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Geochemistry of the insoluble organic matter (kerogen) components in Jurassic deposits in northern regions of the Latitudinal Ob area

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Abstract. The paper addresses the issues of evaluation of the oil-generating potential of deep buried Jurassic sediments of the Nadym-Taz interfluve area within West Siberian basin (WSB) on the basis of geochemical data. Rock samples from superdeep (SD) and deep boreholes that tapped the Mesozoic-Cenozoic sedimentary cover in the north of the central part of WSB (Yen-Yakhinskaya, Yevo-Yakhinskaya, Yarudeiskaya, Tyumenskaya and other wells) were used as the study materials. A portion of the organic matter (OM) that is insoluble in organic solvents (i.e. kerogen) sampled from Upper, Middle and Lower Jurassic deposits (54 samples) was chosen to be object of the study. The methods used for the comprehensive study of the kerogen involved elemental and isotope analyses and Rock-Eval pyrolysis, which allowed to obtain important information about the genetic type of OM, its maturity, and residual oil-generation potential.

Application of the Surfer and Corel Draw software enabled construction of schematic maps and diagrams reflecting changes in the most informative geochemical parameters of kerogen (as well as their analysis) in the study area and down the section (from Upper to Lower Jurassic). The geochemical data obtained indicate that the highest generation potential of OM of the Jurassic interval of the Nadym-Taz interfluve is attributed to the Bazhenov horizon, as well as to individual reservoirs of the Malyshevka, Leontievskiy, Sharapovo, and Kiterbyut horizons. The level of maturity of OM in Upper and Middle Jurassic sediments allowed to infer that these may contain preserved accumulations primarily of oils and wet gases, while Lower Jurassic deposits may host wet and dry gases.

Keywords: insoluble organic matter, oil-generating potential of Jurassic deposits, Western Siberia

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Introduction

A series of superdeep (SD) wells (Yen-Yakhinskaya, Yevo-Yakhinskaya, Yarudeiskaya, etc.) drilled in the northern part of the West Siberian megabasin (WASB) over the last decade, have penetrated the Mesozoic-Cenozoic sedimentary cover, thereby providing a unique opportunity for geochemists to study transformations of the organic matter (OM) during meso- and apo-catagenesis.

Since the beginning of the 1990s, there have been conducted numerous studies addressing different aspects of the organic geochemistry of petroleum reservoirs in the northern West Siberian basin, among them those guided by academician Alexey E. Kontorovich at the Trofimuk Institute of Petroleum Geology and Geophysics, Siberian Branch of the Russian Academy of Sciences (IPGG SB RAS) (Oil and gas basins and regions of Siberia..., 1994; Kontorovich et al., 2002; Kontorovich, 2004; Kontorovich et al., 2019). Analysis of the source rock generating potential from the Tyumenskaya SD-well data showed that Upper Jurassic deposits, whose OM is characterized by a moderate maturity level (R^0_{vt} – 0.8–0.9%), are localized in the oil window, and could be producing liquid hydrocarbons thereat. The Lower-Middle Jurassic sequences are located in the gas generation window, with the level of maturity interpreted to be high (R^0_{vt} – 1.15–2.1%) for these sediments (Kontorovich et al., 2002). While the petroleum generating potential of Lower Jurassic deposits in the Nadym-Taz interfluve is also estimated as medium to low (Nekhaev et al., 2009), however taking into account thicknesses of oil-prone source rocks and density of hydrocarbon generation, the authors managed to identify lands fairly promising for gas in the area of these deposits distribution.

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Accordingly, the present study objectives are aimed to identify the geochemical signatures of the kerogen composition and residual oil-generating potential of the deep-buried sequences in the Nadym-Taz interfluve area.

Materials and object of the study

This research is largely based on results of the study of OM of Jurassic deposits from the drilled wells data (Yen-Yakhinskaya, Urengoyskaya, Yevo-Yakhinskaya, Tyumenskaya, Zapadno-Tarkosalinskaya, Tarkosalinskaya, Vostochno-Tarkosalinskaya, Geologicheskaya, Medvezh'ya, Stakhanovskaya, Gubkinskaya, Chernichnaya, Yubileinaya, Zapadno-Novogodnyaya, Yutyrmalskaya, and Yuzhno-Russkaya). An overview map of the study area is shown in Figure 1.

