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Assessing the duration and possible causes of the earliest Toarcian carbon isotopic excursion

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The early Toarcian stage (Early Jurassic) records two short-lived events of major faunal turnover and environmental perturbation. The first event (eT-E) occurs during the earliest Toarcian (early Polymorphum chronozone) and has been documented only in a few sites worldwide. The second event, better known as the Toarcian Oceanic Anoxic Event (T-OAE) has been documented in numerous sites from Northern Siberia to Argentina. Both events are marked by negative carbon isotope excursions (CIE) recorded in carbonate and organic substrate. Therefore they are thought to be associated with major changes in carbon cycling. Similarities between the eT-E and the T-OAE thus lead to the conclusion that these events might have been triggered by similar mechanisms. If this is the case, the CIEs associated with both events should have a comparable duration. In order to valid or falsify this hypothesis, it is therefore crucial to constrain the duration of both events. The duration of the T-OAE CIE was assessed in several papers by cyclostratigraphic analyses thanks to favourable outcropping condition. It is however not the case for the eT-E CIE, this latter being often associated with sedimentary condensation or hiatal surfaces. We make use of the high palaeo-subsidence rates of the Lower Toarcian Moroccan shelf leading to extended sections in the High Atlas Basin. The Foum Tillicht section was sampled in increments of 20 cm across a stratigraphic interval of 50 m, covering the Polymorphum chronozone. Carbon and oxygen isotopes analyses were performed on micritic and organic matter. Ammonites and nannofossils biostratigraphy aided in calibrating geochemical analyses. Carbon isotopes data display a rhythmic pattern. Preliminary results indicate that the eT-E negative carbon isotope excursion lasted around 400 kyr.