

РЕЗЮМЕТА НА НАУЧНИ ТРУДОВЕ

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представени за участие в конкурс за академичната длъжност „Професор“, обявен в Държавен вестник бр. 45 от 03.06.2025 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 и планетите“ за нуждите на секция „Аерокосмическа информация“ при ИКИТ-БАН.

B4.1

Stoyanov, A., Spasova, T., **Avetisyan, D.** An Analysis of Powder, Hard-Packed, and Wet Snow in High Mountain Areas Based on SAR, Optical Data, and In Situ Data. Remote Sens. 2025, 17, 1649. SJR (Scopus):1.019, Q1, не оглавява ранглистата (Scopus).

Индексирана в: Scopus

Линк към публикацията: <https://www.scopus.com/pages/publications/105004927699>

ABSTRACT

The following study presents the results obtained from a comparative analysis of dry (powder and hard snow) and wet snow based on satellite data and in situ data methods for monitoring in the high mountain belt of Bulgaria. The aim of the study is to analyze the effectiveness of different spectral indices based on satellite data from Synthetic Aperture Radar (SAR), high-resolution (HR) imagery, and spectrometer data for assessing the state and dynamics of the snow cover. The methods studied and the results obtained were validated by instrument-based field observations, with instruments using thermal imaging cameras, spectrometer measurements, ground control points, and HR imagery. Satellite data offer an ever-widening view of trends in snow distribution over time. All these data combined provide a detailed picture of surface temperature and snow properties, which are crucial for understanding snowmelt processes and the energy balance in the high-altitude belt. The findings suggest that a multi-method approach, utilizing the combined advantages of SAR satellite data, offers the most comprehensive and accurate framework for satellite-based snow cover monitoring in the high mountain regions of Bulgaria, such as Rila Mountain. This integrative strategy not only improves the precision of snow cover estimates but can also support many water resource-related studies, such as snowmelt runoff studies, snow avalanche modeling, and better-informed decisions in the management and maintenance of winter tourism resorts.

B4.2

Stankova, N., **Avetisyan, D.** Postfire Forest Regrowth Algorithm Using Tasseled-Cap-Retrieved Indices. Application of Remote Sensing in Forest Fire, 16, 3, Remote Sensing, 2024. SJR (Scopus):1.091 Q1, не оглавява ранглистата (Scopus)

Индексирана в: Scopus

Линк към публикацията: <https://www.scopus.com/pages/publications/85184731501>

ABSTRACT

Wildfires are a common disturbance factor worldwide, especially over the last decade due to global climate change. Monitoring postfire forest regrowth provides fundamental information needed to enhance the management and support of ecosystem recovery after fires. The purpose of this study is to propose an algorithm for postfire forest regrowth monitoring using tasseled-cap-derived indices. A complex approach is used for its implementation, for which a model is developed based on three components—Disturbance Index (DI), Vector of Instantaneous Condition (VIC), and Direction Angle (DA). The final product—postfire regrowth (PFIR)—allows for a quantitative assessment of the intensity of regrowth. The proposed methodology is based on the linear orthogonal transformation of multispectral satellite images—tasseled cap transformation (TCT)—that increases the degree of identification of the three main components that change during a fire—soil, vegetation, and water/moisture—and implies a higher accuracy of the assessments. The results provide a thematic raster representing the intensity of the regrowth classes, which are defined after the PFIR threshold values are determined (HRI—high regrowth intensity; MRI—moderate regrowth intensity; and LRI—low regrowth intensity). The accuracy assessment procedure is conducted using very-high-resolution (VHR) aerial and satellite data from World View (WV) sensors, as well as multispectral Sentinel 2A images. Three different forest test sites affected by fire in Bulgaria are examined. The results show that the classified thematic raster maps are distinguished by a good performance in monitoring the regrowth dynamics, with an average overall accuracy of 62.1% for all three test sites, ranging from 73.9% to 48.4% for the individual forests.

B4.3

Avetisyan, D., Stankova, N., Dimitrov, Z.. Assessment of Spectral Vegetation Indices Performance for Post-Fire Monitoring of Different Forest Environments. *Fire*, 6, 8, MDPI, 2023, A290-1-A290-28. ISSN:25716255. SJR (Scopus):0.78 Q1, не оглавява ранглистата (Scopus)

Индексирана в: Scopus

Линк към публикацията: <https://www.scopus.com/pages/publications/85169102521>

ABSTRACT

Although wildfires are a common disturbance factor to the environment, some of them can cause significant environmental and socioeconomic losses, affecting ecosystems and people worldwide. The wildfire identification and assessment of their effects on damaged forest areas is of great importance for provision of effective actions on their management and preservation. Forest regrowth after a fire is a continuously evolving and dynamic process, and the accuracy assessment of different remote sensing indices for its evaluation is a complicated task. The implementation of this task cannot rely on the standard procedures. Therefore, we suggested a method involving delineation of dynamic boundaries between conditional categories within burnt forest areas by application of spectral reflectance characteristics (SRC). This study compared the performance of firmly established for fire

monitoring differenced vegetation indices—Normalized Difference Vegetation Index (dNDVI) and Normalized Burn Ratio (dNBR) and tested the capabilities of tasseled cap-derived differenced Disturbance Index (dDI) for post-fire monitoring purposes in different forest environments (Boreal Mountain Forest (BMF), Mediterranean Mountain Forest (MMF), Mediterranean Hill Forest (MHF)). The accuracy assessment of the tree indices was performed using Very High Resolution (VHR) aerial and satellite data. The results show that dDI has an optimal performance in monitoring post-fire disturbances in more difficult-to-be-differentiated classes, whereas, for post-fire regrowth, the more appropriate is dNDVI. In the first case, dDI has an overall accuracy of 50%, whereas the accuracy of dNBR and dNDVI is barely 35% and 36%. Moreover, dDI shows better performance in 16 accuracy metrics (from 17). In the second case, dNDVI has an overall accuracy of 59%, whereas those of dNBR and dDI are 55% and 52%, and the accuracy metrics in which dNDVI shows better performance than the other two indices are 11 (from 13). Generally, the studied indices showed higher accuracy in assessment of post-fire disturbance rather than of the post-fire forest regrowth, implicitly at test areas—BMF and MMF, and contrary opposite result in the accuracy at MHF. This indicates the relation of the indices' accuracy to the heterogeneity of the environment.

