Ore-containing data of lyalyagun mineralized zone of malguzar mountains

Abror Abdullaev[1*], *Kholmurod* Khaliyorov[1], *Sunnat* Shanazarov[1], *Paraxat* Ziyayeva[1], *Ilkhom* Ruziyev[2], and *Mahmud* Muminov[2]

[1]National University of Uzbekistan named after Mirzo Ulugbek Tashkent, Uzbekistan
[2]"Tashkent Institute of Irrigation and Agricultural Mechanization Engineers" National Research University, Tashkent, Uzbekistan

Abstract. An analysis of the Malguzar Mountains allows us to note that Silurian formations (sandstones, gravestones, shale) are ore-bearing here, crumpled into folds, which are complicated by a series of faults with a northwest strike. These structures are rectilinear; their zone is characterized by the presence of small discontinuous structures and areas of swelling. Within the Lyalyagun zone, the localization sites of mineralized zones of gold mineralization were identified based on established direct and indirect cosmogeological features.

1 Introduction

The history of developing aerospace-geological research methods began in 1723 when the Montgolfet brothers (Leon, France) launched the first balloon. Intensive development of remote sensing methods began in the second half of the 19th century, especially in compiling topographic maps for military purposes. The current stage in the development of aerospace research methods is associated with the emergence of a new generation of digital tools for obtaining geological information. This led to the development of computer programs for processing remote sensing materials and technologies for the integrated analysis of geological, geophysical, structural-tectonic, mineralogical-geochemical, and other data - this is a geographic information system (GIS) - technologies [Abdullayev et al. 2020] [2].

In the 90s of the last century, space multispectral radar methods for obtaining remote data in digital form were developed and began to operate in Russia (MSU-M, MSU-SK, Almaz), in the USA (Landsat MSS), in France (Spot XS, P), in Japan (JERS-I? ADEAS), in Canada (RADARSAT), etc. As emphasized by N.I.Korchuganova, A.K. aerospace research methods in geology are: to increase the reliability of the results obtained; creation of remote bases of state geological maps; creation of new types of geological and other maps; in solving problems of ore content and geoecology, etc. [Abdullayev et al. 2021] [3], [Ruziev I et al. 2020-100] [27].

Space photographic materials (scale 1:50000, 1:75000) were subjected to visual

*Corresponding author: abrorabdullaev_87@mail.ru

interpretation, as this method allows for obtaining more reliable geological information about the structural and tectonic structure of the earth's crust.

The initial data were various multispectral satellite images (Landsat 5_7, QuickBird), spectral libraries available in the ERDAS software IMAGINE 9.2 (Aster, JPL, USGS), and geoscience data. [Abdullayev et al. 2021] [4], [Ruziev I et al. 2020-100] [21].

Digital processing of space images was carried out using the ACP, ITS, Kirsch, and Index methods IV. As a result, several variants of processed space images were prepared (Fig. 1). [Rundkvist et al. 1990] [1], [Ruziev I et al. 2020-100] [21].

OM ACP method mapped the main formations of rocks that differed in mineralogical composition and identified the main geological and material complexes. [Akbarov 2004] [8]. The contours of linear lineaments and concentric and arcuate structures of territories (piedmont plains) are distinguished by the Kirsch method. The Index IV method recorded structural linearities in bedrock and areas covered by loose formations. [Gaipov. et al. 2018] [5]. [Ruziev I et al. 2020-100] [21].

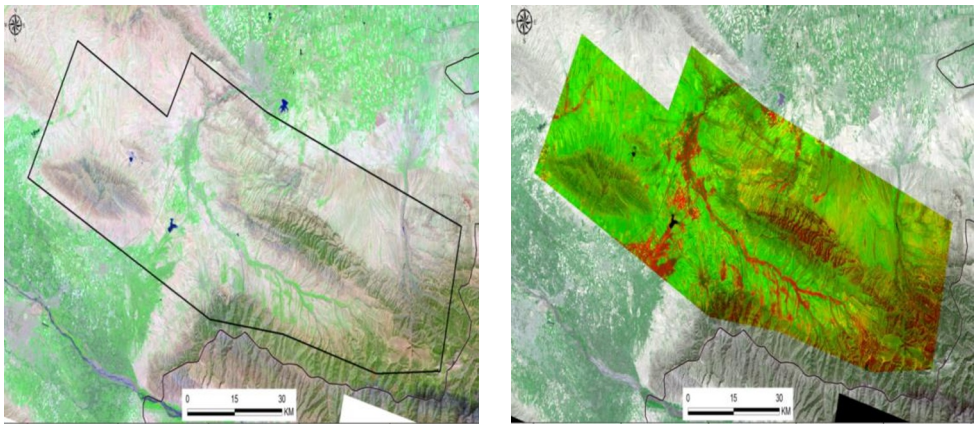

Fig 1. Processed satellite image Landsat 7

Digital processing of space images was carried out using the ACP, ITS, Kirsch, and Index methods IV.

