

Mercury Enrichment Associated with Local Volcanism: A Triassic example relevant to LIPs

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Mercury (Hg) enrichment in the deep time sedimentary record is often used as a proxy for large igneous province (LIP) volcanism, because extant volcanism is one of the few non-anthropogenic sources of Hg in the modern environment, and Hg has a geologically short residence time at the surface. However, existing studies are equivocal as to whether Hg enrichment from smaller-scale, non-LIP eruptions can also be preserved, with few studies examining time intervals when no active LIPs are known. To address whether local volcanism can affect the sedimentary Hg record, we studied a Triassic fluvio-lacustrine sequence with multiple tuff horizons from the Ischigualasto-Villa Unión rift basin of northwestern Argentina. This allowed us to determine: a) whether any Hg enrichment was present; b) if these enrichments are directly associated with volcanic events (i.e., tuff layers); and c) whether depositional style played a role in Hg preservation in the lacustrine Los Rastros Fm versus the overlying fluvial Ischigualasto Fm. We analyzed siliciclastic sediments and tuffs for Hg concentration, total organic carbon content (TOC), and organic carbon stable isotope ($\delta^{13}\text{C}_{\text{org}}$) values. Our data demonstrate multiple Hg enrichments (normalized against TOC) directly associated with tuffs in the Los Rastros Fm. In contrast, there was no evidence for Hg enrichment associated with volcanism in the Ischigualasto Fm., where sediments typically had very low TOC. These data suggest that local small-scale volcanism can be preserved as Hg enrichment in non-marine sediments as long as conditions were sufficient to preserve organic matter. As such, precise age constraints may be necessary to confidently associate sedimentary Hg enrichments with penecontemporaneous LIPs in the geologic record.