B4.4

Trenchev, P., Dimitrova, M., **Avetisyan, D.** Huge CH₄, NO₂ and CO Emissions from Coal Mines in the Kuznetsk Basin (Russia) Detected by Sentinel-5P. Remote Sensing, 15, 6, MDPI, 2023, ISSN:20724292, DOI:10.3390/rs15061590, A1590-1-A1590-20. SJR (Scopus):1.14, JCR-IF (Web of Science):1.02 Q1, не оглавява ранглистата (Web of Science)

Индексирана в: Scopus

Линк към публикацията: <https://www.scopus.com/pages/publications/85151153511>

ABSTRACT

The coal industry is the largest global emitter of carbon dioxide (CO₂). However, recent data suggests that coal mine methane (CH₄) emissions worldwide are higher than those of the oil and gas industry. Furthermore, the coal industry is less active in reducing methane emissions than the oil and gas sectors due to lower profitability. Although uncertainties remain in quantifying methane emissions from mines, the use of satellite observations is revolutionizing the process of monitoring and improving the accuracy of emission accounting. The methodology presented here allows us to determine background CH₄ concentrations and improve our ability to detect emission events using Sentinel-5P data. Knowing the background concentrations for the area of interest provides us the opportunity to track seasonal and annual variations and trends, as well as quickly detect periodic or accidental emissions from unregulated sources, etc. The methodology and systematic research applied in this paper for the period of May 2018 to the end of 2022 enables us to detect hundreds of large-scale emissions of CH₄, NO₂, and CO from the coal mines in the Kuznetsk Basin (the Kemerovo region), the largest coal mining area in Russia. We estimated that the amount of these emissions is significantly higher than the emissions reported by various authors for other coal mining regions such as Poland and Australia. We found that in cases of high methane quantity there is a positive correlation between NO₂ and CO emissions in time and location. The source of emissions in the study area is homogeneous, which allows it to be

used as a benchmark for building models to estimate and track emissions in heterogeneous areas.

B4.5

Avetisyan, D., Velizarova, E., Filchev, L.. Post-Fire Forest Vegetation State Monitoring through Satellite Remote Sensing and In Situ Data. *Remote Sensing*, 14, 24, MDPI, 2022, ISSN:2072-4292, DOI: <https://doi.org/10.3390/rs14246266>, 6266-1-6266-24. SJR (Scopus):1.28 Q1, не оглавява ранглистата (Scopus)

Индексирана в: Scopus

Линк към публикацията: <https://www.scopus.com/pages/publications/85144630001>

ABSTRACT

Wildfires have significant environmental and socio-economic impacts, affecting ecosystems and people worldwide. Over the coming decades, it is expected that the intensity and impact of wildfires will grow depending on the variability of climate parameters. Although Bulgaria is not situated within the geographical borders of the Mediterranean region, which is one of the most vulnerable regions to the impacts of temperature extremes, the climate is strongly influenced by it. Forests are amongst the most vulnerable ecosystems affected by wildfires. They are insufficiently adapted to fire, and the monitoring of fire impacts and post-fire recovery processes is of utmost importance for suggesting actions to mitigate the risk and impact of that catastrophic event. This paper investigated the forest vegetation recovery process after a wildfire in the Ardino region, southeast Bulgaria from the period between 2016 and 2021. The study aimed to present a monitoring approach for the estimation of the post-fire vegetation state with an emphasis on fire-affected territory mapping, evaluation of vegetation damage, fire and burn severity estimation, and assessment of their influence on vegetation recovery. The study used satellite remotely sensed imagery and respective indices of greenness, moisture, and fire severity from Sentinel-2. It utilized the potential of the landscape approach in monitoring processes occurring in fire-affected forest ecosystems. Ancillary data about pre-fire vegetation state and slope inclinations were used to supplement our analysis for a better understanding of the fire regime and post-fire vegetation damages. Slope aspects were used to estimate and compare their impact on the ecosystems' post-fire recovery capacity. Soil data were involved in the interpretation of the results.

Г7.1

Avetisyan, D., Cvetanova, G.. Assessment of drought impact on phenological development of selected sunflower hybrids based on vegetation indices and orthogonalization of multispectral satellite data. *Bulgarian Journal of Agricultural Science*, 28, 6, Agricultural Academy, Bulgaria, 2022, ISSN:1310-0351, 1006-1026. SJR (Scopus):0.25 Q3 (Scopus).

Индексирана в: Scopus

Линк към публикацията: <https://www.scopus.com/pages/publications/85143745864>

ABSTRACT

Agriculture is one of the leading sectors, directly affected by the negative impacts of climate change and in particular of drought. Water stress is amongst the key growth limiting factors in crop production. It is expected that in the next decades Bulgaria will be affected by warming of air temperatures and reduction of precipitation sum that will significantly increase the risk of droughts. Although, sunflower (*Helianthus annuus* L.) is known to be a drought tolerant crop, sufficient and optimized agrotechnical activities are needed to achieve yield increase under changing environmental conditions and depletion of natural resources. The proper irrigation scheduling, for example, requires determination of biologically optimal health and water status for different sunflower varieties, at different stages of ontogeny. The research suggests a remote sensing methodology, integrating vegetation indices and orthogonalization of multispectral satellite data for studying phenological development of selected sunflower hybrids under drought conditions. Two indices – Normalized Differential Greenness Index (NDGI), and Normalized Differential Wetness Index (NDWNI), based on Tasseled Cap Transformation are introduced for agricultural assessments. The results show the dynamics of water and health status of the studied agroecosystems in the different growth stages, defined according to BBCH scale. NDGI and NDWNI appear to be especially suitable for determination of timing and duration of growth stages and for monitoring of the status of the studied crops during these stages. The methodology possesses a great potential for better understanding of drought impact on crop dynamics and functioning.

Г7.2

Avetisyan, D., Stankova, N.. Observation of spectral indices performance for post-fire forest monitoring. *Aerospace Research in Bulgaria*, 36, Space Research and Technology Institute Bulgarian Academy of Sciences, 2024, ISSN:1313-0927, DOI:10.3897/arb.v36.e06, 67-78. JCR-IF (Web of Science):0.1 Q4 (Web of Science)

Индексирана в: Web of Science

Линк към публикацията: <https://www.webofscience.com/wos/woscc/full-record/WOS:001235955300002>

ABSTRACT

Monitoring post-fire forest disturbances and subsequent recovery is vital for the management and preservation purposes of the forest ecosystems. This study aimed to assess forests' damages and regrowth dynamics after fire using remotely sensed data and to compare its reliability for post-fire monitoring in different forest environments. This paper compared forest regrowth dynamics applying selected spectral indices – Differenced Normalized Difference Vegetation Index (dNDVI), Differenced Normalized Burn Ratio (dNBR), and Differenced Disturbance Index (dDI). The post-fire environmental impact and recovery processes were performed on the territory of the three fires in Bulgaria – Ardino, Bistrishko branishte, and Perperek.

