

Permian-Triassic mass extinction – a carbon-driven climatic and biogeochemical collapse

DR. HANA JURIKOVA^{1,2}, DR. MARCUS GUTJAHR²,
KLAUS WALLMANN², SASCHA FLÖGEL², VOLKER
LIEBETRAU², RENATO POSENATO³, LUCIA ANGIOLINI⁴,
CLAUDIO GARBELLI³, UWE BRAND⁵, MICHAEL
WIEDENBECK⁶ AND ANTON EISENHAUER²

¹University of St Andrews

²GEOMAR Helmholtz Centre for Ocean Research Kiel

³Università di Ferrara

⁴Università di Milano

⁵Brock University

⁶GFZ German Research Centre for Geosciences

Presenting Author: hj43@st-andrews.ac.uk

The Permian-Triassic mass extinction (approximately 251.9 million years ago) is the most severe environmental and biotic crisis identified in the geological record that marked the turning point for evolution of life on Earth. To date, however, its exact causes and consequences still remain highly controversial. Magmatism from the large igneous province (LIP) Siberian Traps was contemporaneous with the extinction and is thought to have played an important role, however, how a long-lived LIP could have led to such a sudden and rapid catastrophe of the observed magnitude has been challenging to reconcile. Combining new boron isotope-derived seawater pH estimates, global carbon isotope records and innovative geochemical modelling, we present a comprehensive biogeochemical reconstruction which illuminates the underlying mechanisms that resulted in the largest Phanerozoic mass extinction. We show that a LIP intrusion into organic-rich sediments led to an unprecedented CO₂ release to the atmosphere, setting off a chain of profound climatic and chemical changes that ultimately made a large part of the oceans inhospitable to life [1].

[1] Jurikova H., *et al.* (2020), *Nature Geoscience* 13, 745–750, <https://doi.org/10.1038/s41561-020-00646-4>.