Towards joint monitoring and assessment of eutrophication in the North Sea using Copernicus Marine Service's products

EU project JMP EUNOSAT

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Joint Monitoring Programme of the Eutrophication of the North Sea with Satellite data (JMP-EUNOSAT)


Grant: DG-ENV part of European Maritime and Fisheries Fund - Implementation of the second cycle of the MSFD

- 2 year project, started 15 February 2017
- Budget k€ 874 and 80% EU contribution
- 14 partners in all countries bordering the North Sea
Challenge: from national to North Sea scale assessment
Drivers for change:

- coherence between countries (MSFD)
- availability of reliable remote sensing data
- costs of monitoring
- EU contribution
- examples: Baltic Sea, Belgium
Activities in project

1. Coherence in assessment framework  
   *Deltares, NL*

2. Coherence in monitoring/data, using satellite data  
   *Royal Belgian Institute of Natural Sciences, BE*

3. Organise North Sea wide operational collaboration  
   *Aarhus University, DK*

4. Project management and communication  
   *Rijkswaterstaat, NL*
Towards joint monitoring and assessment of eutrophication in the North Sea using Copernicus Marine Service's products – Belgian example

Dimitry Van der Zande, Heloise Lavigne
Ocean colour from space
Enhance coherence in eutrophication assessments based on chlorophyll, using satellite data

SeaWifs 1997-2010
MERIS 2002 – 2012
MODIS 2002 – ongoing
Sentinel-3 2016 - ongoing

Clear water Algae (CHL) Turbid

RS is neutral, transparent, and provides a high temporal and spatial resolution (cross-boundary)
From ocean color to water quality assessment

Monitoring of Eutrophication

Daily snapshot of CHL (MERIS MEGS 7.5)

Multi-temporal composit of CHL product covering the whole North Sea

CHL time series for the Belgan W01 station used to assess phytoplankton dynamics
**Upscaling to North Sea level**

Generate a coherent satellite-based CHL product by merging CHL products based on optical water types

- Regional CHL retrieval algorithms optimized for specific water types
  - case 1 waters
  - scattering waters (coastal)
  - absorbing waters (CDOM)

And others...

- MERIS MEGS7.5 Turbid Coastal waters
- CMEMS098 GlobColour product
- CMEMS067 OC-CCI product
Joint monitoring strategy to support remote sensing integration (adopted by BE & NL)

Collection of match up between in situ and remote sensing during national monitoring cruises

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<th>Monitoring Cruise Oct 2017 BE</th>
<th>date</th>
<th>Landsat 8</th>
<th>Sentinel 2</th>
<th>Sentinel 3</th>
<th>acceptable acquisition in situ</th>
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Guidelines for in situ data collection:
* any location in BE waters is fine as long as the lat/lon coordinates are registered
* Only collect samples in case of cloudless conditions at the sample location
* parameters of interest: CHL (and TSM if possible)
* sampling depth: 0.5 - 1 m (surface measurement); 3m depth is also acceptable
* Chl a determined using HPLC method

Optimize traditional monitoring cruises at national level to support remote sensing validation without significant additional effort
JMP-EUNOSAT key messages

• Understanding marine ecosystems is extremely important for marine policies and management. Innovative solutions to improve monitoring in a cost effective and coherent manner are very much welcomed by EU MS

• The COPERNICUS program with the Sentinel missions will provide satellite products for the next 20 years creating a strong support for satellite-based monitoring services like presented in JMP-EUNOSAT

• There is still a significant technical barrier to be crossed to push the satellite products (e.g. CMEMS) into an operational service such as MSFD monitoring which is addressed by projects such as JMP-EUNOSAT
Questions?

Harbour of Zeebrugge, Pléiades, 0.5-2M resolution