International
Ocean Colour Science
Meeting 2025

Advancing Global Ocean Colour Observations

Poster Lightning Session 2A

Poster # 63

Quantification and Correction of Adjacency Effects in Optical Remote Sensing Products of Swiss Lakes

Fiona Pühringer[1,2], Abolfazl Irani Rahaghi[1,2], Michel Vittoz[1,2], Anita Schlatter[1] , Mortimer Werther[1] , Jonas Wydler[1] , Alexander Damm[1,2], Daniel Odermatt[1,2]

[1] Eawag, Swiss Federal Institute of Aquatic Science and Technology, Surface Waters – Research and Management, 8600, Duebendorf, Switzerland

[2] Department of Geography, University of Zurich, 8057, Zurich, Switzerland

fiona.puehringer@eawag.ch

Poster # 63

Background

Problem

Adjacency Effect affects Swiss lakes, increasing at-sensor radiance

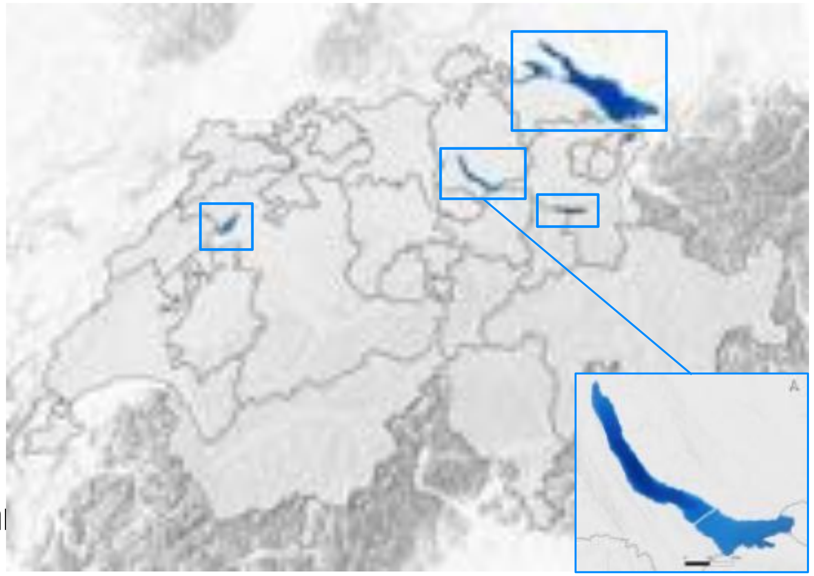
➡ inaccuracies in atmospheric correction, derived reflectances & air/water constituents

Gap

Insufficient in situ (& ancillary) **data examination** of **AE correction algorith**

Goal

Improvement of **water quality indicators**



Study Sites Lakes Biel, Constance, Zurich and Walensee

In Situ Radiometry Measurement Transect (Lake Zurich, 08.10.2023)

Data & Methods

Reference

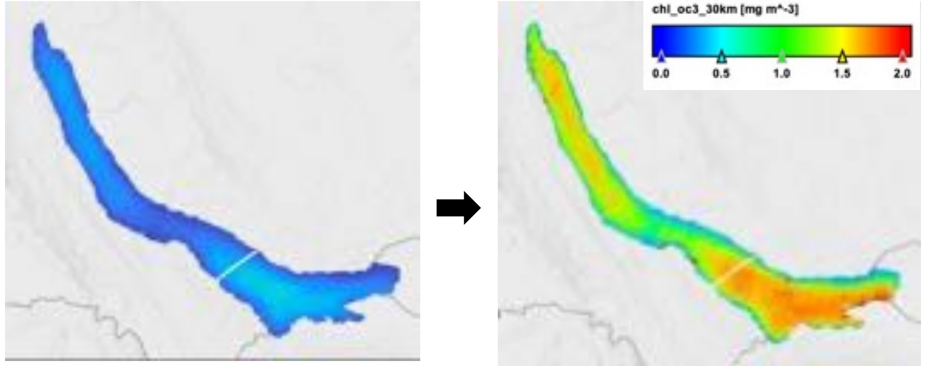
Continuous hyperspectral, along-track radiometry concurrent with **MSI S2A/B** & **OLI L8/9** overpasses

Algorithms

AC: ACOLITE, Polymer / **AEC:** RAdCor, T-Mart

Results

Come talk to me! ☺



Satellite-derived (L9) chl-a concentrations corrected with Polymer (left) and Polymer+T-Mart (right)

Satellite-Derived (L9) vs. Convolved In Situ Rrs Along track, Lake Zurich, 08.10.2023 (RGB wavelengths)

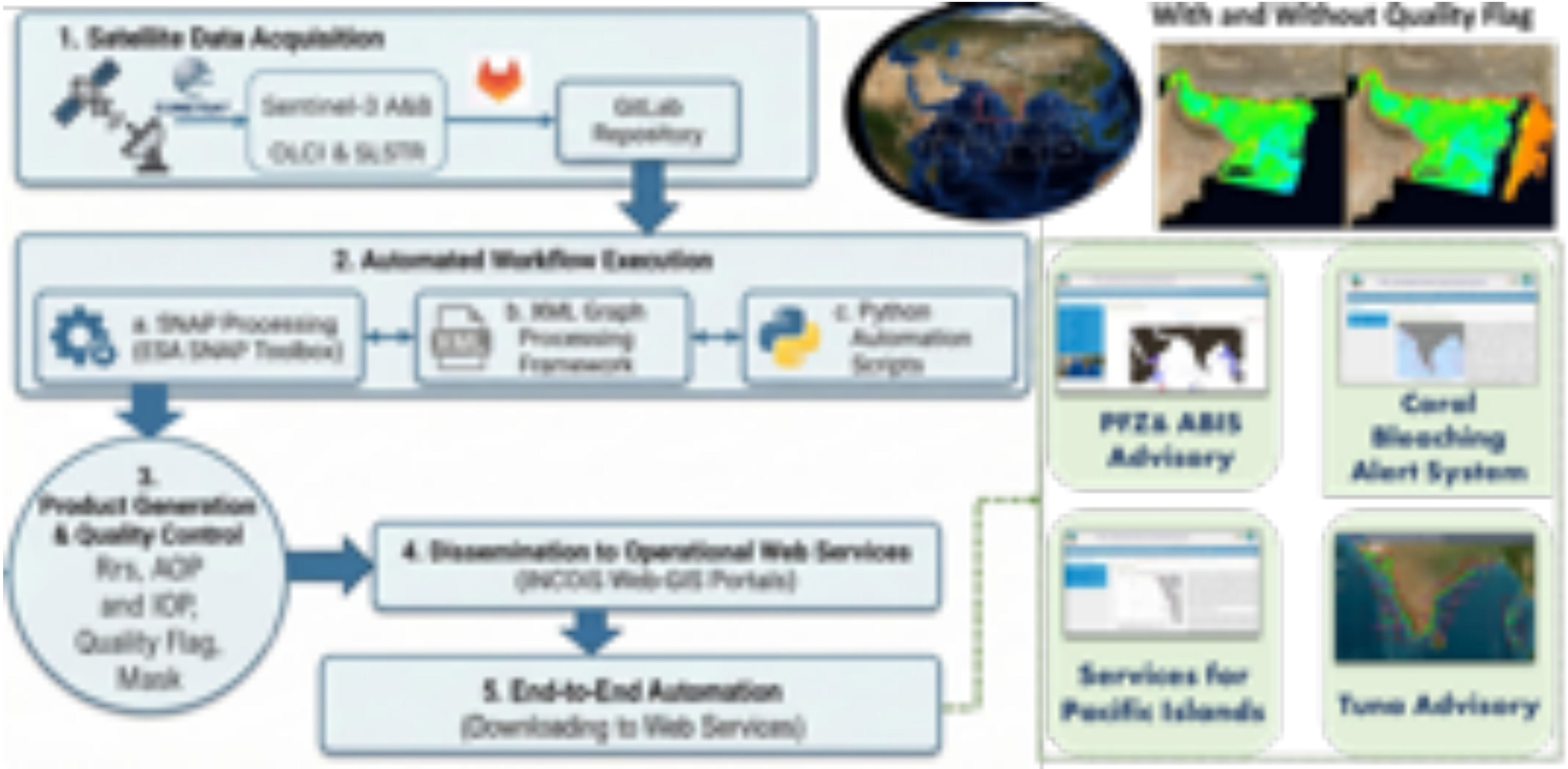
Poster # 67

Operational Ocean Colour Services with Sentinel-3: Applications in the Marine Ecosystem and Fisheries Monitoring

Premkumar Rameshkumar*, *Alakes Samanta, Sk Baliarsingh, Sudheer Joseph & TM Balakrishnan Nair*

Poster # 67

INCOIS | CCG | Copernicus Europe's eyes on Earth | EUMETSAT | International Ocean Colour Science Meeting 2025



Poster # 68

‘Ocean Glow’: Detecting Phytoplankton Nutrient Limitation via Above Water Radiometry

Tiera-Brandy Robinson,
Thomas J. Browning

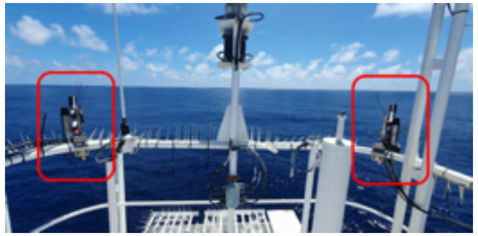
Poster # 68

Project Goal:

- Gather a lot of in-situ passive fluorescence data.
- Determine if we can detect changes in in-situ passive fluorescence between N and Fe limitation

Methods:

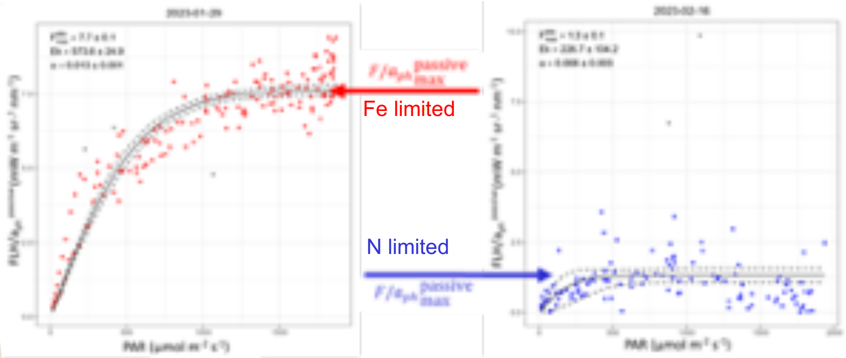
Above water radiometry + Nutrient amendment incubations



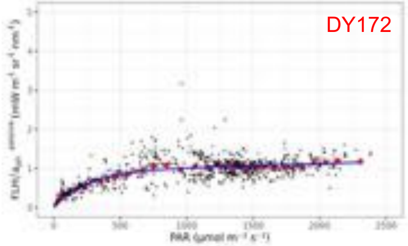
+

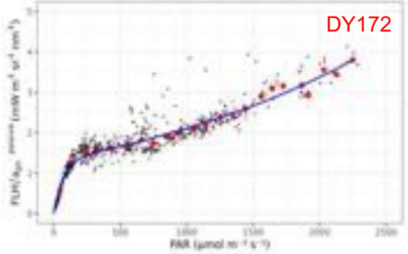
Results:

Increased fluorescence under Fe limitation in South Atlantic



Unusual fluorescence response in high latitude oceans





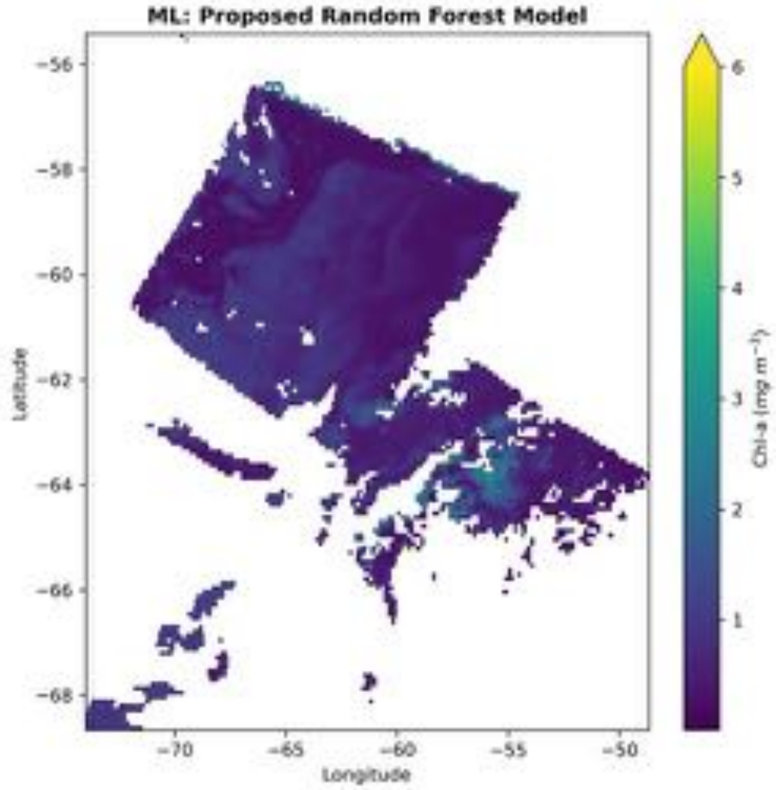
Poster # 69

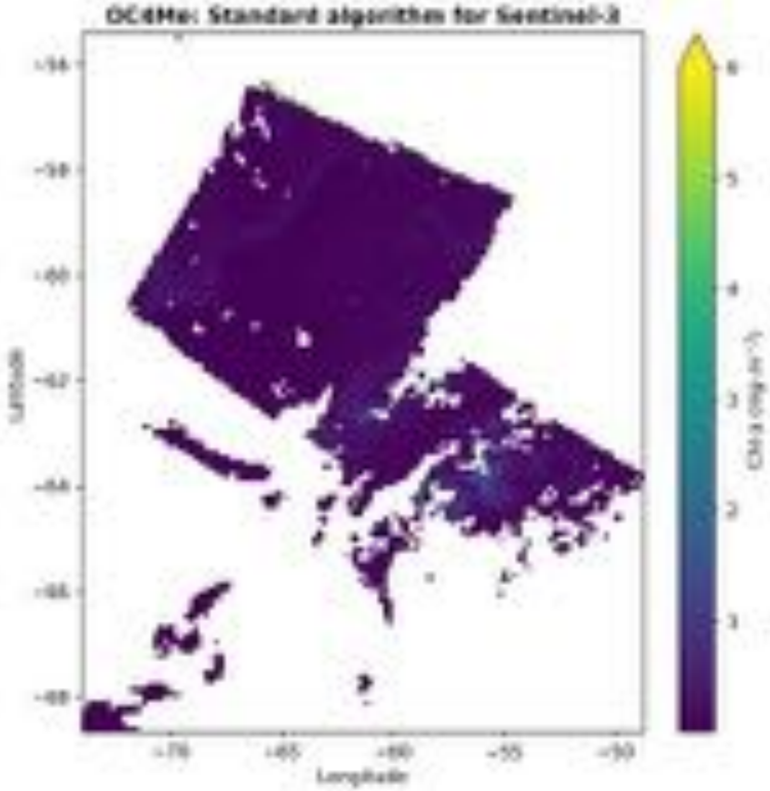
An Improved Ocean Colour Algorithm to detect Chlorophyll-a using Sentinel-3 OLCI for the Western Antarctic Peninsula

