Spatiotemporal evolution of Slow Slip Events along the southern Ryukyu subduction zone, using GNSS data collected by new stations

*Kazuki Komano[1], Shin'ichi Miyazaki[1], Masayuki Kano[2], Takeshi Matsushima[3], Takuya Nishimura[4]

1. Earth and Planetary Science, School of Science, Kyoto university, 2. Geophysics, School of Science, Tohoku university, 3. Earthquake and Volcano observation center, Kyushu University, 4. DPRI, Kyoto University

In the Southwestern Ryukyu Arc, where the Philippine Sea plate subducts into the Amur plate, SSEs (Slow Slip Events) occur about every six months on the plate boundary. It is an important issue to understand the mechanism of SSE, because it has been suggested that the occurrence of SSEs relates the occurrence of earthquakes. Especially in Yaeyama, the Yaeyama earthquake, a large earthquake with a tsunami, occurred in 1771, and SSEs may occur on the same plate boundary this earthquake occurred. We believe that it is necessary to correctly evaluate the possibility of a major earthquake recurring in this region in the future.

Since the SW Ryukyu region is consisted of small islands, there are relatively few GNSS observation points. It is not easy to obtain enough resolution to accurately estimate fault slip at depth. Therefore, in recent years, Kyoto University and Kyushu University have set up many GNSS observation points in SW Ryukyu in addition to the GNSS Earth Observation Network (GEONET). Observation points by Kyoto University are seven points in total: KRSM at Kuroshima Island (observation start in July 2010), OOHR at Ohara in Iriomote Island (February 2011), FNUK at Funauki in Iriomote Island (March 2011), KOHM at Kohama Island (March 2011), YNGJ at Yonaguni Island (March 2018), INDA at Inoda in Ishigaki Island (July 2018), and SRH1 at Shiraho in Ishigaki Island (July 2018). Kyushu University has three observation points: YPNR at Aragusuku Island (September 2017), YKNK at Kanokawa in Iriomote Island (November 2017), and YOGN at Nakanokami Island (November 2017). In addition, we have used one observation point of the Japan Coast Guard. Through this analysis, we try to improve the resolution by using these GNSS observation points.

In this study, we perform inversion analysis of spatiotemporal evolution of SSEs based on Kano et al (2018). This paper reported that the spatiotemporal evolution of slip changes during the events. However, the number of analyzed events is as small as five. So, by increasing the analysis period, we attempted to analyze more events, focusing on the regularity of the temporal change of the moment rate.

Keywords: crustal deformation, slow slip, GNSS

