Maintaining the state cadaster of the territories on the base of remote sensing materials

Olim Allanazarov[1*], *Sanjar* Khikmatullaev[2], and *Utkir* Islomov[2]

[1]Tashkent State Technical University, 100095, Tashkent, Uzbekistan
[2]National Research University "TIIAME", 100000 Tashkent, Uzbekistan.

Abstract. In the past, remote sensing was limited to the use of the visible part of the electromagnetic spectrum, the part of the spectrum that is invisible to the human eye can now be used with the help of spectral filters, photo films and other types of sensors. Also, the view of the earth was applied to practice and to solve life problems, for example, we can cite air reconnaissance during World War II. Aerial photographs provided the opportunity to observe the location of the enemy's army quickly and more safely than observation from the ground. Aerial photographs allowed military maps and information about strategic locations to be updated quickly and with relative accuracy. Remote sensing is carried out from the air by airplanes and with the help of satellites. Digital cameras, scanners, video images, radar and thermal sensors are also used in remote sensing. Remote sensing is a field that requires fast, accurate and new data collection and is widely used in environmental management. This article presents the stages of creating topographical bases for maintaining state cadastres in the Tashkent region, taking space photos, taking aerial photos, performing geospatial linking, vectoring, and creating electronic digital maps. At the same time, scientific research such as filling the attributes of electronic digital cards and comparative analysis of space photo download sources has been reflected.

1 Introduction

Currently, remote sensing is carried out using aerial methods using aircraft and satellites. Also, in remote sensing, not only photographic films, but also digital cameras, scanners, videos, radar and thermal sensors are used [1]. In the past, remote sensing was limited to the use of the visible part of the electromagnetic spectrum, the part of the spectrum that is invisible to the human eye can now be used with the help of spectral filters, photo films and other types of sensors [2]. Also, the view of the earth was applied to practice and to solve life problems, for example, we can cite air reconnaissance during World War II. Aerial photographs provided the opportunity to observe the location of the enemy's army quickly and more safely than observation from the ground [3]. Aerial photographs allowed military maps and information about strategic locations to be updated quickly and with relative accuracy [4].

* Corresponding author: allanazarov@tdtu.uz

Remote sensing is a complex of disciplines that includes aerial, space photography, image processing and interpretation, photogrammetry, structural metrics, as well as space geography and monitoring. The main area of interaction is the creation of topographic and thematic maps [5].

Nowadays, remote sensing is carried out from the air by airplanes and with the help of satellites. Digital cameras, scanners, video images, radar and thermal sensors are also used in remote sensing. Remote sensing is a field that requires fast, accurate and new data collection and is widely used in environmental management [6-8].

In addition, satellite technologies and the creation of multi-spectral sensors have further expanded the possibilities in this field, with the help of these technologies, it is possible to obtain information about the environment in very large areas of the earth, which is not visible to the human eye [9, 10].

2 Research methodology

Nowadays, remote sensing is widely used in environmental management, an area where fast, accurate and new data collection is required. Satellite technologies and the creation of multi-spectral sensors have further expanded the possibilities, with the help of these technologies it is possible to obtain information about the environment from very large areas of the earth that are invisible to the human eye. In their scientific research, the researchers conducted studies on the creation of cadastral maps of state cadastral objects and the formation of a geodatabase based on remote sensing materials.

Zero meridian starting from London) and correspond to 10N, 11N, 12N and 13N (N-North (North)) zones of the Republic of Uzbekistan (Fig. 1) [2].

