

**med 2018**

11–12 December 2018 | ESA–ESRIN | Frascati (Rome), Italy



ESA

# **GEO-CRADLE Initiative: Coordination and Integration of EO Activities Accelerating the Development of Links with Copernicus & GEO/GEOSS**

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National Observatory of Athens, Greece



<http://geocradle.eu>

# Why sustained EO activities at regional level are important?

The continuous provision of **useful, accurate and timely information** through coordinated and sustained **Earth Observation** together with INSPIRE data, Copernicus, and GCI information

is a **key enabler**

for **informed decision making**, in response to regional challenges and towards the achievement of the **UN SDGs** and the implementation of the relevant **EU Directives**.



# The GEO-CRADLE contribution

**GEO-CRADLE** is a Coordination & Support Action; integrates state-of-the-art EO activities in the regions of **North Africa, Middle East, Balkans** (NAMEBA) and **Black Sea**; develops links with Copernicus and GEO, and GEO related flagship initiatives as EuroGEOSS & AfriGEOSS.



**GEO-CRADLE** brings together **key players** representing the **entire EO value chain** (researchers, public/private sectors, SMEs, decision makers), and promotes the **uptake and exploitation of innovative EO activities in the diversified territory of NAMEBA+BS** through:

- ✓ **Capacity building**
- ✓ **Awareness raising of stakeholders**
- ✓ **Establishing cooperation between countries**
- ✓ **Promoting open data sharing principles**
- ✓ **Ensuring interoperability of platforms**

<http://geocradle.eu>



The **GEO-CRADLE** project has received funding from the European Union's **Horizon 2020** research and innovation programme under grant agreement No 690133

# The GEO-CRADLE links



**GEO\_CRADLE: Coordinating and Integrating State-of-the-Art Earth Observation Activities in the Regions of North Africa, Middle East, and Balkans and Developing Links With GEO Related Initiatives Towards GEOSS H2020-SC5-2015, GA : No 690133**

2016-2019



















2.910.800 EUR

<http://geocradle.eu/en/>

**25 partners**

**20 countries**

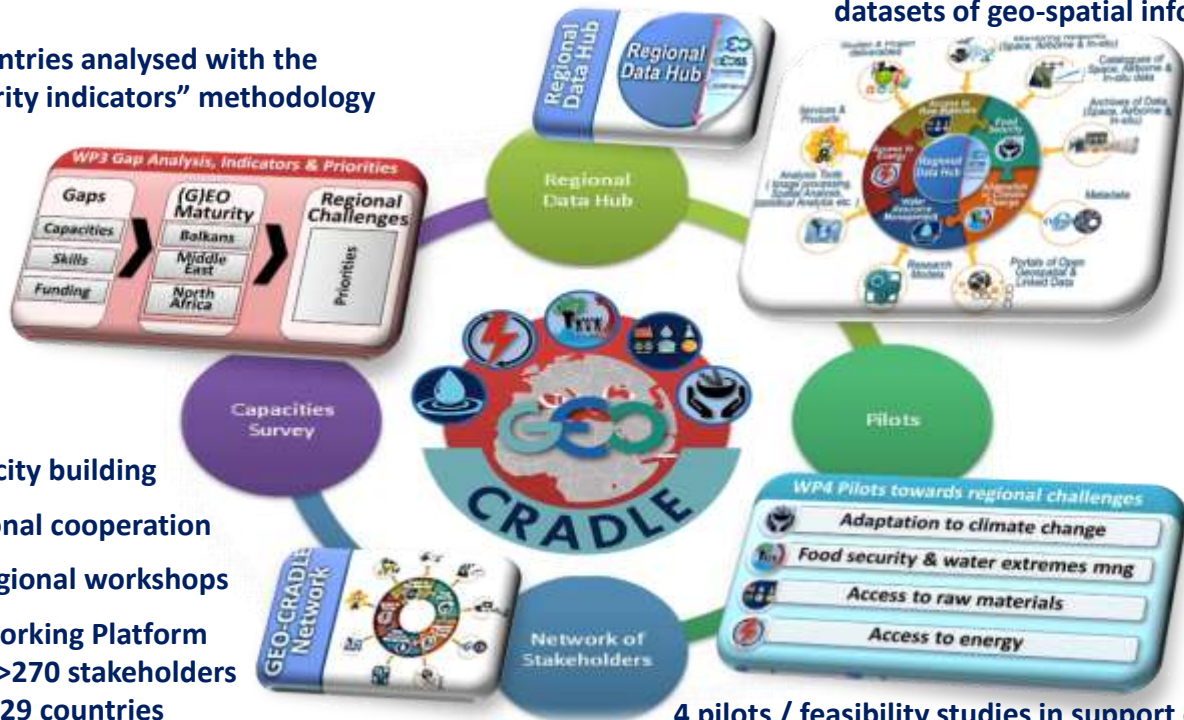
**3 continents around the Mediterranean Sea**

