Резюмета* на научните публикации

на доц. д-р инж. Деница Борисова

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представени за участие в конкурс за заемане на академичната длъжност „Професор“, в област на висше образование 4. Природни науки, математика и информатика, професионално направление 4.4. Науки за Земята, научна специалност „Дистанционни изследвания на Земята и планетите” за нуждите на секция „Системи за дистанционни изследвания” при ИКИТ-БАН, ДВ бр.96/19.11.2021

Група	Публикации и абстракти
В.4. Научни публикации в издания, които са реферирани и индексирани в световноизвестни бази данни с научна информация (Web of Science и Scopus)	
B4_1	Borisova D., B. Banushev, D. Petkov, R. Nedkov, D. Avetisyan, 2017. Optical hyperspectral measurements of rocks and soils in Central Srednogorie, Bulgaria. Proc. SPIE 10444, Fifth International Conference on Remote Sensing and Geoinformation of the Environment (RSCy2017), SPIE, DOI:10.1117/12.2277508, pp.104441O-1-104441O-7. Abstract: Remote sensing is the technique of acquiring, processing, and interpreting images and multi channels spectral data, acquired from optical imager sensors mounted on aircraft and satellite platforms recording the interaction between investigated objects and electromagnetic energy. Remote sensing application in Earth observation begins with the design and development of equipment for carrying out research of the monitored objects remotely and without disturbing their integrity. Ground-truth data in Earth observation of the environment and in the remote sensing investigations are very important. In this work remote sensing images are used for mineral exploration in different applications for mapping geology and recognizing soils and rocks by their spectral signatures. We are used Landsat, ASTER and Sentinel satellites images used to interpret both structures, soils and rocks. For data verification hyperspectral systems USB 2000 and NIRQUEST 512.2 of Ocean Optics Inc. are used in laboratory and field spectrometric measurements. They provide to define finest spectral characteristics of soil minerals and rocks for their identification. The obtained spectral data are compared with similar data from different instruments for Earth observation included in the spectral libraries. They correspond to the shape of the spectral signature in the same spectral range obtained with other spectrometers. These promising results encourage us to plan the next campaigns for the field spectroscopy measurements in different regions of Bulgaria.
B4_2	Borisova D., D. Petkov, R. Nedkov, H. Nikolov, V. Dimitrov, M. Goranova, D. Avetisyan, K. Radeva, 2018. Remote sensing measurements in creating thematic spectral library. Proc. SPIE 10773, Sixth International Conference on Remote Sensing and Geoinformation of the Env. (RSCy2018), SPIE, DOI: 10.1117/12.2326005, pp.107730D-1-107730D-7. Abstract: In Earth observations the reference spectra of well-described objects are required for better object-oriented interpretation of remotely sensed data from laboratory, field, airborne, and satellite sensors. For this purpose measurements of spectra using laboratory and field spectrometers are performed. The acquired spectra are used in creating a thematic spectral library. The used spectral instruments work in the wavelengths (0.4 to 2.5 microns) covering the spectral ranges from the visible /VIS/ to the shortwave infrared /SWIR/. Two different spectrometers are used to measure spectra included in the library: (1) Thematically oriented multichannel spectrometer covering the spectral range 0.4 to 0.9 microns and (2) high resolution NIRQuest spectrometer covering the range from 0.9 to 2.5 microns, both models of Ocean Optics Inc. Spectrometric measurements of representative samples of minerals, rocks, related soils, vegetation, and their natural mixtures are made in laboratory and field conditions. In some cases, samples were purified, so that the unique spectral characteristics of the studied objects could be related to their typical structure. The relations between the spectra and the structures are important for interpreting remotely sensed data acquired in the field or from an air- or space-borne platform. In some cases for making easy wide use of the spectra in the library the obtained spectra have to resample to selected broadband multispectral sensors for example those based on the satellites Landsat and Sentinel. The obtained spectral data with the metadata and additional information are planned for including in files for better interpretation of images with different spatial resolution.

B4_3	Borisova, D., Goranova, M., Hristova, V., Avetisyan, D., Kisyov, A., 2019. Spectral and petrophysical data for filling in thematic database in Earth observation over test site. Proc. SPIE 11174, Seventh International Conference on Remote Sensing and Geoinformation of the Environment (RSCy2019), 11174, SPIE, ISSN:0277-786X, DOI:10.1117/12.2533480, 111740A-1-111740A-8. Abstract: In the presented work the team of PhD students and post-docs aim to collect spectral and petrophysical data for filling thematic database in Earth observation. The spectral data are result of performed laboratory spectrometric measurements of collected rock samples from a test site in Bulgaria. The petrophysical data are result of performed measurements of the petrophysical properties of the collected rock samples from the same test site. The main result of the project work is collect information for filling thematic spectral database in remote sensing monitoring of land covers in a selected test site in Bulgaria. This activity is also in line with the Copernicus of the EC. Filling the database with additional information about collected rock samples such as petrophysical data will lead to upgrading of the measurement methods and in monitoring of different types of land covers and the creation of interdisciplinarity in different fields geosciences and Earth observations. The results will increase efficiency of research investigations in remote sensing monitoring of land covers, synergy between different fields of science, and shared information.
B4_4	Borisova, D., Goranova, M., Hristova, V., 2019. Remote sensing of land covers over a test area. 10th Congress of Balkan Geophysical Society, BGS 2019, EAGE Publishing BV, ISBN:978-946282303-7, https://doi.org/10.3997/2214-4609.201902643, 171-175. Abstract: Remote sensing methods as a part of geophysics have wide applications in different areas of science and practice. In the presented work the team of PhD students and Post-docs aim to collect spectral data for filling in thematic database. The spectral data are result of performed laboratory and terrain spectrometric measurements of the presented in a test area land covers (minerals, rocks, etc.). The result of the project work is collection of remote sensing data and additional information for filling in thematic spectral database in remote sensing monitoring of land covers in Novi Iskar region, Sofia, Bulgaria. Therefore the results will increase efficiency of research investigations in remote sensing monitoring of land covers, synergy between different fields of science and practice, and shared information between researchers.
B4_5	Borisova, D., Hristova, V., Dimitrov, V., Nikolov, H., Goranova, M., 2019. Thematic spectral remote sensing data in land covers' monitoring over test region. Proc. SPIE 11156, Earth Resources and Environmental Remote Sensing/GIS Applications X, 11156, SPIE, ISSN:0277-786X, DOI:10.1117/12.2533119, 111560C-1-111560C-6. Abstract: In this work a project for the implementation of remote sensing research activities for the acquisition of new knowledge and encouraging the participation of the PhD students of Remote Sensing Systems /RSS/ Department at SRTI-BAS in these activities is presented. The goal of the project is collecting data through spectral measurements for land cover monitoring in a selected test region in Bulgaria and create an open access spectral database. The first task of the work to collecting spectral measurements data is related to the methodology of acquiring in-situ spectral data of land covers in test site. Methodology follows the next steps of 1) collecting samples and additional information; 2) laboratory and field spectrometric measurements; 3) spectral data verification. For the implementation of the steps the test region is selected meeting the following requirements: i) Offers a wide variety of objects from the adopted nomenclature; ii) Has spectral data from Earth Observation device systems; iii) Has the possibility to perform regular measurements with available spectrometric systems. According to the described conditions the test region around the town of Novi Iskar is chosen. In CORINE Land Cover database for this area the presence of 12 classes of land covers has been verified which has to be characterized in detail on the basis of the received data. Each one will be recorded in the created database which is the next project task. This will allow the data received in the experiments to be considered reliable and representative. For monitoring purposes the data could be interpolated for larger areas with similar land covers to trace the dynamics of objects using spectral data.

B4_6	Borisova, D., Hristova, V., Dimitrov, V., Nikolov, H., Goranova, M., 2020. Spectral measurements over test site “Novi Iskar” for creating a specific data base. Proc. SPIE 11524, Eighth International Conference on Remote Sensing and Geoinformation of the Environment (RSCy2020), 11524, SPIE - The International Society for Optical Engineering, ISSN:0277-786X, DOI:10.1117/12.2570741, 115240E -1-115240E -7. Abstract: The authors aim to present the collecting of in-situ spectral data for filling in a thematic database of Earth observation as a part of joint project. In-situ spectrometric measurements were made for acquiring spectral data of the rock samples during and after a field campaign in the selected test site. The selected test points are around the town of Novi Iskar where space test site "Novi Iskar" is established. The related land covers in the studied area will also be taken into account in the analysis of satellite images of the region. These in-situ measurements are part of an integrated system for remote sensing and ground-based observations and in line with Copernicus In-Situ Component. In-situ spectrometric measurements have potential for long-term practical application to verify data, which increases their accuracy. Filling in the thematic database for monitoring over test site with the collecting spectral and ancillary data leads to an optimal correlation between the different methods of studying the different types of land covers, increases the effectiveness of scientific investigations in the field of Earth remote sensing, creates synergy between different scientific fields and helps to share information between researchers from different areas of scientific and practical interest. The team is developing a data base structure which is going to be available through SRTI-BAS website. The data base is going to include information about specific spectral properties of the studied objects in the test site. This work is supported by "National Science Fund" in Bulgaria under Contract number KP-06-M27/2.
B4_7	Borisova, D., Hristova, V., Dimitrov, V., 2020. Thematic spectral library for remote sensing monitoring of land covers in local scale. Proc. SPIE 11534, Earth Resources and Environmental Remote Sensing/GIS Applications XI, 11534, SPIE, ISSN:0277-786X, DOI:10.1117/12.2573378, 1153408-1-1153408-9. Abstract**:** Monitoring of the Earth land covers is one of the most important areas in applying remote sensing data. In-situ measurements are necessary to confirm the performance of remote sensing devices through evaluation of data quality. These measurements are performed in established space test sites and serve as datasets presented in open database for referencing remotely sensed data to ground-truth spectral ones, for enhancement of data accuracy and for verification of information extraction techniques. This paper describes the creation of standard experimental data set as a part of a project financed by Bulgarian National Science Fund. This local thematic spectral library is going to allow direct comparability of data from various sources including from available spectral databases. The deliverables are summarized in chapters including information about the used spectrometers and the methodology of measurements; the description of studied land covers in the points of measurements; the additional information such as GPS coordinates and atmospheric conditions for the monitored land covers in appropriated format. It should be noted that the spectral measurements are made with different instruments with proper calibration sources. The final result is creating of a thematic spectral library in local scale as an open access database. For user friendly access to the library without specific programs, simple text versions of the spectral data, their visualizations, and text files in HyperText Markup Language (HTML) format with the metadata and the additional information is used. The authors intended to propose the possibility for exploiting the spectral data from specialists working in different areas following the procedures for accessing the thematic spectral database and downloading the spectral data. This work is supported by "National Science Fund" in Bulgaria under Contract number KP-06-M27/2.
B4_8	Atanassov V., D. Borisova, D. Petkov, H. Lukarski, 2017. Characterization of imaging spectrometers. Proc. SPIE 10423, Sensors, Systems, and Next-Generation Satellites XXI, SPIE, ISSN 0277-786X, DOI: 10.1117/12.2278498, pp.1042323-1-1042323-7. Abstract: The increasingly widespread applications of the Earth observation system information and the rapid development of modern technologies over the past decades have led to the imposition of remote sensing tools and, in particular, of the imaging spectrometers. These trends place high demands on the development and improvement of both the systems themselves and the characterization methods. This paper highlights features that are expected to be considered critical for imaging spectrometer performance: The basic steps for

