



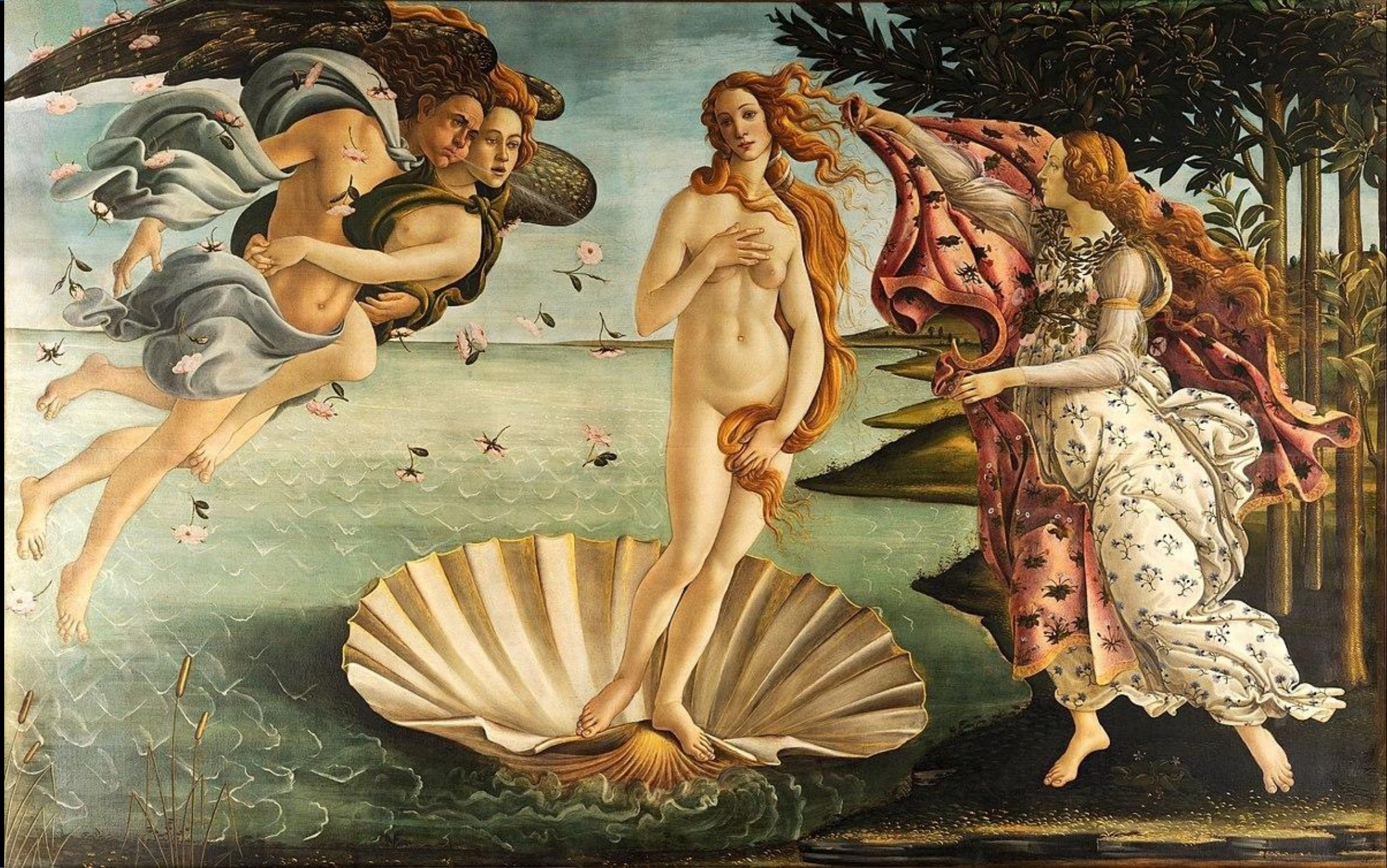
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A new Space Player in the Eastern Mediterranean: ERATOSTHENES Centre of Excellence in Cyprus

Gunter Schreier, Deputy Director German Remote Sensing Data Center
DLR – German Aerospace Center

NEW SPACE AGENCIES DRIVING DOWNSTREAM SPACE ECOSYSTEM DEVELOPMENT
15 May 2024

Geospatial World Forum, Rotterdam, NL





Quick facts on Cyprus

- Independency from UK in 1960.
- UK still operates Akrotiri und Dekelia (military bases)
- Cyprus conflict in 1974. Turkish – Greek intervention
- Unilateral declaration of Turkish Republic of Northern Cyprus in 1983
- Member of European Union: 1 May 2004
- Euro as currency: 1 January 2008
- 1.2 Mio inhabitants (total in 2020)
- ESA PECS (Plan for European Cooperating States) since 2017. Full ESA membership in few years



Mission and vision

- To upgrade the existing Remote Sensing & Geo-Environment Lab (ERATOSTHENES Research Centre), within the Faculty of Engineering & Technology of the Cyprus University of Technology (since 2007), into a **sustainable, viable and autonomous** Centre of Excellence: **the ERATOSTHENES Centre of Excellence (ECoE)**.
- To become a **world-class Digital Innovation Hub (DIH)** for EO and Geospatial Information and develops into the **reference Centre in the Eastern Mediterranean, Middle East and North Africa Region (EMMENA)**.
- To create an **ecosystem** which combines **state-of-the-art remote sensing**, data management and processing technologies, cutting – edge research opportunities, targeted education services and promotion of entrepreneurship. ERATOSTHENES Centre of excellence is paving the way for Cyprus to enter the **space arena**.

