MODELING OF THE GEOLOGICAL STRUCTURE OF COMPLEX-CONSTRUCTED TRAPS OF HYDROCARBONS OF JUR'S DEPOSITS OF THE NORTH-WESTERN PART BUKHARO-KHIVINSKY REGION

Abbasova S. A.
Head of the Laboratory "Commercial Geology" JSC Institute of Geology and Exploration of Oil and Gas Fields (IGIRGIM JSC)

Abstract: *In the article a detailed study of the structure oil and gas regions in the intervals of productive horizons and individual layers of fluid-tight, is one of the urgent problems in the search and exploration of hydrocarbon traps and deposits. Complex held. Today, exploration for oil and gas requires a more detailed study of oil and gas bearing strata using mathematical tools for processing geological and geophysical information. The results of these studies should be identified local areas of distribution of individual lateral heterogeneities, corresponding to productive horizons and layers of fluidic seals.*

Key Words: *north-western, modeling, geological structure, hydrocarbons.*

1. INTRODUCTION:

At present, in the world, the modeling of the structure of complexly built traps is an important task for solving the problems of optimizing the development of hydrocarbon deposits on the basis of scientific developments related to the creation of reliable models of complex traps at different stages and stages of their study. At the same time, the most complex and problematic geological models are inherent in those objects that are complicated by disjunctive tectonics, the presence of a block structure, a variety of lithofacial composition of rocks, heterogeneity of reservoir beds and tires [6].

After gaining independence in our country, special attention is paid to the experience accumulated worldwide in increasing the reserves of fuel and energy resources. Thus, within the limits of the Bukhara-Khiva oil and gas region (BHNGR), the Upper Jurassic carbonate formation, which until recently was the main object of exploration, is characterized by a high degree of depletion of commercial hydrocarbon reserves. In this connection, there arises the need to involve either poorly studied territories, which have practically no remains, or deep-seated strata, such as the Jurassic terrigenous formation and the Paleozoic complex, in the exploration stage. The north-western part of the BHNGR territory is a primary object of research, as a block of structures has accumulated here that are not fully understood and where basic research is needed on the quality geological and geophysical materials presented to search for potential traps in the Jurassic terrigenous formation.

2. LITERATURE REVIEW:

The method of seismostratigraphy, proposed by the American group of researchers (P.Wail, R.Mitcham, A.Gregory, and others), with various additions to specific geological situations, has become widely introduced into the practice of exploration for oil and gas. A great contribution to these. Surveys at the time were introduced by R.Sheriff, E.Helem, I.A.Mushin, L.Yu.Brodov, E.A. Kozlov, F.I. Khatyanov, N.Ya.Kunin, E.V. N.N.Gogonenkov, A.A.Tabakov, V.A. Babadagly, A.E.S. Shlezinger, A.A.Nezhdanov, B.B.Tal-Virsky and many others.

This section of the chapter also provides a brief overview of the results of applying geological and geophysical information and attempts to use some elements of seismic stratigraphic analysis in the study of Jurassic sediments of individual sections of the Bukhara-Khiva region. Studies of the Jurassic formation of the Bukhara-Khiva region were carried out by AM Akramhodzhaev, T. L. Babajanov, B. B. Tal-Virsky, O. M. Romashko, V. P. Panov, L. G. Cherkashina, A.V. Kirshin, A.R. Khodjaev, V.V.Rubo, S.N. Zuev, A.G. Babayev, R.A.Gabrilyan, A.H.Nugmanov, M.E. Egamberdiev, A. A.Kaipov, V.I.Troitsky, A.E.Abetov, V.I.Sokolov, G.I.Mogilevsky, M.M.Rzaev, T.D.Mamadaliev, T.A.Gafurov, N.A. Gafurova, Sh. Latypov, V.M. Fomin, V.P. Alekseev, N.V.Erèmenko, D.Zaripova, V.S. Lepeshkin, Kh.K.Ismatullaev, S.K.Salyamova, Sh.S.Radzhabov, T.V.Sim, I.R.Yanbukhtin and many others who have made a great contribution to the knowledge of the geological structure of these oil and gas deposits .

