



## **New Technique for TOC Estimation Based on Thermal Core Logging in Low-Permeable Formations (Bazhen fm.)**

Evgeny Popov (1), Yury Popov (1), Mikhail Spasennykh (1), Elena Kozlova (1), Evgeny Chekhonin (1), Dzhuliya Zagranovskaya (2), Irina Belenkaya (2), and Aleksey Alekseev (2)

(1) Skolkovo Institute of Science and Technology, Moscow, Russia (e.popov@skoltech.ru), (2) LLC Gazpromneft Scientific and Technical Center, St.-Petersburg, Russia (Zagranovskaya.DE@gazpromneft-ntc.ru)

A practical method of organic-rich intervals identifying within the low-permeable dispersive rocks based on thermal conductivity measurements along the core is presented. Non-destructive non-contact thermal core logging was performed with optical scanning technique on 4 685 full size core samples from 7 wells drilled in four low-permeable zones of the Bazhen formation (B.fm.) in the Western Siberia (Russia).

The method employs continuous simultaneous measurements of rock anisotropy, volumetric heat capacity, thermal anisotropy coefficient and thermal heterogeneity factor along the cores allowing the high vertical resolution (of up to 1-2 mm).

B.fm. rock matrix thermal conductivity was observed to be essentially stable within the range of 2.5-2.7 W/(m\*K). However, stable matrix thermal conductivity along with the high thermal anisotropy coefficient is characteristic for B.fm. sediments due to the low rock porosity values. It is shown experimentally that thermal parameters measured relate linearly to organic richness rather than to porosity coefficient deviations.

Thus, a new technique employing the transformation of the thermal conductivity profiles into continuous profiles of total organic carbon (TOC) values along the core was developed.

Comparison of TOC values, estimated from the thermal conductivity values, with experimental pyrolytic TOC estimations of 665 samples from the cores using the Rock-Eval and HAWK instruments demonstrated high efficiency of the new technique for the organic rich intervals separation.

The data obtained with the new technique are essential for the SR hydrocarbon generation potential, for basin and petroleum system modeling application, and estimation of hydrocarbon reserves. The method allows for the TOC richness to be accurately assessed using the thermal well logs.

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