

Detecting Topographical Change around the Summit of Mt. Merapi by InSAR Technique

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Abstract:

Mt. Merapi in Central-Java, Indonesia has short intervals of eruptions characterized by dome explosion and accompanied large amount of pyroclastic flow deposits. Three years observation data of ALOS/PALSAR were used to detect the topographical change around the summit after the last eruption in June 2006. The change is supposed to be caused by two factors: internal factor related with magma ascent and external factor related with lahars in rainy season. To clarify the change related with lahars generation, we used the Tropical Rainfall Measuring Mission (TRMM) data. A monthly precipitation rate data with grid size $0.25^\circ \times 0.25^\circ$ is selected and covered around the summit of Mt. Merapi. Fig.1A shows the rain rate (mm/hr) from January 2006 to May 2009 overlaid with ALOS/PALSAR data pairs. Fig. 1B shows the baseline and coherence condition of each pair. The Interferograms were generated after removing the topographical and orbital error. The results are depicted in Fig. 3.

Two typical patterns are notable in Fig. 3. The first, the ground surface is uplifted about 10 cm in the radar's line of sight to the surface at the eastern flank (P3, P4, P11, P14, and P15) and the western flank from the summit (P10, P12, and P13). The pattern at the eastern flank is supposed to be related with magma ascent to the shallow reservoir and the western flank is caused by lahars generation in rainy season. The second notable pattern is wide rectangular-shape at the northwestern and southeastern flanks from the summit (P5 and P11). This feature might be caused by the atmospheric disturbance in the peak of rainy season.

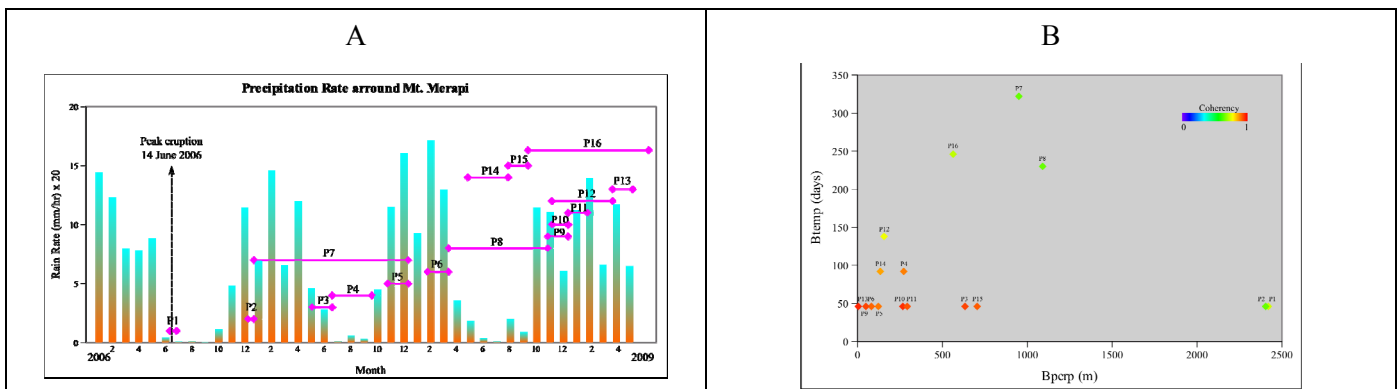


Fig. 1. Precipitation rate around Mt. Merapi (A) and Baseline and Coherence condition for each pair (B)

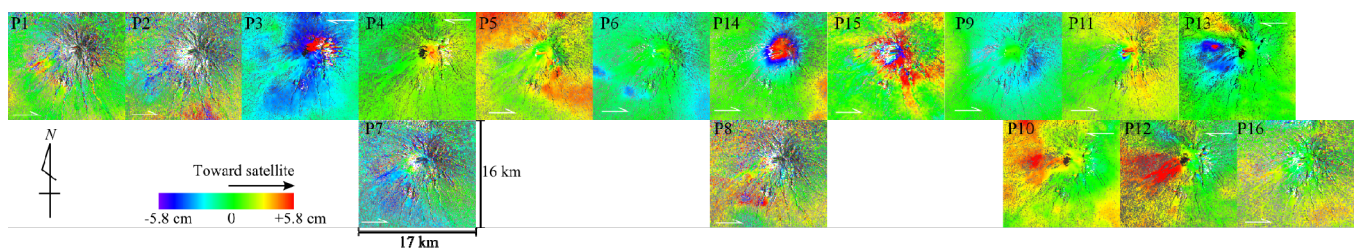


Fig. 2. Sixteen interferograms generated by ALOS/PALSAR for three years observation time of Mt. Merapi

Acknowledgments

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