EXCELSIOR – The Project

- **Funded under H2020 & Republic of Cyprus**
- **Pillar:** WIDESPREAD-01-2018-2019 Teaming 2 program
- **Total Budget:** >38,000,000 € (15 m€ from EC + 15m€ from Republic of Cyprus + 8 m€ from CUT, etc.)
- **Partners:** CUT, DEC, NOA, TROPOS, DLR
- **Advisory Committee:** Vincent Ambrosia, NASA; Bianca Hörsch, ESA Headquarters, Marcello Maranesi, IT; Prof. Lena Halounova, Prague/ISPRS Secretary General; Peter Zeil, AT; Daniel Barok, Israel
- **Duration:** 8,5 Years (EC) incl 1,5 yr extension
- **Start:** 1 October 2019 / **End:** 30 September 2027 (EC)



For more information visit: <https://excelsior2020.eu/> and <https://eratosthenes.org.cy/>

Overview of the Centre

- A new, autonomous Centre of Excellence (ERATOSTHENES Centre of Excellence, ECoE) (www.eratosthenes.org.cy) has been legally & physically established
- ECoE Staff: 50 (early 2024), ~ 100 by end 2026, 132 by end 2034)

Remote Sensing & Geo-Environment Lab
Department of Civil Eng. & Geomatics

2007



ERATOSTHENES
Research Centre

2017/19



Prof. Diofantos Hadjimitsis Managing Director
 Dr. Silas Michaelides Chief Operating Manager
 Dr. Kyriacos Themistocleous External Affairs & Business Development Director

The ERATOSTHENES CoE consists of three Departments:

- **Environment and Climate**

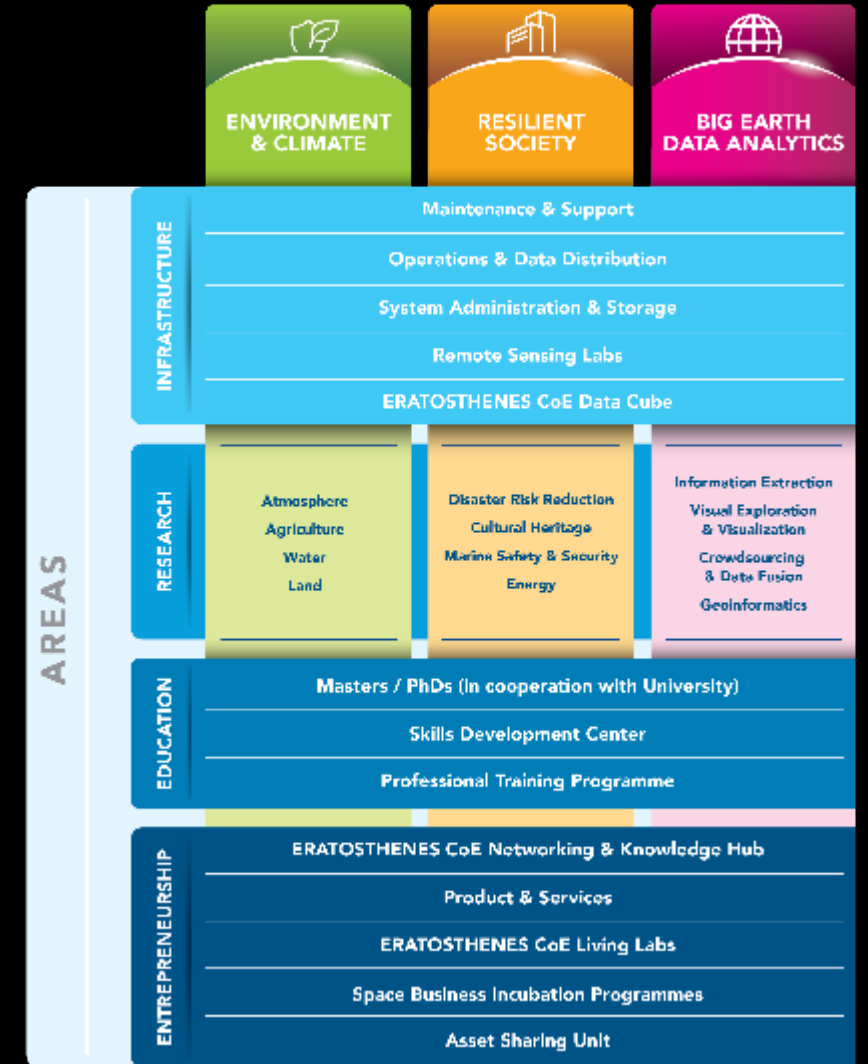
- Atmosphere
- Agriculture
- Water
- Land

- **Resilient Society**

- Disaster Risk Reduction
- Cultural Heritage
- Access to Energy
- Marine Safety and Security

