



International
Ocean Colour Science
Meeting 2025

Advancing Global Ocean Colour Observations

Poster Lightning Session 2B



Poster # 20

Enhanced Continuity of Ocean Colour Observations from Sentinel-3 Next Generation Optical

Paolo Cipollini, Ewa Kwiatkowska, Mounir Lekouara, Simon Proud and the S3NGO Mission Advisory Group

Poster # 20

AOLCI: The future of Ocean Colour for Copernicus



Sentinel-3 Next Generation Optical (S3NGO): European wide-swath mid-resolution reference. Two satellites to be launched in mid-2030s

- **Advanced OLCI (AOLCI) instrument** : 150 m resolution, supporting detailed oceanic, coastal and inland water observations.
- High signal-to-noise ratio maintained
- Spectral capabilities dramatically expanded: **currently looking at feasibility of 408 hyperspectral bands (340 –1040 nm)**, enabling new ocean colour products (e.g., phytoplankton types, primary production).
- Improved synergy with ASLSTR dual-view VIS/IR radiometer



Poster # 45

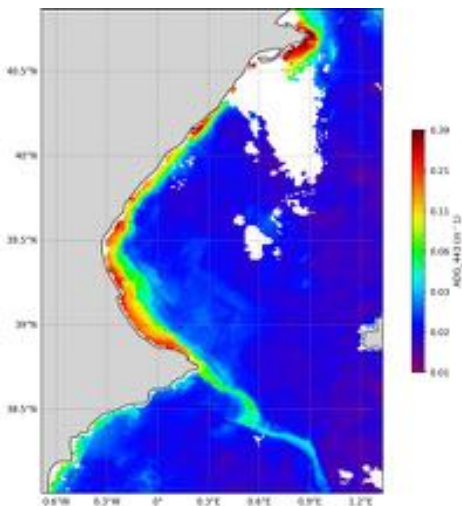
Mapping Mediterranean River Plumes with ADG443: A Remote Sensing Approach

Lapucci C., Böhm E., Brando V., Colella S.

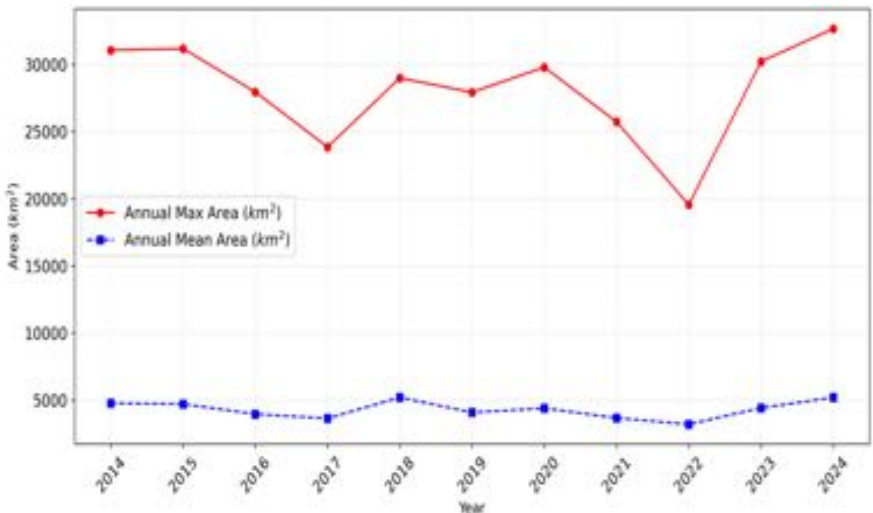
45

Absorption coefficient of colored dissolved organic matter and non-algal particles at 443 nm

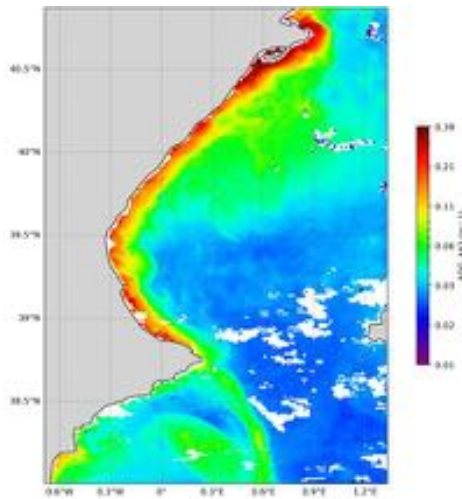
ADG_443 10_11_24



Plume extent interannual variability



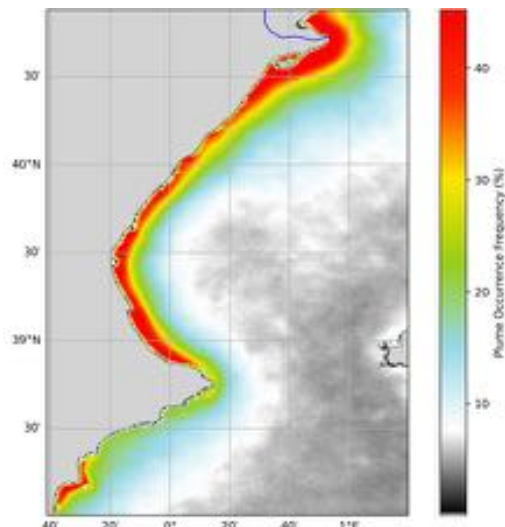
ADG_443 19_11_24



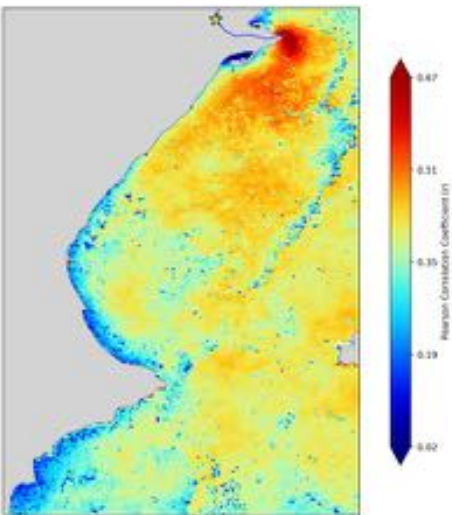
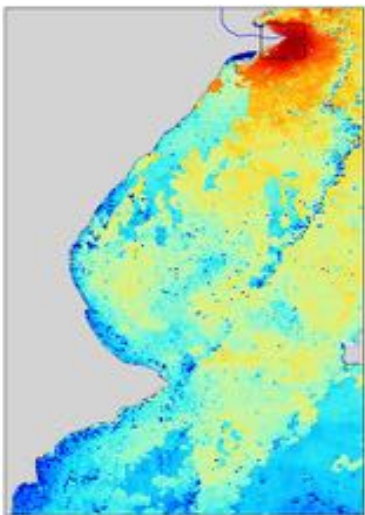
Bathymetry



Plume occurrence frequency map



Correlation maps



GEBCO IBCM

Threshold ADG443: 0.04 m⁻¹

20 x 20 pixel window

Max river flow

Poster # 89

Towards Operational Large Scale Seagrass Mapping Using Sentinel-2 Time Series: Insights from the ESA Coastal Blue Carbon Project.

Benoît BEGUET¹, Olivier REGNIERS¹, Rémi BUDIN¹, Ghali BEN-BOUZID¹, Nicolas COELHO¹, Miguel A. MATEO^{2,3},
Berta BATLLES-SERRADELL², Oscar SERRANO², Aurélie DEHOUCK¹

¹i-Sea, France ; ²Centro de Estudios Avanzados de Blanes (CEAB), CSIC, Spain ; ³School of Science & Centre for Marine Ecosystems Research, Edith Cowan University, Joondalup, WA 6027, Australia.

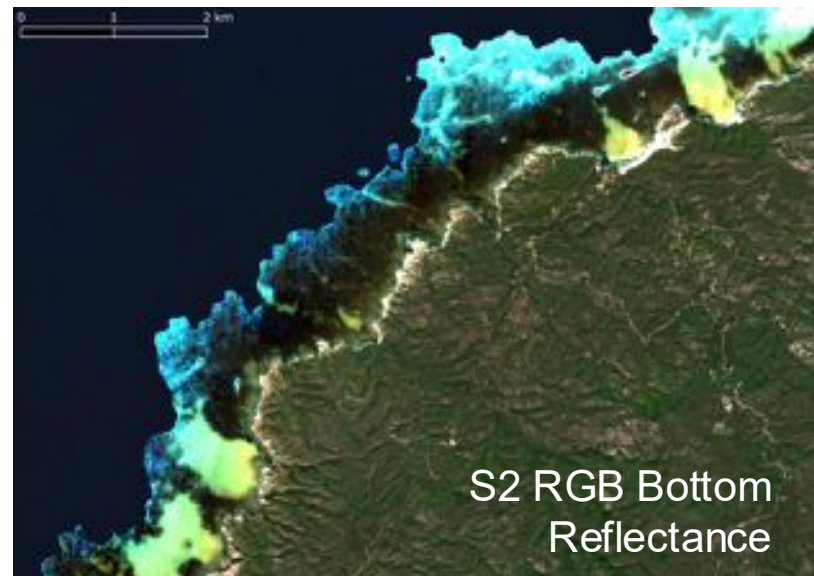
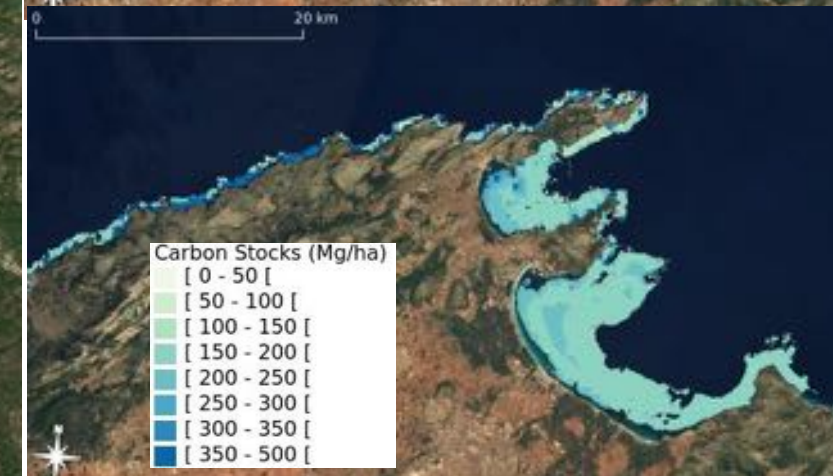
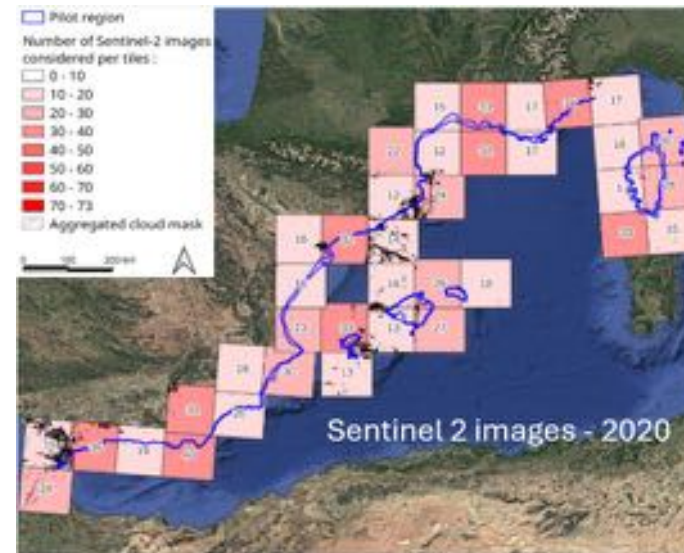
Or What Could Be The Best Strategy To Map
Seagrass Blue Carbon At Large Scale with
Sentinel-2 data And How Correcting
For Water Column Can Improve Results ?



