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Biomarkers and isotopes in the end-Triassic extinction: implications for the $\delta^{13}C_{org}$ record and extinction

C. P. FOX[1] J. H. WHITESIDE[2] P. E. OLSEN[3] X. CUI[4] R. E. SUMMONS[5] K. GRICE[6]

[1]Curtin University, Australia
calum.fox@postgraduate.curtin.edu.au
[2]University of Southampton, UK, j.whiteside@soton.ac.uk
[3]Columbia University, USA, polsen@Ideo.columbia.edu
[4]MIT, USA, xcui@mit.edu
[5]MIT, USA, rsummons@mit.edu
[6] Curtin University, Australia, k.grice@curtin.edu.au

The end-Triassic mass extinction (ETE), one of the largest extinction events of the Phanerozic, was plausibly driven by the Central Atlantic Magmatic Province (CAMP). The CAMP is thought to account for negative excursions in the organic carbon isotope record ($\delta^{13}C_{org}$) that are routuinely used to correlate ETE sections at a global scale. These carbon isotopic excursions (CIEs) are attributed to the dissociation of methane clathrates and/or CAMP intrusions into isotopically-depleted carbon-rich deposits. A focal locality for chemostratigraphic correlations is the SW UK. However, biomarker, compound-specific isotope, and Rock-Eval pyrolysis data of SW UK samples show that the precursor and intial CIEs are not directly related to the CAMP.

The initial CIE, said to represent the extinction horizon, is characterised by sea-level fall and freshening. Environmental changes are accompanied by biomarker evidence for microbial mats (isotopically negative compared to phytoplankton) while compound-specific isotope data supports increased methanogenic activity. Since total organic carbon content in these samples is low, only minor changes in C_{org} input will impact the $\delta^{13}C_{org}$ record. Thus, formation of microbial mats will have large implications for the $\delta^{13}C_{org}$ record. Futhermore, negative $\delta^{13}C_{29}$ *n*-alkane values compared to $\delta^{13}C_{17-19}$ *n*-alkanes, increased terrestrial-derived biomarkers, and change in kerogen type reveal that the precursor CIE is related to terretrial plant input with a negative isotopic signature.

A better candidate for an ETE negative $\delta^{13}C_{org}$ excursion is above the initial CIE in organic-rich paper shales where a Lilliput bivalve assemblage and the last occurrences of conodonts and phytosaurs are observed. Here, biomarkers and fossils show better evidence for CAMP-induced perturbations driving extinction; persistent photic zone euxinia, anoxia, and acidification. Such findings call for more geochemical investigations into ETE sections less affected by changing sea-level and salinity.