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OLCI Product Status & Outlook

7th Sentinel-3 Validation Team Meeting 2022

18-20 October 2022 | ESA-ESRIN | Frascati (Rm), Italy

Ewa Kwiatkowska & Steffen Dransfeld

Eumetsat, ESA/ESRIN

OLCI Operational Processing Baselines

Since 23-Aug-2022 for S3-A and 30-Aug-2022 for S3-B OL__L1_.003.00.00 **only** from ESA (i.e. no update at EUM):

- OLCI L1 radiometric uncertainty per channel/pixel layer provided as separate .nc files on ESA SciHub.

Since 20-Jan-2021 PB OL__L1_.002.22.00 for S3-A & B:

- Inclusion of the Processing Baseline identifier in the product manifest for L1/L2.

Since 18-Nov-2021 PB OL__L1_.002.21.00 for S3-A & B:

- Refresh of the L1 radiometric calibration model

Since 28-Apr-2021 PB 2.76/1.54 for S3-A/B

- Improved anomaly detection of VAM anomalies to avoid processing of corrupted data
- Processing of early mission data (4-24-Apr-2016) by correcting a NAVATT time stamp anomaly

All info available on

- ESA SentinelOnline
- EUMETSAT webpages: https://www.eumetsat.int/ocean-colour-services

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OLCI spectral evolution through the mission, information and tools available

- Spectral prediction model (wavelength correction, no radiance changes): https://sentinel.esa.int/web/sentinel/technical-guides/sentinel-3-olci/olci-instrument/spectral-characterisation-data
- O_2A-band harmonization (radiance correction to nominal wavelengths, no wavelength changes): https://www.eumetsat.int/S3-OLCI-CTP & https://www.eumetsat.int/media/48768

To be released still in 2022

OLCI L1 detection & flagging of partially saturated pixels:

- Over very bright surfaces, typically bright clouds, pixels at the edges of saturated areas tend to be impacted by anomalous radiometric values due to an erroneous on-board aggregation of OLCI microbands manifesting itself when not all microbands of a nominal channel are saturated. The release will detect such pixels and flag them accordingly.

OLCI L1 correction of geometric discontinuities at camera interfaces:

- This will be improved by application of the geometric calibration models specific to each camera module and not as an average model for all cameras.

To be released still in 2022

SYN-SDR and SYN-VG* product improvements:

- As part of aiming for the SYN-SDR product to be ARD compliant we are adding a DOI to the manifest pointing to an online Landing Page on Sentinel Online providing detailed information about the product.
- A saturation flag will be added to the SYN-VG* products to warn users about out-of-range data with the affected pixel values replace by either _FillValue or a maximum/minimum valid value.
- Use of SLSTR VIS-SWIR calibration offsets to correct for bias

SYN-AOD product improvement:

- Flagging of pixels with a Sun zenith angle higher than 70 degrees as they are impacted significantly by cloud and snow contamination more dominant at higher latitudes.
- Use of SLSTR VIS-SWIR calibration offsets to correct for bias.

Further evolutions planned

OLCI GIFAPAR product improvement:

- Empirical model of the GIFAPAR algorithm uncertainties to build on the L1 radiometric uncertainties recently released.

SYN-SDR product improvement:

- In view of ARD compliancy and to provide the continuity to MODIS the SYN-SDR product needs to adopt a different tiling grid. Projection grid is still to be chosen but most likely it will be the MODIS sinusoidal tiling grid.

