РЕЗЮМЕТА НА НАУЧНИ ТРУДОВЕ

на гл. ас. д-р Венцеслав Никифоров Димитров

представени за участие в конкурс за академичната длъжност „Доцент“, обявен в Държавен вестник бр. 43 от 10.06.2022 г. от Института за космически изследвания и технологии - БАН в област на висше образование 4. Природни науки, математика и информатика, професионално направление 4.4. Науки за Земята; научна специалност „Дистанционни изследвания на Земята“ за нуждите на секция „Системи за дистанционни изследвания“.

B4.1

Dimitrov, **V**., Ilieva, N., Nikolov, H.. Evaluation of Urban Atlas and Street Tree Layer 2012 local component datasets for Bulgaria. Proc. SPIE 11524, Eighth International Conference on Remote Sensing and Geoinformation of the Environment (RSCy2020), 1152417 (26 August 2020), 11524, SPIE - The International Society for Optical Engineering, 2020, ISSN:0277-786X, DOI:doi: 10.1117/12.2570763, 1152417-1-1152417-16. SJR (Scopus):0.215 .

Линк към публикацията: https://doi.org/10.1117/12.2570763

ABSTRACT
Land cover data derived from satellite images must be accompanied by information on their quality in order to be properly and fully used. The main purpose of this paper is to present the results of the evaluation of the Urban Atlas (UA) and Street Tree Layer (STL) datasets for Bulgaria for the reference 2012 year. This verification task is part of a project, managed by the European Environmental Agency (EEA) under the Copernicus program. A quantitative assessment approach is applied, based on stratified random sampling at polygon level. The working steps completed are, as follows: preparation of input and reference data, creation of a sample set of land cover/land use (LC/LU) polygons, visual interpretation of selected samples and evaluation of results. The LACO-Wiki web-based tool is used for sampling-related activities. Very highresolution (VHR) satellite imagery and digital aerial photos form major part of the reference data. This way, a scientifically based estimate of the thematic accuracy of UA and STL dataset are obtained and of some geometric characteristics, as well. The following features are estimated: user and producer's accuracy by LC/LU class, overall user's accuracy, uncertainty values, and correctness of delineation by LC/LU class. Comments by LC/LU class are provided. More than 89% of UA polygons have correctly delineated area. The detail of delineation accuracy is over 98%, while the positional accuracy is more than 97%. The overall weighted thematic accuracy of UA is 83.9%, which is higher than the target accuracy of 80%. STL product shows overall accuracy of 94.1% - higher than the required 85%. Relevant and diverse reference data sources together with appropriate stratification and sampling design tailored to the purpose and resources of the project helped to produce realistic accuracy results.

B4.2

Dimitrov V., Koleva R., Tepeliev Y., Kroumova Y., Lubenov T., Ilieva N.. Satellite Mapping of Bulgarian Land Cover – CORINE 2018 Project. Forestry Ideas, 25, 2, Publishing House of the University of Forestry, 2019, ISSN:1314-3905, 237-250. SJR (Scopus):0.103 Q4 (Scopus).

Линк към публикацията: https://forestry-ideas.info/issues/issues_Download.php?download=330

Abstract
The main aim of the CORINE Land cover 2018 project is to identify and map the changes of land cover/land use for the period 2012–2018 using multitemporal/multispectral satellite imagery. Harmonized methodology with a 44 class nomenclature and a computer assisted photo-interpre- tation are applied for creating a geospatial database of Bulgarian territory for the year 2018. A brief description of the applied methodology and the main results achieved are presented. The whole Bulgarian territory is mapped in details adequate for the 1:100 000 scale with a minimum mapping unit of 25 ha and a minimum change area of 5 ha. A statistical analysis of the created databases is made. For the investigated period (2012–2018) the largest in number (2720), the largest as area (53,558 ha) and with the highest percentage (53.54 %) of the total area of the changes are the changes occurring in class 3 'Forests and semi-natural areas'. Six types of changes prevail, forming over 3/4 of the area of all changes – loss of coniferous forests (23,392 ha – 23 %), loss of broad-leaved forests (18,389 ha – 18 %), pastures into non-irrigated arable land (14,534 ha – 14 %), vineyards into non-irrigated arable land (9451 ha – 9 %), fruit trees and berry plantations into non-irrigated arable land (6051 ha – 6 %) and restored broad-leaved forests (4865 ha – 5 %). The area of recovered broad-leaved forests (change 324-311) is 4865 ha, which is almost 4 times less than the lost (18,389 ha). Two negative change processes were identified – conversion of vineyards (221) and orchards (222) into non-irrigated arable land (211), i.e. extensification of agriculture, but also was an intensification one – change of pastures (231) to non-irrigated arable land (211).

B4.3

Tepeliev, Y., Koleva, R., **Dimitrov**, V.. Verification of the Natura 2000 Local Component Dataset in Bulgaria. FORESTRY IDEAS, 23, 2, Publishing House of the University of Forestry, 2017, ISSN:1314-3905 (Print), 2603-2996 (Online), 179-192. SJR (Scopus):0.101 Q4 (Scopus).

