

living planet | BONN symposium | 23–27 May 2022

TAKING THE PULSE
OF OUR PLANET FROM SPACE



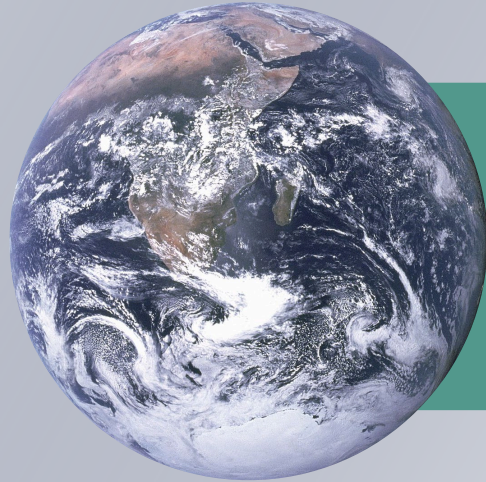
Atlantic Cities: smart, sustainable, and secure ports and protecting the ocean

Pedro Ribeiro¹, D. Petit², G. Ceriola³, R. Silva², N. Grosso², M. Tedesco⁴, K. Topouzelis⁵, J. Jesus⁶, J. Pinto⁷

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27th May 2022

Atlantic Cities: smart, sustainable and secure ports & protecting the ocean



EO-based services to support stakeholders in the Atlantic Region

Climate Resilience

Atlantic Cities and Ports

Protecting the Ocean

ATLANTIC
 CITIES, PORTS &
 PROTECTING THE OCEAN

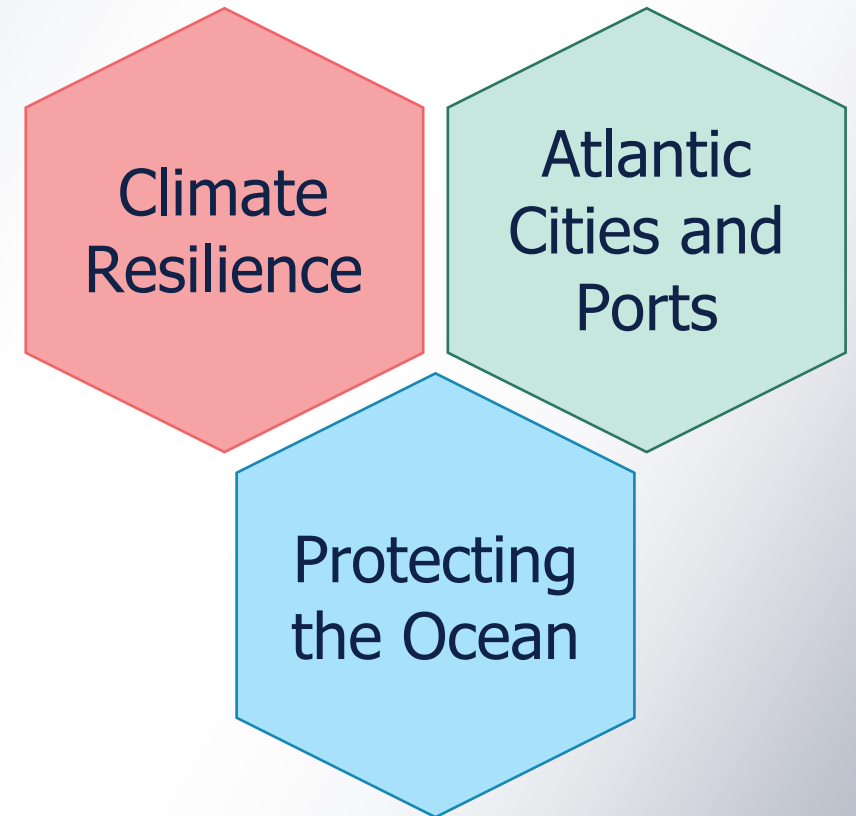


*From August 2020 to November 2022
 AO/1-10030/20/I-DT*

