Records of organically bound iodine during the Cenomanian–Turonian OAE 2

XIAOLI ZHOU[1], HUGH C. JENKYNS[2] AND ZUNLI LU[1]

[1]Department of Earth Sciences, Syracuse University, Syracuse NY, 13244, USA

[2]Department of Earth Sciences, University of Oxford, Oxford, UK

Oceanic Anoxic Events (OAEs) were characterized by deposition of widespread organic-rich sediments and coeval carbon-isotope excursions (CIEs). Carbonate associated iodine (I/Ca) has been used to indicate local upper ocean redox conditions, demonstrating highly dynamic spatial and temporal patterns at multiple sections recording the Cenomanian–Turonian OAE 2. How the marine budget of iodine as a micronutrient changed during OAEs is an important and intriguing question.

We developed a new method of extracting organically bound iodine (I_{org}) from shale using volumes of sample on the order of tens of milligrams. This method has potential for high-resolution work across thin shale bands. We generated I_{org} and I/TOC records from three OAE 2 sections: at Demerara Rise, equatorial Atlantic, Tarfaya, Morocco and Furlo, central Italy. These results help us to examine: 1) the potential global iodine drawdown by organic carbon-burial during the OAE 2; 2) the possibility of applying I/TOC as a bottom-water redox proxy. Bulk sediment I_{org} values are significantly higher at Demerara Rise than at Tarfaya, regardless of the similar TOC contents. No stratigraphic correlation was found between high I_{org} and high TOC during the OAE 2 at any section. The I/TOC record for Tarfaya shows trends similar to that of I/Ca at the same site, which may suggest vertical expansion of anoxia impinging both surface and bottom waters during the OAE 2, given that I/TOC has been suggested to indicate bottom-water redox conditions in modern anoxic basins.

The fact that I/Ca ratios do not uniformly decrease in different sections during the OAE 2 seems to indicate the decoupling of the iodine cycling and organic-carbon burial. Since the main output of iodine from the ocean is organic-matter burial, temporal records of such a flux may shed new lights on iodine cycling during OAEs.