

Carbon organic isotope analysis: methodology and application in stratigraphy

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Most of the chemostratigraphic studies about $\delta^{13}\text{C}$ deal with carbon of carbonates. Shells of the foraminifers or bulk rocks are the most common carbonated supports in marine setting; as pedogenic soil-nodules are for continental setting. The measurement of stable carbon isotope offers a larger range of applications in any kind of environment and constitutes a complementary tool for correlation, especially at the Paleocene/Eocene boundary (P/EB). However, in some section, carbonate rocks lack or diagenetic effects overprinted the rocks and the samples are not suitable for carbonate $\delta^{13}\text{C}$ analysis. The Dababiya section (Egypt), international GSSP of P/EB, the Zumaia (Spain) reference section for P/EB and the Sidi Nasseur section (Tunisia) are eloquent examples. Here we show the limits of $\delta^{13}\text{C}_{\text{carb}}$ methodology when the analysed supports have a low or zero content in CaCO_3 (%). In this case, the $\delta^{13}\text{C}_{\text{carb}}$ isotopic curves usually do not provide a strong negative isotopic anomaly easily identified. On the contrary, the curves issued from the same levels, but based on $\delta^{13}\text{C}_{\text{org}}$, show a stable and progressive decrease of isotopic values followed by a recovery to normal values. The isotopic analyses of the carbon from organic matter (OM) precisely reproduce the CIE in a much more obvious and distinct way than the curve from $\delta^{13}\text{C}_{\text{carb}}$. In this type of section (e.g. Dababiya (GSSP), Zumaia and Sidi Nasseur) $\delta^{13}\text{C}$ analyses must be performed on carbon from OM. However, methodologies used in different laboratories are various, and may influenced results of numerous studies, in the last decade. To obtain reliable measurement results, an accurate and reproducible methodology for the extraction of C_{org} has been developed and would be considered as a reference.