Линк към публикацията: https://forestry-ideas.info/issues/issues_Download.php?download=296

Abstract
The thematic accuracy is an important data quality element of land cover databases. For this reason it has been paid a considerable attention by researchers over years. The main aim of this article is the presentation of the results from verification of the Natura 2000 (N2K) local compo- nent dataset for Bulgaria, which is a part of a project, managed by the European Environmental Agency (EEA). Following the methodology proposed by EE, we apply a quantitative approach based on probability sampling at polygon level. Thus, we obtain scientifically rigorous estimate of the thematic accuracy of N2K layer and of some geometric characteristics as well. Based on local expertise and in situ data, an evaluation of the quality of this product is made and statistical results are obtained, comparable to the results in other countries. The results of the verification show that the overall thematic accuracy is higher than the 85 % level expected at Pan-European scale.

B4.4

Tepeliev, Y., Koleva, R., **Dimitrov** V.. Verification of Forest High Resolution Layers 2015: Tree Cover Density and Dominant Leaf Type in Bulgaria. Forestry Ideas, 27, 2, Publishing House of the University of Forestry, 2021, ISSN:1314-3905 (Print), 2603-2996 (Online), 343-353. SJR (Scopus):0.171.

Линк към публикацията: https://forestry-ideas.info/issues/issues_Download.php?download=418

Abstract The high-resolution layers (HRLs) are Pan-European land cover datasets aimed at monitoring soil sealing (imperviousness, forest, grasslands, wetness and water, and small woody features. The main purpose of this article is to present the methodology and results from verification of two Forest HRL products for the 2015 reference year for Bulgarian territory: Dominant Leaf Type (DLT) and Tree Cover Density (TCD). The verification task aims at identifying systematic classifi- cation errors and the results are supposed to be used for improvement in future product updates. Qualitative approach for assessment of the HRL quality is applied in two steps, called General overview of data quality and Look-and-feel verification. The latter is performed within dedicated strata through non-random sampling, checking HRLs for omission and commission errors. We show results from a verification at country level based on local

expertise and best available in situ data. We also provide comments and recommendations concerning commission and omission strata. Several cases of both of the above types of errors are identified and analysed in the DLT and TCD high resolution layers. Despite of errors found, both DLT and TCD receive a 'good' mark, and the same rating prevails in the strata level evaluation.

B4.5

Kroumova Y., Koleva R., Tepeliev Y., **Dimitrov** V.. Verification of Copernicus Riparian Zones Local Component for Bulgaria. Specific Cases and Typical Problems. European Journal of Geography, 10, 2, The European Association of Geographers, 2019, ISSN:1792-1341, 150-169. SJR (Scopus):0.29 SJR, непопадащ в Q категория (Scopus).

Линк към публикацията: http://www.eurogeographyjournal.eu/articles/18_Y_Krumova_final.pdf

Abstract
This paper deals with quantitative evaluation of Riparian zones land cover and land use data set for Bulgaria, supported by Copernicus Programme's funds. This verification task is a part of a project of the European Environmental Agency. The methodology is based on visual inspection of sample polygons on top of reference data sets. The web-based LACO-Wiki tool is used for the verification, based on levels 1 to 4 of MAES (Mapping and Assessment of Ecosystems and their Services) nomenclature. Typical class encoding errors and delineation drawbacks are grouped and analysed as several problem types. Detailed scores and accuracy estimates are provided, supported by appropriate visual examples. Class code confusion appears mostly in classes missing or with rare occurrence in Bulgaria. In general, the delineation is correct with some predominance of unnecessary parts inclusion in the sample polygons area. The Riparian zones product provides very good thematic and spatial detail and can be of value for many applications.

B4.6

Borisova, D., Hristova, V., **Dimitrov**, V., Nikolov, H., Goranova, M.. Thematic spectral remote sensing data in land covers' monitoring over test region (2019) Proceedings of SPIE, 11156, art. no. 111560C, https://doi.org/10.1117/12.2533119 .

Линк към публикацията: https://doi.org/10.1117/12.2533119

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.

B4.7

Atanassov, V., Borisova, D., Petkov, D., **Dimitrov**, V., Vasileva, H, Goranova, M.. Multisensor Earth

observation systems: data fusion. Proc. SPIE 10785, Sensors, Systems, and Next- Generation Satellites XXII, 10785, SPIE, 2018, ISSN:0277-786X, DOI:10.1117/12.2325731, 107851R-1-107851R-6. SJR:0.234 SJR, непопадащ в Q категория (Scopus)

Линк към публикацията: https://doi.org/10.1117/12.2325731

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.

B4.8

Borisova, D., Petkov, D., Nedkov, R., Nikolov, H., **Dimitrov**, V., Goranova, M., Avetisyan, D., Radeva, K.. Remote sensing measurements in creating thematic spectral library. Proc. SPIE 10773, Sixth International Conference on Remote Sensing and Geoinformation of the Environment (RSCy2018), 10773, SPIE, 2018, ISSN:0277-786X, DOI:10.1117/12.2326005, 107730D-1-107730D-7. SJR (Scopus):0.234 SJR, непопадащ в Q категория (Scopus)

Линк към публикацията: https://doi.org/10.1117/12.2326005

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.