	characterization of imaging spectrometer critical characteristics are indicated in the flow diagrams. The characterization methods and correspondence correction procedures are determined and the obtained results are presented.
B4_9	Atanassov, V., Borisova, D., Petkov, D., Dimitrov, V., Vasileva, H, Goranova, M., 2018. Multisensor Earth observation systems: data fusion. Proc. SPIE 10785, Sensors, Systems, and Next- Generation Satellites XXII, 10785, ISSN:0277-786X, DOI:10.1117/12.2325731, 107851R-1-107851R-6. Abstract: Advancements in modern technologies, such as remote sensing systems and instruments have led to rapid developments in the field of Earth observation /EO/. As a result, enormous volumes of EO data with various spatial and spectral resolutions are obtained. However, the expected enhancements in the classification accuracy still have not been reached, due to the complexity of the remote sensing measurements and the big volume of data that need to be processed. The last leads to the necessity of development and improvement of methods and techniques for data obtaining and analysis. The methods include the validation multi-sensor systems, the processing technique of big data, and the object identification and classification methods for improving information quality through data fusion. To achieve correct information with highest accuracy in data analyzing and interpreting, researchers have to apply these methods and to create technologies for obtaining and integrating data from different Earth Observation Systems /EOS/. For gathering and using all of the information a local and regional EOS of Systems needs to be established. By creating such local EOS of Systems more extensive information could be collected, analyzed and retrieved. In this paper a local system is presented, focusing on the description of the ground component. The main sensors embedded in the system are spectrometers. The working range of the multi-sensor system is VIS-NIR-SWIR. Thus, by applying the data fusion methods, combining images and spectral information, a more accurate thematic interpretation is achieved. Example illustrating the benefits of a multisensor system data fusing is presented and discussed.
B4_10	Hristova, V., Cherneva, G., Borisova, D., 2021. Radio communication system with a high degree of protection of information against non-allowed access. Proc. SPIE 11866, Electro-Optical and Infrared Systems: Technology and Applications XVIII and Electro-Optical Remote Sensing XV, 11866, SPIE, ISBN:9781510645769, ISSN:0277-786X, DOI:10.1117/12.2600499, 1186612-1-1186612-5. Abstract: A characteristic feature of the modern level of development of radio communication systems is the problem of increasing their security and resilience in transmitting information. There are increasing requirements for the secrecy of transmitted information, both for military and civilian radiocommunication systems. The protection of information from unauthorized access and the security of the connection are based on many different methods of hiding messages so that they are incomprehensible to a eavesdropper who has intercepted a hidden message. The paper presents a method of an improved information protection against non-allowed access by scrambling and descrambling on two levels. On the first level this process directly concerns the primary signal, which is a carrier of information in digital kind. The second level has controlling functions in regard to the random sequences. They change in time according to a given dependency defined by a code combination. The input information spectrum expands by switching a number of pseudo random sequences. Switching is controlled by another similar sequence, the symbols of which last much longer. The proposed method is characterized by advantages in relation to the already-known methods of protection against the non-allowed access with information transmitting in the expanded spectrum systems. The disadvantage of the system is the necessity of elements for coordinating and synchronizing the information and control components of the system. The method can be applied to the modern telecommunication systems of expanded spectrum with high requirements related to the protection of information against non-allowed access. One possible application is in remote sensing in terms the acquired data requiring protection against non-allowed access. This work is supported by Bulgarian National Science Fund under Contract number КР-06-М27/2 (КП-06-М27/2).
Г.7. Научна публикация в издания, които са реферирани и индексирани в световноизвестни бази данни с научна информация	
Г7_1	Richter A., M. Kazaryan, M. Shakhramanyan, R. Nedkov, D. Borisova, N. Stankova, I. Ivanova, M. Zaharinova, 2017. Estimation of thermal characteristics of waste disposal sites using Landsat satellite images. Comptes rendus de l'Académie bulgare des Sciences (Proceedings of the Bulgarian Academy of Sciences), 70(2),

Г7_1	Издателство на БАН "Проф. Марин Дринов", ISSN 1310–1331, pp. 253-262. Abstract: The aim of this work is to develop a thermal model of waste disposal sites /WDS/ as a part of the complex analysis of the WDS using Landsat satellite images. In the paper an integrated thermal model of WDS is proposed. In the model a lot of thermal parameters such as temporal temperature variations of WDS surface, thermal risks, epicenters and thermal isolines, temperature forecasting, and thermal stabilization are included. The temporal temperature variations as seasonal and chronological changes are presented. The following approaches are proposed: assessment of the fire risk and the decay risk in WDS through calculating the surface temperatures; detection of the thermal isolines and the thermal epicenters; estimation of the temperature stabilization and the time stabilization in the WDS. An algorithm for applying the images as time-series of temperatures in the surroundings of the specified WDS for the specified thermal characteristics of the WDS and displays the thermal model of the landfill. A method of converting the sensor data into the temperature values, the methods of regression analysis (the estimation of the regression line, the estimation of periodic and trend components of the temperature time- series), the limit filtering method, method of risk assessment of fires and decay in WDS are presented and applied. The proposed methods and algorithms are tested for two WDS near Moscow – Kutchino and Torbeevo. The general classification of the thermal characteristics of the WDS is presented.
Г7_2	Richter A., M. Kazaryan, M. Shakhramanyan, R. Nedkov, D. Borisova, N. Stankova, I. Ivanova, M. Zaharinova, 2017. Quality enhancement of satellite images and its application for identification of surroundings of waste disposal sites. Proc. SPIE 10444, Fifth International Conference on Remote Sensing and Geoinformation of the Environment (RSCy2017), http://dx.doi.org/10.1117/12.2277309, pp. 104441N-1-104441N-7. Abstract: The paper proposes a method for fuzzy interactive enhancement of objects identification in the image which allows identifying hidden or no defined details and objects in the images. The application of the method and its difference from other image enhancement techniques are shown. The paper presents the algorithm and describes the basic processing procedures (sampling, scaling, convolution, contrast). The main processing parameters (increasing and reduction of dimensions, convolutions, brightness, and thresholds contrast) are demonstrated. The results from the applied algorithm are explained on an example related to landfill Kutchino in the Moscow region, on the satellite images with low and high spatial resolution.
Г7_3	Ivanova I., R. Nedkov, D. Borisova, 2017. Application of SAR data for seasonal monitoring of floating reed islands dynamic in Srebarna Lake. Proc. SPIE 10428, Earth Resources and Environmental Remote Sensing/GIS Applications VIII, SPIE, ISSN 0277-786X, DOI: 10.1117/12.2278542, pp. 104280M-1-104280M-8. Abstract: The aim of this paper is seasonal monitoring of floating reed islands dynamic in Srebarna Lake (Bulgaria), using SAR data. In order to study the seasonal dynamic of floating reed islands (such as absolute and relative movement) the only opportunity which provides high-tech methods based on space remote sensing was used. Sensors by suitable parameters for data registration for this type of unsystematic landscape units were used. SAR data (Synthetic Aperture) are powerful high-tech tool for monitoring from the ground objects. SAR data images are privileged to register data at any time of the day or night and in adverse weather conditions, which are the main limiting factor in optical images. Seasonal monitoring of floating reed islands using SAR data was performed - winter - when the water in the lake is frozen, then a relative movement of these islands was observed, spring - melting snow cover and rising water level in the Danube River and Srebarna Lake was observed, when the water level is raised. Obtained results give a quantitative assessment of the ecological dynamics of these types of specific habitats in Srebarna Lake. They show the movement of the islands through the seasons in the period of six mounts, the changes in their shape and size. Regular seasonal monitoring of the floating reed islands dynamic is very important for their preservation as a specific habitat.