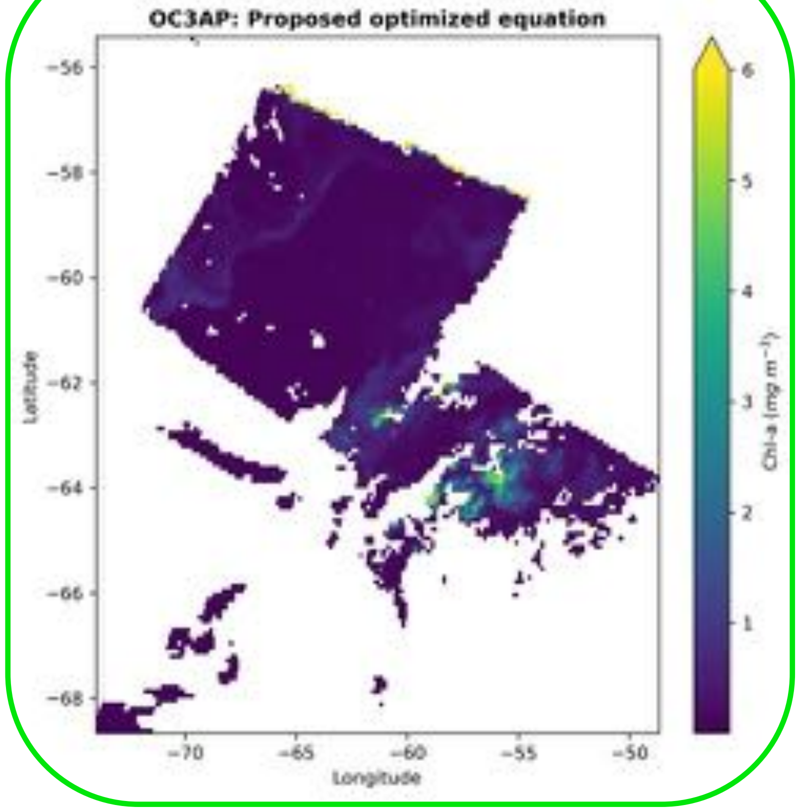
Daniela Rojas-Rojas, Andrea Piñones,
Paula Amador-Véliz & AB Ruescas

Poster # 69

L3-Binned S3A: 3 Day Mean Satellite Chlorophyll







Hyperspectral is not just multispectral with lots of bands - Use of WATERHYPERNET for validation of hyperspectral satellite missions

OR

What can be done with hyperspectral data that cannot be done with multispectral data?

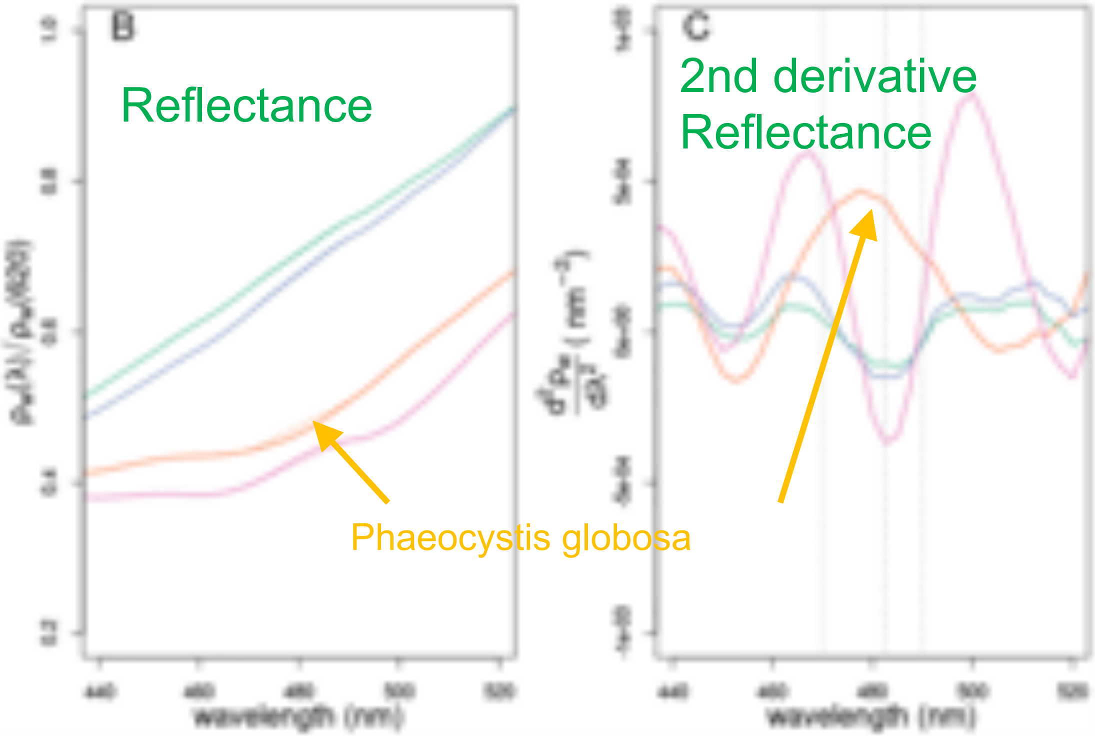
Kevin Ruddick, Agnieszka Bialek, Vittorio Brando, Pieter de Vis, Ana Dogliotti, David Doxaran, Joel Kuusk, Quinten Vanhellemont, Dieter Vansteenwegen, Matthew Beck, Kenneth Flight, Ivan Farace, Anabel Gammaru, Claudia Giardino, Luis Gonzales Vilas, Clémence Goyens, Kaspars Laizans, Héloise Lavigne, Francesca Ortenzio, Pablo Perna, Estefania Piegari, Denis Pailler, Lucas Rubinstein, Morven Sinclair, Kevin Turpie, Dimitry Van der Zande, Philippe Goryl

Poster # 70

Can we band-shift AERONET-OC data to validate hyperspectral sats?

YES will show most (spectrally smooth) aerosol correction problems
YES for most multispectral algorithms, "just" adds to reflectance uncertainty [Talone et al, 2024]

[Lavigne et al, 2022, *Phaeocystsis globosa* detection from WATERHYPERNET in situ data]
…
[Lavigne et al, 2025, *Phaeocystsis globosa* detection from PACE satellite data]



NO for algorithms using spectral anomalies/curvature/derivative
(PACE and CHIME still need us)

Poster # 73

Validation of remote sensing reflectance derived with WASI from EnMAP L2A land data using AERONET-OC data

Ian Somlai-Schweiger*[1], Thomas Schroeder[2], Peter Gege[1]

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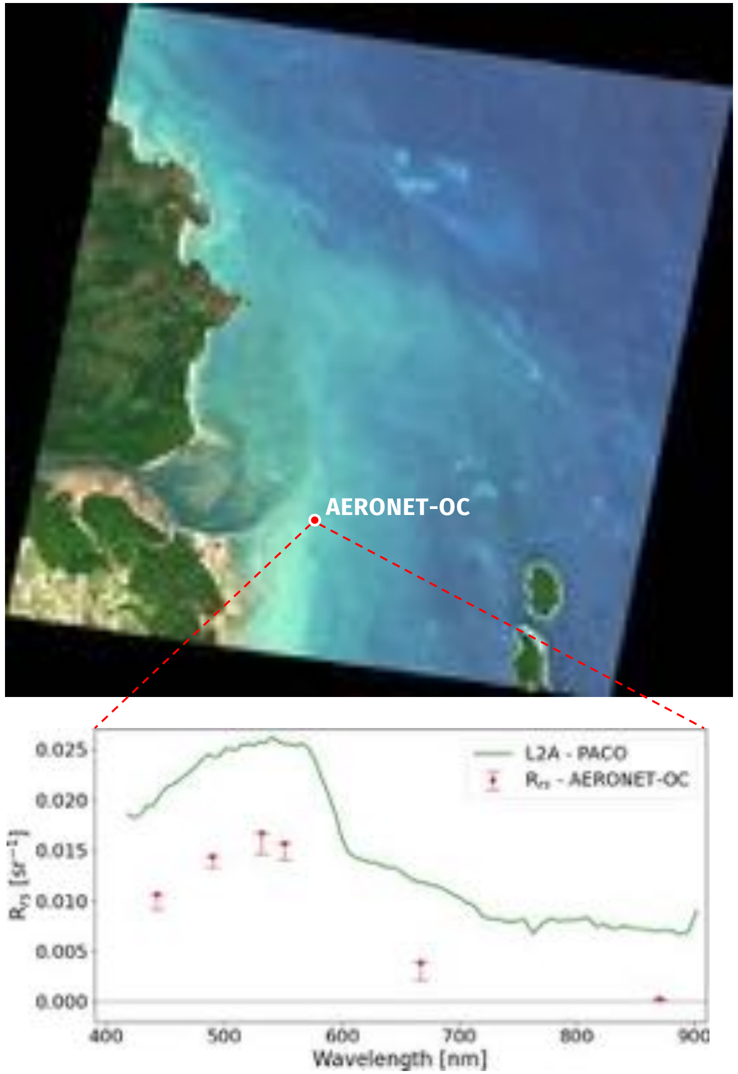
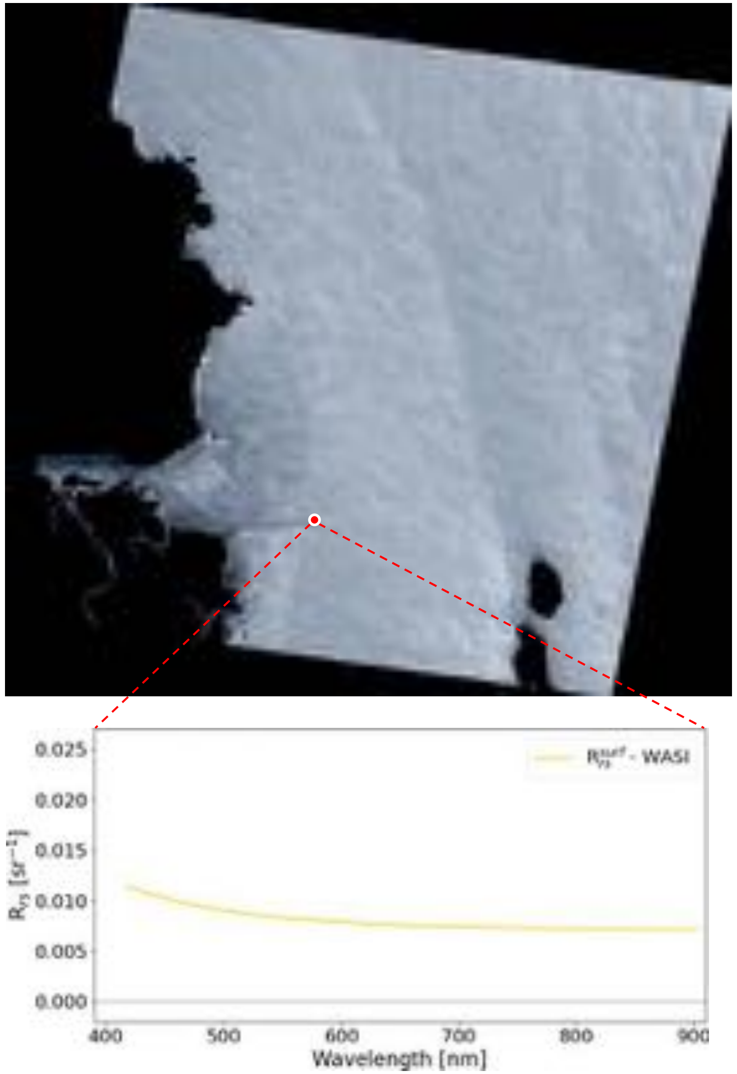
[2]CSIRO Environment, Aquatic Remote Sensing, Coastal Ocean Colour & Radar Sensing, QLD 4001 Brisbane, Australia

