



InSAR Observations of Magmatic Processes in the East African Rift

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The role of magma in accommodating extension and its relationship to fault-based extension in continental rifting is poorly understood. Here we present observations of the temporal and spatial evolution of surface displacements resulting from magmatic processes in the East African Rift.

A systematic InSAR surveys have detected geodetic activity at six of the volcanoes in the East African Rift. In Kenya, subsidence of 2-5 cm occurred at Suswa and Menengai during 1997-2000, ~9cm of uplift at Longonot in 2004-2006 and ~21 cm of uplift at Paka during 2006-2007. The deformation is episodic, and no deformation was observed at these volcanoes during other time-periods. The best-fitting source models for each episode is inflation or deflation of a horizontal lensoid at a depth of 2-5 km. The episodic nature of the activity, its lack of correlation with seasons, and the preferred source geometry are all consistent with activity in the volatile-rich cap to a crystal-rich magma chamber beneath each of the 4 volcanoes.

A seismic swarm occurred in Northern Tanzania from July 14 to August 4 2007. Using InSAR images from Envisat (IS2 and IS6) and ALOS, we show that the seismic swarm was accompanied by 1) subsidence that can be attributed to ~40 cm of normal motion on a NE striking fault, 2) the intrusion of ~2.4 m wide dyke, 3) deflation of a point source magma chamber and 4) collapse of a shallow graben. The large number of available SAR images allows us to examine the sequence and time-dependent behaviour of these processes and relationship between diking and faulting.