

Geochronology and geochemistry of the igneous rocks in the Kalatag area: Implications for the tectonic setting of early Paleozoic magmatism and VMS mineralization in the eastern Tianshan, NW China

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The early Paleozoic magmatism and a large number of Cu-polymetallic mineralization are widespread in the southern Centre Asian Orogenic Belt (CAOB), NW China [1]. The newly discovered Huangtan VMS Cu-Au-Zn deposit in the Kalatage area, hosted in the Late Ordovician to Early Silurian dacitic tuff [2], is a suitable example to discuss the early Paleozoic diagenesis and polymetallic mineralization.

Our new zircon U-Pb ages determined by (LA-ICP-MS) indicate that the quartz diorite and quartz monzobiorite were formed in the Early Silurian (439.4 ± 1.7 Ma) and Early-Middle Carboniferous (346.8 ± 0.7 Ma), respectively. The mineralization occurred in the early Silurian, constraints from the Re-Os age of pyrite (437.9 ± 6.6 Ma, NSWD=7.4, n=6). Geochronology, as well as the mineralization characteristics, indicate that the Cu-Au mineralization is temporally and spatially related to the Early Paleozoic quartz diorite and the Daliugou Formation (andesite and dacitic tuff).

Both of the quartz diorite and the quartz monzobiorite have similar geochemical features of subduction-related origin. It is implied by rock geochemistry and Sr-Nd-Pb-Hf-O isotope. The Daliugou Formation, which mainly host the Cu-Au mineralization, are tholeiitic and consistent with normal arc magmas.

The early Paleozoic igneous rocks were mainly derived from depleted mantle metasomatized by subduction-related fluids with the involvement of bits of continental crust materials. The VMS mineralization were generated by the northward subduction of the North Tianshan oceanic plate beneath the Dananhu-Tousuquan island arc during the early Paleozoic [3].

[1] Deng, X.H (2018) *Ore Geol. Rev* 100, 250-262. [2] Mao, Q.G (2014) Post Doctoral Res. Rep. 1-154 (in Chinese). [3] Zhang, Y (2018) *Tectonics* 37(7), 2142-2164.