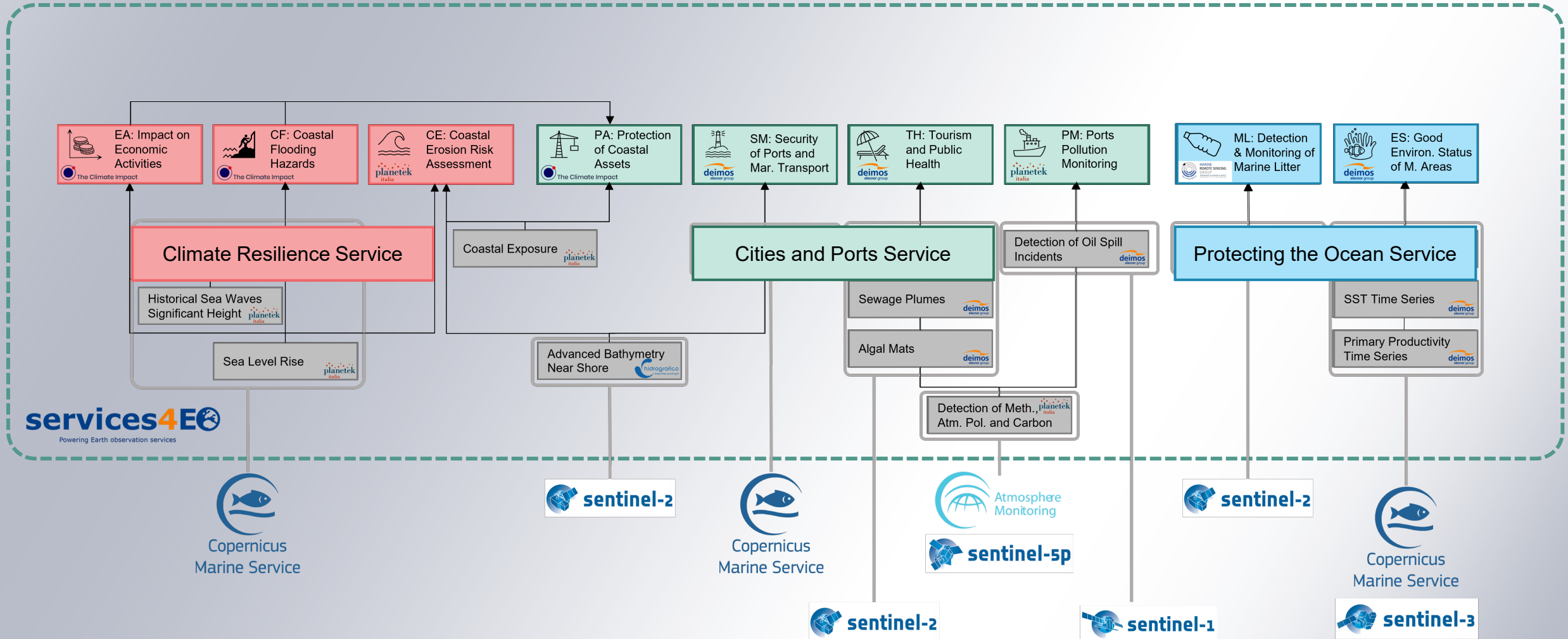


Participatory design

- 6 end users interviews held through virtual platforms
- 2 online workshops promoted with high-level organizations
- Electronic survey distributed within engaged users and high-level organizations network
- **Total of 106 user requirements were identified**

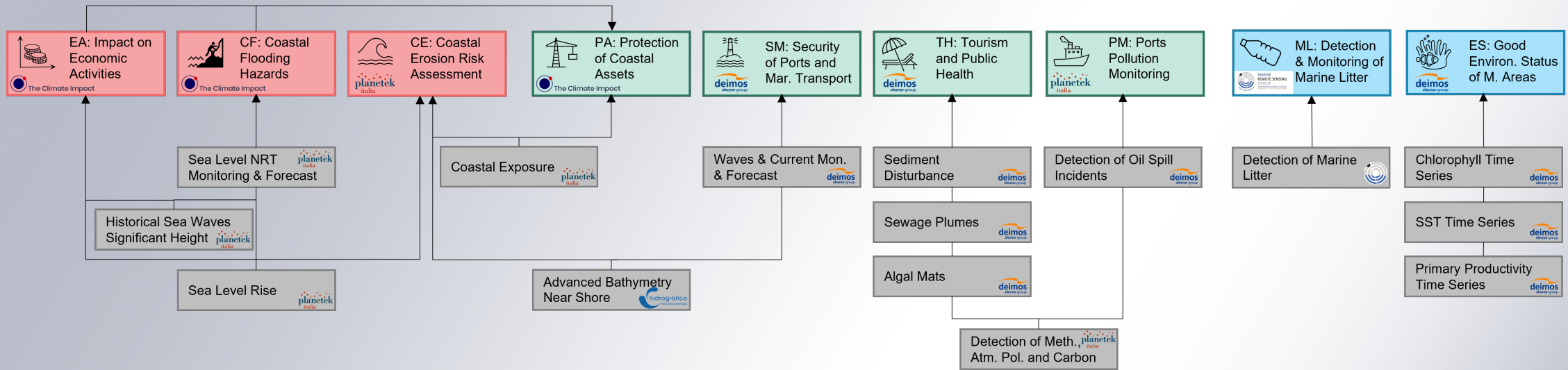


Service Portfolio



Service Portfolio

Demonstration Exercises



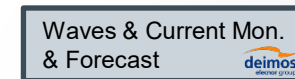
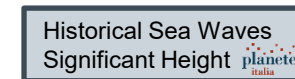
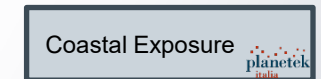
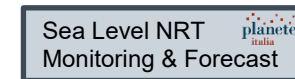
Pilot Applications

Demonstration Exercises



“The probability of hurricanes reaching the Azores is increasing.

Currently, there is no central hub where all the needed information can be found.”

