International Ocean Colour Science Meeting 2023

Advancing Global Ocean Colour Observations

Poster Session 5 Lightning Talks

International Ocean Colour Science Meeting 2023

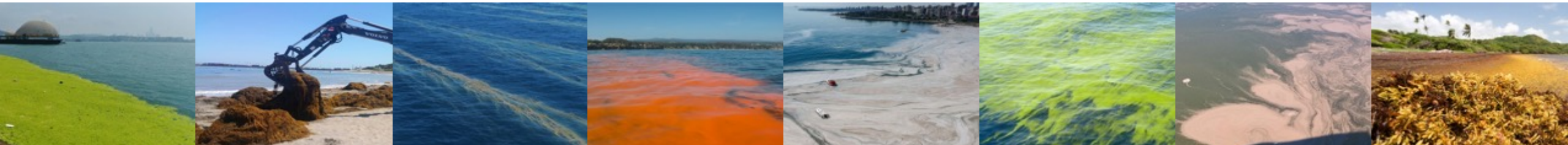
Remote Detection of Floating Algae and Other Floating Matters in Global Oceans and Lakes

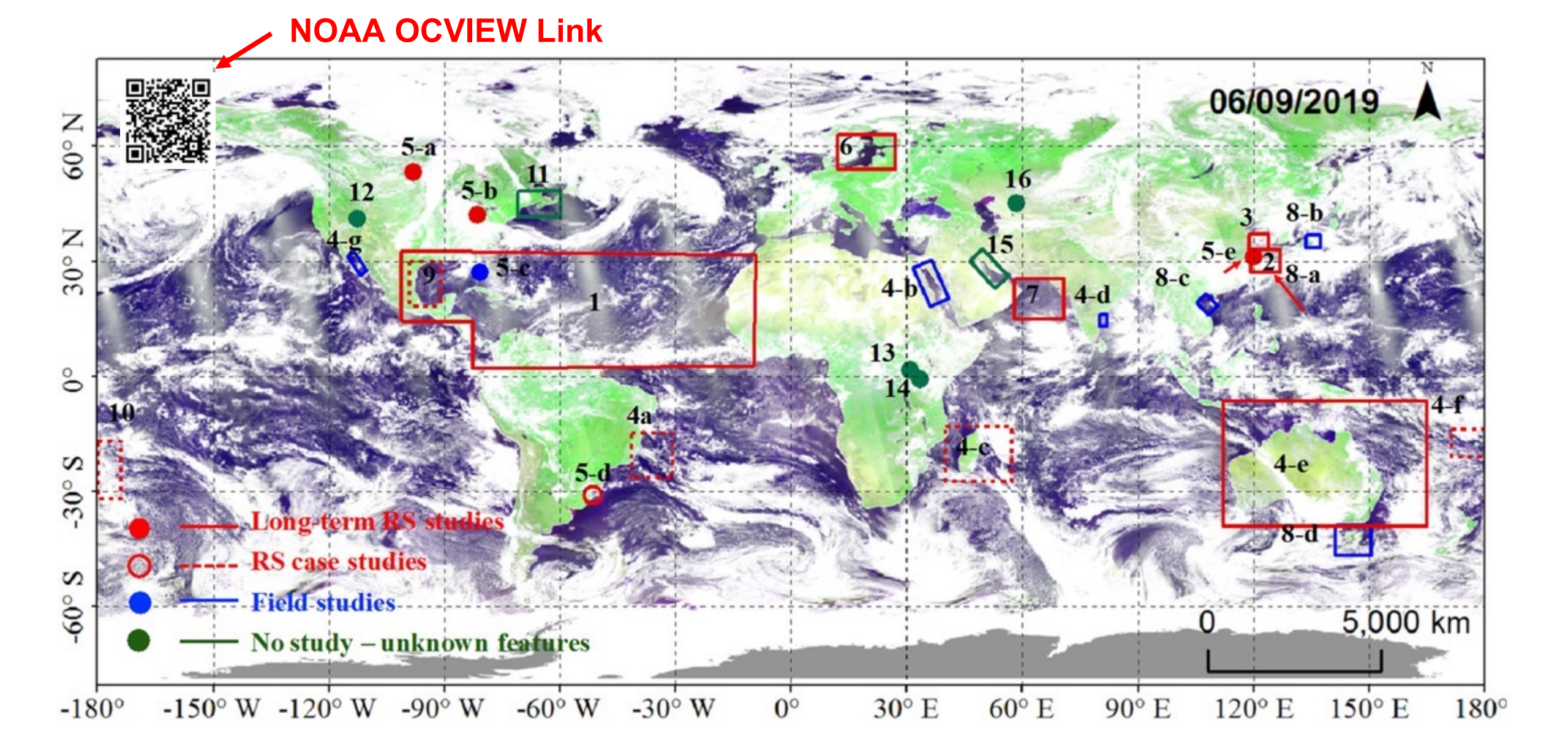
Lin Qi[1,2], Menghua Wang[1], Chuanmin Hu[3], Karlis Mikelsons[1,2]

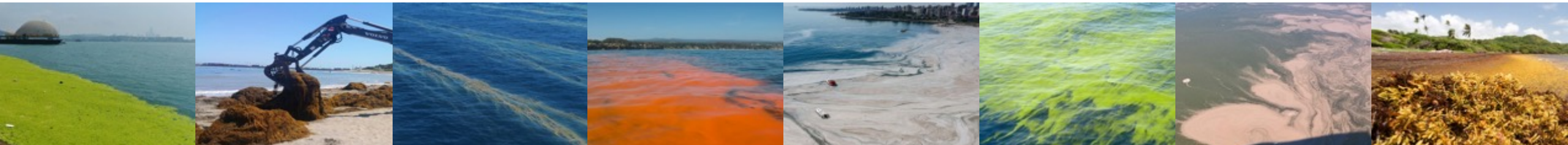
[1]NOAA Center for Satellite Applications and Research, College Park, MD, USA

[2]Global Science & Technology Inc., Greenbelt, MD, USA,

[3]University of South Florida, College of Marine Science, St. Petersburg, FL, USA




NOAA OCVIEW Link
06/09/2019
N
60° N
30° N
0°
-30° S
-60° S
-180°
-150° W
-120° W
-90° W
-60° W
-30° W
0°
30° E
60° E
90° E
120° E
150° E
180°
1
2
3
4a
4-b
4-c
4-d
4-e
4-f
4-g
5-a
5-b
5-c
5-d
5-e
6
7
8-a
8-b
8-c
8-d
9
10
11
12
13
14
15
16
Long-term RS studies
RS case studies
Field studies
No study – unknown features
0
5,000 km



International Ocean Colour Science Meeting 2023

ML Labs

Poster No. 101

Machine Learning for Water Optical Properties Using Satellite Imagery

[1]**Amina Said**, [2]Noel O'Connor, [1]Margaret McCaul

[1]*SFI CRT ML-Labs, Insight Centre for Data Analytics, National Centre for Sensor Research, School of Chemical Sciences, Dublin City University, Dublin 9, Ireland.*

[2]*SFI CRT ML-Labs, Insight Centre for Data Analytics, School of Electronic Engineering, Dublin City University, Dublin 9, Ireland.*

HOST INSTITUTIONS

DCU Dublin City University

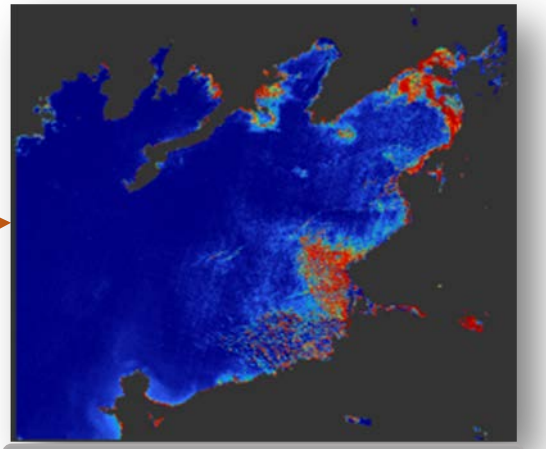
TU DUBLIN

UCD DUBLIN University College Dublin An Coláiste Ollscoile, Baile Átha Cliath

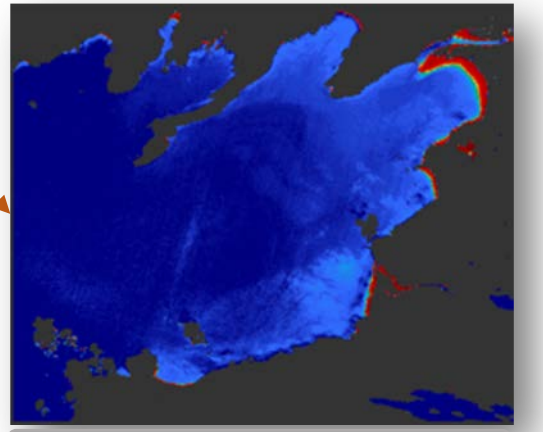
FUNDED BY:

