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Structure and spatial-temporal relationship of potassic magmatism linked to a continental-scale strike-slip shear zone and post-collisional Cenozoic extension

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Adakite□like potassic rocks are widespread in post-collisional settings and provide potential insights into deep crustal or crust-mantle interaction processes including asthenosphere upwelling, partial melting, lower crustal flow, thickening and collapse of the overthickened orogen. However, petrogenesis and compositional variation of these adakite□like potassic rocks and their implications are still controversial. Potassic magmatic rocks are abundant developed in the Jinshajiang–Ailaoshan tectono-magmatic belt that stretches from eastern Tibet over western Yunnan to Vietnam. Integrated studies of structure, geochronology, mineral compositions and geochemistry indicate adakite-like potassic rocks with different deformation are exposed along the Ailaoshan-Red River shear zone. The potassic felsic rocks formed by mixing and partial melting between enriched mantle-derived ultrapotassic and thickened ancient crust-derived magmas. The mixing of the mafic and felsic melts and their extended fractional crystallization of plagioclase, K-feldspar, hornblende and biotite gave rise to the potassic magmatic rocks. Zircon geochronology provide chronological markers for emplacement at 35–37 Ma of these adakite-like potassic rocks along the shear zone. Temperature and pressure calculated by amphibole-plagioclase thermobarometry range from 3.5 to 5.9 kbar and 650 to 750 □, respectively, and average emplacement depths of ca. 18 km for granodiorite within this suite. In combination with the results of the Cenozoic potassic magmatism in the Jinshajiang–Ailaoshan tectono-magmatic belt, we suggest that in addition to partial melting of the thickened ancient continental crust, magma underplating and subsequent crust-mantle mixing beneath the ancient continental crust have also played an important role in crustal reworking and strongly affected the rheological properties and density of rocks. The exhumation underlines the role of lateral motion of the Ailaoshan-Red River shear zone initiation by potassic magma-assisted rheological weakening and exhumation at high ambient temperatures within the shear zone.