

Vertical ground deformation in Sakurajima volcano measured by precise leveling survey (during Nov. 2017 - Nov. 2018)

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We conducted the precise leveling survey in Sakurajima volcano, southwest Japan in November 2018, in order to evaluate the vertical ground deformation associated with the recent eruptive activity of the volcano. The leveling routes measured in this survey are about 21 km long in total, including Sakurajima western flank route and Sakurajima northern flank route. These leveling routes were measured during the period from November 12 to 29. As a result of the preparatory calibrations and careful measurements, mean square errors of the conducted survey were achieved with a good accuracy ranging from ± 0.18 to ± 0.25 mm/km.

From the measured data, we calculated the relative height of each benchmark referring to the reference benchmark BM.S.17 which is located at the western coast of Sakurajima. The calculated relative heights of the benchmarks were then compared with those of the previous survey conducted in November 2017 (Yamamoto et al., 2018), resulting in the relative vertical displacements of the benchmarks during the period from November 2017 to November 2018.

The resultant displacements indicate the ground subsidence (-6.2 mm at maximum) at benchmarks around the central part of Sakurajima. The ground subsidence is also detected at benchmarks along Sakurajima northern flank route, suggesting that the inflation of the magma reservoir beneath Aira caldera was not remarkable during the period between November 2017 and November 2018. From the preliminary analysis based on a spherical source model (Mogi, 1958), the deflation source is located beneath Minamidake crater. The results indicate that the pressure decrease is suggested at the magma reservoir beneath Minamidake caused by the eruptive magma ejection.

Keywords: Sakurajima volcano, precise leveling survey, vertical ground deformation