Geochronology and Geochemistry of Neoproterozoic to Early-Paleozoic Intrusive Rocks in the Erguna Massif, NE China: Implications for the tectonic evolution and affinity of the Erguna Massif

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The Erguna Massif, an important tectonic unit within the eastern section of the Central Asian Orogenic Belt (CAOB), is considered to be the eastern extension of the Central Mongolian microcontinent and records important information on the early geological history of the CAOB. However, the tectonic affinity of the Erguna Massif has been a controversial. Here, we undertook zircon U–Pb dating and geochemical data for the Neoproterozoic to Early-Paleozoic intrusive rocks in the Erguna Massif, with the aim of constraining the early tectonic evolution history of the eastern CAOB and affinity of the Erguna Massif.

Zircons from representative plutons in the Erguna Massif are euhedral–subhedral, and display fine-scale oscillatory growth zoning in CL images, implying a magmatic origin. Zircon U-Pb dating demonstrates that the Neoproterozoic to Early-Paleozoic magmatisms occurred in the Erguna Massif, aged between 851 and 439 Ma. The Neoproterozoic intrusive rocks with the ages of 851 ~ 737 Ma are dominated by A-type granites, with the presence of a typical bimodal igneous rock association at ca. 790 Ma, implying an extensional environment that could be related to the breakup of the Rodinia supercontinent. These new dating results, combined with the published zircon U–Pb ages and Hf isotope data, suggest that this massif in fact represents an ancient microcontinent that contains Precambrian crystalline basement material, and was dissociated from the Tarim craton rather than the Siberia and North China cratons as a result of Neoproterozoic rifting. Additionally, the Early Paleozoic magmatims consist of a suite of granodiorite, monzogranite, syenogranite, and minor amounts of alkali feldspar granite and gabbro. Chemically, they display the evolutionary trend from the post-collisional calc-alkaline series to intraplate alkaline series between 501 and 439 Ma. Combined with the published data, we conclude that these Early Paleozoic intrusive rocks formed under a post-collisional tectonic setting probably related to the amalgamation of the Erguna and Xing'an massifs.

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