Geochemical reconstruction of the Neoproterozoic Urucum habitat

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Marine chemical sediments from the Urucum Iron and Manganese Formation (IF/ MnF), Brazil, are unique targets to reconstruct the environmental conditions of Neoproterozoic habitats. We here present rare earth and yttrium (REY) and Sm-Nd isotope data of chemical and clastic sediments as well as igneous rocks from the Urucum region to reconstruct the ancient environmental conditions in the fate of severe glaciogenic epochs.

Shale-normalised REY patterns (subscript SN) of *pure* chemical sediments are similar to those of modern seawater and show positive La_{SN} and Gd_{SN} anomalies, enrichment of heavy relative to light REY_{SN}, negative Ce_{SN} anomalies and super-chondritic Y/Ho ratios. These features combined suggest a depositional environment dominated by open ocean water masses and oxic atmosphere–hydrosphere conditions.

The dissolved fraction (<0.2 µm) of Urucum seawater, represented by *pure* IF samples, yield $epsNd_{0.635Ga}$ values between -4.56 and -4.08, and is more positive than those of the MnF (-5.52 to -4.66) and associated siliciclastic rocks (-8.35 to -7.69), and is considerably less negative than the crystalline Rio Apa Basement (-13.7). These data support former studies [1] suggesting that clastic sediments in the Urucum area originated from the Amazonia Craton, while the dissolved REY budget of Urucum seawater was tapped from terrigenous material of the nearby Brasília Belt. The Mn-rich chemical sediments were deposited in shallow-marine, more oxidised environments and precipitated from seawater whose inventory of dissolved REY was additionally affected by a riverine and/or benthic REY flux.

The lack of positive Eu_{SN} anomalies, indicative of high-temperature, hydrothermal fluid contributions to Precambrian seawater [2] combined with the Nd isotope data of the Urucum data set further yield no evidence for REY input via hydrothermal fluids or for REY input from a mantle source.

References:
[1] Dantas et al. (2009) *Precamb. Res.* **110**, 1-12.
[2] Viehmann et al. (2015) *Precamb. Res.* **270**, 165-180.