



The Earth Observation status in Greece

Haris KONTOES

Research Director of IAASARS/NOA



Operational Unit "BEYOND
Center for Earth Observation
Research and Satellite
Remote Sensing"

www.beyond-eocenter.eu

email: kontoes@noa.gr

URL: <http://members.noa.gr/kontoes/>



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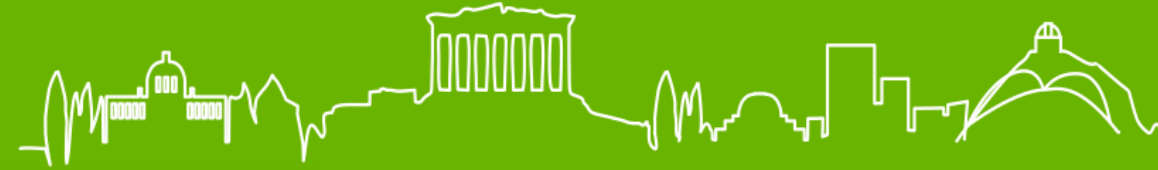


For four decades, Greece has been advancing gradually the Earth Observation (EO) in Space. Private entities, research, and academia collaborate with international stakeholders and entrusted institutions

- In early 1990's the General Secretariat for Research and Technology /Ministry of Development, established the **Hellenic National Space Research and Technology Committee** that:
 - Analyzed the Space/EO related capabilities in Greece
 - Delivered a roadmap towards the inclusion of Greece in the European Space landscape
 - Paved the Strategy for the participation of Greece as a full member in ESA
- Member of the ESA (1st Cooperation Agreement-1994, 2nd CA -2001, Full Member 2003 – **Law 3308/2005**) → Active participation in ESA mandatory and optional programs (**e.g. EOEP, ARTES, GSTP, IAP, GMES SE**)
- Member of the HELIOS II EO Partnership together with FR, BE, SP, IT, and DE (2007)
- Member of the Intergovernmental **Group on Earth Observation (GEO)** and the **GEOSS**
- Establishment of the **Greek GEO Office** enhancing the regional role of Greece in EO (2007)
- Formation of the **Hellenic Association of Space Industries (2009)**
- Inauguration of the **National Space Cluster (2013)** and the **Hellenic ESA BIC (2021)**



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- Since early 2000, Greece participates actively in the **EU Steering Committees and Space Committees** for the definition of Copernicus (former GMES) and the Space Work Programs (**FP4 up to recent H2020 and HE**), focusing on the EO sector where there is significant potential for research and service market uptake

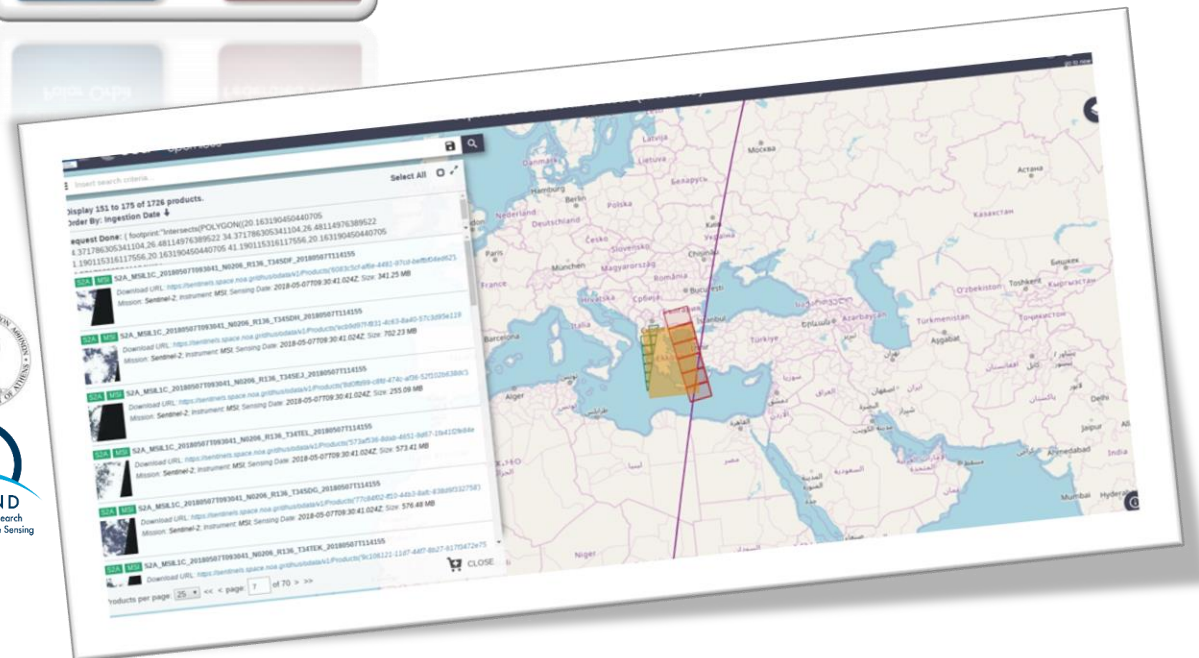
- 2014 – The Hellenic Parliament ratifies the operation of the **1st European Copernicus Collaborative Ground Segment in Greece**, the so-called **Hellenic Mirror Site** hosted by the **National Observatory of Athens (Operational Unit BEYOND)**

