

Mesozoic granitic magmatism and gold-molybdenum polymetallic mineralization in the Chifeng area, Inner Mongolia, China

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The Chifeng area in Inner Mongolia is situated in the transitional zone between the North China Craton and the Xing'an-Mongolia Orogenic Belt, providing favorable conditions for Au-Mo polymetallic mineralization. Gold polymetallic mineralization in this region is intimately associated with the Late Paleozoic and Cenozoic granitic magmatism. The fertilized intrusions are characterized by peraluminous to weakly peraluminous, high-K, calc-alkaline granites that are enriched in light rare earth elements and large ion lithophile elements, but depleted in high field strength elements. These granites are attributed to have emplaced in an extensional setting in the Paleo-Asian and Pacific tectonic domains. Gold polymetallic mineralization predominantly occurred during the Late Permian-Triassic and the Early Cretaceous, and can be classified into magmatic hydrothermal vein-type and porphyry-type. The vein-type mineralization is represented by the Zhuanshanzi and Jinchanggouliang Au deposits, as well as the Bajia Zn polymetallic deposit; while the porphyry-type mineralization is represented by the Baituyingzi W-Mo deposit. The Zhuanshanzi Au deposit and the Bajia Zn polymetallic deposit are closely related to the Late Permian to Triassic granites (U-Pb ages of 237-265 Ma) and mainly controlled by NW- and NWW-trending faults. The Jinchanggouliang Au deposit is intimately related to the Early Cretaceous granite (U-Pb ages of 128-139 Ma) and predominately controlled by NW- and NS-trending faults. The Baituyingzi W-Mo mineralization mainly occurs in the Early Triassic monzonitic granites (U-Pb ages of 248 Ma) and exhibit typical potassic, phyllic, and propylitic zonal alteration. According to the experience accumulated from exploration practice in the Baituyingzi and Bajia deposits, a holistic approach involving integrating geological, geochemical, and geophysical methods to unveil gold polymetallic mineralization concealed beneath surface layers is advocated. It is suggested that the Zhuanshanzi Au deposit has a prospecting potential for porphyry- and skarn-type Au-Cu mineralization at depth, while the Jinchanggouliang and Zhuanshanzi Au deposits and their peripheries show potentials for epithermal gold polymetallic mineralization.