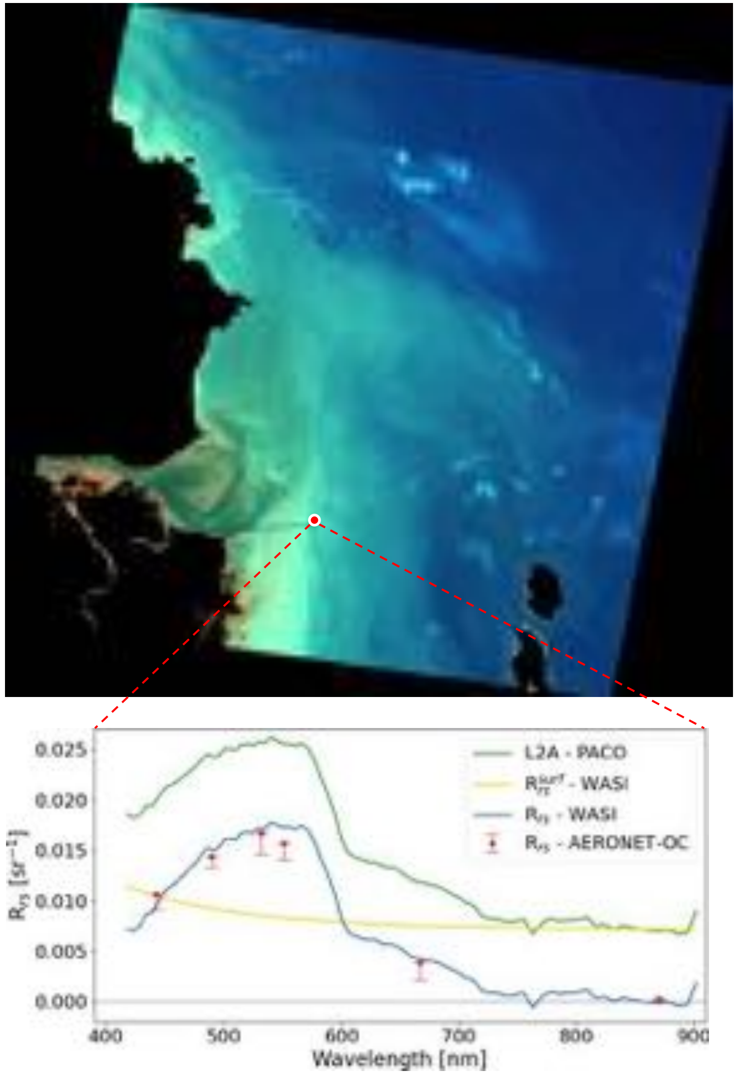
*ian.somlai@dlr.de

Poster # 73

L2A (PACO, AC for Land) - Surface Glint (WASI) = Remote Sensing Reflectance







EnMAP, Lucinda Jetty Coastal Observatory, 2022-09-04

Poster No. 76

Rrs-meters: A Floating Optical Buoy System (FOBY) for Direct Measurement of Remote-Sensing Reflectance Based on the Skylight-Blocked Approach (SBA)

Huizhen Sun[1], Wei Hao[2,3], Liqiao Tian[4], Zhaohua Sun[3,5,*]

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[2] Department of Informatics, University of Zurich, Zurich CH-8006, Switzerland;
[3] AIEyes Technologies (Hong Kong) Co., Limited, Hong Kong 999077, China
[4] State Key Laboratory of Information Engineering in Surveying, Mapping and Remote Sensing, Wuhan University, Wuhan 430079, China
[5] School of Innovation and Entrepreneurship, Southern University of Science and Technology, Shenzhen 518055, China;
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IOCS-2025 Darmstadt, 1-4 December

Contact: info@aieyestech.com www.aieyestech.com

A Floating Optical Buoy System (FOBY) for Direct Rrs Measurement

Abstract:

Accurate measurement of water-leaving radiance (*Lw*) remains a significant challenge in ocean color remote sensing. This poster presents the design and implementation of a novel Floating Optical Buoy (FOBY) that enables direct in situ measurement of *Lw* using the Skylight-Blocked Approach (SBA). Field experiments conducted across coastal and lake environments demonstrate that FOBY yields remote-sensing reflectance (Rrs) with markedly reduced variability and improved stability compared to traditional above-water measurement methods. These findings highlight the potential of FOBY as a robust solution for high-quality radiometric observations and satellite validation applications.

Methods:

FOBY measures water-leaving radiance directly using a compact skylight-blocking cone and a dual-sensor configuration that enables matched Lw and Es acquisition. Its lightweight tripod float minimizes self-shading, while an integrated IMU provides tilt-based quality control. The processing workflow includes radiometric and dark-current corrections, spectral and tilt filtering, self-shading adjustment, and final Rrs generation with quantified uncertainty.

Results:

FOBY shows strong radiometric consistency with a TriOS RAMSES system ($r > 0.9$) and maintains <5% bias between 490–565 nm across Case-1 and Case-2 waters. Monte Carlo analyses confirm reduced shading sensitivity compared with earlier buoy designs, and field demonstrate stable and robust performance.

Applications:

The system is well suited for high-frequency monitoring in aquaculture, estuarine, reservoir, and offshore settings, and serves as a valuable reference for AI-based ocean-color models and radiative-transfer studies.

1. Tian, L., Li, S., Li, Y., Sun, Z., Song, Q., Zhao, J., 2020. A floating optical buoy (FOBY) for direct measurement of water-leaving radiance based on the skylight-blocked approach (SBA): An experiment in honghu lake, China. J. Geophys. Res. Oceans 125, e2020JC016322. https://doi.org/10.1029/2020JC016322
2. TIAN Li-qiao, LI Sen, SUN Xiang-han, TONG Ru-qing, SONG Qing-jun, SUN Zhao-hua, LI Yong. Development of a Novel Floating Water Spectral Measurement System Based on Skylight-Blocked Approach. SPECTROSCOPY AND SPECTRAL ANALYSIS, 2020, 40(09): 2756-2763.

Poster # 77

PCA-Driven Atmospheric Correction of PACE Hyperspectral Ocean Color Imagery

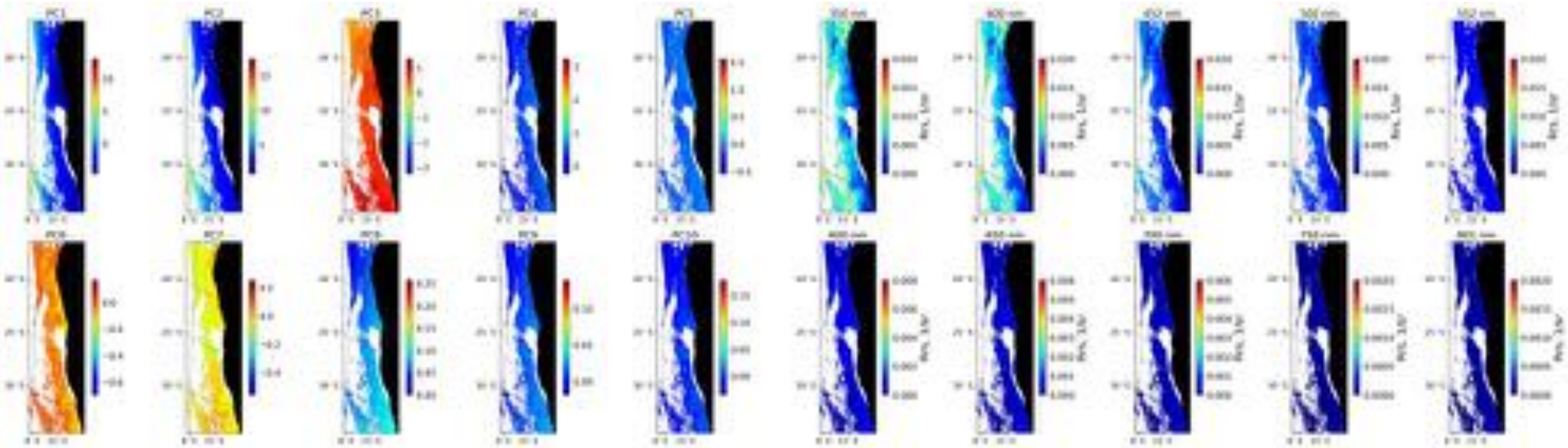
Jing Tan, Robert Frouin, Andrew Barnard, Alexander Bailess, Charlotte Begouen Demeaux, Emmanuel Boss, Paul Chamberlain, Nils Häentjens, Matt Mazloff

Poster # 77

PCA-Based AC for PACE OCI

- -AC fails under absorbing aerosols, adjacency effects, optically complex waters.
- -PCA on OCI TOA spectra → retain water-sensitive PCs → nonlinear mapping to water-sensitive PCs → reconstruction of hyperspectral Rrs.
- -Uses Hydrolight + in situ ensembles for training and uncertainty.
- -Delivers realistic Rrs, no negative short-wavelength artifacts.
- -Early validation shows acceptable agreement with co-located hyperspectral Rrs.

Application to PACE OCI imagery of 24 May 2024 off West Africa.



TOA PCs

Retrieved Rrs

Poster # 78

A spectral unmixing approach for chlorophyll-*a* retrieval from Sentinel-3 OLCI top-of-atmosphere spectra in optically complex fjords

Elinor Tessin[1 *], Børge Hamre[1], Daniel Koestner[1], Arne Kristoffersen[1]

[1] University of Bergen, Norway

[*] elinor.tessin@gmail.com

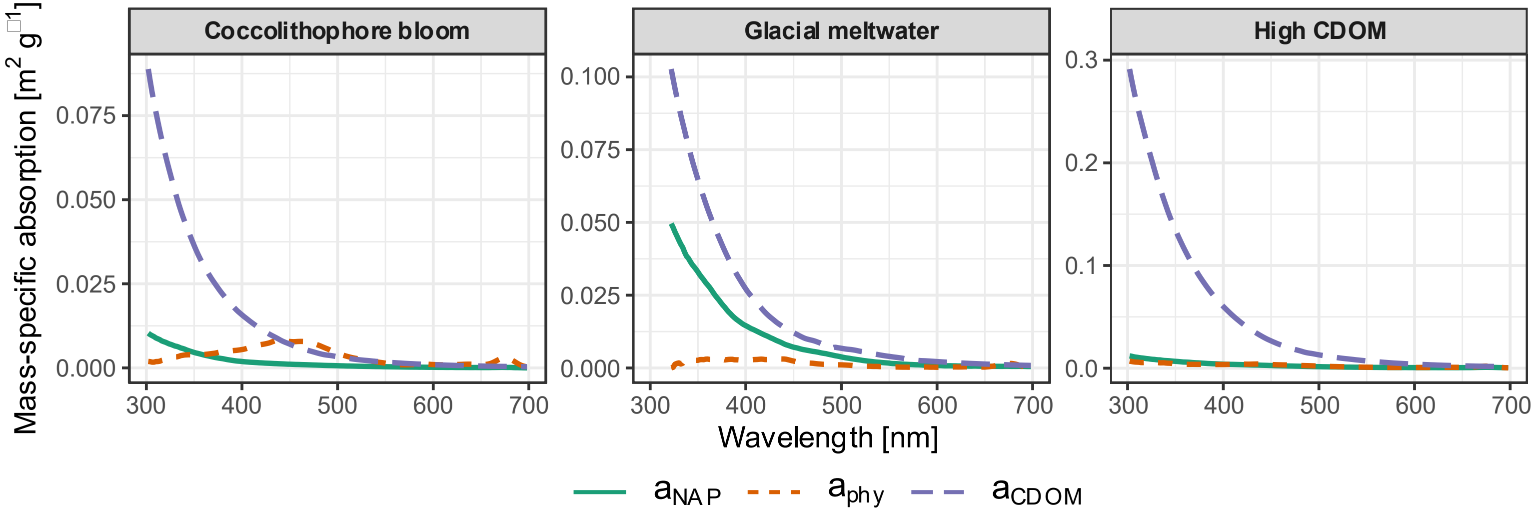
Poster # 78

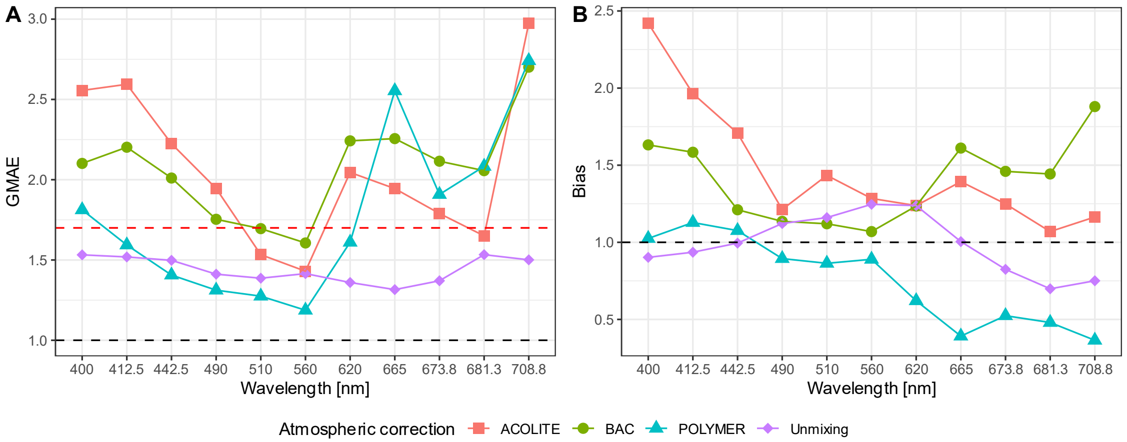
elinor.tessin@gmail.com

Atmospheric correction fails in optically complex fjords with high sediment & CDOM

We use **spectral unmixing** of Sentinel-3 OLCI **TOA radiance** to retrieve **R_{rs} and in-water parameters**

Improved remote sensing reflectance and chlorophyll-*a* retrieval validated with field data





