

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)

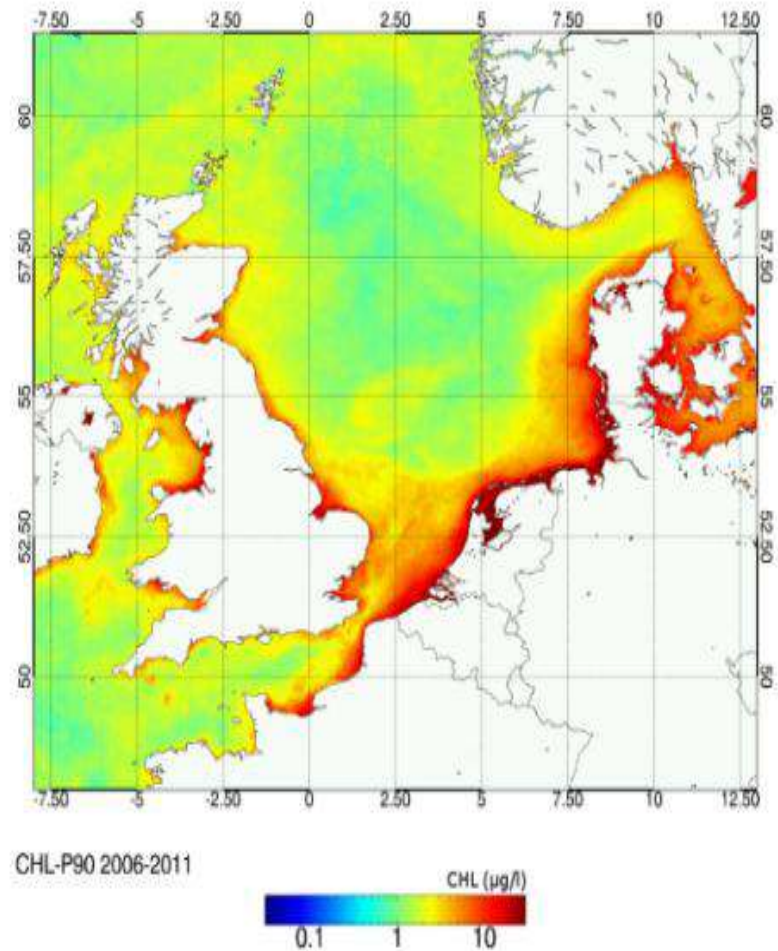
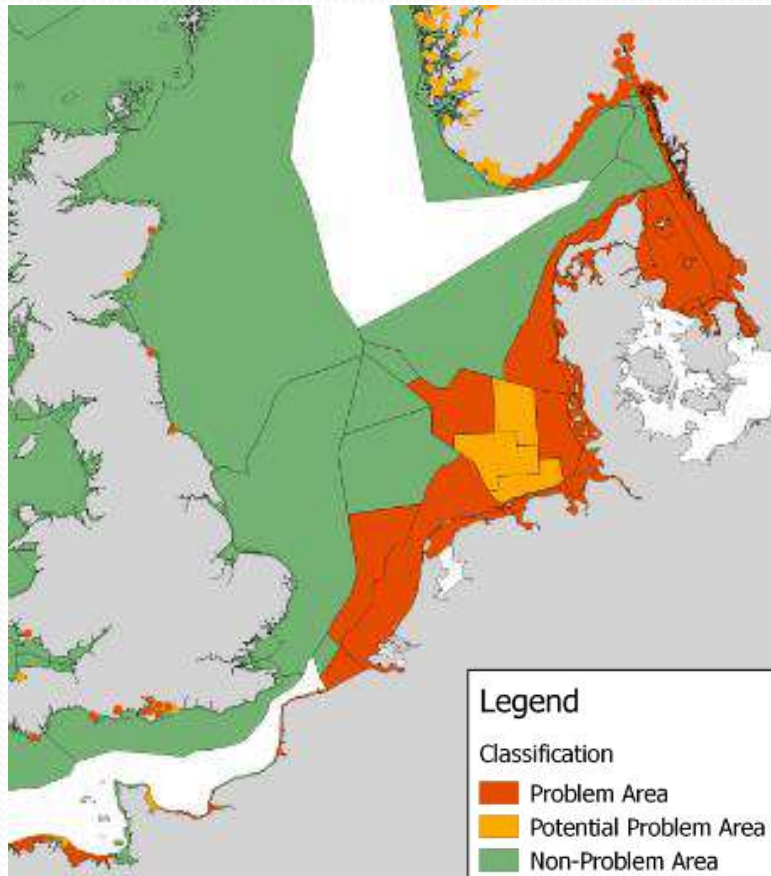
Policy framework: EU Marine Strategy Framework Directive

