



## **Deformation time series at Llaima volcano, southern Andes**

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Llaima volcano, with an edifice height of 3125 m and a volume of about 400 km<sup>3</sup>, is one of the largest and most active volcanoes in South America. Its eruptive history suggest a potential for very large and hazardous eruptions including pyroclastic flows, air falls and material remobilization in the form of lahars affecting regions even at the lower apron and beyond, posing a significant risk to civilizations, infrastructure and traffic ways. Llaima volcano is near constantly active; since the 17th century strombolian eruptions occurred at a mean frequency of one eruptive phase every five years. Although this strong activity and socioeconomic importance the source of magma, possible magma reservoirs and deformations prior to or associated with eruptions are hitherto unknown. One of the problems for establishing a monitoring system is that Llaima is difficult to access and located in vegetated and topographically rough terrain.

To better understand the volcano physics, we created an InSAR time series based on the PS technique using 18 Envisat images from Dezember 2002 to November 2008. Using the StaMPS software we obtained 24,000 stable pixels in the vicinity of the volcano, that allow to investigate a spatiotemporal displacement field. Associated with the recent eruptions, we observed non-linear subsidence at the vicinity of the volcano base. We assessed the validity of the deformation signal, using statistical tests and discussed the possible influence of atmospheric and topographic errors.

To investigate the cause of the observed spatiotemporal deformation we employed an inverse source modelling approach, and simulated the dislocation source as an analytical pressurized spherical model. The inverted source can reproduce the observed deformation and allows to constrain the location of the magma reservoir under Llaima. Moreover we observed a signal might be associated to a slow landslide at the eastern flank of the volcano between December 2007 and Januar 2008.

In this presentation we will give the detail of data processing, modelling and interpretation.