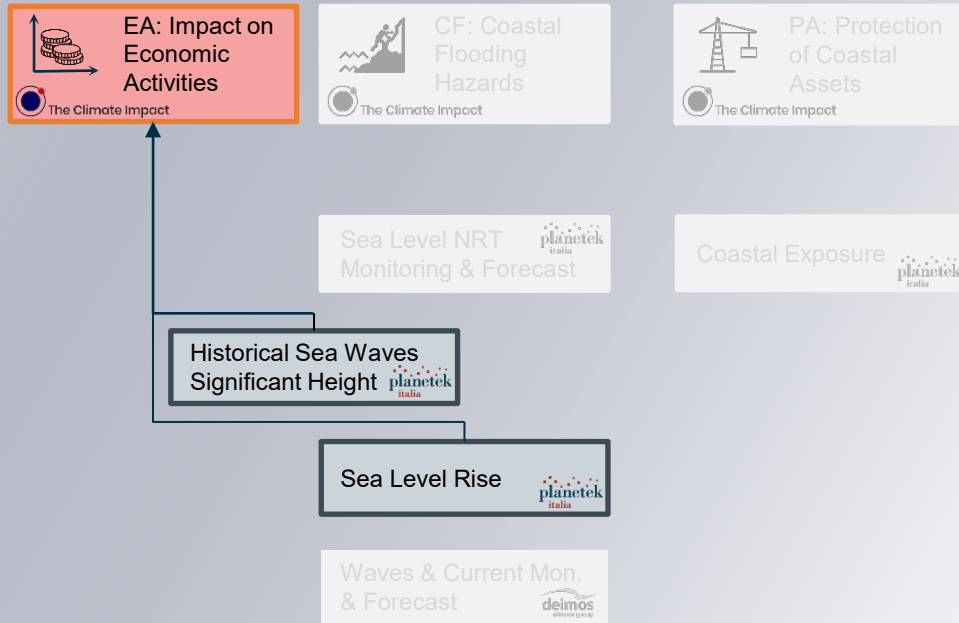


Pilot Applications

Demonstration Exercises



- Estimates of the losses from port activities paralysation due to the exposure to a hydrological or marine disaster (e.g., floods, wave heights)



Pilot Applications

Demonstration Exercises

PORTOS DOS AÇORES

SCPAR PORTO DE IMBITUBA

UNIVERSITY OF PORTSMOUTH

Autorità di Sistema Portuale del Mar Ionio

MARINE REMOTE SENSING GROUP
DEPARTMENT OF MARINE SCIENCES
UNIVERSITY OF THE Aegean

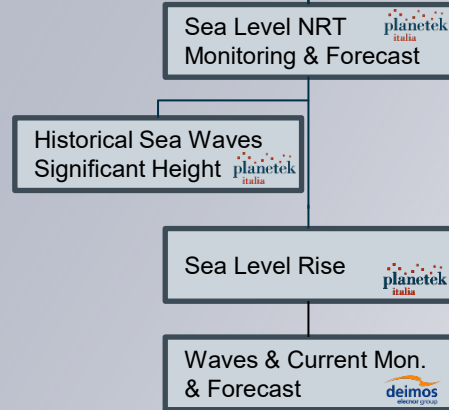
Epagri

EA: Impact on Economic Activities
The Climate Impact

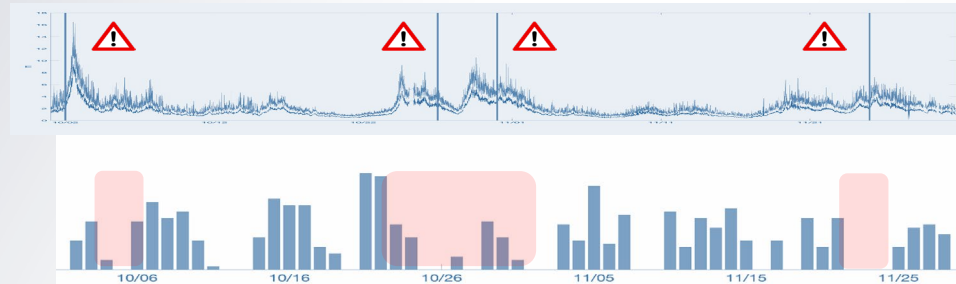
CF: Coastal Flooding Hazards
The Climate Impact

PA: Protection of Coastal Assets
The Climate Impact

- Hazardous Events Alerts
- **Historical analysis of coastal hazards**
- NRT and forecasted SLA, waves & currents



