Geological, geophysical and petrophysical data integration for evaluating the geothermal energy potential of the Romagna and Ferrara folds (RFF), Eastern Po-plain

R. Basant [1], V. Cortassa [1] , M. Tesauro [1-2], G. Gola [3] , T. Nanni [3] , A. Galgaro [4] , A. Manzella [3]

1. Dipartimento di Matematica, Informatica e Geoscienze, Università di Trieste.
2. Department of Earth Sciences, Utrecht University.
3. Istituto di Geoscienze e Georisorse, CNR.
4. Dipartimento di Geoscienze, Università di Padova.

The thermal energy stored within the earth's crust is a renewable source of energy that can be harnessed to help achieve the ambitious commitment of the European Green Deal, which targets a 55 % reduction in CO_2 by 2030. Development of this resource, however, requires a proper assessment of the geothermal prospect to reduce the risks associated with drilling unsuccessful, costly geothermal wells. The InGEO (Innovation in GEOthermal resources and reserves potential assessment for the decarbonization of power/thermal sectors, www.ingeo.cnr.it) project seeks to develop an innovative exploration workflow for combining muti-parameter datasets. It focuses on exploring the geothermal potential of the sector of the Northern Apennine buried - structures of the Romagna and Ferrara Folds (RFF), where a thermal anomaly attributable to deep fluid circulation within the deep-seated Mesozoic carbonate sequences was identified. We integrate geophysical, geological and petrophysical data for evaluating the subsurface thermal regime in the RFF region. First, we utilized previous seismic tomography models to develop a consistent 3D seismic model, by applying a clustering algorithm. The seismic models were next inverted to estimate the spatial variation of the thermal regime. Using geological (well logs, seismic lines, stratigraphic columns), petrophysical (thermal and acoustic measurements on rock samples of representative units of the RFF region) and thermal measurements from boreholes as constraints, we perform a thermophysical characterization of the area, to evaluate the RFF's geothermal potential in the next stage.