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The Two-Phase Intraplate Extension of Different Causes After the Closure of the Middle Tethys Oceanic Basin in the Bangong Lake Zone, Tibetan Plateau

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The Middle Tethys ocean which represents by Bangong-Nujiang ophiolitic melange zone has independent temporal-spatial structure (Li et al., 2008), and now it is generally believed that it closed between the Late Jurassic epoch and Early Cretaceous epoch (Li et al., 2008; Pan et al., 2006; Zhu et al., 2009b, 2011; Kang et al., 2008). A series of EW- and NS- striking dykes distribute in the western Bangong Lake zone, including granite, granodiorite and diabase. Based on zircon U-Pb LA-ICP-MS dating and petrogeochemistry combined with field investigation, the present authors propose that these dikes represent the two-phase intraplate extension of different causes after the closure of the Middle Tethys oceanic basin in the Bangong Lake Zone, Tibetan Plateau. The granite occurring only in EW-strike yield a weighted mean age of 91.2 ± 1.3 Ma (MSWD = 2.9) with 10 zircons. Granodiorite and diabase dikes are both the NS-strike, which respectively yield a weighted mean age of 82.9 ± 1.2 Ma (MSWD = 2.6) with 15 zircons and 86.1 ± 1.5 Ma (MSWD = 3.0) with 11 zircons. These results indicate that the extensional process of the Bangong lake zone which occurring in Late Cretaceous epoch was initial NS-trending and then turn to EW-trending.

Petrochemical characteristics indicate that the granite and granodiorite dykes have typical adakite-like characteristics: high SiO₂ (65.02% ~ 70.72%) and Al₂O₃ ($\geq 15\%$), low MgO (0.97% ~ 2.00%), high Sr (380.4×10^{-6} ~ 490.0×10^{-6} , the average of 428.4×10^{-6}), high Sr / Y ratio (> 35), low HREE and Y (5.64×10^{-6} ~ 10.78×10^{-6} , the average of 8.20×10^{-6}), HREE and LREE fractionation significantly ($20 < (La / Yb)_N < 48$, the average is 33), with no Eu anomaly. These typical adakite-like dykes are not the result from melting of young oceanic crust, nor from the fractional crystallization of basaltic magma, they are likely to be the result from the melting of thickening crust. During Late Cretaceous epoch, middle-Tethys ocean finished the ocean-continent transition and Bangong lake zone entered a period of intraplate tectonism. In the first place, adjustment of relaxation after the collision, along the collision zone

formed graben or linear basin which depositional conglomerates and molasse sediments, crust thinning; both sides of the collision zone were EW-trending linear thermal-uplift expanding tectonic zone, which formed linear Mountains or crustal thickening, especially of the lower crust thickening. The partial melting of the thickened lower crust, low-density lower crustal melting magma occur diapiric process due to the buoyancy effect, cause the middle and upper crust thermal-uplift expanding cracked, formed both EW- and NS-trending Adakitic dykes possessed a unique geochemical characteristics. Subsequently occurred EW-trending extensional adjustment, formed NS-trending dikes. Late Cretaceous mafic diabase-dykes, as an important symbol of extensional tectonics, outcropped on both sides and internal of the suture zone in Bangong Lakes region, and all are nearly NS-trending, on behalf of the beginning of an important extensional mainly with EW-extending after the Bangong Lake area go into intraplate stage.

Keywords: intraplate extension, dyke, Adakite, Geochemistry, Bangong lake, Tibetan plateau

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