SHRIMP zircon U-Pb chronology, elemental and Sr-Nd-Hf isotopic geochemistry of SSZ ridge plagiogranite in western Qinghai-Tibet plateau

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Since the northernmost suture zone, i.e. Oytag-Kuda Suture Zone, of Qinghai–Tibetan plateau has been demonstrated, the nature, timing and tectonic setting of this suture zone remains hotly debated because of the lack of reliable isotopic ages of certain key tectonic units, in particular the ophiolites along the suture zone. This paper presents for the first time a detailed SHRIMP zircon U–Pb chronology, major, trace elemental, and Sr–Nd–Hf isotopic geochemistry for the oceanic plagiogranites within the Oytag ophiolite suite along this suture zone. The plagiogranites include three intrusive bodies. SHRIMP zircon U–Pb dating for the two intrusions indicate that they were emplaced into the Oytag volcanic rocks at 337.5±4.1 Ma and 327.7±4.9 Ma, respectively. Both intrusions are composed of low-Al trondhjemite and tonalite. The rocks have low K_2O and Sr and high Y contents, and are depleted in LREE relative to HREE with negative Eu anomalies. The earlier intrusion has ε_{Nd} (T) values of 6.9 to 7.6, similar to MORB, but its initial $^{87}Sr/^{86}Sr$ ratios (0.7048–0.7051) are higher than those of MORB. The later intrusion has slightly lower ε_{Nd} (T) values (6.2–6.5) and much higher initial $^{87}Sr/^{86}Sr$ ratios (0.7061–0.7068) than the earlier intrusion. In situ Hf isotopic compositions of Early Carboniferous-age-dated zircons in both intrusions are characterized by positive initial ε_{Hf} values (12.5–19.5), similar to MORB. Detailed elemental and isotopic data suggest that the Oytag oceanic plagiogranites were formed by differentiation of a tholeiite magma which was derived from the subduction-modified mantle source in the SSZ ridge setting. The Oytag-Kuda Suture Zone is suggested to be a multiple suture zone that represents the remnants of both the Proto-Tethyan and Paleo-Tethyan oceans.

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Source and crustal assimilation of Jinchuan ultramafic complex in Gansu province, China

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Jinchuan ultramafic complex is world-wide famous for its enormous Cu-Ni resources in western China, which is the third largest magmatic Cu-Ni sulphide ore deposits with more than 5 million ton Ni metal and 3 million ton Cu metal. Therefore, the magmatic processes of Jinchuan ultramafic complex are concerned by many researchers, we analyse the microelements and isotope of the samples from Jinchuan ultramafic complex.

Source of Jinchuan Ultramafic Complex

Datum show low negative $\varepsilon Nd_{(t)}$ value(-6 ~-9) and high positive $\varepsilon Sr_{(t)}$ (56~160)value, with non-radiation Pb isotope composition., especially, $\varepsilon Nd_{(t)}$ values are similar one another among olivine, pyroxene and various ultramafic rocks. What's more, REE and trace element distribution patterns prove the samples enrichment in LREE and LILE, without clear δEu abnormity. All these datum and diagrams suggest that the source of Jinchuan ultramafic complex is enrichment mantle.

Crustal Assimilation of Jinchuan Ultramafic Complex

Trace element distribution patterns show distinct negative abnormity in Nb,Ta; negative relationship between the values of La/Sm and $\varepsilon Nd_{(t)}$[1]; positive relationship between the values of $^{187}Os/^{188}Os$ and 1/Os[2];high initial value of $^{187}Os/^{188}Os$,which is higher than mantle initial value of $^{187}Os/^{188}Os$;all these datum prove Crustal assimilation of Jinchuan ultramafic complex. He, Ne and Ar isotopic composition indicate that mantle component had been mixed by continental crust and atmospheric volatiles in olivine, pyroxenes and sulfide from Jinchuan intrusion[3].The ratio values of Th/Nb, Th/Ta, Ta/Nb, TiO_2/Z, TiO_2/V from Jinchuan ultramafic rocks display that the assimilation is from middle-upper crust material, which is consistent with $\varepsilon Nd_{(t)}$ — $Sr_{(t)}$ diagram, and is an important factor to forming Jinchuan super-large Cu-Ni sulphide ore deposit.

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[1] Li *et al.* (2005) G^3 **6**(11), 1-16. [2] Yang *et al.* (2008) *Chemical Geology* **247**, 401-418. [3] Zhang *et al.* (submitted) *EPSL.*