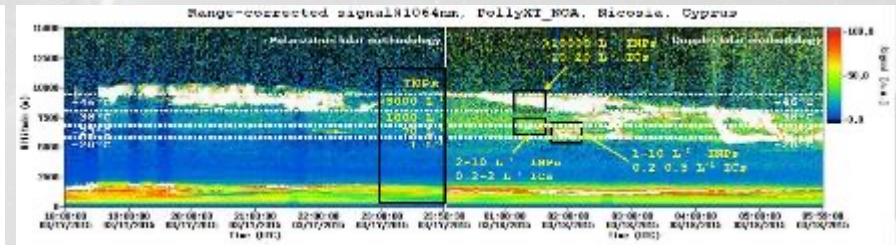
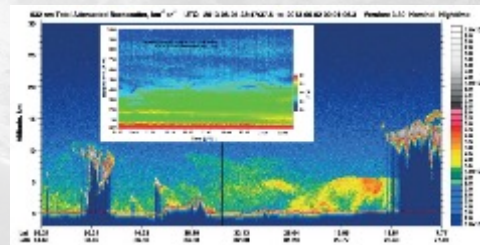
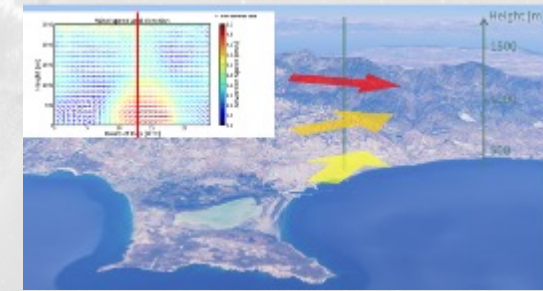
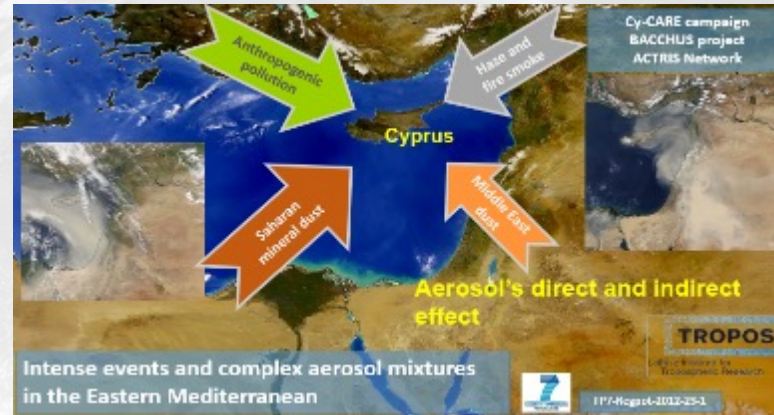
- **Big Earth Data Analytics**

- Information extraction
- Visual exploration & visualization
- Crowdsourcing & data fusion
- Geoinformatics



ATMOSPHERE – Activities

- 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
- CAL/VAL Activities for Satellite Mission
- Aerosol and Cloud Remote Sensing Observational Platforms (GRS)

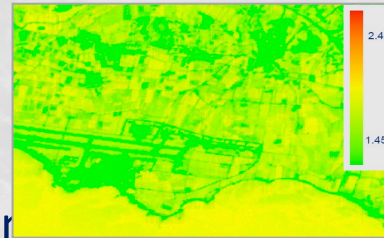


AGRICULTURE – Activities

- Precision Agriculture
- Smart Irrigation water resources management
- Carbon footprint calculations
- Hydrogeological modeling
- Common Agricultural Policy applications
- Soil health; pest/disease control
- Food security / Food safety
- Early warning systems
- Damage assessment and mitigation strategies for extreme weather events

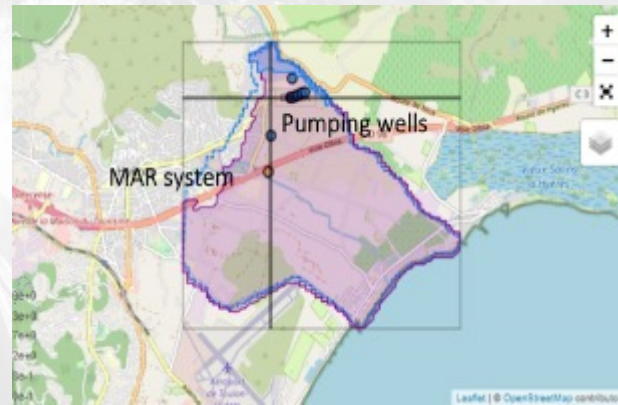
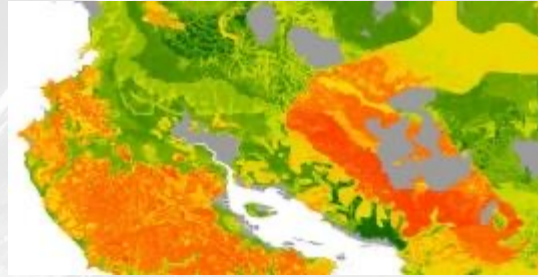