The 1st official Copernicus Data Access point for Sentinel Data serving the entire South & Southeastern Europe, Middle East & North Africa, Balkans and Black Sea countries

Key Milestones



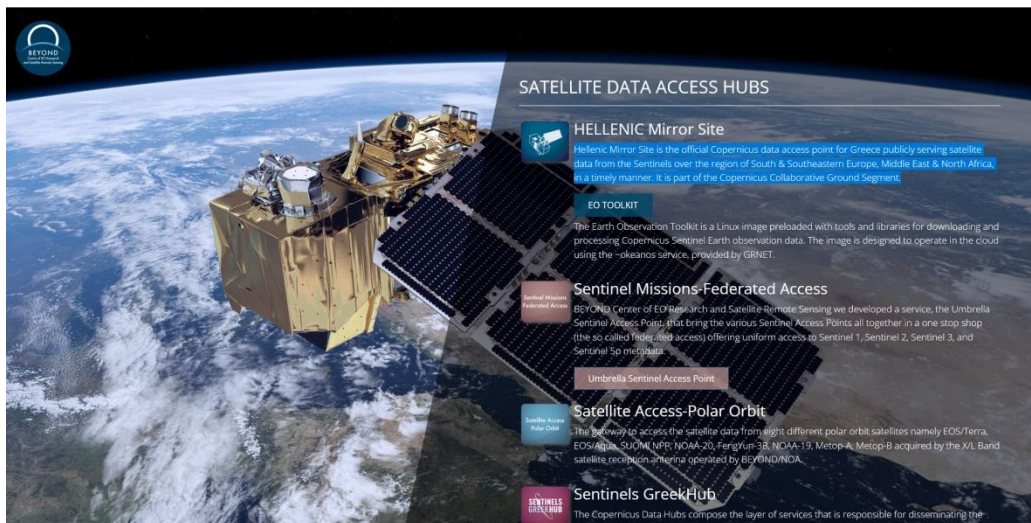
- 2017 – The Ministry of Digital Governance establishes the **National Space Law** and sets the **Space Policy Council of Ministries**
- 2020 – The Ministry of Digital Governance establishes **Law 4727/2020 (article 5)** and sets the objectives of Greece in space engagement



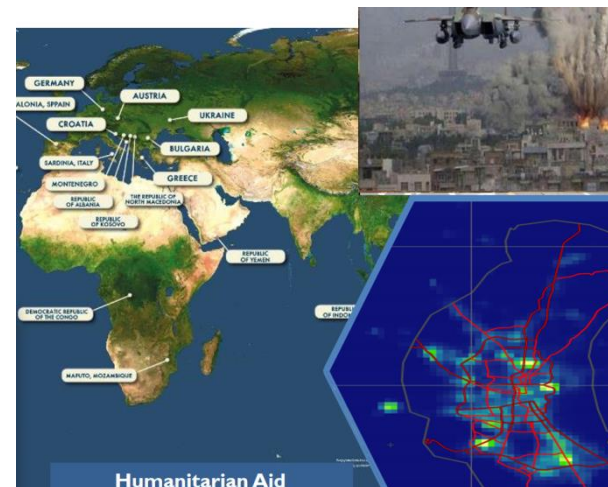


➤ **Law 4727/2020 (article 5)** and the objectives of Greece in space engagement sets ➔

- The Upgrade of the **Greek Copernicus Coll Ground Segment and the Hellenic Mirror Site** through HPC, AI/Big Data Capacity, GEANT bandwidths for opening and exploiting data to increase the size of the domestic market and boost the commercial activities and integrated applications linking EO with GNSS and TELECOM/GOVSATCOM