B4.9

Kopecká, M., R. Vatseva, J. Feranec, J. Oťaheľ, A. Stoimenov, J. Nováček, V. **Dimitrov**. Selected changes of arable land in Slovakia and Bulgaria during the period 1990-2006, Moravian Geographical Reports, 20, 1, The Academy of Sciences of the Czech Republic, 2012, ISSN:1210-8812, 43-54. SJR:0.408, ISI IF:1.435.

Линк към публикацията: https://geonika.cz/EN/research/ENMGRClanky//2012_1_KOPECKA.pdf

Abstract
Changes in arable land use in Slovakia and Bulgaria over two time horizons (1990 to 2000 and 2000 to 2006) are characterized in this paper. Two data layers of land cover changes of the CORINE Land Cover Data Base were used as entry data. The evaluation of changes also considered statistical data about the changing structure of the land resources and sown areas of individual crops for the mentioned periods. The transition from a command economy to a market economy manifested itself in Slovakia by extensification of agriculture in submountainous areas, and by the spatial diversification of plant production as a result of transformation of the original cooperatives into smaller farms. In Bulgaria the changes were mainly represented by transformation of arable land to pastures and they were connected with the closures of agricultural collective farms.

В4.10

Sainov, V., Simova, E., Stoimenov, A., **Dimitrov**, V.. Optical and digital processing of holographic moirograms, Proc. SPIE 1183, Holography '89, April 12, 1990, pp. 359-367. ISSN: 0277786X, DOI: 10.1117/12.963837.

Линк към публикацията: https://www.deepdyve.com/lp/spie/optical-and-digital-processing-of-holographic-moirograms-rcoINJSSL2

Abstract
Results from theoretical and experimental investigations on coherent-optical and digital processing of holographic moiregrams are presented. The cases of holographic moire contouring, comparative holographic moire interferometry, and in-plane displacement measurement in sample bodies with mechanical stress concentrator, subjected to pure tensile loading, are considered.

Г7.1

Borisova, D., **Dimitrov**, V.. Examples of Data Fusion Methods in Road Detection. Conference Proceedings, 11th Congress of the Balkan Geophysical Society, 2021, European Association of Geoscientists & Engineers, 2021, ISSN:2214-4609, DOI:10.3997/2214-4609.202149BGS48, 48-1-48-5 (Scopus).

Линк към публикацията: https://www.earthdoc.org/content/papers/10.3997/2214-4609.202149BGS48

Summary
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 КР-06-М27/2 (КП-06- М27/2).

Г7.2

Borisova, D., Hristova, V., **Dimitrov**, V.. 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, 2020, ISSN:0277-786X, DOI:10.1117/12.2573378, 1153408-1-1153408-9. SJR (Scopus):0.215

Линк към публикацията: https://doi.org/10.1117/12.2573378

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.

Г7.3

Borisova, D., Hristova, V., **Dimitrov, V**., Nikolov, H., Goranova, M.. 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, 2020, ISSN:0277-786X, DOI:10.1117/12.2570741, 115240E -1-115240E -7. SJR (Scopus):0.215

Линк към публикацията: https://doi.org/10.1117/12.2570741

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.

Г8.1

Любенова М., Е. Руменина, В. **Димитров**, Е. Иванов. Изследване на екосистеми от биосферен резерват “Чупрене” с фитоекологични и геоинформационни методи. сб. Доклади от научна

конференция с международно участие в памет на проф. д-р Димитър Яранов. том 3. Варна 2002, с. 260-269. ISBN 954-9531-09-0.

Summary
This report presents results of investigation on the successional dynamics of ecosystems, situated in a model area Chouprene, part of the biosphere reserve “Chouprene”. A spatial model and the ecological state of the complex system comprising parts of the core and the buffer zone of the reserve are prepared using GIS data base, interpretation of aerial photos and a set of modern methods for ecological research. The last includes methods of phytocoenology and dendrochronology and also analysis of the heavy metals compounds adsorbed in the soil and the vegetation biomass.
The developed GIS data base may be beneficial for explaining the forest dynamics of the spruce communities, distributed there and a substantial support tool for decision making considering the conservation of the natural state in the current global, regional and local changes, taking place in the environment.A process of forest declain is expected to continue gradually unless the great bulk of phytocoenological structures, built up mainly in the lower lands of the reserve is processed and released by the heterotrophic system, which has been developing there since recently.

Г8.2

Колева, Р., Тепелиев Ю., **Димитров** В.. Промени в залесените площи от горските територии на България в периода 1990 – 2018 г., установени по резултатите от проекта КОРИНЕ земно покритие. XXVIII сп. Геодезия, картография, земеустройство, 2019, бр.1-2, 7 – 12. ISSN 0324 – 1610.

Линк към списанието: https://joom.ag/h3Fa

SUMMARY

The main objectives of the EU project CORINE Land Cover are creating an unified European land cover map through interpretation of satellite images and a digital database of land cover and changes in it. The results are used for the assessment of land cover and its state and policy formulation on protection of the environment, planning and management of agriculture, forestry, transportation, etc. at European and national level. An analysis is provided of the databases created in different stages of the project CORINE Land Cover – Bulgaria, upon which some of the most typical changes in the forest territories of Bulgaria concerning the forested areas during the period 1990 – 2018 are identified, and from there the trends in their development.
Key words: COPERNICUS Programme, CORINE Land Cover, computer assisted visual interpretation, satellite images, deforestation, afforestation, CLC class, CLC change.

