Black Shales and massive sulfide deposist in the Iberian Pyrite Belt

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Introduction

Many massive sulfide deposits at the Iberian Pyrite Belt (IPB) are hosted by black shales. This relationship is well constrained in some of the major deposits at the province, including Neves-Corvo [1], Tharsis[2], Sotiel [3], and Aznalcóllar [4]. Geochemical environment during ore deposition has been atempted only at the Filon Norte deposit, within the Tharsis District [5][6]. New geochemical data from the black shales hosting the MS at Aznalcóllar and Sotiel show significant differences in terms of environmental conditions for ore generation. Considering the differences in metal content of each deposit, this could be noteworthy for exploration.

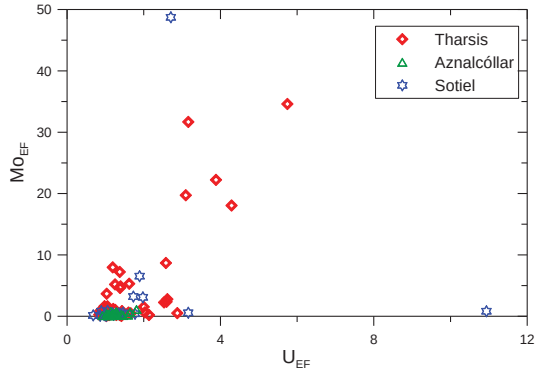

Figure 1: U_{EF} *vs* Mo_{EF} diagram for black shales hosting some IPB ore deposits. Cluster close to x-axis includes the Aznalcóllar and most of the Sotiel samples.

Inorganic geochemical proxies such V/Cr and V/V+Ni suggest general dixosic condition for Tharsis, Aznalcóllar and Sotiel. Recent studies enhance the role of U and Mo as proxies for paleo-environmental reconstructions [7]. Black shales data of these three dstricts on the U_{EF} - Mo_{EF} diagram (Fig. 1) point to disparate environmental conditions. The low absolute values as well as the absence of covariation for the Aznalcollar and Sotiel samples sugest general oxic botom water environents. At Tharsis, the positive correlation together with the dispersion of values sugest changing conditions fron oxic to strongly anoxic, and even euxinic conditions, for the depositional environment.

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Chemical U-Th-total Pb ages in recycled metamorphic terranes: the case of the South Carpathian basement units

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Monazite chemical geochronology

Monazite geochronology has emerged as a reliable dating method for metamorphic ages, as monazite, at variance with other widely employed minerals of geochronological relevance, grows coevally with metamorphic assemblages and displays subsequent chemical and isotopic stability; even dating by chemical methods assuming isotopical equilibrium proved to be accurate enough. Yet, few data refer to metamorphic formations with complex history and thorough succesive overprints, for which the basement units of the South Carpathians represent a typical example.

Previous geochronological data and interpretation

The basement units of the South Carpathians are involved in intricate Variscan and Cretaceous thrust and wrench tectonics. Consisting mainly of medium-grade metamorphic rocks, all types of basement were traditionally considered Precambrian in age [1]. Extensive U-Pb zircon dating revealed Gondwanan provenance and protholith ages ranging from Early Proterozoic to Early Paleozoic [2]. Ar-Ar dating aimed to decipher the metamorphic history overwhelmingly indicated Variscan ages [3], sometimes at odds with cover-basement and intrusion – host-rock relationships. Therefore electron microprobe U-Th-Pb chemical chronology was attempted on rock units of the main basement complexes in order to elucidate the building blocks and temporal details of Variscan tectonometamorphic events.

Results and Conclusions

The age values derived from microprobe U-Th-Pb analyses revealed variable responses of monazite to polymetamorphic events, as well as frequent post-climactic records, resulting in age plateaus often joined by quasi-continuous spectra in case of reworked pre-Variscan complexes. Purely Variscan age patterns in rock units, also displaying microstructures and chemical zonation patterns consistent with a monometamorphic history, sandwiched between pre-Variscan terms, indicate frequent imbrication of reworked and juvenile metamorphic units during the Variscan thermotectonic events in the South Carpathian basement. The recorded evolution is consistent with complex interactions of migrating slivers that originate from the northern Gondwanan margin, up to the time of the Variscan collision. Accidental Alpine age values, mostly unrelated to pervasive metamorphic overprints, indicate low-temperature recrystallization domains in monazite, which call for caution in interpreting monazite age data.

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