



International
Ocean Colour Science
Meeting 2025

Advancing Global Ocean Colour Observations

Poster Lightning Session 4



Calling Session 4 presenters to
the front in Poster Number order

Poster Lightning Session 4

STARTS IN

Poster # 14

HYDRA: a drone-based hyperspectral radiometer system for aquatic remote sensing applications

P. Sciuto¹, G. Zibordi², B. Bulgarelli¹,
M. Talone³, J-F. Berthon¹

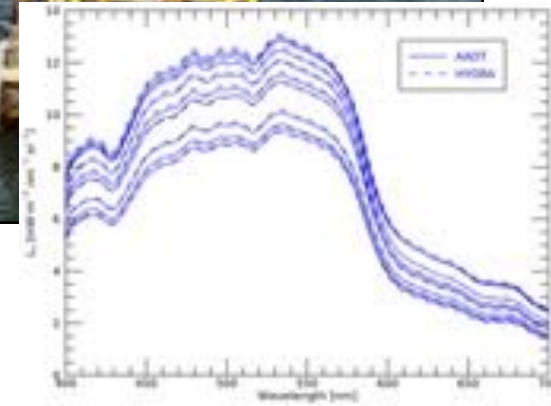
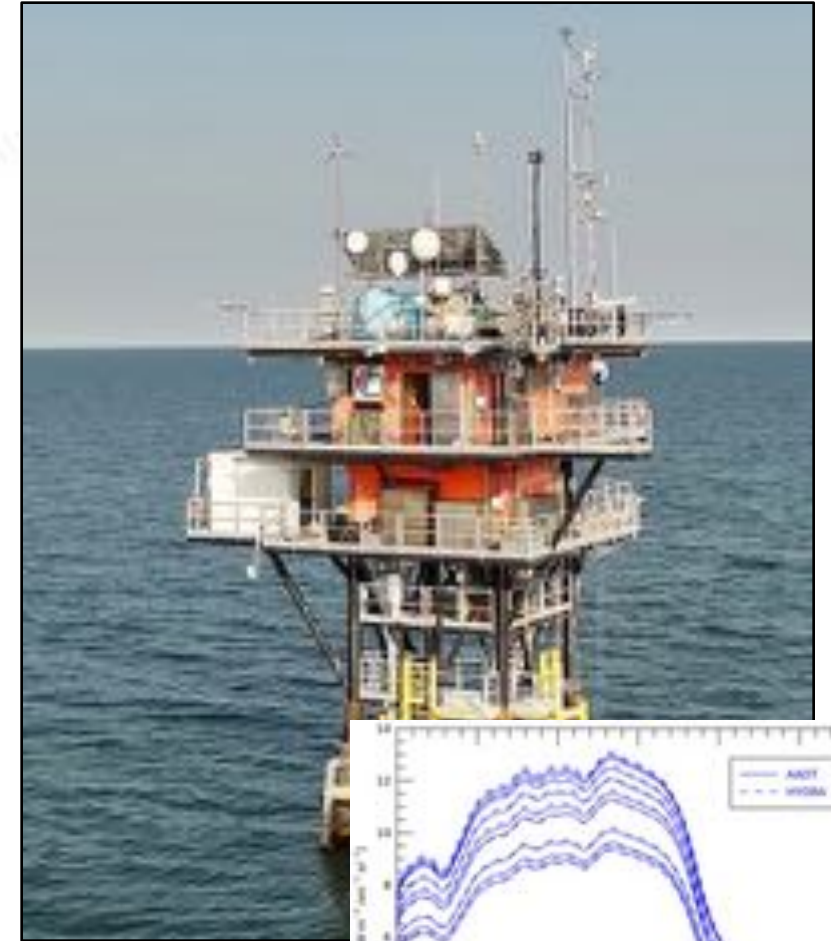
¹EC-JRC; ²NASA-GSFC; ³ICM-CSIC



Poster # 14

HYDRA

HYperspectral Drone-based system for above-water Radiometric Acquisitions



a. Matrice 350 RTK
b. L_T radiometer

c. Sun-alignment jig
d. Inflatable buoys

Smartphone-Based Digital Imaging via the TurbAqua App for Forel-Ule Water Colour Index Determination

Ancy C Stoy¹, Grinson George¹, Mini K G¹, Ranith R²,
Nandini Menon², Anas Abdulaziz³, Shubha
Sathyendranath⁴

¹ICAR-Central Marine Fisheries Research Institute, Kochi.

ancycstoy17@gmail.com, [*grinsongeorge@gmail.com](mailto:grinsongeorge@gmail.com), minikg02@gmail.com

²Nansen Environmental Research Centre, India.

rajranith@gmail.com, menonnandini.n@gmail.com

³National Institute of Oceanography, RC, Kochi. anasabdulaziz@gmail.com

⁴Plymouth Marine Laboratory, Devon, UK. shubhasathyendranath@gmail.com



WATER COLOUR EXTRACTION

A three-tier validation framework

Mini Secchi Disk



1
Citizen Scientists

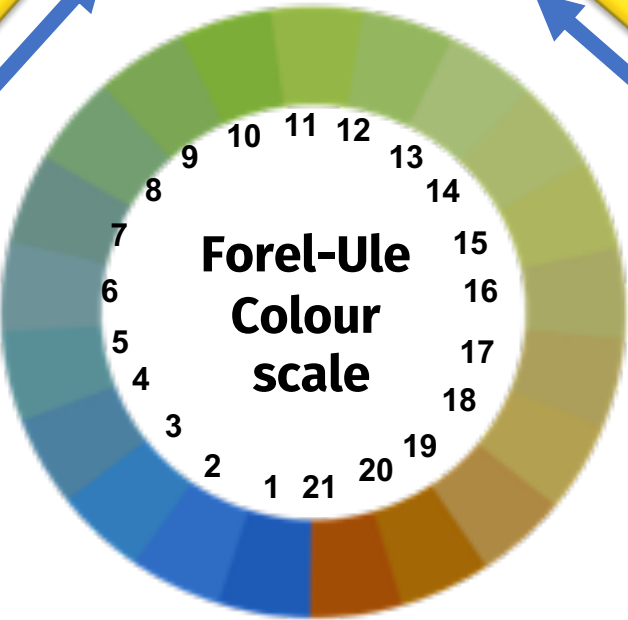


Citizen science vs. Satellite vs. Smartphone App

To what extent do they align?

Satellite data

Crowd-sourced data

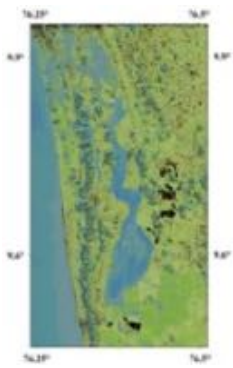


Digital-Image data



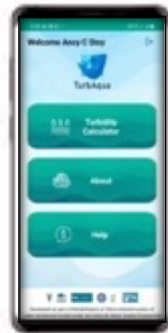
3

ESA-Sentinel-2



2

Digital Images



TurbAqua App

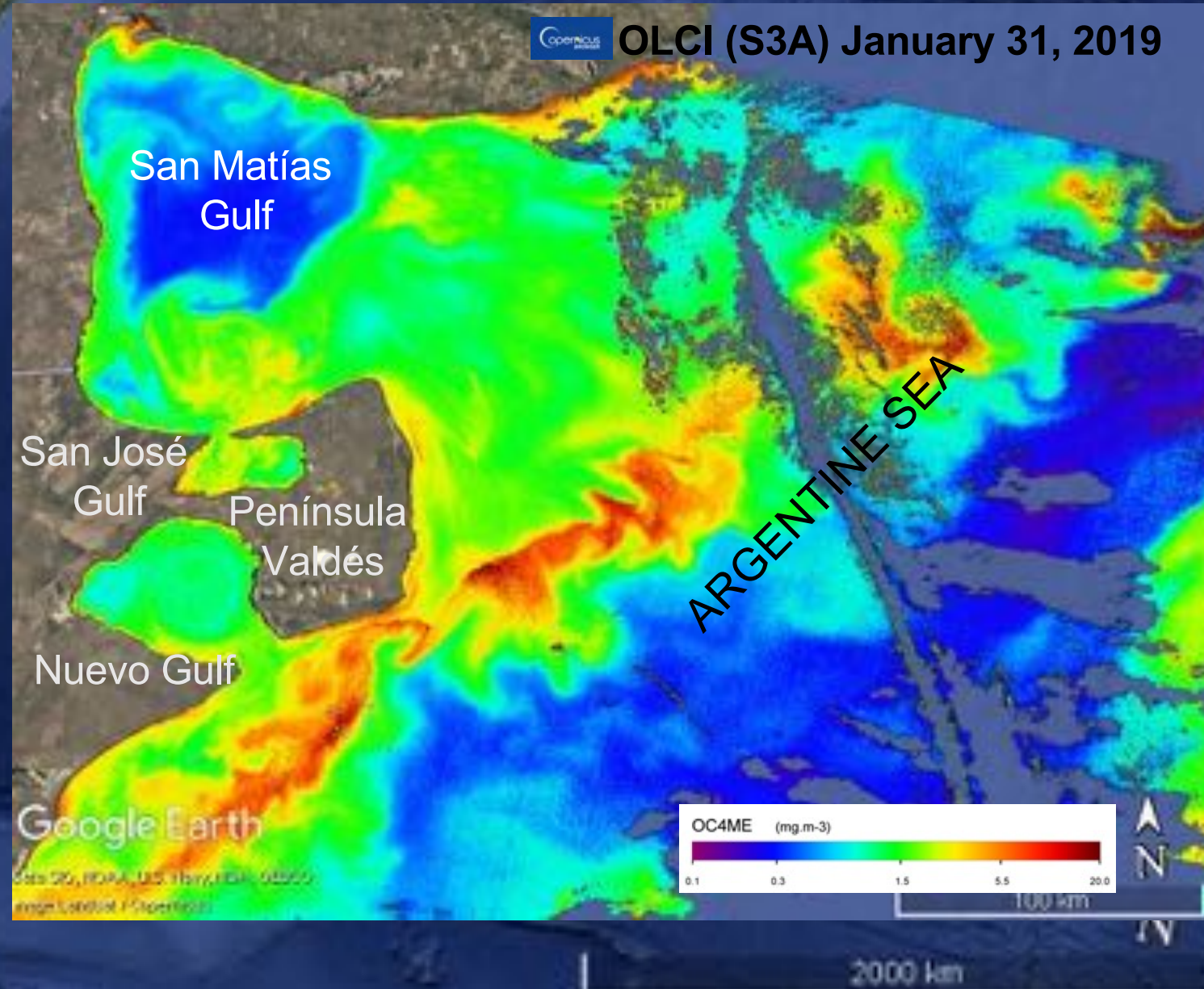
Phytoplankton dynamics, bio-optical trends, and their implications for water quality in the Northern Patagonian Gulfs

