



The pre-Mesozoic tectonic unit division of the Xing-Meng orogenic belt (XMOB)

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According to the viewpoint that the paleo-Asian ocean closed by the end of early Paleozoic and extended during the late Paleozoic, a pre-Mesozoic tectonic unit division has been suggested. Five blocks and four sutures have been recognized in the pre-Devonia stage, the five blocks are called Erguna (EB), Xing'an (XB), Airgin Sum-Xilinhote (AXB), Songliao-Hunshandak (SHB) and Jiamusi (JB) blocks and four sutures, Xinlin-Xiguitu (XXS), Airgin Sum-Xilinhote-Heihe (AXHS), Ondor Sum-Jizhong-Yanji (OJYS) and Mudanjiang (MS) sutures. The EB contains the Precambrian base with the ages of 720-850Ma and $\epsilon_{\text{Hf}}(\text{T})=+2.5$ to $+8.1$. The XB is characterized by the Paleoproterozoic granitic gneiss with $\epsilon_{\text{Hf}}(\text{T})=-3.9$ to -8.9 . Several ages from 1150 to 1500 Ma have been acquired in the AXB, proving presence of old block that links with Hutag Uul block in Mongolia to the west. The Paleoproterozoic (1.8-1.9Ga) and Neoproterozoic (750-850Ma) ages have been reported from southern and eastern parts of the SHB, respectively. As a small block in east margin of the XMOB, the JB outcrops magmatite and granitic gneiss bases with ages of 800-1000Ma. The XXS is marked by blueschists with zircon ages of 490-500Ma in Toudaoqiao village, ophiolites in Xiguitu County and granite with ages of about 500Ma along the northern segment of XXS. The AXHS is characterized by the early Paleozoic arc magmatic rocks with ages from 430Ma to 490Ma, mélange and the late Devonia molass basins, which indicates a northward subduction of the SHB beneath the AXB during the early-middle Paleozoic. The OJYS is composed of the early Paleozoic volcanic rocks, diorites and granites with ages of 425-475Ma, blueschists, ophiolitic mélange, the late Silurian flysch and Early-Middle Devonian molasses in western segment, granites (420-450Ma) in middle segment, and plagiogranites (443Ma) and the late Silurian molasses in eastern segment. This suture was caused by a southward subduction of the SHB beneath the North China block. The MS is between the SHB and JB, marked by the three phase granites of 485, 450 and 425Ma in the SHB.

Tectonic units of the middle Devonian-Carboniferous tectonic stage include the middle-late Devonian continental basin, Carboniferous continental and epeiric sea basin, intrusive and irruptive igneous rock belt with ages from 300Ma to 330Ma containing granites, diorites, gabbros and bimodal volcanic rocks, and early Carboniferous ophiolites of 330-350Ma in Hegenshan and Erenhot. The Permian tectonic units can be divided into continental rift belt, ophiolite belt, alkaline rock belt and "red sea"-like ocean basin, which indicates an continuous extension environment during the Permian. The continental rift belt is composed of thick continental sedimentary rocks containing plant fossils, bimodal volcanic rocks (270-290Ma). The alkaline rocks can be divided into north and south belts by their distribution. The Solonker ophiolite is a thrust sheet that is inserted in a thrust stack containing the Upper Carboniferous epeiric sea clastic rocks and carbonates. The "red sea"-like ocean basin is characterized by basalt sequences with ages of 246-260Ma, which shows an affinity to E-MORB and a tendency towards OIB.