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Zijinshan Porphyry-Epithermal Cu-Au-Mo-Ag Ore System, SW Fujian Province, China: the Product of a Lithospheric Extension Tectonic Setting Related to the Subduction of Paleo-Pacific Plate

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1 Geological setting

The Zijinshan mineral field （ZMF） is located in the eastern part of the Cathaysia Fold Belt, at the intersection of the Xuanhe Anticlinorium and Yunxiao-Shanghang Fault, and at the northeastern margin of the Cretaceous Shanghang Volcanic Basin. The core of the anticlinorium consists of Neoproterozoic phyllite and fine-grained metasandstone unconformably overlain by Devonian-Carboniferous clastic rocks and limestone. The Cretaceous volcanic-sedimentary rocks crop out in the central-southern part of the district, and are restricted to the Shanghang Volcanic Basin.

Middle to Late Jurassic and Early Cretaceous magmatic rocks are common in the ZMF. Their emplacement was controlled by deep-seated structures related to the northeast-trending Lishui-Haifeng Fault. The Cretaceous granodiorite and volcanic rocks are closely related to the Cu-Au mineralization, crop out in the central-southern and northeastern parts of the region, and their occurrence is controlled by northwest-trending structures that are probably linked to the deep-seated Yunxiao-Shanghang Fault.

2 Zijinshan Porphyry-Epithermal Cu-Au-Mo-Ag Ore System

The Zijinshan porphyry-epithermal Cu-Au-Mo-Ag ore system consists of the Zijinshan high sulfidation epithermal Cu-Au deposit (So et al., 1998; Zhang et al., 2003), Luoboling porphyry Cu-Mo deposit (Zhong et al., 2011), Yueyang (also called Bitian) low-sulfidation epithermal Ag-Au-Cu deposit (Zhang et al., 2003; Lin, 2006), Wuziqilong mesothermal Cu deposit (Zhang et al., 1996; Chen et al., 2011), and Longjiangting mesothermal Cu deposit (Zhang et al., 1996). Of these, the Zijinshan Cu-Au deposit is the most important with a resource of 305t Au and 1.9Mt Cu (Wang et al., 2009), with annual production of around 16t Au making it the largest gold mine in China, and Luoboling is a newly discovered large-scale porphyry Cu-Mo deposit with a resource of 1.15Mt @ 0.27% Cu and 0.16Mt @ 0.037% Mo.

Cu-Au mineralization at ZMF range from high-sulfidation epithermal to porphyry styles. The mineralization is characterised by NW-trending breccia bodies and veins within a Cretaceous volcanic pipe. Hydrothermal alteration and mineralization are typically zoned, with quartz-sericite-pyrite in the deeper to outer parts of the system at depths of between 350 and 1200 m to dickite-quartz-pyrite-zunyite at mid-levels, to alunite-quartz-pyrite towards the surface.

Hydrothermal alteration in Luoboling ore district is well zoned, and characterized by potassic silicate alteration in the inner zone, potassic silicate alteration zone overprinted by phyllic alteration zone, phyllic alteration zone, and alunite-dickite-phyllic alteration zone in the ore-bearing granodiorite porphyry at the outer zone (Zhong et al., 2011). The Cu-Mo mineralization is restricted to the potassic silicate alteration zone overprinted by phyllic alteration zone and phyllic alteration zone.

The Re-Os isochron age of 104.9 ± 1.6 Ma for molybdenite separates from the Luoboling Cu-Mo deposit may represents the earliest mineralizing event in the ZMF

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(Liang et al., 2012), while the $^{40}Ar/^{39}Ar$ plateau age of 91.5 ± 0.4 Ma (Liu and Hua, 2005) from adularia at the Yueyang Ag-Au-Cu deposit may mark the latest mineralizing event in the mineral field.