Kerogen, which was made the object this study, is defined as the portion of organic matter in sedimentary rocks that is insoluble in organic solvents and alkaline aqueous solutions (IOM). Ever since the 1960s, when V.A. Uspenskii and co-authors published first classification of the OM types based on results of the kerogen studies (Uspenskii et al., 1958), much of the emphasis began to be placed particularly on the chemical and micro-component composition of the insoluble part of OM (Bogorodskaya, 1973; Parparova, Neruchev, 1977; Bogorodskaya, Kontorovich, 1982; Kontorovich et al., 1985, etc.). Among the fundamental contributions of Russian scientists to this research area, the most complete and detailed study of kerogens was made by L.I. Bogorodskaya. In cumulative efforts with A.E. Kontorovich and A.I. Larichev (2005), they provided most informative summary of the available materials and data on kerogen parameters which enabled identification of major genetic types of OM and the degree of its catagenetic transformation (i.e. maturity level). The kerogen types classification offered by foreign scientists was largely based on the structural and chemical characteristics (Tissot, Welte, 1981), which anyway shows a good correlation with the Kontorovich-Bogorodskaya classification.

In the classical scheme for kerogen analysis (Bogorodskaya, Kontorovich, Larichev, 2005), the study of insoluble organic matter which involves a number of chemical and physical methods, is applied upon removing the bitumen component of the OM, dissolving the mineral sediment with hydrofluoric and hydrochloric acids, and the removal of elemental sulfur. The most informative methods and parameters chosen to be exploited in this work are: elemental analysis (H/C_{at}), stable carbon isotope analysis ($\delta^{13}C$), Rock-Eval pyrolysis (HI, T_{max}).

Research results

A total of 54 kerogen samples recovered from Upper, Middle and Lower Jurassic deposits occurring in the Nadym-Taz interfluve were studied with respect to their elemental and stable isotope compositions and pyrolytic characteristics. The integrated data listed in Table 1 include average values and spread of the most informative parameters which allow to infer basic characteristics of OM such as genetic type, its maturity level (catagenetic transformations), as well as oil-generating potential of the studied kerogen samples from the studied horizons.

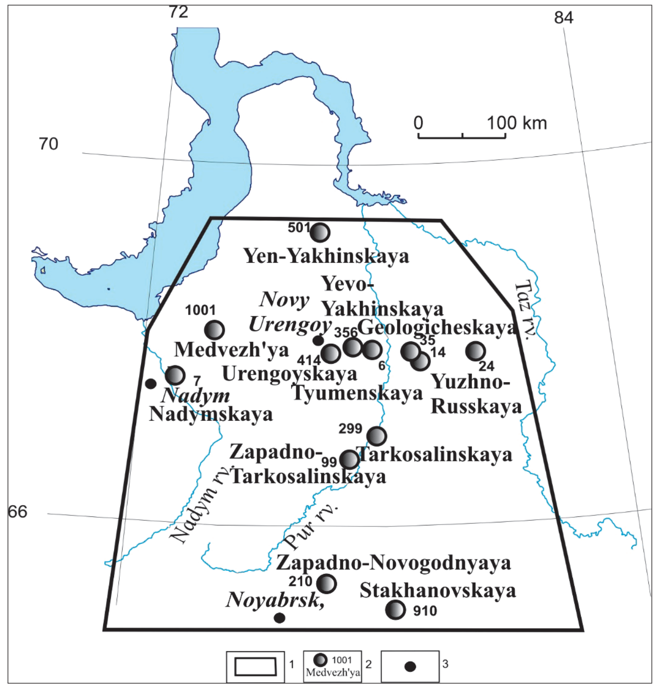

Fig. 1. Overview map showing location of the study area. 1 – study area; 2 – wells that penetrated Jurassic deposits; 3 – cities.

Results of the elemental analysis (Tissot, Welte, 1981; Kontorovich et al., 2019) demonstrated that kerogen of Upper Jurassic deposits (represented by the Bazhenov Formation) is composed of predominantly hydrogen-rich (up to 7.4%) OM and has high H/C atomic ratio up to 1.05 (Table 1) and therefore can be generally assigned to type II OM, while kerogen of Lower and Middle Jurassic deposits whose organic matter is interpreted to be type III OM which is hydrogen-poor (on average 4.7%) and is characterized by the H/C_{at} ratio averaging 0.66 (which is higher than O/C_{at} ratio for type II OM).

For a more detailed analysis, the data obtained from the study of 54 samples of insoluble organic matter from Jurassic sediments were integrated in the overall model of chemical evolution and elemental composition of kerogens with their major genetic types during catagenesis developed by A.E. Kontorovich and L.I. Bogorodskaya (1985–1990) (C-H-NSO trigonograms) (Bogorodskaya, Kontorovich, Larichev, 2005).