Williams, Gabriela N. ^{1,2}

Nocera, Ariadna C. ¹; Pohorylow, Mirna ^{1,2}; Gracia Villalobos, Leilén ^{3,1}; Ruiz, Ma. Guillermina ³; Glembocki, Nora ¹; Bermejo, Paula ¹; Hernández-Moresino, Rodrigo ¹; Svendsen Guillermo ^{4,5}; Saad, Juan ^{4,5}



North Patagonian Gulfs



Poster # 182

A Novel Water Optical Types Framework for Chinese Inland Waters with the Application of Multitype Satellite Sensor

Fangfang Zhang, Ruidan Sang,
Shenglei Wang, and Junsheng Li

*Aerospace Information Research Institute,
Chinese Academy of Sciences, China*



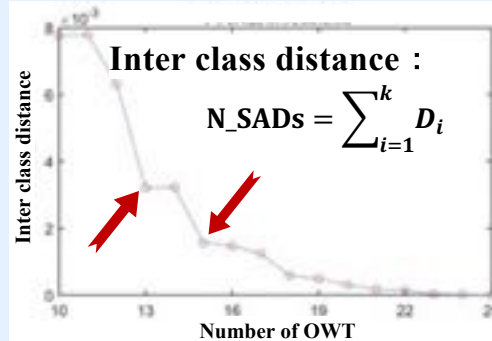
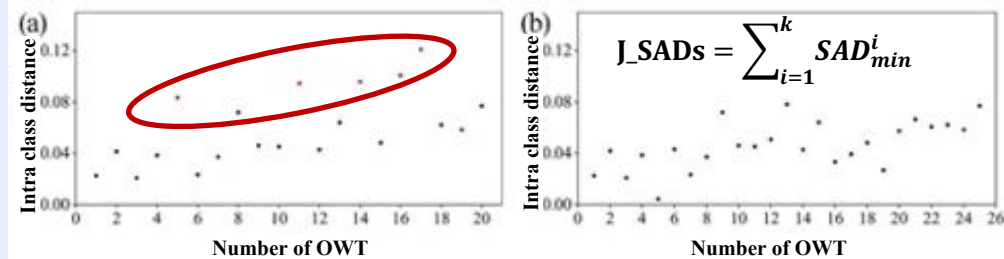
Poster # 182

1. Method

K-means clustering method for gradually merging classes

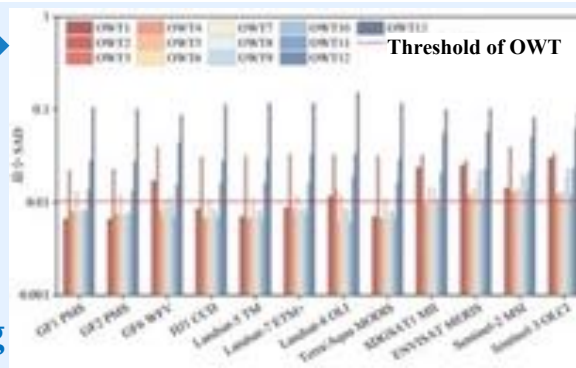
$$SAD = 1 - \frac{x_s \cdot x_t^T}{\sqrt{(x_s \cdot x_s^T)(x_t \cdot x_t^T)}}$$
$$D = \sqrt{\frac{1}{N_i} \sum_{k=1}^{N_i} SAD^2(X_k^i, X^i)}$$

Intra class distance:



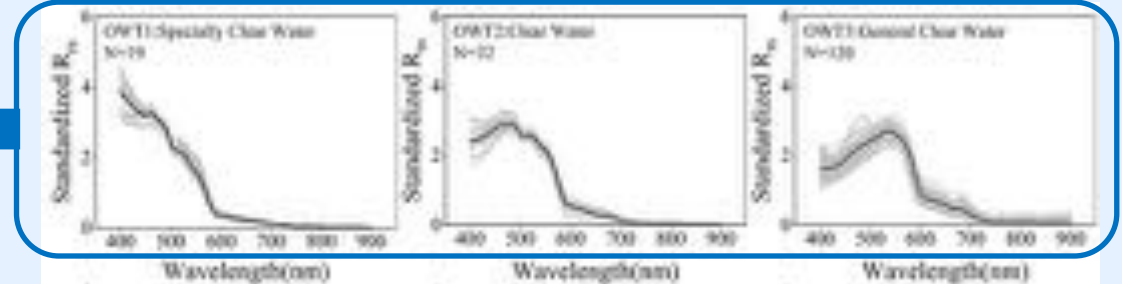
3. Application

- **Good Sensors :** Sentinel-3, MERIS, Sentinel-2
- **Macro assessment**
- **Multi type modeling**

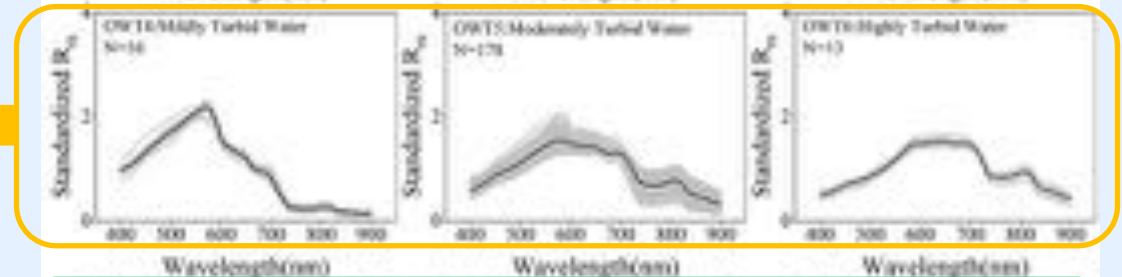


2. Result: Optical water types

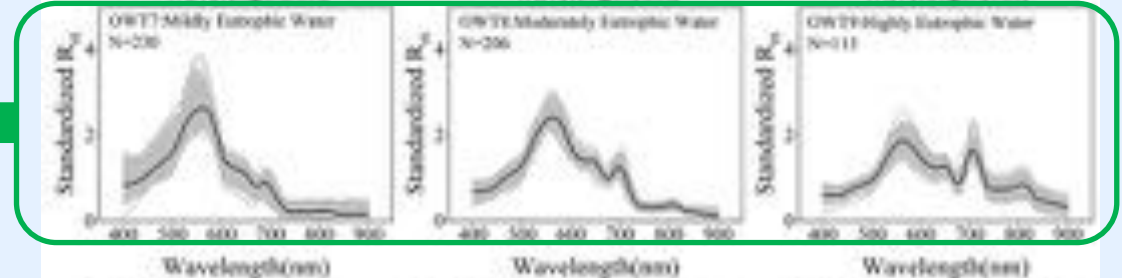
Clean Water



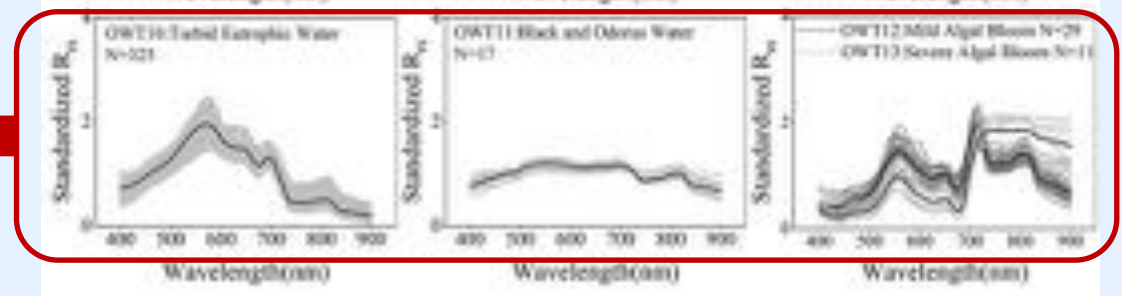
Turbid Water



Eutrophic Water



Other Water



Poster 183

Evaluation and Regional Optimization of Remote Sensing Retrieval Algorithms for Colored Dissolved Organic Matter in the Northern Adriatic Sea

Mengjie Zhao^{1,2}, Carolina Cantoni¹, Simone Colella¹, Chenqian Tang³, Vittorio Ernesto Brando¹

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

² Department of Civil, Building and Environmental Engineering, Sapienza University of Rome, Rome, Italy

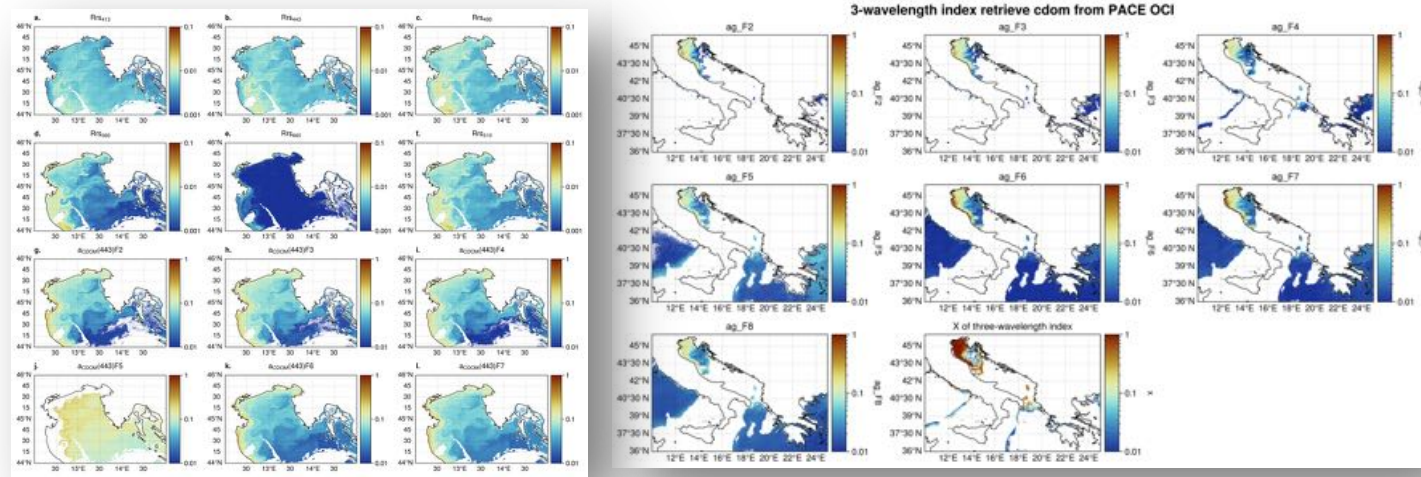
³ Department of Geosciences, University of Oslo, Oslo, Norway