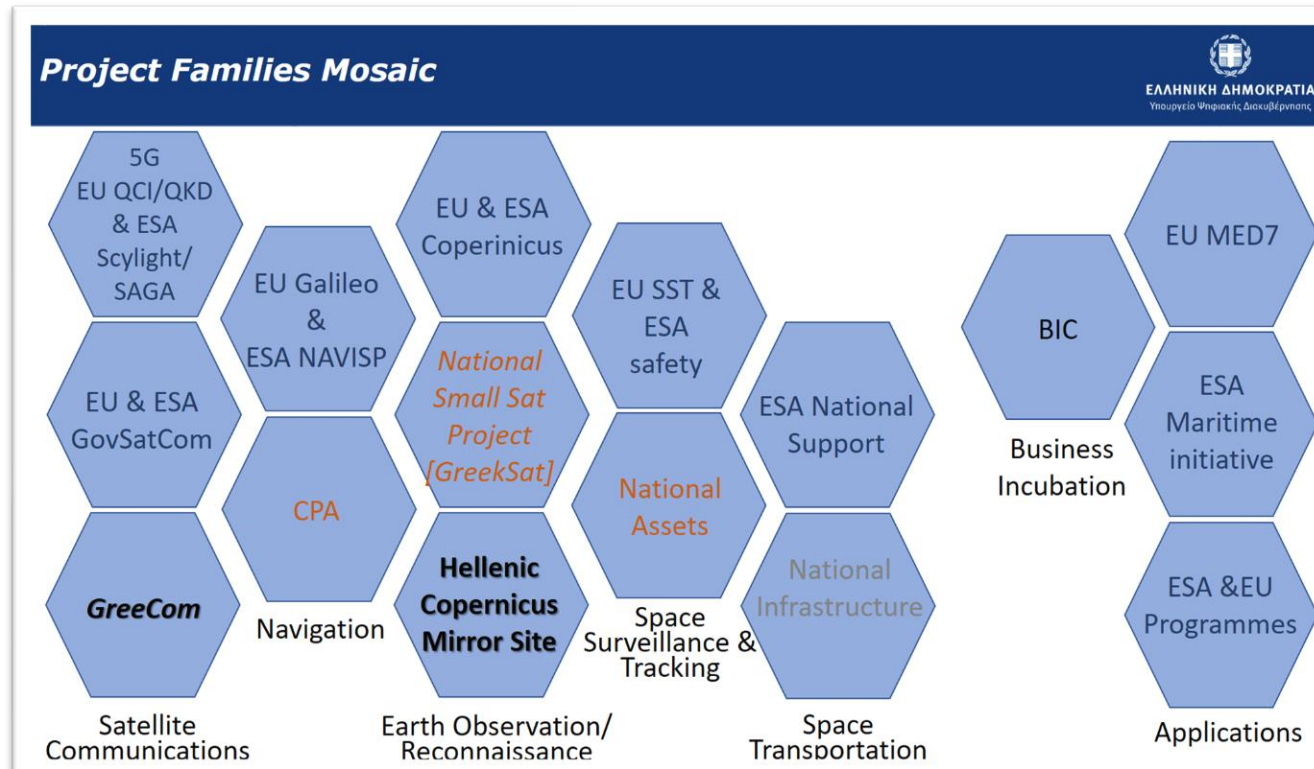
- Develop **Ecosystem Apps and National Scale Applications** in support of **EO Market and Business uptake** and meet **Societal Challenges and Sustainability in Sectors** as Maritime and Urban Environments, Common Agricultural Policy, Decision Making in Emergency Response, Early Awareness in Health and Disaster Risk Reduction, Humanitarian Aid, and Security



- Strengthen **National Defence, Safety and Security**, and **Autonomy** in e.g. border control, DRR by enhancing infrastructures (GreekCom, Small Satellites)
- Insert **Greek companies to European supply chain**
- Support **Research and Innovation** in the field of Space/EO/Telecom, etc



- Develop a **national Small Satellite System Program** for achieving autonomy to meet the national **EO/Telecom needs**, and strengthen the Greek industry competitiveness with the possibility for commercial utilisation in the global market



RRF Allocated Budget 200,37 MEuros

- Address a range of applications in sectors as **Telecom, EO, Cartography, Marine Transport, Agriculture, Urban Planning, Border Control**. In its design the system will use the **Fiber in the Sky – Euro QCI** program so as to secure the fast and safe data transfer

Key Milestones

Strengthen **National Defence, Safety and Security**, and **Autonomy** in e.g. border control, DRR by enhancing infrastructures (GreekCom, Small Satellites)



➤ Creation of the HELLENIC SPACE CENTER – Law 4623/2019 'Αρθρο 60

- The Development of the **National Space Strategy** and **Action Plan**
- **Promotion, dissemination and exploitation** and management of Greece's Space Strategy
- **Participation** in EU and international Space organizations, initiatives, and forums
- Support the development of EU and international **partnerships**
- **Exchange** of knowledge, innovation and actions and maximize the **stakeholder engagement**
- Support the development of technologies, services and terrestrial infrastructures for the **benefit of domestic industry and research**



- **Train** students, young researchers and public officials in Space issues
- The **experimental and commercial exploitation** of the State's rights in satellite and space objects
- Provision of **advisory services and studies** to the Ministry of Digital Governance with regards to **space rights and obligations**

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Fast Facts:

www.beyond-eocenter.eu

Poised to open Science, Innovation, Know How and Services, as well as offer Infrastructure, Capacity Building and Education for the ultimate benefit of:

- Societies
- Researchers,
- Decision and Policy Makers,
- NGOs,
- Sectors & Value Adding
- Industry
- Startups
- Entrepreneurs
- International Institutions

SolarHUB Nowcasting Solar energy continuous monitoring service

The SolarHUB system of EO services, SENSE and nextSENSE, exploits daily acquisitions of big satellite data with AI techniques and provides now-casting and short-term forecasting surface solar radiation and energy assessments over Europe, N. Africa, Middle East, Balkans, and Black Sea.

