Complementary Distribution between Very Low Frequency Earthquakes and Interplatecoupling area in the southwestern Ryukyu Trench

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No thrust earthquake of moment magnitude (Mw) > 8.0 has occurred in the past 300 years in the Ryukyu Trench, which is located in the northwestern boundary of the Philippine Sea Plate [Ando et al., 2009]. Thus, interplate coupling has been assumed to be low in the Ryukyu trench. However, a mega tsunami with the run-up height up to 30 m struck Ishigaki Island on April 24th , 1771. Very low frequency earthquakes (VLFEs) are very active along the Ryukyu Trench (Nakamura and Sunagawa, 2015). The clusters of the VLFE activities are distributed around Amami Island, Okinawa Island, and the Yaeyama Islands. In the Southwest Ryukyu trench, the locked zone is distributed to the west from 123 degrees (Hsu et al., 2012 GRL), and the source area of the 1771 Yaeyama tsunami is located around 125 degrees. The VLFE cluster near the Yaeyama Islands are complementary to the coupled area and tsunami source area. (Nakamura and Sunagawa, 2015). Nevertheless, since the hypocenter of the VLFEs was determined using the Fnet observation network, the accuracy of the hypocenter determination was poor at the western edge of the observation network, and it was difficult to determine the western extent of the VLFEs cluster areas. Then we analyzed the distribution of VLFEs in the southwestern edge of the Ryukyu Trench by integrating the data of Japan's Fnet observation network and Taiwan's broadband earthquake observation network (BATS). We used 3 F-net stations and 6 BATS stations from 2005 to 2018. The seismograms of the vertical component was 0.02-0.05 Hz band-pass filtered, and the waveforms at neighbor 2 or 3 stations were computed by the semblance analysis to determine the hypocenter. As a result, In the southwestern Ryukyu trench, the VLFEs was distributed to the east of the south-southwest offshore of Yonaguni Island. The cluster did not overlap with the coupled zone (Hsu et al. 2012) near Taiwan, indicating that the clusters of VLFEs and the coupled zones are distributed complemental.

Keywords: slow earthquake, very low frequency earthquake, Ryukyu Trench

