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EUMETSAT's Ocean Colour application and research activities

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EUMETSAT

*International Ocean Colour Science meeting
Darmstadt, 01 December 2025*





Current status of Sentinel-3 Ocean Colour data services

www.eumetsat.int

Sentinel-3 OLCI Level-1 Collection-4

- Operational and reprocessed
- Major updates
 - TSIS-1 Solar Irradiance Reference Spectrum
 - Per-pixel Radiance Uncertainties included in the products
 - Spectral Temporal Model introduced
 - Geometric and Radiometric calibration revised

IOCS/IOCCG Recommendations, INSITU-OCR White Paper

- Space Sensor Calibration, Characterization and Temporal Stability
- Development and Assessment of Satellite Products

Sentinel-3 OLCI Level-2 Collection-3

- Operational and reprocessed
 - Good consistency between OLCI-A and OLCI-B
 - IOP new products included in Feb 2024

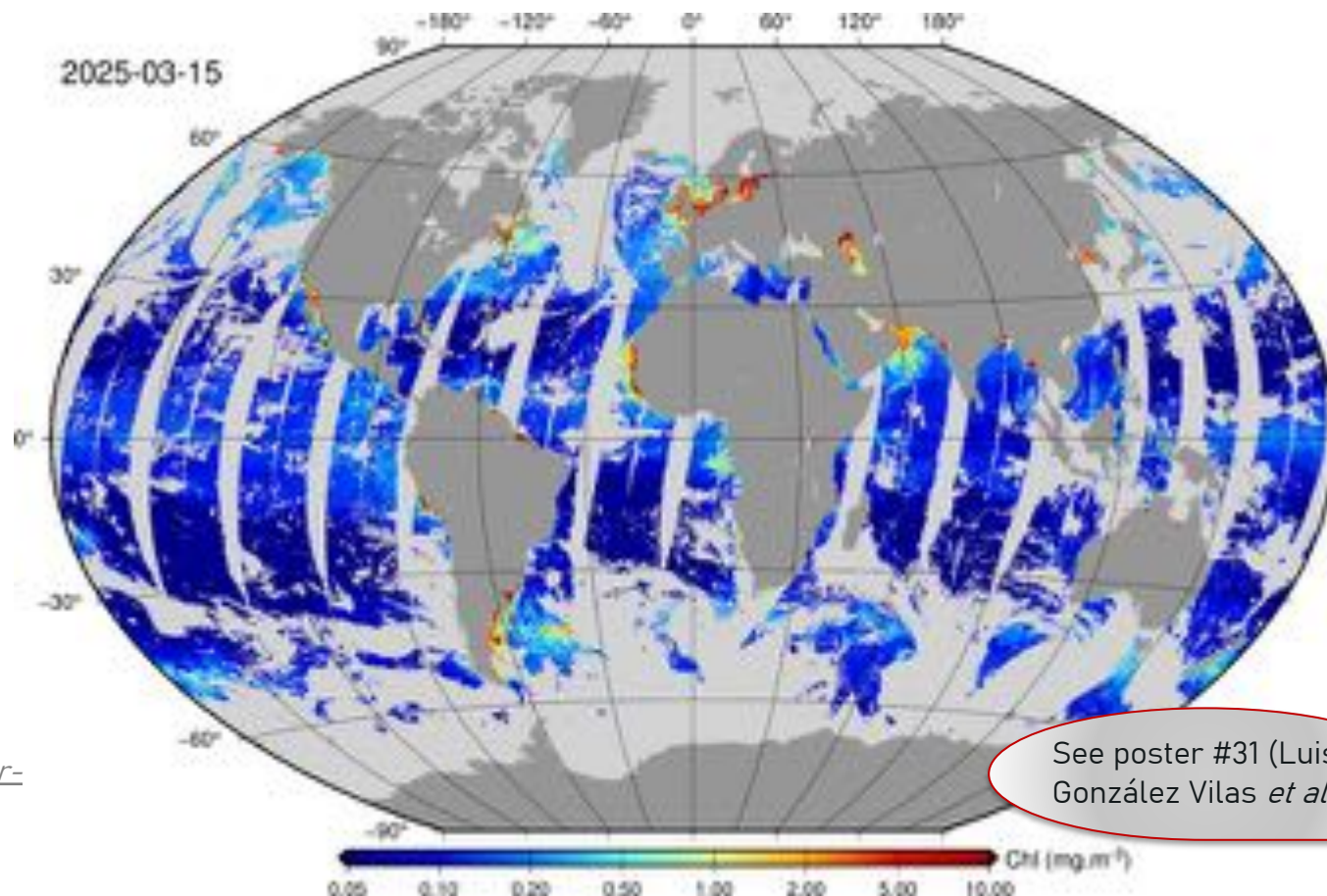