IN SUPPORT TO	LINKED TO GEO SOCIETAL BENEFIT AREA	LINKED TO COPERNICUS THEMATIC AREA	LINKED TO UN SUSTAINABLE DEVELOPMENT GOAL (SDG)	PROJECT TYPE
 <input checked="" type="checkbox"/>	 DISASTERS <input checked="" type="checkbox"/>  ENERGY <input checked="" type="checkbox"/>  FOOD SECURITY <input checked="" type="checkbox"/>  PUBLIC HEALTH <input checked="" type="checkbox"/>  WATER MANAGEMENT <input checked="" type="checkbox"/>	 ATMOSPHERE <input checked="" type="checkbox"/>  MARINE <input checked="" type="checkbox"/>  LAND <input checked="" type="checkbox"/>  CLIMATE <input checked="" type="checkbox"/>  EMERGENCY <input checked="" type="checkbox"/>  SECURITY <input checked="" type="checkbox"/>	 ZERO HUNGER <input checked="" type="checkbox"/>  AFFORDABLE ENERGY <input checked="" type="checkbox"/>  CLIMATE CHANGE <input checked="" type="checkbox"/>  LIFE ON LAND <input checked="" type="checkbox"/>  SUSTAINABLE CITIES <input checked="" type="checkbox"/>	<b>COORDINATION ACTION</b> <input checked="" type="checkbox"/>  <b>RESEARCH &amp; INNOVATION</b> <input type="checkbox"/>  <b>INNOVATION ACTION</b> <input type="checkbox"/>
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# The GEO-CRADLE overview

Regional Data Hub assisting the harmonised access to >25,000,000 datasets of geo-spatial information

11 countries analysed with the “maturity indicators” methodology



Capacity building

Regional cooperation

16 regional workshops

Networking Platform  
with >270 stakeholders  
from 29 countries

4 pilots / feasibility studies in support of 11 UN  
SDGs showcasing the delivery of innovative EO  
services by integrating existing regional capacities



## GEO Capacity Building in North Africa, Middle East, Balkans, and Black Sea

A **continuation** and **extension** of the work of **GEO-CRADLE** which will capitalise, sustain and scale-up its results, as well as key outcomes of other relevant EU flagship projects and initiatives (e.g. GEOGLAM, NextGEOSS, ERAPLANET, EuroGEOSS, AfriGEOSS, GEO-VENER, EO4SDG), in support of the **3 GEOSS priorities**, namely **CC**, **DRR** and **SDGs**.

### Geographic extension



Black Sea

### Thematic extension



Disasters Management &  
Water Resources Management

### Operational Maturity



Operationalisation of services  
to the engaged users

# GEO-CRADLE Initiative: Activities

1. **Promote the coordination of EO activities at regional level**
2. Assess the maturity of EO activities at national level
3. Foster the progressive operationalisation of EO-based services
4. Promote the effective implementation of data sharing principles

Sustained operation of the GEO-CRADLE networking platform



Organisation of more regional workshops



Exploitation of new tools for stakeholder engagement



**FPA**

**Relays**

**Academies**

Interface with key initiatives



# GEO-CRADLE Initiative: Activities

1. Promote the coordination of EO activities at regional level
2. **Assess the maturity of EO activities at national level**
3. Foster the progressive operationalisation of EO-based services
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Further implementation, test and improvement of the “maturity indicators” methodology in the current 11 countries

Geographic extension to new countries with the support of EuroGEOSS and AfriGEOSS