More information: <http://beyond-eocenter.eu/index.php/web-services/solarhub>

AgriHUB Satellite technology as a tool to shape agricultural policy and ensure food security

The AgriHUB system of services, exploits EO with state-of-the-art AI to monitor crops and food production, assess the good agricultural practices, and provides early assessments and warning on Climate Change impact in yield. It also supports decisions in relation to farmers' compliance with CAP.

More information: <http://beyond-eocenter.eu/index.php/thematic-areas/agriculture>

DustHUB Desert Dust Monitoring Service

The DustHUB system of EO services provides a three-day forecast of desert dust concentrations and dispersion over EU, N. Africa, Middle East, Balkans, and Black Sea. It informs on dust particle concentrations at all heights of the atmosphere, as well as dry and wet depositions of dust on the surface.

More information: <http://beyond-eocenter.eu/index.php/web-services/dusthub>

Early Warning System for Mosquito-borne Diseases (EYWA)

EYWA system of EO services forecasts and informs on the entomological and epidemiological risk for Mosquito-borne Diseases (Malaria, West Nile Virus, Dengue Fever, Yellow Fever, Zika, Chikungunya) and supports the public health authorities to prevent the spread of diseases in thousands of settlements in Europe, Africa, and Asia continents.

More information: <http://beyond-eocenter.eu/index.php/web-services/eywa>

➤ Operational Unit “BEYOND Center for EO Research and Satellite Remote Sensing” of IAASARS/NOA – EU FP7-REGPOT-2012-2013-1 (GA 316210)

> 10 Years of Operations in EO/Space sector development

FireHUB: Forest fire monitoring and management service based on satellite remote sensing

The FireHUB system of EO services predicts, detects and monitors in real time the evolution of wildfires in Greece while it simultaneously models the smoke dispersion. It generates daily active fires and burnt areas in Europe, N. Africa, Middle East, Balkans, and Black Sea countries. Through Copernicus CEMS and third party activations, FireHUB delivers fire risk and historical fire regime assessments worldwide.

More information: <http://beyond-eocenter.eu/index.php/web-services/firehub>

FloodHUB Flood monitoring service

The FloodHUB system of EO services is activated as soon as a major flood event occurs and gives a near real-time operational picture of the disaster using hydrological and hydraulic modeling. It dynamically leverages satellite remote sensing observations, crowdsourcing and in-situ sensor data.

More information: <http://beyond-eocenter.eu/index.php/web-services/floodhub>

GeoHUB Geohazards monitoring service using satellite radar interferometry

GeoHUB system of EO services exploits primarily SAR imagery and employs interferometric techniques to assess ground deformation. It generates products for diachronic monitoring of earthquakes, volcanoes, landslides and urban subsidence. The GeoObservatory is activated for any earthquake and/or a volcanic eruption over the world.

More information: <http://beyond-eocenter.eu/index.php/web-services/geohub>

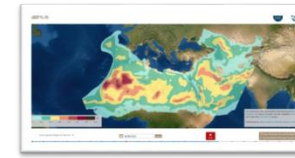
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“BEYOND - A self-sustained Center of Operations - in Figures :

- ❑ **20** cross-sector EO related **services**
- ❑ **14** service **platforms** open to the global public/stakeholders
- ❑ More than **20 Civil Protection Authorities, 22 Countries, 20 Prefectures, 100 Municipalities, 10 Industries** and Associations of farmers and **a few millions** of Citizens benefit from services in DRR, CC, Health, Food Security, and Ecosystem, Water, Energy and Raw Material Sustainable Use
- ❑ More than **20 activations through** Copernicus EMS at **global level**
- ❑ More than **100 Risk & Recovery activations** at **national level**
- ❑ **Collaboration** with **5 International Institutions**
(UN SPIDER RSO, GEO/EuroGEO, ESA, JRC, EC DG-ECHO) through MOUs/Key Initiatives/Action Groups/ GEO WGs (DRR, Capacity Building
- ❑ **Collaboration** with **2 International Funding Institutions**
(World Bank, and Asian Development Bank in CC and DRR fields)
- ❑ **4 Private Sectors | Industries engaged**
(Energy, Health, Agriculture, Insurance)
- ❑ **2 Worldwide distinctions | 1st Prizes (FIREHUB, EYWA)**
5 MEuros award
- ❑ Research record (**>250 papers, 3000 Citations**)
- ❑ Human Resources:
 - ❑ **45 key personnel** (PhD, MSc, other research staff)
 - ❑ **7 disciplines** (AI/ML, Data, EO, Mathematics, Meteo, Engineering, Communication, etc)



<http://dusthub.beyond-eocenter.eu/>



<https://www.arcgis.com/apps/View/index.html?appid=35da5148b81a41eb84140314c854ad98>