ESA Coastal
Blue Carbon
PROJECT — 

Poster # 89

From Sentinel-2 pixels to Blue Carbon : Challenges in Large-Scaling Underwater Seagrass Habitat Maps



Poster # 99

Optical water type classification for better estimation of aquatic carbon in the ocean, coastal, and inland waters

Martin Hieronymi, Daniel Behr, Shun
Bi, Rüdiger Röttgers, Annabeth McCall,
Bennet Juhls



Nanjing Institute of Geography and Limnology
Chinese Academy of Sciences

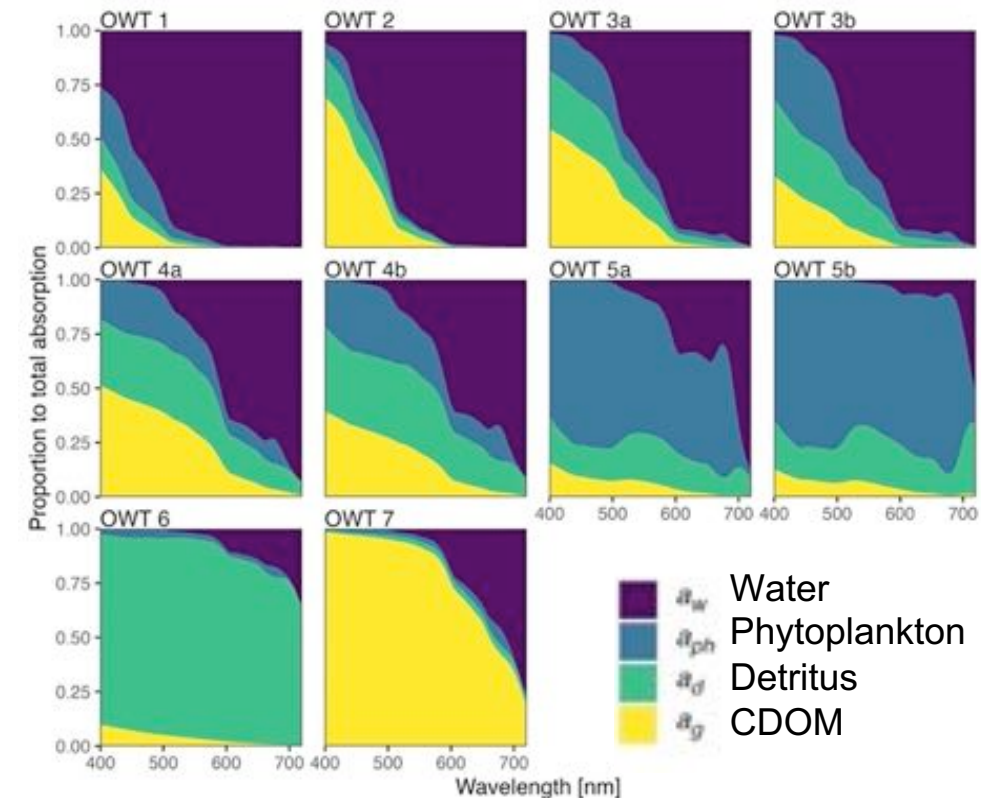
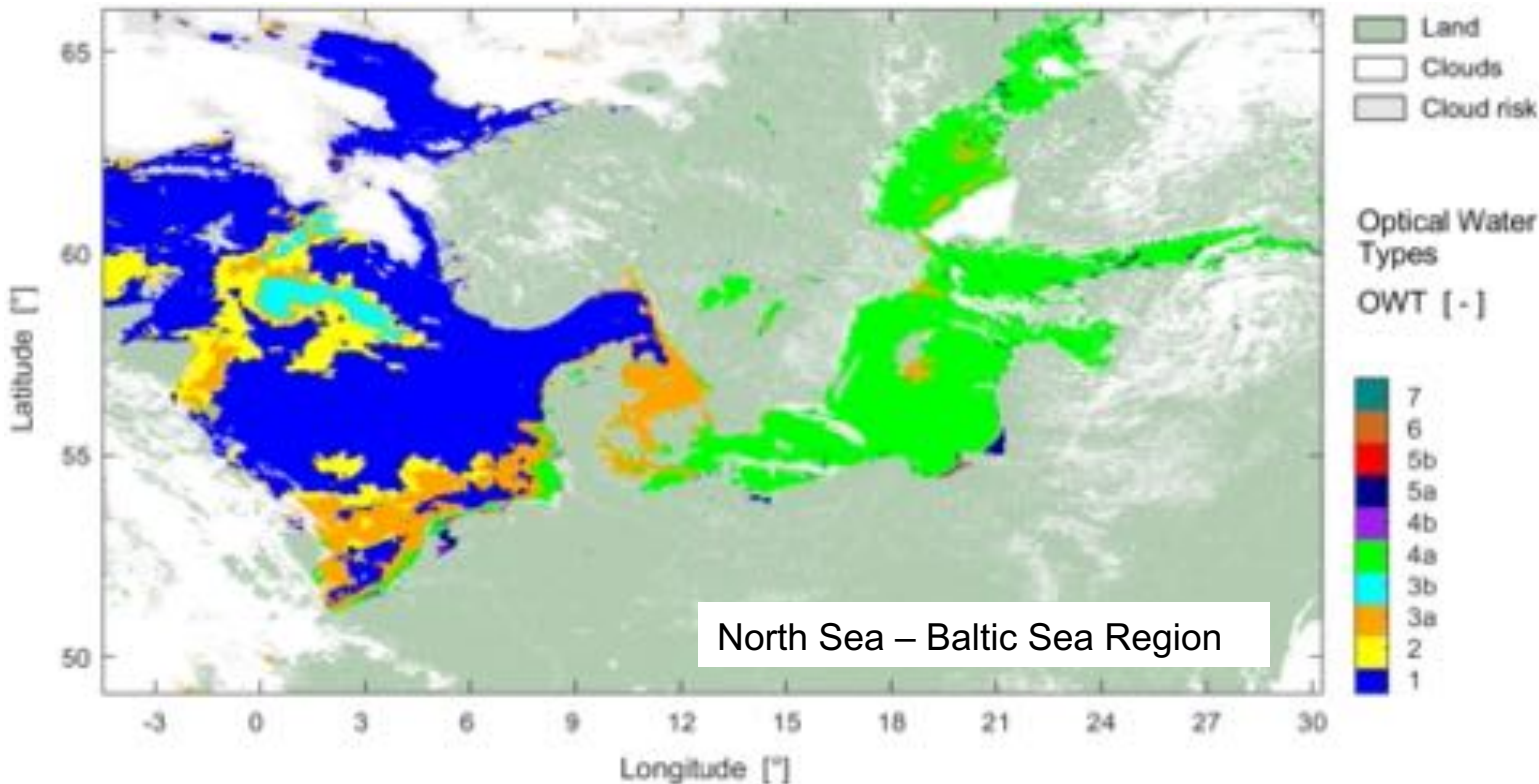
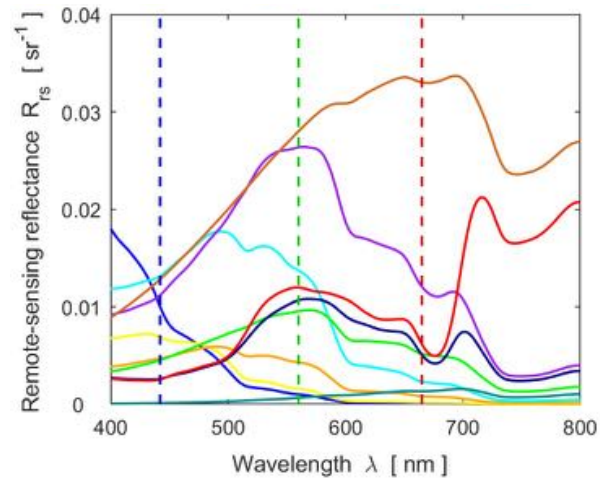


ALFRED-WEGENER-INSTITUT
HELMHOLTZ-ZENTRUM FÜR POLAR-
UND MEERESFORSCHUNG

IOCS-2025 Darmstadt, 1-4 December

Poster # 99

- Different water constituents dominate water types
- Reliable differentiation of components is important
- IOP-based estimation of carbon concentrations
- Update on A4O-ONNS algorithm for Sentinel-3 OLCI



Poster # 100

Seasonal Variability in the Bio-optical Properties of the Central Iceland Basin: Implications for the Regional Modelling of Primary Production

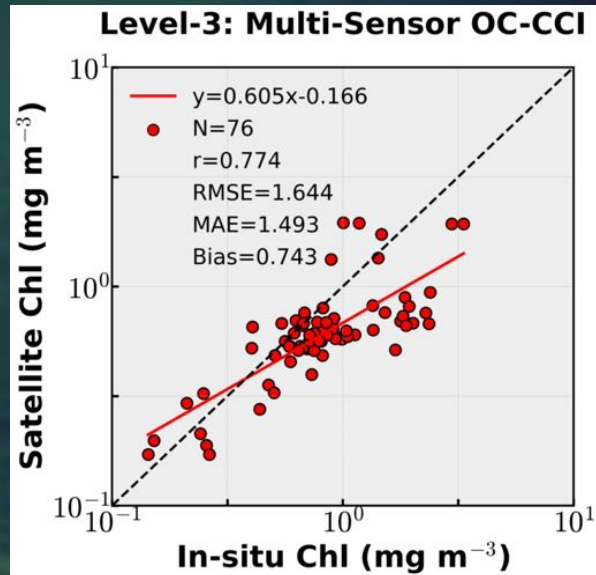
Harish Kumar K S, Miao Sun, Heather A. Bouman
Department of Earth Sciences
University of Oxford



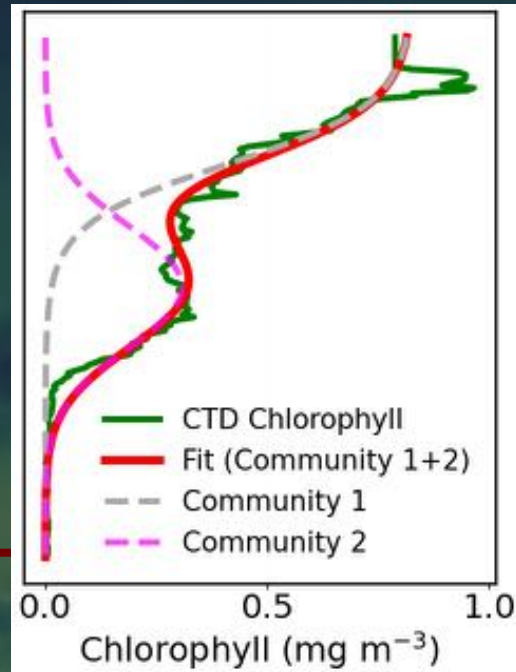
Poster # 100

Greenland

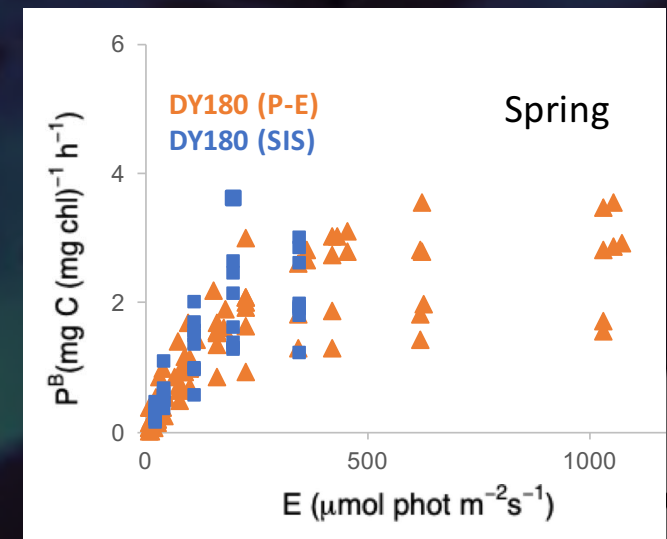
Performance of global
OC chlorophyll-a
(Chl-a) algorithm at
regional scale



Characterise vertical
variability of Chl-a below
the detection of satellite
using ship and float data



