

## Velocity structure of the crust and uppermost mantle beneath the Chugoku-Shikoku district revealed from receiver function analysis

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For the study of large earthquakes as the Nankai earthquake closely related with the subducting Philippine Sea (PHS) plate, it is important to clarify the crust and uppermost mantle structure beneath the Chugoku-Shikoku district. The Hi-net recently established offers unprecedented data for further studies in this region. In this study, applying the receiver function analysis newly developed by Shiomi et al. (2001) to teleseismic waveforms observed, we invert for the seismic velocity structure of the crust and uppermost mantle beneath the Chugoku-Shikoku region.

We select 272 earthquakes recorded at Hi-net stations in the Chugoku-Shikoku district and Hyogo prefecture, of which magnitudes are 5.5 or higher and epicentral distances are between 27 and 90 degree. Considering the response characteristics of the Hi-net system and reflection from the surface, we analyze waveforms in a frequency range from 0.1Hz to 0.6Hz. Integrating receiver functions into 5 groups on the basis of back azimuth, we invert for the seismic velocity structure for each group beneath each station.

Characteristics of the seismic velocity structure revealed from by this study are summarized as follows:

(1) We find that a high velocity layer, which corresponds to PHS plate, is gradually subducting to the north. The upper boundary of this layer is about 30km in depth beneath southern Sikoku and about 40km beneath Okayama prefecture. Hypocenters of subcrustal earthquakes are concentrated in a lower velocity region upon the high velocity layer and the thickness of that lower velocity region is about 10km. We may interpret this region as the oceanic crust subducting into the mantle. At about 40 to 50km in depth beneath Hiroshima and Okayama prefecture, we also find a region whose velocity is nearly the same as the oceanic crust, but seismicity in this region is quite low. The upper boundary of the high velocity zone is located at 50km in depth beneath Chugoku Mountains, if we interpret this layer as a part of the subducting oceanic crust.

(2) For many stations, we detect a clear velocity discontinuity corresponding to the Moho at a depth from 20 to 40km. The Moho depth is relatively shallower at southern Sikoku and Tottori prefecture and deeper beneath Hiroshima and Okayama prefecture. Spatial variation of the Moho depth in this study has high correlation with gravity anomaly.

(3) We find remarkable low-velocity regions beneath Quaternary volcanoes and the eastern Sikoku region at depth from 10 to 20km. In addition, we find weak low-velocity layers at a 20km depth in a wide area.

(4) Seismicity is very low in the low-velocity regions in the crust while many earthquakes occur surrounding the low-velocity regions. The depth of Curie point beneath Quaternary volcanoes and the eastern Sikoku region is shallow, so we think the low velocity and low seismicity anomaly may be related to the thermal structure.