

# Geochronologic and Geochemical Characteristics of Granitoids from SE Tibet

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## Abstract

Northward subduction of the Neo-Tethyan oceanic lithosphere beneath the southern margin of the Asian continent gave rise to an Andean-type magmatic arc, which has been existed since at least the early Jurassic ( $\geq 190$  Ma) and lasted to the Eocene ( $\sim 45$  Ma). Comparing to the Gangdese Batholith, exposed in the southern Lhasa terrane, central part of southern Tibet, as one of the largest intrusive exposures related to the Neo-Tethyan subduction, the temporal and spatial distribution of arc magmatism that occurred in its eastern and southeastern extension remains poorly understood. Here we present for the first time a systematic study that focuses on geochronologic and geochemical analyses of granitoids from Bomi to Chayu areas between  $\sim 95^\circ\text{E}$  and  $97.5^\circ\text{E}$ , southeastern Tibet. In this study, we carried out 10 SHRIMP zircon U-Pb ages, together with major- and trace-element determinations of about 60 granitoid samples among which 27 were selected for Sr-Nd isotope analysis.

Our age data show that the granitoids were emplaced at  $\sim 133$ - $110$  Ma and  $\sim 60$  Ma, in the Cretaceous and Paleocene, respectively. In addition to the common calc-alkaline granitoids, A-type granites of  $\sim 110$  Ma old are observed in several localities. Besides, highly fractionated S-type granites are present. All these granitoids are characterized with depletions in the high field strength elements (HFSE), relative to the enrichments in LILE and LREE, and show spidergram patterns generally similar to those of arc magmas from subduction zones or active continental margins. The A-type granites, a rock type rarely reported in the convergent margin settings, are furthermore marked by the characteristic features including high alkalis ( $\text{Na}_2\text{O}+\text{K}_2\text{O}=7.1$ - $8.3$  wt.%;  $\text{K}_2\text{O}=4.5$ - $5.5$  wt.%;  $\text{Rb}=491$ - $713$  ppm), high Ga/Al, high  $\text{Fe}_2\text{O}_3/\text{T/MgO}$ , and high REE [ $\text{La}=20.1$ - $54.5$  ppm;  $(\text{La}/\text{Yb})_n=1.45$ - $4.86$ ], coupled with low Ba

(10.2-46.2 ppm), low Sr (6.46-11.5 ppm) and strongly negative Eu anomalies [(Eu/Eu\*)= 0.02-0.04].

The granitoids as a whole show a wide range of Sr and Nd isotopic compositions, with  $\epsilon\text{Nd}(T)$  values varying from -1 to -10.9 and  $I_{\text{Sr}}$  from 0.702 to 0.727, which corresponds to the range of granitoids from the Nyainqentanglha belt, northern Lhasa terrane ( $\epsilon\text{Nd}_T = -4$  to  $-13$ , ca. 150-85Ma) and differ remarkably from those of the Gangdese batholith ( $\epsilon\text{Nd}_T = +2$  to  $+6$ , ca. 103-85 Ma,  $\epsilon\text{Nd}_T = -0.5$  to  $+5.3$ , ca. 51-45 Ma).