

## P- and S-wave detection of the low frequency earthquakes (LFE) using 3D array. Application to hypocenter determination

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Tokai area is the eastern side of Southwest Japan subduction where great earthquakes and deep low-frequency earthquakes (LFEs) occur along the convergent plate boundary. Researching the relationship between the great interplate earthquakes and activity of LFEs, Tono Research Institute of Earthquake Science (TRIES) installed a seismic array with 10 stations in and around Shimoyama in Tokai area. Geological Survey of Japan (AIST) also installed a seismic array of three borehole-type instruments with high-sensitive seismographs at three depths of 50m, 200m, and 600m at Shimoyama. We used seismic data of those two arrays and SMYH station of Hi-net array of National Research Institute of Earth Science and Disaster Prevention (NIED) as 3D array data for investigating LFEs. Because of unclear P (especially) and S phases in LFE signals, we analyzed seismic data of the 3D array by using the semblance method (Neidel and Taner, 1971). P phases were picked in vertical component of records with  $V_p=4.5$  km/s in analysis. And S phases were picked in horizontal components of records with  $V_s=2.2$  km/s. Semblance value ( $Sc$ ) is calculated with the parameters of back-azimuth, incident angle and time. Developing and testing the semblance analysis method, we analyzed seismic wave data of five regular earthquakes observed by 3D array. And we obtained station corrections for the semblance analysis. The result shows that the semblance analysis method using the 3D array data is excellent for picking P and S phases. After analyzing 13 LFE data using the same method, we obtained five LFEs with higher semblance values in P and S phases ( $P-Sc > 0.5$ ,  $S-Sc > 0.6$ ) and smaller difference (less than 20 degrees) in incident angles between P and S waves. We read exact arrival times of P and S waves in seismic waves of the five LFEs, referring the time ranges of the higher semblance values. Using those arrival times and JMA's arrival time data, we calculated hypocenters of the five LFEs. The relocated hypocenters in this study are shallower than those of JMA. And we should suggest that our hypocenters locate near the subduction interface (e.g., Hirose et al., 2008) of the Philippine Sea Plate.

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### References:

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