

Relationship between Infrasound Signals and Plume Heights by the JMA's Weather Radar, the Shinmoe-dake 2011 Eruption

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During the continuous sub-plinian eruption of the 2011 Shinmoe-dake eruption, the JMA's weather RADAR detected the sequential echoes from the volcanic plume (Shimbori et al., 2013). We report the brief result of basic analysis for the relationship between the plume heights and infrasound signals.

The eruption cloud echo data observed at the Kagoshima Airport Doppler RADAR (Kagoshima DRAW) were analyzed. While Kagoshima DRAW has the threshold of radar reflectivity factor, its time interval of the volume scan is shorter as 5 minutes. In this study, in order to improve the accuracy of time, the time of the plume top in a volume scan was identified by every scanning time of the antenna.

The relationship between the plume height and discharge rate of magma has the empirical power law, and its power index was estimated to be 0.259 (Sparks, 1997). Assuming that the discharge rate has the proportional relation with the integration of the infrasound signal generated by eruption (Takagi et al., 2013), we estimate the power law between the echo height and infrasound data for this eruption. In the result, the most appropriate power index was estimated to be 0.55, and the delay time and the time window of the infrasound data which make error smaller are 4 minutes and 6 minutes, respectively.

These time delay and window might be subjected to height and velocity of plume top. More advanced analysis for plume heights and infrasound signals would disclose the dynamics of volcanic plume.

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