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Depositional facies, environments and sequence stratigraphic interpretation of the Middle Triassic–Lower Cretaceous (pre-Late Albian) succession in Arif El-Naga anticline, northeast Sinai, Egypt

M.H. El-Azabi, A. El-Araby *

Geology Department, Faculty of Science, Cairo University, Orman, Giza, Cairo, Egypt

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Abstract

The Middle Triassic–Lower Cretaceous (pre-Late Albian) succession of Arif El-Naga anticline comprises various distinctive facies and environments that are connected with eustatic relative sea-level changes, local/regional tectonism, variable sediment influx and base-level changes. It displays six unconformity-bounded depositional sequences. The Triassic deposits are divided into a lower clastic facies (early Middle Triassic sequence) and an upper carbonate unit (late Middle- and latest Middle/early Late Triassic sequences). The early Middle Triassic sequence consists of sandstone with shale/mudstone interbeds that formed under variable regimes, ranging from braided fluvial, lower shoreface to beach foreshore. The marine part of this sequence marks retrogradational and progradational parasequences of transgressive- and highstand systems tract deposits respectively. Deposition has taken place under warm semi-arid climate and a steady supply of clastics. The late Middle- and latest Middle/early Late Triassic sequences are carbonate facies developed on an extensive shallow marine shelf under dry-warm climate. The late Middle Triassic sequence includes retrogradational shallow subtidal oyster rudstone and progradational lower intertidal lime-mudstone parasequences that define the transgressive- and highstand systems tracts respectively. It terminates with upper intertidal oncolitic packstone with bored upper surface. The next latest Middle/early Late Triassic sequence is marked by lime-mudstone, packstone/grainstone and algal stromatolitic bindstone with minor shale/mudstone. These lower intertidal/shallow subtidal deposits of a transgressive-systems tract are followed upward by progradational highstand lower intertidal lime-mudstone deposits. The overlying Jurassic deposits encompass two different sequences. The Lower Jurassic sequence is made up of intercalating lower intertidal lime-mudstone and wave-dominated beach foreshore sandstone which formed during a short period of rising sea-level with a relative increase in clastic supply. The Middle-Upper Jurassic sequence is represented by cycles of cross-bedded sandstone topped with thin mudstone that accumulated by northerly flowing braided-streams accompanying regional uplift of the Arabo–Nubian shield. It is succeeded by another regressive fluvial sequence of Early Cretaceous age due to a major eustatic sea-level fall. The Lower Cretaceous sequence is dominated by sandy braided-river deposits with minor overbank fines and basal debris flow conglomerate.

Keywords: Depositional facies; Environment; Sequence stratigraphy; Arif El-Naga; Sinai

1. Introduction

Gabal Arif El-Naga forms a prominent topographic high in the northeastern border of Sinai about 290 km to the northeast of Suez. It represents an elliptical double plunging anticline trending east–northeast/

* Corresponding author.
E-mail address: elaraby7@yahoo.com (A. El-Araby).

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west–southwest (Fig. 1). The anticline occupies an area of about 28 km^2 with a length of 7 km and a width of 4 km. It is cut along its southeastern flank by an obvious strike-slip fault that dips steeply northwestward and runs in the same trend as the fold axis. This anticline displays an asymmetrical structure with strata in the southeastern flank having steeper dips than those of the northwestern one. The stratigraphic succession of Arif El-Naga anticline ranges in age from Middle Triassic to Middle Eocene. The Triassic sediments occupy the central core of the anticline. They make up the only known Triassic exposure in north Sinai. Jurassic and the overlying Lower Cretaceous sediments cover the area surrounding the Triassic core and form a topo-

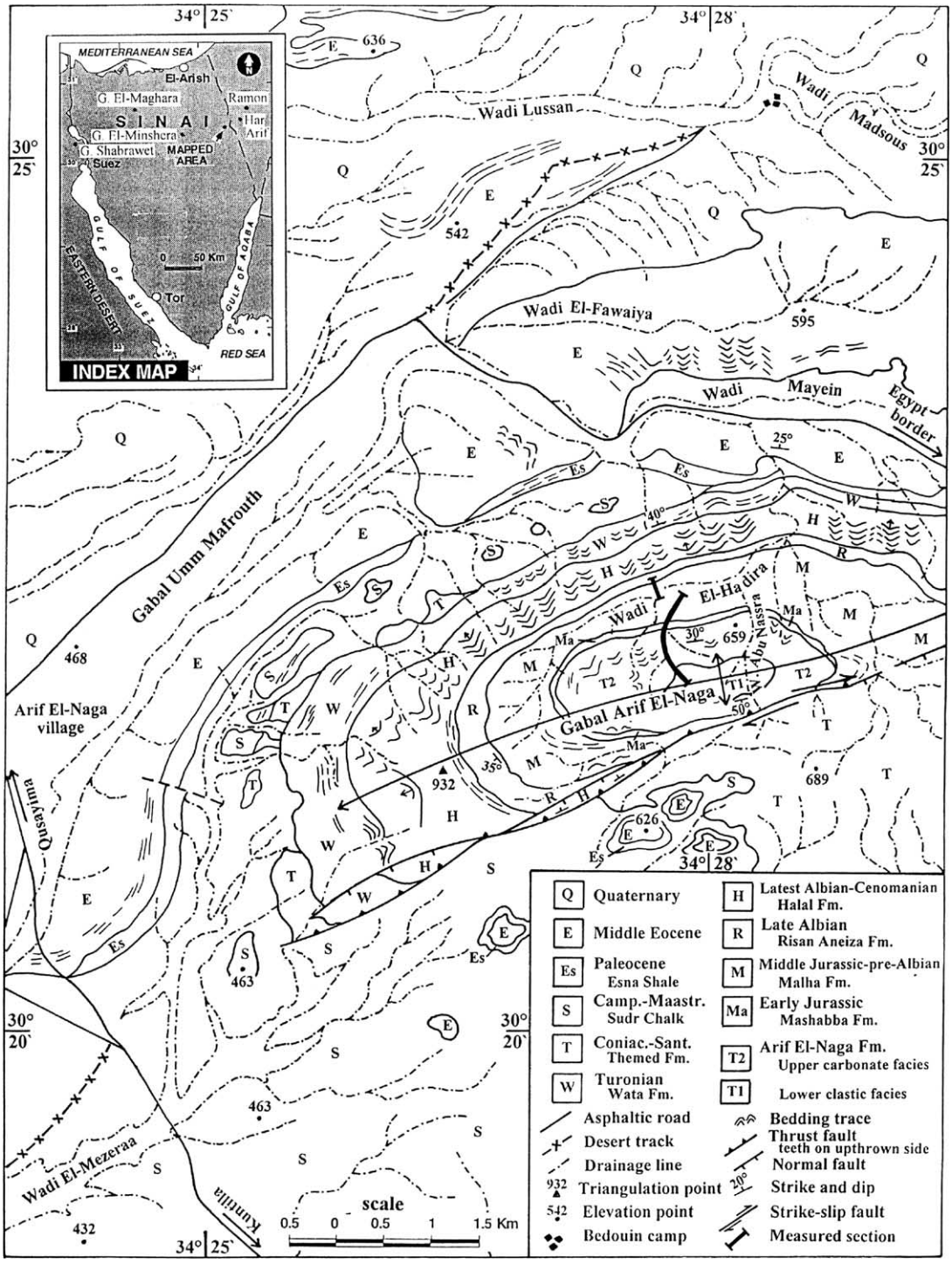

Fig. 1. Photogeologic map of Gabal Arif El-Naga, northeast Sinai, Egypt.