Long-period waves in Eastern Osaka basin due to subduction earthquakes - source and structure sensitivity in 3D FD simulation

Ivo Oprsal[1]; Tomotaka Iwata[1]

[1] DPRI, Kyoto Univ.

Long-period ground motion characteristics of the Osaka basin are important for strong ground motion prediction due to the large subduction earthquakes of the Nankai trough. Among the previous studies for the Osaka basin ground motion characteristics, Hatayama et al. (1995) pointed out distinctive later phases observed at the JMA-OSA station approximately 30s after the S-wave arrival due to the deep events. Based on the 2D anti-plane modeling, they interpreted this later arrival as the basin-induced Love waves generated by the basin Eastern edge. We tried to model the Osaka-basin induced waves of predominant frequency 0.3 Hz by the 3D FD hybrid method using the 3D basin velocity structure by Kagawa et al.(2004) (as model M1) and its modification with uniform, 400m thick layer adjacent to the free surface over the whole basin while bedrock-basin interface remains unchanged (model M2). The two of the three earthquakes investigated in Hatayama et al. (1995) are studied. The later arrivals of S waves (namely SL1 phase) in 3D-FD at the OSA station are in a good agreement with observation.

For 1993/10/12 (M_{JMA}=7.1) event the time difference between SL1(observed) and SL1' (synthesized) is slightly smaller in full 3D case synthetics, than in 2D case modeling (Hatayama et al., 1995) for EW profile. We investigate a possibility of the later SL1 phase arrival due to it's possible arrival from other than Eastern directions.

The 3D-FD modeling proves the existence of the SL1 phase generated at the Eastern part of the Osaka basin for the M2

Model M1 gives unreasonably low amplitudes at the OSA station. Moreover, as seen from the slowness vectors aligned with the waveforms, the later arrival at WOS (supposed to be SL1' in Hatayama et al., 1995) is possibly recognized as an interference of waves arriving both from SE and NE directions.