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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:	**WP7 ECoE Excellence Research Clusters**
Deliverable:	**D7.2 Report on the ECoE research clusters and research groups: management, function and technical capacity**
Version:	**Final D7.2**
Dissemination level:	**Public**

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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):	**WP7 ECoE Excellence Research Clusters** **T7.1 Establishment of Research Clusters**
Deliverable (D):	**D7.2 Report on the ECoE research clusters and research groups: management, function and technical capacity**
Due date of deliverable:	**30 September 2023** **(Month 48 of the project)** / Version: Final D7.2
Author(s):	ECoE: **Marios TZOUVARAS, Rodanthi MAMOURI, Christiana PAPOUTSA, Constantinos PANAGIOTOU, Marinos ELIADES, Athanasios ARGYRIOU, George MELILLOS, Argyro NISANTZI, Konstantinos FRAGKOS, Michalis MAVROVOUNIOTIS**
Contributor(s):	ECoE: **Dante ABATE, Nicos CHRISTOFOROU, Kyriacos THEMISTOCLEOUS** CUT: **Diofantos HADJIMITSIS** DLR: **Gunter SCHREIER** NOA: **Haris KONTOES** TROPOS: **Albert ANSMANN**
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Document Sign-off

Nature	Name	Role	Partner	Date
DRAFT	Marios TZOUVARAS	WP 7 Participant	ECOE	21/7/2023
REVIEWED	Kyriacos Themistocleous	Project Manager	ECOE	1/9/2023
REVIEWED	Diofantos Hadjimitsis	Project Coordinator	CUT	15/9/2023
APPROVED	All partners			29/9/2023

Work Package 7: ECoE Excellence Research Clusters

D7.2: Report on the ECoE research clusters and research groups: management, function and technical capacity

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 D7.2: Report on the ECoE research clusters and research groups: management, function and technical capacity focuses on the formation of the Eratosthenes Centre of Excellence thematic research clusters of Environment & Climate, the Resilient Society and Big Earth Data Analytics in terms of the operations, research collaborations, tools to facilitate research, agreeing internal structures and allocating staff responsibilities. This deliverable is an update to D7.1 and focuses on integrating recruited research personnel, research equipment and the Strategic Partners' expertise to meet the needs of the research groups.

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Abbreviations

BOD	Board of Directors
CARO	Cyprus Atmospheric Remote Sensing Observatory
CoE	Centre of Excellence
CUT	Cyprus University of Technology
DIH	Digital Innovation Hub
ECoE	ERATOSTHENES Centre of Excellence
EMMENA	Eastern Mediterranean Middle East and North Africa
EO	Earth Observation
EXCELSIOR	Eratosthenes: Excellence Research Centre for Earth Surveillance and Space-based Monitoring of the Environment
GBS	Ground-Based Remote Sensing Station
NOA	National Observatory of Athens
NRT	Near Real Time
RP	Reporting Period

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1 Introduction

Task 7.1 deals with the establishment and operation of the three thematic research clusters of ECoE, i.e., the Environment & Climate, the Resilient Society and the Big Earth Data Analytics clusters, in terms of the operations, research collaborations, tools to facilitate research, agreeing internal structures and allocating staff responsibilities, etc. This is mainly achieved by building capacity to cooperate and compete on equal terms with leading European research entities. At the same time, the task consolidates the research modus operandi in ECoE, integrating its research assets, i.e., the recruited research personnel, the research equipment and the Strategic Partners' expertise.

Moreover, task 7.1 coordinates and facilitates the interaction between research clusters and groups for common use of the infrastructure, research osmosis and cross-fertilisation activities, setting up communication and collaboration lines and preparing an "interaction plan" to multiply the research outcomes of ECoE for ensuring vertical organisation of the group's activities from access to equipment data to research and innovation uptake, etc.

This deliverable provides an update on the already established three thematic research clusters/departments of the Eratosthenes Centre of Excellence in terms of the operations, research collaborations, tools to facilitate research, internal structures and staff responsibilities. Research clusters consist of multidisciplinary, challenge-based groups addressing scientific questions in the different thematic domains of ECoE. Chapter 1 provides an introduction to the deliverable. Chapter 2 discusses the Research Clusters and the Functional Areas. Chapter 3 focuses on the Research clusters and thematic areas' organisational internal structure chart. Chapter 4 provides detailed information on the Thematic Clusters of Environment & Climate, the Resilient Society and the Big Earth Data Analytics.

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2 Digital Innovation Hub

As presented in D7.1, the ECoE as a Digital Innovation Hub (DIH) adopts a two-axis model, as shown below in Figure 1.

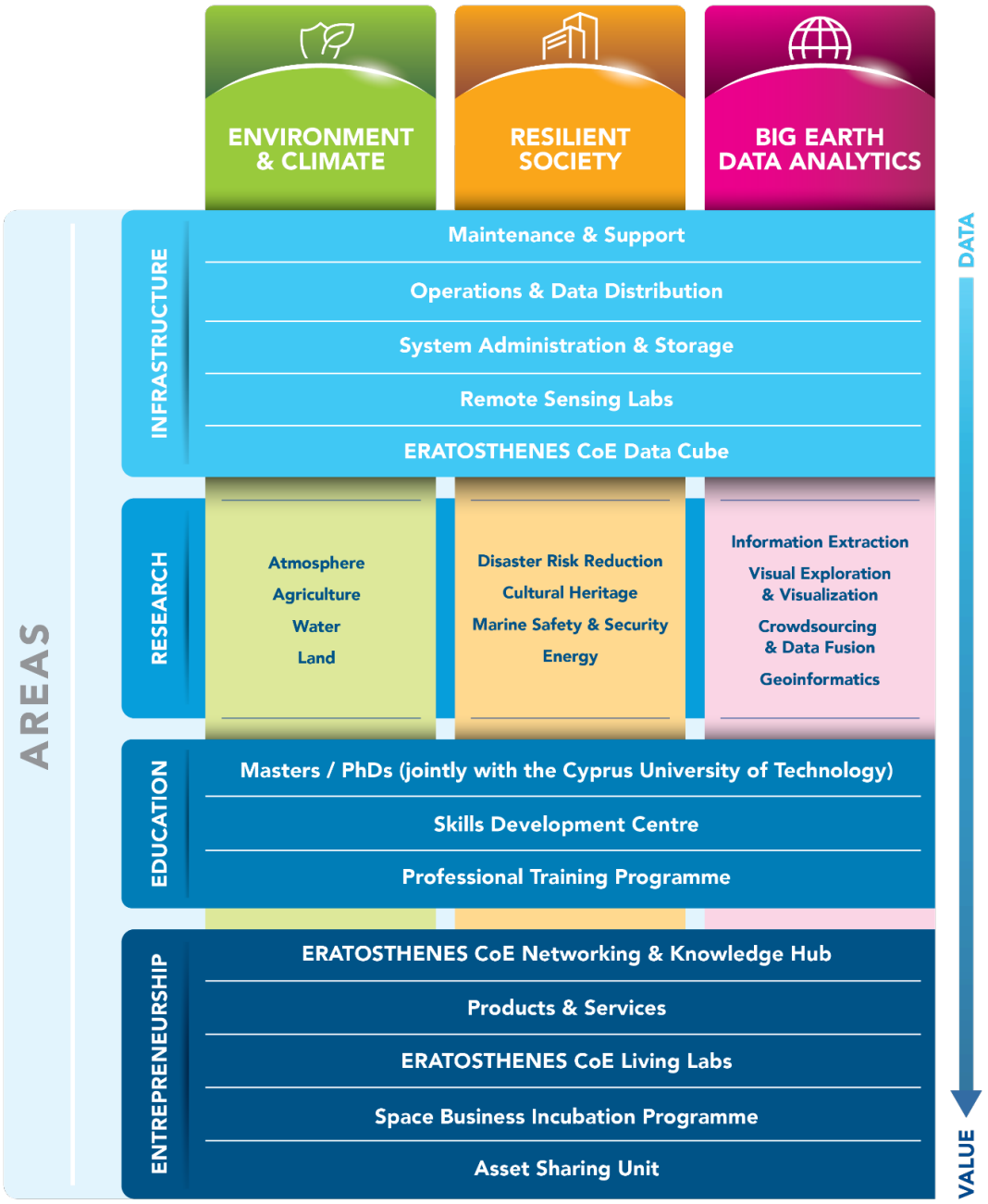

Figure 1: The ERATOSTHENES CoE Digital Innovation Hub

The DIH model is composed of 2 axes where the vertical axis consists of three Thematic Clusters for sustained excellence in research (Environment and Climate, Resilient Societies and Big Earth Data Management) and the Horizontal axis consists of the four Functional Areas (the infrastructure area, the research area, the educational area, and the entrepreneurship area). The five application domains

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that ERATOSTHENES CoE plans to achieve research excellence are presented below in *Figure 2*. The structure and elements of the vertical and horizontal axes were presented in detail in D7.1 that was submitted during RP2.

Figure 2: The 5 application domains that ERATOSTHENES CoE plans to achieve research excellence.

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3 Research Cluster Organisational Chart

As presented previously in D7.1, the research personnel are classified into different thematic areas without restricting their ability to collaborate with each other. Figure 3 provides the updated organisational internal structure chart of the Research clusters and associated Functional Areas.

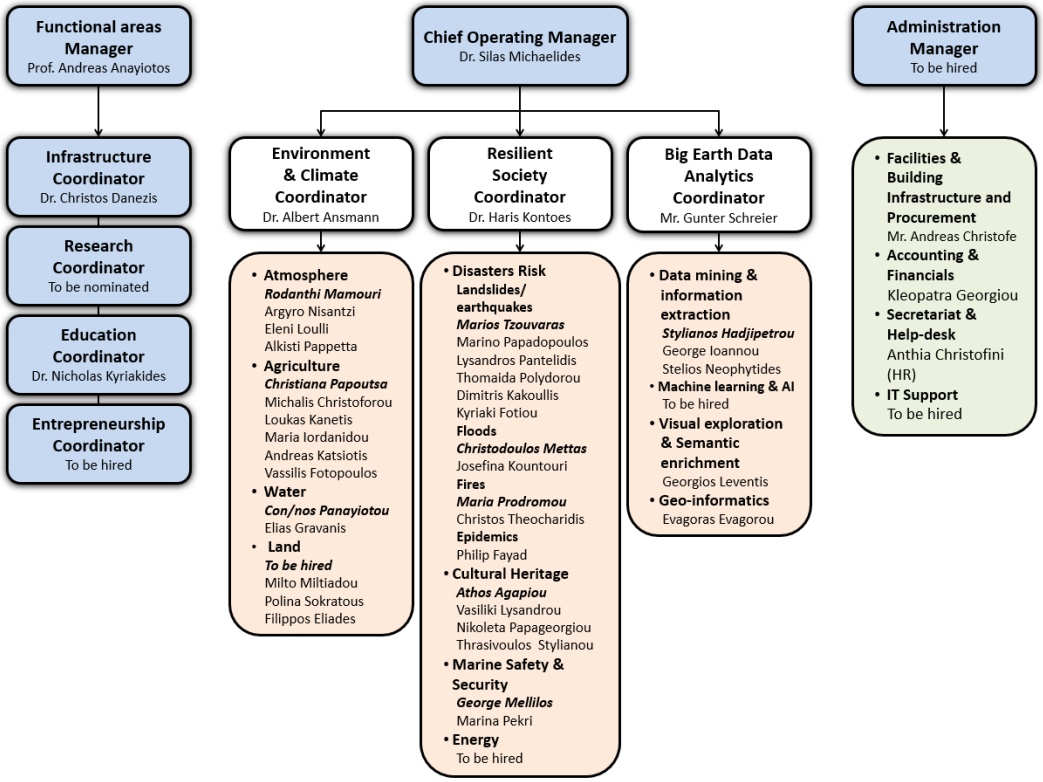

Figure 3: Research clusters and thematic areas' organisational internal structure chart.

