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FORECASTING OF PERSPECTIVE OBJECTS USING GEOPHYSICAL DATA ON THE PALEOZOIC COMPLEX OF WESTERN KAZAKHSTAN

Abstract. Clarification of the internal structure and the deep structure of the Paleozoic deposits of Western Kazakhstan, due to the emergence of new geophysical technologies to identify large promising search objects, acquire topical significance. New data on the south-eastern and eastern margins of the Pre-Caspian basin indicate the possibility of isolating large Paleozoic uplifts at the level of the Upper Devonian and Lower Carboniferous (there flecting horizon P_3). Large uplifts has of a supposedly structure are the massive character and tend to gravitate toward the inner side of the hollow. Inthesouth-east, there are the Guryev-Kulsarin zone and the Matken-Bikjalsky step while in the east of the basin there are the Borzher-Akzhar zone and the Shubarkuduk-Koskol step. The selection of objects of this category is associated with the features of the distribution of magnetic field anomalies, which are located in the contour of the region of its elevated values. In these conditions, an additional factor in matter of optimal delineation of objects of this type is the application of innovative technologies for processing and interpreting of the 2D and 3D seismic data. The substantiation of the forecast of development in the context of major uplifts in the relatively deep parts of the basin is given, in the long term, the important priority tasks of the exploration phase will be to bring the surveys in line with the geological exploration stage and adapt the strategy to the conditions of deep-lying promising zones and objects.

Key words: Paleozoic complex, Pre-Caspian basin, geophysical seismic survey, geological exploration, local features, eastern and south-eastern framing of the basin, sedimentation, oil and gas forecast, structure reflecting the horizon.

The hydrocarbon market of Western Kazakhstan is characterized by the presence of a large number of deposits with a significant period of operation. In these conditions, in order to maintain the planned level of production, it needs to expand prospecting surveys to prepare new large objects in the Paleozoic sediments in the forefront, which is associated with increased depths of occurrence (6.5–8.0 km). The replenishment of the resource base at the expense of large subsalt Paleozoic structures is now becoming important for the entire Pre-Caspian region (Mangyshlak Basin and the Pre-Caspian Basin). This is most relevant, first of all, in the south-eastern and eastern marginal sides of the Caspian basin, according to which new data have obtained in a number of publications recent years [1, 2].

On the side zones of the Pre-Caspian basin, large Paleozoic objects lie on more accessible depths for drilling, about 4.5–5.5 km (figure 1). Mostly are significant hydrocarbon deposits are confined to zones of predominantly carbonate sedimentation, forming high-amplitude structures as platforms and structures, such as Tengiz, Astrakhan, Karachaganak, Kashagan, Korolevskoe (figure 2). The large hydrocarbon deposits in the section of the eastern side (Zhanazhol, Kozhasai, Alibekmola, etc.) are confined to carbonate deposits of a somewhat different formational appearance, in which reservoirs for hydrocarbons of predominantly bedded massive type were developed and formed (figure 3).

The new data on the mode of occurrence of Paleozoic objects have been obtained along the south-eastern and eastern parts of the Pre-Caspian Basin since last few years. As the positive results of drilling

shows, along with the adjacent areas (Urikhtau, Alibekmola, Saztobinskaya group), large perspective objects can also be associated with the near-submerged (more "internal") areas of the sedimentation basin (Southeast Tasim, East Akzhar, Kuzbak, Biikzhal, South-West Ulkentobe, Yesekzhal, etc.). Similarly, data on the possible productivity of local uplifts in the Paleozoic were also obtained from the south-western border of the Pre-Caspian basin (Kobyakovskaya, Alga).

