ISSN: 2350-0328

International Journal of Advanced Research in Science, Engineering and Technology

Vol. 7, Issue 1 , January 2020

Modern Engineering-Geological Processes and Phenomena in Kashkadarya and Surkhandarya Depresses

Irgashev Y.I., Isomatov Y.P., Mustafaev B.N., Pulatov K.K.

Professor, Institute of Geology and Exploration of Oil and Gas Deposits, Uzbekistan;
Associate Professor, Almalyk Branch of the Islam Karimov Tashkent State Technical University, Uzbekistan;
Assistant, Associate Professor, Almalyk Branch of the Islam Karimov Tashkent State Technical University, Uzbekistan;
Associate Professor, Tashkent Institute of Architecture and Construction, Uzbekistan

ABSTRACT: The article provides an overview of the existing basic natural and technogenic processes and phenomena in the developed irrigated territories and industrial zones of some cities within the Kashkadarya and Surkhandarya economic regions. Based on the qualitative and quantitative analysis, an attempt was made to establish the influence of human activities on the geological environment and the development of dangerous geological engineering and geological processes in this regard. Typical examples of flooding of irrigation territories and cities, processing of riverbanks, development of ravines under the influence of mudflows and waste irrigation water, development and operation of structures, subsidence deformations as a result of moistening of loess rocks have been carried out, and fundamental recommendations have been made to reduce their intensity. The classification of geological and engineering-geological processes and phenomena that occur during the economic development of the territory of the Kashkadarya and Surkhandarya basins is given.

KEY WORDS: Geomorphology, distribution, modern tectonic movement, textural characteristic, structural characteristic, irrigation regime, groundwater

I.INTRODUCTION

A complex of modern exogenous geological processes and phenomena, developments within the Kashkadarya and Surkhandarya basin, which had a huge impact on the formation of its geological conditions, and promoting their active change in the present, is quite extensive. It includes a variety of endogenous and exogenous processes, different types vyvetrivaniya rocks, plane wash, ovragoopasnym, undermining and collapse of river banks, slopes of channels, sewers and drains, mudflows, landslides, scree, Osowa, suffusion, the formation of takyrs with Lonchakov, natural subsidence of loess rocks, Aeolian movement of rock etc. the Development of some processes leads to a sharp change of ruggedness of the terrain, the other– on the contrary, smoothing of the rough terrain, the third – to a radical change in the status and properties of rocks, or even the engineering-geological conditions; they are all, without exception, complicate the development of the territory.

The nature and intensity of modern exogenous geological processes is determined, it is known that complex natural environment: geomorphological structure of the territory (difficulties of the terrain, the steepness and exposure of slopes, the ratio of absolute and relative heights, widths and heights of terraced surfaces, etc.), geological structure (distribution, condition, abundance, power, lithology, structural and textural characteristics of rocks, etc.), tectonic regime (intensity of the process of raising and lowering), climatic and hydrogeological characteristics, and physiographic setting.

In the conditions of the Kashkadarya and Surkhan-Darya valleys, where almost 87% of the country is composed of rocks with no hard links, the current state of which is considerably unequal in different parts of the region, the development and activity of these processes is determined primarily by the nature of the direction and intensity of modern tectonic movements, osvoennosti irrigation, irrigation regime, of podtoplentsy, circulation of underground waters, etc.

The patterns of spread and development of modern exogenous geological processes and phenomena within the South-West of Uzbekistan is considered in G. A. Mavlyanova, A. I. Ismailov, M. Z. Nazarov, R. A. Niyazov, M. S.

ISSN: 2350-0328

International Journal of Advanced Research in Science, Engineering and Technology

Vol. 7, Issue 1 , January 2020

Shermatova, M. A. Khudaybergenov, V. I. Presnukhin, martemyanova, N. P. Kostenko, O. K. chedia, E. V. Mavlyanov, E. B. Kadyrov, K. P. Pulatov , I. Irgashev, J. P. Ismatov, M. F. Achilova, R. Espaeva etc.

