

THE GEOTHERMAL SYSTEM OF ROSARIO DE LA FRONTERA (SALTA PROVINCE, NW ARGENTINA) FOR THE SUSTAINABLE DEVELOPMENT OF FUTURE TOWNS: RESULTS OF C.U.I.A. PROJECT 2010 BY MEANS OF AN INTEGRATED GEOLOGICAL AND GEOPHYSICAL APPROACH

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Within the scientific framework recently proposed by C.U.I.A. (Consorzio Universitario Italiano per l'Argentina) for the development of applied researches on the Argentina territory, several research groups, belonging to Italian and Argentina Universities and Research Institutes, converged in the last year and a half on the research line devoted to the "Sustainable development of future towns". This contribution focuses on the results achieved by this collaboration among the Universities of Buenos Aires, Camerino, Jujuy, Roma Tre, Salta, Sapienza-Roma, Florence and CONICET.

The project focuses on the application of robust methodologies and the development of new ones to explore the geothermal potential of the area of Rosario de La Frontera (NW Argentina), located at the northern edge of La Candelaria Ridge, one of positively inverted structures cropping out between the provinces of Salta and Tucuman. It belongs to the Eastern Cordillera of the Andes retro-wedge.

This approach contributes to the sustainable development of the town of Rosario de La Frontera, that can be potentially based on the exploitation of medium enthalpy ($90^{\circ} < T < 150^{\circ}C$) geothermal resources for production of electricity.

The main goals of the project as a whole are to quantitatively assess the main elements constituting the geothermal system (e.g., reservoir-rock, cap-rock, heat source, recharge area, sustainability of the geothermal system).

In detail in this contribution we present results concerning:

- The assessment of the size, fracture network and permeability of the geothermal reservoir and effectiveness of its cap-rock by means of traditional structural analysis at different scales, and combined deterministic-stochastic reconstruction of the fracture network with the aid of dedicated software (2D Move);
- The assessment of the cap rock quality by means of the reconstructions of the paleo-thermal evolution of La Candelaria Ridge. This reconstruction is approached by means of 1D modeling of indicators of thermal exposure (e.g. vitrinite reflectance, clay minerals geothermometers and Th and Tm from fluid inclusions).
- The identification of the recharge areas and deep fluid flow by means of geological surveys, creation of a GIS database and geophysical investigations (namely based on audiomagnetotelluric survey).

In a companion talk, the origin of the geothermal anomaly that affects the study area by means of the reconstructions of geochemical evolution of La Candelaria Ridge will be discussed on the base of classical hydrogeological studies and hydro-geochemical and isotopic investigations on waters sampled in the sites of thermal springs.