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STRUCTURAL INHERITANCE AND TECTONO-SEDIMENTARY ANALYSIS IN AMDOUN ZONE, NORTH TUNISIA

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A structural study was carried out in Amdoun zone, in Northern Tunisia (Fig. 1), based on geological mapping, structures identification and tectono-sedimentary analysis (Fig. 2).

The North western Tunisia is characterised by complex agencement of the structures with overthrusts and thrusts and Triassic diapirs pinching out the entire lithostatigraphic column.

The Amdoun area, was interpreted by Rouvier (1977), as an overthrust structure, with two main units: the youngest one called 'Numidian Unif' (Unité numidienne) which is Oligo-Early Miocene in age, composed of 3000 m of flyschoid and turbiditic siliciclastics deposits.

This unit overlies a Paleocene-Early Eocene dark shales and limestones called 'Kasseb Unit' (Unité Kasseb).

In details the outcrops in Kasseb area are composed of the following formations:

- the Kef Formation is shaly and Late Santonian-Lower Campanian in age.
- the Abiod Formation, is Late Campanian-Early Maastrichtian in age, containing two limestone terms separated by a shaly term.
- the EL Haria Formation is a mainly dark clayey and Maastrichtian-Paleocene in age.
- the Bou Dabbous Formation is composed of black limestones rich in organic material. It is Ypresian in age.
- the Souar Formation is mainly clayey and Lutetian-Priabonian in age.
- the Numidian flysch formation, composed of turbiditic sequences.
- the Bejaoua formation contains alternations of glauconitic sandstones and clay attributed to middle Miocene.

There is a regional unconformity between this late formation and the oldest cenozoic deposit (Fig. 2).

During the late Cretaceous and the Paleocene, the Kasseb area evolves in a half graben dipping toward NE. Then a high area located at Ain Bida defines a shoal (Fig. 3). An adjacent deep environment toward the NE is located in Jebel Ben Amara and Jebel Sabbah. During this period the subsidence gradient increases from SW to NE (Fig. 3). Such a configuration had taken place by stretching regime with ENE extension underlined by 160 N normal faults.

The Ypresian limestones overlie the Paleocene clays, starting with an intraformational conglomeratic level, composed of glauconite, phosphorite and shell debris.

Four types of Ypresian facies are recognised (Fig. 2): a Globigerinids facies with thick series (up to 260m), a Nummulitic facies with less thick series (40m), a subrecifal facies rich in Corals with less thick series of 20m, and a mixed facies with both Globigerinids and Coral where the series are 60m thick. The latter developed between the graben (located at the SW of the area) and the shoal toward the NE at Oued Maaden zone (Fig. 2). The transition between the shoal and graben is controlled by 090 N facies faults (Fig. 2).

Elsewhere in Northern Tunisia (Dorsale range), a compressive tectonic phase occurred between Paleocene and Ypresian, which had created extended synclines and anticlines

(Turki, 1985). Especially in Amdoun area the Ypresian limestones seals similar structures with pelagic deposits in the Kasseb syncline. On the opposite side a Nummulitic facies was deposited on the western limb of Sabbah anticline (Fig. 2 and Fig. 4).

During Ypresian, this paleo-structuration was also controlled by E-W and NE-SW faults allowing a transtensive deformation. This structuration is also responsible of the inversion of subsidence gradient during Eocene, with Ypresian gradient increasing toward the SW.

During Lutetian-Middle Miocene period, the sedimentation was controlled by E-W and 065 N faults, with slumped blocks and olistoliths in a context of elongation or transtension.

At the Late Miocene, the major compressive phase occurred in Tunisia with great stress striking NW-SE (Fig. 5).

This tectonic phase generated reactivation of pre-existent faults. Tectonic inversion generated structural inversion, which is expressed by limited thrusting, where thick Cenozoic formations overlie thin Cenozoic formations (Fig. 4).

Besides, the N-S fault had deviated the general field of the NW-SE compressive stress, creating a local E-W stress field responsible of the N-S trending axis folds of the region (Fig. 5).

These faults are considered as deep and old faults cutting down the basement and inherited from the Jurassic of the Mesogean Realm (Turki, 1985).

These structural patterns are not conform with those proposed by Rouvier (1977) where he distinguished a thrust sheet for Kasseb Unit. In this work we demonstrate that with Paleocene-Eocene deposits there was an old paleogeographic trend, which separates a platform domain shoal with subrecifal facies from a deep basin characterised by pelagic facies.

These two paleogeographic environments are separated by a normal fault facing toward the NW. During Late Miocene, the major compressive phase generates a closer displacement in the Amdoun area contrary to what is indicated by Rouvier (e-i. 20 to 30 Km).

So in this work, we demonstrate the structural inheritance and syndimentary tectonics explaining the geodynamics in Amdoun area in Northern Tunisia.

Ey^p Subrecifal facies

Ey^m mixed facies

Eyⁿ Nummulitic facies

Ey^g pelagic facies (Globigerina)

Fig.2 : geological map of Oued Maaden-Jebel Ben Amara
Showing the main faults and distribution of Ypresian facies

Aïn Bida

J. Sabbah

Fig. 3 : normal (160N) faults controlling the basin during Cretaceous to Paleocene

Fig. 4 : structural cross sections of the zone (see position on fig2)

σ_1 maximum compressive stress

Stress field :

Syncline axis :

Anticline axis :

fault :

thrust :

Fig. 5 : the NW-SE regional stress field perturbed by 160N fault. Note the concavity of axis folds