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Understanding the chromium isotope system: Filling the gaps between the water column and the sediment

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During the last two decades, the chromium (Cr) isotope system ($\delta^{53}Cr$) gained attention as a tool to track changes in biogeochemical conditions, and particularly in O_2 availability. Passing through the different phases of the "Elderfield Curve" [1], the scientific community has not yet agreed on the utility of this isotope system – analysis and interpretation of Cr isotopes are challenging, and key connections between Cr reservoirs are poorly resolved.

Understanding the Cr isotope system in modern marine environments is crucial to use it as a paleo proxy. New findings from seawater and sediment systems slowly start to fill in information of how Cr from the water column is preserved in the sediment (e.g., [2]), and controls on sediment-water fluxes in reducing Cr-rich sediments, which regulate Cr burial efficiency [3]. However, gaps in knowledge remain not only regarding transformations and cycling of Cr in the water column, but also in sediments. Furthermore, studies combining seawater and sediment data are rare. The lack of such data is at least partially caused by the separation of disciplines, typically focusing on either seawater or sediment samples, despite the clear limitations this presents to progress for the community as a whole.

We collect insights from both communities: what did not work and why, what is missing, and how these gaps can be filled.

References

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