Establishment of a mechanism for periodic update

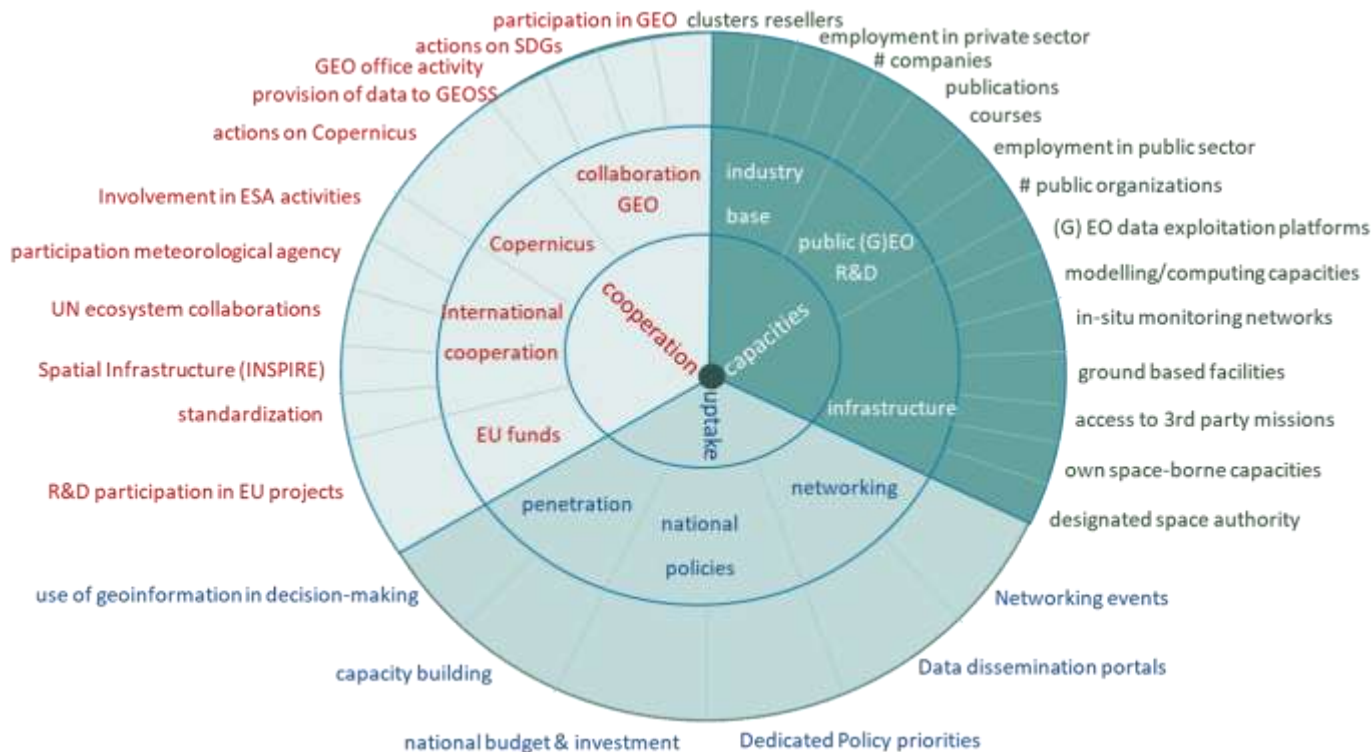


	Maturity Indicators (2nd-c)	MAI2010	BOUNDED
Algeria	3.00	0	0
Bulgaria	3.00	0	0
Cyprus	3.00	0	0
Egypt	3.00	0	0
France	3.00	0	0
Greece	3.00	0	0
Italy	3.00	0	0
Malawi	3.00	0	0
Morocco	3.00	0	0
Senegal	3.00	0	0
Tunisia	3.00	0	0
Turkey	3.00	0	0





# GEO-CRADLE Initiative: The Maturity Criteria



# GEO-CRADLE Initiative: The Maturity Results



The overall maturity score for countries surveyed by the GEO-CRADLE project in the Balkans, Middle East and North Africa



# GEO-CRADLE Initiative: Activities

1. Promote the coordination of EO activities at regional level
2. Assess the maturity of EO activities at national level
3. **Foster the progressive operationalisation of EO-based services**
4. Promote the effective implementation of data sharing principles

Exploitation of the results of the 4 GEO-CRADLE pilots

Link to the 3 GEO priorities (CC, DRR and SDGs) and the national needs for achievement of SDGs

Further involvement of the private sector

## GEO-CRADLE Thematic Areas in support of the UN SDGs



# GEO-CRADLE Initiative: Activities

1. Promote the coordination of EO activities at regional level
2. Assess the maturity of EO activities at national level
3. Foster the progressive operationalisation of EO-based services
4. **Promote the effective implementation of data sharing principles**

Sustained operation  
of the GEO-CRADLE  
Regional Data Hub

Further registration  
of key national and  
regional datasets to  
the GEOSS Platform

Synergies with  
other initiatives and  
projects



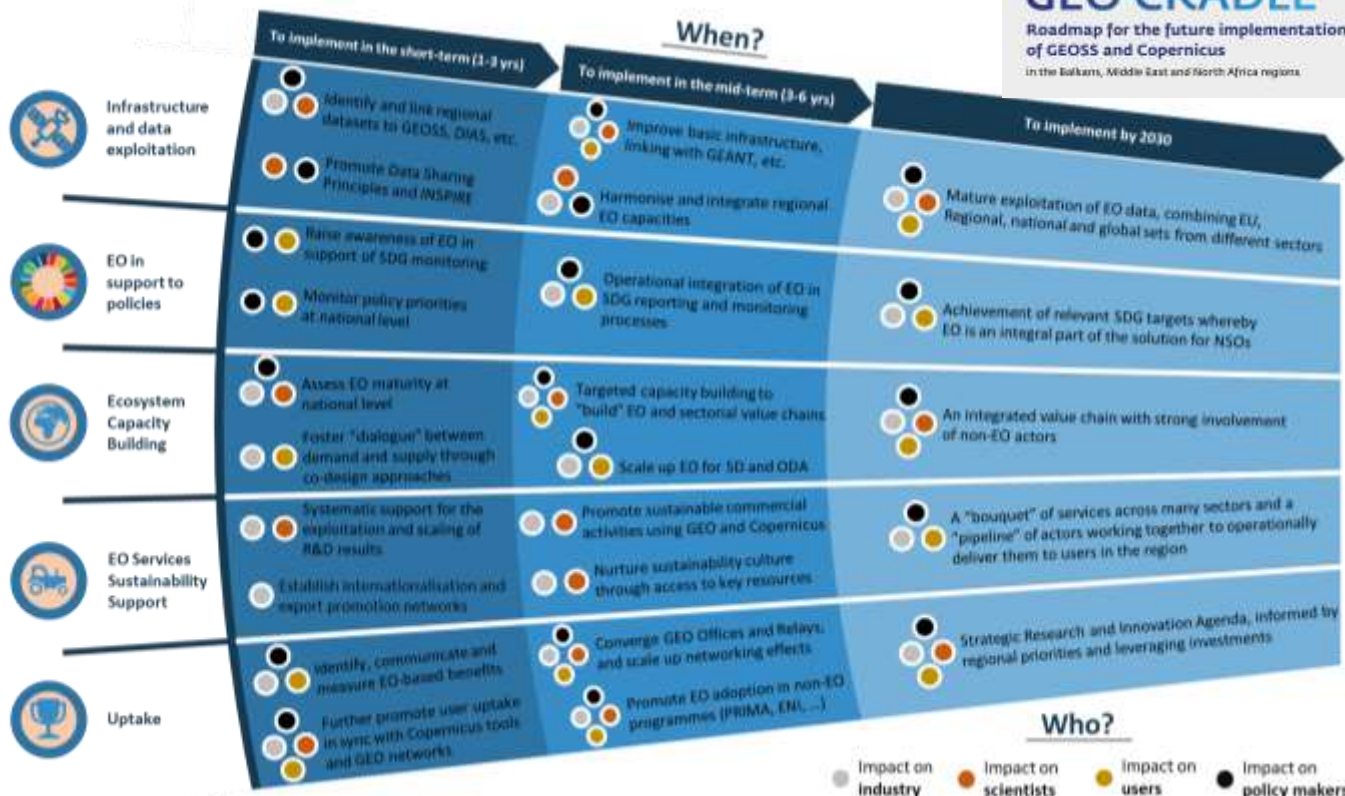
# GEO-CRADLE Initiative: The Roadmap - Action Plan

