GROUP VII.—*Earthquakes which originated in Central Japan.*

Eqke No. 9. August 1st 1898; 2h 12m 21s p.m.
Total duration = 6m 15s.

Observations at Meteorological Observatories :—

Tsu	2h 7m 20s p.m.	Strong.	Motion gentle.
Nagoya	2. 11. 58	Weak.	Motion quick, accompanied by vertical movements.
Hikone	2. 15. 00	„	Houses shaken.
Gifu	2. 11. 39	Slight.	Accompanied by sound.
Fukui	2. 12. 00	„	Doors shaken.
Kyoto	2. 12. 18	„	
Osaka	2. 12. 11	„	Motion gentle.
Mito	2. 13. 51	„	
Wakayama ..	2. 14. 00	„	
Kofu	2. 14. 05	„	
Yagi	2. 18. 00	„	
Tokyo	2. 24. 18	„	

(NS component).

The P.T., whose duration was 58s, consisted of small quick vibrations.

The P.P., whose duration was 1m 20s, began with well defined vibrations of an average period of 2,1s, superposed on slower ones of an average period of about 6,5s. The max. 2a of 0,05 mm occurred at the commencement.

(EW component).

The P.T. lasted for 49s.

The P.T., whose duration was 1m 30s, consisted of vibrations of an average period of 8,7s, superposed of an average period of 5,2s. The max. 2a was 0,09 mm.

Eqke No. 56. November 13th 1898; 11h 33m 3s a.m.

Total duration=13m.

Observations at Meteorological Observatories :—

Nagoya	11h 32m 16s a.m.	Strong.	Motion quick, accompanied by vertical movements: houses shaken.
Gifu	11. 31. 33	,,	Accompanied by vertical motion; liquids overflowed.
Tsu	11. 34. 35	,,	Houses shaken.
Hikone	11. 35. 10	,,	Pendulum clocks stopped.
Kofu	11. 31. 33	Weak.	Accompanied by vertical motion; houses shaken.
Hamamatsu ..	11. 31. 40	,,	Motion gentle.
Yagi	11. 32. 9	,,	Accompanied by vertical motion; houses shaken.
Iida	11. 32. 15	,,	,, ,,
Numazu ..	11. 32. 32	,,	Motion quick; accompanied by vertical movements; articles fell from shelves.
Kyoto	11. 32. 35	,,	
Osaka	11. 33. 25	,,	Houses shaken.
Kobe	11. 29. 30	Slight.	Motion quick.
Fukui	11. 29. 33	,,	Duration long.
Yokohama ..	11. 31. 58	,,	Motion gentle.
Okayama ..	11. 32. 0	,,	
Kumagae ..	11. 32. 56	,,	Doors shaken.
Maebashi ..	11. 33. 0	,,	Motion gentle.
Tokyo	11. 33. 12	,,	

Mito	11h 33m 32s a.m.	Slight.	
Tadotsu.. ..	11. 33. 46	„	Motion gentle.
Utsunomiya ..	11. 33. 47	„	
Matsuyama ..	11. 35. 11	„	
Matsumoto ..	11. 35. 20	„	

The P.T., whose duration was 29s, consisted of very small vibrations of an average period of 2,2s, superposed with still quicker ones.

The P.P., whose duration was 1m 30s, consisted at first of small quick vibrations of an average period of about 1,1s, the initial displacement being 0,1 mm towards E and 0,05 mm towards N. After 1m 15s there appeared 7 well defined slower vibrations, which lasted 52,4s and had an average period of 7,5s; the first of the group having the max. (abs.) 2a of 0,46 mm in the EW and 0,50 mm in the NS component. The waves in the succeeding portion had a slightly shorter period.

The E.P. The average period was 6,6s.

Eqke No. 81. January 22nd 1899; 8h 4m 3s a.m.

Total duration=13m.

Observations at Meteorological Observatories:—

Nagano ..	8h 4m 18s a.m.	Strong.	Houses shaken.
Nagoya ..	7. 58. 56	Weak.	Accompanied by vertical motion.
Kyoto ..	8. 4. 16	„	
Hikone ..	8. 4. 52	„	Accompanied by vertical motion.
Iida	8. 5. 10	„	Houses shaken.
Hamamatsu.	8. 5. 30	„	Motion quick.
Maebashi ..	8. 7. 7	„	Motion gentle.
Tsu	8. 8. 50	„	
Matsumoto .	8. 9. 49	„	Motion quick; accompanied by vertical motion.
Osaka ..	8. 4. 38	Slight.	Motion gentle.

Yokosuka ..	8h 4m 47s a.m.	Slight.	
Mito	8. 4. 50	„	Motion gentle.
Numazu ..	8. 4. 55	„	Motion quick.
Tokyo	8. 4. 59	„	
Utsunomiya ..	8. 5. 0	„	Motion gentle.
Kumagae ..	8. 5. 10	„	
Fukui	8. 5. 30	„	Duration long.
Tadotsu ..	8. 6. 7	„	Motion gentle.
Yagi	8. 10. 40	„	

The P.T., whose duration was 27s, consisted of quick vibrations of an average period of 0,84s, superposed on slight traces of slower waves of an average period of 6,5s. The max. 2a was 0,14 mm in the EW and 0,1 mm in the NS component.

