

Interaction between slow earthquakes in and around Bungo channel, Nankai subduction zone

*Kazushige Obara¹, Ryota Takagi², Yusuke Yamashita³, Youichi Asano⁴, Takanori Matsuzawa⁴, Sachiko Tanaka⁴, Hitoshi Hirose⁵, Takuto Maeda¹

1.Earthquake Research Institute, The University of Tokyo, 2.Tohoku University, 3.Disaster Prevention Research Institute, Kyoto University, 4.National Research Institute for Earth Science and Disaster Prevention, 5.Kobe University

Slow earthquakes occur at transition zones from locked to stable sliding zones along megathrust faults at both shallow and deep parts. So far, various types of slow earthquakes with different characteristic time scales have been detected in many subduction zones along the Pacific Rim. In each subduction zone, the activity style, combination and interaction of slow earthquakes are different. Therefore, the slow earthquake is considered as an index to characterize each subduction process. Interaction between long-term slow slip event (SSE) and downdip tremor has been observed in southwestern Japan, Mexico, and Alaska even though detailed relationship is slightly different. In Bungo channel near the western edge of deep tremor belt-like source region along the Nankai subduction zone in southwest Japan, the long-term SSE occurs at a recurrence interval of about six years. During the 2003 and 2010 long-term SSEs, tremor activity increased at the shallower part of the tremor zone, which is the adjacent region of the SSE source fault. On the other hand, the deeper tremor activity is stable irrespective of the SSE. Takagi et al. (2016) detected tiny crustal deformation and estimated a sequence of long-term SSEs with eastward migration through the gap between locked and tremor zones. Associated with the migrating long-term SSE, the long-term variation of tremor activity seems to migrate eastward at speed of a few 10 km per year in western Shikoku. These observation suggest that the long-term SSE may trigger the downward neighboring tremor activity.

On the other hand, shallow tremor has been recently detected associated with shallow very-low-frequency earthquake near the Nankai trough (Yamashita et al., 2015). This shallow slow earthquake activity shows along-strike variation. At the updip side of the 1946 Nankai earthquake rupture fault, shallow slow earthquake seismicity is quite low. On the other hand, slow earthquake frequently occurs at Hyuga-nada where the quasi-stable sliding zone with many repeaters exists at the downdip side of the shallow slow earthquake region. The slow earthquake seismicity is usually limited at the southern part from the Kyushu-Palau ridge. However, slow earthquake region extended eastward with a length of 100 km from the Kyushu-Palau ridge at the beginning stage of the Bungo channel long-term SSEs in 2003 and 2010. This might suggest that the shallow slow earthquake seismicity is an indicator for the coupling status at the downdip portion of the plate interface.

Keywords: slow earthquake, Subduction zone