Cr isotope response to OAE 2 recorded in the Eagle Ford Formation, Western Interior Seaway

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Chromium is a redox sensitive element with mass dependent fractionations that reflect changes in its oxidation state. Cr(VI) is the dominant oxidation state of Cr in the oceans where it forms the soluble chromate oxyanion. In biologically active regions of the oceans, Cr(VI) is susceptible to reduction to Cr(III) species, which are less soluble and, thus, prone to scavenging and removal by sinking particles. Reduction favors enrichment of the light Cr isotopes in Cr(III). Therefore, in settings where the produced Cr(III) is removed, the residual pool of Cr(VI) is shifted to higher δ^{53}Cr values. Opening up the possibility of using Cr isotopes as paleo-redox proxy. Expanding ocean anoxia in the geological past should correlate increased sedimentary δ^{53}Cr values in marine sediment. However, a test of this prediction, performed on a carbonate succession in the Western Interior Seaway deposited during Ocean Anoxic Event 2 (OAE2), found that sedimentary δ^{53}Cr values decreased during the period of increased ocean anoxia rather than increase as expected. This finding was attributed to submarine eruptions of the Caribbean Large Igneous Province, the proposed trigger for OAE2, which delivered large quantities of isotopically light Cr(III) and other trace metals to the oceans from hydrothermal weathering of basalt at the eruption site. Here, we present a new high-resolution record of δ^{53}Cr changes during OAE2 in the Iona-1 core of the Eagle Ford Formation in the Western Interior Seaway. Our results, thus far, show the same negative excursion in δ^{53}Cr values during OAE2 reported in the earlier study of the Portland#1 Core, with one important difference, the excursion appears to start lower in the section, coincident with the shift to mantle-like ^{187}Os/^{188}Os ratios signaling the onset of massive submarine volcanism. In the Portland #1 core, the negative shift in δ^{53}Cr appears to begin after the onset of volcanism, but the Portland record is complicated in this interval a possible sedimentary hiatus and by significant detrital Cr corrections. We adopted for this study a new dissolution technique that greatly minimizes the size of the detrital correction, resulting in a cleaner record of sedimentary δ^{53}Cr changes surrounding the onset of OAE2.