

Application of SAR interferometry to Indonesian volcanoes -Application of ASTER DEM-

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We have attempted to detect the crustal deformation field of Indonesian volcanoes using JERS-1 SAR interferometry to elucidate the eruption mechanism. To detect crustal deformation by SAR interferometry, the topographic fringes caused by topography are removed using Digital Elevation Model (DEM). However DEM that could be applied to SAR interferometry was not available in Indonesia. Then we generated DEM from interferometric pair that was most sensitive with respect to topography. At the steep topographic area, it is difficult to process 'phase unwrapping' which resolves integer ambiguity, because the fringes become high frequency. In previous study, we attempted to apply JERS-1 SAR interferometry to Indonesian volcanoes, but the area that could determine the crustal deformation field was limited to the east flank and the caldera areas of Tambora volcano by above reason. Although we detected the crustal deformation which was the subsidence of about 9cm/yr at the center of deformation area in the caldera, we could not investigate without wider information if those with wider spatial frequency exist.

From November 2002, DEM generated from ASTER VNIR images became available, and the spatial resolution of ASTER DEM (about 30 m) is enough to apply SAR interferometry. In this study, we attempted to apply ASTER DEM to JERS-1 SAR interferometry in Tambora, Rinjani, Agung and Semeru volcanoes. Though most of topographic fringes could be removed using ASTER DEM, the fringes were remained around the area where the topography changed rapidly. We compared between the observed and the simulated intensity images, and it was showed that there were the differences of the feature in such area. Furthermore the concentric fringes with several hundred meters of diameter were remained in the flat area, and there were also the difference of intensity feature. Then this may be caused by the error of ASTER DEM, and more detailed investigations will be needed. Thus it is possible that the accuracy of ASTER DEM is not enough to remove topographic fringes, but the phase unwrapping could easily process than the previous study by using ASTER DEM to reduce the topographic fringes. By using this useful method, we could detect the crustal deformation field around Rinjani, Agung and Semeru volcanoes that had not been able to process in previous study. Though it is seems that there is not clear crustal deformation in those volcanoes except Tambora volcano in the preliminary result, we will investigate by more detailed processing.

fringes.