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# New Insights on the Volcanic-Hydrothermal System beneath Volcán Uturuncu (Bolivia) - Modeling the Electric Anisotropy and Jointly Inverting Magnetotellurics & Gravity Data

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Volcán Uturuncu is a volcano located in the southwestern corner of Bolivia, near the borders with Chile and Argentina. It sits above the Andean subduction zone and is part of the Altiplano-Puna Volcanic Complex (APVC). Volcán Uturuncu is situated on top of the Altiplano-Puna Magma Body (APMB), which is currently the world's largest continental silicic partial melt reservoir. This reservoir is estimated to hold a total volume of 500,000 km$^3$ of 20-30% partial melt and is located about 15 to 20 kilometers below sea level.

Volcán Uturuncu has not produced any eruption during the last 250,000 years, effectively making it an "extinct" volcano. However, the presence of active fumarole fields and the discovery of a consistent uplift pattern suggest that this volcano remains, up until this day, a dynamic system. Hence, numerous geophysical and geochemical surveys have been conducted during the past decades to understand the physical processes behind the recent unrest of this "zombie" volcano. Thay also aimed to shed light on the dynamics between the APMB and the near-surface volcanic-hydrothermal activity. Recent seismological studies worked on constraining the crustal stress distribution, by mapping the faults below Volcán Uturuncu and studying the seismic anisotropy distribution in the surrounding area. Findings from these studies reveal a complex network of fractures with a strong NW-SE-directed seismic attenuation and anisotropy, seeming to indicate the preferential pathway of fluids (Hudson et al. [2022, 2023]).

With this new information in mind, we aim to re-assess the previous electrical resistivity model of Volcán Uturuncu, which was obtained from isotropic inversion of magnetotellurics (MT) data by Comeau et al. [2016]. This model shows a pattern of low resistivity and high resistivity structures, which was interpreted as a series of magmatic dykes. However, this interpretation may overlook the inherent anisotropy of the system. Thus, we aim to generate electrical resistivity models allowing for isotropic and anisotropic zones and assess the results in the context of the newly available scientific data. We will also present preliminary results from the joint inversion of MT and gravity data. Such joint modeling allows us to delineate the density signature of the resistivity anomalies in the subsurface. This can help us in determining whether low resistivity structures represent either saline brines, partial melt or dense sulfide mineralization.

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