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Short-period seismic wave radiation zones of the great 2011 Tohoku-oki earthquake and historical earthquakes

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Seismic intensity inversion analysis was carried out to obtain short-period seismic wave radiation zones in the fault of main shock and major aftershocks of the great 2011 Tohoku-oki (Mw9.0) earthquake. The short-period seismic wave represents shorter than about one second. The seismic intensity data were corrected by site factor related to local soil amplification of ground motions. The distance attenuation curves for inversion analysis was evaluated using measured seismic intensity of aftershocks. The short-period seismic wave radiation zone of the main shock was separated into two areas, Miyagiken-oki and Fukushima-oki. It is indicated that these areas were located at the rupture end of asperities showing large slip area, compared to the slip distribution by the existing research. Those of four M7 class major aftershocks were located at the edges of large aftershock area.

The short-period seismic wave radiation zones of the main shock and aftershocks were compared to those of historical earthquakes. Those of the so-called Miyagiken-oki earthquake in 1861, 1897, 1936 and 1978 were located on the west of Miyagiken-oki main shock area. Those of the 1763, 1856 and 1968 Tokachi-oki and the 1994 Sanriku-Haruka-oki earthquakes were located in the north and did not overlapped in space. Furthermore, those of the bunch of the 1938 Shioyazaki-oki earthquakes overlapped a little and fill in the space of the West and North regions of the main shock Fukushima-oki area.

Keywords: seismic intensity inversion, Miyagiken-oki earthquake, Shioyazaki-oki earthquake, Tokachi-oki earthquake, historical earthquake, short-period seismic wave