

Crustal deformation due to volcanic activity by continuous GPS observation network in Shinmoedake, Kirishima, Japan

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Kirishima volcano is one of the active volcanoes in southern Kyushu, Japan and is categorized into a composite volcano whose active summits are Shinmoe-dake and Ohachi. It started to erupt at Shinmoe-dake on 19 January, 2011, and was followed by sub-Pulian eruption on 27 January. Eruptive activity gradually ceased since February 2, and moved to Vulcanian activities. Recently eruptions become rare, but crustal deformation due to magma recharge at the reservoir is going on. We have deployed continuous GPS network around the volcano. The crustal deformation related to the eruption is presented in this paper.

We deployed three GPS sites, which are KVO, KRSP and YMNK on March in 2007 and added a station KKCD on October, 2010. NIED installed two stations: KRMV and KRHV in April, 2010. GSJ manages three GEONET(nation-wide GPS network) stations around the volcano. Kyoto Univ. has been installed a station YOSG northwestward of the summit. Therefore, 10 stations were in operation before the eruption within distance of 20km from the summit. Bernese GPS Software Ver. 5.0 is used for the analysis for all data. After the sub-Pulian eruption, six GPS sites were additionally installed and we can use dense GPS network to study the ground deformation related to a series of the volcanic eruption.

Before the eruption, extension of baseline length started on December 2009. However, acceleration was not observed from October 7, 2010 to January 25, 2011, an inflation source is found at the depth of 9.7km beneath the point of about xx km WNW-ward from the summit. The volume is 6.8 million cubic meter under the assumption of Mogi's model. The total volume charged at the source is estimated 32 million cubic meters, if we can assume the accumulation rate was constant. An abrupt volume change of the source was observed during the sub-Pulian eruption. The Volume defect reached to 24 million cubic meters, that is the almost coincide with the estimated equivalent magma volume emitted during the sub-Pulian episode. Then, the magma began to be recharged again at the source.

Even in the recent time, the inflation of the source continues and magma may be recharged. It shows that the volcano has still potential to erupt in the following stage. We would like to reveal the relation between the process of magma charge and the following eruption.