

Crustal deformation due to sub-Pulinian eruption in Shinmoedake, Kirishima, Japan in 2011

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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-Pulinian eruption on 27 January. Eruptive activity gradually ceased since February 2, and moved to Vulcanian activities. Nakao et al. (2012) presented crustal deformation of sub-Pulinian eruption and that before and after the eruption by continuous dual-frequency GPS receivers. They also estimated the single inflation and deflation source. The deflation source is located about 5km north-east from Shinmoe-dake and whose depth is about 10km. GPS sites with the single GPS receiver are operated by Japan meteorological agency near the volcanic vent of Shinmoe-dake. We analyze GPS data of dual and single GPS receivers and estimate the position of magma source.

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. GSI manages three GEONET(nation-wide GPS network) stations around the volcano. Kyoto Univ. has been installed a station YOSG northwestward of the summit. Six single GPS sites are located in the mountain side and near top of the mountain. Bernese GPS Software Ver. 5.0 is used for the analysis for all data.

We assume that there are two magma sources (Mogi's model) when sub-Pulinian eruption occurred. One is the main deflation source and the other is near the summit of Shinmoe-dake. Simulated annealing method is applied when position of magma source is estimated. The main deflation source is about 5km WNW-ward of the Shinmoedake, whose depth is 8.9km. Volume defect is estimated about 12 million cubic meters. The other source is located in very shallow part near the summit of Shinmoe-dake, whose volume change is 0.08 million cubic meters. This shallow source is needed when the crustal deformation observed at the single receiver GPS site of the summit of Shinmoe-dake.