

POTENTIAL SOURCE ROCKS IN GOBI-ALTAI, SW MONGOLIA: FACIAL DISTRIBUTION BASED ON BIOMARKERS AND ORGANIC PETROLOGY

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The Gobi-Altai region in the SW Mongolia consists of Paleozoic, Mesozoic, and Neogene basins. Several organic enriched stratigraphic intervals occur in this area. Bulk and molecular analyses were used to characterise the biological origin and depositional environment of these sediments and to evaluate the similarities with the petroleum systems in the SE Mongolia and NW China. The highest TOC (2-66%) and Rock-Eval pyrolytic yield S2 (up to 101 mg/g) were found in the Permian coals and values of TOC of 30-50% and S2 of 5-20 mg/g in the Lower Cretaceous.

The black siltstones and shales of Lower Carboniferous Tsokhorin Nuruu Fm (C1ch) were deposited in deepwater environment. Their residual source potential is low due to high thermal maturity equivalent to dry gas zone reached during deep burial followed by uplift.

Lower Permian shales were deposited under reducing environment evidenced by $P_{ri} < P_{hy}$. The lacustrine algal and bacterial input is manifested through n-alkanes with maximum at n-C₁₆₋₁₈, C₂₇>C₂₉>C₂₈ steranes, extended tricyclics, and C₂₁ dominated tricyclic terpanes, which are sometimes more abundant than hopanes (Figure 1). The T_{max} of 447-457 °C, sterane and hopane ratios suggest oil window maturity.

The Permian coal from the Chandman mine is characteristic by n-alkane pattern with maximum at n-C₂₃, pronounced odd/even predominance in the n-C₂₁₋₂₉ range, $P_{ri} \gg P_{hy}$ and absence of tricyclic terpanes. Macerals include vitrinite, gelinite and liptinite. These suggest higher terrestrial plant input to the wetland environment.

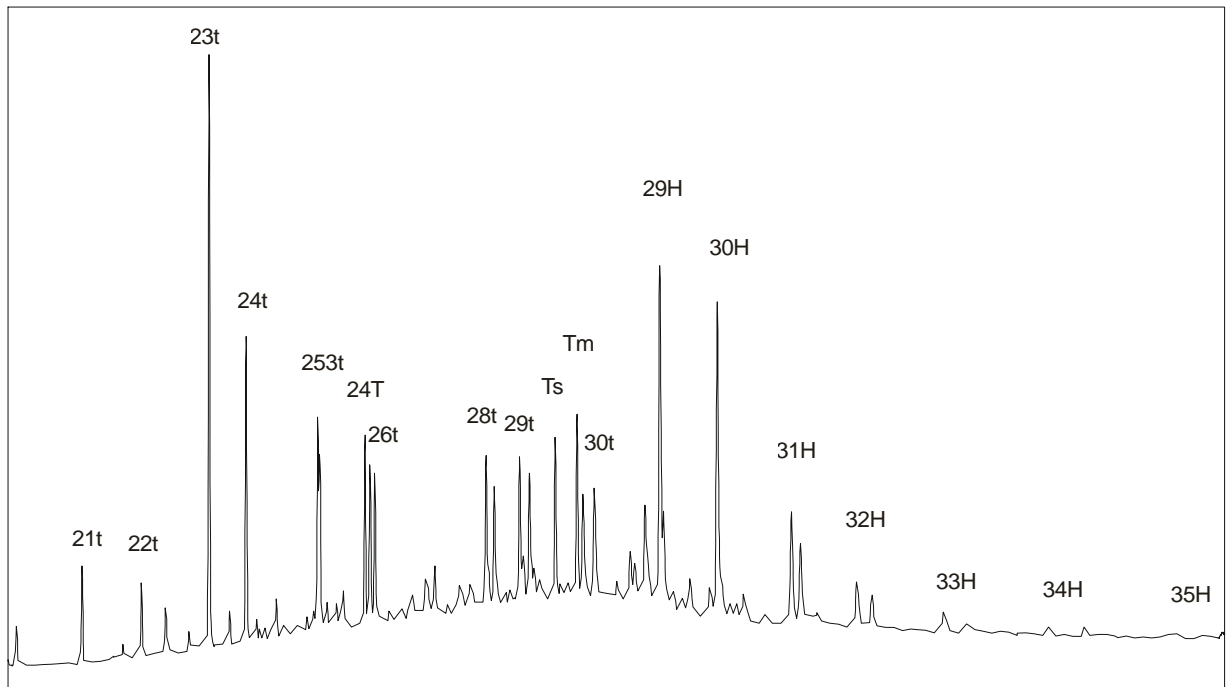


Figure 1. Mass chromatogram (m/z 191) with tricyclic (t), tetracyclic (T), and pentacyclic terpanes (H) of the Permian Budnakhudag Fm

Lower Cretaceous Undur-Ukhin (Kun), Andaikhudag (Kan), Khulsangol Formations (Khl) include coals and carbonaceous shales rich in terrestrial plant debris with waxy cuticles and other liptinites deposited in fluvial to lacustrine environment. Saturates show maximum at n-C_{27, 29, 31} and the Pri<Phy suggests dysoxic conditions.

Based on the biomarker patterns the organic facies of the studied shales and coals in the Gobi-Altai region can be correlated with important petroleum systems of the Permian in the Junggar Basin (Carroll, 1998) and the Lower Cretaceous in the East Gobi Basin (Johnson et al., 2003).

REFERENCES

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