

The Nature and Genesis of Gold-Silver-Tellurium Mineralization in the Metaliferi Mountains of Western Romania

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Abstract

Precious metal (Au, Ag) and base metal (Pb, Zn) deposits in the Metaliferi Mountains of western Romania occur in steeply dipping quartz-Ca/Mn carbonate veins, which are hosted by Miocene andesitic stocks and lava flows, and surrounding sedimentary rocks. The deposits consist predominantly of sulfides (pyrite, chalcopyrite, sphalerite, galena), sulfosalts of As and Sb, and a diverse range of Au-Ag tellurides. The igneous host rocks have undergone mild, pervasive propylitic alteration, whereas immediately adjacent to the veins the wall-rock alteration assemblages consist of quartz, sericite, K feldspar, calcite, and pyrite. Fluid inclusion, stable isotope, and thermodynamic data suggest that the majority of the mineralization and hydrothermal alteration in these deposits was caused by low-salinity (0–5 wt % NaCl equiv), medium-temperature (200°–300°C), nearneutral (pH = 5–6) fluids, which underwent occasional boiling.

The fluid inclusion and stable isotope data support a model in which a metal-bearing, magmatic fluid was exsolved from a crystallizing calc-alkaline melt and ascended to higher levels in the crust, undergoing some isotopic exchange with surrounding sedimentary rocks but limited mixing with ground waters. Although the deposits in this part of the Romanian Carpathians exhibit many of the geologic characteristics of classic low-sulfidation, volcanic-hosted, Au-Ag, epithermal deposits, they seem to have formed from essentially magmatic waters, and there is little evidence for the incorporation of meteoric fluids into the hydrothermal system.