Science Foundation Ireland SFI For what's next

Imagery Source:
Earthstar Geographics

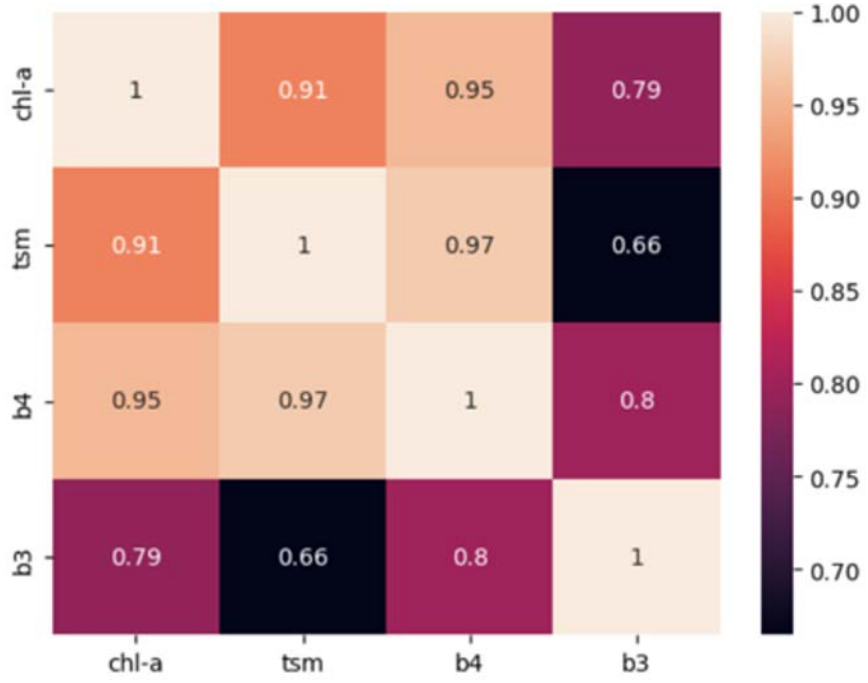


Landsat-9, March 2023



Landsat-9, June 2023

mg/l



Optical and ecological changes in Arctic marine waters

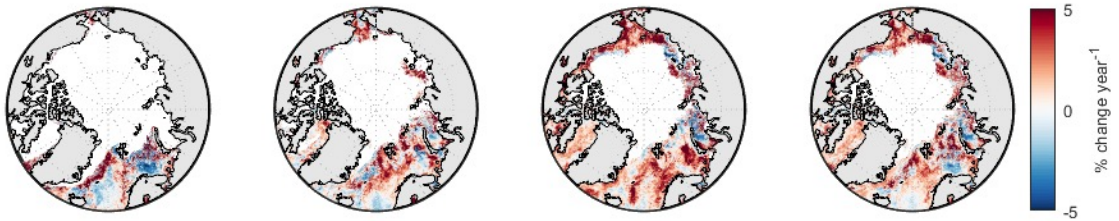
Camila Serra-Pompei, Stephanie Dutkiewicz

Massachusetts Institute of Technology (USA)

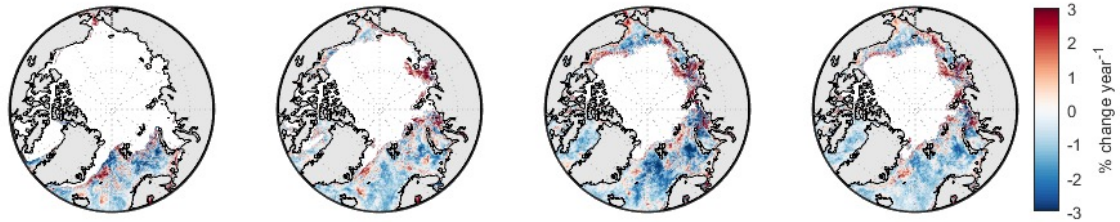
Optical and ecological changes in Arctic marine waters

Trends 2003-2022

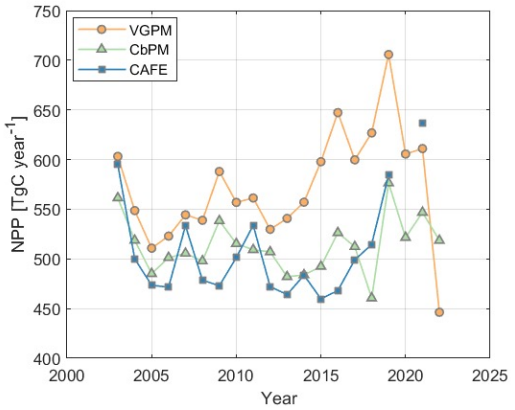
Phytoplankton absorption coefficient



Backscattering coefficient



NPP trends in open-water regions



- Different temporal trends between phytoplankton absorption and Backscattering.
- NPP increases in algorithms that use Chl as their main phytoplankton proxy, but not on the ones that use backscattering or phytoplankton absorption.

If you have an opinion about optical or NPP algorithms for the Arctic, please come to my poster!

Poster # 102 on Thursday :)

Chlorophyll-a concerning Environmental Factors in the Bay of Bengal using Remote sensing and in-situ data

Md. Shahin Hossain Shuva[1*], Mohammad Muslem Uddin[1]

Department of Oceanography, University of Chittagong,

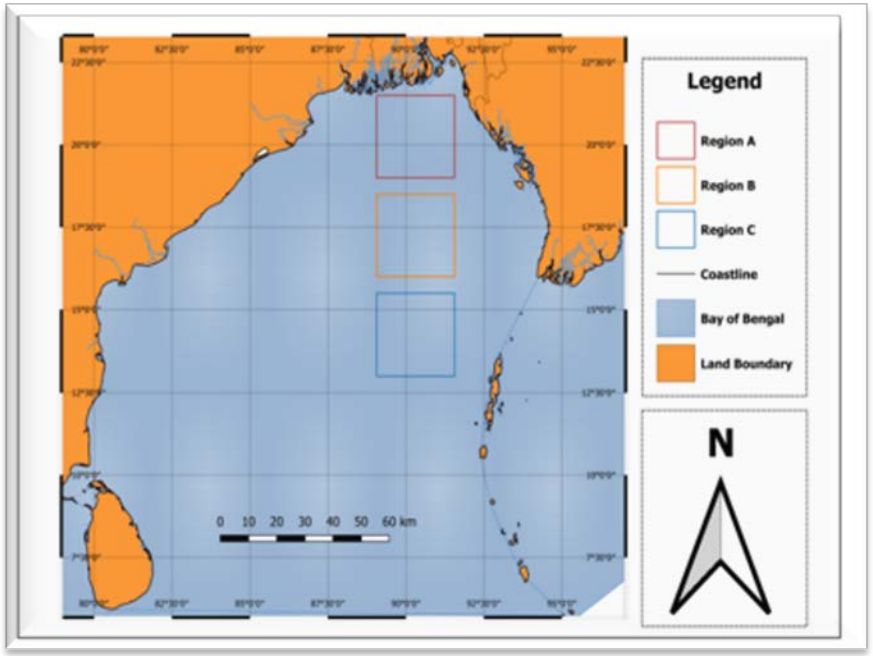
Chittagong-4331, Bangladesh.

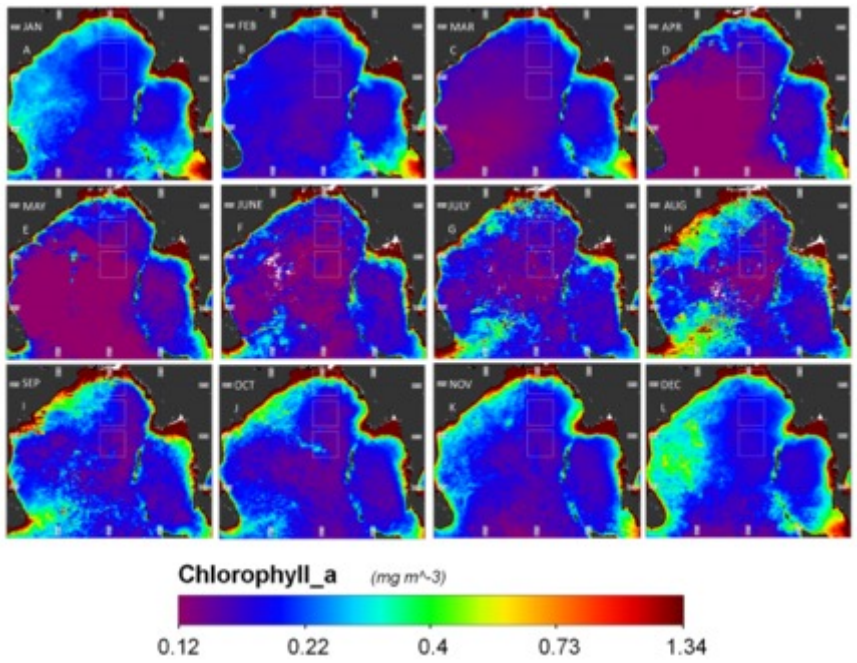
***Corresponding Author: shuvoocean@gmail.com**

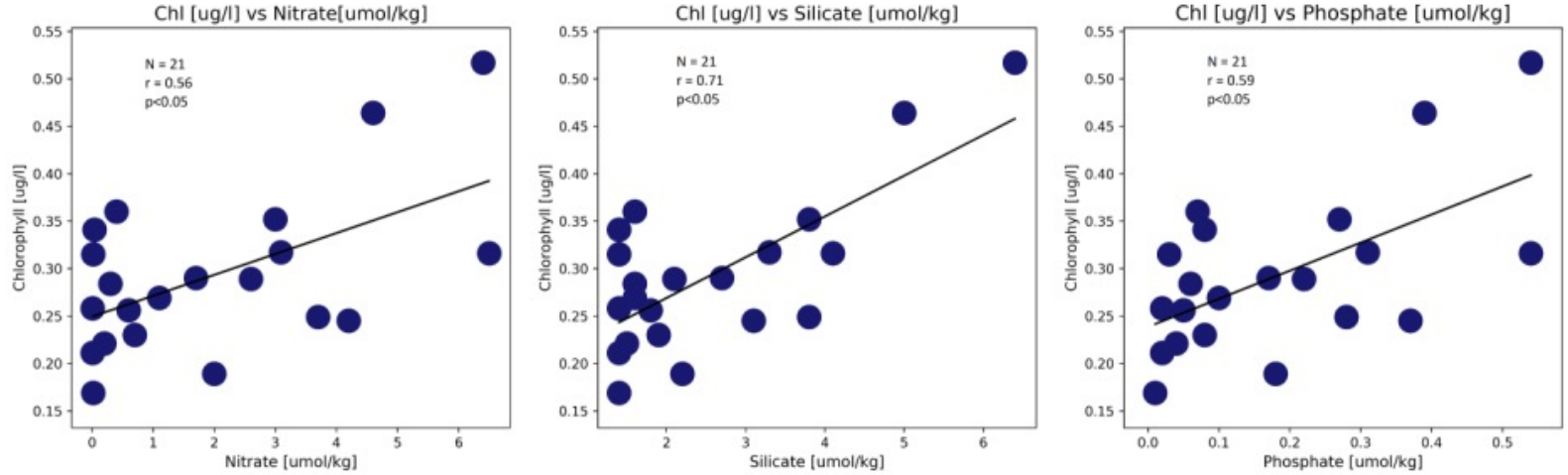
International Ocean Colour Science Meeting 2023