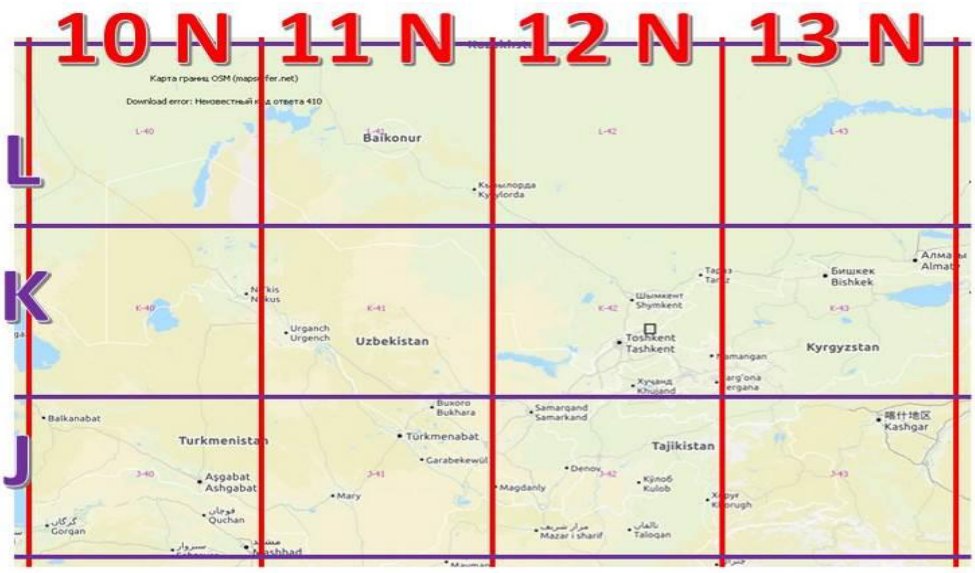

Fig. 1. Classification of the Republic of Uzbekistan by geographical zones.

Zones accept values in a rectangular coordinate system and generally form a zoned coordinate system. In addition, in the process of graphing, lines J, K and L correspond to the territory of the Republic of Uzbekistan. Choosing a zone and coordinate system is important when creating a geodatabase. When creating "Nabor Klassov" it was required to select the area where the research was conducted and to define the zone accordingly.

This article focused on creating cadastral maps of state cadastral objects and forming a geodatabase based on remote sensing materials. In the study of cadastral objects, photos taken from various satellite ships were used.

3 Results and discussion

In order to systematically maintain the state cadastre of the regions, an independent researcher has developed recommendations for the formation of the existing 21 state cadastres in a step-by-step cross-section of scales, in which, initially, it is envisaged to form a general situation of all state cadastres at the state level at a scale of 1:100,000, and at the second stage, 1 per region A scheme for the formation of a geodatabase on a scale of: 10,000 and a scale of 1:2,000 at the district level was developed (Fig. 2) [6].