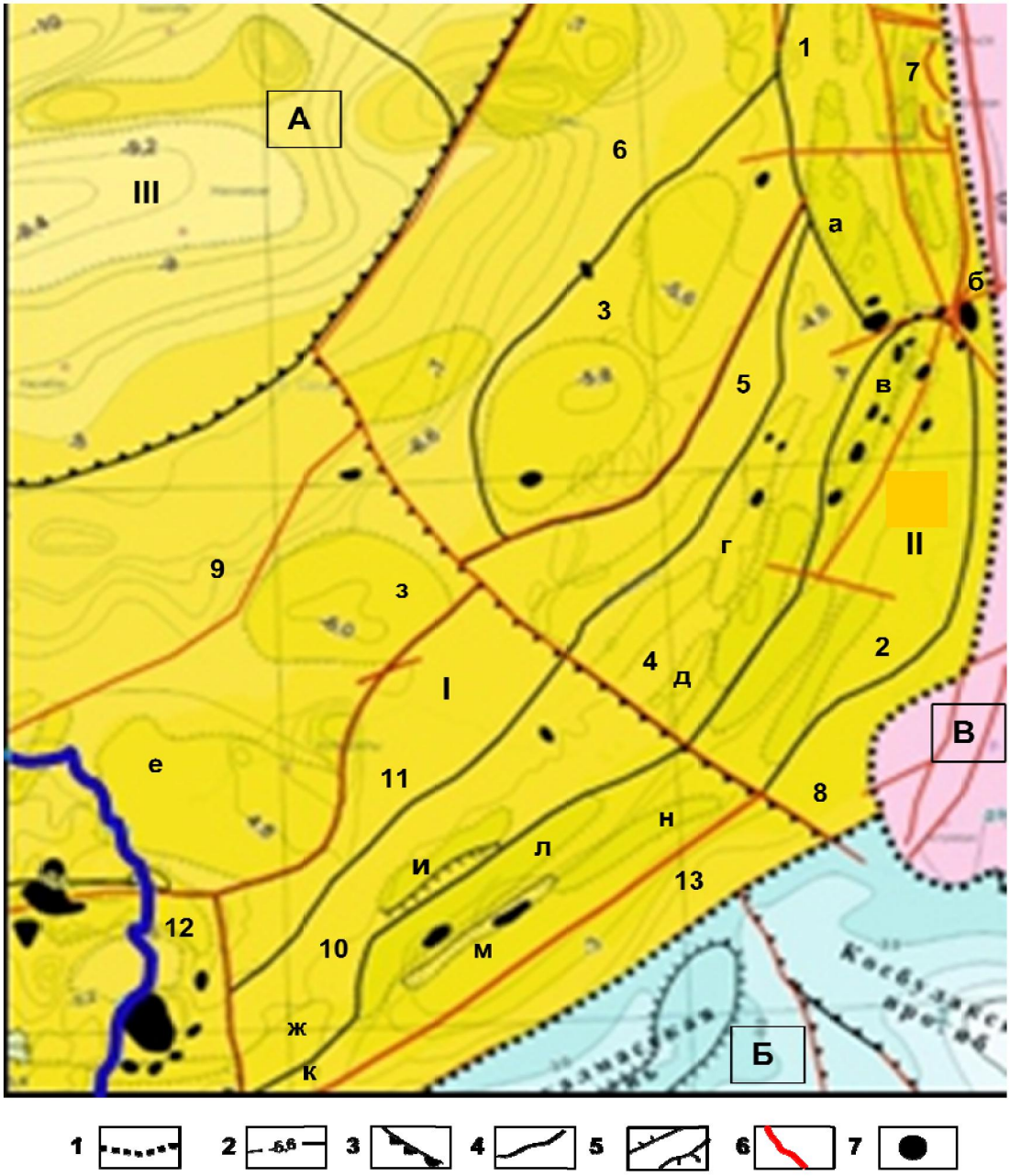

Figure 1 – East and South-eastern sides of the Pre-Caspian basin.
Tectonic scheme of the Paleozoic complex (according to Akchulakov U. A. et.al, 2012).

1. Geological structures of the I order: A – Pre-Caspian Basin, B – Ustyurt-Bozashi, C – Ural folded system; 2. Isohypses along the Paleozoic roof, km; 3. Contours of geological blocks and marginal zones of the Pre-Caspian basin: I – South-East, II – East, III – Central); 4. Elements of the II order: Eastern side (uplifts zones: 1 – Temir, 2 – Zhanazhol-Tortkol, 3 – Shubar-kuduk-Koskol steps, 4 – Borzher-Akzhar, 5 – Baiganinskaya, 6 – Yegendy-Sarykumak, deflections, 7 – Ostansuk, 8 – Teresken). Southeast side (steps: 9 – Guryev-Kulsary, 10 – Matken-Biikjal, 11 – Namaztakyr, 12 – Karaton-Tengiz uplifts zones, 13 – South Emba uplift). 5. Lower order structures: East side (shafts: a – Kenkiyak-Akkuduk, b – Alibekmola, c – Zhanazhol-Sinelnikov, d – Urikhtau-Kozhasai, e – Tuzkum). The south-eastern side (zones: f – Kulsary, g – Arman-Elemes, h – Saryniyaz uplift, shafts: i – Kumsheti, j – Saztobe, k – Sholkara-Ravnina, l – Tortay, m – Urtatau-Sarybulak). 6. Faults; 7. Hydrocarbon fields.

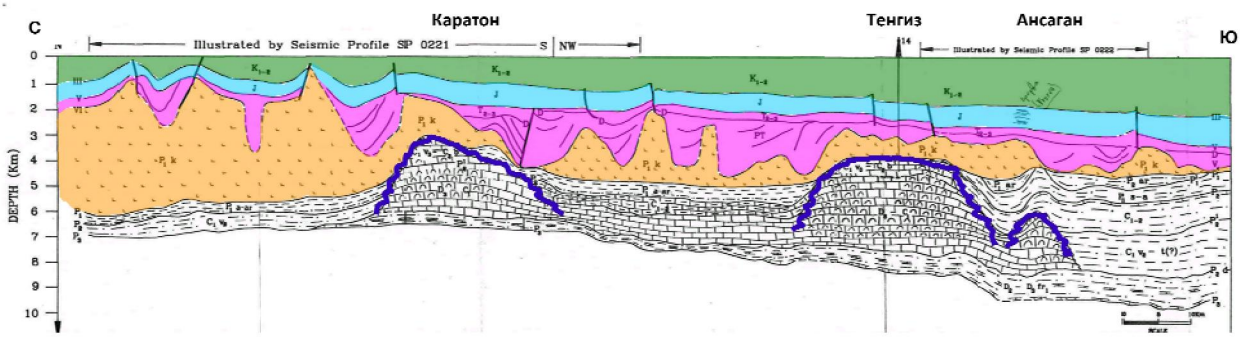

Figure 2 – South-east of the Pre-Caspian basin. Karaton-Tengiz carbonate platform

