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Pliensbachian environmental perturbations: precursors of the T-OAE ?

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The Early Jurassic interval is well known for the Toarcian oceanic anoxic event (T-OAE). However, several studies highlight other important climatic and environmental changes prior to this event (Suan et al., 2010; Peti et al., 2016). They were influenced by major paleogeographic perturbations linked to the break-up of the Pangea in addition of likely volcanic events. Indeed, the Central Atlantic Magmatic Province (CAMP) that triggered the End Triassic Mass Extinction event may have been still active during the Early Jurassic (Rühl et al., 2016) and the Karoo-Ferrar Large Igneous Province that occurred during the Early Toarcian may have started during the Pliensbachian (Ivanov et al., 2017). These events are less studied and not completely understood. We studied therefore the 9 Ma interval (Pliensbachian) prior to the Toarcian with the aim to better assess the environmental changes and their potential causes. For that, a wide array of mineralogical and geochemical data from two European sections respectively located in the Wessex Basin (Dorset) and the Lombardian Basin (Breggia) were obtained.

Four correlated negative carbon isotopic excursions are recorded at the Sinemurian/Pliensbachian boundary and in the davoei, margaritatus and spinatum zones intercalated by positive trends. These events coincided with changes within the hydrological cycle in the Dorset section based on the alteration index (CIA) and clay mineralogy and also on environmental perturbations at the Breggia based on oxygen isotopes and phosphorus content. In addition, mercury (Hg) concentrations were determined for the first time in this interval to evaluate potential Hg enrichments and their relation with Late CAMP and Early Karoo-Ferrar volcanisms.

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