

Lower Aptian climate and recording of the oceanic anoxic event 1a on the terrigenous shelf of the Paris Basin.

Jean-François Deconinck^{1*}, Danny Boué¹, Francis Amédéo^{1,2}, François Baudin³, Ludovic Bruneau¹, Emilia Huret⁴, Philippe Landrein⁴, Jean-David Moreau¹ & Anne Lise Santoni¹

¹ Biogéosciences, UMR 6282, uB/CNRS, Université de Bourgogne Franche-Comté, France.

² 26 rue de Nottingham, 62100 Calais, France.

³ IStEP, UMR 7193, SU/CNRS, Sorbonne Université, France.

⁴ Agence Nationale pour la gestion des déchets radioactifs, Centre de Meuse/Haute-Marne, France.

To the east of the Paris Basin, several boreholes were drilled in 2013 by Andra to better characterize Albian and Aptian clayey formations including the “Argiles à Plicatules” dated from the Lower Aptian. One of these borehole (AUB 121) crosses the “Argiles à Plicatules” with an excellent recovery allowing detailed biostratigraphy (ammonites), sedimentology, clay mineralogy, isotope geochemistry ($\delta^{13}\text{C}_{\text{org}}$) and Rock-Eval analyses to be performed. Potentially, this formation encompasses the Oceanic Anoxic Event 1a (OAE1a) which has never been so far identified in the Paris Basin.

In AUB 121 borehole, the “Argiles à Plicatules” consists of a 30 m-thick homogeneous faintly bioturbated khaki clays and silty clays deposited in lower offshore environments except near the base where occasional bivalve shells accumulations are interpreted as storm deposits characterizing shallower upper offshore environments. The occurrence of some ammonites permits to draw a biostratigraphic scheme notably the recognition of the *deshayesi* and the *furcata* Zones.

The clay mineral assemblages are dominantly composed of illite and kaolinite associated with minor amounts of chlorite, vermiculite and smectite. $\delta^{13}\text{C}_{\text{org}}$ values range generally between -24 and -25‰ except in a particular interval located in the lower part of the *deshayesi* Zone characterized by a prominent negative excursion of about -2.5‰ to -3‰, where the C2-C4 isotopic segments preceding the OAE1a can be easily recognized. Surprisingly the interval corresponding to the OAE1a is not significantly enriched in organic matter. However, the $\delta^{13}\text{C}_{\text{org}}$ negative excursion allows the OAE1a to be identified in the Paris Basin where bottom water anoxic conditions were likely insufficiently marked to preserve OM, what could be linked to a low productivity in semi-restricted conditions.

Finally, the C2 to C5 isotopic segments are characterized by the abundance of kaolinite and the absence of smectite suggesting an acceleration of the hydrological cycle and enhanced runoff and/or hydrolyzing conditions over the emerged landmasses just before and during the onset of OAE1a.

Keywords : Aptian, Argiles à Plicatules, Clay minerals, $\delta^{13}\text{C}_{\text{org}}$, OAE1a