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CORRELATION OF THE STRUCTURAL ELEMENTS OF MAJOR GEOSTUCTURES OF NORTH USTYURT REGION

Abstract. According to the results of research in the Ustyurt region by the nature of correlation the surface of the basement and paleozoic, the bottom of the Jurassic and Cretaceous sediments are divided into three groups of geostructures.

The first group of geostructures included mobile fold systems and "mobile corners", in which the correlation coefficients are weak, either do not appear at all (South Emba uplift, Aral-Kyzylkum arch, Central Ustyurt dislocation system, Mountain Mangyshlak).

Second group forms internal mobile elements, isolated as large positive structures characterized by extremely high values of correlation coefficients by surface of the basement and paleozoic, the bottom of the Jurassic and Cretaceous sediments, (Buzachi uplift, Aktumsuk high, Kuanish-Koskala arch, Baychagyr-Yarkimbay high).

The third group of geostructures forms tectonic elements of the inner areas of the North Ustyurt region (North Ustyurt depression systems, Chelkar and Barsakelmess depressions), characterized by prolonged and inherited subsidence in the Phanerozoic and high correlation surface of the basement and Paleozoic, the bottom of the Jurassic and Cretaceous sediments.

Key words: North Ustyurt, basement, paleozoic, jurassic, cretaceous, correlation coefficient.

Statement of the problem and a retrospective analysis. Studies on the geological structure of the North Ustyurt basin by seismic methods and drilling began in the middle of the 20th century and conducted by various organizations of Kazakhstan, Uzbekistan, Turkmenistan, Russia. Since the 2000s – by foreign oil companies.

The first information about the geology of North Ustyurt was obtained in the early 50s after SRM (Seismic Reflection Method) and CRM (Correlation Refraction Method). According to the results of the interpretation of the data obtained, old ones were clarified and new structural elements were identified, mapped tectonic zoning of the cover and basement.

By the end of the 60s by Turlan Geophysical Expedition were performed CRM regional works, aimed at studying lower horizons of the sedimentary cover and the surface of the consolidated crust. These works allowed to determine the regional structure and the character of changes in the Paleozoic-Triassic sediments and to execute grounding by actual data, first conclusions about the structure of the basement of the Ustyurt region.

70s and 80s of the last century characterized by a significant increase in the volume of geological and geophysical works, by intense accumulation of structure data, material composition and stratigraphy of the Meso-Cenozoic and Paleozoic-Triassic sediments. During this period, regional and CDPM (Common Depth Point Method) search profiles were worked out.

By the mid-1990s, almost in the entire territory of North Ustyurt (in the Kazakh part) the development of a regional network of seismic profiles by the CRM and CDP methods was completed; a large amount of prospecting and detailed seismic works by CDP method was carried out to identify and prepare local structures in the Jurassic-Paleogene section of the sedimentary cover section.

In the eastern part of North Ustyurt, near the border with Uzbekistan, the search seismic prospecting CDPM works by MSUP was performed (with USA funding).

According to the Samsk trough, including its northern side, obtained new additional information about the geological structure. Pre-Jurassic sediments of this trough are classified as unpromising. It was concluded that the Paleozoic sediments could be a source of hydrocarbons for Jurassic sediments.

More informative material, by resolution, during seismic surveys obtained in 1995-2002, these studies were carried out by foreign investment with the most modern equipment. These areas are developed by CDPM- 2D Japanese National Petroleum Company (JNPC) and located on the northwest coast of the Aral Sea (1995-1997), in the Aral Sea (2000-2001), on the area "Teresken" in the junction zone of the Caspian Basin and Ustyurt (1997-1998) and on Kaidak litter (1999-2000).

According to the results of seismic researches and involving data on geophysical potential fields, main features of the Ustyurt tectonics were established, mapped tectonic zoning of the cover and basement and identified areas promising for oil and gas, characterized basement sediments.

Great contribution to the knowledge of the geology and petroleum potential of the North Ustyurt made articles and monographs of A. Bakirov, R. Sapozhnikov, V. Bykadorov, N. Kunin, Yu. Volozh, Z. Bulekbayev, A. Akramkhodzhayev, R. Gareckiy, R. Bykov, V.Gavrilov, I. Dalyan, N. Kalinin, L. Kirukhin, V. Knyazev, S. Ozdoyev, A. Abetov, V. Lipatova, Yu. Vasilyev, I. Grinberg, G. Dikenshtein, B. Dyakov, N. Nevolin, Ya. Ogorodnikov, V. Shraibman, A.Yanshin and et al.

However, quantitative correlation analysis of the main geological boundaries of the sedimentary cover and consolidated crust has not yet been performed. In order to study the structural features and relationships of the structural surfaces in the COSCAD 3D software package, the correlation coefficient (complete spectral correlation analysis of geodata) of a series of structural maps was calculated: by the surface of the basement, Paleozoic, pre-Jurassic surface and Cretaceous base of the North Ustyurt region.