As a result, several variants of processed space images (scale 1:25000) were prepared.

The main formations of rocks differing in mineralogical composition were mapped by the ASR method, and the main geological and material complexes were identified. [Zakirov. 2019] [6], [Ruziev I et al. 2020-100] [21].

The contours of linear lineaments and concentric and arcuate structures of territories (piedmont plains) are distinguished by the Kirsch method. [Gusev et al. 1989][9].

Index IV method fixed structural linearities in bedrock and areas covered by loose formations. [Ivankin. et al. 1988][11]. [Ivankin et al. 1983][10].

The Lyailyaguinskaya mineralized zone of the Malguzar Mountains is structurally a band of contiguous faults of sublatitudinal and western-northwestern strike, isoclinal folding with the manifestation of intense silicon-carbon metasomatism in the rocks. [Nurkhodzhaev et al. 2019] [7].

The ore-controlling value here is played by feathering and cleavage cracks, interstratal delaminations, genetically associated with folding and renewed, blocked by secant faults. In the western part of the Lyailyaguinskaya mineralized zone, there is a silver-gold deposit Bakhmal; in the eastern part, there is a group of small manifestations of gold mineralization. [Pyatkov et al. 1981][14], [Ruziev I et al. 2020-100] [27].

The main ore-controlling structure in the area of work is the Karaulkhona-Charmitan

fault zone of the Tien Shan system, which complicates the southern contact of the Koshrabad intrusion. At the crossing points of the Zirabulak-Koshrabad consedimentary fault and its system with the Karaulkhona-Charmitan long-lived fault zone, the main gold ore objects of the Charmitan ore field are concentrated - the Charmitan, Guzhumsay, and Urtalik deposits, the ore bodies of which are controlled by a series of conjugated deep cleavage cracks, feathering the Karaulkhona-Charmitan fault zone from the north. At the Charmitan deposit, the ore-localizing structures are northwest-trending; at the Guzhumsai deposit, northeast-trending; and at Urtalik, mineralization is confined to the northwestern, northeastern, and sublatitudinal structures.

2 Methods and Materials

To determine the reasons for the formation of splitting blow-ups and other ore-bearing elements into the zones of large ore-controlling faults, the materials of remote sensing of the earth were involved in the study, the interpretation of which may reveal the reasons for the change in the morphogenetic features of the northwestern ore-controlling faults, which are associated with the formation and spatial distribution of gold ore mineralization. [[Razykov . 2017][26], [Ruziev I et al. 2020-100] [27].

In addition to the isolation and study of cosmostructures, work was carried out on the revealed halos of sulfide minerals, with which gold is associated. These studies were carried out in two promising areas, Ardakshan and Kuduk. [Janibekov et al. 2019] [12]. The materials of their remote sensing made it possible to reveal the ring and linear cosmostructures. Ring structures are rare and small in size (2.5-4.5 km). [Razykov. 2017][26]. 2019][25]. In destroying their original ring shape, the northwestern ore-controlling to the northeast transverse linear structures played the main role. The most widely developed are linear cosmostructures, northwestern, transverse to them, north - eastern directions. [Gorzhevsk. et al. 1978][18]. The relationship of the northwestern faults with transverse northeastern structures determined the formation of intersection areas with the formation of splitting, blowing, and pinching in the zones of ore-controlling faults, which subsequently became a favorable structural position for the manifestation of gold ore mineralization in the ore stage. [Razykov 2019][25], [Ruziev I et al. 2020-100] [27].

Based on cosmogeological studies, a cosmostructural model for the Lyailyagunskaya area was built. The initial data were various multispectral satellite images (Landsat 5_7, QuickBird), spectral libraries available in the ERDAS software IMAGINE 9.2 (Aster, JPL, USGS), and geoscience data (Figure 2, Figure 3, Figure 4, Figure 5). [Likhachev et al. 1963] [13], [Ruziev I et al. 2020-100] [27].

