Three-dimensional attenuation structure of the Kyushu subduction zone

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Southwest Japan, including Kyushu Island, is characterized by active subduction of a relatively young (15 to 26 Ma) segment of the Philippine Sea plate, Shikoku Basin, beneath the Eurasian plate. In Kyushu, shallow and intermediate-depth earthquakes occur actively down to a depth of about 200 km. Active arc volcanoes form a distinct volcanic front in the central portion of the island. All of the volcanoes in Kyushu are very active; a few of them have erupted in the last two decades, such as Unzen and Sakurajima. Seismic velocity tomography has been determined for the Kyushu subduction zone, which clearly imaged the cold subducting Philippine Seaslab and slow anomalies in the crust and mantle wedge under the active arc volcanoes (Zhao et al., 2000; Sadeghi et al., 2000). The recent availability of abundant waveform data recorded by the dense Hi-net seismic network covering the entire Japan Islands has provided an ideal opportunity to study the three-dimensional attenuation structure and magmatism in the young Kyushu subduction zone. In this work, we study the 3-D Q structure of the crust and upper mantle under Kyushu using the spectra of first P-wave from local shallow and intermediate-depth earthquakes. The 3-D Q inversion method of Tsumura et al. (2000) was adopted. Our preliminary results show that the subducting Philippine Sea slab exhibits low attenuation (high-Q) while the mantle-wedge low-V zones show high attenuation (low-Q), being in general agreement with the velocity tomography. The attenuation structure will be compared with the velocity structure, and the geodynamic and magmatic implications of the results will be discussed in details.