

SUBSURFACE HYDRO-GEOTHERMICS GRADIENT DISTRIBUTION ON THE NORTHEASTERN AFRICAN MEDITERRANEAN MARGIN (TUNISIA)

Chulli Badiaa ^{1*}, Bedir Mourad ², Mejri Fathia ³ et Ben Dhia Hamed ⁴

¹ Office national des mines, Charguia, Tunisia

² INRS, Hammam Lif, Tunisia - Mourad.Bedir@inrst.rnrt.tn

³ Tunisian Enterprise of Petroleum Activities, Tunis, Tunisia

⁴ National School of Engineers of Sfax, Tunisia

Abstract

The geographical area which concerned by the geothermal map is comprised between the parallels 33° and 37° and the meridians 8° and 12°, it covers the entire Eastern Tunisia domain (on-shore and off-shore). The region corresponds the eastern margin of the Sahel and the Pelagian sea that is characterized by many sebkhas and a wide plains where appear on the out crops Miocene, Pliocene and Quaternary deposits. This margin is indeed structured according to deep strike-slip faults corridors, bounding a grabens basins and Mesozoic and Cenozoic platforms blocks. The values of the geothermal degree map derive from treatment, according to an appropriate methodology, data's of temperature taken from oil well which cover the region.

Keywords : Geothermics. Tectonics. Hydrodynamism. Magmatism. Hydrocarbon.

Introduction

The establishment of the geothermal degree map reveals, for all region, a cardinal importance in measure that allows the spot of zones which have a positive geothermics anomalies (high degree until the average value is about 3°C/100m) (1, 2) and the other which have a negative geothermics anomalies (degree less than 3°C/100m). The knowledge of these zones constitutes a good guide for the petroleum engineering by the following the organic matter maturation, and for the hot water research.

Tectonic framework

At the surface, the eastern Tunisia is characterized by the flat light physiography and sebkhas. In subsurface, the structures of eastern Tunisia had been detected by many seismic and gravity geophysical studies (3, 4, 5). These authors highlight the deep structuring by reaching the Triassic horizons affected specially by transfer faults oriented N90-110 ; N130-140 and 160-170 injected by Mesozoic magmatic rocks (6). The structure organisation associated to the fault corridors is marked by (3) (Fig.1) :

- en echelon folded structures along E-W and N-S corridors.
- platform structures, located between the tectonic corridors
- grabens structures located in side some fault corridors
- triassic dome structures existing along the faults of the western domain of the region.

Geothermal degree map

We note that the major area are characterized by a geothermal degree average higher than 4°C . Only four zones show a lower degrees with a negative anomaly :

- SW sector of the gulf of Gabes
- N-S Axis band laying out
- NW sector of Hammamet Gulf
- NE-SW bands of the tectonic corridors of Zeramidine-El Jem-Kerkennah

For these zones, the hydrodynamism is the important factor of reducing the geothermal degree (1), obviously, these zones correspond of recharging zones from surface water, so cold, of deep aquifers. At Jebéniana block, we measure in the side of the fault corridor of Mahdia-Ksour Essaf geothermal degrees upper than 5°C/1000m (2). This corridor is injected by Cretaceous basic rocks and constitutes a drain of the underground heat.

Conclusions

We retain that the distribution of hydro-geothermal degrees on the eastern margin of Tunisia is double influenced by the deep structuring of transfer fault corridors, the magmatisms of sedimentary basins, and by the hydrodynamism of aquifers across these basins. We remark a relationship between the oil field sites of this margin and the distribution of the geothermal gradient. These results can help to guide petroleum exploration and hot water research.

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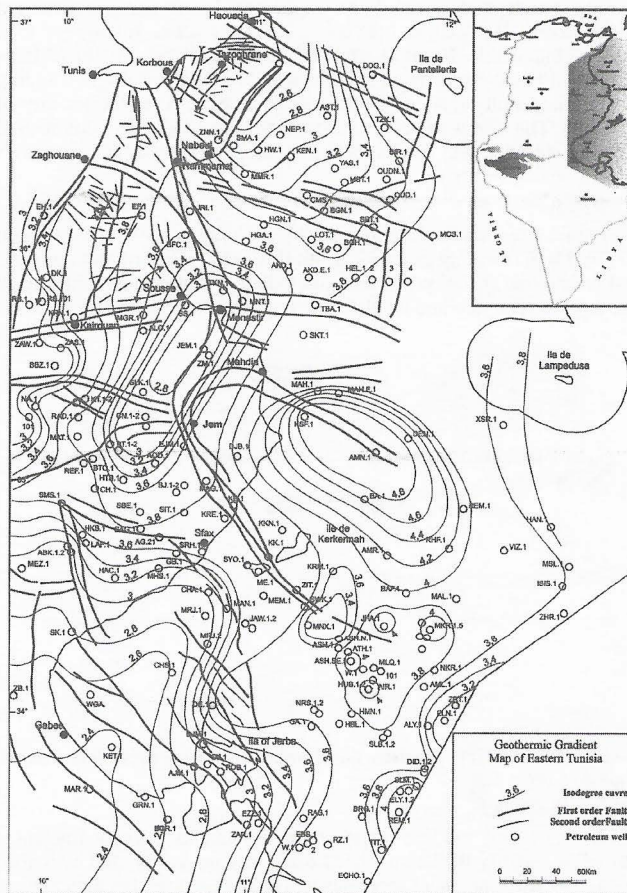


Figure 1. Geothermic gradient map of Eastern Tunisia

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