



Synthetic Aperture Radar Monitoring of Merapi Volcano 2010 eruption

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The Indonesian Mount Merapi is one of the most active volcano in the world. On 25 October 2010, the Merapi Volcano began one of its bigger eruptions in the last century.

In the frame work of two FP7 European projects, MIA-VITA (MItigate and Assess risk from Volcanic Impact on Terrain and human Activities) and SAFER (Service Application For Emergency Response), the space remote sensing monitoring of the volcanic area of Merapi was activated, aiming to provide as much as possible information to the Indonesian authorities responsible for the crisis management: the Centre for Volcanology and Geological Hazard Mitigation – CVGHM- and the Balai Pengembangan Proses dan Teknologi Kimia - BPPTK.

Space-borne Optical and SAR (Synthetic Aperture Radar) sensors were tasked in order to capture a number of satellite scenes to provide a continuous monitoring during the volcanic crises. Unfortunately, the cloudy weather conditions prevented the successful operation of optical sensors. Besides that, thanks to their capability to acquire during night/day time and in all weather condition, SAR sensors gave the opportunity to follow the eruption evolution of the Merapi volcano.

Following the request of new acquisitions by INGV team the Canadian Radarsat-2 (C-band SAR) and the Italian COSMO-SkyMed constellation (X-band SAR) acquired some images over the Merapi volcano, providing useful information on the status of volcano crater and on the deformation occurred during the eruption.

In this work, the results obtained by applying change detection techniques and deformation tracking approach are presented. Strong deformations in the southern flank of the volcano have been detected, measuring maximum displacements in the order of 10 meters. The work also highlights the crater ruptures during different eruption phases and the effects of pyroclastic flows.