Vertical ground deformation after the August 2015 dike intrusion event at Sakurajima volcano measured by leveling survey

*Keigo Yamamoto¹, Takeshi Matsushima², Shin Yoshikawa³, Kazunari Uchida², Hiroyuki Inoue³, Takahiro Ohkura³, Tadaomi Sonoda¹, Yuusuke Takenaka¹, Mikihiro Nakamoto¹, Kana Araue¹, Yoshiko Teguri², Kaori Morita², Hideki Suenami⁴, Daisuke Mitsunaga⁴, Hiroaki Nagayama⁴

1. Disaster Prevention Research Institute, Kyoto University, 2. Faculty of Sciences, Kyushu University, 3. Graduate School of Science, Kyoto University, 4. Japan Meteorological Agency

We conducted the precise leveling survey in Sakurajima volcano in November 2016. The main purpose of the survey is to reveal the vertical ground deformation after the dike intrusion event occurred on August 15, 2015. The leveling routes measured in this survey are about 56 km long in total, including Sakurajima coast route, Sakurajima western flank route and Sakurajima northern flank route. These leveling routes were measured during the period from November 1 to 24. Mean square errors of the conducted survey were achieved with a good accuracy as the range from ± 0.14 to ± 0.26 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 August-September 2015 (Yamamoto et al., 2016), resulting in the relative vertical displacements of the bench marks during the period from August-September 2015 to November 2016.

The resultant displacements indicate the remarkable ground uplift at bench marks around the northern part of Sakurajima. The amount of the maximum uplift is as much as about 20.5 mm referred to BM.S.17. On the other hand, the ground subsidence is detected around Arimura (southern part of Sakurajima). From the preliminary analysis based on Mogi's model, the inflation and deflation sources are located beneath the northern part of Sakurajima and beneath the east of Showa crater, respectively. The inflation source represents the magma accumulation around the location, while the deflation source is supposed to reflect the pressure decrease related to the previously intruded dike.

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