Г8.3

Stoimenov, A., Koleva, R., **Dimitrov**, V., Tepeliev, Y., Lubenov, T., Kroumova, J.. Satellite Mapping of Bulgarian Land Cover – CORINE 2012 Project. Forestry Ideas, 20, 2, Publishing House of the University of Forestry, 2014, ISSN:1314-3905 (Print), 2603-2996 (Online), 189-196.

Линк към публикацията: http://forestry-ideas.info/issues/issues_Download.php?download=220

Abstract
CORINE Land Cover 2012 Bulgaria is a part of the Pan-European project CORINE Land Cover (CLC). Experts from 39 countries participate in this GMES/Copernicus program’s project. The main aim of the project is to identify and map the changes of land cover/land use for the period 2006– 2012 using multitemporal/multispectral satellite imagery. Harmonized methodology with a 44 class nomenclature and a computer assisted photo-interpretation are applied for creating a geospatial database of Bulgarian

territory for the year 2012. In addition to the CLC work, a task for evaluation of five High Resolution Layers (HRL) is included. They are complementary to CLC and provide information on specific land cover characteristics: degree of imperviousness; forest, permanent grasslands, wetlands and permanent water bodies. A brief description of the applied methodology and the main results achieved are presented. The whole Bulgarian territory is mapped in details adequate for the 1:100 000 scale with a minimum mapping unit of 25 ha and a minimum change area of 5 ha. For the investigated period (2006–2012) dominant changes are observed in forests and semi-natural areas – 27,628 ha or 54.65 % of all changes, followed by agricultural lands (21 618 ha or 42.76 %). The statistical analysis of the created databases and a comparison between main land cover changes for the 1990–2000, 2000–2006 and 2006–2012 time periods are discussed. The average annual land cover change rate is 0.17 % which positions Bulgaria among the majority of the European countries having relatively small land cover changes.

Г8.4

Георгиев В., **Димитров** В., Цонева С., Гусев Ч.. Картиране на екосистеми тип "вътрешни влажни зони" - използвани данни и алгоритъм на работа, резултати. – В: Иванова, Н. (ред.) Картиране и оценка на екосистемните услуги във вътрешни влажни зони в България. ИБЕИ-БАН, София, 2017, ISBN 978-954-9746-40-2, 35-37.

Линк към книгата:
https://www.researchgate.net/publication/330442294_Kartirane_i_ocenka_na_ekosistemnite_uslugi_vv_vtresni_vlazni_zoni_v_Blgaria

Резюме

Книгата има за цел да очертае основните подходи при картиране и оценка състоянието на екосистемите тип „вътрешни влажни зони“ извън екологичната мрежа Натура2000 и техните услуги в България; да представи основните абиотични и биотични характеристики на целевите екосистеми. Резултатите в книгата могат да се използват при взимането на обосновани решения относно управлението и опазването на биологичното разнообразие и околната среда, териториалните политики относно земеползването, използването на местните ресурси, земеделието и др.

Г8.5

Димитров, В.. Оценка на точността на тематични данни получени от спътникови изображения. Сборник доклади от XXV международен симпозиум “Съвременните технологии, образованието и професионалната практика в геодезията и свързаните с нея области”, София, 5 – 6 ноември 2015 г., Съюз на геодезистите и земеустроителите в България, 2015, ISSN:2367-6051.

РЕЗЮМЕ

При извличане на тематична информация от изображение в дистанционните изследвания оценката на точността задължителна част от работата, за да има тя завършен вид. Точностните характеристики на получения тематичен слой са ключов елемент при неговото по-нататъшно използване. Докладът разглежда някои от методите за оценка на тематичната точност на данни, получени при обработката на многоканални спътникови изображения спътникови и тяхното прилагане при слоя с висока резолюция за постоянните водни тела за България от 2012 г. Прилага се методът на стратифицираната случайна извадка с референтни данни от същия времеви период. Грешките на включване и изключване се оценяват с отделни извадки и страти. Получените точности са значително по-добри от изисквания праг от 85%.

Г8.6

Vatseva R., A. Stoimenov, M. Kopecká, J. Nováček, V. **Dimitrov**. Forest fragmentation mapping: case studies in Bulgaria and Slovakia. – In: Car, A., G. Griesebner and J. Strobl, Eds. (2009): Geospatial Crossroads @ GI_Forum ’09. Proceedings of the Geoinformatics Forum Salzburg. Wichmann Verlag, Heidelberg, pp. 210 – 213, ISBN 978-3-87907-481-5.

Abstract

Forest fragmentation increasingly affects biodiversity protection, natural resources management, forest policies, and practices. The objective of this study is to map and to assess the amount and type of forest fragmentation in selected model territories in Bulgaria and Slovakia. The created maps are considered a key step toward quantifying forest fragmentation and its potential impacts on biodiversity. Forest fragmentation is generally understood as process of breaking up originally compact forest areas into smaller units (fragments). The assessment of forest fragmentation is based on digital land cover maps derived from satellite imagery and produced by the CORINE Land Cover (CLC) project. CLC data for three time horizons (1990, 2000 and 2006) are used as the most suitable coherent data source. CLC vector databases are reclassified to three groups: forest, water and non-forest. After vector-to-raster transformation, morphological image processing is applied to map forest spatial pattern into four fragmentation components: core, perforated, edge and patch. Further, both connectivity and fragmentation processes are assessed on the basis of the proportion and spatial distribution of forest pattern components. Trends in forest fragmentation and connectivity are evaluated for the time horizons under investigation. The main causes of forest fragmentation (natural and anthropogenic) are commented. The results can be useful for decision makers in identifying forest areas for protection or restoration.