Coastal Exposure
planetek italia

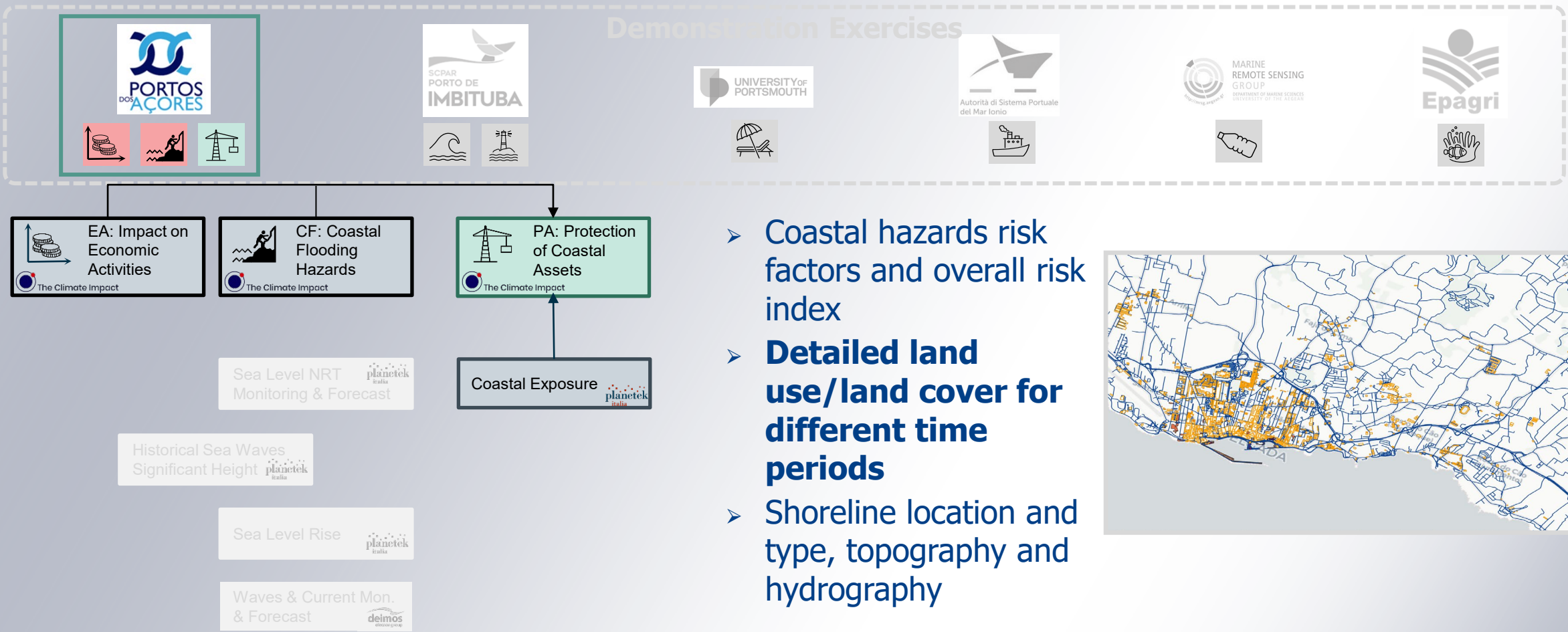


Buoy data.
Detected events with associated major port disruptions.

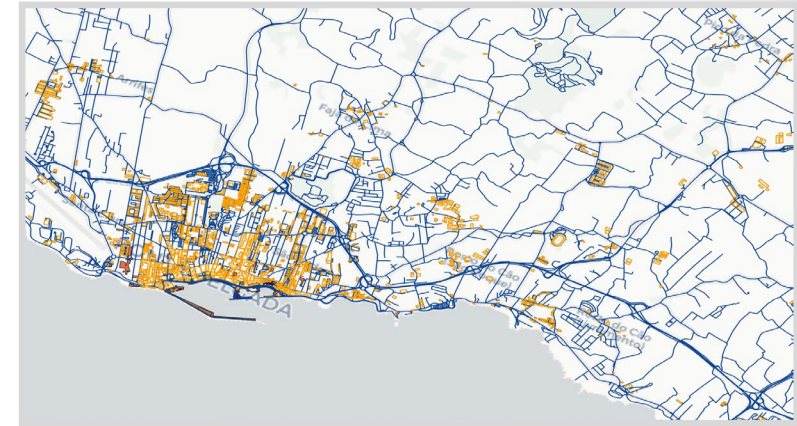
Ship activity
Red regions represent periods when major disruption occurred.

Pilot Applications

Demonstration Exercises



- Coastal hazards risk factors and overall risk index
- **Detailed land use/land cover for different time periods**
- Shoreline location and type, topography and hydrography



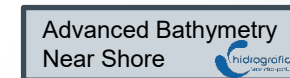
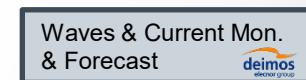
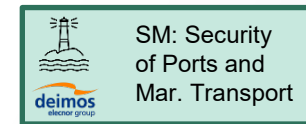
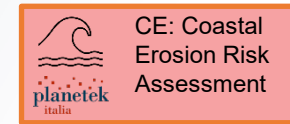
Pilot Applications

Demonstration Exercises



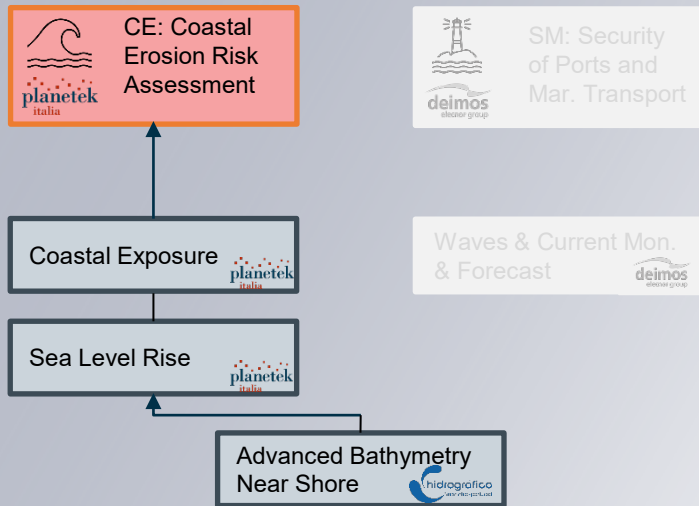
“There is a need to monitor the piers draft, which is subject to rapid change as an effect of storms.

Current measurements could help to better understand the sediment transport process.”