- Transfer of AOD computation module from SYN-AOD to SYN-SDR processor

Status OLCI L2 OTCI

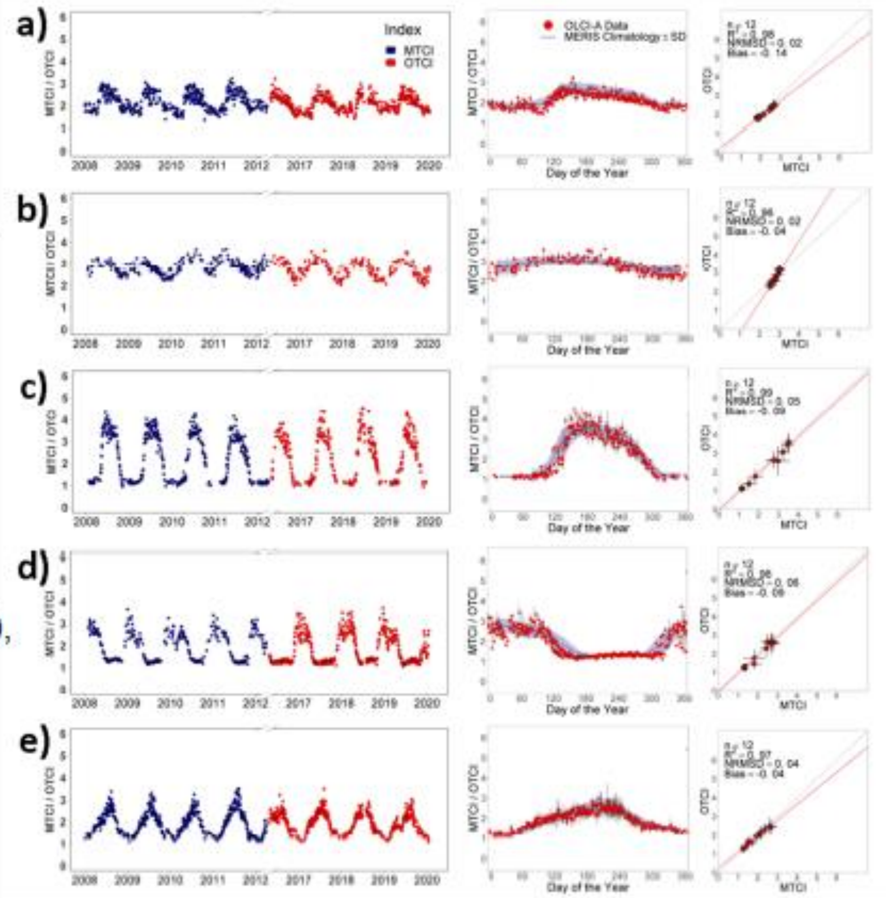
US-Talledaga (ENF),

AU-Robson-Creek (EBF),

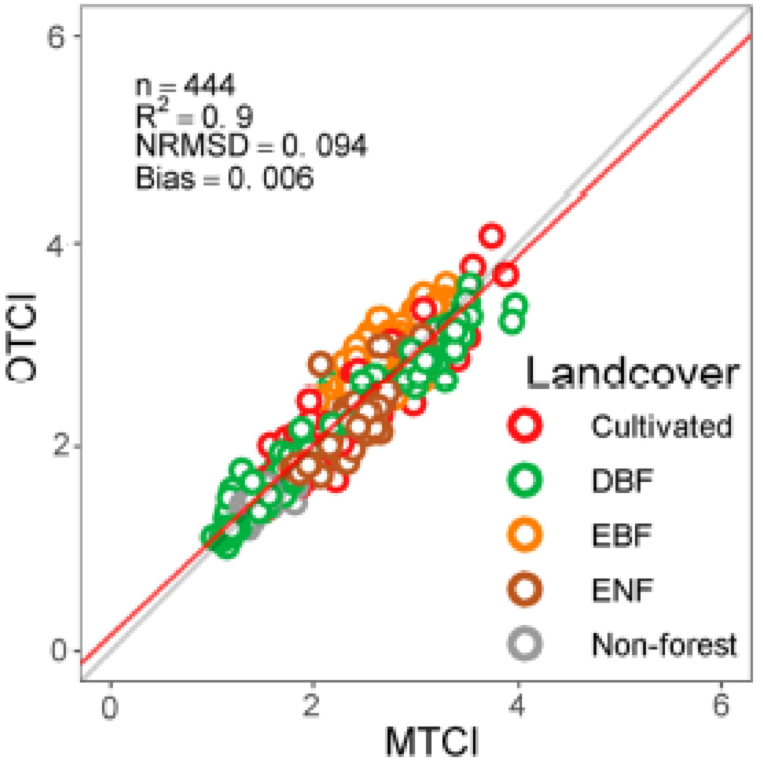
FR-Montiers (DBF),

BR-Mataseca (non-forest),

IT-Lison (cultivated).



