



Is the Donggou Porphyry Mo deposit in East Qinling Mo Belt, China Highly Enriched in Fluorine?

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The Donggou porphyry Mo deposit is the third largest Mo producer after the Jinduicheng and Nannihu deposits in the East Qinling Molybdenum Belt (EQMB), China. Surrounded by a series of hydrothermal vein type deposits (Pb, Zn, Cu and Ag) (Mao et al., 2008, 2009), the deposit has a current proven reserve of 0.717 million tons of molybdenum metal with an average grading of 0.12%. The previous published data show that the Cretaceous Donggou molybdenum deposit and the genetically related porphyry stock formed around the same time period; the alumina saturation index diagram suggests that these intrusions belong to metaluminous to weak peraluminous granitoids; REE chondrite pattern of the Donggou porphyry stock shows that they are more enriched in light incompatible elements than the heavy incompatible elements, indicating obvious fractionation between the light incompatible elements and heavy incompatible elements, and moderate to strong Eu anomaly; the trace elements spider diagram demonstrates that the Donggou porphyry stock are enriched in Large-ion lithophile elements (Rb, K, U, Th etc.) and High field strength elements (Zr, Nb, Ta etc.), but depleted in Sr, Ba and P. Three main stages were determined during the mineralization: Early (Pre-molybdenum) Mineralization, Molybdenum Mineralization, and Post-molybdenum Mineralization. Accompanied by hydrothermal biotite alteration activities, the thin and discontinuous K-feldspar-Quartz veins characterize the early molybdenite-barren stages. The molybdenum mineralization stage has two mineralization processes, separated by molybdenite-barren, apatite-rich veins. Microphotographic study shows that the mineralization stage was enriched in fluorine, which is reflected by abundance of fluorite in the Mo-bearing veins and in molybdenite-barren blue apatite veins. Following the molybdenum-bearing stage and apatite-rich veins, K-feldspar-Chlorite-Quartz-Pyrite veins occur, indicating the end of the entire mineralization. The occurrence of fluorine in early K-feldspar veins, two mineralization stages, and molybdenite-barren apatite vein suggests that the Donggou deposit is enriched in fluorine.