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Abstract

Geothermal Energy in Algeria and the Contribution of Geophysics †

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Geothermal energy is one of the cleanest, most accessible and cheapest alternative energies in the whole world. It is a renewable energy designating an inexhaustible source at a human scale that can be renewed (energy culture). Geothermal energy comes from the disintegration of radioactive elements present in rocks and the Earth's core. These generate heat flow to the surface. This heat increases with depth on average by 30 °C/km [1]. In Algeria, this gradient varies from 25 °C/km in the north to 60 °C/km in the south [2]. In 2006, Madlnés published a world map showing the geothermal potential on all continental plates. North Africa has geothermal potential, which explains why many geothermal studies have been carried out in the north of Algeria (Figure 1). Figure 2 shows the geothermal areas in Algeria where the reservoir rocks are the Jurassic limestone in the north and Albian sandstone in the south. This renewable energy is used in multiple areas: fish farming, greenhouse heating or district heat networks, balneotherapy, and electricity production. Currently, only a tiny fraction of the world's geothermal resources are used. Certain technological improvements and a better recognition of the true value of geothermal energy could lead to a strong development of this clean and reliable energy for the majority of the countries of the world. Algeria, which has about 200 thermal springs, has the possibility of being among the leaders in this field. In this presentation, we cite the characteristics of geothermal energy, the Algerian thermal springs and the possibilities of their uses according to the temperatures using the Lindal diagram, as well as the role of geophysics or the Earth's physics in the exploration of geothermal sources before drilling where most of the techniques are the same as those used in petroleum exploration and reservoir characterization exploiting new technological development such as artificial intelligence from seismic and well-logs data [3].

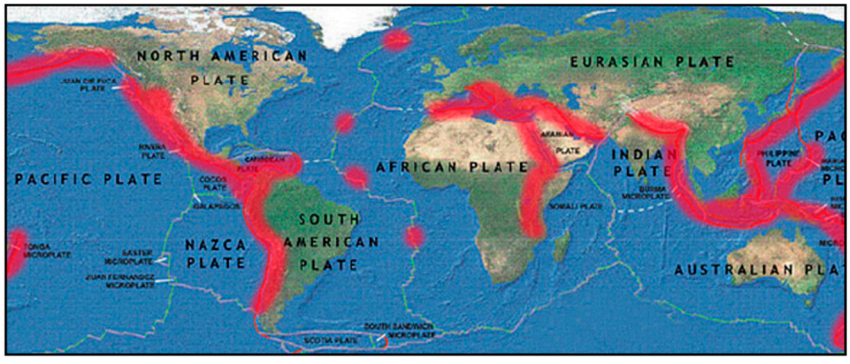

Figure 1. Continental plates and high geothermal potential areas in red [4].

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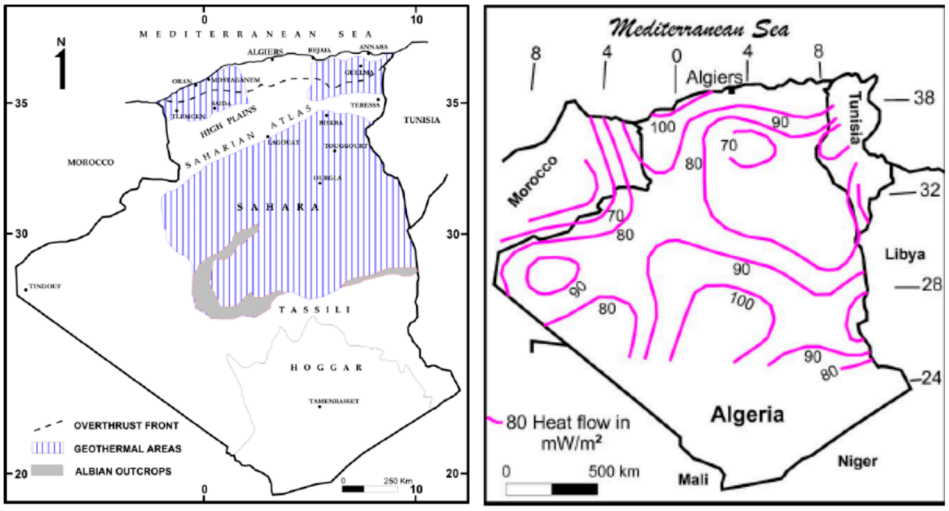

Figure 2. Main Algerian geothermal areas [5], on the left side. Heat flow map of Algeria [2].

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