

The 2011 off the Pacific coast of Tohoku Earthquake

Source process analysis with local strong motion data

Meteorological Research Institute (MRI) of Japan Meteorological Agency (JMA) analyzed source process of the event using strong motion records (18 stations denoted by ▲ in Figure 1) in Tohoku and Kanto areas. The summary of the analysis is listed below.

- Main rupture was located in the north-east of the rupture starting point (shallower side of the hypocenter), and maximum slip amounted to about 25m (Fig.1).
- The size of the main fault was 450km in length and 150km in width. Moment magnitude (Mw) was 8.9 (see *NOTE).
- Rupture gradually extended near the hypocenter (0-50s) and propagated towards both south and north directions (Fig.2)

* NOTE: Mw8.9 obtained by this analysis is 0.1 smaller than CMT solution (Mw9.0 by JMA) due to the low-cut filtering (cutoff period: 100s) to the waveform data.

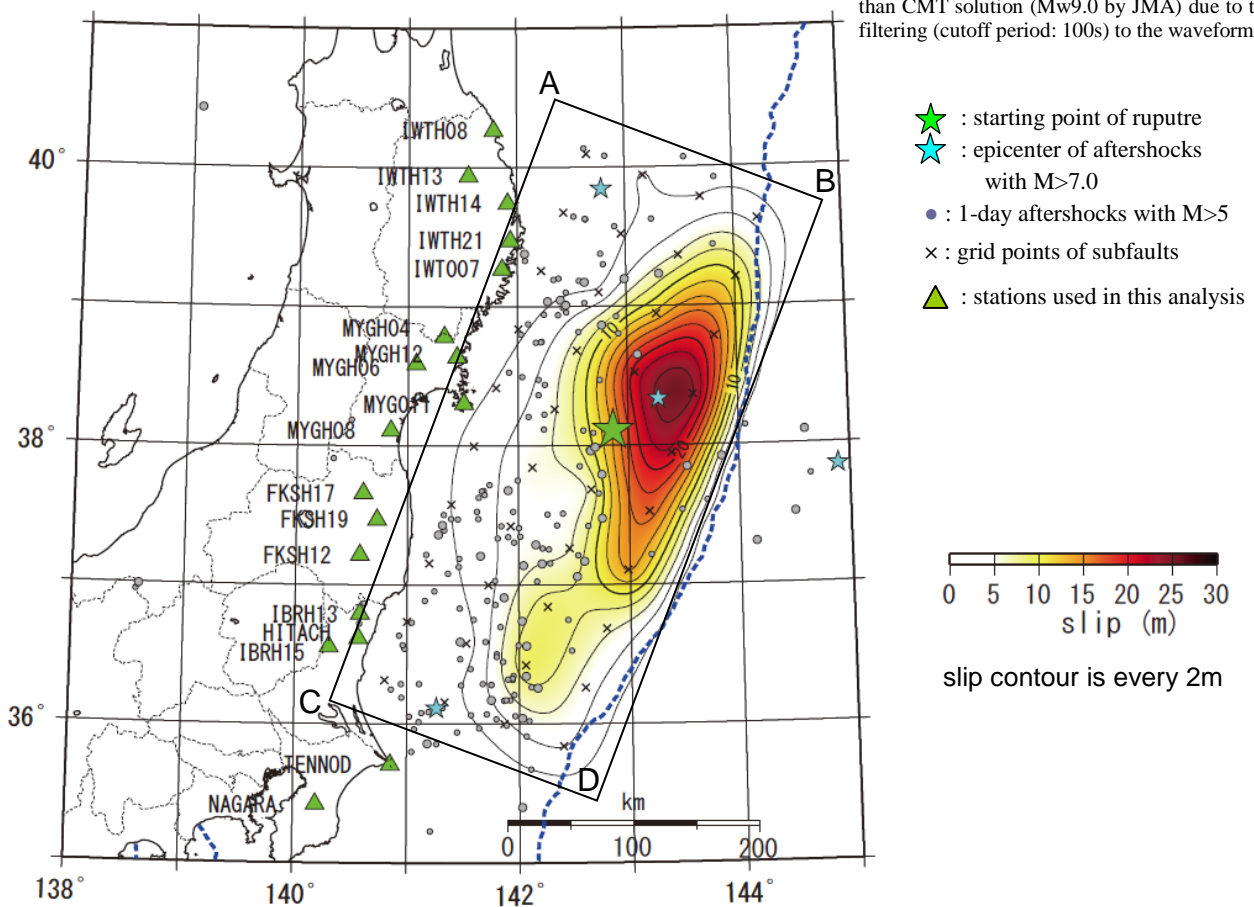


Figure 1 Slip distribution on the fault estimated from source process analysis

We assume the fault plane is parallel to the surface of the subducting Pacific plate, and the starting point of the rupture is at the hypocenter determined by JMA (latitude: 38.1deg, longitude: 142.9deg) in this analysis. You can see many aftershocks occurred around the large slip region.

※ This result is tentative and will be revised in the future.

※ We used the waveform data of seismic stations deployed by NIED (National Research Institute for Earth Science and Disaster Prevention) and JMA (Japan Meteorological Agency).

