

“Synergies for a sustainable future in the EMMENA” 22nd of June, 2022 Virtual meeting



CONSORTIUM



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Organizer:

ERATOSTHENES CENTRE OF EXCELLENCE

CYPRUS UNIVERSITY OF TECHNOLOGY



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ERATOSTHENES Centre of Excellence

A new, autonomous, and self-sustained Centre of Excellence, namely ERATOSTHENES Centre of Excellence of the Cyprus University of Technology (CUT) has been established through the 'EXCELSIOR', H2020 Widespread Teaming Phase 2 project. The newly established centre has been created as a result of upgrading the existing Remote Sensing and Geo-Environment Lab, which has been operating within the Department of Civil Engineering and Geomatics of the Cyprus University of Technology since 2007.

The vision of the ERATOSTHENES Centre of Excellence is to become a world-class Digital Innovation Hub for Earth Observation, space technology and Geospatial Information and to be the reference Centre in the Eastern Mediterranean, Middle East, and North Africa.

The Digital Innovation Hub will create an ecosystem which combines state-of-the-art remote sensing, data management and processing technologies, cutting – edge research opportunities, targeted education services and promotion of entrepreneurship. In order to be dynamic and innovative, the Digital Innovation Hub will be based on two major infrastructures, which are a Satellite Ground Receiving Station and a Ground-based atmospheric remote sensing station. ERATOSTHENES Centre of excellence is paving the way for Cyprus to enter the space arena.

The Cyprus University of Technology (CUT) is a public university founded in Limassol in 2003 and consists of six faculties. Times Higher Education World University Rankings for 2018/19 ranked the Cyprus University of Technology in the top 301-350 universities of the world; the University also received the highest score among all universities in Cyprus and Greece. Cyprus University of Technology (CUT) enrolled its first students in 2007. With its orientation towards applied research, the University aspires to establish for itself a role in support of the state and society in their efforts to confront problems, which cover all areas of science and technology. CUT is an advanced University equipped with the most modern infrastructures and technological equipment which makes it possible to be the strongest on the island in research, with specialized units directed by distinguished professionals.

Goals of the stakeholders' meeting

The outcoming goals from the stakeholders' meeting are:

- Future collaborations like participation in common projects or/and proposals*
- Offer services and expertise in Earth Observation and geospatial related issues/matters*
- Development at policymaking level with local authorities and organizations*
- Promote the ERATOSTHENES Centre of Excellence through joint research efforts in EMMENA*

Speakers

ABDELAZIZ BELAL

National Authority for Remote Sensing and Space Sciences, Cairo, Egypt



Title: Smart or Precision Agriculture technology to Mitigate Climate Change for Sustainable Agriculture Development Belal, A.A.

Abstract: Agriculture is one of the economic sectors that affect climate change contributing to Greenhouse gas (GHG) emissions directly and indirectly. The main goal of the Precision Agriculture (PA) or Smart Agriculture (SA), hypothesize that the increase in crop production and hence food security can be achieved by enhancing the productivity and efficiency of the presently cultivated soils and reclamation of new lands for crop production. Agriculture remains to be one of Egypt's most important sectors and continues to achieve steady growth rates of 3-4% per year. The agriculture sector contributes roughly 16% to Egypt's GDP, but this share has declined in the last two decades and is expected to continue to fall in the future. Similarly, the number of Egyptians employed in the agricultural sector has fallen from about a third of the labor force in the early 1990s to just over a quarter in 2006. The challenge for Egypt is to maintain and expand agricultural production for domestic and export markets while at the same time add value and employment through the development of more agriculture-based processing activities. Conventional farming management plans use a whole field, in which each field is treated as a homogeneous area and the variability in soil properties, topography attributes, local weather conditions, and land use and land cover is not considered. Precision agriculture technology have the potential to reduce GHG emissions. This emission reduction is associated with PAT's ability to optimize agricultural inputs by targeting spatial and temporal on-field variability within fields. Different components of technologies used in precision farming include remote sensing (satellites, aerial photography and UAVs), GIS, GPS, the variable rate application, artificial intelligent, IOT, ICT machine and deep learning and geostatistics.

Keyword: PA or SA, Climate change, Sustainable agriculture.