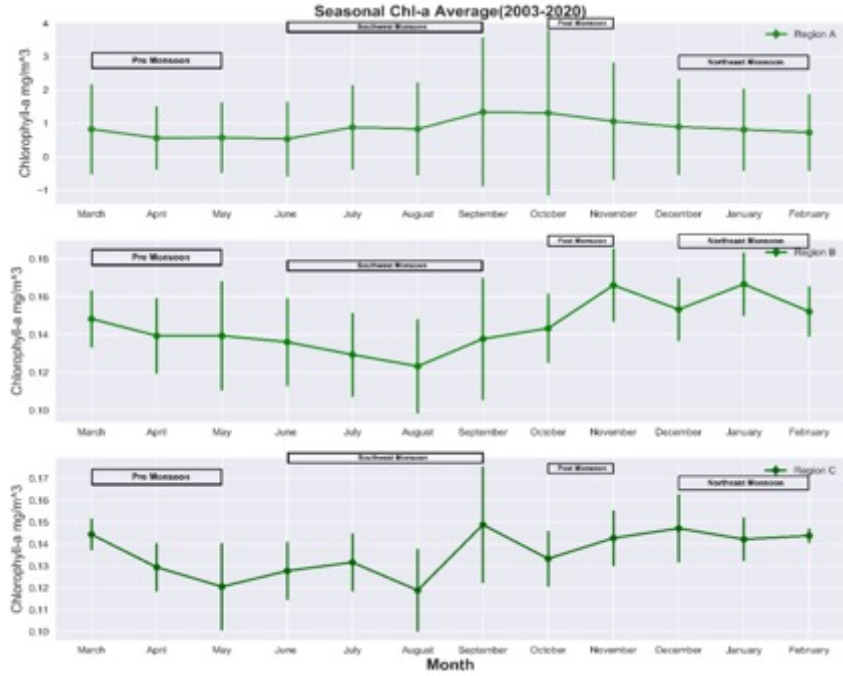
Advancing Global Ocean Colour Observations

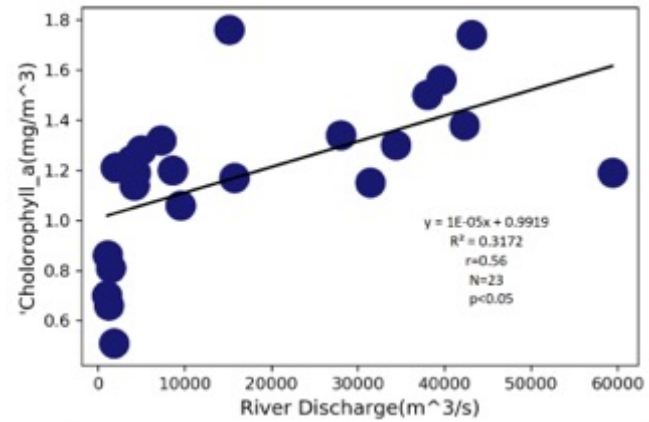
University of Chittagong

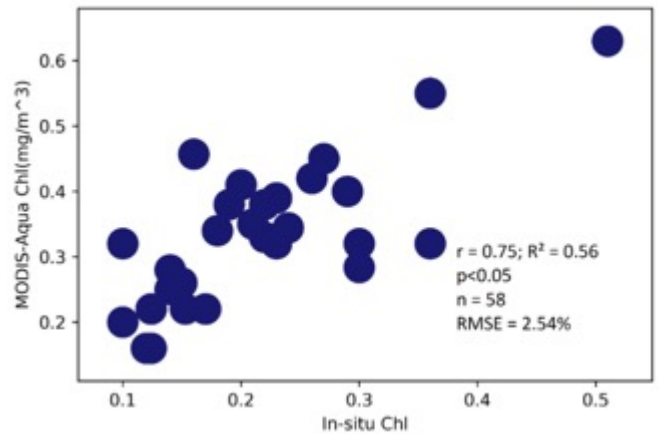

Legend
Region A
Region B
Region C
Coastline
Bay of Bengal
Land Boundary
N
0 10 20 30 40 50 60 km


JAN
FEB
MAR
APR
MAY
JUNE
JULY
AUG
SEP
OCT
NOV
DEC
Chlorophyll_a (mg m^-3)
0.12 0.22 0.4 0.73 1.34


Chl [ug/l] vs Nitrate[umol/kg]
N = 21
r = 0.56
p<0.05
Chlorophyll [ug/l]
Nitrate [umol/kg]
Chl [ug/l] vs Silicate [umol/kg]
N = 21
r = 0.71
p<0.05
Chlorophyll [ug/l]
Silicate [umol/kg]
Chl [ug/l] vs Phosphate [umol/kg]
N = 21
r = 0.59
p<0.05
Chlorophyll [ug/l]
Phosphate [umol/kg]


Seasonal Chl-a Average(2003-2020)
Pre Monsoon
Southwest Monsoon
Post Monsoon
Northeast Monsoon
Region A
Region B
Region C
Chlorophyll-a mg/m^3
March
April
May
June
July
August
September
October
November
December
January
February
Month


'Cholorophyll_a(mg/m^3)
y = 1E-05x + 0.9919
R² = 0.3172
r=0.56
N=23
p<0.05
River Discharge(m^3/s)


MODIS-Aqua Chl(mg/m^3)
r = 0.75; R² = 0.56
p<0.05
n = 58
RMSE = 2.54%
In-situ Chl

Bio-optical and biogeochemical parameterization of IOP-traceable, hyperspectral R_{rs} datasets for transitional water applications

Marié E. Smith[1,2], Lisl Robertson Lain[1*], Jeremy Kravitz[3,4]

1. Coastal Systems and Earth Observation Research Group, Council for Scientific and Industrial Research, South Africa

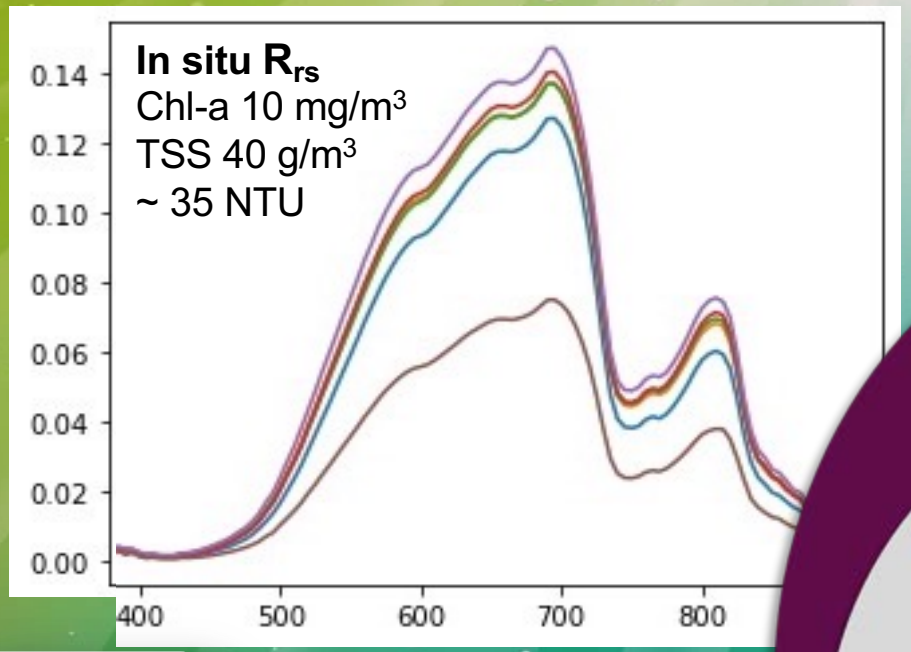
2. Department of Oceanography, University of Cape Town, Cape Town, South Africa

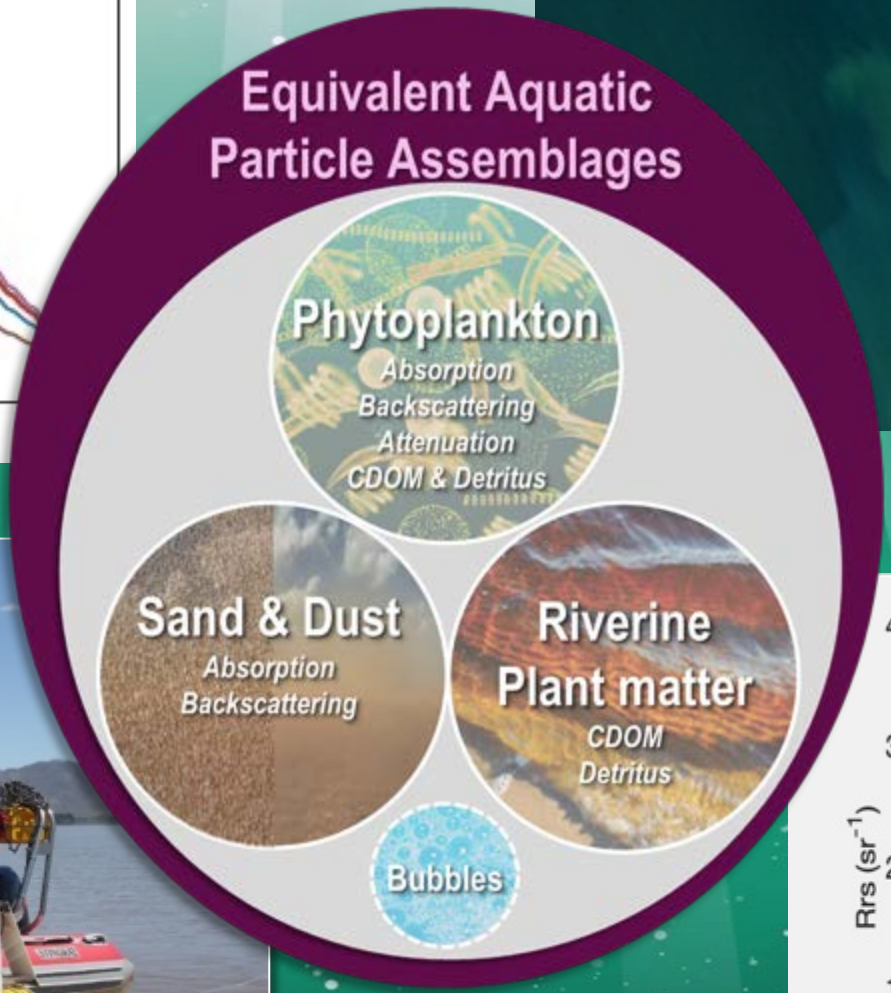
3. Bay Area Environmental Research Institute, Moffett Field, CA, USA

