

D-InSAR Monitoring of Volcanic Activity over Tatun Mountain in Taiwan

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ABSTRACT:

The Tatun volcano group is composed of 29 volcanoes and was once known as an extinct volcano. However, based on the strong ground thermal activities recently observed by local monitoring station (Taiwan Volcano Observatory, 2014), it was implied that the existence of underground magma chamber is possible (Lin, 2009; Yang, 2009). As Tatun volcano group is very close to Taipei City, serious damages would occur if the volcanoes erupted. Therefore it is critical to monitor the precursor phenomenon accompanied with activities of the volcanoes for a early warning. In this paper, we focused on observing the ground surface deformation over the volcano area. For which the ALOS PALSAR images and differential interferometry synthetic aperture radar (D-InSAR) technique was applied. Moreover, in order to improve the accuracy of the solved displacement, atmospheric correction was performed to mitigate the errors introduced while radar propagating through troposphere. To this end, local metrological stations interpolated data and WRF numeric weather model were applied respectively to reduce hydrostatic and wet delays of tropospheric error. Once the surface displacement map was modified, it was further used for inversion modelling the mechanic of magma chamber and channel causing ground displacement. We inverted with various sets of Mogi pressure source model, and compared each forward-modelling result in line-of-sight (LOS) direction with the modified D-InSAR displacement. The preliminary experiment showed that one Mogi source model generated the best consistent pattern with the modified D-InSAR displacement. With the validation, the position and magnitude of the underground pressure source was also determined.