

Fluids associated with the Au-Ag and Ag-Pb-Zn mineralizations of the Blanice graben tectonic zone, Bohemian Massif

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Numerous small-sized Ag-Pb-Zn vein type (intermittently mined from the 14th to the 17th century) and two late orogenic-gold (electrum) deposits (about 6 t of gold was mined at the Roudný deposit between 1895 – 1930) are hosted by the Blanice graben in the central part of the Bohemian Massif. This, about 200 km-long NNE-SSW trending tectonic zone (also called the Kouřim – Blanice – Kaplice – Rödl fault zone) crosses all the Moldanubian Units and extends from east of Prague to Linz in Austria. The faults of the Blanice graben have been repeatedly reactivated; the oldest identified tectonic activity is inferred to be Permo-Carboniferous in age (Stephanian C to Autunian), as has been inferred from the isolated islets of coal-bearing sediments. The major tectonic movements in the Blanice graben must, therefore, be of Permian age or younger. The only geochronological data on the tectonic evolution of the Blanice graben are those of Košler et al. (2001; 270±2 Ma, representing a minimum intrusive age for the microdiorite dike swarm parallel with the strike of the Blanice graben, but located outside the graben structure) and of Brandmayr et al. (1995; 288-281 Ma, ductile deformation in the Austrian part of the Blanice graben).

Up to five different fluid types, were recognized in the quartz and carbonate gangue of the Au-Ag Roudny deposit (Zachariáš et al., 2009). The early fluids represent H₂O-CO₂±CH₄-N₂ low salinity (<3.9 % NaCl) fluids (400-330 °C) with isotopic signatures consistent with a metamorphic origin ($\delta^{18}\text{O}_{\text{fluid}} = +4.7$ to $+2.9$ ‰ SMOW), while the late fluids are of aqueous-only type. The salinity of aqueous fluids evolves from about 24 % NaCl (350-250 °C; probably electrum-bearing) to about 7 to 9 % NaCl (250-70 °C; Ag-Pb-Zn bearing and post-ore fluids).

The Ag-Pb-Zn vein type deposits are represented by quartz-carbonate-barite gangue with Ag-rich galena, pyrrargyrite, proustite, salerite, chalcopyrite and minor pyrite. Arsenopyrite is almost absent; carbonates correspond to dolomite, Fe-dolomite and to calcite. The studied samples (the Rudolfov, Stara Vozice, Stribna Skalce, Zvestov and Hřiva deposits) represent variations in fluid composition along the strike of the Blanice graben of more than 70 km.

Fluids are of aqueous type only, having relatively constant range of homogenization temperatures (from ~200 to ~130 °C; L+V=L), but differing mutually in the salinity (from 10 to 0 % NaCl) for individual deposits. The data suggest almost isothermal mixing between low and moderate salinity fluids. Isotope composition of carbonates indicate more or less constant oxygen composition ($\delta^{18}\text{O}_{\text{fluid}} = +3$ ‰ SMOW), coupled with gradual decrease in the $\delta^{13}\text{C}_{\text{fluid}}$ from about -7 to about -22 ‰ CDT.

Minor variations in total homogenization temperatures of inclusions and constant oxygen isotope composition of fluids points to compositionally homogeneous parent fluid, probably of deep metamorphic origin.

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