COTTON SCIENCE

The multidisciplinary, refereed *Cotton Science* contains articles that improve our understanding of cotton science. Publications may be compilations of original research, syntheses, reviews, or notes on original research or new techniques or equipment. All manuscripts volunteered or invited, are submitted electronically and directed by the editor-in-chief to the appropriate associate editor for a double-blind peer review. The *Journal of Cotton Science* is published four times a year. Articles are available as Adobe PDF
Cotton Science International scientific journal

Founder and Publisher **Zhōnghuá Mínguó**
Published science may 2021 year. Issued Quarterly.
Internet address: http://journals.company
E-mail: info@journals.company

METHODS OF OBTAINING LAND INFORMATION USING DIGITAL TECHNOLOGIES

N.R. Mashrapov
PhD researcher of The State Scientific and Design Institute “Uzdavyerloyikha”

Abstract. The article highlights the authors’ observation the methods and improvement ways of obtaining land information through the use of modern technologies in the Republic of Uzbekistan.

Keywords: remote sensing of lands, unmanned aerial vehicles (drones), coordinate system, Geodetic and cartographic data, electronic tacheometer.

Introduction. Today, high efficiency is achieved with the use of modern technologies in the monitoring of land areas and the preparation of materials used for obtaining information about the land. For example, drones, space cameras in remote sensing of the earth, various data acquisition opportunities are being created using GPS devices.

In the conditions of the Republic of Uzbekistan, in order to increase the efficiency of the use of land resources, the productivity of agricultural land, as well as to improve the activity of the sector and strengthen its material and technical base, monitoring of agricultural land, planting and maintenance of agricultural crops using unmanned aerial vehicles, geodetic data and cartography has been carrying out systematic work using materials.

In this regard, the use of unmanned aerial vehicles is widely implemented in the country today in the fields of land surveying, land cadastre and land monitoring, as well as in the identification and assessment of changes related to new objects.

Although the use of such devices increases productivity, it requires some economic output. Therefore, we consider it the most appropriate choice to use small-area selection technology only in areas with extremely high change indicators, i.e., 5 points (80%) and above, when planning drone-based surveying work.

We have developed a special technology to detect new objects and estimate the levels of change indicators in an area by means of photographs taken from drones.

Figure 1.

