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EXCELSIOR Project

H2020-WIDESPREAD-2018-2020 | Grant Agreement No 857510	
Project full title:	**ERATOSTHENES: Excellence Research Centre for Earth Surveillance and Space-Based Monitoring of the Environment**
Project acronym:	**EXCELSIOR**
Work Package:	**WP6 Knowledge transfer and capacity building**
Deliverable:	**D6.9 Report on visiting experts Seminars and trainings**
Version:	**Final D6.9**
Dissemination level:	**Public**

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	H2020-WIDESPREAD-2018-2020/ H2020-WIDESPREAD-2018-01 **Grant Agreement No 857510** This project is funded by the **EUROPEAN COMMISSION** in the Framework Programme for Research and Innovation (2014-2020).
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Project full title:	**ERATOSTHENES: Excellence Research Centre for Earth Surveillance and Space-Based Monitoring of the Environment**
Project acronym:	**EXCELSIOR**
Work Package (WP): Task (T):	**WP6 Knowledge transfer and capacity building** **T6.3 Technical Skills Development Program**
Deliverable (D):	**D6.9 Report on visiting experts Seminars and trainings**
Due date of deliverable:	**30 September 2023** **(Month 48 of the project)** | **Version: Final D6.9**
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Document Sign-off

Nature	Name	Role	Partner	Date
DRAFT	Theofilos ANTONIOU Zampela PITTAKI	WP6 Participants	ECoE	2/8/2023
REVIEWED	Kyriacos THEMISTOCLEOUS	Project Manager	ECoE	14/9/2023
APPROVED	All partners			26/9/2023

Work Package 6: Knowledge transfer and capacity building

D6.6 Report on ECoE personnel mobility and secondments

Sections to be protected	Description	Owner	Access Rights	
			Period	**Type***
None			-	**PD**

*PD: Public dissemination CA: Confidentiality Agreement required for disclosure

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Executive Summary

Deliverable "D6.9 Report on visiting experts Seminars and trainings" focuses on the implementation of accredited technical short courses to keep ECoE researchers up-to-date with state-of-the-art equipment, new software, models, EO data assimilation techniques, new algorithms, machine learning theory and practice, etc., in a hands-on approach to stimulate innovate research. Several talks have been designed and delivered by invited experts. Finally, an initial training scheme plan that took place during RP3 (M31 – M48) is provided as well as the scheme plan for the upcoming training activities for the period RP4 (M49 – M66).

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Abbreviations

CUT	Cyprus University of Technology
ECoE	Eratosthenes Centre of Excellence
EO	Earth Observation
EXCELSIOR	Eratosthenes: Excellence Research Centre for Earth Surveillance and Space-based Monitoring of the Environment
NOA	National Observatory of Athens
PMOD/WRC	Physikalisch-Meteorologisches Observatorium Davos / World Radiation Center
TROPOS	Leibniz Institute for TROPOSpheric Research
DLR	German Aerospace Centre
TBD	To be determined

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1 Introduction

This deliverable focuses on the initial workplan for training activities (task 6.3 of the WP6). This plan will be regularly updated according to the needs of the ECoE. In this document, the discussions that have already been implemented will be presented (M31 to M48) as well as the workplan for the upcoming training activities (M49 to M66).

Task 6.3 concerns the organization and implementation of short technical training courses and lectures by inviting well-known and established scientists in the field of EO and other professionals to provide theoretical and practical lectures and trainings. Additionally, this task establishes a program of ongoing technical training aimed at both ECoE staff and external stakeholders, with the aim of creating the next generation of researchers, scientists, and engineers to support ECoE operations. Accredited technical short courses are being designed by the senior staff of ECoE, Strategic Partners, invited experts and high-profile researchers from the global scientific community design, to keep ECoE's researchers up-to-date with state-of-the-art equipment, new software, models, EO data assimilation techniques, new algorithms, machine learning theory and practice, etc., in a hands-on approach to encouraging innovate research.

Lectures provide participants with extensive knowledge and/or skills on specific and/or specialized topics over the course of one or two days. Hosting invited experts has numerous benefits and can help participants learn things from a different perspective. More specifically:

a) **Current industry insights:** Lectures by invited experts are among the best ways for participants to familiarize themselves with the current situations and challenges of a particular field. They are given the opportunity to hear about existing problems from industry professionals who are dealing with them, and solutions are also presented that they can use to successfully complete their project.

b) **Prospect to learn something innovative and new:** Invited experts have the opportunity to present their research and knowledge on a specific topic, which the participants could not learn or find on their own. Taking advantage of this kind of training is not only beneficial to the participants in terms of learning new and unique things, but it gives them an unprecedented edge over others in terms of knowledge and perspective.

c) **Inspiration:** Lectures by invited experts can be very vital in inspiring researchers to choose a research topic on a technology, or even to use that technology in an existing research project, that they have not heard of before. Especially in research, invited experts can highlight ideas that researchers have never thought of before, or inspire them to try solutions presented to them on a particular topic.

d) **Out-of-the-box interaction:** Lectures by invited experts help thinking outside the box by introducing new ideas and thoughts. Being able to interact and ask questions from an expert becomes a great experience.

e) **Opportunities for collaborations:** It is common for researchers to undertake projects and collaborate with professionals on various research endeavours. Invited experts often provide opportunities to collaborate with the organizations they represent, as well as with other associations. People attending such lectures can easily establish contacts with the speakers, engage in meaningful interactions, and foster potential collaborations in the future when needed. In addition, the organization itself establishes connections with such professionals,

thereby enhancing its name and stature. This networking allows them to stay connected and work together when needed in the future.

This document represents the 'Report on visiting experts Seminars and trainings' (deliverable D.6.9) for the EXCELSIOR project. It focuses on the talks by invited experts and high-profile researchers from the global scientific community that have been implemented between M31 - M48.

In this deliverable,

Chapter 1 provides a brief introduction to the organization and implementation of seminars, lectures and trainings using Visiting Experts;

Chapter 2 provides detailed information regarding the conducted activities for RP3 and the workplan for the activities that will take place during RP4;

Chapter 3 provides the evaluation of the impact and effectiveness of the activities implemented as well as the feedback from the presenter;

Chapter 4 is the concluding chapter of the deliverable;

Appendix A includes documentation of the conducted seminars/lectures;

Appendix B includes the selected topics for the upcoming activities during RP4.

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2 Implemented Activities

2.1 Invited Experts

The talks that were carried out during RP3 by the Strategic Partners and/or other organizations are shown in Table 1. Table 1 includes a description of the talks conducted by the invited expert, the month and week that they took place, the number of days that the activity required, the targeted cluster and the number of participants.

