Coupled multiple sulfur and organic carbon isotope geochemistry of Brazilian Precambrian rocks.

A.BOUYON[1*], P. CARTIGNY[1], J. AVILA[2], E. REGO[3], C. ROSSIGNOL[3], S. HÜHN[4], A. ZAPPAROLI[4], R. TRINDADE[3], P. PHILIPPOT[5,1]

[1] IPGP, France [*]bouyon@ipgp.fr
[2] ANU, Australia
[3] Universidade de Sao Paulo, Brazil
[4]VALE S.A., CTF, Nova Lima, Brazil (adriana.zapparoli@vale.com)
[5]Géosciences Montpellier, CNRS, France

Early Earth's atmosphere had a completely different composition from today. The period between ~2.7 to 2.2 billion years (Ga) ago saw dramatic atmospheric redox and biogeochemical cycle evolutions which can potentially be tracked through their multiple sulfur and organic carbon isotopes.

Here we present sulfur isotope data of sulfides and carbon isotope data of carbonaceous matter from 70 samples from 4 drill cores from the Paleoproterozoic Carajás Mineral Province, Brazil. This sedimentary succession was deposited during the Archean-Paleoproterozoic transition attending the first rise of atmospheric on Earth. Our samples represent different lithologies from banded iron formations to black shales, intercepting the Grão Pará, Igarapé Bahia and Águas Claras groups. Our results display various C and S isotope behaviors. The δ^{13}C-org ranges from –25‰ to –50‰, while δ^{34}S ranges from –10‰ to +10‰. The Δ^{33}S and Δ^{36}S range from –2‰ to +2‰ with various trends in Δ^{33}S-Δ^{36}S space. One core has an Archean-like –1 Δ^{36}S/Δ^{33}S slope, whereas two other cores show a modern-like –9 slope. The fourth drill core shows surprising negative-negative Δ^{36}S-Δ^{33}S relationships of slope ~1 that are associated with the most negative δ^{13}C values.

No clear correlation can be assigned between sulfur and carbon data but each core shows a specific behavior. Different scenarios will be explored to explain the different correlation trend recorded between organic content, aluminum content, δ^{13}Corg, and C and S isotope variations.