Indirect Validation: MERIS Climatology and Validation Sites



Comparison of monthly mean Sentinel-3 OTCI (2016 to 2019) and Envisat MTCI (2002 to 2012) values over the 37 validation sites

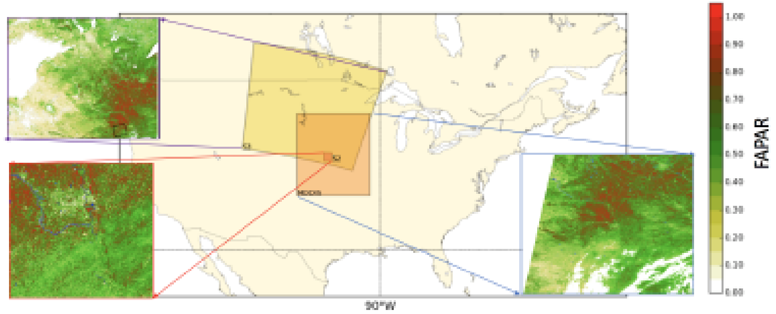
Continuity with MERIS

Status OLCI L2 GIFAPAR

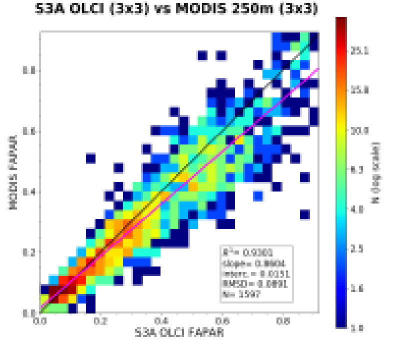
Consistency with MODIS and Sentinel-2 FAPAR retrievals systematically done over a selection of sites.

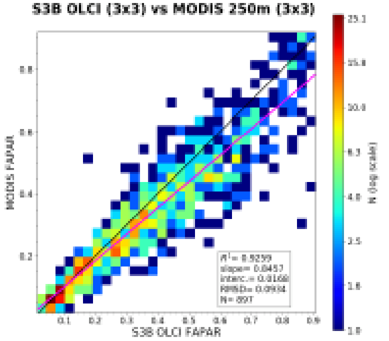
OGVI to GIFAPAR name change end of 2021.
-> Oral presentation by Nadine Gobron

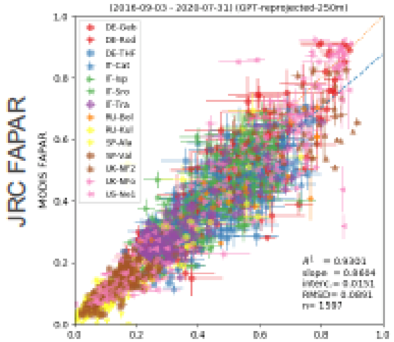
Images of Sentinel3, Sentinel 2 and MODIS over US-Ne1