Г7.3

Moni, D., **Avetisyan, D.** Comparative analyses of secondary ecological succession following wildfires in three distinct forest types. A study case from Moguer, Spain. Aerospace Research in Bulgaria, 36, Bulgarian Academy of Sciences. Space Research and Technology Institute, 2024, ISSN:1313-0927, DOI:<https://doi.org/10.3897/arb.v36.e08>, 94-106. JCR-IF (Web of Science):0.1 Q4 (Web of Science)

Индексирана в: Web of Science

Линк към публикацията: <https://www.webofscience.com/wos/woscc/full-record/WOS:001235955300012>

ABSTRACT

Wildfires have become increasingly prevalent and destructive in forest ecosystems worldwide, necessitating a comprehensive understanding of post-fire recovery dynamics for effective conservation and management. Remote sensing technology, coupled with vegetation indices such as Normalized Burn Ratio (NBR), Normalized Difference Vegetation Index (NDVI), Green Red Vegetation Index (GRVI), and Red Vegetation Index (RVI), offers a powerful means to investigate these processes. In this study, we utilize remote sensing techniques to conduct a comparative analysis of secondary ecological succession following wildfires in three distinct forest types (Coniferous, Sclerophyll, and Mixed) of a forest affected by fire near Moguer, Spain. Through the acquisition and analysis of multispectral satellite imagery, we monitored changes in vegetation health and recovery across the region of interest. The NBR index allowed us to assess the severity and extent of wildfire damage, while NDVI quantified vegetation greenness and regrowth. GRVI and RVI provided insights into subtle variations in vegetation composition and health. We identified distinct temporal and spatial patterns in post-fire recovery among the different forest types by applying these indices for the period between 2017 and 2021. Our findings underscore the significance of understanding the diverse responses of these ecosystems to wildfires. While common recovery patterns emerged, such as an initial decrease in NDVI followed by regeneration, variations were observed in the timing and magnitude of recovery. These distinctions are attributed to differences in species composition, fire adaptations, and ecological processes specific to each forest type. In conclusion, the utilization of NBR, NDVI, GRVI, and RVI indices allows for a more nuanced evaluation of post-fire recovery dynamics.

Г7.4

Станкова, Н., **Аветисян, Д.** Мониторинг на състоянието и възстановителните процеси след три горски пожара в България с използването на дистанционни методи. Географ, VII – VIII, 7, СНЦ „Български географски портал – Географ БГ“, 2023, ISSN:2534-949X, 62-68.

Горските пожари са все по-голям проблем за страните от ЕС, разположени в южните части на Европа, като изменението на климата се смята за една от основните причини за повишаването на техния брой. Горските пожари са природни екосистемни процеси със значително въздействие върху околната среда, затова навременното им

откриване, както и мониторингът на възстановителните процеси са жизненоважни за екологичните изследвания. Екологичните последствия от горските пожари са многостранни – обезлесяване и ерозия на почвите; унищожаване на уникални находища на редки, защитени видове и ендемични видове, ограничаване на биологичното разнообразие; влошаване на санитарното състояние на горите; промяна на водния отток, нарушаване на топлинния и водния баланс на екосистемите; нарушаване на цикъла на CO₂ в природата.

Дистанционните аерокосмически методи са инструмент, който играе роля в четири различни направления: прогнозиране, мониторинг, картографиране и възстановяване на изгорелите площи. В комбинация с бързо развиващите се Географски информационни системи (ГИС), дистанционните изследвания предоставят възможности за създаване на екологични модели в широк мащаб – изучаване на последствията след пожарните ефекти и възстановителните процеси, протичащи в екосистема след пожар. Аерокосмическите дистанционни методи са високотехнологичен инструмент за надежден и мащабен мониторинг на възстановителните процеси, протичащи в горските екосистеми след пожар (Stankova, Nedkov, 2015; Stankova, et. al., 2018). Мониторингът на възстановяването на изгорелите горски екосистеми е по-труден в сравнение с идентифицирането им, основно заради по-малкия мащаб на възстановените участъци, сравнени с общата площ, както и заради едва забележимата промяна в сигнатурата в началните възстановителни етапи.

Г7.5

Spasova, T., Ivanova, I., **Avetisyan, D.**, Dancheva, A.. Assessment of heat islands and renewable energy sources in the north - east planning region of Bulgaria by remote sensing. Proceedings of SPIE - The International Society for Optical Engineering, 13083, SPIE, 2024, ISSN:0277786X, 1996756X, DOI:<https://doi.org/10.1117/12.3012240>, SJR (Scopus):0.15 SJR, непопадащ в Q категория (Scopus)

Индексирана в: Scopus

Линк към публикацията: <https://www.scopus.com/pages/publications/85195504050>

ABSTRACT

Surface and ground air temperatures are one of the variables that best distinguish and characterize the specific climate in urbanized spaces. Over the years, research has shown that urbanized spaces have experienced persistently higher temperatures, which is defined as the urban heat island effect (Urban Heat Island-UHI). Wind turbines and solar panels are two of the main types of renewable energy sources used in Bulgaria. The presence of too many different facilities related to renewable energy sources often has an impact, but sometimes this impact can be negative for specific territories even if they are not highly urbanized, such as the selected territory in Western Pontic steppes, North-East Planning Region (BG33). The study covers examples from the planning region defined in the Law on Regional Development of the Republic of Bulgaria under Art. 111, which will support the Integrated Territorial Strategy for the Development of NUTS 2 planning district. These are territories whose selection is determined by the fact that they have extremely high economic and ecological importance for monitoring the normal course of natural processes, disasters

and consequences of sudden changes. The aim of the research is to create a methodology for monitoring through a complex approach, to be used by experts and non-experts, in order to make decisions for the management of the territories occupied with renewable energy sources. Different indicators and indices from the optical range, such as Normalized Differential Greenness Index (NDGI), Tasseled cap transformation (TCT), Normalized Difference Vegetation Index (NDVI) and Land surface temperature (LST), were used for the different groups of objects. The spectral reflectance characteristics of natural and anthropogenic objects have been used to classify temperatures. Open data^{2,3}, data from the National Spatial Data Portal (Inspire)⁴, Orthophoto and aircraft images from 100 years ago were used for the needs of the methodology.

