Copernicus Evolution – Research for harmonised and Transitional-water Observation (CERTO)

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Copernicus Programme

- Copernicus is a major EU initiative to observe the Earth
- European contribution to the GEO system of systems
- Copernicus has, *inter alia*, two key elements:
  
  Six thematic services that provide data and forecasts

The Sentinel operational satellite series
Data provided by Copernicus includes “Water colour” governed by water constituents like phytoplankton, sediments or coloured dissolved organic matter.
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But each Copernicus service uses different approaches/algorithms.
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Some regions (estuaries, lagoons, large rivers) are not covered by any of the Copernicus services.
Copernicus Marine, Climate Change and Land produce water quality
- Use different methods for ocean, shelf waters and lakes
- Variables have different names and formats between services

- Long time series of Essential Climate Variables
- Long regional time series based on Essential Climate Variables
- Near-real time
- Long time series per lake
- “Near-real time”

- No service fully covers transitional waters (estuaries, rivers, near-coast and lagoons)
• Copernicus evolution – Research activities in support of **cross-cutting applications** between Copernicus services

• Hence, Copernicus Evolution – Research for harmonised and Transitional-water Observation (CERTO)
CERTO Objectives

• **Harmonise** between the different Copernicus services approaches

• Develop specific **in-water and atmospheric correction methods** for water quality in **transitional waters**

• Implement **indicators** relevant to management, policy and science users operating in transitional waters

• Interact and **consult** with commercial, industrial, scientific, policy and monitoring stakeholders

• Provide a **prototype system** for exploitation by the Copernicus Services + **evidence** of its value

• WP3, WP4, WP5

• WP6

• WP2, WP8

• WP7
Management: Advisory Board (AB)

- AB provides independent advice and feedback on: R&D objectives; communication with stakeholder groups; and dissemination.
- AB will encourage the promotion and wide awareness of CERTO amongst their respective communities.

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<tr>
<th>Organisation name</th>
<th>Representative</th>
<th>Role</th>
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<tbody>
<tr>
<td>GEO AquaWatch</td>
<td>Dr S. Greb, Director GEO AquaWatch</td>
<td>Links with GEO AquaWatch; global user community focus</td>
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<tr>
<td>GEO Blue Planet</td>
<td>Dr P DiGiacomo, NOAA, Co-chair GEO Blue Planet</td>
<td>Links with GEO Blue Planet; global user community focus</td>
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<tr>
<td>Future Earth Coasts</td>
<td>Dr S Ferse, Executive Director</td>
<td>Links with Future Earth Coasts; global user community focus</td>
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<td>Joint Nature Conservation Committee, UK</td>
<td>Dr G Jones</td>
<td>Links with JNCC; policy / government focus</td>
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<tr>
<td>European Association of Remote Sensing Companies</td>
<td>Dr R Donnelly, Business manager, EARSC</td>
<td>Links with EARSC; focus European companies in remote sensing</td>
</tr>
<tr>
<td>Helmholtz-Zentrum Geesthacht</td>
<td>Dr H Krasemann</td>
<td>Scientific expert on water quality and EO methods intercomparison</td>
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CERTO User Engagement and R&D Sites

- Six transitional waters: focus of in situ data gathering – radiometry and in water data - and interaction with local and regional users

Elbe Estuary, DE

Curonian Lagoon, LI

Plymouth Sound, UK

Sinoe-Razelm Lagoon, RO

Tagus Estuary, PT

Venice Lagoon, IT
CERTO Study Areas

- Regional: through Copernicus Marine regional areas: Atlantic; Arctic; Baltic Mediterranean; Black Sea

- Globally through key international science groups (GEO Blue Planet; GEO AquaWatch; Lagoons for Life; EC DANUBIUS-RI)
WP4: Optical water type

- Create an **optical water type** scheme for cross-domain optical water classification
- Generate optical water class sets derived from Sentinel-2 and 3
- Propagate information on the quality of the per-pixel classification itself into the final product uncertainty.

OC CCI uncertainties (based on matchups with satellite data) depend on water class
WP5 Atmospheric correction

- Evaluate, inter-compare, validate and select the best performing atmospheric correction algorithm in transitional waters
  - Adequacy of the water reflectance model used for atmospheric correction in transitional waters.
  - Impact of adjacency effects and bathymetry effect (bottom visibility)
  - Uncertainty propagation scheme
• Evaluate **Indicators** harmonised across the water continuum relevant to industry, monitoring agencies, EU policy and scientists.

Figure 1.3.3.6.2 – Satellite based phenology applied to changes in chl-a bloom peaks in response to increasing/decreasing ENSO phases (Racault et al., 2017)
Where do we want to be at end of project?

- CERTO prototype produces water colour data **harmonised** across different aquatic environments
- **Evidence** of the value of the CERTO prototype in transitional waters
- CERTO prototype is **adopted by Copernicus services**
- **Services and indicators** developed in the project continued by downstream data-providers in the project
How can you be involved with CERTO?

- **Contribute** your in situ data in coastal and transitional waters to the LIMNADES data base

- **Link** to one of the user case areas or the Copernicus regional seas

- **You** can specify a user area for which CERTO will produce example time-series data in year 3

- **Subscribe** to the newsletter and **visit** the website
• Thank You

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• https://www.certo-project.org/Home

• @CERTO_project