<http://195.251.203.238/floodhub>



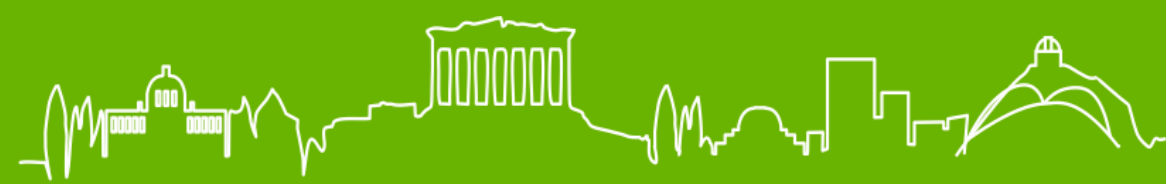
<http://geobioservatory.beyond-eocenter.eu/web/>

Attract a competitive funding in the period 2018-2021 of ~ 7 MEuros



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➤ Copernicus Data Access Service Greek Collaborative Node #3



→ Management/monitoring of >100 VMs, 1200 CPU Cores, 1.5 Pbytes Storage Rolling Archive

→ Sync and disseminate daily 60.000 Sentinel mages

→ Operation of 8 Services/Hubs:

- ❑ **Collaborative Hub** (Node 3): Access to S-1/2/3 data from all Copernicus Participating States (EUMETSAT, Airbus etc.)
- ❑ **International Hub**: Access to S-1/2/3 data from International partners (NASA, USGS, NOAA, Australian Geosciences, etc.)
- ❑ **DIAS Hub** (Node 3): Access to S-1/2/3 data from DIAS partners (Atos, Creotech etc.)
- ❑ **AfricaCast Hub**: Access to S-3 data for EUMETSAT, for Africa
- ❑ **S5Pre-Ops Hub**: Access to S-5P data for all the users globally
- ❑ **S5P Expert Hub**: Access to Sentinel-5P Calibration and Validation data for expert users
- ❑ **Greek DataHub Relay**: Access to S-1/2/3/5P data for selected users not eligible for the Collaborative or International Hubs
- ❑ **Hellenic Mirror Site**: Access to S-1/2/3/5P data in Mediterranean



**BEYOND Unit |
IAASARS/NOA
Infrastructure |
Big EO Data**



**Product
Downloads
for the last 90
days (volume
and number)**

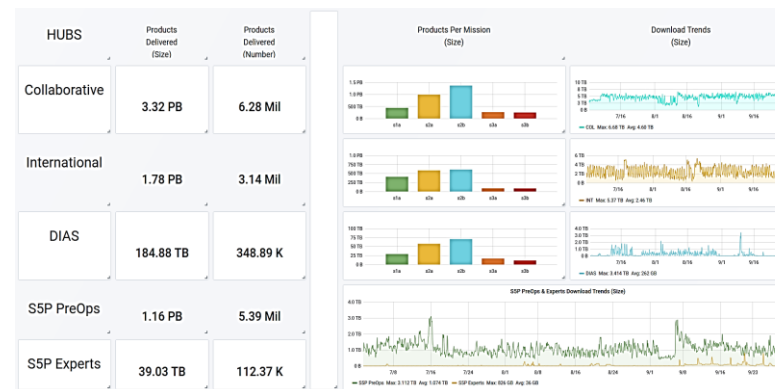
**Downloaded
volumes
15.3 M products
6.5 PB of data**

➤ Satellite Acquisition Antennas



- **Polar Orbit Satellites, X-/L- BAND-300TB Live Archive**
- **Geostationary Satellites: METEOSAT Second Generation**
- **Operation 24/7**

▪ **UAV-DRONES**



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Commercial, Research and Service Sector in relation to EO & GI

The **relevant market** rose significantly through the procurement of **data** and **services**

Large & **national scale projects** (e.g. Cadaster, Cartography, CAP, Civil Protection) were catalytic in the **uptake of private value adding** industry

~45-50 registered SMEs and Academia and RES **have been successful (Georeturn ESA > 1, EU > x2-5 the contribution in the program)** in the EU/ESA EO&GALILEO&Telecom RIA/IA instruments e.g. EU FPs (FP4-FP7 & H2020 & HE), Copernicus FP (EMS, LMS, CAMS) and ESA programs (EOEP, DUE, DUP, Copernicus DAS, ARTES, GSTP, etc)

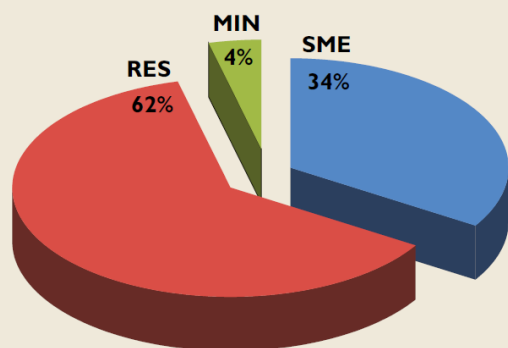
New **cross-sector markets** were created and **non traditional EO actors** have been engaged (e.g. Insurance, Agro-industry, Energy) profiting from the derived downstream products capitalizing the EO data and ICT

