

## Low frequency earthquakes associated with a very low frequency earthquake in southern Ryukyu arc

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Southern Ryukyu arc is an island arc located at southeastern part of Eurasian Plate. Recent seismic and geodetic studies reported very low frequency (VLF) earthquakes near the Ryukyu trench (Ando et al. 2012) and slow-slip events beneath the islands in the southern Ryukyu arc (Heki and Kataoka, 2008). We have conducted seismic observation with 6 onshore stations and 30 ocean bottom seismograms (OBSs) to elucidate seismicity, lithospheric structure and seismic events associated with VLF earthquakes, as a part of "Research project for compound disaster mitigation on the great earthquakes and tsunamis around the Nankai trough region" funded by the Ministry of Education, Culture, Sports, Science, and Technology, Japan. Onshore stations are deployed at Miyako-jima, Tarama-jima, Ishigaki-jima, Iriomote-jima, Kuroshima, and Hateruma-jima islands. They are composed of broadband (STS-2) and/or short period (1Hz) seismometers. OBS equipped with 4.5Hz three component geophone were deployed around the onshore stations. When a VLF occurred at the southern Ryukyu arc during this observation, two different low-frequency events (events-A and B) are observed by several OBSs. Events-A were observed only at the beginning of the VLF event. They recurred at intervals of 100 - 120 sec for about 20 min. Predominant frequency of these events are less than 5Hz, and duration times of oscillation are about 60 sec. Events-B recurred for about 3 hours, and most of their duration times are longer than 100 sec. Predominant frequency is around 2~3Hz, and the amplitude at high frequency (>5Hz) are smaller than events-A. Spatial variations of amplitudes suggests that epicenters of Events-B would be located at north of Events-A. Hypocenters of Events-A were estimated by P- and S-wave arrival times of OBSs. The hypocenters were relocated at the southern end of the forearc basin, and their focal depths are about 15-20km. According to the seismic surveys in this area (Hsu et al. 2013; Arai et al. 2015, JpGU), these hypocenters are located near the plate boundary. In future, we will conduct envelope analysis with consideration of amplitude variation to clarify the detailed hypocenter locations.

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