

## РЕЗЮМЕТА НА НАУЧНИТЕ ТРУДОВЕ ИЗПОЛЗВАНИ ПРИ ПРИДОБИВАНЕ НА АКАДЕМИЧНАТА ДЛЪЖНОСТ „ДОЦЕНТ“

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### **B4\_1**

Scheithauer, J., K. Grunewald, G. Helle<sup>2</sup>, B. Günther A. **Gikov**. 2009. Bosnian Pine (*Pinus Heldreichii*) as Geoarchive at the Timberline in the Pirin Mountains and on the Balkan Peninsula. *Biotechnology & Biotechnological Equipment*, vol. 23, number 2. 2009. Special Edition. ISSN 1310-2818, pp. 96-99

### **ABSTRACT**

High mountains and their ecosystems offer an outstanding opportunity for studies on the impact of climate change. The Pirin Mountains in Southeast Europe, situated at the transition between temperate and Mediterranean climate, are considered as very sensitive to historical and current global changes. Site specific effects as well as the impact of historical disturbances have been analysed at treeline ecotone testplots. Bosnian Pine (*Pinus heldreichii*) and Macedonian Pine (*Pinus peuce*) are the most common species at the recent timberline around 2.100 m a.s.l. in the Pirin Mountains. The results on dendroclimatology provide an insight into the potential of the Bosnian Pine and its chronologies in the Northern Pirin Mountains. First conclusions can be drawn from the chronology and site comparison respectively as well as the climate-growth-analysis. On the one hand, the width growth is humidity limited. On the other hand, the tree-rings similarly reflect high summer temperatures as a negative impact factor at sunny south flanks. At the same time, mild winters have a positive effect.

### **B4\_2**

Grunewald, K., J. Scheithauer, **A. Gikov**. 2009. Network of Methods for Analysis and Reconstruction of Ecosystem Services in The Pirin Mountains, Southeastern Europe. *Biotechnology & Biotechnological Equipment*, vol. 23, number 2. 2009. Special Edition. ISSN 1310-2818, pp. 258-261

## **ABSTRACT**

Mountains are considered as 'hotspots of biodiversity', and contain many ecosystems with rather low anthropogenic influence, particularly at higher altitudes. These ecosystems are exceptionally fragile and subject to both natural and anthropogenic drivers of change. A holistic scientific approach to the management of ecosystem services is required to ensure that local and transnational social activities are directed effectively to solving problems at the interface between these dynamic driving forces and biodiversity. This requires the development and effective use of a multidisciplinary evaluation approach. Such an 'ecosystem services method' (ESM) has been recently developed by the Dresden partner working group. It aims to improve the capacity of ecosystems to deliver ecosystem services, by focusing on the conservation of their structural diversity and multi-functionality. This is shown on the hand of case studies for the Pirin National Park.

## **B4\_3**

Pidek I.A., Svitavská-Svobodová H., van der Knaap W.O., Noryśkiewicz A.M., Filbrandt-Czaja A., Noryśkiewicz B., Latałowa M., Zimny M., Święta-Musznicka J., Bozilova E., Tonkov S., Filipova-Marinova M., Poska A., Giesecke T., **Gikov A.** 2010. Variation in annual Pollen Accumulation Rates of *Fagus* along a N–S transect in Europe based on pollen traps. *Journal Vegetation History and Archaeobotany*. Vol. 19, 2010. pp. 259-270, ISSN 0939-6314

## **ABSTRACT**

Annual pollen-accumulation rates (PAR) of *Fagus* (beech) obtained within the framework of the Pollen Monitoring Programme (PMP) were analyzed in pollen traps along a N–S transect from the Baltic Sea to the Black Sea in different European vegetation units. The study regions are situated in the lowlands of northern Poland, the uplands of SE Poland, the Czech Krkonoše Mts, the Czech Šumava Mts, the Swiss Jura Mts, the Swiss Alps, the Bulgarian Rila Mts and the Bulgarian Strandzha Mts. Most time series are 10 or 11 years long, some are 5–16 years long. Inter-annual fluctuations in *Fagus* PAR were analyzed and compared with seed mast years. Years with high *Fagus* PAR and others with low *Fagus* PAR occurred most frequently in parallel within each region and often in two neighbouring regions. 2006 was exceptional as it had a very high *Fagus sylvatica* pollen deposition in all study regions and it was also a mast year. In Bulgaria, the trend in the 5 years of *Fagus orientalis* PAR in the Strandzha Mts differed from that of *F. sylvatica* PAR in the Rila Mts. Aiming at establishing the relationship between average *Fagus* PAR and tree cover, differences in *Fagus* PAR (averaged per pollen trap) were related in each region to the proportion of beech trees in the vegetation within 2 km of the pollen traps, the distance to the nearest pollinating *Fagus* tree, regional or local presence of beech forests, the degree of landscape openness, and the size of forest opening in which a trap is situated. Average *Fagus* PAR was found to track the regional abundance of beech trees in the vegetation, not the distance of the nearest *Fagus* tree. Regional occurrence of beech-dominated forests was reflected by a *Fagus* PAR of ca. 1,400 grains cm<sup>-2</sup> year<sup>-1</sup>, local abundance very close to

pollen traps by ca. 2,400 grains, small patches of forest with admixture of *Fagus* by ca. 170–220 grains, and scarcity or absence of *Fagus* by ca. 40 grains or less.