Leveraging the **advanced in-situ (Lidars, Antennas)** the participation in **CAL/VAL & data exploitation** of Space Explorer Missions (ADM-Aeolus and Sentinel-5p, etc) for Climate, Atmosphere, and Land has been developed in the recent years using (**PollyXT lidar, lidar system EMORAL, PANGEA-ReACT Facility/NOA**)

The research potential of research/academia entities has been unlocked and much developed in the last decade through the establishment of **Centers of Competence in the EO domain**. **Moreover, 35 University Departments offer 21 MSc programmes and 109 EO relevant courses**

The free/ease access to the EO data via the Greek Coll GS and the Mirror Site, and the FPCUP dissemination/ communication actions resulted in the **widening of the user segment and the identification of new markets**

Indicative participation of the different sectors in EU Funded calls



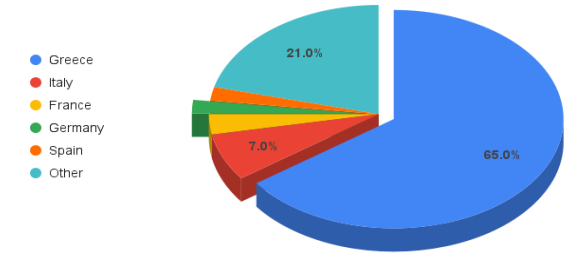


- **The Statistics extracted from the Hellenic Mirror Site is an indicative measure in terms of participation of the different sectors and stakeholders in EO related actions**

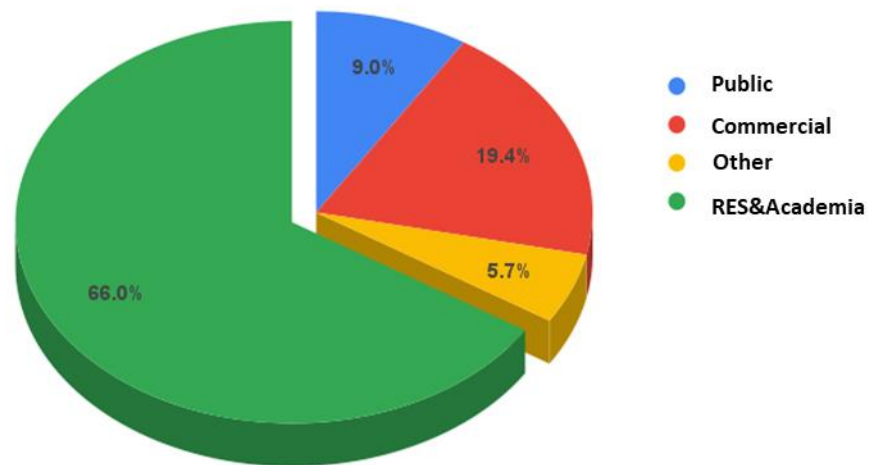
Out of a randomly selected sample from the use of the Mirror Site in 2022 (a total of 814 users)

- The sample is dominated by the research community
- Atmosphere, Emergency, and Land are the main application domains in EO using Sentinel data

