



# Geospatial Intelligence for Environmental Compliance Assurance

4 Networks Conference, Rome, 28-29 September 2023

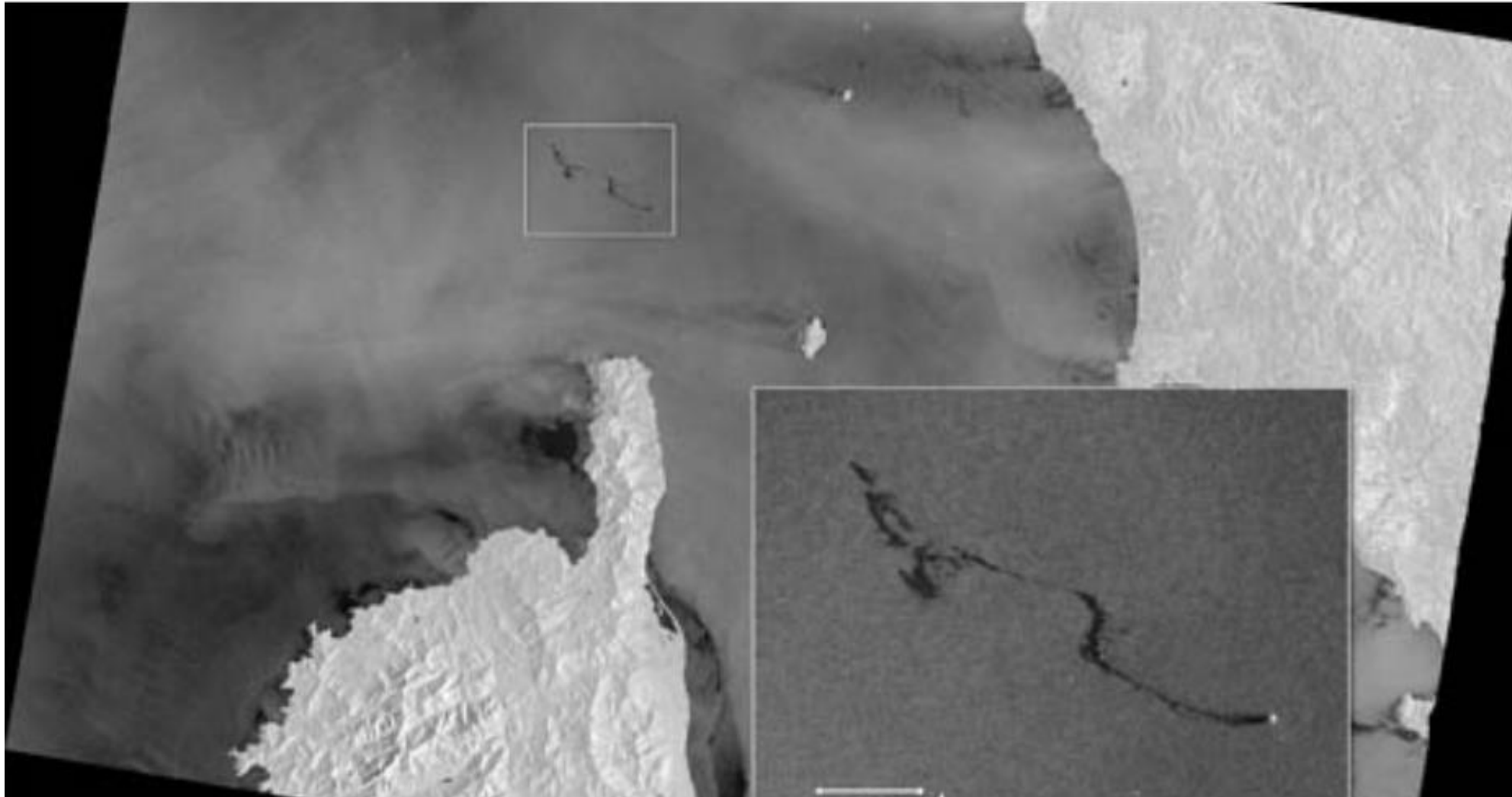
*Pieter Beck, Joint Research Centre*



- Analysis of aerial photos over France, mapped ca. 120 000 swimming pools in 2023 for which taxes were due.



