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The First paleomagnetic study from Central-Eastern Inner Mongolia, China and its implication for the evolution of Paleo-Asian Ocean

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The tectonic evolution of the Paleo-Asian Ocean between North China Block (NCB) and Mongolia Block (MOB) is a contentious issue and geodynamical models remain speculative. As an effort to puzzle out this controversy, a paleomagnetic study was carried out on Paleozoic formations in Central-Eastern Inner Mongolia (China). Despite the indigent outcrop conditions to collect reliable samples over a three-year period, we present the first paleomagnetic data for Inner Mongolia Block (IMB). More than 680 sedimentary and volcanoclastic samples were collected from 86 sites. We have established titanium-poor magnetite and hematite as the principal magnetic carriers. AMS measurements demonstrate negligible deformation of the study rocks with sedimentary fabrics. From primary magnetizations, a Late Devonian and a Permian pole are calculated for IMB at: λ=46.8°N, φ=349.1°E, dp=14.6°, dm=27.3° with N=3 and λ=49.5°N, φ=0.0°E, dp=6.2°, dm=11.0° with N=5, respectively. Two stages of secondary magnetization are also identified probably due to Early Permian and Early Cretaceous magmatic events. As preliminary results, the comparison of our new paleomagnetic poles with available data from NCB, MOB and Siberia indicates that (1) paleolatitude of IMB, NCB and MOB are consistent between Late Devonian and Permian, suggesting pre-Late Devonian closure of the Paleo-Asian Ocean and further evaluation of these three blocks as a single entity; (2) post-Permian intracontinental deformation was significant and characterized by block rotations, which due to strike-slip faulting within the welded NCB-IMB-MOB block.