In brief, the structure and the responsibilities of the various components of the ECoE's organisational chart (*Figure 4*) are presented below:

- The Board of Directors (BOD) are responsible for all strategic and policy decisions.
- The External Advisory Board includes experts in the field of EO who provide recommendations on all matters in relation to EO.
- The Managing Director (Prof. Diofantos Hadjimitsis) oversees all the activities of the ECoE with the help of the Executive Committee, the External Affairs & Business Development Director, the Quality Assurance Manager, and the Human Resources Manager.
- The Executive Committee makes decisions on ECoE's financial and administrative management and coordinates its internal/external operations, specifying and exercising financial control.
- The External Affairs & Business Development Director (Dr Kyriacos Themistocleous) is responsible for the business development and external relationships of the Centre.
- The Quality Assurance manager (Dr. Kyriacos Neocleous) is responsible for ensuring the quality of all activities.
- The Human Resources Manager (Ms. Anthia Christofini) is responsible for all human resources activities of the ECoE.

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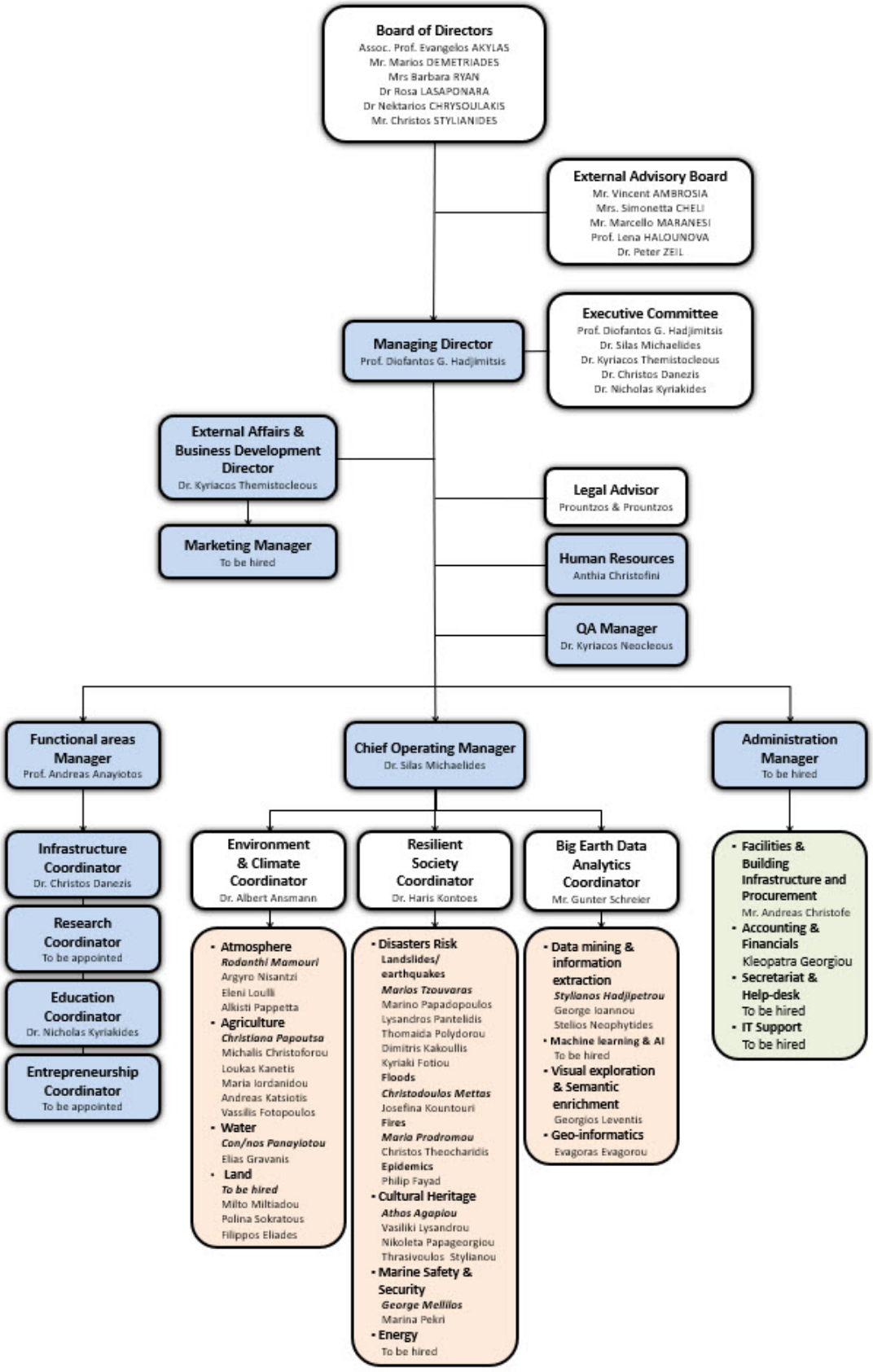

Figure 4: Overall organisational chart of the ERATOSTHENES CoE

- The Chief Operating Manager, the Functional Areas Manager, and the Administration Manager oversee the entire staff matrix and work together with the Managing Director for the effective management of the research clusters and thematic areas. They report to the Managing Director and Executive Committee.
- The Chief Operating Manager (Dr. Silas Michaelides) works with the three coordinators of the Departments of Environment and Climate (Dr. Albert Ansmann, TROPOS), Resilient Society (Dr Haris Kontoes) and Big Earth Data and Analytics (Mr. Gunter Schreier, DLR), who are responsible for the research groups within their department. Within each department, the team leaders report to the department coordinator.
- Each of the 12 research areas has been assigned team leaders (noted in bold under each research area in Figure 3 and Figure 4), who will assign projects and duties to the research staff, that have been assigned to each research area, based on the skills of the researchers. The team leaders will be responsible for the coordination of the projects in their relevant research area.
- The researchers will be responsible for meeting the Key Performance Indicators that are used to measure progress, meeting required goals and objectives, advancement in their research areas, writing journal articles and proposals, utilising the state-of-the-art infrastructure, ensuring the quality of their research, identifying capacity building activities, collaboration with industry and stakeholders and involvement in training activities.
- The Functional Areas Manager (Prof. Andreas Anayiotos) is responsible for the activities of the four Functional Areas, i.e., Infrastructure area, Research area, Educational area and Entrepreneurship area, that work with the thematic clusters.
- The Infrastructure Coordinator (Dr. Christos Danezis), the Research Coordinator (Dr. Marios Tzouvaras), the Education Coordinator (Dr. Nicholas Kyriakides) and the Entrepreneurship Coordinator (to be appointed) work closely with the Functional Areas Manager.
- The Administration manager (to be hired) is responsible for the smooth operation of the Centre. Within the administration department, the Facilities & Building Infrastructure and Procurement Officer (Mr. Andreas Christofe), the Accounting Officers (Ms Kleopatra Georgiou and Ms Chrystalla Koukkidou), the Secretariat & Helpdesk (to be hired) and the IT Support Officer (Mr Periklis Perikleous) who reports to the Administration Manager.

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4 Thematic Research Clusters

The three thematic research clusters are Environment & Climate, Resilient Society and Big Earth Data Analytics. Within each cluster, there are various research areas addressed within these clusters, as shown below in Figure 5. A brief description of the activities and research topics of the three research clusters and their respective sectors is provided in the following sections of the report. For more information on each research cluster and group, please refer to *D3.3: Report on the Research & Education Strategic Plan for RP 3*.

Figure 5: ERATOSTHENES CoE Thematic Research Clusters

4.1 Environment & Climate

For the activities of the Environment & Climate Research Cluster, the ERATOSTHENES CoE exploits the state-of-the-art infrastructure of the Centre such as the proposed Ground-Based Remote Sensing Station (GBS), Copernicus data and core services, archived satellite images and data from various EO networks, among other equipment, to conduct cutting-edge applied research in this research cluster, which results in effective applications, services, education, and related start-ups. This can be combined with regional and global EO monitoring with ground-based networks, in addition to long-term observations, statistics, and trend analysis over the past decades, which is essential to understanding the processes that link the environment with climate problems. The research staff appointed and working in this department/cluster is presented below in *Figure 6*. The Environment & Climate research cluster consists, as shown earlier, of the following sectors:

- Atmosphere
- Agriculture
- Water
- Land

The Environment & Climate research cluster consists of 16 researchers (8 Postdoctoral and 8 PhD students) and is coordinated by Dr Albert Ansmann from TROPOS, one of the EXCELSIOR project's advance partners.

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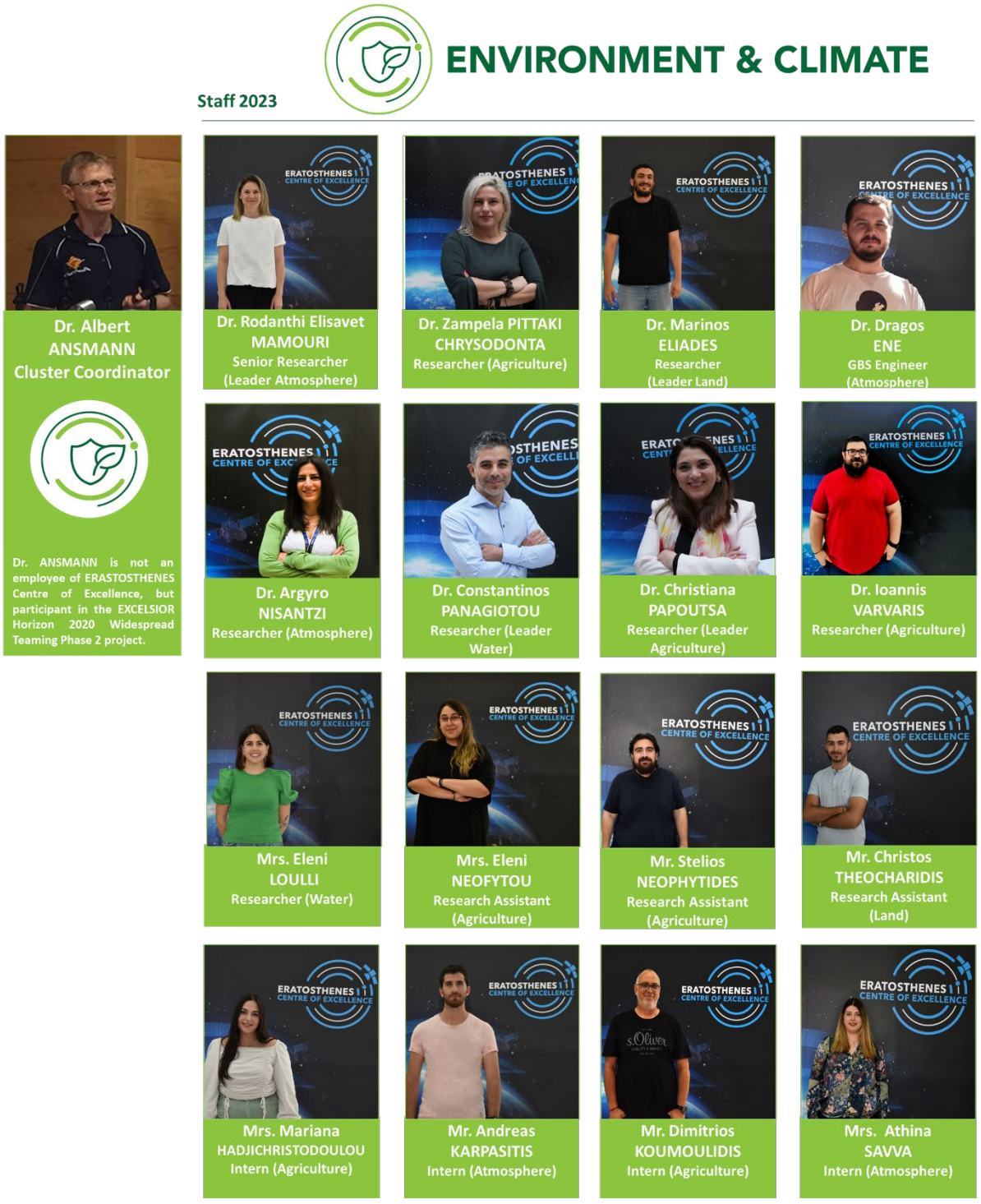

