

The hottest thermal spring in Europe (82°C, Chaudes-Aigues, French Massif Central) and its geothermal potential : a multidisciplinary approach.

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As potential new geothermal reservoirs, crustal fault zones remain largely unexplored and unexploited. The springs cluster of Chaudes-Aigues (French Massif Central) is developed on a microgranite dykes network emplaced in the gneissic basement. The cluster is also at the intersection of three large Variscan fault systems which form a Y-shape structure. Besides hosting the hottest spring in Europe (namely, the Par spring) the village counts 27 hot springs whose temperatures range between 25 and 82°C. According to previous studies, two flow pathways would coexist, one around 5 km depth and the other one at 2 km depth, but the functioning of the deep system remains unknown. All these elements suggest substantial geothermal potential at depth and the area represents an ideal natural laboratory for exploring this type of geothermal reservoirs. Considering a multidisciplinary approach using new microstructural data integrated into a 2D dynamic numerical model, the results of several parametric studies indicate a convective system involving a geothermal reservoir of about 90 km³ between 2 and 5 km depth. Nevertheless, our results will be completed by a dynamic 3D numerical modelling constrained by a geological model and by geochemical analyses in order to understand operating hydrogeological processes at depth.

General theme of this research : Deep Geothermal, Exploration, Fluids.

Keywords : numerical modelling, thermal spring, permeability, topography.