

## Magnetotelluric images of magma distribution beneath Volcan Uturuncu, Bolivia

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The Altiplano-Puna magma body (APMB) is recognized as one of the largest magma bodies on Earth. Geophysical studies reveal a thin ultra-low velocity zone at a depth of about 20 km that is inferred to be 14-27 percent partial melt and less than 1 km thick (1,2). The APMB was also noted to have a very low resistivity by early MT studies. Furthermore, the APMB is spatially associated with the major ignimbrite eruptions of the Altiplano-Puna Volcanic Complex (APVC). Volcan Uturuncu in Southern Bolivia is located near the centre of the APMB and has been inflating over the past two decades at rates of 1-2 cm/year. It has been suggested that this represents a location where pluton formation may be occurring in real time (3,4).

The PLUTONS project is making a comprehensive set of geological and geophysical measurements to define the distribution of magma beneath Volcan Uturuncu, and also to understand the eruptive history. This has included geological studies, seismic monitoring, and detailed geodetic measurements. Magnetotelluric (MT) data use passive electromagnetic signals to image subsurface resistivity from the surface to the upper mantle. Electrical resistivity is an important property because it is sensitive to the presence of partial melt and hydrothermal fluids in the crust.

An extensive MT data set was collected at Volcan Uturuncu in 2011 and 2012. Broadband MT data in the frequency band 0.001-300 Hz were collected at 149 stations. These data are being analysed to generate both 2-D and 3-D resistivity models of the subsurface. Initial analysis of the data has revealed a number of interesting features. An anomalous region of low resistivity at a depth of about 20 km is detected and can clearly be identified as the APMB. This region disappears as we move farther west. The upper boundary bulges upward below Volcan Uturuncu. A number of low resistivity fingers can also be seen, which connect the APMB conductor to the surface above, possibly representing past conduits with hydrothermal alteration, or shallow accumulations of magma beneath Volcan Uturuncu.

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