

Vertical ground deformation in Sakurajima volcano measured by precise leveling survey (during Nov. 2013 - Nov. 2014)

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We conducted the precise leveling survey in Sakurajima volcano in November 2014, in order to evaluate the vertical ground deformation associated with the recent eruptive activity of this volcano. The leveling routes measured in 2014 survey are about 56 km long in total, including Sakurajima coast route, Sakurajima western flank route, Sakurajima northern flank route. These leveling routes were measured by the joint university team during the period of November 5-20. Mean square errors of the conducted survey were achieved with a good accuracy as the range from ± 0.25 to ± 0.32 mm/km.

From the measured data, we calculate the relative height of each bench mark referred to the reference bench mark BM.S.17 which is located at the western coast of Sakurajima. The calculated relative heights of the bench marks are then compared with those of the previous survey conducted in November 2013, resulting in the relative vertical displacements of the bench marks during the period from November 2013 to November 2014.

The results show that no remarkable vertical displacements are seen at bench marks around the northern part of Sakurajima, where the ground uplifts have been observed since around 1993 when the eruptive activity at the summit crater of Sakurajima volcano was gradually decayed. The uplifts reflect the inflation of the magma reservoir beneath Aira caldera. Thus it is suggested that the magma storage at the magma reservoir beneath Aira caldera almost stops during the period from November 2013 to November 2014. On the other hand, the resultant displacements indicate the ground subsidence near the central part of this volcano. This subsidence reflects the deflation of the magma reservoir located beneath the summit crater, caused by the recent increase of the volume of ejected magma associated with the eruptive activity at Showa crater.

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