Comparison and verification of research results of geodesic works carried out in meliorative systems with the help of geoinformation software

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Abstract. The article covers the issues of creation, optimization and rational use of a system that provides the current status, dynamics and changes of location indicators by conducting geodetic and topographic research using modern technologies of mapping based on geoinformation systems, as well as the problems of geodetic and topographic research.

1 Introduction

The problems of generating geodetic resulting data of reconstruction of hydrotechnical structures have been in the focus of geodetic science for many years, and now they are becoming one of the most pressing issues [1].

The research of hydrotechnical structures and geodetic topographic issues are covered in the works of experts and other researchers through all used surveying instruments. In particular, foreign scientists G.A. Fedotov, J. Researched by Bouma, Levchuk G.P and others

From CIS scientists V.N. Sukachev, S.V. Viktorov, and others made an important contribution to conducting geodetic topographic research and studying GAT programs. Y.F. Knijnikov, I.K. Lure, V.S. Stolbova, and others dealt with the application and mapping of GAT (geoinformation systems) programs [2].

In particular, many scientists of our republic studied the processes of obtaining and using geodetic and topographic data in production (Toshpolatov S., Suyunov A.S, Muborakov H, Avchiev Sh.K., Mirzaliev T., Safarov E.Y., Oymatov R., Inomov A.) and others explained the concepts of application of GAT programs in scientific research and production areas, as well as the concepts of scientific justification [1-3].

2 Materials and methods

Research works to reduce manpower and time consumption of geodetic and topographical field research through the methods adopted for field conditions and GAT programs, and to highlight the possibilities of modern geoinformation programs, to monitor the use of

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production and reclamation water using traditional geodetic methods and GAT programs. Geodetic works in the buildings were used. Geodetic and topographic surveys were conducted in field conditions on irrigation and drainage canals based on geoinformation programs and software [4-7].

3 Results

According to the results of this research, algorithms and planning technology of geodetic and topographical data of irrigation canals and drainage profiles have been developed on the basis of GAT software.

With the help of geodetic measurements, the height data right and left banks of relief indicators (N right, N left) during repair and restoration works in geodetic survey drainage collectors were determined, and the leveling work was carried out on the basis of modern GAT software, and as a result, the generality and validity of the research were determined.

In the design of reclamation canal structures, that is, on the basis of the repair-restoration project of a part of the geodetic processes collectors of the irrigation canals and drainage system, the creation of cross-section profiles taken at intervals of 100 m from the open collectors of 20 km and the intersection area (asphalt road, ditch, ditch, stone obtaining topographic data on roads, in addition, if it is required to install one permanent reference at an interval of 2.5-3 km and to determine the turning angles of the length of each trench on a scale of 1:10000, to obtain information about the indicators of the location of the structures, to obtain direct data of certain geodetic works on the above works, modern geodetic tools (electronic tacheometer) field research was carried out, the process of equalization and verification of field research results was carried out using GAT software “global mapper”.

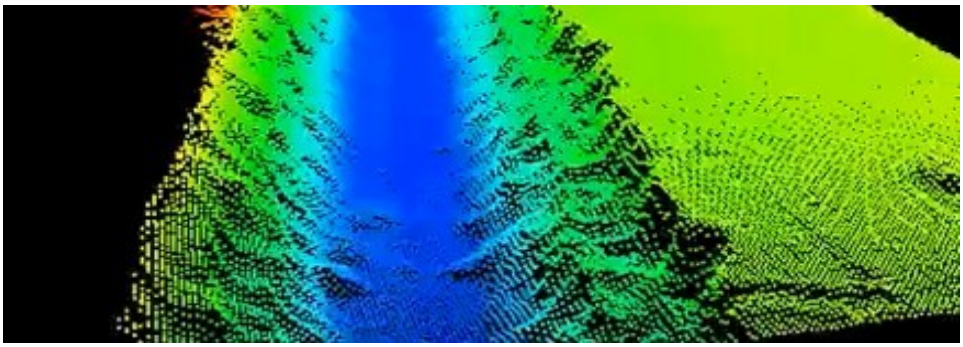

Fig. 1. 3D model of the proposed irrigation canal route.

One of the main indicators of the research is to justify the above opinions and carry out the work of equalizing the height data on the right and left banks of the canal, ditches (N right, N left) and, as a result, work to express the generality and validity of the research.

The necessary task of the process of equalizing the heights of both (left and right banks) in collectors and irrigation canals is to obtain the height H data on both sides, and in almost 68% of the cases in collectors and irrigation canals, the left and right ground level indicators are equal. Left and right bank of melirotative channel CK-3.4 in Fig. 5 bank H are cited as examples of elevation markers. The height H of the water level on the left and right shores of the collectors and irrigation canals is equal in 83% of cases and does not differ up to 50 cm with the highest values relative to each other, that is, collectors with indicators of height H up to 50 cm, taking into account the possibility of designing values

and the surrounding terrain taking into account the changes in the structure, it is appropriate to carry out equalization and comparison.