Data access via EUMETSAT Data Store

<https://data.eumetsat.int>

Sentinel-3 OLCI documentation, resources

- Level-2 Collection-3 Report: [here](#)
- Level-2 monitoring: <https://metis.eumetsat.int/oc/>
- Level-1 / Level-2 Product Notices: <https://user.eumetsat.int/resources/user-guides/sentinel-3-olci-ocean-colour-processing-baseline>
- Ocean colour resources: <https://olci.eumetsat.int>

OLCI-A and OLCI-B constellation daily chlorophyll coverage at 300m resolution



See poster #31 (Luis González Vilas *et al.*)



IOP new products: independent validations

Water Inherent Optical Property (IOP) products

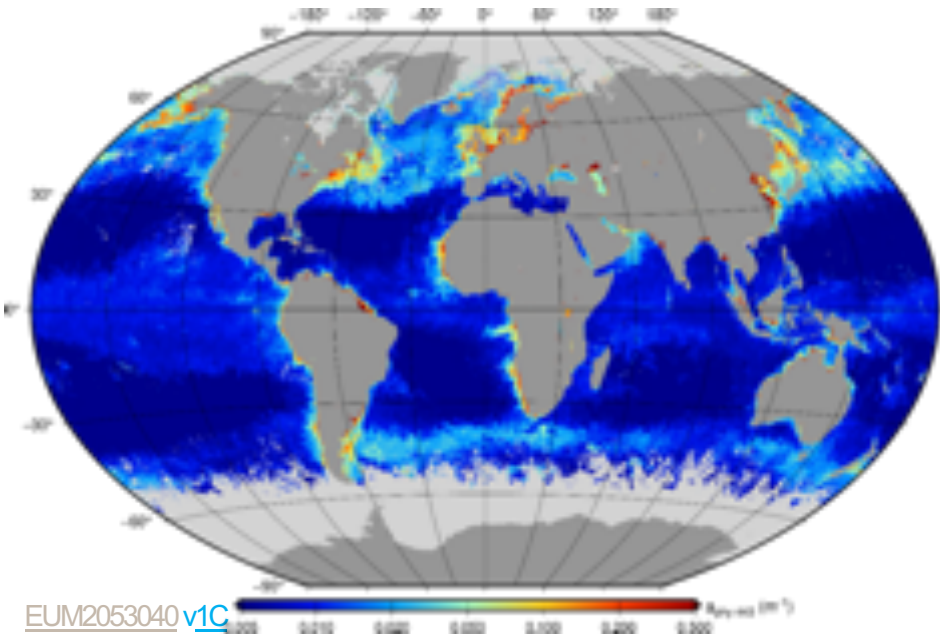
- a_{nw} , a_{phy} , a_{cdm} , b_{bp} at 442.5 nm and b_{bp} slope from the three-step semi analytical algorithm by [Jorge et al., 2021](#)
- a_{cdm} at 442.5 nm by [Bonelli et al., 2021](#)
- K_d 490 nm by [Jamet et al., 2012](#), [Loisel et al., 2018](#)
- Optical Water Class (OWC) based on [Mélin and Vantrepotte, 2015](#)



