

Morphology of the stagnant slab from the northern Okhotsk arc to the northeastern Japan arc and its geodynamic implications

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The slab morphology as revealed by the seismic tomography is supposed to have much information on the physical properties of mantle transition zone, viscosity structure, geologic history and e.t.c. Incorporating the results of seismic tomography and the geologic history around the northeastern Japan arc with 2D numerical geodynamic models, Honda (2016) concluded that the stagnant slab there is the accumulated slab from the time when the ridge plate boundary between the Izanagi and Pacific plate subducted there around 60 Ma. The similar subduction history can be expected also around the northern Okhotsk arc. However, the slab morphology of each region is quite different, that is, the significant slab stagnation around the northeastern Japan arc versus the slab penetration around the northern Okhotsk arc. Honda (2016) also noticed that the slab stagnation around the northeastern Japan zone requires steeper Clapeyron slope than that estimated by the experiments. In this presentation, I seek the consistent answer to these problems based on the dynamics of hot subslab mantle under the Pacific plate (Morishige et al., 2010; Ismail-Zadeh et al. 2013), because it gives the additional force to support the negative buoyancy of the slab in addition to the endothermic phase change at 660 km and it shows the along-arc variations. An example of results is shown in the figure. Upper figures are derived from the seismic tomography following the procedure described in Honda (2016). The lower figures are derived from the numerical models described in Honda (2016).

References

Honda, S., *Tectonophysics*, 671, 127-138, 2016.

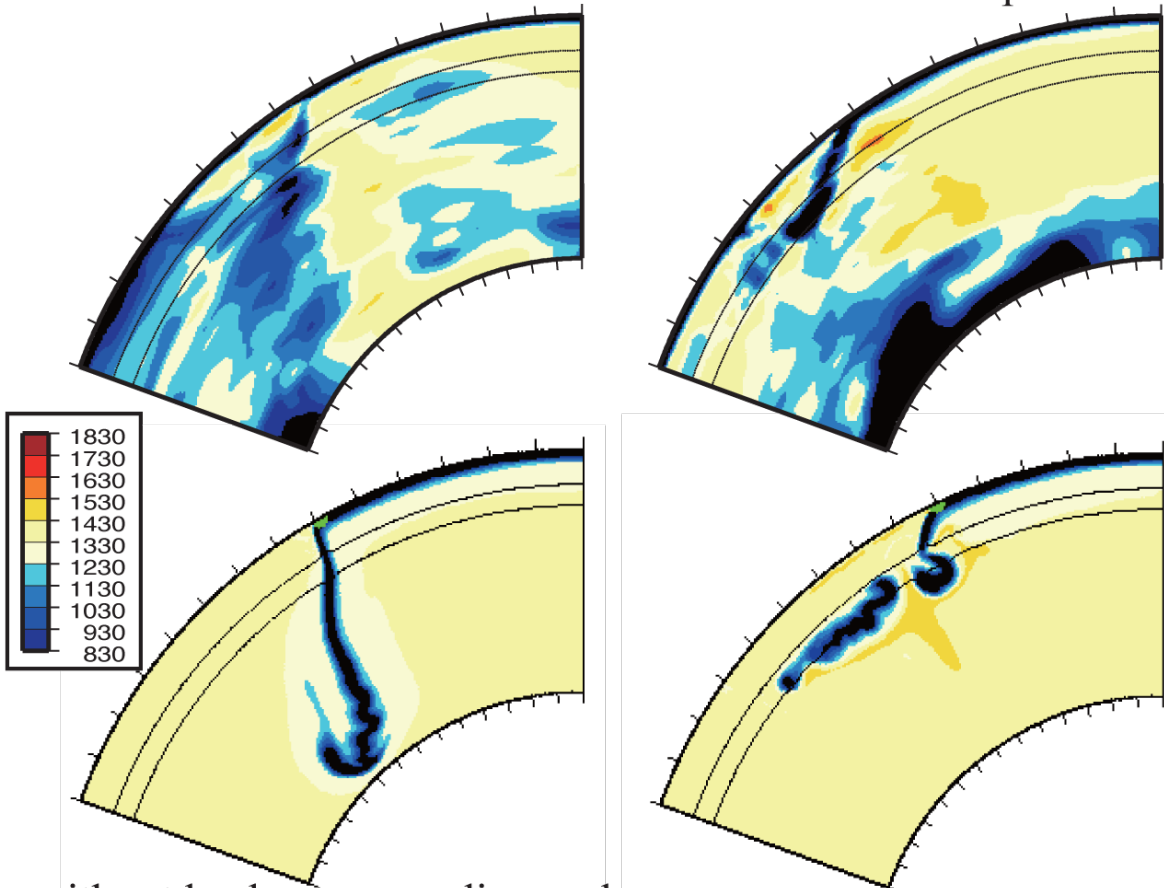
Ismail-Zadeh et al., *Scientific Reports* 3:1137, doi:10.1038/srep01137, 2013.

Morishige et al., *Phys. Earth Planet. Int.* 183, 353-365, 2010.

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Northern Okhotsk arc

Northeastern Japan arc



without back-arc spreading and hot material

with back-arc spreading and hot material