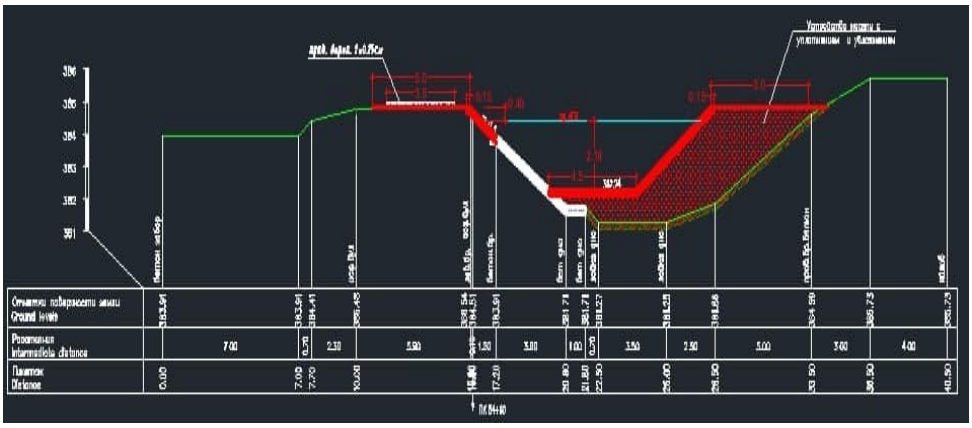

Fig. 2. 3D model of the proposed irrigation canal route.

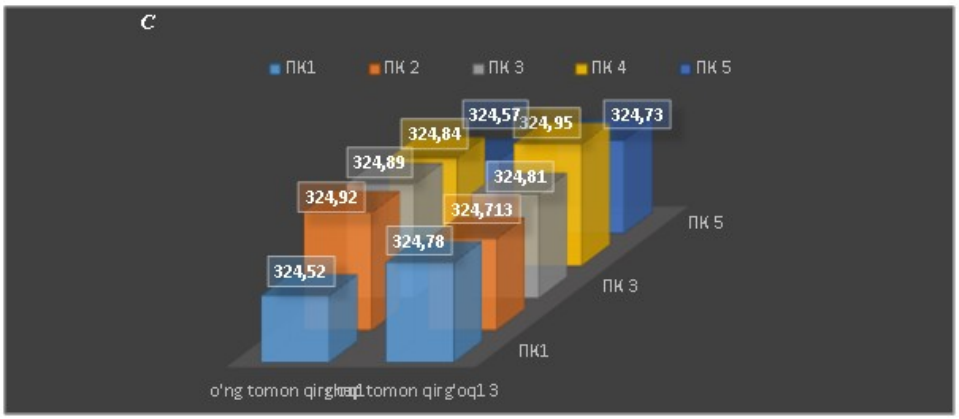

Fig. 3. The ratio of the left and right bank H elevation marks of the CK-3.4 collector in the Abdulla Nabiev area.

4 Discussion

As a result of the research proposed above, it is possible to increase the productivity of a part field measurement work. For example, to shorten labor force and work time in the collectors, when the equality of the results of both banks is observed, it is necessary to carry out geodetic measurement works along one side of the collectors. It is possible to determine the perfection of the results of geodetic topographic exploration of certain collectors and irrigation canals, and the volume of work in the inspection process directly in camera conditions. As a result of comparing some of them with field indicators, it is appropriate to carry out geodetic measurement works along the one-sided coast directly in field conditions, that is, to obtain N height data on the side with large relief indicators and compare them with design results. The results of these measurements are shown in the example of Table 1 below.

In the process of equalization of the results, the data obtained on 1-7, 12-19, 23-39-PKs using the "Stonex" electronic total station along the right bank, i.e. (right land level, left bank, 100 m intervals, water level, 100 m the N heights of the intermediate pickets, the right bank, the left side ground level) are expressed, and the results are presented in the CK-4.3 collector in the Abdulla Nabiev area of the Koson district, Kashkadarya region, on September 15-18, 2022. In order to achieve the validity of the above values and to increase the productivity of part of the geodetic work in the drainage collectors, in addition to reducing the labor force and reducing the working time, the N height data of the left banks of the irrigation canals and the collectors was prepared on September 21, 2022 using the GAT software "Global mapper" N height data was obtained on the 1-7, 12-19, 23-39-PKs of the left shores of the CK-4.3 collector in the Abdulla Nabiev area.

Table 1. Information received through electronic total station and satellite navigation systems.