Table 1: Lectures/Talks

Organization	Lecture Title	Month, Week	# of days	Thematic Area	# of Eratosthenes participants
Israel Space Agency	**Prof. Dan G. Blumberg** **Topic:** Remote sensing of arid lands	M43-W1	1	ALL	28
Egyptian Space Agency/CHAPMAN UNIVERSITY (USA)	**Prof. Hesham El-Askary** **Topic:** The interplay of data science and EO addressing Env. Challenges	M43-W1	1	Big Data / ALL	25
Aristotle University of Thessaloniki	**Prof. Ioannis Gitas** **Topic:** EO Applications in Forest Fire Management: A European Mediterranean perspective	M43-W1	1	Resilient Society	26
University of Aegean	**Prof. Thomas Hasiotis** **Topic:** Investigation of a vertically integrated approach to the study and treatment of coastal erosion (example from the Greek area)	M43-W1	1	Resilient Society	24
University of Oxford	**Dr. Cristian Rossi** **Topic:** A Journey Through Earth Observation: From Basics To Applications	M45-W1	1	Resilient Society	28
Geological Survey of	**Dr. John Dehls**	M46-W2	1	Disaster	25

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Organization	Lecture Title	Month, Week	# of days	Thematic Area	# of Eratosthenes participants
Norway (NGU)	**Topic:** From National to Continental-scale Hazard Mapping – Experience Using Massive InSAR Datasets				
Cyprus University of Technology (CUT)	**Mr. Marios Zervas and Mr. Petros Artemi** **Topic:** CUT Library Bibliometrics	M46-W3	1	ALL	10
AZTI	**Topic:** "Ocean Monitoring using remote sensing platforms"	M31-W2	1	ALL	25
European Topic Centre University of Malaga	**Topic:** "Mediterranean Forest Map"	M34-W3	1	ALL	25
	Topic: Our urban world – Dynamics, dimensions, and forms of global urbanization processes	M41-W1	1	ALL	24
Universite de Geneve	**Topic:** The Swiss Data Cube: EO Open Science for Environmental Monitorin	M39-W2	1	ALL	25

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2.2 Workshop in conferences

The following table is a list of workshops that took place during conferences in which ECoE staff participated that included technical content in terms of scientific value.

Table 2: Workshops

Organization / Presenter	Topic	Month, Week	# of days	Thematic Area	# of Eratosthenes participants
GOFC-GOLD	Mediterranean Regional Information Network (MedRIN)	2019	1	ALL	3
Eratosthenes CoE & Cyprus Remote Sensing Society	Ninth International Conference on Remote Sensing and Geoinformation of Environment (RSCy2023)	M43-W1	3	ALL	21
Eurisy	Satellite-based Services for Disaster Risk Management	M44-W2	1	Disaster	7
Eratosthenes CoE	How AI/OPTIMIZATION can assist EO applications	M44-W3	1	ALL	
Research & Innovation Foundation	Twinning research proposals	M44-W3	1	ALL	16
Prof. Kypros Pilakoutas	Risk assessment and earthquake disaster risk	M45-W4	1	Disaster	5
Copernicus	Participation to EGU23	M43-W4	5	ALL	13
European Commission & Copernicus	8th Copernicus User Forum	M42-W1	1		1
European Centre for Medium Range Forecasts	7th CAMS General Assembly & Atmosphere User Forum	M45-W2	3	Atmosphere	1

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Organization / Presenter	Topic	Month, Week	# of days	Thematic Area	# of Eratosthenes participants
European Centre for Medium Range Forecasts (ECMWF), on behalf of Copernicus	6th General Assembly of the Copernicus Climate Service (C3S)	M48-W2	3	Climate	1
ISPRS	ISPRS Geospatial Week 2023	M48-W1	6		2
ACTRIS Centre for Cloud Remote Sensing (CCRES)	ACTRIS Cloud Remote Sensing Workshop Nov. 2022	M38-W3	2		1
European Space Generation Workshop (E-SGW)	Sixth European Space Generation Workshop 2022	M31-W1	2		5
EXCELSIOR H2020 Teaming	Third Virtual EXCELSIOR Workshop: "Entrepreneurship & Innovation in Earth Observation"	M34-W1	1		25
ACTRIS	ACTRIS Week 2022 and ACTRIS Aerosol Remote Sensing Workshop 2022	M37-W4	4	ALL	1
Research and Innovation Foundation (RIF)	Advanced 'Masterclass' workshop for writing Proposals in Horizon Europe	M38-W1	2	ALL	1
Cyprus University of Technology	DESTINI H2020- TWINNING PROJECT	M28-W4	1	ALL	1
Eratosthenes CoE and EARSeL	6th EARSeL Workshop on Developing Countries	M36-W2	1	ALL	8
Eratosthenes CoE, the Cyprus University of	GIS Day 2022	M38-W3	1	ALL	25

Organization / Presenter	Topic	Month, Week	# of days	Thematic Area	# of Eratosthenes participants
Technology and the Department of Electronic Communications					
Department of Electronic Communications, Deputy Ministry of Research, Innovation and Digital Policy	8th ESA-PECS Call Briefing 2023	M40-W4	1	ALL	1
Cyprus University of Technology, Department of Electronic Communications of the Deputy Ministry of Research, Innovation and Digital Policy and Eratosthenes CoE	Gender, Science and Earth Observation: Strategies to support gender responsive leadership	M37-W1	1	ALL	25
Hydrogeological Sector of GSD and Water Sector of Eratosthenes CoE	Workshop with governmental stakeholders from the Department of Geological Survey regarding the activities of the Demonstration Project of the Water Sector with title "Assessment of vegetation dynamics and drivers of drought for the Republic of Cyprus".	M47-W1	1		3
Consortium of INWAT	INWAT PRIMA Project Workshop	M42-W2	1	ALL	1

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Organization / Presenter	Topic	Month, Week	# of days	Thematic Area	# of Eratosthenes participants
Project; Governmental authorities; Consejo Superior de Investigaciones científicas (CSIC); University of Jijel (Univ-Jijel); Universität Duisburg-Essen (UDE); Université de Montpellier (UM); Università degli studi di Bari Aldo Moro (UNIBA); Centre des Recherches et des Technologies des Eaux (CERTE)					
CERTE, Tunisian Association of Hydrogeologists	Workshop at the 4th ATLAS GEORESOURCES INTERNATIONAL CONGRESS (AGIC2023)	M42-W3	1		1
Limassol Water Development Department	Workshop with personnel of Water Development Department	M42-W4	1		2
EURISY, Department	Satellite-based Services for Disaster Risk Management	M44-W3	1	Disaster	7

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Organization / Presenter	Topic	Month, Week	# of days	Thematic Area	# of Eratosthenes participants
of Electronic Communications, Deputy Ministry of Research, Innovation and Digital Policy and EUSPA					
L3Harris Geospatial Solutions UK Ltd	SAR Sessions	M44-W4	2		1
ACTRIS - CRS	Cloud Remote Sensing Community workshop	M44-W4	1		1
GEO	Participation in the Climate Working Group workshops of GEO 2023			Climate	1
GEO	New strategy to support skills development for the space and geoinformation sector	M29-W1	1		1
Copernicus	Copernicus Land User Event 2023 - Urban applications	M48-W4	1	Land	1
EUSPA	Copernicus and Climate Adaptation Workshop	M48-W4	1	Climate	1

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2.3 Training and seminar activities

The following table is a list of training activities in which ECoE staff participated