4. NASA Ames Research Center, Moffett Field, CA, USA

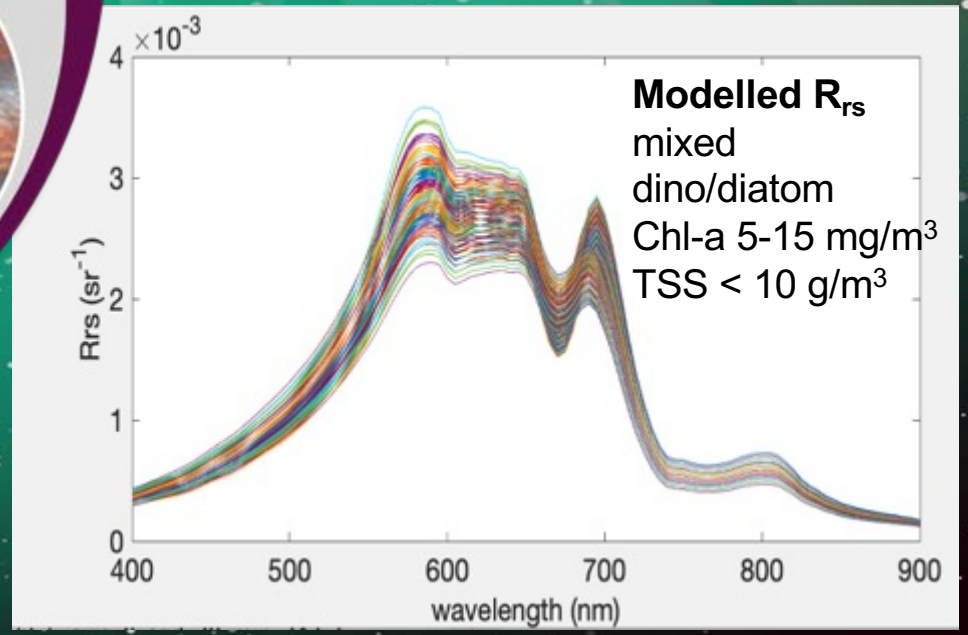
contact email: ELain@csir.co.za

CSIR Touching lives through innovation · BIOSCAPE Biodiversity Survey of the Cape · NASA · Theewater sports club · Stellenbosch University iYunivesithi Universiteit · University of Cape Town · Universiteit van Kaapstad · iYunivesithi yaseKapa · NRF National Research Foundation · SANSA South African National Space Agency · UNESCO


In situ R_{rs}
Chl-a 10 mg/m^3
TSS 40 g/m^3
~ 35 NTU
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
400
500
600
700
800


Equivalent Aquatic Particle Assemblages
Phytoplankton
Absorption
Backscattering
Attenuation
CDOM & Detritus
Sand & Dust
Absorption
Backscattering
Riverine Plant matter
CDOM
Detritus
Bubbles

DTC 787 C
CSIR


$\times 10^{-3}$
4
3
2
1
0
Rrs (sr^{-1})
400
500
600
700
800
900
wavelength (nm)
Modelled R_{rs}
mixed
dino/diatom
Chl-a 5-15 mg/m^3
TSS < 10 g/m^3

International Ocean Colour Science Meeting 2023

esa

Poster Title: “Validation of OLCI SPM Concentration Product and Variability of European Coastal Waters Quality”

Poster number: **105**

Authors: **Corentin Subirade**, Cédric Jamet, Bing Han, Manh Duy Tran, and Vincent Vantrepotte

LOG

UNIVERSITÉ DU LITTORAL CÔTE D'OPALE

KEY RESULTS

SPM model Validation

Large dynamic range of the SPM model and good performance for OLCI-A/B

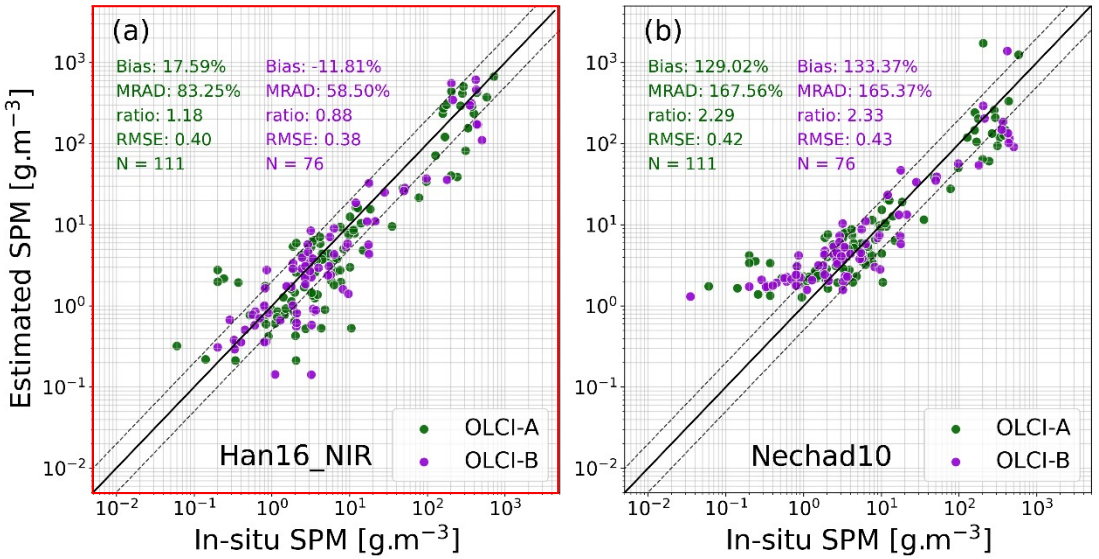


Figure 1 : SPM matchups of in-situ SOMLIT SPM (French coastal waters), and estimated SPM from S3/OLCI-A/B, using (a) Han et al. (2016) and (b) Nechad et al. (2010)

SPM variability in Europe

Significant monotonic **SPM trend** detected over the OLCI period (2016-2023)

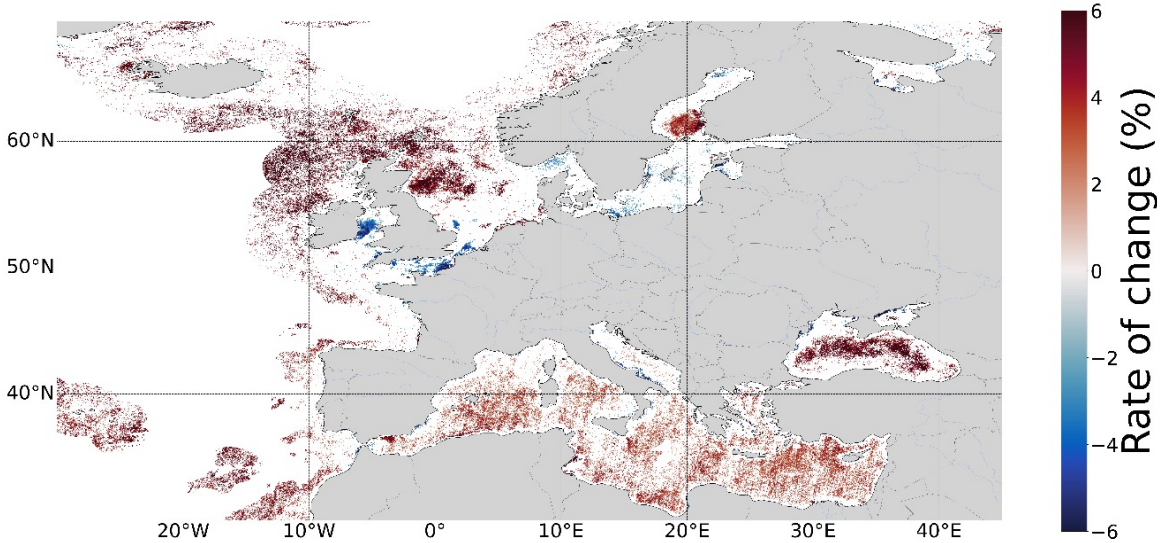
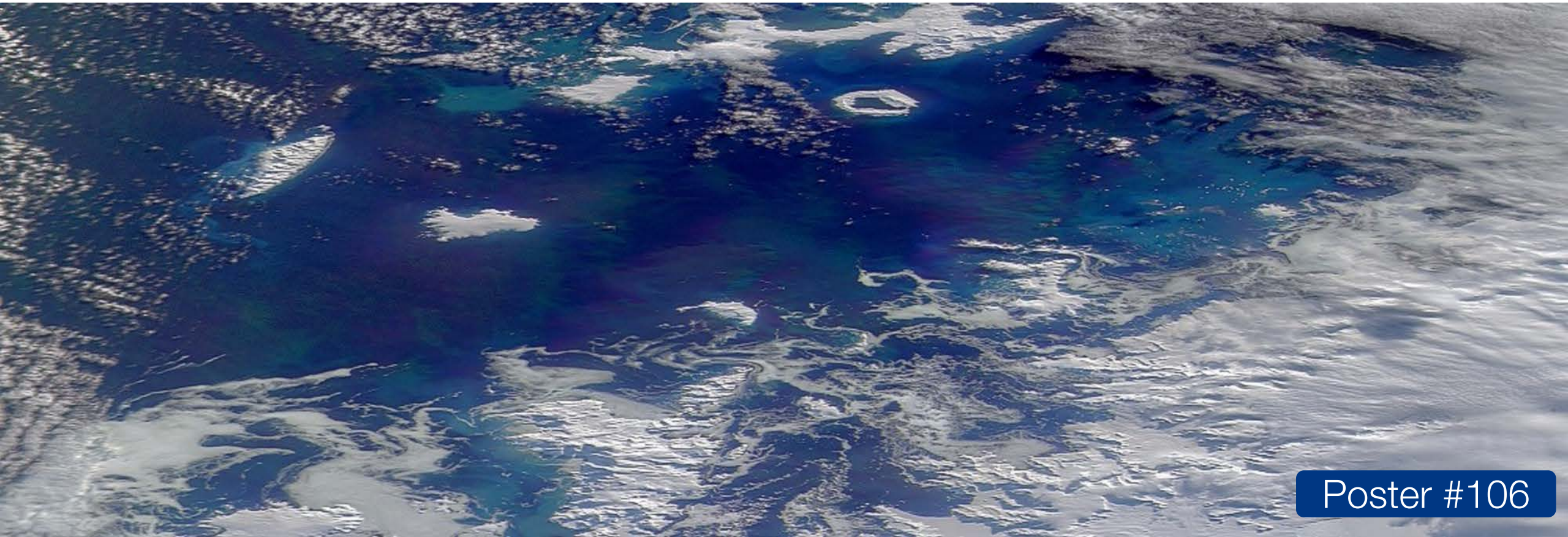