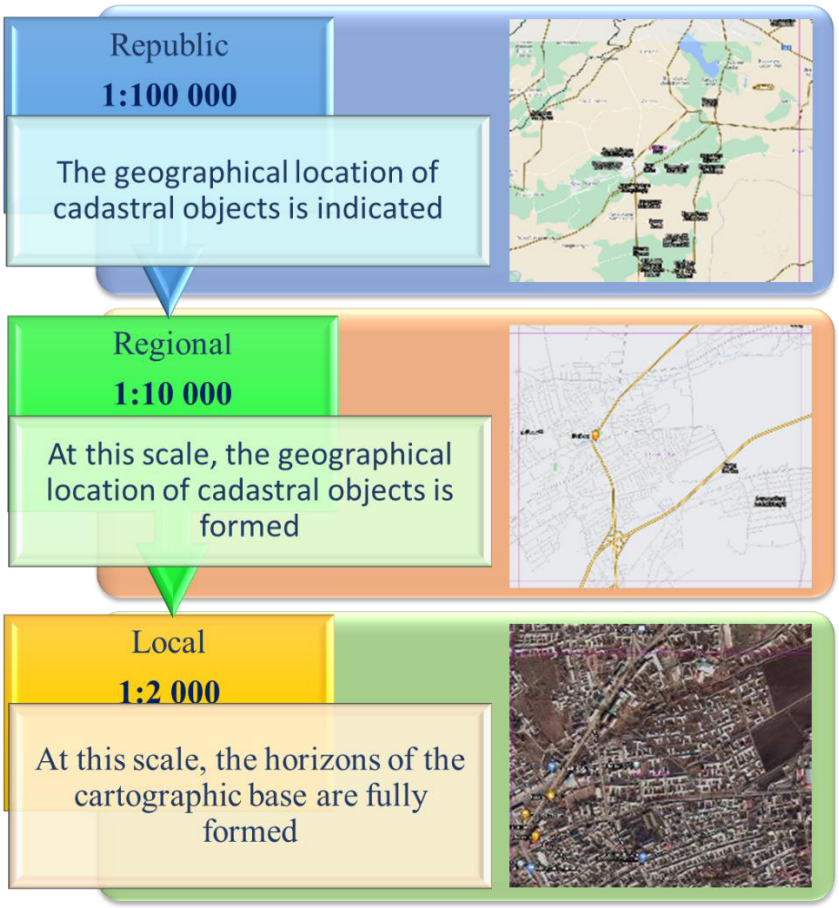

Fig. 2. Scheme of formation of geodatabase at different scales.

On the basis of this scheme, during the formation of cadastral objects at different scales, purposeful service filtration is established. For example, a specified task level was shown to perform query analytics in interactive service delivery to the government. The method of sensing from space means scanning the earth in spectrum rays from 3 types to 11 types with the help of spaceships (sputnik). Aerial sensing means scanning the earth in spectrum rays

from 3 types to 11 types with the help of remotely controlled devices (drones), airplanes and balloons (Fig. 3).

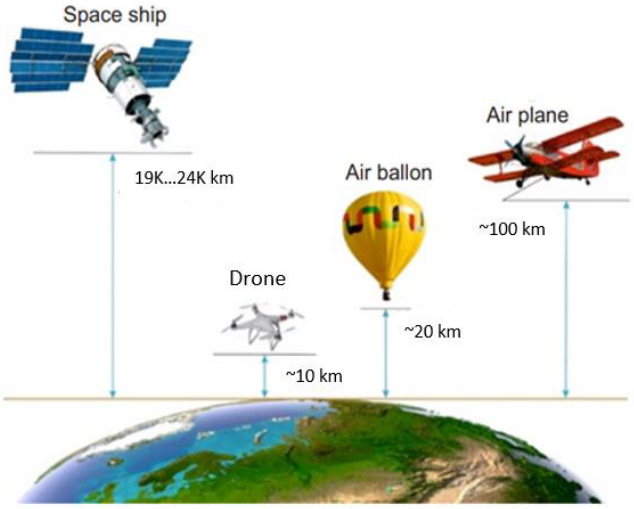

Fig. 3. Interval distances in remote sensing of the Earth.

According to the analysis presented in Fig. 3, the researchers analyzed the spatial data obtained from space and air, and carried out scientific research on qualitative and quantitative indicators. The focus of the study was the comparison of the image taken by the spacecraft with the image taken by the drone, and the result shown in Fig. 4 was reflected. The height of the devices is averaged.

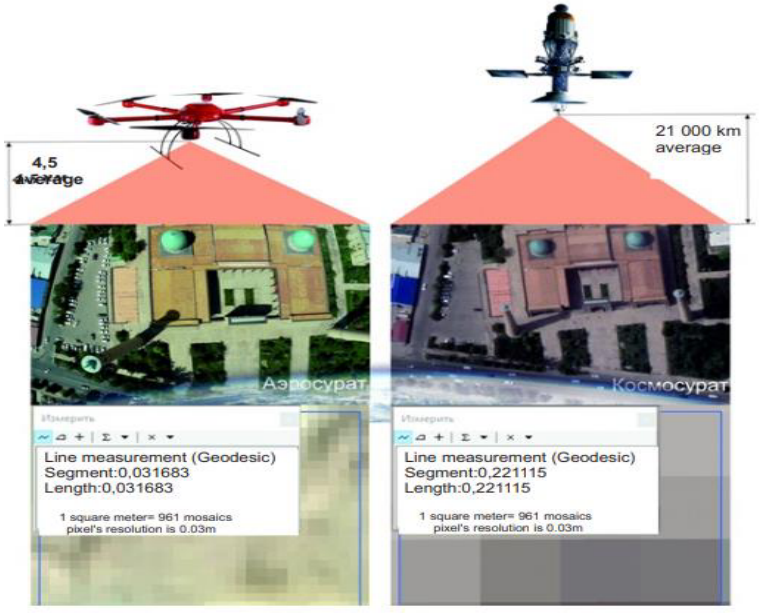

Fig. 4. Spatial data analysis from space and air.