It should be noted, what COSCAD 3D software package provides an opportunity to conduct a full spectral correlation and statistical analysis of geodata and was developed at the Moscow State Geological Prospecting University by supervision of doctors of physical and mathematical sciences, professors A. Nikitin and A. Petrov.

These studies were carried out on the basis of data of the Institute of Geological Sciences named after K.I. Satpayev (A. Abdulin, E. Votsalevsky, S. Daukeev, 1997), which were converted to digital format using software tools Didger, Surfer, ArcGIS, Geosoft.

In the geological structure of the North Ustyurt region stand out stable lumps, which include its internal regions and large linearly extended mobile belts (South Emba uplift, Aral-Kyzylkum arch, Central Ustyurt dislocation system, Mountain Mangyshlak), located in peripheral areas and in the interior “mobile corners” of this region [1].

The results of correlation analyses of the main section of the North-Ustyurt region.

Central Ustyurt dislocation system. Clearly expressed linear structure, stretched in a west-north-west direction and complicated by arch highs and depressions of higher orders [2].

In the central part of these dislocation systems, the surface of the consolidated basement lies at depths of 4.0 – 6.0 km (figure 1). The surface of the Paleozoic, the bottom of the Jurassic and the Cretaceous lie here conformally to the basement and with some variations are identified at depth intervals 2.5 – 3.5 km (Paleozoic surface), 1.8 – 2.0 km (bottom of the Jurassic sediments) and 1.2 – 1.6 km (bottom of the Cretaceous sediments).

The correlation coefficient between the basement and the surface of the Paleozoic everywhere gets high values (to 0.8 – 0.9) (figure 2).

On the surface of the basement and the bottom of the Jurassic formations in the western part of the Central Ustyurt dislocation system antiformal occurrence observed with a correlation coefficient – 0.4-0.6, on the rest of this large geostructure, high values of the correlation of the basement surface and the bottom of the Jurassic up to 0.8 are recorded (figure 2).

A similar pattern is observed on the surface of the basement and the bottom of the Cretaceous formations. In the western part of the Central Ustyurt dislocation system revealed negative values of correlation coefficient (up to – 0.4). The rest of this geostructure the values of the correlation coefficient increase to 0.7 (figure 2).

Buzachi uplift. It stands out in the western corner of North Ustyurt and has a continuation in the waters of the Caspian Sea.

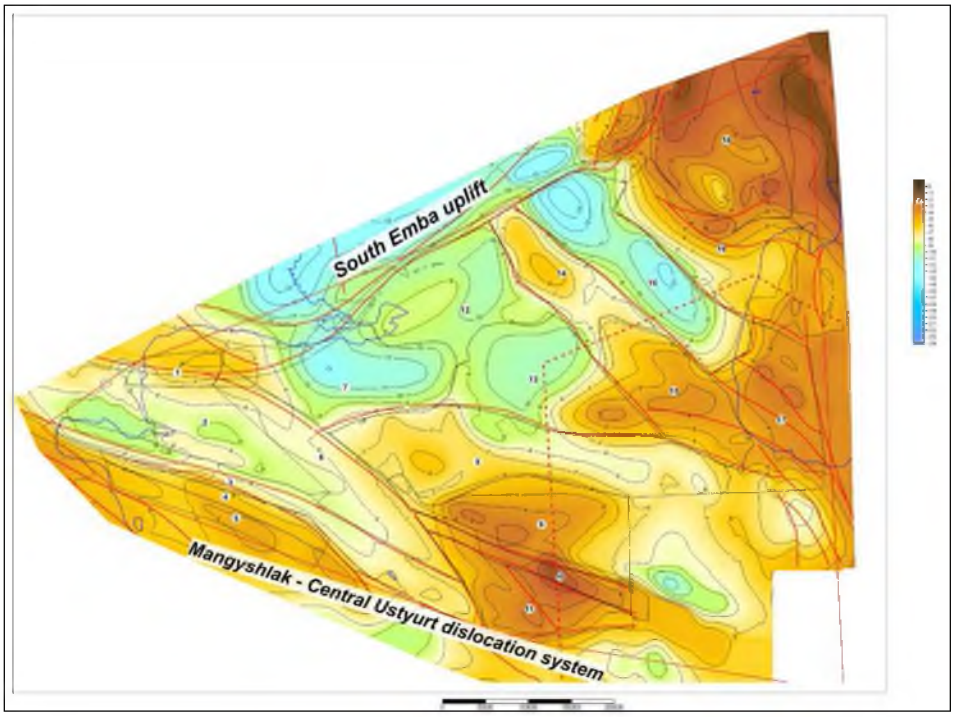

Figure 1 – Map of basement surface. *Legend:* Tectonic elements (by basement surface): 1 – Buzachi uplift; 2 – North Karatau system; 3 – Tyubkaragan-Karatau meganticlinal; 4 – Chakirgan deflection; 5 – Beke-Bashkuduk meganticlinal; 6 – Kizan-Tokubay uplift; 7 – Kultuk depression; 8 – Barsakelmess depression; 9 – Baychagyr high; 10 – Karabaur meganticlinal; 11 – Central Ustyurt system; 12 – Zhayilgan uplift; 13 – Sams depression; 14 – Amanzhol-Sheluran high; 15 – Aktumsuk uplift; 16 – Kosbulak depression; 17 – Aral-Kyzylkum system; 18 – Chelkar depression; 19 – Akkul high

In the North-West of the Buzachi uplift the surface of the basement is traced at depths about 6.0-7.0 km, submerged up to 8.0 km in the southern and eastern directions (figure 1).

