

Source process analysis of the 2011 Tohoku earthquake using the 3-D Green's functions

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The 2011 Tohoku earthquake occurred at 5:46 a.m. on March 11, 2011 (UTC). The Japan Meteorological Agency (JMA) estimated its moment magnitude (M_w) to be 9.0. This earthquake was observed by dense strong motion, teleseismic, geodetic, and tsunami networks. Various source models were inferred using these datasets. In the previous study, we performed a quadruple joint inversion using strong motion, teleseismic, geodetic, and tsunami datasets to determine a source model [Yokota *et al.*, 2011]. However, we calculated Green's functions using the 1-D velocity structure. In this study, we performed the strong motion inversion using Green's functions calculated using the 3-D velocity structure which reflected the subduction zone.

The 3-D Green's functions were calculated using the voxel finite element method (FEM) [Koketsu *et al.*, 2004; Ikegami *et al.*, 2008]. We used the 3-D velocity structure of JIVSM model [Koketsu *et al.*, 2008]. The obtained 3-D Green's functions involved the complex later phases compared to 1-D Green's functions calculated by the method of Koketsu [1985]. We believe that these complex phases were caused by the surface waves generated in the plate boundary and ocean.

We then performed the strong motion inversion using the obtained 3-D Green's functions by means of the method of Yoshida *et al.* [1996] with the revisions of Hikima and Koketsu [2005]. There were some differences between the results obtained using the 1-D velocity structure and the 3-D velocity structure. We plan to carry out similar analyses for other datasets.

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Keywords: 2011 Tohoku earthquake, source process, 3-D velocity structure, strong motion