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STRUCTURE AND LITHO-FACIAL FEATURES OF THE QALA SUITE DEPOSITS OF THE ZYKH-HOVSAN AREA ACCORDING TO 3D SEISMIC AND WELL LOGGING DATA

(Представлено членом редакційної колегії д-ром геол. наук, проф. О. М. Карпенком)

Background. *A detailed study of the geological structure and litho-facial features of the deposits of the Pliocene productive series based on 3D seismic and Well Logging data is of great practical importance, as the main share of hydrocarbons produced in Azerbaijan occurs in these deposits.*

The purpose of the research was to identify the features of the geological structure of the Zykh-Hovsan area, study the litho-facial properties deposits of the Qala Suite of the productive series, identify and study the deposits within the 3 formations of the Qala Suite based on a joint analysis of 3D seismic and Well Logging (WL) data.

Methods. *Structural mapping based on seismic data was chosen as the main research method. In studying the Qala part of the section, seismogeological, seismostratigraphic and paleogeomorphological analyzes were also carried out.*

Results. *According to the contour of anomalies of lowered and enhanced values of medium amplitudes (reflected waves) RW of the SH (seismic horizons) and maps of temporary thicknesses, and in some cases along faults, in different parts of the Zykh-Hovsan area within the QaS formations, deposits were identified, their size and area were determined. Effective and oil saturated thicknesses were determined for each deposit. According to the last interval of testing and perforation in the wells drilled in the study area, as well as along the top of the water-saturated reservoir and along the bottom of the oil-saturated reservoir, absolute marks (a.m.) of oil-water contacts of the identified deposits were established. The nature of saturation was determined using WL data. The type of each deposit was also determined in the process of research.*

Conclusions. *In Qala deposits developed in the research area, the following were identified: one perspective trap in the QaS-3 formation, two traps in the QaS-2 formation and one trap in the QaS-1 formation at the Zykh field, which were identified on the basis of paleo-geomorphological features where it is suspected that the conditions for accumulation of sandy material are advantageous.*

Keywords: *litho-facial features, Qala Suite deposits, deposit, reservoir, effective thickness, oil saturated thickness, 3D seismic, structural maps.*

Background

Studying the geological structure, establishing the paleo-geographic environment and litho-facial features of deposits is particularly important in the search for oil and gas traps of non-anticlinal type. Many researchers have studied the structure and conditions of sedimentation of deposits of the Productive Series (PS), which is of exploration interest in the area under consideration (Kovalevsky, Mirchink, Baturin, Aliev, Sultanov, Avdusin, Konyukhov, Potapov, Alizadeh, Mustafaev, Mehtiev, Reynolds, Hinds, Alieva, Mammadov, etc.). In the papers of these researchers, all judgements are reduced to the fact that the Paleo-Volga inflow of quartz-disthene-staurolite material occurred both from the Russian platform and from the mountain structures surrounding the South Caspian depression at that time (Alizade et al., 2018; Mamedov, 2008). Lithological and facies characteristics of the Lower Pliocene deposits show that they were deposited in a common basin with common paleo-geological, paleo-geographic conditions (Alikhanov, 1978).

The object of the current research was the Zykh-Hovsan area, which is located in the southern coastal part of the Absheron Peninsula (Fig. 1).

It is known that PS deposits within the Zykh-Hovsan area are subdivided on the basis of lithological composition into 9 lithostratigraphic complexes - from bottom to top: Qala Suite, Lower Kirmaky, Kirmaky, Upper Kirmaky Sandy, Upper Kirmaky Clayey Suites (lower part of the productive strata), Interruption (Fasila Suite), Balakhany, Sabunchi, Surakhany formations (upper part of the productive strata). The Balakhany Suite, in turn, is subdivided into 6 horizons from X to V.

The main prospects of the areas under research are associated with deposits of the Qala Suite, in the section of which a number of independent exploitation areas are identified. The purpose of this research was to study the structure and litho-facial features of the Qala Suite deposits of the Zykh-Hovsan area based on seismic and WL data.

Methods

CDP-3D seismic surveys were carried out in the Zykh-Hovsan area in 2012. A total of 321 wells were drilled within the study area, of which 105 wells (for which we have complete information) penetrate Qala deposits (Akhmedov, 2017; Akhmedov, Aliyeva, & Abdurrahmanova, 2018). In studying the Qala part of the section, the main research method was structural mapping based on seismic data, which was supplemented by seismic geological, seismic stratigraphic, and paleo-geomorphological analyses (Alekseeva, & Vazaeva, 2023; Alsadi, 2017; Bembel et al., 2023; Korolkov, Mushin, & Chernov, 2001; Salaev, & Kastryulin, 1977; Shimansky et al., 2011; Chopra, 2009; Sheriff, & Geldart, 1987; Urupov, 2004; Aghayeva, 2021). At the initial stage of study of the interval under consideration, the boundaries of productive layers of the Qala Suite were delineated for seismic referencing and mapping. Further, their correlation schemes were constructed along the well lines selected so as to evenly illuminate the entire drilled area. The final formation breakdowns were obtained with adjustments based on WL interwell correlation and seismic data.

Based on the correlation of seismic horizons and top elevations of formations and reservoirs, structural maps on a scale of 1:10000 were constructed for the Qala Suite-1 (QaS-1), Qala Suite-2 (QaS-2) and Qala Suite-3 (QaS-3) formations with oil and gas prospects. The maps are accompanied by diagrams of dynamic characteristics, temporary thicknesses, maps of effective and oil saturated thicknesses.

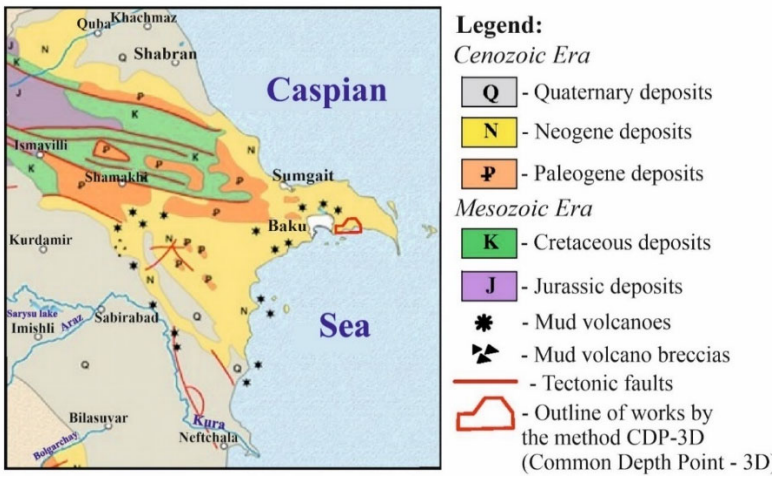

Fig. 1. Geological map of the study area (Geological map of Azerbaijan, 2010)

Results

Based on the seismic stratigraphic data, the correspondence of geological boundaries to reflections in the seismic field was determined and the reflected wave (RW) – geological reference series presented in the table was adopted (Fig. 2).