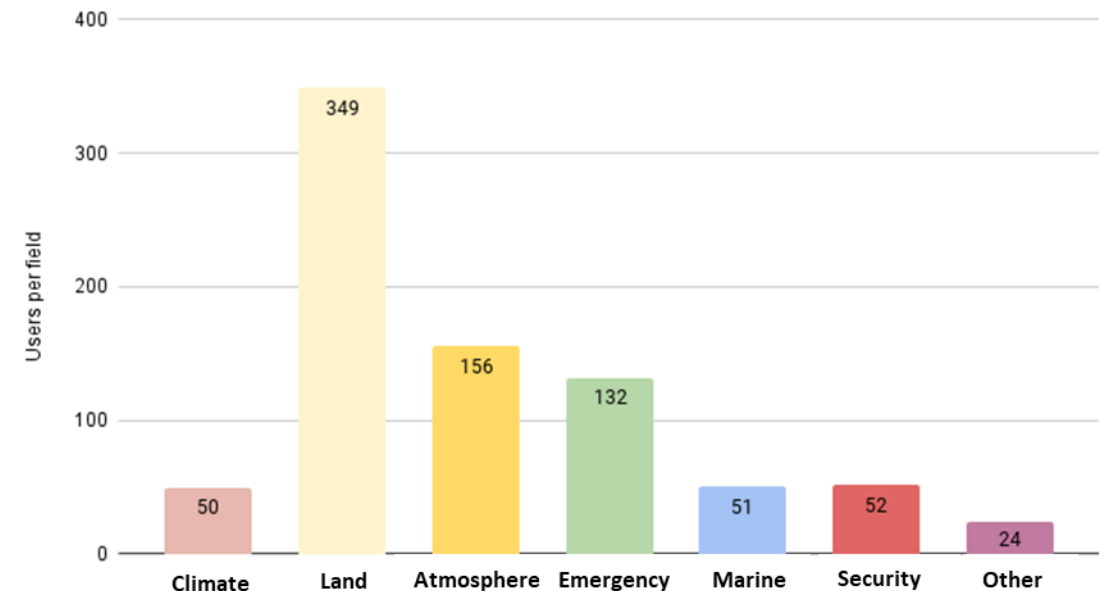
Distribution of users per Country



Distribution of Stakeholders (Data Users) per domain



Distribution of Data Users per Application domain





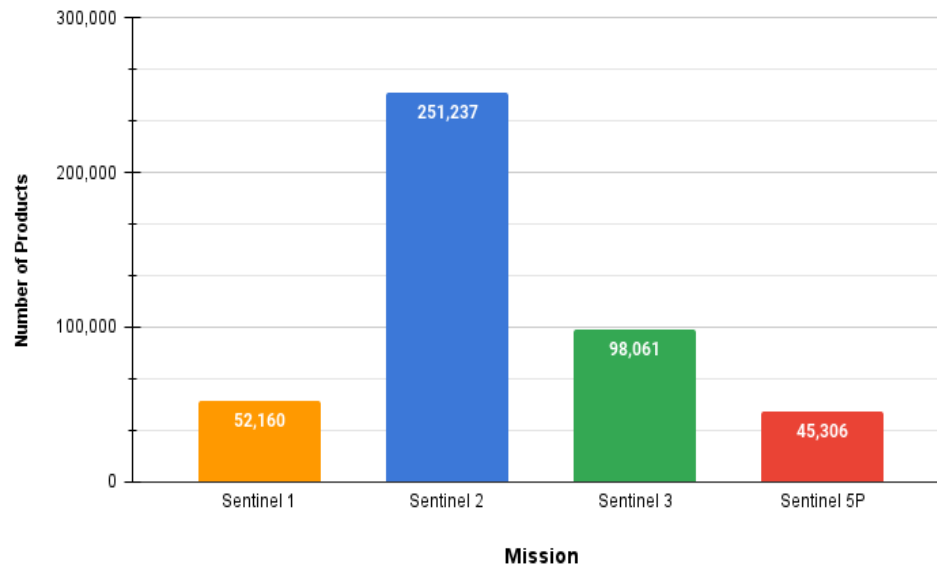
- The Statistics extracted from the Hellenic Mirror Site is indicative of the big volumes of EO data used and the skills for processing the different types of satellite data in relation to the application domains

Out of a randomly selected sample from the use of the Mirror Site in 2022 (a total of 814 users) and offering a capability of a rolling (live) archive of 21 days for Sentinel-1/2/3/5P for Mediterranean Region

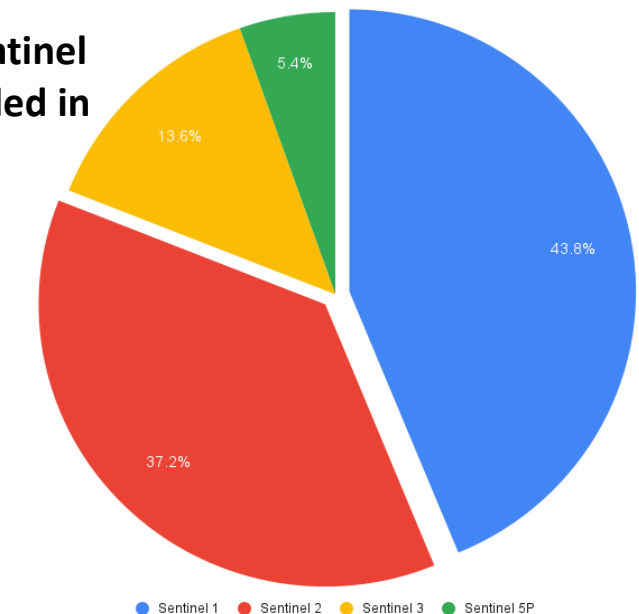
- 55.900 products published per month (37.5 TiB)
- Most downloaded mission is Sentinel-1 (43.8%)



Total Sentinel Products Published in August 2022



Total Volume of Sentinel Products Downloaded in August 2022



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Mandated by the Kyoto 2019 Ministerial Decision of the Inter-governmental GEO to run **GEO-CRADLE Initiative**



