



## About the Relation Between Geodynamics of the Sedimentary Basin and the Properties of Crude Oil

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Earlier, we wrote and reported about the modern geodynamic activity of the territory of South-Tatar arch, where the Romashkino oil field. We identified a periodic change in flow rates of oil and oil density at Romashkino and other oil fields of the South Tatar arch.

Now we have studied the composition of oils and bitumoids from uneven (in terms of age) deposits of the sedimentary cover and basement rocks in the zones of possible hydrocarbon seepage in the central squares of Romashkinskoye field. The results of the comparative studies allowed us to come to the conclusion that the formation of oil-bearing deposits of Romashkinskoye field owes to the income and mixing of hydrocarbons (HC) fluids from different sources.

The analysis of geological and production data (GPD) that was held during the many years of exploitation of the development wells of Romashkinskoye field by TatNIPIneft under the direction of I.F. Glumov suggests contemporary inflow of hydrocarbons in the industrial oil reservoir of the Pashi horizon of Romashkinskoye field and the existence of localized areas of inflow of new portions of HC. A number of criteria was worked out in the analysis of the GPD; that allowed us to identify among the total number of wells those, in which the process of hydrocarbon seepage was recorded with the greatest probability. Such wells were called anomalous.

One of the directions of this research was to study the geochemical characteristics of oil from anomalous wells and to determine the degree of similarity and difference between this oil and the oil from both normal wells (in which the signs of deep seepage is not recorded), and bituminoid from the crystalline basement and sedimentary cover. If the hypothesis of a recurrent (also in modern times) influx of deep hydrocarbon is correct, then the oil from the anomalous wells should have specific features in comparison with the wells located outside the areas of the expected inflow.

The results of geochemical studies of oil and organic matter in sedimentary cover rocks that were carried out within the last decade gave us new and unexpected conclusions. First, on the basis of pyrolysis it was found that the top agent of domanikits of the upper Devonian (which were traditionally considered to be a source rock for most crudes of the Volga-Ural region) is characterized by a low degree of catagenetic maturity. These rocks were not submerged to the depth of more than 2.5 km and were not included in the main area of oil and gas formation in most parts of its distribution within the Republic of Tatarstan, which corresponds to the main territory of North- and South-Tatar arch with surrounding areas of deflections and depressions.

Comprehensive study of oil from the anomalous wells showed that these oils have certain characteristics different from normal oil wells, therefore, the hypothesis of a modern inflow of hydrocarbons is consistent and specific studies of this process should be continued.

The estimated (by biomarker parameters) lack of genetic relationship between oil from producing under-domanik horizons (Pashi, Timansky, Ardatovsky and Vorobyevsky) and the top agent in domanikits indicates the need for searching of the sources of oil generation and confirms the viability of the hypothesis of deep origin of HC and their inflow into the sedimentary cover through the crystalline base.

The oil from the anomalous wells should be subject to special investigations in the monitoring mode designed to examine the isotopic systematics of Sr and Nd, isotope characteristics of helium, carbon, hydrogen, nitrogen in the dissolved gases. The design of these studies needs to be linked, in the first place, with the seismic events continuing on the territory of Tatarstan, as the relationship between the change of the carbon isotopic composition and the seismic events has previously been established. Also in the condition of a recurrent inflow of new portions of the deep HC, it would be logical to assume the changes in the isotopic composition of elements of the dissolved gas.