3. MATERIALS AND METHODS:

The methodological aspects of the application of geological and geophysical information used by various researchers in the study of oil and gas prospective areas are considered. At the same time, special attention is paid to the use of seismic survey and geophysical methods. Well studies with the use of mathematical tools for processing and modeling seismic wave fields The development and application of methodological techniques for using various geological and geophysical information in the study of oil and gas deposits has been studied and is being studied by many researchers. Currently, various methods of integrated interpretation of geological and geophysical data are used, among which methods of its stratigraphy and structural-analysis analysis, as well as various methods of processing geophysical data based on various software and algorithmic complexes

4. ANALYSIS, DISCUSSION AND FINDINGS

Based on the analysis of various methodological aspects and the experience of the study of petroleum potential, we have proposed a new method of integrated interpretation of geological and geophysical data applicable to the Jurassic section of the Bukhara-Khiva region.

The proposed technique consists of 5 main blocks interconnected with each other. As a result of a comprehensive interpretation of the available geological and geophysical data, the author carried out a simulation the geological structure of complex oil and gas traps of terrigenous Jurassic sediments (Fig. 1, 2). It should be noted here that far from all the sections of the GBS, in terms of the quality of the resolved wave field, met the requirements for a stratigraphic interpretation. This is due both to the insufficiently high quality of the materials and to the fact that the study of the Paleozoic complex and the Jurassic terrigenous formation and their reflection in the wave field is difficult due to the low contrast of the medium (minimal differences in acoustic stiffness at the boundaries), mainly the sub-horizontal sediments formed mainly under conditions of compensated sedimentation, and the screening properties of the Upper Jurassic formations, represented by limestones and anhydrites with high reflection coefficients significantly attenuating the probe seismic pulse. The method of field observations has relatively limited possibilities for tracing the reflections of the Lower Middle Jurassic terrigenous formation and deeper horizons, since it requires the combination of two mutually exclusive beginnings: on the one hand, an increase in the frequency of the probe pulse, necessary for the dismemberment of thin-layered media, on the other, an increase in the depth that is available only to a low-frequency signal [5].

