

A multidisciplinary approach for the characterisation of fault zones in geothermal areas in central Mexico

Cesare Comina, Anna Maria Ferrero, Giuseppe Mandrone, and Sergio Vinciguerra
University of Turin, Earth Sciences, Turin, Italy (sergiocarmelo.vinciguerra@unito.it)

There are more than 500 geothermal areas in the Trans-Mexican Volcanic Belt of central Mexico. Of these, two are presently object of a transnational project between EU and Mexico (GEMex): Acozulco, where there is already a commercial exploitation, and Los Humeros, at present not developed yet.

The GEMex project aims to improve the resource assessment and the reservoir characterization using novel geophysical and geological methods and interpretations. One of the main issues controlling the geothermal system is the presence of pervasive fracture systems affecting the carbonatic basements underlying the volcanic complex (basalts and andesites). We propose the characterization of rock masses (rock and fractures) using a multiscale analysis, from the field to the outcrop up to the micro scale integrating a number of techniques.

In detail, the University of Torino unit will take care of:

- 1) Technical field studies aimed to the characterization of the mechanical transitions throughout brittle deformation zones, from the intact rock, to the damage zone to the shear/slip zone; moreover, key geophysical parameters (seismic and electrical properties) will be measured;
- 2) Petrophysical and minero-petrographic detailed studies on representative samples will be performed at room temperature; verification of the mechanical properties of the samples subjected to cycles of heating up to the temperatures of the reservoir (> 400 °C) will be done; measurements of the geophysical properties of the samples will be done in comparison with the measures in place.
- 3) Numerical modeling to estimate the petrophysical, geophysical and geomechanical properties of the rock mass under the P and T conditions of the reservoir (i.e. using Comsol, VGeST, UDEC, 3DEC, ...).

Detailed geological field studies and photogrammetry/laser scanner imaging of studied outcrops are supposed to be available soon: multiscale analysis will benefit from these new data. Results will be shared between EU and Mexican partners to improve the general model of these two geothermal fields.