Thickness variation of the descending Phillipine Sea slab along the Nankai trough off Kii peninsula

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We obtain three-dimensional P-wave and S-wave seismic velocity models off Kii peninsula along the Nankai trough by employing a travel time tomography technique. We pick arrival times of P and S waves from the waveform data recorded by the DONET system during the period from January 2011 to March 2018. In order to improve the resolution in the deeper regions than the seismic area inside of the descending slab, we also pick arrival times from the seismic events occurred outside of this district. We also use the Hi-net data adding to the DONET data, because we precisely cannot determine the hypocenter location outside of the district from only the DONET data. For the modeling space, we take the latitude range of 30-42N, the longitude range of 129-144E, and the depth range of 0-600 km, which includes outside of the district in order to estimate of the effect of the heterogeneity outside of the district. All the hypocenters of earthquakes and seismic stations used in this study are located inside of the modeling space. We assume three-dimensional grid nets in the modeling space. We use a horizontal grid interval of 0.1x0.1, and vertical intervals of 8 km in the depth range of 0-40 km, 10 km in the depth range of 40-60 km, 15 km in the depth range of 60-75 km, 25 km in the depth range of 75-150 km, 50 km in the depth range of 150-300 km, and 100 km at depths deeper than 300 km.

From the obtained tomographic images, we find high velocity anomalies corresponding to the descending Philippine Sea slab. We also find low velocity anomalies under the high velocity slab clearly. There seems to be a sharp velocity contrast between the anomalies. We can estimate the thickness of the descending slab as about 30 km beneath the Kumano basin and about 40 km off Kii strait. The low velocity anomalies under the slab are more remarkable beneath the Kumano basin than off Kii strait.

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