

Biotic extinction at the Norian/Rhaetian boundary (Upper Triassic): geochemical and isotope evidence of a previously unrecognised global event

MANUEL RIGO¹, TETSUJI ONOUE², HONAMI SATO²,
YUKI TOMIMATSU², KATSUHITO SODA³, LINDA
GODFREY⁴, MIRIAM KATZ⁵, HAMISH J. CAMPBELL⁶,
LYDIA TACKETT⁷, MARTYN GOLDING⁸, JERRY LEI⁹,
JON HUSSON⁹, MATTEO MARON¹⁰, SARA SATOLLI¹⁰,
MARIACHIARA ZAFFANI¹, GIUSEPPE CONCHERI¹,
ANGELA BERTINELLI¹¹, MARCO CHIARI¹² AND
LAWRENCE TANNER¹³

¹University of Padova

²Kyushu University

³Kochi University

⁴Rutgers University

⁵Rensselaer Polytechnic Institute

⁶GNS Science

⁷North Dakota State University

⁸Geological Survey of Canada Vancouver

⁹University of Victoria

¹⁰G. d'Annunzio University of Chieti-Pescara

¹¹University of Perugia

¹²CNR

¹³Le Moyne College

Presenting Author: manuel.rigo@unipd.it

The latest Triassic was an interval of prolonged biotic turnovers culminating in the so-called End-Triassic Extinction. We attribute onset of this interval of declining diversity to unusually high volcanic activity at the Norian/Rhaetian boundary (NRB) that may have initiated the stepwise extinctions of the Late Triassic [1]. We correlate the initiation of a rapid decline in ⁸⁷Sr/⁸⁶Sr and ¹⁸⁷Os/¹⁸⁸Os seawater values [2, 3] to a negative organic carbon isotope shift, which we attribute to volcanogenic CO₂ outgassing to the ocean-atmosphere system by the Angayucham large igneous province (LIP). By studying the geochemical and isotope composition of bulk rocks from different sections located at different latitudes, sides of the Pangea continent and Hemispheres, we documented an accelerated chemical weathering due to global warming by elevated CO₂, which enhanced nutrient discharge to the oceans and thus greatly increased biological productivity; higher export production and oxidation of organic matter led to oceanic dysoxia to anoxia at the NRB. Biotic consequences of these climatic and environmental changes include severe extinctions of several fossil groups, such as ammonoids, bivalves and radiolarians, as has been documented worldwide [1].

[1] Rigo et al. (2020), *Earth-Science Reviews* 204, 103180

[2] Callegaro et al. (2012), *Terra Nova* 24, 130-135

[3] Nozaki et al. (2019), *Journal of Asian Earth Sciences* 1,