Consideration of JMA tilt meter data around volcano using boundary element method (2)

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Small volcano deformations detected by tilt meters installed around carter were important to monitor and evaluate the volcanic activity. Japan Meteorological Agency has been installing the tilt meter station around the crater at active volcano. Because these deformation data observed around crater were affected by the topography of volcanic edifice, it is important to consider the topographic effect for the analysis of the estimation of pressure source. When the location of pressure source was estimated above the observation station, the amount of tilt change was not well calculated by the assumption of elastic half space. In this study, to develop the evaluation tools of volcanic deformation data due to shallow pressure sources, we calculate volcanic deformation due to shallow pressure sources by using the 3-d boundary element method (BRM). The boundary element method could calculate the volcanic deformation on any surface topography by the pressure source of any shapes. We express the topography of Nasudake using the 10 m mesh digital elevation data (DEM). Nasudake has a tilt meter around crater which located a distance of about 600 m from the summit and at an altitude of about 1700 m. We calculate tilt changes on this tilt observation station assuming the spherical pressure sources located above sea level. Our calculation results show that, when the altitude of the pressure source was around sea level, the tilt change observed by the tilt station were larger about several percent compared to the case of assuming the elastic half space. When the altitude of the pressure was higher than 1000m above sea level, the amount of tile changes calculated by the BEM was several times larger than that of the case of assuming the elastic half space. These results indicate that in the analysis of tilt change data due to shallow pressure sources, the effect of topography affects the estimation results such as the depth and amount of change of pressure sources.

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