Researchers have improved the methods of creating cadastral maps based on raster data with 3 types of spectrum rays obtained by space probe method.

In order to systematically maintain the state cadastre of the regions, the researchers developed recommendations for the formation of the existing 20 state cadastres in a step-by-step section of scales. 1:2000 scale geodatabase formation scheme was developed.

According to the scientific research carried out by the researchers, it was found that geographic visualization works are being carried out with the help of "SAS Planet" program in the maintenance and formation of state cadastres of the regions. In addition, as a result of research, it became clear that "SAS Planet" program was used by system organizations since 2012, and "Google Earth" program was used before that. "SAS Planeta" software was analyzed in comparison with "Google Earth" software. According to the results of the analysis, it is possible to geospatially link the space images by manually entering the coordinate values and downloading a small piece of the territory, allowing remote study of the territory using space photographs in the Google Earth program. In addition, Google Earth is the only software capable of visualizing space photos with archival data from years ago. This option is not available in the "SAS Planet" program. But it provides the opportunity to fully download the research area and geospatially link the space photos based on an automated system. For this reason, "SAS Planet" software has been approved and introduced by production organizations. Table 1 shows the analytical data on the comparative comparison of the software.

Table 1. Analytical data on the comparative comparison of the software.

No	Criteria	Google Earth (1)	SAS Planet (2)	Choice
1	Download the program	from the Internet	from the Internet	1 and 2
2	Using the program	Free	Free	1 and 2
3	Download scale	By working window extent	According to the specified threshold	2
4	Learning over the years	Available	Not available	1
5	Get coordinate values	Available	Available	1 and 2
6	Define the territory as a whole	Not available	Available	2
7	Download area rounding	Not available	Available	2
8	Geospatial linking of cosmography	Not available	Available	2
9	Cost of using space data	1	22	2
	Total:	**Google Earth**		**4 (1)**
		SAS Planet		**8 (2)**

4 Conclusions

“SAS Planet” program is considered the most effective method in maintaining the state cadastre of territories. Therefore, this software is widely used by relevant official organizations for creating and forming cadastral maps of medium and small scale in the geodatabase. As an innovation by the researchers, he applied his recommendations to production organizations on the formation of large-scale cadastral maps in the geodatabase.

References

1. T.M. Abdullayev, A.N. Inamov, Uzbekistan the ground magazine - Tashkent issue **1**, 23-26 (2020)
2. A. Mitchell. GIS analysis. (ESRI, California, 2005)

3. O.R. Allanazarov, Geographical in studies cartographic of the methods use - T 73-76 (2011)
4. O.R. Allanazarov, E.Yu. Safarov, Sh.M. Prenov, *About application of geoinformation in the education system and communication objects of the state cadaster*. International journal of innovations in engineering research technology (IJIERT), India, pp.18-21 (2018) ISSN: 2394-3696
5. A.N. Inamov, N.T. Mirjalolov, Nauchnyy journal, Internauka, Moscow **14(48)**, 63-65 (2018)
6. S. Narbaev, S. Abdurahmanov, O. Allanazarov, A. Talgatova, I. Aslanov, E3S Web of Conferences **263**, 04055 (2021)
7. A.N. Inamov, N.T. Mirjalolov, Scientific journal, Internauka, Moscow **15(49)**, 87-88 (2018)
8. H.P. Islamov, A.N. Inamov, Nauchnyy journal, Internauka, Moscow **3(9)**, 241-264 (2018)
9. S. Abdurakhmanov, M. Nazarov, O. Allanazarov, M. Yakubov, N. Shamsieva, E3S Web of Conferences **284** (2021)
10. S. Narbaev, S. Abdurahmanov, O. Allanazarov, A. Talgatovna, & I. Aslanov, E3S Web of Conferences **263**, 04055 (2021).