In the area under consideration, Qala Suite deposits are represented by alternating interlayers of clayey and sandy rocks and are subdivided into three formations: QaS-1, QaS-2 and QaS-3.

Sedimentation conditions for all three Qala Suite units (QaS-1, QaS-2, QaS-3) are similar, only the paleo-relief and the amount of transported material differ, which affected the size and location of the formed traps. Filling of the traps with HC (hydrocarbon) migrating from the more submerged part of the basin occurred soon after the deposit of reservoir rocks. However, towards the end of accumulation of the productive strata, there was a rapid intensification of fold-forming movements, which continue to the present time, resulting in the active movement of groundwater and (in some places) in the destruction of the formed hydrocarbon deposits. A characteristic feature of anticlinal structures in the area under consideration is the presence of numerous tectonic disturbances and mud-volcanic manifestations that complicate their structure and have a significant impact on the destruction and change in the composition of formation fluids.

Seismic horizon (SH)	Geological reference point
SH-I	top of the Surakhany Suite of the Productive Series
SH-BS	top of the Balakhany Suite (BS) of the Productive Series
SH-UKC	top of the Upper Kirmaky Clayey (UKC) Suite of the Productive Series
SH-KS	top of the Kirmaky Suite (KS) of the Productive Series
SH-II	top of the Lower Kirmaky (LK) Suite of the Productive Series
SH-III	Qala Suite (QaS), top of the QaS-1 of the Productive Series
SH-QaS2	Qala Suite (QaS), top of the QaS-2 of the Productive Series
SH-IIIa	Qala Suite (QaS), top of the QaS-3 of the Productive Series
SH-IV	surface of Pontic deposits

Fig. 2. Seismic horizon (SH) and its corresponding geological reference point

Absence of commercial deposits and presence of signs of residual oil saturation beyond the contour of oil-bearing capacity within the fields indicate the ongoing process of deposit destruction. The character of distribution and fracture of oil and gas accumulations observed at the present stage is due to the influence of hydrogeological and hydrodynamic factors that appear after the formation of oil and gas deposits. This is evidenced by the uneven distribution of oil and gas deposits by area and depth. The contour of deposits in adjacent blocks within the same field has different hypsometric elevations.

Based on the mentioned above, we can assume high prospectivity of the structures located on the southeastern dip of the anticlinal zones of the basin. These structures on the fluid migration path are characterized by good structural-tectonic and lithological-facial conditions for hydrocarbon (HC) accumulation and accumulation. In addition, these structures have a number of advantages over the other folds located upstream of the reservoirs. Over the entire history of formation, they only had an erosional stage of development; in the Upper Pliocene and Anthropocene, the structures were involved in general flexing and were not subjected to the destructive influence of tectonic and hydrogeological factors.

Taking into consideration the new seismic and reinterpreted well data, the deposits in the eastern and western parts of the Hovsan field are divided into independent objects. This division seems to be related to the paleo-relief and the amount of transported material. According to earlier research (Akhmedov, 2017), the boundaries for all deposits of the Qala Suite of the field were determined conditionally, due to the lack of more detailed seismic exploration at that time.

The QaS-3 formation was penetrated by 72 wells at the Hovsan field. The correlation of Qala Suite deposits in wells 1860–1856–1861 is shown in Fig. 3.