Examine seasonal
changes in the
photosynthetic
parameters



Poster # 102

PhytoBLOOM: Phytoplankton Biogeochemical Laboratory Observations and Optical Measurements — Experiment Design and Initial Analysis

W. Kim^{1,3}, A. Grubb^{2,3}, V. Strohm³, H. Smith³, S. Freeman³, E. Taylor³, A. Mannino³

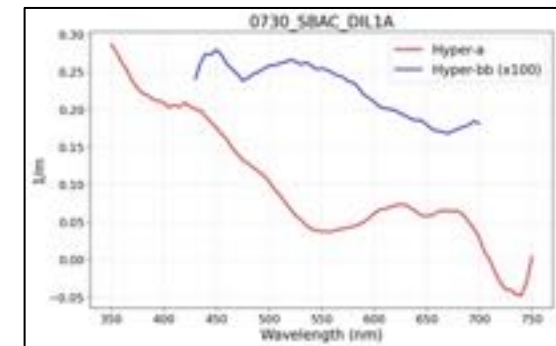
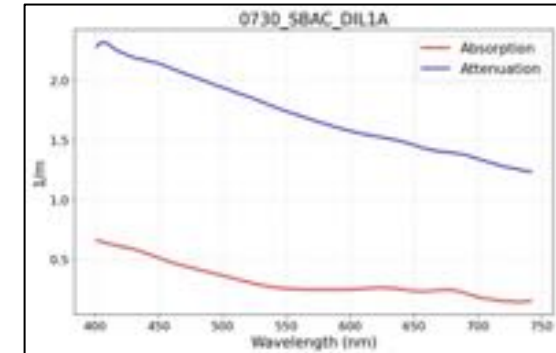
¹Department of Civil and Environmental Engineering, Pusan National University, Busan, Korea

²NASA Postdoctoral Program Fellow, NASA Goddard Space Flight Center, Maryland, USA

³Ocean Ecology Laboratory, NASA Goddard Space Flight Center, Maryland, USA

Poster # 102

- ◆ Resolve **species-specific optical signatures** of bloom-forming strains in Diatom, Dinoflagellate, Cyanobacteria, Haptophyte, Raphidophyte, Chlorophyte
- ◆ With **hyperspectral instruments (ACS, Hyper-a, Hyper-bb)**
- ◆ AC9(absorption/attenuation), SC6(backscattering), LISST-200X, ECO-VSF3, TSG
- ◆ Biogeochemical variables—pigment composition, DOC, PIC/POC, CDOM, ap



Cyanobacteria
(*Synechococcus bacillaris*)

Poster # 103

Bridging the gap between surface and subsurface optical estimates of particulate organic carbon concentration

*Evaluating algorithms for global satellite
ocean color and BGC-Argo applications*

Daniel Koestner¹, Ishan D. Joshi², Rick A. Reynolds², Dariusz Stramski²

¹ *Department of Physics and Technology, University of Bergen, Norway*

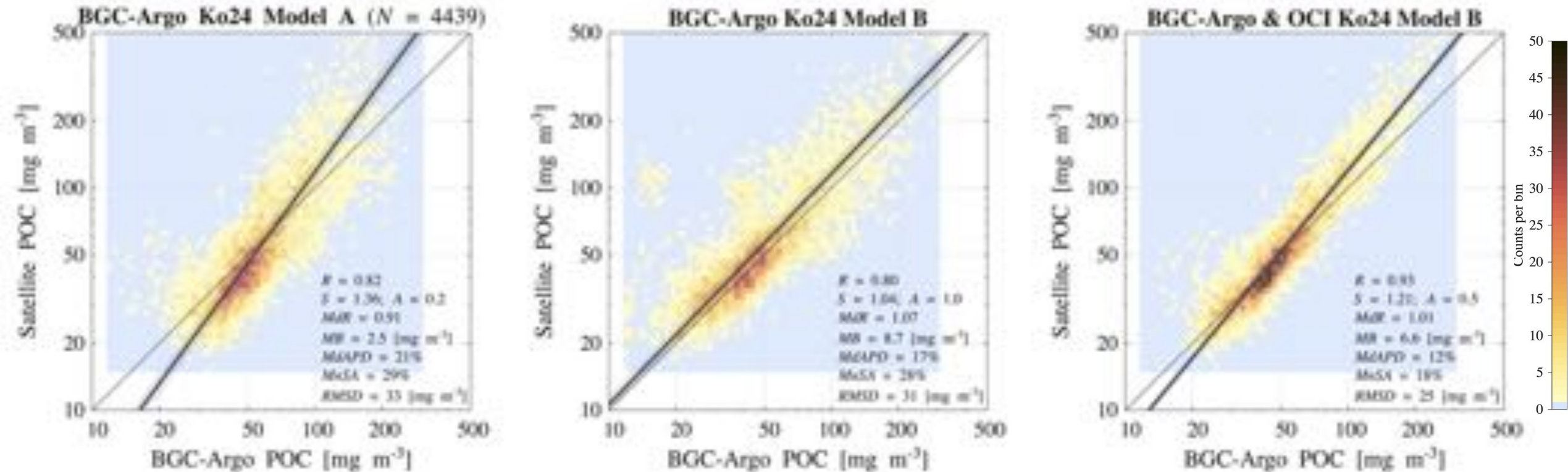
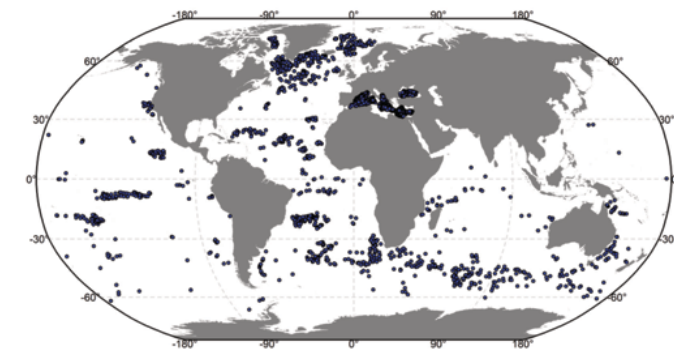
² *Scripps Institution of Oceanography, University of California San Diego, USA*

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Poster # 103

Over 4000 match-ups of MODIS-Aqua observations and BGC-Argo floats indicate **reasonable agreement between satellite-derived POC and BGC-Argo estimated POC**



A **particle composition-specific approach** utilizing BGC-Argo measurements shows best agreement with satellite-derived POC, especially after a **newly developed correction for in situ fluorometric Chla**

Poster # 105

Mapping Eelgrass Meadows and Macroalgae in Swedish Coastal Areas - Earth Observation in Support of Blue Carbon Research

Susanne Kratzer¹ and Samantha Lavender²

¹Stockholm University, Stockholm, Sweden

²Pixalytics, Plymouth, UK

Poster # 105

Eelgrass meadows and macroalgal beds are vital blue-carbon sinks but are in decline. The **SwedCoast-BlueCarb** project (funded by the Swedish and UK Space Agencies) uses satellite Earth Observation and field data to investigate submerged vegetation in Kalmar Strait and at the Swedish west-coast.

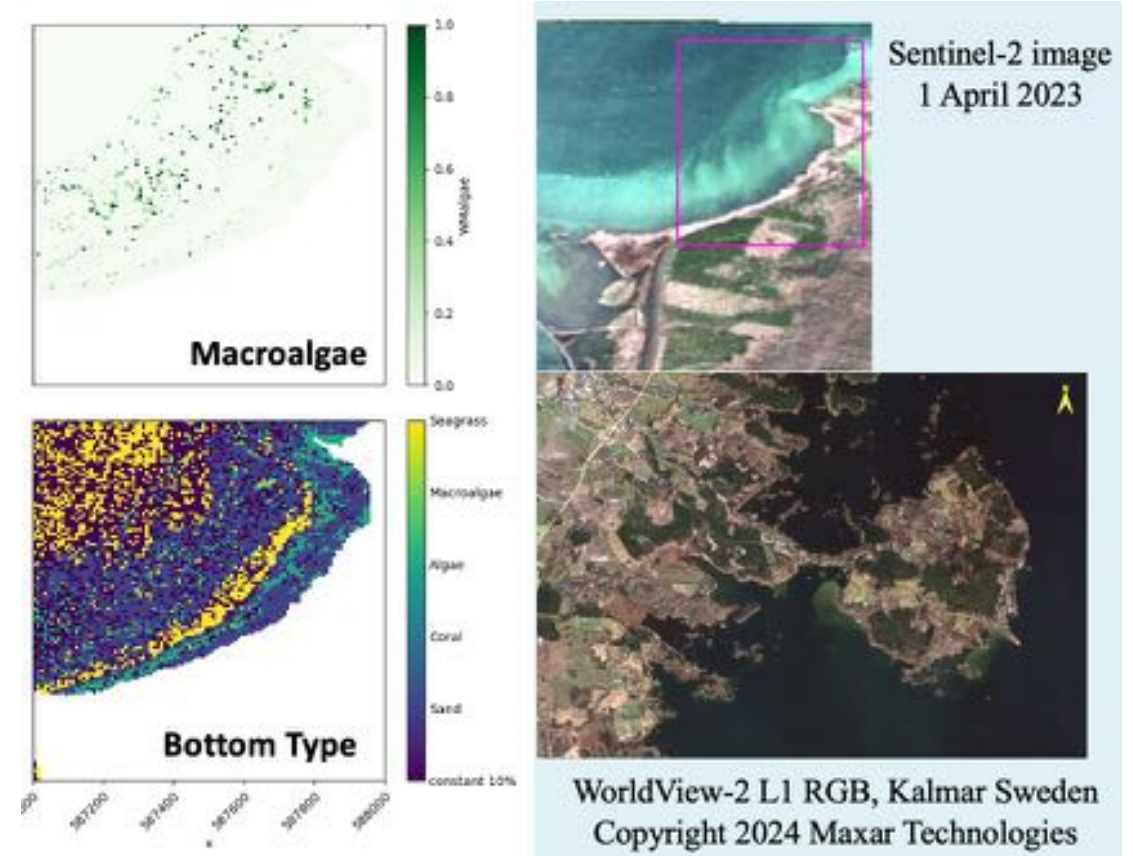


Aim

- Eelgrass & macroalgae mapping
- Support coastal management

Methods

- Sentinel-2, Sentinel-3, WorldView2
- WASI optical modelling
- Machine-learning

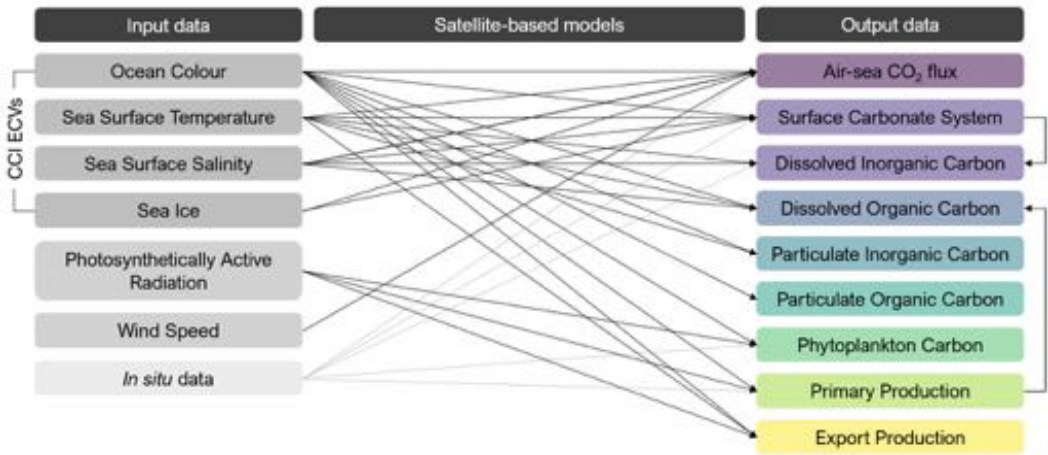


Satellite-based observations of carbon in the ocean: Pools, fluxes and exchanges (SCOPE)

