Multiple S isotopes and Hg geochemistry at the terrestrial Permo-Triassic mass extinction

J. DAL CORSO[1,2]*, R.J. NEWTON[1], D. CHU[2], P.B. WIGNALL[1], A.L. ZERKLE[3], M.W. CLAIRE[3], T. DI ROCCO[3], T. HE[1], T.A. MATHER[4], B.J. W. MILLS[1], R.A. JAMIESON[1], J. TONG[2]

[1]School of Earth and Environment, University of Leeds, Leeds, UK. (*J.DalCorso@leeds.ac.uk)

[2]State Key laboratory of Biogeology and Environmental Geology, China University of Geosciences, Wuhan, China.

[3]School of Earth and Environmental Sciences and Centre for Exoplanet Science, University of St Andrews, St Andrews, UK

[4]Department of Earth Sciences, University of Oxford, South Parks Road, Oxford, UK

The Permian – Triassic mass extinction (PTME) is the most severe known biological crisis of the Phanerozoic. The PTME was coincident with the eruption of the Siberian Traps Large Igneous Province and is thought to have been triggered by the volcanic gases injected into the atmosphere–ocean system. A series of abrupt environmental changes are observed in the geological record. The vast majority of the studies on the PTME are focused on marine environments but less is known about the terrestrial PTME and its causal and temporal links with Siberian Traps volcanism. Here we report a set of new geochemical data, including organic C-isotope, TOC, Hg, and multiple S-isotope data, from lacustrine successions in Xinjiang (Northwest China) and coastal-lagoonal successions in western Guizhou – eastern Yunnan (South China). Data were modelled to constrain the observed geochemical changes. A negative C-isotope excursion is coincident with the terrestrial extinction in the studied sections. Hg shows an abrupt peak that occurs slightly after the onset of the negative CIE, similarly to what observed in the marine records. The multiple S-isotope data of total-S and palaeosol-carbonate-associated sulfate suggest the addition of volcanic S into the terrestrial depositional environments. The new geochemical data help understanding the temporal and cause-and-effect relationships between the eruptions of the Siberian Traps and the terrestrial PTME, shedding new lights on our understanding on the collapse of the terrestrial ecosystems.