	Avetisyan D., R. Nedkov, E. Velizarova, D. Borisova, 2017. SAR and optical data in land degradation processes estimation: a case study from Southeast Bulgaria. Proc. SPIE 10428, Earth Resources and Environmental Remote Sensing/GIS Applications VIII, SPIE, ISSN 0277-786X, http://dx.doi.org/10.1117/12.2277945, pp. 104281D-1-104281D-9.
Г7_4	Abstract: Soil is a dominant factor of the terrestrial geosystems in semi-arid and dry sub-humid zones, particularly through its effect on biomass production. Due to the climate changes and industrial development, soil resources in these zones are prone to degradation. On the other hand, degradation processes cause changes in land cover. Remote sensing optical data are widely used in the process of determining land cover change whereas SAR data is suitable for determination of soil moisture dynamics. In the present study, Tasseled Cap Transform (TCT) and modified Change Vector Analysis (mCVA) techniques are applied to Landsat and Sentinel 2 data in order to be determined magnitude and direction of land cover changes in the semi-natural areas of Haskovo Region, Southeast Bulgaria. The study of the vector direction presents some distinct changes in the soil characteristics for the whole territory and significant changes in vegetation characteristics and moisture content in part of the semi-mountainous territories of the examined region. It has been found that the magnitude of those changes increases up to 50% in some of the territories under investigation. SAR data has been used to evaluate the relative soil moisture content in various soil differences and to trace its dynamics during growing season. In order to achieve this aim, Relative Soil Moisture Index (RSMI) is used. The index estimates the relative variation of volumetric soil moisture content in a given time period and enables determination of its change in relative values. On the basis of integrated application of aforementioned techniques, a model providing key information about the impact of soil moisture change and dynamics upon processes related to land cover change. The suggested model is appropriate for estimation of ecosystem services and functions delivered by landscapes in semi-arid and dry sub-humid zones.
	Kazaryan M., M. Shakhramanyan, R. Nedkov, A. Richter, D. Borisova, N. Stankova, I. Ivanova, M. Zaharinova, 2017. Research of generalized wavelet transformations of Haar correctness in remote sensing of the Earth. Proc. SPIE 10427, Image and Signal Processing for Remote Sensing XXIII, SPIE, ISSN 0277-786X, http://dx.doi.org/10.1117/12.2278572, pp. 104271U-1-104271U-13.
Г7_5	Abstract: In this paper, Haar's generalized wavelet functions are applied to the problem of ecological monitoring by the method of remote sensing of the Earth. We study generalized Haar wavelet series and suggest the use of Tikhonov's regularization method for investigating them for correctness. In the solution of this problem, an important role is played by classes of functions that were introduced and described in detail by I.M. Sobol for studying multidimensional quadrature formulas and it contains functions with rapidly convergent series of wavelet Haar. A theorem on the stability and uniform convergence of the regularized summation function of the generalized wavelet-Haar series of a function from this class with approximate coefficients is proved. The article also examines the problem of using orthogonal transformations in Earth remote sensing technologies for environmental monitoring. Remote sensing of the Earth allows to receive from spacecrafts information of medium, high spatial resolution and to conduct hyperspectral measurements. Spacecrafts have tens or hundreds of spectral channels. To process the images, the device of discrete orthogonal transforms, and namely, wavelet transforms, was used. The aim of the work is to apply the regularization method in one of the problems associated with remote sensing of the Earth and subsequently to process the satellite images through discrete orthogonal transformations, in particular, generalized Haar wavelet transforms. General methods of research. In this paper, Tikhonov's regularization method, the elements of mathematical analysis, the theory of discrete orthogonal transformations, and methods for decoding of satellite images are used. Scientific novelty. The task of processing of archival satellite snapshots (images), in particular, signal filtering, was investigated from the point of view of an incorrectly posed problem. The regularization parameters for discrete orthogonal transformations were determined.

Г7_6	Borisova, D., Banushev, B., Nikolov, H., Petkov, D., 2017. Hyperspectral measurements for rock identification. Proceedings of the 9th Congress of the Balkan Geophysical Society, European Association of Geoscientists and Engineers, EAGE, ISBN:9789462822368, DOI:10.3997/2214-4609.201702589, 497-501 Линк Abstract: Remote sensing investigations and applications in Earth observation /EO/ begins with the design and development of equipment for performing research of the monitored objects remotely and without disturbing their integrity.Ground-truth data in EO of the environment and in the remote sensing are very important. In present paper satellite remote sensing images are used for supporting mineral exploration and mapping geology and for recognizing rocks by their spectral signatures. We are used Landsat and Sentinel satellites images for detecting rocks in the studied area of Sredna Gora Mountain. For data verification hyperspectral systems in visible and infrared spectral regions are applied for laboratory and field spectrometric measurements. They provide spectral data to define finest spectral characteristics of rocks for their identification. The obtained spectral data are compared with similar data from different instruments for EO included in the spectral libraries (USGS and JPL) for data verification. The shape of the spectral signature based on the acquired spectral data in the same spectral range corresponds to the data obtained with other spectrometers. These promising results encourage us to plan the next campaigns for collecting mineral and rock samples for the laboratory and for the field spectrometric measurements in different regions of Bulgaria.
Г7_7	Avetisyan D., E. Velizarova, R. Nedkov, D. Borisova, 2018. Assessment and mapping of the current state of the landscapes/ecosystems in Haskovo region (southeastern Bulgaria) in relation to ecosystem services using remote sensing and GIS. Sixth International Conference on Remote Sensing and Geoinformation of the Env. (RSCy2018), SPIE, DOI: 10.1117/12.2325894, ISSN 0277-786X, pp.107731P-1-107731P-9. Abstract: Assessment and mapping of the ecosystems state in the context of ecosystem services that they supply are important tasks to improve human well-being, especially in regions with considerable land degradation. Haskovo region is situated in the Southeastern part of Bulgaria and is considered as an extremely sensitive to land degradation in terms of climate change and human activities in result of unappropriated land management practices. In order to improve the conservation activities and ecosystem services of the region, rapid and available technics are needed in addition to the used analytical methods. The study presents the potential of remote sensing methods (satellite data from different sensors Sentinel and Landsat) and GIS for assessment of the current state of the landscapes to supply ecosystem services and allows a comprehensive evaluation of the main indicators for assessment of ecosystem services to be performed. The proposed methodology includes application of vegetation indices (NDVI, NDWI and MSAVI2) and SAR data. The results show that the referred technics can be used for a rapid and accurate assessment of the main indicators showing the state of the terrestrial ecosystems such as: soil degradation, land use and impact of human activities, responsible for the ecosystem services supply.
Г7_8	Radeva K., I. Ivanova, D. Borisova, 2018. Application of remote sensing for ecosystems monitoring and risk assessment. Sixth International Conference on Remote Sensing and Geoinformation of the Env. (RSCy2018), SPIE, https://doi.org/10.1117/12.2325854, pp.107731Q-1-107731Q-7. Abstract: In recent years on the territory of Bulgaria it has been observed the existence of events with extreme character - floods, forest fires, etc.- that have a negative effect on ecosystems and ecosystem services. The purpose of the present research is the application of remote sensing for ecological monitoring implementation for the ecosystems upon the appearance of natural hazards. In this paper a methodology for ecological monitoring in different temporal intervals has been proposed and additionally the results from the application of remote sensing for the purpose of ecosystem monitoring and risk assessment in case of events that induce negative effect on ecosystems have been presented. The methodology and criteria have been implemented in observing different types of ecosystems. For the purpose of the present investigation satellite data with different spatial, temporal and spectral resolution from Sentinel 2, Landsat and air photo images have been used. Terrestrial data have been used for results verification and validation. The introduced results have been obtained for different temporal intervals from ecological monitoring, on which base criteria for optimization of the temporal characteristics of the ecological monitoring have been suggested.

	The present research is with conformance of Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora and Directive 2009/147/EC on the conservation of wild birds. The results from the completed research can be of benefit for defining concrete actions for the implementation of measurements appointed in the Action Plan for nature, people and the economy of 27.4.2017 COM(2017) 198.
Г7_9	Hristova, V., Borisova, D., 2018. Experimental study on segmentation methods in road recognition. Proc. SPIE 10790, Earth Resources and Environmental Remote Sensing/GIS Applications IX, 10790, SPIE, ISSN: 0277-786X, DOI:10.1117/12.2327133, 107901W-1-107901W-9. Abstract: The digital image processing is extremely important for numerous areas as a significant one is Earth observation. The identification of the land cover using satellite images is very important for most of the economics spheres. The image segmentation is known as a basic option for the process of classification. It works as an improving element for the performance and for the accuracy. The main role behind the image processing is to provide the recognition of the shapes and objects in an image. In this process a segment has a significant role. A segment is actually a homogenous part of any image. The survey of image processing applications shows examining, refining and combining of already outlined segments are featured. The delineation of the segments is momentous, too, when it comes to the quality of the results. The main goal behind this article is to make a comparison between effectiveness of several graph-based image segmentation algorithms in segmenting of the roads. These are the best merge algorithm of Beaulieu, Goldberg and Tilton, the tree merge segmentation of Felzenszwalb, the minimum mean cut segmentation of Wang and Siskind and the normalized cut algorithm of Shi and Malik. The represented methods in this article are used in segmentation of orthophoto image of an urbanized zone including roads. The image is determined as a matrix of pixels, while they are also vectors of the intensity numbers, which are usually registered by the remote sensing sensors. The results from the experiments are shown, discussed and lead to following conclusions. The tree-merge segmentation by Felzenszwalb and Huttenlocher is not suitable in the road segmentation. Thematic preciseness of the normalized cut segmentation by Shi and Malik is not shown the needed accuracy in this experiment. The best merge method by Tilton shows the most satisfying indexes.
Г7_10	Ivanova I., Nedkov R., Borisova D., Stankova N., 2018. Using SAR and optical data from Sentinel satellites for precise modeling of seasonal floating reed islands dynamics in Srebarna Lake. Proc. SPIE 10790, Earth Resources and Environmental Remote Sensing/GIS Applications IX, 10790, SPIE, ISSN:0277-786X, DOI:10.1117/12.2325703, 107900E-1-107900E-7. Abstract: The present study is a continuation of the previous monitoring studies on floating reed islands based on remote sensing methods, but this time the study is much more precise in order to create a sustainable operating model for subsequent monitoring studies on this specific type of habitats. The aim of this study is to create a precise model for the movement and dynamic of the floating reed islands in Srebarna Lake. This was done by creating a hybrid model (based on optical and SAR data), assessing the actually condition of floating reed islands, and applying it to quantify of the movement of floating reed islands to perform an actual and seasonal habitats monitoring. To create the hybrid model, the advantages of SAR data - Sentinel-1 for the hydrological dynamics monitoring of Srebarna Lake were used. The SAR data used were obtained for different time periods, within the observed seasons. Multispectral satellite data from Sentinel-2 was also used in order to apply an orthogonal transformation model called Tasselled Cap Transformation (TCT). The Tasselled Cap model is a very effective method for classifying and analyzing processes related to the dynamics of changes affecting the main components of the Earth's surface: soil, water, and vegetation. This model proved to be very effective in recognizing specific types of vegetation and habitats, such as floating reed islands and their transformation over a period of time. The results for the reconciliation of TCT images and SAR data define very well the precise boundaries of both the central water body in Srebarna Lake, and the floating reed islands. The results obtained by means of comparative analysis confirm both methods as being equally effective to determine the floating reed islands dynamics in the hybrid model proposed in this study.