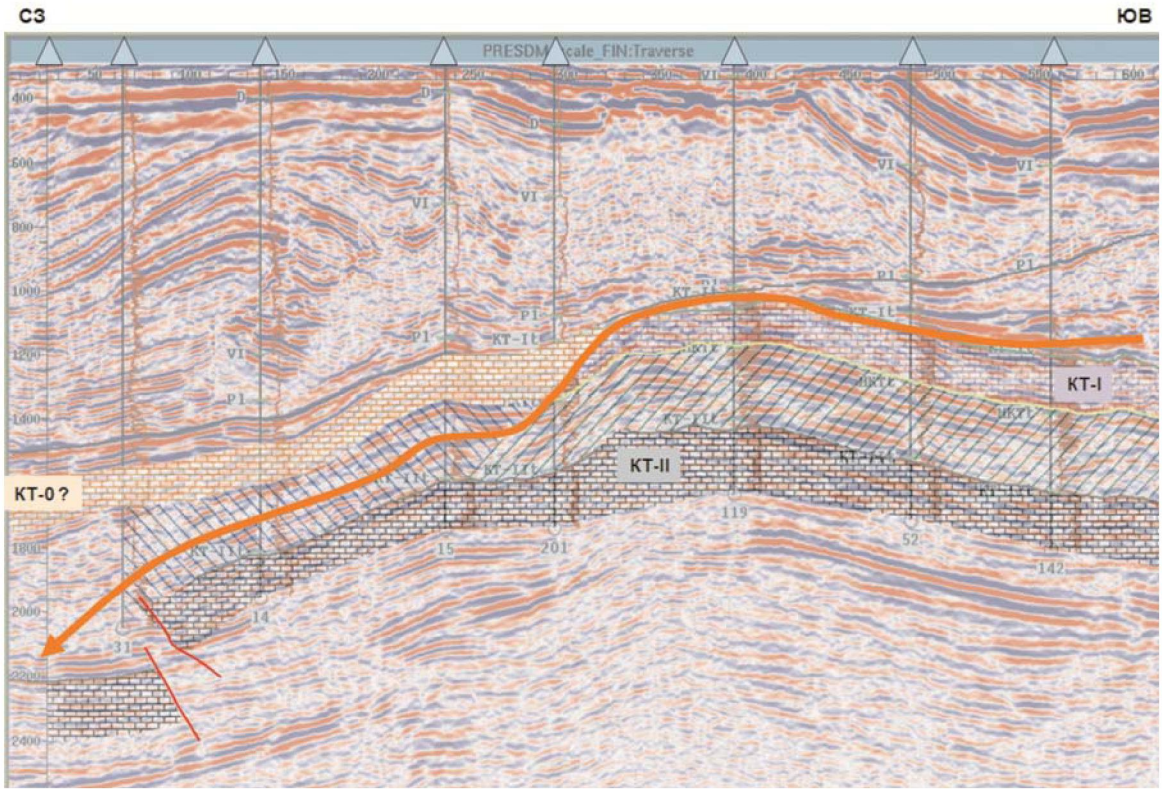

Figure 3 – Eastern side of the Pre-Caspian basin. Principal
Seismic-geological section and characteristics of carbonate strata KT-II and KT-I

Seismic structures and drilling data of a few wells indicate the connection of probable zones of oil and gas accumulation with large local objects as uplifts of the structural and consedimentary development. Major uplifts in the Paleozoic are formed under conditions of extending far to the central deep-water part of the basin of the continental slope. The range of the continental slope is determined by the character and features of the anomalous magnetic field. Thus, the region of development of anomalies with a high value of the magnetic field is associated with a giant “geomagnetic step”, a convex side faces to the southeast. Taking into account possible differences in the composition of the crust and basement, which are characterized by the corresponding behavior of the main magneto-active boundary in the section of the sedimentary cover, this region presumably indicates a relatively elevated position (up to 8.0 km) and the occurrence of the pre-Devonian complex and Devonian strata.

According to [2, 4], suggestion of an alternative option in determining the structural-tectonic and spatial confinement and the position of the continental slope, preference is given to the influence of sedimentation processes and the formation of the Astrakhan-Aktobe system of basement highs or the South Pre-Caspian arch.

A new view of the authors regarding the zones of development of the major Paleozoic uplifts, along with marginal part (traditional in this respect according to the estimates of previous years), is associated with the more submerged and deeply submerged adjacent areas of the sedimentation basin with the occurrence top mark of the Paleozoic sequence of about 7.0-8.0 km. At the same time, the authors assume that the priority perspective objects allocated in the internal more submerged areas of the Pre-Caspian basin are characterized mainly by the terrigenous and carbonate-terrigenous composition of the section with low, minimal or no hydrogen sulphide and elemental sulphur in the reservoir fluids [3]. It should also be noted that on the one hand, the forecasting of the oil-and-gascontent at large depths is associated with difficulties in the technical implementation of well wiring and, significant economic costs. On the other hand, the survey of Paleozoic deposits, lying at elevated depths, including in relatively more submerged basin areas, predetermines the most favourable conditions for occurrence, taking into account the possible scale and commercial characteristics of the hydrocarbon deposits, the ever increasing role as a reliable fluid insulator of the Kungurian salt formation.

The substantiated favourable prerequisites and opportunities for allocating large potential oil and gas bearing sites in the marginal and relatively submerged areas of the Pre-Caspian basin are significantly broaden, involving (along with technical support for drilling at elevated depths) methods of modern processing of seismic data and complexation technology with other types of geophysical surveys (gravity prospecting, electrical prospecting, magnetic prospecting, new methods of geophysical well logging). These new methods provide a more reasonable interpretation of geological and geophysical data with respect to the forecast of prospective horizons in great depths.

The main reliable information on the geological structure of deep-lying Paleozoic horizons is extracted from field seismic data. Among the field seismic method, in addition to the high-tech ground-based methods of 3D-CDP method, it should be noted the well-seismic survey of the VSP, MA-VSP (multi-azimuth and multi-level VSP), which give a more detailed seismic image in the wellbore space and below the bottom, drilled into Paleozoic deposits of single prospecting wells. Unfortunately, the solution of urgent survey problems of deep-lying Paleozoic horizons is restrained by the discrepancy between the parameters of field seismic observation systems [5].