3 Discussion

The metallogenesis of the mineral field is closely related to Cretaceous magmatism. New U–Pb zircon geochronological, geochemical and Sr–Nd–Pb isotopic data have been obtained from granites and volcanic rocks in the ZMF. LA-MC-ICP-MS U–Pb zircon analyses yield weighted mean ages of ca. 112 Ma for granodiorite, and between ca. 111 and 99 Ma for volcanic units in the study area. Major and trace element geochemistry indicates that these igneous rocks are high-K calc-alkaline or shoshonitic rocks, are enriched in LREE and Th, U, Ta, Nd, Sm and Yb, and are depleted in Ba, K, Sr, P, Ti and Y. They have the initial $^{87}Sr/^{86}Sr$ ratios of 0.70554 - 0.71164, εNdT values of -8.0 to 0.5(Jiang et al., 2013), εHf(t) values of −4.2 to 4. These characteristics suggest that the Cretaceous igneous rocks in the ZMF originated mainly from the crustal melt with the incorporation of juvenile component located in a lithospheric extension tectonic setting related to the subduction of the Paleo-Pacific Plate beneath the Eurasian continent.

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References

Chen Jing, Chen Yanjing, Zhong Jun, Sun Yi, Li Jing and Qi Jinping, 2011. Fluid inclusion study of the Wuziqilong Cu deposit in the Zijinshan ore field, Fujian Province. *Acta Petrologica Sinica*, 27:1425–1438 (in Chinese with English abstract).

Jiang, S.H., Liang, Q.L., Bagas, L., Wang, S.H., Nie, F.J., and Liu, Y.F., 2013. Geodynamic setting of the Zijinshan porphyry-epithermal Cu-Au-Mo-Ag ore system, SW Fujian Province, China: constrains from the geochronology and geochemistry of the igneous rocks. *Ore Geology Reviews*, 53: 287–305.

Liang Qingling, Jiang Sihong, Wang Shaohuai, Li Chao and Zeng Fagang, 2012. Re-Os dating of molybdenite from the Luoboling porphyry Cu-Mo deposit in the Zijinshan ore field of Fujian province and its geological significance. *Acta Geologica Sinica*, 86: 113–1118 (in Chinese with English abstract).

Lin Quansheng, 2006. On the Characteristics and genesis of the Yueyang silver polymetallic deposit in Wuping County, *Fujian Province. Fujian Geology*, 25(2):82–88 (in Chinese with English abstract)

Liu Xiaodong and Hua Renmin, 2005. $^{40}Ar/^{39}Ar$ dating of adularia from the Bitian gold-silver-copper deposit, Fujian Province. *Geological Review*, 51:151-155 (in Chinese with English abstract).

So, C.S., Zhang, D.Q., Yun, S.T., and Li, D.X., 1998. Alteration-mineralization zoning and fluid inclusions of the high sulfidation epithermal Cu-Au mineralization at Zijinshan, Fujian Province, *China. Economic Geology*, 93, 961–980.

Wang Saohuai, Pei Rongfu, Zeng Xianhui, Qiu Xiaoping and Wei Min, 2009. Metallogenic series and model of the Zijinshan mining field. *Acta Geologica Sinica*, 83:145–157 (in Chinese with English abstract).

Zhang Dequan, Li Daxin, Zhao Yiming, Wang Wengui and Gu Guangxian, 1996. The Wuziqilong copper depostit: The deformed upper part of a porphyry copper deposit. *Mineral deposits*, 15:109–122 (in Chinese with English abstract).

Zhang Dequan, She Hongquan, Li Daxin and Feng Chengyou, 2003. The porphyry-epithermal metallogenic system in the Zijinshan region, Fujian Province. *Acta Geologica Sinica*, 77: 253–261(in Chinese with English abstract).

Zhong Jun, Chen Yanjing, Chen Jing, Li Jing, Qi Jinping and Dai Maochang, 2011. Fluid inclusion study of the Luoboling porphyry Cu-Mo deposit in the Zijinshan ore field, Fujian Province. *Acta Petrologica Sinica*, 27:1410–1424 (in Chinese with English abstract).