

## USE OF REMOTE SENSING TECHNOLOGIES IN MAPPING OF AGRICULTURAL CROP TYPES

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### Abstract:

In the article, space images when compiling various maps for remote sensing, when you need to create a thematic map of a particular area, enough information can be obtained from remote sensing signals in a short period of time. This speeds up card production and improves accuracy. The use of remote sensing technologies in crop mapping greatly simplifies the mapping work.

**Keywords:** remote sensing, map, electronic map, monitoring, GPS device, GIS, aerial photography, cadastre maps, crop.

### Introduction

In order to effectively use space technologies in various sectors and sectors of our country's economy, to introduce the space monitoring system and its systematic implementation, according to the decision of the Cabinet of Ministers No. 688 of November 30, 2022 "...monitoring the state of agricultural land use, this including raising the level of detection of cases of illegal land use and arbitrary occupation to 98 percent",... b) introduction of space monitoring in the field of agriculture to determine the actual cultivated area, daily monitoring of the growing season, quick monitoring of crops made it possible to obtain data". "Nowadays, all the leading and many developing countries of the world are carrying out scientific research on the exploration and use of outer space to one degree or another, as well as expanding the scope of space strategies, concepts, programs and plans and making them available. A large amount of funds are allocated for support and development.

"...satellite operators for remote sensing of the Earth are Maxar Technologies (USA), Airbus Defense & Space (France), Planet Labs (USA), ICEYE (Finland), "BlackSky" (USA) "NEAD Aerospace" (China) companies, communication satellite operators "SpaceX" (USA),

"OneWeb" (Great Britain), "SES" (Luxembourg), "Eutelsat" (France), "Viasat" (USA), "Inmarsat" (Great Britain) companies, developers of space image processing software products "ESRI" (USA), "Nexagon" (Sweden) companies are implementing projects in cooperation;

Signals obtained from remote sensing serve as the main method for updating cadastral maps, mapping the location of underground mineral resources, and thereby making predictions. Photos serve as a necessary resource for the systematic organization of land cadastral work, the creation and study of this system, and their mapping. Space pictures have a lot of information when it comes to creating different themed maps. When it is necessary to make a thematic map of a certain area, it is possible to get enough information from signals received from remote sensing in a short time. This speeds up card making and increases accuracy. Over a certain period of time, it is possible to see that the cards have become obsolete [8].

When decoding remote sensing signals for state administration and cadastral purposes, the location of spatial objects is first determined. For this, it is necessary to create a database of components and descriptions of the following spatial data [5]:

identification of spatial objects;

coordination of spatial data;

names of objects, if available, description of address information;

determining topological relationships of spatial objects with other objects.

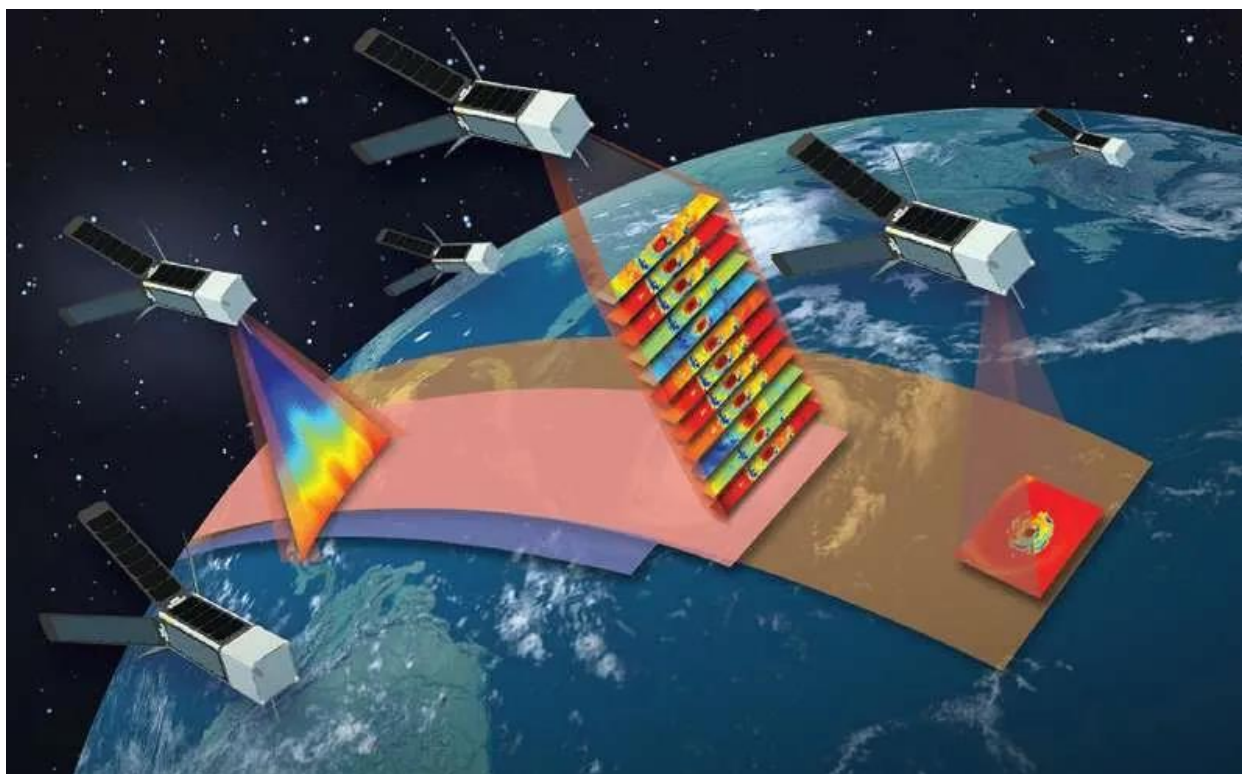
Cadastral maps and plans should be submitted to cartographic fund organizations after updating. This information should be recorded in the following registers: the register of main spatial objects, the register of heights, the register of administrative boundaries and the register of settlements [6]. When creating and updating digital cadastral maps and plans, spatial information is stored in the database of special departments related to the field. When performing this operation, it is necessary to fill and update data in automatic mode, ensuring the identification of objects.

