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New isotope data from the Proterozoic lead-zinc (Ag) sediment-hosted sulfide deposits of Brazil: Implications for their metallogenic evolution

Misi, A.¹; Tassinari, C.C.G.² & Iyer, S.S.³

¹ Instituto de Geociências, PPPG/UFBA, Brazil

² Instituto de Geociências, CPGeo/USP, Brazil

³ Dep. of Physics, Univ. of Calgary, Calgary, Canada

Radiogenic and stable isotope data along with geological and petrographic information, are being used to trace the metallogenic evolution of four Proterozoic sediment-hosted sulfide deposits of Brazil. Our early study⁽¹⁾ suggested that the deposits were apparently formed during periods of extensional tectonics and/or reactivation of old basement structures, forming an integral part of the evolution of the host sedimentary basin. In the present paper we report additional isotopic evidence that reinforces our earlier suggestion that the deposits of Boquira, Canoas-Perau, Morro Agudo-Vazante and Nova Redenção-Irecê (covering a time span from approximately 2.5 Ga to 0.6 Ga), have a common metallogenic evolution, associated with the diagenetic history of the host sediments.

All the deposits studied show stratiform and vein type mineralization with remarkable stratigraphic control. Sphalerite, galena and pyrite are present in varying amounts along with barite, calcite and quartz in all deposits, except in Boquira (~2.5 Ga), where barite has not been found.

The lead isotope composition of galenas and pyrites in all deposits studied appear to be uniform, yielding model ages approximately concordant with the respective geological ages, except in Morro Agudo-Vazante ore deposit where the Pb isotope ages are older than the probable age of the carbonate sedimentation in the area⁽²⁾. However, the lead isotope data of the deposits fall on/or above the upper crustal source curve in the Pb-growth curve (plumbotectonic model)⁽³⁾, implying the derivation of the lead from basement rocks and/or sedimentary pile (Fig. 1).

The sulfur isotope composition of barites and sulfides are in agreement with the geological information, suggesting a predominant seawater source for sulfur. (Fig. 2). Limited initial ⁸⁷Sr/⁸⁶Sr ratios of barites from Canoas-Perau^(4,5) and Irecê-Nova Redenção are not conclusive. However, majority of the data yield radiogenic values, which may be an indication of the formation in intracratonic rift settings⁽⁶⁾.

The main Proterozoic massive Pb-Zn deposits hosted in sedimentary basins of Brazil, with the exception of the Morro Agudo-Vazante mines, are not considered large deposits, but their geological settings and isotopic characteristics are close to the most important Pb-Zn deposits of the world. This opens new perspectives for exploration.

References

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Figure Captions:

Fig.1 - Lead isotope composition of the main Pb-Zn sediment-hosted sulfide deposits of Brazil. Evolution curves according to the plumbotectonic model (3), upper curve corresponding to the upper crust. 1 - Boquira 2 - Canoas-Perau 3 - Morro Agudo-Vazante 4 - Nova Redenção.

Fig.2 - Sulfur isotope variation of sulfides and sulfates from the main Pb-Zn sediment-hosted sulfide deposits of Brazil.