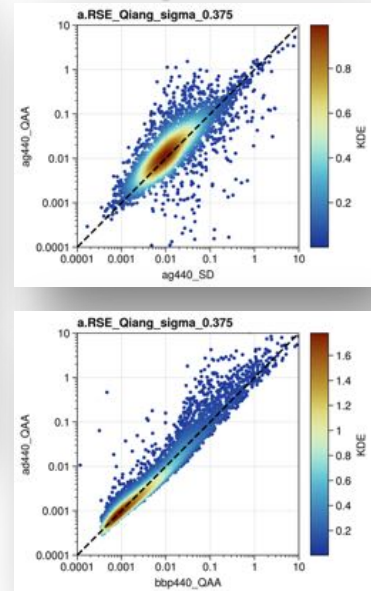
1. Background



3. Previous algorithms applied in multi-sensors OC products



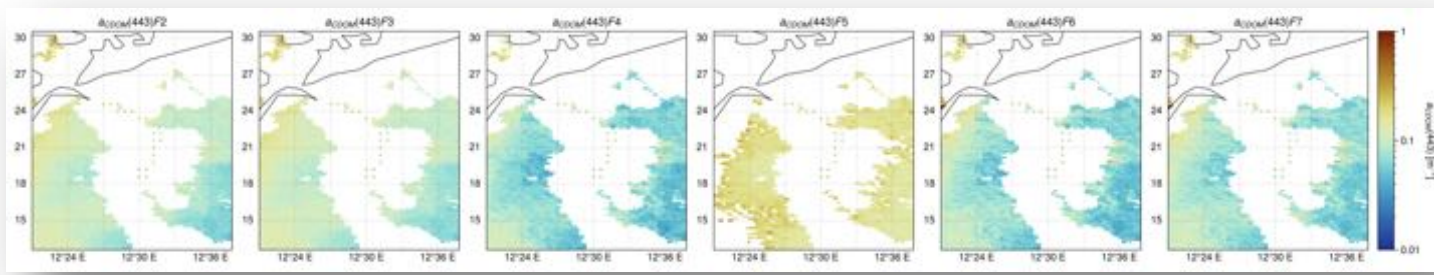
5. Comparison and Development



2. In-situ Measurement



4. Matchup Analysis between in-situ measurement and satellite



CDOM

Poster # 185

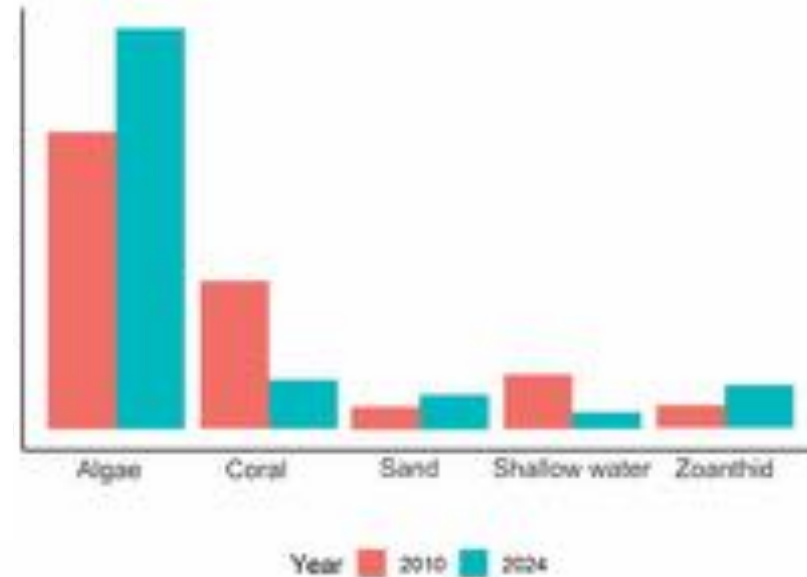
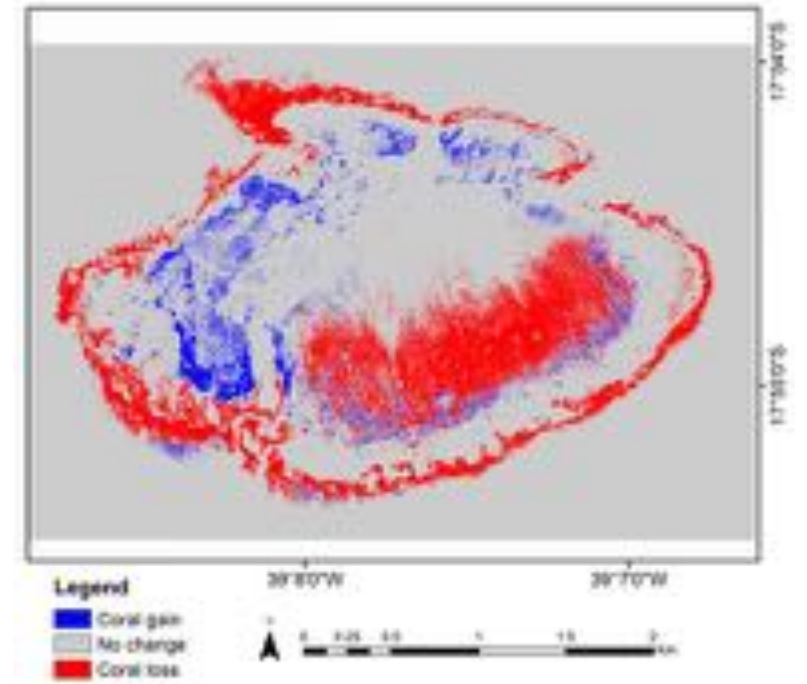
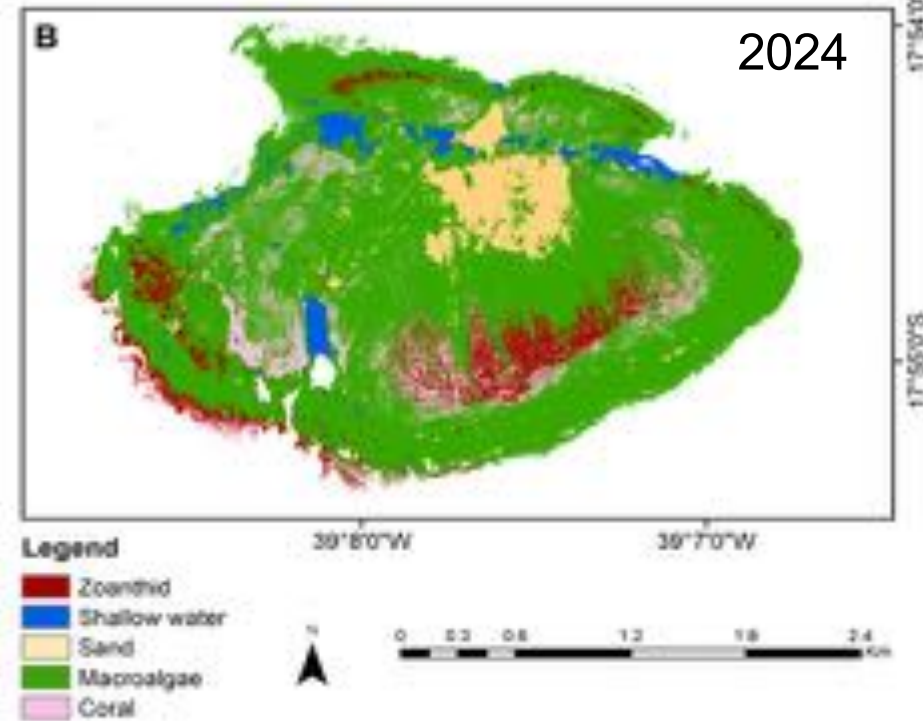
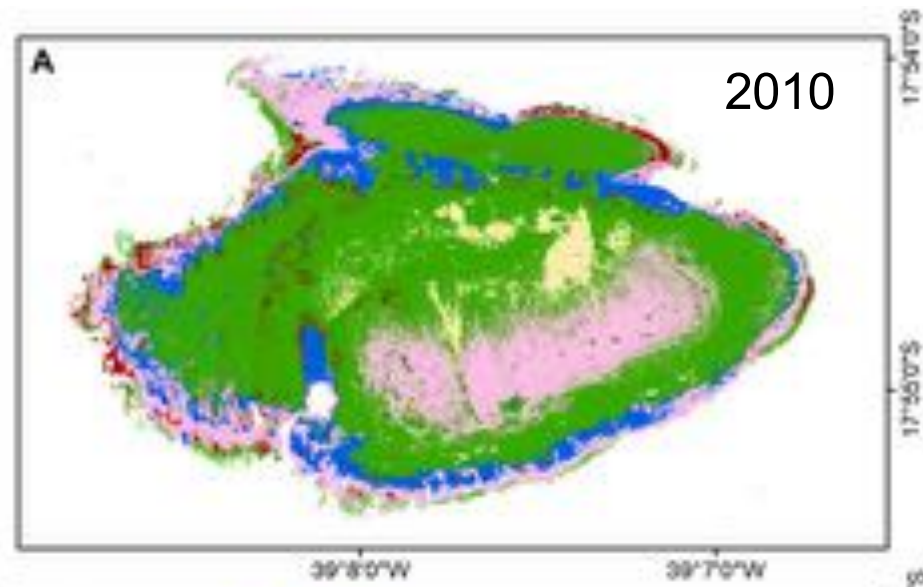
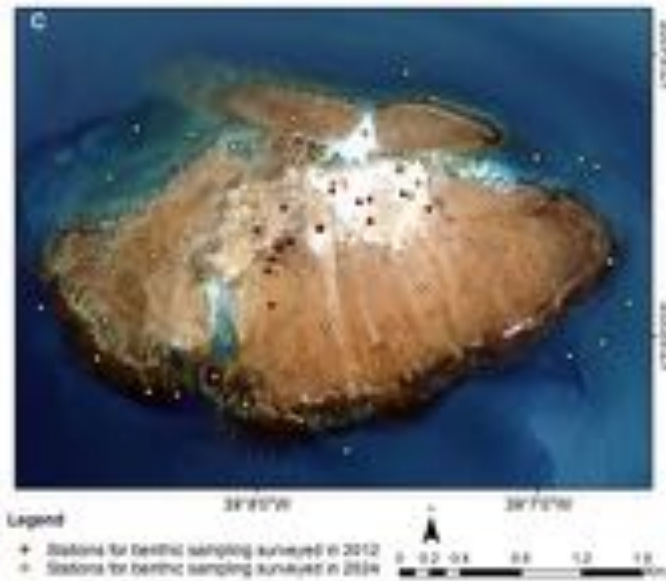
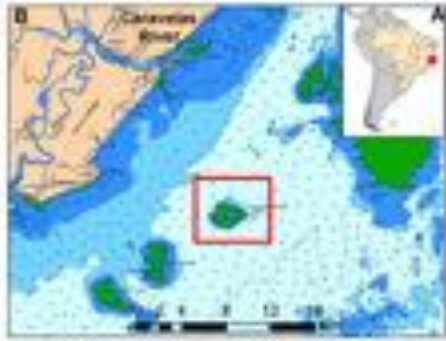
Temporal dynamics of benthic habitats in the coral reef of the Abrolhos bank (Brazil) using WorldView-2 imagery and machine learning.

