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# Distribution of magma and hydrothermal fluids beneath the Laguna del Maule Volcanic Field, Central Chile using magnetotelluric data

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Geodetic data has shown that the surface around the Laguna del Maule volcanic field in central Chile has been moving upwards at rates in excess of 19 cm/yr since 2007 over a 200 square kilometer area. It has been hypothesized that this ground deformation is due to the inflation of a magma body beneath the lake. InSAR deformation modeling and gravity inversion suggest that the depth to the magma body is between 3 km b.s.l. and 0 km (at sea level). This magma body is a likely source for the large number of rhyolitic eruptions at this location over the last 25 ka. A dense broadband magnetotelluric (MT) array was collected from 2009 to 2015 and inverted using the ModEM inversion algorithm to produce a three-dimensional electrical resistivity model. The presence of a large surface conductor (<0.5 Ohm-m; 2.3 km a.s.l.) spatially coincident with the lake bed has the potential to attenuate signal and decrease resolution beneath the area of inflation. Additional broadband MT data were collected in 2016 and this new data suggest there is a mid-depth, weakly conductive feature (5 Ohm-m; 1 km b.s.l.) coincident with the area of maximum inflation which is resolvable despite the low-resistivity surface layer. There are many conductive features which lie on the perimeter of the zone of inflation including a large low-resistivity zone (<5 Ohm-m) at ~5 km depth (3 km b.s.l.) north-west of the lake and a large low-resistivity zone (<10 Ohm-m) at ~5 km depth (3 km b.s.l) north of the lake. The complex, three-dimensional model structure is supported by phase tensor analysis showing poorly-defined strike and high beta skew values (>3) at periods >2 s. The conductive features identified could be interpreted as either hydrothermal systems or magma and further analysis will contribute to better understanding this dynamic system.