Upper mantle structure beneath the Pacific Ocean revealed by land and seafloor broadband observations

*Takehi Isse[1], Hajime Shiobara[1], Kazunori Yoshizawa[2], Hitoshi Kawakatsu[1], Hiroko Sugioka[3], Aki Ito[4], Daisuke Suetsugu[4], Hisashi Utada[1]

1. Earthquake Research Institute University of Tokyo, 2. Hokkaido University, 3. Kobe University, 4. Japan Agency for Marine-Earth Science and Technology

Seismic tomography studies have revealed the structures and dynamics of the Earth's interior. However, spatial resolution of the oceanic region is worse compared to the continental region caused by sparse distribution of the land seismic stations.
In last 20 years, our Japanese seafloor broadband observation groups have conducted several temporary seafloor seismic array observations using broadband ocean-bottom seismographs (BBOBSs) in the Pacific Ocean. Total number of BBOBSs we used is more than 100. U.S. groups have also conducted the seafloor seismic array observations in the Pacific Ocean, and seismograms recorded by their BBOBSs are available from IRIS data center.
These BBOBS data enable us to improve the spatial resolution of the Pacific region.
We analyze three-dimensional shear wave velocity structure in the upper mantle beneath the Pacific region using land and seafloor seismic data by surface wave tomography method.
We have used a surface wave tomography technique in which multimode phase velocities of the surface wave are measured and inverted for a 3-D shear wave velocity structure by incorporating the effects of finite frequency effect and ray bending.
Checkerboard resolution tests suggests that spatial resolution is about 1000 km in the eastern Pacific Ocean but is about 600 km in the western Pacific Ocean.
Large scale heterogeneity of the upper mantle in our obtained model is consistent with previous tomography models. Strong radial anisotropy can be seen in the central Pacific at depths of 100 - 200 km and weak anisotropy can be seen around the subducting slab area.
In the western Pacific Ocean, fastest anomalies are not beneath the oldest seafloor region but beneath southeastward of the Shatsky rise.
Depths of negative peak of velocity gradient, which may be used as a proxy to the depth of lithosphere-asthenosphere boundary, have an age-dependence in young seafloor but is about 80 km in old seafloor (older than 100Ma).

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