# Operational use of geodata for compliance assurance







- Brazil relies on satellite-based alerts to support law enforcement on logging activities

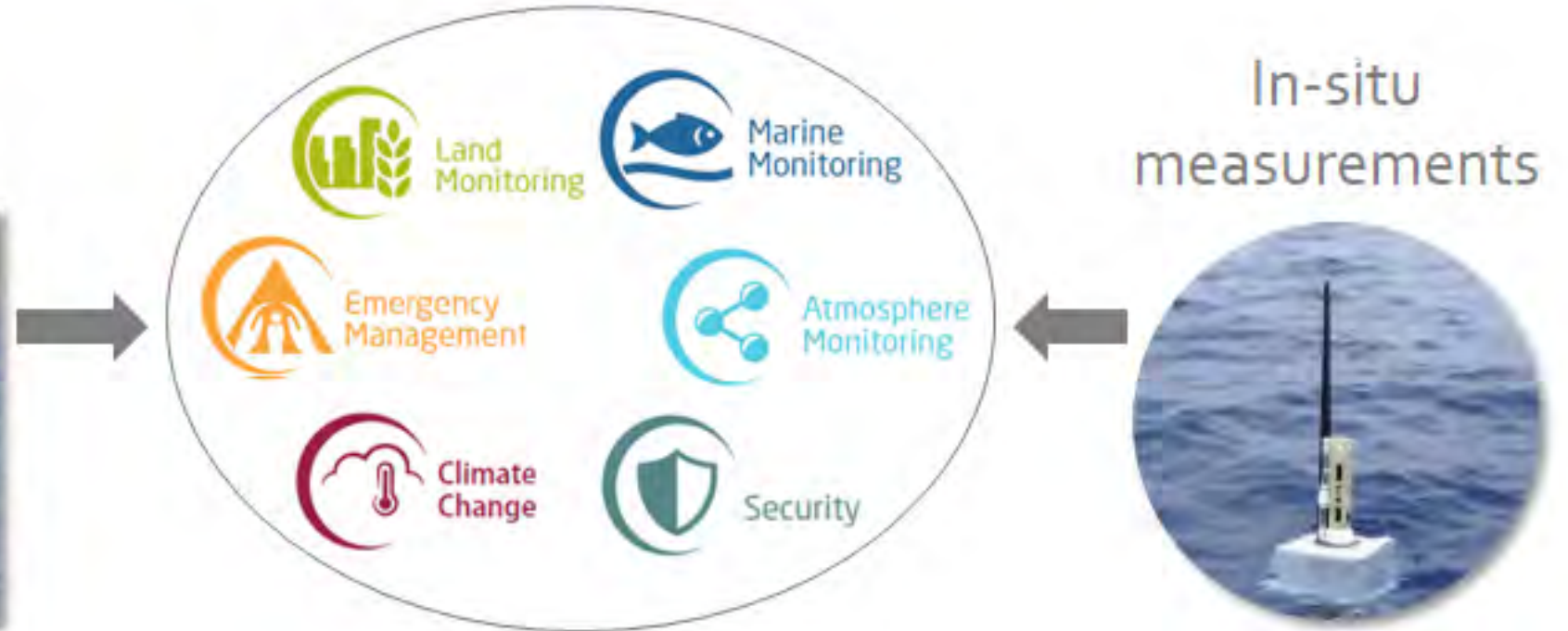
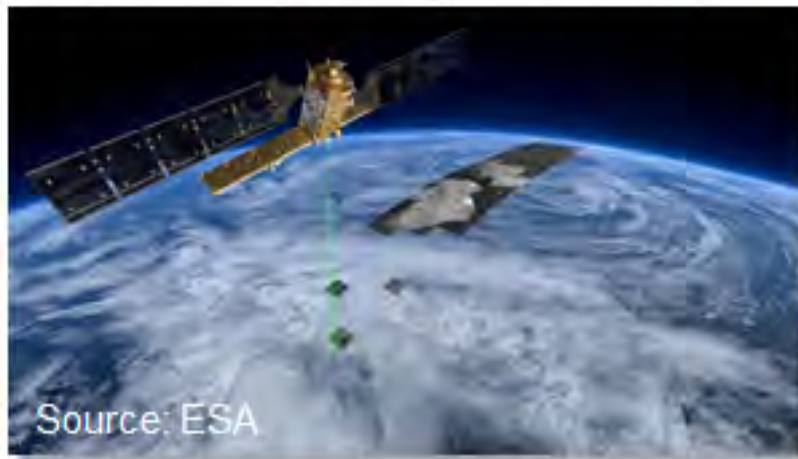




