[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-P05]Estimation of Long-Period Ground Motions Containing Permanent Displacement in the Near-Fault Region for 2016 Kumamoto Earthquake

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1. Introduction

The 2016 Kumamoto earthquake (Mw7.0) generated the expensive surface faulting, and recorded characteristic near-fault strong motions. It is assumed that the region shallower than the seismogenic layer contributes much long-period ground motions containing the fling step in the near-fault Area. Several studies have reported how to set parameters the region shallower than the seismogenic layer (e.g. Irikura and Kurahashi(2017), Kawasato et al.(2017)). We previously reported the procedure to extend the strong ground motion prediction method by the Headquarters for Earthquake Research Promotion ("Recipe") to the region shallower than the seismogenic layer (e.g. Tanaka et al.(2017)). However, in the past study, we focused only strong ground motion and the fling step near source region. Therefore, in this paper, we construct characterized source models for 2016 Kumamoto earthquake and estimate long-period ground motions in wide area by theoretical method.

2. Construction of characterized source models

Figure 1 shows constructed characterized source models. The fault length, width and location were based on Hikima(2016). Parameters of source models located the seismogenic layer were determined based on "recipe" and located the region shallower than the seismogenic layer were determined based on tanaka et al.(2017). In addition, we considered different uncertainty in each model. We assumed Model-01 with large slip, different rake, and short rise time for the region shallower than the seismogenic layer in Futagawa fault. On the other hand we assumed Model-02 considered Idenoguchi fault in addition to Futagawa fault and Hinagu fault. We asummed the rupture velocity of 3.0km/s on the Idenoguchi fault is faster than 2.45km on Futagawa fault and Hinagu fault.

3. Results

Figure 2 shows observed and synthetic waveforms and fourier spectrum. The synthetic waveforms using these models shown in figure1 reasonably explain the observed waveforms. In addition, the contribution of the region shallower than the seismogenic layer in Futagawa fault is dominant in Model-01, but in Model-02 the seismogenic layer in Idenoguchi fault also contributes greatly. On the other hand, agreement of the succeeding phases of S-wave between the observations and the synthetics calculated from the Model-02 at KMM011 was better than the ones of Model-01. This difference is caused by Idenoguchi fault. Next, we examined the validity of the two models. The slip in the region shallower than the seismogenic layer set in Model-01 (4.1m) is larger than the amount of strike slip on the surface rupture based on field surveys of surface ruptures (max 2.2m). The slip velocity time function set in the region shallower than the seismogenic layer in Model-01 is clearly shorter than the past earthquake. The displacement distribution in the region between Futagawa fault and Idenoguchi fault of Model-01(Uplift) is different from the observation (Sedimentation). We concluded that Model-02 is more realistic than Model-01. The present result suggested that the shape and location of fault plane is important in the Near-Fault area.