Slow slip events in the Kanto region, central Japan detected from 25-years-long GNSS data

*Takuya NISHIMURA[1]

1. Disaster Prevention Research Institute, Kyoto University

The Kanto region, central Japan situated in the complex tectonic region where two oceanic plates subducts from the Japan trench and Sagami trough. Although many previous studies clarified repeated M_w ~6.6 Slow Slip Events (SSEs) with a duration of a week in an offshore region of the Boso Peninsula along the Sagami trough, the number of the detected SSEs are limited and overall activity of SSEs have not been fully understood in these regions. We, here, applied our SSE detection in these regions to the whole available GNSS dataset for a quarter century spanning from 1994 to 2019 and clarify the relation between SSE and tremor distribution.

We use daily coordinates at 291 GNSS stations using a precise point positioning strategy of the GIPSY 6.4 software. We apply the method of Nishimura et al. (2013) and Nishimura (2014) to detect a jump associated with short-term SSEs in GNSS time-series and estimate their fault models from observed displacements. A rectangular fault on the Philippine Sea or the Pacific plates is assumed for each SSE. The stacking of GNSS time-series based on the displacement predicted by the fault model [Miyaoka and Yokota, 2012] enable us to estimate duration of SSEs.

We detected >= 150 possible SSEs along both the Japan trench and Sagami trough but we here focus on SSEs along the southernmost part of the Japan trench. Total slip distribution of the detected possible SSEs shows that large slip (>= 0.3 m) is limited near the trench. A comparison with low-frequency tremors (LFTs) along the Japan trench (Nishikawa et al., 2019) suggests SSEs occur in the same depth range (10-20 km) of LFTs but their distribution is rather complimentary whereas a minor tremor activity exists at the edge of the SSE total slip. This complimentary distribution is contrast to overlapping distribution of SSEs and LFTs observed in a deep episodic and tremor region in the other subduction zones including southwest Japan. Another distinctive feature is that SSEs continuously occur from the trench to a depth of ~60 km only at ~35.50N. Because the subducted seamounts locate at this latitude, geometry of plate interface may control a genesis of SSEs in these regions.

Keywords: Slow slip event, GNSS, Kanto region, subduction zone

