The Permian–Triassic boundary: insights from Hg isotopes

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Mass extinctions marked some Phanerozoic chronological boundaries and were probably linked to catastrophic events. Hg/TOC spikes across the Permian–Triassic and Cretaceous–Paleogene transitions that may have resulted of Hg loading from volcanism and/or asteroid impact point to possible link between extinction and contemporaneous volcanism /asteroid impact.

In the GSSP for the P–T boundary at Meishan, China, two Hg/TOC peaks are observed in the extinction interval (beds # 25 through 28), bracketed by volcanic ashes. The largest one (350 $ng.g^{-1}$) is in bed # 25 and the other one (140 $ng.g^{-1}$) in bed# 26, favoring a link between the end-Permian and early Triassic mass extinctions (EPME and ETME) and Siberian Trap activities. The well-known PTB sections at Hovea-3 (Australia), Ursula Creek (Canada), Idrijca Valley (Western Slovenia) and Rizvanusa (Croatia) show Hg/TOC peaks at the EPME and the Permian–Triassic boundary (PTB). The Rizvanusa section also shows a Hg/TOC peak at the ETME.

In a $\delta^{202}Hg$ vs $\Delta^{201}Hg$ diagram, 75% of the analyzed samples plot within the volcanic-emission box. All samples from Meishan (5) cluster within this box and same happens with samples from Rizvamusa (3), likely suggesting one same Hg source in each case with negligible Hg isotope fractionation during Hg atmospheric transport. Small positive $\Delta^{201}Hg$ favors long-term atmospheric transport and may support Hg loading to the environment by the Siberian Traps in three distinct episodes.

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