Geochemical Characteristics of the Yao'an and Machangqing Alkaline-rich Intrusions in the Ailaoshan-Jinshajiang Belt, Western Yunnan, China

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The NW-NNW trending Ailaoshan-Jinshajiang fault zone is one of the biggest strike-slip systems on Earth related to escape tectonics from the India-Eurasia collision since the early Himalayan orogeny. Numerous alkaline igneous rocks occur along or near the fault zone, forming the Ailaoshan-Jinshajiang alkaline intrusive belt over 1000 km long. In recent years numerous gold deposits and copper deposits have been discovered in the area, which are spatially related to and contemporaneous with these alkaline intrusions. The recent researches showed that there are genetic connections between alkaline magmatism and mineralzation.

The Yao'an and Machangqing alkaline-rich intrusions, form parts of the Ailaoshan-Jinshajiang alkaline-rich intrusive belt. The Yao'an intrusion consists mainly of syenite porphyry, and the Machangqing intrusion consists mainly of granite porphyry. Chemically these two intrusions are characterized by enrichment in alkaline and potassium. They enrich in LREE and LILE (such as Rb, Sr, Ba, Th, La etc.), deplet HFSE (such as Nb、Ta and Ti etc.), have high Rb/Sr, La/Nb, Ba/Nb and LREE/HREE ratios, and don't show obvious Eu anomalies. The I_{Sr} values of these two intrusions are relatively high, and $\square_{Nd}$ values are relatively low. It is suggested that the intrusions were derived from partial melting of an enriched upper mantle (EMII), a mixture between normal mantle and subducted oceanic crust, in a continental arc of extension tectonic setting. Although these two intrusions share similar characteristics on tectonic setting in the Himalayan period, age and source region, they have some difference on lithology and chemical composition, which was probably related to the difference on physical-chemical condition (such as T, P and fO_2 etc.) during magmatic crystallization, and on different melted degress of source rocks. Au mineralization is considered to be associated with the intrusions of alkaline series while Cu mineralization with the intrusions of alkaline-subalkaline series in Ailaoshan- Jinshajiang alkaline intrusive belt.

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