## GEO-CRADLE

Roadmap for the future implementation of GEOSS and Copernicus

in the Balkans, Middle East and North Africa regions

What?





# GEO-CRADLE Initiative: The Roadmap - Action Plan

Action 1: Identify and link regional datasets to GEOSS **Platform**, DIAS and data gateways

Action 2: Promote Data Sharing Principles and INSPIRE

Action 3: Improve **basic infrastructure**, linking with GEANT, etc

Action 4: Harmonise and integrate regional EO capacities

Action 5: Raise awareness of **EO in support of SDG monitoring**

Action 6: Monitor **policy priorities** at national level

Action 7: Foster operational integration of EO in SDG reporting and monitoring processes

Action 8: Assess **EO maturity** at national level

Action 9: Foster “dialogue” between demand and supply through co-design approaches

Action 10: Carry out targeted capacity building to “build” **EO and sectorial value chains**

Action 11: Scale up EO for Sustainable Development and ODA

Action 12: Provide systematic support for the exploitation and scaling of R&D results

Action 13: Establish internationalisation and **export promotion networks**

Action 14: Promote sustainable commercial activities using GEO and Copernicus

Action 15: Nurture sustainability culture through access to key resources

Action 16: Identify, **communicate and measure EO-based benefits**

Action 17: Further promote user uptake in sync with Copernicus tools and GEO networks

Action 18: **Converge GEO Offices and Relays**, and scale up networking effects

Action 19: Promote **EO adoption in non-EO programmes** (PRIMA, ENI, ...)

Action 20: Develop and implement a Strategic Research and Innovation Agenda, informed by regional priorities and leveraging investments

# GEO-CRADLE Initiative: The DRR Aspect

**GEO-CRADLE is/will be linked to DRR domain through :**

- (a) already developed thematic services and
- (b) on-going projects/initiatives led by the coordinator and the partners strongly linked with DRR.

**Examples of thematic areas and relevant achievements :**

- **Indicative services**

1. Adaptation to Climate Change; Climate Projections of essential climate parameters for NAMEBA
2. Resilience of Agriculture production and Food against extreme disaster and climate related events (e.g. Droughts and Floods)
3. Soil status, Soil moisture, Water balance, Water scarcity
4. Energy balance – Solar Energy Exploitation for PVs, Agro-food production, Hospitals

- **Web based prototype services** have been developed and made available to the daily practice of end-users, showcasing the benefit from engaging the EO communities and EO means towards building resilient societies and meaningful DRR

- **A number of 106 Stakeholders from all sectors (Institutional 35 + Research & Academic 47 + Commercial 24)** has been engaged so far in the network of GEO-CRADLE, directly or indirectly linked to DRR.

