Japan Geoscience Union Meeting 2011
(May 22-27 2011 at Makuhari, Chiba, Japan)

SSS035-P09 Room:Convention Hall Time:May 25 14:00-16:30

Seismic Waves from a Slab Earthquake and Velocity Structure in Southwestern Japan

Tetsuya Fukuda[1], Keiko Kuge[1*]

[1]Dept. Geophysics, Kyoto University

The nature of interplate megathrust earthquakes can be related to the geometry of the subducting oceanic plate. The Philippine Sea plate, which subducts beneath southwestern Japan and causes megathrust earthquakes along the Nankai trough, has a complicated shape, as shown by many studies (e.g. Nakajima and Hasegawa, 2007). Most of the previous studies suggested a sharp curve in the Philippine Sea plate beneath the Kinki region. Ide et al. (2010) recently proposed a new idea that the Philippine Sea plate is split along the Kii Suido and Hyogo prefecture, causing a step between the western and eastern portions of the plate. Seismic waves traversing in southwestern Japan might be affected by the shape of the Philippine Sea plate.

In this study, we first examined seismograms from a slab earthquake (Mj3.9) beneath the Aki-nada on 11 May, 2010. We used the Hi-net data recorded in southwestern Japan, paying attention to the portions from initial motions of P wave to later phases of S wave. The depth of the earthquake was estimated to be 45 km by JMA. Because we observed the head waves that Ohkura (2000) suggested for slab earthquakes, this earthquake could occur within the oceanic crust of the subducting Phlippine Sea plate. Observed seismograms look different between the western and eastern stations. At the western stations, P waves with apparent velocity of about 8 km/s are significant. We observed later phases of P and S waves, which can be the phases Miyoshi and Ishibashi (2007) interpreted as pPmP, sPmP, and sSmS. Several later phases of P and S waves are also seen at the eastern stations. At the eastern stations, however, P waves with apparent velocity of about 8 km/s are insignificant, and P waves arrive in complicated ways, depending on the station location and distance.

We next computed the theoretical seismograms using the 3-D Gaussian Beam method (Cerveny, 1985; Sekiguchi, 1992). A point source with the double-couple mechanism of F-NET was assumed. We tested some velocity structure models. Based on the results, we discuss how velocity structure including the shape of the Philippine Sea plate can affect seismograms recorded in southwestern Japan.

Acknowledgments: We used data from Hi-net. We thank Shoji Sekiguchi for giving us his code of the Gaussian Beam Method.