The P.P., whose duration was $4\frac{1}{2}$m, was especially active during the first $1\frac{3}{4}$m. The motion consisted of small quick vibrations superposed on waves of an average period of 2,3s, whose max. 2a was 0,55 mm in the EW and 0,5 mm in the NS component. These latter vibrations were in their turn superposed on slow undulations of an average period of 11,7s, whose max. 2a was 0,55 mm in the EW and 0,6 mm in the NS component. Towards the end, the average period was 6,9s.

The E.P. The average period was 8,0s.

P.O. There existed minute P.O. on the 21st and on the early morning of the 22nd. These however almost disappeared before the occurrence of the earthquake. The average period was as follows:—

3,9s (on the 21st, after-noon);
4,2 (immediately before the earthquake).

Eqke No. 87. February 6th 1899; 4h 7m 54s a.m.

Total duration=8m.

Observations at Meteorological Observatories:—

Yagi	4h 7m 49s a.m.	Slight.	
Gifu	4. 8. 18	„	Motion quick; accompanied by vertical motion.

Nagoya	4h 8m 25s a.m.	Slight.	Accompanied by vertical motion.
Yokohama ..	4. 8. 38	,,	
Fukui	4. 8. 50	,,	
Tokyo	4. 9. 0	,,	
Hikone	4. 9. 15	,,	Duration long.
Kyoto	4. 9. 35	,,	
Iida..	4. 10. 15	,,	Accompanied by vertical motion.
Nagano	4. 10. 50	,,	
Matsumoto ..	4. 22. 35 (?)	,,	

The P.T., whose duration was 24s, consisted of small quick vibrations.

The P.P., whose duration was 2m 3s, began with a motion of 0,1 mm in the EW and 0,02 mm in the NS component. For the first 12s the motion remained small and consisted of quick vibrations. Then followed slower waves of an average period of 7,9s, whose max. 2a was 0,15 mm in the EW and 0,10 mm in the NS component.

The E.P. The principal vibrations had an average period of 6,4s, there being also traces of others of an average period of 3,3s.

P.O. There were slight P.O. The max. 2a was 0,03 mm in each component and the average period, measured 2hs before the earthquake, was 4,5s.

Eqke No. 233. November 21st 1899 ; 6h 56m 29s p.m.

Total duration = 20m.

Observations at Meteorological Observatories :—

Takayama ..	6h 56m 9s p.m.	Weak.	Houses shaken.
Fukushima ..	6. 56. 40	,,	Motion quick; doors shaken.
Maebashi ..	6. 57. 25	,,	Motion gentle.

Matsumoto ..	6h 58m 30s p.m.	Weak.	Accompanied by vertical motion; houses shaken.
Iida	6. 59. 55	„	Motion gentle.
Fukushima ..	6. 52. 22	Slight.	
Kofu	6. 55. 45	„	Houses shaken.
Kyoto	6. 56. 8	„	
Gifu	6. 56. 22	„	Duration long.
Nagoya	6. 56. 23	„	Motion gentle.
Nagano	6. 56. 23	„	Houses shaken.
Fukui	6. 56. 37	„	Duration long.
Hikone	6. 56. 40	„	Motion quick; accompanied by vertical motion.
Tokyo	6. 56. 49	„	
Numazu	6. 57. 4	„	Motion gentle.
Kanazawa ..	6. 57. 30	„	
Mito	6. 57. 32	„	
Kumagae	6. 57. 37	„	
Yokohama ..	6. 57. 59	„	Motion quick.

(NS component).

The P.T. consisted of small vibrations of an average period of 2,1s, superposed on slower ones of an average period of 5,8s.

The P.P., whose duration was 2m 40s, began with a few vibrations (max. $2a=0,3$ mm) whose average period was 2s. 1m 6s later there appeared 4 nearly equal well defined waves (max. [abs.] $2a=0,8$ mm) of an average period of 6,8s, which together lasted 27,3s. In the remaining portion of this epoch the average period was 4,5s.

The E.P. In the earlier portion, the motion consisted of small vibrations of an average period of 3,3s, superposed on others of an average period of 7,9s. Towards the end the average period was 6,3s.

(EW component).

The P.T., whose duration was 28s, consisted of small vibrations of an average period of 2,8s, superposed on slower ones of an average period of 9,3s.

The P.P., whose duration was 4m 30s, consisted for the first 16s of quick vibrations (max. 2a=0,55 mm) of an average period of 2,7s. Then there appeared two slow undulations (2a=0,55 mm) of an average period of 10s. These were followed by vibrations of an average period of 4,6s; the first of the group having the max. (abs.) 2a of 1,0 mm. Towards the end the average period was 5,3s.

P.O. There existed slight P.O. The max. 2a was 0,05 mm in each component, and the average period was 3,9s.