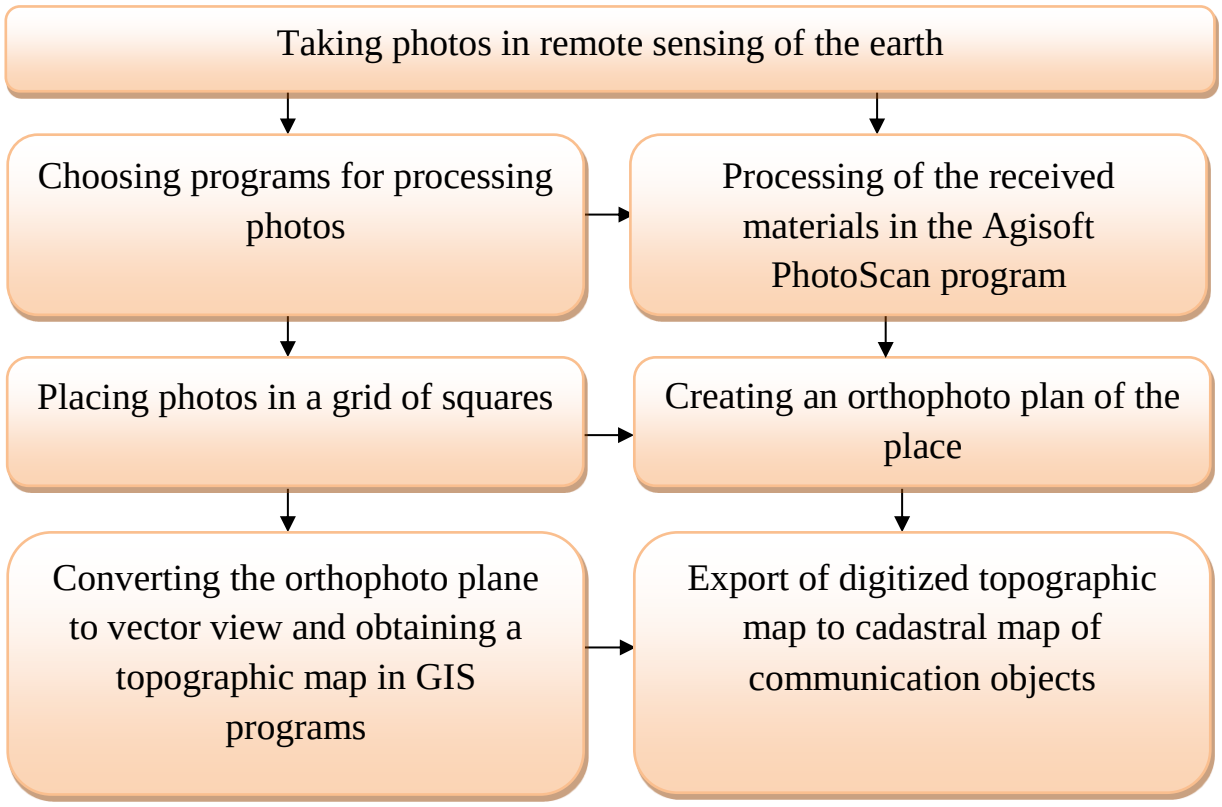

Figure 1. **Technological scheme of processing photos taken from drones**

In the process of shooting with the help of drones, the specialist directly goes to the work area and determines the direction of movement of the drone and programs it. Drone footage speeds up the workflow and costs less than aerial and space photography. Processing of remote sensing data in the AgisoftPhotoscan program is automated in the following sequence:

- first, pictures are uploaded to the program;
- tabular information is loaded on the coordinates of the photos;
- pictures are placed in trapezoids according to the coordinates;
- a point model of the earth's surface is created;
- if there are geodetic networks in place, photo and orthophotoplanes are connected to it;
- the model is optimized and regularized;
- orthophotoplane elevation matrices are exported.

Each of the photos taken by drones will have its own precise coordinate system based on the GPS system built into the device. Photos are placed on the grid created according to these coordinates, and the boundaries of the contours of the objects in the photo are visualized.

As a result, real-time information about the land will be available. The method of comparison is important when creating a digital map of land areas. In this process, a photo of new objects is placed under the existing map, and then the objects on the topo map and the photo are compared.

If the indicators of changes in the place of research are partial or low, these changes are reduced to the old topomap. If the indicators of changes are medium or high, the topo map is re-numbered. If the rate of change is extremely high, 5 points (or 80%) and above, all objects of the search area are photographed again using drones, and the photos taken are completely re-decoded.

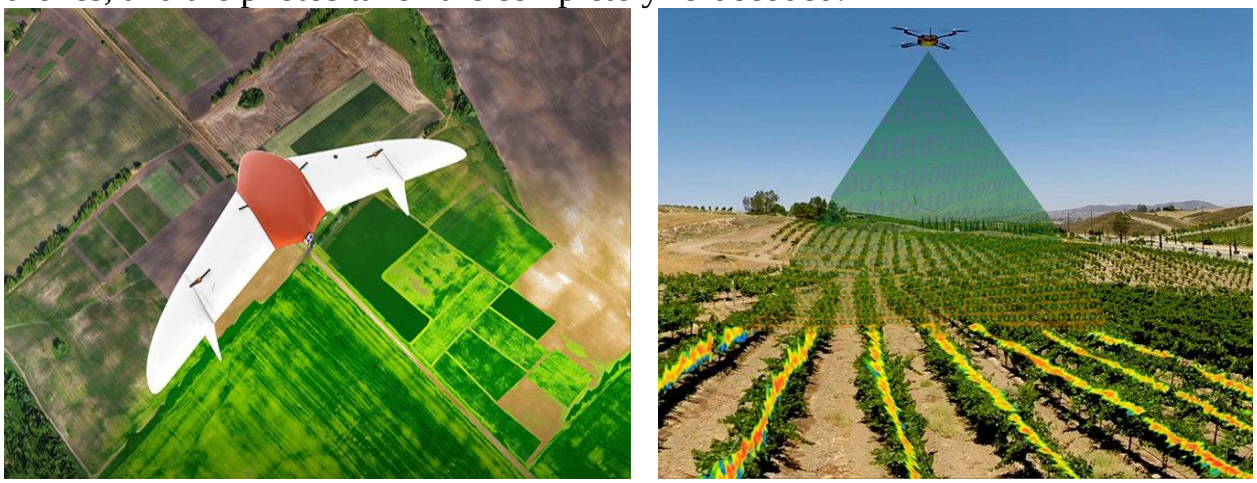

Figure 2. **Land use control by using drones**

Also, the use of modern unmanned aerial vehicles in order to strengthen the control of agricultural land and planting works is considered to be of great importance. Through the effective use of drones in the real sector of the economy, it provides an opportunity to monitor the implementation of land control, planting of agricultural crops and other agrotechnical activities.