Figure 6: The ERATOSTHENES CoE Environment & Climate Thematic Research Cluster

4.1.1 Atmosphere

At the beginning of the EXCELSIOR project, the Atmosphere cluster of the ERATOSTHENES Centre of Excellence (ECoE) focused on the establishment of the Ground-based Atmospheric Remote Sensing

Station (GBS). The main focus was given to the installation of new instruments, the integration of the new research infrastructure of the GBS into Cyprus Atmospheric Remote Sensing Observatory (CARO), and their operation in Limassol.

CARO is a National Facility (NF) for remote sensing of aerosol and clouds and is planned to become an ACTRIS National Research Infrastructure facility for Cyprus consisting of the aerosol remote sensing (ARS) observational platform and the cloud remote sensing (CRS) observational platform. The ARS platform runs a sun photometer of the AERONET network and a multiwavelength Raman lidar part of the PollyNET network. The CUT-TEPAK station is an in-kind contribution of the Cyprus University of Technology (CUT), and the PollyXT-CYP lidar is an in-kind contribution of TROPOS, both to ERATOSTHENES CoE for the EXCELSIOR project. In terms of becoming a national facility (NF) of the European Research Infrastructure ACTRIS, CARO is expected to be fully functional and ready for labelling in the summer of 2024. The ARS observational platform is already ready for this effort. Delays are related to the delayed delivery and installation of the 35-GHz cloud radar of the Cloud Remote Sensing (CRS) observational platform. It is expected to operate the finalised CRS sub-unit at Limassol in April 2024.

The Atmosphere team consists of 6 members, 3 Postdoctoral researchers, 1 PhD candidate, and 2 interns, as presented below in *Table 1*.

Table 1: Atmosphere sector team members

Name and position	Qualifications
 **Dr Rodanthi Elisavet Mamouri** Senior Researcher (Leader)	• BSc in Physics (Aristotle University of Thessaloniki, 2000). • MSc in Environmental Physics (Aristotle University of Thessaloniki, 2002). • PhD in Atmospheric Remote Sensing and Physics (National Technical University of Athens, 2009).
 **Dr Dragoş Ene** Service Scientist	• Diplomat Engineer specialised in Applied Sciences/ Physics Engineering (University of Polytechnics from Bucharest, 2007). • Doctor in Physics (University of Polytechnics from Bucharest, 2011).

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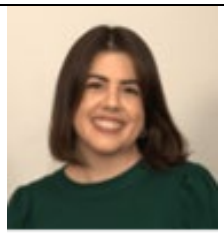
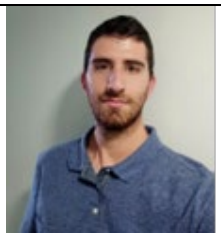
Name and position	Qualifications
 **Dr Argyro Nisantzi** Researcher A	• BSc in Physics (National and Kapodistrian University of Athens, 2005). • MSc in Environmental Physics and Meteorology (National and Kapodistrian University of Athens, 2008). • PhD in Remote Sensing (Cyprus University of Technology, 2015).
 **Ms Eleni Loulli** PhD candidate Researcher C	• BSc in Environmental Engineering, (Technical University of Munich, 2015). • MSc in Environmental Engineering (Technical University of Munich, 2017). • PhD candidate in precipitation monitoring from ground- and satellite-based radars (Cyprus University of Technology, 2018–ongoing).
 **Mr Andreas Karpasitis** Intern	• BSc in Natural Sciences, Mathematics and Statistics (University of Cyprus, 2021). • MSc in Natural Sciences, Mathematics and Statistics: Environmental sciences (The Cyprus Institute, 2022).
 **Ms Athina Savva,** Intern	• BSc in Physics (Aristotle University of Thessaloniki, 2022). • MSc in Ecological Engineering-Energy & Climate Change (University of the Aegean, planned for March 2024).

In brief, the sector of Atmosphere activities and research topics are the following:

- Air Quality and Air pollution monitoring
- Aerosol-Clouds-Precipitation Interaction
- Atmospheric Dynamics and Wind
- Monitoring of Extreme Atmospheric Events
- Dust storms and Dust intrusion
- Climate change monitoring
- Atmospheric model Validation & Assimilation
- CAL/VAL Activities for Satellite Mission
- Planning ACTRIS National Facilities

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- Aerosol and Cloud Remote Sensing Observational Platforms

Cyprus provides a strong environment for demonstrating and further development of climate observation technology in a key region of climate change. This unique position is expected to attract international companies and leading researchers. Air quality monitoring and forecasting will be improved for the whole population of the Eastern Mediterranean, Middle East and North Africa (EMMENA) region.

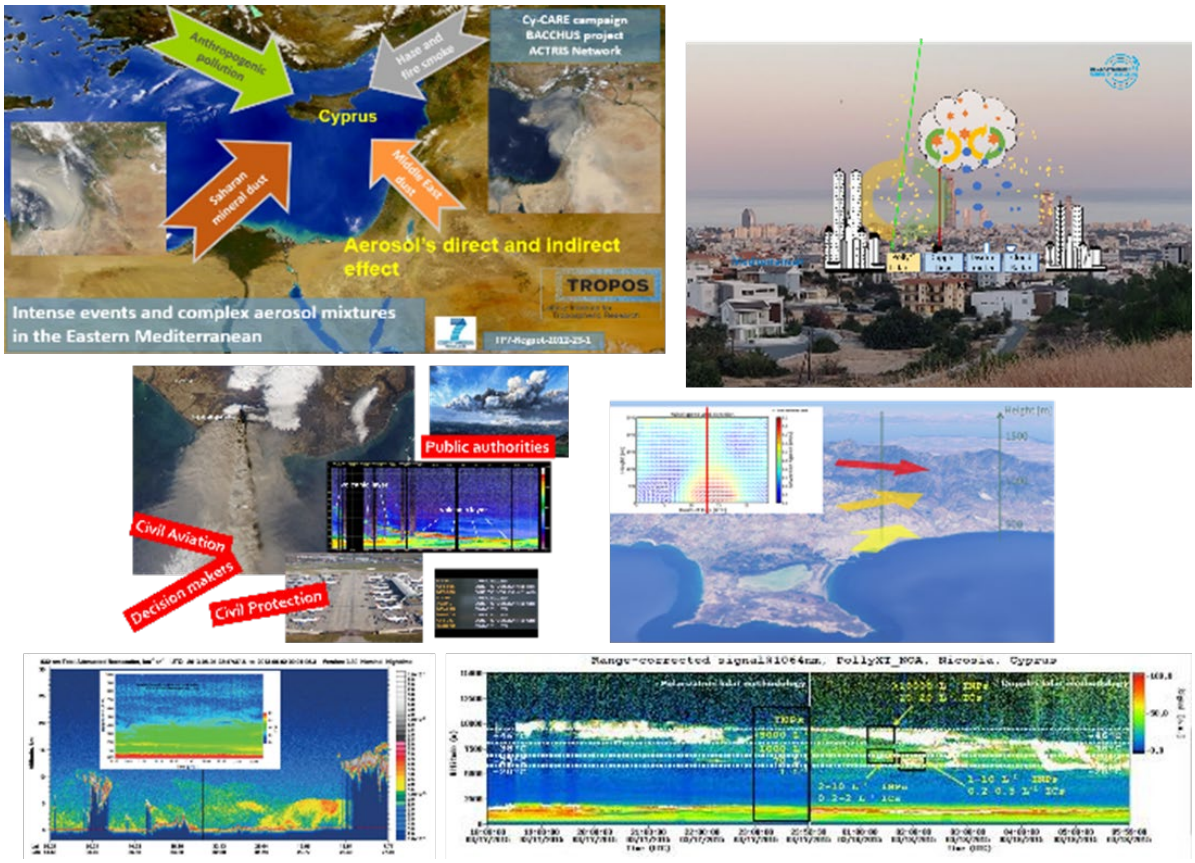


Figure 7: Activities of the Atmosphere sector

As a result of the capacity building of the CARO team received by TROPOS, our EXCELSIOR advanced partner, related to the installation, maintenance, and full operation of the aerosol component of the GBS, the CARO team of the ERATOSTHENES CoE participated in a pilot campaign for NRT (near real-time) lidar observation provision for assimilation into forecast models provided by CAMS. The PollyXT-CYP system participated in the first pilot campaign coordinated by ACTRIS, with the contribution of TROPOS which provided the tools and the expertise in the provision of NRT data. This activity is estimated to restart in September 2023 and to continue and enhance the activities and developments achieved during the previous CAMS21b contract.

A major step towards recognition of the value of the infrastructure build in Limassol is represented by a submission of a cal/val project for the future mission EarthCARE that will be launched by ESA/JAXA in 2024. This proposal will make use of both aerosol and cloud profiling remote sensing instruments of CARO, and will address, together with the Energy sector of Eratosthenes CoE, all three remote-sensing

components (lidar, cloud radar, radiation) of the EarthCARE satellite. In this proposal, also the USRL team of CARE-C/CyI is involved.

Following the installation, operation and trainings of the available instruments, the next step is the capacity building activities for the data transfer scripts, the processing chains, the installation of software analyses and the archiving protocols. Progress in capacity-building strongly depends on the availability of servers, both for the operation of the GBS, as we as a central server of ERATOSTHENES CoE. Currently, the PollyNET processing chain is running at TROPOS servers and all the available data of the GBS (PollyXT and DWL) are stored at the TROPOS servers[1]. Once the server infrastructure for the GBS is hosted at the ERATOSTHENES CoE, the capacity-building activities will start and the PollyNET processing chain will be installed on the ERATOSTHENES CoE IT server.

