

Vertical ground deformation in Sakurajima volcano measured by precise leveling survey (during Nov. 2016 - Nov. 2017)

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We conducted the precise leveling survey in Sakurajima volcano in November 2017, in order to evaluate the vertical ground deformation associated with the recent eruptive activity of this volcano. The leveling routes measured in this survey are about 24 km long in total, including Sakurajima western flank route and Sakurajima northern flank route. These leveling routes were measured during the period from November 1 to 13. Mean square error of the conducted survey was achieved with a good accuracy of ± 0.22 mm/km.

From the measured data, we calculated the relative height of each benchmark referred 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 2016 (Yamamoto et al., 2017), resulting in the relative vertical displacements of the benchmarks during the period from November 2016 to November 2017.

The resultant displacements indicate the ground uplift (4.5 mm at maximum) at benchmarks around the northern part of Sakurajima. On the other hand, the minor ground subsidence is detected around the central part of Sakurajima. From the preliminary analysis based on Mogi's model, the inflation and deflation sources are located beneath the center of Aira caldera and beneath Minamidake, respectively. The results indicate that the magma storage at the magma reservoir beneath Aira caldera is still progressing, while the pressure decrease is suggested at the magma reservoir beneath Minamidake caused by magma ejection.

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