



Expression of the Coniacian-Santonian Oceanic Anoxic Event (OAE3) in two potential GSSP sections : Olazagutia, (Spain) and Ten Mile Creek - Arbor Park, (USA)

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During the Cretaceous, episodes of strong anoxia occur in oceanic worldwide domain and are characterized by accumulation of laminated organic carbon rich sediments, which coincide with a positive excursion in $\delta^{13}\text{C}$. The Cenomanian-Turonian OAE2 is the most studied and appears clearly global. In contrast, the Coniacian-Santonian OAE3 is still poorly known and requires multiproxy investigations. This event appears to be more dependant on local conditions than OAE2. Black shales associated with OAE3 were restricted to areas located around the Atlantic Ocean, such as the east tropical Atlantic Ocean, Ghana and Ivory Coast, Venezuela, Brazil and the Western Interior Seaway of North America. Moreover, black shales linked with OAE3 appear to be more restricted to shallow water settings and epicontinental seas. Specifically, our study focus on bulk and clay mineralogy, phosphorus, stable oxygen and carbon isotopes, and high-resolution quantitative micropaleontology to evaluate biotic effects of anoxia, changes in climate and primary productivity. Several sections from different paleogeographic areas at different paleodepths are currently studied.

We investigate in details Coniacian-Santonian (C-S) sections from two potential GSSP sites: Olazagutia (NW Spain) and Ten Mile Creek-Arbor park (Texas, USA) and an additional section located in Sinai, Egypt (Gabal Ekma) which exhibits several layers enriched in organic matter associated with extensive bonebeds. The Ten Mile Creek- Arbor Park composite section consists of interbedded limestones, marlstones and claystones of the Austin Chalk Formation. The occurrence of the inoceramid *Cladoceras undulaticus* marks the C-S boundary. Several bentonite layers have been recognized just above the proposed C-S boundary and may provide a more accurate age. The lower part of the Olazagutia section is characterized by a marly facies, quite poor in macrofauna, but slightly enriched in organic matter overlain by marly limestone beds with very abundant irregular and infaunal echinoids. Inoceramids are very abundant in only one level with *Cladoceras undulaticus*, the marker of the C-S boundary. Both sections show no black shale layers and no $\delta^{13}\text{C}$ positive excursion around the C-S boundary and therefore reflect dysoxic-oxic conditions. The Gabal Ekma section exhibits a mixed siliciclastic/carbonate sediments at the C-S transition. These siliciclastic sediments (sandstone, calcareous quartz arenite) associated with cross-bedded and wave ripples alternate with silty shales and laminated black shales, indicative of dysoxic-anoxic conditions. Above, three bones bed are present and contain vertebrate bones, shark teeth in a phosphatic matrix reflecting period of reduced sedimentation.

Our preliminary data suggests that OAE3 is rarely expressed by truly anoxic conditions and seems to be more linked to local conditions rather than global paleoenvironmental changes.