Thais Andrade Galvão de Medeiros¹, Maria Laura Zoffoli², Andréa de Lima Oliveira¹,
Aline de Matos Valério³ and Milton Kampel¹

¹National Institute for Space Research (INPE), Brazil, ²Istituto di Scienze Marine (ISMAR), Consiglio Nazionale delle Ricerche (CNR), Italy, ³Indiana University (IU), USA

IOCS-2025 Darmstadt, 1-4 December

Poster # 185



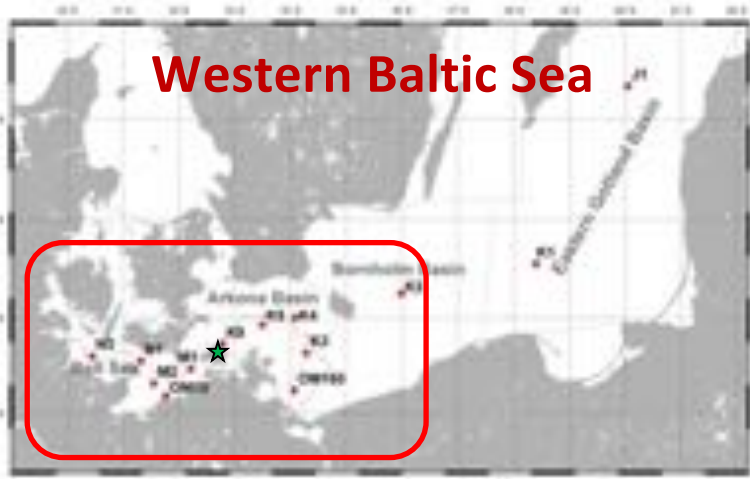
Shedding light on phytoplankton monitoring in the western Baltic Sea

Bronwyn Cahill¹, Anke Kremp¹, Ingrid Sassenhagen¹, Christiane Hassenrück¹, Natalie Loick-Wilde¹, Jerome Kaiser¹, Ulf Gräwe¹, Eefke van der Lee², Thorger Brüning²



Poster # 186

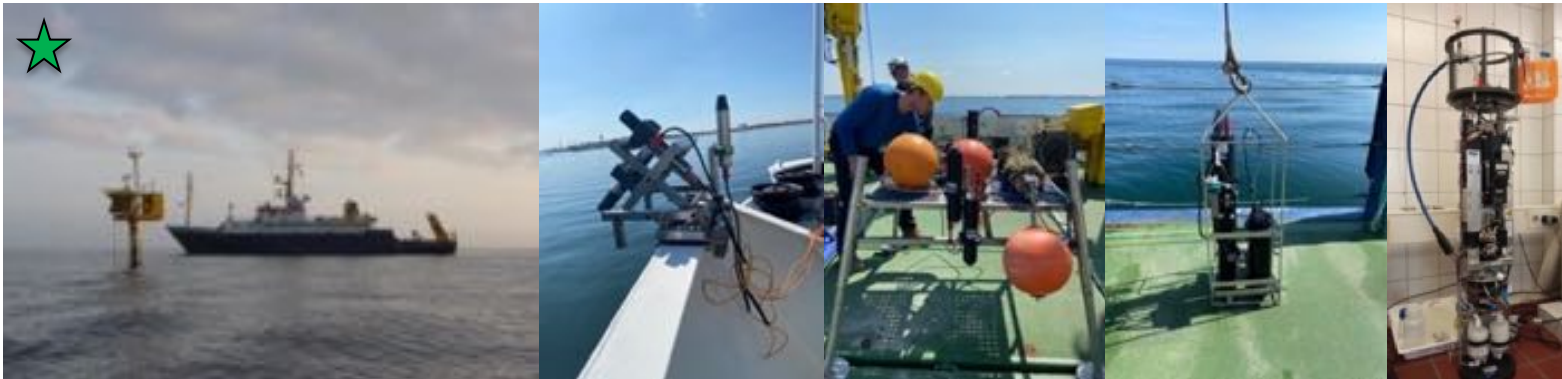
Enhanced Optics Observation Programme



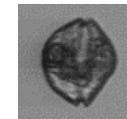
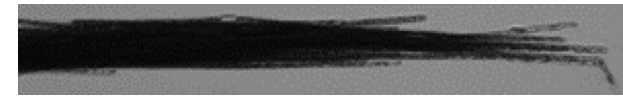
Warming, freshening, internal
nutrient feedbacks ->
increased intensity of cyanobacteria
blooms,
occurrence of toxic diatom species,
mixotrophic shifts in dinoflagellate
species



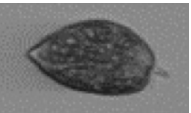
Above water radiometry, in situ hyperspectral optical measurements, Imaging Flow Cytobot (IFCB), eDNA,
Pigments, Biomarkers, NRT satellite, Lagrangian Particle Tracking



summer cyanobacterial blooms:
Aphanizomenon, *Dolichospermum*, *Nodularia*



toxic dinoflagellates:
Alexandrium, *Prorocentrum*



Poster # 188

New IOCCG Report on Benthic Reflectance

Chaired by: Heidi Dierssen, University of Connecticut

Series Editor: Raisha Lovindeer

Authors in Alphabetical Order:

Steve Ackleson Naval Research Lab, USA
Touria Bajjouk Ifremer, DYNECO/LEBCO, France
Brian B. Barnes University of South Florida, USA
Ved Chirayath University of Miami, USA
Maycira Costa Spectral Lab, University of Victoria, Canada
Heidi M. Dierssen University of Connecticut, USA
Arnold Dekker CSIRO, Australia
Andrea Faltynkova F&Z Solutions, Norway
George Fournier DRDC Valcartier Research Centre, Canada
Peter Gege DLR, Germany
Jamie Goodman HySpeed Computing LLC., USA
John Hedley Numerical Optics Ltd., UK
Erin Hestir University of California, Merced, USA
Eric Hochberg Bermuda Institute of Ocean Sciences, Bermuda
Geir Johnsen Norwegian University of Science and Technology, Norway
Wonkook Kim Pusan National University, Korea

Tiit Kutser University of Tartu, Estonia
Julien Laliberte Department of Fisheries and Oceans, Canada
Øyvind Ødegård Norwegian University of Science and Technology, Norway
Natascha Oppelt Kiel University, Germany
Gema Casal Oceanographic Centre of A Coruña (OEO-CSIC), Spain
Stuart Phinn University of Queensland, Australia
Jaime Pitarch CNR-ISMAR, Italy
Chris Roelfsema University of Queensland, Australia
Gillian Rowan University of Queensland, Australia
Brandon Russell Labsphere, Inc., USA
Eva Scrivner University of Connecticut, USA
Asgeir J. Sørensen Norwegian University of Science and Technology, Norway
Murat Van Ardelan Norwegian University of Science and Technology, Norway
Ele Vahtmäe University of Tartu, Estonia
Richard Zimmerman Old Dominion University, USA

Poster # 188

WHAT?

Ch. 1: Introduction

Dierssen, Phinn

WHERE?

Ch. 6: Spatial Scales of Variability

Ackleson, Kutser, Vahtmae

Ch. 7: Examples by Habitat

Phinn, Roelfsema, Dierssen, Hochberg,
Johnsen, Zimmerman, Hestir, Kutser, Dekker,
Hedley, Oppelt, Pitarch, Rowan, Costa

- Sediment
- Corals
- Minerals
- Seagrass
- Algae
 - Macroalgae
 - Algal turfs
 - Coralline algae
- Detritus, wrack and debris
- Melt ponds

HOW?

Ch. 2: Theory

Fournier, Gege, & Hedley

Ch. 3: Instrumentation & Measurement

Zimmerman, Dierssen, Kutser, Gege, Oppelt,
Russell, Dekker, Laliberte, Johnsen,
Casal, Pitarch

Ch. 4: Methodological Considerations

Dierssen, Russell, Zimmerman, Kutser, Gege,
Hochberg, Decker, Hedley, Casal

Ch. 5: Data Processing

Hochberg, Dierssen, Zimmerman, Dekker

WHY?

Ch. 8: Remote Sensing of Optically

Shallow Water

Oppelt, Barnes, Dierssen, Kutser,
Dekker, Casal, Gege, Goodman, Pitarch,
Scrivner

- Optically shallow water
- Benthic endmembers
- Classification approaches
- Challenges

Ch. 9: Global Change

Oppelt, Kutser,

Ch. 10: Deep Sea Applications

Johnsen, Ødegård, Van Ardelan,
Faltynkova, Sørensen, Dierssen

- Deep sea mining
- Archeology
- Litter and Debris

Ch. 11: Emerging Technology

Ackleson, Chirayath, Johnsen

WHEN?

A Decade of Kelp Forest Dynamics in the Northeast Pacific Using Sentinel-2 Multispectral Imagery and Machine Learning

