High-Resolution Seismic Imaging of the subducting Kyushu-Palau Ridge in the Hyuga-Nada in relation to the 2013 and 2015 tectonic tremor distributions

*Yanxue Ma[1], Rie Nakata [1], Kimihiro Mochizuki[1], Seiichi Miura[2], Yasuyuki Nakamura[2], Ryuta Arai[2], Gou Fujie[2], Yuka Kaiho[2], Shuichi Kodaira[2]

1. Earthquake Research Institute, The University of Tokyo, 2. Japan Agency for Marine-Earth Science and Technology

Various types of slow earthquakes including slow slip events (SSEs), very low frequency earthquakes (VLFEs) and tectonic tremors occur around the segment boundary off the Bungo Channel located between the Kyushu and Shikoku Islands. Their distributions appear to vary along depth of the subduction of the Philippine Sea Plate. The VLFE and tremor activities have been observed to occur around a subducted seamount of the Kyushu Palau Ridge (KPR, Yamashita et al.,2017; Tonegawa et al., 2020; Nakata et al., 2020). We processed two seismic reflection profiles; one existing KR0114-8 profile (Park et al., 2008) and the other HYU-02 profile newly acquired by JAMSTEC in 2020 to investigate the relationship between the distribution of the tremor activity, the morphology and physical properties along the plate interface. The HYU-02 line is parallel to the subduction direction, and the KR0114-8 line runs along the strike of the Nankai Trough near the deformation front extending further to the west across the KPR. The HYU-02 line was processed, and a pre-stack depth migration image was obtained. We performed denoise, deghost and designature on the seismic reflection data of KR0114-8. Then, we applied pre-stack time migration to the dataset and imaged in high resolution complex geological structures, the topography of the subducting oceanic crust including the KPR, decollement and faults. The KPR is imaged as a compex topographic high. We compared these structures seen in the seismic images and distributions of the 2013 and 2015 tremor activities. During the 2015 episode, the tremor activity around the KR0114-8 profile apparently concentrates to the east of the KPR reaching near the trough axis where typical accretionary prisms are formed. On the other hand, most of 2013 tremors occurred in the west of the KPR. Tremors are considered to occur along the plate interface. The spatial relationships between the tremor distribution and the subducting KPR suggests that the geometry of the plate interface and surrounding structural disturbances induced by the KPR subduction may have a primary control on the tremor generation.