Late Mesozoic epithermal Te-Au-Ag deposits in the northern Xing'an Block, Heilongjiang province, NE China: Characteristics and metallogenic mechanism

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Numerous important epithermal gold deposits, including Te-Au-Ag deposits (e.g., Sandaowanzi and Beidagou) and Au-Ag deposits (e.g., Shangmachang, Tianwangtaishan and Pangkaimen) are located in the north-eastern margin of the Central Asian Orogenic Belt. Most deposits are hosted by Early Cretaceous calc-alkaline volcanic rocks (ca. 120 - 122Ma), and have the mineralization ages concentrated on Early Cretaceous (ca. 115 - 120Ma) from the isotopic evidences. Sulfur, lead, carbon and copper isotopes from these deposits imply a magmatic source. Ore-forming fluids are featured by low temperature and salinity (150° - 250°C; 1 - 10wt.% NaCl eq.), CH_4-CO_2-H_2S components and predominant meteoric water. The metallic precipitations are related to the fluids boiling, mixing and pH neutralization, and occur beneath the surface less than 1km.

In Au-Ag deposits, the contents of Al from gold-bearing quartz veins are lower than pure quartz veins (Early stage), indicating that gold and silver precipitated with pH increasing. In low temperature and acidic conditions, gold and silver are likely predominated by $AuHS^0$ and $AgCl_2^-$. In contrast, the contents of Al from gold-, silver- and tellurium-bearing quartz veins are higher than pure quartz veins (Early stage) in Te-Au-Ag deposits, indicating that gold, silver and tellurium precipitated with pH decreasing. In low to moderate temperatures and alkaline conditions, gold, silver and tellurium may be predominated by $Au(HS)^{2-}$, $Ag(HS)^{2-}$ and Te_2^{2-}.