Geochemistry of middle Triassic Pi sandstone in the northeastern margin Ordos Basin, China:Implications for provenance and wearhering

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The Pi sandstone refers to a type of terrigenous clastic rock assemblage composed mainly of sandstone, siltstone and mudstone with red and white color, which is characterized by exposing or being covered with sand or loess, vulnerable to weathering and erosion, distributed in the contiguous area of Shaanxi province, Inner Mongolia autonomous region and Shanxi province in China, and formed during Late Paleozoic – Mesozoic. “Pi”comes from the folk name (pishuang) of arsenic in Chinese, the appellation of “Pi sandstone” means that it is harmful to soil and water conservation. In recent years, Great progress has been made in soil erosion control in Pi sandstone distribution area，however, the cause of the erosion vulnerability of the Pi sandstone has not been fully understood. Fourteen Pi sandstone samples from the Middle Triassic Ermaying Formation in the eastern margin of the ordos basin, China, have been investigated to determine its provenance and weathering which is blamed for the erosion vulnerability of the Pi sandstone using Petrography, X-ray diffraction, and X-ray fluorescence. Field observations confirmed that the samples were collected from the ephemeral fluvial facies. Mineralogically, the Pi sandstone is composed of quartz，clay minerals and feldspar as well as calcite and dolomite. X-ray diffraction analysis of ＜2 m portion shows that smectite is a dominant clay mineral followed by kaolinite and illite. Geochemically, the Middle Triassic Pi sandstone are classified as wacke, arkose, and litharenite. Detrital components in Pi sandstones are most probably derived from the igneous and sedimentary provenance based on the discriminant functions, La/Yb-∑REE diagram and δ Eu. The CIA value and A－CN－K diagram reflect a low chemical weathering degree in the source area, which suggests that a semi-arid to arid climate prevailed during the Middle Triassic. Smectite, responsible for the erosion vulnerability of the Pi sandstone, is suggested to be a product of source weathering. This work is supported by National Natural Science Foundation of China (No. 41572082).