Carbonica



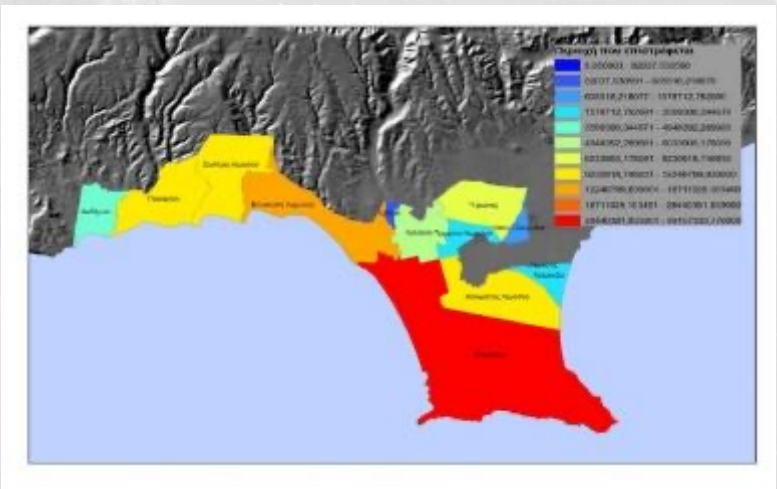
WATER – Activities

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



LAND – Activities

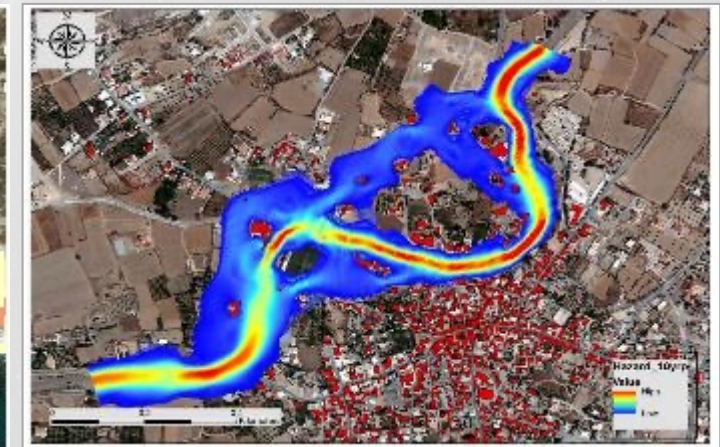
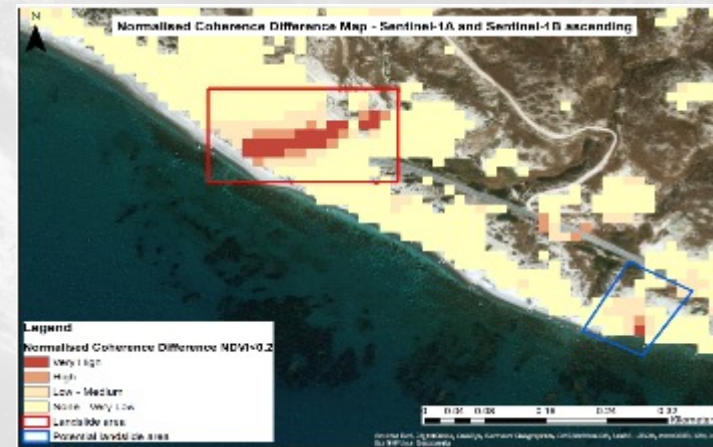
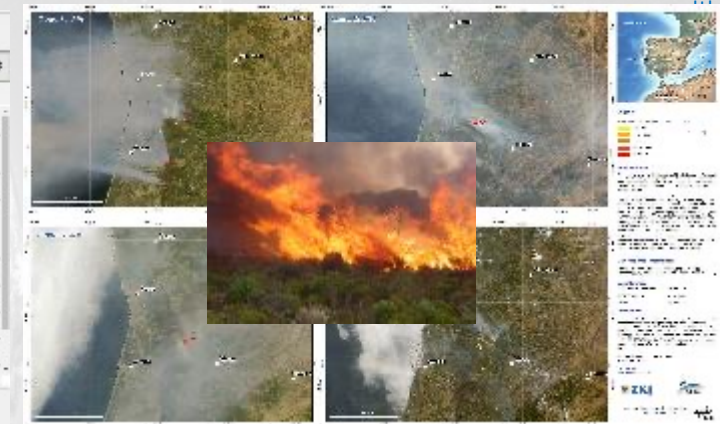
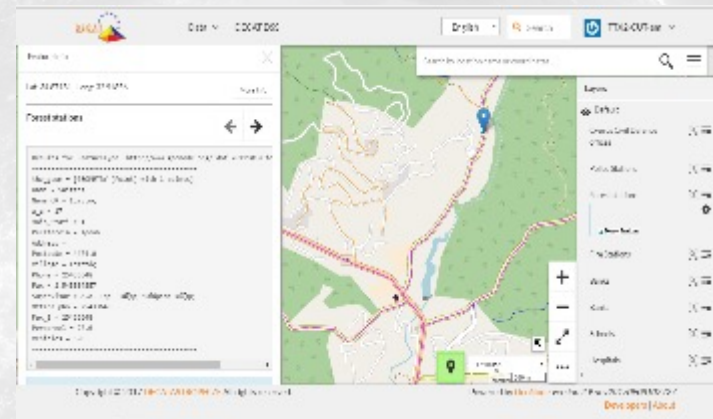
- Land Cover/ Land Use changes
- Urban sprawl monitoring
- Heat island
- Urban and regional planning
- Land Management Information systems
- Photogrammetric applications
- DEM generation



