Determining the Petroleum Sources in Romania by Using Advanced Geochemical Technologies

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Oil and gas has been produced for more than a century in the country of Romania making this one of the world's oldest petroleum provinces. The most assessable prospects have been explored leading to questions about whether significant unrealized potential remains. Yet, the source rocks that account for oil generation in this region are not known with certainty. Surface exposures of organic-rich Tertiary (Oligocene – Miocene) shales point to one candidate, but occasional glimpses of Mesozoic and Paleozoic black shales have also been documented. Thus, remaining untapped light oil and gas discoveries may still be realized, once the petroleum systems are clearly understood.

Molecular geochemistry linking crude oil with its source rocks is an important foundation for basin analysis. Organic compounds in oil and bitumen are inherited from once-living organisms that form the lipid-base for oil. The biological origin for certain compounds called biomarkers is evident. Taxon-specific biomarkers that track the evolution and radiation of species, "age-related biomarkers", constrain source rock age. Compounds including oleanane (related to angiosperms), the highly branched isoprenoid (diatoms) and dinosterane (dinoflagellates) indicate a Tertiary source for each "black oil" sample in our study. However, many of the oil samples are mixed, showing the possible contribution of a co-source.

Quantitative analysis of ultra-stable diamondoids (molecular diamonds found in oil) reveals deeply sourced thermally-cracked components in many of the black oils. Some of the biomarker fingerprints also appear to include components from pre-Tertiary source rocks. Firm identification of the sources and co-sources of the mixtures has been pursued by the application of today's ultimate geochemical technologies, including compound specific isotope analysis of diamondoids and biomarkers (CSIA-D and CSIA-B) applied to both oil and source rock samples.