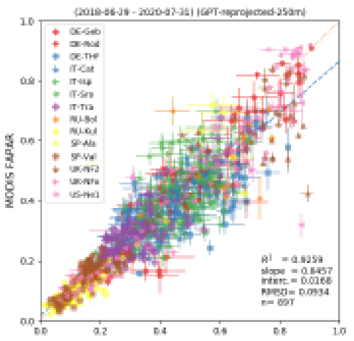


Code	Latitude(°N+)	Longitude(°E+)	MGRS[a]	Land Cover Type
DE-Geb	51.1001	10.9143	32UPB34036269	Croplands
DE-Ros	50.8300	11.7700	32UPB95063457	Croplands,Evergreen Needleleaf Forest,Deciduous Needleleaf Forest
DE-Thf	50.5730	10.8450	32UPB30640396	Mixed Forest
IT-Cat	37.278531	14.883261	33SVB89652577	Croplands (Orange)
IT-Isp	45.8128	8.6345	32TMR71537329	Mixed Forest
IT-Sro	43.7278	10.2844	32TPP03444244	Pinus Pinea
IT-Tra	37.645561	12.852736	33SUB10566865	Croplands (Vineyards and olive trees)
RU-Bol	57.05	93.37.	46VEJ22442301	Mixed Forest
RU-Kul	52.561106	80.708522	44UMD80242348	Cultivated Areas
SP-Ala	38.451556	-1.064556	30SXH68885769	Semi-arid Mediterranean
SP-Val	39.5207193	-1.29259339	30SXJ46767595	Semi-arid Mediterranean
UK-Nfo	50.84984	-1.57406	30UXB00378341	Natural deciduous forest
US-Ne1	41.165	-96.4766	14TQL11706015	Croplands (Maize)
US-Ne2	41.1648	-96.4701	14TQL12246014	Croplands (Irrigated Maize Soybean rotation)
US-Ne3	41.1797	-96.4396	14TQI14746186	Croplands (Irrigated Maize Soybean rotation)



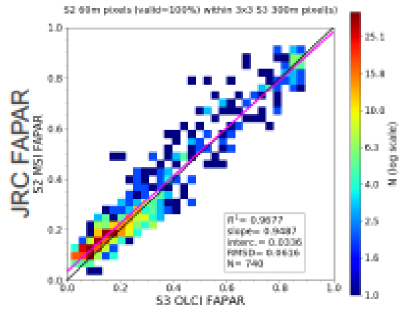


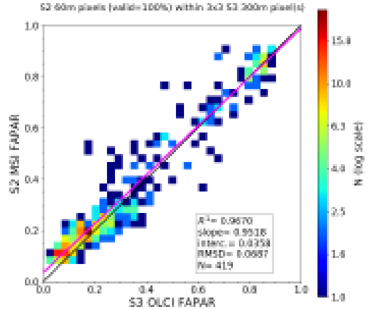




Sentinel-3A OGVI vs Sentinel-2A/B FAPAR

Sentinel-3B OGVI vs Sentinel-2A/B FAPAR





S3 OLCI-A and OLCI-B Level-2 Ocean Colour Collection-3 product status

Collection-3 in operations

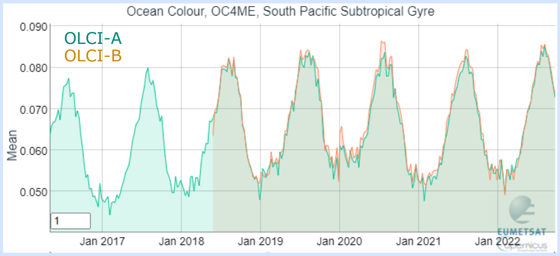
- v. 3.00 since **16 Feb 2021**
- v. 3.01 since **28 Apr 2021**, two minor updates
- v. 3.02 since **19 Apr 2022**, new processor naming

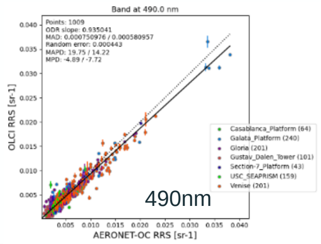
Collection-3 algorithm evolutions and status discussed at S3VT 2020, improvements summary:

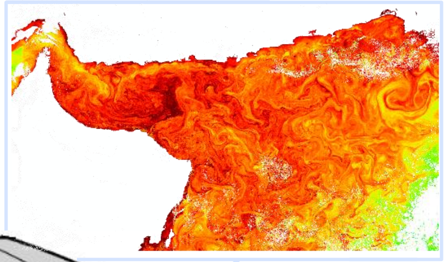
- **High consistency between OLCI-A and OLCI-B**
- Open water chlorophyll within mission requirements
- Improved product retrievals over turbid waters
- Reduced «salt and pepper» noise in products