Г7.6

Spasova, T., Ivanova, I., **Avetisyan, D.**, Dancheva, A.. Spectral analysis and mapping of unregulated and regulated landfills in Bulgaria. Proceedings of SPIE - The International Society for Optical Engineering, 13212, SPIE, 2024, ISBN:978-151067489-9, ISSN:0277786X, DOI:<https://doi.org/10.1117/12.3038626>, 132121M-1-132121M-20. SJR (Scopus):0.15 SJR, непопадащ в Q категория (Scopus)

Индексирана в: Scopus

Линк към публикацията: <https://www.scopus.com/pages/publications/85205389301>

ABSTRACT

The study of unregulated and regulated (legal and illegal) landfills on the basis satellite and field data allows complex monitoring and analysis of waste sites. This approach combines high-resolution satellite imagery to identify and map landfills with detailed field observations to verify data and assess their condition. This provides up-to-date information on the location, volume and potential impact of landfills on the environment, which is critical for effective waste management and nature conservation. The study covers examples of different NUTS 2 planning areas (under the Regional Development and Improvement Act) such as South East (BG 41) and South Central (BG 42). The data generated is for a period of at least five years. Regulated landfills are of national importance and selected events from the territory of Bulgaria have been investigated and monitored through a complex approach based on satellite data, Unmanned Aerial Systems (UAS) and ground-based spectrometric equipment, a thermal camera and an Automatic recording weather station (AWG). The optical monitoring indices used are Normalized Difference Vegetation Index (NDVI), Tasseled cap transformation (TCT) and Normalized Differential Greenness Index (NDGI). The satellite data used are Sentinel 2 MSI, Landsat 9 (OLI/TIRS), Sentinel 3 SLTRS and Sentinel 1 SAR. The study of landfills based on complex methods of remote sensing and validation of the results through ground data brings significant benefits to the administration, society and NGOs. It facilitates the identification and monitoring of illegal landfills and dumps, supports the planning of cleanup measures and pollution prevention. This improves waste management, protects the environment and ensures a healthier life for people, while reducing costs for society and administration in the long term.

Г7.7

Spasova, T., **Avetisyan, D.**, Dancheva, A., Ivanova, I., Tsvetkov, M.. Spectral analysis and mapping of unregulated landfills in Varna, North-East planning region of Bulgaria. Proceedings of SPIE - The International Society for Optical Engineering, 13212, SPIE, 2024, ISSN:0277786X, 1996756X, DOI:<https://doi.org/10.1117/12.3038624>, 132121L-1-132121L-16. SJR (Scopus):0.15 SJR, непопадащ в Q категория (Scopus)

Индексирана в: Scopus

Линк към публикацията: <https://www.scopus.com/pages/publications/85205362438>

ABSTRACT

The Research, Innovation and Digitalisation Programme for Economic Transformation in Bulgaria is one of the tools to respond to the country's strategic needs and priorities for the implementation of a common research and innovation development policy in favour of the country's accelerated economic development. It also responds to the need to speed up the processes of public sector digitalisation and to build an enabling digital environment that ensures high-quality and secure exchange of information between different spheres of life and enhance the effects of their interaction. Developing a useful hybrid spectral analysis model to track climate change is the aim of this research. The subject of research is the dynamics tracked by the hybrid model for spectral analysis of unregulated landfills. For this purpose, a database of several identical climatic seasons (10 years) was created and processed to verify and validate the research based on satellite and in situ data. The study covers an example from NUTS2, the North East (BG33) planning region (under the Regional Development and Improvement Act). The generated data is of high value according to the European Commission. They are for a period of at least five years. The study of the unregulated landfills is of national importance and the selected events from the territory of Bulgaria have been studied and monitored through a complex approach based on satellite data and ground-based innovative spectrometric equipment through a mobile spectrometer and a thermal camera. Indices such as Normalized Difference Vegetation Index (NDVI), Normalized Differential Greenness Index (NDGI) and Tasseled cap transformation (TCT) are also applied. Data from Orthophoto, Landsat-9 OLI-2/TIRS-2, Sentinel 2MSI and Sentinel-3 SLTRS satellites were used. Data from Corine Land Cover 2018 Copernicus and Open data were also used in the study. Through this research, the data being generated for unregulated landfills can be supplemented and will be used to create of register and their use by various stakeholders.

Г7.8

Dancheva, A., Spasova, T., **Avetisyan, D.** Application of remote sensing data to monitor the thermal pollution from waste disposal sites. Proceeding SES 2024, Space research and technology institute, 2024, ISSN:e-ISSN 2603 – 3321, 175-180.

ABSTRACT

The problem of waste management has existed since ancient times. In the modern world, waste generation is directly related to human activity. A large percentage is related to the production of household waste caused by the consumerism of each household. Toxins, leachate and greenhouse gases are one of the main causes of environmental pollution as a result of landfills. Over time, these toxins seep into the soil and groundwater, affecting the quality of the soil itself and drinking water in the area. Leachate, on the other hand, is a highly toxic liquid that forms when waste breaks down in a landfill and water filters through the waste. It is of great importance to take strict measures and monitor the landfills. Thanks to GIS and Remote sensing, efficient and complex monitoring of regulated and unregulated waste landfills can be done. The aim of the present work is to explore the possibilities of aerospace data analysis and to show different methods of processing, interpretation and visualization. Optical images from the Multispectral Instrument (MSI) on the Sentinel 2 platform of the European Space Agency's Copernicus program were used. Thermal bands from the Landsat 5 – 7 (ETM) and Landsat 8/9 (OLI / TIRS) sensors of the Landsat program were used to calculate land surface temperature. For the purpose of primary recognition of the studied objects, the satellite images are orthogonalized.

Г7.9

Spasova, T., Dancheva, A., **Avetisyan, D.**, Ivanova, I., Popov, I., Shirov, B.. Monitoring of renewable energy sources with remote sensing, open data, and field data in Bulgaria. Proc. SPIE 12733, Image and Signal Processing for Remote Sensing XXIX, 12733, SPIE, 2023, ISSN:0277786X, DOI:<https://doi.org/10.1117/12.2680495>, 1273311-1-1273311-20. SJR (Scopus):0.17 SJR, непопадащ в Q категория (Scopus)

Индексирана в: Scopus

Линк към публикацията: <https://www.scopus.com/pages/publications/85179548690>

ABSTRACT

Monitoring through satellite data, in situ (including spectrometer data, GPS, thermal camera), open data, data from various devices and Unmanned Aerial Vehicles (UAV) in the selected anthropogenic sites is of extremely high ecological importance for tracking natural processes, the consequences of climate changes and the creation of a useful model for the analysis of spectral characteristics based on machine learning. The timeliness of the data and the spatial extent of the observed objects allow satellite information to be reliable in monitoring and making predictions about the risk and potential risk of natural disasters, rise of average air temperatures and anthropogenic pollution. The sites were pre-marked based on open data from Non-Governmental Organizations (NGOs) and administration. Data from the Multispectral Instrument (MSI) of the Sentinel 2 platform and SAR of the European Space Agency's Copernicus program, spectrometer (380 nm to 780 nm) and drone data were used. Landsat sensors and data from Sentinel 3 (EUMETSAT) were used to calculate the surface temperature of renewable energy sites such as photovoltaic parks. Data from different years were used in order to track the studied territories according to NUTS2. The result is the development of a useful hybrid model for spectral analysis and tracking of spatial dynamics and surface changes of objects of interest based on satellite and field surveys. Data from the ground mobile and autonomous weather station AWG 1, powered by an environmentally friendly magnesium-air battery was improved specifically for the project. Another important

task is the creation of an energy atlas for the benefit of the Earth's Digital Twins. The data is part of an open data catalog of the NGO Eco Global Monitoring TA2.

