Geometry of the Philippine Sea slab subducted beneath southwest Japan as estimated from hypocenter distribution and seismograms

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Miyoshi and Ishibashi (2004) presented the geometry of the upper surface of the subducted Philippine Sea (PHS) slab beneath the region from Ise Bay to the western Shikoku district, southwest Japan, as inferred from hypocentral distribution. In the present study, we identified the occurrence layers of intraslab earthquakes, oceanic crust or mantle, and re-examined the PHS slab geometry beneath the region from Ise Bay to the Kii Peninsula.

We investigated the seismograms of the PHS slab earthquakes which had occurred beneath southwest Japan from October, 2000 to May, 2005. These events have turned out to be classified into two types, events with weak initial phases and ones without them, in the azimuth of low or gentle dip angle of the slab. Based on the existence of weak P and S initial phases, their apparent velocities, and simulation by Gaussian beam method, we concluded that the events with weak initial phases had occurred within the oceanic crust and those without weak initial phases, within the oceanic mantle.

From Ise Bay to the middle part of the Kii Peninsula, we can identify double seismic zone within the slab. We concluded that the events of upper plane (with weak initial phase) occurred within the oceanic crust and the events of lower plane (without weak initial phase) occurred within the oceanic mantle in the north and middle part of the Kii Peninsula. However, in the southern part of the Peninsula, distinct later phases are observed close to the theoretical arrival time of direct wave, we need to examine the origin of these phases and occurrence layers of the earthquakes.

Beneath the middle part of the Kii Peninsula, dip angles and depths of the intraslab earthquakes show difference between the northeastern part and southwestern part. Some lineaments along the SSE-NNW direction can be seen in the slab seismicity in the southern part of the Peninsula. Moreover, there are a remarkable lineament of aftershocks of the 2004 Off-the-Kii-Peninsula earthquakes in the SE-NW direction, and highly fractured oceanic crust off the Peninsula [Kodaira et al.(2006)]. Judging from these observations, we infer that the slab is fractured beneath the wide region from the Nankai trough to the Kii Peninsula.

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