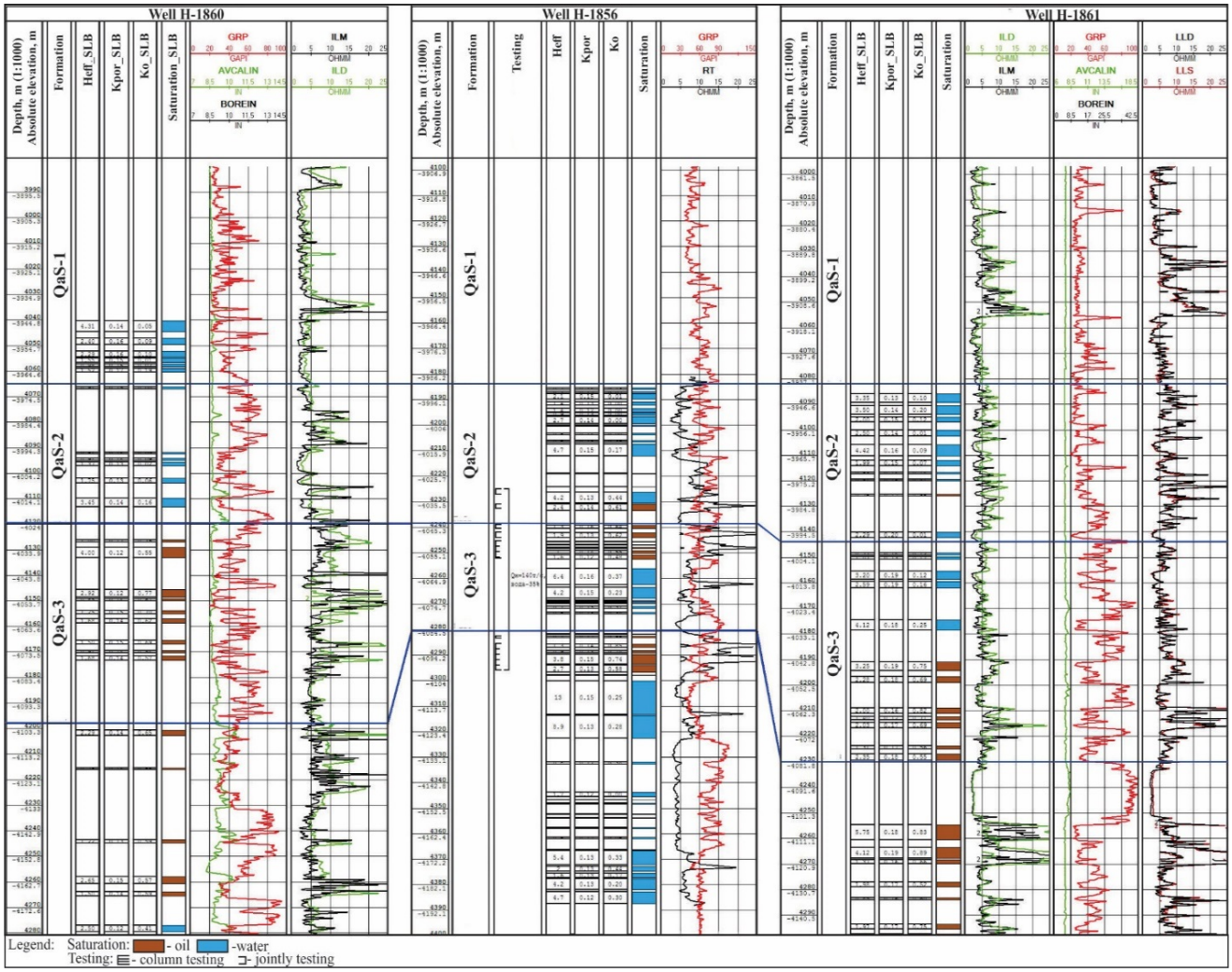

Fig. 3. Correlation scheme of Qala Suite deposits from wells 1860–1856–1861 (Hovsan field)

The QaS-3 formation is distributed over the entire area, only in the south-western and, partially, in the northern parts of the site there is an area of clayisation of the formation. Lithologically, the formation is characterized by the predominance of clays over sandy and silty rocks. The total thickness of the formation is 150–180 m, effective thickness varies from 5 m to 98 m, effective oil saturated thickness varies from 2 m to 20.9 m.

On the structural map of the seismic horizon-IIIa (SH-IIIa) (Fig. 4), confined to the top of the QaS-3 formation, the eastern limb of the Zykh anticlinal structure and the Hovsan syncline, which dips monoclinally to the east, is mapped. The entire area is complicated by numerous tectonic disturbances (zones of decompaction) of submeridian and sublatitudinal direction, identified both by temporary sections and by lowered values of the amplitude map. The depth range of the Lower Qala Suite deposits varies from -2160 to -4720 m.

There are 7 objects identified within the QaS-3 formation (Figs. 4, 5).

The deposit in the area of well 1829 was penetrated, accordingly, by well 1829. Effective thickness is 75 m, oil saturated part is 20 m. The deposit is delineated along the contour of the anomaly of lowered values of the SH-IIIa average RW amplitudes, and from the west by a fault delineated along the map of maximum RW amplitudes of SH-IIIa. The size of the deposit is 0.21 x 0.40 km, the area is 42.3 thousand m^2. The conditional oil water contact (OWC) is assumed to be at the top of the water-saturated formation at a.m. -4402 m. The deposit is combined, lithologically and tectonically shielded.

Deposit in the eastern part of the Hovsan field (area of wells 1854, 1855, 1856).

It was penetrated by 27 wells, in which commercial oil inflows were obtained. Effective thicknesses vary from 18.4 m to 98.0 m, oil saturated part varies from 3.5 m to 31.9 m.

The northern boundary of the deposit is delineated along the contour of the paleo-uplift dome of the temporary thickness map with a boundary value of 123 ms. The paleo-uplift dome probably shows a decline in reservoir properties, and the main accumulations of sand bodies are probably confined to its slope. In the area of well 1816, located in the north-west part of the deposit, there is a zone of lowered instantaneous amplitudes RW of the SH-IIIa. From the west, the deposit is confined by faults; the southern boundary is along the outline of paleo-uplift (159 ms).

The dimensions of the deposit are 1.64 x 1.83 km, the area is 2,886 thousand m^2. The OWC is based on the results of sampling of well 1845 at 4273 m a.m. The deposit is combined, lithologically and tectonically shielded.

The following small-sized deposits were identified in the western part of the Hovsan field.

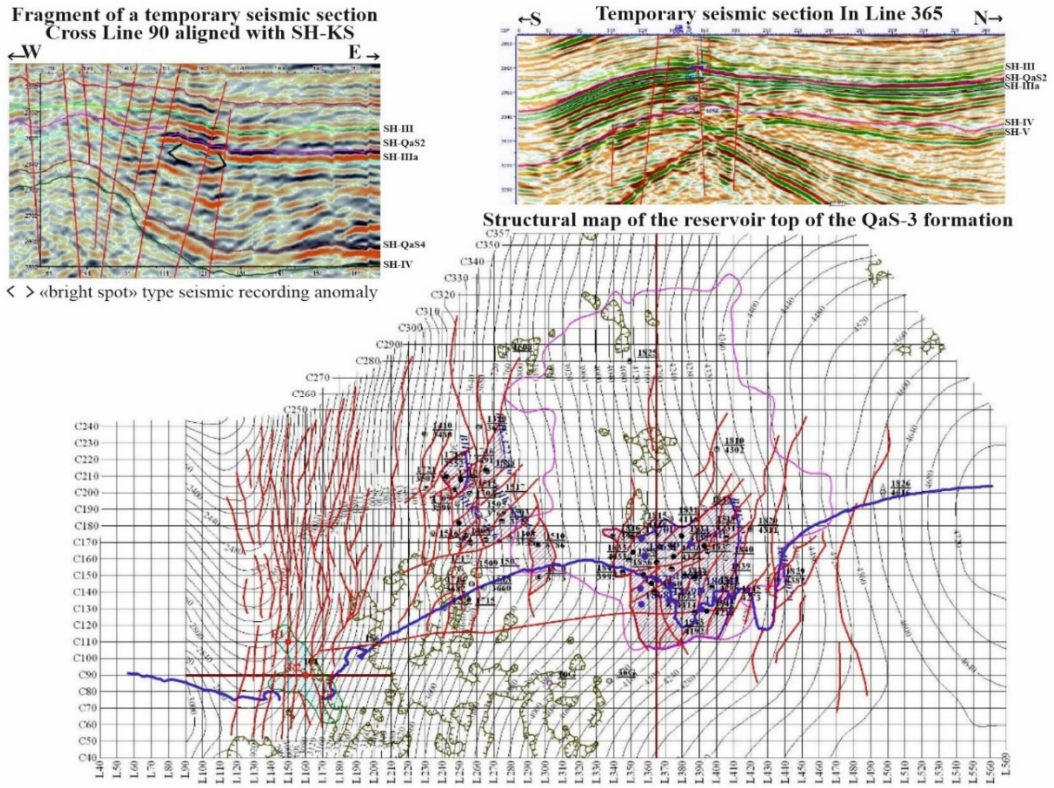

Fig. 4. Structural map of the reservoir top of the QaS-3 formation

The deposit in the area of wells 1510 and 1570 was penetrated by two wells 1510 and 1570, accordingly. The effective thickness is 58 m, oil saturated thickness is 17 m.