Table 3: Training and seminar

Organization / Presenter	Topic	Month, Week	# of days	Thematic Area	# of Eratosthenes participants
Physikalisch-Meteorologisches Observatorium Davos / Word Radiation Center	Solar Radiation/Energy measurements, modeling and applications	M37-W3	2	Atmosphere	4
DLR/Eratosthenes CoE	Earth Observation data processing in cloud environments	M28-W2	1	Big Earth Data	12
Eratosthenes CoE	Training of hydrogeology team of Cyprus Geological Survey	M44-W1	1	Water	2
EUMETSAT	Dust monitoring and forecasting: 2023 events	M43-W1	1	Atmosphere	1
CASTORC	Data analytics in the era of large-scale machine learning	M43-W4	2	Big Earth Data	9
IAASARS/National Observatory of Athens	Radiative effects of water vapor and dust in the Saharan Air Layer	M43-W1	1	Atmosphere	1
Eratosthenes CoE	Research Management and Administration under the AI-Observer funded project	M37-W5	1	Disaster Risk Reduction	20
Central Water Development Department-	Meeting with Geological Survey within the frame of AGREEMAR (PRIMA Project)	M41-W5	3	Water	2

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Organization / Presenter	Topic	Month, Week	# of days	Thematic Area	# of Eratosthenes participants
ERATOSTHENES CoE					
Eratosthenes CoE	Transferring skills of how to establish Living Labs in Earth Observation	M43-W4		Agriculture & Atmosphere	13
Research and Innovation Foundation	Restart 2016-2020 Project Financial Management	M43-W4	1	Administration	1
ACTRIS Centre for Aerosol Remote Sensing (CARS) and PROBE CA18235	Hands-on training on aerosol lidar measurement quality assurance procedures and tools	M45-W4	3	Atmosphere	1
ESA	Series of online trainings: EarthCARE level 1 and 2 algorithms and EarthCARE validation support tools and facilities	M45-M48	---	Atmosphere	4

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3 Overview and Future Work

In this section we provide an insightful overview and evaluation of the implemented some trainings and workshops activities, as well as future activities to be planed. We present a short description of the invited talks and evaluation of the effectiveness on our research clusters. Additionally, based on the training needs analysis we did, we present here some suggested topics for future training and workshop activities. As we reflect on the progress we've made and look forward to the opportunities ahead, this section serves as a roadmap for our continuous pursuit of knowledge and skill development.

3.1 Overview of the invited talks

Topic: Remote sensing of arid lands (by Prof. Dan G. Blumberg)

On 3rd April 2023, in the RSCy2023 that took place at Adams Beach Hotel (Ayia Napa, Cyprus), Prof. Dan G. Blumberg delivered a comprehensive talk on remote sensing in arid regions. He introduced the Earth and Planetary Image Facility (EPIF) and its workflow, including hyperspectral image collection, modeling, and interpretation. The Sumatra Andaman earthquake case study demonstrated how countries used Remote Sensing (RS) and GIS to address post-disaster questions. The talk explored population studies by province and socio-economic estimates. It also examined arid land definitions and case studies, such as desert urbanization and wind streaks. The connection between aeolian geomorphology and climate in Karakum and Kyzylkum deserts was discussed, along with soil water content estimation using RS. Prof. Blumberg stressed the importance of visible and near-infrared measurements and precision agriculture.

Topic: The interplay of data science and EO addressing Env. Challenges (by Prof. Hesham El-Askary)

On 3rd April 2023, in the RSCy2023 that took place at Adams Beach Hotel (Ayia Napa, Cyprus), Prof. Hesham El-Askary delivered an enlightening lecture on the synergy between data science and Earth Observation (EO) in combating environmental challenges. His talk delved into various aspects, including Earth Observation Data Cubes, enabling comprehensive data analysis. He discussed the pivotal role of EO in Agricultural Land, encompassing Crop Classification, Crop Phenology, and monitoring Crop Stresses. He also shed light on how EO aids in Atmosphere analysis, crucial for environmental monitoring. Furthermore, he highlighted its significance in Water Resources Management and advanced irrigation techniques through remote sensing. The lecture also covered the impact of Land Use changes, especially urbanization. Overall, the lecture provided a profound understanding of Earth Data Analytics and its vital role in addressing environmental concerns. An emphasis is given on the use of EO for promoting SDG Goals in different applications that interlinked with the SDG goals.

Topic: EO Applications in Forest Fire Management: A European Mediterranean perspective (by Prof. Ioannis Gitas)

On 6th April 2023, at Eratosthenes CoE premises in Limassol, Prof. Gitas delivered a presentation on "EO Applications in Forest Fire Management." He emphasized the global impact of climate change and forest degradation on the increasing prevalence of forest fires. The talk showcased examples from the Mediterranean region in 2022, highlighting the crucial role of remotely sensed data and GIS analysis in fire management. Fuel type mapping and models, such as the Global Wildfire Information System (GWIS) and Sentinel-2-based tools like ArcFuel map and Fuel Map for Attica and Euboea, were discussed. Prof. Gitas explained the mapping of burned areas using various image platforms, burn severity mapping, and regeneration monitoring through case studies. The presentation also fostered discussions for potential collaborations in Cyprus.

Topic: Investigation of a vertically integrated approach to the study and treatment of coastal erosion (example from the Greek area) (by Prof. Thomas Hasiotis)

On 6th April 2023, at Eratosthenes CoE premises in Limassol, Prof. Thomas Hasiotis delivered a presentation on the critical issue of coastal erosion, which threatens coastal communities worldwide. Coastal erosion, characterized by the gradual loss of land due to natural processes and human activities, poses significant ecological and economic challenges. The research approach presented in this seminar is designed to comprehensively assess and address this complex problem. By focusing on examples from the Greek region, attendees will gain insight into the practical methodology employed and the resulting outcomes. This vertically integrated approach aims to bridge the gap between scientific understanding and effective erosion mitigation strategies, offering valuable insights into safeguarding coastal ecosystems and communities against the relentless forces of erosion.

Topic: A Journey Through Earth Observation: From Basics To Applications (by Dr. Cristian Rossi)

On 6th June 2023, at Eratosthenes CoE premises in Limassol, Dr. Rossi delivered a talk on Earth Observation and presented the basics of optical and radar remote sensing, a set of applications and practical considerations about the use of earth observation data. The applications session covered examples from the finance, earth science and civil engineering sectors. These key areas presented challenges our planet is facing and how EO can be used to tackle those. A business perspective has been also presented towards the commercialisation of ideas. The final session covered practical aspects about how to get EO data and process it, alongside general recommendations about best practices and a specific tutorial about Google Earth Engine. The three sessions were logically sequenced, and the topics flowed smoothly from one to another. This allowed for a cohesive learning experience and facilitated the assimilation of new knowledge and concepts. Additionally, the use of visual aids, such as slides and videos, enhanced the presentation and made complex ideas more accessible.