DISASTER RISK REDUCTION – Activities

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

AI OBSERVER



CULTURAL HERITAGE – Activities

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



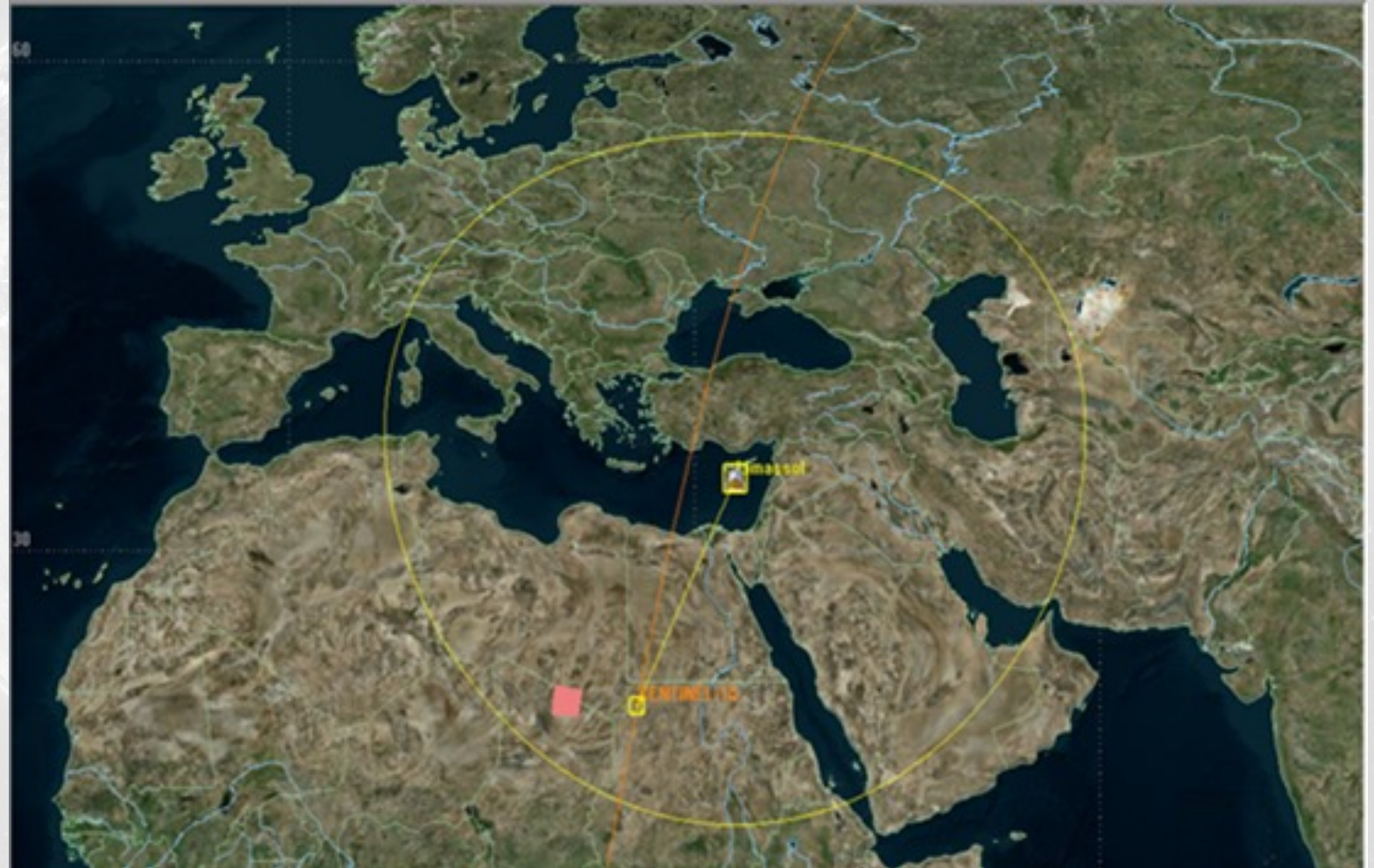
Investment

- 2000m² Offices and Research Laboratories
- State-of-the-art-Remote Sensing Research Infrastructure
 - Ground Based Sensing Station, GRS (Atmosphere)
 - Direct Access Antenna DAS (Data Reception, Near Real Time Services)



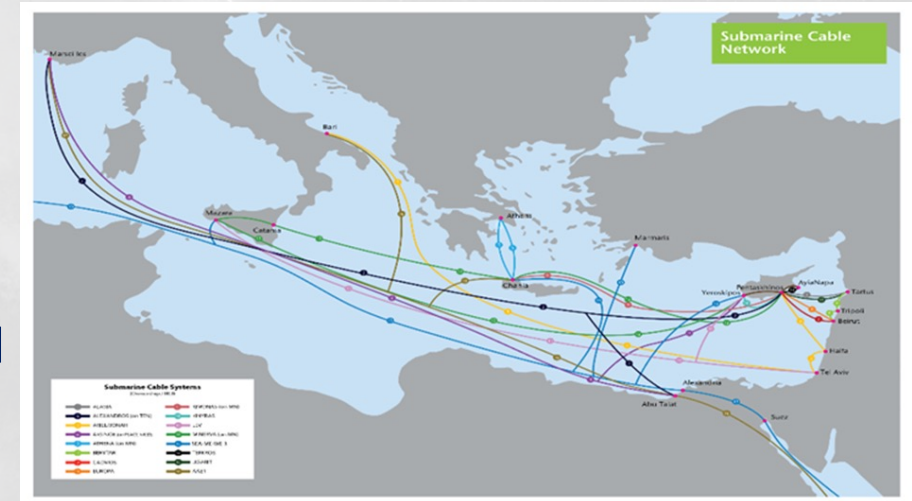
EO Satellites Direct Access Opportunities

- Most South-Eastern location on EU territory
- Covering EMMENA Region and nearby Seas:
 - East Mediterranean
 - Black Sea
 - Caspian Sea
 - Red Sea
 - Persian Gulf
- Near Real Time Services for environmental Science and Security/ Maritime Awareness
- Satellite data acquisition for new inclined orbits

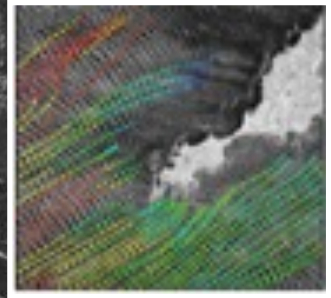


Direct Access Station (DAS)

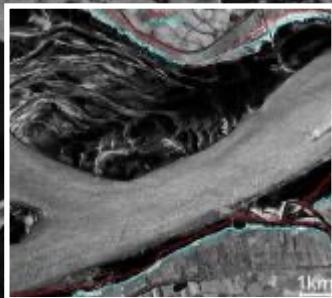
- Installed at Pera, a Cyta operational teleport (Cyta is Cyprus national telecom operator) by Q3/25
- 9m full-motion triband antenna (Safran, Fr)
- Simultaneous Reception in S, X & Ka Bands
- Horizon visibility down to 5° elevation
- 24/7 operations and support by experienced Cyta personnel
- Expansion by further systems



