Applying Case 2 Regional Coast Colour (C2RCC) Algorithms to EUMETSAT OLCI Products

EUMETSAT Short Course #48

Day 1: 24 Oct 2024, 12:00–14:00 UTC (14:00–16:00 CEST)

copernicus.eumetsat.int

- We have an **open Q&A** throughout the meeting
- This is hosted on Slido: https://www.slido.com/ event code; **#EUMSC48**
- Or you can use this QR code >>>>>>>>>>>>>>>>>>>>>>>>>
- We will answer questions throughout each session and at the end of the event
- Reminders of the login details will be given in chat
- At the end we will have a short **feedback questionnaire**, also on Slido (please take 2 minutes to give us your thoughts)
- Session is **recorded.** Presentations available through **Moodle**.

Objectives

- Appreciate the need for different approaches to atmospheric correction and the need for special approaches in complex water retrievals

- Recall how to identify and access the Sentinel-3 OLCI marine products via the EUMETSAT Data Store via GUI and API

- Learn how to navigate and manipulate these products using the ESA SNAP software package

- Understand the theoretical basis, suitability and practical implementation of the C2RCC processor

- Be aware of differences between the EUMETSAT operational and external implementations of the C2RCC processor, and of upcoming developments in OLCI ocean colour products

EUMETSAT marine data streams

The European Organisation for the Exploitation of Meteorological Satellites.

- Providing observations and data services for operational weather and Earth system monitoring and forecasting, and for climate services.

- Also provides operational marine data through our commitments to the Copernicus programme and via our mandatory missions through our Ocean and Sea Ice Satellite Application Facility (OSI SAF)

Sentinel-3   Sentinel-6 Micheal Freilich   Jason-3

MetOp   MSG   MTG

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- Questions about our data: ops@eumetsat.int

- Questions about our training: training@eumetsat.int

- more info on future training courses can be found via: https://trainingevents.eumetsat.int/

Applying Case 2 Regional Coast Colour (C2RCC) Algorithms to EUMETSAT OLCI Products

EUMETSAT Short Course #48

Day 2: 25 Oct 2024, 12:00–14:00 UTC (14:00–16:00 CEST)

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Custom vs operational processing and OLCI product developments

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24/25 Oct 2024, 12:00-14:00 UTC (14:00-16:00 CEST)

Agenda

- Custom vs operational processing with C2RCC

- Upcoming changes to OLCI processing

- New toolkits and opportunities

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- To reduce the size of level-2 products, we do not distribute the level-2 reflectances for the complex water processor.

- The EUMETSAT operational implementation of C2RCC exploits the same neural network demonstrated here.

- However, you may see differences in your own retrievals due to:
  - Differences in parameter selections
  - Differences in ancillary/auxiliary data sources used
  - Differences in flagging applied

- We encourage you to view our guidance on how to flag operational products from the complex water processor: https://tinyurl.com/OLCI-PB

- You can find more information on OLCI processing on our user portal: https://user.eumetsat.int/ (or http://olci.eumetsat.int)

OLCI updates and planning

22 Feb 2024 estimated Q2 2025

S3 OLCI Ocean Colour Collection-3

- Previous OPE processing

S3 OLCI Ocean Colour Collection-3 evolution, 3.04

- Current OPE processing
- IOP new parameters
- Product "_unc" update

S3 OLCI Ocean Colour Collection-4

- Standard atmospheric correction redevelopment
- BRDF correction of water reflectance products
- Chlorophyll algorithm improvements
- Fluorescence new parameter
- Flags: cloud, cloud shadow, bright water
- Offline WEkEO: dPAR planar above water and uncertainties, dPAR scalar under water, iPAR

S3 OLCI L1 reprocessing

S3 OLCI L2 reprocessing Collection-4

New water Inherent Optical Property (IOP) parameters

- Implementation follows S3VT-OC, QWG and CMEMS requests
- New NetCDF file in the OLCI L2 SAFE directory: iop_lsd.nc
  - a_{nw} a_{phy} a_{cdm} b_{bp} at 443 nm and b_{bp} slope from the three-step semi analytical algorithm by [Jorge et al., 2021](#)
  - a_{cdom} at 443 nm by [Bonelli et al., 2021](#)
  - K_d 490 nm by Jamet et al., 2012, Loisel et al., 2018
  - Optical Water Class based on Mélin and Vantrepotte, 2015
- New parameter-specific flag: IOP_LSD_FAIL
- Uncertainties in the parameter attribute
- Scientific algorithm development and validation: https://www.eumetsat.int/S3-OLCI-IOP.

IOP parameters meet the mission requirements (journal publication in preparation)

New uncertainty parameters

- Level 1b products now include per-band radiometric uncertainties

Redevelopment of Standard Atmospheric Correction (OC-SAC)

- Addressing the problems with the Standard Atmospheric Correction
- https://www.eumetsat.int/oc-sac

HYGEOS solvo

Switch to Remote sensing reflectance (Rrs)

- Switch from water reflectance ρ_w to Rrs, where $\rho_w = \pi \times Rrs$

BRDF correction applied

Æquora consulting Consiglio Nazionale delle Ricerche Institut de Ciències del Mar solvo

- BRDF correction developed with an extension to complex waters
- https://www.eumetsat.int/brdf-correction-s3-olci-water-reflectance-products

