



Three-dimensional deformation mapping of a dike intrusion event in Sakurajima in 2015 by exploiting the right- and left-looking ALOS-2 InSAR

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One of the limitations of the interferometric synthetic aperture radar (InSAR) is its one-dimensional measurement capability. Although three-dimensional (3-D) deformation can be studied if there are three or more measurements with different viewing geometries, it has not been executed because almost all SAR data are acquired using a right-looking geometry. For the Sakurajima volcanic activity on 15 August 2015, ALOS-2 conducted SAR observations from four different viewing directions, ascending/descending and right-/left-looking, enabling the retrieval of 3-D deformation data only from the InSAR results. We have retrieved 3-D deformation with high precision and resolution by a weighted least squares approach. Expansive deformation of over 10 cm has been observed with standard errors of 0.8, 3.4, and 0.7 cm for east-west, north-south, and up-down components, respectively. It is inferred that a dike of $1.7 \times 10^6 \text{ m}^3$ volume intruded beneath the Showa crater at a depth of 0.4–1.2 km. In addition to the above-mentioned topic, we will demonstrate that the atmospheric noise has a serious effect on the source modeling and the atmosphere-related noise reduction using numerical weather model has worked well.

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