

Repeating activity of shallow low-frequency tremor in Hyuga-nada

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In the Hyuga-nada region, since the first observation of shallow tremor in 2013, ocean bottom seismological observations have been carried out in the focal area of the shallow tremor since 2014. From March 2017, ocean bottom seismological and geodetical observation have been conducted by the "Science of Slow Earthquakes", JSPS KAKENHI Grant-in-Aid for Scientific Research on Innovative Area, MEXT, Japan. During the first observation period, the ocean bottom seismometers (OBSs) were retrieved from January to February 2019, and good seismic records were obtained. From December 2017 to January 2018 during the observation period, shallow slow earthquake activity was documented from off east Tanegashima Island to Hyuga-nada, and shallow tremors and VLFE activity were recorded on the OBS network. The epicenter of shallow tremor was determined by almost same method as Yamashita *et al.* [2015]. The depth of the tremor source was fixed to the plate boundary model by Nakanishi *et al.* [2018], and the S-wave velocity structure was a uniform structure of $V_s = 3.5\text{km/s}$. For the analysis, the hypocenter was determined by a total of 18 OBSs, including 10 OBSs from another project (the research project for compound disaster mitigation on the great earthquakes and tsunami around the Nankai trough region, the MEXT of Japan) that had been conducting observations in the off east Tanegashima Island at the same time. As a result of the hypocenter determination, it was found that the epicenter distribution of shallow tremor almost coincided with the focal area up to the point where the epicenter distribution turned eastward in the area of the 2013 activity. This distribution is consistent with the first migration area of the two migrations seen in the 2013 activity. In the 2017-2018 activity, a clear migration from south to north direction was confirmed and the end point of the migration are almost the same as the first migration in the 2013 activity. The region where the migration has stopped is considered to be the region where the Kyushu Palau Ridge is subducted. According to the estimation results of the released seismic energy rate by Watanabe [2019], it is located in the region where the released seismic energy rate is relatively low. It is suggested that the heterogeneity of the structure around the plate boundary greatly affects the tremor activity region and the generation process of the shallow tremor. Our new result of the almost same hypocenter distribution and activity characteristics as in 2013, it has become clear for the first time that the shallow tremor activity occurs repeatedly in the same place and has similar activity characteristics in this region. Although no significant pressure change has been observed by ocean bottom pressure gauges at this moment and the expected short-term slow slip event has not been directly observed, its size was assumed to be not larger than $M_w \sim 6$. The all equipment for second observation will be retrieved from spring to summer 2020.

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