

Geothermal energy studies in Venetian Prealps (Valle del Chiampo area, Vicenza-NE Italy)

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The PhD project aims to provide the conceptual geothermal model in the North of Vicenza region (Italy), up to 5 km depth. Currently there is no geothermal models focused on full geothermal energy projects in Northern part of Italy and this research would boost the overall knowledge on this specific topic. Conventionally, in Italy geothermal energy power projects take place only on young volcanic areas, where hydrothermal fluids and high geothermal gradients occur. In the current project, the geothermal energy exploitation is simple connected to sedimentary sequences, where the temperature might increase according to the standard geothermal gradient and concerned by a deep hydrogeological circulation and a hydro structural favorable situation. These kind of geothermal projects are going to be more and more common in Central and Northern Europe areas.

The Ph.D. research would also take an advantage on the geothermal exploration program that is going to start in this area. Indeed, this research is part of a project that plans to exploit geothermal energy in the Valle del Chiampo area, according to the geothermal explorations outcomes.

The proposed research would allow a significant improvement of the scientific knowledge regarding the geological, geophysical, hydrogeological, geochemical and – of course – geothermal aspects of this area. Moreover, the possible impact of the exploitation of geothermal energy sources in this area would play a key role in sustainable development. After the electric power exploitation, local industrial processes and a district heating project are planned by using the waste heat of geothermal fluids. Reduction of carbon dioxide emissions and district heating should also part of the advantages of the geothermal energy exploitation package.

Remote sensing analyses, by means of aerial and satellite images, and field geological survey will compose a significant role in preliminary surveying for geothermal resources, especially regarding the geostructural features. Several field activities will take place in order to support the investigations conducted by a specialized company, regarding geophysical surveys (magnetotelluric methods, gravimetry, etc.) and geochemical (geothermometers and isotopes). The Geoscience Department's laboratories will allow the analysis of physical, mineralogical, petrographic and thermal parameters on rock collected samples. The project expects a stay at least 3 months of study abroad at one of the international project partners. Gathering the geothermal exploration data should drive towards the development of a 3D preliminary conceptual geological model, where all information might be integrated, compared and interpreted. The conceptual geological model will be complete and improve in order to develop a preliminary geothermal model: the analysis of the 3D geological model should support the definition of the main geothermal parameters, like thermal gradient and temperature at depth, reservoir volume, expected pressure conditions and general enthalpy assessment.

International cooperation and partnership: Several activities with international universities may be planned in New Zealand at the GNS Science University (Prof. Malcolm Grant). A special partnership will be agreed with the National Research Council (Institute of Geosciences and Earth Resources) regarding groundwater isotope analyses and geological-structural studies.

Fundings: The research activity is funded by the GEOTAMO project, which is already approved by the Department of Geosciences. Thermal, mineralogical and petro-physical measurements on rock samples are funded within the UE Cheap GSHPs project. The ex-60% grants would cover eventual additional costs.