**1 Introduction**

Xuejiping porphyry copper deposit is located in the eastern part of the Shangri-La Country, northwestern Yunnan Province, China. It belongs to Paleotethys-Himalayan metallogenic district, which is one of the three large porphyry copper belt in the world. Tectonically, it lies in western Zhongdian island arc, which is the southern part of the Triassic Yidun island arc.

Previous studies about age of Xuejiping porphyry complex had a divergence. The hornblende $^{40}$Ar-$^{39}$Ar plateau age of quartz dioritic porphyry was defined as 249.3±3.0 Ma, but zircon U-Pb dating ages were defined as 215.3 Ma. Besides, previous studies didn't discuss the characteristic of each lithology in Xuejiping porphyry complex and their implication for mineralization. In this study, we present detailed geochronologic and geochemistry of Xuejiping intrusion and its related porphyry type mineralization to address magma genesis and metallogeny.

**2 Geological Setting**

The Yidun island arc has been commonly considered to be produced by westward subduction of Ganzi-Litang oceanic lithosphere. As an important part of Yidun island arc, the Zhongdian island arc is accord with Yidun island arc in the way of structure and geological evolution. The evolution history of the arc also experienced three stages, including subduction orogeny stage, collision orogeny stage and intracontinental convergence stage. Numerous Late Triassic intermediate-felsic porphyry intrusions which intruded into contemporaneous volcanic-sedimentary rocks contain porphyry-type or skarn-type Cu-polymetallic mineralization.

Mineralization of Xuejiping deposit is directly related to the Xuejiping porphyry complex. The porphyry complex consists of quartz dioritic porphyry and quartz monzonitic porphyry. There are several alteration zones including potassic, strong silific and phyllic, argillic, and propylitic alteration zones from inner to outer of the mineralized porphyry bodies. The samples of this study were from Orebody Ⅰ and Orebody Ⅱ, including quartz dioritic porphyry and quartz monzonitic porphyry. One sample of quartz dioritic porphyry (XJP-81) and another sample of quartz monzonitic porphyry (XJP-69) were selected for zircon U-Pb dating and in situ Lu-Hf isotopic analyses.

**3 Geochronology**

Basing on their contacting relationship and petrological characteristics, the Xuejiping porphyry complex can be divided into two stages of intrusions. The lithologies of the intrusions include quartz dioritic porphyry formed in the first stage, and quartz monzonitic porphyry in the second stage. By using the LA-ICPMS zircon U-Pb method, the ages of quartz dioritic porphyry and quartz monzonitic porphyry are defined as 213.2±3.2 Ma and 206.7±2.9 Ma, respectively. The dating results coincide with the fact of the field that quartz monzonitic porphyry intruded after quartz dioritic porphyry. They are similar to those of arc magmatic rocks of the Yidun arc, which range from 238 to 206 Ma with a peak age at around 215 Ma.

**4 Geochemistry**

Both porphyry rocks belong to a subalkaline to calcalkaline series. The A/CNK of the quartz dioritic porphyry varies from 0.97 to 1.17 and that of the quartz monzonitic porphyry is from 1.45 to 1.51. Therefore, these intrusions belong to a para-aluminum to aluminum over-saturated series. They have high SiO₂ content, and depleted in Nb, Ta, and Ti and enriched in LILE (e.g. Rb, Li, etc.).
Sr and Ba). All the rocks are depleted in HREE relative to LREE (LaN/YbN=17.30~29.36) with weak Eu anomalies (δEu=0.77~0.93). But quartz monzonitic porphyry is lower than quartz dioritic porphyry in REE and LREE/HREE ratio. The geochemistry shows that the rocks have the similar characteristic with adakite. All the rocks have high Sr content (209~677 ppm) and low Y content (10.6~17.6 ppm) with high Sr/Y ratios (15.71~35.58). These features suggest that porphyritic intrusions were derived from adakitic magmas. There exist an evolution trend that SiO₂ and K₂O increased with decreasing of Al₂O₃ and MgO in the rocks from early to late.

5 Discussion

5.1 Petrogenesis

Two zircon samples εHf (t) values rang from -7.54 to 0.57 (XJP-69) and from -1.37 to 1.69 (XJP-81), respectively. Their corresponding TDMC model ages vary from 1.21 Ga to 1.72 Ga (XJP-69) and 1.15 Ga to 1.34 Ga (XJP-81), respectively. These dating results suggest that the magma origin of the Xuejiping porphyry complex could be composed of depleted mantle and continental crustal rocks. Namely, it may be a mantle-crust mixing model. The previous research about Sr-Nd isotopic also supports that the magma is from two different end members.

5.2 Metallogenic Significance

The major ore host porphyry of Xuejiping deposit is quartz dioritic porphyry. Mineralized quartz monzonitic porphyry only exists in the southern part of mine. The ore body mainly occurred in the strong silific and phyllic zones, and alteration stronger, mineralization better. Compared with the barren mineralization porphyrites, the ore-bearing porphyrites are lower in LILE and REE. It maybe because that these mobile elements were taken out from wall rock by ore-forming fluid in the process of mineralization. The cupper mineralization is associated with replacement of plagioclase by sericite and precipitation of quartz. The porphyrites with higher SiO₂ and K₂O content have larger potential for the formation of porphyry copper deposit.

6 Conclusion

Geochemical studies suggest that both porphyries have similar features in major and trace elements. They also have the characteristics of adakite.

The Hf isotopic data suggest that magmas were derived from a mantle-crust mixing model.

Ore-bearing porphyrites are lower than barren mineralization porphyrites in LILE and REE. The porphyrites with higher SiO₂ and K₂O have better potential for mineralization.

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