A multi-proxy chemostratigraphy of the Cenomanian/Turonian transition in Kopet-Dagh basin (NE Iran); implication for oceanic temperature and *p*CO_2 variations

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In a global scale, the Cenomanian-Turonian anoxic event (OAE2) has been characterized by warm climate accompanied by a major sea level transgression. However, chemo- and biostratigraphy studies in the Kopet-Dagh basin (NE Iran) indicate two intervals of low sea surface temperature in the uppermost *Rotalipora cushmani* and *Whiteinella archaeocretacea* biozones, according to *p*CO_2 proxy (difference between $\delta^{13}C_{carb}$ and $\delta^{13}C_{org}$) minima and high $\delta^{18}O$ values. These cold intervals began shortly after episodes of warm sea surface temperature and enhanced burial of organic matter (high TOC contents) and have been attributed to a drop in atmospheric *p*CO_2 level which in turn was caused by enhanced carbon sequestration by black shale deposition. The first cooling interval at onset of OAE2 is recorded throughout the world and called “Plenus cold event” in Europe and “benthic oxic zone” in the proto north Atlantic and Western Interior Seaway of North America respectively. It coincides with positive shift of carbon isotope values both in carbonate and organic matter. A common feature of the two organic-rich sediments intervals (corresponding to warm episodes) in the Kopet-Dagh basin is their low $\delta^{15}N$ values that falls around 0‰ and implies enhanced nitrogen fixation process as a consequence of enhanced productivity and expanded oxygen minimum zone.