Late Cretaceous adakitic pluton from Rutong, northwestern Tibet

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Mesozoic and Cenozoic igneous rocks are widely distributed in the Lhasa terrane and comprise the Gangdese batholith [1-3]. The Rutog granitic intrusion is located in the westernmost part of the Lhasa terrane, between the Yarlung-Zangbo suture zone to the south and the Bangong-Nujiang suture zone to the north. The Rutog intrusion is composed of a granodiorite, monzogranite and potassic feldspar-granite. This study focuses on SHRIMP zircon dating, and whole rock major and trace elemental and Sr-Nd isotope geochemistry.

New SHRIMP U-Pb zircon dating results yield 80.0 ± 1.2 Ma for the granodiorite and 79.4 ± 0.9 Ma for the monzogranite. All the rocks of the Rutog intrusion have adakite-like geochemical features and have SiO_2 ranging from 62 to 72 wt.% and Al_2O_3 from 15 to 17 wt.%. They have relatively high K_2O (2.33～4.93 wt.%) and low Na_2O wt.% (3.42～5.52 wt.%) with Na_2O/K_2O ratios of 0.74 ～ 2.00. Their REE patterns are enriched in LREE [(La/Yb)n = 15 to 26] without obvious Eu anomalies (δEu=0.68～1.15). The primitive mantle normalized trace elemental patterns are rich in LILE and depleted in HREE, HFSE and Y. The Sr/Y ratios range from 15.2 to 77.6 (average 29.7). The rocks have a narrow range of initial $^{87}Sr/^{86}Sr$ ratios (0.7045 to 0.7049) and $\varepsilon_{Nd}(t)$ values (+0.1～+2.3).

The Rutog adakitic rocks were formed from melts produced by partial melting of the lower part of a thickened continental crust at garnet stable depth. The melting event was caused by a newly underplated basaltic magmas above a mantle wedge, suggesting flat subduction of the Neo-Tethyan oceanic lithosphereic and impling an accretionary orogeny in Late Cretaceous. Thus a narrow mountain range already existed in southern Tibet prior to the India-Asia collision (4). The occurrence of Rutog adakitic rocks shows that the crustal thickness of Rutog area have been thickened to >40 km before 80 Ma, which is significant for interpreting the uplifted mechanism of the Tibetan plateau.

References

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