#### **B4\_4**

Kuhlemann, J., E. Gachev, A. **Gikov**, S. Nedkov, I. Krumrei, P. Kubik. 2013. Glaciation in the Rila mountains (Bulgaria) during the Last Glacial Maximum. *Quaternary International*, v. 293, p.51-62, ISSN 1040-6182, <http://dx.doi.org/10.1016/j.quaint.2012.06.027>

#### **ABSTRACT**

Relict glacial landform complexes have been studied in the mountains of the central Balkan Peninsula since the end of the 19th century. Since their existence was proved for the first time by Cvijic, various authors have debated the number of glacial phases, as well as their age. At present, the problem of age determination is being solved by the application of the new methods for numerical dating. This paper is a detailed study of the maximum glaciation in the Rila massif, which is the highest mountain in Bulgaria and in the whole Balkan Peninsula. The application of cosmogenic nuclide dating ( $^{10}\text{Be}$ ) on moraine samples confirmed that the largest extent of former glaciers that left moraine deposits was around the time of the Last Glacial Maximum. Most probably the maximum extent occurred in two phases, the first around the beginning, and the second around the end of the LGM (24–23 ka BP and 18–16 ka BP respectively), separated by a retreat phase during the coldest (but also driest) phase of the glacial stage. The GIS-processed calculations on the basis of field evidence of the former glacier extent, and the preliminary calculations of the Equilibrium line altitude (ELA) through the accumulation-ablation ratio (AAR) method, show that the ELA during the LGM had quite small differences throughout the Rila massif (from about 2150 to 2200 m a. s. l. in the NW to about 2250–2290 m in the SE), despite the considerable differences in terminal moraine depositional altitudes (from 1150 to 2000 m a. s. l.). This is due to both the complicated pattern in the directions of moisture supply and to the influences of local topography.

#### **B4\_5**

Nikolova, M., A. **Gikov**. 2013. Assessment of vulnerability to climate hazards in municipality of Lom, Bulgaria. *Journal of the Geographical Institute „Jovan Cvijić” SASA*, ISSN 1821-2808. Vol. 63-3, 2013. p. 47-64. DOI: 10.2298/IJGI1303047N

#### **ABSTRACT**

An important part of the natural hazard's risk management is the vulnerability assessment. The study for municipality of Lom is carried out on the base of a framework for vulnerability assessment which includes the following elements: hazard probability, exposure, sensitivity and coping capacity. In this

paper we use the spatial dimensions of the areas prone to a particular climate hazard as an indicator for the level of exposure to this hazard. We introduce a measure for the system sensitivity as a function of hazard and exposure classes assigned to these areas. On the base of a system of indicators and scores for the hazard, exposure, sensitivity and coping capacity is estimated a Vulnerability Index for municipality of Lom. The results from this case study show that municipality of Lom is vulnerable to the investigating ten climate hazards. The proposed Vulnerability Assessment Method provides reliable assessment for the level of vulnerability. It may be of use for different risk management purposes. Key words: Climate hazards, Vulnerability Index, Vulnerability Maps

#### **B4\_6**

Gikov, A. 2015. Assessment of Horizontal Displacements in a Large Landslide in Eastern Rhodope Mountains (South Bulgaria) Using Remote Sensing. In *“Environmental Security of the European Cross-Border Energy Supply Infrastructure”*. Springer. p. 219-231. ISBN 978-94-017-9537-1, doi: 10.1007/978-94-017-9538-8\_14

#### **ABSTRACT**

This study presents the results of measurements of horizontal displacement for a large landslide located in a mountainous area in Southern Bulgaria that was most active in 2000. The landslide has an extensive area of 1.6 km<sup>2</sup>. For that reason it was very difficult to define the magnitude of the horizontal displacement and even its direction for a long period of time. Aerial and satellite images with very high resolution (VHR), acquired before and after the landslide began to move, were used to measure the horizontal movement of the landslide. The aerial photos were acquired in 1996 and the WorldView-1 satellite image was acquired in 2008. Both images were subject to photogrammetric processing for orthorectification purposes. The aerial photos were mosaiced to produce an overall orthophotoplan. The horizontal displacements that occurred during the period between the two acquisitions were established by measurement of the differences in the coordinates of objects identified on both images. The average length of the horizontal vectors between the two locations was 27–28 m, while the maximum was up to 40 m. A landslide displacement value map was composed.