The research results have shown that the kerogen samples from Lower-Middle Jurassic deposits are localized primarily in the region of high maturity OM

Productive horizon	TOC	C, %	H, %	S, %	$(H/C)_{at}$	$\delta^{13}C$, ‰	HI, mg HC/g TOC
Upper Jurassic deposits							
Bazhenov	4.3-10.5	80.3-88.4	6.7-7.4	2.1-2.4	0.96-1.05	(-31.5)-(-30.4)	167-326
	6.5	84.5	7.0	2.2	1.00	-30.9	235
Georgievka	1.5-3.3	84.8-85.4	6.4-6.5	0.1-5.0	0.90-0.91	(-30.7)-(-25.0)	80-96
	2.4	85.1	6.5	2.5	0.91	-27.9	85
Vasyugan	2.5-6.6	81.9-86.0	4.2-5.4	1.0-6.3	0.61-0.78	(-23.7)-(-22.5)	51-90
	3.4	83.3	5.0	2.6	0.71	-23.0	68
Middle Jurassic deposits							
Malyshevka	1.1-7.9	80.2-85.9	4.4-6.5	0.2-0.7	0.70-1.00	(-29.4)-(-23.2)	64-175
	3.6	82.8	5.5	0.4	0.80	-23.5	152
Leontievskiy	0.7-10.6	81.7-86.3	4.6-5.4	0.3-0.9	0.65-0.80	(-29.8)-(-27.6)	90-160
	4.0	83.9	5.1	0.6	0.72	-28.5	146
Vym	0.9-8.6	79.5-86.7	4.3-5.7	0.3-6.1	0.65-0.70	(-28.0)-(-21.8)	40-170
	4.9	84.5	4.9	1.4	0.70	-24.9	93
Lower Jurassic deposits							
Nadoyakha	2.2-5.3	86.9-89.2	4.0-4.7	0.2-04	0.55-0.64	(-28.6)-(-24.2)	18-45
	4.0	88.2	4.3	0.3	0.61	-25.9	32
Kiterbyut	0.2-1.9	84.7-87.1	4.2-4.9	0.3-0.7	0.59-0.68	(-29.9)-(-24.9)	37-92
	1.1	85.7	4.5	0.4	0.63	-25.4	56
Sharapovo	1.5-4.4	86.0-89.2	3.9-5.3	0.0-0.4	0.54-0.73	(-29.5)-(-23.4)	27-94
	3.0	87.2	4.8	0.3	0.65	-24.4	52
Levinskiy	0.4-2.5	82.4-87.4	3.3-4.9	0.0-0.5	0.46-0.68	(-28.6)-(-24.7)	16-64
	1.3	85.4	4.0	0.3	0.56	-24.6	33
Zimnyaya	0.4-2.3	81.3-90.2	3.5-4.7	0.0-0.4	0.55-0.69	(-27.7)-(-26.4)	14-28
	1.9	87.0	4.2	0.2	0.58	-26.9	25

Table 1. Distribution of major kerogen parameters across the horizons. Numerator = range of values, denominator = mean value.

(Figure 2). Kerogens of these deposits have a high carbon content against low concentrations of hydrogen and heteroatoms. However, the hydrogen contents allow to interpret OM of some Middle Jurassic samples as occupying an intermediate position between aquagenic and terragenous types (Malyshevka and Leontievskiy horizons).

Results of the analysis of kerogens from Upper Jurassic deposits represented by the Bazhenov, Georgievka, and Vasyugan horizons revealed that a low-hydrogen (hydrogen content: on average, 5.0) organic matter of the Vasyugan horizon is dominantly terragenous, while kerogens of the Georgievka and Bazhenov horizons are subsumed into the domain of aquagenic OM (hydrogen content: from 6.4 to 7.4%) (Figure 2). The IOM elemental analysis data enabled determination of the genetic type of organic matter, and in addition, provided insights into OM alterations. It follows from the C-H-NSO trigonograms that while the organic matter of Lower-Middle Jurassic deposits is generally strongly altered (MC_1^2–MC_2), it is only the Malyshevka, Levinsky, and Sharapovo horizons that have entered the oil window (MC_1^2–MC_2). Besides, Upper Jurassic deposits are also recognized to be presently passing the oil window ($MC_1^{1\text{-}2}$–MC_2). The interplay of catagenesis factors has resulted in gradually increasing organic carbon in the bulk composition of IOM and dehydrogenation, while Upper Jurassic deposits became depleted of heteroelements (primarily oxygen and sulfur) down the section. The hydrogen content reduction in the process of OM conversion clearly demonstrates a decrease in the H/C ratio: from 1.1 to 0.70 during mesocatagenesis (MC) (in Upper and partially Middle Jurassic deposits), and down to 0.46 during apocatagenesis (AC) in individual samples.

