

# PONTOS Newsletter #4

Common borders. Common solutions.



## PONTOS PROJECT IN THE EUROPEAN SPACE AGENCY LIVING PLANET SYMPOSIUM 2022

Copernicus assisted environmental monitoring across the Black Sea Basin

[PONTOS-EU.AUA.AM](https://pontos-eu.aua.am)



*The posters are available on the last page in a larger size.*

On May 23, 2022, PONTOS project was presented at the [European Space Agency Living Planet Symposium 2022 \(ESA LPS22\)](#). The Centre for Research and Technology Hellas (CERTH) presented the PONTOS Open Data Cube component of the platform, and the land surface phenology assessment employed for forest monitoring in the study sites of Armenia and Georgia. Both posters were presented in the Black Sea and Danube Regional Applications and Science session (code number: E3.03).

ESA LPS22 is the largest biannual global communication event in the field of Earth Observation and Environmental Monitoring. This year it focused on how Earth observation contributes to science and society, and how disruptive technologies and actors are changing the traditional Earth observation landscape, which is also creating new opportunities for public and private sector interactions.



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## PONTOS TRAINING OF TRAINERS CONDUCTED IN GREECE



*Photo caption: A group of people sitting around a table with laptops*

Within the framework of the EU-funded "Copernicus Assisted Environmental Monitoring Across the Black Sea Basin - PONTOS" project, the Training of Trainers (ToT) was held in Greece on March 10, 2022, the first offline training of the team (after the Covid outbreak intervened the normal processes). Overall, twenty participants, including project research staff, from PONTOS project partner institutions, participated in the training organized by the Center for Research and Technology Hellas (CERTH) and Democritus University of Thrace (DUTH). The training was composed of two parts: introduction to the PONTOS Platform and Presentations on the pilot areas' assessments. During the first part of the training, the Greek team conducted training on the PONTOS platform for the project researchers of partner institutions. The PONTOS platform integrates the following services: PONTOS Data Cube, PONTOS Web application, and PONTOS WebGIS. Ms. Maria Banti, MSc, Research Assistant at Centre for Research and Technology Hellas (CERTH), delivered a workshop on PONTOS Data Cube. As Ms. Banti mentioned, "the training material aims to facilitate the training of trainers on PONTOS Data Cube. It is an essential part of the PONTOS platform that targets easing the production of maps from Earth Observation (EO) satellite data and supporting how environmental monitoring in the Black Sea Basin area is accomplished." PONTOS Data Cube enables users to explore, analyze, manage quickly, and visualize

satellite images for each pilot area in Ukraine, Armenia, Georgia, and Greece. The Data Cube decreases the time and specialized knowledge required to access, explore, and process satellite data through various analytical tools, a considerable volume of EO ARD satellite data, and in-built computational infrastructure.

A presentation was followed by Eleftherios Katsikis, MSc, Research Assistant at CERTH/ITI, who elaborated on the PONTOS Web application. The web application enables users to analyze existing data that have been collected and stored in the database or upload and analyze their data. In his introduction, Mr. Katsikis mentioned that the web application would complement PONTOS Data Cube and the webGIS, offering functionalities aimed explicitly at exploiting Satellite, Airborne, and In-situ data. Dr. Nikolaos Kokkos presented the PONTOS webGIS service from Democritus University of Thrace (DUTH), Greece



*Eleftherios Katsikis, MSc, Research Assistant  
Centre for Research and Technology Hellas*

