

Carlin-Type Gold Deposits in Youjiang Basin, Southwest China: Key Characteristics and Genetic Model

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More than 100 Carlin-type gold deposits/occurrences have been discovered in the Youjiang Basin, southwest China (hereinafter referred to as Guizhou deposits). Currently, the Au endowment of Guizhou deposits is more than 900 tons of Au, the second largest Carlin-type gold concentration in the world (after the Nevada deposits).

Key characteristics for the Guizhou deposits include the following: gold is mainly ionically bound in trace element-rich, subhedral-euhedral arsenian pyrite, with minor Au in arsenopyrite; alteration includes dissolution of calcite, jasperoid replacement of calcite, sulfation of Fe in Fe-dolomite/Fe-calcite to form Au-bearing pyrite and dolomite, minor illite replacement of K-feldspar/muscovite, and formation of minor quartz veins; late-ore-stage stibnite, realgar, calcite, quartz, and lesser orpiment and cinnabar precipitated in open space within veins. Fluid inclusion studies reflect these deposits formed at depths between 2 and 8 km and at temperatures of 190° to 300°C from low-salinity (<5 wt % NaCl equiv.) and CO₂-rich reduced fluids.

Combining geologic characteristics with isotope evidences (S, Hg, Mg, and He-Ar) supports a magmatic-hydrothermal origin for the ore fluids. The thick Devonian-Triassic sedimentary sequence and weak extension following sedimentation prevented igneous activity from reaching the surface. However, buoyant ore fluids released from the deep-seated intrusions have ascended along basement-penetrating faults and eventually produced the Guizhou deposits at shallow levels.