II.METHODOLOGY

The material presented in these works suggests that the above-mentioned processes and phenomena have significant different areal transmission for different conditions complicate the construction and operation of engineering structures. Some of them, for example, weathering, landslides, avalanches, Osowa and others developed in the mountainous area of the region; others, natural drawdown, suffusion, the gully formation along, undermining of river banks, canals, reservoirs, drains and Piedmont zones; third, waterlogging, swamping, secondary salinization of soils, Aeolian movement of rock etc. are observed in the plain spaces. Analysis of their distribution indicates that the modern geological processes and phenomena in different parts of Kashkadarya and Surkhandarya depression is a very peculiar and considerably uneven, and in General logical changes from mountains to plain [1]. It should be noted that this article discussed and studied the nature of the manifestation and development of some modern geological processes and phenomena.

Weathering. Within the studied region is the physical, chemical and organic weathering. Intense physical weathering occurs on the slopes of the Babatag, town-Tau, the Hissar, Karatyube, qaratag, and Zirabulak Ziatdin, mountains: Kungurtau, Kisantu, Meimanat, hills Almicar, Uchkizil, Howdah, Alaudidae, Multality, Karakyr, Sassandra with developed sandstones, limestones, clay, siltstone and others as a result of weathering at the foot and on the slopes of accumulating loose material in the form of a talus of debris, at least – Sands and sandy loams. Organic weathering is also caused by the vital activity of plants and animals, resulting in the surface horizons of rocks (especially loess) accumulated humus and pereobrazuetsya into the soil. Dens of burrowing animals occur mainly on proluvial loess plain.

Landslides in the study area are widespread in all geomorphological areas such as the mountains and Piedmont proluvial plains. In the mountains avalanches are formed in rocky and stony slopes and sides, and in the foothill zone – proluvial loess. The intensity of formation of landslides due to the nature of the physical weathering, tectonic regime and the nature of the circulation of underground waters, the properties of rocks. The size of the collapsing mass changes from tens of m3 to 120-300 m3, sometimes more. Sometimes the accumulation of these masses leads to blockages of rivers, contributing to the emergence of local celebreality that threaten human settlements, hydraulic structures, bridges, roads, etc.

Loess landslides in the region occur mainly after the gully erosion and landslide processes, because a wall of newly formed gullies and landslide failures in most cases are precipitous and are a major factor in the formation of loess landslides. The thickness of collapsing, collapsing loess mass in the studied area reaches 5-20 meters, a width of 100-300 meters, length 3-12 m. Their total sometimes reaches 110-160 m3. Loess landslides were studied and mapped by us in both banks of the river Surkhandarya, Kashkadarya, Cherabuddi, Guzardarya.
Planar erosion is evident on hillsides, foothills and silverscreen areas of the described region. Erosion of topsoil by erosion in Uzbekistan reach 500-600 t/ha. Studies have shown that the annual average soil loss on tilled crops, orchards and vineyards is about 30-35 t/ha and grain crops gustovarova crops – 10-15 t/ha. In the district of Kungurtau (Kashkadarya Piedmont basin) the average annual erosion at a slope angle of 1-4º amounted to 2 t/ha; 4-7º to 5.7 t/ha; 7º cooler is more than 11 t/ha. Finely grained particles resulting from weathering, also washed away the rain water and melted snow water. Resulting in flat-bottomed depressions accumulate the clayey rocks with the capacity of 0,5-3,0 m and more.

With the continuous irrigation of crops in some areas intensive plane wash fertile soil with a thickness of 1-3 cm, in some places, and more. As a result of erosion reduced not only the soil resources of the country, but moisture reserves in the soil due to reduced infiltration, which leads to lower crop yields. Along with this erosion of the soil causes environmental pollution. For example, irrigation channels, sewers, drains, reservoirs as a result of this silting process annually.

Gully formation along the most intensely manifested within the foothill areas, where developed loess-like loam and sandy loam. Associated mainly with waste waters, atmospheric precipitation, the intensity of development depends on topography, lithology, erosion the action of water, as well as the depth of the groundwater level. The gully formation along mainly confined to the terraced ledges. In 14-15 years of observation in the area of Kungurtau (the right Bank of the Kashkadarya) depth of individual gullies increased from 0.5 to 3.1-4.5 m. average depth of 1.5-2 m, width 5-7 m [1]. Many SAI and a trough depth of from 3-5 to 25-30 m, educated, apparently, in the upper Quaternary period, creating a

ISSN: 2350-0328
International Journal of Advanced Research in Science, Engineering and Technology
Vol. 7, Issue 1 , January 2020

wavy and silnoroslye relief. If zadernovski of the slope and consolidate the dense vegetation the slope of the sides are usually 34-62º.

