

Genesis of the Mesozoic Weihe granite in the Zhangguangcai Mountain, NE China: Constraints from isotopic evidence

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This study presents Sr-Nd isotopic composition of the Weihe granite exposed in the Zhangguangcai Mountain, NE China, to constrain its petrogenesis and to discuss tectonic evolution in NE China during the Mesozoic. From previously reported geochronologic data, the granite formed mainly between about 200 Ma and 180 Ma. In the Harker diagram, major element oxides of various rocks have a significant linear correlation with silica contents, indicating that the rocks likely evolved from differentiation of a co-magmatic chamber. They have homogeneous isotopic composition with relatively low initial $^{87}\text{Sr}/^{86}\text{Sr}$ ratios of 0.7033-0.7049 and high initial ϵ_{Nd} values of 1.3 to 2.5, corresponding with two-stage Nd model ages of 880-780 Ma, manifesting significant contribution of juvenile crustal material to the magmatic source. Furthermore, according to our field reconnaissance, there are no large outcrops of basic rocks like diorite and gabbro in this region. Previously published data of Hf isotopic composition have revealed that the Weihe granite contains variable zircons with initial ϵ_{Hf} values of -6.7 to +12.1, suggesting complexity of the magma source. We speculate that the magma was partly contaminated by old crustal material during its emplacement. In conclusion, the main magmatic body of the Weihe granite was derived from young basic lower crustal section that was differentiated from depleted mantle. The lower crust then underwent partial melting in early Mesozoic.