In hypsometrically elevated areas of this uplift the basement is weakly correlated with the surface of the Paleozoic formations (0.2), whereas this coefficient increases in a southerly direction to 0.6 (figure 2).

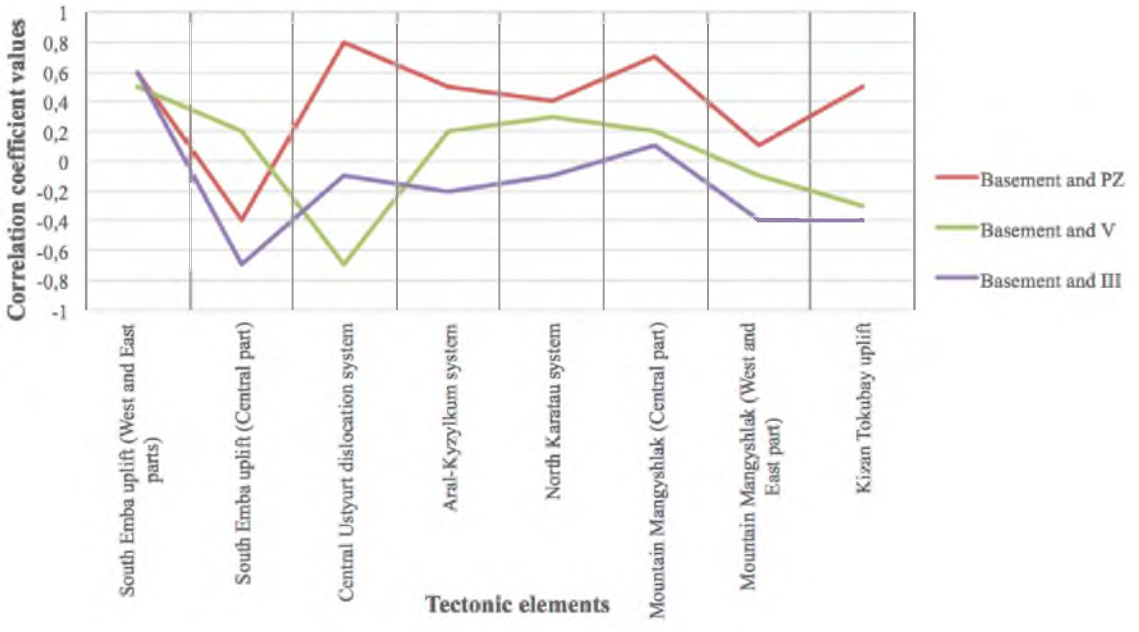

Figure 2 – Graph of average values of the correlation coefficients of the «mobile corners» of the North Ustyurt region

Paleozoic sediment complexes are widely developed here. In the arch of the Buzachi uplift, the surface of the Paleozoic formations lies at depths of up to 2.5 km and more, plunging to 6.5–7.0 km on the southern and eastern pericline of this uplift.

The bottom of the Jurassic sediments stands out at depths of up to 0.6 km in the North-West part of the Buzachi uplift, submerged to south and east to 1.6 km. The depth range of the bottom of the Cretaceous formations varies within 0.6 – 1.2 km.

There is a good correlation between the bottom of the Jurassic and Cretaceous sediments with the basement surface (0.6 – 0.7) (figure 3).