On the surface of foothills Sherabad-Surkhandarya intermountain depressions developed deep and wide ravines, with direction from the mountains to the modern valley of the river of Surkhandarya and Sarbazdary. The distance between the gullies ranges from 500 to 1200 m, sometimes more. For example, the ravine Dadyr Slikarski crossing the valley from the North has a depth of 100-120 m, a width of 100-130 m. It starts from the ridge Babatag and merges reservoir Kumkurgan.

In the South-Eastern part of the village Baldacci (Kashkadarya Piedmont basin) on flat proluvial plain as a result of the discharge of water in the territory of the newly formed gullies. Waste water flowing through the dry tilled earth, washed them, forming small gullies. Lengthening and expanding, the ravines made up in 10 years length 700-1250 m, depth of 1-3. 5 m, width 4-7 m [2]. In the development of new lands should be borne in mind that highly porous, silty loess soils proluvial wavy sinnerschrader flat plains lend themselves to rapid erosion.

Under mining and collapse of river banks, slopes of channels, sewers and drains. Floods occur lateral erosion. In the Kashkadarya, Surkhandarya, Sarbadar, at the intersection of the rivers with proluvial, alluvial-proluvial, loess and loess-like rocks, in some areas the average annual lateral erosion, including rock fall and small avalanches, is 0.8-2.5 m. On alluvial flat plains is a slight undermining and collapse of river banks. On flat proluvial and alluvial-deltaic plains in the bends of the river constantly washed away and collapsing slopes of large irrigation channels (Amu-Zang, Babatag, Beshkent, Faizabad, Kamashi, Denau, Fazli etc.), sewers and drains. Expanding and collapsing sections of the terrace width is 2-3 times more than the initial channel width. As a result, the slopes of sewers and drains often collapse at the bottom formed a dam, causing backwater of groundwater, and which in turn activates the slumping of the coastal masses.

Table 1
Classification of geological and engineering-geological processes and phenomena that occur during the economic development of the territory of the Kashkadarya and Surkhandarya basins

Geological and geotechnical processes	Geological and engineering-geological phenomena	Conditions for the formation of a geological phenomenon					The reason for the occurrence of a geological phenomenon
		Rockgroup					
		C	P	R_n	P_c	O	
Processes related to the internal forces of the Earth	Seismic phenomena	+	++	+++	+++	+++	Earthquake
The effects of weathering agents on rocks	Cracking	+	+++	-	+	+	Impact on rocks of temperature, wind, water, carbon dioxide and other factors
	Decompression	+	++	-	++	++	
Gravity (action of gravitational forces)	Shedding of rocks	-	+	+++	-	-	Violation Natural equilibrium
	Landslides	+	++	-	-	-	
	Solifluction	-	-	-	++	+++	
	Rockswelling	-	-	+	++	+++	
	Rock creep on the slopes	-	+	+	++	+++	
Surface water activities	Mudflows	+	+	+	+	+	Heavy rainfall
	Slope flush	+	+	++	++	+++	Rock destruction by water flow

ISSN: 2350-0328

International Journal of Advanced Research in Science, Engineering and Technology

Vol. 7, Issue 1 , January 2020

	Channel erosion	+	+	++	+++	+++	
	Gully formation	-	-	+	+++	++	
	Abrasioninreservoirs	-	+	+	+++	++	
	Sedimentation	-	-	++	++	+++	Fine particles falling out of water
	Takyroobrazovanie	-	-	+	++	+++	
Groundwater and surface water activities	Takyroobrazovanie	++	++	++	+	-	Aquiferexposure
	Suffusion	-	-	-	+++	++	Leaching of soluble salts and leaching by water streams of the smallest rock particles
	Karst				+++	++	
	Draw down of loessrocks	-	-	-	+++	+	
	Flooding	-	-	++	+++	++	Groundwater level rise to the surface of the Earth
	Water logging	-	-	++	+++	++	
	Secondary salinization	-	-	-	+++	+++	Evaporation of saline groundwater from the Earth's surface
	Salt production	-	-	-	+++	+++	
	Flooding	-	-	++	++	++	Flooding of the territory with mudflows
Processes related to internal	Swelling	-	-	-	+++	++	Alternate wetting and drying of rocks
	Shrinkage	-	-	-	++	+++	
Aeolian processes	Digging	-	-	+++	++	+	Wave blowing and blowing loose material
	Dust storms	-	-	+++	++	+	
Technogenesis-economic activity of man	Rock Formation Change	+	+	+++	+++	++	Human activities
	Relief change	+	+	++	+++	+++	
	Accumulation of embankments and industrial waste	+	+	+++	+++	++	

Note: C– rocky; P - half-body; R_n - loose unbound; P_c - loose bound; O - special condition and properties; "-" geological phenomena are absent; "+" Geological phenomena are poorly developed; "++" geological phenomena have significant developments; "+++" geological phenomena are very developed.