The deposit was identified by the results of sampling in well 1510 – oil inflow was obtained in the interval –3818.8 – –3819.0 m. Well 1570 is characterized as productive based on WL data. The dimensions of the deposit are 0.4 x 1.1 km, the area is 267 thousand m^2. The deposit is tectonically shielded.

The deposit in the area of well 1501 was penetrated by wells 1704 and 1501. Effective thickness is 41 m, oil saturated thickness is 34 m.

The deposit was identified based on WL data in wells 1501 and 1704, which are characterized as productive. The OWC is assumed to be at the bottom of the oil-bearing interval in well 1501 at a.m. -3748 m. The dimensions of the deposit are 0.3 x 0.7 km, and the area is 142 thousand m^2. The deposit is tectonically shielded.

In the area of wells 1713 and 1707, a small-sized deposit is identified. The effective thicknesses vary from 20.5 m to 36 m, the oil saturated thickness varies from 5.8 m to 28.6 m.

Tested in wells 1707, 1708, 1713, 1720.

During testing: well 1707 in the interval –3619.4 – –3629.4 m received oil inflow with flow rate of 50 tonnes per day, well 1708 in the interval -3618 – -3624 m also received oil inflow with flow rate of 58 tonnes per day.

The dimensions of the deposit are 0.4 x 0.74 km and the area is 168.7 thousand m^2.

The OWC is based on the last sampling interval in well 1707 at a.m. -3629.4 m. The deposit is tectonically shielded.

Deposit in the area of wells 1706, 1705, 1503. The deposit was penetrated by wells 1706, 1705, 1700, 1704, 1501, 1503. Effective thicknesses vary from 20.5 m to 36 m, oil saturated thickness varies from 5.8 m to 28.6 m.

Wells 1503, 1706 were tested.

When testing well 1706 in the –3594 – –3597.5 m interval, an oil flow rate of 40 tonnes per day was obtained, and well 1503 in the -3735.0 – -3740.0 m interval, an oil inflow with water was obtained. Wells 1501, 1503, 1704 and 1705 are characterized by WL data as productive.

In well 1501 the oil saturated reservoir bottom at a.m. is 3748.6 m, in well 1503 – at a.m. –3749.6 m. The conditional OWC is assumed for well 1503 at a.m. –3749.6 m.

The size of the deposit is 0.64 x 0.97 km, the area is 366.3 thousand m^2.

A deposit was identified in the area of wells 1716–1588 based on test results. The effective thickness is 13–17 m, oil saturated thickness is 5.4–7.7 m.

The OWC of the deposit is based on the last perforation interval in well 1588 at a.m. –3727.3 m. The dimensions of the deposit are 0.35 x 0.94 km, the area is 192 thousand m^2. The deposit is tectonically shielded.

In the west of the area under review, a potential trap, lithologically and tectonically shielded, was mapped within the Zykh field according to the anomaly of enhanced average RW amplitudes SH-IIIa. Its dimensions are 0.95 x 1.6 km and its area is 588.8 thousand m^2.

The QaS-2 formation was penetrated by 72 wells in the Hovsan field. At the Zykh field, the formation was penetrated by wells 130, 153 and 156 (Fig. 6). It is distributed over the entire area of the surveyed area.

Lithologically, the formation is represented by a homogeneous alteration of clays, sands and siltstones. The total thickness of the formation is 40–65 m, and in well 1720 it reaches 70.7 m. Effective thickness varies from 8.6 m to 45.4 m, effective oil saturation varies from 3 m to 42.7 m.

The structural map for SH QaS-2, which is confined to the top of the QaS-2 formation, shows an inherited monoclinal dip of the area to the east. Tectonic disturbances traced in SH IIIa are also observed at this level. The depth range of the Middle Qala Suite deposits varies from –2120 to –4680 m.

Five objects were identified within the QaS-2 formation (Figs. 6, 7).

