

PETROLEUM SYSTEMS OF THE BARENTS SEA –KARA SEA REGION

Erik Henriksen³, Bjarne Rafaelsen³, Antonina Stoupakova^{2,3}, Tamara Kirjukhina², Jesper Kresten Nielsen¹, Karin Andreassen¹, Ksenia Sitar, Maria Bolshakova, Polina Safronova, Petr Golinchik, Maria Zaytseva, Ekaterina Mironcheva, Maria Ogarkova, Konstantin Chebotar, Anton Kusov, Daria Norina, Nadejda Kiryukhina and Anna Suslova.

¹ Department of Geology, University of Tromsø, Dramsveien 201, NO-9037 Tromsø, Norway.

² Lomonosov Moscow State University, Leninskiye Gory, Moscow 119899, Russia

³ Statoil ASA North Norway, Mølnholtet 42, Pb. 40, 9481 Harstad, Norway

Petroleum resources of the Barents Sea and Kara Sea represent an important future petroleum supply to the global market. The Russian part of the West Arctic shelf, including Barents, Kara, Pechora Seas is estimated to contain more than 75% of discovered resources on the entire Russian shelf (8.2 bln.t of reference fuel). The Norwegian Continental shelf is considered to contain large volumes of hydrocarbons yet to be found. The undiscovered resources have been estimated by the Norwegian Petroleum Directorate to equal discovered volumes (3.4 bln m³ of recoverable oil equivalents). In order to understand the presence of oil and gas potential on a regional scale, analyses have been carried out to correlate oil and gas bearing complexes with specific source rocks.

A detailed study of Palaeozoic source rocks in the Barents Sea, using samples collected during fieldworks from the following regions (Fig 1) have been carried out:

- Northern part of the Timan-Pechora basin,
- South Timan and Polar Ural;
- Southern and Northern Islands of Novaya Zemlya;
- Svalbard.

The following source rocks have been identified in the Timan Pechora Basin:

Lower Silurian Llandovery; Lower Carboniferous Tournaisian-Viséan; Lower Permian Asselian and Artinskian. The best source rocks can be associated with Upper Devonian Lower Frasnian Domanik formation.

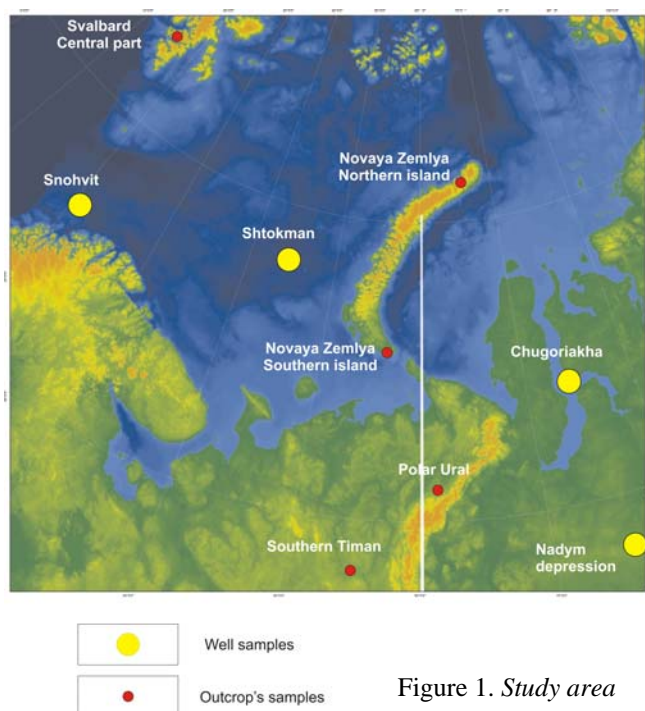


Figure 1. Study area

Samples from southern part of Novaya Zemlya are characterized by the lowest oil remaining petroleum potential due to over-maturation.

A correlation of Upper Jurassic oil source rocks of the Western Barents Sea and Yamal-Kara Basins have been carried out. The Upper Jurassic black shale represents one of main source rocks for the Yamal-Kara Basin and it

may also have sourced the structures in the Barents Sea locally. The maturity of the source rocks in the Barents Sea is low compared to Yamal-Kara area, and may not have reached the oil-window yet.

Geochemical evaluation have been conducted on condensate from Shtokmanovskoye gas-condensate field (Upper Jurassic reservoir), Yamal gas fields (Lower Cretaceous reservoir) and oil from Yamal fields Bovanenkovskoye and Malyginskoye (Middle Jurassic reservoir). The hydrocarbon content indicates presence of different organic matter. Alkanes of the Shtokman condensates have been generated from poorly matured organic matter; aromatic HC have been generated from matured organic matter.

Oil and gas bearing complex correlation and their reservoirs properties were performed for both Palaeozoic and Mesozoic successions. The most productive complexes are the Lower Permian and Upper Devonian carbonates in the Timan-Pechora Basin and Jurassic and Lower Cretaceous in Mesozoic succession of the Barents Sea and Yamal Peninsula. Comparison of the Jurassic reservoirs of the Bovanenkovo and Kharasavey fields from Yamal and Shtokmanovskoye field from the Barents sea may indicate five mega-cycles of sediments accumulation, probably caused by a change of relative sea level .

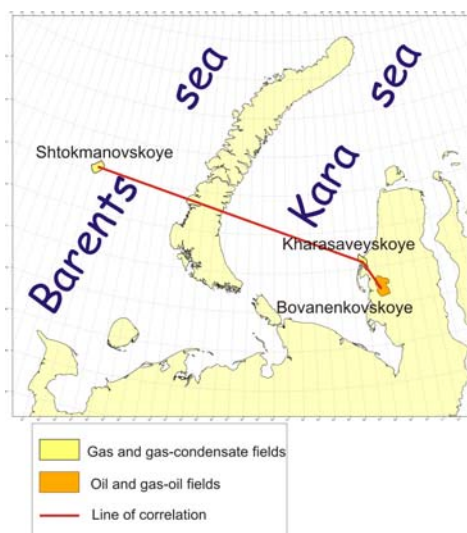


Figure 2. Comparison of reservoirs

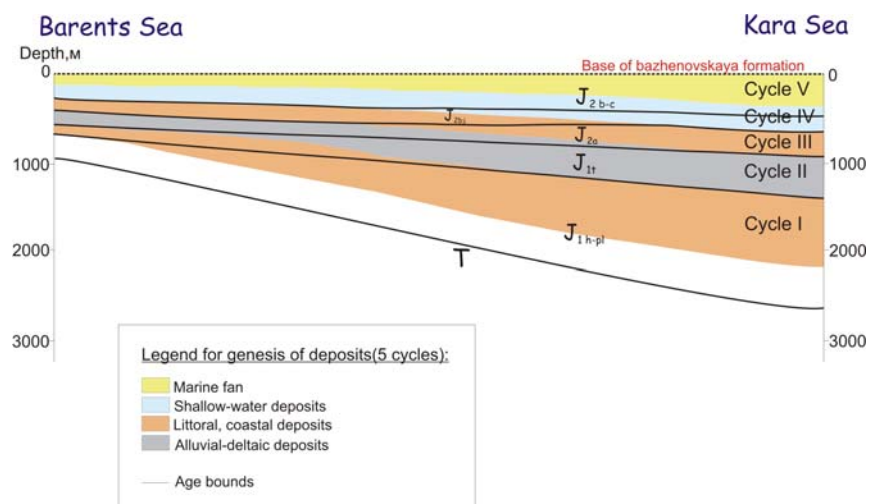


Figure 3. Schematic paleo- profile of Jurassic cycles of Barents-Kara region.