



Petroleum Systems of South Kara Basin: 3D stratigraphic simulation and basin modeling results

S. Malysheva (1), V. Vasilyev (1), V. Verzhbitsky (1), V. Ananyev (1), R. Murzin (1), D. Komissarov (1), N. Kosenkova (1), and Yu. Roslov (2)

(1) Gazpromneft NTC, (2) Seismo-Shelf

Petroleum systems of South Kara Basin are still poorly studied and hydrocarbon resource estimates vary depending on geological models and understanding of the basin evolution. The main purpose of the regional studies of South Kara Basin was to produce a consistent model, which would be able to explain the existence of the fields discovered in the area as well as to determine the most favorable hydrocarbon accumulation zones in the study area for further exploration.

In the study 3D stratigraphic simulation and basin modeling of South Kara Basin was carried out. The stratigraphic simulation results, along with geological, geophysical and geochemical data for the inland areas of Yamal and Gydan peninsulas and South Kara islands enabled to predict the lithological composition and distribution of source rocks, reservoirs and seals in the Kara Sea offshore area. Based on the basin modeling results hydrocarbon accumulations may occur in the reservoir facies of the wide stratigraphic range from Jurassic to Cretaceous. The main source for the hydrocarbons, accumulated in the South Kara Basin Neocomian and Cenomanian reservoirs are the J3-K1 (the northward extension of Bazhenov Formation and its analogs of West Siberia), as well as J1 and probably J2 shales with predominantly marine type of kerogen (type II). Thermal and burial history restorations show that Lower Cretaceous (Aptian-Albian) sediments enriched with terrigenous organic matter (kerogen of type III) and containing coaly layers could not produce the hydrocarbon volumes to fill the giant Rusanovskoye and Leningradskoye gas-condensate fields as the K1 source rocks are not mature enough.

The modeling results, in particular, suggest that the geologic conditions in the South Kara Basin are favorable for further discoveries of giant fields. Although gas accumulations are predominating in the basin, oil-and-gascondensate fields (not a pure oil fields though) with sufficient part of liquid hydrocarbons might be present in particular areas where the source rocks maturation was favorable. Further refining of the model will be possible as soon as new exploration wells will be drilled and new geological, geochemical and seismic data acquired.