

## **Geodynamics and Oil and Gas Potential of the North-Western Margin of the Siberian Craton**

**Valery A. Vernikovskiy<sup>1</sup>, Evgeny Deev<sup>2</sup>, Nikolay Y. Matushkin<sup>2</sup>, Dmitry V. Metelkin<sup>1</sup>, and Georgiy G. Shemin<sup>3</sup>**

<sup>1</sup>Department of Geology and Geophysics, Novosibirsk State University, Novosibirsk, Russian Federation.

<sup>2</sup>Laboratory of Geodynamics and Paleomagnetism, Trofimuk Institute of Petroleum Geology and Geophysics SB RAS, Novosibirsk, Russian Federation.

<sup>3</sup>Laboratory of Oil and Gas Geology of Arctic Siberian Regions, Trofimuk Institute of Petroleum Geology and Geophysics SB RAS, Novosibirsk, Russian Federation.

### **ABSTRACT**

Between the north-western margin of the Siberian craton and the Taimyr fold belt the Meso-Cenozoic Yenisey-Khatanga sedimentary basin (YKB) is located. Based on integrated geological, geophysical, paleomagnetic and petrological data, we present our view on the main stages of its geodynamic history and on its oil and gas potential. In the late Mesoproterozoic – early Neoproterozoic this part of Siberia was a passive continental margin, where siliceous-carbonate, terrigenous and carbonate deposits formed a 2-3 km sequence. From the early Neoproterozoic, an island arc formed here and in the Ediacaran island arc terranes and ophiolites entered the structure of Siberia as the Central Taimyr accretionary complex. From the Ediacaran to the early Carboniferous a 5-6 km sequence of platform cover accumulated (carbonate, carbonate-terrigenous and salt-bearing rocks) on this passive margin. A significant transformation of structure and sedimentation setting took place in the mid-Carboniferous caused by the collision between Siberia and the Kara microcontinent, which formed a large orogen. From the mid-Carboniferous to the late Permian 500-1000 m of littoral and continental terrigenous coal-bearing formations accumulated in the piedmont trough. In the late Permian – Early Triassic a rift system was emplaced between Siberia and the Taimyr orogen and filled with 2 km of effusive-sedimentary deposits. From the end of the Early Triassic the YKB formed on the rift by accumulation of terrigenous Triassic – Cenozoic deposits. Its subsidence during the Triassic and Jurassic changed to an abrupt structural alteration on the Jurassic – Cretaceous boundary. This caused the formation of a diagonal chain of high amplitude (up to 5.5 km) uplifts and depressions adjacent from the south and north. This transformation was due to regional strain during late Cimmerian deformations in the Verkhoyansk fold belt. In the Cretaceous the gradual subsidence of the YKB continued. In the Paleogene – Neogene the opening of the Eurasian Ocean caused a new general uplift of Siberia, Taimyr, Kara and the YKB. 17 hydrocarbon fields were discovered in the YKB, 14 among them – gas and gas condensate fields. The main oil and gas producing horizons are Jurassic and Lower Cretaceous mudstones, which also have a promising combination of reservoir rocks, cap rocks and poroperm properties. The Cretaceous deposits are the main oil and gas complex of the YKB. The Neocomian holds over 90% of known reserves.