# Copernicus:

6 services use Earth Observation data to deliver ...

Satellites: Sentinels & Contributing Missions



In-situ measurements



... added value products

# EU Space Programme ([Regulation \(EU\) 2021/696](#))

## Article 49 – Scope of Copernicus

**Copernicus shall comprise the following elements**

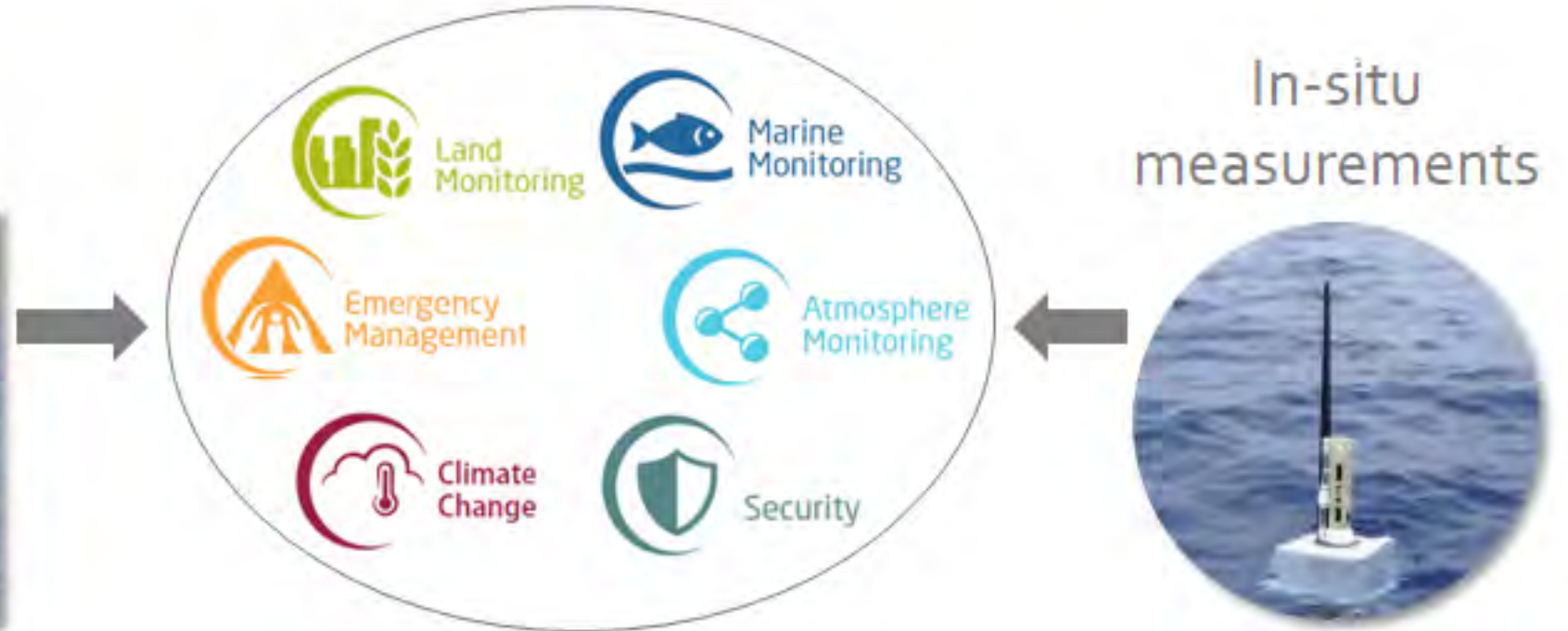
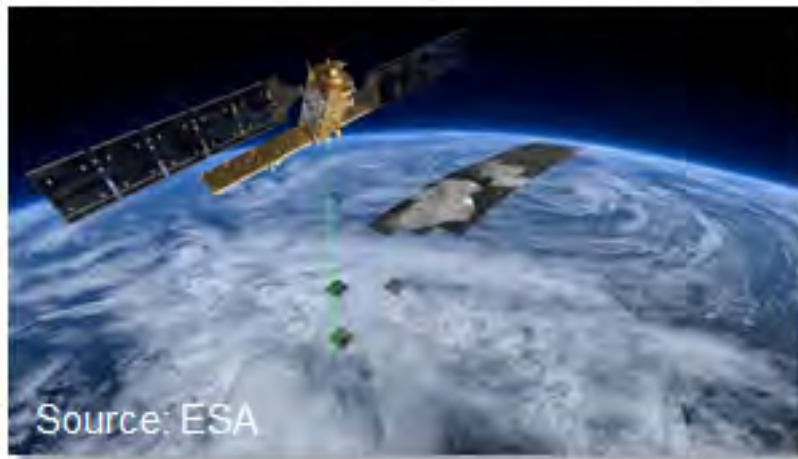
a) data acquisition, [...]