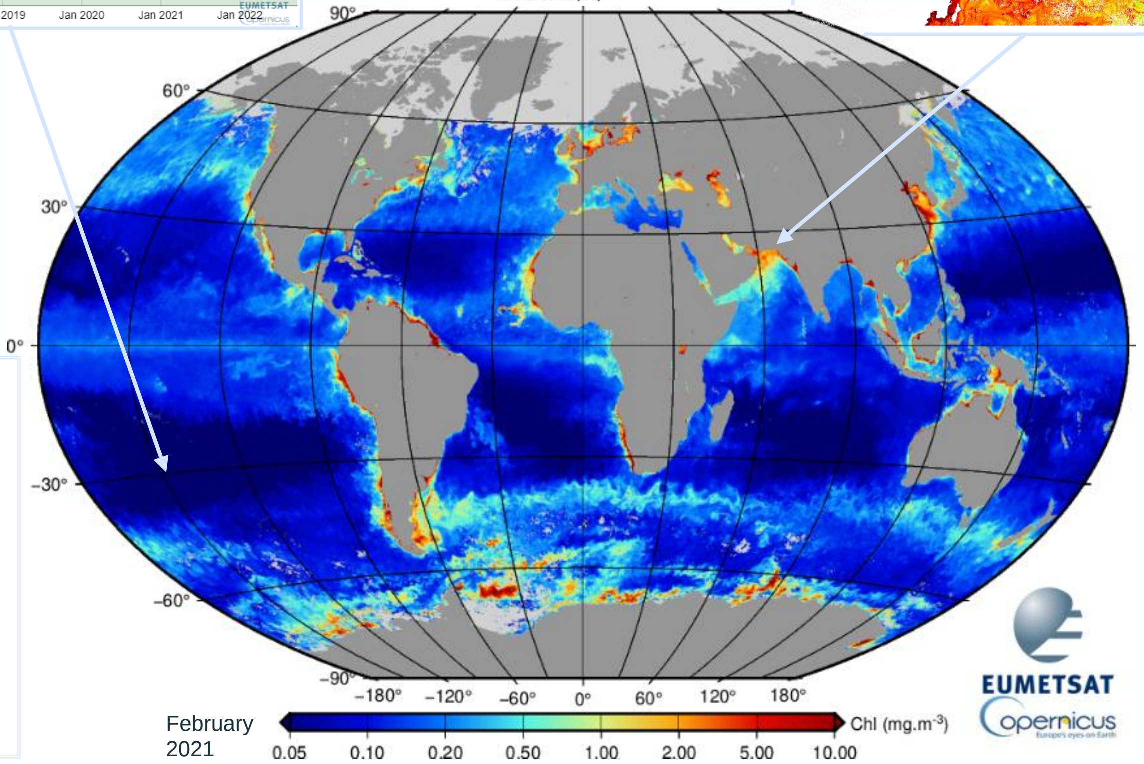
Collection-3 detailed documentation online

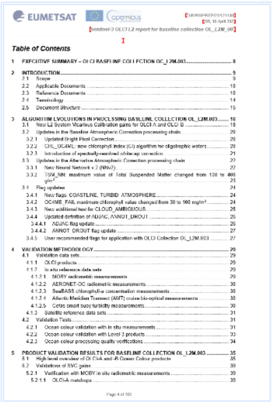
- Collection-3 Report (EUM/RSP/REP/21/1211386): *https://www.eumetsat.int/media/47794*
- Ocean Colour Services page: *https://www.eumetsat.int/ocean-colour-services*
- METIS-OC Monitoring, Evaluation of OC products: *https://metis.eumetsat.int/oc*