Fig. 2. Processed satellite image Landsat 7 on territory of Ardakshan prospective area (Materials of SE "IMR"). Scale 1:25000

Digital processing of space images was carried out using the ACP, ITS, Kirsch, and Index methods IV. As a result, several variants of processed satellite images were prepared (scale 1:25000).

OM ACP method mapped the main formations of rocks that differed in mineralogical composition and identified the main geological and material complexes. [Rumyantseva et al. 1983][22], [Ruziev I et al. 2020-100] [27].

The contours of linear lineaments and concentric and arcuate structures of territories (piedmont plains) are distinguished by the Kirsch method. The Index IV method fixed structural linearities in bedrock and areas covered by loose formations. [Abdullaev et al. 1971][19].

Fig. 3. Processed satellite image Landsat 7 on territory of Kudukcha prospective area (Materials of the GM "IMR") Scale 1:25000

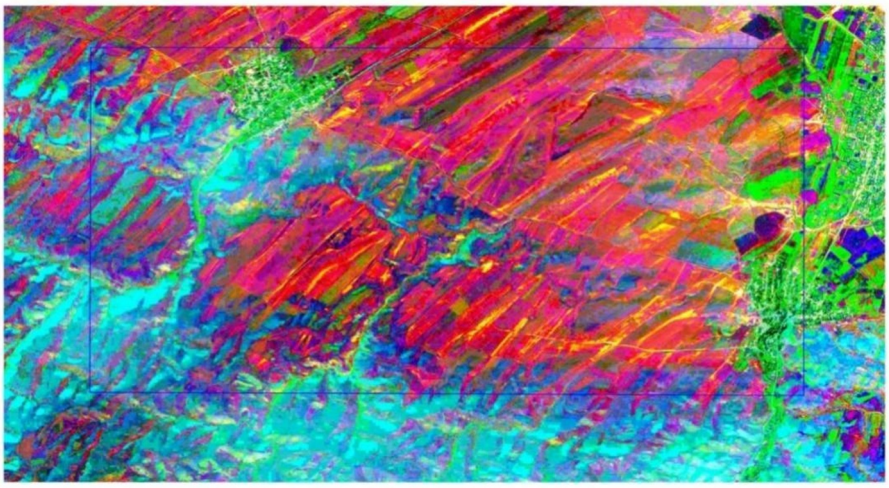

Fig. 4. Processed satellite image Landsat 7 on territory of Ardakshan prospective area (Materials of the GM "IMR") Scale 1:25000

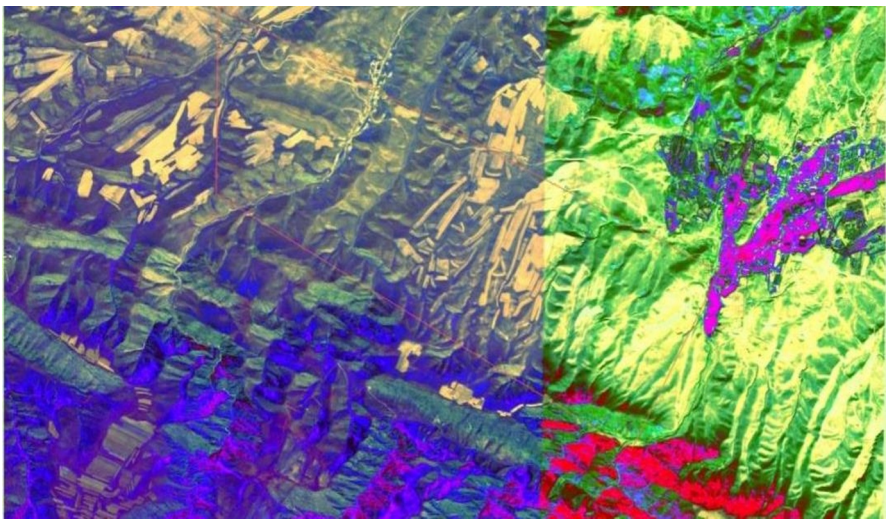

Fig. 5 Processed satellite image of Landsat 7 on territory of Kudukcha prospective area (Materials of the GM "IMR") Scale 1:25000