The genetic type of OM can be primarily inferred from the carbon isotope analysis data obtained for kerogen samples, along with indicators of elemental analysis (Table 1). Kerogen sampled from Lower-Middle Jurassic deposits belong to terragenous type (Kontorovich et al., 1985). However, some of the samples have light carbon isotope composition, suggesting a partial contribution of aquagenic OM. As such, the mixed type OM is inherent in kerogens sampled from rocks of the Sharapovo, Kiterbyut (J_1), Leontievskiy, and Malyshevka horizons (J_2). Kerogen samples from the Vasyugan horizon have heavy carbon isotope composition (–23.7)–(–22.5) ‰. The OM from the Bazhenov and locally from Georgievka horizons is characterized by light carbon isotope composition (–31.5)–(–30.4) ‰, thereby bearing evidence of its aquagenic origin (Table 1).

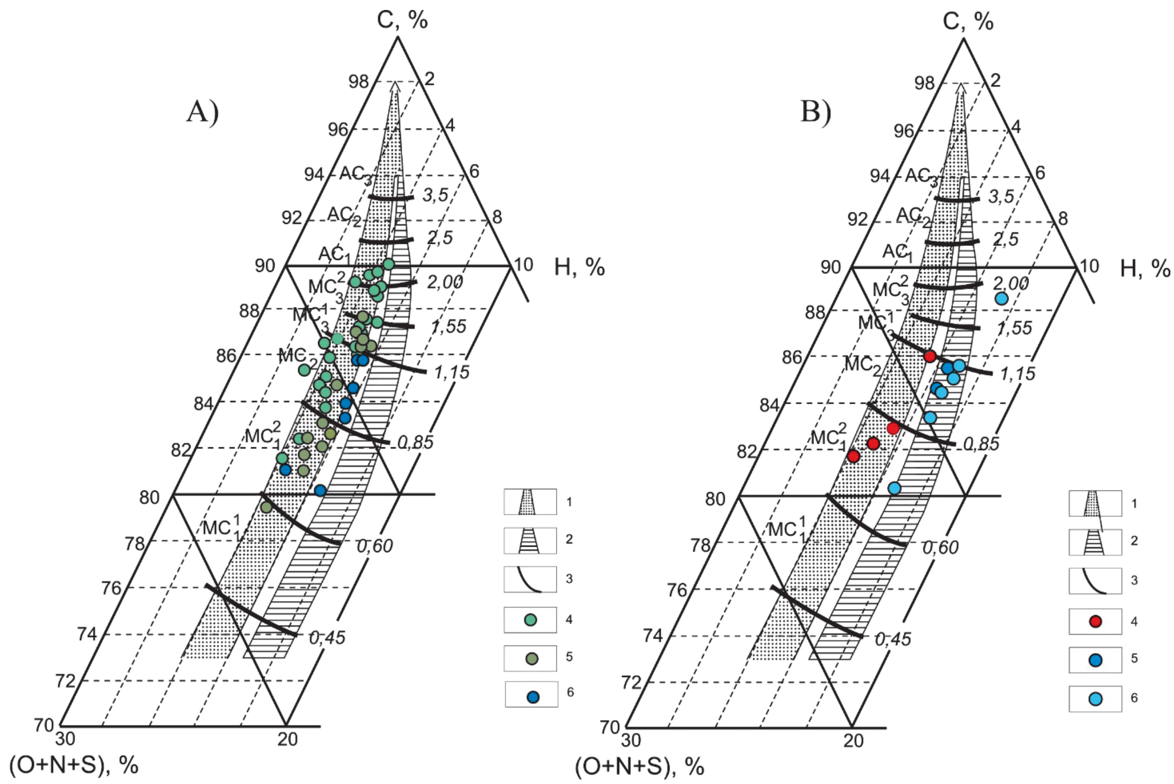

Fig. 2. Trigonograms of the composition of kerogens sampled from Jurassic deposits in the Nadym-Taz interfluve area within the WSB. OM maturation-induced changes in the elemental composition of 1 – coals and kerogen (terragenous type); 2 – kerogen (aquagenic type); 3 – boundaries of the catagenesis zones, with the numbers indicating R_oVt values. Age of deposits: A) J_1: 4 – J_1 (Zimnyaya, Levinskiy, Sharapovo, Kiterbyut, Nadoyakha horizons); J_2: 5 – Leontievskiy, Layda horizons; 6 – Malyshevka horizon; B) J_3: 4 – Vasyugan Fm, Sigovoye Fm, Tochino Fm; 5 – Georgievka Fm; 6 – Bazhenov Fm.

