

## **Source deformation associated to the March 2015 eruption of Villarrica volcano, inferred from GPS data.**

**Loreto Córdova<sup>1</sup>, Fernando Gil-Cruz<sup>1</sup>**

<sup>1</sup>Observatorio Volcanológico de los Andes del Sur, OVDAS, Servicio Nacional de Geología y Minería, Temuco, Chile.

Keywords: Deformation source, Global Positioning System, Villarrica eruption, geodetic monitoring.

On March 3rd 2015, Villarrica volcano increased its activity, finishing in a strombolian eruption. This eruption was monitored by 5 continuous GPS stations installed around the volcano, and there was not evident record of deformation before or during the eruption. Since the cGPS stations were installed in 2012, seasonal variations were registered with amplitudes less than 2 cm and maximum displacement rates of 0.3 cm/month. Few weeks after the eruption, displacement rates showed an increase, mainly in the stations located in the east and south side of the volcano. Vertical rates over than 1 cm/month were adjusted, showing an inflation pattern that was modeled using Dmodels package. Sphere and spheroid sources fit well the displacement observed, inferring a maximum vertical displacement almost 4 km away from the active crater in ESE direction. The location of the modeled sources has remarkable characteristics, due to: (1) is inside the ancient caldera of Villarrica, (2) is nearby the interception between the Liquiñe-Ofqui Fault Zone and Villarrica-Lanin volcanic chain (VLVC), (3) is in the region where the volcano-tectonic seismicity is distributed, (4) is about 5 km depth, in agreement with the depth of the shallower reservoir inferred from P-T conditions of 1971 Villarrica products, and (5) the spheroid source is oriented along the VLVC. The estimated volume of the deformation source has the same order of magnitude than the volume erupted during March event, suggesting a completely refill of the magma chamber in a short period after the eruption.