Г7.10

Yanakieva, N., **Avetisyan, D.** Testing optical spectral indices for assessment of surface changes due to permafrost melting on Livingston Island, Antarctica. Aerospace Research in Bulgaria, 36, Bulgarian Academy of Sciences. Space Research and Technology Institute, 2024, ISSN:1313-0927, DOI:<https://doi.org/10.3897/arb.v36.e07>, 79-93. JCR-IF (Web of Science):0.1 Q4 (Web of Science)

Индексирана в: Web of Science

Линк към публикацията: <https://www.webofscience.com/wos/woscc/full-record/WOS:001235955300017>

ABSTRACT

The present study aims to examine the potential of optical satellite data and spectral indices to assess surface changes induced by permafrost melting. Surface changes related to permafrost melting on Livingston Island, Antarctica, were examined using optical satellite data from Sentinel-2 sensors of the European Space Agency (ESA). The study area coincides with previous field studies by electrical resistivity tomographic profiles made to establish and visualize the presence of permafrost. Utilizing the advantages of remote sensing methods and calculation of optical indices, it was tracked whether and to what extent there was a surface change and melting of the permafrost in the study area. The observation period encompasses the astral summer seasons from 2016 to 2023. The results show that the combination of different optical indices gives a better understanding of changes in the terrain. The combined use of the Normalized Difference Glacier Index (NDGI), Normalized Difference Snow Index (NDSI), Normalized Difference Snow and Ice Index (NDSII), Normalized Difference Water Index (NDWI), Normalized Difference Vegetation Index (NDVI), and Moisture Stress Index (MSI) indicates for a pronounced trend of melting of the active layer of the permafrost periglacial area of research in March 2016 and 2017, and from January to mid of March 2023.

Г7.11

Yanakieva, N., **Avetisyan, D.** Application of SAR for Monitoring of Permafrost Ground Changes on Livingston Island, Antarctica. International Geoscience and Remote Sensing Symposium (IGARSS), Institute of Electrical and Electronics Engineers Inc., United States, 2024, SJR (Scopus):0.26 SJR, непопадащ в Q категория (Scopus)

Индексирана в: Scopus

Линк към публикацията: <https://www.scopus.com/pages/publications/85204879492>

ABSTRACT

The present study aims to examine the potential of radar satellite data to assess surface changes induced by permafrost melting. Surface changes related to permafrost melting on Livingston Island, Antarctica were examined using Synthetic Aperture Radar (SAR) satellite data from Sentinel-1 sensors of the European Space Agency (ESA). The study area coincides with previous field studies of permafrost melting performed by electrical resistivity tomographic profiles and satellite-based monitoring using Sentinel-2 optical images. The observation period encompasses the month of February from 2017 to 2024. The results show that the radar measurements confirm the observed trend of melting of the active layer of the permafrost periglacial area during the Austral summer of 2017.

Г7.12

Spasova, T., **Avetisyan, D.**, Stoyanov, A.. Snow Cover Mapping Based on a Multi-Index Technique in Vitosha, Pirin and Rila mountains. Proc. SPIE 13197, Earth Resources and Environmental Remote Sensing/GIS Applications XV, 13197, SPIE, 2024, DOI:<https://doi.org/10.1117/12.3031481>, SJR (Scopus):0.15 SJR, непопадащ в Q категория (Scopus)

Индексирана в: Scopus

Линк към публикацията: <https://www.scopus.com/pages/publications/85212873711>

ABSTRACT

Snow cover over the Northern Hemisphere plays a crucial role in the Earth's hydrology and surface energy balance, and modulates feedbacks that control variations of global climate¹. Seasonal snow cover is the most dynamic element of the cryosphere. It responds rapidly to atmospheric conditions on timescales of days to weeks and, in fact, exhibits the greatest seasonal variation of any geophysical element on Earth's surface². While large changes in snow cover are useful as indicators of climate change, snow also affects other components of the Earth system at different scales. The aim of the study is to track the use of different data and a differentiated approach to track the state of the snow cover. The object of research is the snow cover and its condition around Vitosha, Rila and Pirin mountains. The objects are mapped according to data of the European Space Agency (ESA) - Copernicus program. Data from different spectral snow mapping are obtained, which can be used to estimate results for quantitative changes in snow cover and wet snow cover. The data used are of high spatial resolution. The snow mapping system has sufficient temporal and spatial resolution. The research also emphasizes the possibilities that field data provide for validating the results of satellite data. Field data were collected from three different areas of interest in mountainous conditions. These are data from a mobile spectrometer Sekonic C-800 with a wavelength of 380 to 780nm and a thermal camera with a wavelength of 8 - 14 μm . A differentiated approach was used in spectral mapping based on data from spectral indices such as Normalized Difference Forest Snow Index (NDFS_I), Normalized Difference Snow Index (NDS_I) and Normalized Difference Vegetation Index (NDVI). The study doesn't make a detailed characterization of each of the example areas, but demonstrates the use and combination of the integrated methodology for monitoring a database from different ranges of the Electromagnetic Spectrum.