In these conditions, the use of modern technologies for in-depth processing of existing 2D/3D seismic data obtained with relatively low density and limited observation base is becoming important. The quality of the zones seismic images with fragmentary and sporadic tracking of reflecting suprasalt and subsalt horizons is significantly improved in the sections and cubes obtained by the Multifocusing method (MF) and pre-stack depth migration technologies based on improved MF seismograms (figure 4) [5]. In this

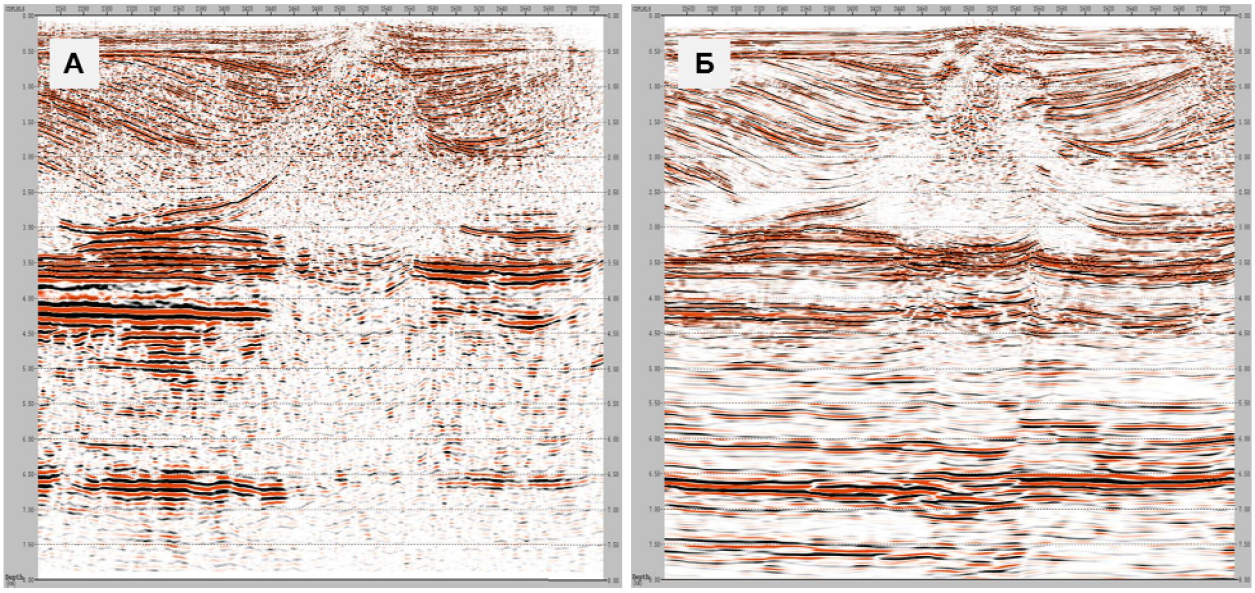

Figure 4 – Comparison of deep cubes:
a) PSDM standard processing, b) Multifocusing + PostSDM technique (example of a deposit on the Caspian Basin's eastern side)

case, the MF method provides the isolation of groups of energetically weak reflecting horizons which can be associated with large uplifts within the Devonian and Carboniferous sediments, as the earlier isolated Urikhtau uplift on the eastern edge of the Pre-Caspian basin. At the same time, the detail of the contours of these uplifts or objects of non-structural type provides additional opportunities for expanding the zone of exploratory surveys due to new local objects which have a probable development along the periphery or within the known Paleozoic uplifts (large in terms of area and thickness). The outline of the large Paleozoic structure of Urikhtau made it possible to identify and justify the prospects of the new Eastern Urikhtau and Northern Urikhtau objects, which are situated in plan between the earlier relatively well surveyed uplifts of Urikhtau and Zhanazhol, Urikhtau and Kozhasai, respectively (figure 1).

In the example of Alibekmola area it is shown that detailed work made it possible to identify a prospective deposit's part in the north of the structure (deposit has elongated structural configuration along the Paleozoic complex (figure 5). In fact, the Alibekmola uplift has a "squeezed" nature of the structure and contours in the plan. Thus, earlier in practice due to the lack of sufficient qualitative data on the structure of the uplift, part of the territory of the potential trap was "cut off" and remained out of sight of prospectors. The results of new seismic methods increase the detail of the geological structure study of the section as a whole and the productive strata, which allow us to more fully account for zones with additional reserves of industrial categories, which was demonstrated in recent years in assessing new prospects for Alibekmola uplift's oil- and-gaspotential.

Thus, on the basis of a comprehensive interpretation of regional 2D profiles and new 3D-CDP method seismic data on a number of large Paleozoic structures had been made significant adjustments and models of the internal structure. As a result, in the south in the interfluve of the Ural-Volga (Novobogatinsk, Sarayshik), in the south-east (Kyzylkuduk, Buyrgyn, Kirykmergen-Munayly North), in the east (Urikhtau) and in the north-east (Shirak, Koblandy) of the Pre-Caspian Basin the new data at organization of prospecting surveys allow to count on a favorable scenario and the possibility of detecting large-scale hydrocarbon deposits [1, 3]. At a number of sites in recent years, these forecasts on the oil-and-gas potential of the Paleozoic strata at depths of 5.5–7.5 km have been confirmed (Tasim Southeast, Ansagan, Urikhtau, Koblandy, Kobyakovskaya, Alga).

It should be specially noted that thanks to the cooperation efforts of several companies' to implement targeted programs in the areas and deposits of the eastern side of the Pre-Caspian basin, a number of unique technologies have been introduced that make it possible to significantly improve the quality of the forecast of the internal structure and oil-and-gas content of complex subsalt Paleozoic objects. The provision of auxiliary services and first of all seismic surveys in various modifications is a great accompaniment for great depths wells drilling. As an important factor it should be taken into account the well-developed infrastructure (proximity of pipelines and transport highways, objects of oil and gas real consumers) and the adequacy of qualified personnel in the region.

In the northern part of the Alibekmola area (the eastern side of the Pre-Caspian Basin), a number of wells did not provide tributaries corresponding to the project level. In this regard, in 2010-2012 JSC NC "KazMunaiGas" with the companies Schlumberger and Azimut for the first time in the CIS realized complex ground and borehole surveys in the region of the arrangement of 3 deep wells by the technology of multi-azimuth MA-VSP, AK (of increased penetration depth), 2D-MOGT (on 6 radial profiles). These surveys made it possible to explain the causes and more clearly delineating the zones of fracturing and loss of productionrate, to study the regularities in the distribution of reservoirs and the inter-carbonate thickness and the oil saturation of the KT-I and KT-II carbonate reservoirs sections, to survey the deep intervals of the Paleozoic section below the bottom-hole mark (figure 5).

