Very low-frequency earthquake near the Nankai Trough -Effect of subducting sea mount-

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The very low frequency earthquake which occurs near the Nankai Trough has been discovered by Ishihara et al. (2002). The waveform of the earthquake is characterized by a period of longer than 10 seconds. The source location, mechanisms and activities of the earthquake have been investigated by Ishihara et al. (2002; 2003) by using mainly NIED F-net data. The very low frequency earthquakes are mainly located between the locked zone and the Nankai Trough. On the other hand, deep low frequency tremor detected by Obara (2002) is located around the deeper part to the locked zone. These low-frequency families might represent the status of the plate motion and the stress accumulation around the locked zone along the plate boundary. From the point of view, the activity of the very low frequency earthquake is investigated using the very dense broadband seismic network data.

Every NIED Hi-net observatory is equipped with the horizontal components of the high-sensitivity accelerometers at the base of the borehole accompanied with the velocity seismometers. The DC output is used as the tiltmeter, which played an important role for the detection of the slow slip event associated with the deep tremor (Obara and Hirose, 2003). The AC output is considered as a broadband seismometer, therefore these dataset is a kind of dense broadband seismic network with spacing of 20-30km, which is shorter than that of NIED F-net. In order to detect and analyze the very low frequency earthquake, the NIED Hi-net tiltmeter array data were used.

According to Ishihara et al. (2002), the earthquake is not appeared on any earthquake catalogs. Therefore, the continuous data recorded by the Hi-net system with a sampling frequency of 20Hz are plotted after the process by the bandpass filtering with a cut off frequency of 10 and 100 seconds and the azimuth correction (Shiomi et al., 2003). Eliminating local events and teleseismic earthquakes listed on JMA and ISC catalogs, unresolved signals including non-reported teleseismic events remain. Because the amplitude and the duration of the teleseismic signal indicate almost the same pattern at all stations in Japan, we can easily remove the teleseismic events. Finally, the extracted signals are divided into two amplitude patterns, which are the largest at stations around the Kii Channel and southern coast area of Miyazaki prefecture. These patterns are consistent to the location of very low frequency earthquakes as reported by Ishihara et al. (2002; 2003). Because these waveforms are quite similar in neighbor stations, epicenters of the events are estimated by using a cross correlation analysis.

The Hi-net stations in southwest Japan are divided into 15 groups with a diameter of about 100km. The cross correlation analysis is carried out for NS and EW components seismograms for each pair of stations with a distance less than 50km and the time lag which gives the highest correlation coefficient is measured. Then, the time lags obtained in each group are used to estimate the propagation direction and the apparent velocity. Finally, the focus of the propagation direction estimated in groups with good resolution is regarded as the epicenter of the event.

As the result, an activity of the very low frequency earthquake continued for a month from June 26, 2003 at the south off of Cape Muroto. Another activity occurred in the Hyuga-nada region from August 26, 2003. Just after the occurrence of Tokachi Earthquake at September 26, 2003, the very low frequency earthquakes in Hyuga-nada region became very active and continued for a month.

Both active areas in 2003 correspond to the sea mount subducting points; Kinan Sea mounts and Kyushu-Palau Ridge. Therefore, the occurrence of the very low frequency earthquake might be related to the existence of the subducting sea mount. Now, we are planning to monitor such very low frequency events in the whole Japan by using the cross correlation method.