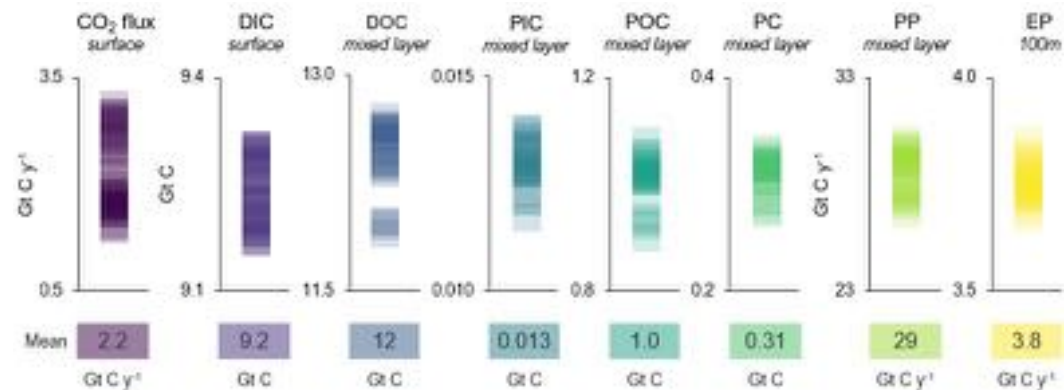
Gemma Kulk, Shubha Sathyendranath, Meike Becker, Marco Bellacicco, Antonio Bonaduce, Heather Bouman, Andrei Chuprin, Javier Concha, Daniel Ford, Johnny Johannessen, Bror Jönsson, Lekshmi Krishnakumary, Tiit Kutser, Marko Laine, Mengyu Li, Joan Llort, Elin Meek, David Moffat, Are Olsen, Emanuele Organelli, Ralf Quast, Roshin Raj, Mayra Rodriguez, Shovonlal Roy, Roberto Sabia, Roman Shevchuk, Jamie Shutler, Valentina Sicardi, Kaire Toming, Tsuyoshi Wakamatsu

Poster #106

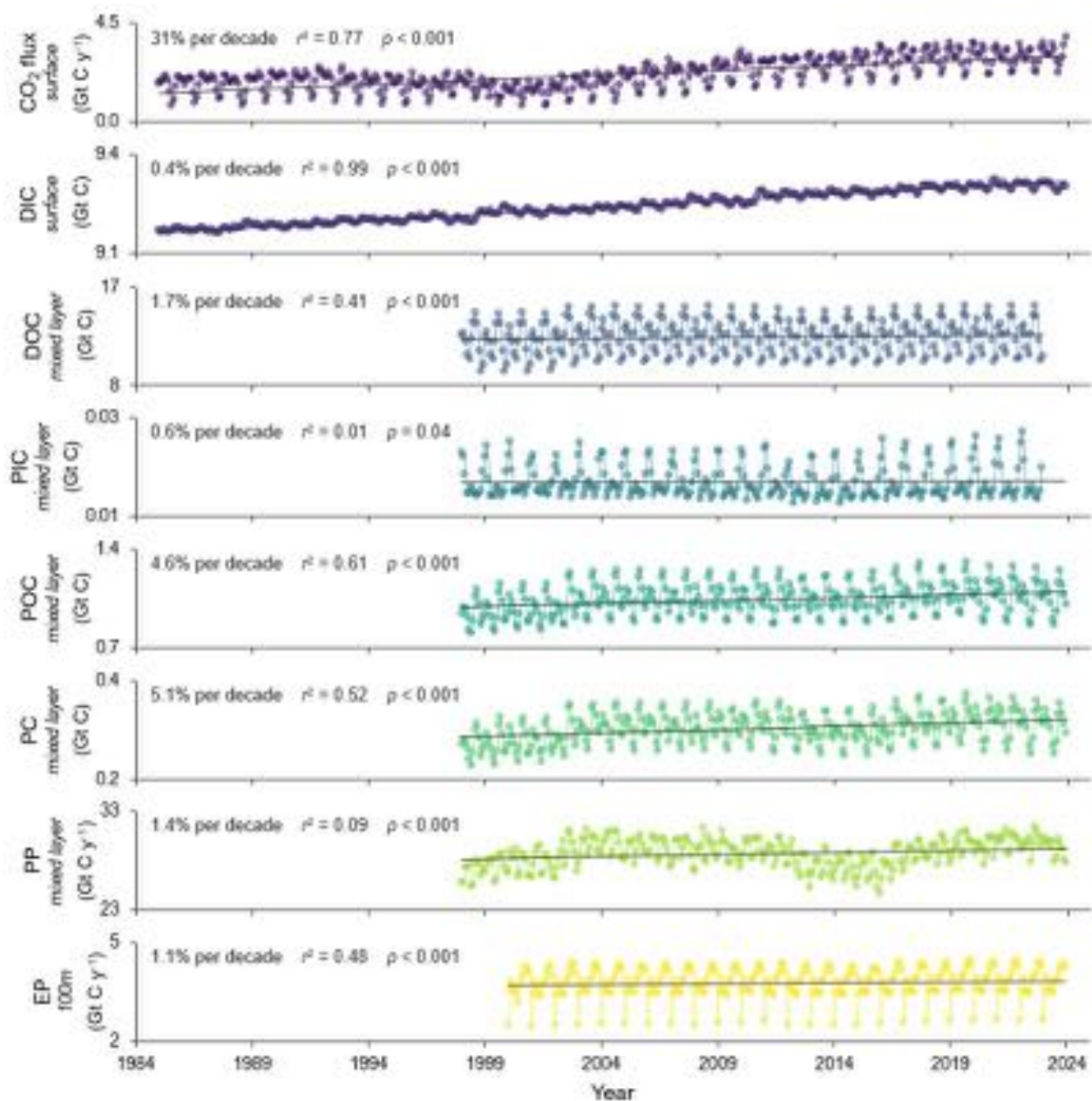
Satellite-based ocean carbon dataset



Ocean carbon budget



Trends in ocean carbon budget



Observing the Coupling of Biological and Microbial Carbon Pumps in the North Atlantic Subtropical Gyre

Mengyu Li¹

Marco Bellacicco¹, Gemma Kulk^{2,3}, Bror Jönsson⁴,

Mayra Rodriguez³, Bruno Buongiorno Nardelli⁵, Emanuele Organelli¹

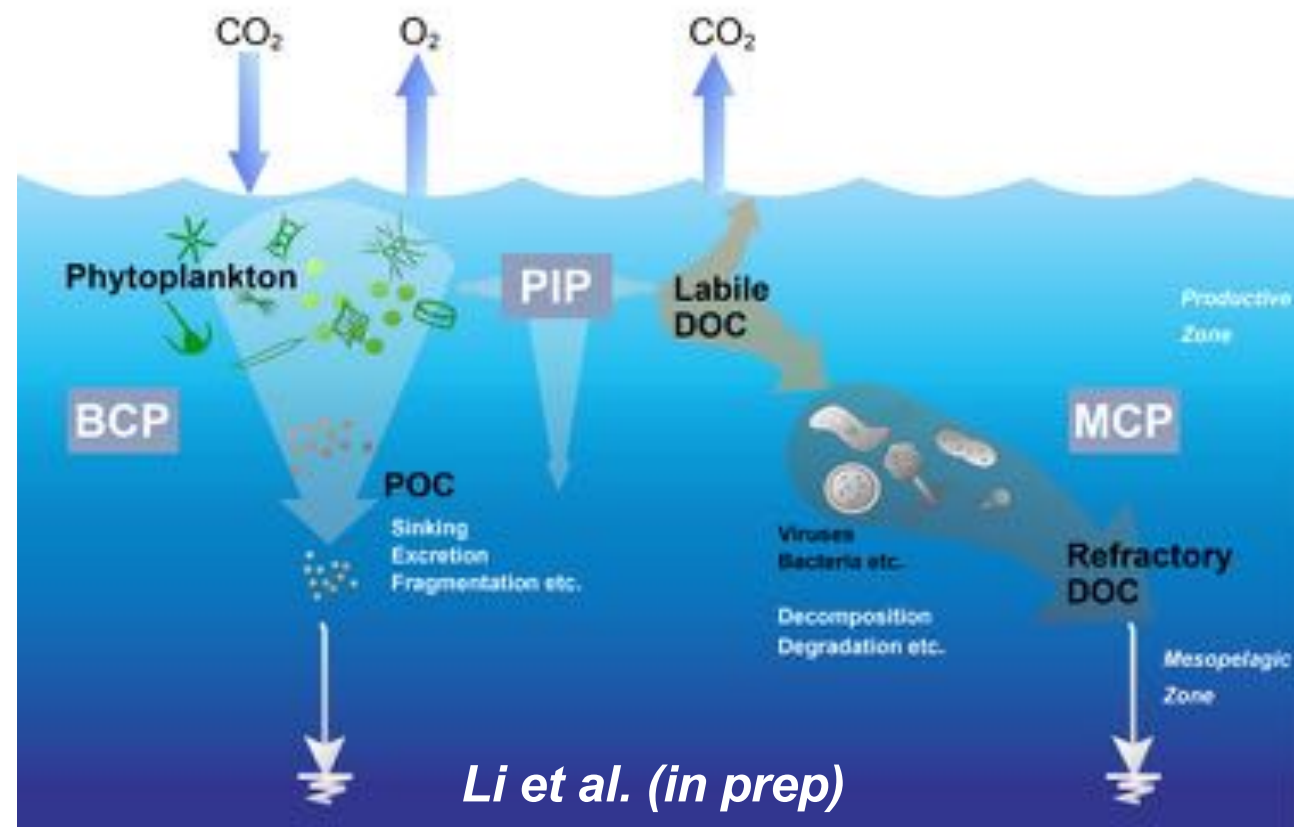
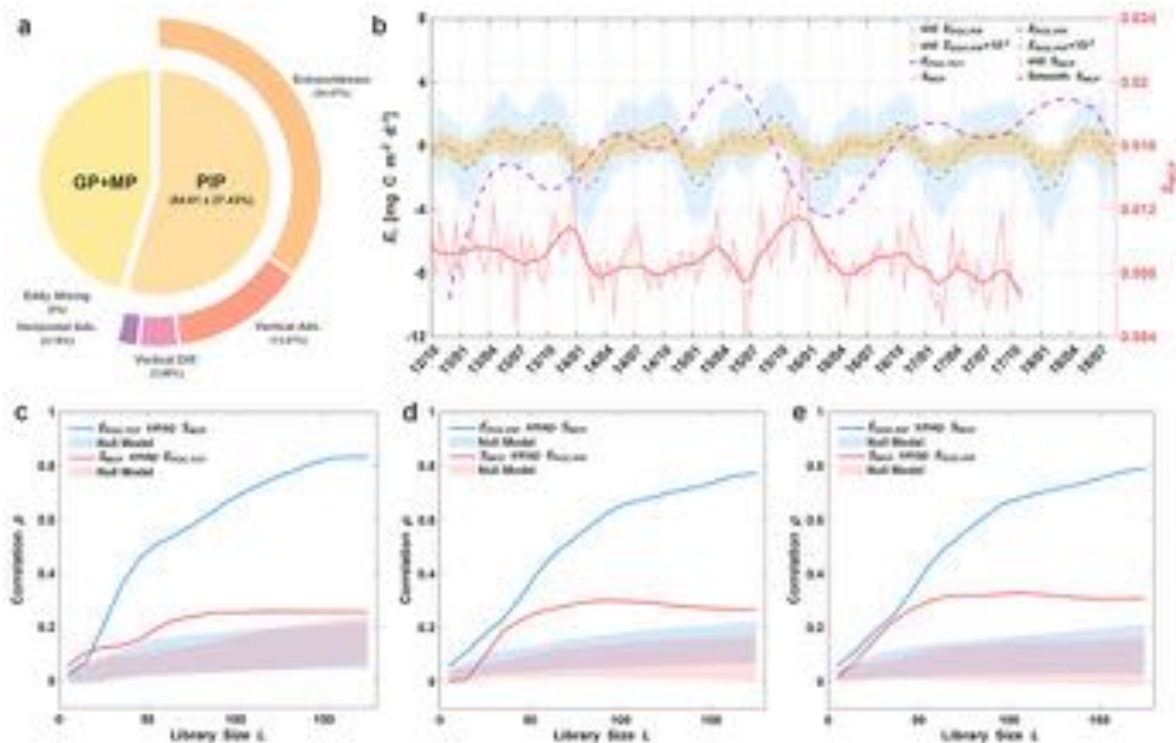
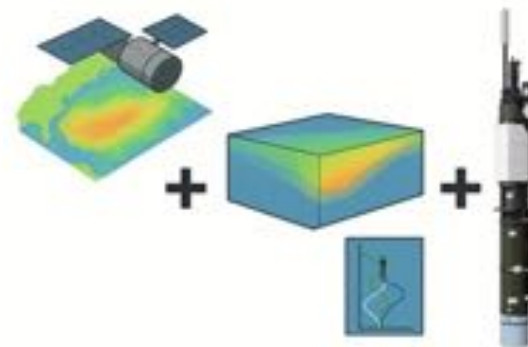
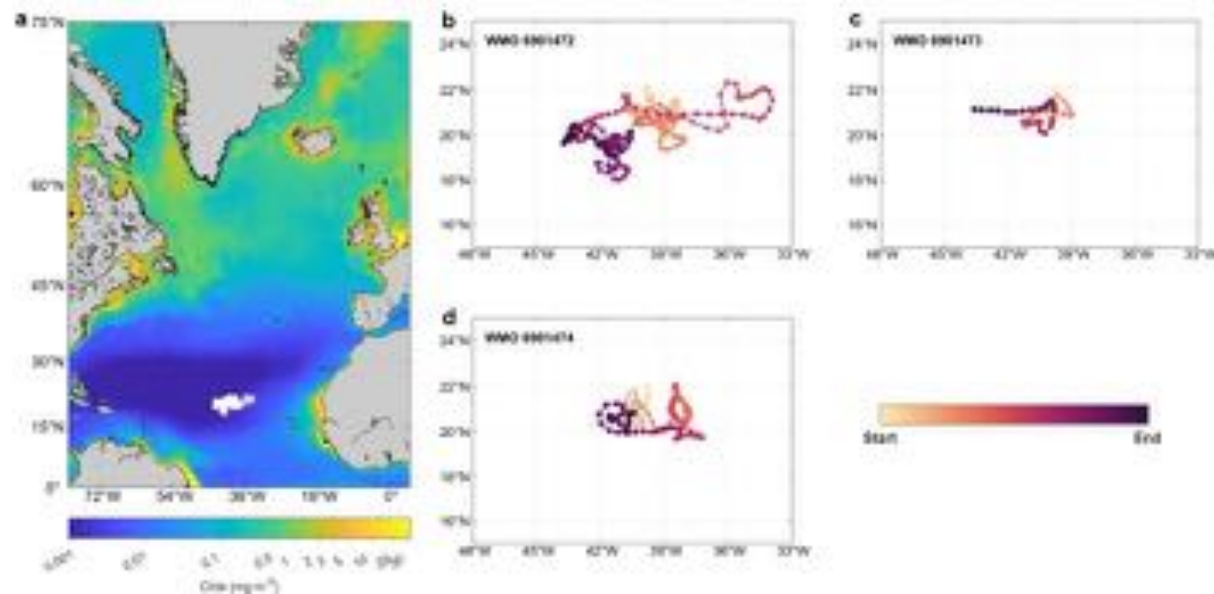
¹ Institute of Marine Science (ISMAR), National Research Council of Italy (CNR), Rome, Italy