Г7_11	Stoyanov, A., Borisova, D., Radeva, K., 2018. Application of SAR and optical data from Sentinel satellites for spatial-temporal analysis of the flood in the region of Bregovo-Bulgaria, 11/03/2018. Proc. SPIE 10783, Remote Sensing for Agriculture, Ecosystems, and Hydrology XX, 10783, SPIE, ISSN:0277-786X, DOI:10.1117/12.2325773, 107831K-1-107831K-7. Abstract: This research presents the results of a survey on the extent of the affected areas in the municipality of Bregovo from the flood of the Timok River, which occurred on 11.03.2018. The application of SAR and optical data for assessment of the spatial and temporal characteristics of the occurred flood is the objective of this paper. This methodology applies orthogonal transformation of different multispectral images from Sentinel 2 mission combined with SAR data from Sentinel 1. The assessment was made on the basis of the orthogonal transformation' components of the bands from different multispectral Sentinel 2 imagery: Tasseled Cap Transformation TCT-brightness, TCT-wetness, TCT-greenness. Indicators of quantitative changes in areas affected by the floods have been obtained. Satellite images from Sentinel 1- SAR and Sentinel 2-MSI satellite missions, orthophotography, terrestrial and in-situ terrain data from the Bregovo municipality affected by flooding were used. The processed satellite images are from different sensors and are selected by different dates before and after the day of the natural disaster. Pseudocomposite radar images with different polarization (vv,vh) were used to clarify and more precisely visualize the territorial coverage of the flood in the surveyed area. Various normalized quantitative differentiation indices (vegetation, humidity, vapors, etc., NDGI,) are generated after image processing. Results are presented for correlation between the values obtained for the different data types. On the basis of the obtained data and results, a comparative analysis of the dynamics of the changes occurred as a result of the disaster was carried out and a quantitative assessment of the changes occurred and respectively the registered negative environmental impacts in the territorial extent of the flood.
Г7_12	Vasileva, T., Nedkov, R., Borisova, D., Sholev, D., 2018. MODIS satellite data for estimating actual evapotranspiration in Bulgaria (2000-2014). Proc. SPIE 10783, Remote Sensing for Agriculture, Ecosystems, and Hydrology XX, 10783, SPIE, ISSN:0277-786X, DOI:10.1117/12.2325771, 107830G-1-107830G-9. Abstract: In the present paper, the actual evapotranspiration for the territory of Bulgaria on an annual basis for the period 2000- 2014 has been modeled, using satellite data MOD16A3. The data was received by means of remote sensing from a MODIS sensor. Raw evapotranspiration (ET) data were integrated and processed in GIS environment in order to obtain the final goal of finding 2D distribution of the qualitative values of the actual evapotranspiration (AET) for the territory of Bulgaria. In order to generate the relevant values for the annual AET in the area, a model was developed using the MOD16A3 evapotranspiration dataset. In the present paper, the actual evapotranspiration was estimated as a function of the land cover and a digital elevation model. The results obtained show the relationship between the actual evapotranspiration, the land cover and a DEM. In the process of research, some trends for the annual quantity of AET were estimated. The model for the quantitative area estimation of the evapotranspiration developed in the study has already been applied to the catchment area of Lefedzha River (located in northern Bulgaria). It was established that the satellite data give a more representative and reliable information on the spatial distribution of the AET on a regional scale. These methods have less human interference in obtaining information about the individual physical parameters on which the process of evaporation depends. In the MOD16 product the temperature of the spreading surface that influences the evaporation processes was recorded.
Г7_13	Avetisyan, D., Nedkov, R., Borisova, D., Cvetanova, G., 2019. Application of spectral indices and spectral transformation methods for assessment of winter wheat state and functioning. Proc. SPIE 11149, Remote Sensing for Agriculture, Ecosystems, and Hydrology XXI, 11149, ISSN:0277-786X, DOI:10.1117/12.2538117, 1114929-1-1114929-10. Abstract: As a commercial activity, agriculture is aimed primarily at production and relies on the availability of natural resources. The development of commercial activities has brought new environmental pressures on the natural capital stock. Technological progress and the desire to maximize returns and minimize costs have produced a marked intensification in agriculture over the last 40 years. Intensification can lead to degradation of soil, water and air. Water scarcity and related with it droughts have now emerged as a major challenge - and

Г7_13	climate change is expected to make matters worse. In the last decades, Bulgarian agricultural sector is also negatively impacted by climate changes and water scarcity. Vegetation growing is limited by water scarcity and it is necessary to figure out the vegetation dynamic changes and responses to climate change to estimate the quality of ecosystems and maintain optimal ecosystem functioning. Water status can be effectively monitored by utilizing spectral indices and spectral transformation methods. Vegetation, water stress, and soil moisture indices are important to assess the crop state and its response of changing environmental conditions and to determine irrigation scheduling. The spectral transformation methods are very effective for interpretation and analysis of phenomena and processes related to the dynamics of change of the main components of the Earth surface. In the study Tasselled Cap model and obtained from its application Normalized Difference Greenness Index (NDGI) and Normalized Difference Wetness Index (NDWnI) will be applied. Microwave and optical satellite data, acquired by the sensors Sentinel 1 and Sentinel 2 of the European Space Agency Program for Earth Observation "Copernicus", as well as climate data will be used.
Г7_14	Dancheva, A., Nedkov, R., Borisova, D., Spasova, T., Georgiev, N., 2019. Using optical and radar images to study the thermal pollution from the waste disposal site around Vidin area. Proc. SPIE 11149, Remote Sensing for Agriculture, Ecosystems, and Hydrology XXI, 11149, Society of Photo-Optical Instrumentation Engineers (SPIE), ISSN:0277-786X, DOI:10.1117/12.2538116, 1114928-1-1114928-9. Abstract: One of the main issues that concerns mankind today is the problem of domestic waste and how it affects climate change, air pollution and the environment. In the present work the heat pollution from the waste disposal site is tracked at various time points. The waste disposal site near Vidin was selected for the purpose of the research. Optical satellite data from the Sentinel 2 multi-spectral instrument (MSI) and synthetic - aperture radar (SAR) data from the Sentinel 1 platform of the Copernicus program of the European Space Agency were used. The Landsat 5 -7 (ETM) and Landsat 8 (OLI / TIRS) sensors were used to calculate the surface thermal pollution of the waste disposal sites. Orthogonalization of satellite imagery was made to trace the dynamics of the main components of the Earth's surface - vegetation, moisture and soil. On this basis, a correlation is made to trace the link between the different components of the Earth's surface at different time points. Climate data on average air temperature, evapotranspiration, radiation and rainfall was used and a comparative analysis of surface temperature from landfill and climatic data was made.
Г7_15	Dancheva, A., Spasova, T., Borisova, D., 2019. Evaluation of temperature changes in waste disposal sites according to satellite data. Proc. SPIE 11174, Seventh International Conference on Remote Sensing and Geoinformation of the Environment (RSCy2019), 111741Q, 11174, SPIE, ISSN:0277-786X, DOI:10.1117/12.2533609, 111741Q-1-111741Q-10. Abstract: The temperature of Earth's surface is one of the most frequently used parameters when researching chemical and physical processes and phenomena. This paper analyses temperature changes in some waste disposal sites (WDS) on the territory of Bulgaria and they are different according to their spatial distribution. The results for different points in time are obtained using remote sensing methods and GIS. Spectral reflectance characteristics of the WDS are used for the evaluation of these changes (collected through the satellite data by multispectral instrument (MSI) of the platform Sentinel 2 of the Copernicus program). The data evaluated is for average air temperature, evapotranspiration, radiation and rainfall. The heat thermal band of the sensors Landsat 5 - 7 (ETM) and Landsat 8 (OLI/TIRS) is used for the measurement of land surface temperature, especially the heat transfer from the WDS, as this band has a high spatial resolution and is suitable for the observation of the dynamics in the processes on surface of the Earth. The satellite images selected for this purpose are from different seasons in different years. A comparative analysis between the surface temperature of the WDS and the climate data used has been carried out. In order to trace the dynamics of the main components of the surface (vegetation, soil, moisture) the satellite images have been orthogonalised.