**b) data and information processing through Copernicus Services, which shall include activities for the generation of value-added information to support environmental monitoring, reporting and compliance assurance, civil protection and security services;**

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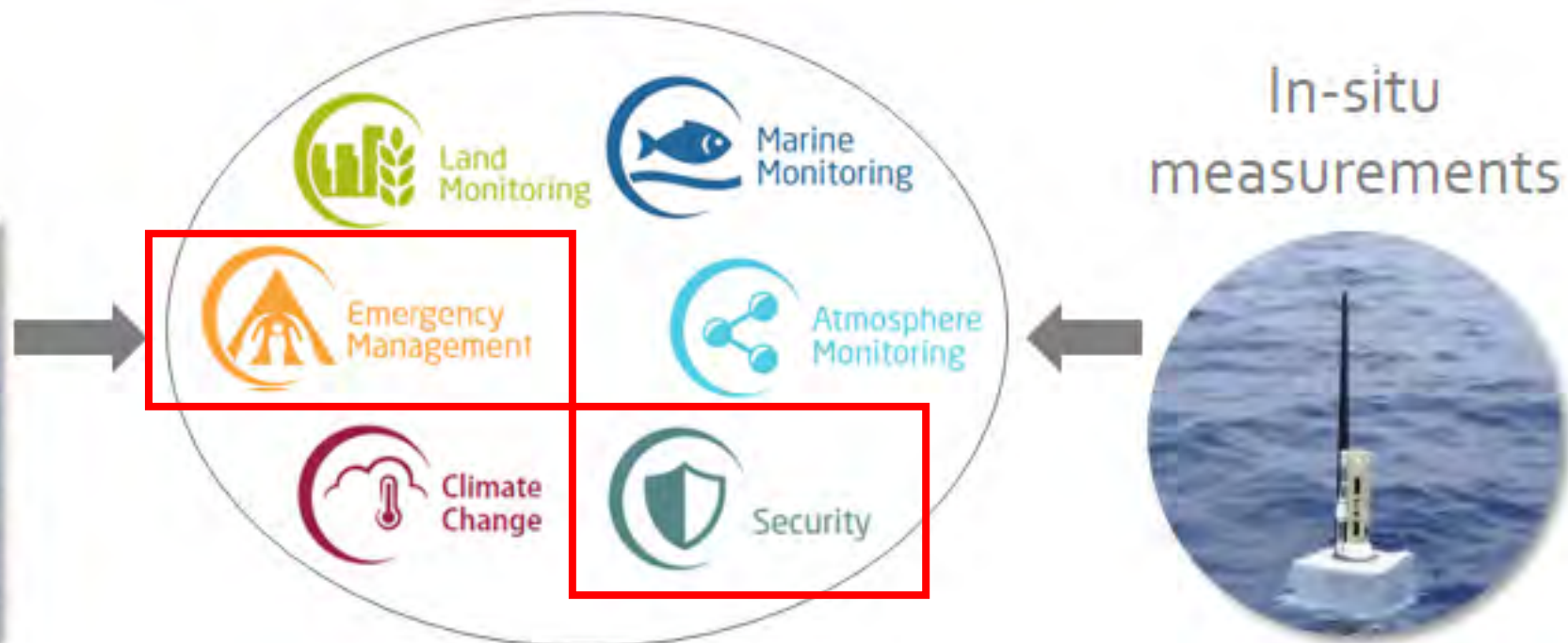
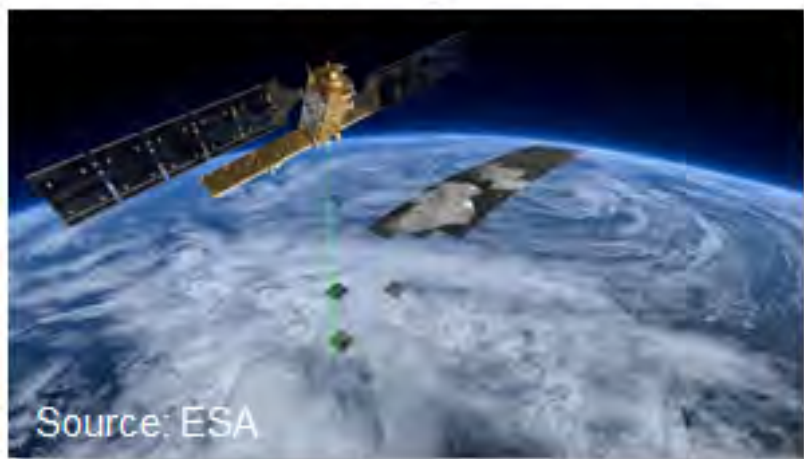
... added value products



