



Presence of the TOAE in extremely shallow environments from Central Atlas, Morocco: evidence from stable isotopes and mercury

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The Toarcian Ocean Anoxic Event (TOAE) took place in the Early Jurassic (~183 My) and is characterized by the widespread deposition of organic matter-rich black shales in deep basins, and by a negative carbon isotope excursion (NCIE) reflecting profound environmental changes. This event is well documented in the sedimentary record of deeper marine settings, in which the TOAE is marked by the presence of organic-rich shales. However evidence of the TOAE in shallower environments is less documented, mainly due to incomplete sedimentary records, sea-level fluctuations and lack of reliable biostratigraphic markers. Here we present data from a new extremely shallow section in Morocco (Dadès Gorges, Central Atlas), located along the northern Gondwana margin. This section consists of alternating dolomitic limestones and paleosols, which contain clear relicts of dinosaur tracks and sedimentary features, including stromatolites, ripple marks, mud cracks and fossil roots. The chemostratigraphic profiles show a significant increase in mercury (Hg), just below a negative excursion in carbonate $\delta^{13}C$ values (-3‰ , that we attribute to the TOAE, which coincided with several cyclical emersion episodes. These results confirm the presence of the NCIE from the TOAE in the most shallow environments of the Tethys. The observed Hg anomalies are probably linked with the volcanic activity (Karoo Ferrar province). This marker combined with stable isotopes is therefore a very promising correlative tool.