Porphyry and Epithermal Mineralization in the Zijinshan Orefield, Fujian, SE China

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The Zijinshan orefield is a world-class Au-Cu (± Ag-Pb-Zn) district located in the west of Fujian Province, South east China. As part of the complex South China fold belt (SCFB), Zijinshan records geological events from the Neoproterozoic to the Cretaceous. Broadly, the local geology comprises a fault-bounded NE-trending magmatic suite of Jurassic age, with a downfaulted Cretaceous volcanic basin to the SW. This is underlain by a Carboniferous age mixed limestone and clastic assemblage and a basement of Neoproterozoic phyllite. Porphyry and epithermal mineralization occurred during the Cretaceous Yanshanian orogeny when a shallow dipping continental margin setting developed across SE China. The Cretaceous metallogenic event is interpreted to be related to incipient subduction of the Pacific plate and a transition from continental to back-arc extensional tectonics.

The Zijinshan orefield hosts a range of intrusion-related deposits styles. The Zijinshan high sulfidation Cu-Au deposit is hosted in a large Jurassic S-type granite and exhibits distinctive metal zoning, with Au-rich oxide and Cu-rich (covellite) hypogene zones, hosted mainly by NE-dipping low angle vein-breccia structures. Zoned silicic (massive and local vuggy quartz), advanced argillic and phyllic alteration assemblages are also present.

The Luoboling deposit is located approximately 4 to 5 km to the east of Zijinshan and is a typical porphyry Cu-Mo system, again with zoned mineralization and alteration assemblages. The Yueyang-Longjiangting system, hosted in the volcanic basin to the south of Zijinshan, appears to show a transition from intermediate to high sulfidation style mineralization northward with chalcopyrite-pyrite in the southernmost extensional vein sets and digenite-bornite ± chalcopyrite in stockwork-breccia systems to the north, suggesting the existence of a buried porphyry system near the northern end of the vein system. Also within the Cretaceous basin, is a large (>2 km diameter, > 700 m vertical extent) polymict lithic breccia, the Gukeng Breccia, which hosts minor high sulfidation style mineralization associated with advanced argillic alteration. The Gukeng breccia is suspected to be a diatreme complex, although juvenile magmatic clasts are yet to be identified.

The recent discovery of low sulfidation style Au mineralization at Gushibei, 5 km south of Zijinshan, confirms that Yanshanian hydrothermal activity in the volcanic basin extended southwards and is likely to have exploited a major SW-dipping structure that may have also served as the main detachment fault for the basin. This discovery highlights significant exploration potential for similar structurally controlled epithermal mineralization styles in the area.