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Zircon LA-ICP-MS U-Pb Dating on the Guyong Granites from the Tengchong Block, Western Yunnan and Its Geological Significance

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1 Geological Background

Magmatism and the related mineralization have been hot topic for decades. The mineral resources are very abundant in Sanjiang region, southwestern Yunnan, with several giant ore deposits of copper, stannum, gold and lead-zinc. Magmatic activation usually accompany with metallic mineralization (Deng *et al.*, 2009, 2011; Wang *et al.*, 2010). Tectonic-magmatic-metallogenic system is essential for the magmatism associated with mineralization. Guyong granite with Sn mineralization is located in a metallogenic belt, western Yunnan, and it is also a granitoid complex. We choose the intrusive rocks to reveal both the intrusive and mineralized processes based on their geochemistry and dating data.

2 The Lithology and Analyzed Results

The Guyong granitoid pluton consists mainly of monzogranite and granodiorite. Monzogranite is composed of quarts (20%~30%), plagioclase (30%~40%), alkalifeldspar (35%), biltite (5%) and a few amphiboles. Gridle texture and fan-crystal can be seen in the plagioclase and alkali-feldspar. Granodiorite mainly contains quarts (20%), plagioclase $(45\% \sim 50\%)$, alkali-feldspar (20%) $\sim 25\%$), amphibole (10%) and a few magnetites. The majority of alkali-feldspar is microcline, and the cleavage of the microcline is bended and deformed. We select 9 wall -rock samples and 6 ore samples from three Sn-ore deposits associated with granites. From the results, the characteristics of these samples are similar. The SiO₂ and Al₂O₃ of the granites have range of 70.79%~79.32% and 11.1%~14.27%, with average of 74.55% and 12.88%, respectively. Guyong granites are calc-alkaline and metaluminous, with high Al₂O₃, K₂O/Na₂O (>1) and A/ CNK (0.94~1.21). The primitive mantle-normalized trace

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element patterns and chondrite-normalized REE patterns for the Guyong granites and ores show almost the same trend. The rocks are enriched in light rare earth elements (LREEs), large-ion lithophile elements (K and Rb) and depleted in high field strength elements (Nb, Ta and Zr). There is also a strong negative Eu anomaly.

LA-ICP-MS zircon U-Pb ages of 74 Ma, 74 Ma, and 80 Ma for three monzogranite samples from wall-rock and ores respectively indicate that this pluton was emplaced during the Late Cretaceous. The zircon $\varepsilon_{\rm Hf}(t)$ values (-7.42~ -4.56) yields zircon Hf crustal modal age of 1.42 Ga~1.27 Ga.

3 Discussion

The TAS diagrams for these rocks display the characteristics of the same rock. The depletion of Sr and Ba may represent the separation of plagioclase during partial melting or fractional crystallization. The depletion of Nb indicates the influence of the crust, and the strong depletion of Ba, P, Ti and Sr suggest the rocks formed under the post -collisional tectonic background. The discrimination diagrams for the A-type granites (Whalen *et al.*, 1987) and Nb-Y-3Ga diagram (Eby *et al.*, 1992) show that these rocks belong to A₂-type granites forming in the post-collisional tectonic setting, indicating the extensional environment after the continental collision or arc process. The granites and ores show the similar distribution trend, showing a genetic relationship between Sn-ores and the granitoids.

The closure of the Neo-Tethys begun at the late Cretaceous, and the subduction and collision between India and Euro-Asian continental crust were responsible for the structure pattern in western Yunnan. In this period of time, the regional structure type has been greatly changed by structure deformation, magmatism and fluid effects (Deng *et al.*, 2010). The dating results of 74Ma and 80Ma, together with 76Ma (Yang *et al.*, 2009) and 67Ma (Jiang *et al.*, 2009)

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al., 2012) in the previous studies, indicate the period between the end of Tengchong Block collides with Baoshan Block and the beginning of Tengchong Block collides with the Indian Block.

Sn-ore bodies from the three deposits all distribute flatly in veins in Guyong granites. The primitive mantlenormalized trace element patterns and chondritenormalized REE patterns for Guyong granites and ores show almost the same trend, indicating the metallogenetic material may come from the alteration of the granites. The hydrothermal fluids extracted the metallogenetic material from Guyong granites and enriched in the structure crack, and the granites may be the source of the minerogenetic fluid and material.

4 Conclusions

(1)LA-ICP-MS zircon U-Pb dating results show that Guyong granites emplaced during the Late Cretaceous.

(2)Guyong granites belong to A_2 -type granites, forming in the extensional setting.

(3)Guyong granites are both the wall rock and parent rock for the Sn-ores.

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