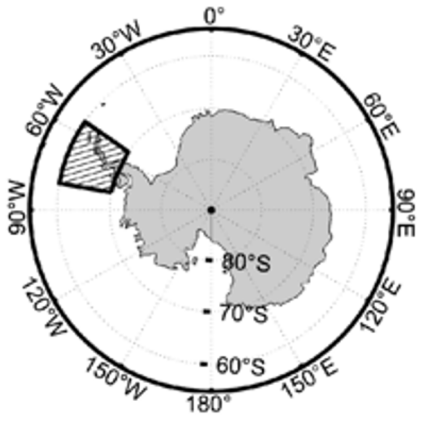
Figure 2 : Significant ($p < 0.05$) rate of change of SPM (%/year)

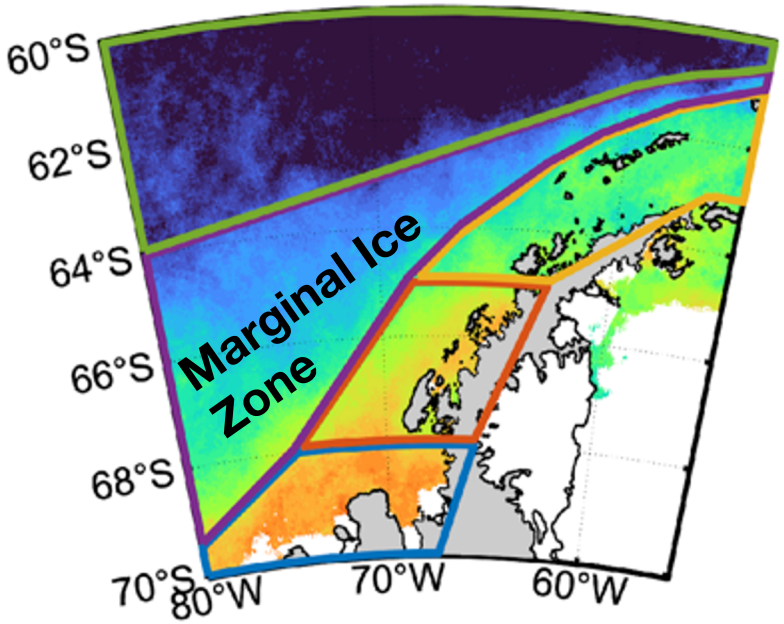
Later start of the accumulation season: 25-year trends in phytoplankton phenology in the marginal ice zone west of the Antarctic Peninsula

Jessie Turner, Heidi Dierssen, Oscar Schofield, Heather H. Kim, Sharon Stammerjohn, David R. Munro, and Maria Kavanaugh

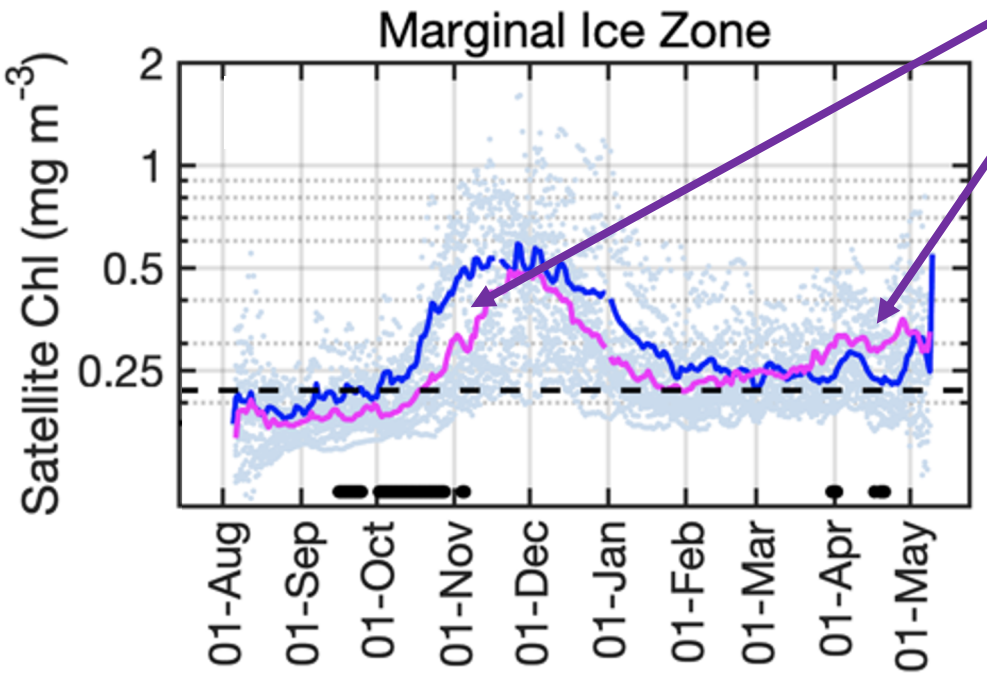


Poster #106





Start Date
of phytoplankton
accumulation season

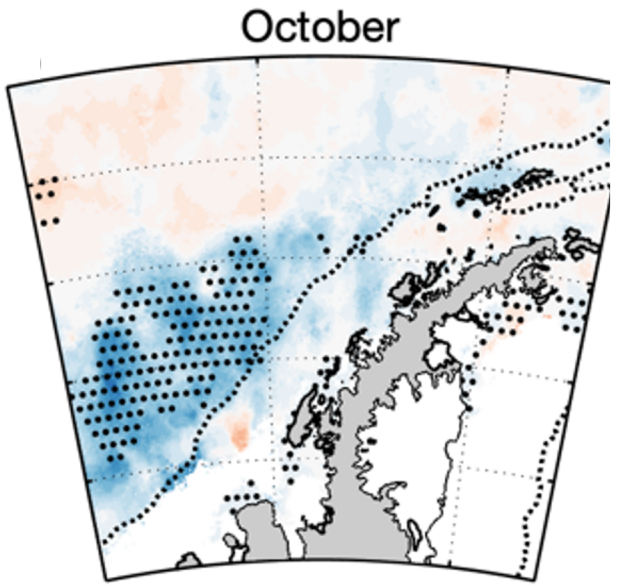


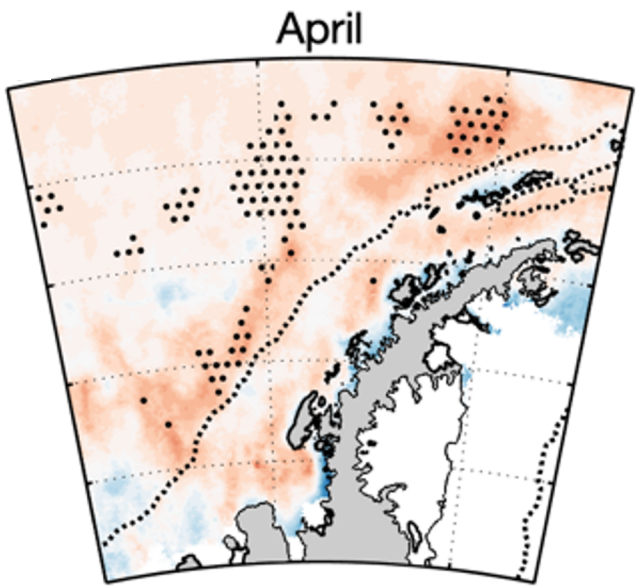
Later spring
Higher fall Chl-a

2000-2010
2010-2020

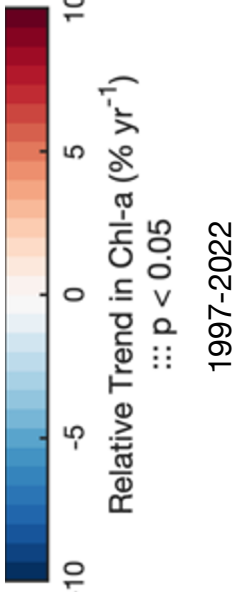
Threshold

- Sig. different (Kruskal-Wallis test, $p < 0.05$)





