The Yangla skarn Cu deposit (150 Mt at 1.03% Cu) is located in the central segment of the Jinshajiang Metallogenic Belt within the Sanjiang (three rivers) region, SW China. The ore associated granodiorite was emplaced at 233.1 ± 1.4 Ma and 231.0 ± 1.6 Ma at 2σ by zircon U-Pb dating (Zhu et al., 2011), coeval to the Cu mineralization (232.0±1.5 Ma; Re-Os dating by molybdenite). Both significantly postdated the Early Triassic collision (246–247 Ma; Zi et al., 2012) between the Qamdo–Simao terrane and the Zhongza terrane along the Jinshajiang Suture following the closure of the Jinshajiang Paleo-Tethys Ocean. Based on their geochemical compositions, two groups of granodiorite have been defined. Group 1 is characterized by relatively low εNd(t) values (-5.1–-6.7) and high initial 87Sr/86Sr ratios (0.7078–0.7148), with ancient two stages Nd isotope model ages (TDM2 = 1420–1551 Ma). In contrast, Group 2 has mantle-like εNd(t) and initial 87Sr/86Sr ratios (εNd(t) = 1.5–2.9; (87Sr/86Sr)i = 0.7042–0.7047), with obvious younger TDM2 ages (769–882 Ma). Both of them are enriched in high ion lithophile elements and depleted in high field strength elements, typical subduction signatures. In addition, Group 2 shows higher Sr/Y ratios (45–81) than Group 1 (Sr/Y = 11–37), indicative of a hydrous magma source which would suppress plagioclase fractionation and be in favor of hornblende crystallization (Naney, 1983; Richards and Kerrich, 2007). In combination, we propose Group 2 was probably derived from the melting of previously subduction-modified lithosphere, especially hydrous arc cumulates in the lower crust. However, rocks from Group 1 were derived from a mixing magma from the melting of both residual metasomatic lithosphere and ancient lower crust. The arc cumulates associated with the subduction of the Paleo-Tethys might provide Cu, S, and water for the fertile magmas. For the contribution of the Neoproterozoic slab subduction, further work should be done.

References