#### **B4\_7**

Zhiyanski, M., **A. Gikov**, S. Nedkov, P. Dimitrov, L. Naydenova. 2016. Mapping carbon storage using land cover/land use data in area of Beklemeto, Central Balkan. In: *Koulov, B., Zhelezov, G. (Editors) 2015. Challenges and Perspectives in Southeastern Europe*, Springer, 2016. p. 53-65. ISBN 978-3-319-27903-9. DOI: 10.1007/978-3-319-27905-3\_4

## **ABSTRACT**

This chapter presents the results of land cover and carbon storage mapping in a study area located in the Central Balkan Mountains. WorldView-2 satellite images and ortophoto maps were used to define the land cover in the area. CORINE land cover classification at the fourth level was applied for the mapping. The carbon stock was determined using InVEST model, and results were validated with in situ data from eight experimental sites in different land use classes.

## **B4\_8**

Gachev, E., K. Stoyanov, A **Gikov**. 2016. Small glaciers on the Balkan Peninsula: state and changes in the last several years. *Quaternary International*, 415, 2016, p.33-54, ISSN 1040-6182. <http://dx.doi.org/10.1016/j.quaint.2015.10.042>

## **ABSTRACT**

Mountain glaciers are among the best environmental indicators of short-term climatic variations. Although presently there are no classical glaciers on the Balkan Peninsula, mountains in this part of Europe comprise a number of small but permanent firn–ice patches, which can be determined as small glaciers. Most of them can be categorized as glacierets, and few have characteristics of small cirque glaciers. Most of these features have survived the warming since the end of the Little Ice Age, and are considered to have persisted for at least five centuries without a complete melt.

## **B4\_9**

Dimitrov, P., Q. Dong, E. Herman, A. **Gikov**, L. Filchev, E. Roumenina, G. JeleV. 2019. Sub-Pixel Crop Type Classification Using PROBA-V 100 m NDVI Time Series and Reference Data from Sentinel-2 Classifications. *Remote Sensing*, v.11, issue 11, 1370, ISSN: 2072-4292, DOI: 10.3390/rs11111370

## **ABSTRACT**

This paper presents the results of a sub-pixel classification of crop types in Bulgaria from PROBA-V 100 m normalized difference vegetation index (NDVI) time series. Two sub-pixel classification methods, artificial neural network (ANN) and support vector regression (SVR) were used where the output was a set of area fraction images (AFIs) at 100 m resolution with pixels containing estimated area fractions of each class. High-resolution maps of two test sites derived from Sentinel-2 classifications were used to obtain training data for the sub-pixel classifications. The estimated area

fractions have a good correspondence with the true area fractions when aggregated to regions of 10 × 10 km<sup>2</sup>, especially when the SVR method was used. For the five dominant classes in the test sites the R<sup>2</sup> obtained after the aggregation was 86% (winter cereals), 81% (sunflower), 92% (broad-leaved forest), 89% (maize), and 67% (grasslands) when the SVR method was used.

## **B4\_10**

**Gikov, A., P. Dimitrov, L. Filchev, E. Roumenina, G. Jelev.** 2019. Crop type mapping using multi-date imagery from the Sentinel-2 satellites. *Comptes rendus de l'Académie bulgare des Sciences*, V. 72, No 6, pp.787-795, ISSN 1310–1331, DOI: 10.7546/CRABS.2019.06.11

### **ABSTRACT**

This paper presents the results of a crop type mapping exercise conducted in two study areas in Bulgaria and based on data from the Sentinel-2 (S2) satellites. A multi-date maximum likelihood classification approach was used in which nine spectral bands from three cloud-free images, well distributed across the growing season, were used. Validation was performed using field data collected as part of the study and data from the Integrated Administration and Control System (IACS) dataset. Depending on the validation dataset and the study area, an overall accuracy of 74-95% was achieved after the crop type maps were post-processed by mode filtering. Further increase in accuracy may be obtained if parcel boundaries, as defined in the IACS dataset, are used to aggregate the per-pixel classification to a parcel level.

## **Г8\_1**

**Gikov, A., M. Nikolova.** 2002. Mapping Air Temperature Changes in Bulgaria using GIS Spatial Analyses. In: *Proceeding of "International Scientific Conference In Memory of Prof. Dimitar Jaranov"*. Varna, 2002 Vol.2 Development and State of Environment, p.114-121, ISBN 954-9531-09-0

### **ABSTRACT**

Due to their low resolution planetary models for predicting climate change with a twice increase in carbon dioxide in the atmosphere are not suitable for predicting changes in small mountain areas such as the Balkan Peninsula. What is the situation on the Balkan Peninsula and in particular what is the trend in Bulgaria? Unfortunately, so far there are no maps to illustrate the degree of temperature change in Bulgaria.