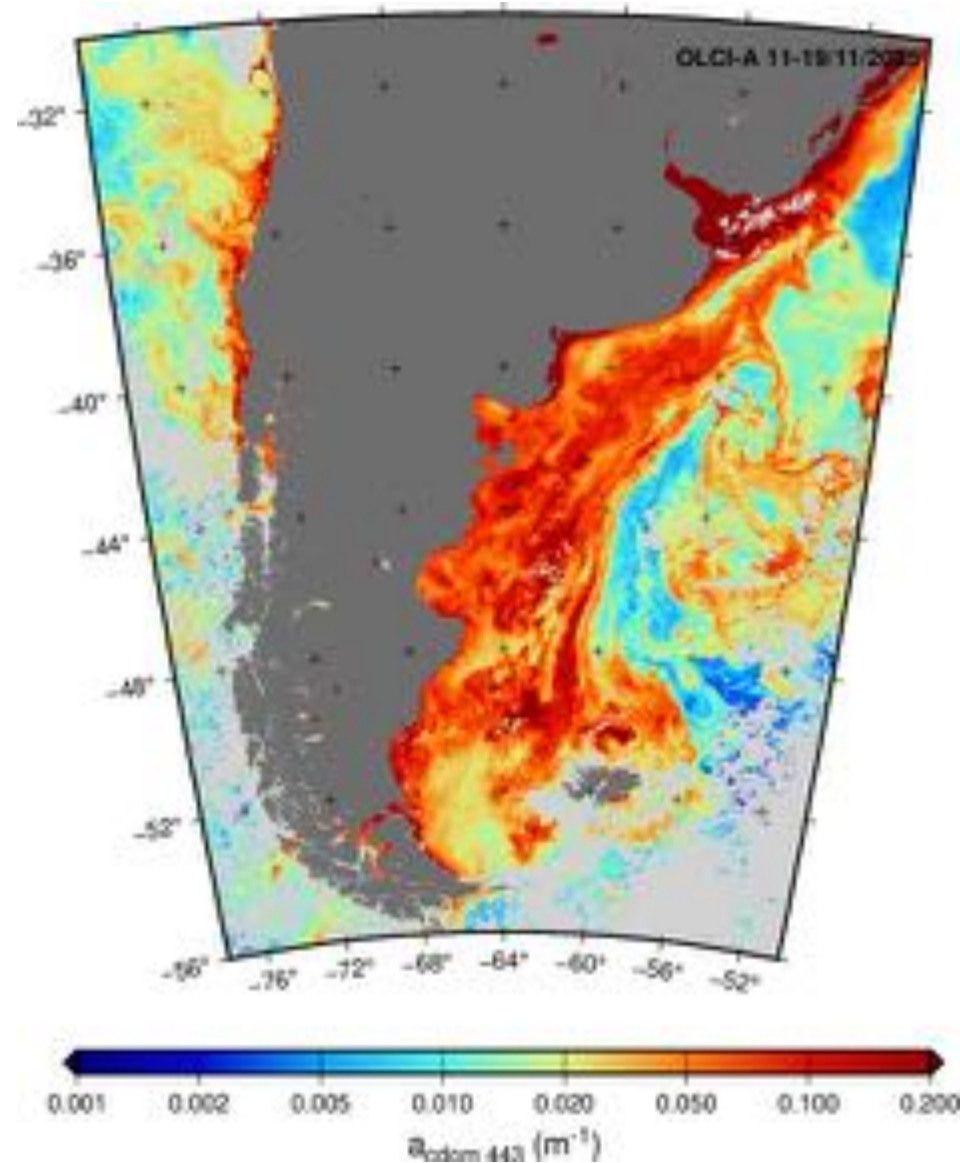
Documentation, resources

- ATBD, validation, link to GitLab source code:
<https://www.eumetsat.int/S3-OLCI-IOP>

Absorption by Phytoplankton at 442.5 nm [$1/m$]



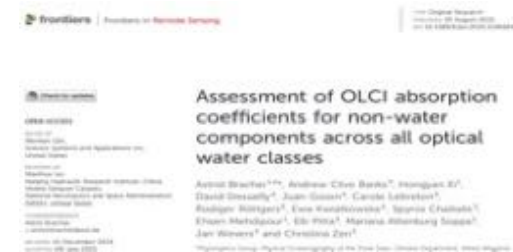
Absorption by Coloured Dissolved Organic Matter at 442.5 nm [$1/m$]
11 – 19 November 2025



Zibordi et al., 2023



Bracher et al., 2025





BRDF correction: validations and new development

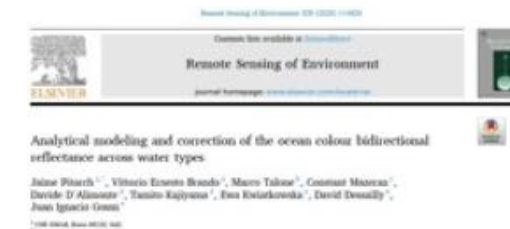
www.eumetsat.int

Corrections of water reflectance for Bidirectional Reflectance Distribution Function (BRDF) tested and validated

- Morel et al., 2002 → M02
- Park and Ruddick, 2005 → P05
- Lee et al., 2011 → L11
- He et al., 2017 → H17
- Twardowski and Tonizzo, 2018 → T18



