

Oil to source rock correlation in Zaláta East-1 well, Hungary

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The Zaláta K (East)-1 exploratory well is located nearby the river Dráva in the administrative area of settlement Piskó, Baranya County, South-West Hungary. Geologically it falls in the area of Drava Basin. The objectives of the drilling were to explore and test hydrocarbon potential of two horizons in Badenian conglomerates on the basis of 3 D seismic interpretations in the Zalata-Dravica East seismic block. Zaláta East-1 well reached a total depth of 3010 m in synrift breccia (Koncz *et al.*, 2010).

Previously drillings (Zaláta-1, Dravica-1) resulted in gas inflow with condensate from dolomitic limestone and breccia reservoir under Middle Miocene sedimentary rocks consisting of sandstones, siltstones and silty marls. But the new well (Zaláta East-1) resulted in heavy oil sample. The API gravity of the crude oil sample from the Zaláta East-1 well is 28.2 and it has intermediate character based on the first key fraction.

Based on the screening analyses (1850 to 2665m) performed on cuttings source rock bodies were identified in Szolnok Formation and Endrőd Formation to Badenian sections.

The questions are as follows: What sources have generated hydrocarbons? What grade of thermal maturity characterises the generating sources?

To answer the questions source rocks from mentioned formation and crude oils were studied using several geochemical techniques (GC, GC-MS, EA-IR-MS).

The GC analysis of light hydrocarbon fraction from crude oil shows low thermal maturity using Thompson category (IHP=0.65), while the aromaticity ratio (toluene/n-heptane) refers slightly water washing. The whole oil chromatogram is showing a lack of biodegradation and slightly reductive environment of source rock based on pristane-phytane ratio (Pr/Ph=1.24) (Peters *et al.*, 2005).

According to our earlier results the Lower Pannonian and Miocene source rocks are genetically different from each other in samples studied from Zaláta East-1 well.

The Lower Pannonian samples have not or have very low amount of oleanane showing minor terrestrial input to biomass based on mz191 fragmentogram. The sources in Lower Pannonian sequence have high hopane-sterane ratios (>7.5). Based on isotope composition of saturated and aromatic fractions separated from rock extract of Miocene sample are isotopically heavier than Lower Pannonian ones.

Investigating geochemical data from oil fractions we can get a good correlation with Miocene source rocks. The oil sample has oleanane, what is a constituent part of oils derived from Miocene sources in other parts of Hungary. Analogy can be seen in the mass chromatograms of m/z=218 as well (Fig. 1.). Both oils and Miocene sources have low hopane-sterane ratio approving genetic correlation. According to isotope ratios of crude oil is genetically similar from that of Miocene rock.

Based on biomarker data we can conclude that Lower Pannonian extracts from Szolnok formation do not or barely reach the equilibrium values showing their immaturity.

The thermal maturity parameters indicate that oil can be considered as autochthonous (indigenous) having no considerable vertical component of migration and its maturity corresponds to early oil-window.

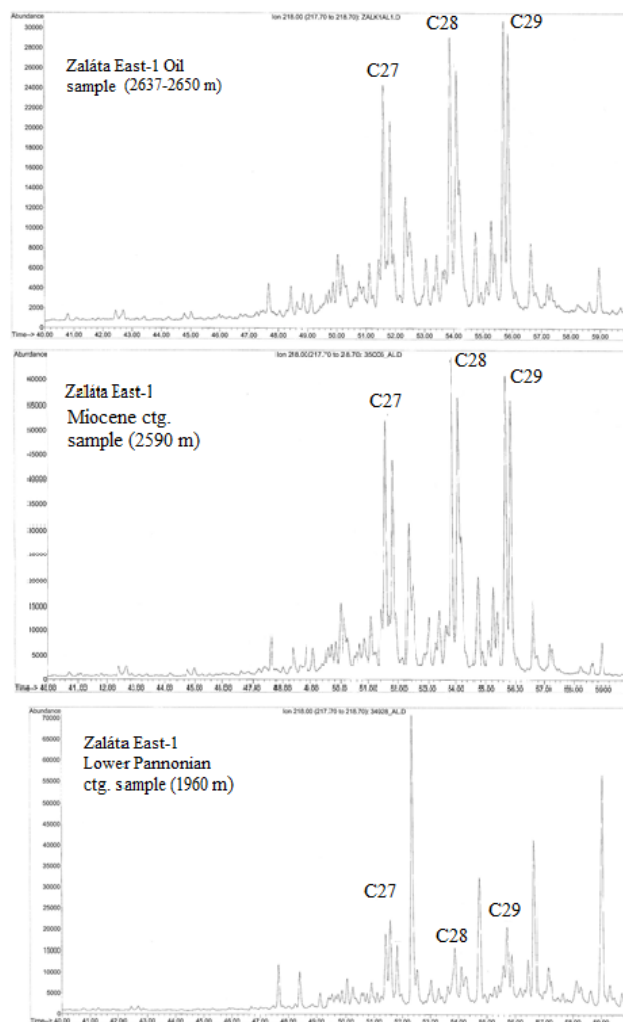


Fig. 1.: Representative mass chromatograms (m/z=218) of rocks and oil

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