One of the priorities in GEO-CRADLE initiative would be to **further expand the network of the involved entities and the collection/assessment of DRR requirements in the regions**, as well as the prioritisation of **common/regional challenges with respect to DRR**

# GEO-CRADLE Initiative: The DRR Aspect

## Institutional

**ALBANIA:** National Food Authority, Risk Management and Inspections Coordination

[www.aku.gov.al](http://www.aku.gov.al)

## Research & Academic

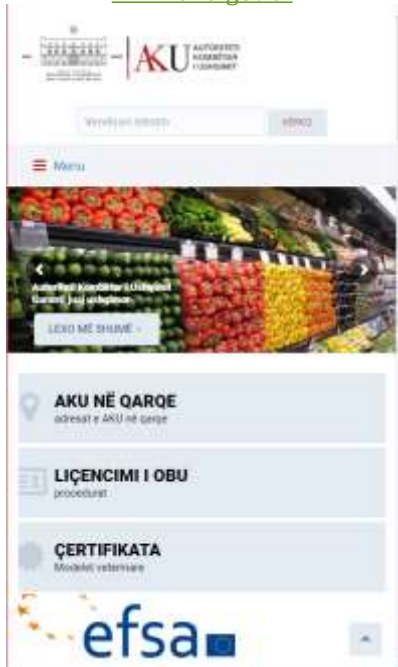
**GREECE:** BEYOND Center of Excellence for EO-based Monitoring of Disasters, NOA

[www.beyond-eocenter.eu](http://www.beyond-eocenter.eu)

## Commercial

**BULGARIA:** RISK – SPACE – TRANSFER Technology Transfer Office

[www.rst-tto.com](http://www.rst-tto.com)



# GEO-CRADLE Initiative: The DRR Aspect

So far, the **geographic distribution of the 106 engaged stakeholders** is as follows:

**BALKANS: 63**                      Albania 9 + Bulgaria 8 + Croatia 1 + FYROM 3 + Greece 19 + Kosovo\* 2  
+ Montenegro 3 + Romania 5 + Serbia 11 + Slovenia 2

**MIDDLE EAST: 25**              Cyprus 4 + Israel 6 + Jordan 3 + Turkey 12

**NORTH AFRICA: 18**            Egypt 6 + Morocco 3 + Tunisia 9

• **The capacities** owned by the engaged countries in terms of **monitoring tool and networks, data and portals** cover all the following fields:

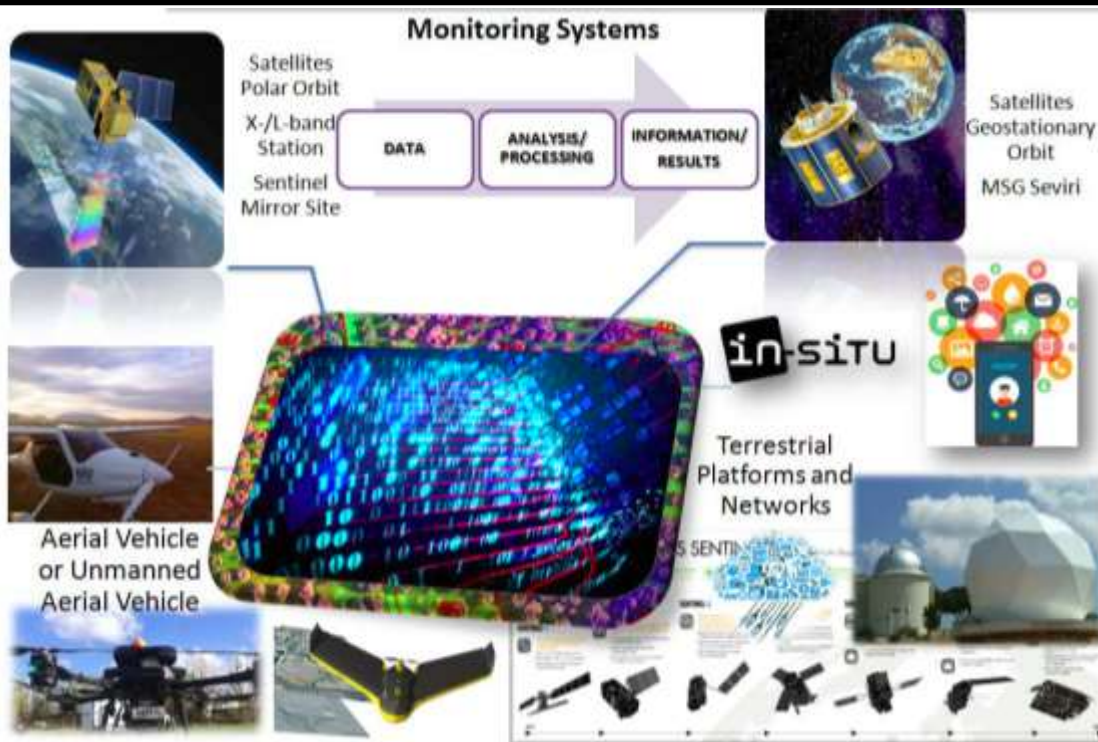
- **Space-borne capacities 12** (BA: 6, ME: 5, NA: 1)
- **Ground-based/In-situ monitoring networks/facilities 38** (BA: 21, ME: 11, NA: 6)
- **Modelling and computing processing capacities 36** (BA: 21, ME: 9, NA: 6)

• **The GEO-CRADLE Regional Data Hub** that facilitates the transparent and interoperable access to hundreds of thousands of cleaned geo-spatial datasets referring to socio-economic and geographic information (linking to GEOSS, INSPIRE, local geo-portals) **will be further expanded with respect to DRR priorities**