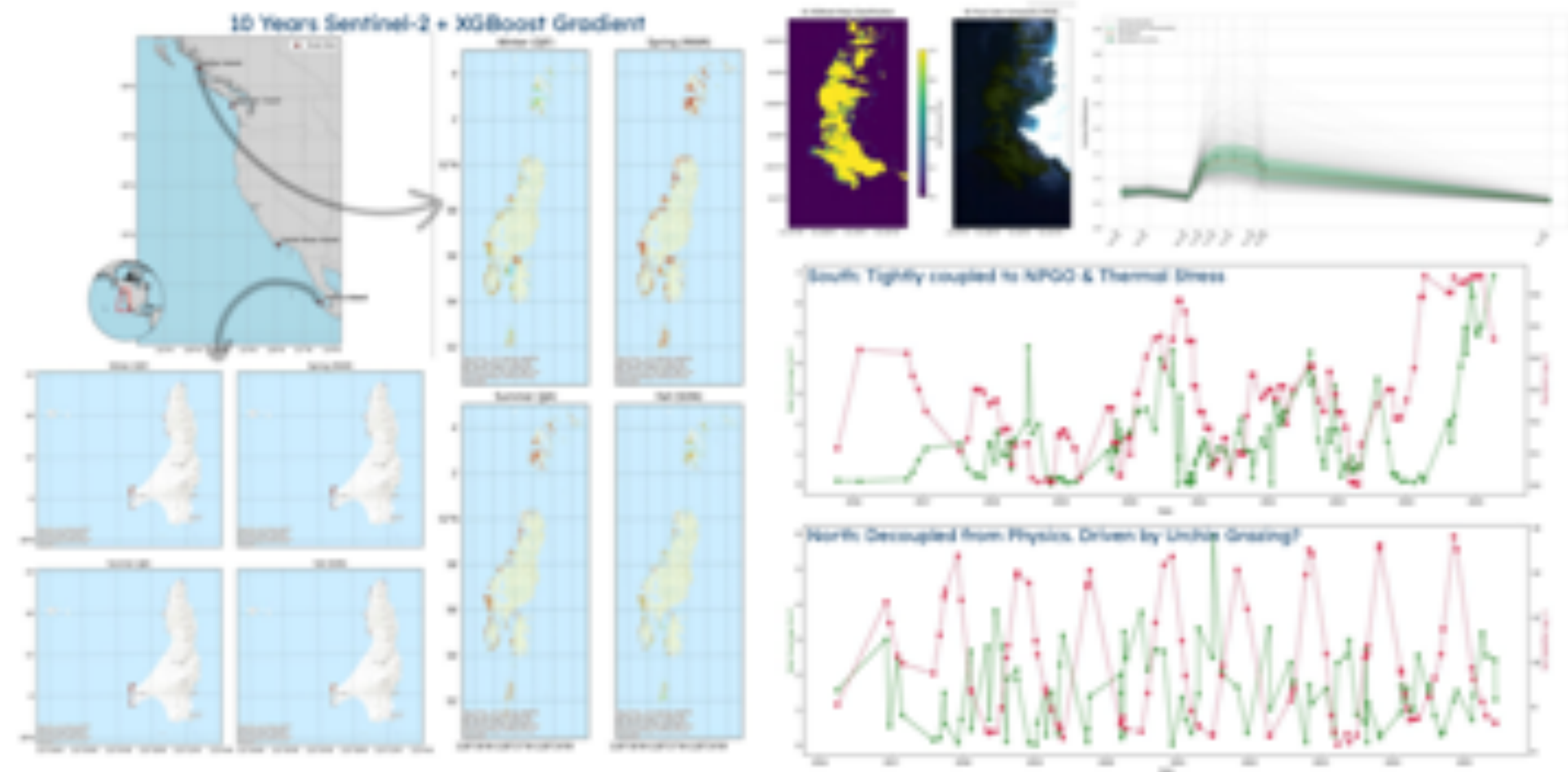
José Manuel Echevarría Rubio¹, Luba Reshitnyk²

¹Interdisciplinary Center of Marine Sciences CICIMAR-IPN

²Hakai Institute

Poster # 189

A Tale of Two Regions. Physics in the South, Biology in the North Decadal Drivers of Kelp Forests (2015-2025)



Poster # 194

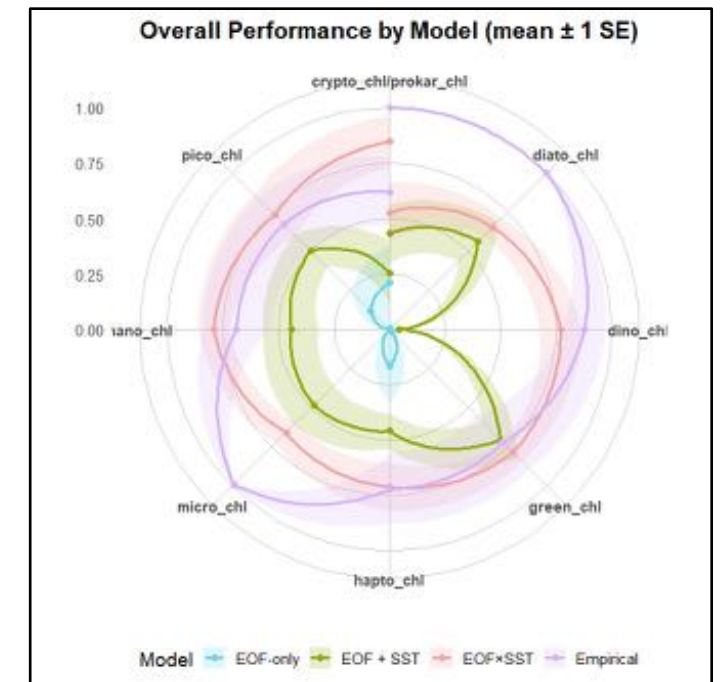
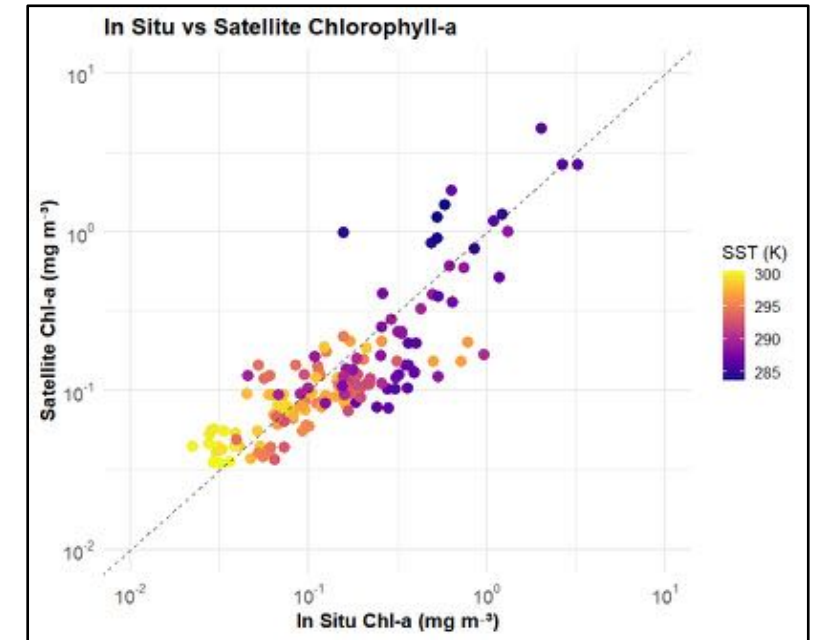
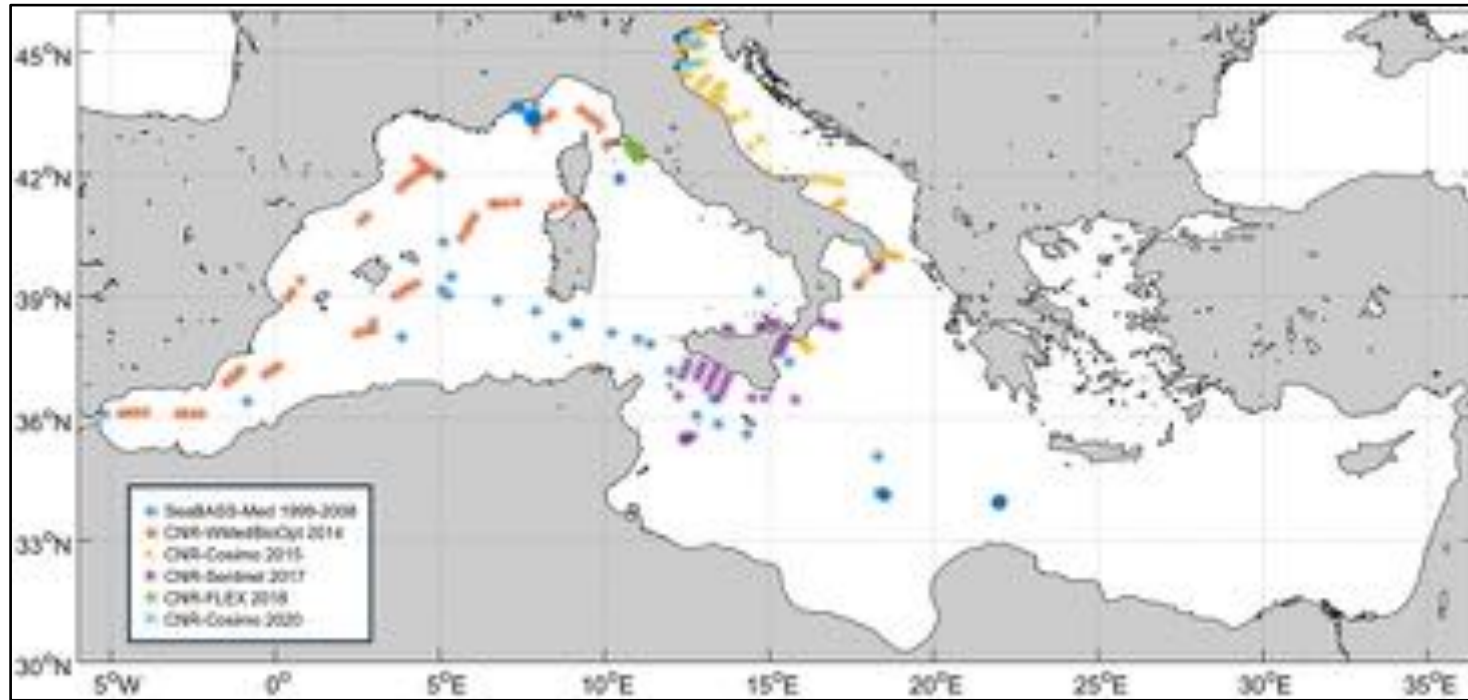
Methods for Phytoplankton Functional Type Retrieval in the Mediterranean Sea

Gian Marco Palamara¹, Annalisa Di Cicco¹,
Gianluca Volpe¹, Simone Colella¹, Florinda
Artuso², Vittorio E. Brando¹

¹ Italian National Research Council, Institute of Marine Sciences, CNR-ISMAR, Rome, Italy

² Italian National Agency for New Technologies, Energy and Sustainable Economic Development (ENEA), Diagnostics and Metrology Laboratory, Frascati (Rome), Italy

Poster # 194



- We compare the performance of **four models** of **Phytoplankton Functional Type (PFT)** and **Size Class (PSC)** retrieval in the **Mediterranean Sea**.
- We assess the importance of including **Sea Surface Temperature (SST)** as well as **optical signals** in predicting PFTs distribution.
- Results show systematic, PFT-specific **differences in predictability** among different methods, including SST based and empirical ones.

