



Structuring and evolution of Neogene transcurrent basins in the Tellian foreland domain, north-eastern Tunisia

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ABSTRACT

The Neogene sedimentary basins (Serravallian to Quaternary) of the Tellian tectonic foreland in north-eastern Tunisia formed within the overall NE-SW sinistral strike-slip tectonic framework of the Ras El Korane-Thibar and El Alia-Teboursouk fault systems.

From stratigraphic logs, structural cross sections and interpretation of 2D seismic lines and boreholes, the pre-Neogene basement can be interpreted to be structured according to Eocene (NW-SE) compressional and Oligocene extensional phases. This basement comprises structural highs (anticlines and horsts) and subsiding areas (synclines, half-grabens and grabens) formed during the Neogene. The subsiding areas are delineated by faults striking N030E, N-S and N140E, defining (i) narrow, strongly subsiding synclines, (ii) lozenge-shaped basins and (iii) trapezoidal basins. The architecture of their fill results from the sedimentary balance between tectonics and eustatism.

Halokinesis and clay diapirism (driven by Triassic and Neogene evaporites and clays) also played an important role in basin evolution, contributing to the formation of domes and diapirs along active faults.

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1. Introduction

The Tunisian Tellian domain and its foreland constitute the eastern prolongation of the Atlas orogenic belt of North Africa, recording the tectonic history of the central Mediterranean realm (Caire, 1970; Cohen, 1980; Wildi, 1983; Rehault et al., 1984; Zargouni, 1985; Dercourt et al., 1986; Ben Ayed, 1993; Pepe et al., 2005; Boukhalfa et al., 2009; Riahi et al., 2010). The Tunisian Tellian domain is one of the key areas to establish the recent tectonic history of the Western Mediterranean because it summarizes the tectonic processes that occurred during Africa–Europe convergence and allows for the tectonic control on the Tertiary basinal evolution from older structures and salt tectonics to be defined.

In this work, we present detailed mapping of the Neogene units cropping out in sedimentary basins of northern Tunisia (Burollet, 1951; Crampon, 1973; Rouvier, 1977; Melki, 1997; Melki et al., 2001; Alouani et al., 2006). The aim of this study is to characterize the Neogene foreland basins from their geometry, sedimentary fill, and location within the major transcurrent fault system. We

focus on the identification of the basin types and kinematics in relation to the regional structural framework and tectonic events. An timetable summarizing the main tectonic events identified in the study area as well as the regional events of the western Mediterranean will be presented. The methods used include the analysis of geological maps, seismic reflection lines (provided by the ETAP Petroleum Company), borehole data and tectonics–sedimentation relationships.

2. Geological setting

Within the Tellian domain in eastern Tunisia (Fig. 1), five depocenters can be defined: Douimim, Jalta, Messeftine, Kechabta and El Alia basins (Fig. 1B) separated either by morpho-structural lineaments, or sedimentary highs (Kacem, 2004; El Euch, 2007; Melki et al., 2009, 2010; Zouaghi et al., 2010).

The tectonic frame defining the structure of Neogene basins in northern and eastern Tunisia is the result of the pre-Miocene tectonic inheritance, influenced by the Lutetian and Priabonian compressional phases (Castany, 1956; Raoult, 1974; Vila, 1980; Ben Ayed et al., 1983; Bédir et al., 1992; Ben Ayed, 1993; Melki et al., 1999; Bouaziz et al., 2002; El Euch et al., 2004; Ben Chelbi et al., 2006; Khomsi et al., 2006; Masrouhi et al., 2008; Frizon de

