

Source depth estimation of a magmatic inflation in 2008-2010 at Mt. Fuji, Japan, based on sparsity-promoting L1 inversion of GNSS data

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Mt. Fuji has not erupted since the Plinian eruption in 1707, but its volcanic activity such as low-frequency earthquakes has not finished. Here, using GNSS (Global Navigation Satellite System) time-series data, we investigate an inflation event of Mt. Fuji in 2008-2010. Referring to recent studies of igneous processes, we focus on “vertically-extensive” magma systems and estimate depth distribution of geodetic inflation sources. A sparsity-promoting L1 regularization algorithm for inversion analysis allows us to estimate concentrated distribution of the sources with sufficient performance of data fitting. Our result shows that the inflation sources were mainly distributed in a depth range from 20 km to 15 km, and the total volume change was on the order of 0.01 cubic kilometers. The magma clot might move upward, and not move back downward as far as we observed. Our sparsity-promoting method is useful to constrain magma movement from limited observation data.

Keywords: Mt. Fuji, GNSS, L1 regularization