Geological reconstruction of the Romagna and Ferrara folds area to evaluate its geothermal potential

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Geothermal energy is recognised as a sustainable and environmentally friendly solution for power generation and district heating/cooling, offering uninterrupted availability throughout the year and day, with significant development prospects worldwide. However, the exploitation of deep geothermal reservoirs requires thorough a detailed reservoir characterisation.

The InGEO project ("*Innovation in GEOthermal resources and reserves potential assessment for the decarbonisation of power/thermal sectors*") aims to develop an innovative exploration workflow that integrates geological/geophysical data and other direct and indirect information, in order to characterize the reservoir rocks and the overlying sedimentary cover.

To this aim, we chose as a target area the Romagna and Ferrara folds, where a thermal anomaly has been identified and attributed to the thermal convection in deep-seated Mesozoic carbonate units (Pasquale et al., 2013; Pasquale et al., 2014). The Romagna and Ferrara folds represent the outer deformation front of the Northern Apennines thrust and fold belt. They are partly buried under thin (about 200 m) Plio-Pleistocene terrigenous deposits of the Po plain. The Ferrara folds are composed of the Mesozoic carbonate sequence, which has been significantly deformed during the Neogene and Quaternary tectonics, while the Romagna folds are composed of the Tertiary clastic formations overlying the Mesozoic limestones (Montone & Mariucci, 1999).

In this study we present the first results of the analyses of the geological data (e.g., seismic lines, stratigraphic columns, well reports and logs, borehole tests and measurements, gravity anomalies) collected from VIDEPI (https://www.videpi.com/videpi/videpi.asp) and GEOTHOPICA (https://geothopica.igg.cnr.it/index.php/it/) database, in terms of the depth of the main geological units. These results will be compared with those already published in previous studies (Livani et al., 2023), in order to implement a consistent geological model of the study area. The last one will be further supplemented with interpretations from thermophysical experiments on rock samples.

The geological model will contribute to the development of an open-source and web-based GIS tool and will be the main input for calculating the area's geothermal potential, improving business planning for the exploitation of deep geothermal resources in Italy.

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geothermal reservoir, geological modelling, InGEO project.

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