Poster # 195

Multi- and hyperspectral remote sensing approaches for retrieving phytoplankton size structure in a subtropical nearshore environment

Bruno Rech, Astrid Bracher,
Áurea Ciotti, Cláudio Barbosa



CENTRO DE BIOLOGIA MARINHA
UNIVERSIDADE DE SÃO PAULO
CEBIMar USP

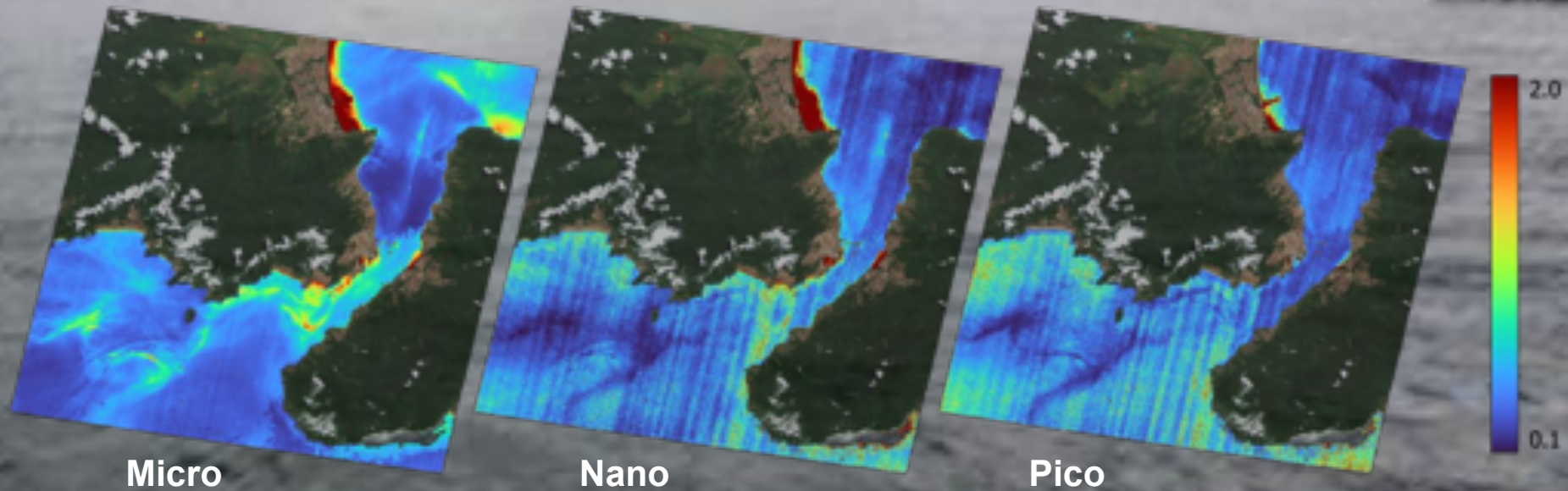
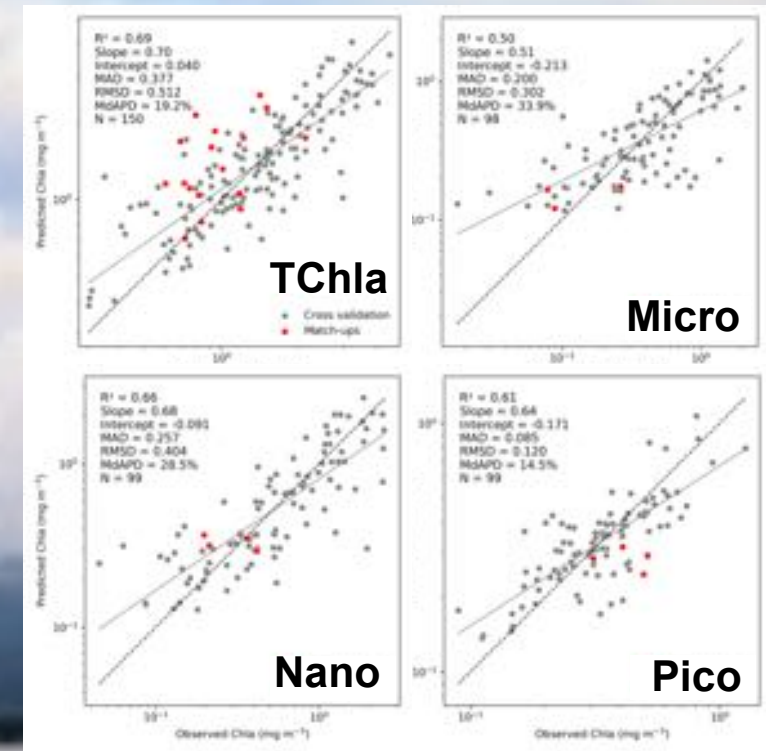


Poster # 195

EOF-based
method

Chla from
size classes

Comparison
of sensors



Poster # 198

Phytoplankton Community in the Equatorial Atlantic

¹Ina Schmidt, ²Ana Fernández Carrera, ³Peter Brand,
³Rainer Kiko, ⁴Ajit Subramaniam

¹Alfred-Wegener-Institute Bremerhaven

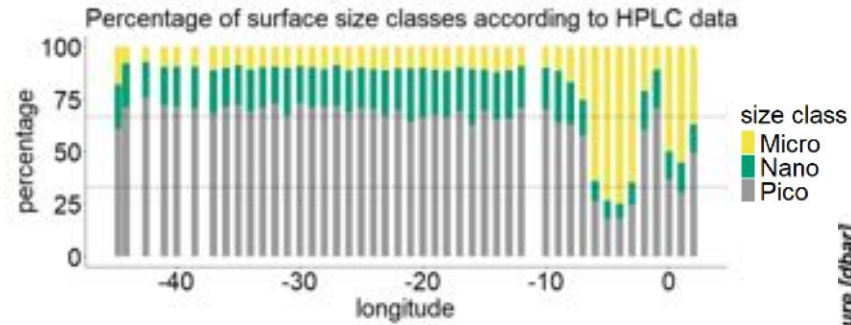
²Universidad de Las Palmas de Gran Canaria

³GEOMAR Kiel

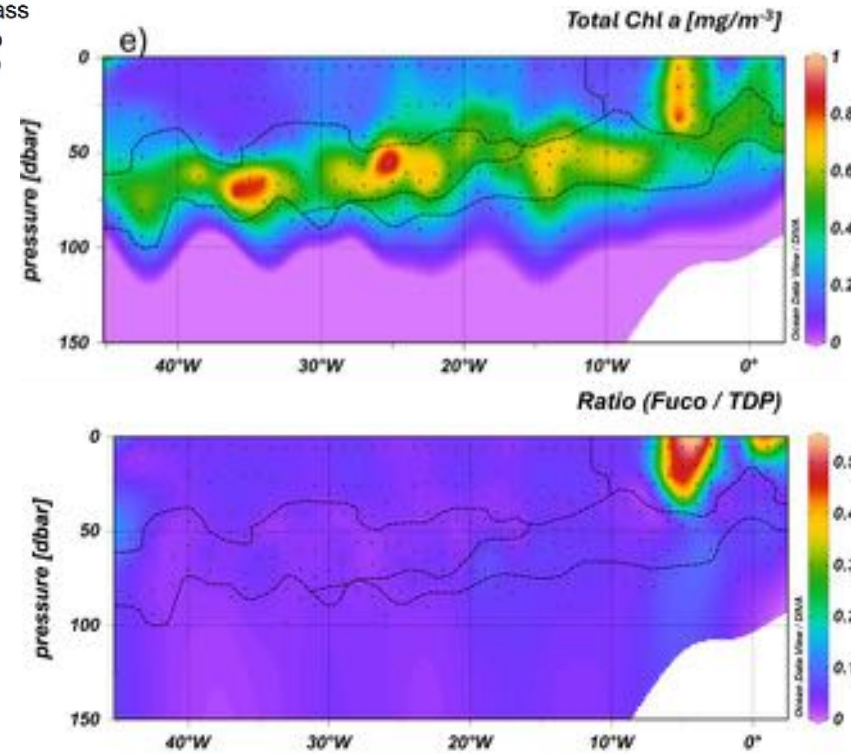
⁴Lamont-Doherty Earth Observatory



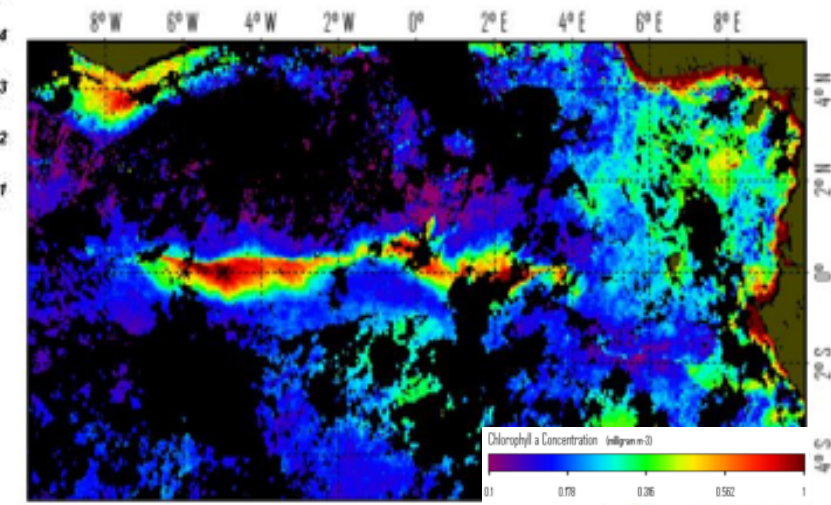
Poster # 198 Phytoplankton Community in the Equatorial Atlantic



Dominance of
Picophytoplankton
in central and western part



High Chl a feature around 5 °W
with high Fucoxanthin
concentration



03.05.2022 (Copernicus Marine Service: Global Ocean Colour Plankton and Reflectance MY L3 daily observations)

Extend of diatom bloom in
satellite image

Poster #199

High-resolution SWOT altimetry and ocean colour observations of the island mass effect in the Kuroshio Current

