

Fluid constraints in the Mociços Cu deposit (Ossa-Morena Zone, Portugal)

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The Mociços copper deposit is located in the Ossa-Morena Zone, at the Sousel-Barrancos metallogenic belt (SBMB) and belongs to a cluster of ancient Cu mines and occurrences, such as Miguel Vacas, Ferrarias and Bugalho. This deposit is characterised by a main sulphide assemblage of chalcopyrite + pyrite in a quartz + carbonate decametric lode, with an NNW-SSE general trend, which cross-cuts metasedimentary Paleozoic successions with circa 1 km length.

The model proposal for SBMB deposits (Mateus et al., 2003) states that the Cu contents were remobilised from metasedimentary host rocks by low to moderate salinity and temperature fluids. The study of more than 200 fluid inclusions (FI's) allowed identifying four main FI types. LVS₁₋₃ where L and V are H₂O, S₁ is halite, S₂ is a carbonate and S₃ is an opaque. Most of these inclusions contain a halite crystal. L₁₋₂VS₁₋₂ each phase representing L₁ is H₂O, L₂ and V are CO₂, S₁ is halite and S₂ is a carbonate or opaque. L₁₋₂V where L₁ is H₂O, L₂ and V are CO₂. LV consists of two-phase inclusions where L and V are H₂O. In addition, CO₂-rich biphasic FI's (L and V are CO₂) were studied in milky deformed quartz. These inclusions suggest a metamorphic fluid circulation with possible CO₂ devolatilisation from the metasedimentary host rocks.

Figure 1 plots T_h versus salinity for all the studied FI assemblages. A two-stage fluid circulation model is suggested by the presence of a high-salinity and a relatively lower salinity fluid (NaCl range= [0.18 – 44.3 wt% NaCl equiv.]; \bar{x} = 21.85 wt% NaCl equiv.) (see arrow). The high salinity FI's are almost exclusively halite-bearing, aligning in the halite saturation curve. These high salinity fluids may be related to brines of magmatic origin, contributing with hot ore-bearing fluids which are progressively replaced with meteoric fluids (T_h range= [68 – 420 °C]; \bar{x} =182.8 °C).

The majority of the halite-bearing FI's (T_{mHal} range [138.3 – 370 °C]; \bar{x} =242 °C) show a behaviour where $T_{h(L+V \rightarrow L)} < T_{mHal}$, corresponding to a pressure of \approx 50-100 MPa. This inclusion behaviour has been reported for several magmatic-hydrothermal ore deposits (Becker et al., 2008). Several carbonates and daughter minerals were identified by Raman spectroscopy. First ice melting temperatures ([-5 – -70 °C]; \bar{x} = -48.4 °C) indicate the presence of solutes other than NaCl, like CaCl₂ and MgCl₂ as suggested by the presence of the carbonates. Fluid inclusion data from the Mociços deposit suggests that a more complex and deeper

fluid circulating system must be present and further studies will be carried out.

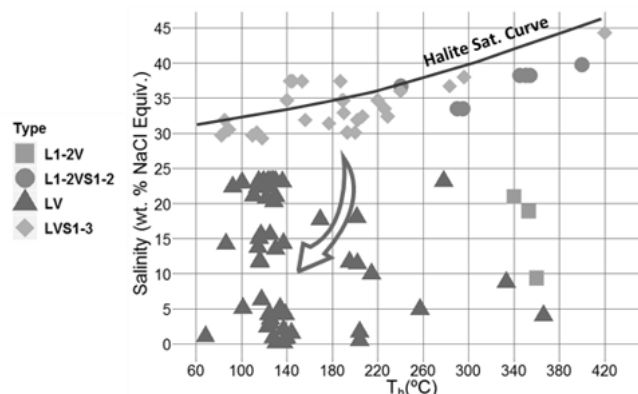


Fig. 1. Salinity (wt% NaCl equiv.) versus T_h from the obtained data for the different fluid inclusions Types.

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