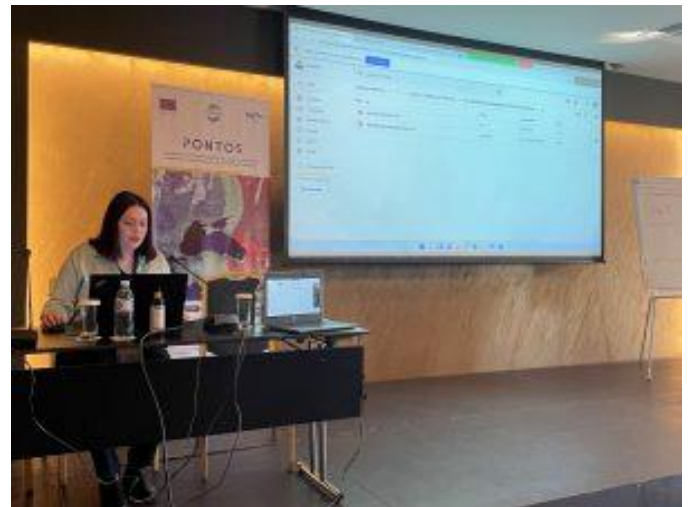
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The PONTOS WebGIS is a website for interactive visualization of the spatial data collected in the Project and organized in a common spatial infrastructure. The system consists of two components: a map server that pushes the user's queries to external Data Servers and a Web Server that hosts the PONTOS's WebGIS website and handles Python Server scripts. Dr. Kokkos mentioned that one of the system's main advantages is a platform for all pilot areas, fully compatible with mobile devices. After the PONTOS platform training, the team conducted sessions dedicated to the theoretical and hands-on experiences of the pilot site assessments within the Project in Ukraine, Greece, Georgia, and Armenia. The training sessions were complemented by presentations on assessment on the dynamics of coastline changes, the assessment on forest cover changes and their consequences on the environment, on the assessment on changes in wetland and floating vegetation cover, on the impacts of eutrophication (such as reduced biodiversity, toxic cyanobacterial blooms, increased undesirable emissions (CH<sub>4</sub>, H<sub>2</sub>S)), and the loss of ecosystem services, on the chlorophyll calculation through satellite images, on the agricultural water balance, water productivity and water stress indices. Each training session was followed by a presentation of the used cases of the assessment. The offline training of trainers was very beneficial to boost the cooperation, to share information and feedback on the project progress, networking of specialists towards the successful implementation of the PONTOS objectives. The agenda and resources of the Training of Trainers is available [here](#).



*Dr. Alexander Arakelyan, PONTOS Researcher, AUA  
Acopian Center for the Environment*



*Maria Banti, MSc, Research Assistant, Centre for  
Research and Technology Hellas*

## PONTOS Platform Presentations in Armenia



Through March 23-25, 2022, the PONTOS project's Armenian team organized meetings with several stakeholders at the American University of Armenia. The meetings aimed at presenting the PONTOS platform to the AUA's environmental-based projects' representatives, experts in remote sensing, AUA's College of Science and Engineering program representatives and scientific researchers. The meetings will enhance the cooperation between various departments of the university towards future use of the platform by the community in academic programs. PONTOS project manager Ms. Aghavni Harutyunyan presented to the audience all three services of the Platform - PONTOS Data Cube, PONTOS Web application, and PONTOS WebGIS. Aghavni presented potential use cases for each type of the services, the potential users, and target groups for each of the services. Question and answers regarding the platform followed. The recommendations and feedback were recorded for further integration and consideration.

## PONTOS Presented during BSB AGREEN Conference

On May 26, 2022, the PONTOS project Manager from the AUA Acopian Center for the Environment, Ms. Aghavni Harutyunyan, and PONTOS project assistant Ms. Haykanush Martirosyan attended a local business workshop dedicated to the presentation of Internet Platform for liaising sustainable producers and promotion of climate-smart agriculture in the BSB (AGREEN Platform). The ICARE Foundation organized the workshop within the Cross-Border Alliance for Climate-Smart and Green Agriculture in the Black Sea Basin (BSB-1135), where ICARE is a project partner.

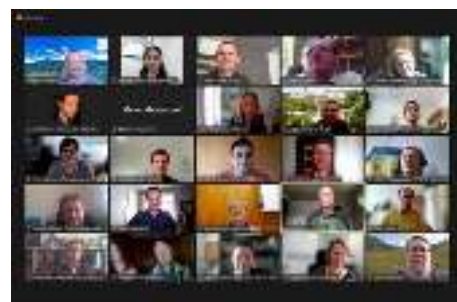


Ms. Harutyunyan presented the PONTOS platform at the session dedicated to discussing Climate-Smart Agriculture (CSA) practices in Armenia presentation of similar platforms and tools for cooperation and development. This was another vital opportunity to present the PONTOS platform to the stakeholders and interested parties, establish communication between the parties, and receive feedback on the efforts.

On June 2, 2022, PONTOS Project Manager Ms. Aghavni Harutyunyan presented the PONTOS project during the SCERIN-8 Workshop (The South, Central, and East European Regional Information Network). The Topic of the workshop was Satellite remote sensing for forest management and ecosystem health, floods, droughts, and wildfires in the context of climate change.

For more info visit:

<https://www.scerin.eu/scerin2022/index.html>



*PONTOS Project Presentation During SCERIN-8 Workshop*

## Satellite Applications: From the Black Sea to the North Aegean Sea: Workshop in Greece

Within the framework of the EU-funded “Copernicus Assisted Environmental Monitoring Across the Black Sea Basin - PONTOS” project, the Joint Open Workshop “Satellite Applications: From the Black Sea to the North Aegean Sea” was held on March 11, 2022, in Thessaloniki, Greece. The event was organized by the Centre for Research and Technology Hellas (CERTH) with the overall aim to inform the Public and the Authorities of Central Macedonia about PONTOS contribution in Environmental Remote Monitoring and the benefits from the data provided.

