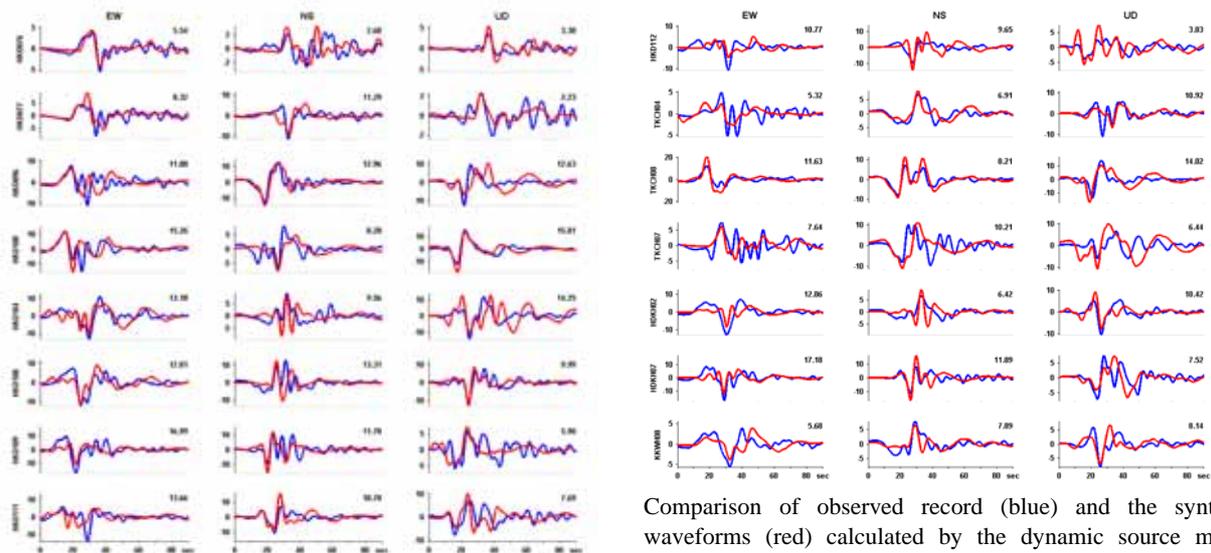


Dynamic Source Rupture Process of the 2003 Tokachi-Oki Earthquake

○Wenbo Zhang and Tomotaka Twata

The 2003 Tokachi-Oki earthquake is one of the largest interplate events occurred around Japan. In this study, we apply a 3D-FDM modified for an inclined fault model (*Zhang and Iwata, 2005*) to analyze the dynamic rupture process of this earthquake. Our analyzing procedure is as follows, 1) Obtain the spatial-temporal stress distribution on the fault surface from the kinematic source model inverted from strong motion data (*Honda et al., 2004*). Estimate the strength excess (yielding stress) and the frictional stress level for each subfault; 2) Estimate the critical slip-weakening distance D_c for each subfault assuming a simple slip-weakening law and according to the method of *Mikumo et al. (2003)*; 3) Reconstruct the dynamic source rupture process using those dynamic source parameters with the slip-weakening friction law; and 4) Simultaneously, simulate the near source ground motions based on the obtained dynamic source model.

Our result shows that in general large stress drop occurred around areas with a large slip except the shallow part around the hypocenter. Although kinematic source model shows that this area has a large slip, the stress drop is not so large comparing with the deep areas that has a similar amount of slip. The estimated strength excess are generally small and that suggests the tectonic shear stress has reached near the level of the fault strength before the main shock. The areas with large strength excess locate on the northwestern deep part of the fault. Usually, the area with a large strength excess on the fault surface will delay the rupture propagation (*Zhang, et al., 2003*). Thus, the rupture propagation becomes slow down at these areas. Faster rupture is observed at the main asperity area whereas slower rupture at the northwestern deep part is shown in the dynamic source model. Based on the dynamic source model, near-source ground motions are simulated. Generally, the synthetic waveforms show well the observed record characteristics. This shows that our dynamic source model reproduces the main features of the long period ground motions in this earthquake.



References: *Honda et al. (2004)*, **EPS**, 56, 317-322; *Mikumo et al. (2003)*, **BSSA**, 93, 264-282; *Zhang et al. (2003)*, **GRL**, 31, L10605; *Zhang and Iwata (2004)*, *Eos Trans AGU* 85(47), S41A-0946.