Г7.13

Spasova, T., **Avetisyan, D.**, Ivanova, I., Stankova, N.. Assessment of mosses in Antarctica based on remote sensing and chlorophyll fluorescence. SPIE Proceedings Volume 13191, Remote Sensing for Agriculture, Ecosystems, and Hydrology XXVI; 131910V, SPIE, 2024, DOI: <https://doi.org/10.1117/12.3031486>, SJR (Scopus):0.15 SJR, непопадащ в Q категория (Scopus)

Индексирана в: Scopus

Линк към публикацията: <https://www.scopus.com/pages/publications/85212821776>

ABSTRACT

Chlorophyll fluorescence refers to the emission of light by chlorophyll molecules when they are excited by absorbed light. Chlorophyll is the pigment responsible for photosynthesis - the process through which plants and other photosynthetic organisms convert light energy into chemical energy. The intensity of chlorophyll fluorescence can vary based on geographical latitude as well as other environmental factors. In Antarctica, where the extreme climatic conditions define the ecosystem, mosses are one of the few land-based organisms that can survive and thrive. The Antarctic Peninsula is especially known for its sparse but resistant vegetation, including several moss species that have adapted to extreme conditions like low temperatures, intense ultraviolet (UV) radiation, and repeated freeze-thaw cycles. These mosses are essential for maintaining the ecological balance in the region and offer important insights into how extreme environments affect plant physiology. This research aims to compare the spectral properties of mosses and lichens, with a focus on differences in their fluorescence intensity on Livingston Island, Antarctica, during the summer season. Field research in Antarctica was carried out in order to validate data obtained from Sentinel 2 MSI satellite images, drone photography, and photogrammetry. A spectrometer was used to analyze the visible spectrum ranging from 380 nm to 780 nm, corresponding to the spectral ranges utilized by the Sentinel 2 MSI and Sentinel 3 SLSTR satellites. The main research methods involve evaluating chlorophyll fluorescence response and applying various optical indices for remote sensing, including Normalized Difference Vegetation Index (NDVI), Normalized Difference Water Index (NDWI), and Moisture Stress Index (MSI). A radar index generated from processing Sentinel 1 data is utilized as well. These methods enable a thorough analysis of photosynthetic activity and plant health in extreme conditions, providing insights into the adaptive mechanisms of mosses in polar environments.

Г7.14

Stoyanov, A., **Avetisyan, D.** Application of optical data from Sentinel-2-MSI for snow cover monitoring on the territory of the mountainous region of Bulgaria. Proceedings of SPIE Remote Sensing for Agriculture, Ecosystems, and Hydrology XXV, 12727, 127341I, SPIE, 2023, ISSN:0277-786X, DOI:<http://dx.doi.org/10.1117/12.2679774>, SJR (Scopus):0.17 SJR, непопадащ в Q категория (Scopus)

Индексирана в: Scopus

Линк към публикацията: <https://www.scopus.com/pages/publications/85177850275>

ABSTRACT

The present study aims to monitor the Snow Cover Extent (SCE) of the mountainous region of Bulgaria (13 905 km²), located 1000m above sea level, for eight years. Information is important for calculation of Snow Water Equivalent (SWE), hydrological runoff modeling, forecasting, and assessing flood events. Global Warming and Climate Change and their impacts, such as a constant increase in recorded high-temperature levels, frequent droughts, water scarcity in the summers, and less-snow winters, have a significant effect on agriculture, hydrology, forests, and ecology in Bulgaria. The present research uses the available cloudless optical data of Sentinel-2 –MSI for snow cover monitoring concerning the decrease in snow distribution during the last decade. Sentinel-2 satellite imagery, from October to May, for the period between 2016 and 2023, was generated and exported from Google Earth Engine (GEE). Normalized Differential Snow Index (NDSI) and Snow Water Index (SWI) were calculated, and the resulting output indices rasters were post-processed and inspected additionally to obtain thresholding classifications, masking out the areas covered by shadows (topographic), water bodies, forests, etc., and snow cover area distribution. The results obtained in the study can be used and integrated for climate change observations and research at the local and regional levels.

Г7.15

Spasova, T., **Avetisyan, D.** A synchronized remote sensing monitoring approach in the Livingstone island region of Antarctica. Proc. SPIE 12786, Ninth International Conference on Remote Sensing and Geoinformation of the Environment (RSCy2023), 12786, SPIE, 2023, ISSN:0277786X, DOI:<https://doi.org/10.1117/12.2682162>, 127861X-1-127861X-20. SJR (Scopus):0.17 SJR, непопадащ в Q категория (Scopus)

Индексирана в: Scopus

Линк към публикацията: <https://www.scopus.com/pages/publications/85174305142>

ABSTRACT

Data-driven innovations bring significant benefits to societies directly affected by global warming, as they underpin Global and European climate change policy. The application of a synchronous approach and interoperability of data from different sources for environmental monitoring in one of the most vulnerable to climate change regions in the World is the aim of this research. The research was conducted at Hannah Point peninsula, near the Bulgarian Antarctic base "St. Kliment Ohridski" on Livingstone Island, South Shetland Islands, Antarctica. The study area has high ecological importance for tracking the dynamics of processes not only on a local but also on a global scale. Various research sites with different groups of objects serving as environmental benchmarks were selected to be studied. The study objects include snow cover, wet snow, water, ice (including sea ice), herbaceous vegetation, lichens, mosses, soils, and sand. For each of the objects, ground GPS points were defined and in situ spectrometric measurements were performed. Data from an innovative automatic recording weather station (AWG), as well as various indicators and indices based on the spectral reflectance characteristics of the investigated objects in the optical and microwave range, were used. For their generation were used satellite images

from Sentinel-1 and Sentinel-2 sensors of European Space Agency. Multiple optical indices were used to demonstrate the changes in the state of the objects for the summer season of 2022-2023. The data obtained and models used will serve the Bulgarian initiative for the construction of the Digital Twins, which is being on pilot developed in the Department of Aerospace Information (SRTI-BAS) and could be used by a wide range of scientists in the field of polar research as well as for climate change education. Open Data were used in this study, to promote the Open science policy and FAIR principles as much as possible.

Г7.16

Avetisyan, D., Stoyanov, A.. Assessment of elevation and slope exposure impact on snow cover distribution in the mountainous region in Bulgaria using Sentinel-2 satellite data. Proc. SPIE 12727, Remote Sensing for Agriculture, Ecosystems, and Hydrology XXV, 12727, SPIE, 2023, ISSN:0277-786X, DOI:<http://dx.doi.org/10.1117/12.2679770>, 127271H-1-127271H-11. SJR (Scopus):0.17 SJR, непопадащ в Q категория (Scopus)

Индексирана в: Scopus

Линк към публикацията: <https://www.scopus.com/pages/publications/85177814871>

ABSTRACT

Snow cover is among the most important features of the Earth's surface and a crucial element of the cryosphere that affects the global energy balance, water, and carbon cycles. Accurate monitoring of this land surface component is of particular significance as snowmelt provides between 50%–80% of the annual runoff in the temperate (boreal) regions and significantly impacts the hydrological balance during the warm season. Limited reserves of soil moisture during the winter period can lead to all types of droughts, including green-water drought, which is expressed by reduced water storage in soil and vegetation. Green-water drought causes a variable effect across landscape components, on the functions and ecosystem services (ES) they provide. The present study aims to track the snow cover dynamics in the transitional seasons of the year when the snow cover is most unstable and to differentiate its territorial distribution depending on elevation and slope exposure. The study area covers the mountainous territories of Bulgaria and the seasons from 2016 to 2022. To achieve the aim of the study, we used Sentinel-2 images and calculated the Snow Water Index (SWI). SWI uses spectral characteristics of the visible, shortwave infrared (SWIR), and near-infrared (NIR) bands to distinguish snow and ice pixels from other pixels, including water bodies which is crucial for the accurate monitoring of snow cover dynamics. The obtained results were validated using VHR images for pre-selected test areas.

