

Deep crustal structure along the Niigata-Kobe Tectonic Zone inferred from seismic tomography: its origin and segmentation

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We carry out the seismic tomography to reveal a detailed 3D seismic velocity structure along a high-strain-rate zone called Niigata-Kobe Tectonic Zone (NKTZ), Japan (Sagiya et al., 2000). The obtained results reveal that the depth extent of the low-velocity zone varies along the NKTZ. We divided the NKTZ into three regions on the basis of characteristics of the obtained velocity structure. A low-velocity anomaly observed in the lower crust beneath the southwestern part of the NKTZ is probably attributable to the fluids derived from the Philippine Sea slab, while a prominent low-velocity anomaly extending from the upper crust to the uppermost mantle in the volcanic region, a middle part of the NKTZ, may be caused by the existence of melts and a higher-temperature condition due to the magmatic activity. The northeastern part exhibits low-velocity anomalies in the upper crust and the uppermost mantle, which are probably due to the thick sediment and fluids related to the back-arc volcanism, respectively. The strength of the crust and uppermost mantle along the NKTZ might have been weakened by the concentration of the fluids, which in turn facilitates the large deformation there. The heterogeneous seismic velocity structure revealed in this study suggests that the origin of the high-strain-rate zone varies along the NKTZ.