Geochemistry of metasediments from the Phyllite-Quartzite Group, Iberian Pyrite Belt: provenance, source-area weathering and geotectonic implications

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Typical Iberian Pyrite Belt (IPB) deposits may result from different extractions/leakages from similar crustal metal reservoirs. With few exceptions (e.g. Neves Corvo), the available data on metal ratios and radiogenic isotope systematics suggest a regionally homogeneous signature for the whole province. Most base metals in the deposits should have been sourced by the thick metasedimentary sequence of the Phyllite-Quartzite Group, as the massive sulphide-hosting volcano-sedimentary complex is less than 600 meters thick. The predominance of sedimentary over volcanic rocks in the footwall sequence, and the large size of many deposits, suggests a volcanogenic/sedimentary-exhalative hybrid model for the IPB metallogenesis. Such a model calls for a renewed look on the geochemical characteristics of the metasediments of the PQ Group, still largely unknown.

Phyllites, quartz-arenites and quartzwackes of the PQ Group have been subjected to a detailed petrographic study, and analyzed for major element, trace element, and rare earth element compositions. The average compositional variability index of phyllites is less than 1, suggesting compositional maturity of these rocks. Both phyllites and sandstones have high chemical index of alteration (CIA) values reflecting the intense weathering of the source area. The similar CIA values for the phyllites and the associated sandstones indicate that recycling processes had an important role in homogenizing compositions. Trace element abundances and ratios, REE patterns, and negative Eu anomalies collectively suggest that these rocks were mainly derived from granitoid rocks. The elemental ratio plots (e.g., Th-La-Sc ternary diagram) indicate a mix of a granite source with granodiorite-tonalite source, being the phyllites closer to granodiorite-tonalite source composition, and the sandstones to the granite source. The compositional maturity of the PQ metasediments and their trace element geochemistry are consistent with a passive continental margin depositional setting.

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