

Repeating Shallow Slow-Slip-Events along the Block Boundary in the Northern Hokkaido

IKEDA, Shohei^{1*} ; HEKI, Kosuke²

¹Department of Natural History Sciences, Graduate School of Science, Hokkaido University, ²Department of Natural History Sciences, Faculty of Science, Hokkaido University

In Northern Hokkaido, to the north of Rumoi, earthquakes larger than M6 class have not occurred for a few decades. However, a block boundary is considered to run N-S in this region with the E-W convergence rate of about 1 cm/year coming from the eastward movement of the Amurian Plate (Loveless and Meade, 2010). Ohzono et al. (2014) reported the shortening of the baseline between Horonobe and Nakatombetsu of about 1cm over 4 months period from 2012 summer to the early 2013 and they considered it an inland SSE (slow slip event).

In this study, we thought there might have been other SSEs at different segments along the block boundary, and analyzed time series of distances between GEONET GNSS points that cross this block boundary from Wakkanai (north) to Rumoi (south). The baseline between Nakagawa and Otoineppu, about 20 km to the south of Horonobe-Nakatombetsu, was found to have shortened by a few millimeters in the middle 2005 and middle 2007. We also found that the distance between Haboro and Horokanai, further south, also decreased in late 2002 and early 2004. All these contractions were a few millimeters and took 1-2 months. To detect changes objectively, we followed Nishimura et al. (2013), and monitored the differences in AIC (Akaike's Information Criterion) between the two cases, i.e. regression with SSE and without SSE. We considered an SSE occurred when AIC significantly decreased by assuming an SSE.

Shallow seismicity occurs along the N-S block boundary in the northern Hokkaido. The seismic zone bends and runs E-W at the latitude of Rumoi (44.1N), and is connected to the plate boundary along the eastern margin of the Japan Sea. In Rumoi, an M6 class earthquake occurred in December, 2004 with over twenty aftershocks larger than M3 (Takahashi and Kasahara, 2005). In this region, more earthquakes occur than in the region to the north. In conclusion, block convergence would take place as regular earthquakes in the region to the south of Rumoi. On the other hand, the convergence will be occurring as repeating SSE to the north of Rumoi.

Keywords: Northern Hokkaido, inland, SSE, GPS, GNSS