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# Chromium burial in continental margin sediments

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Chromium (Cr) is a redox sensitive trace metal and its variations in concentrations and isotope compositions ($\delta^{53}Cr$) in sedimentary rocks have been used to reconstruct past ocean chemical conditions. However, little is known about the transformations Cr is undergoing during early diagenesis and the mechanism by which it is incorporated into the marine sedimentary record. Here, we investigate Cr concentrations and isotope compositions in pore fluids and sediments to examine the effect of early diagenesis on Cr burial. Our study sites target the California and Mexico continental margins, which span a range of marine and sedimentary chemical conditions. In particular, these sites exhibit a range in bottom water oxygen concentrations from <0.1 to 130 µM, and in organic carbon burial rates from 0.08 to 8.4 mmol $m^{-2}$ $d^{-1}$. Additionally, two stations show high solid Mn concentrations (up to 2.3 %) near the sediment surface.

Under sulfidic, organic-rich sedimentary conditions, dissolved Cr in pore fluids increases with depth (>50 nM), which we interpret as Cr release from decomposing organic matter. In contrast, under oxic, organic-poor conditions, with low to high Mn concentrations, dissolved Cr typically remains below 10 nM. Hence, reductive dissolution of Mn oxides does not appear to release dissolved Cr. Preliminary d53Cr values in sediment extracts (1 M HCl) are highest (nearly 1 ‰) in reducing organic-rich sediments, whereas the $\delta^{53}Cr$ values at our other study sites are lower, with an average value of approximately 0.2 ‰. Collectively, our data suggest that organic matter burial and potentially the presence of Mn oxides play key roles in setting the Cr isotope sedimentary record.