² Earth Observation Science & Applications, Plymouth Marine Laboratory, Plymouth, United Kingdom

³ National Centre for Earth Observation, Plymouth Marine Laboratory, Plymouth, United Kingdom

⁴ Ocean Process Analysis Lab, University of New Hampshire, Durham, USA

⁵ Institute of Marine Science (ISMAR), National Research Council of Italy (CNR), Napoli, Italy



Li et al. (in prep)



Machine Learning–Enabled High-Resolution Monitoring of Dissolved Organic Carbon Dynamics in Dongshan Bay and its Environmental Drivers

Lingling Li, Xiaolong Yu*, Wendian Lai, Nengwang Chen, Weidong Guo, Hongyan Bao,

Guizhi Wang, Shuiying Huang, Shaoling Shang, Zhongping Lee

**xlyu@xmu.edu.cn*

Dec. 1-4, Darmstadt

Poster #108

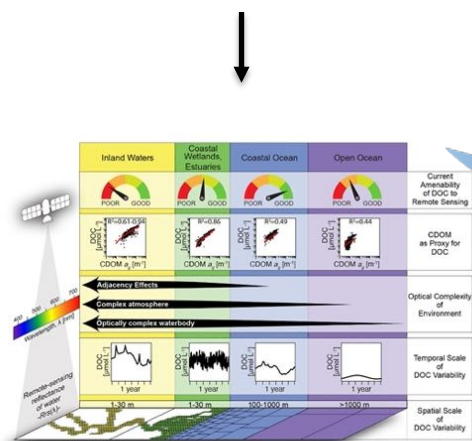
Background

Data processing

Model development

Model application

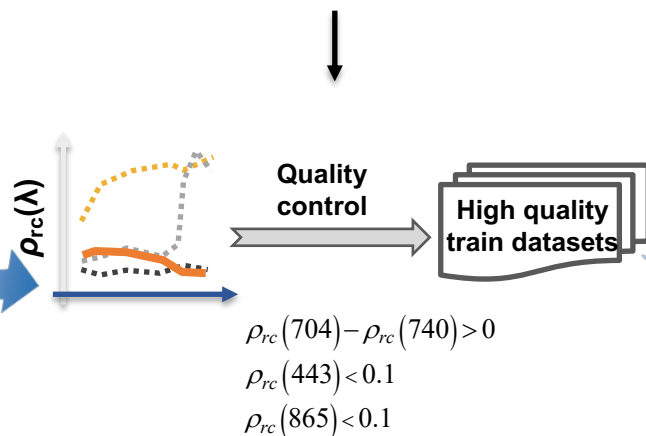
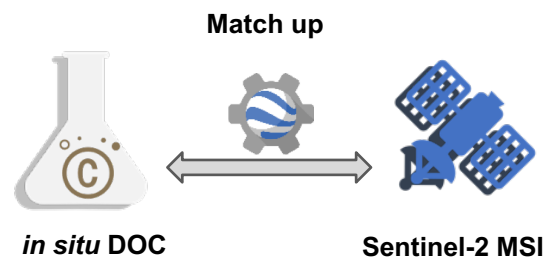
- Terrigenous DOC
- Autochthonous DOC
- Atmospheric-deposition DOC
- Anthropogenic DOC



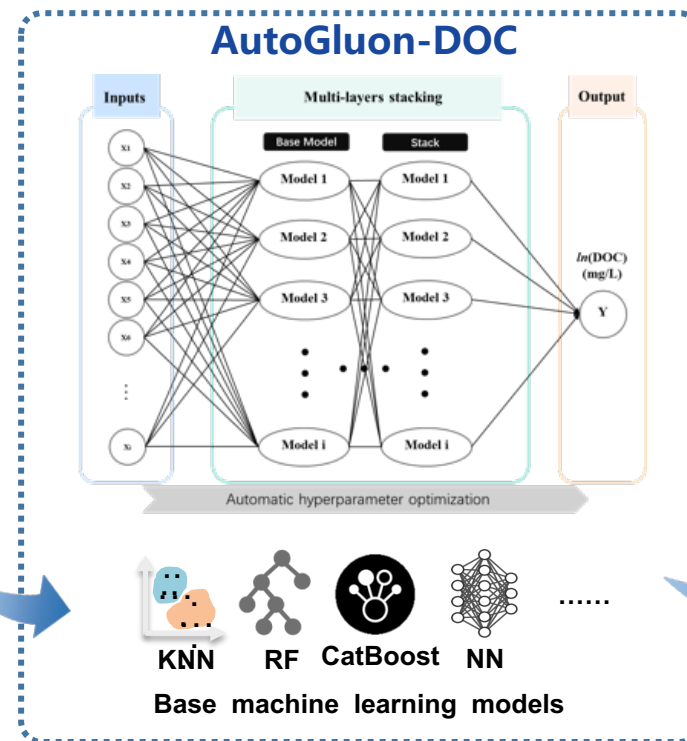
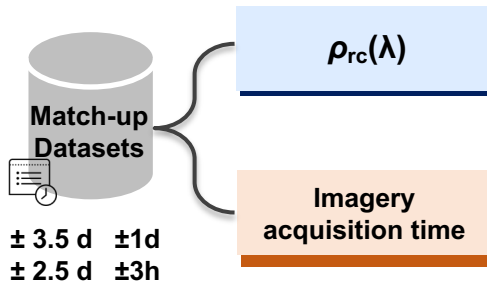
(Fichot et al., 2023)

NN + Sentinel-2
(10 m, ~2-5 d)

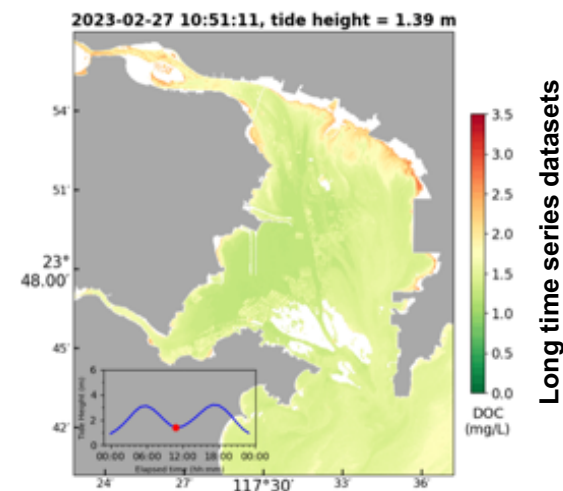
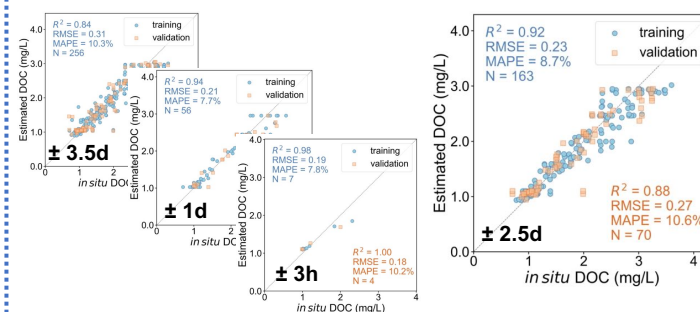
Poster #108



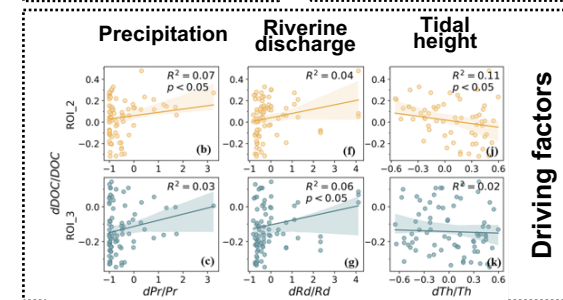
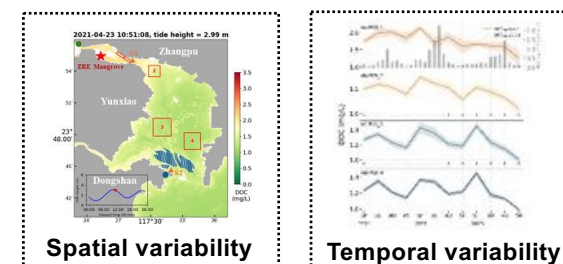
Extract data subset



Model performance across different matchup criteria



Assessments



Poster # 110

***Estimating and Monitoring
Dissolved Organic Carbon (DOC)
from Space across the Global
Ocean, with a Focus on the
Northwest European Shelf***

