

## **Amphibolite of the Xinghuadukou group from the Xinlin-Xiguitu belt, NE China: new evidence for the NE branch of the Paleo-Asian Ocean**

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The tectonic evolution of the Paleo-Asian Ocean (PAO) witnessed the cycling of two supercontinents, Rodinia and Pangea, in Earth's geological history. This long-lasting paleo-ocean was initiated by the breakup of the supercontinent Rodinia during the Early Neoproterozoic (1,2) and terminated by the final collage of the supercontinent Pangea from Central to Eastern (current coordinates) Asia, likely lasting to the Late Permian or Early Triassic (3,4). Numerous continental and island arcs, seamounts, mid-ocean ridges and micro-blocks were amalgamated responding to the subduction and consumption of the oceanic crust of the PAO, to form the most complex and long-living Phanerozoic accretionary orogenic belt, the Central Asian Orogenic Belt (CAOB) (5,6).

Trapped by the collision and amalgamation of the eastern segment of CAOB, several rock suites of oceanic affinity were reported along the Xinlin-Xiguitu belt that connects the Erguna block to the northwest and the Xing'an block to the southeast in NE China, including the Toudaoqiao blueschist (7), Jifeng ophiolite (although the forming environment remains debatable, see 8 and 9), and Xinlin ophiolite (10,11). All these suites have been proposed to be the relics of the NE branch of the PAO. However, along the northeastern extension of this belt, outcropped the Xinghuadukou group that was previously thought Paleoproterozoic in age yet has been reconsidered to be Cambrian (12), the relationship of which and this belt remains unclear.

In this study, a suite of amphibolite was collected from the Xinghuadukou group outcropped in the easternmost Xinlin-Xiguitu belt in NE China and conducted geochemical analysis to discuss their forming environment and tectonic implications. Samples display low SiO<sub>2</sub> (45%-49%wt), low K<sub>2</sub>O (0.55%-1.07%wt) compositions, low in A/CNK, but high in A/NK and FeO<sub>t</sub>/MgO ratios. REE compositions are relative low ( $\Sigma$ REE=52-122ppm) showing a flat chondrite normative pattern with slight enrichment in LREE ((La/Ya)<sub>N</sub>=1.5-2.4) and no Eu anomaly (Eu/Eu\*<sub>N</sub>=0.9-1.0). The LILE fractionation is indistinctive ((Sr/Y)<sub>N</sub>=1.1-1.8). Samples show an evident E-MORB affinity. Along with the previous studies, it can be concluded: 1) the protolith of the amphibolite of the Xinghuadukou group is a suite of tholeiitic basalt that formed in the oceanic islands environment; 2) with all the oceanic suites reported in Xinlin-Xiguitu belt, a branch of the Eastern PAO can be well defined, which likely existed from the Late Neoproterozoic to Late Cambrian, so called the Xinlin-Xiguitu Ocean.

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