

**AAPG Annual Convention
Salt Lake City, Utah
May 11-14, 2003**

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Geochemical Characteristics and Correlation of Oil and Non-Marine Source Rocks from Mongolia

New bulk and molecular organic geochemical analyses of source rock and oil samples from Mongolia indicate the presence of lacustrine-sourced petroleum systems in this frontier region. More than 75 potential source rocks, ranging from Paleozoic to Mesozoic in age, were sampled from 15 sites spanning across most of Mongolia. Rock Eval and Total Organic Carbon (TOC) data from these samples reflect generally high-quality source rocks, at an early stage of generation. In tandem with other linked stratigraphic-biomarker studies, the data document widespread Cretaceous lake basins in the eastern China-Mongolia border region, which provided excellent settings for regional deposition of high-quality source rocks in east-central Asia.

Lower Cretaceous lacustrine mudstone found in core from the Zuunbayan field is the most likely source for the East Gobi basin petroleum system of southeastern Mongolia. Oil samples from the Zuunbayan and Tsagan Els fields (both in the East Gobi basin) demonstrate many geochemical attributes consistent with nonmarine source rocks, including high hopane abundances relative to steranes, and lack of C₃₀ 4-desmethyl steranes. Despite similar characteristics among the oil groups, sterane and hopane isomerization ratios suggest that Tsagan Els oil was generated by distinctly more mature source rocks than oil from the Zuunbayan field. They also suggest a higher degree of algal input into fresh to brackish water source facies compared to Tsagan Els samples, as indicated by the presence of b-carotane, a full suite of C₃₀ 4-methyl steranes, including dinosterane, and elevated concentrations of unusual hexacyclic and heptacyclic polyprenoids.