Chlorophyll improvements

LOG

- Blended chlorophyll algorithm based on Optical Water Classes

Fluorescence new parameter

- New NetCDF file in the OLCI L2 SAFE directory: fluorescence.nc
- https://www.eumetsat.int/S3-OLCI-FLUO

Spectral Earth GmbH

Flagging improvements

- Updated CLOUD NN and new CLOUD_SHADOW flag

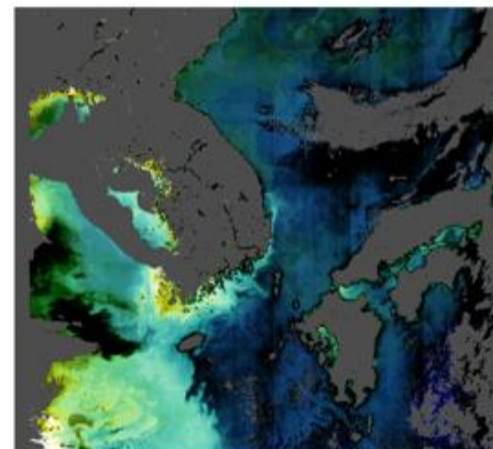BROCKMANN CONSULT GmbH solvo

- New BRIGHT_WATER flag
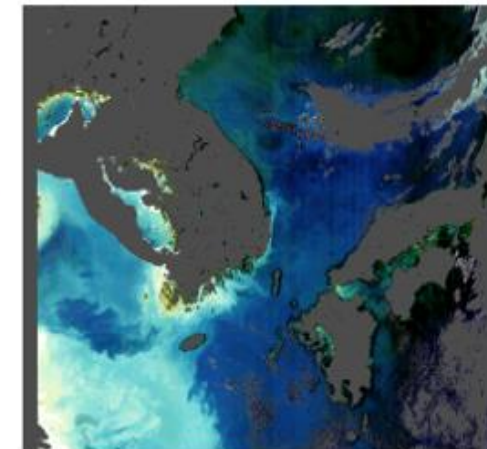
PAR upgrades on WEkEO

HYGEOS

- Daily PAR planar above water and uncertainties
- Daily PAR scalar under water, instantaneous PAR
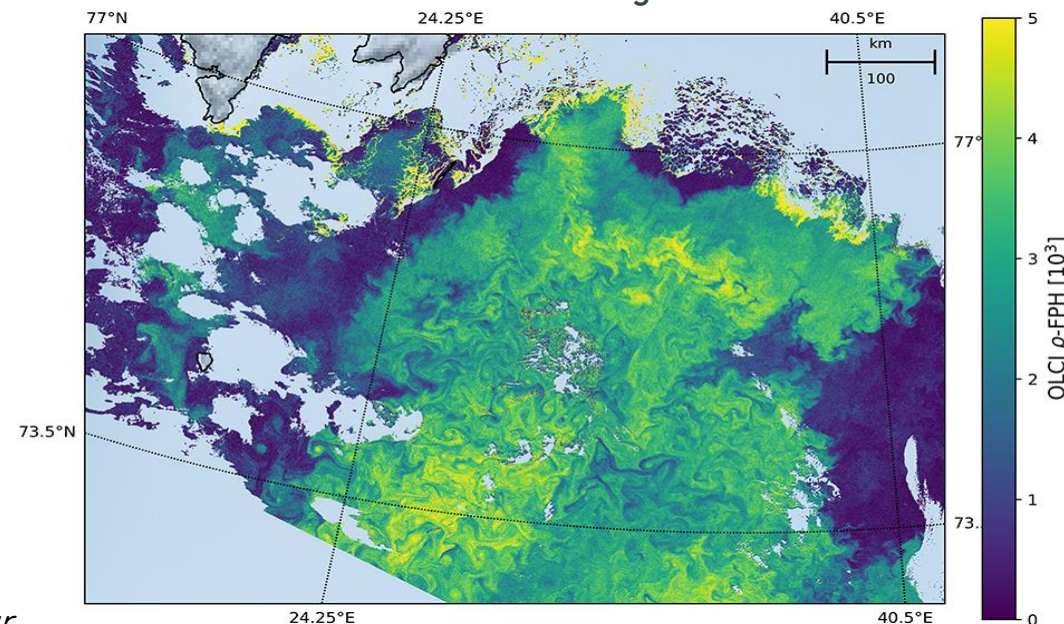- *https://www.eumetsat.int/daily-photosynthetically-available-radiation-s3-olci-ocean-colour*

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OPE Collection-3   OC-SAC Collection-4

OLCI Fluorescence Peak Height in Barents Sea

New toolkits and opportunities

As part of the [FRM4SOC-2](#) project, EUMETSAT have co-developed two new toolkits:

ThoMaS

- ThoMaS is a pan-sensor (OLCI / PACE OCI / VIIRS / MODIS) python toolkit for conducting match-up validation analysis of ocean colour products.
- Exploits data available from the EUMETSAT Data Store and NASA EarthData portal.
- Available at https://gitlab.eumetsat.int/eumetlab/oceans/ocean-science-studies/ThoMaS

HyperCP

- The HyperCP toolkit processes above water hyperspectral ocean colour radiometry to support PACE OCI and Sentinel-3 OLCI.
- It is available at https://github.com/nasa/HyperCP
- Output data from HyperCP can be used as *in situ* validation data for ThoMaS

If you operate your own fleet of radiometers, or are planning validation campaigns, please contact us for further information on opportunities within FRM4SOC-2.

Q&A and feedback session

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