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# Phosphorus and trace-metal records during Cretaceous oceanic anoxic events: Example of the Early Aptian OAE in the western Tethys

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## ► To cite this version:

Stéphane Westermann, Karl B. Föllmi, Virginie Matera, Thierry Adatte. Phosphorus and trace-metal records during Cretaceous oceanic anoxic events: Example of the Early Aptian OAE in the western Tethys. *Carnets de Géologie / Notebooks on Geology*, 2007, CG2007 (M02/03), pp.20-22. hal-00166904

**HAL Id: hal-00166904**

**<https://hal.science/hal-00166904>**

Submitted on 13 Aug 2007

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**Phosphorus and trace-metal records  
during Cretaceous oceanic anoxic events:  
Example of the Early Aptian OAE in the western Tethys**

**[Évolution de la concentration du phosphore et des métaux-traces  
durant les événements anoxiques du Crétacé inférieur :  
exemple de l'événement de l'Aptien inférieur (OAE 1a)  
dans la Téthys occidentale]**

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**Citation:** WESTERMANN S., FÖLLMI K.B., MATERA V. & ADATTE T. (2007).- Phosphorus and trace-metal records during Cretaceous oceanic anoxic events: Example of the Early Aptian OAE in the western Tethys. *In*: BULOT L.G., FERRY S. & GROSHENY D. (eds.), Relations entre les marges septentrionale et méridionale de la Téthys au Crétacé [*Relations between the northern and southern margins of the Tethys ocean during the Cretaceous period*].- *Carnets de Géologie / Notebooks on Geology*, Brest, Memoir 2007/02, Abstract 03 (CG2007\_M02/03)

**Key Words:** Phosphorus; trace metals; Early Cretaceous; Aptian; OAE; redox conditions

**Mots-Clefs :** Phosphore ; métaux traces ; Crétacé inférieur ; OAE ; conditions redox

Global oceanic anoxic events (OAEs) represent exceptional episodes in Earth's history, which are marked by widespread dysoxic to anoxic conditions in world's oceans and which are usually associated with the formation of organic-rich sediments. They are often accompanied by phases of marked evolutionary overturn and extinction, carbonate platform drowning, and shifts in the global carbon cycle (SCHLANGER & JENKYN, 1976; JENKYN, 1980; WEISSERT *et alii*, 1998; FÖLLMI *et alii*, 1994). The goal of the research discussed here is to investigate the phosphorus (P) and redox-sensitive trace-metal (TM) content of a series of representative sections along basin-shelf transects in the western Tethyan realm during the Early Aptian anoxic event.

P is an important and often limiting element in ocean primary productivity. It is closely linked to the carbon (C) cycle by two processes (weathering of continental rocks and photosynthesis). The efficiency of P storage in the sedimentary reservoirs is redox dependent. P regeneration becomes more important in oxygen-depleted bottom waters (INGALL & JAHNKE, 1994; VAN CAPPELLEN & INGALL, 1996; COLMAN & HOLLAND, 2000; EMEIS *et alii*, 2000; TAMBURINI *et alii*, 2002; BODIN *et alii*, 2006). TM concentrations or ratios are used as indicator of redox conditions in modern and ancient

sedimentary systems (CALVERT & PETERSEN, 1993; JONES & MANNING, 1994; WIGNALL, 1994; CRUSIUS *et alii*, 1996; DEAN *et alii*, 1997, 1999; YARINCIK *et alii*, 2000; MORFORD *et alii*, 2001; PAILLER *et alii*, 2002; ALGEO & MAYNARD, 2004; BODIN *et alii*, 2007). TM enrichments have been related to the capacity of organic matter to scavenge TM during its passage through the water column and to their preservation in the sedimentary environment as a function of redox conditions.

We have analysed four sections located in Gorgo a Cerbara (central Italy), Glaise l'Ermitage, Combe Lambert and Cassis La-Bédoule (all SE France) for the Early Aptian event.

The preliminary results in P content suggest that the onset of the Early Aptian event shows a general increase in P contents, 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.

For TM, the data seem to indicate a different behaviour in the two sections analyzed. These differences may be related to their paleogeographical setting and a corresponding difference in anoxic conditions.

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Manuscript online since May 15, 2007

To complete these first results, analysis of organic-carbon contents and the calculation of Corg/Preact ratios will be performed the better to constrain the palaeoceanographic conditions during this event. New TM content analysis using another type of extraction will be done in order to standardize analytical procedures. Finally, we will investigate two other similar periods of the Cretaceous: the Valanginian and the Cenomanian/Turonian anoxic events.

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