Г7_16	Filchev, L., Teodosiev, D., Nedkov, R., Borisova, D., Kehayov, B., Iliev, I., Tsvetkov, T., 2019. Web based EMF monitoring in urban environment. Proc. SPIE 11174, Seventh International Conference on Remote Sensing and Geoinformation of the Environment (RSCy2019), 11174, Society of Photo-Optical Instrumentation Engineers, ISSN:0277-786X, DOI:10.1117/12.2533559, 111741S-1-111741S-9 Abstract: The development of mobile communications in the past decade imposed a real risk to human health. The ever growing technology needs and developments in the telecommunication technology are one of the environmental issues of the urban environments. One solution to accommodate the technology developments is to optimize the mobile communications network which is a topic of investigation of many scientific and technology teams. In order to optimize the network it is necessary to make regular measurements and assess the risk on human health and optimize the mobile network on the basis of software defined radio /SDR/. In European Union /EU/ and in Bulgaria are present regulations for the control of electromagnetic field /EMF/ emissions. Investigation of the EMF pollution on the territory of Sofia municipality is performed within the domain from 100 MHz to 7 GHz using standard measurement equipment, and portative field spectrometer based on SDR. The characteristics of the three spectrometers provide for a more in depth analysis of the EMF sources. The field measurements are continuous during day and nighttime. The data is stored in a personal geodatabase format (ESRI Inc., Academic license) and MySQL and stored on the FTP server of Technical University /TU/ of Sofia IT infrastructure. The data is visualized on a web-portal developed by TU team. In conclusion is analyzed the opportunities for urban developments in view of urban planning for the development of the city of Sofia in compliance with national and EU environmental legislation.
Г7_17	Stoyanov, A., Georgiev, N., Gigova, I., Borisova, D., 2019. Application of remote sensing data for monitoring of forest vegetation on the territory of nature park “Blue Stones," Bulgaria. Proc. SPIE 11149, Remote Sensing for Agriculture, Ecosystems, and Hydrology XXI, 11149, SPIE, ISSN:0277-786X, DOI:10.1117/12.2538115, 1114927-1-1114927-7. Abstract: The aim of the study is to give assessment of and monitor the vegetation's condition of the forest areas in which territories the predominantly forest species of the plantations is Eastern Mysian beech (Fagus orientalis), by combinative approach of Remote Sensing's methods and generation of different vegetation indices (NDVI, NDGI). SAR and optical data of the Sentinel when the phenophase of the forest vegetation is the most active, from April to July, respectively, for the years of the selected period were chosen. Tasseled Cap Orthogonal Transformation is applied to the selected images, resulting in three components - TCT component of the "brightness", TCT component of the "wetness" and the TCT component of the "greenness". In the present research, the TCT component of the "greenness" was used, which is giving more accurate and precise data on the current state of the forest vegetation. A comparative analysis of the processed data obtained from the applied different methods and vegetation indices has been made, in order to select the higher quality and more precise results with purpose the analysis and assessment of the state of forest vegetation on the territory of the Natural Park.
Г7_18	Teodosiev, D., Nenovski, P., Chamati, M., Borisova, D., Nikolova, T., 2019. Indexing of ULF/ELF electromagnetic emissions as a health and life quality factor. 10th Congress of Balkan Geophysical Society, BGS 2019, EAGE Publishing BV, ISBN:978-946282303-7, DOI: 10.3997/2214-4609.201902637, 141-145. Abstract: The authors of the presented work aim to present a project for future work in the field of electromagnetic geophysical methods for applying ULF/ELF electromagnetic emissions measurements as a health and life quality factor. The sources of ULF and ELF are various and could be classified as outer and internal in respect the place of generation. The outer, generally, are geomagnetic pulsations, the Schuman resonance, thunderbird activities having at all global character. The outer sources are due to natural magneto telluric currents generated in globe core, or a product of artificial radar work of humans reaching tens of MW of power. The level of ULF and ELF variations is an important parameter that directly influences the live cells metabolism. The expected results are: - Development of indexing methodology of the ULF/ELF variation; - Comparison between the traditional indexations and the proposed one;

	- Elaboration of a practical evaluation scale having direct impact on the human's health and the live quality; - Development of a measuring system for extending existing one; - Informing the public with adequate information as a media announces, workshop etc. about the nature, the benefits and the level of damage caused by these radiation, especially of the ULF/ELF diapason.
Г7_19	Kazaryan, M., Shakhramanyan, M., Nedkov, R., Borisova, D., Avetisyan, D., 2019. Fractal presentation of space images during waste disposal sites monitoring. Proc. SPIE 11174, Seventh International Conference on Remote Sensing and Geoinformation of the Environment (RSCy2019), 11174, SPIE, ISSN:0277-786X, DOI:10.1117/12.2532890, 111741O-1-111741O-7. Abstract: While constructing a mathematical model of the space observation system for information processing of the data of monitoring the territories on the presence of the waste disposal sites (WDS), we have a stochastic process with a fractal structure. The physical processes of the WDS are formed under the influence of thermal, chemical, etc. factors. There are different methods and approaches for describing the scattering and radiating surfaces of the objects that make up solid household and industrial waste using single-scale and multi-scale correlation radii. With an increase in the order of multi-scale, the multi-scale of the correlation radius also increases, and this, accordingly, complicates the construction of a mathematical model of a space image. The transition to the fractal presentation of the image allows solving the problem of the space images processing. The paper proposes some algorithm for processing the aerospace images using a field of fractal dimension. The theoretical and experimental studies are being held with respect to improving the results of aerospace image classification results while monitoring for the WDS presence. An assessment of the size of the "window" and the magnitude of the "jump" on the parameters of the fractal dimensions is also made. The purpose of the work is to describe the system synergistic approach of multi-scale selection, which allows overcoming the problems of the image processing. This is due to incomplete knowledge of signals, non-stationarity, non-Markov, noise singularity based on preliminary information about the spatial scales of the detected signals. While working with low-contrast images, the usual signal processing technique (contour-texture, spectral methods) does not adequate. There is a need to apply the theory of fractals in the study of processes occurring on the surface of the WDS through remote sensing. An experiment is carried out using the example of fractals, an image is decoded. The features of fractals are considered.
Г7_20	Ivanova, I., Stankova, N., Borisova, D., Spasova, T., Dancheva, A., 2021. Dynamics and development of Alepu marsh for the period 2013-2020 based on satellite data. Proc. SPIE 11863, Earth Resources and Environmental Remote Sensing/GIS Applications XII, 1186315, SPIE, ISSN:0277-786X, DOI:10.1117/12.2597726, 1186315-1-1186315-9. Abstract: Alepu marsh is a protected area in the category of natural landmarks, part of the Ropotamo Ramsar site and sand dunes Alepu. It is situated on the Bulgarian Black Sea coast, within Burgas Province, south of the resort town of Sozopol. It is also situated within the territory of the protected area of the European ecological network Natura 2000 under the Birds directive - Ropotamo Compex. Alepu marsh is covered with reeds and other swamp vegetation. The area is habitat for many rare animals and plant species. The main problem of this area is the overgrowing with reeds and the gradual swamping that leads to reduction of the open water areas in the protected area. This leads to the loss of valuable habitats, and respectively their inhabiting animal and plant species. In the study paper assessment of the dynamics of the marsh for a period of eight years (2013 - 2020) was done. Data from Landsat 8 and Sentinel 2 were used. Classification of NDVI was made for this study period. Sentinel 2 data were also used to apply an orthogonal transformation model that classifies and analyzes the processes associated with the dynamics of change affecting the main components of the earth's surface: soil, water and vegetation. The NDGI model was also used, which evaluates the dynamics of the vegetation in the marsh. The results obtained show a monitoring of the wetland for a sufficiently long period of time, which gives an idea of its condition and the need to take the necessary conservation measures for its protection.

	Spasova T., Dancheva A., Ivanova I., Borisova D., Stankova N., 2021. Monitoring of surface water bodies by Sentinel and open data. Proc. SPIE 11863, Earth Resources and Environmental Remote Sensing/GIS Applications XII, 118631B, 11863, SPIE, ISSN:0277-786X, DOI:https://doi.org/10.1117/12.2600282, 118631B-1-118631B-8.
Г7_21	Abstract: The main purpose of this research is interoperability of data from different sources and creation of innovative models with high value data such as satellite information and Earth data and solutions for public administrations, business and citizens. Building base data to inform and train stakeholders and promote the adoption of good practices and innovations in environmental monitoring is also a leading goal. An assessment was made of several surface water bodies that have acquired personal types of permits for use and construction. The methodology contains a model of Open data processing steps, which are published in the Open Data Portal of the State Agency "E-Government" in Bulgaria, satellite data from Sentunel-1 and Sentune-2 and terrestrial data from many different monitoring devices. Different formats are integrated, and for this aim there must be transdisciplinary knowledge and a complex approach. Composite images of optical and SAR data, TCT and terrestrial data from Environmental assessments and data from Basin Directorates in Bulgaria are combined. The model is further verified by the spectral characteristics of the objects, transformed images into dD (decibels) and statistical data. The interoperability of the data in this model will be a tool for restoring cooperation, coordination and communication between central and local administration, supply of services from the public sector, academia, business, NGOs and IT companies, development of solutions or information processing, in case of geospatial information and Environmental monitoring.
	Avetisyan, D., Borisova, D., Velizarova, E., 2021. Integrated evaluation of vegetation drought stress through satellite remote sensing. Forests, 12, 8, MDPI AG, ISSN:1999-4907, DOI:10.3390/f12080974, 974-1-974-32.
Г7_22	Abstract: In the coming decades, Bulgaria is expected to be affected by higher air temperatures and decreased precipitation, which will significantly increase the risk of droughts, forest ecosystem degradation and loss of ecosystem services (ES). Drought in terrestrial ecosystems is characterized by reduced water storage in soil and vegetation, affecting the function of landscapes and the ES they provide. An interdisciplinary assessment is required for an accurate evaluation of drought impact. In this study, we introduce an innovative, experimental methodology, incorporating remote sensing methods and a system approach to evaluate vegetation drought stress in complex systems (landscapes and ecosystems) which are influenced by various factors. The elevation and land cover type are key climate-forming factors which significantly impact the ecosystem's and vegetation's response to drought. Their influence cannot be sufficiently gauged by a traditional remote sensing-based drought index. Therefore, based on differences between the spectral reflectance of the individual natural land cover types, in a near-optimal vegetation state and divided by elevation, we assigned coefficients for normalization. The coefficients for normalization by elevation and land cover type were introduced in order to facilitate the comparison of the drought stress effect on the ecosystems throughout a heterogeneous territory. The obtained drought coefficient (DC) shows patterns of temporal, spatial, and interspecific differences on the response of vegetation to drought stress. The accuracy of the methodology is examined by field measurements of spectral reflectance, statistical analysis and validation methods using spectral reflectance profiles.
Г. 8. Научна публикация в нереферирани списания с научно рецензиране или в редактирани колективни томове	
	Borisova D., B. Banushev, H. Nikolov, D. Petkov, 2016. Identification of exposed rocks in open pit mines using infrared spectral data. Annual of the University of Mining and Geology "St. Ivan Rilski", Vol. 59, Part I, Geology and Geophysics, ISSN 1312-1820, pp. 192-195.
Г8_1	Abstract: In this study satellite data from Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER) in the wavelength range (1.6-2.5 μm) of bare rocks and soils in the region of open pit mines "Elshitsa" and "Tsar Asen" in Bulgaria were used. The spectral reflectance of exposed rocks was compared with the spectral reflectance of the same rocks taken from different spectral libraries. The analysis of the spectral characteristics in the specified range indicates maintain their specific features. In the obtained curves were observed distinctive extrema that be able to be used to identify the type of rocks. The results show that the suggested methods for analyzing the spectral data could be used to identify

