



Stratigraphy and Structural Style of the Maghrebides Belt Foreland: Souk Ahras Sellaoua Unit Case (External Domain, NE Algeria)

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Abstract

The Sellaoua Unit is part of the foreland of the Maghrebides belt in northeastern Algeria and develops in the footwall of Tellian and Numidian thrusts sheets. A detailed geological mapping of Souk Ahras Sellaoua Unit (North–East of Algeria) supported by micro-paleontological and structural data allow us to reappraise the stratigraphy and the structural style of such area and characterize its relationship with the northern adjacent thrusts sheets. Data were collected from a sampling and observations along with four profiles for biostratigraphic study and five for structural constructions.

The obtained results show that the Sellaoua Unit of Souk Ahras area is made of carbonate marine formations ranging from Turonian to Paleocene unconformably overlain by detrital Miocene strata. Complex thrust systems have occurred during the Tertiary until the middle Miocene.

Keywords

Magrebides belt • Sellaoua unit • Stratigraphy • Structural style • Souk Ahras

1 Introduction

In northeastern Algeria, the external domain of the Maghrebides belt (Vila 1980) is characterized by an imbricate fan of thrust sheets over a detached and folded unit (Chabbi et al. 2016, 2019) which is called “Sellaoua Unit” (Vila et al. 1995). This complex structure is the result of several tertiary compressional phases (Leprêtre et al. 2018).

In the Souk Ahras region (Fig. 1a, b), the stratigraphy of the Sellaoua Unit and its relationships with the surrounding units are poorly known with the exception of a few regional or unpublished studies (David 1956). The northern part of Souk Ahras area (Fig. 1a, b) exhibits excellent outcrops for the Sellaoua Unit. Geological mapping has been performed together with micro-paleontological and structural studies, which allowed us to characterize the stratigraphy and structure of Sellaoua Unit in the Souk Ahras area.

2 Materials and Methods

The Sellaoua unit is part of the Maghrebides belt foreland series, in northeastern Algeria (Vila 1980). It outcrops between the Tunisian border and Souk Ahras city, and it continues westward to Ain Fakroune city (south of Constantine). It mostly consists of whitish carbonate formations outcropping below the allochthonous units (Tellian and Numidian thrust sheets) and in tectonic contact with the Triassic formation.

The present work is based on geological mapping supported by geological cross sections, using micro-paleontological, tectonic and structural data. More than sixty samples of marl, taken from four sections (Fig. 1b), have been dated. The sections are spread over three sectors in the region. From the west to the east, we distinguish the following sections: Oued Djedra section (OJ section), Dj. Bouallegue section (DB section), Ouled Driss section (OD section) and Chaabet el Ballout section (CB section). Five

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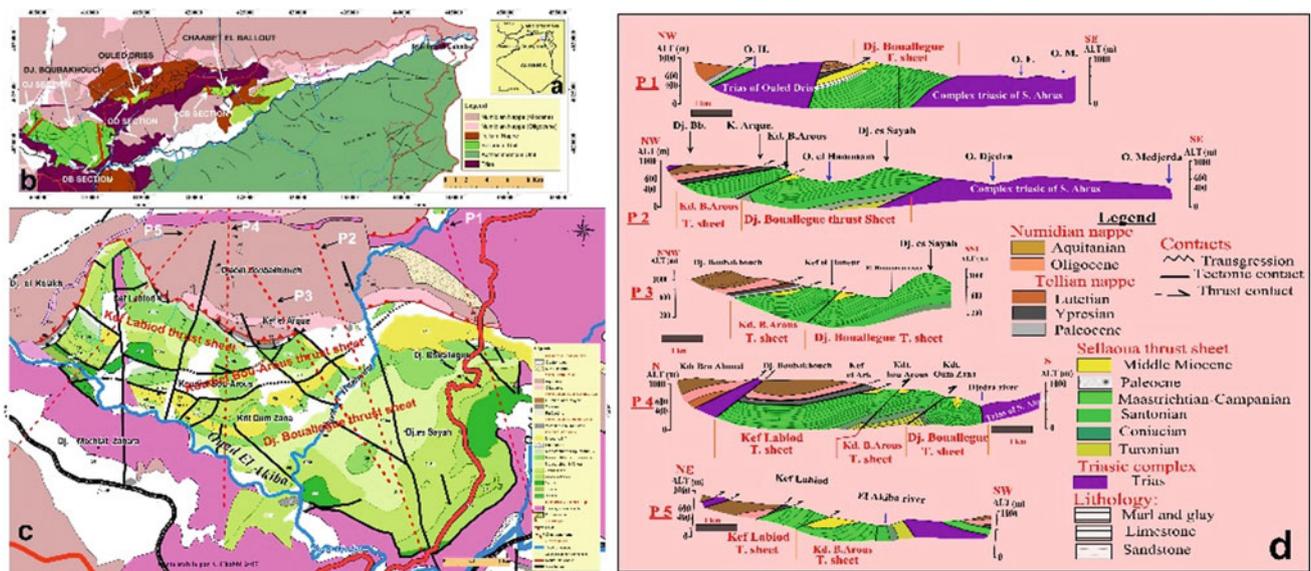


