

Where have all the slabs gone in the Northwestern Pacific subduction zones? Where have all the slabs gone in the Northwestern Pacific subduction zones?

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Based on the new high-resolution seismic image of the mantle beneath the northwestern Pacific subduction zones (Obayashi et al., 2015, in preparation), we discuss the fate of subducted Pacific slabs in the region, as well as their possible relation with the opening of Japan Sea and the widespread off-arc Cenozoic volcanism in Northeast China.

It is well known that the slab subducting from the Japan Trench (Honshu slab) is stagnant in the mantle transition zone. The stagnant slab extends to the west and reaches to northeast China where several late Cenozoic volcanoes exist. These volcanoes are located far from the volcanic front of the Honshu slab subduction and some study proposed the relation between the off-arc volcanoes and the stagnant Honshu slab. The active magmatism started about 25Ma and followed by opening of the Japan Sea back-arc basin that separated Japan away from Eurasia continent. It is suggested that the both surface phenomena were caused by upwelling asthenosphere from petrological viewpoint.

The new tomographic P-wave velocity model with focus on the northwestern Pacific is obtained by combing P data from NECESSArray with global data. Differential travel times between any two stations as a function of frequency are inverted by taking finite frequency effect into account to improve resolution through the upper mantle. The result indicates, to our surprise, the absence of long-tailed stagnant Honshu slab in the mantle transition zone beneath NE China, which was earlier interpreted by Tang et al. (2014, Nature Geoscience) as a gap of the stagnant slab for a deep upwelling in the region that may feed the Changbaishan volcanism. With a help of geodynamic modeling (Honda, 2014, G-cubed), we hope to revisit this issue, as well as the geodynamics of the Northwestern Pacific subduction zones to understand where all the slabs have gone.

キーワード: スラブ, 日本海

Keywords: slab, Japan sea