Increasing Chl-a



Decreasing Chl-a

Poster #109

Variability and trends of the major phytoplankton functional types (PFT) in the Fram Strait (Arctic Ocean) from two-decade satellite observations

Hongyan Xi[1], Ilka Peeken[1], Eva-Maria Nöthig[1], Alexandra Kraberg[1], Katja Metfies[1], Marine Bretagnon[2], Ehsan Mehdipour[1,3], Vanessa Lampe[4], Leonardo M. A. Alvarado[1], Antoine Mangin[2], Astrid Bracher[1,5]

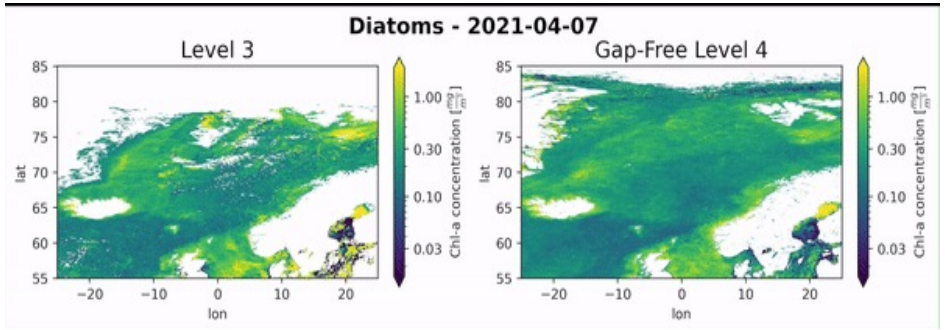
[1] *Alfred Wegener Institute, Helmholtz-Centre for Polar and Marine Research, Bremerhaven, Germany*
[2] *ACRI-ST, Sophia Antipolis Cedex, France*
[3] *School of Business, Social and Decision Sciences, Constructor University, Bremen, Germany*
[4] *GEOMAR Helmholtz-Centre for Ocean Research, Kiel, Germany*
[5] *Institute of Environmental Physics, University of Bremen, Bremen, Germany*

PFT variability and trends in the Fram Strait (Arctic Ocean)

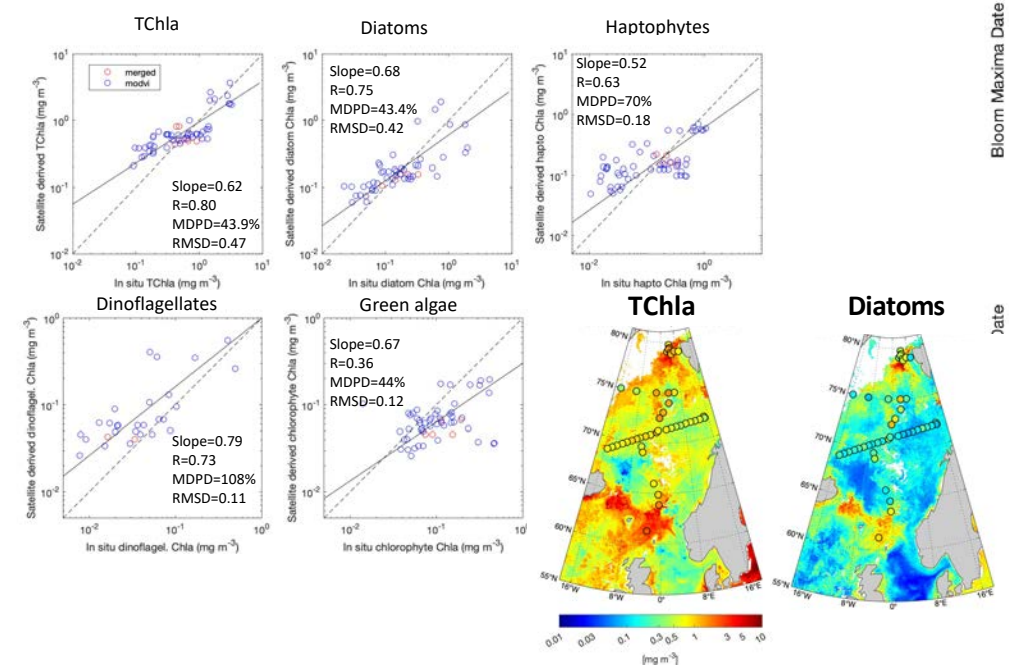
Based on a global approach for PFT CHL retrieval using ocean colour reflectance data and SST

Satellite PFT data products for Copernicus Marine Science (https://marine.copernicus.eu/)
(Xi et al. 2020, 2021, 2023)

Gap-filled weekly diatom Chla 2021-2022



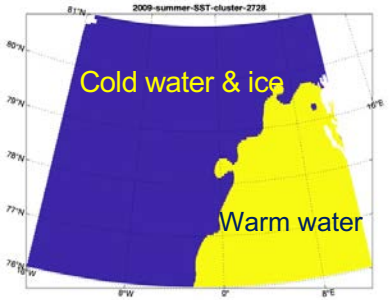
PFT evaluation with in situ data



PFT observation in the western and eastern Fram Strait

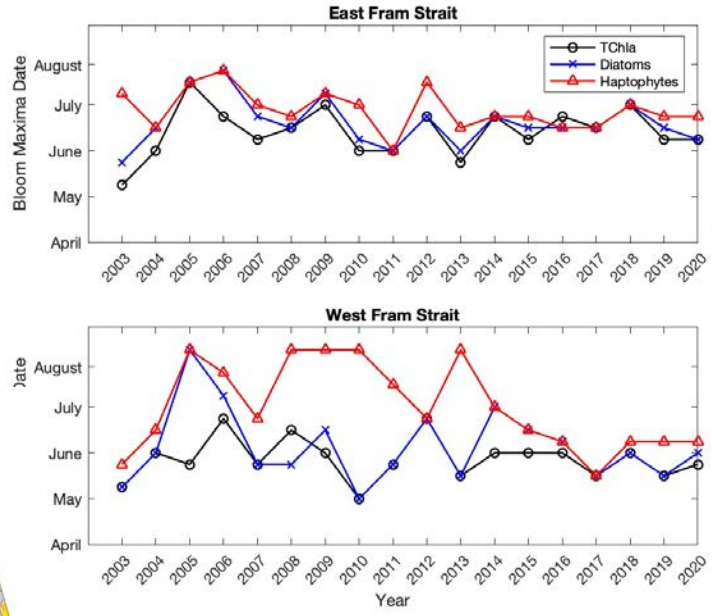
- Study region: 16°W – 12°E, 75°N – 82°N
- Period: April to August (2002-2020)
- Dynamic clustering of water masses based on SST
- PFT trend, phenology and composition

Water mass clustering

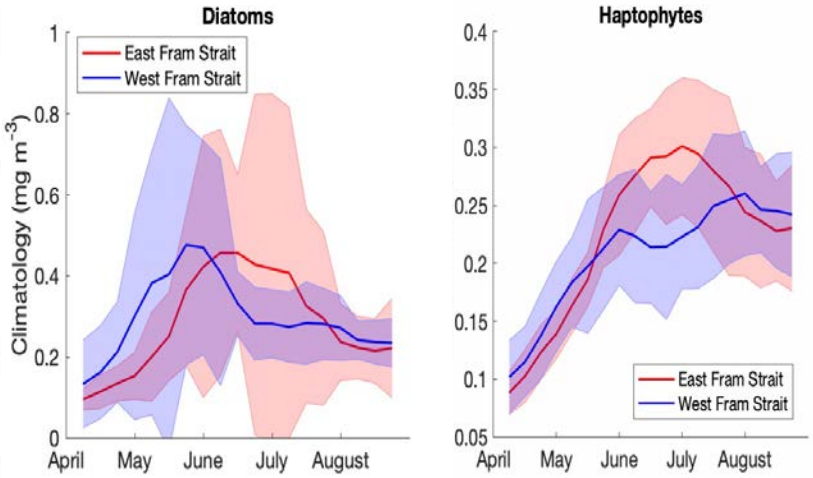


PFT phenology

Time of bloom maxima



PFT climatology



Poster #109

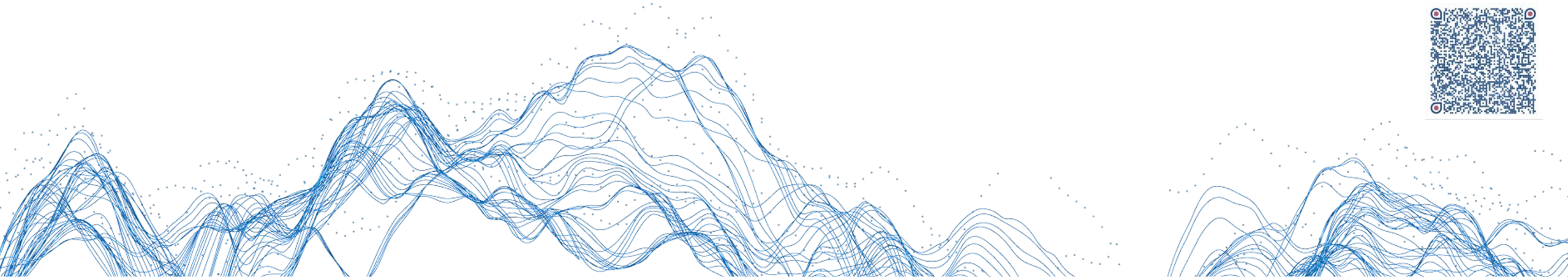
International Ocean Colour Science Meeting 2023

Spectral signatures & water sampling in Chile: Initial insights for enhancing desalination system efficacy and water supply precision with satellite data