ALI BENBRAHIM

FIWARE iHubs



Title: FIWARE Ihubs: Think Global, Act Local

Abstract: FIWARE is an open source initiative that works towards building a set of standards to develop Smart applications for different domains such as Smart Cities, Smart Energy, Smart Agrifood, Smart Water, Smart Ports, Smart Logistics, Smart Factories and others. Smart Applications require collecting data from different sources about what is going on that is relevant to the application at any moment, what we refer to as "context information". Such as satellite images, IoT, Open Data ... Current and historic context information is then processed, visualised, and analysed at large scale, thus producing the expected intelligent behaviour. FIWARE promotes a standard that describes how to collect, manage and publish context information, and additionally adds certain elements that allow exploiting collected data. Such standard doesn't exist today and it would be instrumental in building a Digital Single Market for Smart Applications where

apps/solutions can be ported from one customer to another without major changes. It also solves multiprotocol communication in multisensor networks. It offers a solution to the diversity in multiformat data ingestion, data filtering and data IoT protocol and languages, the aim is to translate the information gathered from multisources to a common language. The current wave of digitalization is bringing multiple challenges as well as clear opportunities to collaborate in the creation of new markets and the development of a Smart Economy, based on scalable, open, reliable, interoperable and portable smart solutions. This is where FIWARE steps in. With its Open Source approach, the FIWARE Community is driving a universal set of open standards for context data management, following a driven-by-implementation approach. This way, accelerating the availability of Open Source platform offerings that ease the development of smart solutions across many fields in an easier, faster and affordable way. Why get into vendor lock-in scenarios When FIWARE platform giving more. Common standards are at the heart of interoperability and portability of solutions, set to become a core element of next-generation data sharing and trading infrastructures worldwide. FIWARE iHubs are not asked to build products based on the standards. But to support and coordinate. Thus they have:

- The Regional and local strategies for digitalisation capabilities
- The technical capacities for demonstration, and awareness

FIWARE Hubs are iHubs. I for innovation. Innovation means creating new markets and staying relevant. It's about turning ideas into ready-to-use smart solutions, supporting the creation of new products and services. By accessing the iHubs services private companies, public administrations, universities and research institutions benefit from regional multi-partner cooperation. Serving as an innovation engine, iHubs look for gaps in the local business ecosystem and try to fill them, breaking the traditional barriers for the technology enablement and business acceleration, increase competitiveness and facilitate the diversification of the local economy through scalable open, reliable and disruptive smart solutions.

FIWARE iHubs purposes are to deploy 5 activities:

- FIWARE iHub physical center activities, it is a physical hotspot acting as a meeting point for the local community ecosystem.
- FIWARE School is the place where you can learn everything you want to know about FIWARE, from a business and technical perspective
- FIWARE lab is where testing, piloting, certification of FIWARE solutions and services
- iHub Business mentor for awareness, dissemination and promotion of FIWARE solutions
- iHub community creation in order to bring together the local stakeholders, to act as a doorway to the FIWARE local and global ecosystem.

AMIN SHABAN

National Council for Scientific Research-Lebanon (CNRS-L)



Title: Space Techniques: A Supportive Tool for Implementing SDG6 in Lebanon

Abstract: The Remote Sensing Center (RSC), a governmental entity belonging to the National Council for Scientific Research in Lebanon, has been established since 1995 aiming to elaborate research studies on different sectors (e.g. water, agriculture, environment, etc.) using space techniques and the relevant geo-information systems. Over this period, RSC has developed several studies and research projects on water resources management in Lebanon including surface and groundwater resources, and they have been investigated and monitored using a miscellany of satellite images that enabled identifying hydrological features which were not accessible to be identified on-ground. Therefore, a number of studies and projects were executed to address water deficit in the country and to support decision makers for adopting optimal water strategies and