Results of the study based on Rock-Eval pyrolysis of kerogen samples from Lower, Middle and Upper Jurassic deposits in the Nadym-Taz interfluve have provided insights about their residual hydrocarbon-generating potential (Figure 3). Hydrocarbon potential of the IOM is known to be strongly depleted with progressively increasing burial depth of the sediment and because of the generated liquid and gaseous hydrocarbons (Espitalie, 1988), while the OM type plays nonetheless important role. Samples from the Bazhenov Formation recovered in the study area are characterized by a relatively high hydrocarbon generating potential (up to 326 mgHC/g TOC), while passing the oil window (T_{max} 440–450°C). Despite a relatively low oil-generative potential (51–90 mgHC/g TOC) of the kerogens sampled from the Upper Jurassic interval (the Vasyugan formation), their position in the HI-T_{max} diagram also corresponds to the oil window, which is corroborated by the paleogeographic data for the period of the Vasyugam Fm accumulation within the study area (Kontorovich et al., 2013), and by the continental type of their OM.

The IOM samples from Lower and Middle Jurassic deposits in the Nadym-Taz interfluve have predominantly low oil-generating potential averaging 25–56 mgHC/g TOC and 93–152 mgHC/g TOC, respectively, and are attributed to the gas generation window (T_{max} 470–520°C) (Figure 3), except some kerogen samples from Middle Jurassic (Malyshevka, Leontievskiy, Vym horizons) in the north-western and southern regions of the study area (wells: Medvezh'ya-1001; Yevo-Yakhinskaya-356; Stakhanovskaya-910), which are characterized by relatively high HI values (175, 160 and 170 mgHC/g TOC, respectively).

Discussions

A detailed study of a total of 54 IOM samples from Lower-Middle Jurassic and Upper Jurassic deposits allowed to infer their basic characteristics.

Lower Jurassic deposits have generally low TOC values (on average, 1.8, except few samples from the Sharapovo horizon with TOC reaching 4.4%).

The element concentrations in the studied kerogens are described as minor for pyrite sulfur (on average 4.0) and essentially high for carbon (up to 90.2%), at this hydrogen and sulfur are at the levels of 3.3–5.3%, and 0.0–0.7%, respectively. The H/C atomic ratio is low (0.46–0.73), and carbon isotope composition is heavy (on average, –25.4‰) (Figure 2, Table 1). Kerogens sampled from Lower Jurassic sediments are dominated by terragenous OM. However, sporadic samples from the Kiterbyut and Sharapovo horizons are differentiated by light carbon isotope compositions (–29.9‰) and (–29.4‰, respectively).

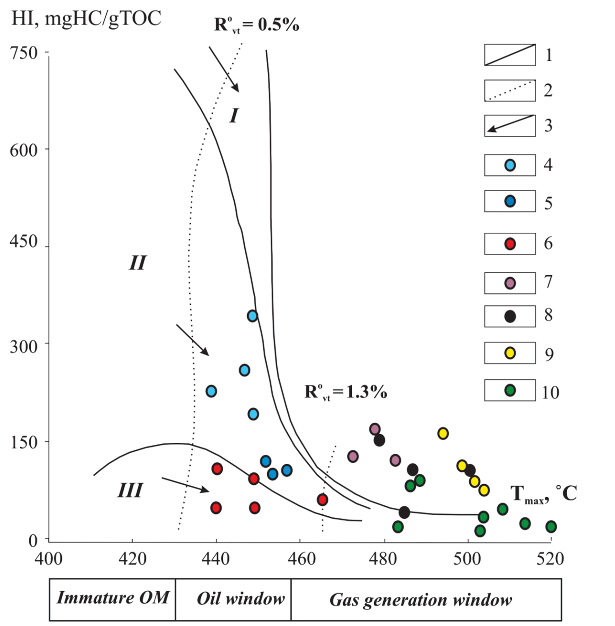

Fig. 3. Pyrolytic characteristics of kerogens sampled from Jurassic deposits. In the Nadym-Taz interfluve area. Age of the deposits: J_3: 4 – Bazhenov, 5 – Georgievka, 6 – Vasyugan horizons; J_{1-2}: 7 – Malyshevka, 8 – Leontievskiy, 9 – Vym horizons; 10 – Lower Jurassic deposits.

