Long-period ground motion characteristics of the 2004 Off Kii-Peninsula earthquakes in Osaka Basin

Asako Iwaki[1]; Tomotaka Iwata[1]

[1] DPRI, Kyoto Univ.

It is well known that large amplification and long ground motion duration are observed at stations inside a basin during earthquakes. For Osaka basin, Hatayama et al. (1995) pointed out that large later phases at about 30s after the S-wave arrival in the NS component appeared at Kawachi basin (eastern portion of the Osaka basin) during deep earthquakes occurred near Japan. They concluded that these later phases are basin-induced Love waves that propagate from the basin edge to the stations. These characteristics of basin-induced surface wave are very important to evaluate site-specific ground motions for earthquake disaster mitigation.

In this study, we analyze long-period ground motions observed in Osaka basin during the series of the 2004 off Kii-Peninsula earthquakes to examine the site-specified characteristics. We used ground motion data of six earthquakes, including the foreshock (9/05 19:07), the mainshock (9/05 23:57), and four aftershocks (9/06 05:31, 9/07 08:29, 9/08 03:36, 9/08 23:58), at 17 inside stations and one outside station of the basin.

We take the amplitude spectra of S-wave part (time window length of 20s from the S-wave onset) and total wave part (time window length of 160s from the S-wave onset to include large later phase part) for each component. Taking the spectral ratio of ground motions between at the sediment station and the rock station for the each horizontal component, we compare each component ratio among the stations. Here, we focused on the spectral ratio at the period of 6.0 seconds, at which many stations inside the basin show large amplifications. As Hatayama et al. (1995) mentioned, spectral ratio for the total wave part of the NS-component are about twice of that of the EW-component at the stations in Kawachi basin. On the contrary, the EW-component spectral ratio is larger than the NS-component one at shore-side stations, where sediment is thicker than other area. These characteristics are more or less independent of the events and could be recognized as site-specific. Numerical simulation would be needed to explain the reason of the characteristics.

We used CEORKA, K-NET, PARI, and K-NET data. F-net moment tensor solutions are also used.