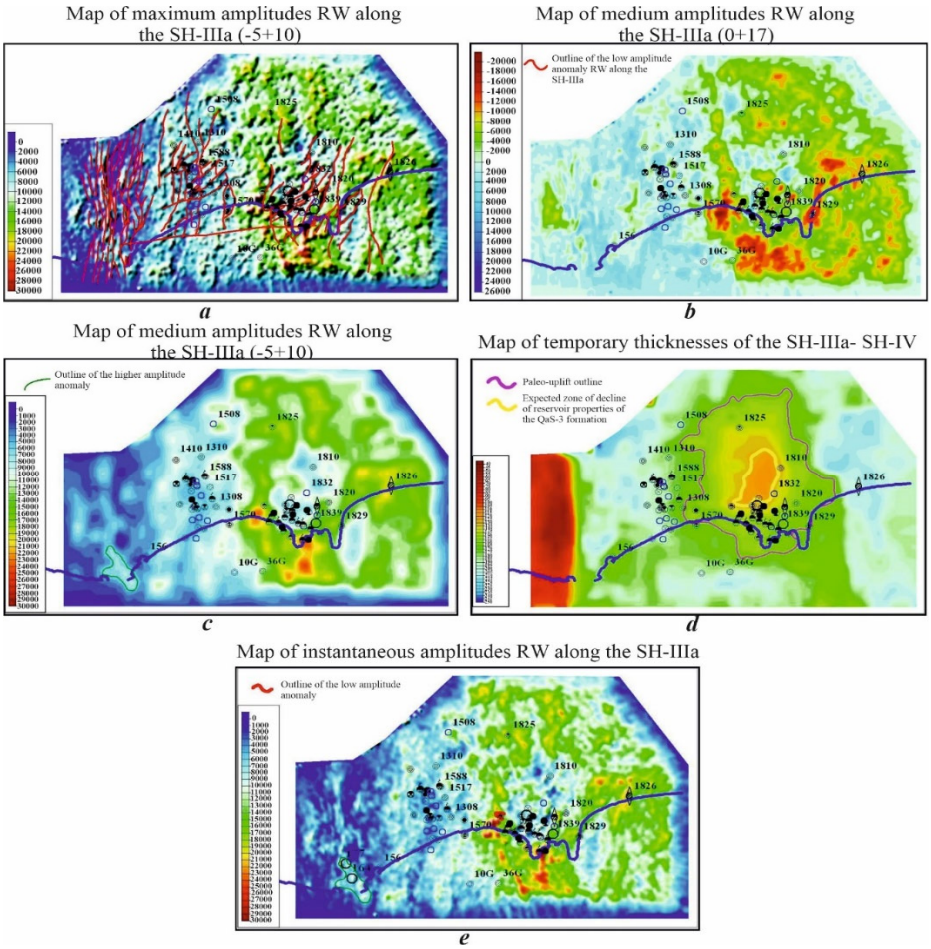

Fig. 5. Seismic and geological features of the QaS-3 formation:
a – Map of maximum amplitudes RW along the SH-IIIa; b – Map of medium amplitudes RW along the SH-IIIa (frame 0 + 17);
c – Map of medium amplitudes RW along the SH-IIIa (–5 + 10); d – Map of temporary thicknesses of the SH-IIIa-SH-IV;
e – Map of instantaneous amplitudes RW along the SH-IIIa