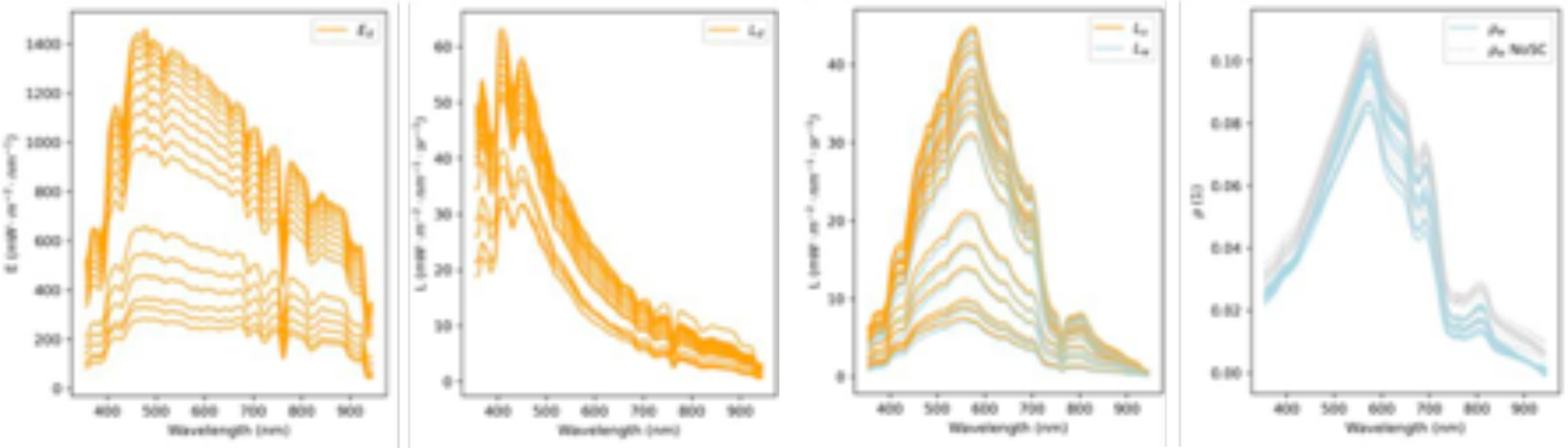
Poster # 80

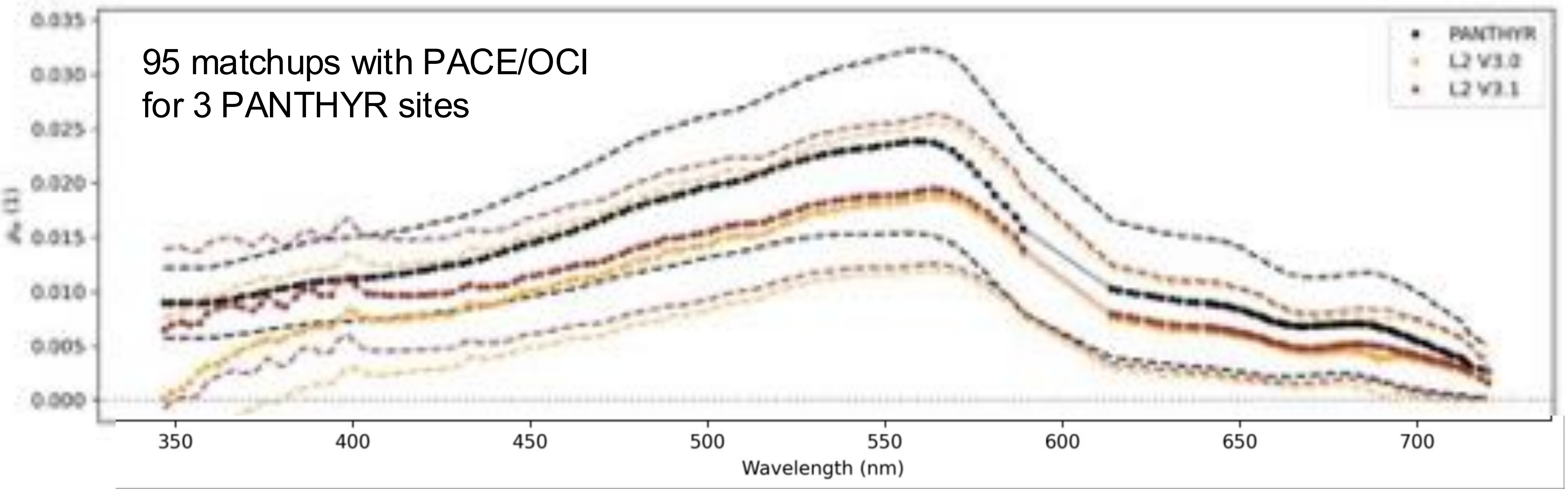
Validation of satellite water reflectance products with WATERHYPERNET/PANTHYR

Quinten Vanhellemont, Dieter Vansteenwegen & Kevin Ruddick

Poster # 80

Clear sky PANTHYR measurements at Oostende, Belgium



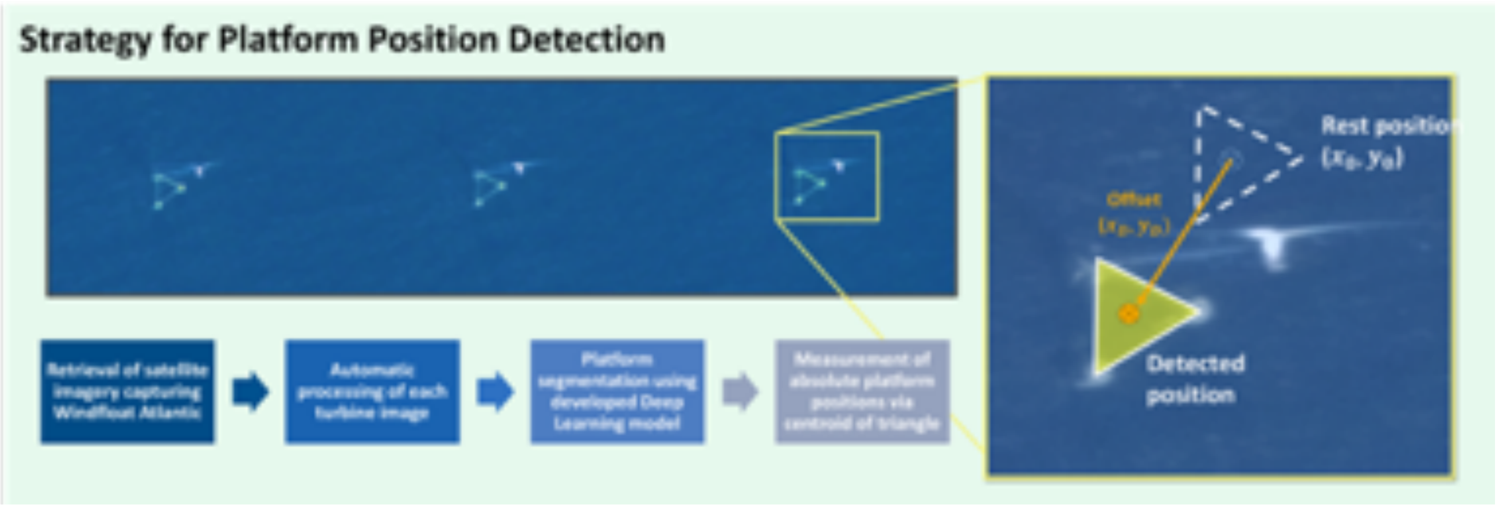


Poster # 83

INVESTIGATING METOCEAN EFFECTS ON FLOATING OFFSHORE WIND PLATFORM POSITIONAL OFFSET USING SENTINEL-2 IMAGERY

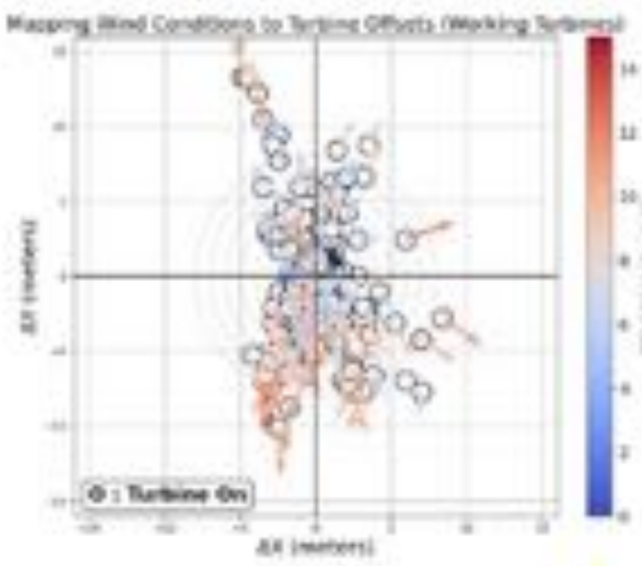
Mário Alberto Vieira, Leonardo Filipe,
Tiago Mota

Method

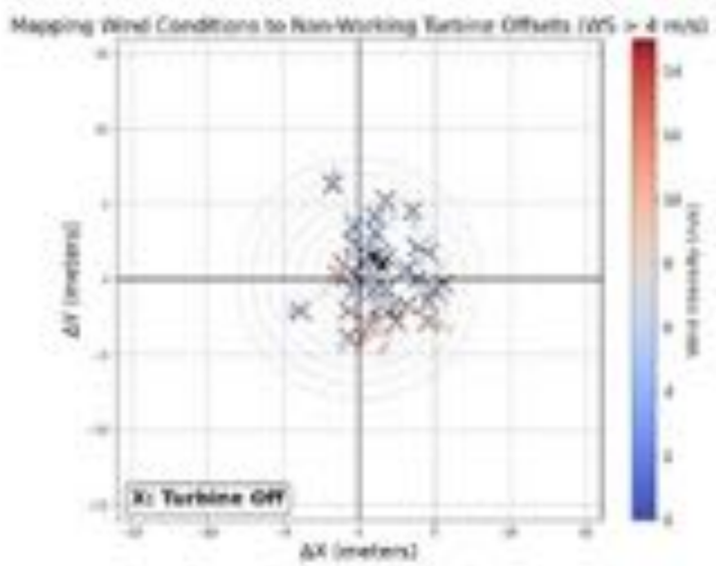


Results

Turbine offsets of working turbines (arrows are wind speeds)

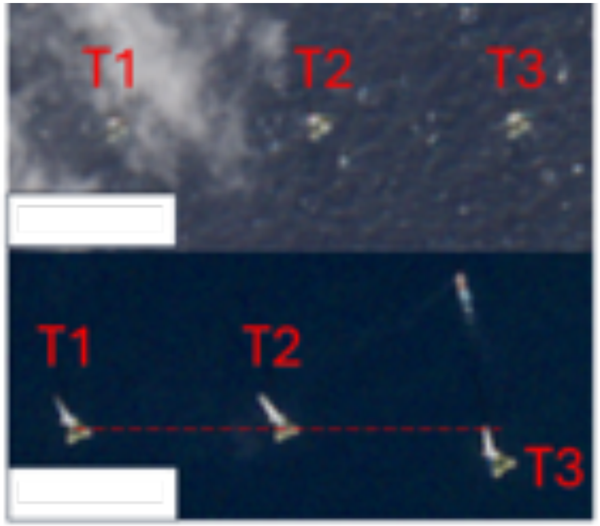


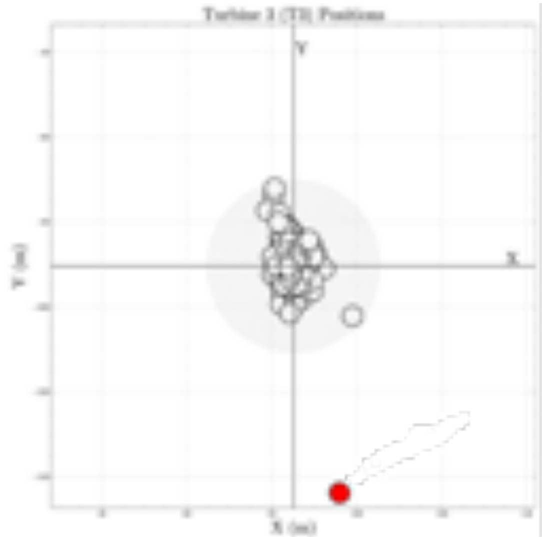
Turbine offsets of stopped turbines (arrows are wind speeds)



Case-study

Drift divergence detected on platform T3





Poster # 84

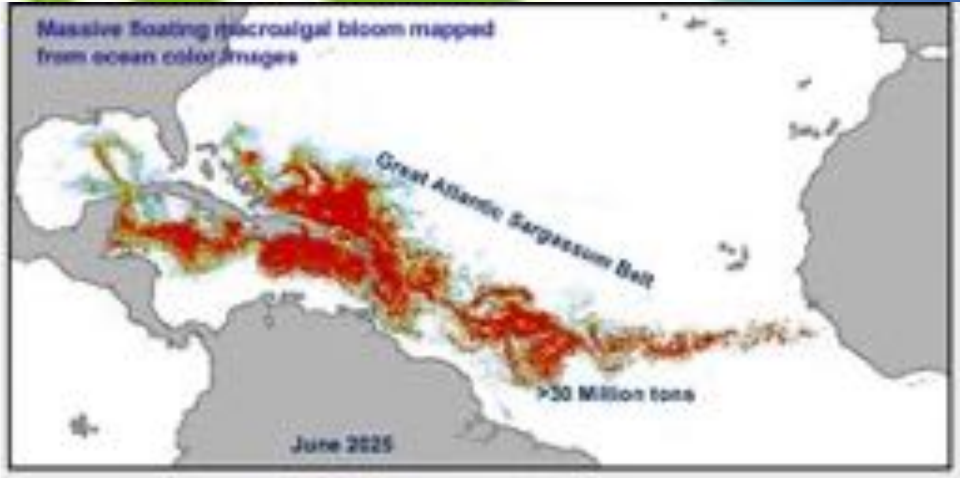
Denoising VIIRS and Sentinel-2 MSI ocean color imagery using noise-simulation-aided deep learning