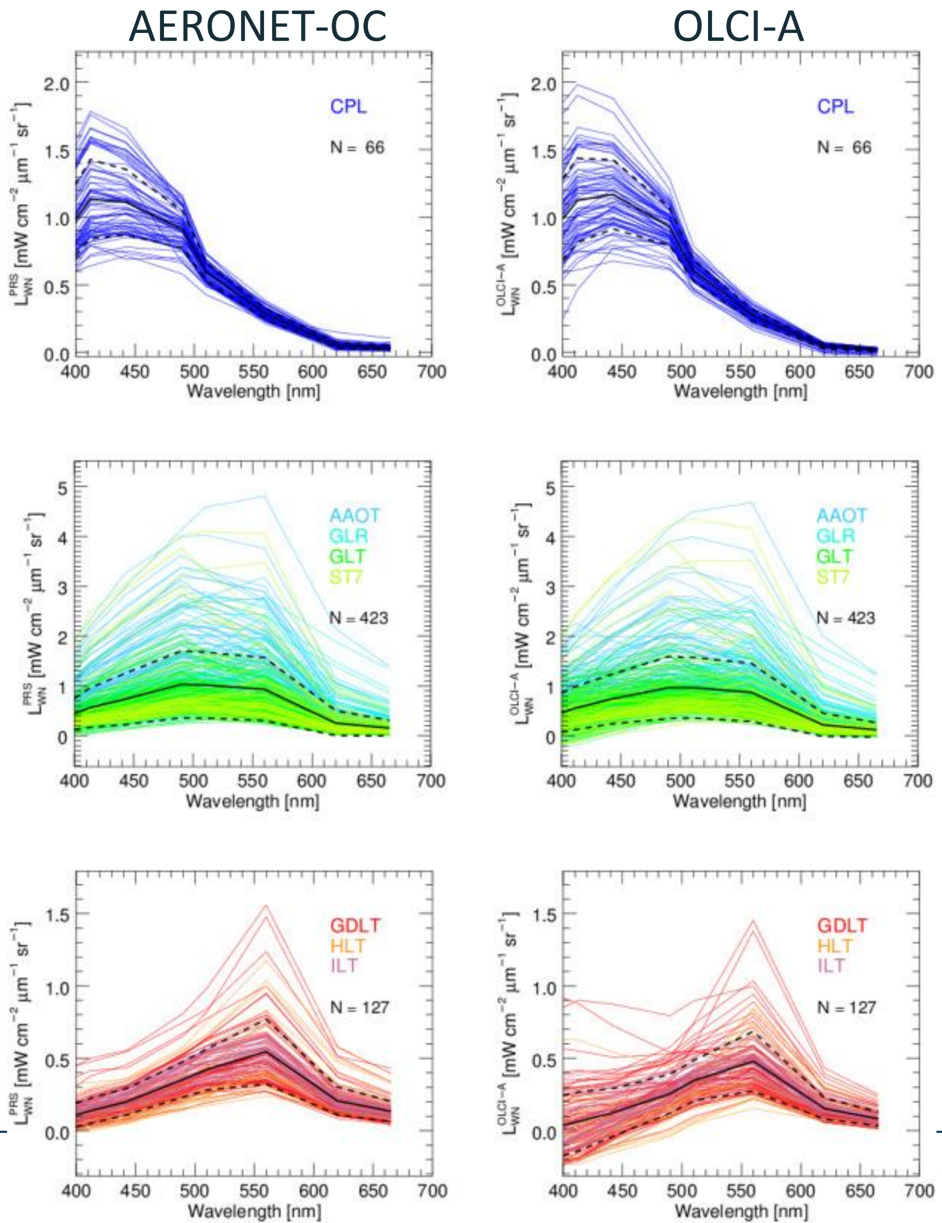


OLCI Collection-3 validations

Collection-3 OLCI L2 Ocean Colour validation papers

- Zibordi *et al.*, 2022, RSE: https://doi.org/10.1016/j.rse.2022.112911
- Cazzaniga *et al.*, 2022, IEEE GRSL: https://doi.org/10.1109/LGRS.2021.3136291
- Tilstone *et al.*, 2021, RSE: https://doi.org/10.1016/j.rse.2021.112444
- Tilstone *et al.*, 2022, MDPI RS: https://doi.org/10.3390/rs14010089
- Vanhellemont and Ruddick, 2021, RSE: https://doi.org/10.1016/j.rse.2021.112284
- …

→ S3VT-OC presentations in the Ocean Colour sessions



Clear oligotrophic and mesotrophic waters

Generic complex waters with moderate concentrations of sediments and CDOM

High CDOM concentration waters

OLCI Collection-3 reprocessed + operational data stream: *data.eumetsat.int*

2016 · 2017 · 2018 · 2019 · 2020 · 2021 · 2022 · Now

OLCI-A L2 reprocessing: 25 April 2016 – 28 April 2021 | OLCI-A L2 operational 28 April 2021 - onwards

