AOGS 2005

Geometry of the Philippine Sea Slab beneath Southwest Japan as Estimated from Hypocenter Distribution and Seismograms

TAKAYUKI MIYOSHI[1] and KATSUHIKO ISHIBASHI[2]

[1]*Graduate School of Science and Technology, Kobe University*
[2]*Research Center for Urban Safety and Security, Kobe University*

We studied minutely the geometry of the subducted Philippine Sea plate beneath southwest Japan (PHS slab) based on hypocenter distribution of slab earthquakes and distinct phases in their seismograms. We re-examined the geometry of the upper surface of the seismic PHS slab using well-determined hypocenters and focal mechanisms during the period from Oct. 1997 through Dec. 2004. The remarkable features pointed out by Miyoshi and Ishibashi (2004) have been confirmed; beneath the Lake Biwa region, northwestward gently-dipping PHS slab reaches around the depth of 40 km; beneath the middle Kii Peninsula, the slab is torn into two parts, with the southwestern part underlying the northeastern part. Since seismic refraction/reflection profilings and receiver function analyses have recently showed that slab earthquakes occur in the oceanic mantle beneath eastern Shikoku, we investigated seismograms of slab earthquakes, as discussed by several researchers (e.g., Fukao *et al.*, 1983), and found distinct later phases of both P and S waves in several areas. To know the origin of these phases, we made travel-time analyses by using a two-dimensional ray tracing method (Luetgert, 1992) assuming our slab geometry. For slab events beneath the Lake Biwa region, toward WSW, it turned out that initial P and S phases are refracted waves which travel through the highvelocity oceanic mantle and later P and S phases are direct waves. Thus, in this region it is concluded that slab events take place within the oceanic crust and there exists westerly-dipping aseismic slab. More study of this kind is necessary in other regions to know in which part of the slab, oceanic crust or mantle, slab earthquakes are taking place and to obtain more reliable slab geometry. We used JMA's hypocenter database and seismograms from Tokyo, Kyoto, Nagoya and Kochi Universities, JMA and NIED. We thank them for providing us with valuable data.

Keywords: slab geometry; Philippine Sea plate; southwest Japan; hypocenter distribution; seismogram; initial phase; later phase; ray tracing

References

[1] T. Miyoshi and K. Ishibashi, *Zisin (J. Seismol. Soc. Japan),* **57**, 139-152 (2004).
[2] Y. Fukao, S. Hori and M. Ukawa, *Nature*, **303**, 413-415 (1983).
[3] J. H. Luetgert, *USGS Open-File Rep.*, 92-356 (1992).