Г8.7

Dimitrov, V., T. Lubenov, N. Pelova, A. Stoimenov. Geospatial Data Processing in CORINE Land Cover 2006 - Bulgaria Project, 18th International Symposium on Modern Technologies, Education and Professional Practice in Geodesy and Related Fields, Sofia, 06 - 07 November 2008, Proceedings, ISBN 978-80-87159-03-3, pp. 157-164.

ABSTRACT This paper presents problems related to computer processing of geospatial data in the frame of the CORINE Land Cover 2006 - Bulgaria Project. Data processing activities of an additional task of verification of soil sealing data, created in the frame of the GMES initiative is discussed as well. The data processing work passes through two main stages: 1. Preprocessing for working unit (WU) data sets preparation for computer aided visual interpretation and 2. Integration of interpretation results and generation of seamless final products for the whole country. The first stage includes tasks on defining the WU subdivision, transforming all the data (raster and vector) into uniform coordinate system and WU data set organization and preparation. During the second stage the interpretation results of land cover changes by WU and of revised CLC2000 database are integrated into seamless databases. Next, the new CLC2006 land cover database is created. Final products for delivery are generated in compliance with technical specifications. One part of the processing procedures is automated developing proper scripts and the processed results are uploaded to a web server for further use within the project.
For the soil sealing data verification a working layer of built-up areas is generated and other supporting layers as well. The CLC2006 land cover database is employed to make a thematicspatial stratification of the country. The internet based resource Google Earth is used as a source of reference satellite images as well as other IKONOS and QuickBird very high resolution imagery.

Г8.8

Stoimenov, A., R. Vatseva,V. **Dimitrov**. Soil Sealing Part of CORINE Land Cover 2006 Bulgaria Project, International Conference Fundamental Space Research, Sunny Beach, Bulgaria, September 21-28, 2008, Conference Proceedings, ISBN 978-954-322-316-9, pp. 110-113.

ABSTRACT
CORINE Land Cover 2006 Bulgaria is a part of the Pan-European project CORINE Land Cover (CLC). Experts from 38 countries participate in this GMES program's project. CLC2006 Bulgaria is implemented by a team of academic experts from the Bulgarian Academy of Sciences and the University of Forestry. The Executive Environmental Agencies at the Ministry of Environment and Waters and the EC are the supervisor institutions. The main aim of the national project is to create two databases – CLC Change2000-2006 and CLC2006. The identification and mapping of the land cover/land use changes (LUCC) is based on computer aided visual interpretation of satellite imagery – IMAGE2000 and IMAGE2006 databases. For the territory of Bulgaria IMAGE2006 includes 78 multispectral and multidate images received by IRS-P6, SPOT4 and SPOT5 satellites during 2006 (+/– 1 year). The CLC2006 is generated in automated way by combining the

revised CLC2000 and the CLC Change2000-2006 databases. Harmonized methodology and standardized 44 classes nomenclature (36 classes for Bulgaria) are applied. The mapping scale is 1:100 000 with minimal mapping unit 25 ha and minimum width of polygons 100 metres. All real changes ≥ 5 ha are identified and mapped. The final database geometric accuracy is better than 100 m and the thematic accuracy ≥ 85%. Metadata on working unit and national level are recorded in a standardized form. Comprehensive verification and validation procedures are carried out by qualified national and EEA experts during the project implementation to ensure the databases quality and completeness.

Г8.9

Dimitrov, V., T. Lubenov, N. Pelova, A. Stoimenov. Data Processing Problems and Solutions in the Frame of the CORINE Land Cover 2006 - Bulgaria Project, International Conference Fundamental Space Research, Sunny Beach, Bulgaria, September 21-28, 2008, Proceedings, ISBN 978-954-322-316-9, pp. 61-64.

Линк към публикацията: https://www.researchgate.net/profile/Ventzeslav-Dimitrov/publication/275576254_Data_Processing_Problems_and_Solutions_in_the_Frame_of_the_CORINE_Land_Cover_2006_-Bulgaria_Project/links/553f7b150cf24c6a05d22565/Data-Processing-Problems-and-Solutions-in-the-Frame-of-the-CORINE-Land-Cover-2006-Bulgaria-Project.pdf

Abstract
In the frame of the CORINE Land Cover (CLC) 2006 project large volumes of data from diverse sources are processed for mapping land cover changes for the period 2000 – 2006 based on satellite images. Main data sets consist of satellite imagery from different optical sensors, vector geospatial land cover databases and raster maps at different scales. Proper organization and successful fulfillment of computer data processing tasks are directly connected to the successful completion of the project itself. Main objectives of these activities are directed to providing the necessary data sets for the project, to ensuring an efficient data processing flow as well as to generating deliverables that comply with final product specifications. The computer data processing passes through two main stages: 1. Working unit (WU) data sets preparation for computer aided visual interpretation and 2. Integration of the interpretation results of WU and generation of seamless final products for the whole country. During the first stage tasks are carried out on defining the WU subdivision, transforming all the data into uniform coordinate system and WU data set organization and preparation. The second stage includes integration of the interpretation results of land cover changes by WU and of revised CLC2000 database. On this basis the new CLC2006 land cover data base is generated and final deliverables to the European Environment Agency (EEA) are prepared. Specific data processing problems arisen in the course of the project are described. They are linked to the large volume and diversity of data sources, data access issues, the great number of WU and the high labor-consuming degree of manual processing operations. Solutions applied in turn are considered like efficient WU workspace organization, computer processing automation through specialized software tools, web access to the basic data sets as well as internet based data exchange with the interpreters.

