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Volume Increase of Lava within the Kirishima, Shinmoe-dake Crater, Detected by TerraSAR-X/DInSAR

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Shinmoe-dake in the Kirishima volcano group is located in southwestern part of Japan. In January 2011, eruptive activities started from the Shinmoe-dake crater with a rapid accumulation of lava within the crater. The eruption phase ceased by the beginning of September, and the post-eruptive inflation also ceased by November 2011. After the 2011 eruption, monitoring by TerraSAR-X have continued and revealed a continuous shortening of satellite-ground distance even after the end of the main activity. This LOS shortening means uplifts of the lava surface. We estimated the volume increase of the lava after November 2011, using DInSAR processing of TerraSAR-X data, and concluded that the volume increase still continued in January 2014. The volume change rate has exponentially decreased with a small fluctuation as an overall trend. PSInSAR and long-term DInSAR results show LOS elongation including a subsidence in the northeast flank of the crater. It is interpreted that the subsidence is caused by deflation of a shallow deformation source located just beneath the crater. A total amount of effused lava after November 2011 is comparable to a volume decrease of the shallow source estimated from the deflation deformation. This long-term continuous lava extrusion suggests a possibility of an additional injection from the deeper source.

Keywords: SAR, Kirishima, Shinmoe-dake, Deformation