Evolution of the lava dome in the 2011 Shinmoe-dake (Japan) eruption revealed by spaceborne SAR imagery

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SAR observations to investigate the 2011 Shinmoe-dake (Japan) eruption were carried out by several SAR satellites. We found temporal change of a crater shape in their SAR images. A convex shape appeared in the PALSAR image acquired on January 27, but it is unclear whether this shape indicates lava. A larger convex shape that does indicate lava could be identified in SAR images acquired after that, and it seems to have grown progressively. Estimating topography so that the simulated intensity image corresponds to the acquired one, we estimated that lava grew from the night of January 28 until January 31 with a constant effusion rate of 89.2 m^3/sec. The lava volume of 15 million m^3 estimated from the TerraSAR-X image of February 1 was in good agreement with that of airborne SAR observation by the Geospatial Information Authority of Japan. From the estimated lava effusion rate and lava-covered area, we estimated that lava viscosity was less than 2.1 GPa·sec, suggesting the potential to form a lava flow. Furthermore, we corrected the foreshortening distortion using the estimated topography and suggested that the lava effusion point was around the crater lake.