Г8.10

Dimitrov, V., Y. Tepeliev. Application of fuzzy supervised classification of satellite images. Papers of 16th International Symposium on “Modern Technologies, Education and Professional Practice in Geodesy and Related Fields”, ISBN 80-903478-3-5, Sofia, 2006, pp. 347-353.

ABSTRACT
This paper deals with a fuzzy approach for supervised classification of satellite images. The conventional supervised classification algorithms require considerable amount of homogenous training data. These traditional hard decision methods usually fail to deal with mixed pixels. The presented fuzzy procedure consists of two key phases - estimation of the fuzzy parameters from training data sets, and a fuzzy classification of the images. The fuzzy mean and covariance parameters are determined throughout the training phase. During a subsequent classification a membership value is assigned to each pixel for all of the candidate classes. For this study Landsat 7 and QuickBird satellite images are used. The procedure is performed over a test site of 10 x 10 km. It includes mostly forest areas characterized by great diversity of tree species. The results of the study show that the fuzzy techniques for supervised classification are

suitable for forest mapping.

Г8.11

Димитров В., Н. Пелова, С. Рашков. Обработка на пространствени геоданни по проект CORINE Land cover 2000 – България. Scientific conference with international participation Space, ecology, safety – SES'2005, Book 1, Space Research Institute, 2005, ISBN 954-438-484-7, 197-202.

ABSTRACT:
The CORINE Land Cover 2000 – Bulgaria project aims to update the land cover GIS database of the country and to identify the changes occurred during the period 1990-2000. Major steps of the geospatial data preparation and processing are described. Raster and vector data from the 90s contain systematic and random errors due to the methodology used. Geometric corrections applied to the satellite images and to vector data in order to correct the errors are considered. Satellite images are ortho-rectified using a rigorous method. The main error sources in CLC90 vector data base are described. Several algorithms are applied to the vector data with reference points taken from the corrected raster imagery. Planimetric accuracies of the corrected image and vector data are evaluated.

Г8.12

Tepeliev Y. , **V. Dimitrov**. Interpretation of Electric Power Network Elements in QUICKBIRD Satellite Images, Papers of International symposium on “Modern technologies, education and professional practice in geodesy and related fields”. Sofia, 2004. pp. 333-340.

ABSTRACT
The primary objective of the research is to establish proof-of-concept that the QuickBird satellite images provide for interpretation and large scale mapping of the electric power system infrastructure.
The main parameters of the satellite are presented and the characteristics are described of the panchromatic and the multispectral images used for the study. The input images were orthorectified and a pansharpened image was generated as well. By means of selected standard patterns elements of the electric power utility system were interpreted in the panchromatic image – electric poles, towers, transformer buildings and sub-stations. After digitizing these elements were presented in a vector form for mapping in GIS. An assessment of the results was made. The conclusions that were drawn confirm the relevancy of the QuickBird satellite images for large scale mapping of the electric power utility network.

Г8.13

Roumenina E., V. **Dimitrov**, E. Ivanov. Spatial Model of Ecosystem Changes in Chouprene Region, West Balkan Mountains, Bulgaria. Journal of Balkan Ecology, vol. 6, No1, 2003, pp. 64-76, ISSN 1311-0527.

Резюме:
В статията се разглежда проблемът за сукцесионните изменения в самовъзстановила се след пожар естествена горска екосистема. Изследват се горският диклайн при многодишните смърчови формации в представителна част от биосферният резерват “Чупрене“. Разработен е модел, който се базира на тримерен пространствен анализ със средствата на географска информационна система. Създадената база данни съдържа информация за дървесените видове, земното покритие и релефа. При моделирането са генерирани нови тематични слоеве и са съставени цифрови тематични карти. Получени са количествени резултати за наличието на връзка между промените в земното покритие в тестовия участък, топографските свойства и протичащите в екосистемата сукцесионни изменения Установени са три вида сукцесионните промени в изследваната територия. Две от тях индикират тенденциите за развитието на автотрофна система, а една - на хетеротрофна на съответните площи. Географската база данни може да послужи като основа за по нататъшни изследвания, мониторинг и управление на територията на целият резерват.

Г8.14

Руменина Е., В. **Димитров**. Пространствено моделиране на здравния статус на горите в резерват "Чупрене". сп. Екологично инженерство и опазване на околната среда., No 3, 2003, Издание на НД

“ЕИООС”, с. 53-59, ISSN 1311-8668.

