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Structure Of The Underground Water Monitoring Algorithm Based On Remote Sensing Of The Earth

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Abstract *- The article presents the structure of the study of hydrogeological monitoring of groundwater based on remote sensing of the earth. In the article, a groundwater monitoring structure has been developed to study hydrogeological processes based on the modern ERDAS Imagine software environment. The ERDAS Imagine system allows you to directly view and process files of various vector and raster formats, as well as has extensive import and export capabilities for determining groundwater. The effectiveness of groundwater monitoring is to determine the wet layer of a given satellite image area.*

Keywords: *Underground water; monitoring; remote sensed earth; geographic information technology*

The main part. Modern remote sensing methods of objects, especially space ones, have opened a qualitatively new stage in the information support of research and development in Earth Sciences and economic practice.

Currently, most of the Earth's remote sensing data is obtained from artificial earth satellites. A large view of the Earth's surface from the height of the satellite flight, the high speed of movement of satellite bands allow you to get huge amounts of data. The breadth of territory coverage is a characteristic feature of remote land research methods. The organization of work

on the Earth's surface, based on a combination of aerospace methods with a small amount of ground research, which is carried out on a limited number of reference routes and key sites, allows you to significantly reduce the time of work and reduce their cost.

Presently, remote sensing images are aerospace images that are represented digitally as raster images, so the problem of remote sensing data processing and interpretation is closely related to digital image processing.

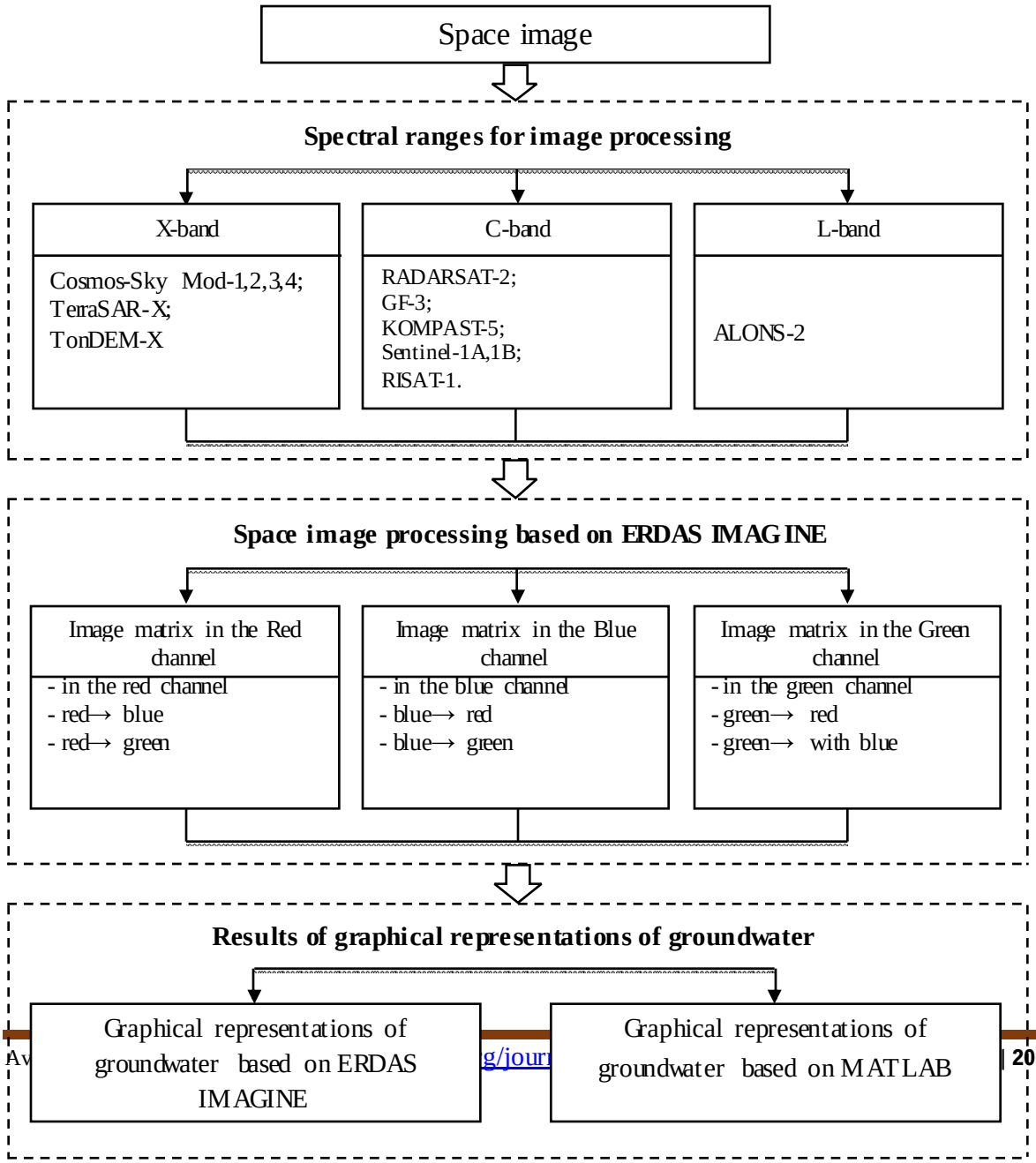
Data from space surveys have become available to a wide range of users and are actively used not only for scientific purposes, but also for production purposes. Remote sensing of the Earth is one of the main sources of current and operational data for geographic information systems (GIS). The main applications of remote sensing of the Earth data from space-a study of the environmental, land use, the study of plant communities, assessment of crop yields, assessment of consequences of natural disasters, etc. In these conditions arises the problem of providing the population with drinking water, exactly in disadvantaged areas.

