

# Organic geochemical characteristics and depositional environment of coal bearing Oligo-Miocene sequence in the Oltu-Narman Basin (Erzurum), NE Turkey

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In the Oltu-Narman (Erzurum) Tertiary Basin, coals occur in the Oligo-Miocene lacustrine sequence. In this study, n-alkane, isoprenoid and saturated-aromatic biomarker distributions of coals in the Sütkans region are found in association with pyrolysis and petrographic data and detailed organic geochemical characteristics, depositional environments and hydrocarbon potential of the coals are propounded.

Huminite is the dominant maceral type in coals (51–84%), telehuminite is in lesser abundance, detrohuminite (especially densinite) and gelohuminite (gelinite) are in higher abundance. Groundwater Influence Index (GWI) and Gelification Index (GI) are quite high for the studied coals whilst Tissue Preservation Index (TPI) and Vegetation Index (VI) are found to be extremely low. According to the results of pyrolysis, coal, coaly claystone and clayey coal samples contain Type II kerogen.

Although Sütkans coals have high ash content (6.28–44.60%, average: 27.99%), their calorific value is quite high (3947–7583 Kcal/kg). Random huminite reflectance values of coals ( $V_r\%$ ) are 0.4–0.48 (average=0.44) indicating sub-bituminous B rank.  $T_{max}$  values of coal, coaly claystone and clayey coal samples are between 413 and 437°C.  $20S/(20R+20S)$ ,  $\beta\beta/(\alpha\alpha+\beta\beta)$  sterane,  $22S/(22R+22S)$  homohopane,  $MA(I)/MA(I+II)$ ,  $TA(I)/TA(I+II)$  and  $C_{28}TA/(C_{29}MA+C_{28}TA)$  steroid, MPI, MPR, and MDR ratios which reflect the maturity of coals are very low; MPI-1 is intermediate and moretane/hopane ratio is high.

According to petrographical, palynological, and geochemical data, the coal sequence was formed in an environment changing in character from lacustrine to fluvial, and coals were accumulated in a swamp area with high-water level, high pH, and intense microbial activity represented by suboxic-anoxic conditions.