On the Kozhasai deposit it also were obtained unique results on increasing the information content and resolution of the seismic signal using the latest software technologies on 3D survey materials [5]. By the way, the uniqueness of MF technology is visible not only in the expressiveness of the reflections from the roof of the salt dome and the adjacent Permian-Triassicsediments, but also in the subsalt complex including the dome zone. Usually these are mute areas due to the variety of disturbances in this zone. The diffractive MF method makes it possible to obtain, in addition to the expressiveness of the wave pattern, a clear correlation between the amplitudes of the diffraction anomalies directly with the hydrocarbons production rate in wells. It opens up new opportunities for the application of this technology in the developed fields for the forecast of production rates and monitoring the design parameters in subsequent development.

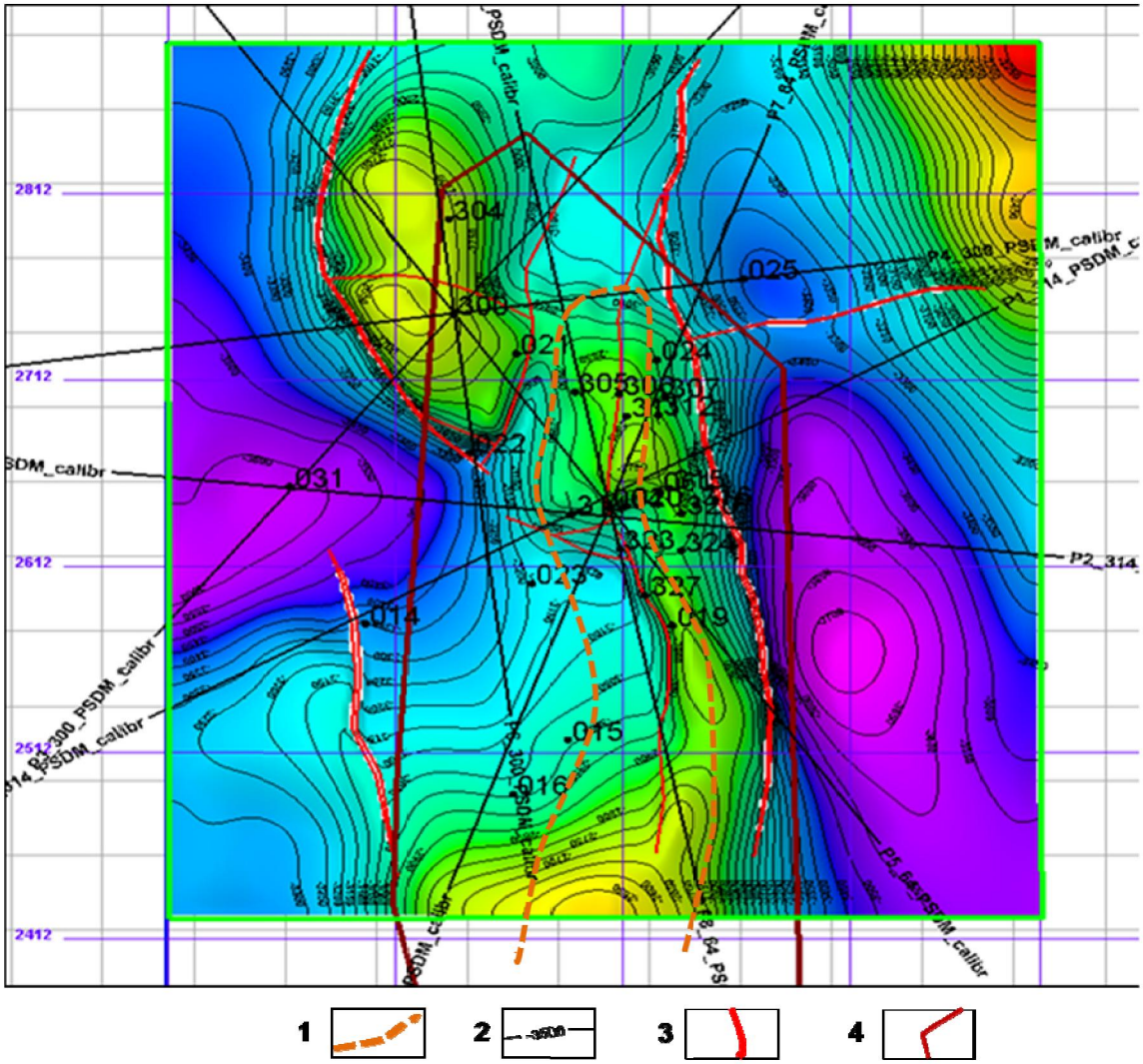

Figure 5 – Alibekmola area. Structural diagram of the roof KT-II of the unit
(according to the data of JSC NC "KazMunaiGas", 2011)

1. Zone of increased density of rock sfractures; 2. Isohyps on the roof CT-IIof the unit; 3. Tectonic faults; 4. Contours of the contract territory.

Based on the analysis of new data and results, the application of the latest technologies (in terms of "advanced" seismic survey methods) within the prospective areas and uplifts of the Zhanazhol-Tortkol zone is proposed. With this in mind, local facilities and areas on the eastern board in the future can be represented to an extent as landfills for the application of advanced methods and the latest seismic survey technologies in the rest of the prospective territory of the Pre-Caspian Basin.

