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Cenozoic tectono-magmatic processes in the Gaoligongshan strike-slip fault zone, southwestern China

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The Cenozoic tectonic units in the Sanjing (Three Rivers) region, southeastern China, comprise, from west to east, three main crustal-scale strike-slip fault zones including the Gaoligongshan, Chongshan, and Ailaoshan–Red River. The Gaoligongshan strike-slip fault zone is the boundary between the Baoshan block to the east and the Tengchong block to the west around the southeast of the Eastern Himalayan Syntaxis in western Yunnan, China. It is one of most important tectonic zones due to its role in the southeastward extrusion of the Indochina block during and subsequent to India-Eurasia collision. Research spanning more than twenty years has provided a wealth of information on the geometry of the Gaoligongshan shear zone and its structural and geothermal evolution. However, the temporal-spatial relations between the shear zone structures and magmatic intrusions are still not clear.

Along the Gaoligongshan strike-slip fault zone, mainly ylonitic Cenozoic granites and Proterozoic rocks are exposed. The field and microscopic observations reveal that the pre- and syn-kinematic granitic intrusions are coeval with high-temperature mylonitization. Widespread shear sense indicators including sheared veins, S-C/C' mylonitic fabric, shear bands, mica-fish arrays, asymmetric fabrics (e.g. sigma- and delta-types of feldspar and hornblende porphyroclasts) suggest that the high-grade metamorphic rocks and most granite intrusions experienced progressive right-lateral shear. However, post-kinematic granitic pegmatite dykes remain weakly deformed, which show cross-cutting relationship with the mylonitic foliation and stretching lineation. Our new LA-ICP MS zircon ages of granitic intrusions suggest a division of Cenozoic magmatic rocks in Gaoligongshan strike-slip fault zone into two groups: 1) an magmatic group with ages ranging from 64 to 57 Ma is related to the Neotethyan oceanic slab subduction; 2) another group with the ages ranging from 32 to 15 Ma is related to the ductile high-temperature right-lateral shearing along the Gaoligongshan strike-slip fault zone. The new age data, coupled with our meso- and microstructural observations on these granitic intrusions, not only allow us to establish the age framework of Cenozoic magmatic activities Cenozoic tectono-magmatic processes in the Gaoligongshan strike-slip fault zone, but also allow us to improve the current geodynamic models for the exhumation of the high-grade metamorphic rocks along the fault zone, in particular exhumation related to the post-collisional stage of the India–Eurasia plate interaction in Southeast Asia.