The aim of this report is to show the possibility of presenting the spatial changes of the average temperatures in Bulgaria for two sufficiently long periods with the application of a new method, combining the modern GIS technologies with the often used in climatology regression analysis. Data

for air temperatures in 27 stations for the periods 1931-1970 and 1971-2000 were used. Using regression analysis was established correlation relationship between the air temperature and altitude for the three regions of the country. Applying the established equation in GIS Arc View 3.2, Spatial Analyst 2.0 the January temperatures for the two periods were mapped. For the territory of the Danube Plain traditional interpolation was applied.

Despite the limited number of stations the combination of regression analysis and new capabilities of spatial analysis in GIS, allows sufficiently mapping the changes in average monthly temperatures over the last 30 years. The changes are most significant for average January temperatures. The proposed algorithm for work is universal in mountainous areas. When there are significant planes in the study area the combination with interpolation provides better results.

## **Г8\_2**

**Гиков, А.** 2003. Използване на дистанционни методи и ГИС при ландшафтни изследвания в Рила планина. В: Сб. *"100 години от полета на братя Райт"*. Долна Митрополия, 24-25 април 2003 г., с. 435-442, ISBN 954-713-064-1

### **ABSTRACT**

An analysis of capabilities for mapping contemporary landscapes using remote sensing and GIS is made. Two phases in landscape mapping are outlined. The first one is the mapping of potential landscapes - native landscapes formed by natural forces without anthropogenic influence. The second one is mapping of the actual existing contemporary landscapes formed after the anthropogenic transformation. The application of geoinformation technologies in both phases is discussed. The advantages and disadvantages of using aerial and satellite images are evaluated

## **Г8\_3**

Nikolova, N.; **Gikov, A.**; Borissov, S.; Vassilev, V.; E.Bournaski. 2004. GIS of Mesta/Nestos catchment in Bulgarian territory. In: *Proceedings of the Eco-Geowater Conference "GI for International River Basin Management"* Budapest, June 3-5, 2004, p.163-170. ISBN 963-420-801-0

### **ABSTRACT**

The MestaNestos River basin between Bulgaria and Greece is one of the case studies of two FPS European projects on integrated water resources management. The Bulgarian team of the projects has developed the main layers of spatial database for the Bulgarian part of the river basin. The foundations of the GIS data base are laid covering the following layers: relief, rivers, lakes, settlements, roads, land cover, forests, and protected areas. The paper presents the important

features of each layer - origin map sources, scale, fields in attributive tables and future directions of the GIS. The MestaiNestos GIS will be a basic component of the integrated water resources management in this transboundary river basin.

#### **Г8\_4**

**Гиков, А., С. Недков.** 2005. ГИС базиран модел на пространственото разпределение на климатичните елементи в планинските територии. В: *Сб. Доклади от Научна конференция "Космос, Екология, Сигурност"*, ИКИ - БАН, 10-13 юни 2005, Варна, с. 161-166, ISBN 954-438-484-7

#### **ABSTRACT**

The paper represents an approach for modeling of climatic elements distribution in the mountain areas on the base of GIS techniques. The approach includes three different methods for modeling – spatial interpolation, regression analyses and integration by weighted overlay. It has been implemented for building of spatial model of the mean January temperatures in Bulgaria for two periods 1931 – 1970 and 1971 – 2000. The approach was also used to create layers with precipitation distribution in models computing the nitrogen and phosphorus load into river Kamchiya as well as for modeling of landscape differentiation using climatic indices in part of Western Bulgaria.

#### **Г8\_5**

**Гиков, А., З. Пиронкова.** 2005. Използване на геоинформационните технологии за оценка на щетите от смерч в горски територии. В: *Сб. Доклади от Научна конференция "Космос, Екология, Сигурност"*, ИКИ - БАН, 10-13 юни 2005, Варна, с. 269-274, ISBN 954-438-485-5

#### **ABSTRACT**

As a result of one of the most intensive tornados in Bulgaria on May 22, 2001, 13.6 percent of the old growth spruce trees (*Picea abies*) in the Bistrishko braniste reserve in Vitosha Mountain were destroyed. RS/ GIS technologies are used for assessment of the damages in the forest. For this purpose two images - Landsat and ICONOS - from different dates are interpreted. The area of the damaged forest has been delineated and the surface area measured. Forest cadastre data were used for the estimation of the damaged wood volume. The total area of destroyed forest is 75.4 ha and the total wood volume of uprooted trees is almost 28 000 cubic meters.



## **Г8\_6**

**Гиков А., Н. Николова.** 2005. Пространствен анализ на геохимичния фон в горната част на басейна на река Места чрез ГИС. В: *Сб. Доклади от Научна конференция "Космос, Екология, Сигурност"*, ИКИ - БАН, 10-13 юни 2005, Варна, с. 275-278, ISBN 954-438-485-5

### **ABSTRACT**

GIS methods for building the grid layers of background content of 5 heavy metals (Cu, Pb, Zn, Co, Mn) in the Mesta River basin is shown. In compares with the Clark of the lithosphere the local background content is lower for 4 of 5 elements. Only Pb has concentration between 1 and 5 times greater than the Clark.