The Workshop brought together a total of 47 participants who represented regional and local public authorities, sectorial agencies, civil society, universities, students, enterprises, press, and Project partners. The event was focused on topics related to PONTOS Objectives, to Satellite Earth Observation and Environmental Monitoring, to PONTOS activities in Greece, to Environmental Projects implemented in Thessaloniki and to PONTOS Platform.

The Joint Open Workshop “Satellite Applications: From the Black Sea to the North Aegean Sea” started with welcoming remarks by Dr Ioannis Manakos, Principal Researcher of the Centre for Research and Technology Hellas (CERTH). Dr. Manakos welcomed the participants as the organizer of the event and presented the Agenda of the day.

The participants of the Workshop’s Greetings Session were representing the Regional Public Authorities and Local Public Authorities of Central Macedonia. The Deputy Mayor for the Environment from the Municipality of Thessaloniki, Mr. Erotokritos Theotokatos, the Head of the GIS Departments of the Municipality of Thessaloniki, Mr. Simos Misirloglou and Mr. Ioannis Tsolakidis, Rural and Surveying Engineer from the Natural Environment and Climate Change Agency-Kerkini Branch Office, welcomed the audience and underlined the significance of PONTOS services in the area. Moreover, the Vice Governor of Development and Environment at

the Region of Central Macedonia, Ms Kostas Gioutikas, sent an Open Message by highlighting that “the contribution of the project is considered as extremely essential for solutions that can be offered in order to achieve the goal for a green and sustainable region”. The session continued with the virtual participation of Ms. Ana Leganel, Project Officer from the Joint Technical Secretariat of the Black Sea Basin Joint Operational Programme 2014-2022, who presented the main objectives and the future funding opportunities in the framework of the Black Sea Programme.

### Overview of PONTOS Project

A comprehensive overview of the project was presented by Ms. Aghavni Harutyunyan, Project Manager from the American University of Armenia (AUA). Ms. Harutyunyan highlighted that “the overall objective of the project is to make information and knowledge available to scientists, policy makers, citizens and other relevant stakeholders and to provide a full picture of the state and temporal evolution of Black Sea region environment”. She then underlined that PONTOS aims to transfer technology among the Black Sea nations, to develop the knowledge infrastructure of online services, to encourage the use of the Copernicus program for environmental monitoring and to engage local and regional actors at multiple levels.

### PONTOS activities in Greece

PONTOS activities in the pilot area of Greece, which expands from Nestos River, its Delta and the coastal zone close to the Delta, were presented by the Professor of Democritus University of Thrace (DUTH), Georgios Sylaios. Prof. Sylaios started by clarifying that coastal erosion has been greatly affected, especially after 1996, when the river dam was constructed. He mentioned that the main problems of Nestos Agro-ecosystem are the degradation of coastal wetlands and lagoons, the massive fish deaths, and the declining fishery production. He also underlined that, “PONTOS mission is to address these challenges through the continuous and systematic monitoring of the area with the use of satellite images and Copernicus programme, to encourage satellite monitoring of the coastal erosion and of eutrophication episodes, and to inform and/ or train stakeholders.”

## The Press Conference

A Press Conference was held during the Joint Open Workshop in Thessaloniki aiming to communicate PONTOS message with the local Media. Journalist from the Athens-Macedonian News Agency (AMNA) interviewed Aghavni Harutyunyan from the American University of Armenia (AUA) Acopian Center for the Environment, Ioannis Manakos from the Centre for Research and Technology Hellas (CERTH), Georgios Sylaios from the Democritus University of Thrace (DUTH) and Irakli Matcharashvili Green Alternative (GRAL). The partners answered the questions and presented an overview of PONTOS. The press conference generated 27 publications about the project by local and national Media.

## Black Sea Basin Joint Operational Programme (BSB JOP) - Regions of Central Macedonia and East Macedonia and Thrace

Ms. Koralia Branioti (CERTH) presented the objectives and the future priorities of the Black Sea Basin Joint Operational Programme with a focus on the regions of Central Macedonia, East Macedonia and Thrace. Ms. Branioti mentioned the projects that are implemented in the framework of the Programme, and especially those that are focused on environmental issues. Then she presented the Open Message, which was sent by Mr. Dimitris Liatsis, Officer of the Managing Authority of European Territorial Cooperation Programmes of Thessaloniki. Mr. Liatsis underlined that “according to the draft document, the priorities of the next Black Sea Basin Programme will be: 1. *Smart and Blue Region* through innovative technological developments in support of the blue economy and research on integrated coastal, and 2. *Clean and Green Region* through the climate change adaptation, risk prevention and disaster resistance, and through the protection of the Natural Environment, conservation of Biodiversity and Green Infrastructures”.