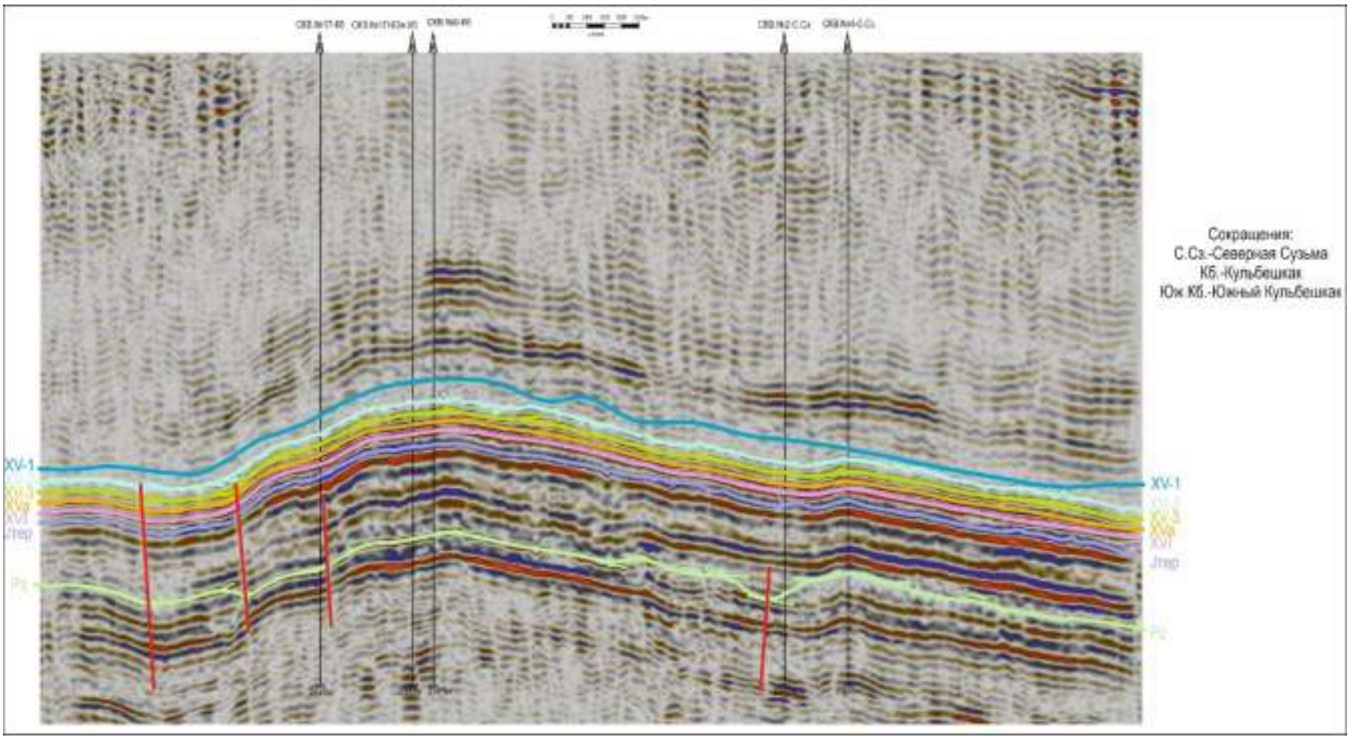

Fig. 1. Inline Time Cross Section 2614

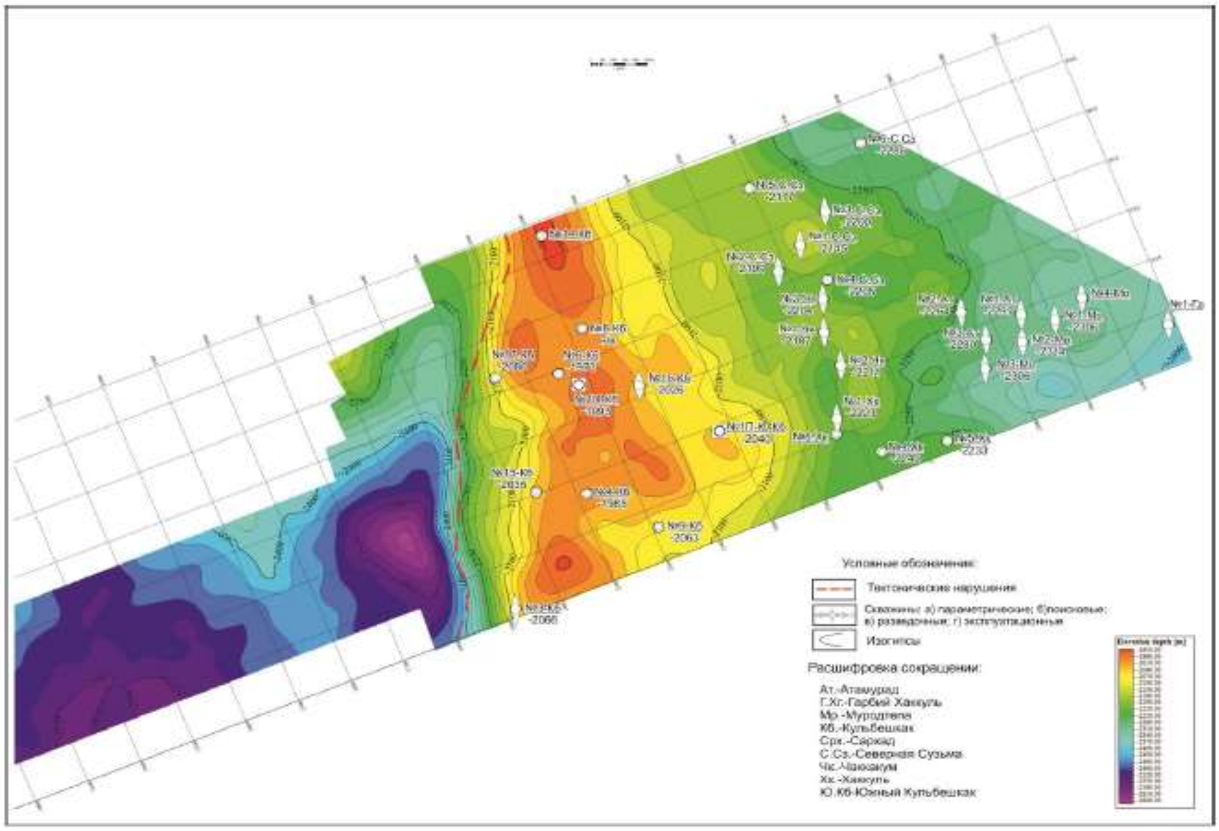

Fig. 2. Geological model of the roof of terrigenous deposits of the Jurassic age. Compiled by: Abbasova S.A., 2018