Currently, there are many different GIS packages that allow you to implement the processing of space survey materials. Depending on the task, you should choose the software and the actual method of automated processing to solve the

problem most effectively and systematically. In addition, the ERDAS Imagine system allows you to directly view and process files of various vector and raster formats, as well as has extensive capabilities for importing and exporting images for determining groundwater. The effectiveness of underground water monitoring is to determine the wet layer of a given area in the satellite image. To do this, use the ERDAS Imagine system effectively in the following order:

- determine the map of the area under study in the Muynak region;
- operation of the space image on the ERDAS Imagine system;
- selection of the spectral range of images of the Muynak region;
- check the histogram of different image ranges;
- operation of the image matrix;
- exploitation of wet layers of the study area;
- exploitation of underground water in wet areas;

To provide the population with drinking water, first of all, it is necessary to determine surface and underground water sources. To determine surface and underground waters, it is necessary to develop a monitoring system in connection with hydro geological parameters. In these conditions, the creation of ground water monitoring based on remote sensing of the Earth is relevant, namely with the use of the software package ERDAS Imagine(Picture 1).


Space image
Spectral ranges for image processing
X-band
Cosmos-Sky Mod-1,2,3,4;
TerraSAR-X;
TonDEM-X
C-band
RADARSAT-2;
GF-3;
KOMPAST-5;
Sentinel-1A,1B;
RISAT-1.
L-band
ALONS-2
Space image processing based on ERDAS IMAGINE
Image matrix in the Red channel
- in the red channel
- red→ blue
- red→ green
Image matrix in the Blue channel
- in the blue channel
- blue→ red
- blue→ green
Image matrix in the Green channel
- in the green channel
- green→ red
- green→ with blue
Results of graphical representations of groundwater
Graphical representations of groundwater based on ERDAS IMAGINE
Graphical representations of groundwater based on MATLAB

Picture 1. The proposed structure for an algorithm for monitoring ground water based on remote sensing of the Earth.

Water resources monitoring involves observing snow and ice cover, determining the characteristics of surface and ground water, and monitoring flooding that can lead to dangerous phenomena.

When ground water sources are directly detected, their access to the surface and the nature of interaction with surface water sources are detected.

Indirect signs on the surface of the sum allow you to detect the presence of ground water and the depth of their occurrence. Delineating aquifers involves assessing the size, quantity, and quality of groundwater sources. If we work on a sequence of groundwater monitoring structure, then we can envy the following results (Fig. 2,3)

Fig. 2. A satellite image of the territory of Muynak

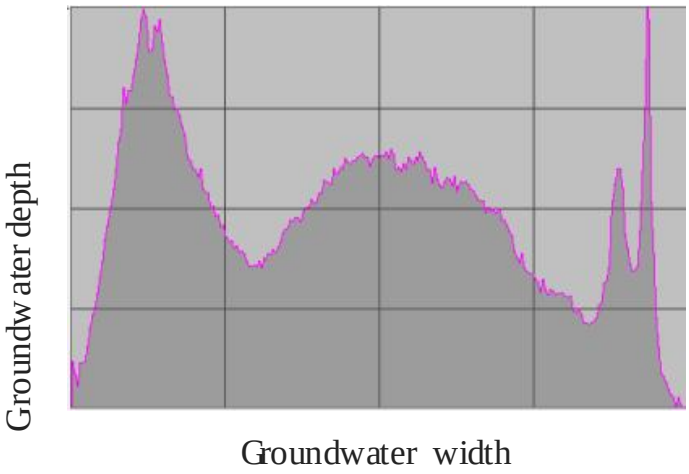


Fig. 3. A satellite image histogram based on the ERDAS IMAGINE system.

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