



Integrated biostratigraphy of the upper Oligocene–middle Miocene successions in west central Sinai, Egypt



Abdel Galil A. Hewaidy^{a,*}, Sherif Farouk^b, Haitham M. Ayyad^a

^a Geology Department, Faculty of Science, Al-Azhar University, Nasr City, Cairo, Egypt

^b Exploration Department, Egyptian Petroleum Research Institute, Nasr City, Egypt

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ABSTRACT

The nannofossil and planktonic foraminiferal biostratigraphy in four upper Oligocene–middle Miocene sections are examined in Nukhul–Sudr area of west central Sinai, Egypt. The integration of calcareous nannofossils and planktonic foraminifera is used to verify the ages and determine the biozones of the upper Oligocene–middle Miocene units in the studied area. This target is important in the light of the great lithofacies changes during the time interval. The detailed examination of the nannofossil and planktonic foraminiferal contents in these sections led to identification of 86 calcareous nannofossil species belonging to 22 genera, 10 families and 3 orders, in addition to 64 planktonic foraminiferal species belonging to 11 genera, 4 families and 2 superfamilies. The identified nannofossil and planktonic foraminiferal assemblages allow to distinguish five calcareous nannofossil biozones and six planktonic foraminiferal biozones. The biostratigraphic integration suggested the Chattian–Aquitian age for the Nukhul Formation where the *Globigerina ciperoensis* Zone (P22) and *Globigerinoides primordius* Zone (M1a) correspond to calcareous nannofossil *Sphenolithus ciperoensis* Zone (NP25) and *Discoaster druggii* Zone (NN2), respectively. The Rudeis Formation is assigned to the Burdigalian–Langhian age depending on correspondence of *Catpsydrax dissimilis* Zone (M2), *Globigerinoides bisphericus* Zone (M4b) and *Praeorbulina sicana* Zone (M5) with *Discoaster druggii* zone (NN2), *Sphenolithus belemnos* Zone (NN3) and *Helicosphaera ampliaperta* Zone (NN4). The Somar Formation is found barren of any microfossils, but it contains index pectens and oysters of Burdigalian age which may be equivalent to the lower part of the Rudeis Formation. The Kareem and Sarbut El-Gamal formations are represented by evaporitic and conglomeratic succession, where no foraminifera or nannofossils are recorded and assigned to the Langhian age according to their stratigraphic position. The Belayim Formation is assigned to the Serravallian age, due to the presence of *Globorotalia fohsi* Zone (M8) which equivalent to *Discoaster exilis* Zone (NN6).

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1. Introduction

The exposed upper Oligocene–middle Miocene sections of west central Sinai are characterized by obvious rapid lateral and vertical lithologic variations. The enable of correlation between these sections is a matter of difficulty and lack of precision. Many attempts have been made in the past decades to determine the ages of different Oligo–Miocene units and correlate between them (e.g. Said, 1962; Souaya, 1965, 1966; Said and El Heiny, 1967; Wasfi, 1968; National Stratigraphic Sub-Committee (NSSC), 1974; Garfunkel and Bartov, 1977; Andrawis and Abdel Malik, 1981; El-Heiny and Martini, 1981; El-Heiny and Morsi, 1992; Haggag

et al., 1990; El-Azabi, 1996, 1997, 2004; Phillip et al., 1997; Amundsen et al., 1998; Abul-Nasr and Salama, 1999; Shahin, 2000; Sadek, 2001; El-Deeb et al., 2004; Faris et al., 2009). In these works, the Nukhul Formation was assigned to the early Miocene age based on calcareous nannofossils, the planktonic and/or benthonic foraminifera.

Contrary to these attempts Hewaidy et al. (2012) at Wadi Baba area assigned the Nukhul Formation to the late Oligocene (Chattian)–early Miocene (Aquitian) age. This conclusion magnified the role of integration in solving the age problem of the Miocene units in west central Sinai area.

This study aims to integrate calcareous nannofossil and planktonic foraminiferal zonations to make more precise division of sequential access to correlate the upper Oligocene–middle Miocene sections of the study area by means of high-resolution integrated biostratigraphy.

* Corresponding author. Tel.: +20 02 22475060, mobile: +20 01002660758.

E-mail addresses: ahewaidy@hotmail.com, ahewaidy50@yahoo.com (A.G.A. Hewaidy).

