STACKED CYCLIC SEDIMENTARY PATTERNS PRIOR TO THE ARABIAN SHELF COLLAPSE (OLIGOCENE/MIOCENE, OMAN)

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The collision of Africa and Eurasia during the Oligo-Miocene and the resultant closure of the marine passage between the eastern and western Tethys (Terminal Tethyan Event) had far-reaching consequences for the distribution of shallow water areas and the course of ocean currents. It was therefore one of the major events for the distribution and evolution of terrestrial, as well as marine faunas during the Cenozoic. The exact timing of the Terminal Tethyan Event is thus crucial for palaeobiogeographic questions. In this context, the emersion of the Arabian Shelf during the Early Miocene was an important step because of a drastic reduction of shallow-water areas. The collapse of the Arabian Shelf was initiated by the opening of the Gulf of Aden during the Oligocene. At this time an extensive carbonate platform existed on the NE rift shoulder in the area of SE Oman. It emerged during the Early Miocene when rifting had ceased and the rift shoulder was uplifted. However, the exact timing of its subaerial exposure is problematic due to the rarity of age-diagnostic fossils in the restricted shallow-marine environment, as well as the so far poor knowledge of the invertebrate faunas. New taxonomic studies of abundant mollusc faunas and some benthic foraminifers from Oligo-/Miocene sections in SE Oman allow a sequence stratigraphic correlation with the Ru4/Ch1-Ch4/Aq1 lowstands of the Hardenbol et al. (1998) sea-level curve. It shows that the termination of rifting in the Gulf of Aden must be back-dated from the middle Burdigalian to the beginning of the early Aquitanian. Therewith, the area of SE Oman was a primary area that became emerged and produced an early permanent restriction of the marine passage between Africa and Eurasia already during the early Aquitanian.

For the uppermost part of the sedimentary succession that developed immediatly before the final emersion of the platform, a cyclic alternation of inter- (B) and subtidal environments (C) documents a fluctuating relative sea-level at different frequences. Single erosive surfaces with palaeokarst cavities and caliche crusts separate larger B-C segments. They display relative long episodes of subaerial exposure and are interpreted to have been formed during lowstands of 3rd order that emerged the platform. Accordingly, they sandwiched a stack of B-C alternations representing a third order sequence. It is composed of short deepening cycles (allocycles). Each cycle starts with a succession of a high frequency fluctuating B-C stack, in which C members are characterised by their low thickness and a shoaling trend. Therefore they are suggested to represent inferior autocycles that formed during the lowstands of the high order sequences. A thick C member that shows an internal deepening follows above. It developed under rising and high standing sea-level of the higher order sequence TST. Our depositional model possibly explains why peritidal cycles did not occur in older tertiary deposits of the Arabian Shelf in Oman although they comprise shallow marine platform carbonates that are equivalent to the C member in facies. It suggests peritidal cycles could have only developed at the end of the synrift stage when the subsidence rate had so far declined that the platform was elevated into the intertidal zone during sea-level lowstands of higher order.