Mengqiu Wang, Bowen Huang, and Zhongbin B. Li

Department of Earth & Planetary Sciences
The University of Hong Kong

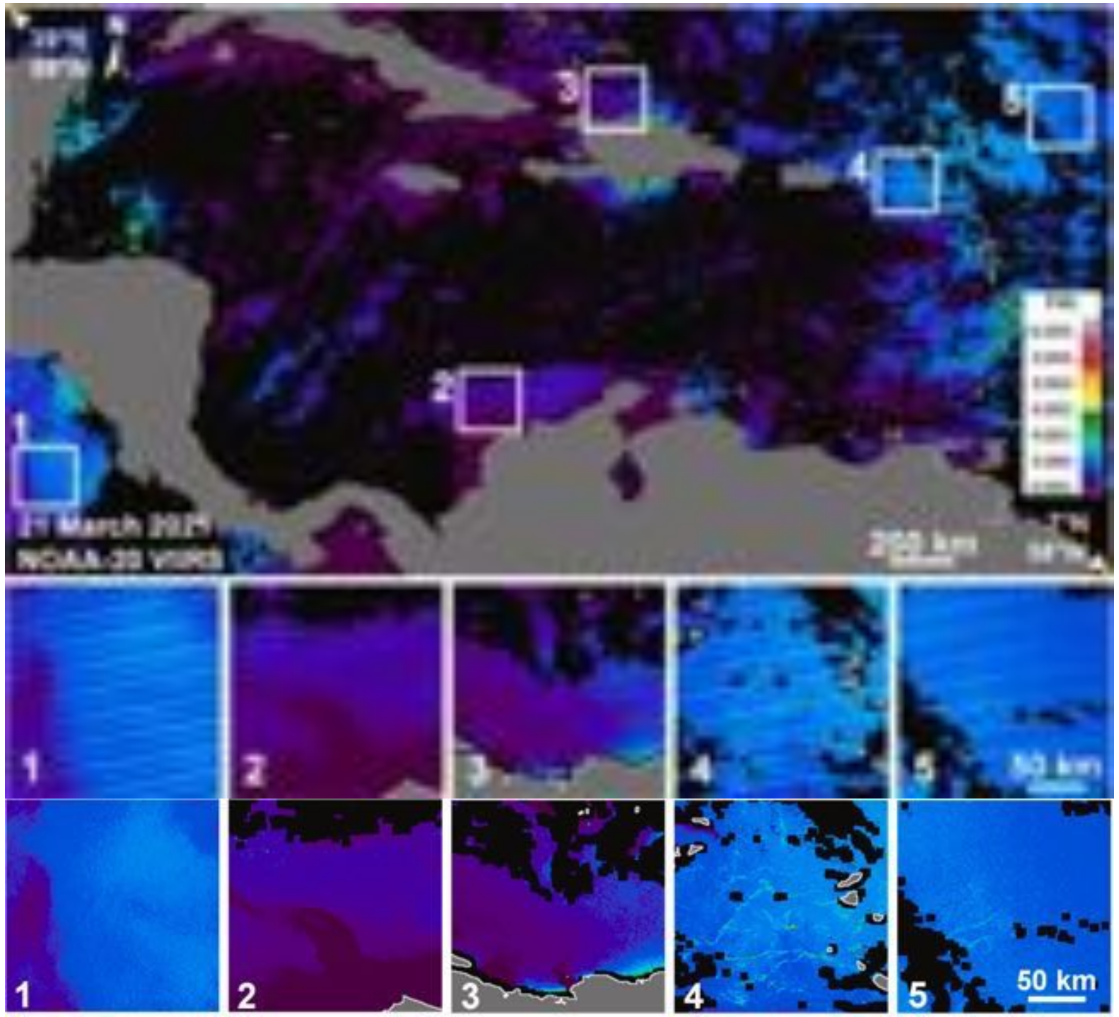
The Swire Institute of Marine Science
The University of Hong Kong
香港大學 太古海洋科學研究所

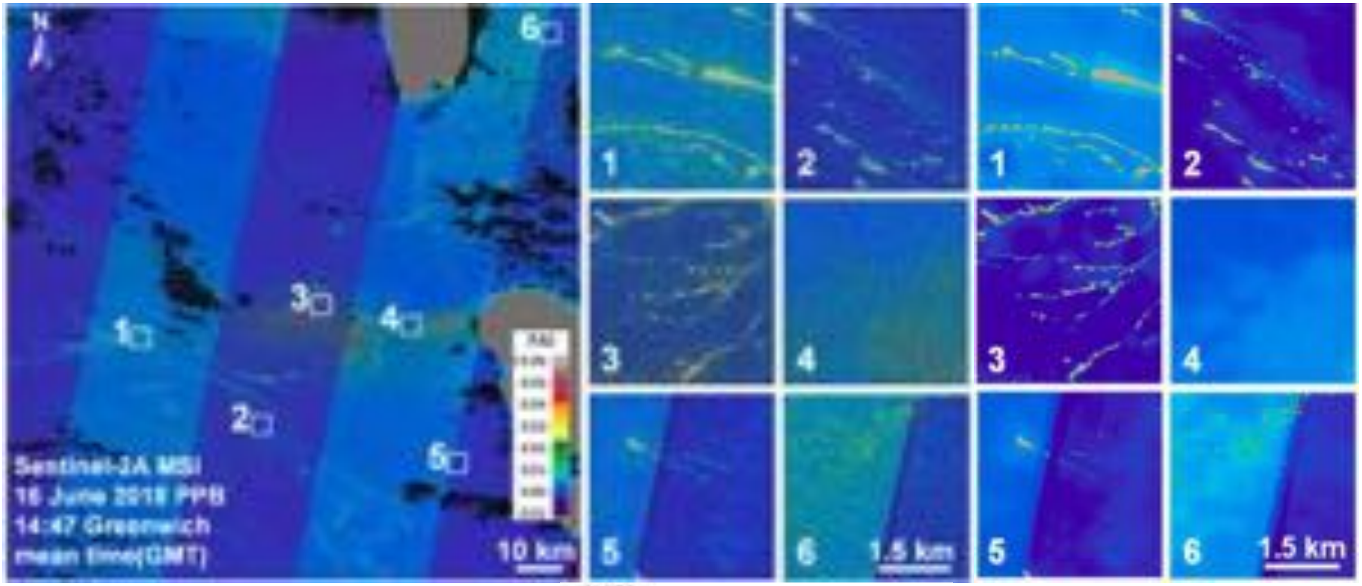
Wuhan University

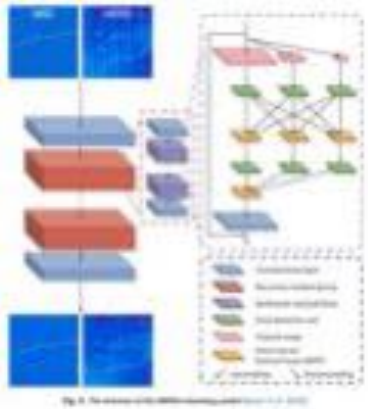


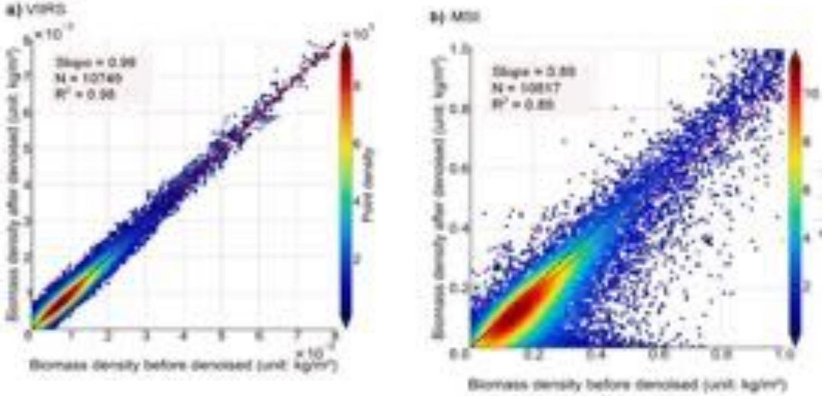
IOCS-2025 Darmstadt, 1-4 December

Poster # 84










ELSEVIER

ISPRS Journal of Photogrammetry and Remote Sensing

Denoising VIIRS and Sentinel-2 MSI ocean color imagery for improved floating algae monitoring using noise-simulation-aided deep learning

Bowen Huang, Mengqiu Wang, Mingqing Liu, Yue Sun, Zhongbin B. Li

- **PhD Students** (**Fully Funded Scholarship**)
  - Big satellite **data + AI** + **physical models**
  - Surface **ocean dynamics** & g**lobal changes**
- **Postdocs** (ocean science, remote sensing, etc.)

Email: **menggiu@hku.hk**

Poster # 85

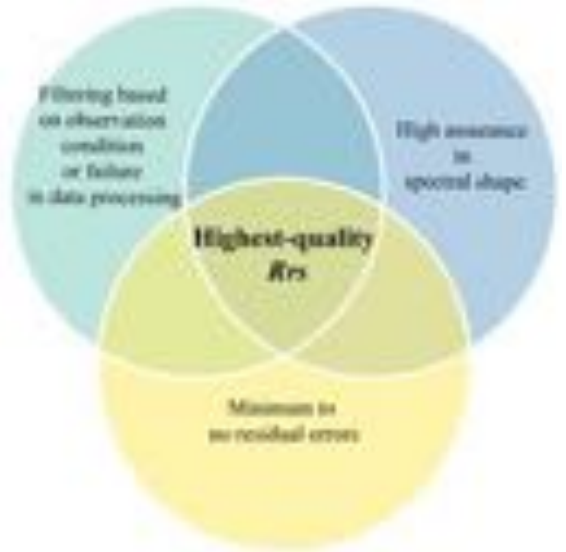
Highest Quality Remote Sensing Reflectance Database Compiled from 20+ years of MODIS-Aqua measurements

Longteng Zhao, Zhongping Lee

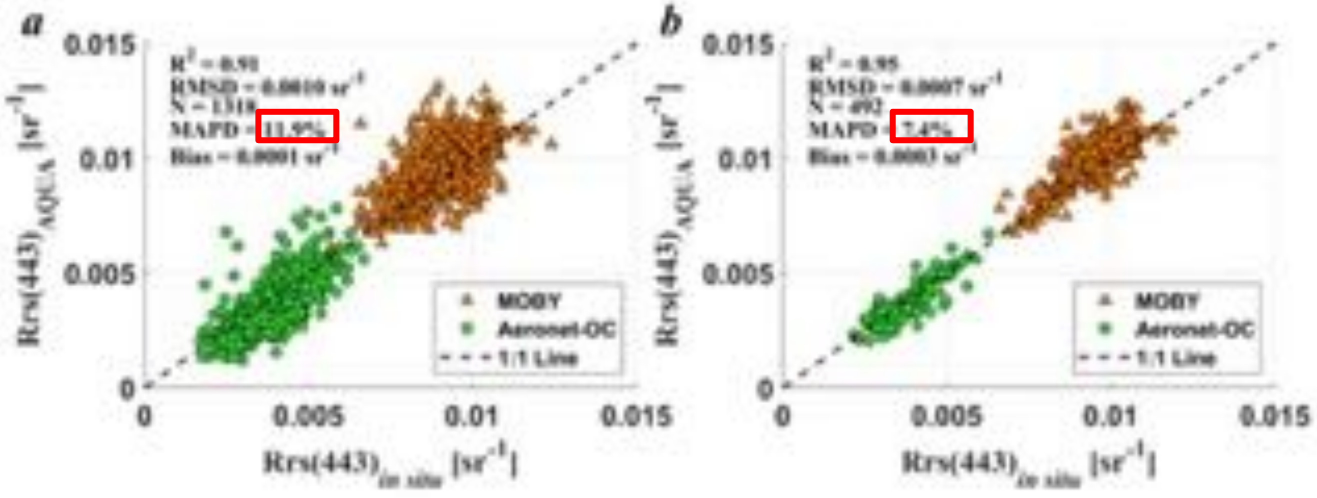
MEL, COES, Xiamen University

In collaboration with
Xiaolong Yu, Tianhao Wang, Daosheng Wang, Shaoling Shang

Highest Quality Remote Sensing Reflectance Database Compiled from 20+ years of MODIS-Aqua measurements



Criteria for the highest-quality *Rrs* (CHQR)

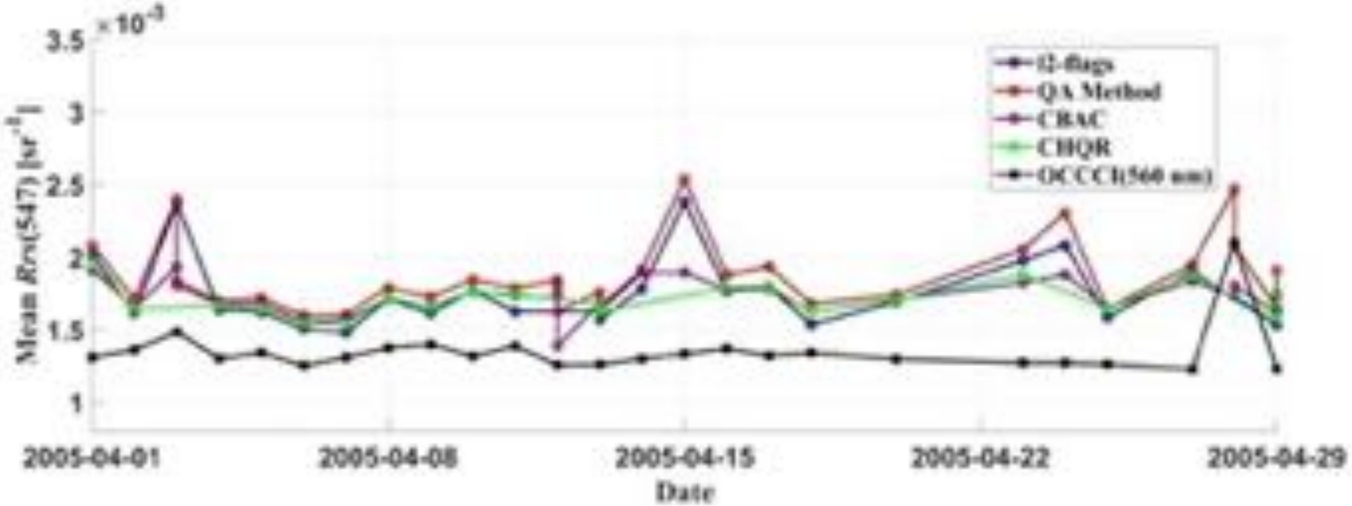


Higher consistency with the *in situ* data

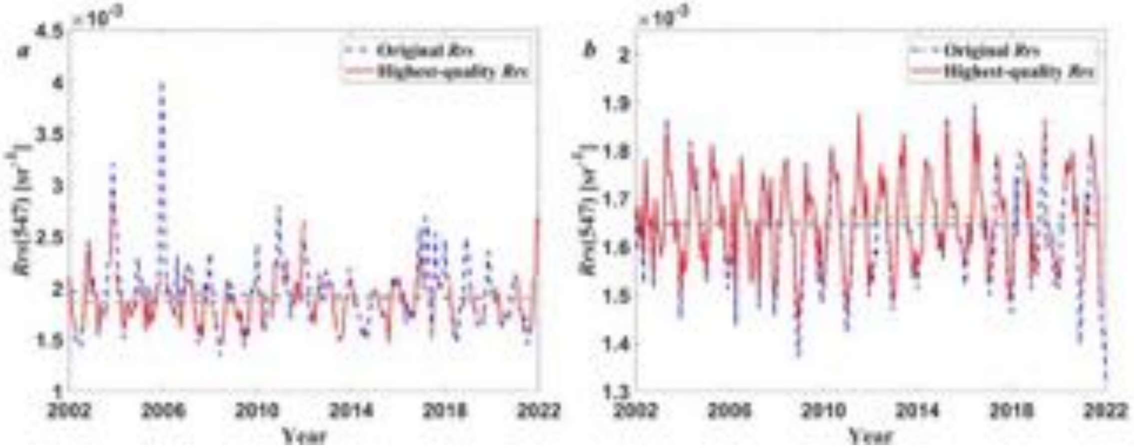
Future Applications

Indispensable benchmark for other ocean color missions

Long-term response of marine ecosystems



Minimal spatial variability and stable time series in the South Pacific Gyre



Long-term trend reversal

Poster # 86

MEL 海洋生物地球化学 全国重点实验室（厦门大学） State Key Laboratory of Marine Environmental Science

Optical Oceanography Laboratory

XIAMEN UNIVERSITY

Obtain Consistent Remote Sensing Reflectance between Hyperspectral PACE OCI and Multi-band NPP VIIRS