policies. The variety of used satellite images represented a useful and supportive tool in water resources monitoring, assessment and exploration. This has been utilized, for example, when using Digital Elevation Models (SRTM SDM) to extract terrain characteristics and aspects to deduce stream flow regime and storage capacity; while, the use of thermal satellite images (e.g. Aster, Landsat 8, etc.) and Radar images (e.g. Radarsat, Sentinel-1, etc.) enabled detecting the distribution of groundwater bodies. This was also supported by the applications performed by GIS to display geo-spatial datasets and facilitate the visualization of this data for decision makers and different level stakeholders. The majority of the applied studies includes: watershed and rivers management, transboundary water, water harvesting, water pollution sources, monitoring water flow to the sea, groundwater storage/flow regime, groundwater artificial recharge, water recharge potential mapping. In addition, the relevant themes and influencers on water resources were investigated including mainly climate change, water hazards and the anthropogenic impact. The produced studies and research projects were oriented in a way to be used by local institutions in Lebanon; and therefore, a number of these works was convened between RSC and the Lebanese public sector concerned with water management, such as the ministries of water, agriculture, health, tourism and the ministry of public works. Nevertheless, there are also several joint studies and research projects performed in cooperation with the international organizations, such as UNESCO, FAO, UN/ESCWA, etc. The adoption of 2030 Agenda for sustainable development, as adopted by all United Nations Member States in 2015, provided a catalyst for the Lebanese water sector to perform research studies in the trend of sustainable development goal (SDGs) vision, and this was support by the international agencies (e.g. UN-Water, WHO, UN-Habitat, UNICEF, etc.). Hence, Lebanon, through its institutional framework, participated in this shared global blueprint; and therefore, RSC had a strong deal in this respect. Hence, RSC established a consortium to develop an institutional capacity for an integrated approach in SDGs, with a special emphasis to SDG6. This was mainly based on the geo-spatial datasets obtained in the studies and research projects of the RSC. This stud shows a number of examples where space techniques were in water resources management, as well as it highlights on how these studies helped in performing SDG6 targets. Keywords: global indicator, base-line surveys, water shortage, sustainability.

DIANA FRANCIS

University, Abu Dhabi UAE - Head of ENGEOS Lab, KU.



Title: The Environmental and Geophysical Sciences (ENGEOS) Lab at Khalifa University, Abu Dhabi UAE.

Abstract: The Environmental and Geophysical Sciences (ENGEOS) Lab is Khalifa University's entity performing research and applications related to climate change and the environment. The research activities span the different components of the Earth System: The atmosphere, land, oceans and the cryosphere. As tools, ENGEOS lab relies heavily on satellite observations as well as numerical modelling technics and in-situ measurements. In my presentation, I will talk about some projects performed by ENGEOS team members and how their outputs link to the UNSD's Climate action and Affordable & Clean Energy goals.

DIMITRIOS ALEXAKIS

Laboratory of Geophysical – Satellite Remote Sensing & Archaeoenvironment, Institute for Mediterranean Studies, Foundation for Research and Technology Hellas (FORTH), Rethymno, Crete, Greece



***Title:** Laboratory of Geophysical – Satellite Remote Sensing & Archaeoenvironment: Monitoring, Mapping and Modeling the cultural and natural environment through Geoinformatic approaches.*

Abstract: The Laboratory of Geophysical – Satellite Remote Sensing & Archaeoenvironment (GeoSat ReSeArch) of the Institute for Mediterranean Studies, Foundation for Research and Technology, Hellas (IMS-FORTH) was funded in 1996. The Lab of IMS has been the first in the area of Eastern Mediterranean offering an integrated and specialized suite of tools dealing with the ground based-satellite remote sensing prospection and GIS management of environmental resources and cultural heritage monuments and sites protection. Specifically, the Laboratory of Geophysics - Satellite Remote Sensing & Archaeoenvironment (GeoSat ReSeArch Lab) is active in the field of Geoinformatics, covering a wide range of Geophysical Surveys, Geographic Information Systems (GIS), Satellite Remote Sensing, Phtotogrammetry 3D visualization and Landscape modelling. Emphasis is placed on both the natural and cultural environment. The Laboratory conducts basic and applied research in the above research fields through International, European and National research programs. This research is close related to some of the UN's Sustainable Development Goals such as Climate Action, Life below water and Life on Land. At the same time, the Lab has developed a training and education program for researchers of geophysical, Earth Observation and Geographic Information Systems applications in archeology and culture, while at the same time is conducting studies on the anthropogenic effects on the natural environment over time. Equipped with the most modern geophysical equipment for the investigation of shallow depths and with the development of algorithms for processing geophysical data and tools for spatial analysis and models through Geographic Information Systems and satellite image processing, the Laboratory offers a complete package of services related to imaging surface, subsoil and shallow submarine targets, mapping of natural / cultural resources, developing Web GIS applications and developing web geographic databases. The Laboratory has entered into numerous collaborations with university and research institutions from Greece and abroad beyond the borders of the Mediterranean. The continuous activities of the Laboratory are disseminated through scientific publications, international conferences and workshops.

