Global mercury cycle during the end-Permian mass extinction and subsequent Early Triassic recovery

LAISHI ZHAO[1], XIANGDONG WANG[1], HE ZHAO[1], PETER A. CAWOOD[2], STEPHEN E.GRASBY[3], ZHONG-QIANG CHEN[4], LEI ZHANG[1]

[1] State Key Laboratory of Geological Processes and Mineral Resources, China University of Geosciences (Wuhan), Wuhan 430074, China
[2] Monash University, Victoria 3800, Australia
[3] Geological Survey of Canada, Natural Resources Canada, Calgary, Alberta T2L2A7, Canada
[4] State Key Laboratory of Biogeology and Environmental Geology, China University of Geosciences, Wuhan, 430074, China

The end-Permian mass extinction (EPME) at ~252Ma was the most severe extinction in the Phanerozoic. Marine ecosystems devastated by the EPME had a highly prolonged recovery, and did not substantially recover until after the Smithian–Spathian substage boundary (SSB) of the Lower Triassic. To investigate the relationship between STLIP and extinction/recovery processes on a global base, we examined mercury chemostratigraphy, including mercury concentrations and isotopes, from high southern latitude and equatorial sections that span the Late Permian Changhsingian to Early Triassic Spathian substage successions. Hg/TOC values are dramatically elevated approaching the EPME horizon and maintain high values until the lower *Isarcicella Isarcica* conodont zone, the base of which is believed to be the end of the mass extinction. The high Hg/TOC values with positive Δ^{199}Hg values indicate a predominant atmospheric-derived signature of volcanic Hg. In the stratigraphically overlying beds, Hg/TOC generally displays lower values with slight fluctuations through the sections. These fluctuations are likely related to the increased terrestrial Hg influx associated with strong chemical weathering in the Early Triassic, as shown by a positive correlation between the contents of Hg and Al, and by less positive Δ^{199}Hg values in Early Triassic samples. Our data suggest a global impact of STLIP eruption during the EPME, while there is no evidence of potentially renewed STLIP volcanism in the Early Triassic.