

104 YEARS OF THE CARPATHIAN-BALKAN GEOLOGICAL ASSOCIATION



**XXIII International Congress  
of the Carpathian-Balkan Geological Association  
CBGA**

**ABSTRACTS VOLUME**

**Sergiu Drăgușanu, George Pleș, Călin Gabriel Tămaș  
(EDITORS)**

**PRESA UNIVERSITARĂ CLUJEANĂ**

## Geochemical characterization of crude oils and condensates from Romania and Bulgaria: new insights from carbon, hydrogen, and sulfur contents and trace element data

Gatien L. F. Morin<sup>1,\*</sup>, Svetoslav V. Georgiev<sup>1</sup>, Lora Bidzhova<sup>1</sup>, Emiliya Raeva<sup>1</sup>, Nikola Botoucharov<sup>2</sup>, Eva Marinovska<sup>2</sup>, Ciprian Chelariu<sup>3</sup>, Daniel Tabără<sup>3</sup>

<sup>1</sup> Geological Institute, Bulgarian Academy of Sciences, 1113 Sofia, Bulgaria; e-mail: gatmorin@geology.bas.bg; s\_georgiev@geology.bas.bg; bidzhova@geology.bas.bg; emiliya@geology.bas.bg

<sup>2</sup> Department of Geology, Paleontology and Fossil Fuels, Sofia University “St. Kliment Ohridski”, 1000 Sofia, Bulgaria; e-mail: botnd@gea.uni-sofia.bg; evarmarinovska@gmail.com

<sup>3</sup> Department of Geology, Faculty of Geography and Geology, “Alexandru Ioan Cuza” University of Iasi, 20A Carol I Blv., 700505 Iasi, Romania; e-mail: ciprian.chelariu@uaic.ro; daniel.tabara@uaic.ro

\* Corresponding author: gatmorin@geology.bas.bg

The major and trace metal composition of crude oil, bitumen and their source rocks provides insight into the paleoenvironmental conditions during source-rock deposition and ultimately the processes of oil generation, migration and secondary modification, as well as the basis for chemical classification of petroleum products (e.g., Georgiev and Hurtig, 2025). Here we present the first published C and H contents for 43 petroleum samples from two eastern European petroleum provinces: 12 crude oils and 7 condensates from the Moesian Platform in Bulgaria and 24 crude oils sampling various basins across Romania. These data are complemented by new, as well as previously published (Georgiev et al., 2024) trace element compositions and S contents.

The crude oils from Romania exhibit a broad range of C (67.70 to 85.66 wt%) and H (8.55 to 14.40 wt%) contents, with atomic H/C ratios within 1.28–2.05. In contrast, the Bulgarian crude oils show narrower C (80.96–84.68 wt%) and H (11.22–13.59 wt%) content ranges, as well as atomic H/C ratios (1.66–1.95). The Bulgarian condensates have even smaller variations of C (83.24–84.07 wt%) and H (13.64–14.65 wt%) contents and exhibit the highest atomic H/C ratios (1.97–2.09), which is consistent with a dominantly paraffinic composition. Sulphur content is generally low (<0.5 wt%), except for one Romanian sample (ST05) from the Eastern Carpathians with 4.63 wt%. Trace element concentrations are overall low (<1–2 ppm) in most samples. However, two Romanian crude oils have elevated Fe (172.30–244.58 ppm), Ti (10.70–15.14 ppm), and Cr (5.87–6.08 ppm), most likely reflecting entrapped detrital minerals or contamination from pipeline corrosion rather than indigenous petroleum geochemistry. Furthermore, the crude oils from Gigen and Selanovtsi (Bulgaria) have substantially higher V (11.85–10.67 ppm), Ni (12.98–9.62 ppm), and Ca (134.76–41.59 ppm) concentrations compared with the rest of the Bulgarian samples.

Low V/(V+Ni) ratios (<0.15) in most Romanian crude oils, as well as the Bulgarian Tyulenovo crude oil and Butan and Dolni Dabnik condensates indicate lacustrine origin for the source rocks and deposition under predominantly oxic bottom-water conditions. By contrast, the remaining Bulgarian samples mostly have V/(V+Ni) ratios of ~0.5 indicative of suboxic conditions, which is consistent with published palaeoenvironmental reconstructions pointing to Lower-Middle Jurassic source rocks from the Moesian Platform (Georgiev et al., 2024). Conversely, the elevated V/(V+Ni) ratio (0.59) and high S content (4.63 wt%) of the Romanian sample “ST05” from the Eastern Carpathians suggest a more anoxic-euxinic depositional setting for the source rock of this crude oil.

**Acknowledgements.** This work is supported by grant KII-06-DB/6 of the Bulgarian National Science Fund.

## REFERENCES

- Georgiev, S. V., Botoucharov, N., Morin, G., Raeva, E., Marinovska, E., Lyubomirova, V., Bidzhova, L. 2024. Vanadium, Ni, S and Hg contents in Bulgarian crude oils: Genetic and environmental implications. Review of the Bulgarian Geological Society 85(3), 105-108.
- Georgiev, S.V. and Hurtig, N.C., 2025. Oil and water—intimate conversations. Elements, 21(4), pp.271-276.