## Live Demo and Tutorial of PONTOS Platform

In this session the PONTOS platform was presented, and a step-by-step tutorial of use was presented for the participants. Ms. Maria Banti (CERTH) presented the PONTOS Data Cube, Mr. Eleftherios Katsikis (CERTH) the PONTOS Web Application and Dr. Nikolaos Kokkos (DUTH) presented the WEBGIS component of the platform.

The Workshop ended with a short discussion between the working team and the participants. Most of the attendees expressed their gratitude for the opportunities offered and asked for updates, when possible.



*PONTOS partners during the Joint Open Workshop in Thessaloniki, March 11, 2022*

## Odessa National University Signs 6 MoUs to Foster PONTOS Collaboration

To provide a mutual understanding of the activities envisaged as part of the BSB889 Copernicus assisted environmental monitoring across the Black Sea Basin (PONTOS) Project, Odessa National I.I. Mechnikov University has signed the Memorandums of Understanding with six local stakeholder organisations:

- Basin Management Authority of Water Resources for the Black Sea Rivers and the Lower Danube (Odesa, Ukraine)
- Centre of Ecological Safety, LLC (Odesa, Ukraine)
- Odesa State Environmental University (Odesa, Ukraine)
- Hydrometeorological Centre of the Black and Azov Seas (Odesa, Ukraine)
- Lower Dniester Natural Nature Park (Odesa Region, Ukraine)
- Department of Engineering Protection of City Territory and Development of Coast under Odesa City Council (Odesa, Ukraine)

The MoU verifies their high interest in PONTOS results and suggested solutions and promotes and forms local clusters on water management and pollution prevention in all participating countries.



## PONTOS Local Open Workshop for Youth and Future Specialists in Armenia

On May 05, 2022, a Local Open Workshop for the youth and future specialists was held about Copernicus Assisted Environmental Monitoring Across the Black Sea Basin - PONTOS project.

The workshop was held in the framework of the PONTOS program with EU financing. In Armenia, the project is implemented by two partners Environmental Protection and Mining Inspection Body of the Republic of Armenia (Inspection Body) and the American University of Armenia (AUA) Acopian Center for the Environment.

The participants of the Local Open Workshop for the youth and future specialists represent higher educational and high school institutions of the Republic of Armenia. The selection of the corresponding audience aimed to allow the participants to get acquainted with the various earth observation tools, their professional perspectives on the application of environmental issues, and possible solutions.

Karine Petrosyan, PONTOS Project manager's assistant from the Inspection Body, opened the event with a greeting speech presenting the agenda and the goals and then expecting the workshop results.

Tatevik Vardanyan, PONTOS Project Communication manager from AUA Acopian Center, presented the project's general overview: the platform and the services, the Copernicus system, spaceborne monitoring, and its potential for the environment.

Armen Ghlijyan, PONTOS Project researcher from the Inspection Body, presented earth observation data, the main issues connected with data management, the main directions of data use, and international earth observation organizations.

Narek Julhakyán, PONTOS Project researcher from the Inspection Body, presented practical work with image collection examples, satellite data use, and SNAP application. Calculating the



chlorophyll-A concentration in Lake Sevan's water by using Sentinel 2 satellite data and the tools of SNAP application allows having adjusted and specified results for the areas with higher chlorophyll-A concentration by combining satellite and in-situ data.

Karen Harutyunyan and Karen Eroyants, PONTOS Project researchers from the Inspection Body, presented earth observation data and tools in professional activities, contributing to more scientific decisions. Examples of detection of violations registered in different spheres of environmental control and decisions made in connection with them were presented.

The participants asked questions about satellite data and the collection and combination of images through the SNAP application. It was also suggested to contribute a pilot course about the earth observation tools in profile school-university programs considering the necessary imperative of today regarding the use of information and high technologies.

Aghavni Harutyunyan, PONTOS Project Manager from the AUA Acopian Center, made a summarizing speech, noting the enthusiasm and interest of the students in terms of the use of earth observation tools and technologies, and promised to invite the participants to the next course provided by the PONTOS program to get more comprehensive information and knowledge.

At the end of the event, young participants received certificates of participation in the workshop.



## PONTOS Project Coordination Meeting Held in Georgia



Tbilisi, Georgia - On May 18-19, Copernicus Assisted Environmental Monitoring Across the Black Sea Basin - PONTOS consortium members participated in the third coordination meeting in Tbilisi.

The meeting kicked off with welcoming remarks from Irakli Matcharashvili of Green Alternative NGO, Georgian partner of PONTOS.

Project Coordination Meeting Agenda was structured to cover all the activities and work packages implemented or to be implemented by the partnership.