Irrigation sediments. Within the irrigated part of the region annually accumulated sediment irrigation, the capacity of which according to the content of turbidity in the water reaches 0.8-1.0 m. as a result of years of cleaning along the canals, ditches and reservoirs stretch solid

The scale and intensity of landslides identified specific geological conditions. From the geological conditions leading importance are the composition, physical state of rocks, their strength and water-physical properties, water resistance and the degree of irrigation.

ISSN: 2350-0328

International Journal of Advanced Research in Science, Engineering and Technology

Vol. 7, Issue 1 , January 2020

Within the mountainous part of the Kashkadarya and Surkhan-Darya basin taking into account of the surface structure of the relief, lithologic composition, degree of destruction and the safety of the rocks composing slopes, hydrogeological and climatic conditions, the degree of development of certain types of geological processes and identified stages and phases of development of landslides on the slopes of a steady, relatively sustainable and non-sustainable areas; also the highlighted areas isolated by landslides, areas of the linear distribution of landslides and areas area development of landslides [4].

Takyrs. The Western part of the Kashkadarya basin foothill within proluvial-alluvial flat-hilly plains loosely held surface gentle slopes of the sandy uplands in the process of heavy rains amenable to planar flushing. In the result of washout of the clayey particles with gentle slopes to flat-bottomed depressions accumulate muddy liquefied mass, power, fine-grained deposits of 0.5-3.0 m. After drying, the surface cracks in these areas is multifaceted blocks, resulting in formation of takyrs and takyr land plots with an area of 0,2-9,2 square kilometers, rarely more. Crack width reaches 3-4 cm, their depth depends on the power of clay-silt sediments in the area varies from 10 to 60 cm.

III. RESULTS AND DISCUSSIONS

Suffosion phenomena observed to the South of the village of Carahil in places of transition flat proluvial plain in a deflationary-accumulative plain, and on the slopes of proluvial and dissected loess plains. Processes occur due to erosion of underground, surface and rain waters fine particles and dissolution of soluble salts, resulting in formation of small saucer-shaped depression and suffosion sinkholes. Suffosion sinkholes, reached a depth of 2.1-4.5 m meet at the foothills Chr. Babatag, Gissar, Zirabulak Ziaeddin etc. They often develop along the terraced ledges in the sides of the SAI and, generally in areas with sharp elevation differences.

As a result of suffusion in the loess in places are marked void. An example of loess karst include caves Lyabo dashnabad above the city, forming a system of interconnecting underground tunnels and vaulted chambers with flowing streams for them, with a length of 250-300 m.

The salt marshes. Within the foothills of Kashkadarya and Surkhandarya intermountain depressions (Sorsasalo, Modakurichi, Kuraginskogo and other depressions) as a result of the action occurring close to the surface (0.5 m) salt and selfnomination groundwater, the processes of salinization.

In hot climates, due to intensive evaporation of moisture from the soil, repeated and repeated ascents of the groundwater level on the earth's surface accumulate salts and are formed plump and cortical saline, saturated with crystals of salts and strongly saline sandy loam and loam. The capacity of cortical and plump saline reaches 0.2-0.3 m in the lower part to a depth of 1.1-1.3 m – soils are strongly saline.

The main part of the bottom surface Sorsasalo, Codecolorizer and Kuraginskogo depressions covered with white cortex and puffy solonchaks. On separate sites proluvial undulating plains are the alluvial fans of major valleys Chirality, Bobbikins and Gattaca, meet saline surface. Along with salt marshes in the lower reaches Sorsasalo and Modakurichi downgrade (North-Western part of the district) a separate small area zavolakivaya as a result of close abundance and groundwater seepage.

Since 1968, thanks to the construction of the southern drainage-collector network (depth of 7 m, dozens of drained wetlands. However, in the winter and spring, when there was high precipitation, again there are wetlands.