Г7.17

Avetisyan, D., Spasova, T.. Copernicus data utilization for polar research and monitoring purposes. Proceedings of 3rd National Workshop with international participation under the EU Copernicus programme, Space Research and Technology Institute, Bulgarian Academy of Sciences (SRTI-BAS), 2023, ISBN:978-619-7490-16-9, DOI:<https://doi.org/10.5281/zenodo.10438976>, 28-38.

Линк към публикацията: <https://zenodo.org/records/10438977>

ABSTRACT

The Polar Regions are remote and hard to reach and in the meantime they are distinguished by unique conditions, influencing in specific way processes occurring on the Earth's surface. Their study is a challenging task that needs to utilize the whole potential of the available technologies to be solved. This paper outlines Copernicus data utilization for polar research and monitoring purposes using remote sensing methods for the retrieval of additional and valuable information. In our study, we present the ability of remote sensing technology for monitoring and assessment of processes influenced by climate change and global warming combining the advantages of three of the Copernicus satellites – Sentinel 1, 2, and 3. The satellite data used and the applied methods for retrieval of information were validated through field observation of distinct objects on the Earth's surface including snow cover, wet snow, water, ice (glaciers and sea ice), vegetation (lichens and mosses), permafrost, and rocks. The monitoring of the fragile environment of the Polar Regions has extremely high ecological importance for tracking the dynamics of processes induced by climate change not only on a local but also on a global scale.

Г7.18

Avetisyan, D., Spasova, T.. Приложение на дистанционните методи за изследване въздействието на климатичните изменения в полярните райони като част от дестинация земя Антарктика. Географ, 8, СНЦ „Български географски портал – Географ БГ“, 2024, ISSN:2534-949X, 45-56.

Изграждането на дигитално пространство за полярните райони позволява съхранение, споделяне и преизползване на оперативно съвместими данни от научни изследвания и по този начин способства придобиването на по-задълбочени познания за екологичните предизвикателства в полярните райони и откриването на ефективни мерки при борбата с негативните ефекти от все по-често наблюдаващи се неблагоприятни за местните екосистеми явления. Чрез мониторинг, анализ и симулиране на динамични процеси, протичащи в земната система и оценка на взаимовръзките между отделните ѝ компоненти могат да се прогнозира потенциалните негативни ефекти от различни въздействия, тяхното проявление и своевременно да се предприемат действия за тяхното ограничаване.

В Антарктика негативните ефекти, свързани с изменението на климата се проявяват по различни начини, включително чрез възникване на катастрофични събития и екстремни климатични явления като срутване на шелфов лед; спад в количеството на морски лед; бърза промяна в условията на околната среда и свързаните с това бързи изменения в състава на видовете и т.н.

Основно предизвикателство, свързано с изследването на полярните райони е тяхната отдалеченост и трудна достъпност. Тяхното изследване е предизвикателна задача, която трябва да използва целия потенциал на наличните технологии, за да бъде решена. Дистанционните методи за изследване на Земята чрез спътникови данни способстват за решаването на тази трудна задача. Тази статия представя методи за извличане на допълнителна информация от спътникови данни и оценка на процеси, повлияни от изменението на климата и глобалното затопляне, комбинирайки предимствата на различни спътници и апаратура за теренно верифициране на

получените резултати. Използваните спътникови данни и приложените методи за извличане на информация са валидирани чрез теренни наблюдения на отделни обекти от земната повърхност, включително снежна покривка, мокър сняг, вода, лед (ледници и морски лед), растителност (лишеи и мъхове), пермафрост и скали.

В резултат на проекта „Дестинация Земя Антарктика – Дигитално пространство за данни, пилотен проект“, финансиран от Българския антарктически институт по програма „Полярни научни изследвания за млади учени“ през 2022 г. е изготвено и „Ръководство за дистанционни изследвания в полярните области“ (Спасова и др., 2024), насочено към широка читателска аудитория с интерес към изучаване на полярните райони и изследване на климатичните промени и околната среда, в обхвата на комплекса от Науки за Земята.

Г7.19

Trenchev, P., Dimitrova, M., **Avetisyan, D.** Determining background concentrations of major atmospheric pollutants using Sentinel-5P TROPOMI data. Proc. SPIE 12730, Remote Sensing of Clouds and the Atmosphere XXVIII, 12730, SPIE, 2023, ISSN:0277786X, DOI:<https://doi.org/10.1117/12.2679839>, 127300Q-1-127300Q-8. SJR (Scopus):0.17 SJR, непопадащ в Q категория (Scopus)

Индексирана в: Scopus

Линк към публикацията: <https://www.scopus.com/pages/publications/85180005698>

ABSTRACT

The increase in concentrations of major atmospheric pollutants such as NO₂, CO, CH₄ as result of human activities is one of the main causes of the dynamic climate changes observed in recent years. These rapid changes have a strong influence on air quality at local and global levels and directly affect human health. This is one of the main reasons for faster global warming. The concentration of methane in the atmosphere is increasing at an accelerating rate. Three sectors are responsible for most anthropogenic CH₄ emissions: fossil fuels, waste and agriculture. Locating, tracking and quantifying all these emissions is an important step towards a more accurate inventory. The use of satellite observations rises at a new level the monitoring process and improves the accuracy of emissions reporting. Medium-resolution satellite data, such as that provided by the TROPOMI sensor on the European Sentinel-5P satellite, is a powerful tool for detecting and tracking large emissions of air pollutants. The methodology presented here enables us to determine background concentrations of CH₄, NO₂, CO relatively quickly and efficiently. It improves our ability to quickly detect periodic or occasional emissions from unregulated sources, track seasonal and annual variations in concentrations of these air pollutants, etc. Hundreds of cases of high methane, NO₂ and CO emissions in coal mining areas have been registered using this methodology. The method is also applicable to lower-intensity emission sources, such as landfills, agriculture or recording methane emissions from wetlands.

