Grid search method estimating wave source positions

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Infrasound is inaudible and low-frequency sound, which is lower than 20 Hz. It is enhanced by an occurrence of huge-scale events such as tsunami, typhoon, lightning, volcanic eruption and so on. Because of the very low frequency, the attenuation of infrasound by viscous energy dissipation and thermal conduction is negligible. Hence, this advantage enables us to catch distant events with the sound speed. Furthermore, it is expected to take advantage of disaster preventions.
In our laboratory, 15 units of infrasound sensors developed independently have been set widely distributed along Kochi coast since 2017. Such a wide distribution of infrasound sensors enables us to monitor and maintain data of a large-area at the same time. However, even if these sensors detect the huge-event signals, the precise time and direction for the occurrences are unknown. Hence, it is required to build a new model for analyzation and estimation of the wave source positions.
In this study, as one of the estimation method of wave source points, we introduce the grid search method which is familiar with seismology. To verify this method for the sound wave, we analyzed two months data containing the Mount Sakura-jima eruption events. As results, 53 events were detected, and it is found that the wave source positions for 38 of 53 events were estimated within around 6 km of the crater of the Mound Sakura-jima.

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