## **Г8\_7**

**Гиков, А., К. Стефанов.** 2006. Използване на аероснимки за картографиране на ландшафтите в планински територии - В: *Сб. Доклади от Научна конференция "Космос, Екология, Нанотехнологии, Сигурност"*, ИКИ - БАН, Варна, 2006

### **ABSTRACT**

Using high resolution images (HRI) provides for detailed mapping of landscapes and even their morphologic structure. Because of the great price of HRIs (from IKONOS, Quick Bird etc.), they enjoy only limited application in landscape studies. Where the objective is to map in detail only a small key area, aerophotos may prove to be a good alternative. Another advantage of using this resource is the possibility to buy archive photos from the Military Topographic Survey to monitor landscapes' multiannual dynamics. The paper presents an algorithm for processing of aerophotos for the purposes of large-scale landscape mapping. The used techniques and experienced difficulties during the images' geometric correction and their transformation from central into orthogonal projection, so-called orthorectification, are described.

## **Г8\_8**

**Gerdjikov I, Z. Pironkova, A. Gikov.** 2007. Using Geoinformation Technology for Geological Risk Assessment: Study in the Area of the Northern Foothills of the Rila and Rhodope Mountains. In: *Proceedings of the Third International Conference "Global Changes and Regional Challenges"*. 28-29 April 2006 Sofia. p. 111-116, ISBN 978-954-07-2524-6

## **ABSTRACT**

This contribution seeks to focus on applications of Geoinformation technology to geological hazard assessment, on the example of well-known tectonically active area – the northern foothills of the Rila and Rhodope mountains. The work process involved acquisition of published geologic data onto GIS, processing and interpretation of DEM and ASTER imagery, as well as creation of new products using GIS technologies. The Sestrimo fault is consisting of three normal fault segments well defined on 90 and 30 m DEMs. All of these segments are marked by sharp slope breaks and triangular facets. Degraded fault scarp and fresh fault planes bearing striations have been observed in the field. Despite this evidence for active faulting the limited length of the fault segments precludes the possibilities to expect catastrophic earthquake along the Sestrimo fault zone.

## **Г8\_9**

**Гиков, А.** 2008. Използване на земното покритие и класовете по CORINE за оценка и картографиране на степента на антропогенизация на ландшафтите. В: *Сб. Доклади от четвърта Научна конференция с международно участие "Космос, Екология, Нанотехнологии, Сигурност"*, 4-7 юни 2008 г. Варна, 2008. с. 119-125

## **ABSTRACT**

An attempt to create an algorithm for transformation of CORINE land cover information for the purposes of contemporary landscape mapping is presented. A table for conversion of the CORINE land cover classes into degree of human impact of natural landscapes is created. The exact spot of some classes is still questionable.

## **Г8\_10**

Roumenina, E., A. **Gikov** H. Lukarski, V. Naydenova, G. Sotirov, G. Jelev, L. Filchev, L. Krалеva, S Fotev, M. Cherveniyashka, P. Dimitrov, V. Kazandzhiev, N. Valkov. 2008. Establishment of a Scientific-Information Complex for Aerospace Test Sites on the Territory of the Republic of Bulgaria. In: *Proceedings of the Fourth Scientific Conference with International Participation "Space, Ecology, Nanotechnology, Safety – SENS' 2008"*, June 2008, Varna, Bulgaria. pp. 106-112

## **ABSTRACT**

The report presents a concept model for establishment of a scientific-information complex with thematically distributed satellite and subsatellite data base for the aerospace test sites on the territory of the republic of Bulgaria. The subject matter of the scientific-information complex will be: establishment, development, training, collection of thematically oriented data and transfer of techniques, instrumentation and technologies for remote sensing and monitoring of the environment, unfavourable and hazardous natural and anthropogenic processes and phenomena.

The scientific-information complex will be used as a system, providing easy access to the data, their quick visualization, processing and analysis. It will support the scientific-research activity of the scientists from the BAS institutes working in the field of earth sciences and the Centre for Aerospace Monitoring at the Ministry of Emergency Situations. The complex will be also used to improve the training provided to Master and PostGraduate Students in the field of Remote Sensing of the Earth.

