INTEGRATED GEOLOGICAL MODELLING FOR ASSESSING GEOTHERMAL POTENTIAL IN THE ROMAGNA AND FERRARA FOLDS

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Geothermal energy is recognised as a sustainable and environmentally friendly solution for power generation and district heating/cooling. It provides continuous availability year-round and day-long, with considerable potential for development worldwide. However, the exploitation of deep geothermal reservoirs requires thorough and 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 characterise the reservoir rocks and the overlying sedimentary cover. InGEO is a PRIN 2022 PNRR Project and has received funding from the European Union, Next Generation EU.

Our target area includes the Romagna and Ferrara folds, where a thermal anomaly has been identified and attributed to thermal convection in deep-seated Mesozoic carbonate units. The Romagna and Ferrara folds represent the outer deformation front of the Northern Apennines thrust and fold belt, buried beneath the Plio–Pleistocene terrigenous deposits of the Po plain. The Ferrara folds consist of a Mesozoic carbonate sequence that was strongly deformed during Neogene and Quaternary tectonics, while the Romagna folds consist of Tertiary clastic formations overlying Mesozoic limestones.

We collect, digitise and analyse data from over 200 seismic surveys from the VIDEPI database, 250 deep (>1500 m) boreholes (CNR database) and 160 borehole logs (sonic and lithological logs). We use this database, to construct a 3D geological model, needed to evaluate the geothermal potential of the reservoir. The model is based on the identification of main lithological unconformities, through the interpretation of seismic reflection lines constrained by well-stratigraphic data. The obtained results will be further complemented by those derived from thermophysical experiments carried out on samples representative of each main geological unit.

This geological model will contribute to the development of an open-source web-based GIS tool and will serve as the main input for the calculation of the geothermal potential of the area, thus improving the business planning for the exploitation of deep geothermal resources in Italy.

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