In this regard, in the south-eastern adjacent zone the exploratory interest from the point of view of the ability to detect large deposits of reserves on the basis of the experience gained in the application of new technologies, is primarily acquired by the internal submerged areas of the sedimentation basin. The main part of the south-east relatively submerged territory is represented by the Matken-Biikzhal tectonic step (figure 1). On the roof of the subsalt Paleozoic (RH P_1), this step stands out in the depth interval of 3.4-5.6 km. Estimating the degree of perspective of this step should be noted that its exploratory maturity in comparison with its south-east areas is somewhat lower.

To the north-west of the Matken-Biikjal step is associated with the Namaztakyr step. On the further farther north along the Paleozoic roof it is recorded a weak regional upward movement in the direction of the Guriev-Kulsary regional step (figure 1). Nearly all the major in recent years discovered Paleozoic uplifts are associated with these regional elements of the second order, in which the Upper Devonian-Lower Carboniferous part of the section is emphasized in evaluating the prospects.

It should be noted detail some features of this type of objects' structure. Local objects (uplifts) within the considered territory generally differ in large sizes, high amplitude and, presumably, to a greater extent, the consedimental nature of development (figure 6). The authors tend to attribute the allocated part of the south-eastern edging to the region of the continental slope of the paleo-basin. Throughout its entirety, the conditions for the formation of deposits contributed to the formation of large local structures - uplifts along the Devonian and Lower Carboniferous (Kyzylkuduk, Buyrgyn, Kuzbak, Tasym Southeast, Esek-zhal, Kyrykmergen - Munayly North, Ulkentobe Southwest, etc.). By analogy with this, on the eastern side in the advanced part of the sedimentation basin the forecast of major structural uplifts is associated with the Shubarkuduk-Koskol zone (Shilikty) and the Borzher-Akzhar step (Akzhar Eastern-Kursay).

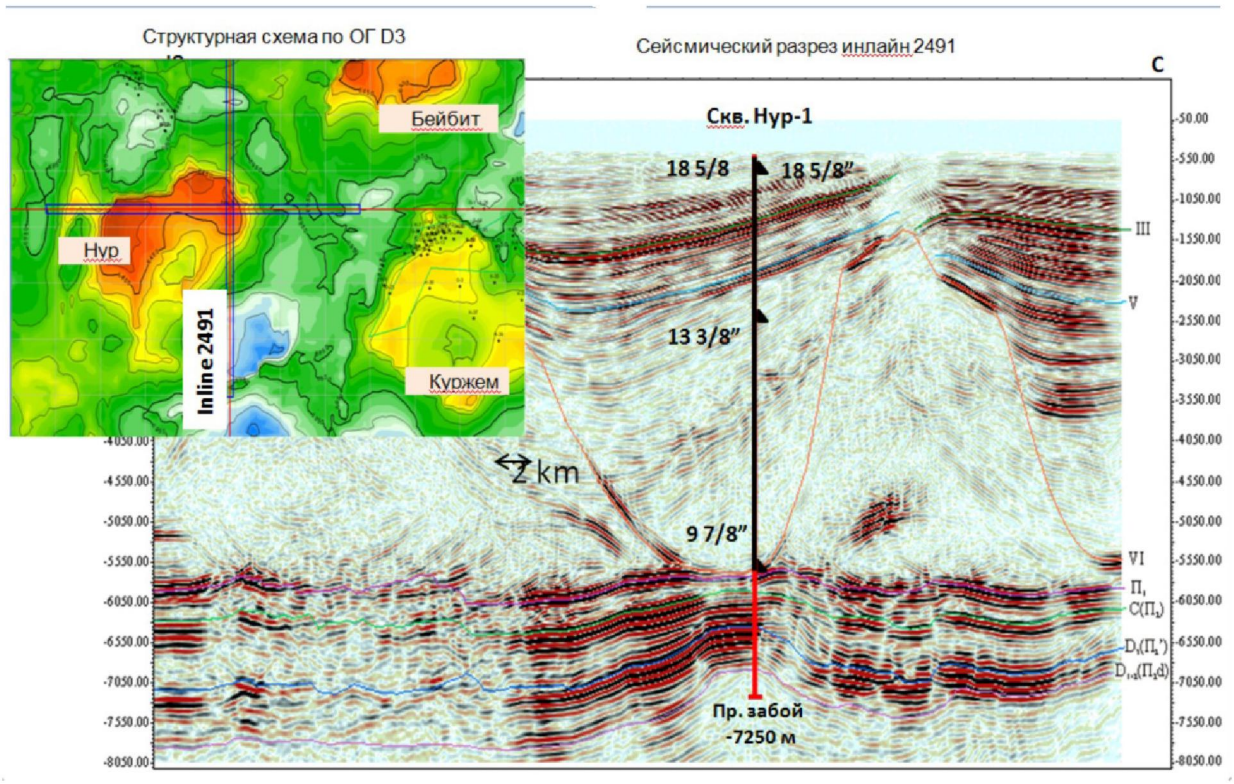

Figure 6 – Guryev-Kulsary tectonic step. Kuzbak uplift
(according to the data of LLP "Samek International", 2013)

The analysis of the spread features of magnetic field anomalies shows the general characteristics of the structure and composition of the pre-Devonian complex and Devonian deposits in the section of these large elements of the second order. The isolation of the Matken-Biikzhal step is seenin the analysis and tracing the lithic-facies conditions of the Lower Permian sedimentation step (Assel-Sakmar). On this development fragment the step was characterized by a more intensive sedimentation. The deposition of sediments in North-west of the Namaztakyr and Guryevo-Kulsarinskiy zones in the Assel-Sakmar period was weakened or intermittent. At the regional level the Matken-Bшikzhal step continues alongside to the north-easterly direction and on the east side the Borzher-Akzhar step is its structural continuation (figu-re 1). In the direction to the south-west the Matken-Biikzhal and Namaztakyr steps are structurally "resting" on the Karaton shaft (Karaton-Tengiz uplift zones). This transition is fixed by changing the "calm" occurrence and the structural plan to a more contrasting character. And in the direction to the Karaton-Tengiz uplift zone the territory has a sharp hypsometric rise.