FAIZA KHEBOUR ALLOUCHE

University of Sousse, Tunisia



***Title:** The University of Sousse and the ISA-CM towards an opening to the geospatial technology for a sustainable future in the EMMENA Region.*

Abstract: The University of Sousse provides a range of academic and professional training in basic sciences, legal, economic and management, technical, agronomic, medical, paramedical, arts and crafts, letters and human sciences. The high institute of agronomic sciences (ISA CM) is organized into training and research departments, whose specific educational themes provide students with a complete and varied education, and administrative services, whose role

guarantees the regular functioning of the various functions of the establishment. ISA-CM is organized into five training and research departments: Horticultural and Landscape Sciences, Biological Sciences and Plant Protection, Engineering of Horticultural Systems and Natural Environments, Animal resources, agri-food and rural development and landscape engineering and planning. Through training and research, the establishment applies the SDGs, for example, we have an Erasmus + Mehmed master's degree for which I am a member of the educational committee and an Erasmus + GEOMAG for which I am the coordinator on the University of Sousse. Already within the framework of these two Erasmus we apply the use of space technology to achieve the objectives of sustainable development.

GORDANA JAKOVLJEVIC

Department of Geodesy, Faculty of Architecture, Civil Engineering and Geodesy, University of Banja Luka, Bosnia and Herzegovina



Title: Automatic monitoring of SDGs indicators based on earth observation data

Abstract: In order to protect the planet from feature degradation and ensure sustainable economic, social and environmental, United Nations has adopted the 2030 Agenda for Sustainable Development. Access to safe water is the most basic human need therefore goal 6 aims to ensure the availability and sustainable management of water. To measure the progress toward reaching SDG quality, timely and accessible data are needed. A large amount of remote sensing data with high temporal and spatial resolution and global coverage are available however their practical application in the decision-making process is still limited.

Therefore the development of a clearly defined methodology for monitoring water resource quantity (water body geometry), water quality, and river network topology based on the Earth Observation data is crucial. The model consists of four components which are based on a deep learning algorithm for processing optical and radar satellite images. Component for monitoring water quality is developed in conjunction with in-situ data. The resulting information can be used for monitoring of process toward the achievement of SDG, including Indicator 6.3.2., Indicator 6.4.2., Indicator 6.6.1., and Indicator 14.1.1. Moreover, the model is developed in line with the requirement of INSPIRE and the Water Framework Directive and can be used for fulfilling the WFD reporting obligations.

HAJRI HASKA

Agricultural University of Tirana, Albania



Title: Sustainable cities and communities through urban greenery and urban forestry development, with the aim maintaining natural equilibrium and improvement of quality of the life in urban communities.

Abstract: The world in recent decades is becoming more and more urbanized. Before 42 years, around the 1980s worldwide, almost 50% of the population lived in urban areas in the city/town, and this urban population is projected to reach about 70% by 2050. This urban overcrowding, definitely more and more besides roads, buildings, hospitals, schools, etc., there is a need for more green areas, including trees and shrubs. In this context, in any kind of urban planning, in a world that is becoming extremely overcrowded, urban greenery in general and urban forestry in particular in recent decades have become a vital necessity for the services they provide and the natural balances and quality improvement of the life. Elements of urban forestry, despite the

denominations, have appeared in the world since early times, but around the 80s years the term of Urban Forestry was mentioned. There are many concepts and definitions for Urban Forestry, but in scientific communities used definition that defines Urban Forestry as: - "the art, science and technology of managing trees and forest resources in and around urban community ecosystems for the physiological, sociological, economic, and aesthetic benefits trees provide society". Also, FAO - Food and Agriculture Organization 2016, five main types of urban forests have been identified, and we need to have our discussions and our studies on the relationship between these contemporary definitions and official recognition. Urban forests and trees in the urban area and in their vicinity have a range of benefits and services they have provided to society, but indisputably they should underline them for the preservation and support and balance of natural ecosystems as well as benefits such as improving life social and health of society, urban communities and individual peoples. The main purpose in this my short presentation is to highlight the role and the importance of Urban Forestry and trees in relation to the contribution they make in creating and maintaining natural balances for a sustainable city and improving the quality of the life of communities in urban areas by taking an overview and comparison with current situation in each our country, in our region, in Europe and wider, in the world. So, I think it is necessary to collect and analyze data related to urban forestry in some urban areas, main cities in our countries, including Albania and more other major cities in our countries. Next, we can look at these elements of urban forestry in our countries and other developed countries in Europe and the world, compare this with the norms needed for greenery, for the capita/inhabitants and the service that this urban forest offers and trees for society, for life in cities. But, in other hand, also the contributions and responsibility for the sustainability of natural ecosystems, and finally giving some conclusions and recommendations have been made for the creation and improvement of elements of Urban Forestry in order to increase the sustainability of natural ecosystems in urban areas and cities where the community lives in these urban areas, with the main goal of future development of sustainable cities and communities together.

