Danian-Selandian transition at Gabal el-Qreiya section, Nile Valley (Egypt): lithostratigraphy, biostratigraphy, mineralogy and geochemistry

Mamdouh F. Soliman, Nageh A. Obaidalla

Abstract:

In a detailed investigation of the lithostratigraphy, biostratigraphy, mineralogy and geochemistry of the stratigraphic interval spanning the Danian/Selandian (D/S) transition about 16 m within the Dakhla Shale exposed at Gabal el-Qreiya has been examined and collected. Litho-stratigraphically, the part of the Gabal el-Qreiya section under investigation is mainly composed of grey shale and encompasses the D/S boundary. There is a marker bed (~30 cm thick) represents the D/S boundary at Gabal el-Qreiya that consists of four alternating black and brownish organic-rich shale bands (~5-12 cm thick each) sandwiched between two thick grey shale beds. We formally describe this interval as the el-Qreiya Bed, which has been recognized in several localities elsewhere in Egypt. The sediments of the el-Qreiya Bed are very similar to those in the lower part of the earliest Eocene Dababiya Beds in Egypt, which include thinly laminated, phosphatic (fish debris), organic-rich and extremely pyritic shales. The organic debris is noticed as amorphous organic matter and woody fragments. Biostratigraphically, the succession is subdivided into six planktic foraminiferal biozones, documenting a case of continuous sedimentation during the D/S transition. These biozones are: The Danian Praemurica uncinata (P2), Morozovella angulata (P3a) and Igorina albeari/P. carinata (lower most part of P3b) biozones and the Selandian I. albeari (main part of P3b) and Globanomalina pseudomenardii (P4a) biozones. The basal surface of the el-Qreiya Bed is marked by the last appearance of Praemurica carinata (El Naggar) and is taken to mark the Danian-Selandian boundary. Above the D/S boundary, the planktic foraminiferal taxa of the praemuricids were gradually replaced by morozovellids, acrininids and igorinids. The clay mineralogy analysis of these sediments indicates alternating periods of humid (high kaolinite) and dry (low kaolinite) climatic conditions during the deposition of the el-Qreiya Bed. Geochemical analyses of samples representing the el-Qreiya Bed and the sediments above and below revealed that the sediments of the el-Qreiya Bed are characterized by high anomalies in chalcophile elements. The trace elements are most probably incorporated into the phosphatic components and organic matter. The sediments around el-Qreiya Bed are normal marine sediments deposited in oxic bottom waters. The sediments of el-Qreiya Bed reflect anoxic/euxinic marine environments and deposition in H2S-containing bottom waters rich in organic matter. It is believed that high productivity and upwelling activity were responsible for such conditions and the sedimentological, mineralogical, geochemical and faunal characteristics of the D/S boundary at Gabal el-Qreiya section.

Keywords:

D/S boundary, el-Qreiya Bed, biostratigraphy, organic-rich sediments, pyrite, chalcophiles, upwelling, environment.

Published In:

N. Jb. Geol. Paläont. Abh. 258/1