Pilot Applications

Demonstration Exercises



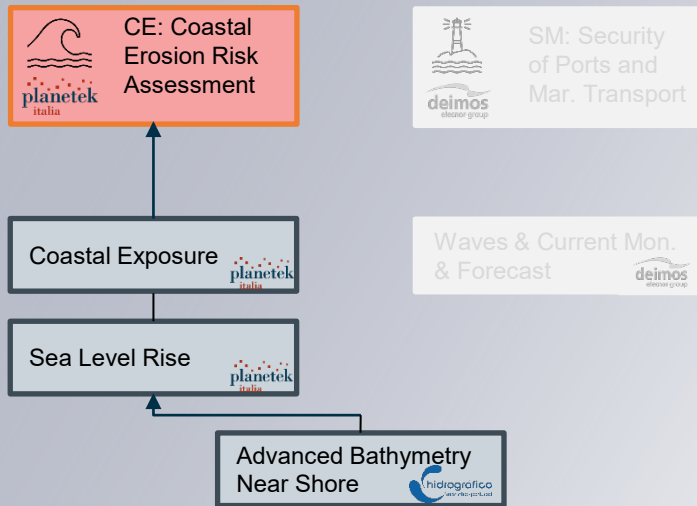
- Erosion risk factors and combined risk index
- Bathymetry from satellite near shore
- Historical analysis of coastal hazards
- **Detailed land use/land cover for different time periods**
- Shoreline location and type, topography and hydrography



LC 2016

LC 2021

Pilot Applications

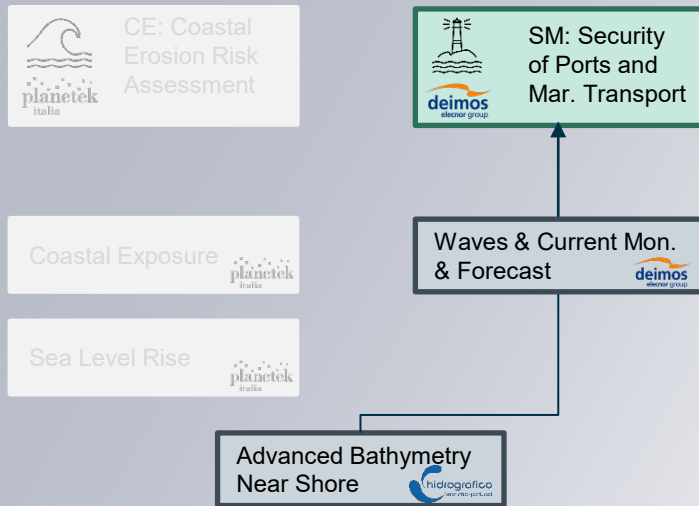


- Erosion risk factors and combined risk index
- Bathymetry from satellite near shore
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- Detailed land use/land cover for different time periods
- **Shoreline location and type, topography and hydrography**

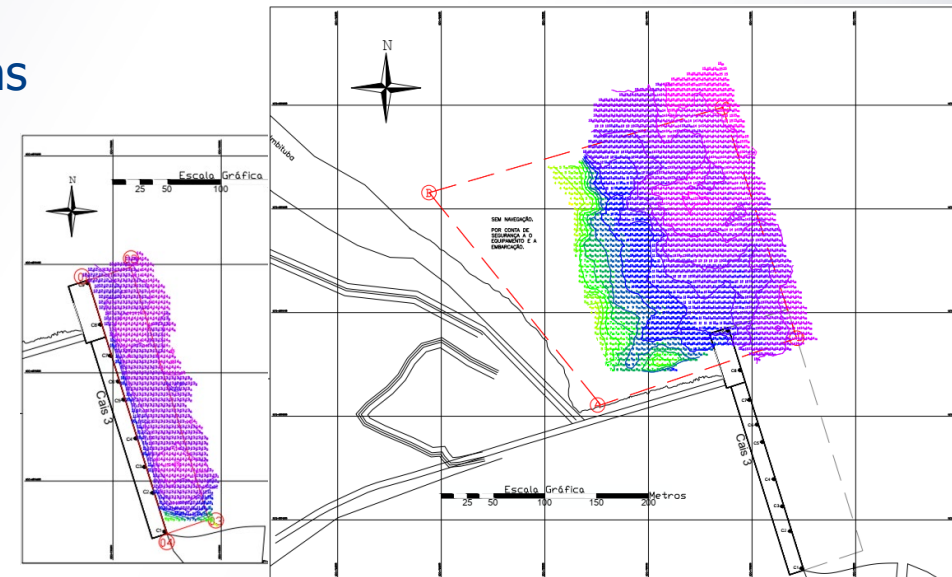


Pilot Applications

Demonstration Exercises



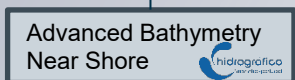
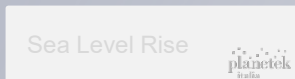
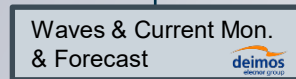
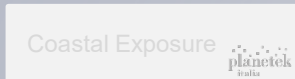
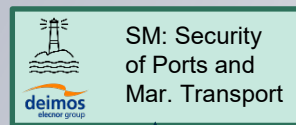
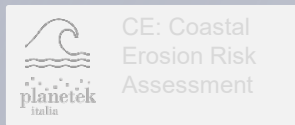
- Alerts for events with potential to affect berths draft
- **Bathymetry from satellite near shore**
- Historical analysis of currents & waves
- NRT and forecasted currents & waves