Topic: From National to Continental-scale Hazard Mapping – Experience Using Massive InSAR Datasets (by Dr. John Dehls)

On 12th July 2023, Dr. Dehls delivered an online presentation titled "From National to Continental-scale Hazard Mapping – Experience Using Massive InSAR Datasets." In this informative talk, he highlighted the significant strides made by his team in making InSAR-based deformation data accessible to both authorities and the general public on a large scale to maximize societal benefits. Dr. Dehls discussed several key topics during his presentation. Firstly, he delved into the history of InSAR usage within the Norwegian Government, emphasizing the development of InSAR Norway, a ground motion service, and its value to public authorities and citizens. He also touched upon the systematic landslide mapping program in Norway, explaining how InSAR data aids in detecting and mapping potential landslides. Additionally, Dr. Dehls provided insights into the European Ground Motion Service (EGMS), covering its products, usage, and offering numerous examples of ground motion applications. Lastly, the presentation included discussions on data related to Cyprus and explored opportunities for collaboration in disaster management through the signing of a Memorandum of Understanding (MoU).

Topic: CUT Library Bibliometrics (by Marios Zervas and Mr. Petros Artemi)

In this lecture, that took place on 18th July 2023 at Eratosthenes CoE premises, attendees received information on essential aspects of bibliography organization and citation management, and gained valuable insights into disseminating scientific results, data, and projects effectively, with a strong emphasis on strategies to enhance their impact and utilization. Notably, the lecture introduced a novel platform called "Altmetrics," designed to track the online attention received by research outputs, including scholarly articles and datasets, through data aggregation from various social media platforms and websites. Furthermore, the presenters conducted training on utilizing the "KTISIS" platform, which serves as Cyprus University of Technology's repository, offering comprehensive materials related to the university's research activities.

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3.2 Evaluation of invited expert talks

The lectures delivered by visiting experts left a profound impact on the cluster members. These impactful talks not only enriched their knowledge but also sparked inspiration, fostering innovation and collaboration. The table below captures various dimensions of this influence, from enhanced skillsets to increased engagement, demonstrating the tangible benefits of expert insights.

VISITING EXPERT	LECTURE TOPIC	CLUSTER	EVALUATION
Prof. Dan G. Blumberg	Remote sensing of arid lands	Cultural Heritage	The lecture opened exciting prospects for possible collaborative research projects in the EMMENA region, fostering cross-border cooperation and knowledge exchange.
		Water	
		Energy	
		BigData	
		Maritime	The lecture significantly contributed to knowledge enhancement by providing valuable insights and information on the topic. Additionally, it facilitated skills development, equipping attendees with practical tools and techniques to apply in their respective fields.
		Land	The lecture enhanced their comprehension of arid ecosystems through innovative technology applications. It also ignited a fusion of fresh ideas, potentially leading to exciting new proposals/publications in the field, further enriching the scientific discourse on arid ecosystems.
		Disaster	The lecture's focus on various applications in arid environments broadened their comprehension of these ecosystems. It also served as a compelling

			catalyst for embracing cutting-edge technology in the monitoring and conservation efforts of arid regions, inspiring proactive measures for their preservation.
		Agriculture	Applications and projects presented motivated the agriculture cluster members. After discussion with Prof. Blumberg it is expected that lectures related to the Agriculture sector as well as site visits to agricultural institutes in Israel can benefit the cluster and can enhance future development and collaboration opportunities between ERATOSTHENES and Israel institutes.

Prof. Heshan El-Askary	The interplay of data science and EO addressing Env. Challenges	Cultural Heritage	The lecture opened exciting prospects for possible collaborative research projects in the EMMENA region, fostering cross-border cooperation and knowledge exchange.
		Water	The lecture opened exciting prospects for possible collaborative research projects in the EMMENA region, fostering cross-border cooperation and knowledge exchange.
		Maritime	The lecture significantly contributed to knowledge enhancement and equipped attendees with valuable insights for long-term sustainability.
		Energy	The lecture illuminated diverse outcomes and applications within atmospheric and climate sciences in

			the EMMENA region, enriching their understanding of this complex domain. Furthermore, it identified open research areas, promising to be a valuable reference for future studies, fostering continued progress in the field.
		Land	The lecture opened exciting prospects for possible collaborative research projects in the EMMENA region, fostering cross-border cooperation and knowledge exchange.
		Disaster	In this talk, the visiting expert presented, among other topics, data fusion with Earth Observation to address environmental challenges, aligned specifically with most of the United Nations' Sustainable Development Goals (SDGs). His approach enabled the cluster's researchers to think new ideas and applications in alignment to the SDGs, to provide sustainable solutions in various environmental issues.
		BigData	Useful on the design and implementation of machine learning models used on the on-going publications and research activities of the department.
		Agriculture	Applications presented indicated that we faced common problems in the two areas. This is promising for possible future collaboration.

Prof. Ioannis Gitas	EO Applications in Forest Fire Management: A European Mediterranean perspective	Cultural Heritage	Knowledge on information about forest fires management that can be associated with fire disaster risk reduction of archaeological sites.
		Water	The lecture opened exciting prospects for possible collaborative research projects in the EMMENA region, fostering cross-border cooperation and knowledge exchange.
		Energy	
		BigData	
		Agriculture	
		Maritime	This lecture enhanced the knowledge of the cluster members on forest fire management and valuable insights for long-term sustainability. The members also gained practical skills to employ Earth Observation tools effectively.
		Land	The lecture introduced the implementation of novel EO applications in fire forest management which sparked the generation of fresh ideas for potential proposals and/or publications.
		Disaster	Cutting-edge knowledge, methodologies, and tools for Earth Observation applications in Forest Fire Management were presented by Prof. Ioannis Gitas. His perspective on Earth Observation in forest fire management updated and reshaped their thinking about combating and managing wildfires. This facilitated the development of novel ideas, in this direction, through the implementation of new Earth

			Observation methodologies and data into the research for monitoring forest fires. Following this lecture, two conference papers were submitted by Ms Maria Prodromou in collaboration with Prof. Ioannis Gitas as part of her PhD.

Prof. Thomas Hasiotis	Investigation of a vertically integrated approach to the study and treatment of coastal erosion (example from the Greek area)	Cultural Heritage	The cluster members enhanced their knowledge of coastal erosion processes that can be associated with coastal archaeological sites.
		Water	The lecture opened exciting prospects for possible collaborative research projects in the EMMENA region, fostering cross-border cooperation and knowledge exchange.
		BigData	
		Agriculture	
		Maritime	This lecture significantly enhanced the cluster members' knowledge in coastal erosion. It also equipped members with practical skills and insights, likely to be incorporated into running research projects and publications.
		Energy	The presentation was highly informative and engaging, encompassing a wide range of topics and applications related to Earth Observation (EO) observations. Our cluster members find that it holds potential relevance for their future research endeavors, as it introduced them to novel tools and ideas.

		Land	This lecture provided a holistic approach to address the issue of coastal erosion. Some of the knowledge gained may be proved useful for an upcoming ESA PECS project related to coastal erosion through remote sensing techniques.
		Disaster	Prof. Hasiotis' lecture on integrated coastal erosion study methods offered a holistic approach to tackle this issue. His lecture and methodological approach enabled researchers to identify existing multifaceted erosion mitigation strategies, fostering resilient coastlines for future generations. Future collaboration through the submission of a research proposal in upcoming calls was discussed following Prof. Hasiotis' talk.

Dr. Cristian Rossi	A Journey Through Earth Observation: From Basics To Applications	Cultural Heritage	The lecture opened exciting prospects for possible collaborative research projects in the EMMENA region, fostering cross-border cooperation and knowledge exchange.
		Water	
		Land	
		Agriculture	
		Maritime	This lecture significantly enhanced the cluster members' knowledge in coastal erosion. It also equipped members with practical skills and insights, likely to be incorporated into running research projects and publications.