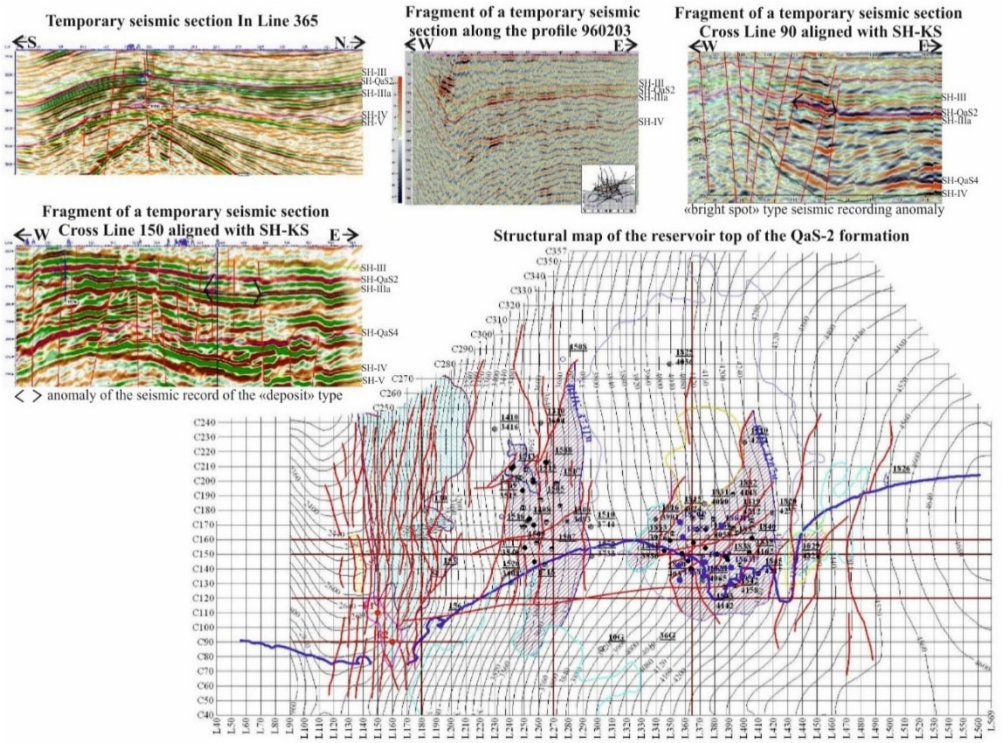

Fig. 6. Structural map of the reservoir top of the QaS-2 formation

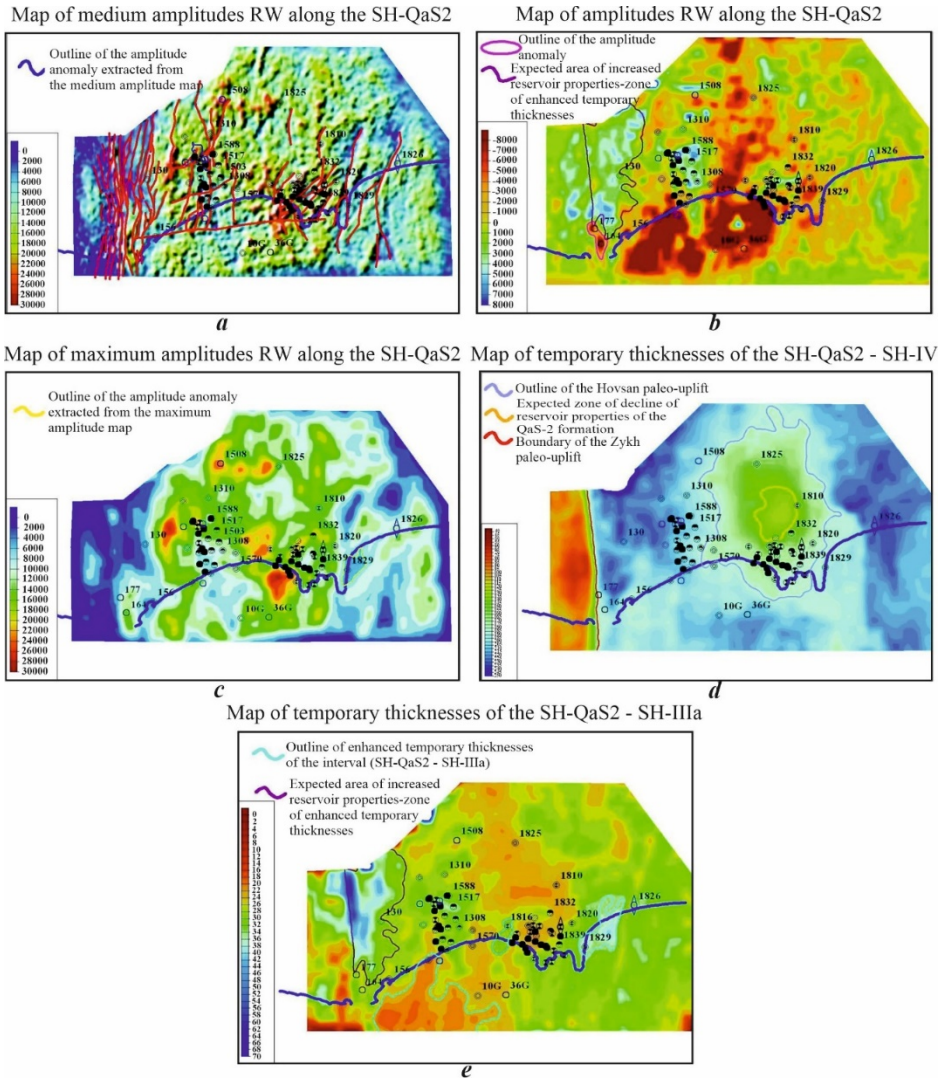

Fig. 7. Seismic and geological features of the QaS-2 formation:
a – Map of medium amplitudes RW along the SH-QaS2; b – Map of amplitudes RW along the SH-QaS2;
c – Map of maximum amplitudes RW along the SH-QaS2; d – Map of temporary thicknesses of the SH-QaS2- SH-IV;
e – Map of temporary thicknesses of the SH-QaS2- SH-IIIa

The deposit in the area of well 1829 was discovered using WL data. Effective thickness in well 1829 is 39.6 m, oil saturated thickness is 39.6 m.

It was identified within the zone of increased temporal thicknesses between SH QaS-2 and IIIa by the boundary value of 35 ms. The presence of the potential zone here was also confirmed by the amplitude anomaly identified on the map of maximum amplitudes of RW of SH QaS-2.

The size of the deposit is 0.70 x 0.75 km, with an area of 367 thousand m^2. The deposit is lithologically and tectonically shielded.

The eastern deposit of the Hovsan field (in the area of wells 1816, 1856, 1855, 1845) was penetrated by 31 wells, in which commercial oil inflows were obtained.

Effective thicknesses vary from 3.0 m to 30 m, oil saturated thickness varies from 3.0 m to 27.4 m.

The northern boundary of the deposit is delineated along the contour of the proposed zone of reduced reservoir properties according to the map of temporary thicknesses with a boundary value of 140 ms. The deposit boundary in the area of well 1816, located in the north-west of the deposit, is delineated along the contour of the increased temporary thicknesses of SH interval QaS-2 – IIIa. From the south-west the deposit is confined by faults, the southern boundary is delineated along the contour of 180 ms paleo-uplift.

The size of the deposit is 2.7 x 3.5 km and the area is 4,521 thousand m^2. The OWC is assumed to be at the top of the water-saturated interval in well 1820 at 4267 m. The deposit is combined, lithologically and tectonically shielded.

Western deposit of the Hovsan field (area of wells 1714, 1509, 1706, 1716, 1588). It was penetrated by 27 wells, in which commercial hydrocarbon inflows were obtained. Compared to the QaS-3 formation, this deposit is a single object. Effective thicknesses vary from 10.0 m to 45.0 m, oil saturated thickness varies from 5.0 m to 28.0 m.

The deposit is delineated by faults, amplitude anomaly (area of well 1720) according to the map of medium amplitudes RW of QaS-2, the southern boundary is along the boundary (22 ms) of the zone of enhanced temporary thicknesses of the interval SH QaS-2 - IIIa.

The dimensions of the deposit are 1.6 x 5.1 km and the area is 3,960 thousand m^2. The water saturated reservoir in well 1308 at a.m. –3731.0 m is assumed to be at the top of the water saturated reservoir. The deposit is lithologically and tectonically shielded.

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To the south of it, an amplitude anomaly is identified on the medium amplitude map, along the outline of which a perspective trap is mapped. Its dimensions are 0.5 x 0.9 km and its area is 329.3 thousand m^2.

The QaS-1 formation was penetrated by 133 wells of the Zykh and Hovsan fields. It is spread over the entire area. Lithologically, the formation is composed of sandy and siltstone rocks with relatively thin clay interbeds that are not sustained along strike. The total thickness of the formation is 50–81 m and at the Zykh field in well 165 it is up to 125 m. The effective thickness varies: at the Zykh field from 15.7 m. to 53 m.; at the Hovsan field - from 8.2 m. to 41.8 m. Effective oil saturation varies: at the Zykh field within 4.5 m, 17.2 m to 37.3 m; at the Hovsan field – 3.0 m, 18.7 m to 30.6 m.

The structural plan at the SH-III stage, confined to the top of the QaS-1 formation, is conformable to the underlying SH QaS-2. The depth range of the Upper Qala Suite deposits varies from 2040 m to 4640 m.

Six objects were identified within the QaS-1 formation (Figs. 8, 9).

The deposit in the area of well 1829 was discovered using WL data, which resulted in the delineation of oil-saturated reservoirs. The effective thickness is 30.1 m, oil saturated thickness is 11.0 m.

The reservoir was recognised within the amplitude anomaly identified on the map of amplitudes between RW III.

The conditional OWC is taken along the top of water-saturated reservoir of well 1829 at a.m. -4298.1 m.

The size of the deposit is 0.2 x 1.6 km and the area is 205 thousand m^2. The deposit is combined, lithologically and tectonically shielded.

