Multiple sulfur isotopes compositions of detrital pyrite from Jacobina conglomerates and the underlying 3.3 Ga volcanogenic massive sulfides

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The Au-(U) and pyrite-bearing conglomerates of the Jacobina Basin, NE portion of the São Francisco Craton, Brazil, have several features that resemble the Witwatersrand deposits. There is a debate about the sources of mineralization in Jacobina Basin, which includes models of hydrothermal input and paleoplacer, wherein the latter points that the most probable source would be the volcanogenic massive sulfides (VMS) deposits of the 3.3 Ga Mundo Novo Greenstone Belt.

In order to bring further insights about the sources of the Jacobina mineralization, and test the hypothesis of a VMS-derived detrital particles, we carried out *in-situ* multiple sulfur isotopes analysis (^{32}S, ^{33}S, ^{34}S, ^{36}S) by SHRIMP-SI on pyrite grains of several minerallized conglomerate beds, as well as two samples of the VMS pyrites.

Detrital pyrite occurs in conglomerates as rounded inclusion-rich and massive grains, which commonly have an euhedral overgrowth of late pyrite. The detrital grains display a narrow range of $\delta^{34}S$ (-6.2 to +5.6‰), besides Mass-Dependent (MDF-S) and Mass-Independent-Fractionation (MIF-S) signatures, with $\Delta^{33}S$ ranging between -0.14 to +0.70‰ and $\Delta^{36}S$ between -0.83 and +0.50‰. The VMS samples have close to zero $\delta^{34}S$ values (+0.8 to +1.95‰), and show cleary MIF-S anomalies with $\Delta^{33}S$ ranging between -1.2 to -0.90‰, and $\Delta^{36}S$ between -0.50 and +1.50‰.

According to these data, the VMS is not the source for detrital pyrites of Jacobina. The detrital pyrites have grains with MDF-S signatures and also with atmospheric sulfur contributions, which carry small positive MIF-S (S^0 species). Nevertheless, the sulfides from VMS have isotopic compositions compatible with hydrothermal sulfate reduction, with negative MIF-S values. The isotopic signatures of detrital pyrites may reflect contributions from a magmatic-hydrothermal provenance area (MDF-S), as a Paleoarchean Au-enriched magmatic arc [1], besides a sedimentary source (MIF-S), which could be an external or intrabasinal environment.

[1] Teles *et al* (2015) *Precambrian Research* **256**, 289-313.