

Line-of-Sight displacements in Nishinoshima detected by ALOS-2 PALSAR-2 SAR interferometry

*Ryo Natsuaki¹, Manabu Watanabe¹, Masato Ohki¹, Masanobu Shimada², Sinichi Suzuki¹

1.Japan Aerospace Exploration Agency, 2.Tokyo Denki University

Nishinoshima island in the Pacific Ocean has been erupting since November 2013. At first, it created a small new island located in south-east off shore of the pre-existing island. Nowadays the new island has rapidly expanded the land with its lava flow and almost absorbed the pre-existing island. According to the current record, the pre-existing island had 760(North-South) x 600(East-West) meter land while the new one had 1960 x 1960 m as of February 3, 2016 [1]. The state-of-the-art L-band Synthetic Aperture Radar (SAR), Phased Array type L-band Synthetic Aperture Radar-2 (PALSAR-2) aboard Advanced Land Observation Satellite-2 (ALOS-2) has been continuously observing the island since its launch. It has 3m spatial resolution with 50km swath in ultra-fine mode [2].

As Nishinoshima is an active volcano, it has been analyzed with mainly photogrammetric approach [3]. In this paper, we performed interferometric analysis and found line-of-sight displacements, which indicates ground subsidence toward the lava flow. The ratio was approximately 20 - 30cm in 2 months. Because of the discrete timing of ascending and descending observations, and unsteady volcanic activities, the precise speed of subsidence has not been determined. At the same time, we found that the lava flow hidden by the coagulated rocks shows very low temporal coherency. That is, we can evaluate the activeness of the volcano by interferometric analysis which cannot be seen by the simple photographic analysis. On the other hand, no significant deformation was found in the interferograms acquired after October, 2015.

References

- [1] Japan Coast Guard website "Nishinoshima Volcano" 9 Feb. 2016.
<http://www1.kaiho.mlit.go.jp/GIJUTSUKOKUSAI/kaiikiDB/kaiyo18-e1.htm>
- [2] Kankaku Y. et al., "PALSAR-2 Launch and Early Orbit Status" IEEE Geoscience and Remote Sensing Symposium 2014, pp. 3410 - 3412.
- [3] Ohno Y. et al., "The change of the Nishinoshima volcanic activity to catch with the image of various sensors," Journal of the Japan Society of Photogrammetry Vol. 54(1), PP. 46-51, 2015

Keywords: ALOS-2, PALSAR-2, SAR interferometry, Nishinoshima