

Ground deformation associated with the 2004-2005 unrest of Asama Volcano, Japan

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Ground deformation associated with the 2004-2005 unrest of Asama Volcano, central Japan, was recorded with continuous Global Positioning System (GPS) sites around the volcano. The GPS data shows clear inflation of the volcano starting late July, approximately 1 month before the first moderate-size eruption on September 1, 2004. Deformation has been continuing up to the time of writing of this abstract.

We modeled the deformation field with a rectangular dike intruded in the elastic, isotropic, and homogeneous medium. Because these parameters have nonlinear relationship with the deformation field, we estimated the model parameters and their uncertainties with the Simulated Annealing, a tool for solving a nonlinear inverse problem with random search for optimum parameters.

The result shows that the deformation field is modeled well with intrusion of a near-vertical dike at approximately 6 km west of the flank. Location of the intruded dike is constrained within 1 km. Dip of the dike is constrained within 10 degrees from vertical. Estimated strike of the dike is N71.3W (± 7.5 degrees), which is consistent with the regional stress field, east-west compression. Because the observed deformation was only up to 10 mm, shape and depth of the dike is poorly constrained; we estimated the top of the dike at 1.2 \pm 1.6 km below the sea level. Nevertheless, total volume of the intruded dike is relatively well constrained as 6.48 \pm 1.87 million cubic meters with a 95 percent confidence interval.