Sources and magnitude of Hg loading during the Permian-Triassic transition, Buraydah section, Saudi Arabia

S.V. GEORGIEV[1], H.A. ELTOM[1]

[1]Geology Department, King Fahd University of Petroleum and Minerals, Dhahran, Saudi Arabia
georgiev@kfupm.edu.sa (*presenting author)

The Late Permian mass extinction (LPME) was caused by rapidly deteriorating environmental conditions that are marked by significant and often long-lasting geochemical changes recorded in sediments near the Permian-Triassic boundary (PTB). Perhaps most prominently, the LPME interval coincides with a major shift in the isotopic composition of carbonate carbon toward lower values. The partly coeval emplacement of the Siberian Traps is the most commonly invoked (and likely) trigger for the LPME and the source of isotopically light carbon. However, a sizeable part, or even all of the carbon isotopic excursions may have been caused by other mechanisms. Decades of intense research have shown little conclusive geochemical evidence directly linking the LPME with the Siberian traps.

Elevated mercury concentrations identified in several PTB sedimentary sections represent perhaps the most telling geochemical proxy directly linking volcanism to extinction. These Hg peaks are generally thought to reflect increased contribution of volcanic Hg to the atmosphere and from there into the ocean. However, some of the Hg loading may also be related to increased continental runoff.

A PTB outcrop section near Buraydah, central Saudi Arabia, exposes a mixed carbonate-siliciclastic succession, part of the regionally extensive Khuff Formation. The studied PTB sediments were deposited in a coastal to shallow marine environment on the Gondwanan margin facing the south Neotethys Ocean. We use the detailed sedimentology of this section[1] together with new major and trace metal contents and amount and type of organic matter to characterize the depositional conditions of the sediments and trace redox changes across the extinction interval and the PTB. Combining these results with Hg contents and Hg/TOC ratios, we evaluate the sources, magnitude, and temporal changes of Hg inputs for a number of near-coastal environments. Detailed comparisons with Hg data from other PTB sections improve regional correlations and add to the interpretation of globally identified geochemical signals across the PTB.

[1] Eltom et al. (2018), P-cubed 472, 203–215.