Geophysical Research Abstracts,
Vol. 11, EGU2009-13006, 2009
EGU General Assembly 2009

Termination of the Arabian shelf sea: stacked cyclic sedimentary patterns and timing (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. In the Janahbah region of southeastern Oman, Oligocene/Miocene limestones of the Shuwayr, Warak and Ghubbarrah formations are widely exposed. They were deposited on an extensive shallow carbonate platform that was part of the Arabian Shelf and located on the Gulf of Aden's northeastern rift shoulder. The uppermost part of the studied sedimentary succession developed immediately before the permanently subaerial exposure of the carbonate platform during the Early Miocene. Cyclic changes of intertidal and subtidal facies document a fluctuating relative sea level at different frequencies and a continuous decline of accommodation space. Single erosive surfaces with palaeokarst cavities and caliche crusts separate larger depositional cycles. These disconformities imply relatively long episodes of subaerial exposure and are interpreted to have been formed during lowstands of third-order sea-level cycles that denuded the platform. Taxonomic studies of the accompanying mollusc faunas and certain benthic foraminifers allow a correlation of the recognised subaerial disconformities with the Ru4/Ch1 to Ch4/Aq1 sequence boundaries of Hardenbol et al. (1998). This demonstrates that the termination of the Arabian shelf sea must be back-dated from the middle Burdigalian to the early Aquitanian.