Engaging NAMEBA needs & priorities:
25 Countries
300 Users

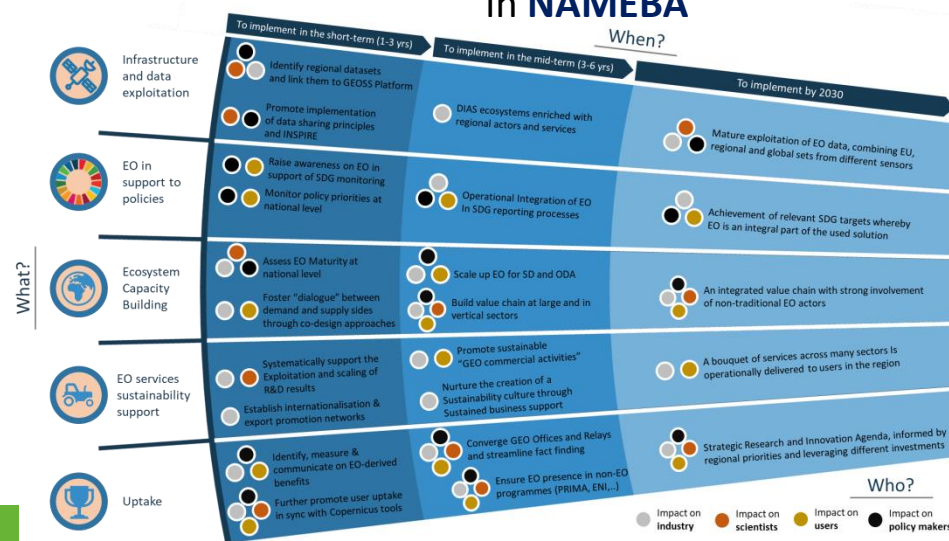
Capacity Building,
Education, and
Networking of
stakeholders across
NAMEBA Region

Supported by
in-kind, NOA,
COPERNICUS
FPCUP

Roadmap up to 2030 for
EO, GEO, GEOSS and
Copernicus implementation
in **NAMEBA**



Date	Location
28/04/2016	Cairo, Egypt
14/07/2016	Novi Sad, Serbia
26/09/2016	Tirana, Albania
17-18/10/2016	Rabat, Morocco
19/10/2016	Timimoun, Algeria
16/11/2016	Limassol, Cyprus
03/01/2017	Chişinău, Moldova
02/02/2017	Abu Dhabi, United Arab Emirates
24/03/2017	Sofia, Bulgaria
26/04/2017	Brussels, Belgium (Industrial market)
09/05/2017	Magurele, Romania
25/05/2017	Cairo, Egypt
14/09/2017	Tel Aviv, Israel
07/12/2017	Tunis, Tunisia
15-16/03/2018	Istanbul, Turkey
04-05/06/2018	Thessaloniki, Greece (3 rd South-Eastern Europe GEO Workshop)
09/05/2022	Tirana, Albania



- **Networking Platform** (> 206 profiles of EO actors from 31 countries)
- **Liaison activities** (GEO, Copernicus-DG GROW, DG RTD and ESA)
- **Stakeholder engagement and capacity building events** (including 25 regional workshops) and **dissemination activities** (including **31 scientific papers and articles**)
- **Communication** materials (i.e. website, social media)
- **Regional Data Hub** connected to GCI (25.534.239 datasets, 45 regional portals and sites)
- **Four Sectors: Climate Change, Food Security, Renewable Energy, Raw Materials**

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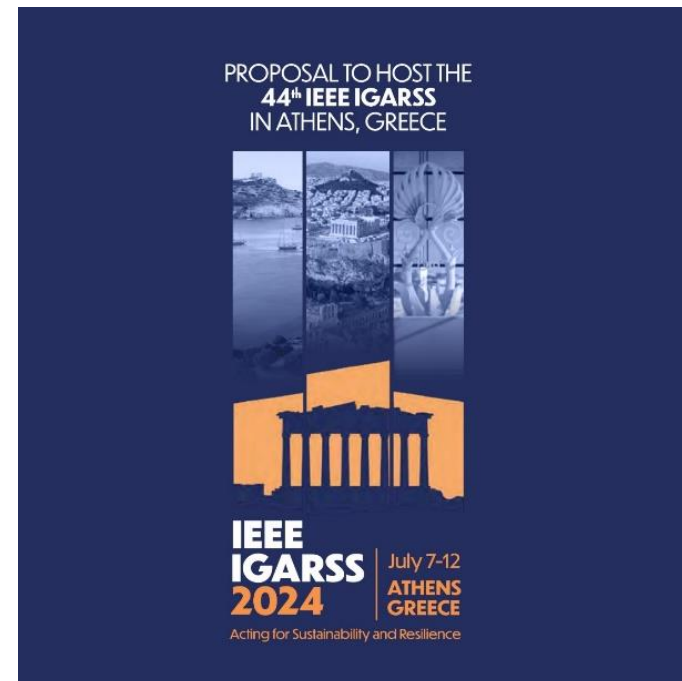


Organization

(2018-2021) > 35 Conferences, Information Days, Capacity Building Seminars in 15 EU and non EU countries (i.e. USA, Mexico, Japan, Tunisia, Jordan, Turkey, Albania, Morocco, Ukraine etc.)

Member of LOC of [COSPAR 2022 - 44th Scientific Assembly - 16-24 July 2022](#) - Responsible for Earth Observation Thematic Area

Chair of the LOC for the Organization of [44th IEEE IGARSS 2024 | July 7-12 2024 Athens - MEGARON](#)





Thank you!

Tel: +302103490125
email: beyond@noa.gr
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IMAGINATION
TAKES US
BEYOND
OUR LIMITS

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