Japan Geoscience Union Meeting 2015
(May 24th - 28th at Makuhari, Chiba, Japan)

SIT03-14 Room:106 Time:May 25 17:45-18:00

Deep structure and seismic anisotropy of the Western-Pacific subduction zones

ZHAO, Dapeng[1*] ; WEI, Wei[1]

[1]Tohoku University, Department of Geophysics

We determined high-resolution P and S wave tomography and 3-D P-wave azimuthal anisotropy of the Western-Pacific subduction zones by inverting a large number of P and S wave arrival-time data of local and regional earthquakes. Our results show some differences between P and S wave images for the stagnant Pacific slab in the mantle transition zone (MTZ) beneath Northeast Asia. The stagnant slab looks thicker in the P wave image than that in the S wave image, which may reflects the effects of both hydration and lower temperature in the MTZ, though differences in the resolution of P and S wave tomography may also have some effects. The Changbai and other intraplate volcanoes in NE Asia are caused by hot and wet upwelling in the big mantle wedge above the stagnant Pacific slab in the MTZ. Our P-wave anisotropy tomography shows that the fast velocity direction (FVD) in the subducting Philippine Sea plate beneath the Ryukyu arc is NE-SW (trench parallel), which is consistent with the spreading direction of the West Philippine Basin during its initial opening stage, suggesting that it may reflect the fossil anisotropy. A striking variation of the FVD with depth is revealed in the subducting Pacific slab beneath the Northeast Japan arc, which may be caused by slab dehydration that changed elastic properties of the slab with depth. The FVD in the mantle wedge beneath the Northeast Japan and Ryukyu arcs is trench normal, which reflects subduction-induced convection. Beneath the Kuril and Izu-Bonin arcs where oblique subduction occurs, the FVD in the mantle wedge is nearly normal to the moving direction of the downgoing Pacific plate, suggesting that the oblique subduction together with the complex slab morphology have disturbed the mantle flow.

Keywords: Subduction zones, Seismic tomography, Anisotropy, Slab, Earthquakes