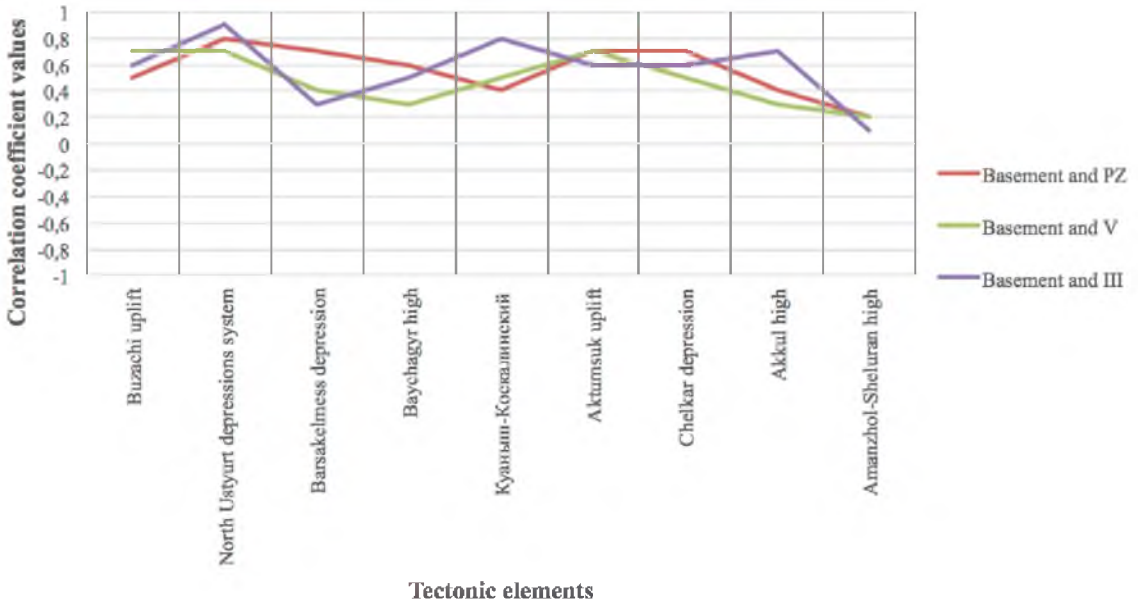

Figure 3 – Graph of average values of the correlation coefficients of the internal ares of the North Ustyurt region

Mountain Mangyshlak. Formed along the Scythian-Turanian planetary lineament [3]. The depth of the basement here is sustained everywhere and takes values of 6.0 – 7.0 km (including North Karatau and Chakirgan troughs) (figure 1). The elevations of Mountain Mangyshlak are separated in the form of narrow (about 20 km) and extended (up to several hundred km) elevations — meganticlines [4].

The surface of the Paleozoic Mountain Mangyshlak is separated at depths of 3.0 – 4.5 km and more.

The correlation coefficients of the basement and the surface of the Paleozoic take minimum values (from 0.1 to -0.6) on the northwestern and southeastern flanks. In the central part of the Mountain Mangyshlak, the basement and surface of the Paleozoic lies conformally with a high correlation coefficient (up to 0.8) (figure 2).

In the relief of the bottom of the Jurassic sediments, Mountain Mangyshlak is isolated in the form of elevation in absolute elevations -1.6 – 2.0 km. The correlation coefficients of the basement and the bottom of the Jurassic sediments are distributed in a similar way. The lack of correlation of these boundaries is observed in the north-western and south-eastern parts (-0.3 – 0.1), whereas in the rest of the Mountain Mangyshlak their weak correlation is recorded (0.2 – 0.4) (figure 2).

On the bottom of the Cretaceous sediments, the eastern part of Mountain Mangyshlak is raised to 0 km, with immersion in a north-west direction to 2.0 km.

The bottom of the Cretaceous formations lies non-conformally with the above-described interfaces and is characterized by the absence of correlation, values of which reach here extremely high values (up to -0.9) (figure 2), which, in turn, gives grounds to assume a significant restructuring of the structural plan on the border of the Jurassic and the Cretaceous.

South Emba uplift. Splits the Caspian depression and the North Ustyurt massif and in the form of a narrow inversion structure extends in the northeast direction [5].

In the axial part of the South Emba uplift, the surface of the basement is submerged to 12.0- 13.0 km, whereas on the northern and southern flanks of this uplift it is raised to depths of 9.0 – 10.0 km and less (figure 1).

In the relief of the surface of Paleozoic formations, the South Emba uplift is isolated in the form of a large anticlinorium with a depth of surface of the Paleozoic formation of 1.5–4.5 km, in separate areas, up to 0.5 km.

The surface of the basement and Paleozoic deposits almost the entire territory of South Emba uplift occur antiformally and do not correlate among themselves (-0.4 – 0.1) (figure 2).

The depth of the bottom of the Jurassic sediments South Emba uplift can be divided into three areas. The most curved position of the bottom of the Jurassic formations was recorded in the central part of the South Emba uplift (3.0 – 3.2 km). From here it rises to 0.6 – 2.0 km on its south-western flank and up to 1.2 – 1.6 km, respectively, on the northeastern flank.

The surface of the basement with the bottom of the Jurassic sediments is correlated by positive values of the coefficient (up to 0.7), having only in the central part the reduction of this coefficient to 0.1, which indicates a weakening of the correlation of the basement surface and the bottom of the Jurassic sediments (figure 2).

The bottom of the Cretaceous sediments has a similar pattern in depth. In the southwestern part of the South Emba uplift, it occupies a hypsometrically elevated position of up to 0.6 km. In the north - eastern part it takes an intermediate position and in the central part is submerged to 1.4 – 1.8 km.

Aral-Kyzylkum tectonic rampart (dislocation system). On the surface of the basement, it manifests itself as a large polygonal array with the depth of the basement up to 6.0 km (figure 1).

In the relief of the surface of the Paleozoic in most of its stretch Aral-Kyzylkum arch shows itself as an uplift with an unclearly pronounced linear form and the depth of submergence of this surface to 4.5 – 5.0 km.

