

## Facies Analysis of Volcano-Sedimentary Successions Hosting Massive Sulfide Deposits in the Iberian Pyrite Belt, Spain

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### Abstract

The Iberian pyrite belt volcanogenic sulfides are hosted in volcano-sedimentary successions of Upper Devonian to Lower Carboniferous age and represent the greatest concentration of large massive sulfide deposits on Earth. Most of the ore deposits are exposed at the surface, and little investment in geological research has been needed to mine them. As a consequence, fundamental aspects of the ore geology, such as the depositional environment, the eruptive style of volcanism, the chronostratigraphic relations between facies types, and the final mode of emplacement of volcanic rocks have not been studied previously in detail.

A facies analysis has been systematically carried out on several volcano-sedimentary successions of the ore-host unit. Seventeen volcanic and sedimentary facies are defined. The main facies are silicic volcanic facies, mafic volcanic facies, reworked volcanoclastic facies, siliciclastic facies, slope instability facies, and hydrothermal facies. Facies analysis suggests that the Iberian pyrite belt volcanism took place in a submarine, below-wave-base, depositional environment and that water depth increased to the east and north in the ore-hosting basin. Fragmentation mechanisms suggest that the eruptive style of volcanism was mainly nonexplosive, though explosive volcanism may have occurred outside the basin. Transport and depositional processes suggest that most of the volcanoclastic rocks were emplaced from syneruptive, nonpyroclastic mass flows. Contact relationships of volcanic and sedimentary facies reveal that peperitic facies are very widespread, silicic and mafic magmas intruded simultaneously at shallow levels in the volcano-sedimentary pile, and low-temperature hydrothermal processes may have occurred prior to volcanism at many sites.