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Ophiolites in the Xing'an-Inner Mongolia accretionary belt of the CAOB: Implications for two cycles of seafloor spreading and accretionary orogenic events

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The Xing'an-Inner Mongolia accretionary belt (XIMAB) in the southeastern segment of the Central Asian Orogenic Belt (CAOB) was produced by the long-lived subduction and eventual closure of the Paleo-Asian Ocean, and by the convergence between the North China Craton and the Mongolian micro-continent[1-4]. Two ophiolite belts have been recognized: the northern Erenhot-Hegenshan-Xi-Ujimqin ophiolite belt and the southern Solonker-Linxi ophiolite belt. Most basalts in the northern ophiolite belt exhibit characteristics of N-type to E-type MORB affinities with depleted Nd isotopic composition ($\varepsilon Nd(t) > +5$), comparable to modern Eastern Pacific mid-ocean ridge basalts. Most basaltic rocks in the southern belt show clear geochemical features of supra-subduction-zone type (SSZ-type) oceanic crust, probably formed in an arc/back-arc environment. The inferred back-arc extension along the Solonker-Linxi belt started at ca. 280 Ma.

Statistics of all the available age data for the ophiolites indicates two cycles of seafloor spreading/subduction, which gave rise to two main epochs of magmatic activity at 500-410 Ma and 360-220 Ma, respectively, with a gap of ~50 million years (Myrs). The spatial and temporal distribution of the ophiolites and concurrent igneous rocks favor bilateral subduction towards the two continental margins in the convergence history, with final collision at ~230-220 Ma. In the whole belt, signals of continental collision and Himalayan-style mountain building are lacking. We thus conclude that the Xing'an-Inner Mongolia segment of the CAOB experienced two cycles of seafloor subduction, back-arc extension and final "Appalachian-type" soft collision.

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