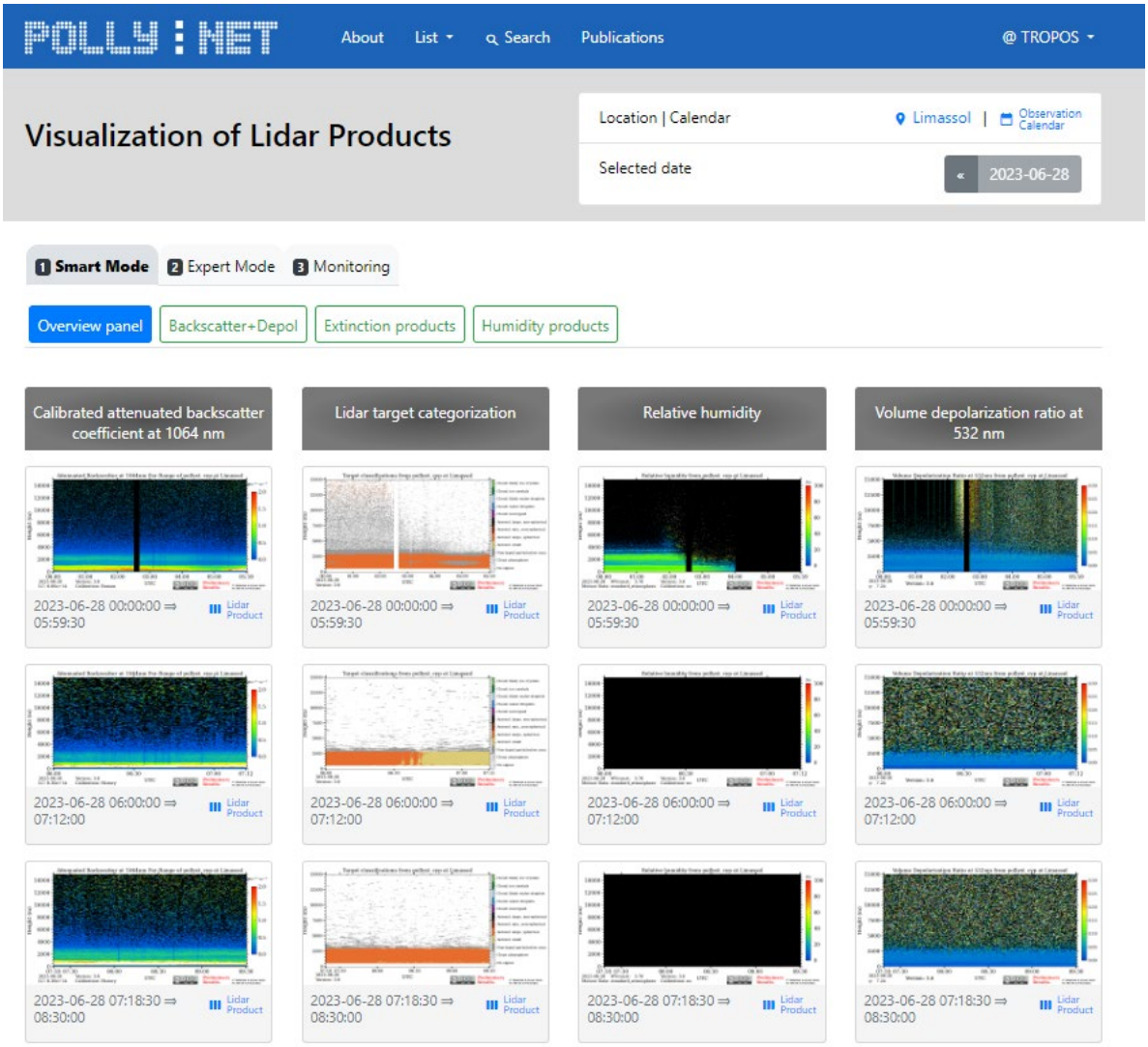


Figure 8: NRT visualization of the PoolyXT-CYP observations in Limassol.

[1] TROPOS servers: https://polly.tropos.de/

4.1.2 Agriculture

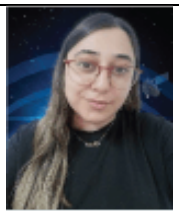
Joint activities, such as capacity-building and the demonstration project between the members of the Agriculture sector and the advanced partner (NOA), targeting the enhancement of the research skills and knowledge have been carried out. Furthermore, a summary of other activities related to the sector is given describing the stakeholders' engagement – living labs; the development of the beta-version of the ERATOSTHENES CoE Agri Nexus Hub is also provided.

Following the above-mentioned Agriculture capacity-building activities, a demonstration project followed on "Agriculture Monitoring" with the support of NOA. Various technologies were transferred to ERATOSTHENES CoE's personnel such as databases and data querying, Causal ML, Data Cube implementation and experience related to agricultural practices, yield prediction, soil degradation and ecosystem services indicators. The transfer of knowledge aims to support ERATOSTHENES CoE personnel to demonstrate its capacity for agricultural monitoring and machine learning techniques to assist in agricultural decision-making.

The team of the Agriculture sector consists of 7 members: 3 Postdoctoral researchers, 1 PhD candidate/ Research Assistant A (shared with the Big Earth Data Analytics Department), three new members, who recently joined the group (1st of May 2023), 2 PhD candidates/interns and 1 Research Assistant A.

Table 2: Agriculture sector team members

Name and position	Qualifications
 **Dr Christiana Papoutsa** Senior Researcher (Leader)	• BSc in Chemistry (National and Kapodistrian University of Athens, 2006). • MSc (Honors) in Environmental Chemistry & Technology (National and Kapodistrian University of Athens, 2009). • PhD in Water quality monitoring of inland and coastal water bodies integrating field spectroscopy and remote sensing techniques (Cyprus University of Technology, 2015).
 **Dr Zampela Pittaki** Post-Doc Researcher	• BSc in Surveying Engineering and Geoinformatics Engineering (Cyprus University of Technology, 2013). • MSc (Distinction) in Hydrogeology and Environmental Geoscience (Georg-August-Universität Göttingen, 2015). • PhD in Predicting soil hydraulic properties: Comparing visible–near infrared spectroscopy with classical pedotransfer functions (Aarhus University, 2019).
 **Dr Ioannis Varvaris**	• Diploma in Mineral Resources Engineering (Technical University of Crete, 2010). • BSc in Civil Engineering (Cyprus University of Technology, 2013). • MSc (Distinction) in Hydrogeology and Environmental Geoscience (Georg-August-Universität Göttingen, 2015).

Name and position	Qualifications
Post-Doc Researcher	• PhD in Water flow dynamics and solute transport across hydro-topographical gradients and drainage sequences in agricultural landscapes (Aarhus University, 2019).
 **Mr Stelios Neophytides** Research Assistant A	• BSc in Computer Engineering and Informatics (Cyprus University of Technology, 2019). • MSc in Geinformatics and Geospatial Technologies (Cyprus University of Technology, 2021). • PhD Candidate in Big Earth Data Analytics for Agriculture (Cyprus University of Technology, 2021 – ongoing).
 **Ms Eleni Neophytou** Research Assistant A	• BSc in Biochemistry (University of Salford, Manchester, 2018). • MSc in Biotechnology and Enterprise (University of Manchester, 2019).
 **Ms Marianna Hadjichristodoulou** Intern	• BSc in Biological Applications and Technologies (University of Ioannina, 2021). • MSc in Biological Applications and Technologies (University of Ioannina, 2022).
 **Mr Dimitrios Koumoulides** Intern	• BSc in Forestry and Natural Environment Management (University of Thessaly, 2000). • MSc in Management and Protection of Natural Environment employing GIS applications and Environmental Impact Assessments (Open University of Cyprus, 2016).

It is essential to mention that some members of other thematic areas participated and contributed to the activities of the Agriculture thematic sector, such as Dr Marinos Eliades (Land), Dr Konstantinos Panayiotou (Water) and Ms Eleni Loulli (Water).

In brief, the activities and research topics of the Agriculture sector are the following:

- Precision Agriculture
- Smart Irrigation water resources management

- Carbon footprint calculations
- Hydrogeological modeling
- Common Agricultural Policy applications
- Soil quality for crop productivity
- Pest/disease control
- Food security / Food safety
- Early warning systems
- Damage assessment and mitigation strategies for extreme weather events

Figure 9: Activities of the Agriculture sector

The "Agriculture Monitoring" demonstration project acts as a knowledge-transfer tool dedicated to highlight and advance the research capabilities of the ERATOSTHENES CoE. NOA and ERATOSTHENES CoE staff worked together closely, developing capacity, critical workflows from data to core outputs to produce new scientific knowledge and practical advice on crop and agricultural practice (irrigation, ploughing etc.) suitability.

Through the demonstration project, the agriculture data cube of the ERATOSTHENES CoE was initiated where different Analysis Ready Data (ARD) satellite products were ingested such as Sentinel 1 & 2 satellite imagery data (pre-processed) as well as five different MODIS products (1. Vegetation Indices 16-Day L3 Global 250 m; 2. Vegetation Continuous Fields Yearly L3 Global 250 m, 3. Leaf Area Index/FPAR 8-Day L4 Global 500 m; 4. Burned Area Monthly L3 Global 500 m; and 5. Land Surface Phenology (Land Cover Dynamics) Yearly L3 Global 500 m). Additionally, during the Agriculture demonstration project, crop suitability maps were developed, incorporating information on barley, wheat, crop diversification, and fallow suitability. To assess the accuracy and reliability of these derived crop suitability maps, field-scale hydrogeological models were developed. These models were utilised to estimate irrigation demand, allowing for an evaluation of the associated uncertainty of the derived suitability indices. This approach enabled a thorough assessment of the suitability maps and their applicability in agricultural decision-making processes. The capacity-building activities, the demonstration project and input by the continuously increasing Agriculture team led to the development of the Agri Nexus Hub, presented below.

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The ERATOSTHENES CoE Agri Nexus Hub: The Agroclimatic Observations Tool utilises data acquired from meteorological stations of the Department of Meteorology of Cyprus, the Copernicus Atmosphere Monitoring Service, Satellite Imagery from Sentinel-2, LPIS from the Cyprus Agriculture Payment Organization and in-situ observations such as spectroradiometric data, Leaf Area Index, Meteorological data from local weather stations, etc. The objective of this tool is to inform farmers daily about the water losses of their fields due to climatic conditions. Agroclimatic Observations provides also daily calculations of Crop Evapotranspiration (ETc) for citrus orchards, olive groves and potatoes cultivations around Cyprus. Sentinel-2 Normalized Difference Vegetation Index (NDVI) is beneficial to understanding the vegetation's health in the island's territory. This is the first phase of the development of the ERATOSTHENES CoE Agri Nexus Hub[2], which will be open access for stakeholders and end users; in contrast, a second phase (validation phase) of collecting in-situ data will follow, aiming to validate the estimated irrigation demand.

