SEDIMENTARY COVER STRUCTURING AND GEODYNAMIC MECHANISMS OF THE NORTH-AFRICAN EASTERN MARGIN OF TUNISIA

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Abstract

The Eastern margin of Tunisia constitutes a transition area between the most western and eastern Mediterranean active margins. Subsurface geophysical studies based on petroleum well, reflection seismic and gravimetric data had highlighted the deep tectonic structuring and the related Meso-Cenozoïc sedimentary cover basin evolution. The geodynamic reconstructions show an inherited deep tectonic mosaic of assimilated micro-plates blocks and ramified fault corridors acting as a continue space-time differential transform mechanisms. Related space-time basin migration mechanisms constitutes an original phenomena that merits to be presented here.

Tectonic cover structuring

Fault corridors

The eastern margin of Tunisia is affected by tectonic corridors represented by first order kilometric deep-seated strike-slip master flower fault trending north-south and east-west to west-north-west-east-south-east (1,2,3) and second order and third order ramified faults oriented northeast-southwest and/or northwest-southeast (Fig.1).These faults are marked by deep gravimetric and seismic discontinuities (2,3,4,5). The Meso-Cenozoic alkaline magmatic rocks (6) and the Hydro-geothermic gradient anomalies (7) follow the fault system.

Outside and inside fault corridor basins

Platform blocks

The fault corridors separate deca-kilometric quadratic rigid blocks of superposed deviated and tilted Mesozoic and Cenozoic platforms (1,2). The platform blocks have a differential subsidence rates that are marked by the sedimentary unconformities, sequence deposit distribution, environment and thickness variations highlighted in the petroleum well log correlations and in the seismic horizons (1,2).

Graben structures

Graben and half-graben Mesozoic and Cenozoic basin structures took place inside the fault corridors by a space-time superposition (1,2). The opening system of the grabens is induced by transtensive fault movements along east-west and north-south corridors (1,2). They are marked by the inversion subsidence mechanisms and the space-time sealing by platform structures.

Fold and syncline structures

They affect the sedimentary cover with low or high amplitude angles and are placed inside and/or outside the fault corridors. Their formation start at the Upper Cretaceous Alpine compressions and are accentuated by the successively Pyrrenean and Atlassic orogenies (1,2). These folds are disposed according a strike-slip en echelon drag folds.

Geodynamics mechanisms

The reactivation of the inherited fault system since the Triassic extensive Tethyan rifting until the Neogene Atlassic compressions (1,2,3) had been characterized by a differential and space-time transtensive and transpressive movements accompanied by Mesozoic and Cenozoic magmatic basaltic rocks (6), Triassic evaporites and salts halokinesis and Neogene claykinesis (1,2). This kinematics had induced block platform and basin migration and inversion marked by the sedimentary and stratigraphic unconformities and the superposition of Mesozoic and Cenozoic paleoenvironments and paleogeographies (1,2). These records are shown by sequence deposit configurations of Downlap prograding and onlap/toplap aggrading and retrograding sequences along the fault corridors border basins and platforms. Time-space rotational clockwise and anti-clockwise migration and blockage characterize the basin subsidence (1,2,3). The tectonic deep structuring and the geodynamic mechanisms of the sedimentary cover can reveal a deep crustal organization of the lithosphere discontinuities witch can be recorded by the transfer fault ramified corridors bounded by lithosphere micro-plate platform blocks (1).

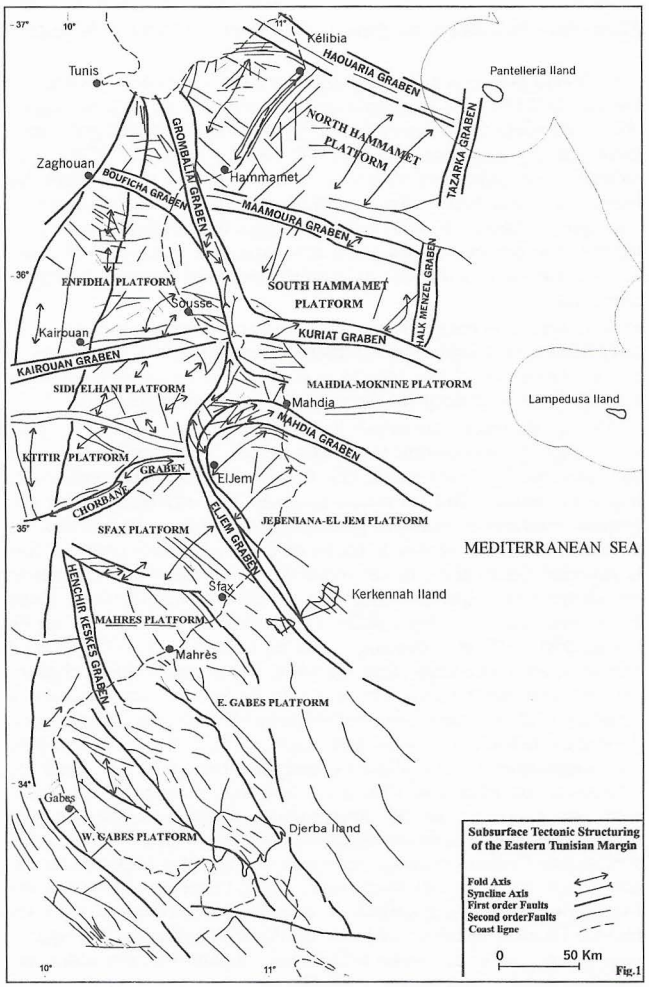

Fig. 1. Subsurface Tectonic Structuring of the Eastern Tunisian margins

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