

Analysis of tilt data at Stromboli volcano using boundary elemental method

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Recent geodetic observations at active volcanoes succeeded in detecting volcano inflation prior to volcanic eruptions. These data can be used for quantitatively understanding the magma ascent dynamics before eruptions. In this study, we calculate the volcano deformation on the basis of 3D boundary element method to explain the observed tilt data at Stromboli which are associated with volcanic eruptions. Assuming a pressure sources extending from the vent to a depth inside a cylindrical conduit and using topography of Stromboli volcano, we calculate tilt motions at tilt stations. Our forward modeling shows that pressure sources extending down to about 450 m depth with about 1.3 MPa can explain the tilt amplitudes reported in Genco and Ripepe (2010). Using temporal changes of tilt amplitude will enable us to constrain the pressure sources, which may give a new constraint on magma ascent process before eruptions.

Keywords: Stromboli Volcano, volcano deformation, boundary element method, tilt motion