

## **Environmental responses to carbon release during the Toarcian Oceanic Anoxic Event: Insights from the Panthalassa Ocean margin**

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A pronounced excursion in the carbon isotope composition of biospheric carbon and coeval seawater warming during the early Toarcian (~182 Ma) has been linked to the rapid transfer of <sup>12</sup>C-enriched carbon to the oceans and atmosphere. Coupled with this disturbance to the carbon cycle, there is associated evidence for seawater anoxia, an increase in chemical weathering, and ocean acidification. A Euro-centric bias in the distribution of available data means that the precise pattern and expression of the carbon cycle perturbation, and hence its true global significance, is uncertain. In this contribution, we present a new high-resolution geochemical dataset through the early Toarcian Oceanic Anoxic Event from Toyora area, Japan. Organic-rich rocks in this succession were deposited at the margin of the Panthalassa Ocean. We define at high resolution (cm-scale) the precise structure of carbon isotope changes in the succession, and couple these analyses with similarly high resolution organic geochemical and elemental data. Our new data provide compelling evidence that <sup>12</sup>C enriched carbon was effused to the biosphere abruptly (likely sub-millennial scale). Moreover, the data indicate the presence of short-lived, millennial-scale increases in terrestrial organic matter flux and burial, that are broadly coeval with sedimentary structures indicative of high energy conditions in the depositional environment. We attribute these features to transient strengthening of the hydrological cycle and weathering in direct response to carbon release and warming. The new data help to elucidate both the global character and rapidity of climate change during the early Toarcian, as well as the local environmental responses to carbon release and consequent warming.