Fig. 1 a Schematic situation map, b regional geological map showing the structural Souk Ahras units and sampling cross-sections location, c study area geological map showing the structural cross-sections location, d geological cross sections

other structural sections exhibit the geological structure and tectonic style of the study area (Fig. 1c, d).

3 Results

3.1 Stratigraphical Results

The lithological analysis and micro-paleontological determinations of different samples taken from the Sellaoua outcrops, between (OJ) in the west of Dj. Boubakhouch and Chaabet el Ballot (CB) in the east, allowed us to define the stratigraphy of the Sellaoua Unit of Souk Ahras region and characterize its depositional environments. The stratigraphy and distribution of benthic, planktic foraminifera and ostracoda are summarized in table (Fig. 2). From base to top, the following succession was identified:

3.1.1 Turonian

Turonian is the oldest documented age in Sellaoua Unit of Souk Ahras region. It is cropping out on the right bank of Oued el Akiba (OJ). It exhibits about fifty meters (50 m) of yellow limestone (beds of 30–40 cm) alternating with gray marl levels. It is defined by a rich association of planktic foraminifera (*Marginotruncana marianosi*, *Dicarinella primitiva*, *Marginotruncana sinuosa*, *Dicarinella concavata*) with the presence of rare benthic foraminifera (Fig. 2).

3.1.2 Coniacian

Outcropping only at Oued Akiba and is represented by about 150 m of gray marls and limestone containing exclusively planktic foraminifera of the *Marginotruncana sinuosa* biozone. They include *Marginotruncana coronata*, *Marginotruncana scheegansi* and *Marginotruncana primitiva*.

3.1.3 Santonian

Outcrops in Dj. Boubakhouch and is dominated by a series of gray marl, with rare decimetric levels of marl-limestone with yellowish patina. It is about 200 m thick, characterized by rich planktic foraminifer assemblage of *Dicarinella concavata* and *D. asymetrica* biozones associated to a benthic foraminifera and ostracoda (Fig. 2).

3.1.4 Campanian

Campanian is characterized by a 100-m thick package of grayish marls with abundant planktic foraminifera of *Globotruncanita elevata* biozone. The middle and upper Campanian is represented by 80 m alternating marl and marly calcareous surmounted by a bar of 60 m of chalky limestone containing Inocerames and ending with 10 m of marl and limestone. The planktic foraminifera contained in these series belongs to *Globotruncana ventricosa* and *G. calcarata* biozones. The benthic foraminifera and ostracoda exist but are not dominant (Fig. 2).

Sellaoua Unit remains unknown in the Souk Ahras region, while in the western part of the Sellaoua basin, the series begins in Jurassic age (Vila 1980). The dominance of planktic foraminifera on benthics in Sellaoua deposits reveals that it is a marine deposition environment of internal platform. The absence of Eocene- Oligocene deposits under the lower Miocene probably indicates that the Sellaoua basin was uplifted during this period and then it was deformed and eroded. This phase corresponds to the Atlasic phase. The transgression of the Miocene on the Sellaoua series indicates the subsidence of the Sellaoua basin during the Burdigalian—Langhian period.

The structure of the Sellaoua unit is characterized by the presence of thrust sheets, folds and reverse faults NE-SW to E-W trending, dipping to the north, involving Miocene formations attributed to Burdigalian—Langhian, which indicates a compressive N-S phase that probably corresponds to the Tortonian phase. This phase led to the folding and thrusting of Sellaoua Unit and the setting up of Tellian and Numidian thrust sheets which are overthrust on the Sellaoua Unit in this area (Chabbi et al. 2019).

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