

## Potential Ability of Weather Radar for Volcanic Ash Detection

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Operational weather radar data of 27 big eruptions from Shinmoedake volcano in the Kirishima range in Kyushu, Japan in the period from January to March 2011 are analyzed to examine possibility of radar for quantitative volcanic ash estimation. The radars used in the analysis are C-band radars located at Kunimiyama and Shakadake, which are operated by the Ministry of Land, Infrastructure, Transport, and Tourism (MLIT). The eruption time period, maximum and accumulated reflectivity, and differential reflectivity were collected for each eruption. It is concluded from the radar data analysis that operational weather radar has potential ability to quantitative detection of volcanic ash amount. An empirical relationship between the reflectivity and ash amount is proposed based on comparisons of radar data with ground ash distribution measured after the eruption on 26-27 January. Meanwhile the radar could not detect eruptions in such a case where the ash particle size is too small to be detected by the radar: the ash reflectivity is lower than the minimum detectable signal of the radar receiver. Naturally, it is impossible to detect an eruption when its height is below the radar beam height. It is also hard to detect eruptions under rain conditions when erupted ash particles are contaminated with precipitation particles. Differential reflectivity which is one of polarimetric radar parameters fluctuates over the crater in space and time while it shows significant distributions over downwind regions from the crater which suggests sorting of ash particles.