Lufei Zheng

MEL, COES, Xiamen University

In collaboration with
Zhongping Lee, Tianhao Wang, Xu Li, Xiaolong Yu,
Shaoling Shang, Wendian Lai, Lingling Li, Yankun Hou

Poster # 86

Cross-Satellite Atmospheric Correction for hyperspectral measurements (CSAC-H): A Hybrid Framework

CSACoci Model

OCI $\rho_{rc}(\lambda)$ (10)
senz, solz, sena, sola (4)
Atmospheric parameters (7)

↓

NN-based CSACoci

↓

High quality VIIRS
$R_{rs}^{NN}(\lambda')$

(λ' =380, 410, 443, 487, 550, 671 nm)

Reconstruct *the hyperspectral* ***atmospheric-contribution*** *spectra*

Heritage AC scheme (SeaDAS l2gen)

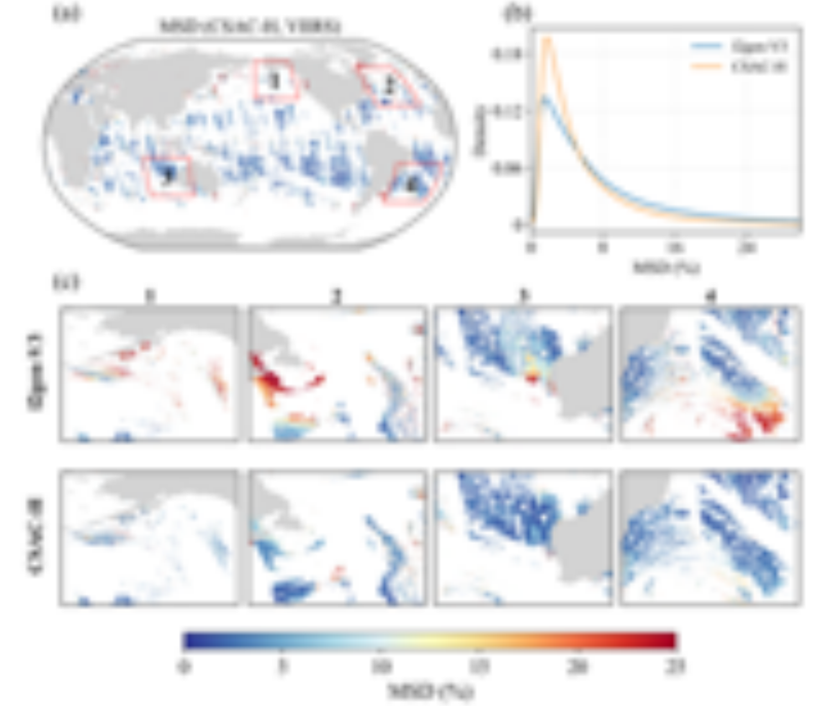
Rayleigh corrected reflectance

$$\rho_{rc}(\lambda) = \rho_t^*(\lambda) - \rho_r(\lambda)$$

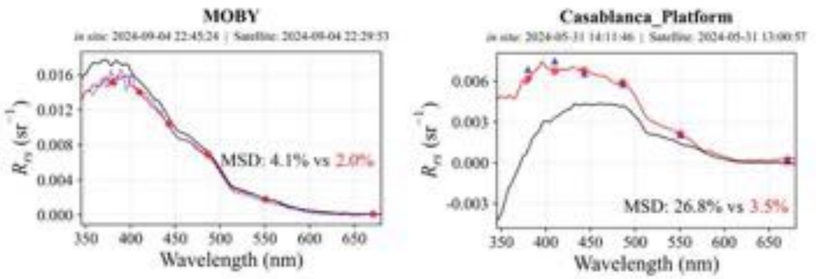
$$= \rho_{ta}(\lambda) + \pi t_s(\lambda) t_v(\lambda) R_{rs}(\lambda)$$

■ ***More consistent*** *with high-quality VIIRS while preserving hyperspectral fidelity*

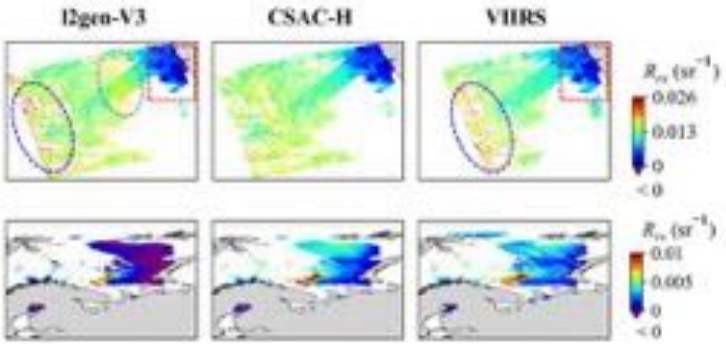
$$MSD = \frac{\sqrt{\sum_{i=1}^{N}\left[R_{rs}^{obj}(\lambda_i) - R_{rs}^{ref}(\lambda_i)\right]^2}}{\sum_{i=1}^{N} R_{rs}^{ref}(\lambda_i)} \times 100\ \%$$



■ *Closer to in situ than l2gen.*



■ *Better performance in cloud-edge noise areas and high-latitude regions.*



Poster # 87

Spatiotemporal Dynamics and Drivers of Surface Ocean pCO_2 in Polar and High-Latitude Regions

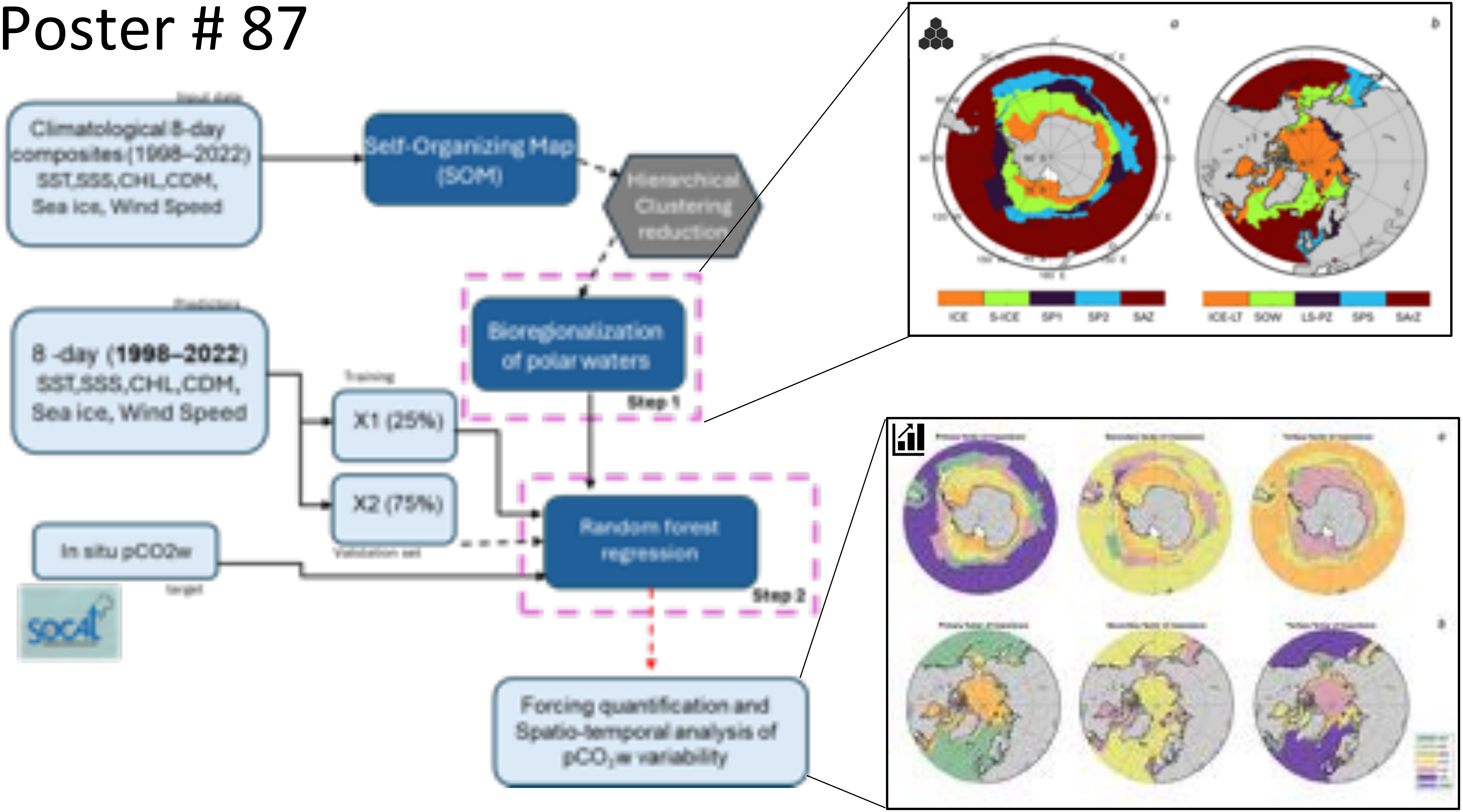
Maximiliano Arena, Hubert Loisel, and Roy El Hourany

Univ. Littoral Côte d'Opale, CNRS, Univ. Lille, IRD, UMR 8187-LOG-Laboratoire d'Océanologie et de Géosciences, F-62930 Wimereux, France

*maximiliano.arena@univ-littoral.fr

IOCS-2025 Darmstadt, 1-4 December

Poster # 87


Input data
Climatological 8-day composites (1998–2022) SST,SSS,CHL,CDM, Sea ice, Wind Speed
Self-Organizing Map (SOM)
Hierarchical Clustering reduction
Bioregionalization of polar waters
Step 1
Predictors
8 -day (1998–2022) SST,SSS,CHL,CDM, Sea ice, Wind Speed
Training
X1 (25%)
X2 (75%)
Validation set
In situ pCO2w
target
SOCAT
Random forest regression
Step 2
Forcing quantification and Spatio-temporal analysis of pCO2w variability
ICE
S-ICE
SP1
SP2
SAZ
ICE-LT
SOW
LS-PZ
SPS
SAcZ

Poster # 90

Assessing satellite estimates of particle backscatter in the Mediterranean Sea using the first array of Biogeochemical-SVP Lagrangian drifters

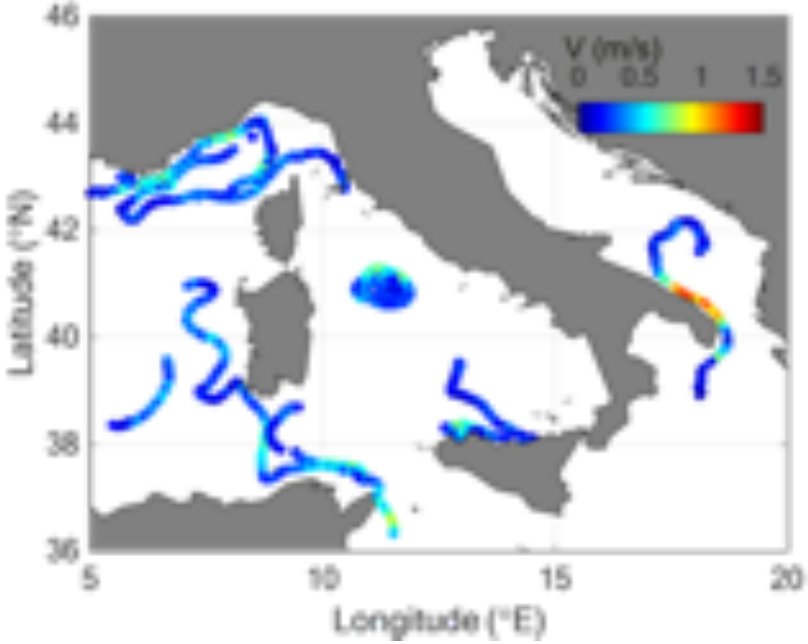
Marco Bellacicco[1], Jacopo Busatto[1], Giovanni La Forgia[1], Emanuele Organelli[1], Robert J. W. Brewin[2], Xuerong Sun[2], Guglielmo Lacorata[1], Federico Falcini[1], Gianluca Volpe[1], Salvatore Marullo[1], Rosalia Santoleri[1], Luca R. Centurioni[3], Maria Laura Zoffoli[1] and Jaime Pitarch[1]

