
Under the radar: New activity beneath the "Roof of Patagonia", Domuyo volcano, Argentina

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Abstract

Volcanoes dormant for thousands of years ago are challenging, both for hazard assessment and for understanding their physical processes. Nevertheless, the monitoring of dormant volcanoes has experienced a revolution over the past 25 years thanks to the advent of satellite-based remote-sensing methods. In this study, we present geodetic observations (interferometric synthetic aperture radar - InSAR - time series and interferograms from the SAR sensors onboard the ALOS, ALOS-2, Radarsat-2, and Sentinel-1 satellites) and thermal observations (radiance time series retrieved from the moderate resolution imaging spectroradiometers -MODIS - onboard the Terra and Aqua satellites) of a new center of unrest discovered in the southern Andes, beneath Domuyo volcano. Domuyo is a little studied 4700m elevation volcano that is considered a dacitic dome rising out of a caldera; it features an active hydrothermal system, but most recent eruptions are Pleistocene to possibly Holocene. Our geodetic analysis reveals that Domuyo was the location of gentle to null subsidence from 2008 to 2014, which abruptly started inflating in 2014, continuing to present. This surprising inflation has been roughly linear (~ 11 cm/year), and is consistent with a sub-horizontal flattened ellipsoidal source between 5.5-6 km depth that coincides with the width of the caldera. In contrast, our thermal analysis, based on a new algorithm that captures the diffuse emissions of heat through volcanic edifices, reveals that the thermal output of Domuyo was relatively steady from 2008 to 2013. Then, it abruptly started to decline at a roughly steady rate (~ -20 mW/m²/sr/micron/yr) through 2017, with an increase of thermal emissions over the past year. Our results beg the question: what are the physical mechanisms that can account for simultaneous inflation and reduced thermal output while also accounting for a time lag between both observables? We present some of the competing mechanisms in this presentation.

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