There is a confident correlation between the surfaces of the basement and the Paleozoic (0.5 – 0.7), decreasing to 0.1 in the southeast of this shaft (figure 2).

The bottom of the Jurassic sediments lies in the anti-formal underlying sediments and has a deepening trend in a westerly direction from 1.8 to 3.4 km. The Aral-Kyzylkum arch in the relief of this surface acquires a clearly expressed linear shape. The correlation coefficients of the basement with the bottom of the Jurassic formations vary in the range 0.1 – 0.6 (figure 2).

A close tendency is manifested in the behavior of the surface of the Cretaceous sediments of the Aral-Kyzylkum arch, which also deepens in a westerly direction from 1.6 to 2.4 km.

The basement with the bottom of the Cretaceous sediments practically does not correlate (to -0.1-0.4). And only, on separate squares on the western and eastern flanks of the Aral-Kyzylkum arch, the values of this coefficient increase to 0.5 (figure 2).

Aktumsuk dislocation system and Kuanish-Koskala tectonic rampart on the surface of the basement are separated at depths of 5.0 – 7.0 km (figure 1).

In the relief of the surface of the Paleozoic, they manifest themselves as elevations with hypsometric values of depth within 3.5 – 4.0 km. In the central part of the Kuanysh-Koskala tectonic rampart, the surface of Paleozoic formations is up to 5.0 km.

The correlation coefficient between the surfaces of the basement and the Paleozoic takes on quite high values (up to 0.6 – 0.8). In the central part of Kuanysh-Koskala arch, a decrease in the correlation of these interfaces to 0.1 (figure 3).

On the bottom of the Jurassic, Aktumsuk shaft is an uplift, which stands apart in a depth range of 2.2 – 2.6 km. The Kuanysh-Koskala arch is notable for stable depths of the bottom of the Jurassic sediments (2.0 to 2.4 km).

High correlation links are established for the Aktumsuk dislocation system (up to 0.7) between the surface of the basement and the bottom of the Jurassic deposits. On Kuanysh-Koskala arch, the values of the correlation coefficient are reduced to 0.5 (figure 3).

On the bottom of the Cretaceous sediments Aktumsuk dislocation system is isolated at depths of 1.6 – 1.8 km, Kuanysh-Koskala arch at 1.8 – 2.0 km. The correlation coefficient reaches extremely high values (0.7 – 0.8) (figure 3).

Chelkar depression. Located on the northeastern flank of the North-Ustyurt region. The sides of this trough are complicated by uplifts, groups of structures, structural terraces, anticlines and brachyanticlines [6].

In most of the depression, the depth of the basement is set in the range of 2.0 – 3.0 km. Two troughs are distinguished in the depression: Kurgantuz and Arradung. The Kurgantuz trough has a simple structure and a basement depth of up to 4.0 km. Arradung - characterized by a complex internal structure. The basement surface is submerged here to a depth of 6.0 km (figure 1) [2].

On the surface of the Paleozoic, the Chelkar depression is separated by isogypsy -1.5 – 2.0 km. In the Arradung trough, its depth is set to 5.0 km. In the Kurgantuz trough to 3.5 km.

The basement and surface of the Paleozoic in the Chelkar depression lies conformally with a high correlation coefficient (0.6 – 0.8) (figure 3).

In the relief of the bottom of the Jurassic sediments in the side zones of the Chelkar depression, the desired surface stands out at depths of 1.0 – 1.4 km. In the depot centers of this trough, it deepens to 4.0 km in the Arradung trough and to 2.4 – 2.6 km of the Kurgantuz trough.

The correlation of the basement with the bottom of the Jurassic formations in the Chelkar trough decreases to 0.4 – 0.7 (figure 3).

The bottom of the Cretaceous sediments of the Chelkar trough separates at depths 0.8-1.2 km. Submerged to 2.8 km in Arradung trough. There is a high correlation between the bottom of the Cretaceous sediments and the basement (0.6 – 0.8) (figure 3).

Barsakelmess depression. On the surface of the basement is a difficult - built asymmetric structure with steep north and northeast (8.0 – 9.0 km) and gentle south-west (6.0 – 7.0 km) sides (figure 1) [7].

On the surface of the Paleozoic, there is a trend of submergence in the north direction from 4.0 to 6.5 km. Correlation coefficients reach extremely high values 0.8 – 0.9 (figure 3).

In the relief of the bottom of the Jurassic sediments, most of the Barsakelmess depression is isolated in the form of depression, oriented in the north - east (3.0 – 3.6 km) direction, whereas in the western, lateral part, there is uplift of the bottom of the Jurassic sediments (2.4 km).

In most parts of the Barsakelmess depression, high values of the correlation coefficients of the basement and the bottom of the Jurassic sediments are recorded (0.6- 0.8). Exceptions are its western and southeastern parts, where these boundaries are not correlated (correlation coefficients are reduced to - 0.4-0.1) (figure 3).

