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GEOHERMAL TRAINING PROGRAMME



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## **GEOHERMAL EXPLORATION AND RESULTS IN THE REPUBLIC OF DJIBOUTI**

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### **ABSTRACT**

Owing to an exceptional geodynamic situation, the Afar Depression, an emerged triple junction of the Red Sea, Gulf of Aden and East African rifts, where volcanic and tectonic activity occurs since 30 My, the Republic of Djibouti (23000 km<sup>2</sup>) is characterized by numerous current and past hydrothermal activities. Schematically, the country can be divided in to sectors, westward regions composed of plateaus and plains formed since 3.4 My and Eastward regions elevated and mountaineous lands separated by the Gulf of Tadjourah ridge. Most of the current hydrothermal activities are located in specific zones of the recent western regions formed by the opening of the Afar Depression and the Danakil plate anticlockwise movement. Few other current and past hydrothermal activities are found in the Eastern part around the Gulf of Tadjourah ridge. Already in the early geological explorations these hydrothermal manifestations were described as a result of potential geothermal resources.

Surface explorations based essentially upon geological, tectonic and geochemical studies have identified the geothermal provinces of the country. All of the surface manifestations are fracture controled and occur within the recent volcanic and sedimentary rocks or at the contact of recent and old formations. As a result, Asal rift, Nord Goubhet Hanle and Gaggade areas were determined as priority sites for geothermal explorations. Therefore, gradient wells and geophysical prospections were undertaken at different stages to assess geothermal reservoirs. Deep drilling programmes revealed a high enthalpy reservoir in Asal rift zone and a low enthalpy reservoir at medium depth. Results in Hanle plain demonstrated low temperatures caused by a high underground fresh water flux.

Although potential geothermal reservoirs have been recognized in the Republic of Djibouti, the power generation from geothermal energy is still to be achieved. The next step for the geothermal development programme is the regional ARGEO project. The first phase for this project is to complete the exploration in Asal rift area and begin the power generation. The next phases will focus on other geothermal sites as Obock and Gaggade first.