Keywords: Cities, Communities, Urban forestry, trees, urban, benefits.

LACHEZAR FILCHEV

Space Research and Technology Institute, Bulgarian Academy of Sciences (SRTI-BAS)



Title: Copernicus Academy and Copernicus FPA activities of SRTI-BAS

Abstract: The presentation will present a short overview of Space Research and Technology Institute, Bulgarian Academy of Sciences (SRTI-BAS, Bulgaria) activities within the Copernicus Academy and Copernicus FPA. The opportunities to engage via other similar regional networks and initiatives such as EuroGEO (GEO), SCERIN/MedRIN (FAO, NASA) will also be discussed.

LEV EPPLEBAUM

**Dept. of Geophysics, Faculty of Exact Sciences, Tel Aviv
University, Ramat Aviv 6997801, Tel Aviv, Israel**



***Title:** Combined geophysical-geological studies of the Sea of Galilee
(Lake Kinneret) – main fresh water reservoir in Israel*

Abstract: The Sea of Galilee (Lake Kinneret) is Israel's primary source of fresh water. This lake is located in northern Israel in a complex tectonic setting where the Dead Sea Transform (DST) crosscuts other fault systems. In geological-geophysical terms, the region of the Sea of Galilee represents one of the most complex structures of the Earth's crust in the Eastern Mediterranean. Various types of morphological elements, tectonic structures, and complexes of sedimentary and igneous rocks are developed here. The recently obtained data indicate that the complexity of this area can be partially caused by its location above the zone of the arched apical part of the deep mantle uplift. Another factor is associated with the development of intricate geodynamic processes in the so-called Arabian "syntaxis" zone, which covered the tectonic-geophysical junction of the Northern Gondwana, the Tethyan mobile belt, and Southwest Eurasia. This lake has an average surface of 166 km² and an average volume of 4.6·10⁹ m³. Maximal depths of the sea (about 50 m) are located in the northeast part of the basin. This sea is located in a larger basin which is a part of a series of rhomb-shaped grabens (pull-apart basins) along with the DST. The present configuration of the Sea of Galilee formed about 24,000 years ago. Geological studies indicate rock outcrops in this area, and rock samples discovered in boreholes surrounding this lake range from Jurassic to Quaternary. The practical absence of boreholes in the sea hinders geological-geophysical data interpretation. For the first time, gravity, magnetic, paleomagnetic, radiometric, and seismological data were analyzed together. An integrated analysis of gravity and seismological data made it possible to clarify some tectonic parameters. The total magnetic field map shows an intricate pattern caused by a combined influence of the basalt flows of various ages and magnetization in and around the sea. Calculated statistical-probabilistic parameters of the magnetic field indicate some essential peculiarities of the medium. The recognized magnetic anomalies were analyzed using methods of quantitative interpretation especially developed for the complex physical-geological environments. 3D magnetic field modeling revealed the following important features: thick basaltic plate occurrence in the southernmost sea basin, presence of the reversely magnetized basalts near the sea's eastern boundary, and possible subsidence of basaltic bodies in the center of the pull-apart basin. The paleomagnetic stratigraphy of basalt associations around the Sea of Galilee basin proved to be correlated with the paleomagnetic zones and anomalies in the sea. The paleomagnetic characteristics of traps are linked with the development of the Dead Sea Transform. The previously constructed magnetic-paleomagnetic scheme with predominantly K-Ar dating has been significantly elaborated based on newly arriving data. It is stated that a characteristic feature of the study area is the turns of tectonic blocks, mainly counterclockwise. The revised structural map of the Cover Basalts is intended to coordinate various geological and environmental investigations in this area. Thus, an integrated tectonic-geophysical analysis significantly increases the interpretation reliability and facilitates the creation of non-trivial physical-geological models reflecting the essential features of this crucial freshwater reservoir.

