The Permian–Triassic and Cretaceous–Paleogene boundaries: insights from Hg chemostratigraphy and Hg isotopes

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Mass extinctions which marked the P/Tr and K/Pg transitions were probably linked to catastrophic events. Hg/TOC spikes across these two transitions allow exploration of possible link between mass extinction and synchronous LIP volcanism.

In the GSSP for the P/Tr boundary at Meishan, China, two Hg peaks are observed at the mass extinction interval (EPME and ETME), bracketed by volcanic ash layers. The largest peak (350 ng g^{-1}) is in the top of bed 24 (24E) and the other one (140 ng g^{-1}) within bed # 26. Two Hg/TOC peaks were recorded in the Hovea-3 (Australia), Ursula Creek (Canada) and Rizvamusa (Croatia) sections, the largest one synchronous to the EPME and the smaller (about 30 cm above), to the P/Tr boundary. The largest Hg/TOC peak is perhaps linked to the main pulse of the Siberian Trap volcanism and the second one, to a second pulse or it is simply of secondary origin. Three Hg/TOC spikes are present in the K/Pg sections of Stevns Klint, Denmark; Gubbio, Italy; Um Sohringkew, India and Poty, Brazil: (a) spike I within the CF2 planktic foraminiferal biozone, (b) spike II at the K/Pg boundary layer, and (c) spike III, within the P1a planktic foraminiferal subzone, perhaps corresponding to the DAN-C2 event of Quillévéré et al. (2008). The spike II has, perhaps, resulted from Hg loading from an asteroid impact and/or Deccan volcanism. In a δ^{202}Hg vs Δ^{201}Hg plot, samples from the spike II and from Bidart-France lie within the Hg volcanic emission box. Samples from spikes I and III from Bidart lie within the volcanic emission/chondrite box. Small positive Δ^{201}Hg favors long-term atmospheric transport and supports Hg loading to the environment by Deccan phase-2 in three episodes.

Quillévéré et al (2008). EPSL 265, 600-615