

A Remaining Open Paleogeography of Paleo-Asian Ocean by Early Permian, Paleomagnetic Constraints from Eastern CAO

Donghai Zhang (1,2), Baochun Huang (1), Jie Zhao (3), Joseph Meert (2), Ye Zhang (1), Yalun Liang (1), Qianhui Bai (4), Qian Zhao (1), and Tinghong Zhou (1)

(1) Key Laboratory of Orogenic Belt and Crust Evolution, Ministry of Education, School of Earth and Space Sciences, Peking University, Beijing 100871, China, (2) Department of Geological Sciences, 355 Williamson Hall, University of Florida, Gainesville, FL 32611, USA, (3) State Key Laboratory of Continental Dynamics, Department of Geology, Northwest University, Northern Taibai Str. 229, Xi'an 710069, China, (4) Sino Shaanxi Nuclear Industry Group Geological Survey Co, Ltd, Xi'an 710100, China

We carry out a combined paleomagnetic and U-Pb geochronologic study on Paleozoic strata ranging from Lower Devonian to Upper Permian in mid-eastern Inner Mongolia, NE China with the purpose of puzzling out the timing and location of the final closure of Paleo-Asian Ocean (PAO), and thus provides further implications for the evolution of eastern Central Asian Orogenic Belt (CAOB). Inside North Margin of North China Block (NMNCB), 20 sites from Middle Permian Elitu formation and 9 sites from Lower Permian Sanmianjing formation yields a high temperature Characteristic Remanent Magnetism (ChRM) of $Dg=330.9$, $Ig=54.3$, $Kg=4.9$, $a95g=14.9$ $N=24$ before and $Ds=347.4$, $Is=38.1$, $Ks=28.6$, $a95s=5.6$, $N=24$ after tilt correction. 13 sites from Songliao-Xilinhot Block (SXB) isolate a ChRM of $Dg=196.6$, $Ig=36.4$, $Kg=18.0$, $a95g=11.1$, $N=13$; $Ds=222.9$, $Is=20.5$, $Ks=15.7$, $a95s=11.9$, $N=13$ with a positive fold test, which suggests a likely primary magnetization. Inside of Khingan-Airgin Sum Block (KAB), 2 different component is extracted from Lower Devonian Niquihe formation, Upper Carboniferous Baoligaomiao formation and Lower Permian Dashizhai formation. A high temperature Component A ($Dg=28.3$, $Ig=29.7$, $Kg=24.4$, $a95g=6.6$, $N=21$; $Ds=49.8$, $Is=62.1$, $Ks=57.4$, $a95s=4.2$, $N=21$) with a synfolding origin is derived from 21 sites of Baoligaomiao formation in west KAB, which is traditionally named as Uliastai passive continental margin, whilst 11 sites from Lower Devonian Niquihe formation in east KAB generate a post-folding Component B ($Dg=196.6$, $Ig=36.4$, $Kg=18.0$, $a95g=11.1$, $N=11$; $Ds=222.9$, $Is=20.5$, $Ks=15.7$, $a95s=11.9$, $N=11$) with a possible remagnetization in early Permian suggested by widely exposed granitic intrusion of 299 Ma in adjacent areas. Accordingly, 4 paleomagnetic poles are calculated as early-middle Permian of NMNCB ($Plat=67.9^\circ N$, $Plong=326.7^\circ E$, $A95=4.2^\circ$), early Permian of SXB ($Plat=45.3^\circ N$, $Plong=250.3^\circ E$, $A95=5.8^\circ$), late Carboniferous of west KAB ($Plat=55.1^\circ N$, $Plong=187.8^\circ E$, $A95=6.2^\circ$) and early Permian of ($Plat=-16.3^\circ N$, $Plong=109.1^\circ E$, $A95=8.4^\circ$). The early Permian paleomagnetic pole of SXB and NMNCB are located at a common small circle centered around the reference site ($43^\circ N$, $114^\circ E$), whilst late Carboniferous pole of west KAB and early Permian pole of east KAB share a similar paleolatitude, about 17.8° higher than that of SXB and NMNCB, with a huge $\sim 85^\circ$ longitudinal difference in between. These data indicate the final closure of PAO happened at the northern Hegenshan-Heihe Suture Zone (HHSZ) after early Permian instead of the pre-assumed southern Solonker-Xar Moron Suture Zone (SXMSZ) with a remaining open paleogeography of Paleo-Asian Ocean between SXB and KAB by early Permian.

Keywords: Paleo-Asian Ocean, Central Asian Orogenic Belt, Paleomagnetism, Paleolatitude, Late Paleozoic, XMOB.