MARIA ZORAN

National Institute of R&D for Optoelectronics, MG5 Magurele-Bucharest, 077125 Romania



***Title:** Exploring open-source multispectral satellite remote sensing for urban thermal environment changes analysis over Bucharest Metropolitan City*

Abstract: This paper investigated the influences of city land cover changes and extreme climate events on land surface temperature in relationship with several biophysical variables in Bucharest metropolitan area of Romania through time series satellite and in-situ monitoring data. Remote sensing data from Landsat TM/ETM+/OLI, MODIS Terra/Aqua and NOAA AVHRR sensors and climate data provided by EO COPERNICUS have been used to assess urban land cover- temperature interactions changes over 2000 - 2022 period. Time series of Thermal InfraRed (TIR) satellite remote sensing data in synergy with meteorological data (air temperature, relative humidity, rate of precipitation, wind speed intensity, surface solar irradiance, etc.) have been applied mainly for analyzing land surface temperature (LST) patterns and its relationship with surface landscape characteristics, assessing urban heat island (UHI), and relating urban land cover temperatures (LSTs) and urban heat fluxes. The land surface temperature, a key parameter for urban thermal characteristics analysis, was also analyzed in relation with the Normalized Difference Vegetation Index (NDVI), land surface albedo and surface latent heat net flux at city level. Changes in the urban and periurban land cover and land surface properties as well as in the atmospheric abundance of greenhouse gases and aerosols, in solar radiation alter the energy balance of the climate system. These changes are expressed in terms of radiative forcing, which is used to compare how a range of human and natural factors drive warming or cooling influences on regional and global climate. Given the ability to define land cover characteristics at the site level based on attributes such as physiognomy, horizontal and vertical structure of built environment, vegetation phenology and leaf morphology, direct parameterization and mapping using remotely sensed data can enhance the ability to characterize and monitor these important biogeophysical parameters. Vegetation abundances and percent impervious surfaces were derived by means of linear spectral mixture model, and a method for effectively enhancing impervious surface has been developed to accurately examine the urban growth. Also, this study investigates the changing pattern of the UHI and establishes the relationship between land cover (LC) change and LST variations in Bucharest metropolitan city in Romania. The relationships are defined by correlation analysis, cross-section profiles, and Simple Linear Regression Models (SLRM). The results suggest that vegetation cover, water body, and bare-soil have decreased by 7%, 5%, and 11%, respectively, where the built-up area has increased by 22% in the study area during the study period. The average LST of the study area has increased by approximately 9 °C in the last 22 years. Therefore, excess urbanization at the expense of vegetation decrease damages the urban ecological environment and accelerates UHI effects, which threaten habitat health and living comfort. Such studies contribute at implementing in Romania of required decision makers UN SDG 3 indicator actions ensuring healthy lives and promote well-being of citizen, and SDG 11 indicator making Bucharest metropolitan city more safe, resilient and sustainable.

Keywords: land cover changes, urban thermal environment, biogeophysical variables, Bucharest, Romania.

***Title:** Time series satellite data for assessment of climate changes impacts on Carpathian Mountains Forest*

Abstract: Earth Observation (EO) based on Remote Sensing (RS) is gaining importance nowadays, since it offers a well-grounded technological framework for the development of advanced