To the south-east the main large structural elements in the zone of more active folded and faulted tectonics are the Elemes-Arman uplifts zone, Kumshet shaft (-3.7-4.8 km). To the south it is stacked out a series of contrastingly distinct long anticlines, structural shafts (Sholkara-Ravninniy, Tortaisky and Saztobinskiy shafts) defining simultaneously the isohypes thickening band along the subsalt reflecting surfaces, which directly marks the "transition" in the south-east to the South Emba Paleozoic uplift (figure 1).

Taking into account the found structural and lithic-facies differentiation of the concerned territory as well as new drilling data obtained from the relatively advanced interior part of the south-east of the Pre-Caspian Basin, below it will be mentioned important features of the structure of the Paleozoic stratum and its oil-and-gas potential.

– The Paleozoic section has a distinct three-membered structure, up-section are terrigenous lower carbon (C_1v_{1-2}-s), carbonate-terrigenous deposits of the Middle Carboniferous-Upper-Moscow-Moscow age (C_1v-C_2m) and the terrigenous fragment of the Lower Permian (P_1as-s).

– In a relatively advanced part of the basin in a number of well sinareas of Ulkentobein South-West,Karashungyl, Matken, Esekzal the oil inflows were previously obtained in Middle Carboniferous sediments (C_1v_3-C_2m). These inflows often had a pulsating character. In the areas of Biikzhal and Tortay the hydrocarbons inflows were also obtained in the Lower Carboniferous sediments.

– In South-east in the strip of relatively elevated bedding of the Paleozoic roof (Elemes-Arman zone, Kumshetinskiy, Sholkara-Ravninniy and Tortay shafts), the oil-and-gas potential in the Paleozoic complex is more closely related to the Lower Permian terrigenous deposits of the detrital cone and Paleontological flows (P_1ar), and also the sulfate-terrigenous unit of the Philippine horizon (P_1k). In the end, despite the lack of a "perfect"exploration methodology, in the early stage of study in the Carboniferous two small depositswith limited reservoir (Ravninniy, Tortay) of the subsalt complex in the south-east were discovered.

– The deposits and oil-and-gas show are confined to certain stratigraphic intervals of the section (Matken-Biikzhal step), which accordingly determines some common regional patterns in the spatial location of hydrocarbon deposits.

– The structural plan of local uplifts generally at the level of seismic horizons P_{21}, P_2, P_1has an inherited character without significant fluctuations in the thicknesses of seismic complex itiesen closed between the reflecting boundaries. In given depths for a seismic signal (no more than 4.4–5.0 km) previously general reference points for prospecting survey were set, which were adjusted depending on several factors (i.e. the quality of structural formations, the foundation state of the more prepared structures and etc.). As a consequence, the seismic pattern of the lower Terrigenous complex lying below the boundary of P_{21} remained as not completely clear.

– The picture of the structural plan representation for the lower part of the subsalt section (Devonian - Lower Carboniferous) has noticeably improved. According to the results of research in recent years (by JSC Kazakhstankaspiyshelf in 2005-2006, LLP OilGeoconsulting in 2007-2008), the reflecting horizon P_3 (bottom of the Upper Devonian?) corresponds to this interval of the section. A rather differentiated character of the structural plan and a relatively more contrasting character of the reflection on the structural basis of local upliftsare noted in a number of regions.

In contrast, the pattern of the structural plan and local uplifts along the lower subsalt seismic horizons in the section is more seen in the northern and north-eastern parts of the Matken-Biikjal step. The Kulsary uplifts zone corresponding to the southern part of the Guryev-Kulsary regional step (U. A. Akchulakov et.al, 2012) [1] is stacked out. Uplifts within mentioned structural zone are characterized in general by large sizes, significant amplitude and contrast development, especially at the level of horizon P_3. The main features of local objects in this regard are the buried character and the gradual smoothing of their development upwards along the section. In the relief of the reflecting boundary P_1 they are fixed less contrast. An important factor in forecasting the prospects on large uplifts in the intra-basin part of the territory is their association with inter-dome zones in the plan, which was confirmed by the results of the area seismic interpretation of the Kyrykmergen-Munayly North and Kuzbak major uplifts and points to a fairly high level of assumptions'objectivity (Eskozha, Voronov, 2008) [4]. At the same time, the contrasting character of the structure along the lower Devonian-Lower Carboniferous interval of the section is quite typical, and the "lock" of the structure is occurred at the level of the reflecting horizon P_3 (figure 6).

In assessing and substantiating the high prospects of large structural uplifts in the Devonian Carbon, along with the tectonic criterion, the role of the litho-facies criterion is also dominant. Deep-lying local structural objects were formed in a condition of predominantly terrigenous and carbonate-terrigenous sedimentation. High values of filtration and capacitance properties were provided by the occurrence of fracture tectonics and the development of fracturing processes, the activity of paleo-channel systems and deep-sea detrital cones, which cause the lenticular character of the traps in some places, as well as paleo-

flows. The positive results and nature of hydrocarbon occurrence on Ulkentobe South-West, Esekzhal, Karashungyl, Matken, Biikzhal uplifts confirm these conclusions and assumptions.

In this, the role and new capabilities of seismic methods of data processing and interpretation are significant, allowing to substantiate and consider the identified large Paleozoic uplifts on a higher qualitative level. In practical terms, the possibilities of new methods have been successfully tested in the preparation and justification of the typical Paleozoic uplifts of Kuzbak (Nur-Kurzhem-Beybit), Kyzylkuduk, Buyrgyn, Kyrykmergen-Munayly North etc.

Conclusions.

