Tracing paleoenvironmental conditions during massive sulfide deposition in the Iberian Pyrite Belt (IPB): A geochemical and Mo isotope approach

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Black shales and massive sulfide deposits (MSD) are representative lithologies of low-oxygen bottom waters in marine environments. Examples are found in the IPB (SW Spain), where black shales host some of the world's most important MSD deposits. Size and grades vary dramatically between deposits: i.e., Tharsis (85 Mt @ 1.8%Zn, 0.8%Pb, 0.7%Cu) and San Jorge prospect (small barren pyrite lens), located 8 km westwards, laterally to the Tharsis ore horizon. As the location of the redox chemocline above, below or at the water-sediment interface determines the mechanism of sulfide deposition, the evaluation of paleoenvironmental conditions may be crucial to locating prospective targets. We present geochemical and Mo isotope data of ore and non-ore related black shales to unravel the role of paleoenvironmental conditions on the size of sulfide deposition at Tharsis and San Jorge. Values of $Mo_{(EF)}$ up to 11.5 and $U_{(EF)}$ up to 2.33 for San Jorge black shales suggest anoxic to euxinic conditions compared to Tharsis (strongly euxinic). Different $\delta^{98/95}Mo$ values, up to 1.55‰ at Tharsis (n=4) and between 0.69 and 0.83‰ at San Jorge (n=3) suggest distinct paleoenvironmental conditions, from euxinic at Tharsis to suboxic at San Jorge, allowing a better characterization compared to other common inorganic proxies (i.e., V/Ni, $U_{(EF)}$, $Mo_{(EF)}$).