Paleocene-Eocene Thermal Maximum consequences on terrestrial environments. Insights from the evolution of organic matter in the Vasterival section (Dieppe-Hampshire Basin, France)

Sylvain Garel[1], Johann Schnyder[1], Jérémy Jacob[2], Mohammed Boussafir[2], Christian Dupuis[3], Jean-Yves Storme[4], Johan Yans[4], Alina I. Iakovleva[5], Emile Roche[6], Claude Le Milbeau[2], Florence Quesnel[7]

[1] ISTEP, Université P. & M. Curie, 4 place Jussieu, 75252 Paris cedex 05, France.
[2] ISTO, Université d'Orléans, 1A rue de la Férollerie, 45072 Orléans, France.
[3] UMONS, GFA, rue de Houdain 9, B-7000 Mons, Belgium
[4] FUNDP, Département de Géologie, 61 rue de Bruxelles, 5000 Namur, Belgium
[5] Geological Institute, Russian Academy of Sciences, 109017 Moscow, Russia
[6] Paléontologie végétale, ULg, Sart Tilman, 7000 Liège, Belgium
[7] BRGM (French Geological Survey), Geology Department, 45060 Orleans, France

The Paleocene-Eocene Thermal Maximum (PETM, 55.8 Ma, Aubry et al, 2007) is regarded as one of the most rapid global warming of the Cenozoic era, with temperature increase of 4–8°C in about 10–20 ka. Thus, it is often proposed as a potential analogue of future climatic conditions expected in the screenplays provided by the International Panel on Climate Change (IPCC). The PETM is recorded in both marine and continental deposits by an abrupt negative Carbon Isotope Excursion (CIE) associated with other sedimentary and biological anomalies. The consequences of the PETM in terrestrial environments are less documented than in marine ones. This limits our regional- and global-scale understanding of the impact of such a climate change on continents and the ecosystems response.

This study focuses on the Vasterival section (Seine-Maritime, Upper Normandy) located in the southern part of the Dieppe-Hampshire Basin, in which the PETM is recorded in the organic matter (OM) by the negative shift in $\delta^{13}C_{org}$ of the CIE, and confirmed by the stratigraphic record in this locality belonging to the Cap d'Ailly composite section (Dupuis et al., 1998). The 2 m thick section, which presents a notably well preserved OM, is mainly constituted by terrestrial sediments from lacustrine to coastal swamp environments and in which OM-poor clays are followed by OM-rich clays, centimetric lignite beds and clays with roots evidences. The uppermost part of the section is constituted by 50 cm thick lagoonal clay with shell debris that records the *Apectodinium* acme.

Global organic geochemical, palynofacies and isotopic analyses were performed on thirty samples. The total organic carbon of this section is ranging from 0.5% for OM-poor-clays to 45% for lignite levels. Lipid biomarkers extracted from twenty five samples were quantified and their hydrogen and carbon isotopic composition were determined by GC-irMS. Important changes in palynofacies, biomarker assemblages and compound-specific isotopic data are coincident with the CIE onset interval. This is consistent with an important environmental modification in the Vasterival area during the Early Eocene that could be linked to the PETM climatic change.