# Petrogenesis of Miocene dikes in southern Tibet: Linking magmatism across different geologic units

WEI-QIANG JI[1]*, FU-YUAN WU[1], CHANG ZHANG[1], XIAO-CHI LIU[1], TONG LIU[1], JIAN-GANG WANG[1], ZHI-CHAO LIU[2]

[1]State Key Laboratory of Lithospheric Evolution, Institute of Geology and Geophysics, Chinese Academy of Sciences, P.O. Box 9825, Beijing 100029, China (*correspondence: jiweiqiang@mail.iggcas.ac.cn)

[2]School of Earth Science and Geological Engineering, Sun Yat-sen University, Guangzhou 510275, China

Cenozoic dikes are widespread in southern Tibet from the Lhasa terrane through the Yarlung Tsangpo suture to the Tethyan Himalaya, which intrude different geologic units, such as Gangrinboche conglomerate, Xigaze forearc sediment, Yarlung Tsangpo ophiolite, Liuqu conglomerate, and Tethyan Himalaya sequence. They show various rock types including diorite porphyry, granodiorite porphyry, aplite, and minette. Compared with the research on magmatism of Gangdese batholith and coeval volcanic rocks in the Lhasa terrane and that of the leucogranites in the Himalayas, there has been an obvious lack of studies on these dikes. These dikes can provide an important window into the thermal and compositional regimes of the deep orogen at the time of the intrusion.

We conducted chronological, zircon Hf isotope, whole-rock element and Sr-Nd-Hf isotope analyses on these dikes to reveal their petrogenesis. These dikes were dated at middle Miocene from 15 to 10 Ma. The minette dikes from Liuqu conglomerate and Yarlung Tsangpo ophiolite show geochemical characteristics similar to ultrapotassic rocks from southern Lhasa terrane, while the diorite porphyry and aplite dikes from Xigaze forearc sediment and ophiolite display geochemical characteristics resembling Miocene adakitic rocks of southern Lhasa terrane. The granodiorite porphyry dikes from the Tethyan Himalaya exhibit elemental and isotopic compositions similar to Kuday adakitic dikes near Sakya dome, which also plot in the field of Miocene adakitic rocks of southern Lhasa terrane. The minette dikes were derived from lithospheric mantle metasomatized by previously subducted Indian continental slab, whereas the felsic dikes were generated by partial melting of thickened lower crust. The adakitic dikes in the Tethyan Himalaya represent the relatively primitive magmas of Himalayan leucogranites. The leucogranites were generated by highly fractionation as well as assimilation of various degrees by ancient Indian crustal materials, as constrained by elemental and isotopic evidence.