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Dynamic model of hypocenter vibration based on time reversal and prevision of earthquake

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Previously, a hypocenter vibration was analyzed by using time-reversal process for the seismic waves in Suruga Bay. A dynamic model of the hypocenter vibration has proposed from these results. This dynamic model is consistently approved to premonitory symptoms of an earthquake, the main shock, and the aftershock. This model is verified about four earthquakes of M5 or more caused in the vicinity of Mt. Fuji between 2009 and 2012 and the effectiveness is confirmed. The pulse formed at the hypocenter position, that is, time reversal pulse (TRP) was obtained by processing the time reversal to P wave signals received at the observation station in 44 places that enclosed the hypocenter for the earthquake that had occurred in the central part of Suruga Bay in August, 2009. The TRP corresponds to the equivalent sound source that the hypocenter radiates. The clear azimuthal dependency was confirmed to the obtained TRP. To clarify the origin of this azimuthal dependence, the frequency spectrum of the TRP to the azimuth was obtained. The frequency spectrum has changed greatly according to azimuthal. Then, the distribution of the maximum amplitude frequency to azimuthal was obtained. As a result, the maximum amplitude frequency rises greatly as the azimuth changes from west to east and it has descended. The rise of the frequency is due to the movement of the sound source. The moving direction concentrated on the Nishiizunishi station. The head part only of the received signal in the Nishiizunishi St. has expanded though the received signals in Ito and Kawazu St. near the Nishiizunishi St. ware usual waveforms.

The point where the beam of narrow angle radiated from the active fault reaches surface of the earth is called a parametric spot, and the head of the pulse to which the head observed here increases is called a parametric head.

The precursor earthquake of M2 or more had occurred 17 times before earthquake of Suruga Bay (2009/8/11). The waveform to accompany the parametric head in that was observed seven times. These parametric heads suggest that the crack begin to move in the active fault by the high-speed. Therefore, it is thought that it is effective to observe the seismic wave of about M2 in a peculiar parametric spot to each active fault, and to examine the change as the prevision of earthquake.

Keywords: Prevision of earthquake, Time reversal, Hypocenter vibration, Seismic wave propagation