Introduction In the beginning of the 70-ies, under the Intercosmos Programme, a network of aerospace test sites was established for conductance of international quasi-synchronous sub-satellite experiments. Seven test sites were fixed for Bulgaria: Pleven, Shoumen, Rila, Plovdiv, East Rhodopes, Pchelina and Novi Iskur. The conductance of the experiments on the Bulgarian side was assigned to the SRI-BAS. As a result of more than 80 conducted experiments, a great stock of aerial photos and satellite images was accumulated. To make them adequate for use by modern geoinformation technology means, they should be entered in a thematically distributed data base. This database will be supplemented with the agrometeorological information available on the NIMH-BAS network as well as with new satellite photos. The development of civilization is accompanied by the increasingly topical problem of forecasting the scale of expected changes of the environment and the changes of man-inhabited environment related with them. Satellite information has become a major source in studying and observation of the Earth's surface. It is preferred in the composition of topical spatial data bases, servicing a given geographic-information system (GIS). In this context, satellite images are a major information source for a number of branch and complex studies. One of the priority lines of the 7 th EU Framework Programme is the establishment of GMES (Global Monitoring for the Environment and Security). The adequate participation of Bulgarian scientists in it requires updating the information about the test sites on the territory of the Republic of Bulgaria, bringing it in compliance with the modern substantially new development stage of remote sensing of the earth technologies. For the purpose, a scientific-information complex should be established, with thematically distributed satellite and subsatellite data base for the aerospace test sites on the territory of the Republic of Bulgaria.

## **Г8\_11**

**Gikov, A. N. Nikolova.** 2009. Application of Remote Sensing Data to Assess the Big Fire in the Rila Mountain of September. В: *Сб. Доклади от Международна научна конференция 3-6 юни 2009 г. Благоевград, Математика и природни науки, Югозападен университет „Неофит Рилски“*. Том 2. 2009. с. 287-293, ISSN 1314-0272

### **ABSTRACT**

The various capabilities of current satellite sensors for observing and mapping of fires are overviewed. RGB combinations with pseudo colours for best visualization of bands are shown. For mapping and area assessment of fire-scar, a KOMPSAT-2 image with 1 m resolution is used. In GIS environment, the fire-scar is delineated. Both plan area and surface area are calculated.

## **Г8\_12**

Димитров, П., А. **Гиков**. 2009. Идентификация и оценка на пожари в Рила планина чрез използване на спектрални индекси по данни от Landsat. В: *Сб. Доклади от пета научна конференция с международно участие "Space, Ecology, Nanotechnology, Safety, – SENS 2009"*, 2-4 ноември 2009 г. София. с. 142-149, ISSN: 1313-3888

### **ABSTRACT**

The scars and effects of several wild fires which occurred in the summer of 2000 in the Rila Mountain are identified and mapped, comparing the NDVI and NBR spectral indexes, calculated from Landsat pre- and post-fire images. The used images were three ETM+ scenes from 1999, 2000 and 2001 and one TM scene from 2007. Attempt is made to classify the most significant burned area near the Malyovitsa hut by fire severity. The difference between pre- and post-fire NBR is used. The results are presented in series of maps of Northwestern Rila Mountain and a detail of the Malyovitsa hut area. This work presents for the first time an assessment of burned areas by NBR index in Bulgarian conditions. The analysis shows that NBR performs better than NDVI in identifying fire scars and accessing fire severity.

## **Г8\_13**

**Гиков**, А., П. Димитров. 2009. Приложение на геоинформационните технологии за оценка на щетите и последиците от големия пожар в района на х.Мальовица, Рила планина. В: *Сб. Доклади от пета научна конференция с международно участие "Space, Ecology, Nanotechnology, Safety, – SENS 2009"* 2-4 ноември 2009 г. София. с. 150-159, ISSN: 1313-3888

### **ABSTRACT**

Changes after the big fire of 2000 near the Malyovitsa hut in the Rila Mountain are presented by analyzing and mapping land cover changes over a twenty-year period. Aero photos of 1988 and a Quick-Bird 2 satellite image of 2007 are used. Additionally, 5 frames from the MKF-6 multispectral camera of 1977 are processed. In order to orthorectify the images, an attempt is made to define the MKF-6 camera model and use it for the first time in Bulgaria in the LPS software package.

In mapping land cover, the fourth level of CORINE Land Cover (CLC) classification system is used. The area affected to some degree by the fire amounts to 363 ha (planimetric area). The actual surface area is somewhat larger - 397 ha, because of the rugged terrain. As a result of the natural regeneration processes, disintegration of fire scar (class 3341 according to CLC) to several other land cover types may be expected in future.

## **Г8\_14**

**Гиков, А.** 2009. Изследване на пожара около връх Аризманица, Рила планина чрез сателитни изображения с различна разделителна способност. В: *Сб. Доклади от пета научна конференция с международно участие "Space, Ecology, Nanotechnology, Safety, – SENS 2009"*, 2-4 ноември 2009 г. София. с. 160-167, ISSN: 1313-3888

### **ABSTRACT**

The potentials of current satellite sensors for observing and mapping of fires are considered. RGB combinations with pseudocolors for best visualization of bands are shown. To map and assess the area of the fire-scar around Arizmanitsa peak, images of Landsat-5, Landsat-7, ASTER and KOMPSAT-2 are used. In GIS environment the fire-scar is delineated. Both plan area (130 ha) and surface area (151 ha) are calculated.