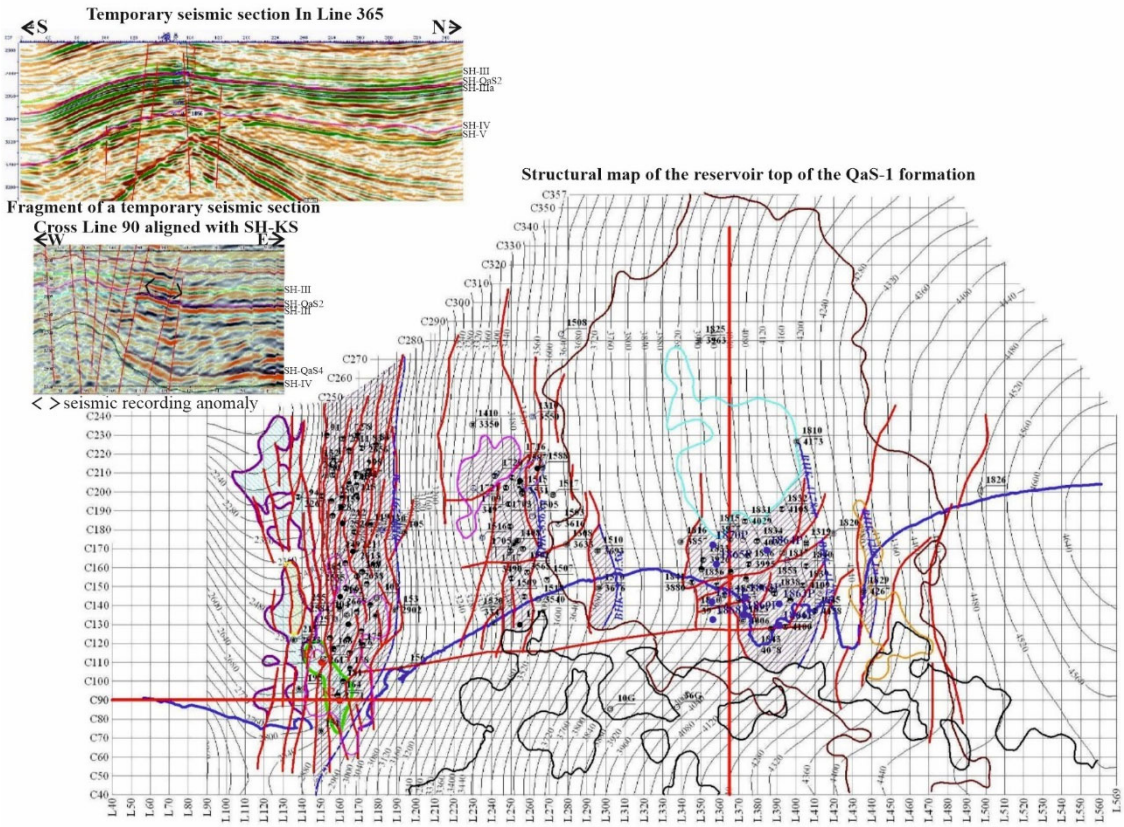

Fig. 8. Structural map of the reservoir top of the QaS-1 formation

Eastern deposit of the Hovsan field (area of wells 1856, 1855, 1845). It was penetrated by 28 wells, in which commercial oil inflows were obtained.

Effective thicknesses vary from 10.1 m. to 41.8 m, with oil saturated thicknesses ranging from 3.8 m to 30.6 m.

The northern boundary of the deposit is delineated along the contour of the proposed zone of reduced reservoir properties of the formation according to the map of temporary thicknesses between SH IV-III with a boundary value of 175 ms. The deposit boundary is delineated on the west by faults, and on the south by the outline of a lowered amplitude anomaly marked on the map of average RW III amplitudes.

The OWC is assumed to be at the top of the water-saturated reservoir in well 1810 at a.m. -4178 m.

The size of the deposit is 1.8 x 2.2 km, with an area of 2,871 thousand m^2. The deposit is combined, lithologically and tectonically shielded.

Deposit in the area of wells 1510, 1570. Revealed by WL results of wells 1510 and 1570, which are characterised as oil saturated. Effective thicknesses are 13.7 m and 15.5 m, accordingly, oil saturated thicknesses are 4.5 m and 7.0 m.

The deposit is delineated on the west by a fault, on the south by the contour of the paleo-uplift (200 ms).

The conditional OWC of the deposit is assumed to be at the top of the water-saturated reservoir of well 1570 at a.m. –3711.5 m.

The size of the deposit is 0.3 x 1.4 km, with an area of 345 thousand m^2.

Western deposit of the Hovsan field (area of wells 1714, 1509, 1706, 1716, 1588). It was penetrated by 26 wells, in which commercial hydrocarbon inflows were obtained. Effective thicknesses vary from 9.7 m to 29.5 m, oil saturated thicknesses vary from 3.0 m to 18.7 m.

The deposit is outlined by faults, anomalies of enhanced amplitudes (area of wells 1713, 1720), lowered values of

relative impedances (area of wells 1716, 1588), and in the south the boundary is carried out along the contour of the anomaly of lowered values of amplitudes.

The size of the deposit is 0.8 x 2.9 km, with an area of 1,619 thousand m^2.

The OWC is assumed to be at the top of a water-saturated reservoir in well 1501 at a.m. -3565 m. The deposit is lithologically and tectonically shielded.

Eastern deposit of the Zykh field (area of wells 253, 255, 164). It was penetrated by 54 wells with commercial hydrocarbon inflows obtained during testing.

Effective thicknesses are 8.3 m, 37.3 m, 53 m oil saturated varying from 4.5 m to 37.3 m.

The deposit expands to the north and is confined by faults to the west.

The size of the deposit is 1.0 x 5.5 kilometres, with an area of 4,170 thousand m^2.

The conditional OWC of the deposit is accepted at the bottom of the oil-saturated reservoir of well 153 at a.m. -2917.7 m. The deposit is tectonically shielded.