During the Session on Management Work Package, Aghavni Harutyunyan and Haykanush Martirosyan presented the status and upcoming plans under the project management and administration and financial management activities.

A presentation and short discussion were organized on Methodological Framework Development and Implementation in Pilot Sites. The session was conducted by CERTH researchers Maria Banti and Eleftherios Katsikis and DUTH researchers Nikolaos Kokkos. PONTOS Platform updates were presented on Open Data Cube (ODC), PONTOS training modules, Web App, and WebGIS.

In the following session, PONTOS team members shared their insights, plans, and activities dedicated to the Capacity Building Activities within the PONTOS project. Irakli Matcharashvili gave an overview of the work package's achieved milestones and planned activities. Then, Nikolaos Kokkos of DUTH presented the second set of Training Sessions on Earth Observation and Environmental Monitoring plans. Tatevik Vardanyan from AUA presented the plan for virtual training modules and how to make the project's knowledge sharing and knowledge management sustainable beyond the end of the project. Roza Sekhleyan from Armenia's EPMIB talked about the Capacity Building for Public Administration, Civil Society Organizations, and Private sector actors, activities so far achieved, and next steps.

The final session of the coordination meeting was dedicated to the report on the dynamics of the coastal line changes. DUTH's Konstantinos Zachopoulos facilitated the session, conducting presentations on Greek, Georgian, and Ukrainian pilot sites. Konstantinos Zachopoulos of DUTH presented essential updates on the data collection results, image processing results, shoreline evolution evaluation, and general assessment results. GRAL's Nutsa

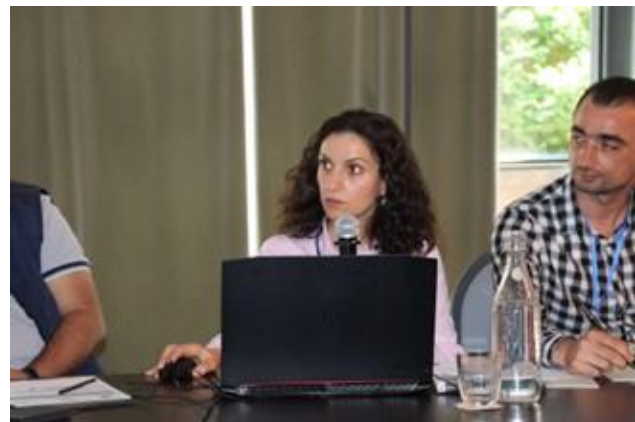


# PONTOS Newsletter #4

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Megvinetukhutsesi and Volodymyr Medinets delivered similar presentations on the Georgian Pilot Site and the Ukrainian Pilot Site.

The session on the assessment of changes in wetland and floating vegetation cover included a presentation from Armenian, Georgian and Ukrainian pilot sites. The presentations were dedicated to the assessment updates, data collection and image processing, and general results. PONTOS's Armen Ghlijyan (EPMIB), Artak Piloyan (AUA), Giorgi Mikeladze (GRAL), and Sergiy Medinets (ONU) made presentations on respective pilot site assessment status and challenges. Then a discussion was followed by all partners.



The third set of presentations was dedicated to the chlorophyll concentration and eutrophication dynamics assessment and was conducted by PONTOS researchers Garabet Kazanjian (AUA), Artak Antonyan (EPMIB), Ketevan Kupertadze (GRAL), Volodymyr Medinets (ONU), and Maria Zoidou (DUTH). The researchers addressed all four pilot area-related assessment results, updates, data collection, and image processing results. Challenges and questions were discussed during the follow-up discussion session.

The last set of sessions, including the assessment results of Greek, Armenian and Ukrainian pilot areas, covered the Agricultural water balance, water productivity, and water stress indices. Sessions were conducted by PONTOS researchers Ioannis Tsakmakis (DUTH), Alexander Arakelyan (AUA), and Sergiy Medinets (ONU).



## PONTOS Joint Open Workshop Conducted in Tbilisi



Within the framework of the EU-funded "Copernicus Assisted Environmental Monitoring Across the Black Sea Basin - PONTOS" project, the Joint Open Workshop was held on May 20, 2022, in Tbilisi, Georgia. The event was organized by the Green Alternative (GRAL) NGO to inform the participants from various Georgian local NGOs and the Authorities of Georgia, and International organizations representatives about PONTOS activities and their contribution to the environmental monitoring efforts.

The Workshop brought together 69 participants (including online) who represented regional and local public authorities, sectoral agencies, civil society, universities, enterprises, international organizations, media, and Project partners. The event focused on PONTOS project presentation and project activities, Implementation in pilot areas, and presentations by partner organizations implementing Black Sea Basin Cross Border Cooperation projects.

