Slab image improved by Stagnant Slab Project seismic networks

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Broadband seismic networks in the western Pacific Ocean and in the Russian Far East have been deployed by the Stagnant Slab Project since 2005. The observation has been conducted to investigate behavior of the subducted slabs in the northwestern Pacific.

We obtained a three-dimensional P-wave velocity structure of the whole mantle with a focus on the Western Pacific by adding these new data. We manually picked arrival times of P-waves on the seismograms in the new networks. When the signal to noise ratio of the data is not high enough for the manual picking, we measured relative arrival times of P-waves using a waveform cross-correlation. After visual evaluation the waveform data, we collected approximately 4300 relative times for western Pacific Ocean BBOBS data and 900 for Russian Far East data. We also manually picked about 6000 of P-wave arrival times using the Chinese digital seismometer network: National Seismograph Network of China from 2001 to 2006. We weighted these originally obtained data 4 or 10 times as large as ISC data in the tomographic inversion.

The new model is improved in the northwestern Pacific as expected and finer structure of the subducted slabs is observed. Among the slabs subducted from the Kurile, Japan, Izu-Bonin and Mariana arcs, the northern Kurile and Mariana slabs penetrate the 660-km seismic discontinuity into the lower mantle down to ˜900 km depths, where the shape of the penetrated slab is not typically slab-like but blob-like, suggesting strong internal deformation of the slab upon its penetration into the lower mantle. On the other hand, the southern Kurile, Japan and Izu-Bonin slabs bend sharply to flatten orizontally over the 660-km discontinuity. The flatten part of the Pacific are divided into three segments corresponding approximately to South-Kurile, Japan and Izu-Bonin slabs.