Deflationary-accumulative activity of the wind. Within the investigated territories the winds are strong. Typical North-Western, Western (Kashkadarya basin) and South West (Surkhan-Darya basin) wind, blowing from the Kyzylkum and from Afghanistan with an average speed of from 2 to 5,0 m/s, sometimes 16-21 m/s in a few hours or days. Summer dust storms are observed, they create the conditions for the development of Aeolian process. This is also the dryness of air and soil, the disturbance of rocks erosion and denudative, deep groundwater table or nevoconnect of soil, poverty of vegetation, etc.

Within the Kashkadarya basin as a result of constantly blowing winds formed sand wavy and undulating plains. Waviness due to the presence of spray sand, sand mounds, sand-dunes and ridges with a relative excess of from 1-2 up to 7-8 m. Sands Shrub height from 0.1-0.2 to 0.5-1.0 m developed in the South-Western and Central parts of the basin. Along with the shrub sand there is accumulated sand material in the form of solid Plasa almost smooth surface [1].

Hilly Sands are developed in Central and North-Western parts of the basin, mainly elongated in the North and North-West directions with a separate dunes with a height of 2-3 m Between the mounds and dunes there are often

ISSN: 2350-0328
International Journal of Advanced Research in Science, Engineering and Technology
Vol. 7, Issue 1 , January 2020

depressions blowing depth of 0.5-30 m. the Ridge-hilly Sands reach a height of 7-8 m, with depressions blowing depth of 3-5 m.
Barkhan Sands are developed mainly in the southwestern part of the basin, separate areas with a height of 20-30 m are found in the Central part. In addition, wind activity is observed where developed proluvial loess rocks.

Aeolian processes are most intensively manifested and the desert areas are located near irrigated areas, which is due to the difference in moisture levels and temperature, while partially pinned Sands, saxaul bands. It also leads to the settlement and entered a sand irrigated and newly irrigated areas, canals and roads.

Subsidence of loess rocks. Subsidence phenomena are manifested in the loess massifs lowering of the surface in the form of sapadin, saucers at saturation of part or all of the capacity collapsible soil thicknesses under the action of its own weight of soil, causing a change in its structure, reducing the internal connections, seal with a shift between mineral soil particles.

In the process of field research on the surface of the proluvial and deluvial-proluvial loess rocks we found numerous subsidence areas in the steppe saucers, formed from rainwater and meltwater. Collapsible funnel with a diameter of 3-5 up to 100-150 meters or even more are often observed within the newly irrigated areas. The amount of lowering of the surface ranges from 0.05 to 1.0 m or more [6].

Within the Sherabad-Surkhandarya (Slikara and Tibetan valley) and Kashkadarya (Galafassi, Bozicany, along the canal Eski anchor, etc.) of the depressions, at the bottom of erosion gullies discovered from 12 to 20 subsidence saucers emerged in the thickness of the hydration rain, snow melt and irrigated waters. The size of the plates varies from 2 to 25 m, surface lowering of 0.05 to 0.35, more rarely up to 0.5 m. a small amount of natural subsidence because of limited moisture zone of subsidence strata (1-3), rarely up to 5.5 m, the lower, main part (10-30 m or more) remains nezamechennym, therefore in some places the natural funnel has not yet stabilized, the surface continues to sink, albeit slightly.

Significant damage caused subsidence phenomena in the village Almicar, on the left Bank of the Surkhandarya river valley. The bottom of the ravine is quite wide (600-800 m) and flat, in some places reaches 1,000 m, is composed of proluvial loess loams and sandy loams of the Dushanbe and irakskogo complexes.The thickness of the subsidence is 16-20 m.

In the spring of 1983 and 2009, in the northwestern part of the village of Lalmikar, after heavy rains and accumulation of water from small mudflows emerging from the lateral erosion hollows, a lake 300 m wide, 700 m long, water thickness about 0.5-0.7 m formed. The accumulating water in the ground caused subsidence, several subsidence saucers were formed with an area of 169 m2, a surface subsidence of 33.4 cm. As a result, numerous cracks appeared on the surface of the earth, up to 44 mm wide, and almost completely one-story houses in the village collapsed. Within each saucer, 3-5 subsiding annular gaping cracks arose with vertical ledges up to 18-20 cm high.

The nature of exogenous geological and engineering-geological processes developed within a particular region of the region is determined, as shown in Table 2, by a large number of factors, of which ravines, landslides, landslides, mudflows, subsidence, and secondary salinization are distinguished in the conditions of South-West Uzbekistan. , deflation of sand and soil, etc.

