Goldschmidt 2022 Abstract
https://doi.org/10.46427/gold2022.8536

The role of orogenesis on the formation of epigenetic sediment-hosted Cu-Co deposits

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The origin of cobalt-enriched sediment-hosted copper deposits (SCDs) within metamorphic terranes remains contentious, particularly regarding the timing of mineralization relative to the basin evolution and the orogenesis. We examine pyrite from SCDs in the southern Trans-North China Orogen by in situ trace element and iron and sulfur isotope analysis, in combination with geological and geochronological work. The result show cobalt was mobilized from Co-rich sedimentary via fluid-mediated dissolution and reprecipitation during the metamorphic process. The scapolitic rocks in this region suggest that the metamorphic fluid is saline. The High S6+ / σS ratios in scapolite obtained via synchrotron XANES indicate that equilibration between fluid and scapolite would buï¬€er the fluid to oxidized conditions. This saline and oxidized fluid create enhanced potential for scavenging a range of metals within the metamorphic terrane. This work highlights the importance of Co enrichment in a sulfidic ocean along an evaporative margin and upgrading through remobilization during orogenesis for the formation of high-temperature SCDs.We suggest that orogenic belts with large volumes of sulfidic shales and evaporitic rocks are ideal for generating epigenetic Co-enriched SCDs. Unlike, the traditional orogenic gold deposits characterized by ubiquitously low salinity, H2O-CO2 fluids, the evaporite-bearing orogenic belts produce Cl-rich and SO4-bearing fluid suitable for transporting Cu and Co. Furthermore, it demonstrates the diverse styles of syn-orogenic hydrothermal ore formation.

This research was supported by the National Science Foundation of China (41890833, 41902080).

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