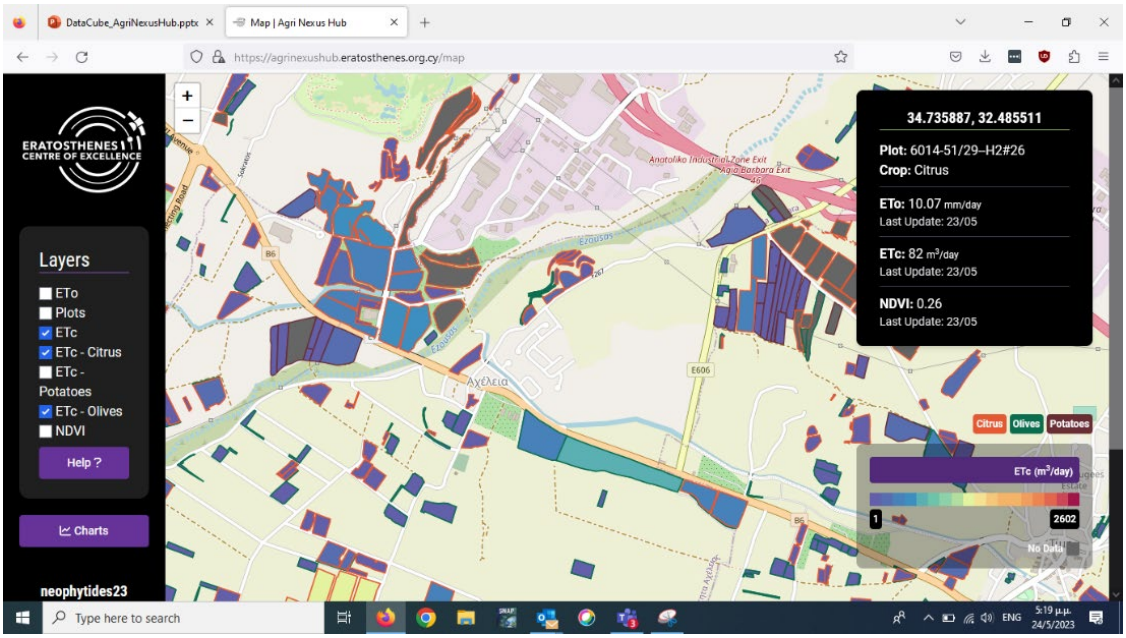

Figure 10: The ERATOSTHENES CoE Agri Nexus Hub platform

4.1.3 Water

EO techniques can be applied to monitor the quality and quantity of water in dams and coastal areas. By exploiting high-resolution dense time series for large scale water applications (such as monitoring all the inland water bodies on a national level), improved water management strategies and policies can be developed. Research into water shortages, droughts, climate change, eutrophication, changes in water depth and desertification in the EMMENA region will be better understood through capacity building and knowledge transfer. As well, the ECoE can capitalise on the available EO-data combined with sensor-networks and ground-based derived data to develop new products which will fulfil the specific needs of the end-users at the national and regional level (technological development and innovative products/solutions for commercialisation). Cyprus provides a strong environment for

[2] ERATOSTHENES CoE Agri Nexus Hub: https://agrinexushub.eratosthenes.org.cy/

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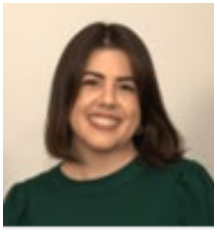
demonstrating and further developing climate observation technology in a key region of climate change, which is expected to attract leading researchers in the field of water resources.

The Water sector is situated within the Department of Climate and Environment of ERATOSTHENES Centre of Excellence (ERATOSTHENES CoE). *Table 3* provides basic information regarding the current members of the cluster.

Table 3: Water sector team members

Name and position	Qualifications
 **Dr Constantinos Panagiotou** Researcher B (Leader)	• BSc (Honors) in Physics (Aristotle University of Thessaloniki, 2009). • PhD (Honors) in Mechanical Engineering and Manufacturing (University of Cyprus, 2016).
 **Ms Eleni Loulli** PhD candidate, Researcher C	• BSc in Environmental Engineering, (Technical University of Munich, 2015). • MSc in Environmental Engineering (Technical University of Munich, 2017). • PhD candidate in precipitation monitoring from ground- and satellite-based radars (Cyprus University of Technology, 2018–ongoing).

In brief, the activities and research topics of the Water sector are the following:

- Water quality monitoring
- Water resource management
- Microbial risk assessment
- Water leak detection
- Managed aquifer recharge
- Hydrogeological modelling
- Groundwater modelling
- Feasibility mapping

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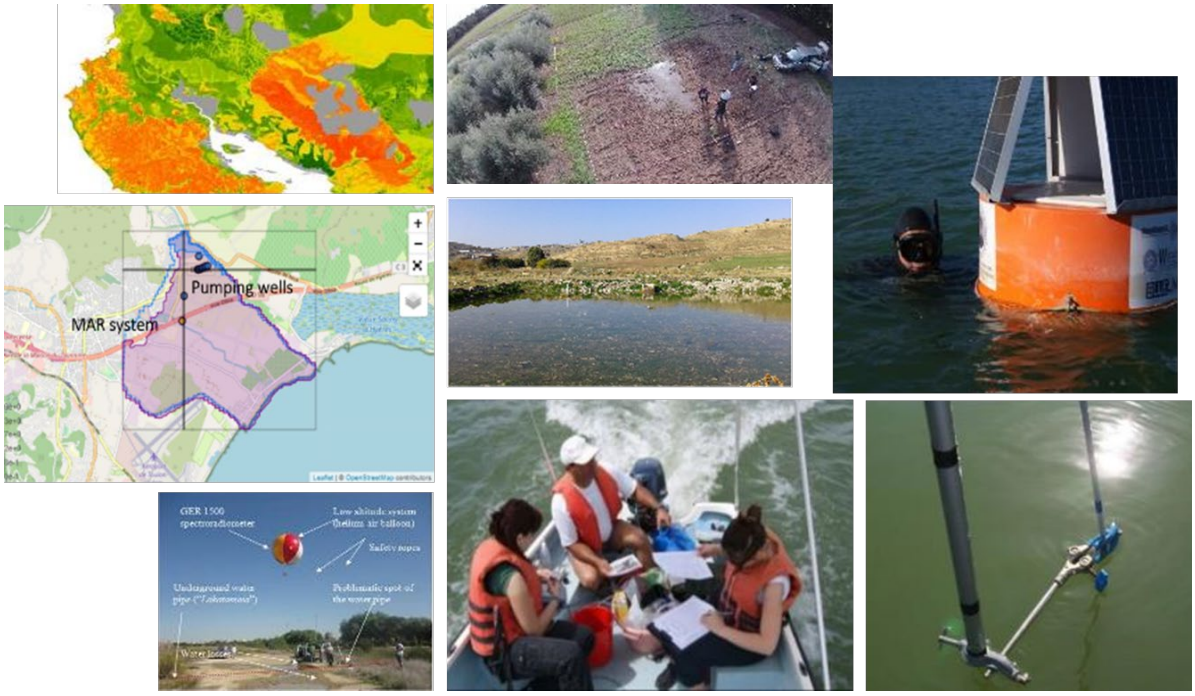

Figure 11: Activities of the Water sector

4.1.4 Land

The combination of EO, remote sensing and GIS techniques has provided a useful and detailed way to improve the selection of areas designed for agricultural, urban and/or industrial exploitation in a region. Such techniques can be used for land-cover characterization, mapping and monitoring. In addition to facilitating sustainable management of the land, land cover and land use information can be used for planning, monitoring, and evaluating the development, industrial activity, or reclamation. In addition, remote sensing can be used to monitor forests, forest fires, forestry and environmental management. The assessment of forest information over time enables the comprehensive monitoring of forest resources. The use of remote sensing in forest resource assessment provides information regarding the spatial extent of forest cover, the forest type and the biophysical and biochemical properties of forests. In brief, the activities and research topics of the Land sector are the following:

- Land Cover/ Land Use changes
- Urban sprawl monitoring
- Real Estate
- Heat island
- Spatial planning
- Urban and regional planning
- Land Management Information systems
- DEM generation
- Photogrammetric applications
- Urban heat island effect

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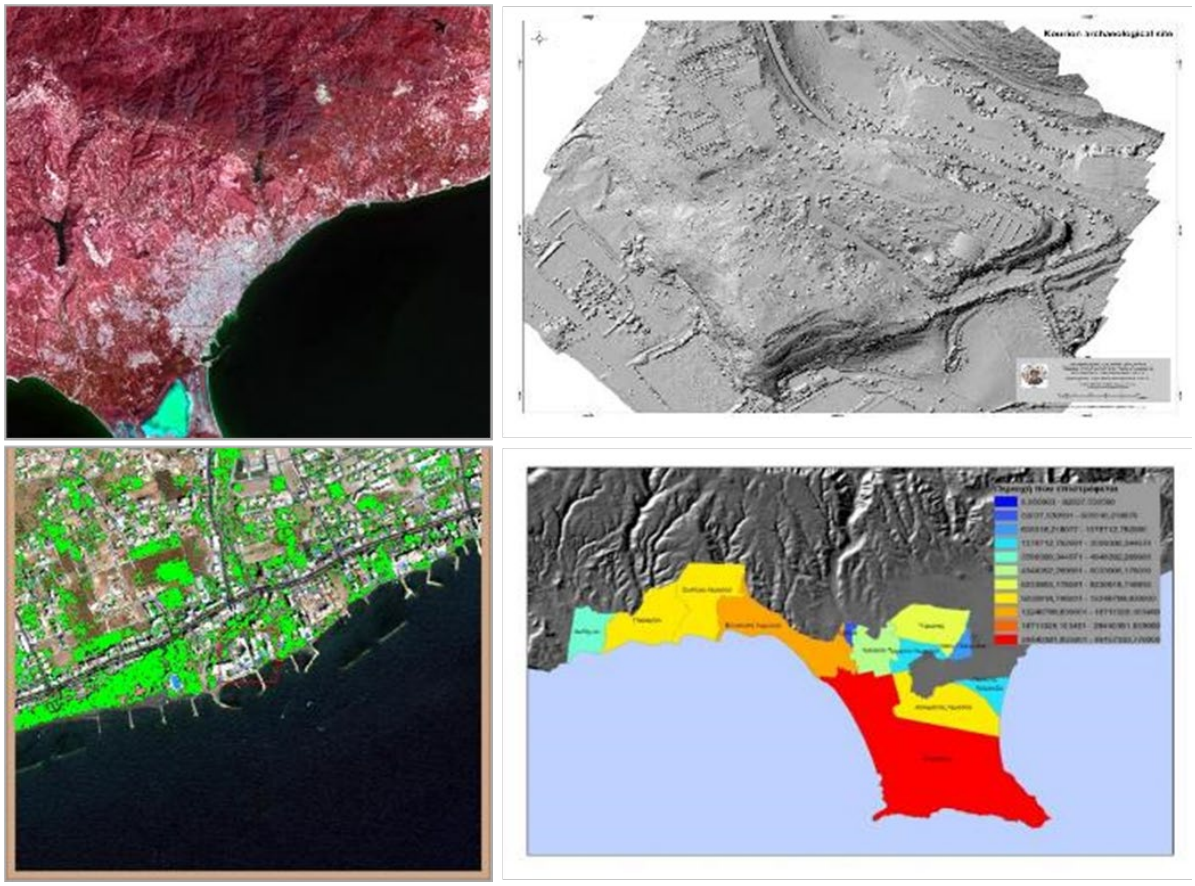

Figure 12: Activities of the Land sector

The Land sector is under the Department of Climate and Environment of ERATOSTHENES Centre of Excellence. *Table 4* provides basic information regarding the current members of the cluster.

Table 4: Land sector team members

Name and position	Qualifications
 **Dr Marinos Eliades** Researcher C (Leader)	• BSc in Geology (Aristotle University of Thessaloniki, 2008). • MSc in Ecological quality and water management at a river basin level from (Aristotle University of Thessaloniki, 2010). • PhD in Energy, Environment and Atmospheric Sciences (The Cyprus Institute, 2018).

 **Mr Christos Theocharidis** Research Assistant A	• BSc in Forestry and Management of the Environment and Natural Resources (Democritus University of Thrace, 2018). • PhD candidate in Earth Surveillance & Space Monitoring of the Environment (Cyprus University of Technology, 2020– ongoing).