2. Material and methods

The material and methods on which this study carried out by the examination of four upper Oligocene–middle Miocene sections located in Nukhul–Sudr area, west central Sinai, Egypt. These are from south to north: Wadi Nukhul (Latitude 29°01'30" and Longitude 33°11'30"), Gabal Sarbut El-Gamal (Latitude 29°07'15.66" and

Longitude 33°12'29.82"), Wadi Wasit (Latitude 29°13'30" and Longitude 32°56'54.58") and Wadi Sudr (Latitude 29°41'55" and Longitude 32°53'41") (Fig. 1). About one hundred and sixty samples were collected from the studied successions and their calcareous nannofossils and foraminiferal species were prepared. The abundances of calcareous nannofossil species were counted for each sample using a Prior Photomicroscope under X1200

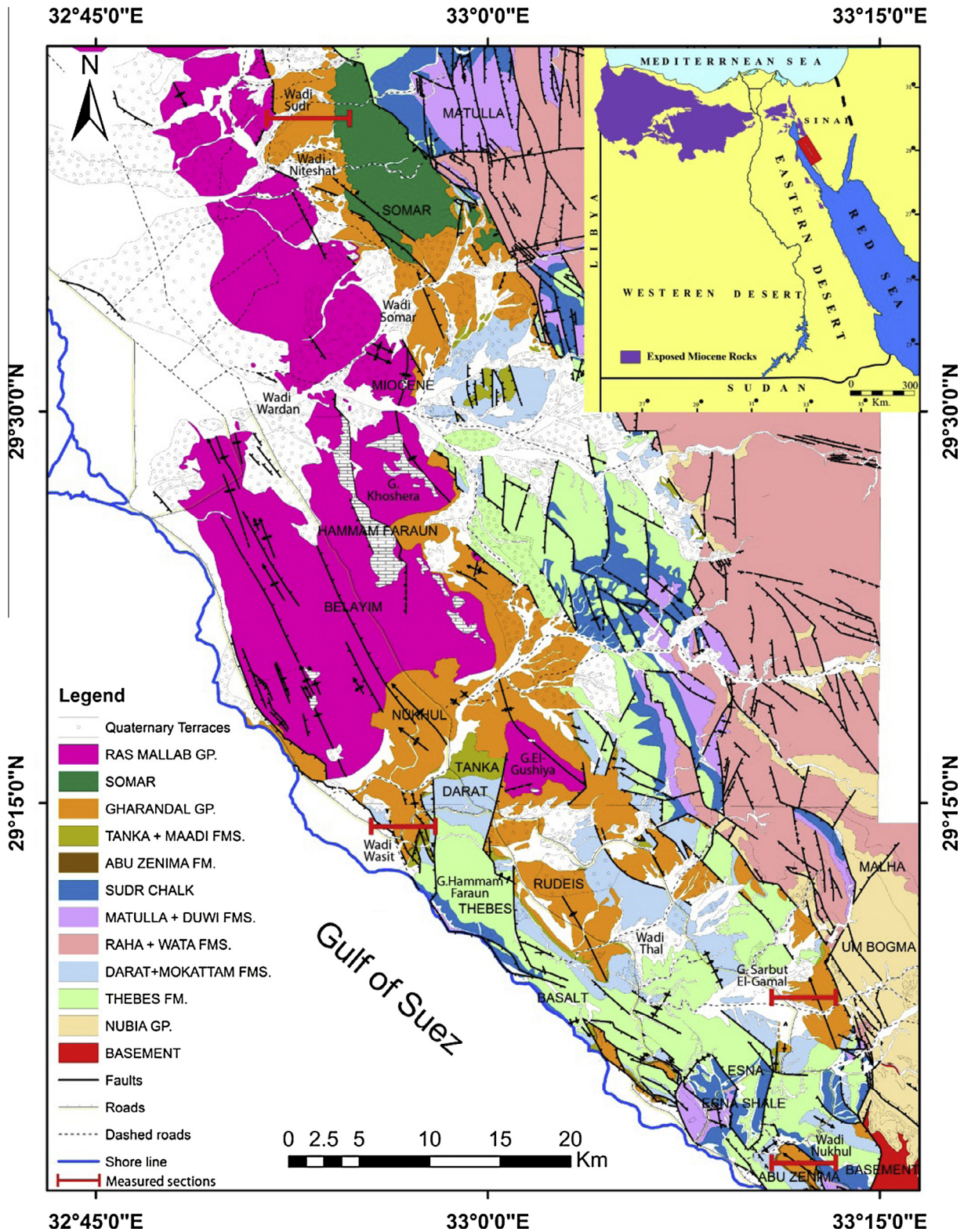


Fig. 1. Geological map (modified after Moustafa, 2004), showing the distribution of the measured sections in the study area.

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