

Japan Geoscience Union Meeting 2011

(May 22-27 2011 at Makuhari, Chiba, Japan)

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MIS036-P34

Room:Convention Hall

Time:May 26 14:15-16:15

Source process of the 2011 Tohoku earthquake

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We examined the source process of the 2011 Tohoku earthquake, which occurred in the subduction zone off the coast of Japan. We analyzed the source process of this earthquake using several data sets. We reported the results using strong motion data.

First, we carried out point source analysis [Kikuchi and Kanamori, 1991] and W-phase inversion [Kanamori and Rivera, 2008] using teleseismic waveforms. In the results, the rupture was generated in large areas off the coast of Miyagi. Next, we performed waveform inversion [Yoshida et al., 1996] using strong motion data. We considered the analyses using teleseismic waveform data and aftershock distributions and the rectangle of 480 x 150 km² was adopted with a strike of 200° and a dip of 12° to model the source fault of the mainshock. Green's function was calculated using Koketsu [1985]. We used a layered velocity structure constructed by the JIVSM [Japan Integrated Velocity Structure Model; Koketsu et al., 2008].

We obtained the source model with a seismic moment of 3.4×10^{22} Nm ($M_w \sim 9.0$) and a maximum slip of about 30 m. This slip distribution recovered at the regions off the coast of Miyagi and Fukushima.

Acknowledgment: The GPS data were recorded by NIED and IRIS.

Keywords: 2011 Tohoku earthquake, source process, strong motion