

Cryogenian–Ediacaran carbonates and BIF chemostratigraphy, Cachoeirinha Group, Northeastern Brazil

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The Cryogenian–Ediacaran Santana dos Garrotes Formation of the Cachoeirinha Group, northeastern Brazil is represented by a metaturbiditic sequence with carbonates, banded iron formations (BIF) and metavolcanic intercalations, deposited in a back arc basin. We have used C, O and Cr isotopes, ⁸⁷Sr/⁸⁶Sr ratio, REE+Y patterns and redox-sensitive element abundance. In the obtained $\delta^{13}\text{C}$ pathways from carbonates, values vary between +3.1 and +5.5‰, $\delta^{18}\text{O}$ displays a broader range from -15.4 to -9.1‰ and ⁸⁷Sr/⁸⁶Sr ratios range from 0.7079 to 0.7093. The BIF are chemically divided into two groups, the Fe₂O₃-enriched and aluminosilicate-enriched BIFs related as lithogenic or hydrogenetic by terrigenous/continental input and marine sources respectively. The detrital-corrected [Cr_{auth}] and $\delta^{53}\text{Cr}_{\text{auth}}$ are presented just for samples that have a detrital Cr content (%Cr_{det}) less than 80%. The $\delta^{53}\text{Cr}$ from Fe₂O₃-enriched BIF display positive fractionation (up to 1.07‰), whilst aluminosilicate-enriched BIF have preferentially negative $\delta^{53}\text{Cr}$, within the Igneous Silicate Earth Reservoir ISER (-0.124 ± 0.101‰).

The hydrogenetic, Fe₂O₃-enriched BIF and some carbonate with %Cr_{det} < 65% indicate continental oxidative weathering processes. These samples record positive $\delta^{53}\text{Cr}_{\text{auth}}$ (+0.15 to +1.07‰), consistent with those from other Neoproterozoic carbonate sections and BIF deposited in an oxygenated environment. Aluminosilicate-enriched BIF and most carbonates with %Cr_{det} > 65% are considered entirely detrital-derived sediments, these display negative $\delta^{53}\text{Cr}$ measured and detrital-corrected $\delta^{53}\text{Cr}_{\text{auth}}$ with mean values of -0.12 and -0.15‰, respectively. The positive $\delta^{13}\text{C}$ plateau (≈ +5‰) and the reported ⁸⁷Sr/⁸⁶Sr values support a late Ediacaran age for carbonate and BIF deposition.