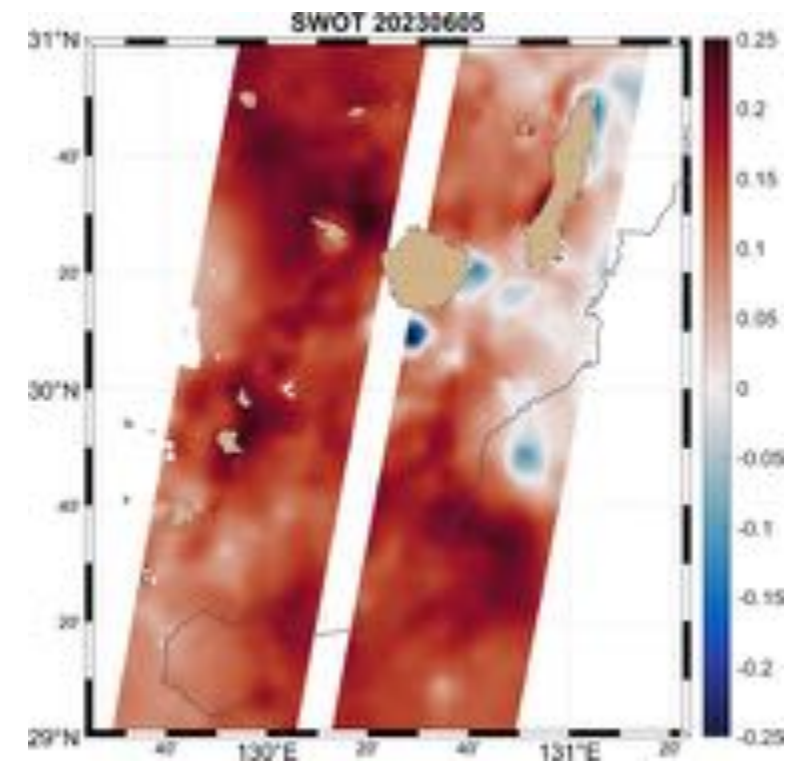
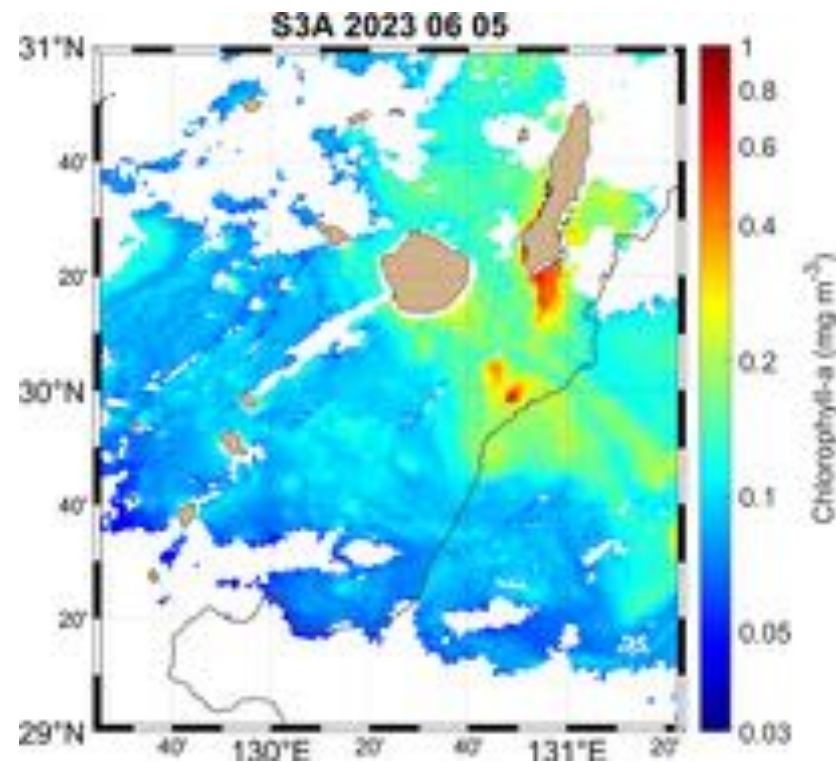
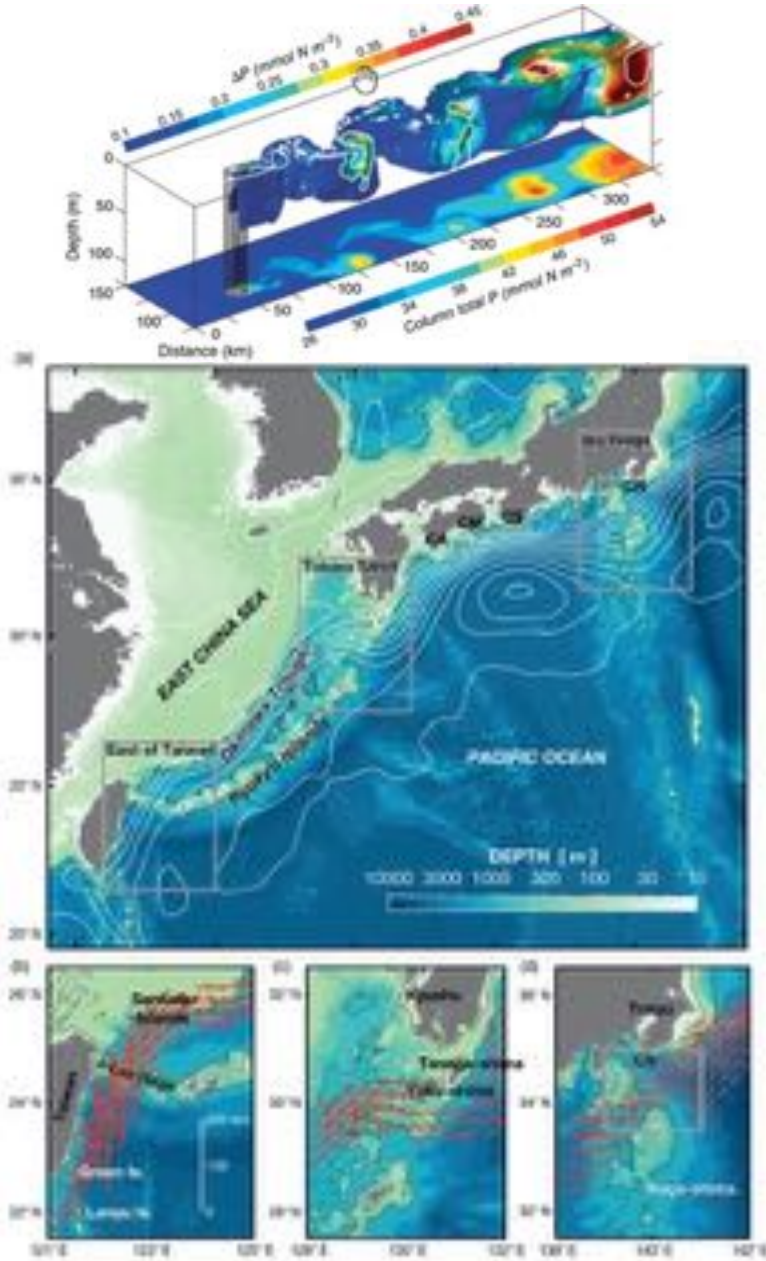
Shiliang (Dan) Shan^{1,2} and Daisuke Hasegawa³

¹Royal Military College of Canada, ²Queen's University,
³Japan Fisheries Research and Education Agency

Poster #199

The **Island Mass Effect (IME)** occurs when ocean currents interact with island or seamount topography, driving upwelling and stimulating biological production (Hasegawa, 2019).

- **Sentinel-3 OLCI** shows elevated Chl-a downstream of islands.
- **SWOT** reveals island-eddies ~10 km in scale that were previously undetectable with traditional altimeters.



Poster # 202

Exploring ocean colour and lidar data in relation to Calanus spp. distributions from glider-derived acoustic scattering layers

André Valente¹, Cassandra Pacheco¹, Pierre Priou², Joaquim Melo¹, Andrea Giusti¹, Heidi Dierssen³, Kanchana Bandara², Debanshu Ratha², Lionel Camus²

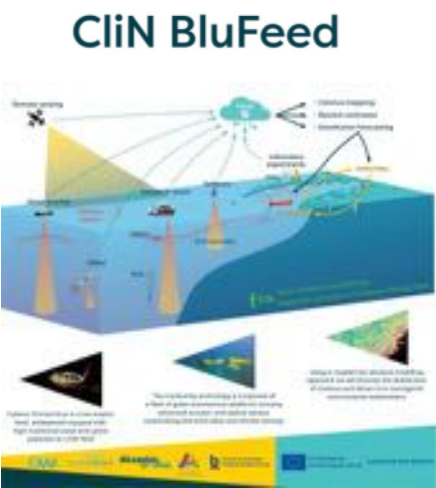
¹ Atlantic International Research Centre (AIR Centre), Portugal

² Akvaplan-niva, Fram Centre, 9296 Tromsø, Norway

³ Department of Marine Sciences, University of Connecticut, Groton, CT, USA



Poster # 202



fct Sustainable Blue Economy Partnership



CliN-BluFeed WP2:
**Can Ocean Color and
LiDAR map *Calanus
finmarchicus* spatial
distributions in 3D?**

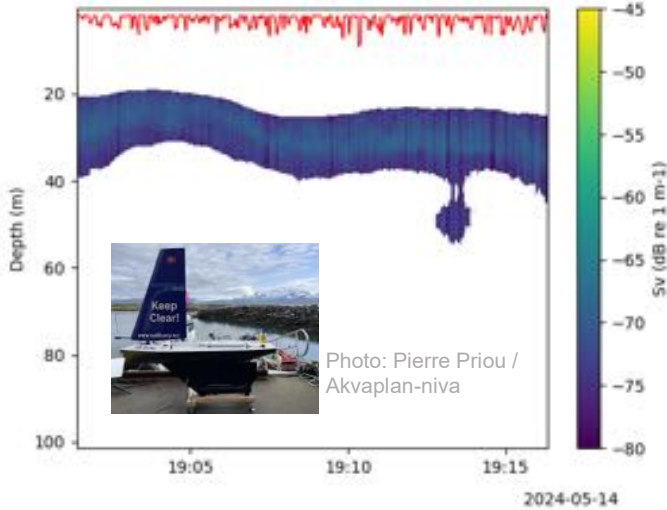


Photo: Pierre Priou / Akvaplan-niva

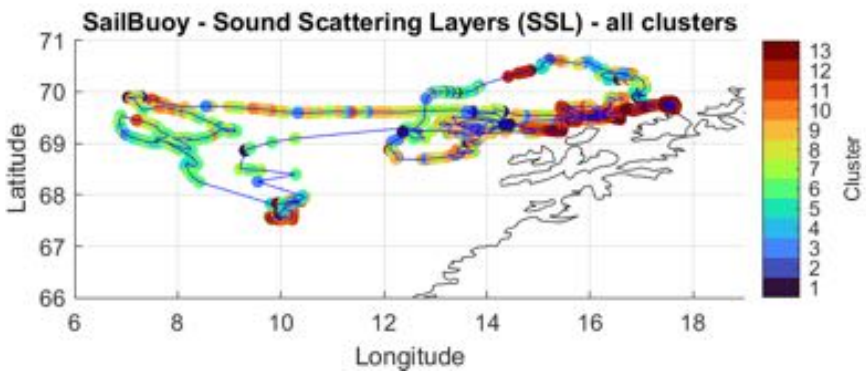


Source: Zooca-
Calanus AS

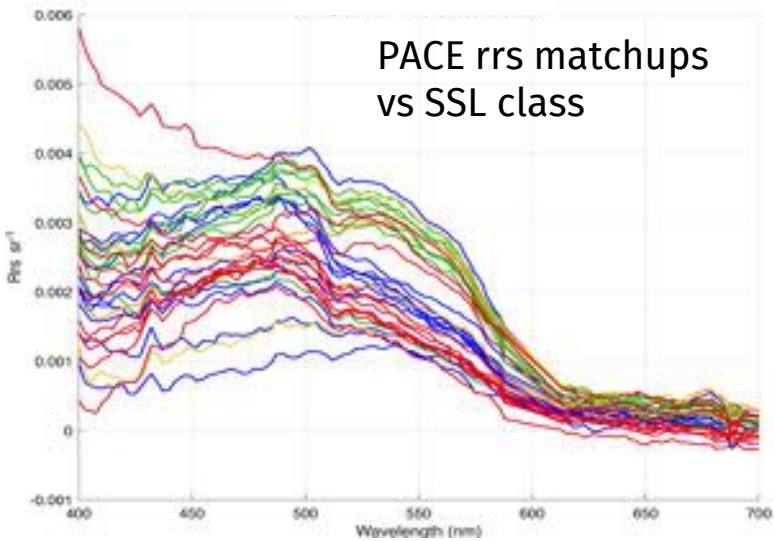
Sound-Scattering Layers (SSLs) dataset



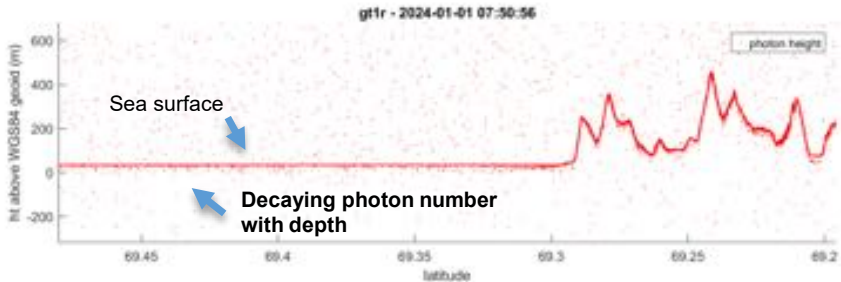
2-Month Echosounder Data from USV (SailBuoy)



Ocean Colour Rrs (Sentinel3, PACE,..)