Bathymetry surveys from Port of Imbituba for validation

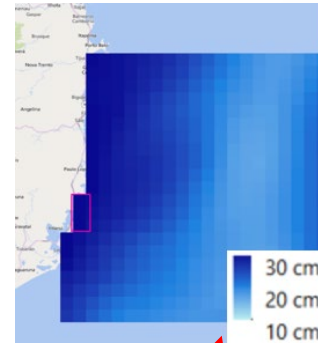
Pilot Applications

Demonstration Exercises

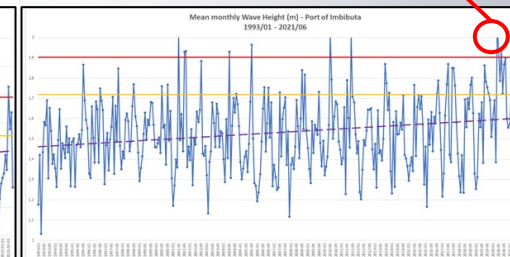
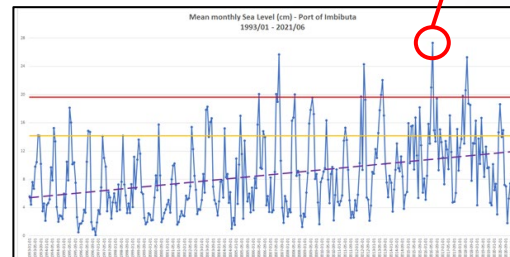
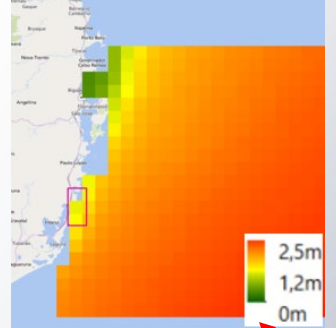


- Alerts for events with potential to affect berths draft
- Bathymetry from satellite near shore
- **Historical analysis of currents & waves**
- NRT and forecasted currents & waves

Sea level – June 2016



Wave height – July 2021



Pilot Applications

Demonstration Exercises



“Impacts on the intertidal area are a major concern.”

“Daily monitoring of air quality is crucial for public health issues.”

TH: Tourism and Public Health

Sediment Disturbance

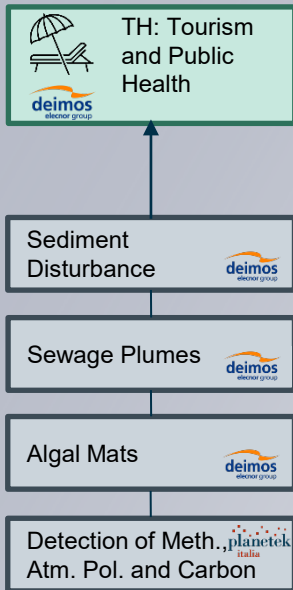
Sewage Plumes

Algal Mats

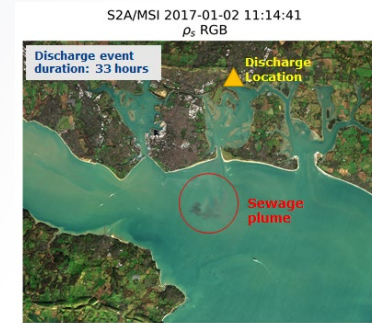
Detection of Meth., Atm. Pol. and Carbon

Pilot Applications

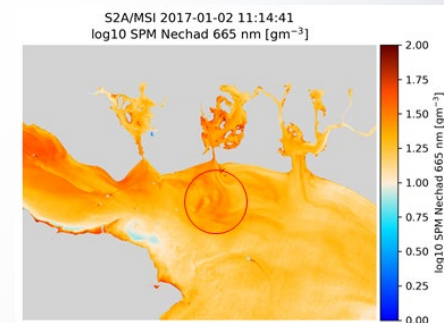
Demonstration Exercises



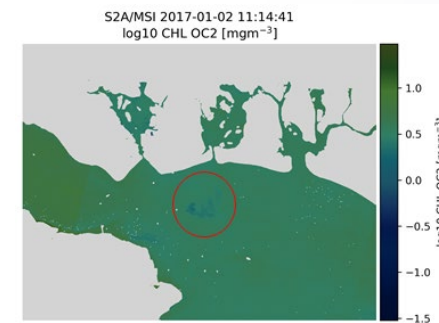
- Probability maps of sediment disturbance
- **Time series and vector maps of sewage plumes events**
- Probability maps of algal mats
- Maps and alerts for methane, atmospheric pollution and carbon



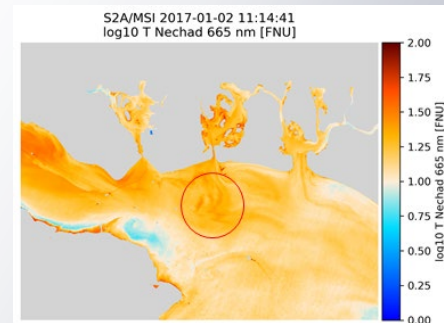
Sentinel 2 RGB



TSM concentration



Chlorophyll-a concentration



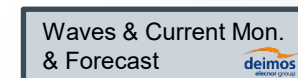
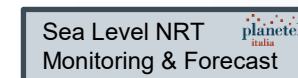
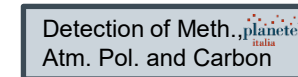
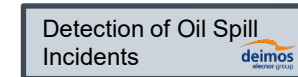
Turbidity

Pilot Applications

Demonstration Exercise

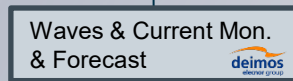
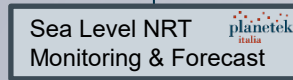
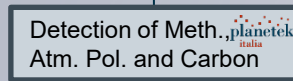
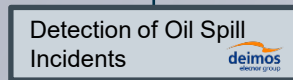


“We need to have a synergic view of all the port area and its surroundings in order to understand the nature and origin of a pollution event (air and water).”

