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2.5 次元差分法を用いた 1994 年三陸はるか沖地震の震源過程解析
Rupture process analysis of the 1994 far east off Sanriku earthquake using the 2.5 dimension finite difference method

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The effect of the near-source heterogeneous structure on the teleseismic body waveforms can become large for shallow subduction zone earthquakes: large amplitude later phases are generated as a result of the distortions in the ray paths due to the heterogeneous structure. Such structural effect must be carefully considered in evaluating the results of the source process inversion.

As an example of the source process analysis by considering the effect of the near-source structure, we perform inversion of teleseismic P waveforms for space-time slip distribution of the 1994 far east off Sanriku earthquake (the origin time: 12:19:23.60 UTC, December, 28; location: 40.45 degree N, 143.49 degree E; depth 33.0 km after USGS. Mw: 7.7 after Global CMT Catalog). The broadband waveform data were retrieved from the IRIS DMC. We integrate the velocity records to obtain displacement records, and applied band-pass filter with the pass-band between 0.007 Hz and 0.2 Hz to obtain displacement record for inversion. In order to consider the effects of crust and mantle structure around the source region, we constructed the structure model referring to the studies by Ito et al. (2004, EPSL, 223, 163-175), Ito et al. (2002, Zisin2, 54, 507-520), Amante and Eakins (2009, NOAA Technical Memorandum NESDIS NGDC-24, 19 pp.), Bassin et al. (2000, EOS Trans AGU, 81, F897). We presented the results of comparison between observed waveforms of middle size (Mw: 5.9-6.4) earthquakes that occurred in the source region and synthetic waveforms computed for this model using the 2.5 dimension finite difference method (REF) and showed that this model well explained the observed waveform data (Okamoto et al., 2010, P3-29, 2010 Fall Meeting, SSJ).

Using the Green's functions computed for the model, we invert the data for the slip distribution following the inversion procedure developed by Okamoto and Takenaka (EPS, 61, e17-e20, 2009). The preliminary inversion resulted in a small (weak) moment release near the rupture starting point, and a large (strong) moment release around the middle of the fault after about 30 s from the onset. In the companion paper (Hara et al., this meeting), we will present results of the synthetic experiments of this inversion.

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