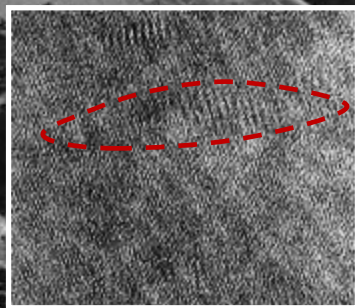
MARINE SAFETY AND SECURITY – Activities



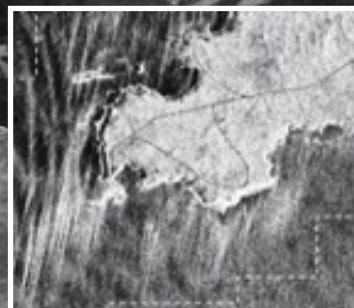
Bathymetry



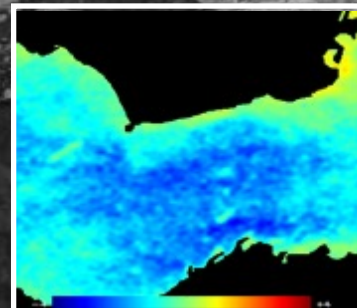
Land-Water line



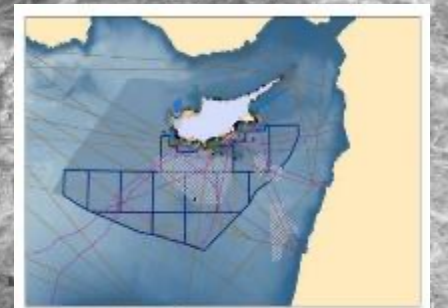
Wave groups



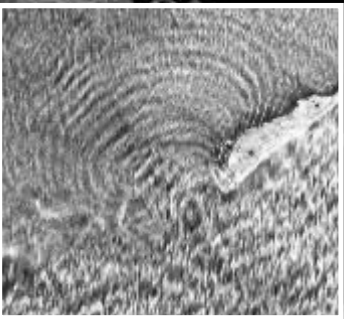
Wave breaking



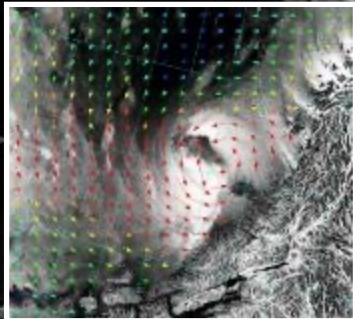
Surface Currents



Marine Spatial Planning



Sea state



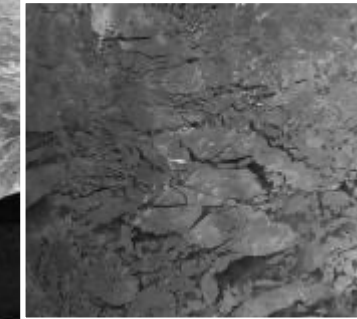
Wind



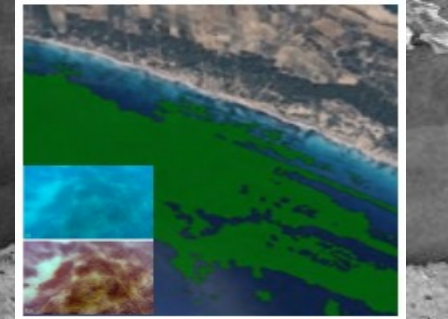
Ship detection



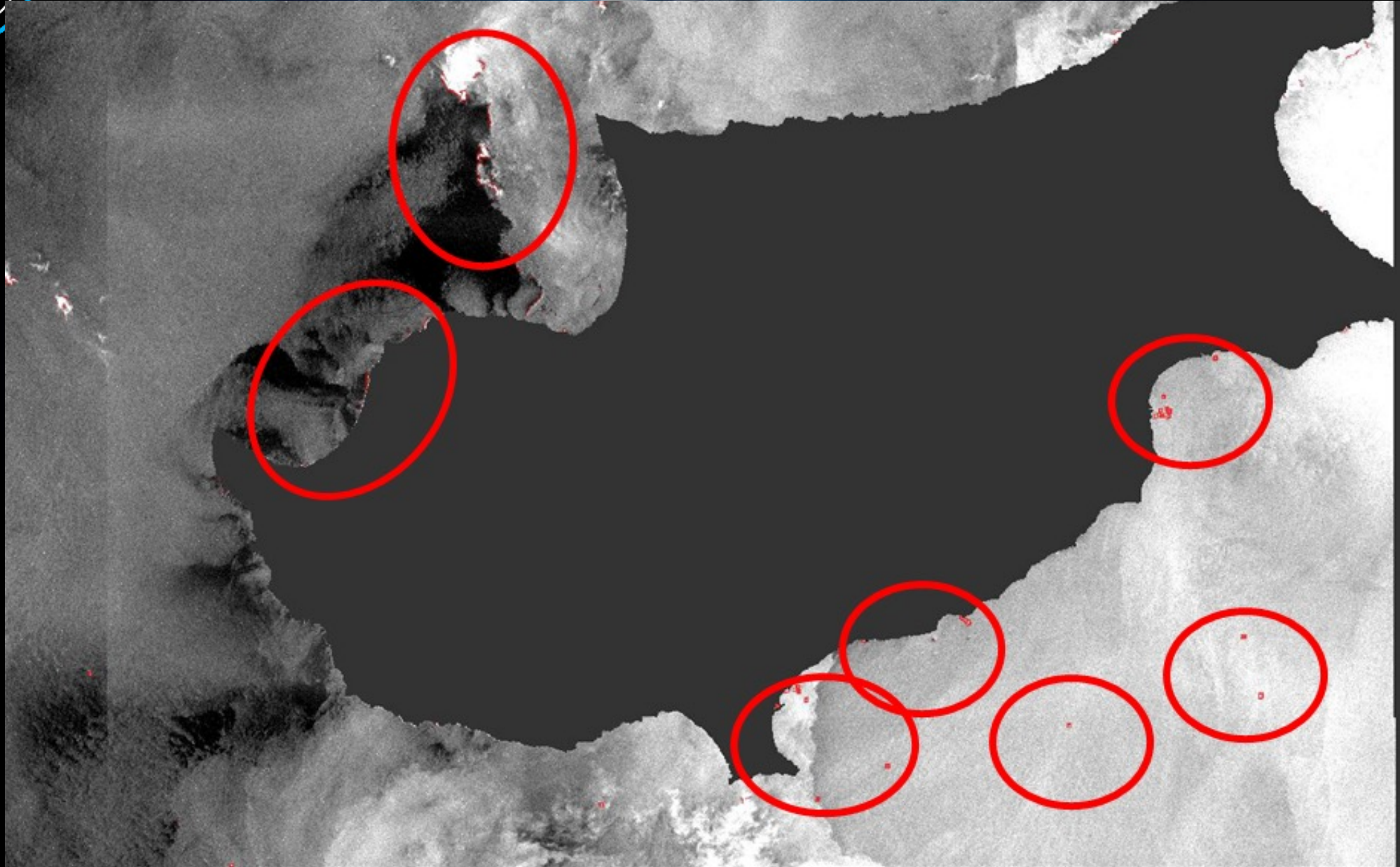
Oil spills



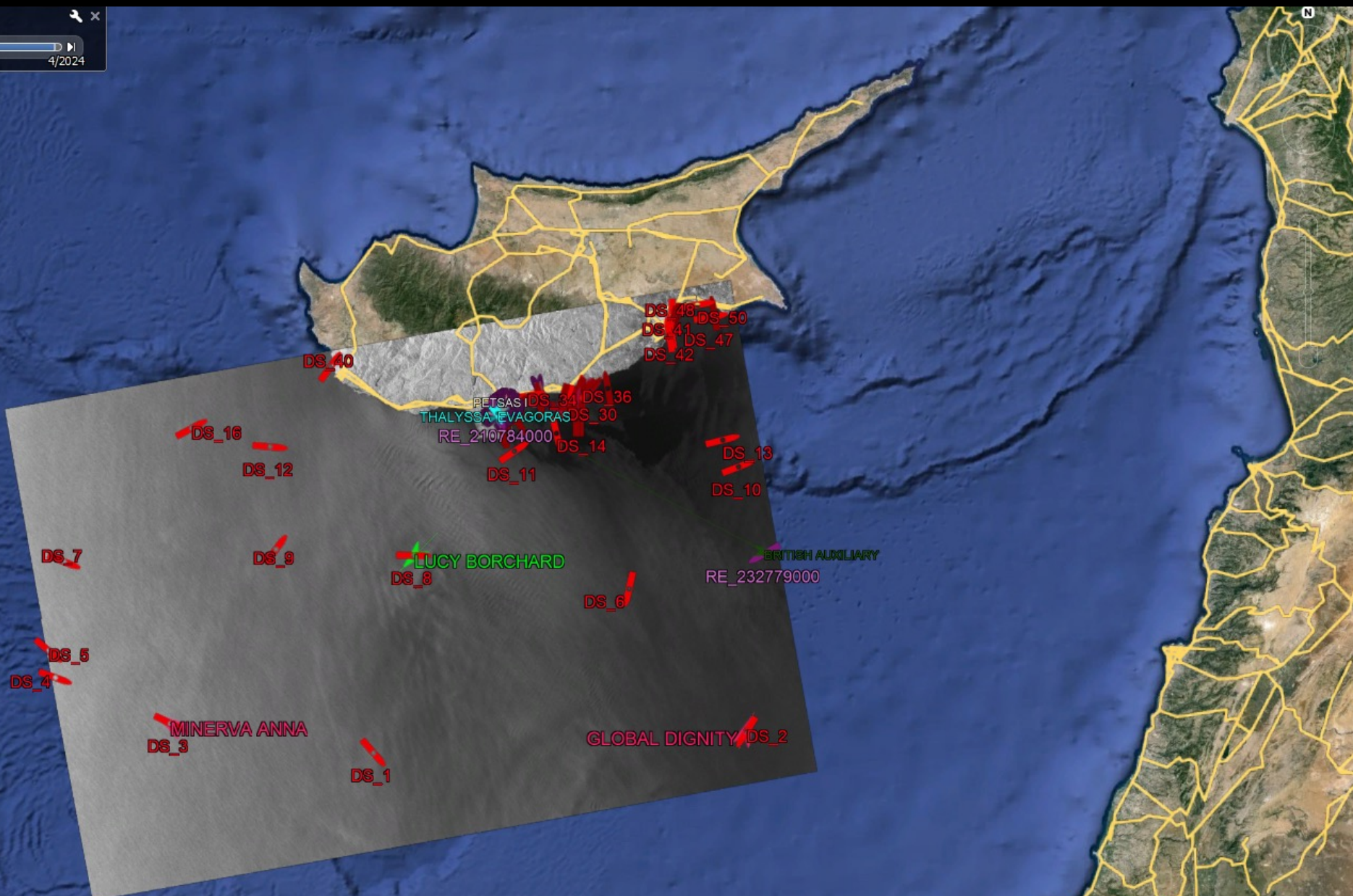
Icebergs



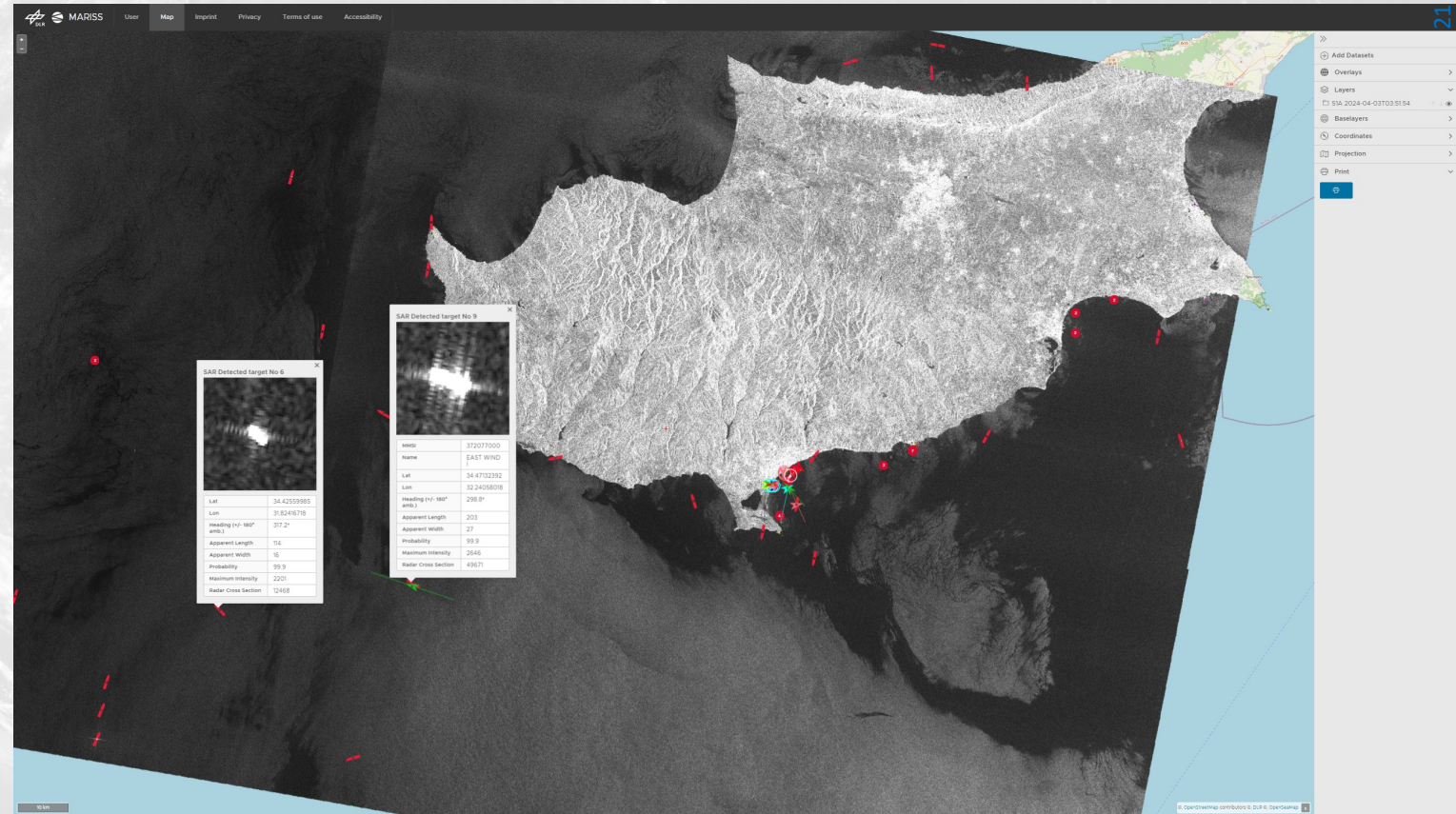
Posidonia



-  SAR detected ship
-  Radar echo expected position
- AIS Types**
-  Yacht
-  Passenger
-  Highspeed
-  Cargo
-  Tug/service
-  Fishing
-  Military
