

Petrographic characteristics of Middle Permian sandstones in Southern Mongolia and their geological implications

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Middle Permian Tavantolgoi coal deposit lies in southern Mongolia and has more than 6 billion tons of coal including significant tonnage of coking coal. In 2017, exploration bore holes were drilled at Borteeg, the largest syncline of the deposit. Eighteen sandstone samples were collected from coal-bearing sequences that were intersected by 900 m deep bore holes. Standard thin sections were prepared from core samples and studied under polarizing microscope and point-counted using the Gazzi-Dickinson method.

Detrital grains of the studied samples consist of mineral grains and rock fragments. They are generally well-rounded and moderately sorted. Size of detrital grains ranges from 0.1 mm to 1.0 mm. Detrital minerals quartz and feldspar comprising 7-31% of the total constituents. Quartz comprises 13-24% and monocrystalline quartz dominates over polycrystalline quartz. In feldspar grains, plagioclase is more abundant than K-feldspar. Lithic fragment comprises 49-60%, of which volcanic rock fragments predominates. Cement is carbonates partly enriched in iron oxide, resulting in reddish color.

The sandstones of Middle Permian in Borteeg syncline are classified as litharenite suggesting that weathering intensity in source area was weak, probably due to relatively arid to semiarid climate conditions. Provenance analysis (Q-F-L, Qm-F-Lt, and Qp-Lvm-Lsm diagrams) suggests that the sandstones are recycled sediments derived from transitional arc and undissected arc that were formed during the closure of Paleasian ocean between southern Mongolia and North China block.

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