



Upper Maastrichtian to Lutetian nannofossil biostratigraphy, United Arab Emirates, west of the Northern Oman Mountains



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ARTICLE INFO

Article history:

Received 27 July 2013

Received in revised form 5 December 2013

Accepted 18 December 2013

Available online 9 January 2014

Keywords:

Biostratigraphy

Nannofossils

Maastrichtian–Lutetian

United Arab Emirates

Northern Oman Mountains

ABSTRACT

The latest Cretaceous (Maastrichtian) to Middle Eocene (Lutetian) interval of shallow water carbonate rocks in the NE part of the Arabian Peninsula (Oman Mountains) includes important regional oil reservoir units. These carbonates are richly fossiliferous in foraminifera, which have been useful in correlating sequences and formations. Previous foraminiferal studies have indicated the existence of several hiatuses or lacunae related to sea level changes or due to erosion. Subsequent studies of the abundant calcareous nannofossils have permitted definition of these hiatuses via high resolution biostratigraphy. However, these previous studies were of limited extent. In this study a total of 103 nannofossil species were identified from the upper Maastrichtian–Lutetian successions at Jabal Qarn El Barr, El Faiyah Range Mountains (Jabal Thanays and western side of Jabal Buhays), United Arab Emirates, as well as Jabal El Rawdah, west of the Northern Oman Mountains, Oman.

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1. Introduction

Upper Cretaceous–Middle Eocene rocks are widely distributed in the western foothills of the Northern Oman Mountains (Fig. 1). The Upper Cretaceous sediments unconformably overlie the Semal Ophiolite, the folded and thrusting Hawasina Complex and the Sumeini Group of Permian–Late Cretaceous age (Glennie et al., 1974; Wilson, 2000).

The stratigraphy, facies and faunal content (larger and planktonic foraminifera) of the Upper Cretaceous–Eocene neoautochthonous sequence of the Northern Oman Mountains have been discussed in numerous papers, including Glennie et al. (1974), Hamdan (1990), Alsharhan and Kendall (1991), Anan et al. (1992), Hamdan and Bahr (1992), Anan (1993), Anan and Hamdan (1993), Noweir and Eloutefi (1997), Noweir et al. (1998), Sayed and Mersal (1998), Boukhary et al. (1999), Alsharhan et al. (2000), Noweir and Abdeen (2000), Abd-Allah (2001), Abdelghany (2003, 2006), Faris et al. (2012), Abdelghany and Abu Saima (2012) and Abd-Allah et al. (2013). Faris et al. (2012) studied the calcareous nannofossil assemblages of the exposed upper Maastrichtian (Late

Cretaceous) to Ypresian (Early Eocene) rocks at Jabals Malaqet and Mundassah. They reported a stratigraphic gap around the K/P boundary where the *Micula prinsii* Zone and NP1 to NP2 are absent. The Danian/Selandian boundary lies at the base of Zone NP5, while the Selandian/Thanetian boundary lies at the base of the NP7/8 Zone. The Paleocene/Eocene boundary lies at the base of the Zone NP9b at Jabal Mundassah. However, in the Jabal Malaqet section, this boundary is missing due to a major hiatus indicated by the absence of NP9b subzone and NP10 Zone. Zones NP10 and NP11 are present in the Early Eocene (Ypresian) at Jabal Mundassah.

This present paper aims first to: (1) identify calcareous nannofossils of Maastrichtian to Middle Eocene age from the Simsimah, Muthaymimah and Dammam Formations in three well-exposed sections in the United Arab Emirates and Oman; (2) define the Cretaceous/Paleocene (K/P), Danian/Selandian and Paleocene/Eocene (P/E) boundaries based on these sections; and (3) subdivide the studied sections into standard nannofossil biozones to enable construction of a high resolution biostratigraphy. The present study extends to use nannofossils in delineating hiatuses along the upper Maastrichtian to Middle Eocene rocks in the studied area.

2. Materials and methods

Four well-exposed stratigraphic sections (Figs. 2–5) of the Upper Cretaceous–Middle Eocene sediments were measured and