The Land sector currenty collaborates closely with Water, Agriculture and Disaster Risk Reduction sectors

4.2 Resilient Society

The research cluster of Resilient Society, with an impact on the public sector and the industry, focuses on research and services tailored to ensure society's wellbeing, make economy sectors resilient, efficiently exploit the available resources, and protect civilians and businesses from natural threats and illegal actions in respect to smuggling/refugees trafficking in the surrounding sea. The research cluster includes a portfolio of several research fields, but the emphasis is on Disaster Risk Reduction and Access to Energy. The research staff appointed and working in this department/cluster are presented below in *Figure 13*. The Resilient Society research cluster consists of the following sectors:

- Disaster Risk Reduction (Landslides/Earthquakes, Floods, Fires, Health/Epidemics)
- Cultural Heritage
- Marine Safety & Security
- Energy

The Resilient Society research cluster is the most populated cluster of the Centre, consisting of a total of 18 researchers (10 Postdoctoral and 8 PhD students) and is coordinated by Dr. Haris Kontoes from NOA, one of the EXCELSIOR project's advance partners.

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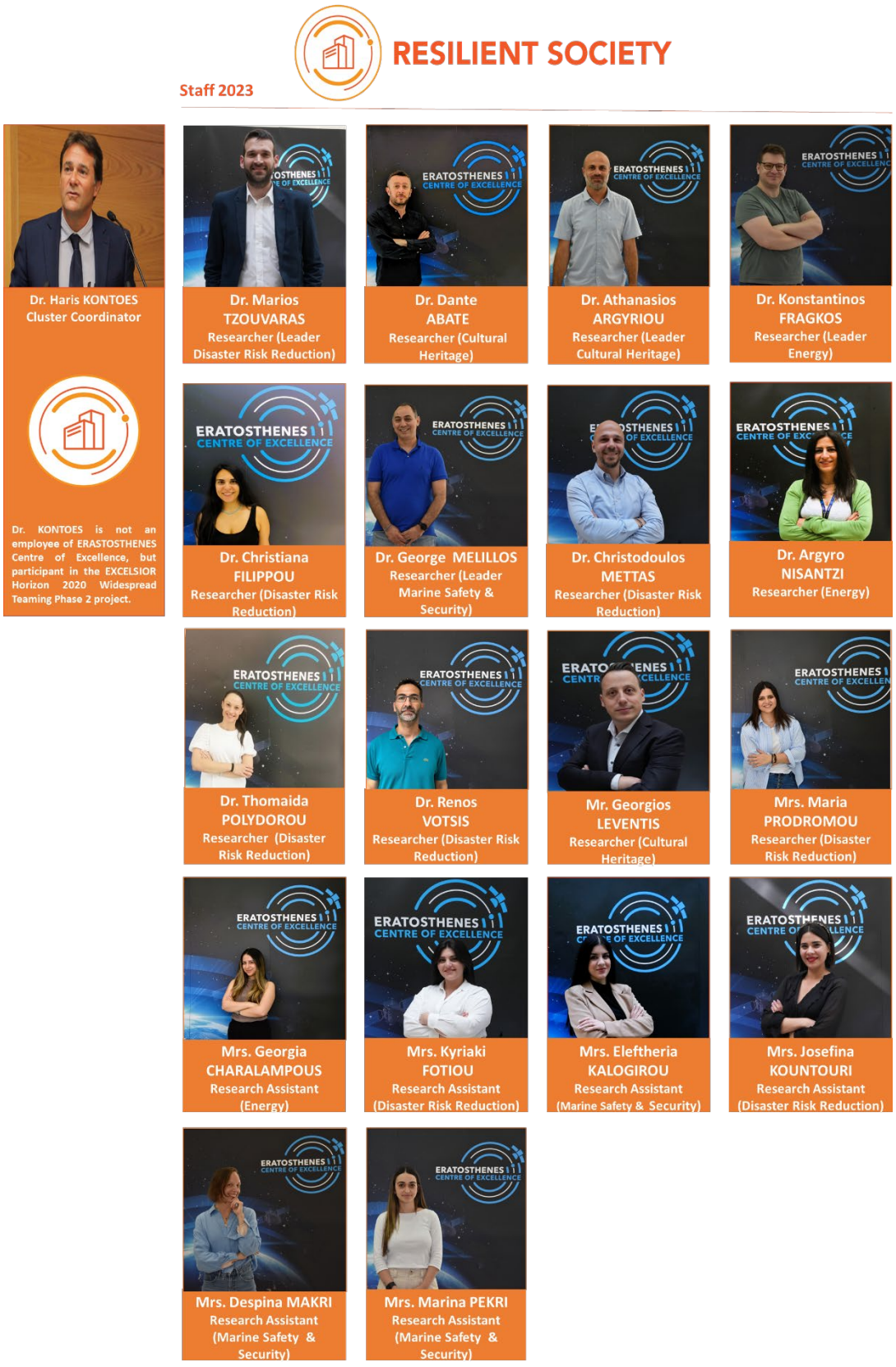

Figure 13: The ERATOSTHENES CoE Resilient Society Thematic Research Cluster

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4.2.1 Disaster Risk Reduction

In situations of disasters, both environmental and/or anthropogenic, satellite EO data can be used to access and monitor target areas at the right time. The ECoE will use EO for Disaster Risk Reduction by increasing coordination of EO to forecast and prepare for disasters, mitigate damage and better manage and recover from disasters, through enhanced preparedness plans, timely activation, and dynamically updated situational awareness throughout the emergency management cycle for early action. Cutting-edge research in this domain can provide improved thematic accuracy, reliability and robustness of disaster risk reduction products and services with the incorporation of uncertainty, for developing resilient cities, shield critical infrastructures, enable business operation continuity after impacted by major disasters. This cluster will focus on natural and anthropogenic disasters, such as fires, floods, earthquakes, and health issues, such as epidemics, on the following research topics:

- Forest fire monitoring.
- Burnt area mapping.
- Systematic monitoring of geohazards.
- Soil erosion detection.
- Soil degradation/desertification.
- Floods monitoring.
- Epidemics/Health.
- Impact assessment.
- Disaster management.
- Early Warning Systems.
- Decision Support Systems.

Figure 14: Activities of the Disaster Risk Reduction sector

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Based on the GAP analysis of the Disaster Risk Reduction cluster, the aforementioned training and future capacity buildings by NOA and other experts, are expected to fulfil the goal of research excellence in the topic of Disaster Risk Reduction, and more specifically in the development of near-real time disaster monitoring platforms; early warning systems; risk assessment frameworks of natural and built environment; disaster prediction models for geo-hazards, fires, floods and epidemics; Integration of risk monitoring frameworks with prediction models; structural condition assessment and health monitoring of critical infrastructure ; enhanced the burned area processing using RStudio, /Jupiter (python); and development of Digital Twins based on /earth observation data.

The team of Disaster Risk Reduction consists of 8 members, 5 Post-Doc researchers and 3 PhD candidates, as presented below in *Table 5*.

Table 5: Disaster Risk Reduction sector team members

Name and position	Qualifications
 **Dr Marios Tzouvaras** Researcher B (Leader)	• BSc (Honours) in Rural and Surveying Engineering (National Technical University of Athens, 2005). • Integrated MSc (Honours) in Rural and Surveying Engineering (National Technical University of Athens, 2005). • MSc (Distinction) and DIC in Transport (Imperial College London and University College London, 2006) • PhD in Monitoring and assessment of the impact of Natural Hazards using Earth Observation (Cyprus University of Technology, 2020).
 **Dr Christodoulos Mettas** Researcher B	• MEng (Honours) in Civil Engineering (University of Nottingham, 2009). • MSc in Civil Engineering and Sustainable Planning (Cyprus University of Technology, 2014). • PhD in Asphalt pavement condition assessment using Remote Sensing (Cyprus University of Technology, 2021).
 **Dr Thomaida Polydorou** Researcher B	• BSc in Civil Engineering (Kansas State University, 2009). • MSc in Civil Engineering (Kansas State University, 2011). • PhD in Civil Engineering (Kansas State University, 2014).

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Name and position	Qualifications
 **Dr Renos Votsis** Researcher A	• Higher National Diploma in Civil Engineering (Higher Technical Institute, XXXX). • BEng (Honours) in Civil Engineering (University of Surrey, XXXX). • PhD in dynamic analysis and damage identification in fibre reinforced polymers structures using non-destructive testing methods and damage identification techniques (University of Surrey, XXXX).
 **Dr Christiana Filippou** Post-Doc Researcher	• BSC in Civil Engineering (University of Cyprus, 2011) • MSc in Analysis and Design of Earthquake Resistant Structures (National Technical University of Athens, XXXX) • PhD in seismic retrofitting of masonry-infilled RC frames using innovative composite materials (Cyprus University of Technology, 2021).
 **Ms Maria Prodromou** Researcher C	• BSc in Surveying Engineering and Geomatics (Cyprus University of Technology, 2016). • MSc in Geoinformatics and Geospatial Technologies (Cyprus University of Technology, 2018). • PhD candidate in exploitation of remote sensing techniques in wildfires (Cyprus University of Technology, XXX – ongoing).
 **Ms Kyriaki Fotiou** Research Assistant A	• BSc in Surveying Engineering and Geomatics (Cyprus University of Technology, 2017). • MSc in Geoinformatics and Geospatial Technologies (Cyprus University of Technology, 2019). • PhD Candidate in SAR Remote Sensing (Cyprus University of Technology, 2020 – ongoing).
 **Ms Iosifina Kountouri** Research Assistant A	• BSc in Rural and Surveying Engineering (Aristotle University of Thessaloniki, 2018). • MSc in Protection, Preservation and Restoration of Architectural Monuments (Aristotle University of Thessaloniki, 2020). • PhD Candidate in flood monitoring using earth observation and GIS (Cyprus University of Technology, XXX – ongoing).

In the activities of the Disaster Risk Reduction sector, including the demonstration project that is currently underway with our advanced partner NOA on Geohazards, members of other sectors also

participated and contributed, such as Dr Athanasios Argyriou (Cultural Heritage), Dr Zampela Pittaki-Chrysodonta (Agriculture) and Mr Christos Theocharidis (Land).

