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REGIONAL STRUCTURES IN THE LOS HUMEROS GEOTHERMAL SYSTEM: INSIGHTS FOR SUPER-HOT GEOTHERMAL FLUIDS LOCATION

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The Los Humeros geothermal field is presently located inside a wide, almost circular caldera structure, collapsed during late Pliocene-Holocene (≤ 2.8 Ma). Geothermal exploration is targeted to exploitation of hot- to super-hot geothermal fluids, in order to improve the production of electricity.

With these aims, in order to investigate the deep part of the present active Los Humeros geothermal system, we have integrated information from the exhumed, fossil, Las Minas area (considered analogue of the deep part of the Los Humeros geothermal field) with gravity data and satellite images and digital topography. These latter finalized to the study of the monogenetic volcanoes distribution and other volcanic structures related to tectonics.

The studies from Las Minas area suggest that hot to super-hot fluids are mostly trapped at the intersection between NNW-SSE and NE-SW striking fault-damage zones affecting the Jurassic-Cretaceous calcareous volcanic basement. Such fluids, as inferred by fluid inclusions studies in quartz-hydrothermal minerals, display a clear magmatic imprinting, being strictly related to the cooling process of magma patches.

The analysis of gravity data indicates two main regional trends, along which clear and sharp changes of densities are recorded. These trends are NNW-SSE and NE-SW oriented, respectively. Some of them are delimiting the Los Humeros volcanic area, thus suggesting that the volcano location was controlled by pre-existing regional structures.

The satellite image analysis and digital topography, focused on the alignment of monogenic volcanoes, again indicated the NNW-SSE and NE-SW regional structures as the most significant for channeling magmatic fluids from depth, highlighting the control of crustal fractures on volcanism.

With this background, we suggest that the investigation of hot to super-hot geothermal fluids should be addressed to the intersection between the two fault regional systems, at depth compatible with the basement location.

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