applications in multiple domains, such as climate change impacts on forests, precision agriculture, smart urbanism, and many others. Vegetation phenology is an important proxy of climate and environmental change being related to carbon, energy, nutrient and water cycles within forest ecosystems, operating from local to global scales, therefore, many important feedbacks to the climate system are affected by the seasonality of vegetation. Carpathian Mountains forests, particularly Prahova Valley in Romania, are important ecosystems for regional carbon and water cycles as well as for biological diversity and speciation. Owing to their remoteness, however, ecological key-processes are less understood as in the temperate mountains areas. Remote sensing allows monitoring and modeling of biogeophysical variables related to spatial patterns of vegetation, carbon stocks and fluxes (e.g., biomass) and ecosystem functioning (e.g., functional leaf traits). Multispectral satellites at moderate spectral and spatial resolutions are able to provide spatially continuous and repeated observations. Forest systems are all sensitive to climatic factors and extreme climate events and are likely to have different vulnerability thresholds according to the species, the amplitude, and the rate of climatic stressors. According with numerical models forecasting, as a result of global climate change, there is a clear evidence that some of the most severe weather events (thunderstorms, floods, heat waves, etc) could become more frequent and intense in Romania over the next years. Effects of climate extremes on mountain forest systems can have both short-term and long-term implications for standing biomass, tree health and species composition. The preservation and enhancement of mountain forest vegetation land cover in natural, semi-natural forestry ecosystems is an essential factor in sustaining environmental health and averting natural hazards. Fusion technique was applied to time series satellite imagery data (Landsat TM/ETM/OLI, Sentinel 2 and MODIS Terra/Aqua satellite data) for Prahova Valley forest test site in Romania over 2000-2022 period. Several daily climatic variables provided by COPERNICUS climate data were used as explanatory variables for the discussion of the vegetation phenology behavior. For investigated test area, considerable NDVI/EVI and LAI decline were observed for drought events during 2003, 2007, and 2012 years. The vegetation phenology analysis was correlated with associated time series of climatic variables in order to detect recorded anomalies. Such studies contribute at implementing in Romania of UN SDG 13 indicator in order to take urgent action to combat climate change and its impacts, and SDG 15 to ensure the conservation, restoration and sustainable use of forest ecosystems.

Keywords: multispectral time-series satellite data, climate change, extreme climate events, Carpathian Mountains forest, Prahova Valley, Romania

ZAMPELA PITTAKI

World Agroforestry (ICRAF), Nairobi, Kenya



Title: Innovations in Monitoring of Soil Health: Combining Systematic Field Assessments with Spectroscopy and Earth Observations

Abstract: World Agroforestry (ICRAF) is a center of science and development excellence that harnesses the benefits of trees for people and the environment. ICRAF's Soil Theme provides leadership in applying landscape-scale soil and land health data analytics for impact, which, consequently, contributes to ICRAF's strategic goals, the CGIAR Strategy and Results Framework, the CIFOR-ICRAF Restoration Transformative Partnership Platform (TPP), as well as global goals and commitments for ecosystem restoration and climate change adaptation and mitigation. In addition, the Soil and Land Theme promotes soil health restoration, which is central to achieving the Sustainable Development Goals (SDG) 1, 2, 3, 5, 6, 13, 15, and 17 as set out by the United Nations for 2030. ICRAF has an advanced soil and plant spectral laboratory that supports regional spectral labs worldwide. Spectroscopy enables landscape-scale assessments of land and soil health by providing a reliable and cost-efficient analysis of key soil health indicators, which is critical for

global monitoring efforts. Our lab also hosts the largest physical archive of soil samples collected using a systematic sampling methodology, the Land Degradation Surveillance Framework (LDSF), which provides exciting opportunities for collaboration with partners. The Soils Theme contributes to a number of global programs, including the CGIAR Research Programme (CRP) on Water, Land, and Ecosystems (WLE), the CGIAR Research Programme (CRP) on Forests, Trees and Agroforestry (FTA), the CGIAR Research Programme (CRP) on Climate Change, Agriculture and Food Security (CCAFS) and the CGIAR Big Data Platform. Furthermore, ICRAF is one of the key-partner that leads the Coalition of Action 4 Soil Health (CA4SH). CA4SH was inspired by the UN Food Systems Summit in 2021 and was formed by the Food Systems Soil Hub. The overarching goal of the CA4SH is to improve soil health globally by addressing critical implementation, monitoring, policy, and public and private investment barriers that constrain farmers from adopting and scaling healthy soil practices. The Soil and Land Health Theme at ICRAF has six sub-thematic research areas to address pressing global challenges, broken food systems, environmental degradation, accelerating climate change, and biodiversity loss. Combining systematic field surveys using the LDSF methodology, soil spectroscopy, and Earth Observation (EO) data, an assessment of soil erosion in over 50 countries across the global tropics was successfully conducted. Given that the methodology provides robust results that can be rapidly replicated at scale and the importance of restoring the soil and ecosystem health, we argue that soil spectroscopy and EO will play a key role in enabling landscape-scale assessments. Thus, they could be used as tools and methods for measuring and tracking soil and land health changes at scales relevant to multiple stakeholders.

List of participants

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Amin	SHABAN	National Council for Scientific Research
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