Chapter 12
The Miocene (Aquitanian–Tortonian) of North-Eastern Tunisia: Sedimentology and Tectonic

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ABSTRACT

In the Mediterranean Sea, the Cenozoic corresponds to a compressive period represented by folding phases and basin filling. The Tertiary structural development of North Eastern Tunisia is characterized by two tectonic phases: the Oligo-Miocene rifting and the late Miocene compression. These tectonic events came along with global eustatic and climatic changes. In order to identify the response of the Miocene sedimentary deposits in north-eastern Tunisia to global events, five wells from the Gulf of Hammamet and three outcrops from the surrounding area, were studied. A multidisciplinary approach integrating biostratigraphy, facies analysis, interpretation of depositional environments, and structural setting has been adopted. Thus, three transgressive events were recognised during the lower to middle Miocene, and an eustatic fall is identified in the early Serravalian–late Langhian.

DOI: 10.4018/978-1-6684-7801-1.ch012

INTRODUCTION

The Miocene sedimentary deposits of eastern Tunisia have been the subject of numerous studies, mainly on biostratigraphy, sedimentology, structural, and petroleum reservoir characterization (e.g., Burollet (1956); Colleuil (1976); Hooberg (1995); Ben Salem (1992); Jeddi (2004); Ben Brahim et al. (2013); Gharsalli et al. (2013); Bedir et al. (2016); Boukhalfa et al. 2020). However, syntheses emphasizing the interaction of all factors in the sedimentary architecture and its relation to the Tethysian evolution are still uncommon. The Miocene deposits in Tunisia are organized into four sequences of deposits, reflecting tectonic, eustatic, and climatic conditions (Mannaï-Tayech 2004, 2006a, b, 2009). These deposits vary vertically and horizontally but are essentially deltaic (Yaïch, 1997). In 1995, Bedir described in Cap Bon tidalitic facies, tides, tempestites, and turbidite deposits. This variation in thickness and facies over time and space may be the result of changes in the environment and tectonic of Miocene.

In order to improve the relationship between these different factors (tectonics, facies variation, and environment), we had the opportunity to study the cores of five wells crossing Miocene deposits drilled by the Lundin Netherlands company in the Gulf of Hammamet, the Birsa, Oudna, Zelfa, Halk El Menzel, and Tazarka boreholes. For comparison, at the same time, we studied three outcrop sections taken in the Grombalia-Bouficha area (Jebel Ressas, Msella, and Menchar). In this study we attempted using structural setting, biostratigraphic, and sedimentological analysis to propose a global and integrated vision of the Miocene depositional system in northeastern Tunisia. Thus, a correlation of Miocene deposits on this basin has been proposed, in order to contribute to a better comprehension of the sedimentary evolution and the recorded events, at a regional and global scale.

GEOLOGICAL SETTING AND METHODS

The studied area covers the Grombalia-Bouficha region and the northern part of the Gulf of Hammamet (Figure 1). The geological framework corresponds to a succession of NE-SW anticlines and synclines extending from the Cap Bon peninsula to the Pelagian Sea. The Gulf of Hammamet is affected by several tectonic corridors including the N90–120 El Haouaria and Maamoura, and the N160–170 Enfidha corridor. The structural development of the region is marked by the Alpine tectonics, resulting from the collision between the African and European plates (Cohen et al. (1980), Dercourt et al. (2000a, b); Khomsi et al. (2009); Bedir et al. (2016); Boukhalfa et al. (2020)).