Marie Montero¹

Roy Elhourany¹, Daniel S.F. Jorge¹, Marine Bretagnon², Vincent Vantrepotte¹, Arnaud Cauvin¹, Aurélien Prat², Ana Gabriela Bonelli³, Lucile Duforêt-Gaurier¹, Antoine Mangin², and Hubert Loisel²

¹ Univ. Littoral Côte d'Opale, CNRS, Univ. Lille, IRD, UMR 8187-LOG-, F-62930 Wimereux, France,

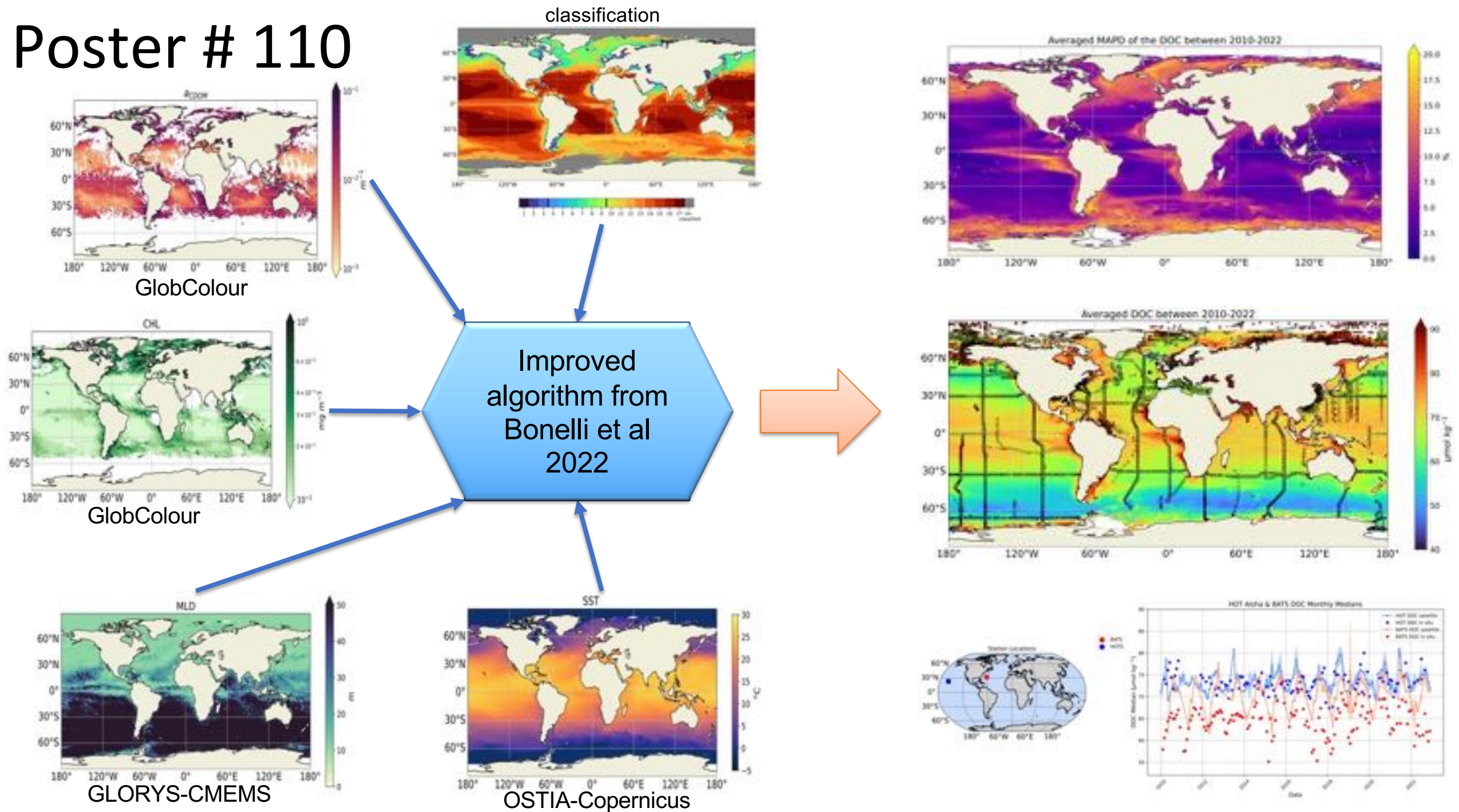
² ACRI-ST, 260 Route du Pin Montard, 06904 Sophia-Antipolis, France

³ Département de Biologie, Chimie et Géographie, Université du Québec à Rimouski, Rimouski, QC G5L3A1, Canada



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Poster # 110

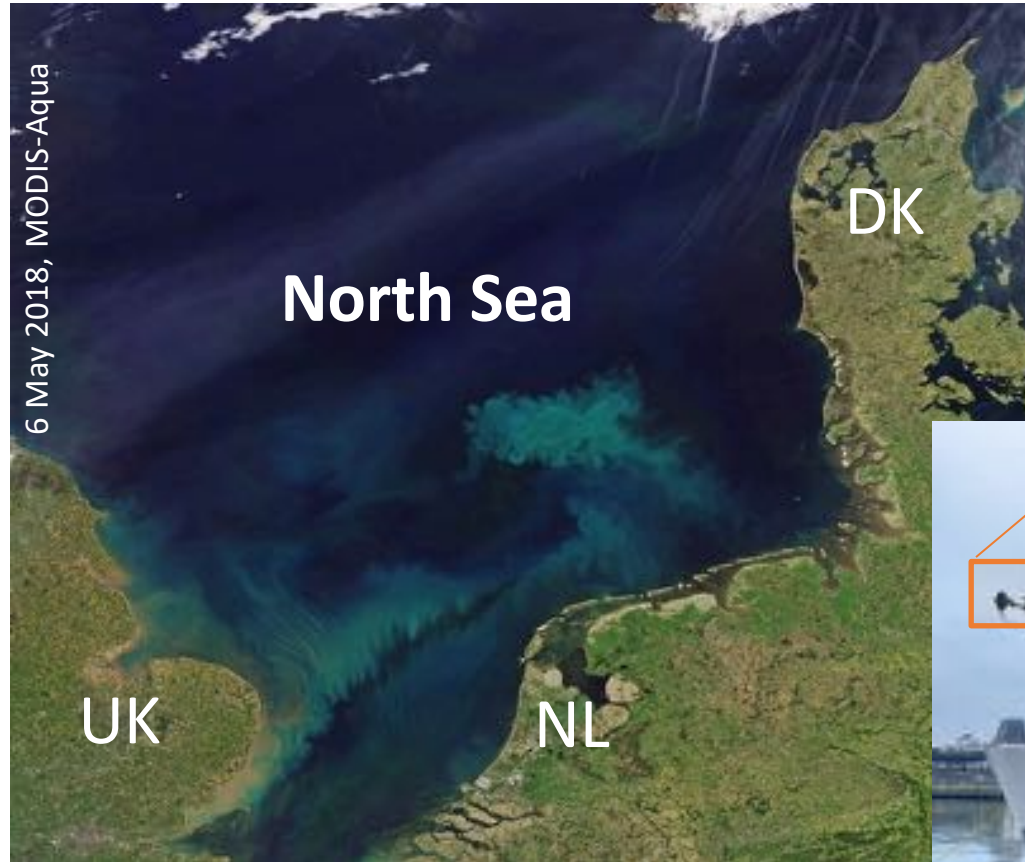


Poster # 111

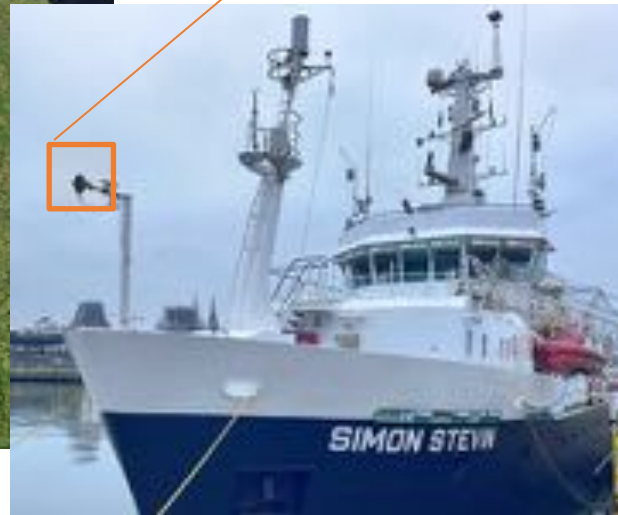
Autonomous monitoring of pCO₂, and hyperspectral optical properties during ship transit

Griet Neukermans, Andrea van Langen Roson,
Clémence Goyens, Alexandre Castagna, Qiming Sun,
Thanos Gkritzalis, Peter Landschützer,
Nils Haëntjens, Emmanuel Boss, Heidi Dierssen, and
Hubert Loisel

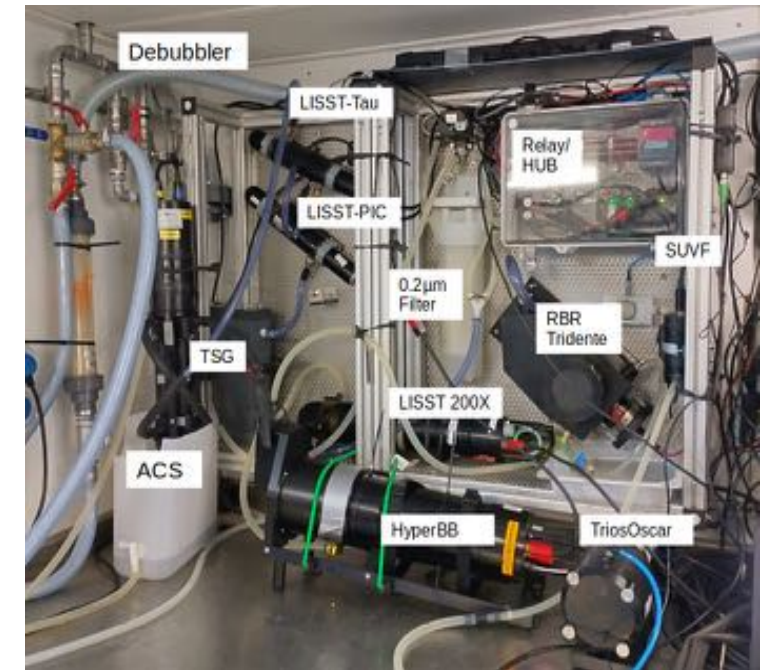
Setting up a carbon budget for the North Sea based on in situ and remote sensing observations



Hyperspectral radiometry



Hyperspectral IOPs



Poster # 114

**Concerted carbon system
observations in the Baltic Sea as
asset for verification and
algorithm development for
remote-sensing-based carbon
data products**

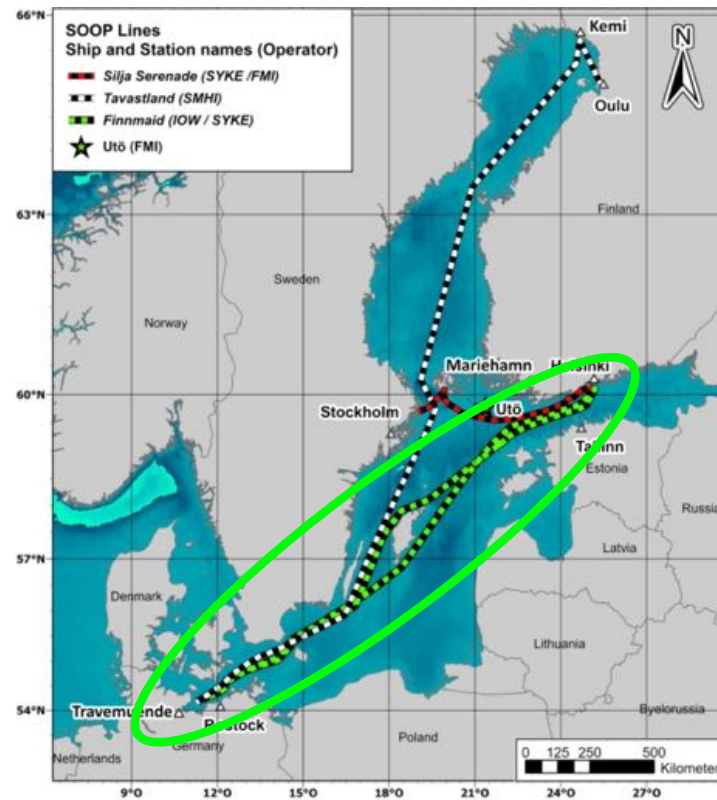
Gregor Rehder, Henry Bittig, Martti Honkanen, Lauri
Laakso, Madeleine Nilsson, Jukka Seppälä