Dalimonte et al., 2025

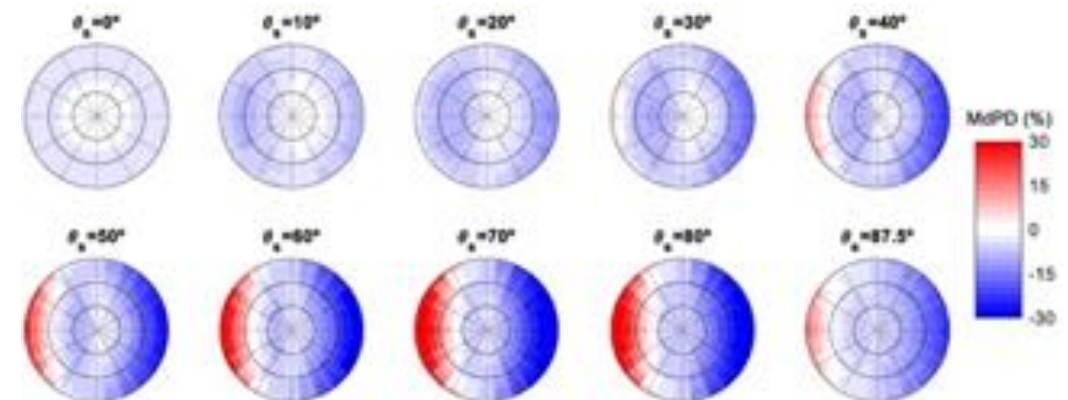


Pitarch et al., 2025

O25 analytical BRDF modelling for diverse water types

- New method starting from L11 analytical framework, named O25
- O25 calibrated with a tailored synthetic dataset that is representative of many diverse optical water types

Median percent difference of the BRDF correction for every geometrical combination



Documentation, resources

- ATBD, validation: <https://www.eumetsat.int/brdf-correction-s3-olci-water-reflectance-products>
- GitLab source code included in the ThoMaS matchup and HyperCP in situ processing tools:
 - <https://gitlab.eumetsat.int/eumetlab/oceans/ocean-science-studies/ThoMaS>
 - <https://github.com/nasa/HyperCP>



Sentinel-3 OLCI Level-2 Collection-4 in 2026

www.eumetsat.int

Standard Atmospheric Correction update

- <https://www.eumetsat.int/oc-sac>



Switch to Rrs with 025 BRDF correction applied

Chlorophyll product update

- Blended algorithm based on Optical Water Classes [link](#)



Fluorescence new product

- <https://www.eumetsat.int/S3-OLCI-FLUO>



PAR product update for the WEkEO platform

- Daily PAR planar above water, scalar under water, instantaneous
- Additional PAR test products in an offline tool
- <https://www.eumetsat.int/daily-photosynthetically-available-radiation-s3-olci-oc>