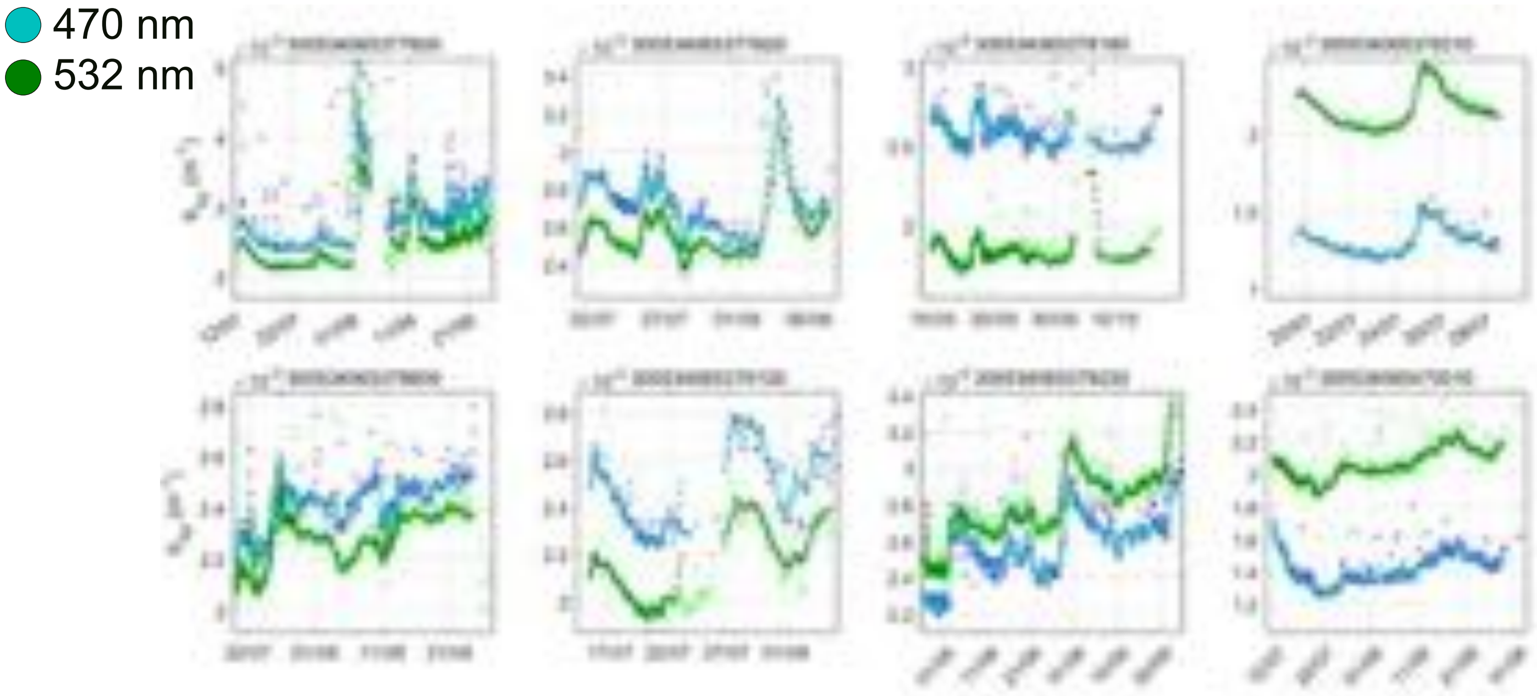
[1] Institute of Marine Science, National Research Council of Italy, Italy

[2] Centre for Geography and Environmental Science, Department of Earth and Environmental Sciences, University of Exeter, Cornwall, United Kingdom

[3] Lagrangian Drifter Laboratory, Scripps Institution of Oceanography, University of California, San Diego, La Jolla, California, United States

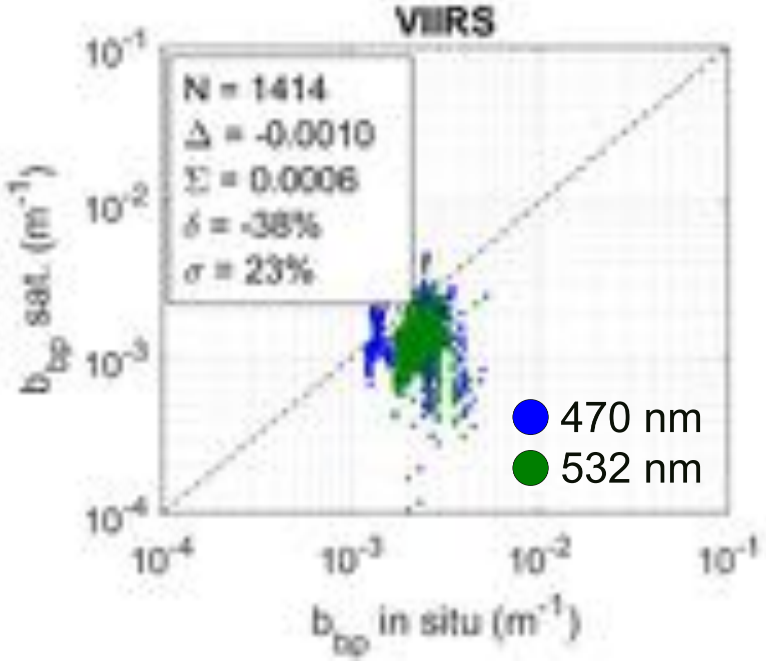
Poster # 90





INSPIRE


Biogeochemical-SVP drifter for Cal/Val activities



Poster # 91

ALFRED-WEGENER-INSTITUT
HELMHOLTZ-ZENTRUM FÜR POLAR- UND MEERESFORSCHUNG
Universität Bremen
CNR ISMAR ISTITUTO DI SCIENZE MARINE

Enhancing Ocean Color Observations' Description of Surface Carbon Compounds using Diffuse Attenuation Products in the UV and Blue from Sentinel-5P TROPOMI

Astrid Bracher, Alfredo J. Bellido Rosas, Vladimir Rozanov, Andreas Richter, Emanuele Organelli, Christian Marchese, Hongyan Xi

IOCS-2025 Darmstadt, 1-4 December

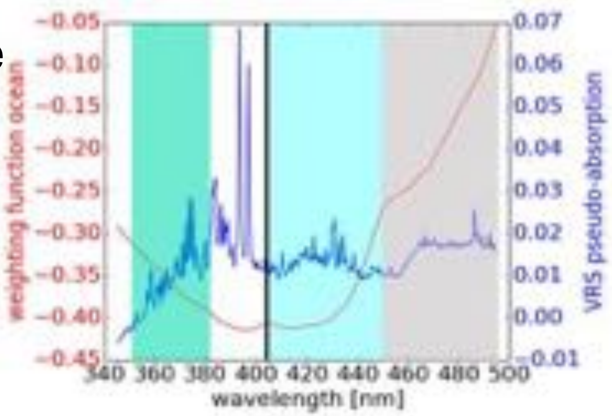
Poster # 91

Application S5-TROPOMI Spectral Kd to the Med Sea

TROPOMI: for inelastic scattering (VRS) retrieval

↓

Coupled Ocean-Atmosphere RTM



↓

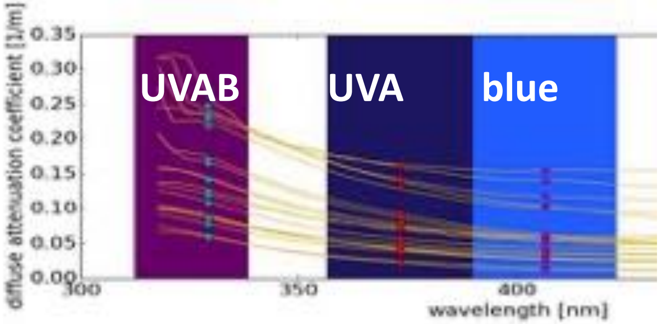
inversion

↓

VRS fit-factor

↓ RTM-based LUT

global Kd at UVAB, UVA, short-blue



https://data-portal.s5p-pal.com/products/kd.html

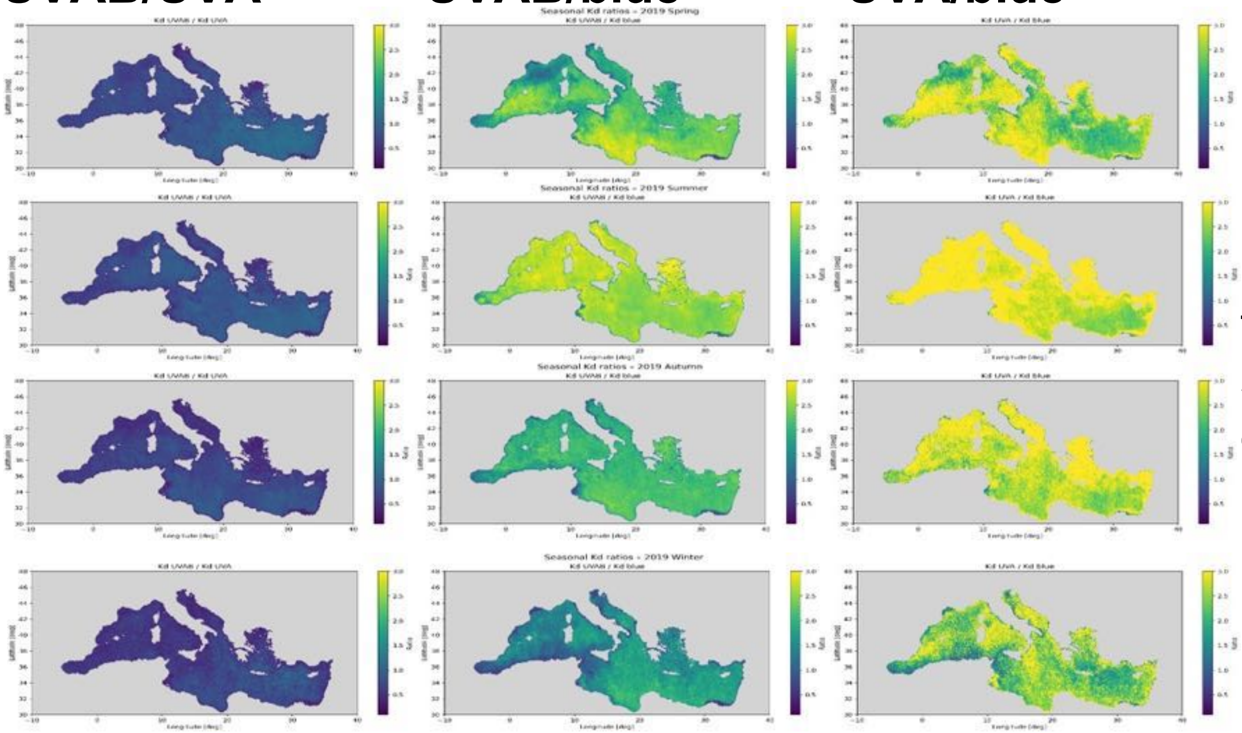
UVAB/UVA **UVAB/blue** **UVA/blue**

Spring

Summer

Fall

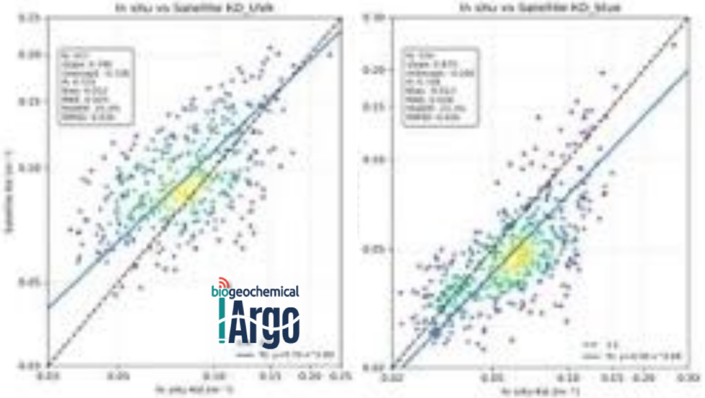
Winter



KD-ratios separate type / sources of CDOM

Bioregions based on Kd+PFT+PP

Validation with bgc-ARGO (2018-2024)



Poster # 92

The next level: Quality metrics for climate indicators

Olivier Burggraaff, Nicole Reynolds, Agnieszka Białek, Joanne Nightingale

Dadiyorto Wendi, Helen Triggs, Daniel Tipping

André Obregón

NPL National Physical Laboratory

oxidian

ECMWF

Poster # 92

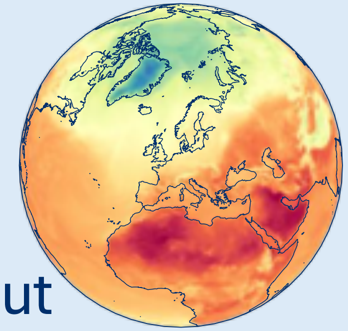
The next level: Quality metrics for climate indicators