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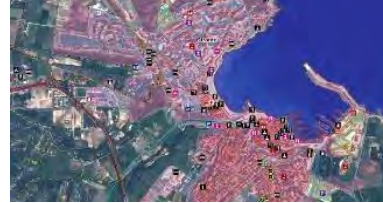
# R R M standard products : overview

Emergency Management

P1



P2



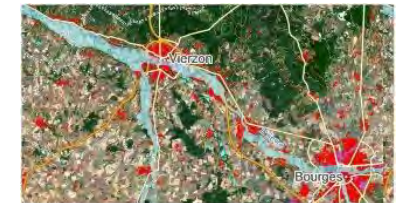
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P5



P6



P7



P8



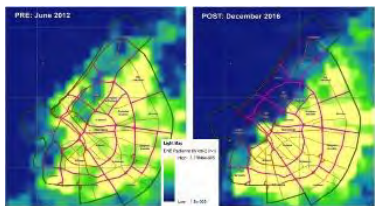
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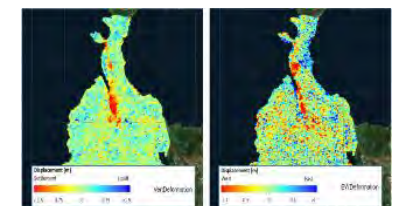
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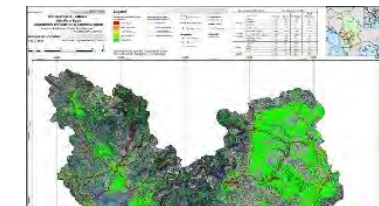
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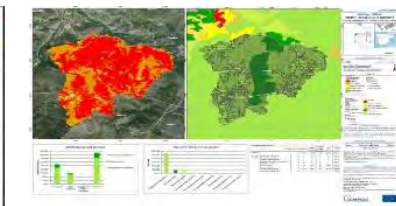
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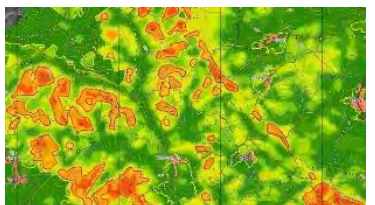
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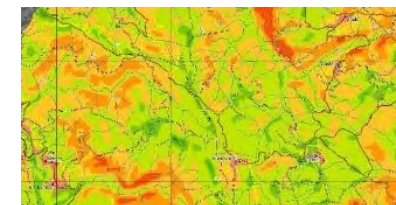
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P16