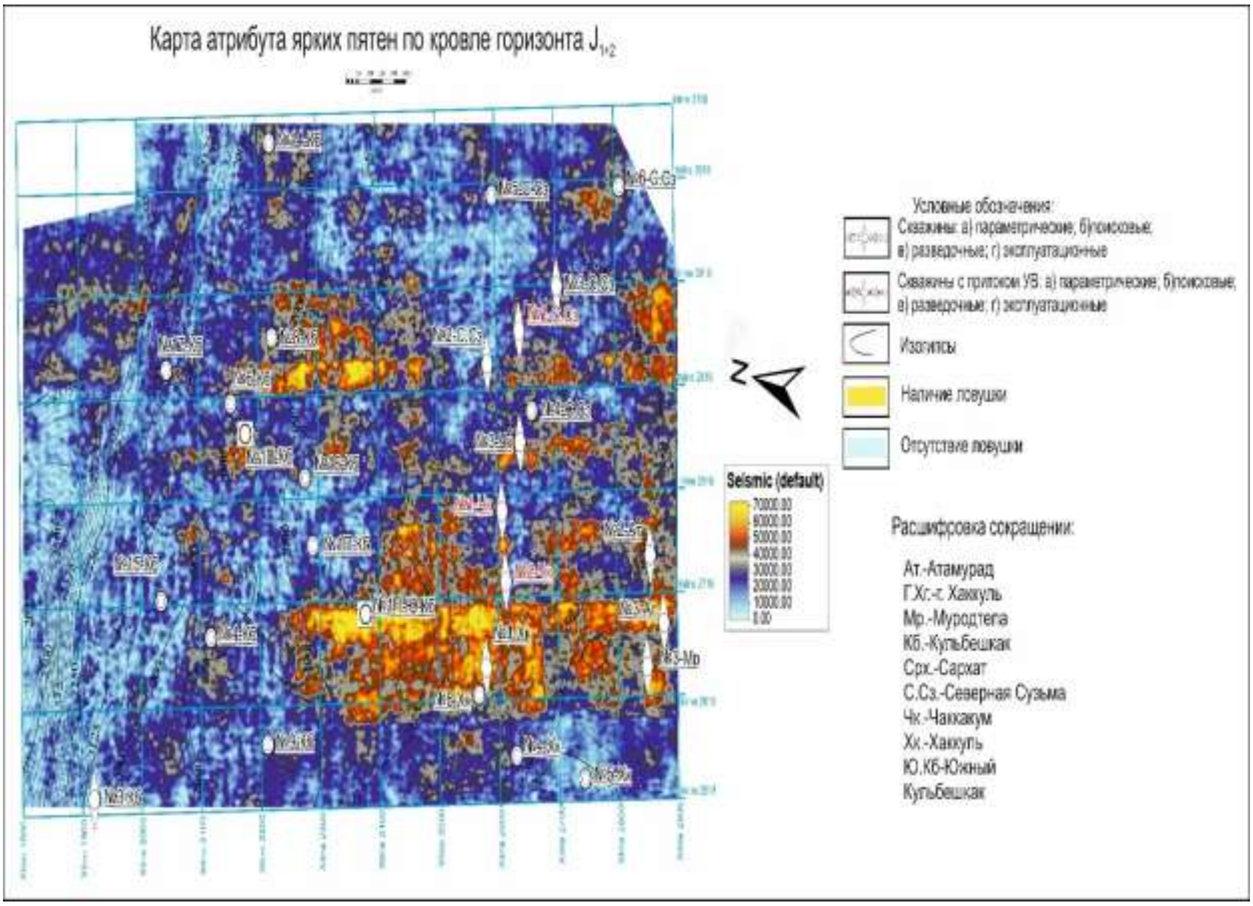

Fig. 3. The results of dynamic modeling and the selection of "bright spots" on the terrigenous deposits of the Jurassic age. Compiled by: Abbasova S.A., 2018

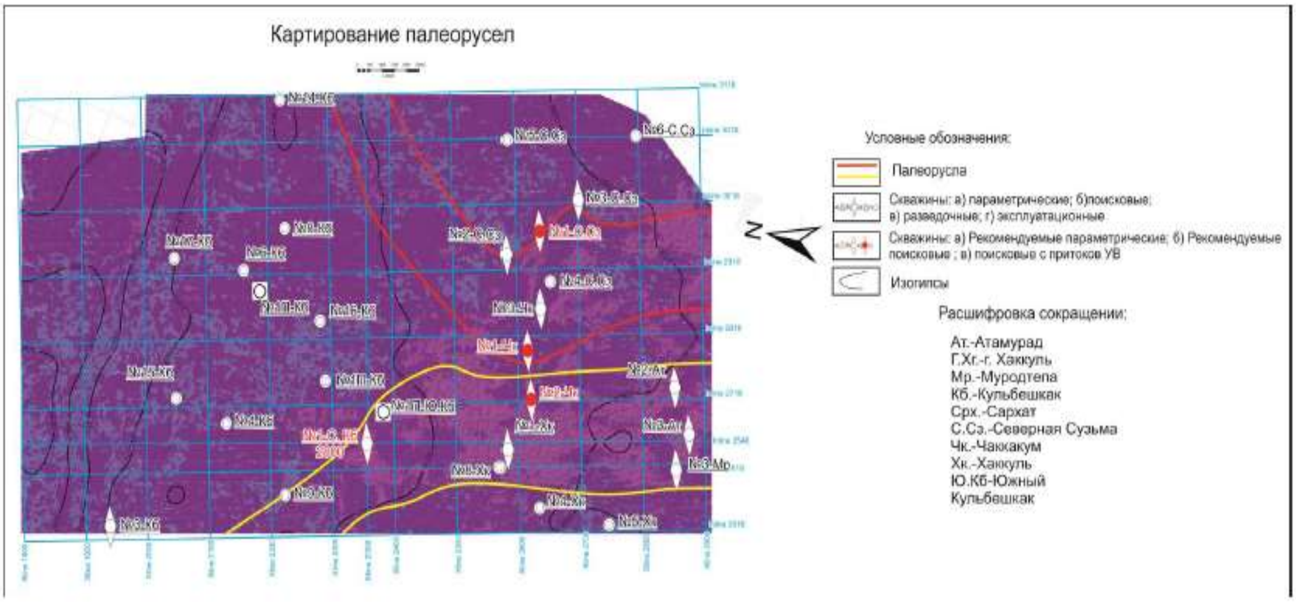

Fig. 4. Isolation of paleorasls within the study area.
Compiled by: Abbasova S.A., 2018

