

The emplacement depth of granitoid intrusions from the Gaoligong strike-slip shear zone: new insights from Al-in-hornblende barometry and U-Pb and ^{39}Ar – ^{40}Ar geochronology

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Lateral extrusion of continental blocks during continent-continent collisional orogeny is a well-known process. However, a vertical motion along confining these blocks remains poorly constrained. The Cenozoic Gaoligong strike-slip shear zone (GLSZ) is located in the southeast of the Eastern Himalayan Syntaxis (EHS) in western Yunnan, China, and separates the Baoshan block in the east from the Tengchong block in the west. The GLSZ plays a vital role in our understanding of the collision between the Indian and Eurasian plates. Along the GLSZ are exposed large volumes of granitoids and granitic gneisses, which are composed of varying proportions of quartz, plagioclase, K-feldspar, biotite, hornblende, sphene, magnetite, apatite and zircon. Geothermobarometric calculations using hornblende-plagioclase thermometry and aluminum-in hornblende barometry have been made on the samples from granitoids and amphibolite rocks in the GLSZ. The undeformed granodiorite outside the GLSZ were emplaced at average temperatures and pressures ranging between 643 and 729 °C and 4.0 to 5.8 kbar, respectively. The average emplacement depth estimates for the investigated granitoids is constrained, therefore, at about 14 to 21 km. The strongly deformed granitic gneisses were emplaced and deformed at average temperatures and pressures ranging between 568 and 745 °C and 1.2 and 3.5 kbar, respectively. The average deformation depth estimates for the investigated granitoids are constrained at about 4.4–12.7 km. The U-Pb zircon and ^{39}Ar – ^{40}Ar white mica data from the deformed granitic mylonites revealed, that the Cenozoic strike-slip shearing occurred after 35 Ma, and continued until 15 Ma. These results indicate that crustal rocks of GLSZ have been exhumed at least 16 km during shearing at an approximate exhumation rate of 0.08 mm/year. This rate is in a similar order of a magnitude as in other shear zones related to the same lateral extrusion process in Indochina.