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Late Carboniferous continental arc magmatism in the southeastern Central Asian Orogenic Belt: Insights from the Erenhot granitic pluton, Inner Mongolia, China

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The closure time of the Hegenshan Ocean and its suturing scenario is debated, which hinders our understanding of the architecture and tectonic evolution of the southeastern Central Asian Orogenic Belt. We present an integrated study of in-situ zircon U-Pb isotopic ages and Hf isotope compositions, whole-rock geochemistry and Sr-Nd isotopes on the less-studied Erenhot granitic pluton in central Inner Mongolia, China. The ca. 303 to 300 Ma Erenhot pluton is composed of monzogranites, which are high-K calc-alkaline rocks and show I-type affinities. Moreover, positive correlation between Ba and Sr, along with the notably positive Rb and Pb anomalies, negative dEu and depletion in Ba, Eu, Nb and Ti, imply crystal fractionation played an important role in the magma evolution. The pluton also shows relative enrichment in light rare earth elements and large ion lithophile elements and depletion in high field strength elements, typical features of subduction-related magma. Isotopically, predominantly positive whole-rock eNd(t) (0.9–3.8) and zircon eHf(t) (4.50–13.66) values indicate a dominat juvenile crustal source with minor older crustal contamination. Given the mostly Proterozoic model ages (1318–543 Ma) and the presence of xenocrystic zircons, we infer that the Erenhot pluton probably was formed in a continental arc setting. Combined with the available published data, it is proposed that an east-west trending continental arc developed and was accreted onto the Uliastai Continental Margin in the Carboniferous, resulting from the northward subduction of the Hegenshan Ocean. The late Carboniferous continental arc-related magmatism (ca. 303–300 Ma) at Erenhot probably witnessed the waning stage of Hegenshan oceanic lithosphere subduction beneath the Uliastai Continental Margin.