36 10	139 51	100	80	N 38° E–S 38° W
180	II	,,	36 11	139 38	104	79	N 42° E–S 42° W
181	II	*Slight.*	—	—	57	36	N 43° E–S 43° W
182	IV	*Strong.*	35 42	139 12	160	160	——
184	VII	*Weak.*	35 0	139 25	120	120	——
186	II	*Slight.*	—	—	—	—	——
188	II	,,	36 5	140 0	55	40	N 40° E–S 40° W
189	V	*Weak,*	37 0	142 0	—	—	——
192	V	*Strong.*	36 25	141 0	150	150	——
194	II	*Slight.*	36 0	140 20	70	70	——
195	III	,,	35 46	140 7	81	37	N 23° W–S 23° E
197	VII	*Violent.*	35 28	136 57	310	157	N 70° E–S 70° W
203	V	*Slight.*	—	—	—	—	N 30° E–S 30° W
207	V	,,	—	—	137	77	N 38° E–S 38° W

Distance and direction of earthquake origin from Tokyo.	REMARK.
26 km, S 10° E	——
58 „ N 8° E	——
59 „ N 13° W	——
53 „ N 43° E	——
120 „ S 30° W	The area was nearly circular.
74 „ S 23° W	„ „ „ „
— —	This was a small earthquake, the origin and the area being nearly the same as those of No. 188.
55 „ N 40° E	——
260 „ N 60° E	This was an extensive earthquake, felt along the coast between N part of Iwaki and E portion of Musashi.
137 „ N 54° E	The motion was felt *strongly* in the N half of Hitachi; Tokyo being on the SWS edge of the disturbed area.
60 „ N 55° E	The area was nearly circular.
37 „ N 60° E	——
260 „ S 83° W	This was an extensive earthquake, whose E and W radii of propagation were respectively 300 and 330 km; the origin being in the vicinity of Koori in the N part of Owari. The mean radii of the areas of *violent*, *strong* and *weak* motion were respectively 34, 100 and 158 km.
160 „ N 60° E	The land area was 200 km long and 80 km wide.
——	——

TABLE II. (*Continued.*)

Earthquake.		Intensity.	osition of earthq. origin.		Area of disturbance.		Direction of the major axis.
No.	Group.		Lat. N.	Long. E.	Semi-major axis. (km)	Semi-minor axis. (km)	
208	II	—	36° 22′	140° 16′	103	36	N 30° E–S 30° W
209	V	—	36 30	142 0	—	—	——
210	V	—	36 10	141 0	—	—	——
211	II	—	—	—	55	42	——
212	V	—	35 42	141 0	—	—	——
214	V	*Strong.*	36 30	141 25	320	75	N 40° E–S 40° W
215	VII	,,	34 35	138 30	315	62	N 80° E–S 80° W
216	II	—	36 17	139 57	73	73	——
219	II	—	36 5	140 11	103	55	N 10° W–S 10° E
220	IV	—	—	—	57	36	N–S

Distance and direction of earthquake origin from Tokyo.	REMARK.
100 km, N 30° E	The area was a long regular ellipse, Tokyo being on the SW end of the major axis.
230 „ N 65° E	The land area was 250 km long and 63 km wide, Tokyo being at the SW edge of it.
120 „ N 65° E	The land area was 96 km long and 23 km wide.
53 „ N 25° E	——
107 „ E	The shock was felt only in the vicinity of the Inubō-*zaki*.
170 „ N 58° E	The motion was felt *strongly* in the SE portion of Iwaki and the NE part of Hitachi.
160 „ S 42° W	The origin was at the mouth of the Suruga Bay, and the motion was felt *strongly* in the SE portion of Totomi, SW part of Suruga and W half of Izu.
73 „ N 10° E	The area was nearly circular.
60 „ N 40° E	Tokyo was at the SW edge of the area.
36 „ E	Tokyo was at the W end of the minor axis.