



Present-day magmatic pulses in the Andes ? results from geodesy and geophysics

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Large scale ground deformations have been recently revealed in the central Andes from satellite ERS InSAR data [Pritchard and Simons, Nature 418 (2002) 167-170]. Both uplift and subsidence signals with amplitudes up to few cm/y^{-1} have been identified at several volcanic complexes suggesting that active magmatic processes might occur nowadays at crustal depths below these edifices. With the aim to better understand the time evolution of such crustal deformations and their related source processes, we carried out detailed investigations on the Lastarria-Cordon del Azufre volcanic complex (Chile-Argentina), which is one of these major deforming areas. The ENVISAT InSAR data, we have collected since 2003, shows the persistence of the large wavelength ground inflation previously revealed for this complex [Froger et al., EPSL 225 (2007) 148-163]. We produced an accurate InSAR time series showing a four years long temporal evolution of the ground displacements patterns. It is characterized by an on-going uplift which extends over an elliptical area (45 km NNE-SSW major axis and a 37 km minor axis). The maximum inflation rate estimated from the InSAR data analysis reaches $\sim 2.5 \text{ cm}/\text{yr}^{-1}$ for the 2003-2007 period. The inferred source parameters for such inflation are consistent with an over-pressured reservoir at shallow to intermediate crustal depths (7-15 km), with an average volumetric rate of inflation of about $14 \times 10^6 \text{ m}^3/\text{yr}^{-1}$. From these results, we propose that deformation processes observed at Lastarria-Cordon del Azufre volcanic complex could represent

a present-day episode of magmatic pulse at intracrustal depths. To confirm this hypothesis and refine the proposed model we performed geodetic and geophysical field surveys including GPS, gravity (relative and absolute), seismology, heat fluxes and geochemistry. We present here the results of the satellite- and ground-based observations and discuss their implications on the understanding of magma emplacements at crustal depths in the Andes.