*\* This designation is without prejudice to positions on status, and is in line with UNSCR 1244/1999 and the ICJ Opinion on the Kosovo declaration of independence.*

# GEO-CRADLE Initiative: The DRR Aspect – GEO-CRADLE vs EMS

- **The GEO-CRADLE** is strongly engaged (through the BEYOND EO Center for Disasters <http://beyond-eocenter.eu/> coordinated by the NOAA) in **DRR**:



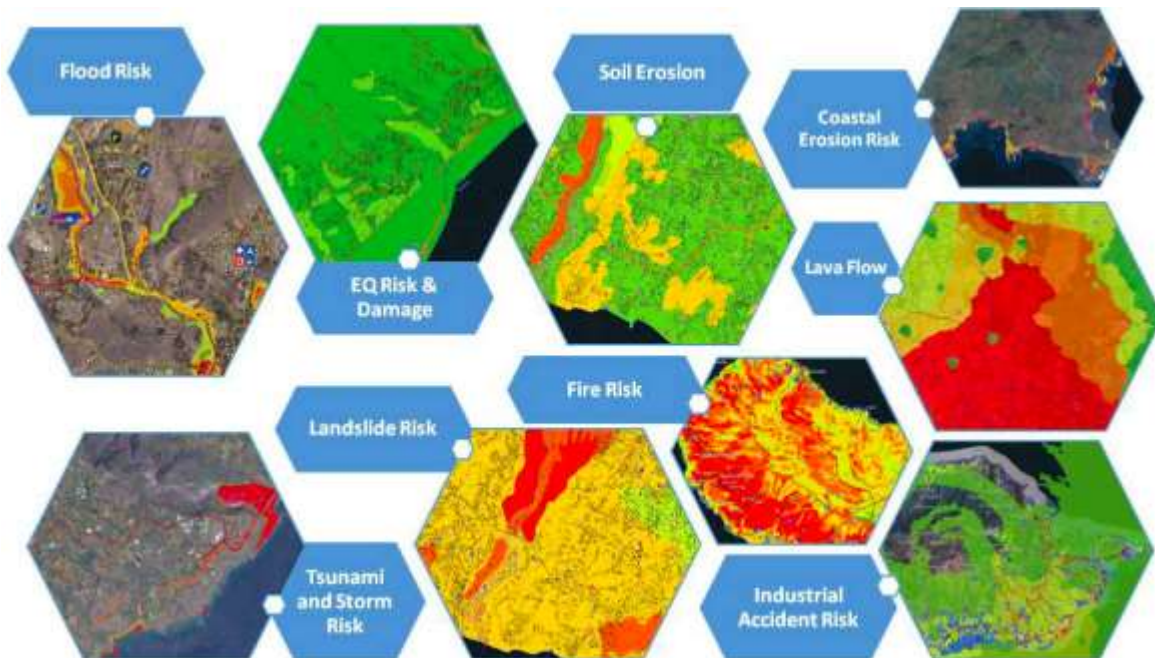


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- **The GEO-CRADLE** is strongly engaged (through the BEYOND EO Center for Disasters <http://beyond-eocenter.eu/> coordinated by the NOA) in **DRR**:
  - **BEYOND** is actively involved in the Copernicus EMS Risk & Recovery Pillar as service provider, delivering only in the last two years **Preparedness, Vulnerability and Risk Assessment and Recovery Services**, and **Mitigation Planning** to > 20 Civil Protection Authorities worldwide for a vast portfolio of events and types of disasters
  - Also **Rapid Damage Assessment services over Greece and neighbouring countries** (e.g. fires/floods – 2007/2009/2018 Attica fires in Greece, Balkans and EQs/landslides globally)



## Actively involved in the Copernicus EMS Risk & Recovery - Examples



Thousands of **Vulnerability, Hazard, Damage Assessment Maps and Reference (Assets) Maps** have been delivered in the scale of 1:5000 – 1:10000

A vast portfolio of disasters: **fires, floods, draughts, water scarcity, landslides, earthquakes, volcanic eruption, tsunamis, epidemics, industrial accidents, storms/typhoons, etc.**

# GEO-CRADLE Initiative: The DRR Aspect – GEO-CRADLE vs EFFIS

- **The GEO-CRADLE** is strongly engaged (through the BEYOND EO Center for Disasters <http://beyond-eocenter.eu/> coordinated by the NOA) in **Early Warning**:
- **BEYOND delivers the Copernicus EFFIS services over the NAMEBA and entire Europe.**

## ECOSYSTEM OF EO SYSTEMS & SERVICES

- **Early detection, Monitoring, Decision Making Support, and Management of Forest Fires and Burned Areas in Real Time and Post Fire –**  
Best Service Challenge Service Copernicus Masters 2014
- The [European Forest Fires Information System - EFFIS](#)



