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Rapid re-inflation following the 2011-2012 rhyodacitic eruption at Cordón Caulle volcano (Southern Andes) "imaged by InSAR: evidence for magma chamber refill "

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Cordón Caulle is a large fissural volcano that has erupted rhyodacitic magma of the same composition in its past three historical eruptions in 1921-1922, 1960 and 2011-2012, the latter the best instrumentally recorded eruption of this kind. The 2011-2012 eruption was preceded by a sequence of at least three transient inflation events and followed by more than 2.5 m of subsidence. Here we use new X and C band InSAR time series results to document post-eruptive uplift up to 0.8 m between March 2012 and May 2015, with LOS rates up to 45 cm/yr, one of the largest ever detected by satellite geodesy for silicic systems, along with more localized lava flow subsidence. The uplift event was largely aseismic, with no other signs of unrest and was likely produced by magma intrusion in a different source compared with the pre and co-eruptive ground deformation sources. However, as all the sources active between 2007 and 2015 overlap in space along the volcanic edifice, we propose that inflation occurred in the same tectonically controlled plumbing system that has been active during the historical ?eruptions. An intriguing feature of the inflation event is that uplift ended before the chamber refilled with the erupted volume, thus we speculate that the eruption changed the pressure gradient required for magma flow from a deeper source. As geodetic models are highly non-unique; we are exploring a plausible range of viscoelastic effects, volatile exsolution and magma injection models that can explain the ground deformation data. Preliminary numerical models show that the exponential decay in the uplift signal can be explained by the viscoelastic relaxation of a pressurized elongated chamber surrounded by a viscous shell. Further models that include time variable pressure histories will be calculated to assess the abrupt end of the deformation in May 2015.