



**HAL**  
open science

## Interdisciplinary and shared 3D geomodels of the Los Humeros and Acoculco geothermal systems (Mexico)

Philippe Calcagno, Eugenio Trumpy, Luis Carlos Gutiérrez-Negrín, Domenico Liotta

► **To cite this version:**

Philippe Calcagno, Eugenio Trumpy, Luis Carlos Gutiérrez-Negrín, Domenico Liotta. Interdisciplinary and shared 3D geomodels of the Los Humeros and Acoculco geothermal systems (Mexico). International Geological Congress 37, Aug 2024, Busan, South Korea. hal-04450713

**HAL Id: hal-04450713**

**<https://brgm.hal.science/hal-04450713v1>**

Submitted on 10 Feb 2024

**HAL** is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

## **Interdisciplinary and shared 3D geomodels of the Los Humeros and Acoculco geothermal systems (Mexico)**

Philippe Calcagno<sup>1</sup>, Eugenio Trumphy<sup>2</sup>, Luis Carlos Gutiérrez-Negrín<sup>3</sup>, Domenico Liotta<sup>2,4</sup>

<sup>1</sup>BRGM, France; <sup>2</sup>CNR, Italy; <sup>3</sup>Geoconsul, México; <sup>4</sup>Aldo Moro University, Italy

Contact e-mail: [p.calcagno@brgm.fr](mailto:p.calcagno@brgm.fr)

Keywords: Interdisciplinary integration, 3D geomodelling, geothermal exploration, Los Humeros, Acoculco.

The European-Mexican geothermal GEMex project aimed at developing non-conventional geothermal resources in the easternmost region of the Trans-Mexican Volcanic Belt. Two sites under development by the Comisión Federal de Electricidad (CFE, Mexican National Power Company) were investigated to assess possible superhot resources and to assist in developing an Enhanced Geothermal System, respectively in Los Humeros and Acoculco (Mexico).

In Los Humeros, geothermal energy is exploited since the 80's by CFE where dozens of wells have been drilled. The goal is to better understand the geothermal field under exploitation and to aim expected super-hot fluids to be exploited. The geothermal target is mainly located in the basement, pre-calderic rocks.

Acoculco is far less known. Only two exploratory boreholes have been drilled, showing high temperature but a lack of fluid. Here, the expectation is to develop the field using EGS techniques. According to existing studies, the geothermal target is probably located in the basement composed of calcareous, granitic, and metamorphic rocks.

On both sites, European and Mexican partners constructed 3D geomodels to describe and interpret the geothermal systems. The geomodels evolved from preliminary knowledge to the extensive integration of geological, geophysical and geochemistry data further acquired. European-Mexican teams developed the characteristics of the modelling in a "Knowledge and Data Sharing - Modelling - Validation" cycle. The construction of the geomodels was performed in a collaborative and interdisciplinary way to enable a consensual interpretation and representation among the several experts of the geoscientific disciplines involved in the process.

The outcome— consists in four and five geomodels, dedicated to Los Humeros and Acoculco sites, respectively. These were developed at various scales depending on the needs of the investigations. The 3D geomodels were used by partners during the course of the project as input for computations and simulations based on the geometry of the geological structures. In addition, the geomodels are shared in open access media\* for further use and evolution beyond the project.

The collaborative and interdisciplinary work to produce the geomodels benefited from many European and Mexican scientists. Authors want to acknowledge the contribution of all the experts of the H2020 GEMex project who participated to some degree in the discussion and revision of the several stages of the Los Humeros and Acoculco geomodels.

The authors wish to thank the technical experts from CFE for their assistance and support. This work presents results of the GEMex Project, funded by the European Union's Horizon 2020 research and innovation programme under grant agreement No. 727550, and by the Mexican Energy Sustainability Fund CONACYT- SENER, Project 2015-04-268074. More information is available on the GEMex Website: <http://www.gemex-h2020.eu>.

\*Calcagno, P., Trumpy, E., Gutiérrez-Negrín, L.C. *et al.* A collection of 3D geomodels of the Los Humeros and Acoculco geothermal systems (Mexico). *Sci Data* **9**, 280 (2022). <https://doi.org/10.1038/s41597-022-01327-0>