P-wave mantle tomography with a focus on the Western Pacific obtained from traveltime and relative traveltime data

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We obtained a three-dimensional P-wave velocity structure of the whole mantle with a focus on the Western Pacific by adding the data of ocean bottom seismometers (OBSs).

We measured relative arrival times of P-waves using a waveform cross-correlation method from broadband OBSs installed in the Philippine Sea and the northwestern Pacific Ocean during 2005-2007 and short-period OBSs established near Japan during 2001-2006. After visual evaluation the waveform data, we collected approximately 1300 relative times for BBOBS data and 1400 relative times for SPOBS data. We weighted these data ten times as large as ISC data in the inversion.

The obtained model was improved in the northern Philippine Sea at depths shallower than 500km and in the whole Philippine Sea at depths of 500 - 1200km. The slab subducting at Ryukyu Trough is clearly observed at depths of 100 - 250 km. Slow anomalies below the back arcs of Izu-Bonin and Mariana get stronger than the previous model and connect each other at the depths shallower than 150km. An extensive body of fast anomalies is newly observed below the mid Philippine Sea at depths around 750 km. As this anomalous body extends broadly in the east-west direction, it may be interpreted as the slab subducting from the Northern Mariana trench, now stagnant in the uppermost lower mantle. This body is located just to the south of the Izu-Bonin slab stagnant at around 660 km depths and to the north of the Marina slab
descending vertically to further depths.