The trend of deepening in the north-east direction is also observed on the bottom of the Cretaceous sediments (1.8 – 2.4 km). The values of the correlation coefficient between the basement and the Cretaceous bottom in the inner regions of the deflection reach here extremely high values (to 0.8 – 0.9), dropping to -0.2 in the western and southeastern parts (figure 3).

Baichagyr-Yarkimbay arch. Large positive element, bounding Barsakelmes trough from the west and having a massive configuration and slight development of structural complications in the sedimentary cover [6].

In most of this arch, the surface of the basement submerged to north from 4.0 to 6.0 km (figure 1).

In the relief of the surface of the Paleozoic formations, the Baychagyr-Yarkimbai arch is isolated at depths 3.0 – 3.5 km.

The surface of the basement and Paleozoic sediments over almost the entire territory of this arch lie conformally and correlate well with the values of the correlation coefficients 0.6 – 0.8 (figure 3).

The bottom of the Jurassic deposits of the Baychagyr-Yarkimbay arch is uplift in the northeast direction from 2.2 to 3.0 km.

The high correlation of the basement with the bottom of the Jurassic sediments is established (to 0.7 – 0.8). And, only, in the western part of the Baichagyr-Yarkimbay arch, a decrease in the correlation of these surfaces to 0.1 (figure 3).

The bottom of the Cretaceous sediments has a similar correlation trend with the basement surface. It occupies a hypsometrically elevated position in the southwestern part of the Baychagyr-Yarkimbai arch (to 1.2 km), in the northeast, up to 1.8 km. The correlation coefficient here gets high values (to 0.6 – 0.8) and only, on the northeast flank of this arch, the values of this coefficient are reduced to -0.1 (figure 3).

North Ustyurt depressions system formed by the Sam and Kosbulak troughs and the Kultuk depression. This depression system is characterized by deep basement submergence (up to 10.0 – 12.0 km and more) (figure 1) [7; 13-20].

To the south, by the complex system of large-amplitude faults, the surface of the bottom rises sharply

to a depth of 7.0 – 8.0 km in Kyzan-Tokubay uplift and up to 6.0 – 7.0 km of the Aktumsuk dislocation system.

To the north, in the relief of the basement surface of this system of depressions, there is no physical boundary with the South Emba uplift (12.0 – 13.0 km) (figure 1).

In the surface relief of the Paleozoic deposits, the Kosbulak and Sam troughs are isolated at depths 5.5 – 6.5 km and 6.5 – 7.5 km, respectively, and the Kultuk depression to 7.0 – 8.0 km.

In the North Ustyurt depressions system, in North Ustyurt depressions system exhibits high values of correlation coefficient basement surface and Paleozoic (to 0.8), which decreases to the border with the South Emba uplift to 0.1 (figure 3).

The bottom of the Jurassic sediments over most of the North Ustyurt depressions system are separated at depths of 3.6 – 4.2 km. The correlation coefficient between the basement surface and the bottom of the Jurassic sediments acquire high values (to 0.7), in some places reaching a maximum (0.9) (figure 3).

In the relief of the Cretaceous bottom, this system of deflections is separated at depths 1.8 – 3.0 km. There are high values of correlation coefficients to 0.8 – 0.9 (figure 3).

Conclusion. Conducted studies to identify correlations of structural elements within major geostructures of the North Ustyurt region give grounds for the formulation of the following conclusions:

In linearly extended mobile systems and mobile corners, the correlation of the basement surface and Paleozoic formations, the bottom of the Jurassic and Cretaceous sediments are weak, or not at all. Here, these interfaces often lie antiformally.

For example, the Aral-Kyzylkum system of uplifts in the surface structure of the basement and Paleozoic manifests itself as an arch, whereas in the structure of the Jurassic and Cretaceous sediment complexes it is isolated as a submerged depression.

The South Emba uplift in the sediments of the Upper Paleozoic and Mesozoic-Cenozoic deposits is arch, whereas in the relief of the basement surface it manifests itself as a deep trough.

The conformal occurrence of the surface of the basement and the Paleozoic and the bottom of the Jurassic deposits in the form of highs identified in the Central Ustyurt dislocation system, the central part of the Mountain Mangyshlak. The bottom of Cretaceous sediments is not correlated or weakly correlated with the above boundaries.

The exceptions are the Buzachi arch, Aktumsuk swell, Kuanish-Koskala tectonic rampart and Baichagyr-Yarkimbay arch, characterized by extremely high values of correlation coefficients, manifest themselves as large positive structures along all analyzed interfaces.

In the interior of the North Ustyurt region (North Ustyurt depressions system, Chelkar and Barsakelmess depression), characterized by prolonged and inherited subsidence in the Phanerozoic, observed the curved position of the surface of the basement and the Paleozoic, bottom of the Jurassic and Cretaceous with high values of the correlation coefficient.