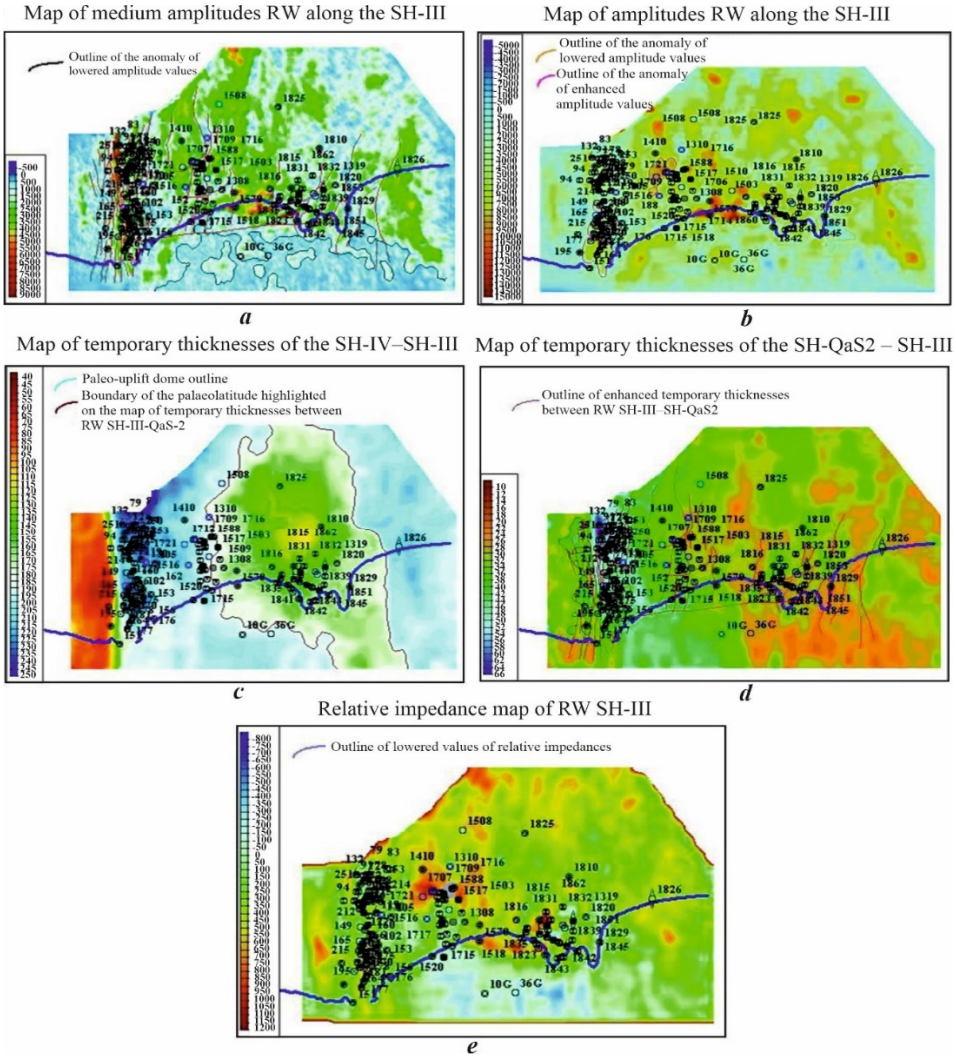

Fig. 9. Seismic and geological features of the QaS-1 formation:
a – Map of medium amplitudes RW along the SH-III; b – Map of amplitudes RW along the SH-III;
c – Map of temporary thicknesses of the SH-IV-SH-III; d – Map of temporary thicknesses of the SH-QaS2 – SH-III;
e – Relative impedance map of RW SH-III

Within the eastern deposit of the Zykh field, an enhanced anomaly is outlined on the RW III amplitude map.

In the western part of the Zykh field, the map of temporary thickness between SH III and QaS-2 shows an area of increasing thickness, along which a potential trap QaS-1 is mapped. Wells 94, 215 and 195 were penetrated. Oil, gas and water flows were obtained in the intervals 2649.6–2653.6 m and 2657.6–2660.6 m in well 195. Wells 94 and 215 are characterized as oil saturated according to WL data.

The dimensions of the trap are 1.0 x 3.6 km, with an area of 1,591 thousand m^2. The trap is lithologically and tectonically shielded.

Discussion and conclusions

On the basis of the joint analysis of time sections and constructed structural maps, maps of maximum amplitudes of RW SH-IIIa, medium amplitudes of RW SH-IIIa, instantaneous amplitudes of RW SH-IIIa, temporary thicknesses of SH-IIIa-SH-IV in the Zykh-Hovsan area, tectonic disturbances of submeridian and sublatitudinal direction were identified, deposits were revealed and their size, type and other characteristics were determined.

During the survey, 7 objects were outlined within the QaS-3 reservoir, 5 objects within QaS-2, and 6 objects within QaS-1.

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Combined, lithologically and tectonically shielded deposits were identified in the eastern part of the Hovsan field. In the western part of the Hovsan field, as well as in the eastern and western parts of the Zykh field, the trap type is lithologically and tectonically shielded.

In Qala deposits developed in the research area, the following were identified: one perspective trap in the QaS-3 formation, two traps in the QaS-2 formation and one trap in the QaS-1 formation at the Zykh field, which were identified on the basis of paleo-geomorphological features where it is suspected that the conditions for accumulation of sandy material are advantageous.

In our judgement, trap formation occurred within the southeastern and western slope parts of the paleostructure, where oil deposits of the Hovsan field were subsequently discovered.

Authors' contribution: Tofik Akhmedov – conceptualization, methodology, writing (original draft), formal analysis; Lala Khalilova – data validation, writing (review and editing).

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БУДОВА ТА ЛІТО-ФАЦІАЛЬНІ ОСОБЛИВОСТІ ВІДКЛАДІВ КАЛАКСЬКОЇ СВИТИ ЗИХ-ГОВСАНСЬКОЇ ПЛОЩІ ЗА 3D-ДАНИМИ СЕЙСМОРОЗВІДКИ ТА КАРОТАЖУ

Вступ. ***Детальне вивчення геологічної будови та літо-фаціальних особливостей відкладів пліоценової продуктивної серії на основі 3D-даних сейсморозвідки та каротажу свердловин має важливе практичне значення, оскільки основна частка вуглеводнів, що видобуваються в Азербайджані, припадає на ці родовища.***

Метою досліджень було виявлення особливостей геологічної будови Зих-Говсанської площі, вивчення літо-фаціальних властивостей відкладів калакської свити продуктивної серії на основі спільного аналізу 3D-даних сейсморозвідки та каротажу свердловин (WL).

Методи. ***Як основний метод дослідження обрано структурне картування за сейсмічними даними. Під час вивчення розрізу також проводили сейсмогеологічний, сейсмостратиграфічний і палеогеоморфологічний аналізи.***

Результати. ***За контуром аномалій знижених і підвищених значень середніх амплітуд відбитих хвиль сейсмічних горизонтів і картами часових потужностей, а в окремих випадках і за розломами, у різних частинах Зих-Говсанської площі визначено QaS-пласти й ідентифіковано родовища, з'ясовано їх розміри та площу. Для кожного покладу визначено ефективні та нафтонасичені товщі. За даними останнього інтервалу випробувань і перфорації в свердловинах, пробурених на досліджуваній території, а також за верхом водонасиченого пласта і за вибоєм нафтонасиченого пласта, встановлені абсолютні позначки нафто-водоконтакту виявлених родовищ. Характер насичення визначали за даними каротажу. У процесі дослідження також було встановлено тип кожного родовища.***

Висновки. ***У родовищах Qala, що розробляються на території досліджень, виявлено одну перспективну пастку в пласті QaS-3, дві пастки в пласті QaS-2 й одну пастку в пласті QaS-1 на родовищі Зих на основі палеогеоморфологічних особливостей, де можливо припустити, що умови для накопичення піщаного матеріалу сприятливі.***

Ключові слова: ***літо-фаціальні особливості, відклади калакської свити, родовище, колектор, ефективна товщина, нафтонасищена товща, 3D-сейсморозвідка, структурні карти.***

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