-  Wing
-  Tanker
-  Other



- Near real time ship detection application based on SAR images
- Currently optimized for: TerraSAR-X, TanDEM-X, Radarsat-2, Sentinel-1
- AI based new development for: Sentinel-1,
- Joint DLR – ECoE improvements also based on DLR developments



Summary

- Small EU member states ambitions in space technology & space economy
- Taking advantage of geographic, climatic and geopolitical conditions
- but also challenged by these conditions
- Finding and enhancing the strategic advantage
- Motivation, education, training of young staff
- and also governmental/political support
- Teaming with experienced players, European and worldwide
-It takes time

Thank you



CONSORTIUM



AFFILIATED ENTITIES



ACKNOWLEDGEMENTS



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SPARE

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AFFILIATED PARTNERS



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Management & Administration

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Member of the Executive Committee (CUT)

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MICHAELIDES



Dr. Kyriacos
THEMISTOCLEOUS



Prof. Christos
DANEZIS



Prof. Nicholas
KYRIAKIDES



Prof. Andreas
ANAYIOTOS



Dr. Kyriacos
NEOCLEOUS



Mrs. Anthia
CHRISTOFINI

Collaborations

EXCELSIOR consortium

Affiliated partners

Networks

CYTA, the national telecommunication authority, provided also a significant commitment for hosting the ground satellite receiving antenna in their land for 15years (10,000 sq.m land with LoC of 200K€)



>25 MoU agreements

National Support and Commitment from 19 Governmental Departments