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Lithospheric bending of the Tengchong Terrane from late Eocene to early Miocene: New extrusion mechanism of SE Tibet during the Indo-Asian collision

Zhiqin Xu (1,2), Qin Wang (2), Zhihui Cai (1), Hanwen Dong (1), Huaqi Li (1), Xijie Chen (1), Xiangdong Duan (3), Hui Cao (1), Jing Li (3), and Jean-Pierre Burg (4)

(1) Institute of Geology, Chinese Academy of Geological Sciences, Beijing, China, (2) Department of Earth Sciences, Nanjing University, China (qwang@nju.edu.cn), (3) Geological Survey of Yunnan Province, Kunming, China, (4) Geologisches Institut, ETH Zurich, Zurich, Switzerland

It is generally believed that the extrusion of SE Tibet was bounded by the dextral Gaoligong and the sinistral Ailaoshan-Red River strike-slip shear zones from the Oligocene to early Miocene. This study integrates field mapping, structural analysis and geochronology in western Yunnan (China), where foliated Precambrian basement rocks and late Cretaceous to early Eocene plutons are exposed to the west of the Gaoligong shear zone. We found that the Tengchong Terrane was neither rigid nor vertically coherent during its southward extrusion and clockwise rotation. The Tengchong Terrane consists of four elongated gneiss domes (Donghe, Guyong, Yingjiang and Sudian) that are cored by high-grade metamorphic rocks and pre-kinematic granite plutons, and bounded by top-to-NE detachments and NE-trending dextral strike-slip shear zones. Zircon U-Pb ages from LA-ICP-MS analysis and 40Ar/39Ar ages of micas and hornblende demonstrate that the flat-lying Donghe Detachment (>35-15 Ma) and the Nabang dextral strike-slip shear zone (41-19 Ma) were sites of prolonged, mostly coeval ductile deformation from amphibolite to greenschist facies metamorphism. The Gaoligong shear zone experienced dextral shearing under similar metamorphic conditions between 32 and 10 Ma. Coeval activation of the flat-lying detachments and strike-slip shear zones resulted in fast exhumation and SW-ward extrusion of the basement rocks and granite plutons of the Tengchong Terrane. The Tengchong Terrane can be regarded as vertically plunging folds formed by lithospheric bending around the proto-Eastern Himalayan syntaxis since 41 Ma. The intense clockwise rotation of the Tengchong Terrane was accommodated by strike slip along the Sudian, Yingjiang, Lianghe and Nabang shear zones before 35 Ma, and the subsequent localized movement along the Nabang and Gaoligong strike-slip shear zones until the early Miocene. This deformation geometry indicates the importance of mid-crustal detachments in accommodating the large displacements of continental fragments in a transpression orogen.