The current activity of the same exogenous geological and engineering-geological processes that occur unequally within the described region is due to two main reasons: 1) the nature of the lithological structure, moisture, composition and properties of rocks composing different areas of the zone and 2) the spatial position of the site within the zone , which is associated with the modern tectonic activity of the territory, its orographic and hydrographic features.
It should be emphasized that the direction and intensity of modern tectonic movements has the most active influence on the rate of processes and the morphology of the occurring phenomena. That is why the same processes are currently developing both within the mountain zone and within the foothills and intermontane depressions of the studied territory (table 2).

ISSN: 2350-0328

International Journal of Advanced Research in Science, Engineering and Technology

Vol. 7, Issue 1 , January 2020

Table 2

The nature of the spatial distribution and development of geological and engineering-geological processes and phenomena in the territory of the Kashkadarya and Surkhandarya basins

The main geological and structural elements of the region	Rock distribution pattern	Geological processes	Geological phenomena
Mountain zone, with absolute elevations of 1100-2500 m and more	The ubiquitous distribution of Paleozoic, Mesozoic-Cenozoic rocks	1. Weathering 2. Gravitational processes	1. Cracking 2. Softening 3. Shedding rocks 4. landslides 5. Sailing rocks 6. Creeping rocks on the slopes 7. Sat down
Sherabad-Surkhandarya intermountain basin, with abs. 290-1100 m	The ubiquity of the Quaternary and island-Meso-Cenozoic rocks	1. Surface and groundwater activities 2. The processes associated with the internal forces of rocks	1. Sat down 2. Flushing on slopes 3. Channel washout 4. Gully formation 5. Suffusion 6. Karst 7. Drawdown 8. Flooding 9. Secondary salinization 10. Swelling 11.Shrinkage
Kashkadarya foothill basin, with abs. 490-975 m	–"–	1. Surface and groundwater activities 2. The processes associated with the internal forces of rocks	1. Sat down 2. Gully formation 3. Erosion 4. Suffusion 5. Drawdown 6. Flooding 7. Secondary salinization 8. Sand Deflation 9. swelling 10. Shrinkage
Amudarya Platform Depression, with abs. 210-490 m	UbiquitousQuaternary	–"–	1. Sat down 2. Osaka formation 3. Takyroobrazovanie 4. Secondary salinization

ISSN: 2350-0328

International Journal of Advanced Research in Science, Engineering and Technology

Vol. 7, Issue 1 , January 2020

			5. Flooding 6. Flooding 7. Water logging 8. Saline formation 9.Deflation of sand, soil and salts

IV. CONCLUSION

Thus, it can be noted that the altitudinal variability of the complexes of modern exogenous geological processes and phenomena within the Kashkadarya and Surkhandarya basins is very pronounced. It has a huge impact on the nature of the variability of the entire engineering-geological situation in the region.

REFERENCES

1. Mavlyanov G.A. Pulatova K.P., Irgashev Yu.I. and other Engineering-geological conditions of the Karshi steppe. - Publishing house "Fan", - Tashkent, 1974. - 278 p.
2. Irgashev Yu.I., Isomatov Yu.P. Engineering and geological characteristics of modern geological processes in South-West Uzbekistan. Materials of the International Scientific Conference - “Geophysical Methods for Solving Actual Problems of Modern Seismology” - Tashkent, 2018, pp. 356-360.
3. Mavlyanov E.V. Engineering and geological foundations of irrigation of lands in the arid zone. - Publishing house "Fan", - Tashkent, 1989. - 133 p.
4. Niyazov R.A., Minchenko V.D. Guidelines for maintaining the state cadastre of zones of increased natural hazard of the Republic of Uzbekistan. Funds of the Hydroingeo Institute. - Tashkent, 2005.
5. Shermatov M.Sh. Exogenous geological processes of the Middle Tien Shan and the main factors determining their manifestation and development. - Tashkent Uzbek Geological Journal, 1987.– No. 3. - S. 45-50,
6. Irgashev Yu.I. Engineering and geological basis of the regional study of changes in the geological environment of South-West Uzbekistan during its economic development. Materials of the International Scientific Conference - “Geophysical Methods for Solving Actual Problems of Modern Seismology” - Tashkent, 2018, pp. 352-356.