



Neogene tectonic evolution of the Gulf of Hammamet area, Northeast Tunisia offshore



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ARTICLE INFO

Article history:

Received 30 September 2011

Received in revised form 8 December 2012

Accepted 8 January 2013

Available online 4 February 2013

Keywords:

Gulf of Hammamet

Atlas domain

Pelagian domain

Neogene tectonic events

Basin inversion

Sub-surface geology

ABSTRACT

This paper discusses the Neogene tectonic evolution of the Tunisia offshore Gulf of Hammamet basin. Based on seismic and well data, this basin was created during the Miocene and is currently trending NE–SW. During the Neogene, the study area was affected by geodynamic interactions controlled simultaneously by convergence of the Eurasia and Africa plates and the opening of the Atlantic Ocean. These interactions generated compressive and extensional regimes which led to a variety of structures and basin inversions.

The middle Miocene extensional regime created horst and graben structures (e.g. the Halk El Menzel graben). The two major compressive phases of the Tortonian and post Villafranchian age created different structures such as Ain Zaghouan and Fushia structures and the Jriba trough, and led to the reactivation of the old normal faults as reverse faults. During the Plio–Pleistocene and the Quaternary times, the Gulf of Hammamet was affected by an extensional regime related to the Siculo–Tunisian rift, which led to the development in the area of several sedimentary basins and new normal fault patterns.

The Gulf of Hammamet shows several basins ranging in age from the Tortonian to the Quaternary, which display different structural and stratigraphic histories. Two main groups of sedimentary basins have been recognized. The first group has Tortonian–Messinian sedimentary fill, while the second group is largely dominated by Plio–Quaternary sediments. The shortening during the Tortonian and post Villafranchian times has led to the tectonic inversion of these basins. This shortening could be correlated to the Europe–Africa collision.

Despite the large number of hydrocarbon discoveries, the Gulf of Hammamet remains under-explored, in particular at deeper levels. This study aims to guide future exploration and to highlight some new play concepts.

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1. Introduction

The Gulf of Hammamet basin lies in the Northeast Tunisia offshore area between two major domains: the Atlas domain to the west and the Pelagian domain to the east. During the Neogene, the study area was affected by successive tectonic events. These events conferred to the area a complex shape characterized by compressive and extensional structures and tectonic basin inversions.

This paper aims to analyze these tectonic events and to explain them in a global geodynamic context in order to propose a precise tectonic evolutionary model for the Neogene deformations and to reconstruct the tectonic history of the area.

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2. Geographical and geological settings

The Gulf of Hammamet lies in the Northeast Tunisia offshore (Fig. 1) between the following geographical coordinates:

Latitudes: 35°40–37°00 N.

Longitudes: 11°00–12°30 E.

It covers about 20,000 km².

The study area is located between the Cap Bon Peninsula to the north, the Sahel province to the west and the Mahdia–Kerkennah uplift to the south. To the northeast, it is limited by the Sicily channel (Boccaletti et al., 1987; Gardiner et al., 1995; Torelli et al., 1995; Catalano et al., 1996 and Tavarnelli et al., 2004) which acts as an active rift system trending NW–SE and extends to the Malta escarpment (Fig. 1).

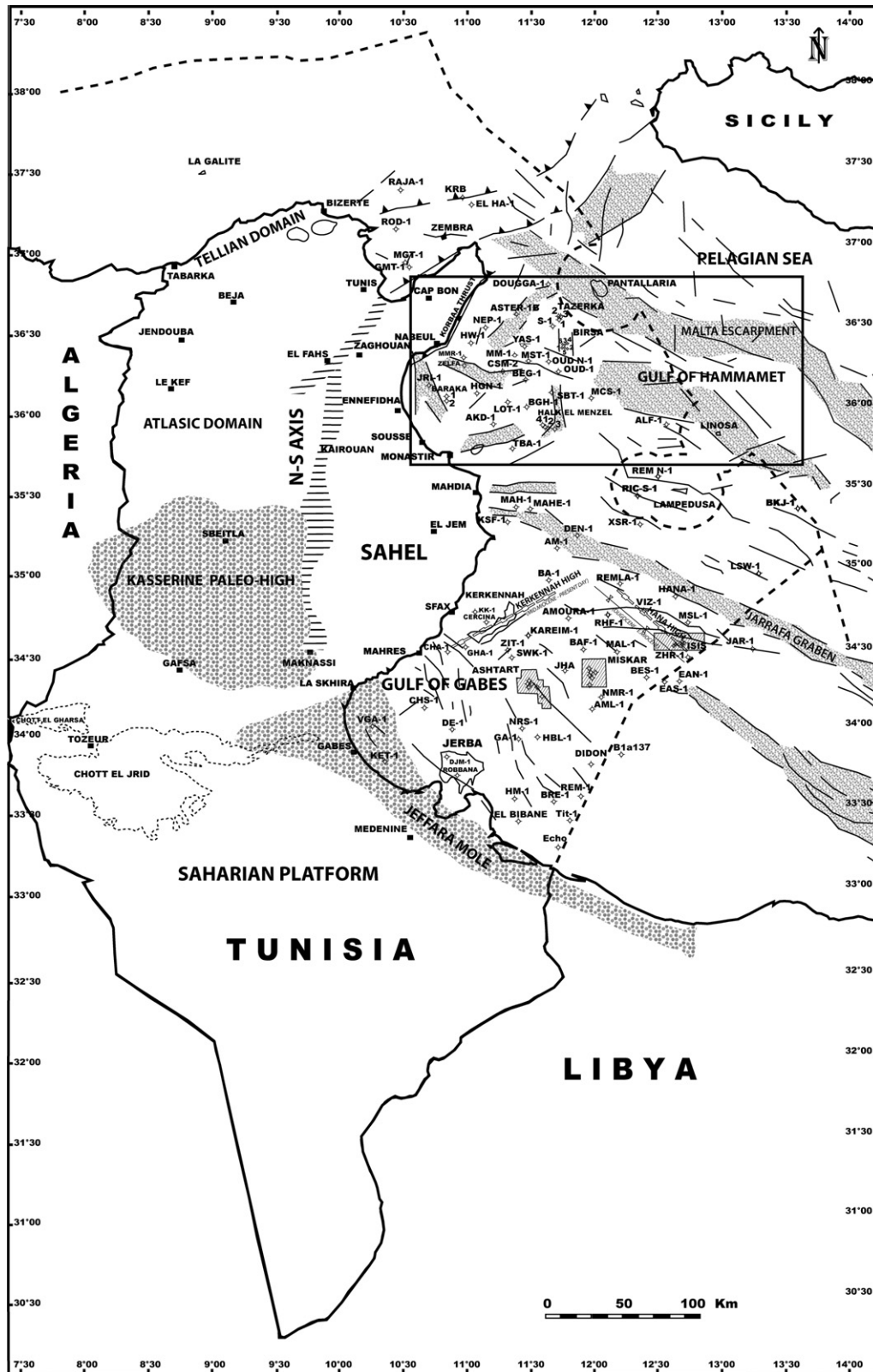


Fig. 1. Location map of the Gulf of Hammamet area.

The subsurface geology of the Gulf of Hammamet is dominated by grabens, anticlines trending NE–SW, horsts and fault-bend folds of Meso-Cenozoic age (Haller, 1983 and Bédir, 1995). The grabens have been active during the Oligocene and Miocene times (Burolet, 1991 and Bédir et al., 1996).

3. Materials and methods

This study was based on subsurface data. The seismic data (Fig. 2) were acquired by various companies between 1978 and 1982. The most recent data display the best quality.

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