Г7.20

Dimitrova, M., Trenchev, P., **Avetisyan, D.** Spatiotemporal behavior of atmospheric pollutant ingredients over Bulgaria, based on open access GAMS data. Proc. SPIE 12730, Remote Sensing of Clouds and the Atmosphere XXVIII, 12730, SPIE, 2023, ISSN:0277786X, DOI:<https://doi.org/10.1117/12.2684037>, 127300R-1-127300R-9. SJR (Scopus):0.17 SJR, непопадащ в Q категория (Scopus)

Индексирана в: Scopus

Линк към публикацията: <https://www.scopus.com/pages/publications/85180013873>

ABSTRACT

In recent years a steady trend of increasing concentrations of major air pollutants is observed. The nature and dynamics of this trend vary according to the type of pollutant, source of emissions, and location. Because of these differences, it is important to comprehensively analyze the spatial and temporal behavior of the most important air pollutants using satellite and ground-based measurement data. An important step in this process is locating, tracking, and quantifying the emissions. This paper presents the results of air pollution monitoring based on the analysis of data obtained from 32 Ground-based Automatic Measuring Stations (GAMS) located throughout Bulgaria. The spatial and temporal behavior of major air pollutants such as NO, NO₂, SO₂, CO, and benzene for the period 2015 - 2022 was investigated. However, not all GAMS have data for all types of pollutants. The largest amount of information is available for SO₂ and NO₂, while small numbers of GAMS provide data for CO. For pollutants such as NO₂, SO₂, and CO an analysis with satellite data from the European Sentinel-5P satellite was performed. Due to the uneven distribution of the available information from ground measurements, the spatial behavior of the pollutants studied is presented using a unified methodology for selected regions. Monthly and annual average data were also analyzed in our study.

Г7.21

Dimitrova, M., Trenchev, P., **Avetisyan, D.**, Spasova, T.. Spatio-temporal monitoring of air pollution over Bulgaria's largest industrial area using Sentinel-5p TROPOMI data. Proc. SPIE 12786, Ninth International Conference on Remote Sensing and Geoinformation of the Environment (RSCy2023), 12786, SPIE, 2023, ISSN:0277786X, DOI:<https://doi.org/10.1117/12.2681792>, 127861P-1-127861P-8. SJR (Scopus):0.17 SJR, непопадащ в Q категория (Scopus)

Индексирана в: Scopus

Линк към публикацията: <https://www.scopus.com/pages/publications/85174259613>

ABSTRACT

Air pollution is one of the most significant environmental problems in the world nowadays. A considerable part of anthropogenic emissions is produced by industry and Bulgaria is no exception. The most important air pollutants that have a significant impact on the air quality

and have a direct or indirect influence on climate change are nitrogen dioxide (NO₂), carbon monoxide (CO), methane (CH₄) and sulphur dioxide (SO₂). This paper reports on pollution monitoring results in Bulgaria's largest industrial area, located in the triangle between the cities of Stara Zagora, Haskovo and Plovdiv. Daily satellite data from the Sentinel 5P - TROPOMI instrument were used to study high levels of nitrogen dioxide, carbon monoxide, methane and sulphur dioxide emissions from October 2018 to December 2022. Validation of the results was carried out using ground data from the nearest Automatic Identification System (AIS) station. The monitoring results show that the study area has the highest levels of NO₂ pollution. However, many cases of SO₂ pollution have also been recorded.

Г7.22

Trenchev, P., Dimitrova, M., **Avetisyan, D.**, Spasova, T.. A fast and efficient method for calculation of background methane concentrations using Sentinel-5P satellite data. Proc. SPIE 12786, Ninth International Conference on Remote Sensing and Geoinformation of the Environment (RSCy2023), 12786, SPIE, 2023, ISSN:0277786X, DOI:<https://doi.org/10.1117/12.2681793>, 1278624-1-1278624-7. SJR (Scopus):0.17 SJR, непопадащ в Q категория (Scopus)

Индексирана в: Scopus

Линк към публикацията: <https://www.scopus.com/pages/publications/85174248950>

ABSTRACT

Increased emissions and thus higher concentrations of greenhouse gases in the atmosphere as a result of human activities are one of the main reasons for the observed rise in temperatures in recent years. Methane is the second most abundant greenhouse gas and plays a significant role in global warming. With the oil and gas industry and coal mining accounting for the majority of anthropogenic emissions, atmospheric methane concentrations are increasing at an accelerating rate. In this paper, using satellite data from the Sentinel-5P for the period of May 2018 to December 2022, we present an efficient and fast method to calculate background atmospheric CH₄ concentrations. The emission source in the study area is homogeneous, allowing the proposed method to be used as a benchmark for building models to estimate and track emissions in heterogeneous regions. The knowledge of background concentrations allows the tracking of seasonal and annual variations and trends, as well as the rapid detection of regular or accidental emissions from unregulated sources.

Г7.23

Cherneva, G., Hristova, V., Borisova, D., Bouzekova-Penkova, A., **Avetisyan, D.** Compensation of linear distortions in case of transmitting measurement information. Proc. SPIE 12734, Earth Resources and Environmental Remote Sensing/GIS Applications XIV, 12734, SPIE, 2023, ISSN:0277-786X, DOI:10.1117/12.2680510, 127341G-1-127341G-7. SJR (Scopus):0.17 SJR, непопадащ в Q категория (Scopus)

Индексирана в: Scopus

Линк към публикацията: <https://www.scopus.com/pages/publications/85179546771>

ABSTRACT

A fundamental problem in the transmission of measurement information in contemporary information management systems is the distortion of the signals as an outcome of uneven frequency characteristics of the connection channels. The link channel, as the signal propagation medium, is part of the cascades, as at the transmitter as well at the receiver. The linear distortions of the signal consist in a change in its information parameters, and they can be related to its amplitude and phase spectrum. Compensation of signal distortions is an effective and operative method for increasing the speed of transmitted information and the quality of measurement systems. To compensate for amplitude and phase distortions of the signals, correctors are gained, which are connected coherently to the link channel. The properties of the correctors are identified by their transfer function, frequency response and attenuation. Depending on the assign of elements in the circuit of the corrector, different frequency characteristics and attenuation are derived. Of particular importance is the question of their sensitivity, both to a change in a certain parameter of the scheme, and to the frequency. In the presented work, a fusion of a digital corrector is proponed for the compensation of linear distortions in the transmission of discrete signals. Its characteristics have been explored and analyzed, and conclusions have been drawn regarding its effectiveness and application.