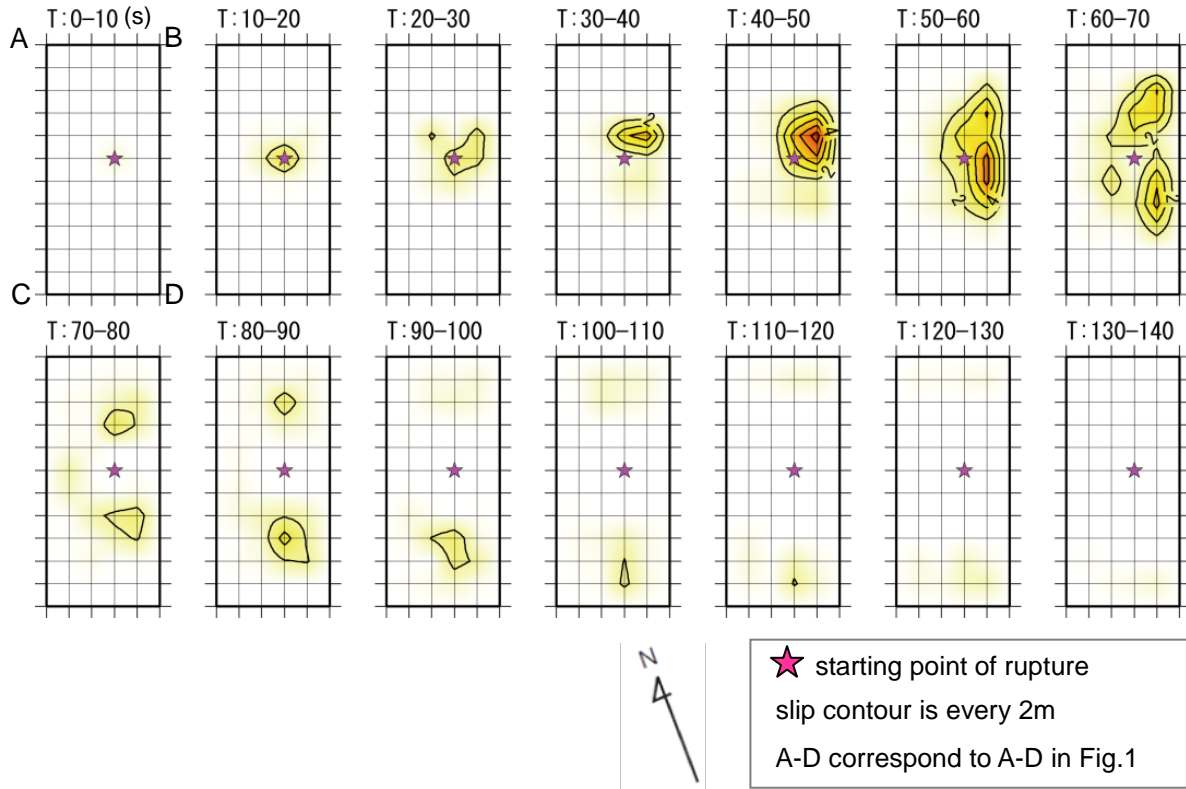


Figure 2. Rupture propagation on the fault (slip distribution of every 10s)

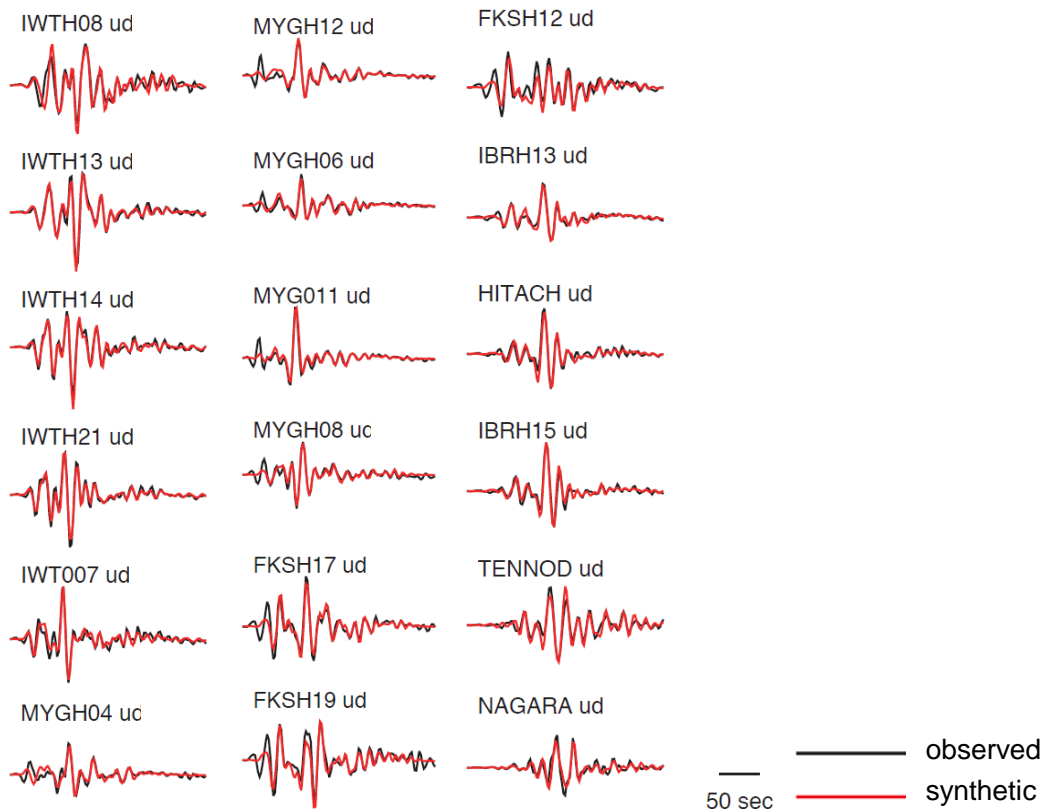


Figure 3. Comparison between observed and synthetic waveforms (velocity, UD-components only)

Comparison between observed waveforms and synthetic waveforms calculated from the slip distribution obtained by this analysis. Overall fitting between them is quite well.