

## Water distribution in the upper mantle beneath Kyushu, Japan, as derived from receiver function analyses

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The Kyushu district, Japan, where the Philippine Sea (PHS) plate subducts, has several active volcanoes. In Kyushu, volcanoes are not distributed at regular intervals on the volcanic front and volcanic rocks have various chemical properties. To reveal the causes of the distribution of volcanoes and the chemical variation in volcanic rocks and to understand the process of magma genesis, we should reveal the water transportation by the PHS slab.

We investigated the seismic velocity discontinuities in the upper mantle beneath Kyushu, with seismic waveform data from stations of Hi-net, which are established by National Research Institute for Earth Science and Disaster Prevention, and stations of the J-array, which are established by Japan Meteorological Agency, Kyushu University, Kagoshima University and Kyoto University. We used receiver function analyses developed especially for discontinuities with high dipping angles (Abe et al., 2011, GJI). We obtained the geometry and velocity contrasts of the continental Moho, the oceanic Moho, and the upper boundary of the PHS slab.

We detected a discontinuity corresponding to the oceanic Moho and interpreted that the oceanic crust of the PHS slab has a low S-wave velocity and is hydrated down to 70 km beneath south Kyushu, down to 80-90 km beneath central Kyushu, and down to less than 50 km beneath north Kyushu.

We revealed from the detected velocity contrast at the continental Moho that the forearc mantle beneath central Kyushu has a low velocity region ( $V_s=2.8-3.5$  km/s) that can be composed of hydrated materials and free aqueous fluid. Such a low velocity forearc mantle does not exist beneath north and south Kyushu. Beneath north Kyushu, the oceanic crust would not convey much water to the mantle wedge. Beneath south Kyushu, water dehydrated from the slab would move to the backarc side and cause arc volcanism, while it would move to the forearc side and cause a gap in volcanism and serpentinization of the forearc mantle. The low velocity forearc mantle exists only near the edge of the mantle wedge beneath the southern part of central Kyushu while it spreads more widely beneath the northern part of central Kyushu. Geochemical studies indicated that volcanic rocks that were and were not influenced by slab-derived fluid coexist in north Kyushu and the northern part of central Kyushu (Kita et al., 2001, JVGR; Miyoshi et al., 2008, JVGR). Wide distribution of the hydrated materials in the forearc mantle and mantle upwelling may cause such coexistence.

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