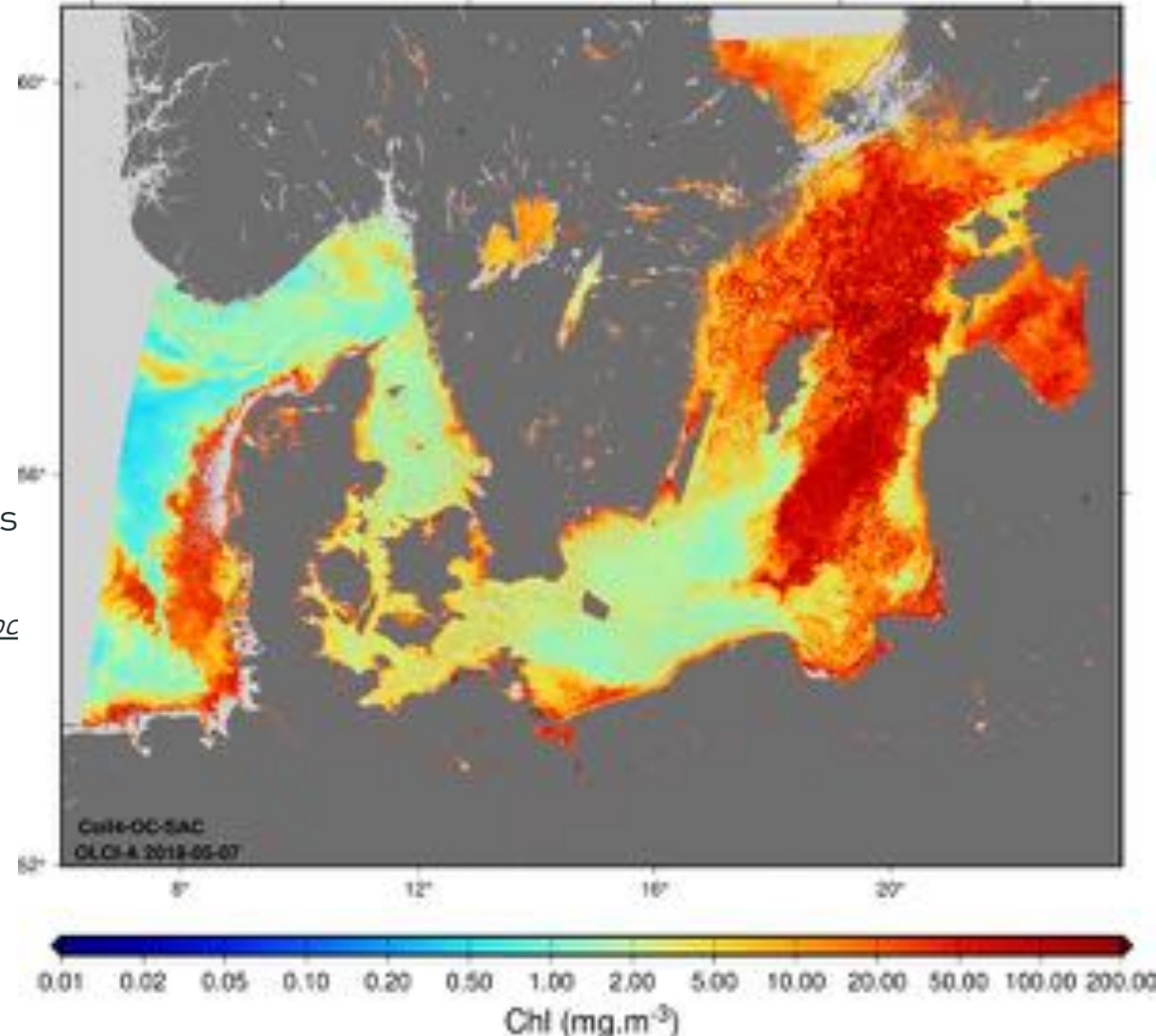


Flagging updates

- e.g. CLOUD_SHADOW [link](#)



Collection-4 chlorophyll retrievals in the Baltic Sea, tentative result





Sentinel-3C launch in Q3/Q4 2026

- Commissioning tandem phases between Sentinel-3C and Sentinel-3B, and Sentinel-3C and Sentinel-3A
- After successful commissioning, Sentinel-3C will replace the Sentinel-3A optical payload

ESTEC

S3NGO input courtesy of ESA's
Paolo Cipollini and Simon Proud

Sentinel-3 Next Generation Optical (S3NGO) mission: ESA preparatory activities are continuing

- Phase A/B1 studies and Mission Advisory Group (MAG) activities started in 2023 and Phase A now completed
- Definition of the Mission Requirements Document (MRD) is supported by the MAG which includes EUMETSAT's experts

S3NGO	Aquatic Colour user needs	ESA AOLCI industrial studies to define technology capabilities against the evolving user needs
Enhanced continuity of the EC Copernicus Sentinel-3 Visible and Infrared measurements Advanced OLCI (AOLCI) and Advanced SLSTR (ASLSTR) instruments	Copernicus user needs now emphasise applications in coastal and inland waters, in addition to open oceans and seas	Constellation of 2 satellites Revisit time ≤ 2 days over ocean As hyperspectral as possible, tentatively several hundred bands in the range 340 nm – 1040 nm Spatial resolution ≤ 150 m Enhancements in the synergistic use of AOLCI and ASLSTR NASA's PACE OCI is a useful reference for S3NGO, supporting definition of the requirements

See posters #20 (Paolo Cipollini *et al.*) and #56 (Constant Mazeran *et al.*)

Launch for S3NGO-A (first of two satellites) tentatively in mid-2030s



Geostationary Meteosat SEVIRI and FCI instruments are NOT developed with Ocean Colour requirements

