

Permian-sourced oil in the Norwegian Barents Sea

by Paul Farrimond

IGI's [Barents Sea Geochemical Database](#) contains geochemical data compiled from all relevant reports available on the Norwegian Petroleum Directorate's website (now updated to the end of 2015), and has been used as the basis for a comprehensive regional geochemical interpretation report (IGI Ltd., 2015). Part of that report concerns oil-source correlation, and oil samples from one well in the area have been correlated to the Permian Røye Formation.

The Røye Fm. has been penetrated in several locations in the Barents Sea, but is often mature, which can partly obscure its real oil potential. The type section (in well 7128/6-1 on the central Finnmark Platform) is 122m thick, and contains dark grey to black silicified calcareous claystone in the lower part. Although mainly relatively low in organic carbon, some samples have TOC contents of 1.4-2% and Hydrogen Indices in the range 200-360mgHC/gTOC, indicating some oil potential (Fig.1).

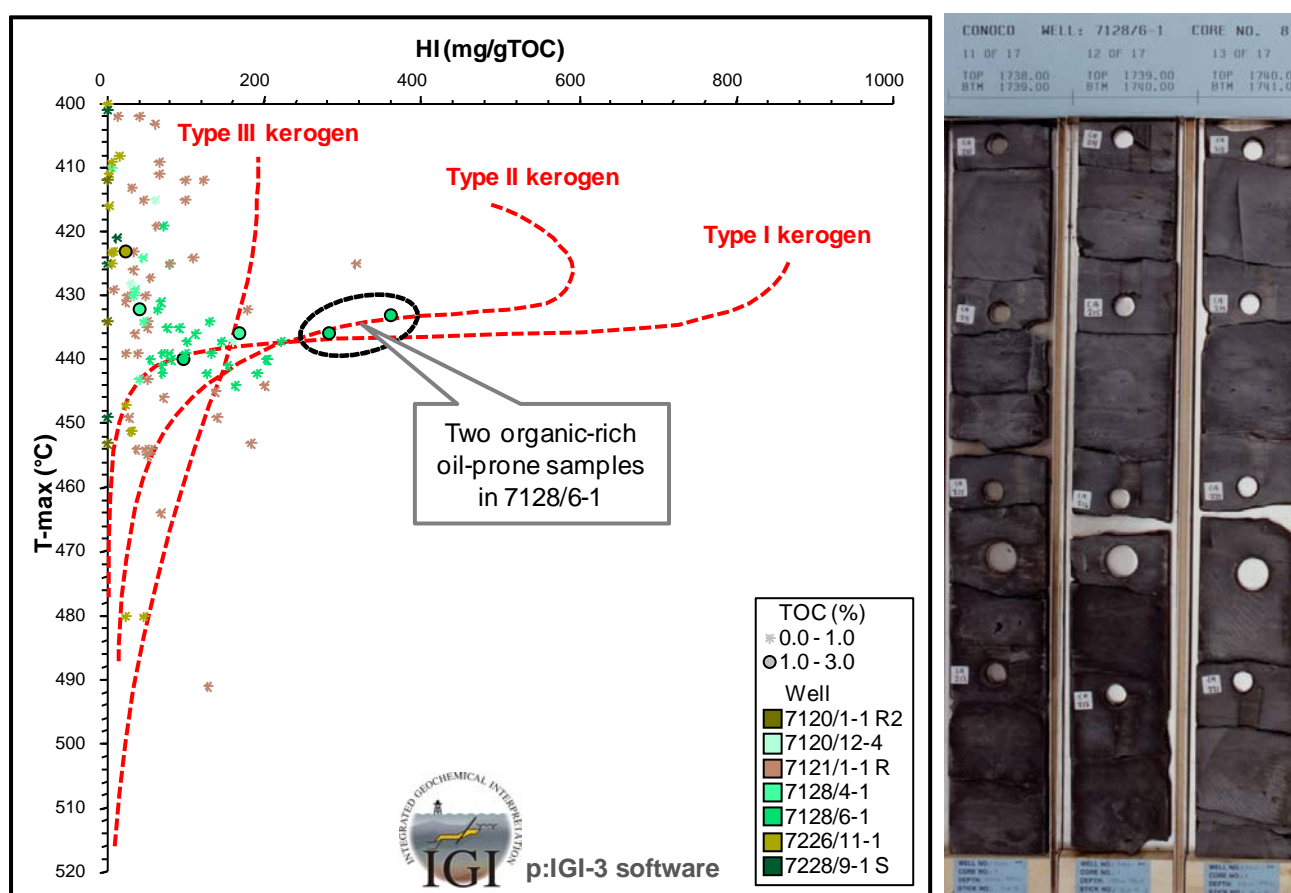


Figure 1: Plot of Hydrogen Index vs. Tmax from Rock Eval pyrolysis for samples of the Røye Formation and a core photograph (from the Norwegian Petroleum Directorate website) showing dark claystones in well 7128/6-1.