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СОЛТҮСТІК ҮСТІРТ ӨҢІРІНІҢ ІРІ ГЕОҚҰРЫЛЫМДАРЫНЫҢ ҚҰРЫЛЫМДЫҚ ЭЛЕМЕНТТЕРІНІҢ КОРРЕЛЯЦИЯСЫ

Аннотация. Жұмыста бұрын жүргізілген шөгінді жамылғының және шогырланған жер қыртысының негізгі геологиялық шекараларын сандық корреляциялық талдау нәтижелері келтірілген. COSCAD 3D багдарламалық пакетіндегі құрылымдық беткейлердің құрылымдық ерекшеліктері мен қатынастарын зерттеу үшін бірқатар құрылымдық карталардағы корреляция коэффициенті (спектрлік корреляциялық талдау) есептелді: іргетас беті, палеозой, юрага дейінгі беткей, Солтүстік Үстірт аймағының бор негізі.

COSCAD 3D бағдарламалық пакеті геодатаға толық спектрлік-корреляциялық және статистикалық талдау жүргізуге мүмкіндік береді және Мәскеу мемлекеттік геологиялық барлау университетінде физика-математика ғылымдарының докторлары, профессор А.А. Никитин және А.В. Петров жетекшілігімен жасалған.

Солтүстік Үстірт аймағының ғеолоғиялық құрылымында перифериялық аймақтар мен құрлықта орналасқан ішкі аймақтарды және ірі сызықты созылған жылжымалы аймақтарды (Орталық Үстірттің дислокация жүйесі, Таулы Маңғышлақ, Оңтүстік Ембі көтерілісі және Арал Қызылқұм валдары) қамтитын тұрақты блоктар бөлінеді. Осы аймақтың «жылжымалы бұрыштары».

Орындалған зерттеу нәтижелері бойынша Үстірт өңірінде жоғарғы ірғетас және палеозой, юра және бор табандарының корреляция мәніне байланысты үш ғеоструктуралық топ бөлінеді.

Бірінші ғеоструктуралық топқа жылжымалы қатпарлы жүйе және «мобильді бұрыштар» кіреді, жоғарыда айтылған шектерде корреляция коэффициенті әлсіз танылады немесе мүлдем танылмайды (Оңтүстік Ембі көтерілімі, Арал-Қызылқұм белесі, Орталық Үстірт дислокация жүйесі, Таулы Манғышлақ). Мысалы, Арал-Қызылқұм жүйесі жоғарғы және төменгі жақтардың бәріне көтеріліп, өзін көтерілім ретінде көрсетті, ал юра және бор кешендері құрылымында тау асты депрессиясы ретінде оқшауланған.

Ірғетас пен палеозойдың беткейлері мен юра түбінің шығыңқы түрінде конформды түрде пайда болуы Таулы Маңғышлақтың орталық бөлігіндегі орталықтанған жүйесінде анықталды. Бор шөгінділерінің табаны жоғарыда аталғандармен байланыстырылмаған немесе нашар байланысқан.

Мысалы, Арал-Қызылқұм жүйесі ірғетас пен палеозойдың құрылымындағы көтерілістер жүйесі пандус түрінде көрінеді, ал юра және бор кезеңіндегі тау жыныстарының кешендерінің құрылымында ол жерасты депрессиясы ретінде бөлінеді.

Жоғарғы палеозой және мезозой-кайнозой шөгінділерінің құрылымындағы Оңтүстік Ембі көтерілісі - бұл қорған, ал жертөле бетінің рельефінде ол терең құлату ретінде көрінеді.

Екінші топ – ішкі мобильді топты құрайды, ірі оңтайлы құрылымдар болып жекеленетін және ірғетас бетінің палеозоймен, юра және бор шөгінділерімен корреляция коэффициентінің экстремалды жоғары мәндерімен сипатталады (Бұзащы төбесі, Ақтұмсық көтерілімі, Қуаныш-Қосқала белесі, Байшағыр-Яркымбай төбесі).

Жер асты және палеозой бетінің және юра шөгінділерінің шығыңқы түрінде конформды кездесуі Орталық Үстірт дислокация жүйесінде, Таулы Маңғышлақтың орталық бөлігінде анықталды. Бор қабаттарының табаны жоғарыда аталған интерфейстермен байланыстырылмаған немесе нашар байланысқан.

Бұзащы, Ақтұмсық көтерілісі, Қуаныш-Косқала шыңы және Байшағыр-Яркимбай арка ерекшеліктері корреляция коэффициенттерінің өте жоғары мәндерімен сипатталады, барлық талданған аудандарда үлкен позитивті құрылымдар ретінде көрінеді.

Үшінші ғеоструктуралық топты Солтүстік Үстірт өңірінің ішкі ауданының тектоникалық элементтері құрайды (Солтүстік Үстірт иілім жүйесі, Шалқар және Барсакелмес депрессиялары), ұзақ және мұралы иілумен және ең көп ірғетас бетінің палеозой, юра және бор шөгінділері корреляциясымен сипатталады.

