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Source process inversion of the 2007 Chuetsu-oki earthquake using theoretical 3-D Green's functions

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The strong motion waveforms are inverted for the source process of the 2007 Chuetsu-oki, Niigata, earthquake. One of the authors of this study has already performed the inversion analysis using theoretical Green's functions which are calculated with optimized 1-D horizontally stratified velocity models (Hikima and Koketsu, 2008). However, observed waveforms strongly suggest the existence of complex subsurface structures. Especially, the waveforms observed within the Kashiwazaki-Kariwa nuclear power station (KK NPS) are affected by fold structure beneath the KK NPS (Tokumitsu et al., 2009). So we have constructed 3-D velocity structure model and present the result at this meeting (Hayakawa et al., 2011). In this study, we calculate Green's functions for the source process analysis using this 3-D velocity structure and perform a inversion analysis.

Tentative analyses are preformed with same fault geometry and data set with Hikima and Koketsu (2008). We used 3-D Green's functions only for the stations in the KK NPS, because the 3-D model is not properly tuned in the area outside the KK NPS. So we used former 1-D Green's functions for the station except for the KK NPS. The inversion result is not so different with the result of Hikima and Koketsu (2008). However an asperity existing at the southern part on the fault plane moved toward the south and the coastline. Those results are consistent with other studies (ex. Shiba, 2008). However, time development on the fault is somewhat complex. We need detailed verification for the results.

Although the results have some problem, the observed waveforms in the KK NPS are well reproduced by the inversion analysis. Those results suggest that the fold structure beneath the KK NPS strongly affect the observed waveforms in the main shock of Chuetsu-oki earthquake.

Keywords: Chuetsu-oki earthquake, Source process, 3-D velocity structure, strong motion