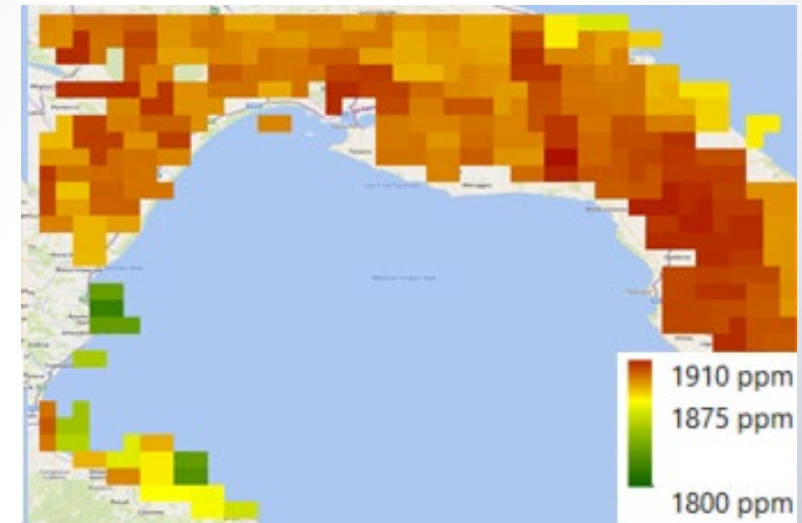


Pilot Applications

Demonstration Exercise



- **Maps and alerts for methane, atmospheric pollution and carbon**
- Alerts regarding oil spill with maps of detected features
- NRT and forecasted SLA, waves & currents



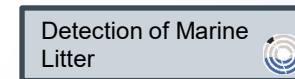
CH4 column concentration for 2021-08-10

Pilot Applications

Demonstration Exercises



“Deployment of targets is needed to validate marine litter detection methodology for large scale monitoring.”

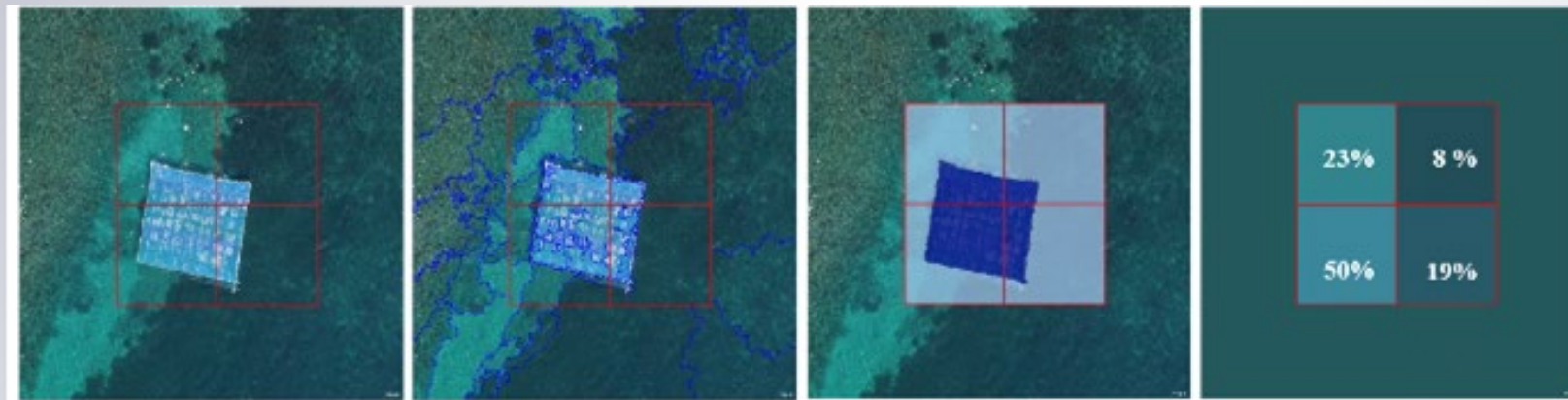
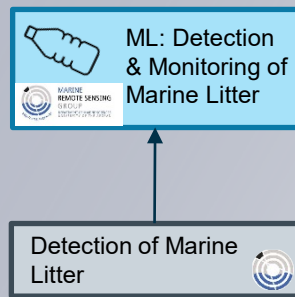


Pilot Applications

Demonstration Exercises



- Alerts for the detection of marine litter aggregations
- Maps of marine litter aggregations



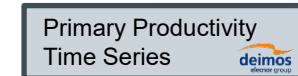
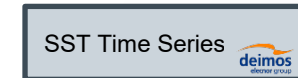
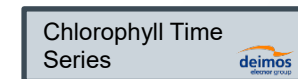
Percentage plastic coverage calculation for each Sentinel-2 pixel using the A5100 othophotomap

Pilot Applications

Demonstration Exercises

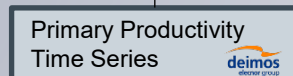
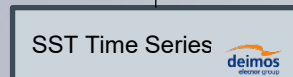
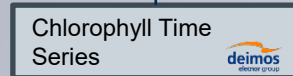


“Satellite data can help to understand the distribution and dynamics of contaminants, especially regarding SST, salinity and nutrients.”

