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Early-Jurassic tonalite- monzogranite association from the southern part of the Zhangguangcai Range: implications for the Paleo-Pacific plate subduction along the NE China

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Phanerozoic granitic rocks in the northeastern China exposed over an area of ~200000km^2, these granitic rocks display depleted Sr-Nd isotopic compositions, which indicate significant Phanerozoic crust growth[1~4]. However, the crustal growth model and the petrogenesis of these granitic rocks still remains controversial, the granitic rocks with depleted Sr-Nd isotopic compositions were considered to be formed by fractional crystallization of mantle-derived melt [5], mixing of crust-derived and mantle-derived melts [1] or remelting of pre-existed of juvenile basaltic rocks[3]. The initiation time and tectonic responses of the Paleo-Pacific plate subducted beneath the Eurasian continents remains controversial [3]. In this paper, we report Early-Jurassic (198 to 201 Ma) monzogranite-tonalite association from the southern part of the Zhuangguangcai Range, NE China. Zircon LA-ICP MS U-Pb dating indicate that the monzogranite and tonalite have identical $^{206}Pb/^{208}U$ ages of 201±2 (MSWD = 1.2, 2σ) and 198 ±3 Ma (MSWD=3.2, 2σ), respectively. The monzogranite and tonalite display different geochemical features, suggesting that they were derived from two distinct source regions. The monzogranite display high SiO_2, K_2O and Rb contents, as well as depleted whole-rock Sr-Nd-Pb isotopic compositions, i.e., εNd(t) = +5.8 to +6.2, with single-stage Nd model ages of 0.31 to 0.33 Ga, zircons from the monzogranite also have depleted Lu-Hf isotopic compositions, these contradictory geochemical features suggest that the monzogranite may be derived from melting of MORB–sediment mélanges in subduction zone. The Na-rich tonalite have lower SiO_2 and higher TiO_2 contents, in combination with their relatively evolved Sr-Nd-Pb isotopic compositions and zircon Lu-Hf isotopic compositions, it can be considered that the tonalite was derived from juvenile basaltic crust in active continental margin. Considering other Triassic to Jurassic mafic intrusive and I-type granites in the Zhuangguangcai Range, we propose that the Early-Jurassic monzogranite-tonalite association from the Shihe area was caused by the westward sunduction of the Paleo-Pacifc plate beneath the NE China.

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