3 Results

During the deciphering, several small ring structures and several systems of linear structures were identified (Fig. 5, Fig. 6). In total, six small ring structures with a diameter of 2.5 km to 4.5 km were identified. [Vasilkovsky 1956] [20]. Only one of the largest ring structures northeast of the Malguzar Mountains has retained its rounded shape. The remaining ring structures are represented by their fragments. [Kim et al. 1978] [27]. In changing the initial morphology of the ring structures, the revealed linear structures (faults) of the northeast strike played an important role. The ring structures' inner part is composed of Paleozoic and Cenozoic formations. [Abdullayev et al. 2022] [15], [Ruziev I et al. 2020-100] [27].

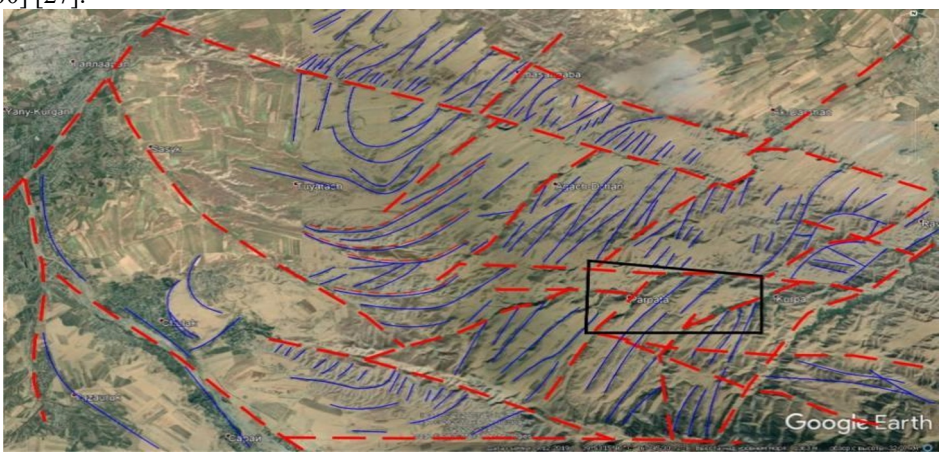

Fig.6. Cosmostructural model of the Malguzar Mountains0

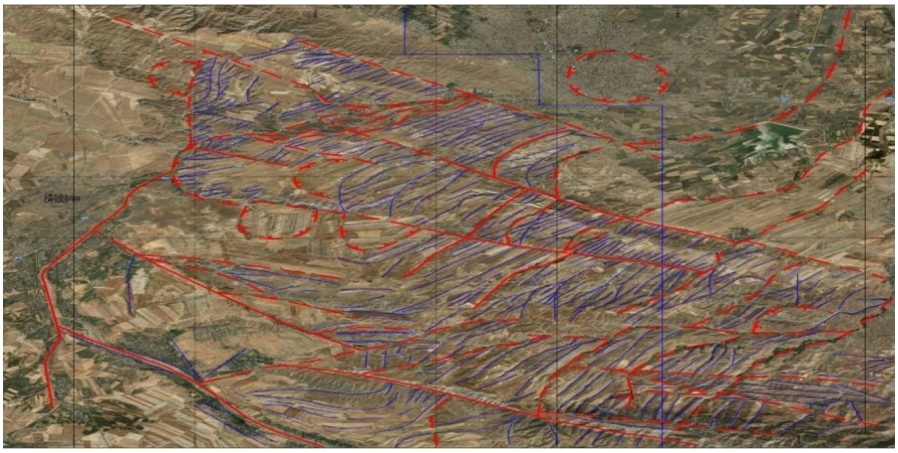

Fig. 7. Cosmostructural model of the Malguzar Mountains

The analysis shows that most of the zones, sites, and points of manifestation of gold mineralization are located in the central southern parts of the Malguzar Mountains, confirming the scientific results obtained by deciphering remote sensing materials of the territory of the Malguzar Mountains. [Mirkamalov et al. 2019] [16].

Position of the Lyalyagun mineralized zone in space structures The Malguzar mountains are determined by their confinement to a strip between two large linear structures of sublatitudinal strike, complicated by a series of northwestern and northeastern faults. [Khokhlov. 1983][22], [Ruziev I et al. 2020-100] [27].

Deciphering satellite images Lyalyagun area on a larger scale (1:25000) allowed us to build its detailed cosmostructural model (Fig. 7).

