Planktic Foraminifera stratigraphy along the Oceanic Anoxic Event OAE2 of the Tunisian Southern Tethys

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Abstract

The Bahloul Formation of northern Atlas Tunisia comprises deep water deposits rich in organic matter that span over the Cenomanian-Turonian boundary and Oceanic Anoxic Event 2. The black shale samples from a 38m thick section at Oued Kharoub section (36○ 2' 21.01" N; 9○ 32' 58.32" E) have been studied for their microfossil content, focusing on planktic foraminifera, in order to obtain a biostratigraphical zonation of the OAE-2 event at the Southern Tethyan margin. Characteristics of the assemblages were studied in detail, to gain insight into paleoenvironmental conditions and paleoecological dynamics. In addition, geochemical data (Total organic carbon) carbonate content and stable carbon isotope data, have been used to further enhance stratigraphic and paleoenvironmental understanding of the vertical stacking pattern of Oued Kharroub facies. Three planktic foraminifera biozones and several secondary associated bioevents could be identified. The base of the section represents the *Rotalipora cushmani* zone (*Dicarinella algeriana* subzone). The assemblages in this zone reflect relatively stable environmental conditions, with at least partly oxygenated bottom waters and abundant and diverse large keeled planktic foraminifera (*Rotalipora, Praeglobotruncana*). The LO of *R. cushmani*, along with the extinction of the genus *Rotalipora* is reported just below the first positive carbon isotope peak. It marks the beginning of the faunal turnover and the *W. archaeocretacea* zone, which spans over 20m in this section. With the extinction of *Rotalipora*, a crisis for keeled, deep dwelling foraminifera could be observed, that persists until the top of the section. One minor return of keeled taxa is reported in the middle of the *W. archaeocretacea* zone just above a silica-rich interval with an acme of radiolaria. Here, transitional forms between *H. praehelvetica* and *H. helvetica* occur, as well as large *Dicarinella*. This has been interpreted as a temporary upward movement of the oxygen minimum zone, which allowed larger keeled species to exist. A prominent development is the proliferation of *Heterohelix* (*Heterohelix* shift). Generally, the planktic foraminifera assemblages of the *W. archaeocretacea* zone in this section are clearly dominated by opportunists and surface dwellers. *Heterohelix*, *Whiteinella* and *Muricohedbergella* make out the vast majority of the PF assemblages. The FO of *H. helvetica* in this section coincides with a slight return of keeled genera (*Dicarinella*, *Marginotruncana*), the marker species however remains very rare. The paleoenvironmental situation during OAE-2 can be defined as highly stressed, with continuous oxygen deficient waters, which preclude the proliferation or even at times rare presence of larger complex morphotypes within the planktic foraminifera genera. The stable isotope excursion lasts from the LO of *R. cushmani* until slightly below the FO of *H. helvetica*. TOC values are elevated with a delay compared to the isotope excursion.

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They correlate with a general decrease of microfossils per gram sediment and a reduction in carbonate in the respective interval especially in the middle part of the *W. archaeocreatea* zone. Benthic foraminifera remain rare and low in diversity throughout the section, although small infaunal forms become more frequent in the upper part of the section (upper *W. archaeocretacea* zone and *H. helvetica* zone). The faunal assemblages remaining OAE-typical until the top of the section, where a *Guembelitria cenomana* acme and highest occurrence of *Heterohelix* occur, raise questions about the local environmental conditions after the OAE-2 and the stratigraphical position of the top of the investigated section interval.

Keywords: OAE2, Cenomanian, Turonian, planktic foraminifera, biostratigraphy, Tunisia