

On impact and volcanism across the Cretaceous/Paleogene mass extinction: A new, high-resolution sedimentary mercury record from Lahti Butte, South Dakota, USA.

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The putative drivers of the end-Cretaceous mass extinction (ECME) at the Cretaceous/Paleogene (K/Pg) boundary are highly controversial due to uncertainty in the timing and relative importance of volcanogenic outgassing associated with the Deccan Traps igneous province, which was active from the end of the Cretaceous through the early Paleocene. The K/Pg boundary is marked by elevated concentrations in elements such as iridium and mercury (Hg) in sediments on a global scale. Sedimentary Hg enrichments, predominantly from marine environments, have been used to determine the relative timing of Deccan Traps volcanism across the Late Cretaceous and early Paleogene. In marine settings, however, there are several biogeochemical processes other than volcanism that can lead to sedimentary Hg enrichments. Terrestrial environments across the North American Interior preserve some of the highest-resolution archives of environmental and biological change across the K/Pg boundary. This study examines the chemostratigraphic morphology of sedimentary Hg and total organic carbon (TOC) concentrations of ~77 meters of Upper Cretaceous Hell Creek Formation and early Paleogene Fort Union Formation at Lahti Butte, South Dakota in the Williston Basin.

The sediments at Lahti Butte are dominated by sandstone, siltstone, mudstone, and lignite/coal seams, interpreted as mostly fluvial, floodplain, and swamp environments. In addition to geochemical data, high-resolution drone surveys and hand-held photogrammetry have been used to provide a digital twin for the surface landscape. Mercury concentrations range from ~15 - 1,100 ng/g, with elevated values in the organic-matter rich facies. We will discuss the implications of these sedimentary Hg/TOC data on the interpretation of environmental changes that occurred in the Late Cretaceous and early Paleogene in the western United States as a consequence of the bolide impact and volcanism.