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СБОРНИК МАТЕРИАЛОВ

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The proceedings are the papers of students, undergraduates, doctoral students and young researchers on topical issues of natural and technical sciences and humanities.

В сборник вошли доклады студентов, магистрантов, докторантов и молодых ученых по актуальным вопросам естественно-технических и гуманитарных наук.

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TYPES AND CLASSIFICATION OF EARTH REMOTE SENSING DATA PROCESSING

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In recent decades, the volume, diversity and quality of remote sensing materials has increased significantly. The main purpose of the use of remote sensing data (ERS) is to recovery useful information from them that is used to compile topographical and thematic maps, land inventory, ecological and geographic assessment of territories, research of the dynamics of natural and anthropogenic objects and phenomena, creation of operational and forecast maps and etcIt is also clear that further progress in the development of geographic sciences will be inextricably linked with the use of ERS materials and the improvement of processing technologies.

Considering that at the present time a significant part of RS data is obtained in digital form, in this area there is a transition to digital methods of processing remote information. The effectiveness of the use of remote materials depends not only on the cartographic-photogrammetric features of the original image, but also on the accepted methodology of working with them and the processing methods used. It is at the stage of choosing suitable methods and algorithms for work that there are often significant difficulties, since the methods in this area are predominantly problem-oriented and there is no general approach to improving the images. Consequently, the study and systematization of methods is an actual problem.

Classification and analysis of methods for processing Earth remote sensing materials

All methods of processing remote sensing images can be divided into two main groups:

1) image enhancement (image pre-processing, image correction). These are methods that ensure the transformation of images aimed at facilitating visual interpretation, increasing its objectivity and reliability, as well as preparing images for subsequent automated interpretation and mapping;

2) thematic image processing (recovery of information from remote sensing images). These are methods of automated decoding - classification of objects from images using a priori information about the features of the allocated classes or without it.

Characterizing the first group of methods, it can be noted that these methods are predominantly problem-oriented; So, the method of improvement, which is useful for one image, does not necessarily prove useful to another.

Thus, there is no general approach to image enhancement. The choice of methods depends, first of all, on the nature of the data, the purpose of the processing, the knowledge of the area represented and the preparedness (experience in performing image enhancement work).

Nevertheless, three main types of image correction, including geometric, radiometric and luminance transformations can be distinguished in the basis of the process for improving remote sensing data.

Geometric correction is based on the principles of digital photogrammetry. As a result of the geometric transformation, the coordinates of the elements of the digital image are associated with spatial coordinates (geographic or geodetic), and the image is transformed into a given projection. The image can be coordinated by rotating the image (since the coordinate axes of the digital snap-

shot, as a rule, are not parallel to either the grid of parallels and meridians or the grid of rectangular coordinates).

To do this, the method of entering "clean" pixels is used, which does not require image reconstruction [1].

Radiometric correction is a correction of equipment radiometric distortions caused by the characteristics of the imaging device used and the transmission medium (atmosphere). Radiometric correction of Earth Remote Sensing data is performed basically by two methods: using known parameters and settings of the survey instrument (correction tables) or statistically [2]. In the first case, the necessary correction parameters are determined for the sensor based on long-term ground and flight tests. In the second case, the improvement is performed by detecting a defect and its characteristics directly from the image to be improved. The quality of the improvement in the first case is higher than in the statistical method, since this takes into account the features of the sensor that created the image. Types of defects in images that are eliminated by radiometric correction: bad pixels, dropping lines, modulation (banding), distortions due to the influence of the atmosphere [3].

The second group of methods for processing remote sensing materials concerns the extraction of information from processed materials. This process is carried out by logical and arithmetic operations, analysis classifications and other methodical techniques. This includes visual interpretation of the image on the computer screen, which is carried out using a stereo effect. A key role in the thematic processing phase is assigned to classifications, the essence of which is the sorting of image pixels into a finite number of classes based on certain values of characteristics. The classification procedure is based most often on statistical analysis of various image characteristics: spatial, spectral or temporal. There are two main approaches to classification: pixel-oriented and object-oriented classification. The classification procedure is based most often on statistical analysis of various image characteristics: spatial, spectral or temporal. There are two main approaches to classification: pixel-oriented and object-oriented classification.

Analysis of the methods of digital processing of RS images, developed to date, made the following conclusions:

- for working with remote data and extracting information from them, special processing methods are required, which can be divided into two groups

- methods for improving images and methods of thematic processing. Currently, these methods are implemented in image processing systems and specialized software; - in the field of processing ERS materials, a lot of experience in image recognition and decoding has been accumulated, but there are no universal methods for fully automated image decoding;

- since the thematic processing of ERS materials at the present stage is made directly by the consumer, the choice of optimal methods for image enhancement and thematic processing depends on the purpose and objectives of the studies.

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ЗАМАНАУИРОБОТТАНДЫРЫЛҒАНТАХЕОМЕТРЛЕР

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