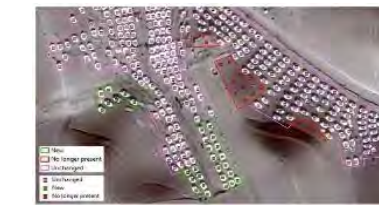
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P18



P19



P20



# Risk and Recovery Mapping: FLEX

FLEX products are highly customisable to the user needs

- Used in complex or big activations:
- Need of tailor-made products



# Aerial image acquisition through drones

## Key facts :

- Creation of an EU-wide Drone Operator Network
- Data collection in event of activation: RGB (NIR) orthomosaic
- DSM / point cloud with GSD = < 5cm/px
- Data processing after image collection (within 48 hrs)



# The CEMS Drone Pilot network

- **Specialized Equipment**
  - Fixed Wing drones:  $> 20\text{km}^2/\text{day}$
  - Commercial Multicopters:  $\pm 10\text{km}^2/\text{day}$
- **Special Training and preparations for Pilots** in accordance to coordination plan of national Authorities





# The CEMS Drone Pilot network

## Status of Drone Operator Network

- **140+ local CEMS pilots active:**  
Currently good coverage in Austria, Belgium, Denmark, Germany, Hungary, Italy, Romania, Portugal,

**Target of >100 Pilots until End of Year EU-wide and min 1 in every EU-Member state.**



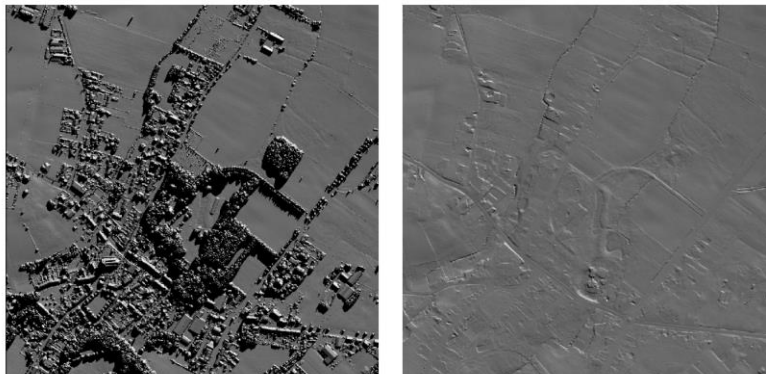
# CEMS imaging from manned aircraft

## OPTICAL DATA ACQUISITION

RGB/NIR > 10 to 20 cm GSD



DSM/DTM conversion



## LIDAR DATA

Low Density Lidar

Leica/Riegl: 1-2 pt/m<sup>2</sup>

High Density Lidar + Optical

Leica Terrain Mapper 2

8 pt/m<sup>2</sup> – GSD 15 (optical)



**Able to cover 26 EU countries plus Norway**

Austria, Belgium, Bulgaria, Croatia, Czech Rep., Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Italy, Latvia, Lithuania, Luxembourg, Malta, Norway, Poland, Portugal, Republic of Ireland Ireland, Romania, Slovenia, Slovakia, Spain, Sweden The Netherlands.



# Conclusions

- Copernicus is the European Union Programme, coordinated and managed by the European Commission, aimed at **developing European information services based on satellite Earth Observation and in situ (non-space) data.**
- The EU Space Programme Regulation of 2021 states **that all Copernicus services shall support environmental compliance assurance**
- **The Copernicus Emergency Service (with its “FLEX” products) and components of the Security Service (entrusted to SATCEN) are particularly well-suited for this support**

# Thank you



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