		Energy	A very informative and interesting presentation that covered many different topics and applications of EO observations. Our cluster members think that it might be useful in their future research since they get familiar with new tools and ideas.
		Disaster	This talk refreshed the existing knowledge of researchers for EO technologies (algorithms, processing techniques, new EO data, etc.) from a business perspective.
		BigData	Useful on the design and implementation of machine learning models used on the on-going publications and research activities of the department.

Dr. John Dehls	From National to Continental-scale Hazard Mapping – Experience Using Massive InSAR Datasets	Cultural Heritage	Knowledge on information about hazard mapping that can be associated with disaster risk reduction of archaeological sites.
		Water	The lecture opened exciting prospects for possible collaborative research projects in the EMMENA region, fostering cross-border cooperation and knowledge exchange.
		BigData	
		Agriculture	
		Maritime	The lecture significantly contributed to knowledge enhancement and equipped attendees with valuable insights for long-term sustainability.

		Energy	A well-structured and thoughtfully designed presentation on the utilization of Earth Observation (EO) data in identifying and managing hazards in Norway. This topic holds significant value in expanding our members' understanding of remote sensing applications and broadening their knowledge base.
		Land	This lecture significantly amplified the cluster's hazard assessment capabilities, empowering them to undertake more comprehensive and data-driven approaches to mapping hazards at both national and continental scales.
		Disaster	The invited speaker presented the European Ground Motion Service (EGMS) and other novel applications and methodologies for monitoring land movements on a national scale. Similar equipment and methodologies (e.g., GNSS and Corner Reflectors) are used for monitoring land movements /landslides in Cyprus and possible collaboration can be made between us and Dr Dehls, for improving EGMS for Cyprus, and transferring their knowledge in used methodologies and developed tools.

Mr. Marios Zervas and Mr. Petros Artemi	CUT Library Bibliometrics	Cultural Heritage	The information provided offered valuable insights into best practices for disseminating scientific results, data,
		Water	

		Maritime Energy Land Disaster BigData Agriculture	and projects, as well as strategies for increasing their impact and utilization. All attendees intend to adopt these practices to enhance the effectiveness of their work. After the completion of this topic, all members have established their ORCID profiles and connected them to the CUT website.

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3.3 Suggested topics for future training/workshop activities

In our ongoing commitment to enhancing skills development, we will introduce a series of trainings and workshops based on the specific needs identified within our research clusters. These training and workshops will cover a range of topics tailored to address the skills development requirements of our participants. The availability of these activities will depend on the schedules of the invited trainers/presenters.

Based on the training needs analysis, the following topics are suggested:

1. NASA Satellite Missions (CALISPO; CLOUDSAT)
2. ESA campaigns for spaceborne missions calibration and validations
3. ESA current and future missions for atmosphere sampling
4. Wind measurements using ground based remote sensing
5. Dust forecasting modelling
6. ACTRIS as European Research Infrastructure consortium
7. Aerosol typing and aerosol classification satellite
8. Aerosol and Ozon
9. Precipitation and Rain Rate
10. Geophysical prospection applicability in Geoscience
11. Copernicus Sentinel-1 supports detection of shoreline positions
12. Risk Assessment and Monitoring Networks for Coastal Regions: Automatic Extraction of Shoreline from Satellite Images
13. Coastal Erosion Monitoring with Sentinel-1
14. Automated Extraction of Annual Erosion Rates for Arctic Permafrost Coasts Using Sentinel-1, Deep Learning, and Change Vector Analysis
15. Agricultural Land Cover Changes
16. Crop Modeling / Carbon Cycle
17. Agricultural Development and Innovation in Developing Countries
18. Agriculture ecosystem services
19. Remote sensing for climate data
20. Monitoring of abiotic stresses in croplands

4 Conclusions

This deliverable presents the lectures conducted by invited experts, trainings and workshops that have been executed. These activities are a vital component of the continuous skills development initiative for ECoE staff. These activities address the gaps in knowledge and/or skills required by ECoE researchers that cannot be adequately fulfilled by the strategic partners and/or other current collaborating organizations. Furthermore, these activities may uncover new training needs, leading to further training on specific topics that can significantly benefit the researchers in their respective research projects.

In conclusion, the implementation of such activities greatly enhances the thinking and understanding of the participants, equipping them with the necessary tools and knowledge applicable to their research projects. For this reason, ECoE actively promotes and prioritizes organizing such activities to ensure the sustainable skills development of its staff.

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Appendix A – Documentation of the conducted seminars/lectures

1. Topic: Remote sensing of arid lands (by Prof. Dan G. Blumberg)

On 3rd April 2023, Prof. Dan G. Blumberg delivered a talk on the remote sensing of arid lands. Specifically, he presented the Earth and Planetary Image Facility (EPIF) and its workflow, covering hyperspectral image collection, model building, and interpretation. A case study of the Sumatra Andaman earthquake was also presented, highlighting how affected countries addressed various questions using Remote Sensing (RS) and GIS. The talk further delved into studying the impacted population by province and estimating socio-economic factors.

Additionally, the definition and examination of arid lands were discussed, with several case studies presented, including urban sprawl in desert cities and a global study on wind streaks on Earth. Moreover, the presentation showcased the connection between aeolian geomorphology and climate in the Karakum and Kyzylkum deserts. The talk also included a discussion on estimating soil water content in arid regions through RS. Finally, it was emphasized the significance of visible and near-infrared measurements, as well as the importance of precision agriculture.

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Figure 1: *Remote sensing of arid lands*

2. Topic: The interplay of data science and EO addressing Env. Challenges (by Prof. Heshan El-Askary)

On 3rd April 2023, Prof. Hesham El-Askary delivered an insightful lecture exploring the intersection of data science and Earth Observation (EO) in addressing environmental challenges. His presentation covered a wide range of topics, including Earth Observation Data Cubes for comprehensive data analysis. He emphasized the importance of EO in agriculture, including Crop Classification, Crop Phenology, and Crop Stress monitoring. Additionally, he discussed EO's role in analyzing the atmosphere for environmental monitoring and its significance in Water Resources Management and advanced irrigation techniques through remote sensing. The lecture also touched on the impact of urbanization on land use changes. Overall, it provided a deep understanding of Earth Data Analytics' vital role in facing environmental issues.

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Figure 2: *The interplay of data science and EO addressing Env. Challenges*

3. Topic: EO Applications in Forest Fire Management: A European Mediterranean perspective (by Prof. Ioannis Gitas)

On 6th April 2023, Prof. Gitas delivered a presentation on "EO Applications in Forest Fire Management." Specifically, he elucidated how climate change and forest degradation have contributed to fire-prone conditions globally and discussed the consequential impacts, including the number of European countries affected by fires and the extent of burned hectares. The talk included fire examples from the Mediterranean region in 2022 and highlighted how remotely sensed data and GIS analysis play a pivotal role in various phases of a fire management program.