Fig.8. Scheme of the cosmostructural model of the South-Eastern part of the Malguzar mountains Lyalyagun area

There are no ring structures in this area. The most widely developed linear cosmostructures are northwest-trending. These are rectilinear faults of various lengths, interrupted in places by branched ones. [Kim et al. 1978][17]. Their discontinuity and branching, in many cases, are associated with the influence of northeastern structures. Crossing the northwestern

faults, they displace branches, which leads to an increase in their thickness and a change in morphology. [Khamrabaev. 2021][24], [Ruziev I et al. 2020-100] [27].

4 Conclusion

Cosmogeological studies of the Lyailgunskaya area based on cosmogeological studies made it possible to establish the spatial distribution of sulfide mineralization in the presence of linear structures (faults) of the northeast strike. Sulfide mineralization is located strictly along the line of the northeast direction, and, in all likelihood, their formation and placement to the location are controlled by a system of linear structures in the northeast direction.

References

1. Rundkvist IK , Tarasenkova LV, Danilova M.Yu . Automated processing of lineament systems and revealing the deep structure of complexly dislocated areas for the purposes of metallogenic analysis // Aerospace surveys in the study of the deep structure of regions of the USSR. - L.: VSEGEI, 1990. - S. 68-78.
2. Abdullayev AX, Zokirov OT, Stelmax AG, Kutliyev EX, Axmedov Sh.B. _ _ Cosmostructual model of the Malguzar mountains for ore bearing data processing on the laiyagun mineralized zone. Tashkent state technical university named after Islam Karimov // Technikal science and innovation. - 2020. - №4. - C .90-99 (04.00.00. No. 6).
3. Abdullaev A. Kh ., Zokirov OT, Stelmakh AG, Kutliev E.Kh. _ Forecasting promising gold deposits within the Malguzar mountains (on the example of Kuduk and Ardakshan) // Uzbekiston national university information. - 2021. - No. 3/1.-S.122-126 (04.00.00. No.7).
4. Abdullayev A.Kh. _ , Khudoyqulov Sh.Sh. _ _ Geological-geochemical and geophysical characteristics of f the Kuduk and Ardakshan sites // International Journal of Geology, Earth & Environmental Sciences / An Open Access, Online International Journal Available at http://www.cibtech.org/jgee.htm 2021. - Vol. 11.-P. 97-105 (04.00.00. No.7).
5. Gaipov AB, Usmanov MS, Tokaev IS Spectral reflectivity of rocks on the example of the Aktau mountains (Yuzhny Nuratau) // Matly Mezhdunar . nauch. - tehn . conf. "Integration of science and practice as a mechanism for the effective development of the geological branch of the Republic of Uzbekistan." - T.: GP "IMR", 2018. - pp. 171-173.
6. Zakirov OT Cosmostructural objects of Central Asia and their significance in the placement of minerals: Abstract. diss... Doctors. G.-M. sci. - T., 2019 - 51 p.
7. Nurkhodzhaev AK, Togaev IS A new methodological approach to the technology of decoding materials of remote sensing of the Earth // Matly I International scientific-technical. conf. "The role of science and practice in strengthening the sustainability and actualization of risk management of the manifestation of egzogknyh geological processes." – Vol.: 2019. – pp. 132-134.
8. Akbarov KhA (2004). Geological and structural positions of ore fields and deposits of the Tien Shan. Study tasks and systematics. Geology and Mineral Resources. 2 , C . 3-10.
9. Gusev V . A. _ (1989). Report on the results of prospecting for gold and other minerals

at the Chetkisay prospective area in the Malguzarsky mountains (report of the Shaibekskaya GPP for 1986-1989).

