

Crustal Movements associated with the 2011 eruption of Shinmoe-dake detected by DInSAR and GPS

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Shinmoe-dake in the Kirishima volcano group located in southwestern part of Japan started to erupt on January 19, 2011 and the eruption developed to Sub-Plinian and Vulcanian type eruptions on January 26 and 27. A generation of lava dome and its rapid growth within the crater were accompanied by succeeding explosive eruptions. The explosive phase ceased by the end of March. A magnitude of the 2011 eruption was large comparable to 1716-1717 eruptions that lasted for about one and half year, therefore it is necessary to take care for a while.

Although it is generally difficult to make a field observation in dangerous active volcanoes, a satellite remote sensing can make observations of even ongoing volcanoes periodically. Especially, SAR sensor is well-suited for monitoring of active volcanoes because it can penetrate ash clouds. Moreover, SAR data are applicable to use a DInSAR technique to detect crustal movement caused by magmatic activities. Around the Shinmoe-dake volcano area, there is a GPS network operated by GSI and NIED since before the 2011 eruption. This set of geodetic data from both DInSAR and GPS indicates pre-eruptive, co-eruptive, and post-eruptive deformation, and they are quite helpful to understand a condition of the volcano for each period and to anticipate future unrests. In this research, we use geodetic data from DInSAR and GPS to estimate and discuss about a volume change of the magma source associated with the 2011 eruption of Shinmoe-dake volcano.

Keywords: SAR, DInSAR, GPS, Shinmoe-dake, Crustal movement