	exposed rocks. Theoretical and analytical techniques that have been developed for the analysis of the laboratory spectral data also could be applied to field spectral data.
Г8_2	Borisova D., B. Banushev, H. Nikolov, D. Petkov, 2016. Recognition of open pit mines using spectral data in 1600-2500 nm range. Proceedings of the 8th National Geophysical Conference of Bulgarian Geophysical Society /BgGS/, © Дружество на геофизиците в България, ISSN 1314–2518, Диск CD, http://www.bggs.eu/Conferencia_2016/N11.pdf, pp. 65-70. Abstract: In the present study satellite spectral data from Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER) in the wavelength range (1600-2500) nm of bare rocks and soils in the region of open pit mines "Elshitsa" and "Tsar Asen" in Bulgaria were used. The spectral reflectance of exposed rocks and soils was compared with the spectral reflectance of the same rock and soil types taken from different available spectral libraries. The analysis of the spectral characteristics in the specified range indicates maintain their specific features. In the obtained curves were observed distinctive extrema that be able to be used to identify the type of rocks and soils. The results show that the suggested methods for analyzing the spectral data could be used to identify different soils and exposed rocks. Theoretical and analytical techniques that have been developed for the analysis of the laboratory spectral data also could be applied to field spectral data.
Г8_3	Nikolov H., D. Borisova, 2016. Landscape changes near open pit mines. Proceedings of the 8th National Geophysical Conference of Bulgarian Geophysical Society /BgGS/, © Дружество на геофизиците в България, ISSN 1314–2518, Диск CD, http://www.bggs.eu/Conferencia_2016/N12.pdf, pp. 71-78. Abstract: Open pit mining areas in Europe are responsible for 8333 km2 according to Corine2006 data. In this paper we focus our research on the change of landscape in the one of the most exploited mining regions of Bulgaria – Panagyurishte ore region. We investigate the impact of the mining industry in this specific region since it is exploited starting in the early 60-ties of the last century. In our previous research we traced the changes of the environment at small scale investigating specific open pit mine and one of the conclusions was that an extensive study encompassing the whole region is needed. In this case we are focused on the developments taking place in larger area and the impact this specific type of activities has on the land cover/land use. We expect that the results from this study can be used for better planning at regional level. Main source of data used throughout this research are multichannel data from TM/ETM+/OLI instruments and this choice was based on the two essential for this study requirements – repeatability of the data and derived products and the open access to them. For verification of the results additional data from other sources were also used – in-situ measurements made by the team at specific points of interest, digital orthophotos, DEMs, etc.
Г8_4	Atanassov V., D. Borisova, H. Lukarski, 2017. Multitasking applications of hyperspectral imager. Proc. of Twelfth Scientific Conference with International Participation SES 2016, Sofia, ISSN 1313-3888, pp. 253-258. Abstract: Spectral imaging provides both the capabilities of two powerful areas such as spectroscopy and digital images. Thus each pixel of the digital image is presented with a number of contiguous spectral bands. When this number of contiguous spectral bands is more than a hundred, then we are talking about hyperspectral instruments. In the work are presented several hyperspectral instruments with their characteristics. Emphasis is put on the wide range possibilities for applications which are illustrated with appropriate examples.
Г8_5	Richter A., M. Kazaryan, M. Shakhramanyan, D. Borisova, N. Stankova, I. Ivanova, 2017. Information modeling of waste disposal sites. Ecological Engineering and Environment Protection, vol.1, ISSN 1311-8668, http://ecoleng.org/archive/2017/1/15-21.pdf, pp. 15-21. Abstract: The paper proposes a methodology for developing information model or database of waste disposal sites /WDS/ or landfill sites, applying received remotely and in-situ data from Earth surface monitoring, especially including procedures of morphological processing, data normalization and visualization models. The overall structure and composition of the information model, described subsystems, classes, objects, and attributes (properties) of the data, are presented. The possibility of formation of new information relations, that arise between different kinds of information, through morphological (in particular, the morphemic)

	processing “raw” information at the input, for example, between the classifiers (waste products, settlements, economic activities, etc.), is described. The paper used methods of system analysis, methods of mathematical linguistics, space monitoring methods. For example a structure of constructing the database, the archive and the classifier of unauthorized waste disposal facilities (solid waste landfills, waste piles, municipal landfills, and others) is presented. The scheme of data model describes the components (tables) as part of the model: general information, geometric and geographic parameters of geo-referenced data, including data for adjacent territorial-administrative facilities, etc.
Г8_6	Shakhramanyan M., A. Richter, M. Kazaryan, R. Nedkov, D. Borisova, N. Stankova, I. Ivanova, M. Zaharinova, 2017. Evaluation of chemical process parameters in waste disposal sites by satellite images. Ecological Engineering and Environment Protection, 1/2017, ISSN 1311-8668, http://ecoleng.org/archive/2017/1/22-28.pdf, pp. 22-28. Abstract: The presented paper proposes a method for estimating parameters and characteristics of the chemical processes in large municipal landfills and solid waste disposal sites according to the waste monitoring from space. The model of chemical transformations in the waste disposal sites is described based on the idea of waste biochemical degradation in the form of the “transformations tree”. The presentation of chemical transformations in the form of statistical integrated chemical equations allows us to describe the chemical system "a waste disposal facility" in the analytical form. The paper presents the main types of physical (volume and mass, thermal) and chemical (filtrate) characteristics which assessment could be made by data from satellite images. As an example the obtaining of the volume and mass characteristics of landfills in their 3D-models is described. Results of the algorithm on the example of a polygon of solid municipal and industrial waste in Salaryevo (Leninsky district of the Moscow region) are presented. As an example the assessment of volume and mass of landfill gas and its main component – methane is shown. An airborne image from year 2000 is compared with the satellite images in visible spectral range closed to its date. The main sources of errors in the evaluation of volume and mass characteristics are defined. The error which source is the spatial and spectral resolution of the satellite image is calculated.
Г8_7	Stoyanov, A., D. Borisova, 2017. Monitoring on forest ecosystems by using space-temporal analysis of different types aerospace data. Ecological Engineering and Environment Protection, vol.2, ISSN 1311-8668, http://ecoleng.org/archive/2017/2/31-37.pdf, pp. 31-37 Abstract: The following work presents results derived by space-temporal analysis of different types of aerospace data for environmental monitoring on the dynamics of the condition of the forest vegetation. Different indices (NDVI, NDWI) and indicators have been used for territories occupied by different types of forest ecosystems. A comparative analysis between optical and radar images have been conducted and results about the degree of correlation between the different generated indices from the tested areas are presented. Based on the performed different analysis and surveys and the results derived from them, an evaluation can be done for the following: for which territories occupied by specific forest vegetation are the most sensitive indices during the monitoring. The derived results could be used for monitoring and ecological assessment on forest resources management in regional and national action plans.
Г8_8	Kancheva R., G. Georgiev, D. Borisova, 2017. Remote sensing in landscape ecology surveys. Proceedings of Fifth International Conference Ecological Engineering and Environment Protection (EEEP'2017), National Association "Ecological Engineering and Environment Protection", ISSN 2535-0773, pp. 192-200. Abstract: Landscape ecology is an interdisciplinary science for studying the interactions between organisms and their relationship to the environmental conditions. The results of the study of the ongoing processes are a condition and scientific basis for the assessment, management, conservation and restoration of natural resources and biodiversity. The aim of the present work is to highlight these features of remotely received data, which closely connect remote sensing methods with modern landscape-ecological research. A systematized concept of the prerequisites for the use of remote sensing methods in landscape ecology and the new opportunities they provide in ecological analysis is presented.