Солтүстік Үстірт аймағының ішкі аймақтарында (Солтүстік Үстірт депрессия жүйесі, Шалқар және Барсакелмес ойпаттары) олар фенерозойда ұзақ және мұраланған ауытқумен сипатталады, ірғетаспен қисық орналасуы және корреляция коэффициентінің жоғары мәндері бар палеозой, юра және бор табандары байқалады.

Түйін сөздер: Солтүстік Үстірт, ірғетас, палеозой, юра, бор, корреляция коэффициенті.

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КОРРЕЛЯЦИЯ СТРУКТУРНЫХ ЭЛЕМЕНТОВ КРУПНЫХ ГЕОСТРУКТУР СЕВЕРО-УСТЮРТСКОГО РЕГИОНА

Аннотация. В работе отображены результаты количественного корреляционного анализа основных ғеолоғических границ осадочного чехла и консолидированной коры. В целях изучения структурных особенностей и взаимоотношений структурных поверхностей в программном комплексе COSCAD 3D рассчитаны коэффициент корреляции (полный спектрально-корреляционный анализ ғеоданных) серии структурных карт: по поверхности фундамента, палеозоя, доюрской поверхности, подошве мела Северо-Устюртской реғиона.

Программный комплекс COSCAD 3D дает возможность провести полный спектрально-корреляционный и статистический анализ ғеоданных и был разработан в Московском Государственном ғеолоғоразведочном Университете под руководством докторов физико-математических наук, профессоров А.А. Никитина и А.В. Петрова.

В геологическом строении Северо-Устюртского региона выделяются стабильные глыбы, к которым относятся его внутренние районы и крупные линейно-вытянутые мобильные пояса (Центрально-Устюртская система дислокаций, Горный Мангышлак, Южно-Эмбенское поднятие и Арало Кызылкумский вал), расположенные в периферийных зонах и внутренних «мобильных углах» этого региона.

По результатам выполненных исследований в Устюртском регионе, по характеру коррелируемости поверхности фундамента и палеозоя подошвы юрских и меловых отложений выделены в три группы геоструктур.

В первую группу геоструктур вошли подвижные складчатые системы и «мобильные углы», в которых коэффициенты корреляции вышеуказанных границ проявляются слабо либо не проявляются вовсе (Южно-Эмбенское поднятие, Арало-Кызылкумский вал, Центрально-Устюртская система дислокации, Горный Мангышлак). К примеру, Арало-Кызылкумская система поднятий в структуре поверхностей фундамента и палеозоя проявляет себя как вал, тогда как в строении юрских и меловых комплексов пород обособляется как погруженная депрессия.

В линейно-вытянутых подвижных системах и мобильных углах коррелируемость поверхности фундамента и палеозойских образований, подошвы юрских и меловых отложений проявляется слабо либо не проявляется вовсе. Здесь эти границы раздела зачастую залегают антиформно.

К примеру, Арало-Кызылкумская система поднятий в структуре поверхностей фундамента и палеозоя проявляет себя как вал, тогда как в строении юрских и меловых комплексов пород обособляется как погруженная депрессия.

Южно-Эмбенское поднятие в структуре отложений верхнего палеозоя и мезозоя-кайнозоя представляет собой вал, тогда как в рельефе поверхности фундамента проявляет себя как глубокий прогиб.

Вторую группу формируют внутренние мобильные группы, обособляющиеся как крупные положительные структуры, характеризующиеся экстремально высокими значениями коэффициентов корреляции по поверхности фундамента и палеозоя, подошвы юрских и меловых отложений, (Бузачинский выступ, Актумсукское поднятие, Куаныш-Коскалинский вал, Байчагыр-Яркимбайский свод).

Конформное залегание поверхности фундамента и палеозоя и подошвы юрских отложений в виде выступов выявлено в Центрально-Устюртской системе дислокаций, центральной части Горного Мангышлака. Подошва меловых отложений не коррелируется или слабо коррелируется с вышеописанными границами раздела.

Исключение составляют Бузачинский выступ, Актумсукское поднятие, Куаныш-Коскалинский вал и Байчагыр-Яркимбайский свод, характеризующиеся экстремально высокими значениями коэффициентов корреляции, проявляют себя как крупные положительные структуры по всем анализируемым границам раздела.

Третью группу геоструктур образуют тектонические элементы внутренних районов Северо-Устюртского региона (Северо-Устюртская система прогибов, Челкарская и Барсакельмесская депрессии), характеризующиеся длительным и унаследованным прогибанием в фанерозое и высокой коррелируемостью поверхности фундамента и палеозоя, подошвы юры и мела.

Во внутренних районах Северо-Устюртского региона (Северо-Устюртская система прогибов, Челкарская и Барсакельмесская депрессии), характеризуются длительным и унаследованным прогибанием в фанерозое, наблюдаются прогнутое положение поверхности фундамента и палеозоя, подошвы юры и мела с высокими значениями коэффициента корреляции.

Ключевые слова: Северный Устюрт, фундамент, поверхность палеозоя, подошва юры, подошва мела, коэффициент корреляции.

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