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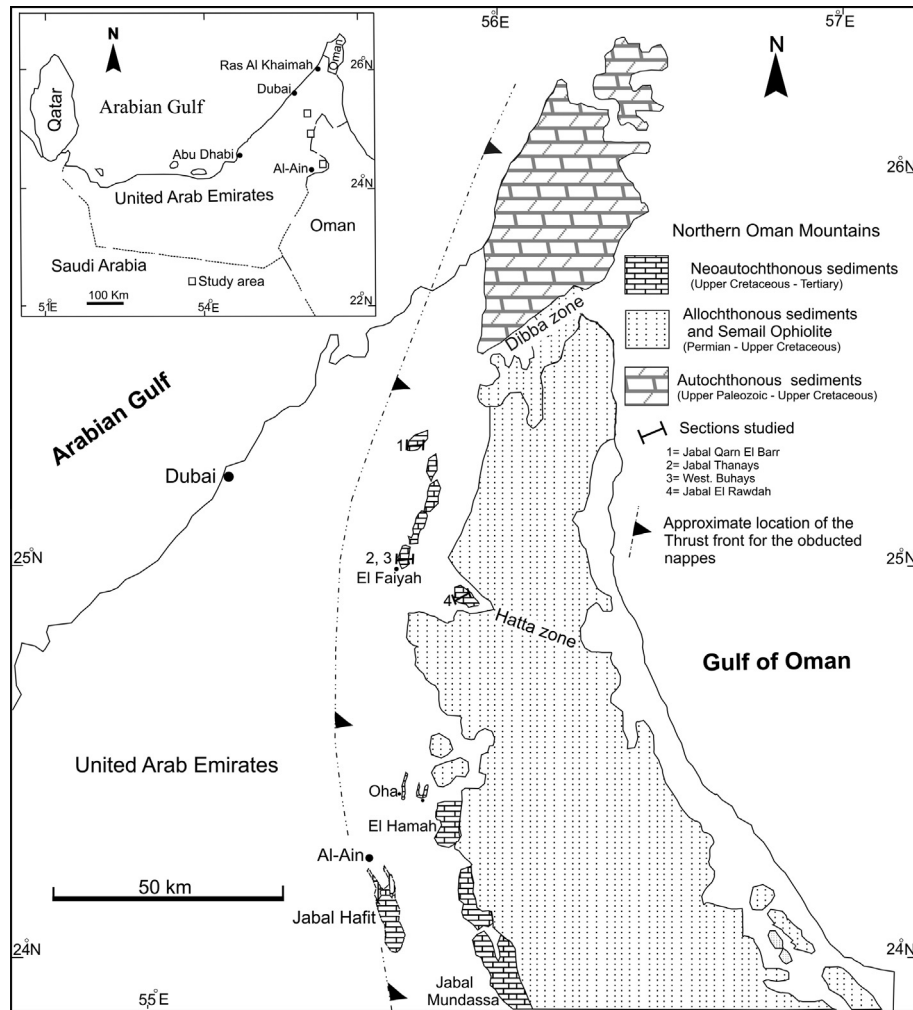


Fig. 1. Regional map for the Northern Oman Mountains showing locations of the studied sections, modified after Abdelghany (2003).

sampled for analysis. Three sections are located in the United Arab Emirates (Jabal Qarn El Barr, Jabal Thanays and western side of Jabal Buhays) and one lies in the Sultanate of Oman (Jabal El Rawdah) (Fig. 1). The techniques proposed by Bramlette and Sullivan (1961) and Hay (1964, 1970) were used for preparing smear slides. The slides were examined using a Carl Zeiss Photomicroscope 3 at 1250 \times magnification in both plane polarized light and cross polarized light. Selected calcareous nannofossils are documented in Tables 1–4. Some of the most significant nannofossil taxa are presented in photomicrograph plates (Figs. 8 and 9).

3. Stratigraphic background

The post-obduction neoautochthonous Upper Cretaceous-Eocene sedimentary succession unconformably overlies Late Cretaceous age Semail Ophiolite. The first marine transgression deposited fluvial to shallow marine Qahlah Formation over the eroded nappes of the Semail Ophiolite (Glennie et al., 1974). This was followed by deposition of shallow-water limestones (Simsima Formation), which are exposed at Jabals Qarn El Barr, El Faiyah Range Mountains and El Rawdah (Fig. 1). Further to the north, at Jabal Qarn El Barr, the Simsima Formation consists of deep marine pelagic sediments, indicated by planktonic foraminifera and calcareous nannofossil (Abdelghany, 2003). The Simsima Formation is unconformably overlain by the Muthaymimah Formation in the study area. The stratigraphic units mentioned above have been subdivided in

several recent studies (Abdelghany, 2003, 2006; Abdelghany and Abu Saima, 2012; Abd-Allah et al., 2013). These subdivisions are based on their lithostratigraphic characteristics established in the field and planktonic as well as benthic larger foraminifera biostratigraphic zonation. The formations of the study area will be described in detail below as follows.

3.1. Qahlah Formation

The Qahlah Formation was first recorded as a formal rock unit by Glennie et al. (1974). It unconformably overlies the Semail Ophiolite and is unconformably overlain by the Simsima Formation. It consists of a thick conglomerate bed containing clasts of various rock types, ranging in size from granules to boulders of variable roundness, suggesting diverse source areas. It is absent in the Jabal Qarn El Barr section. In the other sections studied (Jabals: Thanays, Buhays and El Rawdah), the Qahlah Formation is non-fossiliferous, while at Jabal Huwayyah (Oman) it is rich in rudists, corals, oysters and larger foraminifera, the age of the Qahlah Formation is Late Campanian to Maastrichtian (Abdelghany, 2006).

3.2. Simsima Formation

The Simsima Formation was first described by Glennie et al. (1974) which shares unconformable contacts with both the underlying Qahlah Formation and the overlying Muthaymimah

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