

Study of 2010 Eruption of Merapi Volcano, Indonesia Using ALOS PALSAR Interferometry

Ka Ming CHUA¹, Jie WU¹, Jean-Claude THOURET², Soo Chin LIEW¹

¹*Centre for Remote Imaging Sensing and Processing (CRISP), National University of Singapore (NUS), 10 Lower Kent Ridge Road, Block S17 Level 2, Singapore 119076, crschua@nus.edu.sg*

²*PRES Clermont, Université Blaise Pascal, CNRS UMR6524 Laboratoire Magmas et Volcans et Institut de Recherche pour le Développement-R163, 5 rue Kessler, 63038 Clermont-Ferrand cedex, France, thouret@opgc.univ-bpclermont.fr*

Abstract

Mount Merapi is one of the most active volcanoes in Indonesia, and its most recent massive eruption was in November 2010, causing great loss of lives and assets. Land movement of the volcano and the regions around were known to be significant. One of the methods that can be used to monitor such motion is Interferometric Synthetic Aperture Radar (InSAR).

The Synthetic Aperture Radar (SAR) images are acquired from the Advanced Land Observing Satellite (ALOS) Phased Array L-Band SAR (PALSAR) sensor, which managed to capture images of Mount Merapi before, during and after the eruption. The Shuttle Radar Topography Mission (SRTM) digital elevation model (DEM) was used as a reference topology in deriving the Differential InSAR (DInSAR).

However, it is known that DInSAR has limited application when the land movement is too significant due to the wrapping of phases. Therefore, the interferograms of the volcano before and after the eruption were used to estimate the land movement for large changes, while the DInSAR method was used for changes less than half a meter to generate a complete land motion map of the volcano.

Keywords: Volcano, Change Detection, Interferometric Synthetic Aperture Radar (InSAR) Processing, Differential InSAR (DInSAR)