Targeted research showed the need to develop special software tools for creating cadastral map plans and predicting underground mineral resources based on a parallel algorithm of digital processing based on a bicubic spline to the signals obtained from remote sensing of the earth [7].

The Decree of the President of the Republic of Uzbekistan No. PF-5806 on August 30, 2019 on the development of space activities in the Republic of Uzbekistan was signed. According to the decree, "... remote sensing of the earth, satellite communication, navigation, which has the opportunity to increase the efficiency of the fields of agriculture and water management, ecology, telecommunications, geological exploration, cartography, meteorology, seismology and urban planning in the country Space research and technology, such as systems, are almost non-existent. Active investment policy aimed at expanding existing scientific and technological directions and creating new directions with high demand, as well as implemented programmatic measures to improve the standard of living and quality of the population, innovations, nano-technologies, atomic requires the use of

high scientific volume, technological and large-scale areas of activity that have not yet been used, such as energy, space industry [1].

As we know, new technologies are introduced every year. One of these is remote sensing technology. It really has a lot of potential.



1 picture. Electronic using remote sensing data the functional process of creating a map.

Remote sensing is the information obtained by analyzing the information obtained with the help of a device that is not in direct contact with the object, field or event under investigation. The demand for using remote sensing in the development of e-cards is increasing day by day, and it is used to perform the following tasks: stereo coverage, frequent imaging, timely data delivery, large area coverage, global coverage, future map updates storage in digital format and adaptation with modern GAT technologies.

Remote sensing agriculture plays a key role in the economy of developed and developing countries. Agriculture is a solid means of production in economically strong countries or a means of livelihood in backward and overpopulated countries, it plays a huge role in the economy of almost all nations. Food production is important for everyone and economic production of food products is the goal of every farmer, chairman of farmers' association and regional agricultural agencies. The efficiency of the farm and having knowledge and information about the product is the strategy of the farming activity.

Remote sensing technology is of great help in determining crop health, parasite prevalence, damage incidence, yield potential, and soil conditions. Product brokers are also interested

in farmers' production products, because the quality and quantity of the product determines the price of all products in the world market.

Satellite images and aerial photographs are used as mapping tools for crop classification, health and fitness testing, and monitoring of farming activities. In agriculture, remote sensing is used to:

- Classification of crop type;
- Assessment of crop condition;
- Assessment of crop yield;
- Mapping soil characteristics;
- Mapping of soil management practices;
- Compliance monitoring (in farm work).

Identifying and mapping crop types is important for several reasons. The map of crop types is created by state agricultural agencies, insurance companies and regional agricultural enterprises. The purpose of this is to compile a list of what was grown on a given plot of land and when. This, in turn, serves to predict harvest, organize crop rotation, map soil fertility, determine factors affecting crop damage, assess crop damage from drought or heavy rainfall, and monitor farming activities.

In the identification and mapping of crop types, multi-period images are used, and the change of its returnability during the growth of the plant is taken into account in the classification. This in turn requires calibrated sensors for repeated imaging during the growing season. For example, a canola plant is easier to detect when it is in flower, because the change in spectral reflectance coincides with the time of flowering.

Multi-sensor data is more useful than a single sensor as it increases the classification accuracy with the large amount of information it contains ( picture 2).



2 picture. Combined Landsat-TM and SAR data to determine (a) crop type and (b) damaged crop.

Visible and infrared sensing provides information on plant chlorophyll content and canopy structure, and radar provides information on plant structure and moisture. In areas covered



by persistent cloud or fog, the radar is very good at tracking and distinguishing crops with its active detection capability and long wavelength, which is able to pass through water vapor in the atmosphere.

Also, crops usually do not grow evenly across the field, and as a result yields vary from place to place. This difference in crop growth may be due to a lack of nutrients in the soil or other factors. Remote sensing enables farmers to identify crop problems in the field and provide these crops with the necessary nutrients, pesticides and herbicides. With this method, the farmer not only increases the productivity of the land, but also achieves financial savings and reduces the impact on the environment.

Remote sensing can also monitor variable growth in crops located in the same field. Healthy crops appear uniformly light in color, while infected crops appear darker than healthy crops. If the data is georeferenced and we have a GPS device, we can very quickly locate the problem location by matching the local coordinate with the image coordinate.

Remote sensing is used in mapping for the following purposes:

- Creating a contour map;
- Creating a digital elevation model (DEM);
- Making the main thematic map, making a topographical map.

There are 3 main methods of mapping in remote sensing and area monitoring:

1. Field imagery-gathering data using geodetic measuring instruments, observation and location maps.
2. Taking digital pictures of the Earth's surface with the help of equipment specially installed on aerial photography devices (planes, helicopters, etc.).
3. Spatial imaging - taking pictures of the Earth's surface with the help of special equipment installed on space apparatus (sputnik).

Based on the information given above, it can be said that the information obtained by remote sensing serves as the most convenient source in every field, because we can get an effective result by spending less time on the information we receive. This creates great opportunities for effective use of limited resources. Especially in the fields of agriculture and water management, the use of remote sensing materials will make mapping easier.

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