

## Convergence boundary and velocity between Amur and Okhotsk plates in northern Hokkaido inferred by GNSS velocity data

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Tectonics of east Asia especially around Japan are complex. Earthquakes at the eastern margin of the Japan sea are due to interaction of plates, and some huge events occurred. However, there is absence of seismicity at west off northern Hokkaido; between focal regions of Shakotan-oki earthquake in 1940 (M7.0) and southwest off Sakhalin earthquake (M7.1). Sarobetsu active fault zone is located onshore of northern Hokkaido, the Japan Sea side, and pointed that it has potential of earth quake generation over M7.6 by the Headquarters for Earthquake Research Promotion. In northern Hokkaido, a boundary between Amur and Okhotsk plates has been assumed. Its geometry has been in debate, and there are many plate boundary models. In addition, distribution of seismic activity and geological structure indicate there is difference of the structure between west and east parts.

Several block models are constructed, and the boundary is estimated by using geodetic data in this region (e.g., Loveless and Meade, 2010), but comprehensive discussion considering geological structure, the Bouguer gravity anomaly and earthquake distribution is lacked. To verify the insistence that the boundary between Amur and Okhotsk plates exists onshore in northern Hokkaido, we estimate the location of the boundary, convergence velocity and elastic thickness applying a dislocation model for collision zone by Shimazaki and Zhao (2000) to represent velocity field observed by Global Navigation Satellite System (GNSS). Most of previous studies for northern Hokkaido fixed location of the boundary arbitrary. Therefore, we treated the boundary location as unknown parameters and estimate it in this study.

Estimated location of the collision boundary is in ENE-WSW direction and roughly consistent with boundary of seismicity, geological structure, and Bouguer gravity anomaly. Geological structures would behave as a kinematic boundary. Estimated thickness of elastic zone is 21.6-28.8 km. Indicator of seismic activity in vertical direction; D90' s and Moho depth are 20-30 km and 30 km, respectively. In this model, determination accuracy of thickness is lower than the other parameters, however consistent with the discontinuous depth indicates that estimation of other parameters would show plausible value. Estimated velocity is 13.7-18.9 mm/yr, and these values are consistent with results by other studies that estimated velocity between some plates. The boundaries that estimated by discrete data, geology, seismology, and our result, roughly consistent with each other. Therefore, possibility that the boundary between Amur and Okhotsk plates is located onshore of northern Hokkaido became increasingly high.

Keywords: GNSS measurements, crustal deformation, collision zone, northern Hokkaido