10. Ivankin PF, Nazarova NI (1983). Report on detailed deep prospecting for gold deposits based on integrated volumetric mapping of the Marjanbulak ore field at a scale of 1: 10000. Funds of the State Committee for Geology of the Republic of Uzbekistan, T.
11. Ivankin PF, Nazarova NI and others (1988). Compilation of a consolidated metallogenic map of scale 1: 50,000 of the eastern part of Western Uzbekistan. Report for 1984-88. Funds of the State Enterprise " Samarkandgeologiya ".
12. Janibekov BO, Turapov MK, Akbarov HA, Tulyaganova NSh , Abdullaev AX (2019). Research Geodynamic Situation of the Ore Formation of the Ore DepositsInternational *Journal of Engineering and Advanced Technology* (IJEAT), 9 (2).
13. Likhachev Yu.A , Vladimirsky VS et al. (1963). Tectonics of the Paleozoic basement of the Kyzyl Kum , Problems of oil and gas content in Central Asia. Issue 15.M. : Gostekhizdat .
14. Pyatkov KK, Abduazimova ZM, Pyanovskaya IA, Korsakov VS On the age, volume and stratigraphic position of the Besapan formation in the Central Kyzylkums // Questions of regional geology of the occidental part of the Southern Tien Shan. - T., 1981 - pp. 97-106.
15. Abdullaev AH Criteria for the manifestation of gold ore in the Ardakshan section of the Malguzar Mountains of Uzbekistan // The 5th International scientific and practical conference "Modern science: innovations and prospects" (February 6-8, 2022) SSPG Publish, Stockholm , Sweden, 2022, pp. 234-238.
16. Mirkamalov RH, Chirikin VV, Divaev FK Geodynamic reconstruction of the orogenic belt of the Western Tien Shan and forecasting of endogenous deposits in the basement rocks (methodological recommendations) T.: SE "Institute of Mineral Resources", 2019. -162 P .
17. Kim AI, Erin MV, Mikhailova ED A brief description of the boundary deposits of the Silurian and Devonian along the Obisafite in the West of the Zeravshan ridge (Southern Tien Shan) // Stratigraphy and paleontology of the Urals and the Asian part of the USSR. Zap. LSU. - 1978. - Vol. 1. XXIII. - Issue 2 of ed. 101-108.
18. Gorzhevsky DI, Ivankin PF Types of structural metallogenic zones and ore areas with lead-zinc mineralization // Principles of forecasting lead-zinc deposits and methods of making forecast maps. - M.: Nedra , 1978. - Vol. IX-pp. 17-24.
19. Abdullaev RN, Akhmedzhanov MA, Bazarbayev ER, Borisov OM, etc. Scheme of Precambrian stratigraphy of Uzbekistan // Stratigraphic meeting on the Pre-Paleozoic and Paleozoic of Kazakhstan. - Alma-Ata, 1971 - pp. 69-73.
20. Vasilkovsky NP On the scheme of age-related dismemberment of Upper Paleozoic volcanogenic and intrusive formations of the southwestern spurs of the Northern Tien Shan, Zap. Uzbekistan . otd . WMO. - T., 1956. - Vol . X- pp . 96-101.
21. Kim AI, A Beijing Yu.L ., Erin MV Biostratigraphy of the Middle-Upper Ordovician and Lower Silurian (llandoveri) of the Shakhri-mon tract (Zeravshan-Hissar mountain region) // Boundary layers of the Ordovician and Silurian of the Altai- Sayan region and the Tien Shan. - M.: Nauka , 1978 - P. 87-95.
22. Rumyantseva ZS, Trigan DI To the zonal dismemberment of the Zhivet and Fransk tiers in the Khanbandytau mountains (Western Uzbekistan) by conodonts // Uzbek geol. Journal. - 1983. - No. 1-pp. 47-53.

23. Khokhlov VA Geology and some issues of metamorphism of the Precambrian metamorphic complex of the southwestern spurs of the Gissar ridge: Abstract. diss... cand . G.-M. sci. - T., 1970 - pp. 42-44.
24. Khamrabaev IH Selected works in 6 volumes. Vol.1. Magmatism and postmagmatic processes in Western Uzbekistan / edited by HM Abdullaev . – T.: GU "IMR", 2021. – 424 p.
25. Razykov OT Metallogeny of rare-metal gold and rare-metal mineralization of the Zeravshan -Alan belt 2019 (Uzbekistan) auto-abstract 54 P.
26. Pirnazarov MM Gold of Uzbekistan: Ore-formation types, predictive-prospecting models and complexes. - T.: GP "IMR", 2017. - 248 P.
27. G Yusupov, I Ruziev, S Nurjanov, On the establishment of the correlation dependence of results of physical properties, dynamic probing and filtration coefficient from the granulometric composition of alluvial sands in the valley of the Amudarya river IOP Conf. Series: Materials Science and Engineering 883 (2020) 012035 IOP Publishing doi:10.1088/1757-899X/883/1/012035