Geochemistry and geochronology of the Paleozoic granitoids in the eastern Central Tianshan Belt

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The eastern Central Tianshan Belt (CTB) is characterized by outcropped a large number of granitoids, which are represented by the muscovite moyites (MM), biotite monzonitic granites (BMG), biotite moyites (BM) and alkali granites (AG) in Kumish area.

The MM have pronounced S-type affinity and strongly peraluminous, and enrichment in LREE with strong negative Eu anomalies. They also show Ba, Nb, Sr, P and Ti negative anomalies, and Rb, Th and U positive anomalies. The geochemical features suggest the MM derived from melting of continental crust, which are mainly composed of the sediments eroded from a pre-Silurian continental island-arc where had been influenced by subduction components of the Junggar oceanic crust. The LA-ICPMS zircon U-Pb dating indicate the MM were formed at 424.5 ± 2.6 Ma.

The BM and BGM granitoids display I-type affinity and geochemistry related to subduction. Especially, the BMG granite are characterized by calc-alkaline peraluminous granite, significant LREE enrichment and negative Eu anomalies, as well as depletion in Ba, Nb, Ta, Sr, P and Ti, and enrichment in Rb, Th, U, Nd, Zr and Sm. It is suggested that the BMG were derived from a mixed magma source of lower continental crust and mantle derived components above the subduction zone of the South Tianshan Oceanic crust. The LA-ICPMS zircon U-Pb ages of 411 ± 4.7 Ma and 402 ± 3.4 Ma represent the formation ages of the BM and BMG, respectively, which also imply that the subduction movement of the South Tianshan oceanic crust still occurred during Early Devonian.

The geochemical compositions indicate the AG are alkaline granites and have typical A-type granite affinity with higher ΣREE and HFSE compositions than the S-/I-type granites. In addition, the AG display extremely enrichment in LREE and depletion in Nb, Ta, Sr, P, Ti and Y. All above evidences indicate the AG were formed within plate tectonic setting, and related to continental up-doming and rifting zones as a consequence of the extensional collapse after the collision of the Tianshan orogen. The LA-ICPMS zircon U-Pb ages of 290 ± 5.1 Ma represents the formation age of the AG, and the time of the extensional collapse and rifting.

Geochemical characteristics and isotopic age of gabbros in Altun south margin fault

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Gabbroic intrusions occur in Mangya area of Mt. Altyn Tagh, West China. The gabbroic samples have Si_2O of 47.74~50.04%, Ti_2O of 1.11~1.38%, MgO of 6.56~9.3%, and high Al_2O_3 (11.58~16.26%), CaO (8.13~11.06%), $Fe_2O_3^T$ = 8.11~10.55%, ALK (K_2O+Na_2O) =3.26~4.26% contents, showing typical calc-alkalic series trend (σ=1.0~1.4). Their chondrite normalized REE patterns are LREE enriched, with significant LREE/HREE fractionation (La_N/Yb_N = 9.52~11.50) and weak Eu abnormity (δEu=0.80~0.97), probably resulted from the fractional crystallization of plagioclase. The gabbros was suggested to relate to plate subduction and similar to IAB in their trace elements patterns and spider diagram, with enrichment of LILE Rb, Ba, Sr, and U, Pb and depleted of HFSE (Nb, Ta, Zr, Hf). Hence we propose the gabbroic magma originate from enriched lithospheric mantle or lower crust, and the uprising melt mix with crust materials. LA-ICP-MS zircon dating show that the formation age of gabbros is 445±1Ma (WSMD=0.94). We suggest subduction of oceanic crust occurred in southern margin of Altyn in late Ordovician, which provide important evidence to study formation and evolution of Altyn Tagh tectonic belt.

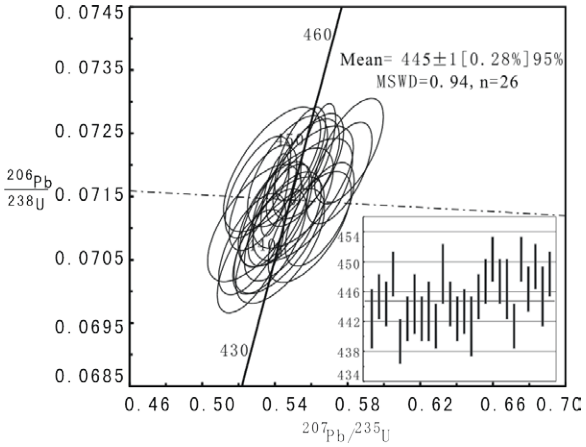

Figure 1: The diagram of zircon U-Pb concordant age of gabbro

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