IOCS/IOCCG Recommendations

- IOCS 2013, 2015, 2019
- Geostationary Ocean Colour - Report 12

Meteosat demonstration products to showcase the value of GEO-OC

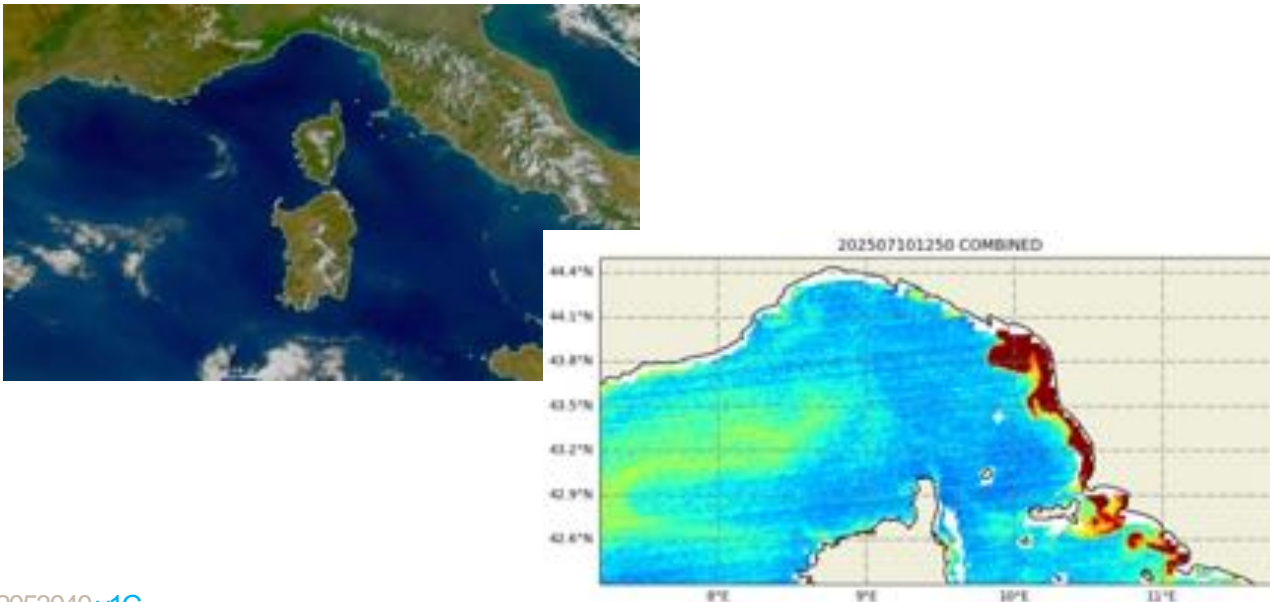
- Prototyping of products such as Turbidity, SPM, Chlorophyll (FCI only), cocco index
- Investigating different Atmospheric Correction approaches: standard, spectral-matching (POLYMER, FCI only), and Neukermans *et al.*, 2012, 2009

Documentation, resources

- <https://www.eumetsat.int/OC-GEO>



MTG FCI RGB and chlorophyll over Mediterranean, Ligurian Sea



Meteosat Third Generation (MTG) Flexible Combined Imager (FCI)
disk observation every 10 min at 1 km at nadir



See poster #148
(Carole Lebreton *et al.*)



Ocean Colour System Vicarious Calibration (OC-SVC) development of Copernicus OC-SVC infrastructure