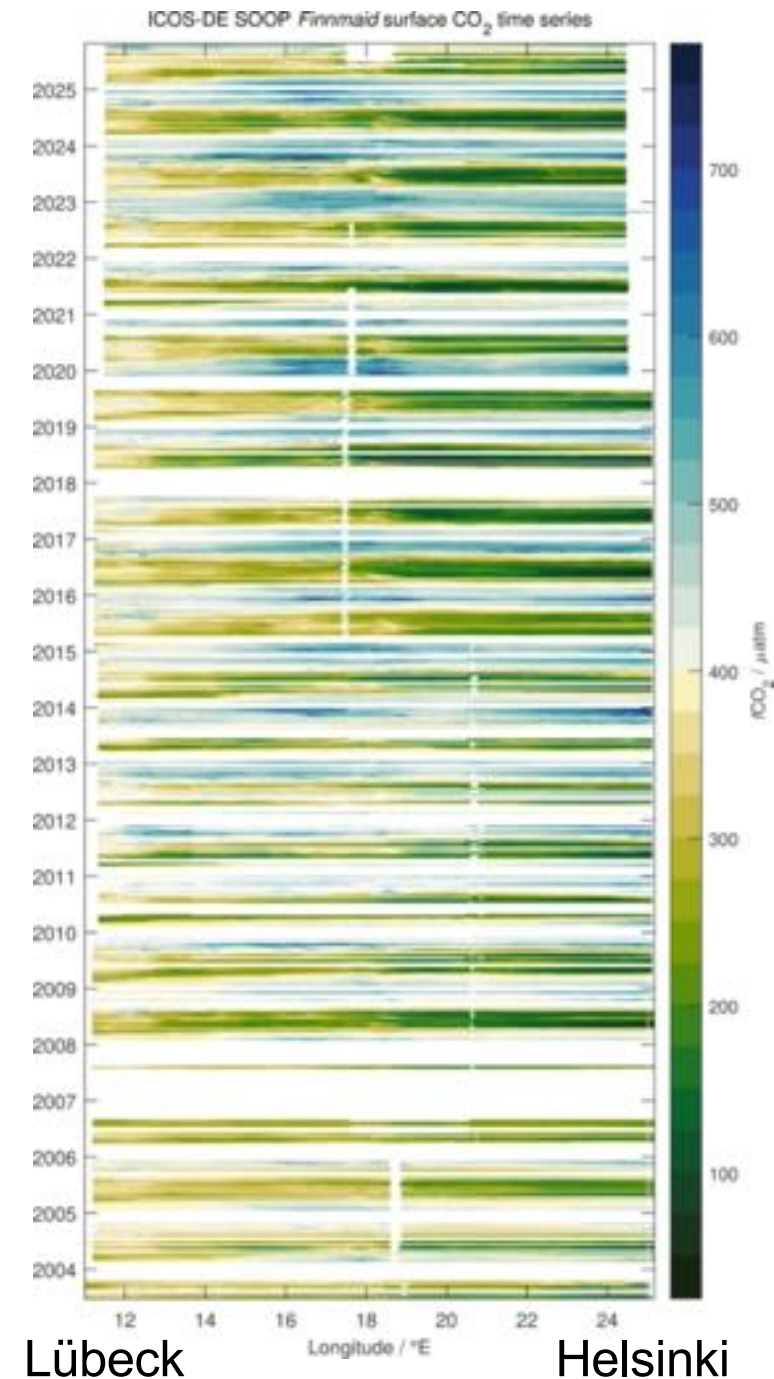
Poster # 114

- Assessing Baltic Sea Carbon System parameters is important
 - Carbon source/sink
 - mCDR
 - Blue Carbon
- Assessing Carbon System parameters from space in the Baltic Sea is difficult
 - Unusual colour
 - Adjacency effects

**Let's talk
at # 114**



- Here is the good news!
- ✓ Highest quality data through five stations of **ICOS** Integrated Carbon Observation System
 - ✓ We can provide ground-truthing

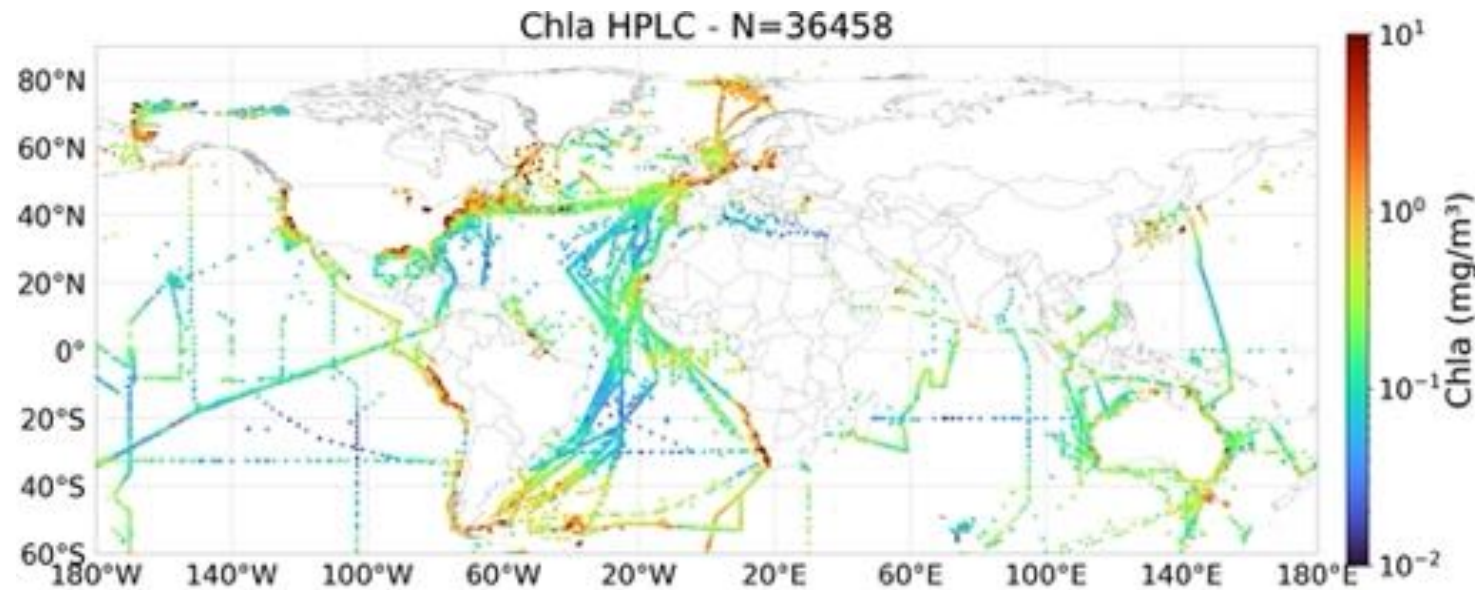


Monitoring Phytoplankton Biomass and Diversity from Space: ESA OC-CCI and PHYTO-CCI Perspective

Salem I. Salem, Gemma Kulk, Steve Groom, Victor Martinez-Vicente, Andrei Chuprin, Marco Bellacicco, Astrid Bracher, Ana Brito, Carsten Brockmann, Vanda Brotas, Andrei Chuprin, Sarah Connors, Alexander Hayward, Lekshmi Krishnakumary, Angus Laurenson, Dan Clewley, Elin Meek, François Steinmetz, Frédéric Mélin, Gianluca Volpe, Jane Netting, Peter Miller, Emanuele Organelli, Ralf Quast, Robert Brewin, Vittorio Brando, Xuerong Sun, Hongyan Xi, Shubha Sathyendranath

Poster 116

- ❖ **OC-CCI**: **New global in situ database** has been prepared. OC-CCI V7 is being prepared.
- ❖ **PHYTO-CCI**: Developing global products for **pigment diversity** and **phytoplankton carbon biomass**.



Poster # 119

Ocean Colour and Offshore Wind

Insights from RRS Discovery

Benjamin Whitcombe



UNIVERSITY
of HULL



Natural
Environment
Research Council

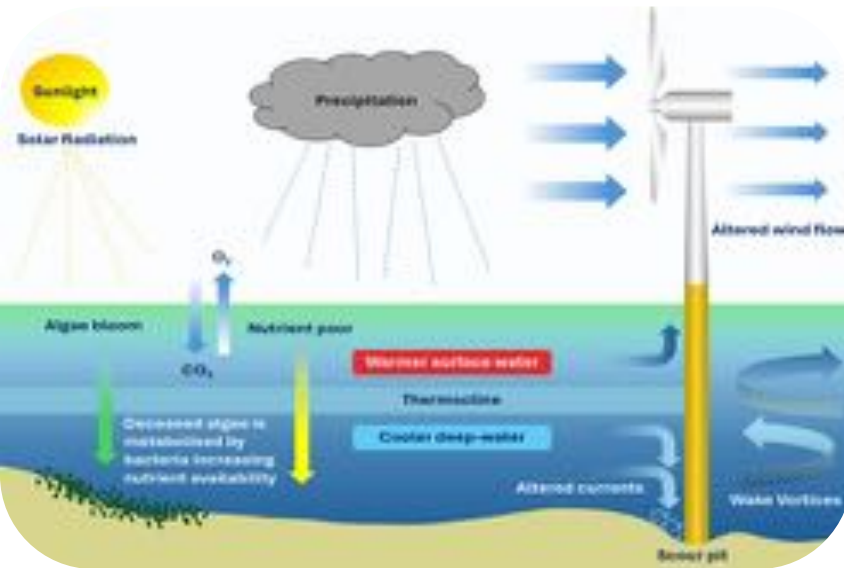


Engineering and
Physical Sciences
Research Council



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Poster # 119



Poster # 121

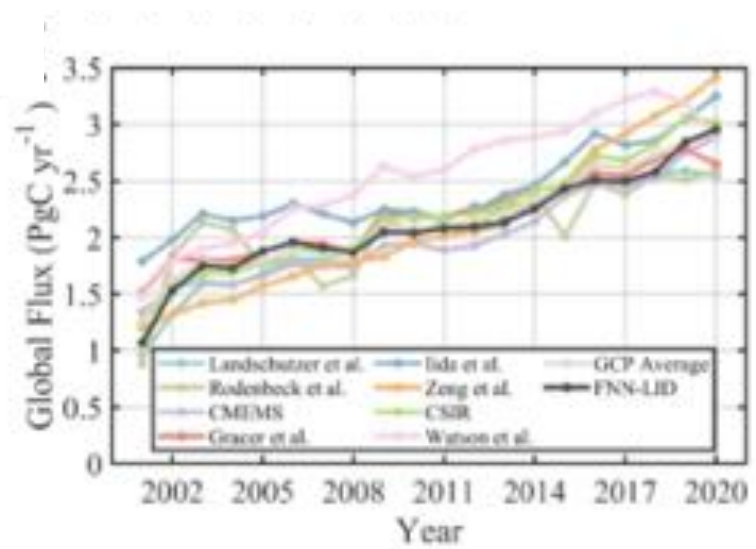
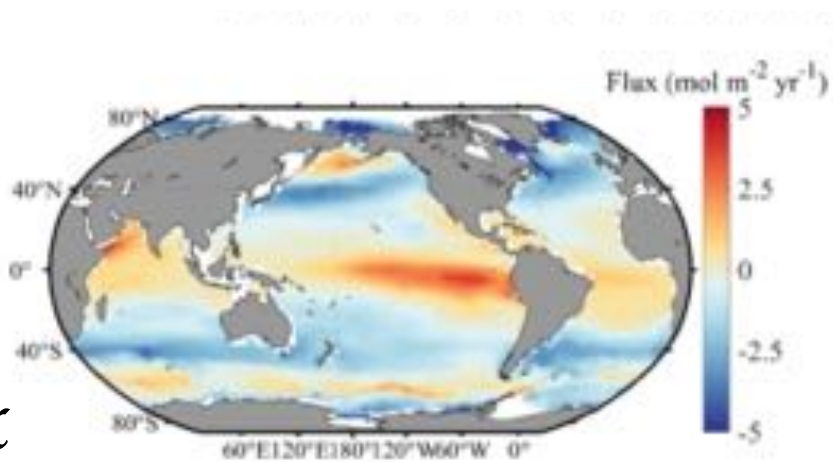
Diurnal Global Air-sea CO₂ Flux Reconstructed from Spaceborne LiDAR Data