## **Г8\_15**

**Гиков, А.** 2009. Изследване на скоростите на деформация на свлачището при кв. Ораново (г. Симитли) през 2009 година с повторни GPS измервания. В: *Сб. Доклади от пета научна конференция с международно участие "Space, Ecology, Nanotechnology, Safety, – SENS 2009"*, 2-4 ноември 2009 г. София. с. 251-256, ISSN: 1313-3888

### **ABSTRACT**

The study subject is a landslide in the North-East part of the Simitli Kettle (Strouma River Valley), which was activated in the spring of 2009. Four reference marks were fixed to monitor deformations. The results from four consecutive GPS measurements carried out in 2009 are presented. Throughout the entire period of 168 days, significant shifts were identified reaching up to 66.7 m. Average velocities vary between 13 cm/day and 40 cm/day

## **Г8\_16**

**Гиков, А., П. Димитров.** 2010. Идентификация на реликтните каменни ледници в Рила планина чрез използване на аерокосмически изображения. В: *Сб. Доклади от Шеста научна конференция с международно участие "Space, Ecology, Safety – SES 2010"*, 2-4 ноември 2010 г., София, с. 252-259, ISSN: 1313-3888

### **ABSTRACT**

The paper presents the results from the first attempt to map the relict rock glaciers on the whole territory of the Rila Mountain. These forms of the relief, material witnesses of the changes in our high mountains from the end of Pleistocene and the beginning of Holocene, are an essential element

of the mountain periglacial morphological complex. In addition to the paleoclimatic reconstructions, the studies of relict rock glaciers contribute to the attempts for modelling the future environmental changes related with climate changes. To identify relict rock glaciers, panchromatic aerial photos and colour images captured by Satellites QuickBird and SPOT were used. A GIS layer was created, which comprises 27 interpreted objects. The attributive data base contains morphometric information for each object. The results are presented in the form of a map and a table.

## **Г8\_17**

**Гиков, А.** 2010. Използване на дистанционни данни за изучаване на свлачища (на примера на свлачището при Генерал Гешево – Източни Родопи). В: *Сб. Доклади от Шеста научна конференция с международно участие "Space, Ecology, Safety – SES 2010"*, 2-4 ноември 2010 г., София, с. 260-269, ISSN: 1313-3888

### **ABSTRACT**

The application of aerial and satellite optical images with various spatial resolutions for landslide study is examined. The landslide is located between the Villages of General Geshevo and Zheludovo, Eastern Rhodope Mountain. Both aerial and WorldView-1 images with resolution of 0,5 m acquired before and after the sliding are used for calculation of the horizontal displacement. A four-step algorithm is shown. A map of the horizontal shifting is composed. To determine the landslide's activation, a series of Landsat-7 images are used.

## **Г8\_18**

**Гиков, А.** 2010. Деформации в свлачището при кв. Ораново (г. Симитли) през 2010 година. В: *Сб. Доклади от Шеста научна конференция с международно участие "Space, Ecology, Safety – SES 2010"*, 2-4 ноември 2010 г., София, с. 365-372, ISSN: 1313-3888

### **ABSTRACT**

The monitoring of landslide deformations and the results thereof are presented in the paper. The object of observations is one of the most active landslides in Bulgaria. It is situated in the eastern quarter of the Town of Simitli – Oranovo. To monitor the landslide's shifting, a network of 8 marks is set. The measurement of the landslide's displacement is organized using repeated determination of mark coordinates by GPS technique. The relationship between the velocity of movement and the precipitations measured by two close climatic stations is analyzed. The risk for the local population and the effectiveness of risk mitigation activities are discussed.

## **Г8\_19**

**Гиков, А.,** Х. Спиридонов, Г. Желев. 2010. Изследване на свлачищните процеси между селата Устрен и Генерал Гешево, Източни Родопи. В: *Сб. Доклади от Шеста научна конференция с международно участие "Space, Ecology, Safety – SES 2010"*, 2-4 ноември 2010 г., София, с. 373-380, ISSN: 1313-3888

### **ABSTRACT**

Detailed description of the vast landslide morphology close to the village of General Geshevo in the Eastern Rhodope Mountain is shown. An attempt for classification of the types of landslide deformation with relation to lithology is made. A map with areas of the type's deformation and the main landslide's elements is presented. A model of the landslide's toe formation is suggested. To monitor the landslide's activity, a net of 9 points is built. A table with the GPS coordinates of these points (November 2009) is presented. In the end, the key issue for the landslide's genesis in this part of the Rhodope Mountain is discussed.