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

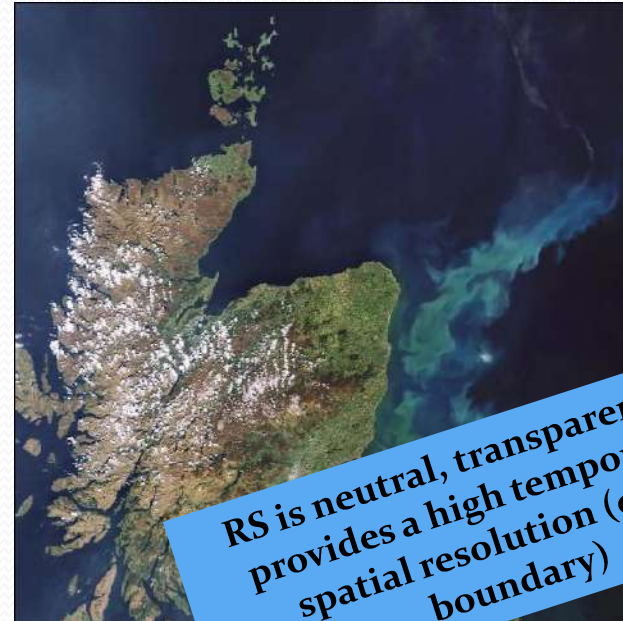
Enhance coherence in eutrophication assessments based on chlorophyll, using satellite data



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



Clear water waters Algae (CHL) Turbid



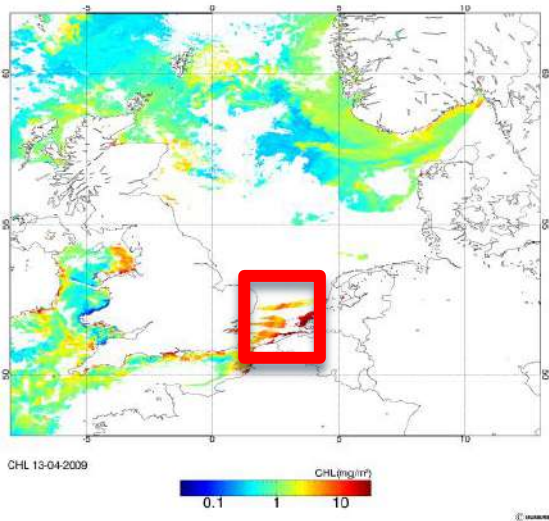
RS is neutral, transparent, and provides a high temporal and spatial resolution (cross-boundary)

ESA MERIS 7 May 2008

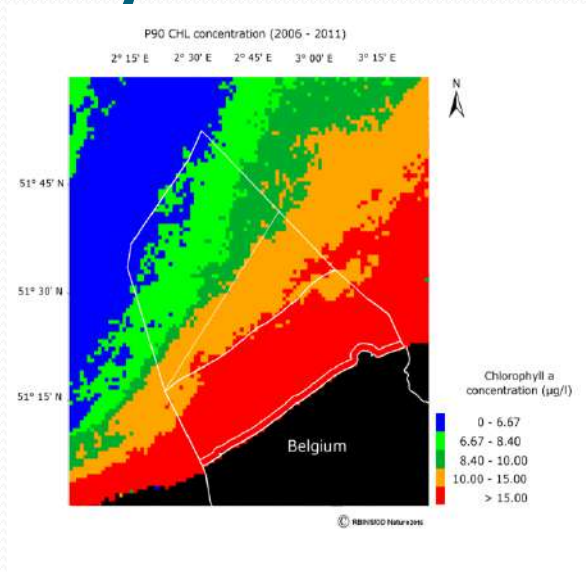
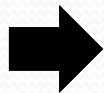