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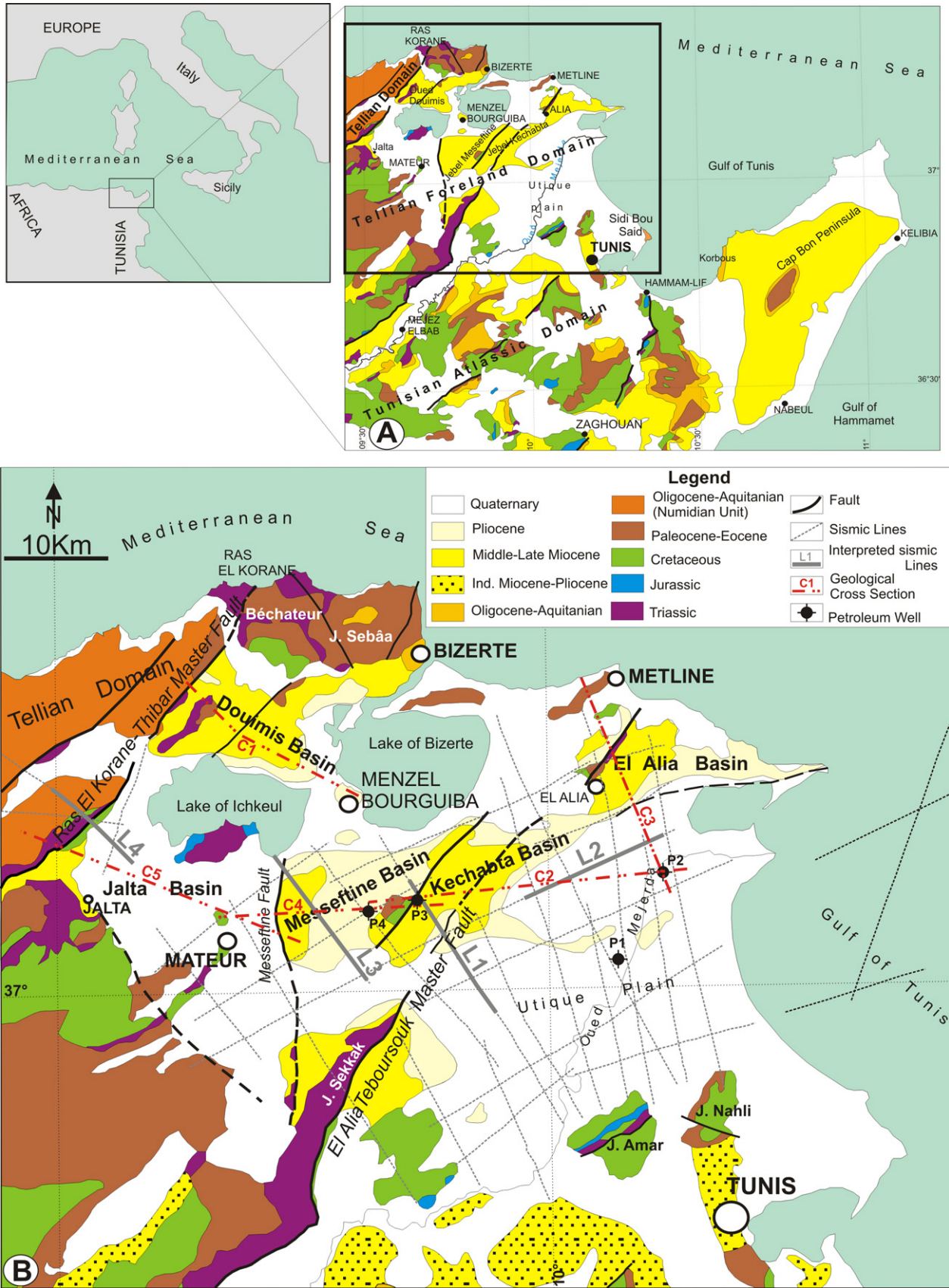


Fig. 1. (A) Geological setting of onshore north-eastern Tunisia; (B) detailed geological map showing location of the main tectonic features, including distribution of the Neogene basins and paleohighs in the NE-SW transcurrent shear zone. This figure shows dataset used in this study (reflection seismic sections and petroleum wells).

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