

ALOS-2 / PALSAR-2 ScanSAR-ScanSAR interferometry observation for Philippine Mayon Volcano analysis

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On September 14 - 18, 2014, Mayon Volcano recorded some activities including lava flows. Before and the after those activities, Advanced Land Observation Satellite-2 (ALOS-2) observed the volcano on September 4 (Scene ID: ALOS2015233350-140904) and October 16 (Scene ID: ALOS2021443350-141016). ALOS-2 carries the state-of-the-art L-band Synthetic Aperture Radar (SAR), the Phased Array type L-band Synthetic Aperture Radar-2 (PALSAR-2) [1]. It has 3m spatial resolution with 50km swath in ultra-fine mode. However, in those observations, 100m x 100m resolution with 350km swath ScanSAR mode was scheduled. No better resolution image was taken during the activities by ALOS-2.

In this paper, we tried interferometric SAR (InSAR) analysis for Mayon volcano with those pair of two ScanSAR images. There are two requirements for the ScanSAR ? ScanSAR interferometry. One is the time synchronization between two observation and the other is the accurate co-registration. PALSAR-2 is designed to have 90% or more burst synchronization. However, as PALSAR-2 was under calibration those days, some pairs have less synchronization ratio. Fortunately, the pair we used marked approximately 53.6% of burst synchronization which is enough high for the interferometry. For the co-registration, in this paper, we applied a local co-registration method using phase gradient estimation from amplitude information proposed in [2], in addition to the popular cross-correlation and geometrical co-registration.

We found some low coherency parts at the summit and the southwest skirt of the mountain. Those low coherency areas represent the surface change caused by the lava or rock fall. On the other hand, no significant deformation was found in the interferogram. These results indicates that this activity was not large enough to make a detectable deformation for 100m resolution SAR interferometry.

References

[1] Kankaku Y. et.al. , "PALSAR-2 Launch and Early Orbit Status" IEEE Geoscience and Remote Sensing Symposium 2014, pp. 3410 - 3412.

[2] R. Natsuaki and A. Hirose, "Performance improvement of InSAR local co-registration with multiresolution interferogram," Asia-Pacific Conference on Synthetic Aperture Radar (APSAR) 2013 Tsukuba, Proc, WE2.R3.1, Tsukuba Japan, September 2013.

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