



Nyiragongo Volcano 2002 Eruption Constrained by Multibeam InSAR Data

Christelle Wauthier (1,2), Valérie Cayol (3), François Kervyn (1), Nicolas d'Oreye (4,5)

(1) Earth Sciences Dept., Royal Museum for Central Africa, 3080 Tervuren, Belgium (christelle.wauthier@africamuseum.be),

(2) ArGEnCo Dept., University of Liege, 1 Chemin des Chevreuils, Building B52, 4000 Liège, Belgium

(c.wauthier@ulg.ac.be), (3) Lab. Magmas et Volcans, Université Blaise Pascal, UMR 6524, OPGC, 5 rue Kessler, 63038

Clermont-Ferrand, France, (4) Dept. of Geophysics/Astrophysics, National Museum of Natural History, 7256 Walferdange,

Luxembourg, (5) European Center for Geodynamics and Seismology, Walferdange, Luxembourg

Since 1996, several seismic and volcanic events in the Virunga volcanic area (Democratic Republic of Congo) have been captured by InSAR. On 17th January 2002, the Nyiragongo volcano erupted along an approximately 20 km long fracture network extending from the volcano to the city of Goma. The event was captured by InSAR data from the ERS-2 and RADARSAT-1 satellites acquired with three different viewing geometries. A combination of 3D numerical modeling and inversions is used to interpret these displacements. Inversions of synthetic data, realized considering a single-dike defined by six geometrical parameters and an overpressure, show that the dike parameters can be resolved. We show that using several viewing geometries, the parameters determination is not significantly improved, however, the efficiency of the inversion is increased. Several models are tested to fit the InSAR data and discussed: 1) a dike associated to the 2002 eruptive fissure, 2) a dike associated to the fissure, combined with a normal fault network, and 3) several magmatic intrusions. Furthermore, we suggest that the 2002 eruption, similarly to the previous eruption in 1977, is linked with the rifting process. A possible scenario for the 2002 eruption is finally presented. As we cannot rule out the presence of a magmatic intrusion underneath the gas rich Lake Kivu and the city of Goma, the interaction of magma and dissolved gas in the lake should be considered as a significant hazard for future eruptions.