

Oxidative weathering in the Late Neoproterozoic: Cr-isotopes in the Banda Alta Fm. iron deposit, Brazil

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Fractionated Cr-isotope signatures in Iron Formations (IF) have been interpreted as an indicator for oxidative weathering of the continents. This study complements a previous study of the IF pertaining to the Late Neoproterozoic Banda Alta Formation (Jacadigo Group, Matto Grosso do Sul, Brazil), with samples from a drill core, circumventing the potential effects of modern weathering. IF from the Banda Alta Fm. has been reported to exhibit a strong, positively fractionated Cr-isotope signature ($\delta^{53}\text{Cr} = 1.1 \pm 0.4\%$; 2σ ; $n=16$; [1]), interpreted as the result of oxidative continental weathering. Pure hematite bands from drill core samples show linear LREE depleted shale normalized Rare Earth Element + Yttrium (REY) patterns that lack Eu/Eu^* , and have negative Ce/Ce^* and super-chondritic to near-chondritic Y/Ho . With the exception of the near-chondritic Y/Ho , the REY patterns have features consistent with modern seawater. The negative Ce/Ce^* suggest the presence of oxygen in the water column, allowing complete Cr removal through reductive Fe-co-precipitation. The new drill-core based Cr-isotope signatures agree with those published for surface outcrop samples and are consistently positively fractionated across the measured section ($\delta^{53}\text{Cr} = 0.81 \pm 0.28 \%$; 2σ ; $n=30$). This further supports a stable and constant supply of continentally derived Cr(VI) at the time of deposition, implying high atmospheric O_2 levels in the late Neoproterozoic.

[1] Frei et al. (2017) *Gondwana Research*, 49, 1–20