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Chicco J.,[a] Invernizzi C.,[b] Marziali E.[c]

[a, b] *School of Science and Technology, Geology Division, University of Camerino, Via Gentile III da Varano I, 62032 Camerino (MC);e-mail: jessica.chicco@unicam.it;chiara.invernizzi@unicam.it*

[c] *Gruppo Ergon Bluenergy, Via dell'Industria, 62010 Loc. Passo di Treia (MC); e-mail: marziali@ergon.biz*

It is well known that geothermal energy is a clean and sustainable source of energy, directly coming from the Earth. Geothermal energy resources range from hot water and hot rock found a few meters beneath the Earth's surface and down even deeper to the extremely high temperatures. Common uses of geothermal energy include direct use systems providing direct heat for residential, industrial and commercial purposes. This has many advantages both for environment and for heating bill, because it is much less expensive than using traditional fuels. In this regard, the aim of the PhD project in collaboration with Ergon Bluenergy Group, is to increase the knowledge of the subsoil of Marche Region[1] through its geological, hydrogeological and thermal[3] characterization. This study, is of primary importance to understand the correct depth of well drilling to extract the necessary amount of heat for buildings energy need and to perform low enthalpy geothermal plants, linked to use of geothermal probes and heat pumps at a specific depth of investigation (until 400 m a.s.l.). Our preliminary studies focused on the connections of three important parameters such as lithology, depth and thermal conductivity, useful to find T values at depth and essentials to create a thermal modelling of the subsoil. Data from well profiles drilled to find hydrocarbon in Marche Region[2] show that in Jesi, Macerata and Fano surroundings, at depths ranging between 100 and 308,50 m a.s.l., variable T values corresponds to variable lithologies (from 20°C to 28°C for clay lithologies and of 34°C for sandy clay lithologies). This means that more porous and permeable lithologies, particularly in presence of water circulation in sediments at the same depths, show a strong increase of T values. Another important factor to consider is thermal conductivity that notably increases from impermeable (e.g. clay) to permeable lithologies. A significant example of this could be the Fossombrone area[4], where calcareous sediments at shallow depths probably indicate higher T values than those seen in Jesi, Macerata and Fano surroundings (with clay and sandy clay lithologies) at the same depths. This is supposed on the basis of higher thermal conductivity values of the limestones with respect to clays.

References:

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