BIODIVERSITY COLLAPSE AND SHIFTS IN COMMUNITY STRUCTURE DURING THE PERMIAN-TRIASSIC MASS EXTINCTION

Baran Karapunar[1], William Foster[2], Stella Buchwald[2], Andrej Ernst[2], Anja Frank[2], Mónica Alejandra Gómez Correa[2], Müjde Gürsoy[3], Hans Hagdorn[4], Erdal Kosun[5], Colin Sumrall[6], Jeffrey Thompson[7], Ben Thuy[8], Alexander Dunhill[1]

[1]School of Earth and Environment, University of Leeds, Leeds, LS2 9JT United Kingdom
[2]Universität Hamburg, Institute for Geology, 20146 Hamburg, Germany
[3]MTA General Directorate of Mineral Research and Exploration, Natural History Museum, 06530 Çankaya, Ankara, Türkiye
[4]Muschelkalkmuseum, Schloss-Str. 11, 74653 Ingelfingen, Germany
[5]Department of Geological Engineering, Akdeniz University, 07058 Antalya, Türkiye
[6]Department of Earth and Planetary Sciences, University of Tennessee, Knoxville, TN, USA
[7]School of Biological Sciences, The University of Southampton, Southampton, SO17 1BJ, UK
[8]Natural History Museum Luxembourg, Department of Palaeontology, 2160 Luxembourg, Luxembourg

Corresponding Author e-mail: B.Karapunar@leeds.ac.uk

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The Permian-Triassic mass extinction (PTME) was the largest biotic crisis in the Phanerozoic and significantly altered the composition and structure of marine communities. Our knowledge of community-level response across the PTME is limited to just a few well-studied sections, and changes in trophic structure have only been inferred for a single marine community from South China. Herein we analysed the newly collected Changsinghian–Spathian samples from Türkiye to show how shallow water marine communities were affected during the PTME at low palaeolatitudes and modelled trophic structure in the well-sampled Dolomites (Italy) and Meishan (Zhejiang, China) successions based on the most comprehensive species-level compilations. New samples from Türkiye (Antalya, Konya) indicate an abrupt shift in faunal composition with the dominance of the Palaeozoic evolutionary fauna (brachiopods, echinoderms, bryozoans, bellerophontids) in Changhsingian being replaced by the modern evolutionary fauna (bivalves, modern gastropod groups) at the Permian-Triassic boundary, consistent with global patterns. The trophic community analyses from the Dolomites and Meishan show that the low diversity post-extinction communities became more densely connected and had less competition. Diversity and trophic structure were analysed at the finest temporal resolution using the bed-by-bed compilation of Changhsingian–Griesbachian species occurrences from Meishan. The major shifts in trophic structure occurred after a substantial loss of biodiversity in Meishan (beds 23–28). Contrarily to the common presumption that higher trophic levels are more vulnerable to extinction, the lowest trophic levels (detritus and filter feeders) were selected against during the PTME, supporting benthic deoxygenation and decline in primary productivity as main causes. Despite significant reductions in species richness and functional redundancy (within-guild richness), different trophic levels persisted, and food webs did not entirely collapse. This corroborates that the Skeleton Crew Hypothesis, originally proposed to explain the persistence of ecological guilds at the global scale, also explains community-level ecological dynamics.

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Suggested Sessions for the Talk: General session G3: Changing Ecosystems