Goldschmidt 2023 Abstract
https://doi.org/10.7185/gold2023.16119

Geochemistry and fossil record of the end-Triassic event: a holistic view from a single site

JÓZSEF PÁLFY[1,2], ATTILA DEMÉNY[3], JÁNOS HAAS[1], BERNÁT HESZLER[1], JOACHIM KATCHINOFF[4], EMMA BLANKA KOVÁCS[5], LÁSZLÓ PALCSU[6], NOAH J. PLANAVSKY[4], ANNA SOMLYAY[1,7], ZSOLT VALLNER[1] AND NORBERT ZAJZON[8]

[1]Eötvös Loránd University
[2]ELKH-MTM-ELTE Research Group for Paleontology
[3]Research Centre for Astronomy and Earth Sciences
[4]Yale University
[5]Trinity College Dublin
[6]Institute for Nuclear Research
[7]ETH Zürich
[8]University of Miskolc

Presenting Author: palfy@elte.hu

The end-Triassic event (ETE) is the epitome of rapid global environmental and biotic change in deep time: a major mass extinction that is linked to environmental crises through geochemical anomalies. Volcanism of the Central Atlantic Magmatic Province (CAMP) is widely regarded as its plausible trigger. Here we review the holistic, multimethod study of a single site, the marine carbonate succession that spans the Triassic-Jurassic boundary (TJB) at Csővár (Hungary).

Ammonites furnish biostratigraphic evidence of the TJB and the extinction of conodonts signal the ETE locally. Microfacies studies characterized the continuous carbonate deposition within an intraplatform basin. Cyclostratigraphic analysis of multielement data led to the development of a robust astrochronology of the section that spans 2.9–3.0 Myr. This age model is a prerequisite for geochemical modeling and provides a basis for reconstructing the timing of environmental and biotic changes. A negative carbon isotope excursion (CIE) was recognized early on at the TJB, and subsequent analyses confirmed the initial CIE, a promising, albeit controversial means of chemostratigraphic correlation and record of a major carbon cycle perturbation. Its synchrony with the biotic event is manifest in coincident spikes of spores and prasinophyte algae, signaling terrestrial and marine ecosystem perturbation. Linkage to CAMP volcanism is established by a major Hg spike and slight enrichment of REE. Persistent negative Ce anomaly indicates locally oxygenated waters, yet recognition of a prominent shift in uranium isotopes suggests a spread of marine anoxia globally. Peak anoxia inferred from $d^{238}U$ postdates the extinction but likely delayed biotic recovery. A significant negative shift in $d^{7}Li$ reveals a major increase in continental weathering intensity across the TJB. Recently obtained $^{87}Sr/^{86}Sr$ data allow a highly resolved strontium isotope stratigraphy and help interpretation of changes in the weathering regime.

Further opportunities exist to employ additional and novel geochemical proxies and modeling. Correlation with other sections that represent different depositional and paleogeographic settings allows us to develop a global perspective. Our case study demonstrates the utility of a holistic approach and validates the ETE as a prime example of LIP-driven global events that led to major perturbations of biogeochemical cycles and a mass extinction.