Furthermore, the presentation covered fuel type mapping and models, featuring tools like the Global Wildfire Information System (GWIS), the ArcFuel map, and the Fuel Map for Attica and Euboea, all utilizing Sentinel-2 images and other platforms accessible for ECoE staff to leverage in their research. The mapping of burned areas, including the use of medium and very high-resolution images, as well as Synthetic Aperture Radar, was also explained. The presentation further touched upon the steps involved in burn severity mapping and the monitoring of regeneration using case studies.

Moreover, Prof. Gitas highlighted the current trends in RS technologies applied in fire management applications. Throughout the presentation, extensive discussions took place between ECoE staff and Prof. Gitas, leading to the identification of potential collaborations for applications in Cyprus.

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Figure 3: *EO Applications in Forest Fire Management*

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4. Topic: Investigation of a vertically integrated approach to the study and treatment of coastal erosion (example from the Greek area) (by Prof. Thomas Hasiotis)

On April 6, 2023, Prof. Thomas Hasiotis presented on the global issue of coastal erosion, a threat to coastal communities. Coastal erosion involves gradual land loss due to natural processes and human activities, creating ecological and economic challenges. The seminar showcased a research approach focusing on Greek region examples, offering insights into its practical methodology and outcomes. This vertically integrated approach aims to connect scientific understanding with effective erosion mitigation strategies, providing valuable insights for protecting coastal ecosystems and communities from erosion's relentless forces.

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Figure 4: *Investigation of a vertically integrated approach to the study and treatment of coastal erosion*

5. Topic: A Journey Through Earth Observation: From Basics To Applications (by Dr. Cristian Rossi)

Dr. Cristian Rossi is the Geospatial Science Lead at the Satellite Applications Catapult, UK, where he is PI of several research projects. In parallel, he is a Visiting Lecturer at the University of Oxford, responsible for the 'Remote Sensing of the Environment' course at the School of Geography and Environment, and an Associate Research Fellow at the UK Centre for Greening Finance and Investment (CGFI). He is a member of various scientific committees and three Centres for Doctoral Training steering boards.

Before moving to the UK, Cristian was a Research Scientist with the German Aerospace Center (DLR), where he developed novel algorithms for Earth observation missions. He holds a B.Sc. and M.Sc. degrees in telecommunication engineering from the Polytechnic of Milan, Italy, and a Ph.D. degree in remote sensing technology from the Technical University of Munich, Germany.

His research interests are focused on remote sensing for sustainability applications and climate change adaptation. He supervises several data science PhD students. Cristian has authored or co-authored more than 90 publications in international journals, conferences, and book chapters.

Dr. Rossi, presented:

- A gentle introduction to Earth Observation (1h)
    - What should I know about EO?
    - How can I use EO data/products/data within my research/business proposition?
    - What should I consider to include EO products in my research/business?

- Applications of Earth Observation (1:30h)
    - Application to the finance sector: ethical investing and sustainability
    - Application to the mining sector: the search for battery metals
    - Application to the civil engineering sector: early warning systems for infrastructures

- Practical aspects of EO (1h)
    - Data and software
    - A Google Earth Engine tour

After the presentation, it was a discussion session with Dr. Rossi and EcoE staff and it was discussed having an MoU with Catapult, UK.

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Figure 5: *A Journey Through Earth Observation: From Basics To Applications*

6. Topic: From National to Continental-scale Hazard Mapping – Experience Using Massive InSAR Datasets (by Dr. John Dehls)

"Dr. Dehls is a research scientist at the Geological Survey of Norway (NGU), in Trondheim. His research has primarily involved the use of remote sensing methods for geological mapping, neotectonics and geological hazard studies. The last twenty years have been focused on radar remote sensing; specifically, the use of InSAR to measure ground motion. With strong support from the Norwegian Space Agency and the Norwegian Water and Energy Directorate (NVE), Dr. Dehls has led the development of operative national ground motion services in Norway; first using data from the Radarsat 2 mission (2009-2018) and subsequently the Sentinel 1 mission (2014-). NGU and NVE use these data for operational landslide mapping and monitoring. Dr. Dehls was active within the EU-GMS Task Force, which led to the decision to establish the European Ground Motion Service (EGMS). Subsequently, he was project leader for the drafting of the EGMS Specification Documents. He currently sits in the Technical Steering Committee of the EGMS production consortium."

Dr. Dehls will present **"From National to Continental-scale Hazard Mapping – Experience Using Massive InSAR Datasets"** by showing how Dr. Dehls and his team have made InSAR-based deformation data available to authorities and the public at large scales, to gain maximum societal benefit.

The agenda was:

Part I

10:00-10:15	A Warm Welcoming!
10:15-11:15	*InSAR Norway*: the history of using InSAR within the Norwegian Government, culminating with the development of InSAR Norway, the Norwegian Ground Motion Service. How initial pilot projects using ERS data led to the decision to develop InSAR capacity in Norway. Years of development demonstrated the value of this data to both public authorities and citizens. With the advent of the Copernicus Programme, providing free and open SAR data across the world, we were able to develop and free and open ground motion service for Norway.
11:15-11:30	Q&A
11:30-11:45	Coffee/Tea break

Part II

11:45-12:45	*Landslide mapping in Norway:* How InSAR data is used within the systematic landslide mapping program in Norway, for detection and mapping of potential landslides, hazard and risk classification, and monitoring of moving slopes. How they

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	install corner reflectors to obtain near daily measurements throughout the year for high-risk sites.
12:45-13:00	Q&A
13:00-14:00	Well-deserved Lunch

Part III

14:00-15:00	*European Ground Motion Service*: A thorough overview of EGMS, the latest service of the Copernicus Land Monitoring Service, covering the products, how to use the EGMS Explorer, and numerous examples of ground motion covering a range of themes.
15:00-15:15	Q&A
15:15-16:15	*Cyprus:* Presentation on the data available within EGMS as well as data produced at the Geological Survey of Norway, demonstrating the difference between locally-referenced and geodetically referenced data. ***A live demo*** *session where Dr. Dehls and ECoE staff can discuss the data.*
16:15-16:30	Photo time 😊

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Figure 6: *From National to Continental-scale Hazard Mapping – Experience Using Massive InSAR Datasets*

7. Topic: CUT Library Bibliometrics (by Marios Zervas and Mr. Petros Artemi)

The lecture covered bibliography organization, citation management, effective dissemination of scientific results, and strategies for increasing impact. It introduced "Altmetrics" for tracking online attention to research outputs, and attendees received training on using the "KTISIS" platform, the Cyprus University of Technology's research repository.