The OM of Lower Jurassic deposits was subjected to a material transformation up to AC catagenesis stage. Whereas OM in Middle Jurassic deposits altered to a lesser extent (MC_1^2–MC_3^1). Middle Jurassic deposits are also characterized by higher TOC values (on average, 4.1%) and pyrite sulfur contents in the kerogen (on average, 7.3%). Results of the elemental analysis data showed that IOM samples have rather high carbon content (79.5–89.2%) at relatively low contents of hydrogen (4.5–5.6%) and sulfur (0.8% on average). The H/C atomic ratio is higher than in Lower Jurassic deposits (0.65–1.00). The highest H/C atomic ratios are reported from kerogens of Middle Jurassic deposits (Malyshevka and Leontievskiy horizons), which may suggest an admixture of aquagenic OM. Some samples from these horizons display high TOC contents (up to 7.9% and 10.6%, respectively). In addition, some kerogen samples are characterized by a lighter carbon isotope composition (–29.4‰ and –29.8‰, respectively). However, kerogen sampled from Middle Jurassic deposits are represented by terragenous OM and have a heavy carbon isotope composition averaging (–25.6‰) (Figure 2, Table 1). In the Lower-Middle Jurassic interval, hydrocarbon potential changes from 14-64 mgHC/g TOC (for terragenous OM type) and to 92–175 mgHC/g TOC (for OM admixed with aquagenic OM).

The Bazhenov Fm samples from Upper Jurassic deposits next to their having high TOC values (4.3–10.5%) are characterized by high levels of pyrite sulfur in kerogen (in the range from 13.9 to 36.1%). Carbon concentrations in IOM vary between 80.3 and 88.4%, while hydrogen content is relatively high (from 6.7 to 7.4%). The samples are characterized by higher sulfur contents. Their H/C atomic ratio is elevated (from 0.96 to 1.05), while the $\delta^{13}C$ carbon isotope compositions vary within the interval (–31.5)–(–30.4)‰. Unlike typically aquagenic IOM in the Bazhenov Fm and Georgievka Fm, IOM in the Vasyugan Fm and Sigovoye Fm is attributed to terragenous type OM (Figure 2, Table). Catagenetic alteration of OM (according to the elemental analysis (Bogorodskaya, Kontorovich, Larichev, 2005) corresponds to MC_{1-2} meso-catagenesis stages.

The constructed schematic maps of changes in the most informative geochemical parameters (using the Surfer software) represent the kerogen properties distribution within the study area. Other maps reflecting changes in the atomic H/C ratio and residual oil-generating potential (HI) in the Nadym-Taz interfluve area were constructed separately for Lower, Middle and Upper Jurassic (dominantly Bazhenov) deposits. In most of the study area, the H/C_{at} values which are high for Upper Jurassic deposits (Figure 4), and tend to decrease only in the east and south-east (primarily in boreholes where the kerogen is sampled from the Vasyugan Fm). The residual oil-generating potential in the Upper Jurassic interval varies from 107 mgHC/g TOC in the east and northeast to 244-326 mgHC/g TOC in the central parts of the study area (Figure 5).

Kerogens of Middle Jurassic deposits occurring in the study area (Figures 4, 5) is featured by minor values of H/C_{at} and HI, which show an increasing trend (to 0.8 and 175 mgHC/g TOC, respectively) only in the south (Stakhanovskaya-910 well) and in the north-west (Medvezh'ya-1001 well). While these parameters are generally lower for the kerogen of Lower Jurassic deposits (Figure 4), as compared to Middle Jurassic deposits, with the lowest values reported from the basin's central parts where Jurassic horizons have the greatest burial depth. However, the kerogen parameters are locally characterized by relatively high H/C_{at} values (around 0.70). Should the residual oil-generating potential of Lower Jurassic deposits be taken into consideration as well, specifically such areas (along the meridian running from Zapadno-Novogodnaya-210 well to Medvezh'ya-1001 well) will accommodate a zone of essintially high HI values in the Kiterbyut (Togur rock unit) and Sharapovo horizons (up to 80 mgHC/g TOC) (Figure 5).

