
Analysis of the ongoing uplift observed in the Laguna del Maule area (Chile)

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Résumé

Laguna del Maule is a rhyolitic volcanic field located in the Southern Volcanic Zone of the Andes (Chile), which last erupted for the last time 2200 years ago, but had been actively deforming since 2007. In this study, we analyzed the surface displacements observed on this volcanic field from a large InSAR dataset containing ENVISAT, ALOS1-2 and SENTINEL data acquired from 2003 to 2017. InSAR time series highlight that the surface displacement pattern remains nearly constant over the study period but with an amplitude decreasing gradually with time. The maximum cumulative displacement is about 1.6 m with a rate of about 0.23 m/y from 2007 to 2011 of 0.14 m/y from 2015 to 2017. For a surface displacement source embedded in an elastic medium, the volume change estimate is between 230 to 450×10⁶ m³ depending on the magma compressibility considered and the amplitude decrease is related to internal pressure decrease within the surface displacement source. We also explored another possibility by considering that the gradually decrease in surface deformation rate be due to a viscoelastic relaxation mechanism. First results using a finite element method (ADELI) for modeling time-dependant ground deformation due to volcanic pressure source embedded in a viscoelastic medium are presented.

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