1. The conditions of formation and sedimentation in the Paleozoic complex of the internal, relatively submerged part in the Pre-Caspian basin's south-east (Matken-Biikjal, Namaztakyr, Guryev-Kulsary zone) and east (Borzher-Akzhar and Yegendy-Sarykumak steps, Shubarkuduk-Koskol zone) contributethe formation of major uplifts which have massive consediment ativenature of development. The new technologies of seismic processing and interpretation give expectation significantly improving the survey degree of the Paleozoic deposits deep-lying complex and the forecasting of perspective local structures and objects.

2. For an optimal survey of deep horizons structure in the Paleozoic scientific research institutes should develop and implement with oil companies a clear phasing of geological exploration and a strategy for adapting to the conditions of deep-lying persperctive zones of technological seismic methods, both at the stage of field research and at the stage of processing primary data.

3. A detailed comprehensive analysis of geological and geophysical data should be the basis for improving the technology of prospecting and improving the efficiency of oil exploration in Western Kazakhstan as a whole.

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ГЕОФИЗИКАЛЫҚ ДЕРЕКТЕР БОЙЫНША БАТЫС ҚАЗАҚСТАННЫҢ ПАЛЕОЗОЙЛЫҚ КЕШЕНІНДЕ ПЕРСПЕКТИКАЛЫҚ ОБЪЕКТІЛЕРДІ БОЛЖАУ

Аннотация. Ірі перспективалық іздестіру объектілерін анықтаудың жаңа геологиялық-геофизикалық деректері мен технологияларының пайда болуына байланысты палеозой шөгінділерінің ішкі құрылысы мен терең құрылымын нақтылаудың өзекті маңызы бар. Каспий маңындағы бассейнді оңтүстік-шығыс және шығыс жиектеуі бойынша жаңа деректер үстіңгі девон және астыңғы карбон (ПЗ көкжиегін көрсететін) деңгейінде ірі палеозойлық көтеруді бөлудің мүмкіндіктері туралы куәландырады. Ірі көтерілулер құрылымдық жаппай сипатта жиектеудің ішкі тереңдетілген бөлігіне заңды түрде болжалды тартылады. Оңтүстік-шығыста – бұл Гурьев-Құлсары аймағы және Мәткен-Биікжал деңгейі, бассейннің шығысында - Боржер-Ақжар аймағы және Шұбарқұдық-Қоскөл деңгейі. Осындай санаттағы объектілерді бөлу магнитті өрістің ауытқуларын бөлу ерекшеліктерімен байланыстырылады, бұл тұрғыда оның жоғарылатылған мәндері облыстың сызығында бар. Бұл жағдайда, осындай түрдегі объектілердің оңтайлы кескіндеу мәселелеріндегі қосымша фактор 2Д және 3Д (МФ, дифракциялық МФ, көп азимуталды ВСП және енудің жоғарылатылған тереңдігінің АК) сейсмикалық деректерін өңдеу және түсіндірудің инновациялық технологияларын қолдану болып табылады. Бассейн жиектеуінің тереңдетілген бөліктеріне қатысті ірі көтерілулер бөлінісінде даму

болжамының негіздемесі беріледі, келешекте іздестіру кезеңінің маңызды басым міндеттері тереңде жатқан перспективалық аймақтар мен объектілердің шарттарына іздеу стратегиясын бейімдеу және геологиялық барлау жұмыстарының кезеңділігіне сәйкес зерттеулерді келтіру болып табылады.

Түйін сөздер: ұңғыма, палеозойлық кешен, Каспий маңындағы бассейн, геофизикалық сейсмикалық зерттеулер, геологиялық барлау жұмыстарды, жергілікті объекті, бассейнді шығыс және оңтүстік-шығыс жиектеу, шөгінді жиналуы, мұнайгаздылық болжамы, құрылым, деңгейжиегін көрсетуші және т.б.

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ПРОГНОЗИРОВАНИЕ ПЕРСПЕКТИВНЫХ ОБЪЕКТОВ В ПАЛЕОЗОЙСКОМ КОМПЛЕКСЕ ЗАПАДНОГО КАЗАХСТАНА ПО ГЕОФИЗИЧЕСКИМ ДАННЫМ

Аннотация. Уточнение внутреннего строения и глубинной структуры палеозойских отложений, в связи с появлением новых геолого-геофизических данных и технологий выявления крупных перспективных поисковых объектов приобретают актуальное значение. Новые данные по юго-восточному и восточному обрамлению Прикаспийского бассейна свидетельствуют о возможностях выделения крупных палеозойских поднятий на уровне верхнего девона и нижнего карбона (отражающий горизонт $П_3$). Крупные поднятия предположительно, структурного массивного характера закономерно тяготеют к глубинной внутренней части обрамления. На юго-востоке – это Гурьевско-Кульсаринская зона и Маткен-Биикжальская ступень, на востоке бассейна – Боржер-Акжарская зона и Шубаркудук-Коскольская ступень. Выделение объектов такой категории увязывается с особенностями распределения аномалий магнитного поля, которые в плане располагаются в контуре области его повышенных значений. В этих условиях, дополнительным фактором в вопросах оптимального оконтуривания объектов данного типа, является применение инновационных технологий обработки и интерпретации сейсмических данных 2Д и 3Д (МФ, дифракционный МФ, многоазимутальное ВСП и АК повышенной глубины проникновения). Дается обоснование прогноза развития в разрезе крупных поднятий в относительно глубинных частях обрамлений бассейна, в перспективе важными приоритетными задачами поискового этапа будут являться приведение исследований в соответствии с этапностью геологоразведочных работ и адаптации стратегии поисков к условиям глубоко залегающих перспективных зон и объектов.

Ключевые слова: скважина, палеозойский комплекс, Прикаспийский бассейн, геофизические сейсмические исследования, геологоразведочные работы, локальный объект, восточное и юго-восточное обрамление бассейна, осадконакопление, прогноз нефтегазоносности, структура, отражающий горизонт и др.

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