Abstract:
The paper deals with the problem of influence of relief characterisitics on health status of old-growth spruce and beech forest formations in Chouprene biosphere reserve. A modeling procedure is developed based on 3D and spatial analysis in a geographic information system. During the modeling new thematic layers are generated and thematic maps are composed. Quantitative results are obtained about the presence of a relation between the health status of spruce and beech formations and relief characteristics.

Г8.15

Roumenina E., **V. Dimitrov**. 3D Modeling for Investigation of Influence of Orographic Factors on Land Cover Health Status in a Biosphere Reserve. International Conference “Automatics and Informatics '03”.
Published by CAI. Proceedings, vol. 1, 2003, pp. 57-60, ISBN 954-9641-34-1.

Abstract:
The paper deals with a modeling procedure based on 3D and spatial analysis in a geographic information system. It is applied to establish the influence of orographic factors on the health status of old-growth spruce and beech forest formations in the Chouprene biosphere reserve. During the modeling new thematic layers are generated and thematic maps are composed. Quantitative results are obtained about the presence of a relation between the health status of spruce and beech formations and relief characteristics.

Г8.16

Малинов И., В. **Димитров**, В. Стефанова. Някои основни резултати от регионализацията на риска от площна водна ерозия на почвата чрез данни от дребномащабни карти. Сборник научни доклади от международна научна конференция “75 години Институт за гората при БАН”. 2003, 1, 133-138.
Проф.Марин Дринов. ISBN: 954-90896-6-5.

SOME MAIN RESULTS OF THE SOIL SHEET WATER EROSION RISK REGIONALIZATION BY SMALL-SCALE DATA MAPS

Ilia Malinov, Ventseslav Dimitrov, Vihra Stefanova

Abstract: The paper presents the potential and actual water erosion risk mapping by small-scale data and GIS. The maps at scale M 1:1 000000 for the main water erosion factors are received. The maps of potential and actual water erosion risk are created by the data in GIS as the new layers. The paper involves table data, percentages and areas of threatened in different degree lands and maps.

Г8.17

Е. Руменина, М. Любенова, **В. Димитров**. Екологична рискова оценка на смърчовата растителност в биосферен резерват "Чупрене" чрез пространствено моделиране в ГИС. Сборник научни доклади от международна научна конференция “75 години Институт за гората при БАН”. 2003, 1, 61-64.
Проф.Марин Дринов. ISBN:954-90896-6-5.

Abstract:
The paper deals with the problem of forest decline of a spruce formation in the western part of Chouprene biosphere reserve. A model for ecologic risk assessment is developed based on three-dimensional and spatial analysis by means of a geographic information system. A database containing information on relief, soil type, land cover, forest type and health status of spruce communities is created. In the process of modeling new thematic layers are generated and digital thematic maps are composed. The extent of relief and soil type impact on spruce formation decline is established. Ecologic risk assessment of coniferous

vegetation in the territory of investigation is made. The geographic database could be used for further studies, monitoring and management of the territory of the whole reserve.

Г8.18

Руменина Е. В. Димитров. Пространствен модел за оценка на динамиката на земното покритие в биосферен резерват “Чупрене”. сб. Доклади от Юбилейна научна сесия “100 години от полета на братя Райт”. ВНВВУ "Г. Бенковски", Д. Митрополия, т. 1, 2003 г., с. 413-418. ISBN: 954-713-64-1.

Резюме

В доклада се разглежда проблемът за динамиката на земното покритие в самовъзстановила се след пожар естествена горска екосистема. Осъществено е интегрирано използване на методи от ландшафтната екология, дистанционните изследвания и географските информационни системи. Разработен е модел, който се базира на тримерен пространствен анализ със средствата на ГИС. Създадената база данни съдържа информация за релефа, почвените различия и земното покритие за 1967 г. и 2002 г. При моделирането са генерирани нови тематични слоеве и са съставени цифрови тематични карти. Получени са количествени резултати за промените в земното покритие на изследваната територия.

Географската база данни може да послужи като основа за по-нататъшни изследвания, мониторинг и управление на територията на целият резерват.

Г8.19

Руменина, Е., В. **Димитров**, Н. Пелова. Мониторинг на земеползването на част от полигон Пловдив с използване на изображение от Landsat TM И ГИС. Сборник доклади Международна научна сесия "50 години Географски институт при БАН", ноември 2000, с. 540-551. ISBN 954-9649-05-9

SUMMARY

Up-to-date land use maps availability is of great importance for various activities in agricultural regions. As this type of information becomes outdated relatively quickly regular update is needed. This task can be realized receiving periodically satellite images of the territory of interest. In this paper a research study of land use of a part of Plovdiv district is presented. A geographic database is developed in which thematic information, extracted through a supervised classification of a Landsat TM image is integrated. A land use map is composed and an evaluation of the land use of the region is prepared.

Г8.20

Тепелиев, Ю., **В. Димитров**, С. Рашков. Изследване на разделимостта на иглолистни насаждения по дървесни видове и класове на възраст при многоканална класификация на изображение от Landsat TM. Геодезия, картография, земеустройство, 1998, бр. 5 – 6, с. 21 – 24, ISSN 0324 – 1610.

