Source rocks in the Ediacaran deposits from the southwestern part of the East European Platform
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Introduction
The Ediacaran Kaluis Member of the Nagorianski Formation may represent a potential hydrocarbon source rock extending across the southwestern part of the East European Platform. They are comprised of gray to black shales occasionally interbedded with nodular phosphorites, lenticular phosphorites and cone-in-cone carbonate mounds (figure 2). Rock samples from outcrops and borehole core samples from the northeastern part of the Republic of Moldova have been analysed to assess their quality.

Methods
Twenty-six samples (K1-K14 - outcrop samples N1; K15-K23 - outcrop samples N2; 021, 023 and 085 - shallow core samples) were analysed using a Rock-Eval 6 Analyser in order to determine the main geochemical parameters: S1, S2, S3, TOC (Total Organic Carbon), HI (Hydrogen Index), OI (Oxygen Index). These parameters provide information on quantity, type and thermal maturity of the associated organic matter [1, 2]. The analyses were performed at the Institute for Research and Technological Design (ICPT) in Câmpina, Romania.

Results
Geochemical parameters including HI (Hydrogen Index, [S2/TOC]100), OI (Oxygen Index, [S3/TOC]100, PI (Production Index, S1/[S1+S2]) are calculated.

Discussion
Individual Tm values for the outcrop samples are between 436 and 445 °C which indicates that the degree of thermal maturity is early mature (figure 3). The Tm value of 438 °C obtained for the core samples from the northern part of the Republic of Moldova (025, 065) indicates that the degree of thermal maturity is also early mature. The highest TOC (%) values were obtained from core sample 065 which shows the characteristics of a source rock with a good generative potential. The samples 021, K1, K2, K9, K10, K11, K12, K13, K14 indicate source rocks with a rather low organic potential and the samples 021, K3, K4, K5, K8, K7, K10, K15, K16, K17, K18, K20, K21, K22, K23 indicate source rocks with a poor generative potential.

Conclusion
The data from Rock-Eval pyrolysis suggest a poor genetic potential for 25 samples (S1/S2 = 0.00 - 1.78 mg HC/g rock) and an average genetic potential for one sample (065, S1/S2 = 2.28 mg HC/g rock). The modified Van Krevelen diagram (figure 4) and the Hydrogen Index (47 - 150 mg HC/g organic carbon) indicate the presence of type III gas-prone kerogen for 15 samples (021, 023, K1, K14). The samples K15 - K23 have low Hydrogen Indices (<47 mg HC/g organic carbon) and are not able to generate hydrocarbons.

TOC versus HI plots offers information regarding the source rock potential of the analysed samples. Figure 5 indicates an absent hydrocarbon potential for 16 samples (021, K3, K4, K5, K7, K10, K15, K16, K17, K18, K19, K20, K21, K22, K23), little potential for 9 samples (021, K3, K2, K5, K9, K11, K12, K13, K14) and fair-gas prone potential for 1 sample (065).

The following remarks regarding the associated organic matter from the rocks of the Kaluis Member can be pointed out: a) outcrop samples located near the Naslavcea (N2) church were exposed to atmospheric weathering for a long period of time (for thousands of years); b) the quarry located near the Naslavcea village was exploited in the 70s & 80s of the 20th century, thus the outcrop samples (N1) taken from this area were not exposed to weathering conditions for a long period of time which means that the processes of alteration was not so strong and, respectively, the quality of lost organic matter was lower than in the case of the samples located near the church; c) core samples that could be obtained in the future from other boreholes, most probably, would have higher TOC (%) values than the obtained values from the outcrop samples.

References