



Does the Magma intrusion at Long Valley caldera (California) drive the detected ground deformation?

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The Long Valley caldera (California) formed $\sim 760,000$ yr ago following the massive eruption of the Bishop Tuff. Postcaldera volcanism in the Long Valley volcanic field includes lava domes as young as 650 yr.

In the last two decades the caldera region has experienced an unrest phenomenon characterized by uplift of the resurgent dome and earthquake activity followed by periods of relative quiescence. More specifically, the analysis performed on spatial dense InSAR deformation map and time series, detected via Small Baseline Subset (SBAS) techniques, revealed that the deformation trend has been characterized by a slow background uplift (1992-1997) followed by an a 1997–1998 unrest phenomenon and a 1998–2000 subsidence phase.

The cause of unrest is still debated, and hypotheses range from hybrid sources (e.g., magma with a high percentage of volatiles) to hydrothermal fluid intrusion. In order to clarify the shape, size and spatial orientation of the stress source, an analytical optimization model of ground deformation based on differential synthetic aperture radar interferometry (InSAR), global positioning system (GPS), two-color electronic distance meter (EDM) was performed. Finally, the joint analysis that considers space based geodetic measurements and microgravity data, we are able to discriminate the nature of the causative unrest's source.