Cyprus University of Technology

Library of Cyprus University of Technology
Info-Day

Agenda

Meeting Organization	Marios Zervas, Library Director, marios.zervas@cut.ac.cy (CUT) Petros Artemi, System Librarian petros.artemi@cut.ac.cy (CUT) Eleni Kamberi, Data Librarian eleni.kamberi@cut.ac.cy (CUT) Kyriacos Neocleous, kyriacos.neocleous@eratosthenes.org.cy (ECoE) Christiana Filippou, christiana.filippou@eratosthenes.org.cy (ECoE)

Date	18/07/2023 (9:30 – 13:30 Cyprus Time)
Venue	ERATOSTHENES CoE)

TIME SCHEDULE

Tuesday 18 July (9:30 - 13:30)		
Time (CY)	**Topic**	**Presenter**
9:30 – 10 :00	Effective management of research data at the level of project and research Centre : -Deposit research data into KTISIS - The significance of linking research data with the Project - Data Management Plan and compatibility with KTISIS	CUT Marios Zervas, Library Director
10-00 - 11:00	Creating an Academic Personnel Short Profile / Short CV according the (CYQAA) template	CUT Marios Zervas and Petros Artemi
11:00 - 11:15	Break	
11:15 - 12:30	- Monitoring research output by Bibliometric Application - Presentation of Altmetric Explorer – Measuring the attention and engagement of Eratosthenes research output in social media, news outlets, and blogs.	CUT Marios Zervas and Petros Artemi
12:30 - 13:00	Publish in open access hydric journals according the Cyprus Libraries Consortium agreement	CUT Marios Zervas and Petros Artemi
13:00 - 13:30	Discussion	CUT Marios Zervas and Petros Artemi ECoE Christiana Filippou

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Library of Cyprus University of Technology Info-Day

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Figure 7: *CUT Library Bibliometrics*

8. Topic: Risk assessment and earthquake disaster risk (by Prof. Kypros Pilakoutas)

In this workshop, our staff gained essential skills to seamlessly integrate Earth Observation (EO) and Geographic Information System (GIS) data into comprehensive risk models for earthquake risk assessment. This hands-on session empowered our team with the tools and knowledge needed to analyze and mitigate earthquake-related risks effectively.

Figure 8: *Risk assessment and earthquake disaster risk*

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9. Topic: How AI/OPTIMIZATION can assist EO applications (by Dr. Michalis Mavrovouniotis)

This workshop explored the synergies between Artificial Intelligence (AI) and optimization techniques in the realm of Earth Observation (EO) applications. Participants discovered how these cutting-edge technologies can enhance the analysis and utilization of EO data, optimizing processes for a wide range of applications, from environmental monitoring to disaster management.

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Figure 9: *How AI/OPTIMIZATION can assist EO applications*

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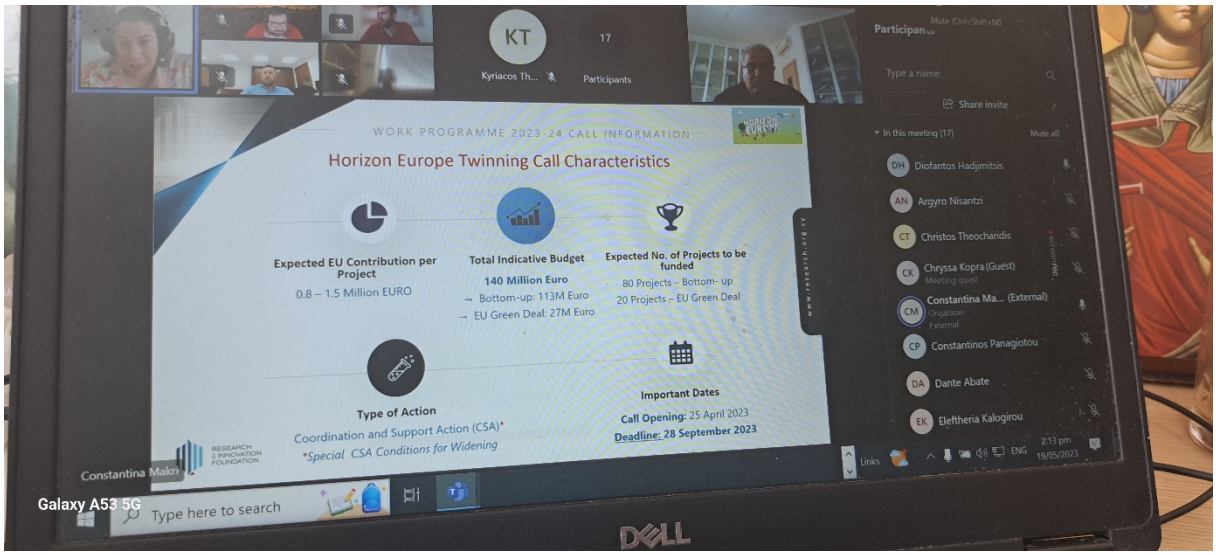
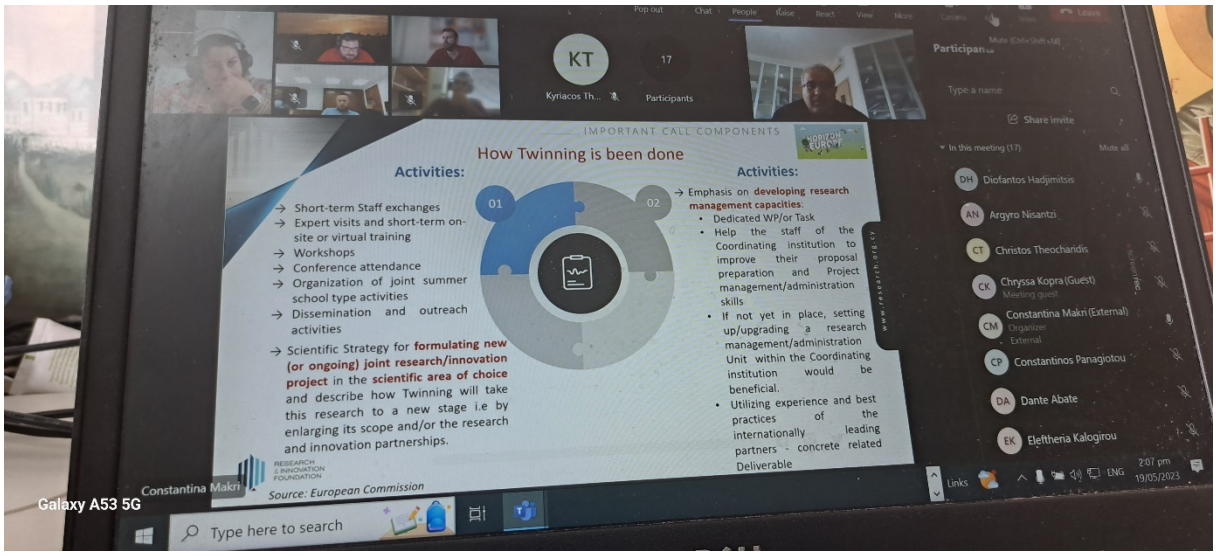
10. Topic: Twinning research proposals (by Ms Constantina Makri)

This workshop revolved around the Horizon Europe funding program for the 2021-2027 period. It focused on Twinning, a collaborative strategy with the ultimate purpose of building on the huge potential of networking for excellence through knowledge transfers and exchange of best practices. Participants delved into the mechanics of Twinning, which involves pairing a less developed research entity with established institutions, fostering knowledge exchange and capacity-building. The workshop provided a deep understanding of the key characteristics of the Horizon Europe Twinning call, offering valuable insights and guidance to potential applicants seeking to leverage this funding opportunity for collaborative research proposals.





