

3-D P and S wave velocity structure and its relationship to seismic and volcanic activity in Southwest Japan

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We used 23,895 P and 21,969 S wave high-quality arrival times from 836 local earthquakes during 2002 to 2004 recorded by the dense High-sensitivity Seismic Network (Hi-net) installed on the Japan islands. Detailed three-dimensional seismic velocity (V_p and V_s) structures of the crust under Southwest Japan are determined with a horizontal resolution of about 33 km and a depth resolution of 4-15 km. We also estimated the Poisson's ratio structure by using the obtained V_p and V_s data. Our results revealed a significant low-velocity anomaly beneath the Daisen volcano, which suggest that Daisen is potentially an active volcano. We detected low-velocity anomalies in the lower crust and relative high-velocity anomalies in the upper crust beneath eastern Shikoku and western Kii peninsula, which are in good agreement with the results of most previous geophysical and geochemical studies. Moreover, the subducting Philippine Sea plate is clearly imaged beneath Southwest Japan. Low-velocity and high-Poisson's ratio anomalies are visible above the Philippine Sea slab, which may indicate the existence of fluids released by the slab dehydration. In addition, we discuss the important role of fluids played in the generating and triggering process of large crustal earthquakes. The ray paths in our data set crisscross well in the study area, and the obtained tomographic images have a good resolution, indicating that the main features of our results are reliable.