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A multidisciplinary study for geothermal energy sources identification in the Baia Mare area (Romania)

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Geothermal energy is known as a renewable source that has little effect on environment, since no burning process is involved in the producing of thermal and electric energy. Geothermal water is considered an environmentally friendly energy source which is valuable especially in polluted areas. Our study area, the Baia Mare region, is located in the northwestern part of Romania, a region known as one of the most polluted environment in Romania due to its long-lasting local mining and metallurgical activities. Additional quantities of CO₂ emissions resulted from the use of various, relatively cheap, heating sources by the local population. The main goals of our study are to evaluate the subsurface geothermal potential of the Baia Mare area and to identify promising geothermal exploitation sites. Heat flow values in this area are among the highest in Romania. We therefore plan to combine geological, geophysical, geochemical and hydrogeological data (geo-data) in order to provide a geoscientific solution for increasing the geothermal energy production in this part of Romania. Our research program contains surface geological mapping, geophysical surveys (active and passive seismic, magnetic, magnetotelluric and geothermal), geochemical analysis, hydrogeological surveys, modeling of geo-data and joint interpretation of geo-data. An initial 3D geothermal model will be built using existent geo-data. This model will help us to identify subsurface structures which show high potential for geothermal exploration. Interpretation of existent active seismic data collected during previous hydrocarbon exploration will provide information about the subsurface structural geology. The results of the new interpretation will be compared and correlated with the existent geological maps and sections for the study area. The magnetic data available in the public domain will be used to identify subsurface igneous bodies. The temperature data available from previous measurements will be used to build temperature-versus-depth distributions. These results will be analysed within a larger geodynamic framework. A pilot site will be selected after the analysis of the initial 3D geothermal model on which we plan to collect and record new geo-data. Data processing, inversion and modeling will be performed in order to create the final geothermal model with locations of promising exploitation wells.