# Investigation of deep thermal state in buried Romagna and Ferrara fold sector

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With the massive expansion of renewable energy demand, the InGEO Project (Innovation in geothermal resources and reserve potential assessment for the decarbonization of power/thermal sectors) aims at developing and testing an innovative, multidisciplinary exploration workflow to assess the geothermal potential for power generation and direct uses of thermal energy. As case study, the InGEO Project selected the buried Romagna and Ferrara folds sector (Eastern Po Plain, Italy).

The essential parameters for evaluating geothermal resources, in terms of spatial and vertical distribution, are the undisturbed formation temperatures and lithostratigraphic information from deep hydrocarbon and geothermal exploratory wells. In this context, data collection and critical review of the available temperature data are fundamental activities. Different catalogues are available and freely accessible: the Italian National Geothermal Database (Trumpy & Manzella, 2017), the Global Heat Flow Database (GHFD), temperature data from bibliographic sources (Agip, 1977 and following updates), technical reports (consultable from the ViDEPI project website https://www.videpi.com), and scientific studies (Pasquale et al., 2008). Temperature data can be divided into two main categories: Drill Stem Test (DST) and Bottom Hole Temperature (BHT). DST data can be considered representative of the undisturbed thermal regime. Conversely, BHT data usually underestimate the real formation temperature. In this study, we applied different methods to correct the raw BHT data. Time temperature series were corrected with the Horner method (Horner, 1951). In case the circulation time was unknown, we estimated it using the relation proposed by Pasquale et al. (2008).

Following the correction of temperature data, thermal gradient maps can be produced using this dataset. These maps can be spatially correlated with known geological features, such as folds, faults and lithological boundaries, providing valuable insights into subsurface heat flow dynamics. Additionally, thermal modeling will be applied to further refine the interpretation and simulate subsurface temperature distribution, enabling identification of thermally relevant areas to conduce site-specific analyses for geothermal resource assessment.

In conclusion, performing data quality control and applying a robust correction method are essential steps to produce a reliable dataset for assessing the subsurface thermal field and supporting geothermal potential studies through thermal modeling.

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