www.eumetsat.int

OC-SVC is a requirement for all Ocean Colour missions

EUMETSAT manages OC-SVC activities on behalf of the EC Copernicus Programme

IOCS/IOCCG Recommendations

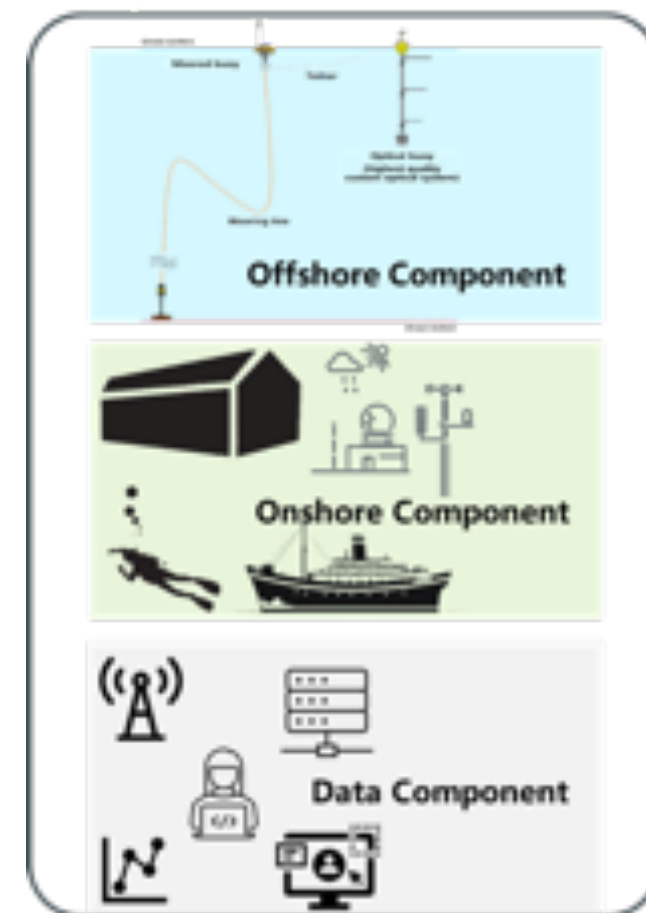
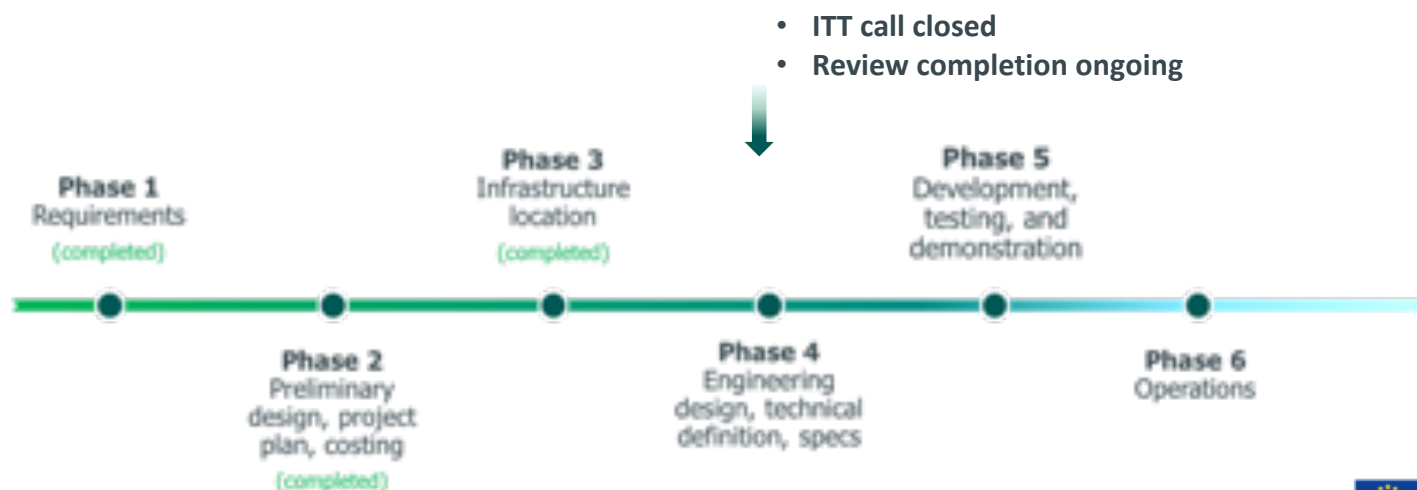
➤ IOCS2013, 2017, 2019

➤ OC-SVC White Paper

- Establishing a European node of these unique OC-SVC infrastructures and securing European OC-SVC capability for its Copernicus missions (S3, S2, NG, Expansion)
- Standardising with NOAA's MOBY and NASA's MarONet
- Collaborating with NASA and the MarONet Team whose support is highly acknowledged
- Close oversight by the EC and the international Expert Review Board
- Free, full and open policy on data and code, complete infrastructure documentation

Documentation, resources

- <https://www.eumetsat.int/OC-SVC>





FRM4SOC2 → developments to assign a metrological “quality label” to *in situ* and satellite data

FRM4SOC2 focus on above water radiometry

FRM4SOC2 developed and promoted radiometric FRM

- *In situ* data operators and validation teams are trained on FRM field procedures and tools
- *In situ* instrument manufacturers are adopting upgraded instrument designs and calibration practices
- Cal/char laboratories are adopting detailed guidelines and new labs are being established
- New tools for *in situ* FRM data processing, storage and satellite validation are broadly used and people are trained on them

