

The first case of Cenozoic porphyry copper occurrences in the eastern Pamir, Siruyidie'er copper polymetallic mineralization belt, Xinjiang

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The eastern Pamir is bordered by the Tarim Basin in the north, the Himalaya in the south and the Pamir Plateau in the west, where tectonic activity is active and complex, and there are many mineral resources. However, few copper deposits have been found that post-date Indo-Asian continental collision, especially porphyry copper deposits. The Siruyidie'er copper polymetallic mineralization belt, located in Taxkorgan county, Xinjiang Province, is a newly discovered Cenozoic copper deposit in the eastern Pamir. Due to the harsh environment and remote setting, mining here is at initial stages, and there are few research studies about the genesis of ore deposits, granite ages, and regional metallogeny. As a result, this work presents a preliminary study on this belt of mineralization.

The ore deposits are hosted in three mineralized belts. The first belt is the largest, including north and south ore sections, with the north section containing hydrothermal breccia and crypto-explosive breccia facies, and the south hosting granite porphyry type mineralization. The second belt exhibits quartz-vein type mineralization. The third belt contains both granite porphyry type mineralization and skarn mineralization. Ore minerals are mainly composed of chalcopyrite, pyrite, sphalerite, magnetite, specularite, and hematite, and the main alteration are K-feldspar, sericite, quartz, fluorite, malachite, and iron oxides.

A sample of the granite porphyry from the first belt comes from south ore section and yields an average $^{206}\text{Pb}/^{238}\text{U}$ age of 13.63 ± 0.20 Ma (MSWD=0.37). A sample of porphyritic granite come from the third mineralized belt yielded an average $^{206}\text{Pb}/^{238}\text{U}$ age of 13.73 ± 0.22 Ma (MSWD=1.5). Because of excess argon, an isochron age and the inverse isochron age best represents the age of the Siruyidie'er copper deposit at 13.34 ± 0.85 Ma.

The sample of granite porphyry has high SiO_2 (69.06-73.05 wt.%) and Al_2O_3 (14.24%~15.09 wt.%) contents, high Sr/Y (38-41) and La/Yb (78-96) ratios, and is enriched in LILE and LREE. Likewise, the porphyritic granite also shows high SiO_2 (69.06-72.19 wt.%) and Al_2O_3 (14.54%~15.81 wt.%) contents, high Sr/Y (87-117) and La/Yb (103-207) ratios, and is enriched in LILE and LREE. These sample show some geochemical affinity with adakites, e.g., high SiO_2 , Al_2O_3 , and Sr, low MgO, Y, and Yb, and absence of negative Eu anomalies. Based on the geochemical data, we argue that these magmatic rocks are related to partial melting of the thickened lower crust under a post-collision extensional setting after the India and Eurasia plates collided.

This work draws on new detailed field investigations, geochronology, and geochemistry from the Siruyidie'er deposit to conclude: 1) based on basic geological characteristics, alteration type, and mineral assemblage, the Siruyidie'er copper deposit is best classified as a porphyry ore deposit, 2) the ore-forming age of the Siruyidie'er deposit is 13.34 ± 0.85 Ma, 3) the mineralized rocks

show geochemical affinity with adakites, and 4) the tectonic setting is a post-collisional extensional environment.