Comparison of the schematic maps of changes in kerogen parameters for Lower, Upper, and Middle Jurassic sediments revealed a decline in oil-generating potential and H/C atomic ratio as progressive burial of the sedimentary cover takes place in the subsurface (Figures 4, 5). The level of OM maturity is critical in evaluation of the oil and gas potential of sedimentary sequences. This paper draws a comparison between the data inferred from the study of residual oil-generating

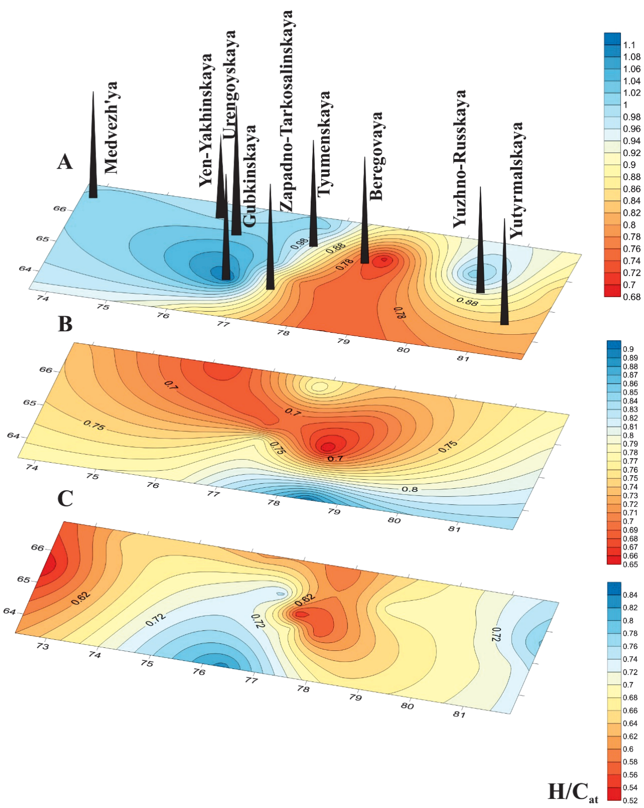

Fig. 4. Schematic maps showing variations in the H/C ratio for the kerogen of the OM from Jurassic deposits in the Nadym-Taz interfluve area. Age of deposits: A – Upper Jurassic; B – Middle Jurassic; C – Lower Jurassic. Notations represent isolines of equal values.

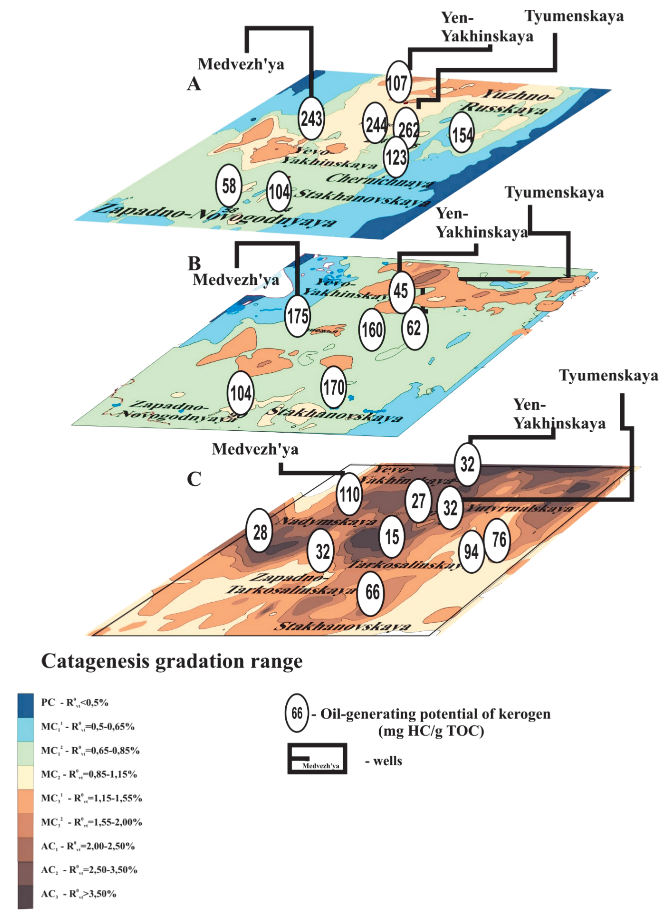

Fig. 5. Compared levels of catagenetic transformations of Jurassic deposits (Fomin et al., 2001) and petroleum-generating potential of IOM in some exploration wells drilled in the Nadym-Taz interfluve area. Age of deposits: A – Upper Jurassic; B – Middle Jurassic; C – Lower Jurassic.

potential and vitrinite reflectance measurements performed by A.N. Fomin and colleagues for Jurassic rocks of Western Siberia (Fomin et al., 2001).

