Distribution of very low-frequency earthquakes in the Miyako Strait, central Ryukyu Trench

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Very low-frequency earthquake (VLFE) constantly occur in the Ryukyu Trench. This activity is low in the region where the mega-tsunami occurred in the past (Nakamura and Sunagawa, 2015), which suggests that the activity would correlate inversely to the occurrence of large earthquakes. The VLFEs also occur in the Miyako Strait, which is between Okinawa Island and Miyako Island. The VLFE activity in this region is low and their distribution is scattered. However, the detection ability of the VLFE in this region would be low because this area is far from the F-net stations of the NIED, and also the error of epicentral determination would be large. In this study, we conducted epicentral determination of the VLFEs including the data of temporary stations in order to reveal where the VLFEs occur in this region.

As a waveform of the broadband earthquake, we used the F-net stations of the NIED and the temporary stations (Hateruma, Tarama, Miyako, Kume, and Okinoerabu) which were set by Association for The Development of Earthquake Prediction (ADEP). The waveforms were band-pass filtered at the frequency range of 0.05–0.1Hz for seismogram of top and bottom, using the Seismic Analysis Code (SAC). Next, we searched the VLFE swarms which occurred between the Okinawa island to Miyako island from the VLFE catalog that is computed for the method of (Nakamura and Sunagawa, 2015), and we adopted the most remarkable events to the template. Next, we conducted the detection of the VLFE swarms which occurred in 5 October 2017 and epicentral determination.

Three VLFE events were detected and their hypocenters were determined during this period. The epicenters were located near 25.227N and 126.415E with a radius approximately 20 km. This position is almost the same as that obtained by Nakamura and Sunagawa (2015) and is distributed within a narrower area compared with the results of Nakamura and Sunagawa (2015). Although the accuracy of the location from the trench is poor because the seismic stations are parallel to the island arc, it indicates that the cluster of the VLFE in the region occur in a narrow area.

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