

### 3-D resistivity imaging of the Misti Volcano (Peru) from broadband Magnetotelluric data: Preliminary results

Gonzalo Romero-Beltran<sup>1</sup>, Yanet Antayhua<sup>2</sup>, Jose Luis Torres<sup>3</sup>, Svetlana Byrdina<sup>4</sup>, Hernando Tavera<sup>5</sup>, Juanjo Ledo<sup>6</sup>, Volker Rath<sup>7</sup> and Yovana Alvarez<sup>8</sup>

<sup>1</sup>Departamento de Ciencias de la Tierra Sólida, Instituto Geofísico del Perú, Arequipa-Perú, romerobeltran70@gmail.com

<sup>2</sup>Departamento de Ciencias de la Tierra Sólida, Instituto Geofísico del Perú, Arequipa-Perú, yantayhua@igp.gob.pe

<sup>3</sup>Departamento de Ciencias de la Tierra Sólida, Instituto Geofísico del Perú, Arequipa-Perú, jtorres@igp.gob.pe

<sup>4</sup>Université Grenoble Alpes, Université Savoie Mont Blanc, CNRS, IRD, Univ. Gustave Eiffel, ISTERRE, 38000 Grenoble, France, svetlana.byrdina@univ-smb.fr

<sup>5</sup>Departamento de Ciencias de la Tierra Sólida, Instituto Geofísico del Perú, Arequipa-Perú, htavera@igp.gob.pe

<sup>6</sup>Departamento de Física de la Tierra y Astrofísica, Universidad Complutense de Madrid, Spain, jledo@ucm.es

<sup>7</sup>Dublin Institute for Advanced Studies, Geophysics Section, 5 Merrion Square, Dublin, Ireland, vrath@cp.dias.ie

<sup>8</sup>Departamento de Ciencias de la Tierra Sólida, Instituto Geofísico del Perú, Arequipa-Perú, yalvarez@igp.gob.pe

---

#### SUMMARY

The dehydration of the oceanic slab generates fluids that ascend through the continental crust, lowering the partial melting point. This process forms magmatic fluids that migrate and play a key role in controlling the formation of volcanoes in the subduction arc. Understanding the factors that influence magma ascent and determining its storage depth is crucial for evaluating volcanic hazards. Misti Volcano (5820 m.a.s.l), situated in the central volcanic arc of the Andes Mountain range, is a stratovolcano located only 17 km from the city of Arequipa (in southern Peru), which has a population of nearly 1 million inhabitants. The volcanic history reveals that the primary products of the most recent eruption (A.D. 1440-1470) showcase a subtle andesitic evolution with the presence of a few rhyolites, diverging from previous eruptive outcomes (dacite and andesite), events of which occurred since approximately 833 ka. Therefore, there is a strongly suggested discernible shift in the physical conditions within the magmatic reservoir. In this study, we evaluated 30 broadband magnetotelluric (MT) soundings distributed around Misti volcano to investigate its internal magmatic and hydrothermal system, which are largely unknown. We constructed a resistive model through 3D inversion of MT data, covering a range from 0.001 to 1000 s. The preferred model evidences a thin conductive layer of  $< 10 \Omega\text{m}$ , extending laterally beneath the volcanic edifice, interpreted as hydrothermal alteration due to hot fluid interaction with volcanic rocks. Below this layer and beneath the volcano crater, the model does not exhibit high conductive anomalies, typically associated with partial melting and/or magmatic saline deposits. Instead, the model reveals a slight conductivity ( $\sim 30 \Omega\text{m}$ ) plume surrounded by a resistivity domain (metamorphic basement), the interpretation of which is still in debate. This work marks the initial findings highlighting the active state of the volcanic system.

**Keywords:** Peru, Misti volcano, Magnetotellurics

---

EMIW2024 abstracts are distributed under the Creative Commons Attribution 4.0 Unported License. Authors retain the copyright of the abstract but grant any third party the right to use the abstract freely as long as its original authors and citation details are identified.

To view a copy of this license, visit <https://creativecommons.org/licenses/by/4.0/>