

High-resolution sedimentary mercury records spanning the Cretaceous/Paleogene boundary from a western North American latitudinal transect

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The end-Cretaceous mass extinction event at the Cretaceous/Paleogene (K/Pg) boundary is linked to significant environmental disruptions on geologically short timescales. The two leading hypotheses of what triggered this extinction are either an asteroid impact or the influence of Deccan Traps volcanism. Global sedimentary mercury enrichments from predominantly marine stratigraphic sections have been argued to reflect increased Hg loading through enhanced atmospheric fallout of volcanic-derived mercury. Biogeochemical feedbacks to an asteroid impact and large-scale volcanism, such as those associated with the ECME, can also result in enhanced accumulation of Hg in sediments. Due to the known processes that can enrich marine sediments in Hg other than direct volcanic outgassing, terrestrial environments with high accumulation rates have the potential to represent higher-fidelity archives of atmospheric deposition of mercury, which may yield insight into the ultimate cause of sedimentary Hg enrichments across the K/Pg boundary.

This study reconstructs Hg accumulation in terrestrial environments (representing floodplains, ponds/lakes, and swamps) during the latest Cretaceous and earliest Paleogene from a suite of study locations (outcrops and drill core) in western North America that span approximately 9° latitude. Mercury concentrations are paired with total organic carbon (TOC) concentrations from locations spanning from northeastern New Mexico to southwestern North Dakota to assess the chemostratigraphic morphology of Hg/TOC within this transect. This allows us to better interpret the controlling mechanisms of Hg deposition during the study interval from geologic archives that preserve some of the highest known sediment accumulation rates during the latest Cretaceous to earliest Paleogene. In general, Hg concentrations are highest in the microspherule and clay layer associated with the K/Pg boundary as well as lignite and coal deposits above and below the K/Pg boundary. Therefore, there is a distinct possibility that K/Pg boundary sedimentary Hg enrichments are the product of an asteroid