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The Los Humeros Superhot Geothermal Resource in Mexico: Results from an Extensive Resistivity Survey

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GEMex, a joint geothermal project of a European and Mexican consortium, began in late 2016 with the purpose to develop geothermal energy in the easternmost region of the Trans-Mexican Volcanic Belt. Los Humeros superhot geothermal area, commissioned to the Comisión Federal de Electricidad (CFE), was chosen as a test site for a superhot geothermal system. Extensive geological, geochemical, and geophysical studies were carried out to gain a better knowledge of the subsurface physical conditions.

The resistivity survey was planned using results from previous work that had been carried out in the area, i.e., an existing resistivity model and geological maps. The resistivity campaign consisted of 122 co-located magnetotelluric (MT) and transient electromagnetic (TEM) measurements made in 2017 and 2018 through a joint effort by the European and Mexican partners. Geoelectrical strike analysis of the MT data was carried out and the results are in agreement with the main geological features of the area, adding to the tectonic information at depth in Los Humeros.

The co-located TEM and MT soundings were jointly inverted in one-dimension, where the TEM data were used to correct the MT data for static shift. Along with the results from the one-dimension inversion we present preliminary results of a 3D inversion performed on the full impedance tensor of the MT data corrected for static shifts, using different initial models. Two inversion codes were applied for comparison, the WSINV3DMT code was run in Europe and the ModEM code in Mexico.

The resistivity model has been compared with the main geological structures in the area revealing the location of a geothermal significance. Interpretation with other geoscientific results, such as gravity, passive and active seismics and geology, is ongoing within the GEMex project.

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