Level 1, 2 data

Metrological process established

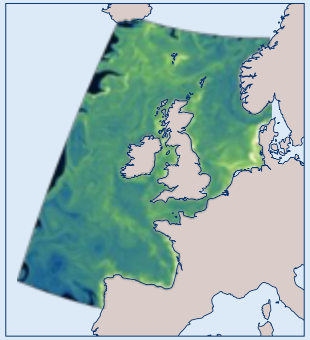
Level 3, 4 data

Reanalysis
Forecasts
Projections
Model output



Climate indicators

Derived datasets for specific sectors



KNOWLEDGE GAP:
Metrology for downstream products

Poster # 93

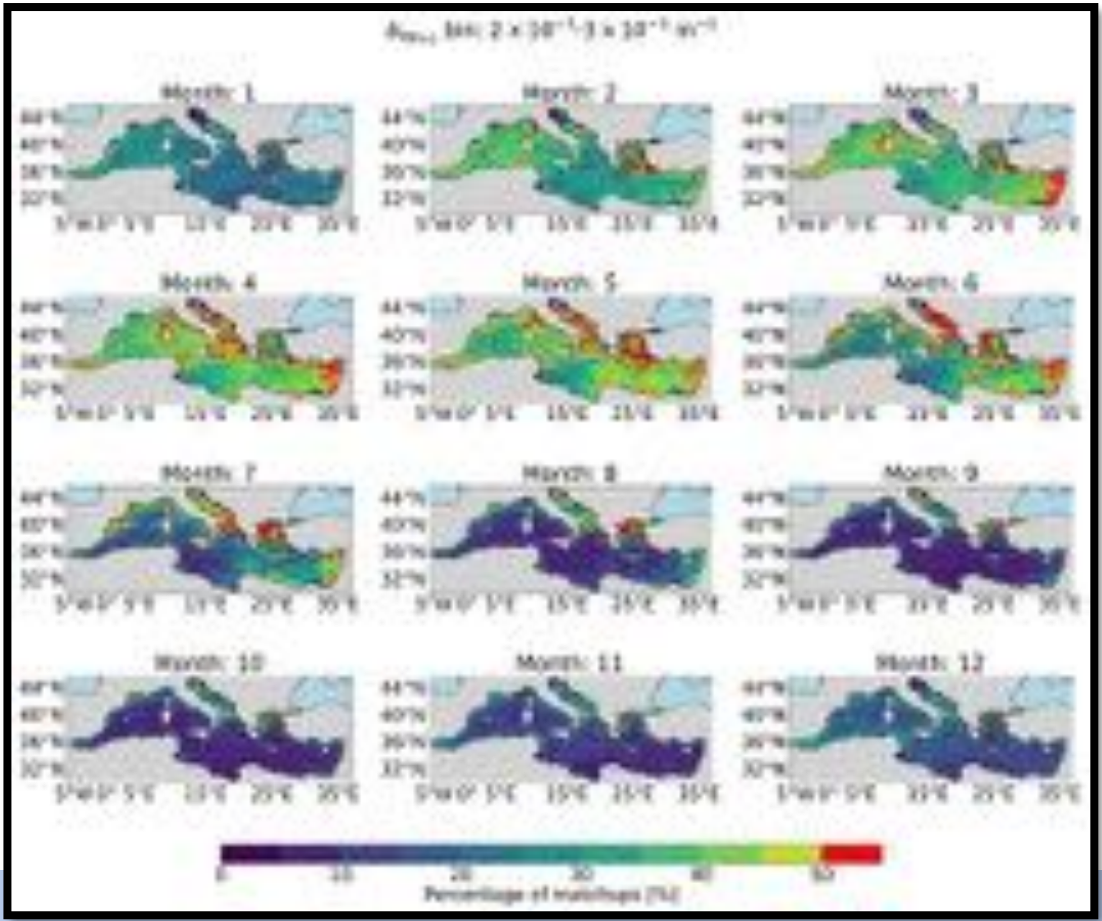
Optimizing Lagrangian drifter deployment for ocean color validation coupling kinematical models, remote sensing, and in situ data

Busatto, Jacopo[1]; Lacorata, G. [1]; Falcini, F. [1]; Volpe, G[1]; Marullo, S. [1]; Santoleri, R. [1]; Centurioni, L. [2]; Zoffoli, M. L. [1]; Bellacicco, Marco[1]

[1] Institute of Marine Science, National Research Council of Italy, Rome, Italy;

[2] Lagrangian Drifter Laboratory, Scripps Institution of Oceanography, University of California, San Diego, La Jolla, California, United States

Poster # 93



We designed a fast, data-driven algorithm that pinpoints the best sites to deploy BGC-SVP drifters for robust validation of satellite bbp.

SEE YOU LATER!

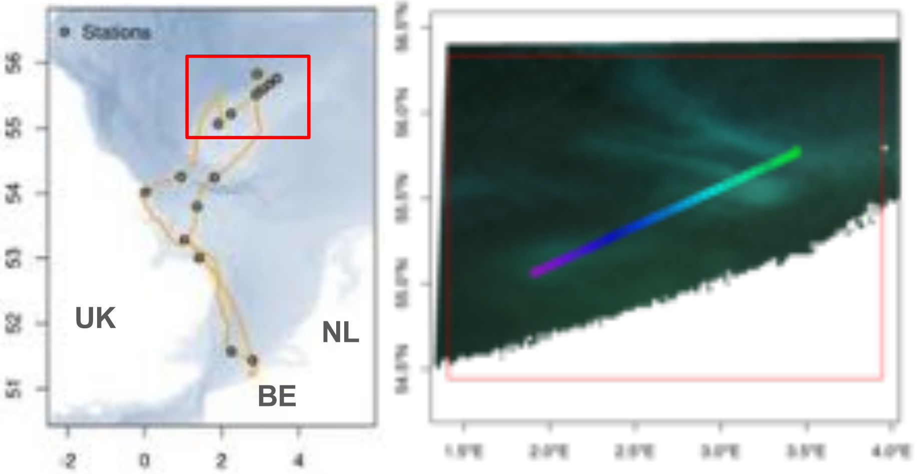
Poster # 94

Retrieval of Particulate Inorganic Carbon in the North Sea with the MTG/FCI geostationary sensor

Alexandre Castagna, Clémence Goyens, Qiming Sun, Quinten Vanhellemont, Griet Neukermans

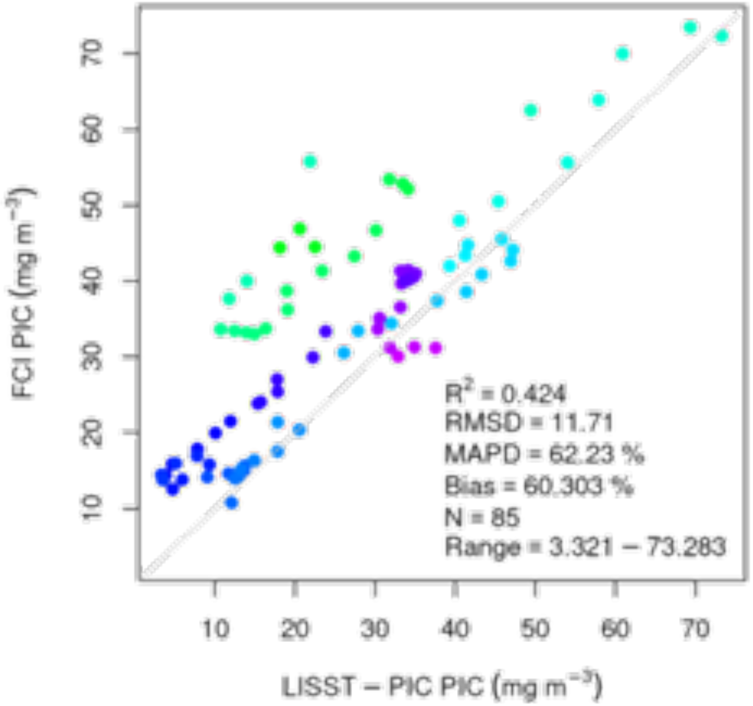
Poster # 94

Bloom crossing on 2025-06-04

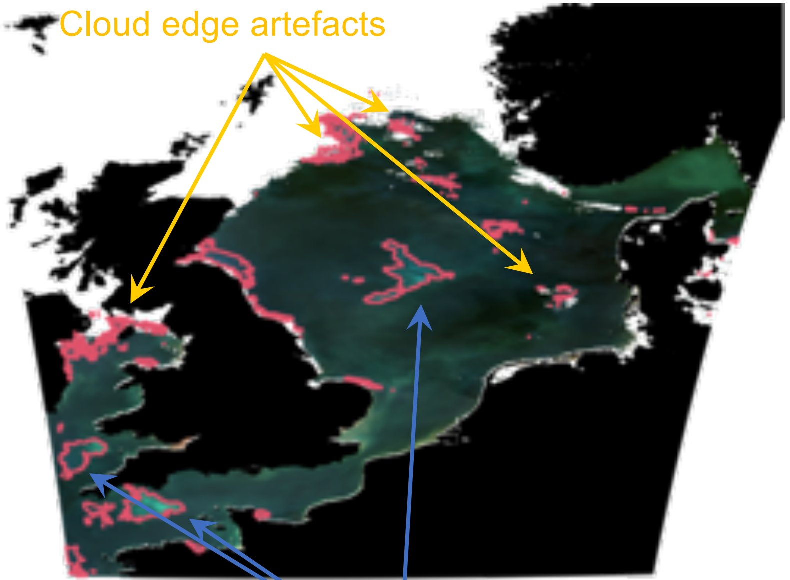


FCI Earth full disk

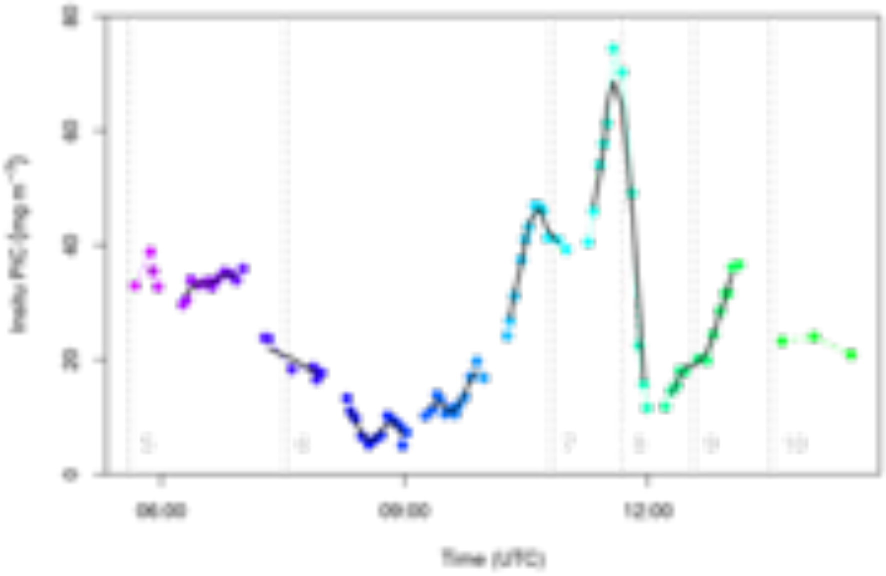
PIC retrieval with FCI



Bloom classification with FCI



In situ LISST-PIC transect



Poster #98

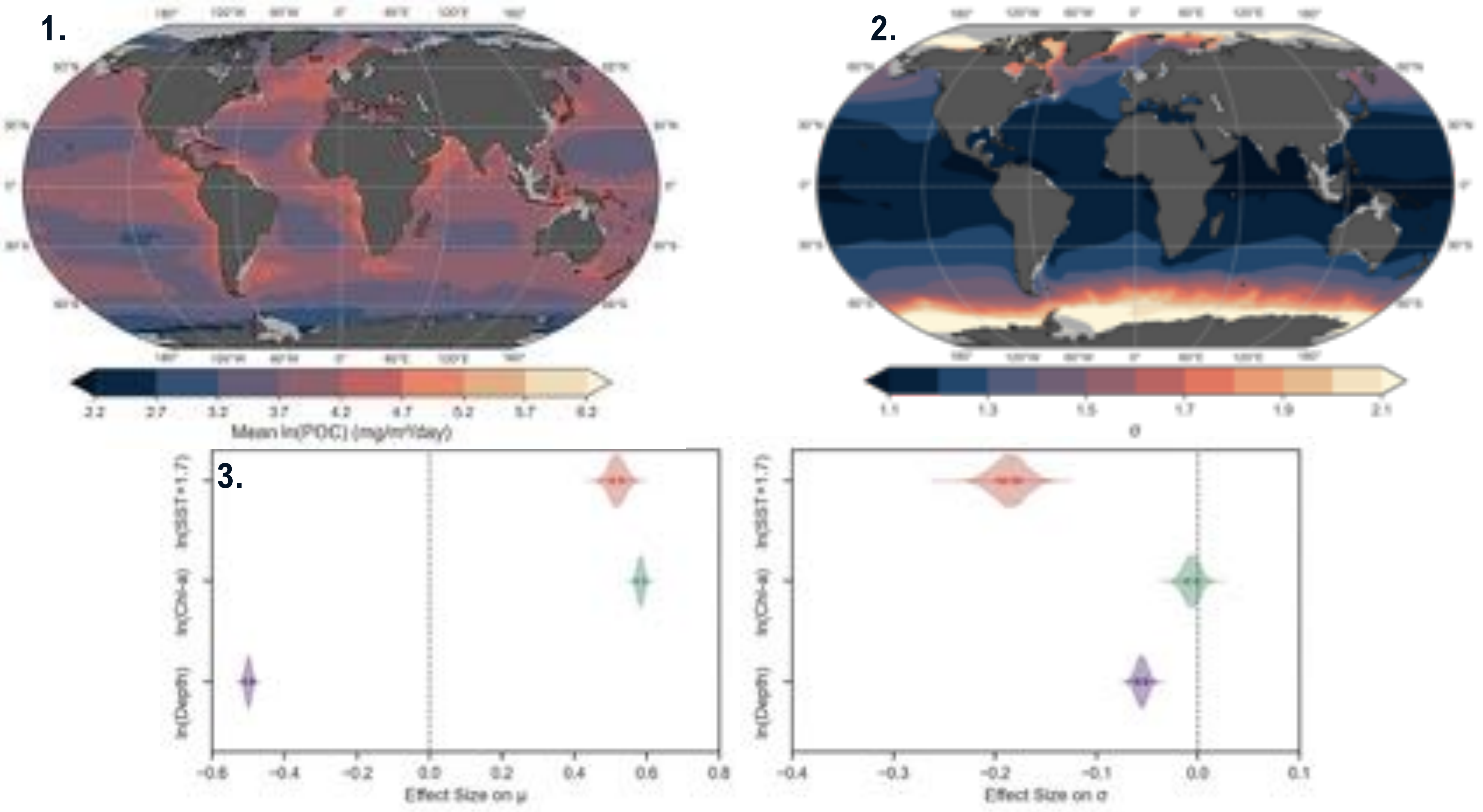
Capturing Variability Within the Marine Particulate Organic Carbon Flux: A Bayesian Approach

P. Edwards[1,2], G. L. Britten[3], L. Biermann[4], L. Guidi[5], S. A. Henson[1,2], C. M. Moore[2], S. Ramondenc[5], B.B. Cael[1,6]

[1]NOC – National Oceanography Centre, Southampton, UK; [2]University of Southampton, Southampton, UK; [3]WHOI – Woods Hole Oceanographic Institution, Massachusetts, USA; [4]EUMETSAT – European Organisation for the Exploitation of Meteorological Satellites, Darmstadt, Germany; [5]Sorbonne University, Laboratoire d'Océanographie de Villefranche, Villefranche-sur-Mer, France; [6]University of Chicago, Chicago, USA

Poster #98

$$\ln(POC\ flux) \sim N(\mu, \sigma)$$



International Ocean Colour Science Meeting 2025

Advancing Global Ocean Colour Observations

Poster Lightning Session 2A

END OF LIGHTNING TALKS