Mr. Irakli Matcharashvili of GRAL opened the Joint Open Workshop. Mr. Matcharashvili greeted the participants as the event's organizer, highlighting the partnership's valuable achievement in becoming a solid team responsible from administration to research.

The partnership went through Covid-19 and two wars, and exclusively the team's commitment, dedication, and high sense of responsibility towards the consortium enabled the project to continue and grow.

"Without the EU's resources, and not just financial, but the will of the EU to bring together and integrate neighborhoods into the European instruments as from research to regional collaboration. We have been very actively pursuing and using this opportunity to build bridges, and we look forward to continuing to do that. At least in Armenia, now the EU is the single biggest partner in building capacity in the Academic community. A partnership like we have here should build to the next step ....," highlighted in his welcome remarks Mr. Alen Amirkhonian, Director of the AUA Acopian Center for the Environment, a lead partner of the PONTOS project.

Common borders. Common solutions.



*Photo Caption (from left to right): Alen Amirkhanian, Director of the AUA Acopian Center for the Environment, Alexandre Darras, Attaché, Team Leader Connectivity, Energy, Environment & Climate change, Delegation of the European Union to Georgia Irakli Matcharashvili (GRAL), Aghavni Harutyunyan, PONTOS project manager, AUA*

The opening session went on with welcome remarks by Dr. Nato Sultanishvili, Head of the Planning and Development Division, Agency of Protected Areas of Georgia, Ministry of Environment Protection and Agriculture of Georgia, Mrs. Nino Antadze, Team Leader, Energy, and Environment Portfolio, UNDP Georgia, Mr. Alexandre Daddras, Attaché, Team Leader Connectivity, Energy, Environment & Climate change, Delegation of the European Union to Georgia.

Mr. Alexandre Darras presented the Delegation of the European Union to Georgia. While speaking about the project, he mentioned that “the cross-border cooperation format is an instrument that the EU likes to have. It goes in line with the spirit of what the EU is”. Mr. Darras said that the slogan “Common borders. Common solutions” is a civilization call or a symbol meaning that there is a common duty to find solutions.

He highlighted that the Black Sea is a commonwealth, and the PONTOS project aims at improving the environmental monitoring in the Black Sea basin to protect the natural environment.

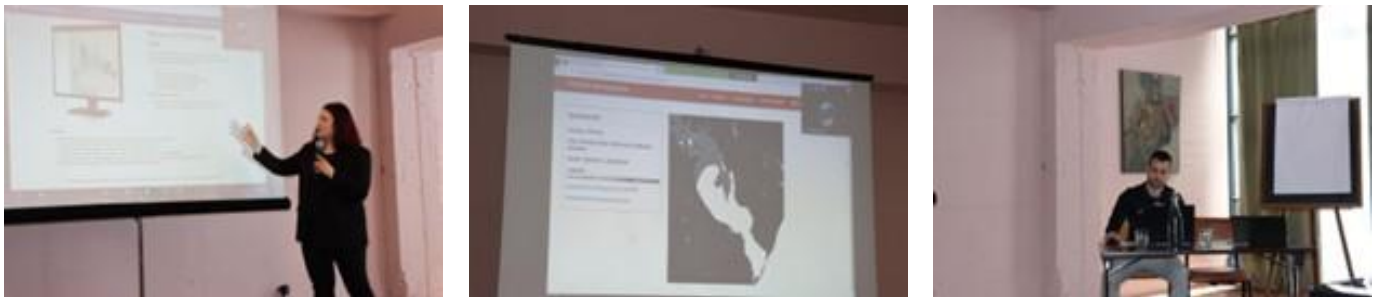
## ***Presentation of PONTOS project, PONTOS Platform and Assessments***

A comprehensive overview of the project was presented by Ms. Aghavni Harutyunyan, Project Manager from the AUA Acopian Center for the Environment. She highlighted the three main objectives of the project – from the technology transfer among the Black Sea nations to the development of the knowledge infrastructure of online services and encouraging the use of the Copernicus program for environmental monitoring and engaging local and regional actors at multiple levels.

The session continued with the presentation of the PONTOS platform by Ms. Maria Banti, Research Assistant, Centre for Research and Technology Hellas (CERTH), and Mr. Eleftherios Katsikis, Research Assistant, (CERTH), and by Ms. Nikolaos Kokkos, PostDoc Researcher, Democritus University of Thrace.

By incorporating various tools and applications, the PONTOS platform is built for everyone interested in online analyses of environmental monitoring. We support and enhance environmental monitoring using all the tools and Copernicus data available and building on the shared knowledge. The PONTOS platform will have three services -- PONTOS Data Cube, PONTOS Web Application, and PONTOS webGIS.

