Induced Low Frequency Earthquakes Contributed to Teleseismic Events Along the Ryukyu Islands, Okinawa

*Ayumi Kinjyo[1], Mamoru Nakamura[1], Youhei Kadoi[1]

1. Fauclty of Science, University of the Ryukyus

Recently, triggered low frequency earthquakes (LFEs) have been observed during the passage of surface waves from teleseismic earthquakes. The occurrence of the triggered LFE depends on the maximum amplitude of surface wave and its propagation direction (Chao et al., 2011). The triggered LFEs are observed around various places in Japan (Chao et al., 2016), but it has not observed in Ryukyu Trench yet. We investigated the LFEs in the Ryukyu arc by the teleseismic earthquake.
First we picked several teleseismic events witch were Mw>7.5 and >1000km away from Naha. By using F-net data from NIED and short-period seismometers by JMA, we bandpass filtered them at the frequency range 2-8 Hz for horizontal components and 0.02-0.05 Hz for horizontal and vertical components, for the waveforms produced of teleseismic earthquake. Then, we detected the triggered LFEs manually comparing low frequency waveforms (for surface waves) with high frequency ones. Then we compared relation between triggered LFEs and surface wave amplitudes, durations, and wave intrusion directions of teleseismic earthquake. Among 56 teleseismic events, we could observe 18-37 LFEs. Also, LFEs were induced when least 0.1 cm/s of maximum amplitudes intruded. The wave propagation direction might not affect on the occurrence of LFEs; however, the durations of surface waves possibly conditioned to induce LFEs.
We determined the triggered LFEs of three teleseismic earthquakes (Sumatra 2004, Nias 2005, and Sumatra 2012) by using the time differences of S-waves arrival times at each station. The time differences were computed using the Envelope Correlation Method (Obara, 2002), and hypocenter locations were determined by grid-search method (Chao et al., 2013). Thus, some clusters of the LFE hypocenters are distributed at the Trench side and Okinawa Trough side. This suggests that the LFEs were triggered in the subducted plate and backarc area including volcanic zone.

Keywords: Low Frequency Earthquake, Ryukyu Trench, Triggered Earthquake, Earthquake Interaction