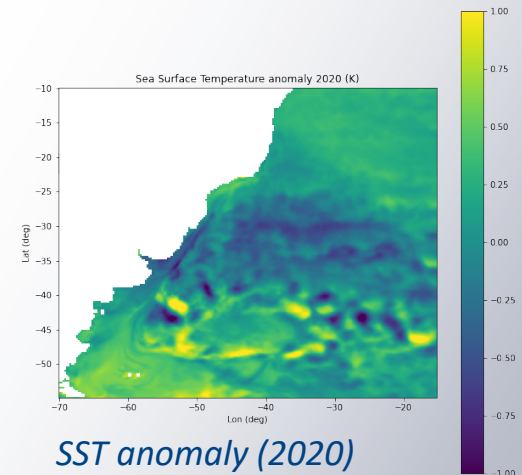
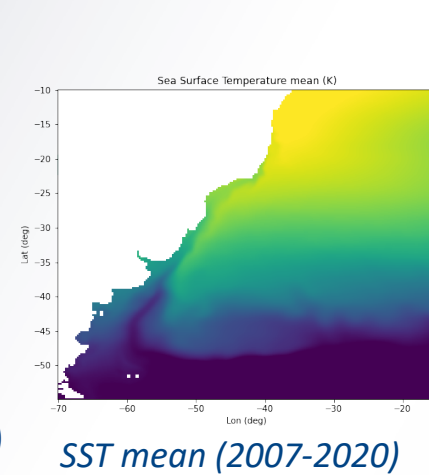


Pilot Applications

Demonstration Exercises

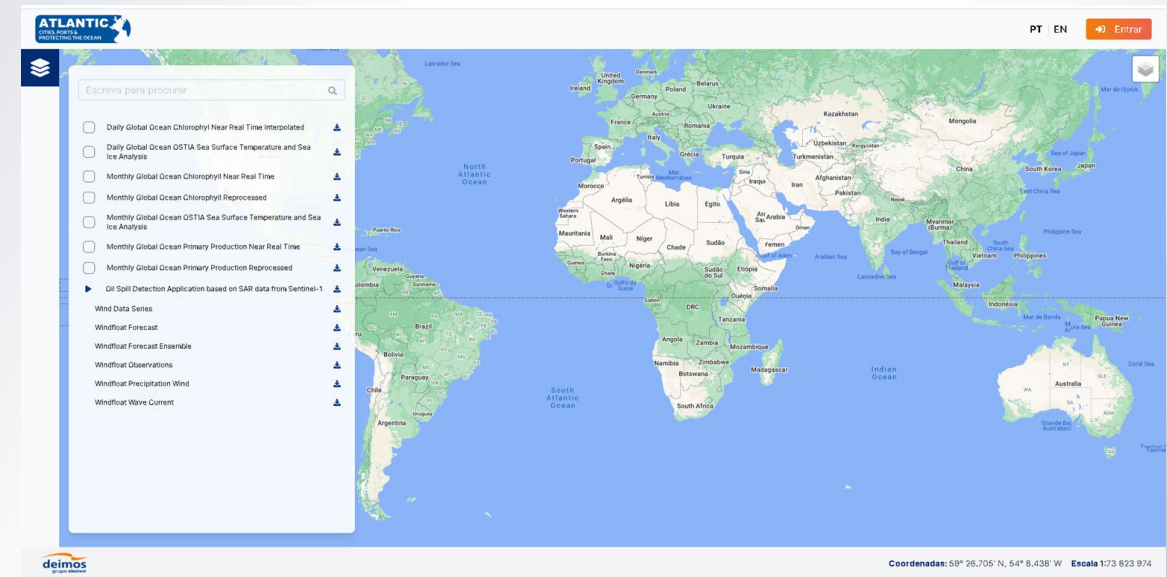


- Alerts for anomalous conditions defined by the user
- Historical dataset, statistical analysis and monthly anomalies of :
 - Sea Surface Temperature (SST)
 - Chl-a
 - Primary productivity



Current status and next steps

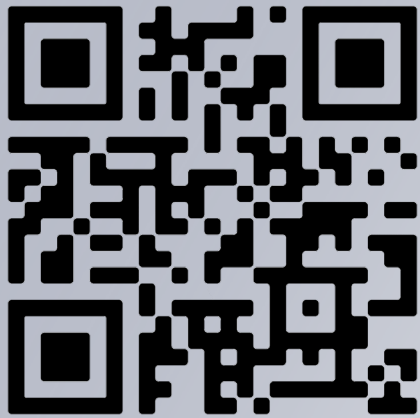
- All services developed and integrated in services4EO and available on web-based geoportal
- First round of evaluation among project partners – bug fixes
- Demonstrations with users to start in June 2022
- Impact assessment to be performed from August to October 2022



Powered by **services4EO**

Thank you!

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services4EO

collaborative Earth
observation ecosystem

Visit us at **Booth #6** and
register for a present!