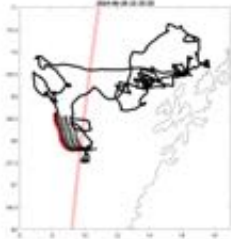


LiDAR Photon-Height (IceSat2)



Derive **Kdph** “photon-based
attenuation coefficient”

$$\ln(E_z) = - (K_{dph}z) + \ln(E_0)$$



Time series of phytoplankton groups in the Fram Strait under changing Arctic Ocean

Hongyan Xi^{1*}, Ilka Peeken¹, Ehsan Mehdipour^{1,2}, Astrid Bracher^{1,3}

¹ Alfred Wegener Institute, Helmholtz-Centre for Polar and Marine Research, Bremerhaven, Germany

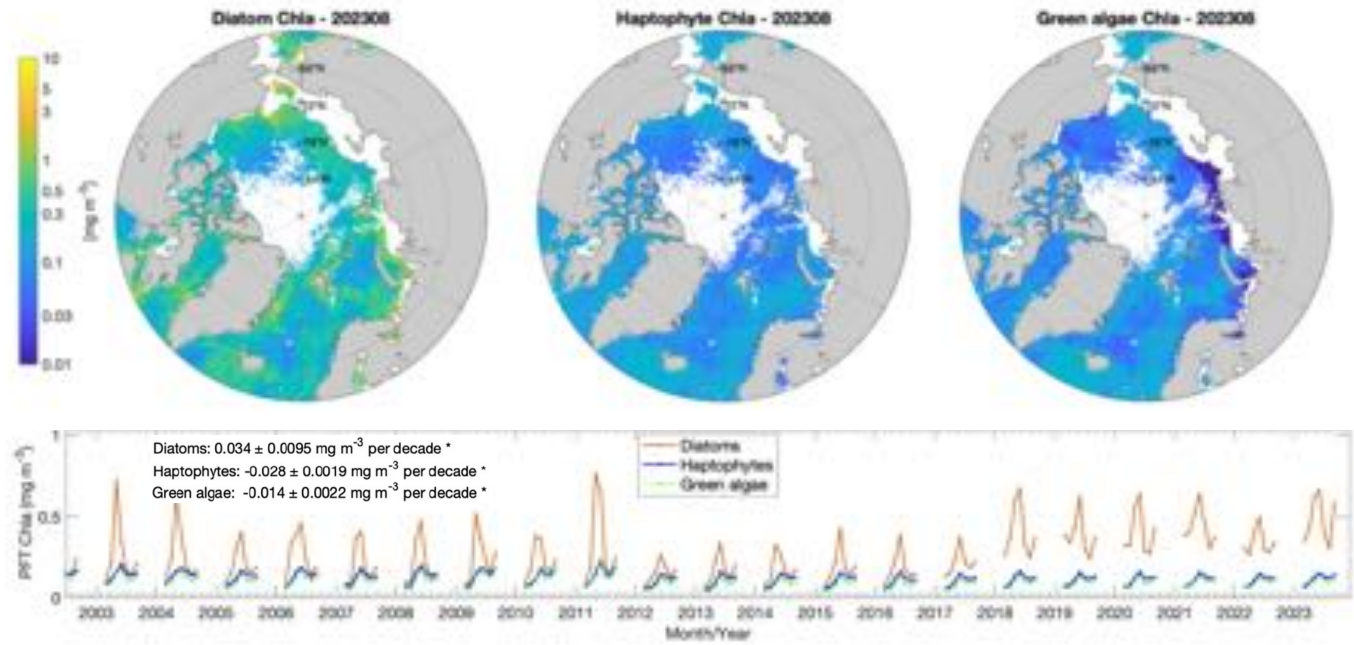
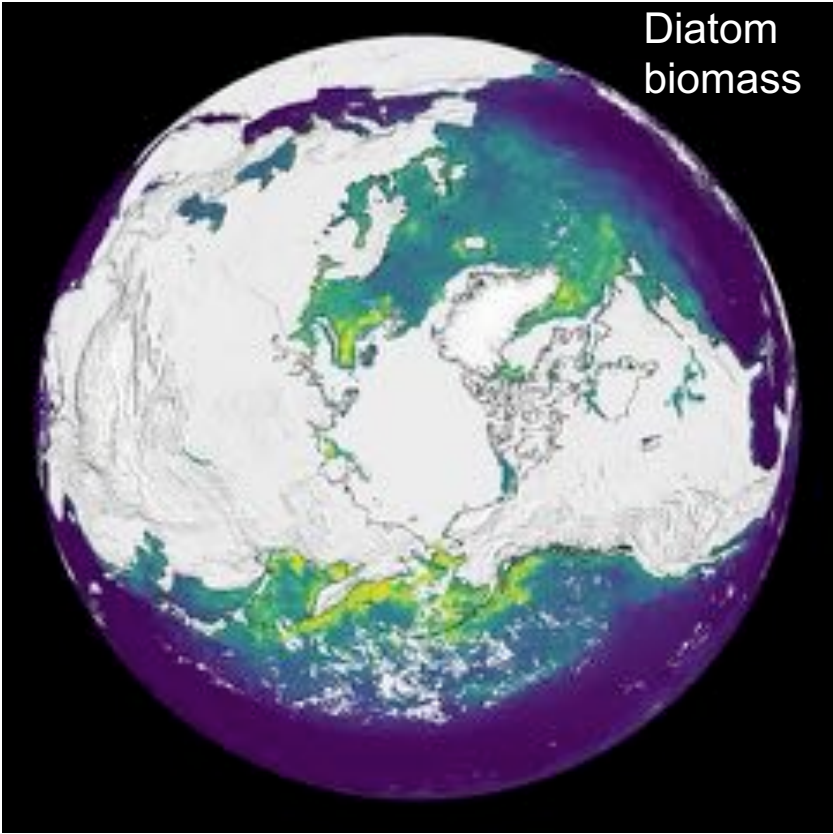
² School of Business, Social and Decision Sciences, Constructor University, Bremen, Germany

³ Institute of Environmental Physics, University of Bremen, Bremen, Germany

hongyan.xi@awi.de

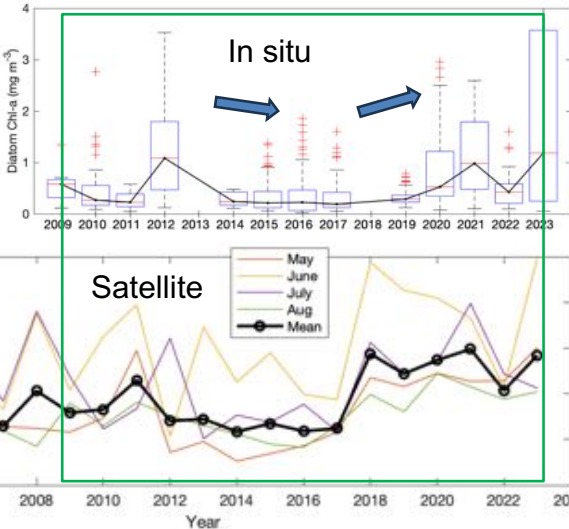
Poster # 203

Two-decade monitoring of PGs in the Arctic Ocean

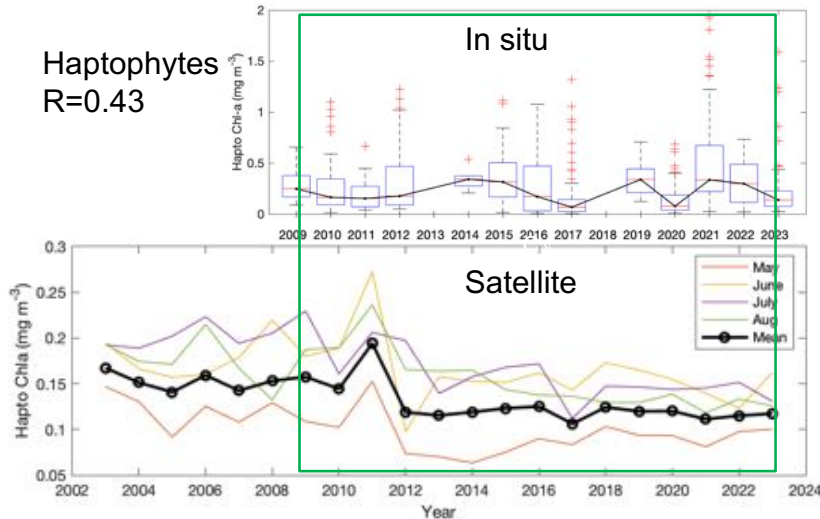


Satellite v.s. in situ time series of PG Chl-a from 2009 to 2023

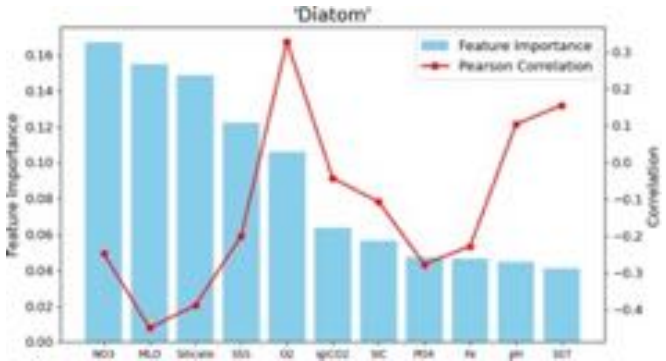
Diatom
 $R=0.67$



Haptophytes
 $R=0.43$



Environmental factors to PGs





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Advancing Global Ocean Colour Observations

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END OF LIGHTNING TALKS