4.2.2 Cultural Heritage

Cultural Heritage (CH) (both tangible and intangible) is a strategic resource for Europe and the International society with high cultural, social, environmental and economic value. To maximise the benefits of the application of Earth observation and digital technologies to CH, important challenges need to be addressed through research in order to develop approaches which meet the needs of all existing and potential user/stakeholder groups and thereby increase the social and economic value of CH. This will reinforce and expand partnerships and networks, exploiting the unique position of Cyprus in the region and connecting European countries with East and South continents. The activities and research topics of the Cultural Heritage sector are the following:

- Risk assessment of Cultural Heritage from natural and anthropogenic hazards
- Looting detection
- Protection of Cultural Heritage
- Cultural Heritage digitization (3D models)
- Archaeolandscape assessment and modelling
- Study of unexcavated areas
- UAV photogrammetric applications

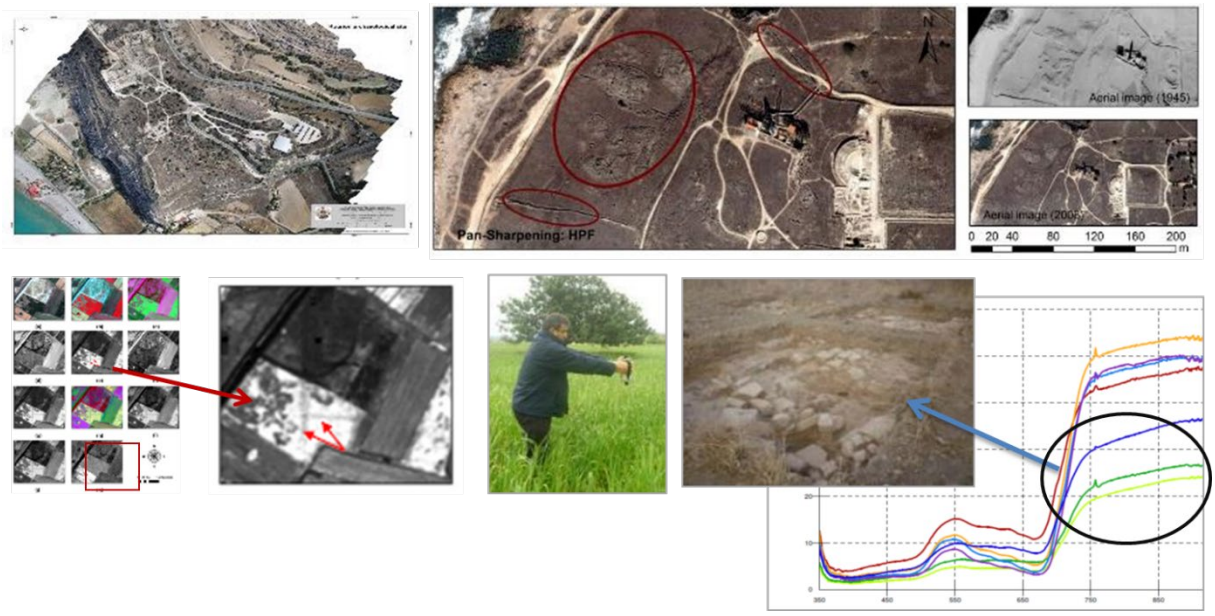

Figure 15: Activities of the Cultural Heritage sector

The team of Cultural Heritage sector consists of 3 members, 2 Post-Doc researchers and 1 PhD candidate, as presented below in *Table 6.*

Table 6: Cultural Heritage sector team members

Name and position	Qualifications
Dr Athanasios Argyriou Researcher C (Leader)	• BSc in Environmental and Natural Resources Engineering (Technological Institute of Crete, XXX), • PhD in Earth and Environmental Sciences (University of Portsmouth, 2012).
Dr Dante Abate Post-Doc Researcher	• Undergraduate degree in the History of Art (XXX, XXX). • Diploma of Specialization in Protection and Valorisation of Historical & Artistic Heritage (XXX, XXX). • Degree in Cultural Heritage (XXX, XXX). • PhD in E-learning Development and Delivery (XXXX, 2009.
 **Mr Georgios Leventis** Researcher C	• BSc in Cultural Informatics (University of the Aegean, 2011). • MSc in Cultural Informatics (University of the Aegean, 2013). • PhD Candidate in XXX (Cyprus University of Technology, XXX – ongoing).

The initial main activities of ECoE CH team focused on risk assessment of CH assets against natural and anthropogenic hazards, CH digitization and applicability of remote sensing technologies for identifying unexcavated and buried archaeological features. The overall capacity building achieved by the workshops and training, carried out by the advance partners, have already provided and continue to provide to the Cultural Heritage (CH) sector team members valuable tools towards the systematic monitoring of CH against natural and anthropogenic hazards while forthcoming workshops will lead towards the appropriate mitigation measures to be implemented for their protection, management and safeguarding for future generations. A direction that CH team aims for future capacity building and activities is the geophysical equipment acquisition and conducting geophysical prospection surveys. The capacity building in conducting geophysical prospections surveys (e.g., Ground Penetrating Radar (GPR), magnetometer, electrical resistivity tomography) and pre/post processing of the datasets with relevant software will be advantageous for the CH sector team to initiate collaborations with further revenue for ECoE by conducting geophysical prospection surveys for various stakeholders.

The goal is to establish a regional hub for digital and EO research in CH on the Eastern Mediterranean and Middle East as a bridge of collaboration between the region and the EU, whilst continuing to actively contribute and act as a focal point at European level.

4.2.3 Marine Safety & Security

The ECoE will establish a satellite-based maritime research and services and engage in capacity-building and knowledge transfer with the strategic partners, which will include a better understanding of marine and maritime processes in the eastern Mediterranean and contribute to environmental,

climate and socio-economic research and studies. The ECoE will support maritime traffic, transport and exploitation regulations at national and European/Global scale. Based on a dedicated ECoE owned direct data acquisition antenna/facility, which will be used for direct data downlink and obtaining near real-time information, Cyprus will rely much less upon third party maritime surveillance and services for local satellite data. The marine safety and security sector will capitalise on a secured supply of EO data and rapid development of services and customer needs in this domain and specifically in that geographic area. The main activities of the Marine Safety & Security sector are presented below and in *Figure 16*:

- Marine pollution monitoring.
- Law Enforcement.
- Illegal immigration monitoring.
- Unreported and unregulated (IUU) fishing detection.
- Ocean acidification monitoring.
- Climate change or the irreversible destruction of marine habitats as a result of anthropogenic activities.
- Information systems (ICT) for ports operation and the simplification of port procedures for clearance of vessels and cargoes.
- Maritime Spatial Planning to enhance and optimise port planning and management, which can be used by decision-makers for the development of a new port or the upgrade/extension of an existing one.
- Integrated Coastal Zone Management using Earth Observation and remote sensing techniques.

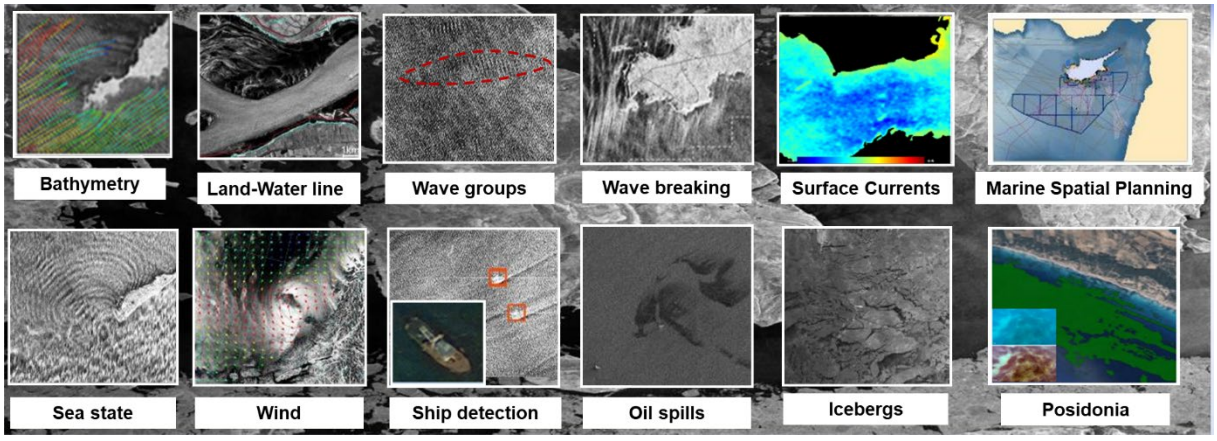

Figure 16: Activities of the Marine Safety & Security sector

The team of Maritime Safety and Security consists of 4 members, 1 Post-Doc researcher and 3 PhD candidates, as presented below in *Table 7*.

Table 7: Maritime Safety and Security sector team members

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Name and position	Qualifications
 **Dr George Melillos** Researcher A (Leader)	• Diploma in Military Science (Non-Commissioned Officer Academy's (NCOA), 1991). • Diploma in Computer Programming/Programmer (Hellenic Army Academy Computer Programming School, 2000). • Higher National Diploma (HND) in Software Engineering (OGOmiros College, 2005). • B.Sc. (Hons) in Computing (University of Huddersfield, 2007). • M.A (Master of Arts) in ICT and Education (University of Leeds, 2009). • PhD in Remote Sensing, GIS, and Space Technology (Cyprus University of Technology, 2018).
 **Ms Despina Makri** Research Assistant A	• BSc in Oceanography (University of the Aegean, 2016). • MSc in Geography and Applied Geoinformatics (University of the Aegean, 2018). • PhD candidate in Remote Sensing (Cyprus University of Technology, 2021 – ongoing).
 **Ms Eleftheria Kalogirou** Research Assistant A	• BSc in Surveying Engineering and Geoinformatics (Cyprus University of Technology, 2020). • MSc in Geoinformatics and Geospatial technologies (Cyprus University of Technology, 2022). • PhD candidate in Marine Surveillance - Marine environment monitoring, maritime safety, and protection, in Remote Sensing, GIS and Space Technology (Cyprus University of Technology, 2022 – ongoing).
 **Ms Marina Pekri** Research Assistant A	• BSc in Surveying Engineering and Geomatics (Cyprus University of Technology, 2017). • MSc in Geoinformatics and Geospatial technologies (Cyprus University of Technology, 2019) • PhD candidate in the field of Satellite Altimetry (Cyprus University of Technology, 2020 – ongoing).

4.2.4 Energy

Solar energy is the most abundant renewable resource, and, therefore much of the focus on sustainable energy is targeting the optimum solar energy use. Southern Europe, including Cyprus, presents an important solar energy potential and its exploitation is critical for regional sustainable development through efficient energy planning and a gradual independence from fossil fuels. The main question in solar radiation and energy research is the better understanding and the improvement of

measurement and forecast accuracy of solar radiation related parameters and products. Energy is a top priority in the Smart Specialization Strategy for Cyprus, so solar energy management is crucial in the energy exchange marketplace, where on-the-spot energy prices are defined by supply and demand equilibriums; hence, energy ''liquidity'' is vital. Possible end-users can be national transmission system operators, national distribution system operators, environmental, energy related authorities, thematic sectors (Tourism, Agriculture, Health, Energy), industries, value adders, SMEs, decision makers**.**

The Solar Radiation/Energy group of Eratosthenes Centre of Excellence was established in July 2022 in the framework of Excelsior project. Initially, it was formed from two post-Doctoral researchers, one working full-time and one 5%, while since February 2023 a new PhD student has joined the group. From the beginning, strong linkages were established with advanced partners and, more specifically, with researchers from NOA and PMOD/WRC. In close collaboration with the advanced partners, several actions that aimed to advance the solar radiation/energy group have been planned and executed. These actions include the provision of expertise for creating the specifications of the instruments for the development of the Cyprus Solar Network (CSN), two trainings on solar radiation radiative transfer modelling and instruments.

The team of Energy sector consists of 3 members, 2 Post-Doc researchers and 1 PhD candidate, as presented below in *Table 8*.

Table 8: Energy sector team members

Name and position	Qualifications
 **Dr Konstantinos Fragkos** Researcher B (Leader)	• BSc in Physics (Aristotle University of Thessaloniki, 2004). • MSc Environmental Physics (Aristotle University of Thessaloniki, 2007). • PhD in Atmospheric Physics (Aristotle University of Thessaloniki, 2015).
 **Dr Argyro Nisantzi** Researcher A	• BSc in Physics (National and Kapodistrian University of Athens, 2005). • MSc in Environmental Physics and Meteorology (National and Kapodistrian University of Athens, 2008). • PhD in Remote Sensing (Cyprus University of Technology, 2015).
 **Ms Georgia Charalampous** Research Assistant A	• BSc in Physics (Aristotle University of Thessaloniki, 2019). • MSc in Nanosciences & Nanotechnologies, (Aristotle University of Thessaloniki, 2022). • PhD Candidate in Remote Sensing of Solar Radiation (Cyprus University of Technology, 2023 – ongoing).