Tomás Acuña-Ruz[1,2], Enzo Garcia-Bartolomei[2], Bryan Casanova[2], Cristian Mattar[1]

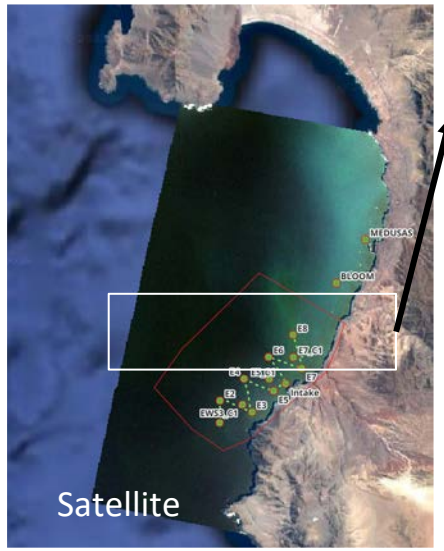
1. University of Chile, Laboratory for Analysis of the Biosphere (LAB).
2. Bloom Alert StartUp, https://bloomalert.com

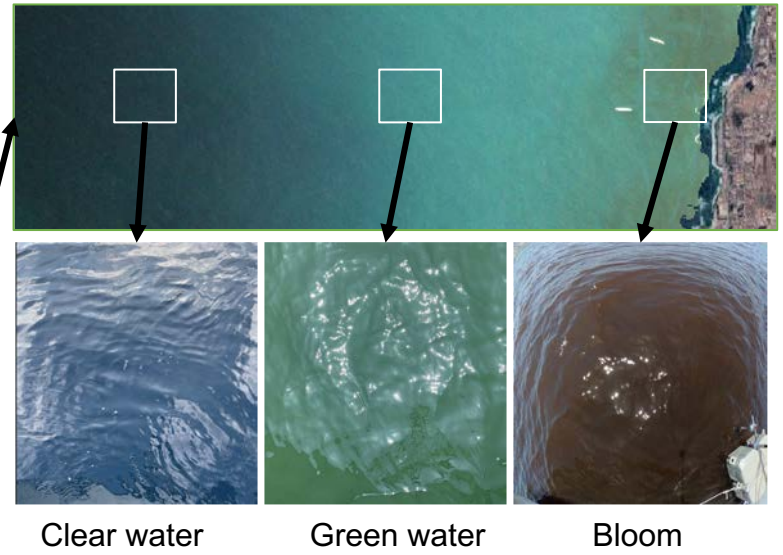
Poster #111
Session 5

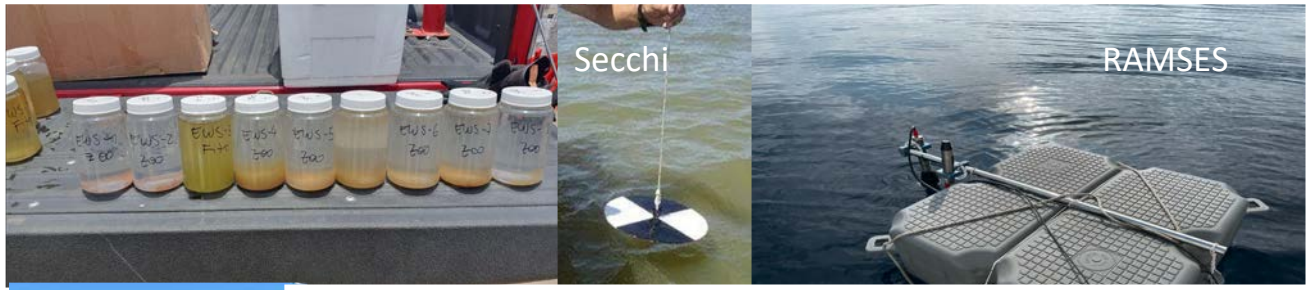


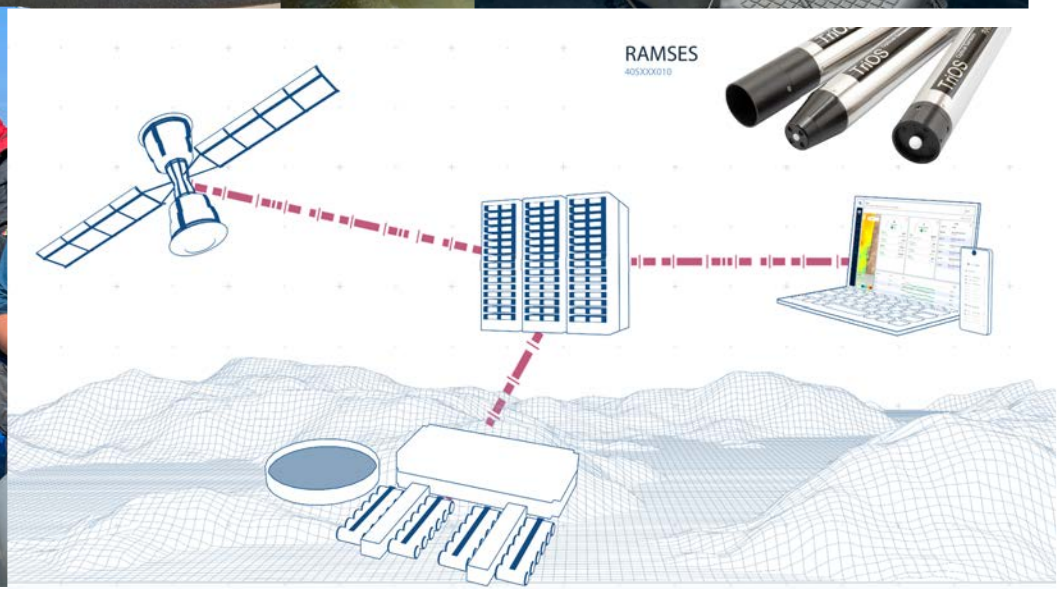
Intensive Water Quality Sampling for Desalination Processes

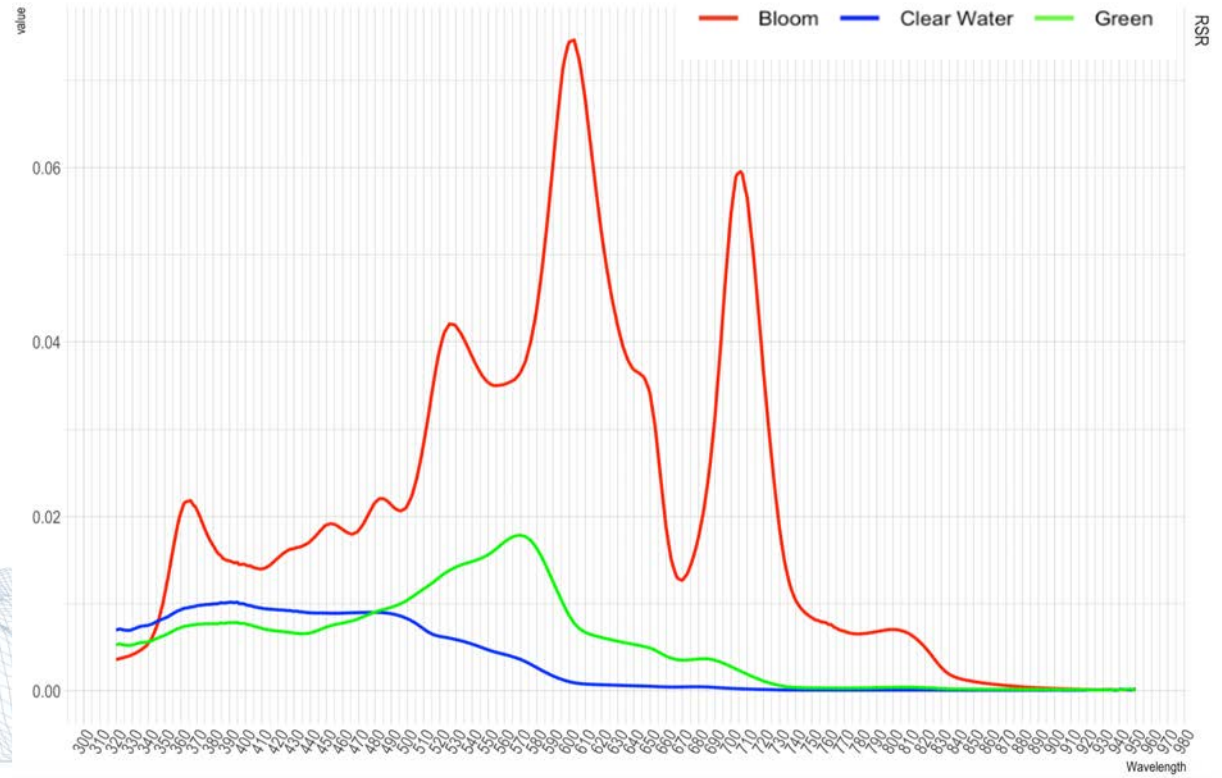
- Addressing Water Scarcity in the Atacama Desert and Central Chile
- Projected 350% Capacity Increase by 2030: Anticipating a surge to 38,766 L/s in water production
- Cost Implications of Environmental Challenges: Estimating a 30-45% increase in water production costs.











