

## Observation of Eruption Plumes by X-Band MP radar and Lidar at Sakurajima and Kuchinoerabujima

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We report the comparison between results by radar and lidar observations of Minamidake eruption on June 16, 2018, at Sakurajima, and the radar observation results of Kuchinoerabujima eruptions since December 2018. The radar reflectivity factor data distribution showed that the plume reached 3,300 m height within 1 min after the onset of the Minamidake eruption and increased to be 5,000 m height, after 3 min from the onset of the eruption. At the same time, it was confirmed from the radar reflectivity factor data that the eruption column shifted 1 km to the west direction. The radar reflectivity factor reincreased vertically above the crater at about 3,000 m height, 5 min after the starting of the eruption, which is corresponding to the second eruption. In the lidar observation, changes corresponding to the movement in the west direction of the eruption column were observed from 3 min after the start of the eruption to 8 min afterward, and the scattering peak corresponded well with the enhancement of the radar reflectivity factor. After 15 min from the onset of the eruption, there was no change in the radar reflectivity factor corresponding to the ash plume, but the significant scattering intensity of the lidar was found at a distance less than 2 km and continued for more than 20 minutes. It reflects that the lidar outperforms the radar in terms of detecting the finer particles exist in the atmosphere. The lidar observation showed that volcanic ash was diffused and moved by the wind. Next, we observed the increase in the radar reflectivity factor corresponding to the eruption columns of the eruptions on December 18, 2018, and January 17 and 29, 2019 at Kuchinoerabujima. One minute after the eruption on December 28, the radar reflectivity factor showed a rise to 3,000 m of ash plume and reached the maximum height at about 5,000 m, 3 min after the onset of the eruption. It was found from the radar reflectivity factor that the maximum height of the plume was 4,000 m, 2 min after the onset of the eruption on January 17. Five minutes after the onset of eruption, the reflectivity factor of the plume reached 4,000 m and did not raise any further. From these facts, we can suggest that by grasping the temporal change of the plume height given by the temporal changes in radar reflectivity factor, we can extract the information of the eruption intensity.

Keywords: X-band MP Radar, Lidar, Eruption, Sakurajima, Kuchinoerabujima