With the help of drones, you can get information about the area of fields, complex contours, vegetation and soil conditions. With their help, it is possible to control and carry out land surveying (inventory), quickly create maps of plant indicators, carry out work related to land reclamation, carry out agrotechnical activities and carry out fertilization for planning.

Figure 3. **Creating three-dimensional land models using software**

In turn, if innovative technologies are used in the field of geodesy and cartography, the importance of such technologies in performing field and camera

work is considered very high. At the same time, it is possible to control land use and obtain geodetic-cartographic information about them with high accuracy.

Without geodetic and cartographic data, it is practically impossible to obtain information on any component of the land cadastre. Such information is usually obtained from ground-based imaging, aerial photography, and aerial photography. Cartographic data should provide the main requirement of land cadastre - necessary accuracy of land cadastre data.

In our country, all geodetic works, including cadastral surveys, are carried out in the local coordinate system. Cadastre maps and plans in electronic (digital) form in the format of a program belonging to the ArcGIS family in the state coordinate system of 1942 or in the local coordinate system to form a database of the Unified State Cadastre System implemented in practice in the conditions of the Republic of Uzbekistan, summarized at the district level, the unified electronic digital map of the district as a layer, it is submitted to the National Center of Geodesy and Cartography for the areas of settlements, and for agricultural lands to The state scientific and design institute "Uzdaverloyikha".

Currently, the number of state geodetic points preserved in our country is 6,611, of which 1,539 are state-planned geodetic network points and 5,072 are state-level network points.

Currently, almost all developed countries are creating a geodetic base using global navigation satellite systems to establish geodetic base networks in order to maintain state cadastres.

The analysis of geodetic networks in Fergana region of the country, which was selected as a research object in the course of research conducted by us, shows that there are 754 state geodetic network points and 652 state leveling networks in this region. Of these, 552 state geodetic network points and 402 state leveling networks have been preserved. The rest disappeared for various reasons. Today, 5 modern permanent GPS stations have been installed in Fergana region.

At first, land surveying and design work was done using theodolite and level device. Over time, as a result of the development of science and technology, it was possible to perform such work with the help of modern geodetic devices. For example, now, using electronic tachyometers and GPS devices, the exact amount of land is calculated by coordinates. Measurement works are carried out using Leica FlexLine TS02 plus brand electronic total station and i70 GPS brand devices, 3 geodetic reference points whose coordinates are known for obtaining initial information are determined (Fig. 4).

Figure 4. L**and area measurement process by using an electronic tacheometer and GPG**

Today, opportunities are being created for the use of innovative technologies in order to improve the efficiency of land cadastral works in our Republic. In particular, the use of unmanned aerial vehicles (UAVs) in conducting land monitoring provides an opportunity to conduct quality land monitoring and obtain accurate information.

Geodetic-cartographic data is of great importance in the development of the unified system of state cadastres. Based on this data, it is possible to get all the information about the object. Based on existing geodetic points, the probability of creating maps and plans of the area increases. This, in turn, makes it possible to create electronic digital maps of the area with the help of special programs and obtain information about the area.

In conclusion, it is possible to have accurate and reliable information about the land by applying digital technologies and improving the methods of their use in obtaining land information. For this purpose, it is possible to obtain accurate information on the basis of conducting measurement works using digital technologies on land areas in the course of land development design works, conducting land monitoring by using modern innovative technologies.

References

1. Ўзбекистон Республикаси Президентининг 2019 йил 17 июндаги “Қишлоқ хўжалигида ер ва сув ресурсларидан самарали фойдаланиш чора-тадбирлари тўғрисида”ги ПФ-5742-сон Фармони.

2. Бобер Н.П. Создание геопортала земельно-информационной системы Республики Беларусь // Москва. Geomatics №3, 2011. С. 85-92.

3. Кулибекова Р.Д. «Земельные информационные системы» / Курс лекций. – Махачкала, Россия, 2017. - 76 с.

4. Сафаров Э.Ю., Мусаев И.М., Абдураҳимов Ҳ.А. Геоахборот базаси ва технологиялари / Дарслик. - Тошкент, 2008. - 156 б.

5. Avezbaev S., Avezbaev O.S. “Geoma’lumotlar bazasi va arxitekturasi” O‘quv qo‘llanma TEMPUS dasturining GE-UZ – “Geoinformatika: O‘zbekistonda barqaror rivojlanishga erishishni ta’minlash” loyihasi. - Toshkent: “Iqtisod-Moliya”, 2016. - 215 b.