In the Upper Jurassic interval (Bazhenov formation and its equivalents), the level of maturity of organic matter corresponds to PC_3–MC_1^1–MC_2 (from low maturity to mature OM (oil window). The OM is least altered (PC_3–MC_1^1) within the oil window in marginal parts of the megabasin and the study area. Approaching the basin's center, catagenesis gradually increases (MC_1^2–MC_2) and reaches maximum (oil window) (MC_3^{1-2}) in the north. The HI values for the Bazhenov Fm part of totally agree with the OM maturity derived from vitrinite reflectance, showing the lowest values for residual oil-generating potential in the north of the area's central part (Figure 5).

Maturity level of the OM in the samples from Middle Jurassic sequences is moderate within some horizons (Malyshevka, Vym), i.e. moderate catagenesis; kerogen samples in a number of boreholes drilled in western and southern regions of the study area is characterized by relatively high values of the residual oil-generating potential (up to 175 mgHC/g TOC). Given that sediments in the basal Jurassic horizons were exposed to complex temperature and pressure (T-P) conditions, in most of Western Siberia and the study area, the OM underwent significant alterations (became over-mature) and reached the MC_3^1–AC_3 (apo-catagenesis stage).

The HI values for Lower Jurassic deposits in the north of central Nadym-Taz interfluve area are also indicative of a high level of OM maturity and low residual oil-generating potential (<20 mgHC/g TOC) (Figure 5), except some of the regions in western and north-western regions (Medvezhya-1001 well) of the Nadym-Taz interfluve area, where the Kiterbyut and Sharapovo horizons are located in the moderate catagenesis zone (MC_2), with residual oil-generating potential estimated as relatively high (up to 90 mgHC/g TOC).

Thus, the level of maturity of OM (hence, the degree of its transformation) progressively increases from marginal to central parts and reaches maximum (oil window) in the north, as the burial depth of the sedimentary cover increases.

Conclusions

Jurassic deposits within the Nadym-Taz interfluve are characterized by relatively high TOC content throughout the cross-section, which allows considering them as potential petroleum source rocks. The highest

TOC concentrations are documented in the Bazhenov mudstones (shales), as well as in rock units of the Malyshevka, Leontievskiy, and Vym horizons.

2. While Upper Jurassic deposits in most of the study area have not yet passed oil window, they may generate liquid hydrocarbons. The study of the insoluble organic matter in these sedimentary sequences confirmed high hydrocarbon generating potential of the Bazhenov formation, whose organic matter is the primary source of oil accumulations both in Yu_0 horizon and in the over- and underlying reservoir rocks, which is emphasized by A.E. Kontorovich and co-authors (2019). The organic matter of the Vasyugan and Georgievskaya formations has a significantly lower hydrocarbon potential. The Lower Jurassic sequences are generally characterized by a terragenous type of OM and are inferred to be in the gas generation window. Kerogen in these deposits has a lower generation potential as compared to Upper Jurassic sequences (Bazhenov horizon). In Middle Jurassic sequences, maturity level of the organic matter in interpreted as moderate (hence, moderate hydrocarbon potential) in some intervals of the section, which is consistent with results of the elemental and isotope analyses of the kerogen.

It is shown that the hydrogen content decreases significantly with depth, while the kerogen having very low values of hydrogen (HI) and the hydrogen and carbon (H/C) atomic ratios became over-mature (apocatagenesis stage). However, in Middle Jurassic (Malyshevka and Leontievskiy horizons) and Lower Jurassic deposits (Kiterbyut, Sharapovo horizons), rock units characterized by a relatively high residual oil-generating potential are widespread in some regions of the study area.

The constructed schematic maps allow to identify zones of high hydrocarbon potential in the Nadym-Taz interfluve whose paleogeothermal conditions allow for preservation of hydrocarbon accumulations contained therein. The level of maturity of OM sampled from Upper and Middle Jurassic sediments suggests the presence of preserved oil and oil- and gas acumulations, and in lower Jurassic – wet and dry gas accumulations.

Acknowledgments

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