Г8_9	Борисова Д., Х. Николов, 2018. Създаване на спектрална библиотека базирана на спътникови и терени данни. Списание „Геодезия, Картография, Земеустройство“, 5-6’2017, Съюз на геодезистите и земеустроителите в България – ФНТС, ISSN 0324-1610, стр. 14-17. Резюме: Спътниците, които обикалят около Земята, осигуряват огромен обем данни, предоставящи на изследователите и бизнеса нови възможности за изледвания и развитие. Една от стъпките при получаване на информация от оптични данни във видимия /VIS/ и близкия инфрачервен /NIR/ обхвати е да се превърнат спектралните класове в информационни класове. За постигането на тази задача се използват различни подходи, като например класификация с/без наблюдение, обектно-ориентиран анализ на изображения, евристични методи и т.н. За оптимален избор на спектралните канали с цел намаляване на излишъка в наличната информация при данните от дистанционни изследвания, които ще се използват в споменатите процеси, от съществено значение са типичните спектрални характеристики за отделните класове, които са обект на изследване. Това е причината да предложим да се създаде специфична и да се обогатят налични спектрални библиотеки, където такива представителни набори от данни могат да бъдат намерени за повечето обекти, които се разпознават на земната повърхност. В това изследване се опитваме да докажем необходимостта от добавяне на повече спектрални данни (включително и метаданни) към съществуващите спектрални библиотеки с отворен достъп.
Г8_10	Borisova, D., Banushev, B., Petkov, D., 2018. Spectral reference library filled with reflectance rock features. Journal of Mining and Geological Sciences, 61, Part I, Publishing House "St. Ivan Rilski", ISSN 2535-1176, 97-103. Abstract: Remote sensing is applied often in Earth observations. It includes acquiring, processing, and interpreting images and multispectral data, acquired from optical sensors mounted on airborne and satellite platforms. For better object-oriented interpretation of remotely sensed data the reference spectral features of welldescribed objects are required from laboratory, field, and satellite sensors. In-situ laboratory and field remote sensing measurements provide a significant part of the spectral data for interpreting spectral images with different spatial resolution and creating thematic spectral reference libraries. Including data from different experiments into an accessible reference spectral library ensures their continued exploitation, provides a basis for their qualitative assessment, and allows them to be exchanged between specialists from different research and applied sciences. Creating, updating and maintaining a spectral reference library requires periodic laboratory and field experiments, including spectrometric and other type of measurements, in this case, of rocks. The reflectance rock features are used for updating regularly the library with the necessary information. This study suggests that collected spectral data from the field spectrometric measurements of the different exposed rocks and laboratory spectral measurements of the samples collected in the field campaign will be used for filling in the reference spectral library. The obtained spectral reflectance features could be used in airborne and satellite image classification and for comparison with reference reflectance spectra from other spectral libraries. To obtain the data for filling in the presented spectral reference library, spectrometric systems, assembled in the Department of Remote Sensing Systems at the Space Research and Technology Institute of the Bulgarian Academy of Sciences, based on models of Ocean Optics spectrometers Inc. were used. The spectrometric system TOMS /Thematically Oriented Multi-Channel Spectrometer/ was used to perform laboratory and field spectrometric measurements. Field spectrometric measurements were performed during petrology training on established geological routes. Laboratory spectrometric measurements were performed in the Spectral and Photometric Measurements Laboratory of the Remote Sensing Systems section. The resulting reflecting spectra can be used to classify satellite images and compare them with the reference reflection spectra from other spectral libraries.
Г8_11	Borisova, D., Goranova, M., 2018. Remote sensing systems for thematic spectral data collection. Proc. XXVIII International Symposium “Modern technologies, education and professional practice in geodesy and related fields”, ISSN:2367-6051, http://symp2018.geodesy-union.org/wp-content/uploads/2018/11/33.pdf Abstract: Remote sensing technique is a general tool to study the different surfaces of the Earth and to investigate the planets in the Solar System. The development of the implementation capabilities of the optoelectronic devices which are long-term-tested in the laboratory, in the field and are mounted on-board of the remote sensing platforms further improves the capability of instruments to acquire information about the Earth and its resources

	in different scales. Remote sensing application in the Earth and planet observations begins with the design and the assembling of equipment for performing research of the observed objects remotely and without disturbing their integrity. Remote sensing methods for studying of rocks are closely related to current programs for the mineral and chemical composition study of the Earth, Mars and Phobos surfaces. Ground-truth data in the Earth observations of the environment and in the remote sensing investigations are very important. The experience and the knowledge from previous experiments in space missions encourage us to continue our efforts to acquire spectral data using different remote sensing systems, to compare the obtained results, and to use the acquired data for filling the thematic spectral data collection. For this purpose the laboratory and the terrain spectrometric measurements are completed. These measurements are made for filling data collection with spectral reflectance data of rocks for their reliable identification and for the determination of their mineral and chemical composition. In the present study ex-situ and in-situ spectrometric measurements of the granites together with their rock-forming minerals from the territory of Bulgaria in visible and near infrared range of the electromagnetic spectrum are performed using following remote sensing systems: SRM, (400-820) nm; SPS-1, (550-1100) nm; Thematically Oriented Multi-channel Spectrometer /TOMS/, (400-900) nm; all of them designed and constructed in Remote Sensing Systems Department at Space Research and Technology Institute-Bulgarian Academy of Sciences /RSS-SRTI-BAS/. All the systems are calibrated before and through the performed measurements. The obtained spectral data are compared with similar data from different instruments for Earth observation included in the reference spectral data collections, also known as spectral libraries. Our results correspond to the shape of the spectral signatures in the same spectral range obtained with other spectrometers. The achieved results proved that this methodology could be applied for comparing the spectral data acquired by different remote sensing systems. These results give us confidence to plan the next campaigns for the terrain spectrometric measurements in different regions of Bulgaria.
Г8_12	Atanassov, V., Borisova, D., Dimitrov, V., Petkov, D., Nikolov, H., Georgiev, G., Vasileva, H., 2018. Multisensor Earth observation system. Proceedings SES2018, Space Research Technology Institute - Bulgarian Academy of Sciences, ISSN 2603-3313, 282-288. Abstract: Satellite Earth observation systems mark the high rates of growth and today provide a huge volume with a wide variety of data regarding the spectral, spatial and temporal characteristics of observed objects. Notwithstanding these achievements, due to the particularities of the remote observation technology, it is not possible in many practical cases to define precisely certain characteristics of the monitored objects. Therefore, in order to make full use of this variety of multispectral high spatial resolution data is also required obtaining and using multisensor and multitemporal data from observation. In the proposed work, the authors discuss a multisensor Earth observation system focusing primarily on the place and role of these systems in today's Earth exploration phase. The examples presented show both the advantages of its use and the particularities of the functioning of such systems. The location and role of a multisensor system in sync with existing global observation systems is outlined, a set of tools and systems that could be included in the exemplary implementation of such a system is shown. The accompanying difficulties and challenges that need to be solved for sharing and merging data from a multisensor system are outlined.
Г8_13	Goranova, M., Borisova, D., 2018. Spectral libraries as spectral data source. Сборник доклади от Деветата Национална конференция по геофизика, Дружество на геофизиците в България, ISSN:1314-2518, 115-118. Резюме: При наблюденията на Земята дистанционните изследвания са често използвани. За повишаване на точността при интерпретация на данните от дистанционните изследвания на изучаваните обекти се изисква провеждането на измервания на еталонни спектри. Лабораторните и полеви дистанционни спектрометрични измервания осигуряват значителна част от спектралните данни за интерпретиране на спектрални изображения с различна пространствена разделителна способност и за създаване на спектрални библиотеки. Включването на данни от различни експерименти в достъпна референтна спектрална библиотека гарантира тяхната продължителна експлоатация, осигурява основа за тяхната качествена оценка и позволява получените данни да се обменят между специалисти от различни научни и приложни области.

Г8_14	Hristova, V., Borisova, D., 2018. System for remote sensing in case of traffic signs recognition. Сборник доклади от Деветата Национална конференция по геофизика, Дружество на геофизиците в България, ISSN:1314-2518, 104-108. Резюме: Представените алгоритми, методи и подходи за обработка на изображения са подходящи за решаването на поставената задача. Системата е съвкупност от алгоритми, които вече са били разработени и техните положителни и отрицателни черти са известни. Те са приложени по оптимален начин в ясна и логична последователност, която е съществена за полуавтоматизираната система. Полуавтоматизираният процес значително повишава степента на откриване на обектите, наблюдавани в изображението, спестявайки време и средства на крайния потребител, в случай, че се решава конкретен проблем. Обработката и анализът на изображенията е с крайна цел сравнение и анализ на резултатите, относно наблюдаваните характеристики на обектите в изображението. Представената система притежава ясна практическа насоченост.
Г8_15	Borisova, D., Hristova, V., 2018. Remote sensing spectral data in road identification: case study. Scientific Journal “Mechanics Transport Communications”, 16, 3/2, https://mtc-aj.com/article.1695_EN.htm, ISSN:1312-3823, pp.VII-1-VII-5. Abstract: The idea of this paper is to exploit, view and develop to larger extent the possibilities which are offered by multispectral instruments having mid spatial resolution in this case instruments on board of Landsat and Sentinel satellites. The mid spatial resolution leads to obtaining of the mixed data related to mixing of land covers and to a lot of mistakes in the interpretation of the images. The correct identification of the mixed pixels is key element for the segmentation of the shape of the artificial feature from the land cover. This especially holds true for objects with relatively narrow structure for example two-lane roads for which the spatial resolution is larger that the object itself. For better road identification in the used Landsat/Sentinel images in the study we have combined spectrometry of asphalt, and in-situ measured spectral reflectance of pavers made from granite. In this innovative research the spectral and directional reflection properties of the asphalt surfaces compared to those of paving stone made from different rocks are measured. The in-situ measurements are obtained using the Thematically Oriented Multichannel Spectrometer /TOMS/ designed in Remote Sensing System Department at Space Research and Technology Institute – Bulgarian Academy of Sciences, Sofia.
Г8_16	Борисова, Д., Петков, Д., Христова, В., Димитров, В., Саворский, В., Ермаков, Д., 2020. Структура на спектрална библиотека в дистанционните изследвания на земната повърхност. XXX Международен симпозиум "Съвременните технологии, образованието и професионалната практика в геодезията и свързаните с нея области", Съюз на геодезистите и земеустроителите в България - ФНТС, ISSN:2367-6051, http://symp2020.geodesy-union.org/reports-bg/ Резюме: Спектралните библиотеки са важен инструмент за съхранение и управление на масиви от спектрални данни и са в основата на дистанционните изследвания на Земята и планетите. Те се използват за подобряване на анализа и интерпретацията на спътниковите изображения и за подпомагане при идентифицирането на изследваните обекти от земната повърхност. Към настоящия момент спектралните данни се съхраняват в различни бази данни, обединени в спектрални библиотеки, по целия свят. Данните се получават при in-situ, като например, теренни, полеви, в атмосферата, на водната повърхност, и лабораторни дистанционни измервания със спектрометри с различна радиометрична, пространствена и спектрална разделителна способност и в различни диапазони от слънчевия електромагнитен спектър. Засега липсва уеднаквен стандарт и терминология при провеждането на дистанционните спектрометрични измервания на изследваните обекти и не във всички библиотеки са представени параметрите на самите измервания като условия на измерване, метеорологични условия и др. В настоящия доклад е представено проучването относно структурата и дизайна на спектралните библиотеки. Това проучване авторите подготвят във връзка с проект, финансиран по Договор № КП-06-М27/2 с Фонд “Научни изследвания”.
	Желев, Г., Борисова, Д., 2020. Приложение на геоинформационни системи при дистанционни изследвания на площта на водното огледало на водни обекти. Списание „Геодезия, Картография, Земеустройство“, LIX, 5-6/2020, Съюз на геодезистите и земеустроителите в България - ФНТС, ISSN:0324-1610, 28-32.

