Copper and molybdenum seperation in the Dabate porphyry Cu-Mo deposit, Xinjiang, NW China

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In most porphyry Cu-Mo deposits, Cu sulfides were commonly associated with molybdenite at vein or orebody scales [1]. However, in the Dabate porphyry Cu-Mo deposit which is located in the Sailimu Block, there is no relationship between Cu and Mo mineralizations in space. The detailed exploration has shown that the Cu mineralization is frequently associated with fluorite and mainly occurs along the edge of the rhyolite porphyry at shallow depths, whereas the Mo mineralization is commonly associated with quartz and is developed in the inner of the rhyolite porphyry at deeper depths. Did they form in one metallogenic epoch? If they did, what are the factors that control the large-scale separation of Cu and Mo?

The fluorite Sm-Nd and molybdenite Re-Os dating indicate that the Cu mineralization was formed in 298.1 ± 5.0 Ma and Mo mineralizaiton was formed in 299.6 ± 3.2 Ma. Four types of fluid inclusions (FIs) are present in the quartz and fluorite: solid-bearing (type 1), liquid-rich (type 2), vapor-rich (type 3), CO_2-bearing (type 4). The Cu mineralization stage contains type 1, 2 and 4, which yield homogenization temperatures of 174~328 °C and salinities of 0.2~14.9 wt.% NaCl eqv. The Mo mineralization stage contains all types of FIs except type 4, which yield homogenization temperatures of 221~396 °C and salinities of 1.2~45.6 wt.% NaCl eqv. The Laser Raman analysis show that the fluid of Cu mineralization was more oxidizing (more CO_2 but less CH_4) than that of Mo mineralization. The REE of fluorite (high ΣREE and $La_N/Lu_N \approx 1$) indicate that the fluid of Cu mineralization was derived from magma by release of gaseous HF and near-neutral, whereas the fluid of Mo mineralization was acidic (the sericitization was intensely developed).

Based on the above data, we conclude that the Cu and Mo mineralizations were formed in same metallogenic epoch. The temperature, fo_2, pH and the different geochemical behavior between Cu and Mo (Mo partitions preferentially into brine, but Cu is more likely concentrated in volatiles (e.g. CO_2, HF) during boiling) may be the reasons of the large-scale separation of Cu and Mo in the Dabate deposit.

References: [1] Seo et al (2012), *Econimic Geology* 107, 333-356.