[JJ] Evening Poster | S (Solid Earth Sciences) | S-SS Seismology

[S-SS14]Strong Ground Motion and Earthquake Disaster

convener:Masayuki Kuriyama(Central Research Institute of Electric Power Industry)

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Strong ground motion has social impacts as it induces earthquake disasters. We solicit contribution on any seismological topics related to strong ground motion that includes, but are not limited to, source processes, wave propagation, and site effects. We also welcome contribution on earthquake related disaster mitigation.

[SSS14-P29]Source process of the 2014 Nakagano-ken Hokubu earthquake (M_J 6.7) - Reanalysis considering 3D subsurface structure -

*Kazuhito Hikima[1], Ryoichi Nakamura[2], Tomiichi Uetake[1] (1.Tokyo Electric Power Company Holdings, Inc., 2.Earthquake Research Institute, Univ. of Tokyo)

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<INTRODUCTION>

During the 2014 Nagano-ken Hokubu earthquake, distinct surface ruptures were observed along the known Kamishiro fault, so it suggests that fault slip was occurred near the shallow parts on the fault plane. Furthermore, because more than one seismogram was observed at several seismic stations near the fault, it may be possible to determine high resolution spatiotemporal slip distribution on the fault, especially in the shallow part. It is very meaningful to know those slip characteristics with reliability for precise strong motion predictions.

In previous study (Hikima *et al.*, 2015), we carried out source process inversion using strong ground motion records, also including the displacement waveforms at K-NET and KiK-net Hakuba stations. The result suggested that property of the slip velocity time function is different between shallow and deep parts on the fault. In this study, we advance those research and reanalyzed the Nagano-ken Hokubu earthquake. Major changes for the inversion are fault geometry, subfault size, the velocity structure models for calculating the Green's functions, and so on.

<DATA>

We used basically the waveforms from KiK-net borehole stations (by NIED) within about 50 km from the source area. The acceleration waveforms were filtered between 0.03 and 0.8 Hz, and were integrated to velocity waveforms for the inversion analysis. In Addition, two displacement waveforms at K-NET Hakuba (NGN005) and KiK-net Hakuba (NGNH36), which were adequately integrated from acceleration waveforms (Nakamura *et al.*, 2015), were also incorporated to the analysis.

<OUTLINE of INVERSION>

The source processes were inverted by the multi time window analysis (Yoshida *et al.*, 1996, Hikima, 2012). The Green's functions were calculated using 1-D velocity models for each station, which were tuned by the waveform inversion method (Hikima and Koketsu, 2005) using the records of the Mj 4.4 event occurred on November 23 in the source area. The Green's functions for velocity and displacement waveforms were calculated using the programs by Kohketsu (1985) and Zhu and Rivera (2002), respectively.

The parameters of the hypocenter, which is the base point of fault geometry, were taken from Sakai *et al*. (2015) and those are [36.6882°, 137.9135°, 3.78km]. The strike of the fault plane was set as 25 degree, that is same as previous analysis. However, dip angle was varied according to depth, and the values were 60 and 50 degree for deep and shallow part, respectively. The fault dimension was about 20 km for length and 15 km for width. The subfault size was 1.5km, and 1.0 km as the precise inversion. The rupture velocity, which means the propagation velocity for the first time window, was set about 2.8 km/s at deeper part and 1.5 km/s for shallow part.

<INVERSION USING 3-D GREEN'S FUNCTION>

Although we used tuned 1-D velocity models for calculating the Green's functions, waveform fitting between the data and synthetics was not so good for several stations. The source area is in intermountain region, hence complex subsurface structure is supposed. We, therefore, tried to calculate the Green's functions by 3 dimensional finite difference method using a 3-D velocity structure model. The 3-D velocity structure was taken from the model constructed for the long period ground motion prediction map by the HERP.

<RESULT> tentative

Two large slip areas were estimated on the fault plane. One was slightly deeper from the hypocenter and the other one was on the shallow and small part of the fault plane. Although the amount of final slip was similar on these area, shape of the slip velocity time functions was different. The time functions on shallow part were broader than those on deeper part, so it suggests that the strong motions from the shallow portion relatively lack high frequency components than those from deeper parts. These results provide important information to interpret the near fault ground motions.