Г8_17	Резюме: В настоящето изследване се разглежда възможността за определяне на повърхността на водни обекти чрез използване на дистанционни данни и методи, и геоинформационни системи (ГИС). Границата суша-вода на избраните водни обекти е определена по спътникови изображения (серия спътници Sentinel 2A и 2B) с използване на два спектрални индекса – воден индекс MNDWI (Modified Normalized Difference Water) и вегетационен индекс NDVI (Normalized Difference Vegetation Index). За провеждане на изследването са избрани седем водни обекта на територията на България: язовирите „Искър“, „Ивайловград“, „Камчия“, „Кърджали“, „Копринка“, „Студен Кладенец“ и „Студена“. В ГИС среда е приложен модел за обработка на спътниковите изображения и растерни продукти във векторни слоеве. Входните данни и векторните резултатите са организирани в ГИС база данни (Water_body_Index.gdb). Работата по обработка на данните е автоматизирана чрез използване на създаден модел (Model_WO). Получените резултати за изчислените площи по двата индекса са съпоставени и анализирани.
Г8_18	Христова, В., Борисова, Д., 2020. Обзор на съвременното състояние на алгоритмите от ниско ниво за извличане на праволинейни структури. XXX Международен симпозиум "Съвременните технологии, образованието и професионалната практика в геодезията и свързаните с нея области", СГЗБ - ФНТС, ISSN:2367-6051, http://symp2020.geodesy-union.org/wp-content/uploads/2020/11/38_WALENTINA_DENI.pdf Резюме: Системите, при които се извлича информация, относно пътно-транспортни структури и съоръжения от изображения, получени чрез дистанционни изследвания, са многобройни и включват разнообразни методи и алгоритми от различни области на информатиката и числените методи. Най-ниското ниво алгоритми включва обработката на изображения с цел да се подобри тяхното качество или да се извлекат някои геометрични характеристики, средното ниво обикновено открива обекти, които се наблюдават в изображението.
Г8_19	Borisova, D., Dimitrov, V., 2021. Examples of Data Fusion Methods in Road Detection. Conference Proceedings, 11th Congress of the Balkan Geophysical Society, 2021, European Association of Geoscientists & Engineers, ISSN:2214-4609, DOI:10.3997/2214-4609.202149BGS48, 48-1-48-5. Abstract: In this study, some examples of the data fusion methods in merging the remotely sensed images in road detection are presented. The process of image merging methods is meant to integrate the data with various spatial and spectral resolutions obtained by sensors based on aerial and satellite platforms. The goal of the current paper is to show some examples of realization and determination of the suitable method for precise integration of multisource data. For this purpose and the correct image categorization the performance of technical tasks such as extraction of features, classification and segmentation as the biggest advantages of the fusion technique are done. This work is supported by Bulgarian National Science Fund under Contract number KP-06-M27/2 (КП-06- M27/2).
Г8_20	Borisova, D., Goranova, M., 2021. Infrared Spectral Measurements of Quartz, Malachite and Hematite in Interpretation of Remote Sensing Data. Conference Proceedings, 11th Congress of the Balkan Geophysical Society, European Association of Geoscientists & Engineers (EAGE), ISSN:2214-4609, DOI:10.3997/2214-4609.202149BGS52, 52-1-52-5. Abstract: Infrared spectral measurements as a part of remote sensing are used in mineral deposit investigations. The objective of the present paper is to compare infrared spectral measurements made in laboratory and spectral data from USGS spectral library. In the present investigations laboratory spectral reflectance measurements of quartz, malachite and hematite in the infrared range (2–25 micrometers) of the electromagnetic spectrum are performed. The obtained data of the performed spectral measurement could be used for filling in the database and for better interpretation of satellite data. This work is supported by Bulgarian National Science Fund under Contract number KP-06-M27/2 (КП-06-M27/2).

Г8_21	Борисова, Д., Горанова, М., 2021. Спектрални характеристики на калиев фелдшпат и зеолит. Proceedings of International symposium on modern technologies, education and professional practice in geodesy and related fields, Union of Surveyors and Land Managers in Bulgaria, ISSN:2367-6051, 215-221. Резюме: Измерени са спектралните отражателни характеристики на следните минерални образци: 1. Калиев фелдшпат, находище в Плана планина, с. Горни окол; 2. Калиев фелдшпат, полупрозрачен, с.Коприва, Кюстендилско; 3. Клиноптилолит, с. Голобрадово, Кърджалийско, в диапазона 200 nm - 2500 nm. Използвани са четири спектрометъра - Vetex 70, Lambda 1050, NIRQuest512, TOMS (Тематично ориентиран многоканален спектрометър). Получените данни от измерванията са представени в графичен вид като зависимост на дължината на вълната от коефициента на отражение. Данните биха могли да се използват за комплексен анализ на резултатите, които са получени от измерванията с наличните спектрометрични системи. Тези данни дават възможност за повишаване на точността на измерванията и по-бърз сравнителен анализ. Това изследване е направено във връзка с проект, финансиран по Договор № КП-06-М27/2 с Фонд “Научни изследвания”.
Г8_22	Николов Х., Атанасова, М., Борисова, Д., 2021. Създаване на нов аерокосмически полигон в България за мониторинг и оценка на техногенното въздействие върху околната среда – Панагюрски руден район. Proceedings of Seventeenth international scientific conference Space, ecology, safety – SES'2021, Space Research and Technology Institute Bulgarian Academy of Sciences, ISSN:p-ISSN 2603 – 3313 / e-ISSN 2603 – 3321, 192-198. Резюме: В този доклад са обобщени извършените дейности за създаване на нов тестов аерокосмически полигон в България насочен към проследяване динамиката на промените в ландшафта на Панагюрския руден район, като се използват най-новите постижения на технологиите за дистанционни и полеви изследвания. По принцип полигони и тестовите участъци в тях са относително големи площи от земната повърхност съставени от обекти, които лесно се идентифицират в изображения получавани от сателитни и/или самолетни апаратурни комплекси. В разглеждания район е очевидно техногенното въздействие причинено от предходни (обхващащи последните 40 години) и съвременни минни дейности в няколко открити рудници разположени в него. В това изследване са представени резултатите, получени от авторите при изучаване на промяната в земеползването на районите, където все още функционират минно-добивни комплекси, състоящи се от открит рудник и флотационна фабрика. Друга важна тема, която беше изследвана, са дейностите по възстановяване на качествата на почвата в зоните изложени на висок риск от замърсяване и трансформацията на бивши насипища и хвостохранилища в няколко вече затворени минни обекта в същия регион. Друг резултат от проведеното изследване е редовното наблюдение на текущите минни дейности в изследваната зона, които се считат за основен фактор за местното (река Тополница), както и за трансгранично замърсяване на посредством река Марица. От изследванията, проведени до този момент, беше създадена обширна геобазаданни, която се състои от растерни и векторни слоеве, които са готови да бъдат използвани от местните власти за по- добро регионално планиране.
Г8_23	Борисова, Д., Петков, Д., Димитров, В., 2021. Дългосрочно ползване на данни от дистанционни спектрални измервания. Сборник доклади Десета национална конференция по геофизика, Дружество на геофизиците в България, 2021, ISSN:1314-2518, DOI:https://doi.org/10.48368/bgs-2021.1.N12, 106-110. Резюме: Дългосрочното ползване на данни от дистанционни спектрални измервания, както и тяхното споделяне, е фундаметнална научна задача. В настоящия доклад е представено проучването относно структурата и дизайна на спектралните библиотеки. Спектралните библиотеки или библиотеки от бази данни от дистанционни спектрални измервания са важен инструмент за съхранение, управление и използване на масиви от спектрални данни. Тази информация е една от основните при прилагане на дистанционните изследвания на Земята и планетите. Авторите подготвят проучването във връзка с проект, финансиран по Договор № КП-06-М27/2 с Фонд “Научни изследвания” /ФНИ/.

*Резюметата са представени на езика на публикацията