Oil samples from a well on the Finnmark Platform have an unusual composition, the saturated and aromatic hydrocarbon fractions being isotopically very heavy (ca. -27‰). This carbon isotopic composition correlates very well with the Røye Fm. source rocks in the dataset (Fig.2). Biomarker compositions support this correlation, for both the sterane and hopane carbon number distributions (Fig.2). Further confirmation that this oil is from an Early Triassic or older source comes in the form of an apparent absence of age-diagnostic

23,24-dimethyltriaromatic steroids (Barbanti *et al.* 2011). The geochemical data in the database show that a Soldogg/Tettegras source is highly unlikely.

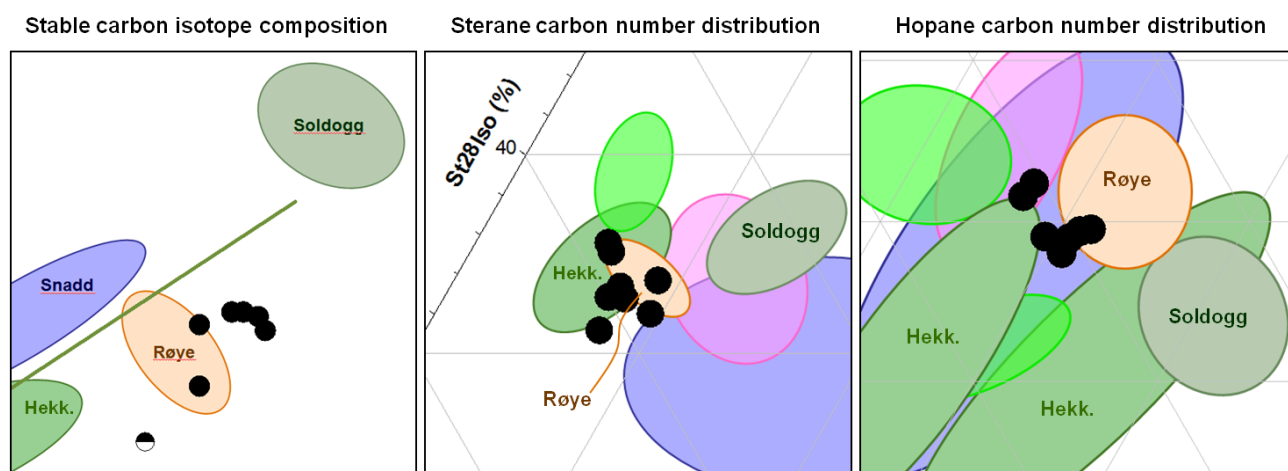


Figure 2: Enlarged extracts (zoomed view) from oil-source correlation plots based on bulk fraction carbon isotope (left) and biomarker compositions; oils shown as black circles; shaded areas are typical of selected source rock intervals.

The oil potential of the Røye Fm. has been rarely noted, but our study provides compulsive evidence that this Permian source rock is the source of an oil in the Norwegian Barents Sea. Further details of the source characterization, oil typing and oil-source correlation are available in [IGI's multicient report](#) (IGI Ltd., 2015).

References:

- Barbanti S.M., Moldowan J.M., Watt D.S. & Kolaczowska E. (2011). New triaromatic steroids distinguish Paleozoic from Mesozoic oil. *Organic Geochemistry* **42**, 409-424.
- IGI Ltd. (2015). *Geochemical data interpretation for the Norwegian Barents Sea*. A multi-client report to accompany the 2015 Barents Sea Geochemical Database.