

Oil Source Correlation and Petroleum System Models in the Halar Basin, Inner Mongolia, NE China

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Although the controversy over the capability of bedded coals to act as oil-prone source rocks has been largely settled, the relative contribution of discovered oils from deltaic coals versus lacustrine shales has not been resolved unequivocally in the Halar, a Mesozoic-Cenozoic coal-bearing basin located in the Inner Mongolia of NE China. This basin remains to be a frontier area for petroleum exploration, even though 3.8 billion barrels of original in place oil reserves have been identified from 34 exploration and appraisal wells in the Beier and Wuerxun depressions.

Forty-four oils and 38 rock extracts were examined isotopically and molecularly in this study to unravel the oil-source relationships and petroleum system models in this basin. Our results show that most of the discovered oils are molecularly characteristic of freshwater lacustrine source rocks, with only a few samples displaying geochemical parameters indicative of a coaly source contribution. Oil-source rock correlations indicate that the primary oil source rocks in this basin are in the Cretaceous Nantun Formation, while the overlying Damoguaihe Formation and underlying Tongbumiao Formation being also effective in the Wuerxun Depression. The proposed petroleum system models predict four different types of petroleum traps as the focus of future exploration activities in this basin.