

## The onset of the negative Carbon Isotope Excursion on dispersed organic matter as criterion for the Paleocene-Eocene boundary: uses, biases and limits

Yans J.<sup>1</sup>, Storme J.-Y.<sup>1</sup>, Iacumin P.<sup>2</sup>, Dupuis C.<sup>3</sup>, Gingerich P.D.<sup>4</sup>, Smith T.<sup>5</sup>, Magioncalda R.<sup>6</sup>, Quesnel F.<sup>7</sup>, Steurbaut E.<sup>5</sup>

→ [Johan.yans@fundp.ac.be](mailto:Johan.yans@fundp.ac.be)

1 FUNDP, University of Namur, Department of Geology, rue de Bruxelles, 61, B-5000 Namur, Belgium

2 Department of Earth Sciences, University of Parma, Via Usberti 157/A, I-43100 Parma, Italy

3 UMONS, Faculty of Engineering, rue de Houdain 9, B-7000 Mons, Belgium

4 Museum of Paleontology, University of Michigan, 1514 Ruthven Museums Building, 1109 Geddes Ave., Ann Arbor, MI 48109-1079, Michigan

5 Department of Paleontology, Royal Belgian Institute of Natural Sciences, rue Vautier, 29, B-1000 Bruxelles, Belgium

6 Geonumeric, 145, rue Michel Carré, ZI Les Algorithmes - Bât. Platon, BP 73, F-95100 Argenteuil, France

7 BRGM (French Geological Survey), GEO/G2R, BP 36009, F-45060 Orléans Cedex 2, France

The primary criterion ratified by the International Subcommission on Paleogene Stratigraphy (ISPS) to define the Paleocene-Eocene (P/E) boundary, and the beginning of the Paleocene-Eocene Thermal Maximum (PETM), is the onset of a prominent negative Carbon Isotope Excursion (CIE; Aubry *et al.*, 2007), located in the lower to middle part of Chron C24r, in calcareous nannofossil Zone NP9 and at the base of planktonic foraminiferal Zone E1 of Berggren & Pearson, 2005 (see also Wade *et al.*, 2011), also termed Zone P5 in Aubry *et al.* (2007). Based on cyclostratigraphy, the CIE is estimated to have spanned  $150 \pm 20$  kyr and would reflect a major perturbation of the global carbon cycle. Organic matter (OM) may be judged as a (very) reliable material for isotopic chemostratigraphy, in both marine and terrestrial settings. Here we show several examples of successions (Belgium, Egypt, France, Spain, Tunisia, USA-Wyoming) where:

1. isotopic analyses on OM are necessary to define the P-E boundary (lack of carbonates and/or diagenetic alteration of the isotopic signal on carbonates, including calcitic shells, bulk rocks and pedogenic nodules),
2. organics are probably not the best material to precise the P-E boundary,
3. geological processes, such as hiatuses, and potential reworking of OM in channels and turbidites, may perturb the reliability of the carbon isotope results (on both organics and carbonates).

Aubry M.-P., Ouda K., Dupuis C., Berggren W. A., Van Couvering J.A. and the members of the Working Group on the Paleocene/Eocene Boundary (2007). *The Global Standard Stratotype-section and Point (GSSP) for the base of the Eocene Series in Dababiya section (Egypt)*. Episodes 30/4, pp 271-286.

Berggren W. A., Pearson P. N. (2005). *A revised tropical to subtropical Paleogene planktonic foraminiferal zonation*. The Journal of Foraminiferal Research Volume 35, n°4, pp 279-298.

Wade B. S., Pearson P. N., Berggren W. A., Paelike H. (2011). *Review and revision of Cenozoic tropical planktonic foraminiferal biostratigraphy and calibration to the geomagnetic polarity and astronomical time scale*. Earth Science Reviews, n°104, pp 111-142.