Special attention was paid to the identification of dynamic anomalies of the wave field, which, according to modern theoretical concepts, are direct indicators of the presence of traps and the presence of hydrocarbon fluids. As is known, the speed and density in sedimentary rocks is directly dependent on porosity and the properties that fill the pore space of fluids. The change in velocity due to the change in the nature of the pore fluids often creates amplitude anomalies associated directly with hydrocarbon traps. So replacing water with hydrocarbons almost always leads to a decrease in speed. If the velocity in the overlying rocks is higher than in the reservoir, lowering the velocity in the reservoir when filled with hydrocarbons increases the difference in acoustic stiffness and, consequently, increases the reflection amplitude from its roof. A bright spot anomaly is created. If the overlying sediments are characterized by a lower velocity than the reservoir, then the influence of the HC creates a “dim spot”. Thus, “phase assimilation” can be considered as a sign of HC (Fig. 3). A decrease in velocity in large hydrocarbon clusters affects reflections from deeper horizons. Formed "deflection" in the axes of the phase. Sometimes the effect of a deposit is simply due to the deterioration of the quality of reflections under the “shadow zone” tank. Often, immediately below the hydrocarbon accumulations, a decrease in the instantaneous frequency is observed.

It should be noted that none of the listed wave field anomalies is an unambiguous sign of the presence of a shock wave. For example, speed and frequency anomalies may be associated with fractured zones. Anomalies of the “bright spot” type can occur when a stack of strands is wedged out to a “resonant” thickness or when they reach the time level of the basement rocks under study. A “dim spot” may occur in the zone of facies substitution or disjunctive disorders, local horizontal reflection may be associated with the filling of the incision, etc.

It should be noted that the interpretation based on the analysis of the dynamic characteristics of the wave field is used in Uzbekgeofizika to search for traps in the carbonate formation. Based on the analysis of the wave field over the well-known deposits of S.N. o); - decrease in instantaneous frequencies (increase in the period of oscillations of the T6 wave;); - the appearance of amplitude growths in the region of low velocities under the T6 wave on the velocity spectra. The dynamic modeling of the wave field, carried out by the author, is exemplified in the generalized model of Lower-Middle Jurassic sediments by the example of the north-western BHNGR.

To simulate the formation of complex traps of terrigenous Jurassic sediments, the author conducted seismic and facial modeling of the northwestern part of Bukhara - the Khiva region. It is believed that the Lower Middle Jurassic terrigenous sediments were formed in a transitional situation from coastal to shallow-marine conditions [2, 3]. According to the form of seismic recording, this section interval is characterized by the presence of unextended, often interference reflections, a sharp increase in the amplitudes of the reflections. Such a wave field pattern is typical for an environment with highly variable properties, for non-marine sediments. As a result of dynamic modeling, two “channel” anomalies were mapped (Fig. 4.5). The relief in the northeastern part of the study area is rather flat, at least within sight. The stream of the pale river beds has a northeast direction. A little to the south, in the western part of the territory, the “channel” of the meandering form, of the same northeastern direction, is mapped. The sediments of the “channel” type are represented by fine-grained sandstones with unidirectional or plane-parallel oblique layering, often ascending flow ripples. May contain interlayers of small clay intraclasts and carbonaceous material in the form of thin interlayers, lenses and shapeless inclusions. The bases of the interlayers often have an erosive lower boundary and a characteristic sequence of textures indicating a drop in the flow force (the change of the homogeneous texture into intermittent and wavy-layer). The thickness of the sandstones in the “channels” is up to 20 m. For the northern part of the territory, deposits of smaller, minor streams are characteristic, deposits of breakthrough cones are possible, but for the most part these are coastal marches (or bays), as well as small banks. The sediments can be represented by siltstones, fine-grained silty sandstones, their texture is partially disturbed by bioturbation (vertical and horizontal courses of ice eaters) [3]. The color of the rocks is dark gray, with greenish tint. The thickness of the sandstones in the wells ranges from 0 to 5 m. The resulting seismic facies map reflects the structural features of the deposits in a given area. Next, focusing on it, select the parameters for the attribute analysis used in the prediction of petrophysical parameters in the interwell space. Thus, on the basis of 3D CMP seismic data, GIS data and core data, the problem of the formation of complex traps was solved for subsequent prediction of their distribution.