PONTOS platform incorporates and is being built on the practical experiments in several areas, and five assessments are being carried out, which will enable the platform to have the respective modules for the future. The five assessments include Assessment of dynamics of coastal line changes, Assessment of forest cover changes and their consequences on the environment, Assessment of changes in wetland and floating vegetation cover, Assessment of chlorophyll concentration and eutrophication dynamics, and Agricultural water balance, water productivity, and water stress indices. PONTOS project researchers made presentations on each Assessment. The assessments come to improve data sharing and cross-border information exchange systems on the environment within the Black Sea.



*Photo Caption: Presentation of PONTOS Platform*

## ***Enhancing partnership and knowledge sharing***

To highlight the importance of creating and maintaining collaborations with other local and international projects GRAL invited partners from other Georgian organizations who are implementing projects under the EU's Black Sea Border (BSB) Cross Border Cooperation (CBC). Particularly the following projects were presented: Zero waste project presented by Alexander Kaladdadze from Civitas Georgica organization, BSB ECO Monitoring project presented by Mariam Archuadze from Sabuko and finally AGREEN project, presented by Mariam Jorjadze from Elkana.

The Joint Open Workshop was concluded by a Press Conference aiming to communicate PONTOS message with the local Media.



*Photo Caption: Presentations by other BSB projects in Georgia*

## DISCOVERING ARMENIA WAS A LIFETIME EXPERIENCE: PONTOS'S VALERIA KORMISH FEATURED IN THE TESIM NEWS



**Valeria Kormysh**  
PONTOS project

*The American University of Armenia (AUA) Acopian Center for the Environment collaborated with the Interreg Volunteer Youth (IVY) initiative managed by the Association of European Border Regions last year. As a result of the successful collaboration the Center recruited two Interreg volunteers. Read below the interview of Interreg volunteer Valeria Kormish taken from the TESIM news website.*

“During the first half of 2021 I was volunteering within the European Solidarity Corps in Spain. The project organization pointed the IVY programme to me. I was looking for a country with a completely different cultural background from mine, and a project focused on environment. When I read the description of the PONTOS project on the IVY’s website I didn’t hesitate to apply immediately - that was exactly what I was looking for. In the project I mainly support the researchers from my partner’s organisation in collecting and processing data from the Lake Sevan area (Armenia). I also assisted the organization of events and the elaboration of reports, articles, social media posting content, etc.

Events organization was a memorable experience: it was a unique occasion to get to know the staff from my hosting organization and have fun with them on long bus rides across Armenia. Discovering Armenia, its culture, music, food and people was a lifetime experience and I feel that I learned so many interesting facts, met amazing people and experienced places that will be forever in my memory.

From the professional point of view, I learned a lot about environmental issues I worked on water stress and its impact on agriculture, GIS methods in agriculture, etc. I feel that the new knowledge on such world top issues as climate change is very valuable for my professional future.”

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## living planet symposium 06-09 2022

### PONTOS Data Cube: an innovative approach for environmental monitoring applied in the Black Sea and Mediterranean regions



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#### CHALLENGE

- Need of computational infrastructure and storage capacity for the acquisition, distribution, storage, management and analysis of Earth Observation (EO) data in this new Big Data era.
- Demand for specialized knowledge that is required in order to access, explore and process satellite data.
- Necessity of EO Analysis Ready Data (ARD) for environmental applications

#### OPEN DATA CUBES

- are stacks of multi-dimensional spatially aligned pixels.
- have been developed with success at national or regional scales by various initiatives.
- target on enabling analysis at various spatial scales, starting multi-dimensional EO data as well as addressing the demand for computational infrastructure by the end-user.

#### PONTOS DATA CUBE

- is implemented within the framework of the 'Copernicus assisted environmental monitoring across the Black Sea Basin' PONTOS project.
- supports and enhances environmental monitoring in the Black Sea Basin area with the use of EO spaceborne products.
- targets on facilitating the cross-border transferability of knowledge and information.

CEIRH - Center for Research and Technology, Thessaloniki, Greece  
Information Technologies Institute, Thessaloniki, Greece  
CENTRE FOR RESEARCH AND TECHNOLOGY | IKT@CERTH.GR

<https://pontos-eu.aia.am/>



Greece



Ukraine



Romania



Bulgaria

PONTOS Data Cube addresses the environmental needs for Seven Lake Basin in Armenia, Rioni River Delta and Kolkheti National Park in Georgia, Nestos River Delta in Greece as well as and the coastline from Odessa city to the Danube river delta including the Danube river delta area and adjacent estuary in Ukraine.



- It is a full-stack web-application built on COG Systems Engineering Office Open Data Cube software suite, release 2.21.