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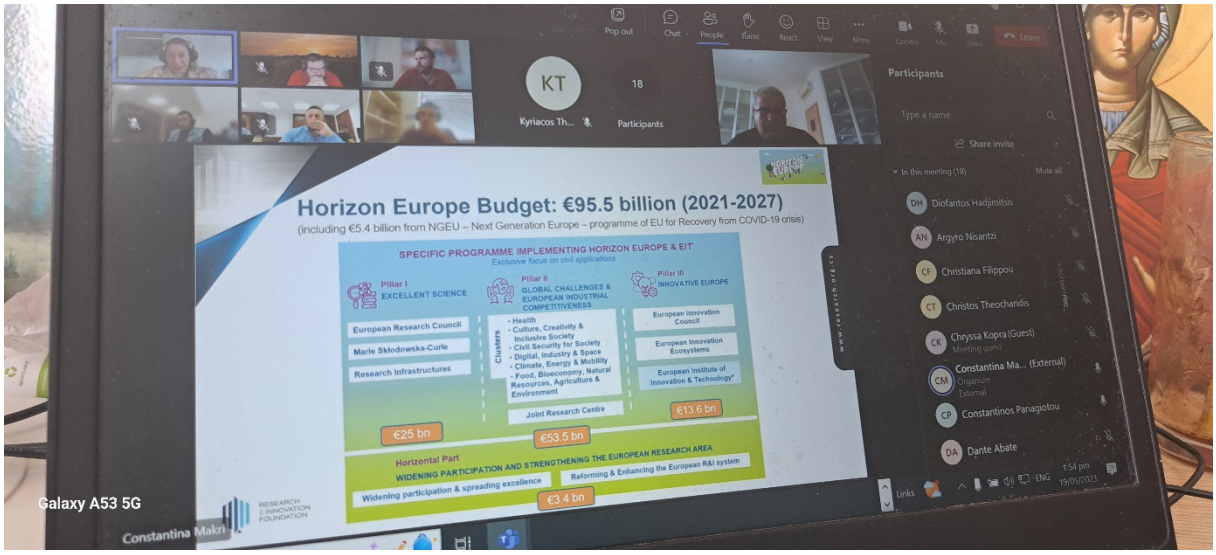

Figure 10: *Twinning research proposals*

11. Topic: Satellite-based Services for Disaster Risk Management (by Eurisy)

This workshop served as a vital platform with multifaceted objectives. Its foremost goal was to elevate decision makers' awareness regarding the diverse utility of satellite applications throughout disaster management phases. Furthermore, the workshop actively engaged stakeholders to gather valuable insights into user needs and integration experiences of satellite-based services in disaster management. Participants engaged in discussions aimed at enhancing accessibility to these services and contribute to the formulation of policy recommendations at both national and institutional levels. Ultimately, this workshop laid the groundwork for a comprehensive roadmap, facilitating the seamless integration of satellite-based services for more effective disaster risk management practices.

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Figure 11: *Satellite-based Services for Disaster Risk Management*

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12. Topic: Mediterranean Regional Information Network (MedRIN) (by GOFC-GOLD)

The Mediterranean Regional Information Network (MedRIN) workshop serves as the newest addition to the GOFC-GOLD network, dedicated to facilitating coordination in remote sensing for monitoring land-cover changes, supporting soil and water resource management, and monitoring fire and other hazards. Situated in a region rich with organizations and institutions possessing advanced expertise in earth observations, MedRIN capitalizes on existing relationships and initiatives to foster collaboration and communication, addressing shared priorities. The workshop's primary objective is to keep its members informed about the latest advancements in earth observation applications using NASA and ESA satellite data and products. It further promotes better coordination of monitoring systems, database linkage, alignment with international norms, and the utilization of Copernicus and freely distributed services in the Mediterranean region. Additionally, it actively contributes to the creation of publicly-available data through interoperable databases and services, enhancing the overall capacity and effectiveness of earth observation efforts in the Mediterranean.

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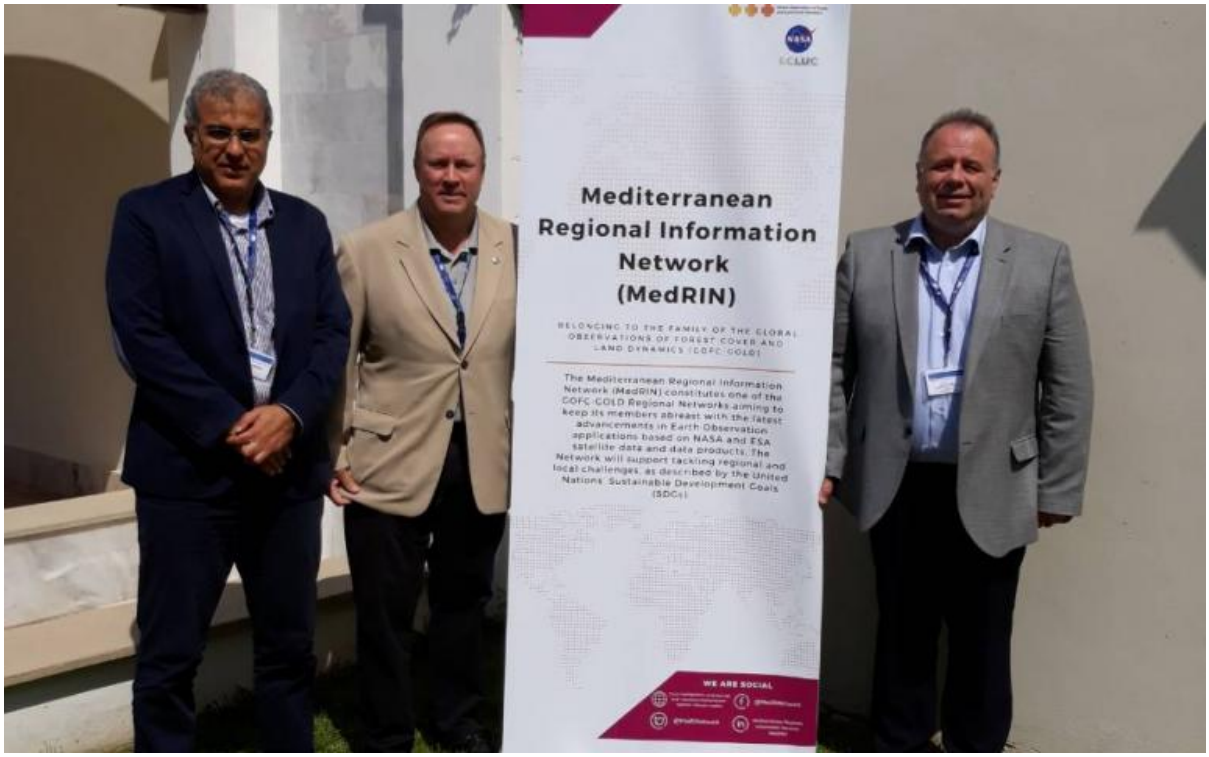

Figure 12: *Mediterranean Regional Information Network (MedRIN)*

13. Topic: Ninth International Conference on Remote Sensing and Geoinformation of Environment (RSCy2023) (by Eratosthenes CoE & Cyprus Remote Sensing Society)

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Figure 13: *RSCy2023*