# Resolution Analysis of Teleseismic Waveform Inversion of Rupture Process of Tsunami Earthquake Using 1D and 2.5D Green's Functions

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Flat-layered or 1D structure is usually assumed as model structure for source region in the teleseismic waveform analysis of earthquakes, because it is a reasonable approximation for many events in land area. However, for shallow subduction zone earthquakes, the thick ocean (water) layer with dipping ocean bottom and the thick sediments with low seismic wave velocity cause large effects on the teleseismic body waveforms, and these effects are not reproduced by flat-layered structure (e.g., Wiens 1989; Yoshida 1992; Okamoto 1993).

In this paper we employ a synthetic resolution test to see the effect of the differences in the Green's functions on the inverted rupture process of a tsunami earthquake. Tsunami earthquake occurs very close to the trench axis (e.g., Polet and Kanamori 2000) and the structural effect is the largest of those for the shallow subduction zone earthquakes. We assume a 2.5D realistic near source structure based on a detailed seismic experiments (Kopp et al. 2002) conducted at Java trench where the 2006 Java tsunami earthquake occurred. We compute realistic Green's functions for teleseismic body waveforms by a 2.5D FDM (Okamoto 1994; Takenaka and Kennett 1996). *Synthetic data* are then generated by using the 2.5D Green's functions for time-space slip models on a fault with a length of 220 km and a width of 130 km. To the synthetic data we apply a non-linear waveform inversion method in which unit point sources are put at the grid points on the fault and the amplitudes and onset times of them are simultaneously retrieved.

We find that when we use the 2.5D or correct Green's functions in the inversion, large slips are obtained near the *true* patches of the slip models. On the other hand, in some cases, somewhat large misfits in the peak positions are found between true and inverted slip patterns when we use 1D Green's functions computed for 1D model structures. The peak amplitudes are smaller than the true ones in both cases using 2.5D and 1D Green's functions. Also, smearing in the slip patterns are observed in both cases.