06/12/2018

<https://sentinels.space.noa.gr/>

The [FireHub](#) System



**BEYOND**

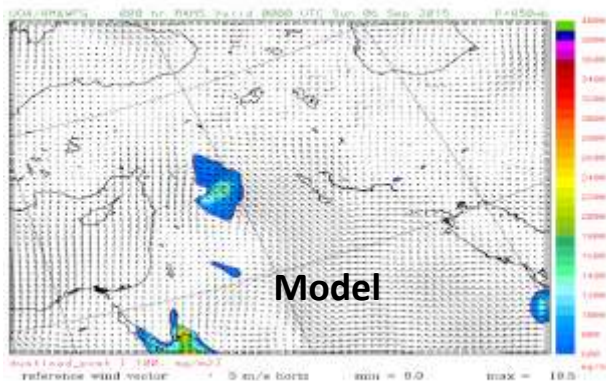
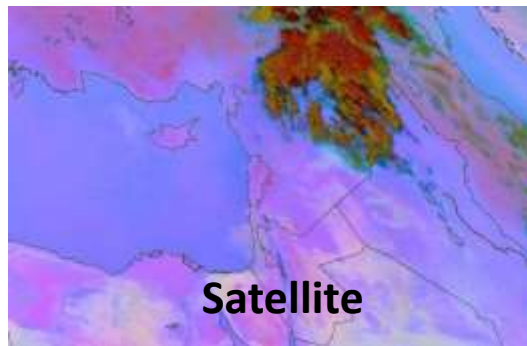
**esa**

## A record-breaking Middle East haboob 6-13 September 2015

Climate Change ?  
War Aftermath?



**Severe convective downdrafts over East Turkey and North Iran resulted in mobilization of dust over Middle East and East Mediterranean.**



Mamouri, R.-E., Ansmann, A., Nisantzi, A., Solomos, S., Kallos, G., and Hadjimitsis, D. G.: Extreme dust storm over the eastern Mediterranean in September 2015: satellite, lidar, and surface observations in the Cyprus region, *Atmos. Chem. Phys.*, 16, 13711–13724, doi:10.5194/acp-16-13711-2016, 2016.



# SMURBS: SMart URBan Solutions for disasters – GEO-CRADLE vs ERAPLANET

Flood events are the world's most frequent disasters affecting a large number of people and assets.

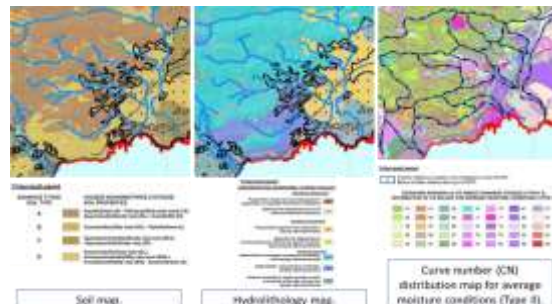
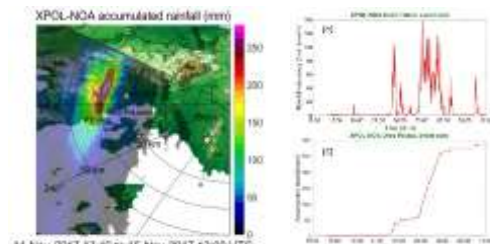
During the past 30 years, flooding killed more than 200.000 people and affected more than 2,8 billion others worldwide.



*Lethal flood (24 casualties) on 15/11/2017 in Mandra, Attica region, Greece*



Flood monitoring using remote sensing (satellite & airborne), in-situ data, modelling, and **crowdsourcing**





# SMURBS: SMart URBan Solutions for disasters – GEO-CRADLE vs ERAPLANET

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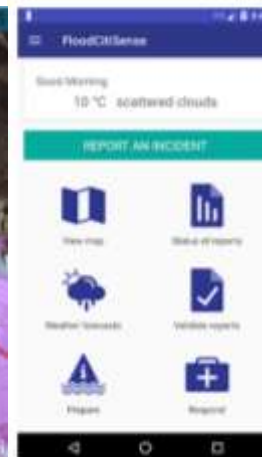
Flood monitoring using remote sensing (satellite & airborne), in-situ data, modelling, and **crowdsourcing**

**BEYOND**  
Centre of Excellence for EO-based monitoring of Natural Disasters



**SMURBS**  
ERA-PLANET

**FloodCitiSense**



# GEO-CRADLE Initiative: The DRR Aspect – GEO-CRADLE vs NEXTGEOSS

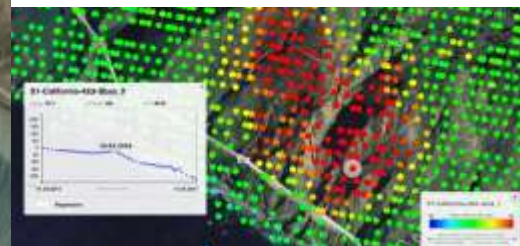
Landslides represent one of the disasters that occur most frequently worldwide after hydro-meteorological events.