From ocean color to water quality assessment

Monitoring of Eutrophication



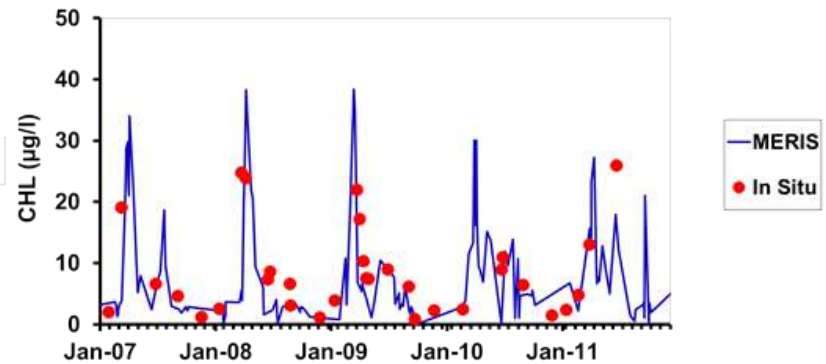
Daily snapshot of CHL (MERIS MEGS 7.5)



MSFD eutrophication component of CHL production in the whole North Sea



W01

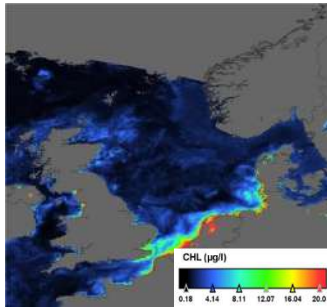


CHL time series for the Belgian W01 station used to assess phytoplankton dynamics

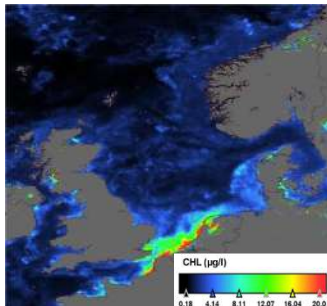
Upscaling to North Sea level

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

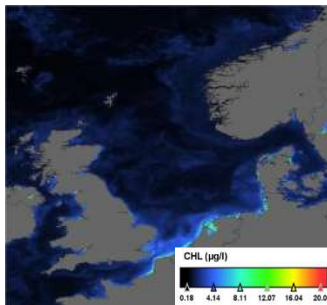
- Regional CHL retrieval algorithms optimized for specific water types
 - case 1 waters
 - scattering waters (coastal)
 - absorbing waters (CDOM)



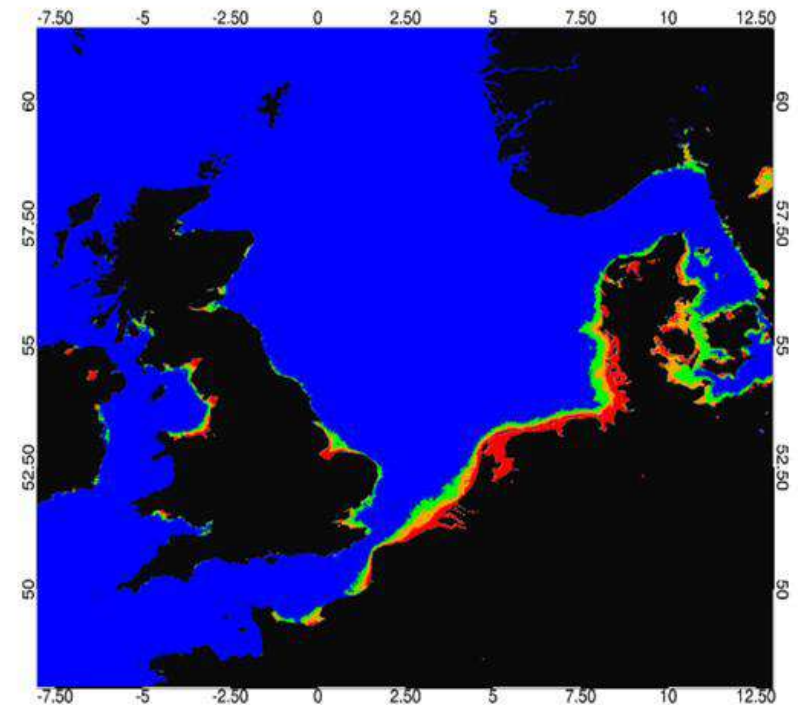
MERIS MEGS7.5
Turbid Coastal
waters



CMEMS098
GlobColour
product



CMEMS067
OC-CCI product



CHL-P90 2006-2011

And others...



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

Monitoring Cruise Oct 2017 BE					
date	Landsat 8	Sentinel 2	Sentinel 3	optimal acquisition in situ	acceptable acquisition in situ
18/10/2017	10:40 UTC	n.a	09:39 UTC	from 9:39 UTC to 10:40 UTC	from 8:39 UTC to 11:40 UTC
19/10/2017	n.a.	n.a.	10:53 UTC	from 09:53 UTC to 11:53 UTC	from 9:53 UTC to 11:53 UTC

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