No.	Electronic tachymeter data				Information about satellite navigation systems			
H	**The right side is ground level**	**Left bank**	**100 m intervals**	**Water level**	**Water level**	**100 m interval pickets**	**Right bank**	**The left side is ground level**
PK1	324.26	321.50	321.05	317.61	317.61	321.09	321.93	324.52
PK2	324.52	321.68	321.12	317.67	317.67	321.04	321.81	324.92
PK3	324.98	321.81	321.31	317.75	317.75	321.44	321.67	324.89
PK4	324.73	321.68	321.25	317.81	317.81	321.33	321.76	324.84
PK5	324.44	321.57	321.32	317.87	317.87	321.51	321.62	324.57

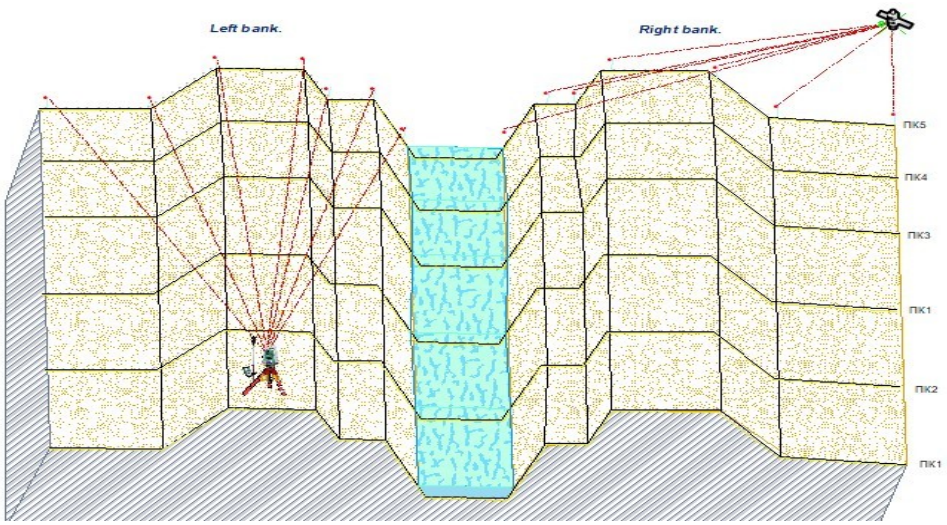

Fig. 4. Methods of obtaining H height data on the right and left banks of the Melirotiv channel at intervals of 100 m.

A comparison and equalization of the data is shown in Figure 3, where the H heights of the right and left banks, collector were obtained by geodesic methods along the left bank with a modern electronic total station, while the data obtained by satellite navigation systems along the right bank were used in the GIS software "Global mapper" based creation works are displayed. Here, the information on the heights between 100 m PKs (left and right banks, ground level of the collector, its lower water table and water levels on the right and left side of the collector) is presented.

The measurement results of the melirotiv channel at a distance of 7.5 km It was carried out on the basis of the analysis of the melirotiv channel of the territory of Koson district (CK-4.3) organization and design work of "repair and restoration of irrigation canals and

drainage collectors". The main indicator values of the above-mentioned data are fully explained in the applications of the research, and geodetic and topographical works were carried out in field conditions and camera conditions within the framework of the cooperation agreement, and in addition, the renovation of the 3.5 km long collector in the area of the Abdulla Nabiev massif (CK-4,3) and it is justified that the restoration works are covered with the help of GAT software.

5 Conclusion

The results of scientific and practical reasoning on improving geodetic and topographical field research during the appearance and repair of hydrotechnical structures with the help of GAT technologies were analyzed.

The indicator of geodetic and topographical research directly serve to design hydrotechnical structures, i.e., to obtain a number of elevations, height and plan information in the process of topographical research in irrigation and drainage canals, to apply them to production, and to some extent to update the scope of work.

There are opportunities to improve geodetic and topographical field research appearance and repair of irrigation canals and drainage systems using GAT technologies. This can also be seen in performance analysis above-mentioned scientific and practical justification that the execution of project markings in local conditions is a rather complicated and laborious process.

The indicators show that, taking into account that the data presented in Figure 3 above are represented by the same height value of the right and left banks of the collectors, GAT programs in certain areas are also in order to develop geodetic field research, increase measurement accuracy and reduce manpower and working time. We consider it appropriate to organize geodetic works with the help of. As mentioned above, using the "Global mapper" program, which is part of GIS technologies, allows not only to improve geodetic and topographical work and increase the quality of work, but also to save time and economic efficiency.

References

1. I.Yu. Belov, Development and methodology for taking into account the influence of external conditions on the results of geodetic light-range measurements. Dissertation for the degree of Ph.D. GUZ
2. GOST R 51774-2001 "Electronic total stations. General technical conditions", IPK Publishing house of standards, 10 (2001)
3. V.L. Assur, M.N. Kutuzov, M.M. Muravin, Higher geodesy ("Nedra", Moscow, 1979)
4. Geodetic methods for studying the deformations of the earth's crust on geodynamic polygons (Methodological guide) (SNIIGAiK, Moscow, 1985)
5. M. Scaioni, M. Marsella, M. Crosetto, V. Tornatore, J. Wang, Sensors, **18**, 11 (2018)
6. S.A. Tashpolatov, O.P. Islamov, A.N. Inamov, A.P. Pardaboyev, Modern geodetic instruments, Textbook. "TIQXMMI" MTU, 253 (2022)
7. E.N. Agafonov, A.S. Maslennikov, Field tests of the light range finder 2ST10, Geodesy and cartography, **2**, 48-50 (1990)
8. T.M. Aliyev, P.R. Stendal, Automatic correction of errors, M.6 Energy, 216 (1975)