Резюме

Площите от горския фонд в България са разделени на сравнително големи площни единици - горски стопанства. Всяко стопанство се дели на технически участъци, а те от своя страна на отдели и подотдели. За граници на отделите служат скелетните линии на релефа или изкуствени линейни обекти със значима дължина. Границите на подотделите се формират въз основа на хомогенността на горската растителност по 8 основни таксационни показателя, определяйки по този начин отделни насаждения. Дървесният вид и класът на възраст са едни от най-важните таксационни показатели, с които функционално са свързани други основни показатели като - пълнота, запас, бонитет и т.н. Целта на проведеното изследване е да се установи разделимостта на иглолистните насаждения по дървесни видове (за някои от тях) и класове на възраст при многоканална класификация на изображения от Landsat TM . То е част от работата по проекта MERA, финансиран от ЕС и ръководен за България от Министерство на околната среда.

Г8.21

Tepeliev, Y., V. **Dimitrov**, S. Rashkov, B. Donchev, D. Stoev. Results of MERA forest ecosystem mapping activities in Bulgaria, Proceedings MERA Project 1994-1996 Results conference, Bratislava, December 1996,

European Communities, 1998, pp. 87-98.

INTRODUCTION
The aim of MERA (MARS and Environmental Related Activities) Project, within PHARE Multi-country Environment Programme, is to extend the implementation of" operational GIS and satellite remote sensing methodologies for mapping and monitoring agriculture, forest ecosystems and land degradation, from the European Union (EU) to Central and Eastern Europe. Within the MERA Forest Ecosystems Mapping Sub-Project, components of the Commission's European-scale FIRS (Forest Information from Remote Sensing) Project were implemented at national level in Bulgaria, Czech Republic, Hungary, Poland, Romania and Slovakia.
The aim of the MERA Forest Ecosystems Mapping Sub-Project is to provide satellite-based forest maps and digital databases at regional scale. These data bases describe the environmental conditions (forest type, health, biodiversity, etc.) and sectorial characteristics (tree species, timber volume, growth rate, age, etc.) of the country's forests. The methodology used in this MERA Sub-Project is based on the development of an integrated Geographic Information System (GIS), incorporating Landsat Thematic Mapper (TM) satellite imagery and ancillary mapped data on forests, soils, climate, topography...

Г8.22
Малинов И., В. Стойнова, В. **Димитров**, С. Рашков. Оценка и картиране на ерозионния риск с използване на ГИС и дистанционни методи. Сборник доклади от Международна научна конференция "100 години география в Софийскияуниверситет", София, 14 - 16 май 1998, с. 360-368, ISBN 954-07-1227-0.

Резюме

В доклада е представено приложение на универсалното уравнение за прогнозиране на потенциалния и действителен ерозионен риск от площна водна ерозия на почвата с използуване на ГИС и спътникови изображения от Landsat TM. Факторите на уравнението за оценка на потенциалния ерозионен риск (ерозионност на дъждовете - R, податливост на почвата на ерозия - K, наклон на терена - S) са определени количествено и формират отделни слоеве в ГИС-базата данни. Със средствата на ARC/INFO от тях се създава нов резултантен слой на потенциалния ерозионен риск. За оценка на действителния ерозионен риск се използува информация за различните видове земно покритие - C-фактор, извлечена чрез многоканална класификация на спътниково изображение. Получени са карти на потенциалната и действителна водна ерозия за тестови участъци в района на гр. Монтана и долината на р. Струма в мащаб 1:100 000.

Г8.23
Dimitrov V.. Geographic Information Systems and Remote Sensing Integration and their Application, Proceedings AFCEA-Europe Sofia Seminar "Information Infrastructure for Free market Societies in Transition", 1995, pp. 69-72, ISBN 954-90071-1-1.

INTRODUCTION
Remote sensing (RS) produces a tremedous amount of data used for inventories as well as for monitoring. To extract from these data usable information efficiently to interrelate it with other types of saptial information a geographic handling and processing system is required. The major tool for maintaining spatial data is the geographic information system (GIS). However in the operational GIS usually maps are used as a primery source of spatial data. Although many of the maps are derived from air photography or other remote sensing sources, there is a little use of digital remote sensing data as a direct data input. To show the importance and application of GIS and RS and the benefit of their integrated use could be a contribution for clarifying of their place and role in the society.

Г8.24

Тепелиев, Ю.,Р. Колева, А. Стоименов, **В. Димитров**, С. Рашков. Компютърен анализ и класификация на цифрово изображение, получено от спектрозонална аерофотоснимка на горите в НП Пирин. Лесовъдска мисъл, 1997, бр. 3 – 4, с. 29 – 38, ISSN 1310-5639.

Резюме

Представени са резултатите от компютърна обработка и анализ на цифрово изобра- жение, получено от спектрозонална аерофотоснимка за нуждите на горското стопанство. Целта на разработката е да се установят възможностите на тези методи и данни за надеж-дно извличане на информация за състава и площта на горските насаждения, необходима за тематичното картографиране на горите.

Чрез сканиране на контактно копие на аерофотоснимка на проекторазширение на НП „Пирин" е получено цифрово изображение, което е цветна композиция в условни цвето- ве. Върху него са извършени компютърен анализ и класификация – без обучение и с обучение по метода на „максималното правдоподобие". При класификацията с обучение са дефинирани седем интерпретационни класа, от които пет за видове горски насаждения. Направена е оценка на точността на класификацията.