In 2017, 453 landslides were recorded worldwide causing 4,164 deaths (D. Petley, April 2018)

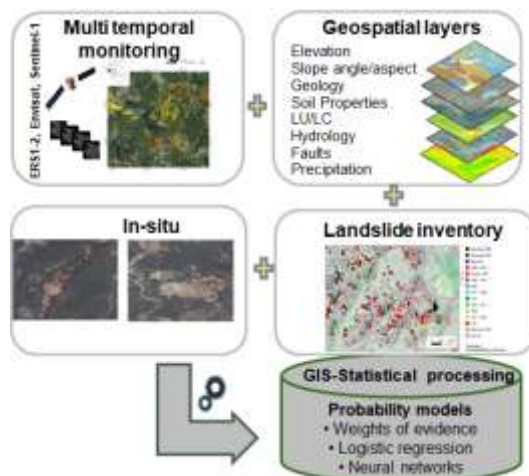
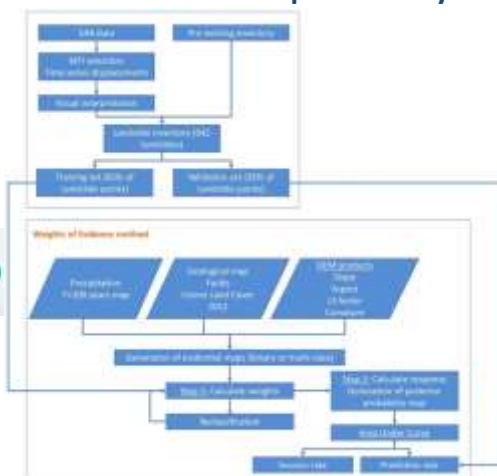


California, USA

**Use of Sentinel-1 & Small Baseline Subset interferometry (SBAS) technique**



Landslide using remote sensing (satellite & airborne), in-situ data, modelling, and open platform allowing multitemporal analysis of EO data



**NEXTGEOSS**  
Contributing to the Vision of GEO

## GEO-CRADLE Initiative: The DRR Aspect – GEO-CRADLE vs EUROGEOSS

- **The GEO-CRADLE is strongly engaged in the EUROGEOSS Initiative for DRR:**
  - In the **EuroGEOSS initiative** we have been mandated to coordinate the **Disasters Action Group** bringing together the **EU Research and SME and co-designer communities** (sectors: Energy, Facilities, Transport, Tourism, Agriculture, Insurance) **along three axes of resilience:**
    - (a) Business Resilience,
    - (b) Ecosystem and Citizen Resilience,
    - (c) Agro-food Resilience.
- Key partners who are actively involved and coordinated in this framework are: **ECMWF, CNR, FMI, ARMINES / MINES, EU-SatCen, Médecins Sans Frontières, Greek Ministry of Health, Egyptian Ministry of Electricity and Renewable Energy, Moroccan Royal Centre for Remote Sensing, Multi-hazards Functional Centre - Regional Environmental Protection Agency of Calabria/Italy.**



# SCENT: Smart Toolbox for Engaging Citizens into a People-Centric Observation Web

**BEYOND**  
Centre of Excellence for EO-based monitoring of Natural Disasters

FloodHUB



scent



## Kifisos, Attica, Greece

### Legend

Hydrographic Network

Meteorological Stations

Drills Research

Altitude

High 1400

Orientation



Scale

0 2 4 6 8 Kilometers

Low 0



The hydrographic network has been drastically altered due to distinct land-use and **68% of the basin is occupied by urban expanses** – host to 4 million citizens. The **city's rapid development** occurred without an appropriate plan for drainage works: Parts of the drainage network were shrunk and converted into streets whilst critical river cross sections were diminished. When **floods** occur they have a **significant impact on infrastructure**, especially at the downstream part, including Piraeus port, a major transportation hub that is served by railway network and major roads.

During the **large scale citizen campaign with field visits**, citizens took **on-site images** from the pilot site, enriching the existing dataset. A larger group of citizens participates in the **online gaming apps** for annotating already available images.

**scent**

## Attica Pilot Campaign

Become a Citizen Scientist and join us at our Scent Campaign in Attica, Greece, 15-18 November, and help test the new Scent Explore and Scent Measure apps.

Register now: <http://bit.ly/2ndAthensPilotEngl>

European Commission funding under the Horizon 2020 research and innovation programme

med 2018

11-12 December 2018 | ESA-ESRIN | Frascati (Rome), Italy





- **The GEO-CRADLE** is strongly engaged (through the BEYOND EO Center for Disasters <http://beyond-eocenter.eu/> coordinated by the NOA) in **ESA and UN-SPIDER DRR programs**:
  - The **ESA's EO4SD Climate Resilience Action** to address DRR and Preparedness/Mitigation needs of the
    - (a) **World Bank (WB)**
    - (b) **Asian Development Bank (ADB)**
    - (c) **Inter-American Development Bank (IADB)**
  - Undertake capacity building in the regions of:
    - (i) **Sahel, South Asia, Africa, Monrovia (Liberia) and Afghanistan** for WB
    - (ii) **Philippines, China and Mongolia** for ADB
    - (iii) **Peru (Amazon rainforest), Nicaragua, Trinidad** for IADB.
  - **Act as regional Support Office of UN-SPIDER in the NAMEBA region**, with the responsibility to assist **the transfer of know-how, capacity building and training** of the competent authorities.



thank you!



<http://geocradle.eu>

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