



Trace-metal and phosphorus contents associated with the Valanginian and the Early Aptian oceanic anoxic event

S. Westermann (1), V. Matera (1), N. Fiet (2), T. Adatte (1) & K. B. Föllmi(1)

(1) Institut de géologie et d'hydrogéologie, Université de Neuchâtel, Emile-Argand 11, 2009 Neuchâtel

(2) UMR 8148 - I.D.E.S. Bât. 504, Université de Paris XI, Orsay, 91405 ORSAY Cedex, France (stephane.westermann@unine.ch)

The Early Cretaceous is characterized by oceanic anoxic events (OAE) (Schlanger and Jenkyns, 1976), which are short-lived periods of marked environmental change documented by organic-rich sediments and variations in the carbon cycle. In this study, we aim at comparing the intensity as well as the lateral and temporal evolution of redox conditions of two major OAE of the Early Cretaceous in the western Tethys: the Valanginian OAE and the Early Aptian OAE. These two events are both marked by a positive excursion in the carbon-isotope curve (1.5 ‰, and 2 ‰, resp.).

We analysed two sections for the Valanginian and three for the Aptian with regards to their trace-metal (TM) distribution and phosphorus (P) content. The sections are located in Malleval, Cassis-La Bédoule, Glaise l'hermitage (SE France), Capriolo and Gorgo a Cerbara (Central Italy).

For the Valanginian OAE, in Malleval, we observe a long-term decreasing P trend during the Early Valanginian, reaching a minimum in the beginning of the Late Valanginian, followed by a general increase in P contents for the *verrucosum* ammonite Zone, i.e., during the maximum in $\delta^{13}\text{C}$ values. More data are needed to confirm this trend. Concerning the TM distribution, our values measured in Capriolo are systematically lower, in comparison to the data of Bodin et al. (2006), who measured the section of Fiume Bosso for the late Hauterivian Faraoni level in a similar pelagic setting (central Italy). We observe three more or less pronounced peaks in the lower part of the section; the first one corresponds to an increase in Mn contents and the two

others occur close to the positive shift in $\delta^{13}\text{C}$ (Lini et al., 1992).

For the Early Aptian event, preliminary results for Cassis-La Bédoule show that a general increase in P contents is coeval with the onset of the early Aptian event, whereas the return to lower values through the first part of the anoxic event may be related to a weakened capacity to retain P in the sedimentary reservoir due to bottom water oxygen depletion. This general pattern is contrasted by the data of Gorgo a Cerbara which show P-enrichments also at the top of the livello Selli. For TM, the data seem to indicate a different behaviour in the two sections analysed (Cassis-La Bédoule and Gorgo a Cerbara). These differences may be related to their paleogeographical setting and a corresponding difference in anoxic conditions. These data should be interpreted with care. In comparing our data with those of Nicolas Fiet (personal communication) differences are present which are due to the type of extraction used. However, our results show that the Livello Selli is characterised by several anoxic phases with intermittent returns to less oxygen depleted conditions.

These first results may indicate that conditions during the Valanginian event were eventually less reducing than those during the Early Aptian event. To complete these results, an analysis of organic-carbon contents and the calculation of C_{org}/P_{react} ratios will be performed to better constrain the palaeoceanographic conditions during these events. Additional TM analyses using another type of extraction will be performed in order to standardize analytical procedures. Finally, we will investigate a further OAE of the Cretaceous: the Cenomanian/Turonian anoxic event.

References:

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