OL__L2M.003.01/02

OLCI-B L2 reprocessing: 15 May 2018 – 28 April 2021 | OLCI-B L2 operational 28 April 2021 - onwards

EUMETSAT Data Store – a single online access point for all reprocessed and operational data

- *https://data.eumetsat.int*
- → Hayley Evers-King presentation

EUMETSAT tools and resources for data extraction and validations

- Scripts to download OLCI products from EUM Data Store
- Scripts to extract minifiles, calculate minifile statistics
- Ocean Colour in situ Database: *https://ocdb.eumetsat.int/*
- Scripts to perform matchups with in situ measurements
- → Juan Ignacio Gossn presentation in the OC session

S3VT-OC sessions

Following the S3VT recommendations

“In summary, much progress but still *room for improvements*”

OLCI Collection-3 Ocean Colour feedback from S3VT-OC 2020

- Remaining problems with the Standard Atmospheric Correction
  - As a result, the radiometry is performing poorer over complex waters, particularly in the CDOM-dominated waters
  - Causing geometry dependences in products (viewing and solar), which are showing as product biases, e.g. across track
- BRDF correction is needed, suitable for all water types
- Remaining pixel flagging limitations, high-chlorophyll limitations, additional user products needed

Redevelopment of Standard Atmospheric Correction (OC-SAC)

- https://www.eumetsat.int/oc-sac
- → Constant Mazeran presentation in the OC session

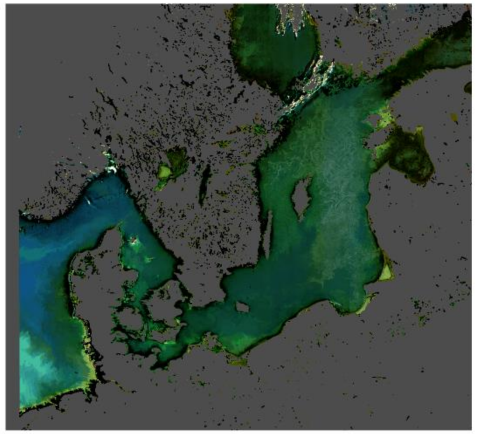
Development of BRDF correction for complex and clear waters

- https://www.eumetsat.int/brdf-correction-s3-olci-water-reflectance-products
- → Davide D’Alimonte presentation in the OC session

New demonstration test products available: IOPs, Fluorescence

solVo HYGEOS

OC-SAC first results



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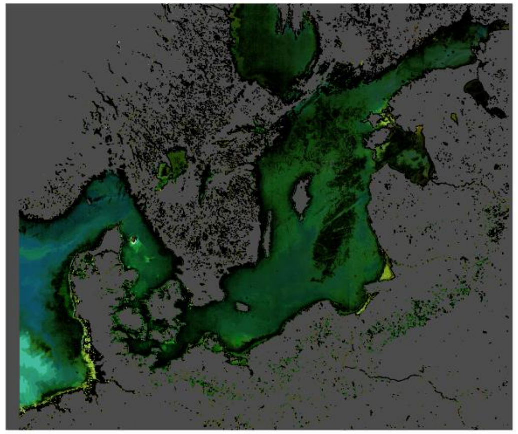

Reference BRDF
M02, L11, P05,
H17, T18

Æquora consulting
Consiglio Nazionale delle Ricerche
ICM Institut de Ciències del Mar
solVo

Aiming to provide to S3VT easy procedures, guidelines and tools to collect FRM-quality in situ measurements and to facilitate OLCI validations

Fiducial Reference Measurements for Satellite Ocean Colour – Phase 2

- *https://frm4soc2.eumetsat.int*
- Developing measurement procedures that are prescriptive, easy-to-follow 'cooking recipes', and easy to adopt
- Developing an in situ Community Processor including a complete uncertainty propagation chain
- → Riho Vendt, Viktor Vabson, Agnieszka Białek, Alexis Deru and other presentations in the OC session

Chlorophyll HPLC standards

- → Elisabetta Canuti, JRC, presentation in the OC session