- It provides a user-friendly interface as part of the PONTOS Platform.

- It contains easy-to-access and easy-to-use applications already accompanied by the Open Data Cube software suite.

- It grants access to a big volume of shareable ARD EO satellite data in order to minimize the time, the complexity and the specialized knowledge that their pre-processing demands.



Currently, PONTOS Data Cube incorporates multiple space-borne products in the form of ARD satellite datasets, i.e. 35 complete years (1984 - 2020) of Landsat 5 ETM+, 7 ETM+, 8 OLI, and 6 years (2015 - 2021) Sentinel 2 MSI images. This archive contains approximately 90,000 images, occupying a total volume of 20.82 TB.

#### ONGOING ACTIVITIES

CEIRH's team aims to incorporate proven online services, such as the WaterMasks and HydroPeriod, which are the legacy of successful research results from the completed H2020 ECOPONTOS project.



PONTOS project has received funding from the ERIC CBC Joint Operational Programme Black Sea Basin 2014 - 2020 under Grant Agreement: ESB 940.



#LPS22

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## living planet symposium 2022

### Employing Land Surface Phenology for the assessment of forest gain and loss around Lake Sevan in Armenia and Kolkheti lowlands in Georgia

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#### FRAMEWORK

- Changes in forest cover are not always distinguished by modern monitoring systems based on remote sensing data. The fact is that in global models it is not always possible to distinguish forest degradation because the density and structure of trees are difficult to interpret in satellite images of medium resolution.
- Difficulties also arise with the use of topographic image correction in rugged terrain because of topographic illumination effects.
- Interpretation of the forest status arises also due to its vertical structure, as it is extremely complicated to detect degradation under the closed canopy cover using optical satellites.
- Mapping of forest cover using remote sensing is usually performed by land classification into forest and non-forest. However, the maps derived from satellite data depend on the definition of the forest, mainly on the threshold of tree cover parameters, above which the territory is identified as a forest.

#### LAND SURFACE PHENOLOGY (LSP)

- Changes in seasonal patterns of natural phenomena occurring on terrestrial naturally vegetated ecosystems are influenced by fluctuations of biotic and abiotic factors taking place on a seasonal as well as annual basis.
- Land surface phenology (LSP) may be used as a well aligned proxy to the observed phenology on the ground.

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#### INPUT DATA

NDVI	Time series	Spatial Resolution
MODIS NDVI	2002 - 2020	250 m
*Landsat 8 OLI TIRS	2014 - 2020	30 m
*Sentinel-2 <small>Vegetation indices</small>	2015 - 2020	10 m

Contributing knowledge and factors:

- In-situ conditions acquisition via existing or PONTOS updated protocols.
- Spatial distribution of the data takes, temporal resolution.

#### METHODOLOGY

- **PhenologyMetrics** and **PhenologyChanges** modules, which were developed within the H2020 ECO-POTENTIAL project, are harnessed for the estimation of LSP metrics and changes. LSP estimation is realized through time series of Earth Observation satellite image products (e.g. Vegetation Indices - VI).
- **PhenologyMetrics module:** Facilitates the estimation of LSP covering a vegetation growth period. LSP metrics are estimated per pixel with the exploitation of R phenex package and they encompass (a) the day of the growth period at which the greenup takes place, (b) the day of the growth period with the highest VI value and (c) the day of the growth period at which senescence takes place (Figures 1 & 2).
- **PhenologyChanges module:** Enables the monitoring of abrupt changes along the vegetation phenology cycles of sequential years via numerous annual VI series based on the R BFAST (Breaks For Additive Seasonal and Trend) package (Figures 3 & 4).

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#### INDICATIVE RESULTS

→ Figure 1: Phenology metrics estimated with MODIS NDVI for Mtskheti NP, GE.

Figure 2: Phenology metrics estimated with Landsat 8 NDVI for unprotected forested area in Kolkheti Lowlands, GE.

→ Figure 3: Phenology changes output: Dates of abrupt changes estimated with MODIS NDVI for Mtskheti NP, GE.

Figure 4: Phenology changes output: Number of abrupt changes estimated with MODIS NDVI for Sevan Lake, AM.

#### CONCLUDING REMARKS

- The accuracy of detectability of LSP proxy dates depends on the frequency of the image acquisition and its spatial resolution. More than one dominant vegetation species may be detected per pixel; thus, providing for an indication of local biodiversity.
- PhenologyMetrics and PhenologyChanges outputs will assist in the detection of the possible factors that led to forest cover changes in the study sites towards an evidenced based forest management.
- Comparison of the results with in situ data and knowledge of local experts leads to enhancement of credibility and impact of the products.

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## #LPS22

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