## **Г8\_20**

**Gikov, A.** 2010. Assessment of Horizontal Displacement in Landslide Close to General Geshevo Village (Eastern Rhodope Mountain) Using Aerial and Satellite Images. In: *Proceedings of Sixth International Conference, 16-17 April, 2010, Sofia, Bulgaria, "St. Kliment Ohridski University Press"*, pp 18-23, ISBN 978-954-07-3200-8

### **ABSTRACT**

Aerial and satellite images with very high resolution (VHR), acquired before and after the landslide were used to measure the horizontal shifts of the large landslide between the Villages of General Geshevo and Zheludovo. The aerial photos were acquired in 1996 and the satellite image from WorldView-1 was acquired in 2008. Both images were subject to photogrammetric processing for orthorectification purposes. The aerial photos were mosaiced to produce an overall orthophotoplan. By measurement of the differences in the image coordinates of objects identified on both images, the horizontal displacements which occurred during the period between the two acquisitions were established. A landslide displacement value map was composed.

## **Г8\_21**

**Гиков, А.,** Н. Николова. 2011. Мониторинг на свлачището при г. Симитли през последните 2 години. В: *Сб. Доклади от Международна научна конференция 8-*

11 юни 2011 г. Благоевград, Математика и природни науки, Югозападен университет „Неофит Рилски“. Том 2. с. 220-229, ISSN 1314-0272

#### **ABSTRACT**

This contribution seeks to focus on applications of Geoinformation technology to geological hazard assessment, on the example of well-known tectonically active area – the northern foothills of the Rila and Rhodope mountains. The work process involved acquisition of published geologic data onto GIS, processing and interpretation of DEM and ASTER imagery, as well as creation of new products using GIS technologies. The Sestrimo fault is consisting of three normal fault segments well defined on 90 and 30 m DEMs. All of these segments are marked by sharp slope breaks and triangular facets. Degraded fault scarp and fresh fault planes bearing striations have been observed in the field. Despite this evidence for active faulting the limited length of the fault segments precludes the possibilities to expect catastrophic earthquake along the Sestrimo fault zone.

#### **Г8\_22**

Димитров, П., А. **Гиков**. 2011. Идентификация и картографиране на реликтните каменни ледници в Пирин планина чрез използване на аерокосмически изображения. В: *Сб. Доклади от Седма научна конференция с международно участие "Space, Ecology, Safety – SES 2011"*, 29 ноември – 1 декември 2011 г., София, с. 256-263, ISSN: 1313-3888

#### **ABSTRACT**

This paper presents the results from a study of the relict rock glaciers in Pirin Mountain using remote sensing methods and is continuation of a previous paper concerning these morphological features in Rila Mountain. The two papers represent the first attempt to map the relict rock glaciers in the two Bulgaria's highest mountains, which is of key importance for understanding its paleoclimatic settings during the end of Pleistocene and the beginning of Holocene. For identification of relict rock glaciers, true colour orthophoto and SPOT images were used. As a result of the visual interpretation 55 relict rock glaciers were found. The identification of part of them was subject of uncertainty and the confirmation will require terrain observations to be made or additional remote sensing images to be used. The identified features are presented on a map and in table containing basic morphometrical data and descriptions of their location.

#### **Г8\_23**

**Гиков**, А., П. Димитров. 2012. Приложение на сателитни изображения със средна разделителна способност за оценка на щетите от пожарите на Витоша през 2012 г. В: *Сб. Доклади от Осма научна конференция с международно участие "Space,*



*Ecology, Safety – SES 2012*”, 4-6 декември 2012 г., София, с. 306-315, ISSN: 1313-3888

#### **ABSTRACT**

The aim of this paper is to provide estimation of the areas affected by the wild fires in Bistrishko branishte reserve and in the vicinity of Aleko hut in Vitosha, that occurred in the summer and autumn of 2012. For this aim satellite images with moderate spatial resolution from Landsat ETM+ are used. The flat areas of the two fire scars determined through visual interpretation are 69.3 ha and 36.2 ha respectively. Furthermore, a comparison of the two scars is attempted based on the spectral indices dNBR and RdNBR, and the relation of these indices with the pre-fire land cover state, as characterized by NBR, is studied. The results show that, unlike dNBR RdNBR is not correlated with the pre-fire NBR values.

#### **Г8\_24**

Желев, Г. Л. Филчев, В. Стаменова, В. Василев, П. Димитров, А. **Гиков**, Е. Руменина, С. Стаменов. 2015. Добри практики в България за приложение на спътникови данни в земеделието и ландшафтно-екологичния мониторинг. В: *Сб. Доклади от Десета научна конференция с международно участие “Space, Ecology, Safety – SES 2014”*, 12-14 ноември 2014 г., София, с. 307-320, ISSN: 1313-3888

#### **ABSTRACT**

The work is dedicated to some of the basic research in the application of aerospace data in agriculture and landscape-ecological monitoring on the territory of Bulgaria, carried out by members of the Section "Remote Sensing and GIS" at the Space Research and Technologies Institute – BAS.