Siqi Zhang, Peng Chen, Delu Pan

1. Zhang, S., Peng Chen(*), Bisson, K., Jamet, C..., Zhang, Z.(*), ., Substantially underestimated winter CO₂ sources of the Southern Ocean. **Science Advances**, 2025, 11,
2. Peng Chen(*), Zhang, Z., Bisson, K., Jamet, C....Zhang, S.(*)., Underestimated accelerated Antarctic phytoplankton net primary production in winter over past decade from spaceborne LiDAR, **Nature Communications**, 2025, In press
3. Peng Chen(*), Jamet, C., Di Girolamo, P., Dionisi, D,..., Zhang, S., Zhang, Airborne blue lidar reveals the ocean's hidden biological engine in the South China Sea, **Communications Earth & Environment**, 2025, , In press

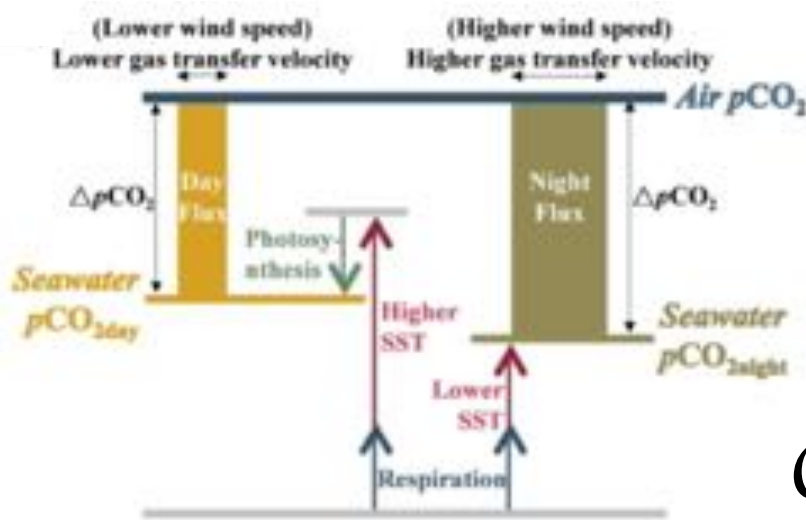
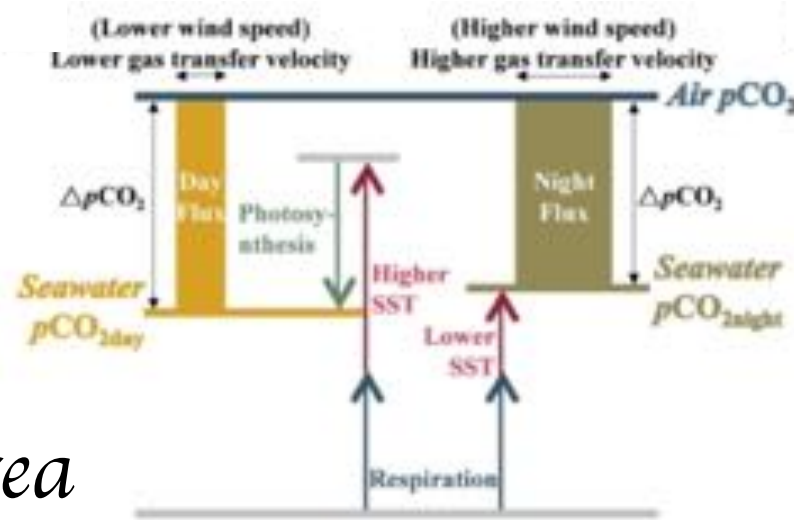
Poster # 121

Air-sea
CO₂ flux



Global flux
trends

Coastal area



Open ocean

Poster # 122

Whiting Events in Pre-Alpine Lake Constance: Integrating in-situ and Remote Sensing Data to Monitor and Quantify Calcite Precipitation

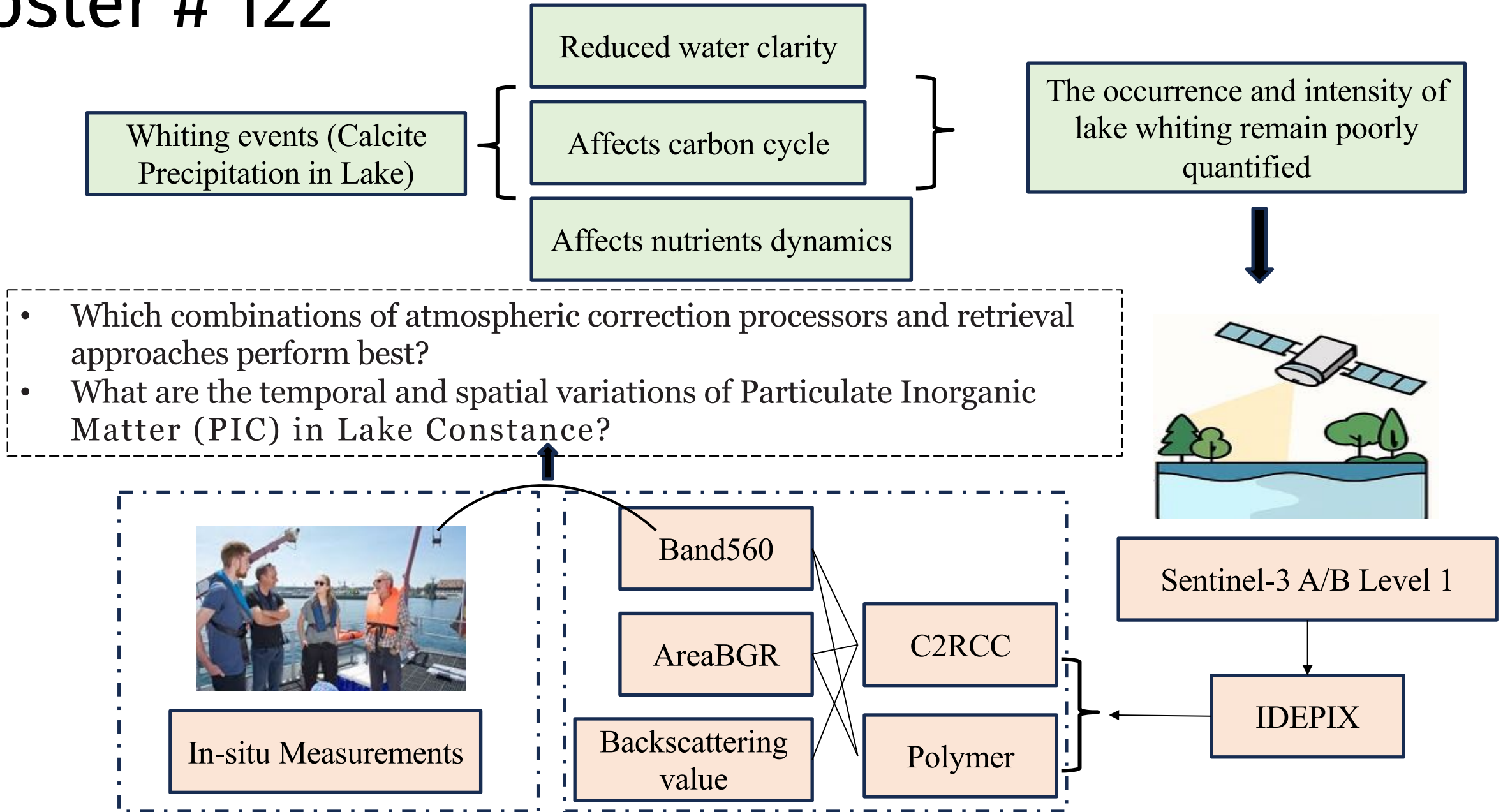
Minyan Zhao¹, Daniel Odermatt², James Runnalls², Alexandra Schmidt¹, Dietmar Straile¹ and David Schleheck¹

1. Limnological Institute, Department of Biology, University of Konstanz, Konstanz, Germany

2. Department of Surface Waters Research and Management, Swiss Federal, Institute of Aquatic Science and Technology (Eawag), Duebendorf, Switzerland



Poster # 122

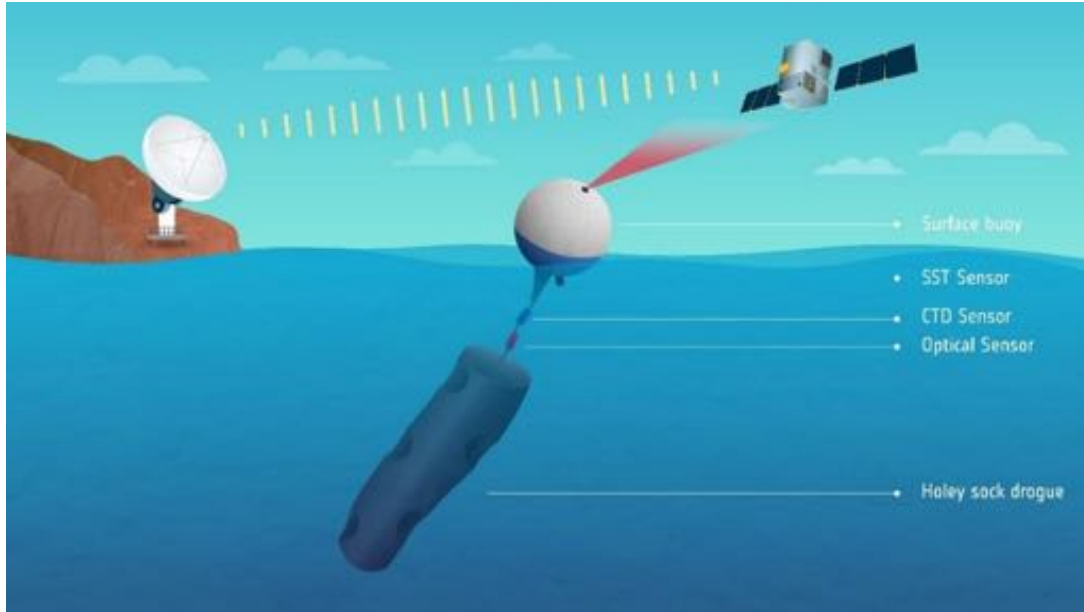


Poster #123

Improving validation of satellite particle backscatter estimates to support climate research: the INSPIRE project

Bellacicco, M, Busatto, J, Falcini, F, Volpe, G, Marullo, S, Centurioni, LR, Santoleri, R, **Zoffoli, ML**

Poster #123



- Measurements of: SST, b_{bp} , chl, salinity, subsurface temperature, and oxygen
- Real-time data transmission
- Adaptive strategy

The **INSPIRE** project aims to address this gap by developing a **Global Observing System** (GOS) specifically tailored for **validating satellite b_{bp} products**, harmonizing **remote sensing**, **Lagrangian modelling** and **in situ** data.



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Advancing Global Ocean Colour Observations

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END OF LIGHTNING TALKS