Mesozoic magmatism in Tengchong block, Southeastern Tibet, and its tectonic implications

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A gigantic Mesozoic to early Cenozoic semi-coherent magmatic belt trends from Kohistan-Ladakh, across southern Tibet and Yunnan-Myanmar and E-Thailand further to Malaysia and Sumatra. The section from Kohistan to southeastern Tibet is referred to as the Transhimalayan batholith, which is a ca. 2500 km first order geologic feature of the Himalaya-Tibet tectonic realm. The Tengchong block is located south of the eastern Himalayan syntaxis, confined by the Bangong-Nujiang suture in the east and by the Indo-Burma suture in the west. The Indo-Burma suture zone is considered as equivalent to the Yarlung-Tsangpo suture separating rocks related to India in the west from rocks related to Tengchong block in the east.

Four episodes of magmatism are as yet documented from the Tengchong batholith: (1) Triassic magmatic rocks are found in the western Tengchong block, composed of diorite. (2) Early Cretaceous magmatic rocks are located in the eastern Tengchong block, a large N-S trending quasi-continuous magmatic belt of ca. 400 km length and 25-40 km width, consisting of predominantly granitic plutons that resulted from the subduction of Nujiang oceanic crust and continental collision between Lhasa(+Tengchong) and Qiangtang(+Baoshan) blocks. (3) Late Cretaceous to early Cenozoic granitic rocks are exposed in the central and western parts of the Tengchong block. (4) Late Miocene to recent predominantly basaltic-andesitic volcanism (5.5 to 0.01Ma) within NE- to NNE-trending rift basins in the central parts of the Tengchong block. In particular, the Mesozoic magmatic rocks may provide important evidence for the tectonic evolution of the Tengchong block in southeastern Tibet.

The zircon U-Pb dating shows the Mesozoic magmatism in Tengchong block occurred at Triassic (245Ma), early Cretaceous to early Cenozoic (76-43Ma)and late Cretaceous to early Cenozoic (76-43Ma), respectively. The Hf isotopic data of these magmatic rocks display εHf(t) values are +7.8 to +14.9 with TDM^C ranging from 320 to 773 Ma, -4.7 to -9.6 with TDM^C ranging from 1483 to 1677 Ma, and -2.7 to -15.5 with TDM^C ranging from 1312 to 1928 Ma, respectively. The geochemical analyses displays: 1) the Triassic diorite is characteristized by the strongly enrichment of large-ion lithophile elements (LILE) relative to those in the Primordial mantle， negative anomaly of Th, U, Nd, Ta, and Ti in the Primitive mantle-normalized trace elemental spider diagram. 2) the early Cretaceous magmatic rocks have the characteristization of high Na_2O and low K_2O contents, and distribution of strongly enrichment of LILE (K, Rb, Ba and K) and negative anomaly of Ba, Nd, Ta, Sr, P, Ti, and high Th/Yb, low Ba/La and Yb/Hf ratios. 3) late Cretaceous granite displays metaluminous and peraluminous affinity, and strong enrichment of U and Th, significantly negative anomalies of Eu, Ba, Sr, Nb, P, and Ti. Geochemical and Hf isotopic data suggest that the Triassic diorite formed with mantle-derived magma mixed by a little crust-derived magma in island arc setting, early Cretaceous and late Cretaceous plutonic rocks were derived by partial melting of ancient continental crust in a syn-collisional setting.

The emplacement age and tectonic setting for magmatic rocks in Tengchong block show: 1) The Triassic diorite in Tengchong block is the same with the eclogite in the Lhasa block, and regional angular unconformity with omission of P2 to T1, suggest the subduction-collision in Tengchong block had happened during early Indosinian, like that between Lhasa and northern Australia blocks from P2 to T1. 2) The early Cretaceous plutonic rocks in Tengchong block have the same features with that in the central section and southeast part of Lhasa block, and resulted from subduction of middle Tethyan oceanic crust and continental collision between Lhasa-Tengchong and Qiangtang-Baoshan blocks. 3) The late Cretaceous to Cenozoic granites are initiated as a result of significant subduction of Neotethyan ocean. The late Miocene to recent magmatism related to the extrusion of the Tengchong block.

Key words: Mesozoic magmatism; Zircon U-Pb dating; Hf isotopic dating; Tengchong block