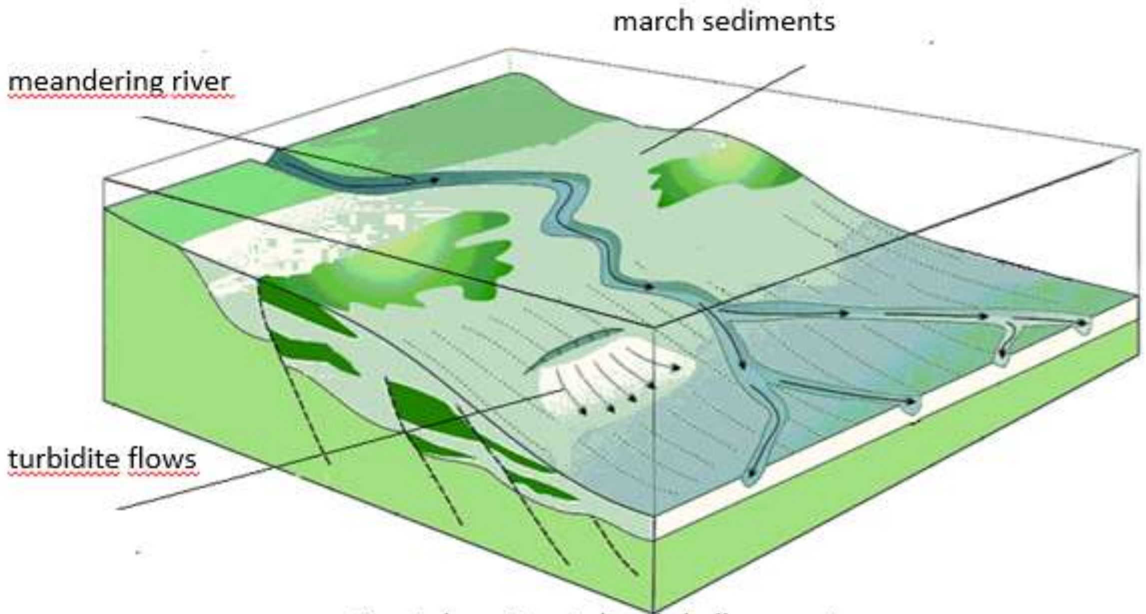

Fig. 5. Model of sedimentation conditions of the Lower Jurassic age within the study area

Thus, based on the results of modeling the geological structure of the complexly constructed hydrocarbon traps of the Jurassic sediments of the northwestern part of Bukhara-Khiva region, the following conclusions can be drawn:

- proposed a three-dimensional modeling technique for complexly constructed hydrocarbon traps in the north-western part of Bukhara - the Khiva oil and gas region;
- the geological model of the terrigenous Jurassic sediments of the northwestern part of the Bukhara-Khiva oil and gas region was clarified;
- established regular changes in the identified structural and genetic types of traps, as well as the composition and properties of reservoir rocks in complexly constructed traps;
- The conditions of sedimentation of terrigenous Jurassic sediments for the studied territory were determined.

The results of the study allowed to extract complex hydrocarbon traps in terms of terrigenous deposits of the Jurassic age, to carry out the ranking of hydrocarbon reserves in order to create the necessary conditions for a detailed assessment of economic risks, as well as the selection of optimal sites for laying new prospecting, exploration and production wells, which could contribute to the discovery deposits and hydrocarbon reserves growth.

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