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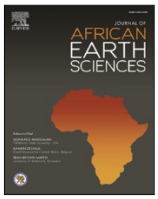

Calcareous nannofossil biostratigraphy and paleoenvironmental study along the Upper Maastrichtian- Eocene sequence at Eastern and Western Deserts, Egypt

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ABSTRACT

Biostratigraphy and paleoenvironment of seventy surface samples were studied based on calcareous nannofossils along the Upper Maastrichtian – Eocene sequence at Gebel Duwi and Gebel Ghanima sections, Egypt. This succession includes three rock units, arranged from base to top as follow: Dakhla, Tarawan and Esna formations. Seven calcareous nannofossil biozones have been recorded, arranged as follow: CC 25c, CC 26, NP 2/3, NP 4, NP 5, NP 6 and NP 9b, discussed and compared with their counterpart in and outside Egypt. Four present stage boundaries have been discussed; the Cretaceous/Paleogene boundary, it seems to be incomplete in the Gebel Duwi section due to the absence of the biozone NP 1. The Danian/Selandian boundary, it can be determined in the Gebel Ghanima section based on the FO of *Fasciclithus tympaniformis*. The Selandian/Thanetian boundary, it was difficult to trace in the Gebel Ghanima section, where the topmost part of Zone NP 6 was missed. The Paleocene/Eocene boundary, it cannot be accurately determined in the Gebel Ghanima section, owing to the presence of a small hiatus represented by the absence of the Subzone NP 9a. There is predominance in assemblages' taxa and were relatively warm-water temperature during the Late Danian in the Gebel Duwi section and highly warm-water temperature around the Paleocene-Eocene boundary in the Gebel Ghanima section. There are two ecozones have been recognized in our study. In the Gebel Duwi, the sediments of ecozone (A) are deposited in cool-water, and transitional states between eutrophic and oligotrophic environments, while that of ecozone (B) are deposited in warm-water and also transitional states between eutrophic and oligotrophic environments. The sediments of ecozone (B) in the Gebel Ghanima are deposited in warm-water and mainly oligotrophic environments.

1. Introduction

The Upper Maastrichtian - Eocene successions in Egypt have attention of many authors specially the Cretaceous/Tertiary and Paleocene/Eocene transitions. During K/T boundary major changes in the ocean circulation and global climate took place (e.g., Shahin, 2001; Aubry and Ouda, 2003; Lamolda et al., 2005; Obaidalla, 2005; Molina et al., 2006; Abu Shama et al., 2007; Fornaciari et al., 2007; Keller et al., 2007; Thibault and Gardin, 2010; El-azabi and Farouk, 2011; Mandur, 2011, 2016; Faris and Farouk, 2015; Farouk et al., 2016; Khalil et al., 2016; Thibault and Husson, 2016; Faris et al., 2017; Abu Shama et al., 2019; Faris and Sabour, 2020; Kasem et al., 2020).

At the Cretaceous/Paleogene (K/Pg) boundary, one of the top five mass extinctions occurred that deeply affected both the continental and marine domains, for instance calcareous nannofossils suffered a dramatic extinction event (Molina et al., 2006). The major changes in calcareous nannofossil assemblages across the K/Pg boundary have long been a subject of intensive studies to reveal the nature of these changes in different environments and latitudes (e.g.,Bramlette and Martini, 1964; Percival and Fischer, 1977; Perch-Nielsen, 1979a, 1979b; Thierstein and Okada, 1979; Romein and Smit, 1981; Perch-Nielsen, 1982; Pospichal and Wise, 1990; Gartner, 1996; Gardin, 2002; Tantawy, 2003; Bown, 2005; Molina et al., 2006).

In addition, the P-E transition was characterized by variations in biotic assemblages including faunal and floral turnovers, radiations, originations, and migration toward higher latitudes (Thomas et al.,

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