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Magnetotelluric imaging of the restless Laguna del Maule volcanic field and its fore-arc region

Valentina Reyes[1], Daniel Diaz[2], Martyn Unsworth[3], Darcy Cordell[3]

[1]Departamento de Geofísica, Universidad de Chile, Blanco Encalada 2002, Santiago, Chile

[2]Centro de Excelencia en Geotermia de Los Andes, Plaza Ercilla 803, Santiago, Chile

[3]Department of Physics, University of Alberta, 116 Street and 85 Ave., Edmonton, Alberta T6G 2R3, Canada

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The Laguna del Maule volcanic field presents one of the highest rates of deformation measured in a volcano that is not actively erupting, reaching uplift rates of 250 mm/yr and an accumulated vertical displacement of at least 1.8 meters at the maximum deformation point since it was first detected in 2007. It is located in the Southern Volcanic Zone in Los Andes and it has been active since 1.5 Ma, featuring the greatest postglacial rhyolitic volcanism in the area, characterized by 36 silicic eruptions distributed around the Laguna del Maule basin. Besides InSAR and GPS studies, seismological, gravity and magnetotelluric data has been measured around the basin, preliminary results agree on the existence of a rhyolitic magma body at a depth of ~3-5 km. Consequently, monitoring and scientific research in this area is very important, and it presents a unique opportunity to understand the processes taking place in a restless rhyolitic system and to study the warning signals of a potential eruption. This thesis is part of an international collaboration that seeks to obtain a numerical model of system dynamics, using geophysical and geochemical data sets. Particularly, this study focuses on associating the magma body and the source ofthe high deformation rate observed at the volcanic field with the subduction of the Nazca plate under Sudamerican plate, by providing electromagnetic regional studies to complement the different data sets available on a local scale. Magnetotelluric measurements have been conducted in the area, along a EW profile which starts from Laguna del Maule, and extends to the Chilean coast, considering at a first stage, only broadband stations separated by 10 km. The results obtained from this profile, besides providing a first idea of the processes involved here, will be used as a reference for an upcoming profile of long period magnetotelluric measurements.