The Energy sector closely collaborates with the Atmosphere group in many of its activities, including the Atmosphere Living Lab.

4.3 Big Earth Data Analytics

The Big Earth Data Analytics Department consists of 7 researchers (3 Postdoctoral and 4 PhD students) and is coordinated by Mr Gunter Schreier from DLR, one of the EXCELSIOR project's advance partners.

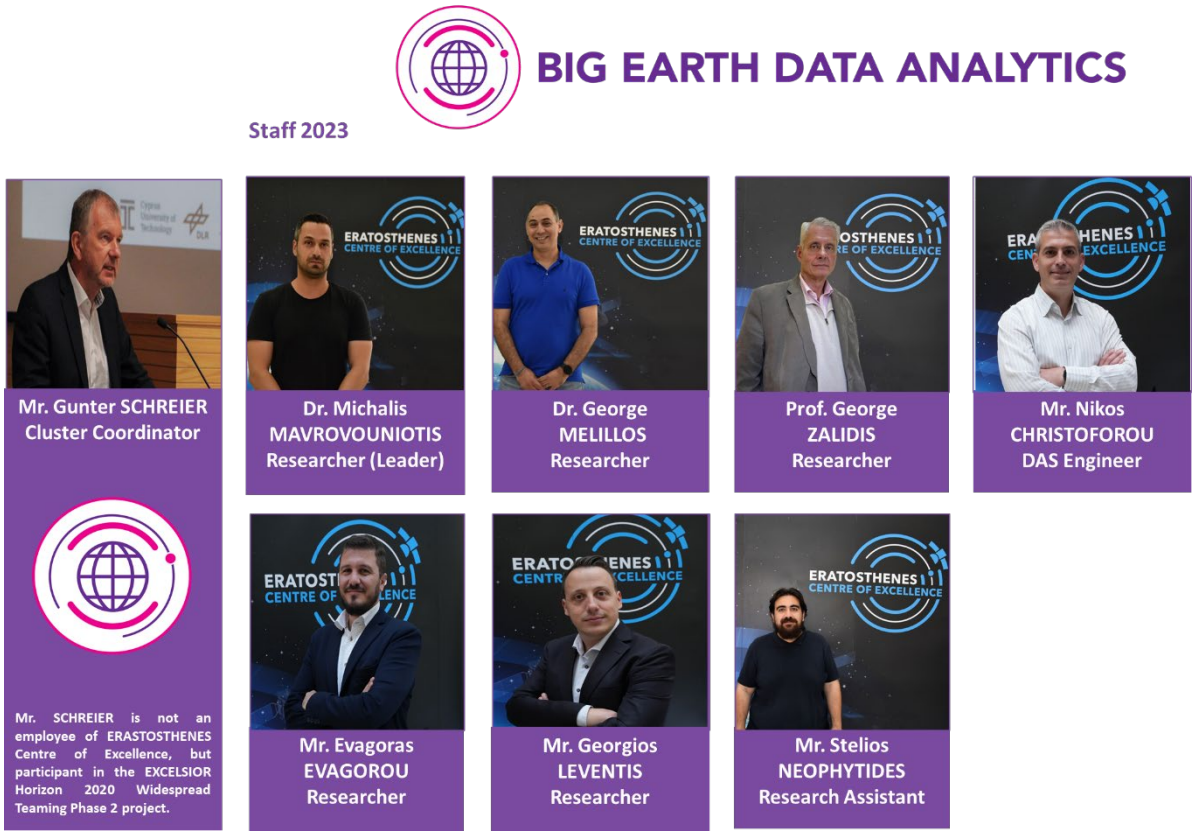
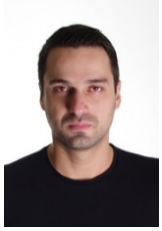


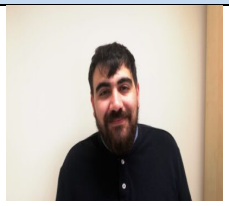
Figure 17: The ERATOSTHENES CoE Big Earth Data Analytics Thematic Research Cluster

The current members of the Big Earth Data Analytics cluster of the ERATOSTHENES Centre of Excellence (ECoE) are presented below in *Table 9*.

Table 9: Big Earth Data Analytics department team members

Name and position	Qualifications
 **Dr Michalis Mavrovouniotis**	• BSc in Computer Science (University of Leicester, 2008). • MSc in Natural Computation (University of Birmingham, 2009). • PhD in Computer Science (University of Leicester, 2013).

Name and position	Qualifications
Post-Doc Researcher	
 **Prof. Georgios Zalides** Senior Researcher	• BSc in Agriculture (Aristotle University of Thessaloniki, 1980). • PhD in Soil Science (University of Michigan, 1988).
 **Dr George Melillos** Researcher A	• Diploma in Military Science (Non-Commissioned Officer Academy's (NCOA), 1991). • Diploma in Computer Programming/Programmer (Hellenic Army Academy Computer Programming School, 2000). • Higher National Diploma (HND) in Software Engineering (OGOmiros College, 2005). • B.Sc. (Hons) in Computing (University of Huddersfield, 2007). • M.A (Master of Arts) in ICT and Education (University of Leeds, 2009). • PhD in Remote Sensing, GIS, and Space Technology (Cyprus University of Technology, 2018).
 **Mr Georgios Leventis** Researcher C	• BSc in Cultural Informatics (University of the Aegean, 2011). • MSc in Cultural Informatics (University of the Aegean, 2013). • PhD Candidate in XXX (Cyprus University of Technology, XXX – ongoing).
 **Mr Evagoras Evagorou** Researcher C	• BSc in Rural and Surveying Engineering (National Technical University of Athens, XXX). • Integrated MSc in Rural and Surveying Engineering (National Technical University of Athens, XXX). • PhD Candidate in XXX (Cyprus University of Technology, XXX – ongoing).

Name and position	Qualifications
 **Mr Stelios Neophytides** Research Assistant A	• BSc in Computer Engineering and Informatics (Cyprus University of Technology, 2019). • MSc in Geoinformatics and Geospatial Technologies (Cyprus University of Technology, 2021). • PhD Candidate in Big Earth Data Analytics for Agriculture (Cyprus University of Technology, 2021 – ongoing).
 **Mr Nicos Christoforou** DAS Engineer	• MSc in Mobile and Satellite Communications (University of Surrey, 2004). • MBA in Business Administration (University of Cyprus, 2020). • PhD Candidate in XXX (Cyprus University of Technology, XXX – ongoing).

The research cluster of Big Earth Data Analytics, tailored to EO data, allows the management and presentation of vast amount of EO data and the discovery of new information that is hidden in the data and promote the value-adding combination with non-EO data streams. The cluster will research and develop technologies related to data mining, machine learning, visual spatio-temporal exploration of big geospatial and temporal data, semantic enrichment of EO data and products, fusing EO and crowd-sourced data generated from smart sensor technology and geoinformatics. In the last years, different data mining technologies have been developed to cope with the different volume, variety, velocity and veracity of space-based data in order to make the EO services and applications development more efficient and to benefit from all the information hidden within the data. The need to move geospatial data analysis, and more specifically EO data processing, into the "cloud" and to store and represent data in formats (e.g., data cubes) has been recognised by many organisations worldwide. Consequently, several organisations and initiatives worldwide have already begun or are preparing for the uptake of EO data into their Big Data infrastructures. The activities of the research cluster are presented in more detail in the following sections.

4.3.1 Information extraction

Information extraction refers to techniques such as data mining, machine learning and semantic annotation to extract actionable knowledge hidden in EO data. It is often used with general analytical methods for the exploitation of the information contained in Time Series satellite images. The main focus is on the information extraction in the form of "categories of evolution" and elaboration of technologies to classify the evolutions processes of observed scenes.

4.3.2 Visual exploration & visualization

Visual exploration allows interactive data presentation in order to increase users' capabilities to understand the information content of large data sets of images and extract meaningful, relevant semantic clusters, together with quantitative measurements presented in a suggestive, visual way.

Visual exploration provides a preliminary insight into optical or radar data by revealing its semantic structure and quantitative estimations regarding the structure through simple visual representations. The benefit of the technique is that the end-user can make more informed decisions on the feasibility of the desired image processing. 3D visualization techniques provide capabilities for visual analytics of geospatial and time series data and building Augmented Reality application, by using state of the art technologies, thereby enabling flexible and fast interactive visualisation of big multidimensional spatial data through linked views.

4.3.3 Crowd Sourcing & Data Fusion

The data fusion process, which combines crowd sourced data with multi-modal EO information, can be used to make a high-resolution value-added map representing the environment at the time at which the observations were made. It requires the analysis of large amounts of data and the use of automatic and semiautomatic tools. Crowd sourcing and data fusion techniques are applied to multisource data for increased accuracy of documentation.

4.3.4 Geo-informatics

Geoinformatics deal with all information infrastructures related to geospatial data, such as acquisition, analysis, processing, evaluation, and visualisation, to facilitate the interpretation, management and decision-making in basic research, as well as the addressing of complex social and environmental challenges. Geo-informatics can be used to identify property, infrastructure and cultural heritage monuments that are damaged as a result of geo-hazards. It includes the techniques of geoprocessing, geographic information systems, geometry computer modelling, coordinate reference systems and frames, precise position techniques and navigation.

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5 Interoperability and collaboration between ECoE's Research Clusters

The various research groups of the three clusters have already started collaborating at various levels:

- Presentation of the work of researchers to the Centre's research staff to facilitate the discussion leading to new collaborations between researchers of different scientific backgrounds.
- Presentations by PhD students are encouraged by the more senior staff to present their work so that they are assisted in the continuation of their studies.
- Exchange of ideas for the preparation and publication of conference and journal papers.
- Preparation and submission of joint research project proposals to attract funding from national and European funds.
- Continuous interaction with the advanced partners to understand the new upcoming trends in different research topics.

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6 Strategy for ECoE's Research Clusters

The research strategy of the ERATSOTHENES CoE for RP3 is presented in detail in D3.3. However, in brief, the goal is to integrate the recruited research personnel, the research equipment and the Strategic Partners' expertise through the following activities:

- Management activities, such as the assignment of roles and responsibilities in the research groups, setting individual scientific goals and group **KPIs,** establishing a systematic collaboration scheme with the Strategic Partners, harmonising processes for internal and external teamwork, ensuring vertical organisation of the group's activities from access to equipment data to research and innovation uptake, etc.
- Technical activities that include customisation and calibration of the ECoE infrastructure to meet the ECoE's scientific needs, technical work required to prepare the participation to European and/or global infrastructure networks (e.g., for the atmospheric equipment and receiving antenna foreseen), defining the IT interfaces for the seamless access to EO data from the research equipment, set-up of scientific models and other core tools as research enablers, explaining laboratory standards guidelines and best practices, etc.

7 Conclusions

The deliverable provided an update for the three already established thematic research clusters and their respective groups/sectors, as well as the four functional areas of the Eratosthenes Centre of Excellence. It described the interoperability of the 2-axis model of the DIH through both the vertical and horizontal axis to achieve excellence. It also provided an overview of the research organisational chart for the staff involved in the departments of Environment & Climate, the Resilient Society and Big Earth Data Analytics, the Functional Areas and the administrative areas, in terms of managers, coordinators and staff. The two-axis model, through the Functional Areas, begins with raw data, which are further developed into added value for stakeholders and the greater society. This report will be updated once more in month 84 to show the implementation and adaptation of the internal structure of the research clusters and research groups.