Documentation, resources

- <https://frm4soc2.eumetsat.int>

UNIVERSITY OF TARTU



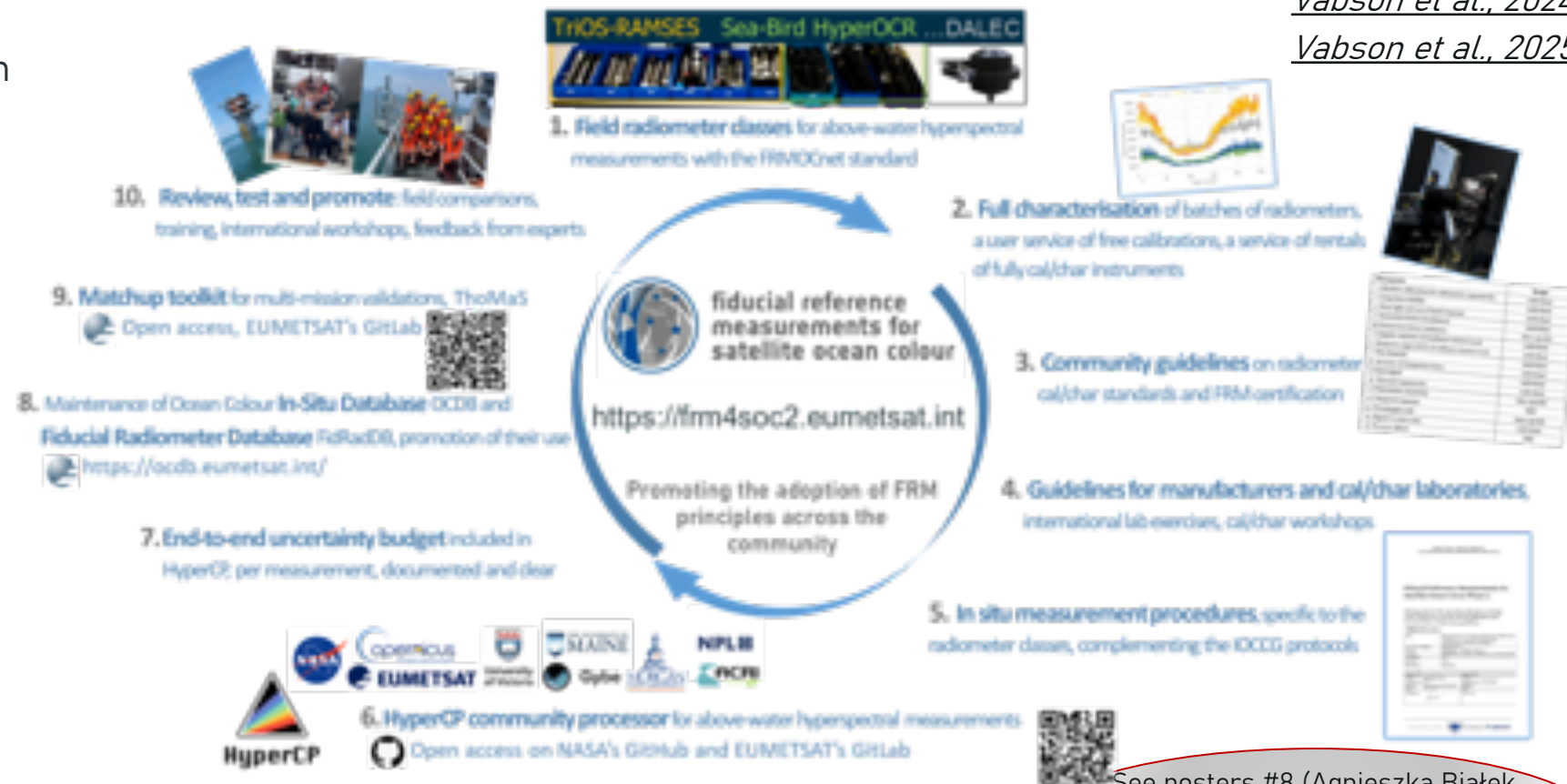
www.eumetsat.int

IOCS / IOCCG Recommendations, protocols

- IOCS 2013, 2017, 2019
- *In Situ* Data - INSITU-OCR White Paper

Vabson et al., 2024

Vabson et al., 2025



See posters #8 (Agnieszka Białek *et al.*) and #25 (Hayley Evers-King *et al.*)

Panel on In situ Data; Breakout 6; Training HyperCP & ThoMaS



User support and training resources

EUMETSAT Helpdesk

OPS@eumetsat.int

OPS@eumetsat.int – any questions about EUMETSAT data products or services.
Hayley.EversKing@eumetsat.int – any inquiries about organization or support of training events.

www.eumetsat.int

Capacity Building
Townhall, 4 Dec, 14:00

User portal

Copernicus
& mandatory
missions
Data access



Code distribution

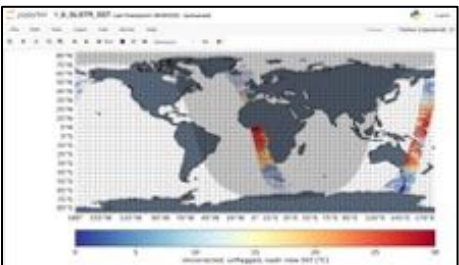
CONDA



GitLab



Jupyter Notebooks



Cloud
services

binder



Copernicus

Courses



moodle



Video tutorials



YouTube



Case studies