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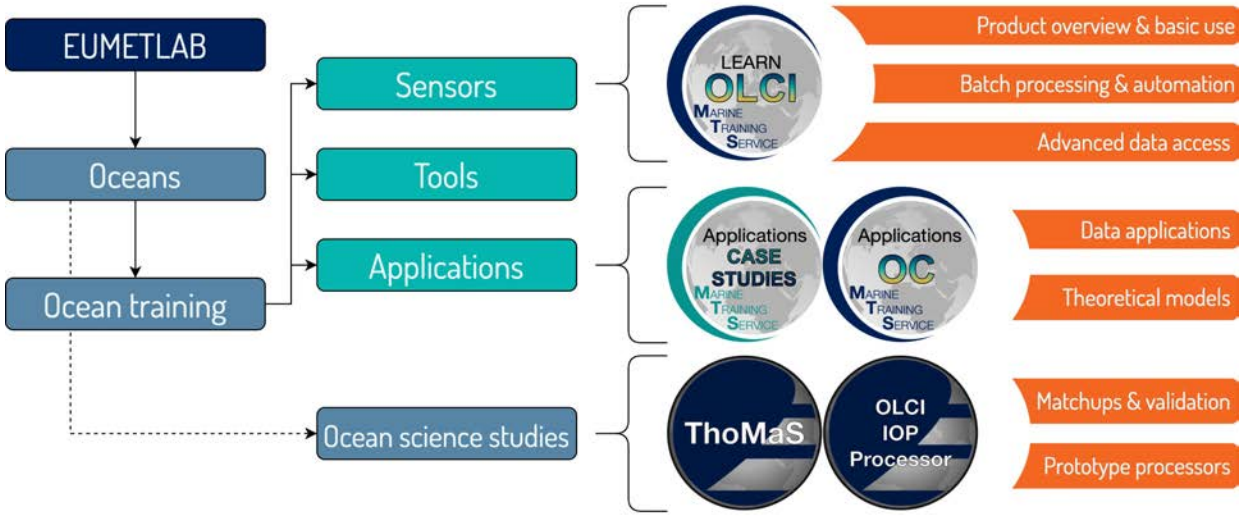
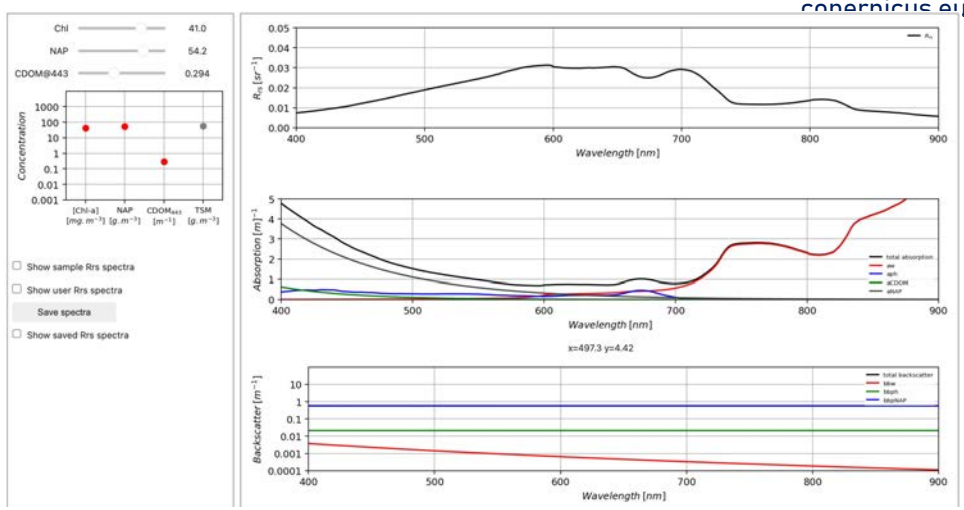
Advanced training material and tools for the next generation of marine remote sensing experts (#113)

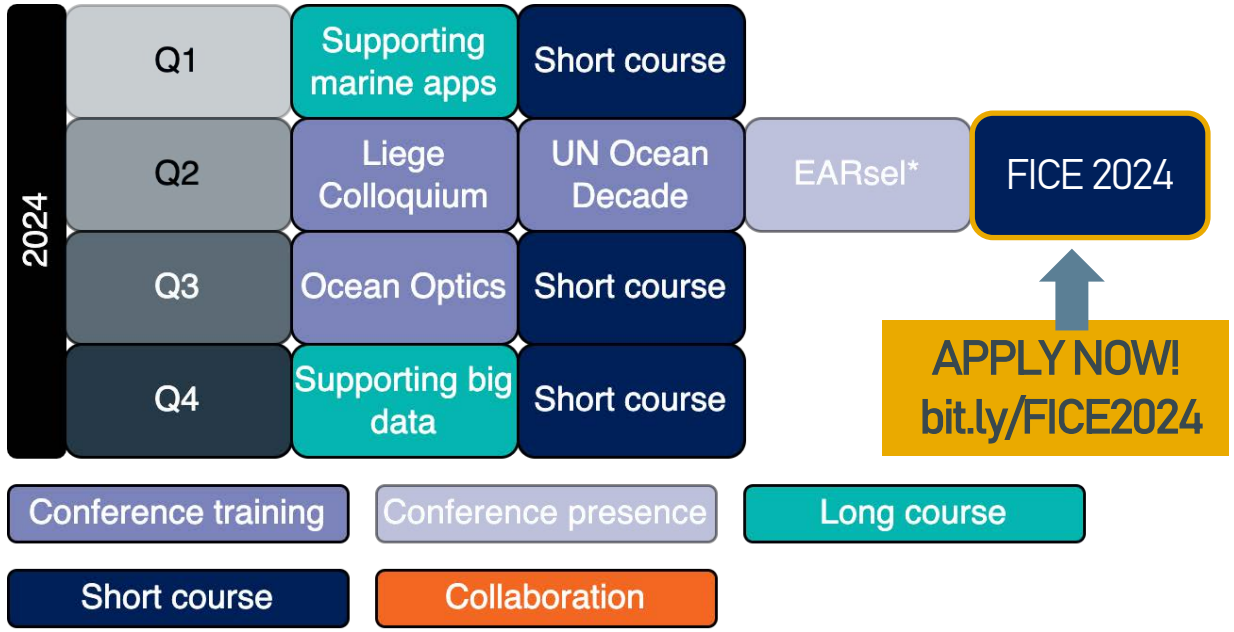
Hayley Evers-King
Lead Marine Applications Expert, EUMETSAT
Hayley.EversKing@eumetsat.int

IOCS, 2023

Code based tools and training to support Ocean Colour use







Poster 120: Interannual trends in water clarity in Cape Cod recreational ponds: Assessment from medium-resolution satellite imagery

Nikolay P. Nezlin, Megan M. Coffer - *Global Science & Technology, Inc. and NOAA, National Environmental Satellite, Data, and Information Services, Center for Satellite Applications and Research*

Nicole Bartlett - *NOAA North Atlantic Regional Team*

Timothy Pasakarnis - *Cape Cod Commission*

SeungHyun Son - *CIRA, Colorado State University*

Paul M. DiGiacomo - *NOAA, National Environmental Satellite, Data, and Information Services, Center for Satellite Applications and Research*

CAPE COD COMMISSION

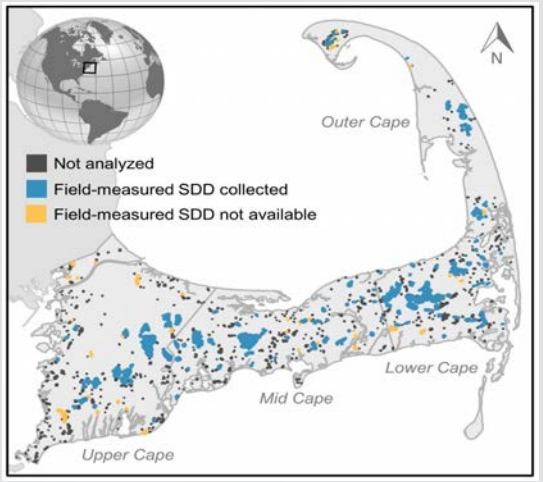
capecod CHAMBER OF COMMERCE

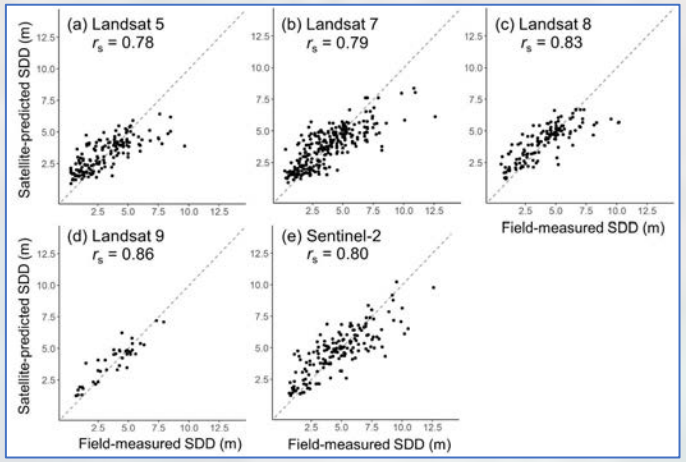
COUNTY OF BARNSTABLE MASSACHUSETTS

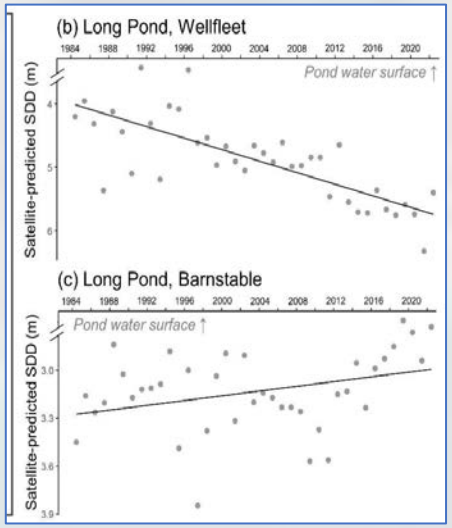
GLOBAL SCIENCE & TECHNOLOGY, INC.

NOAA STAR CENTER FOR SATELLITE APPLICATIONS AND RESEARCH

- Statement of the problem: Can medium-resolution (10-30 m) satellite imagery be used for assessment of changes in water clarity in small inland water bodies?
- Study area: Cape Cod Peninsula, Massachusetts
- Satellite data: Imagery of Landsat-5/7/8/9 and Sentinel-2A/B available from Google Earth Engine
- Field data: Water clarity (Secchi disk depth, SDD) collected by Cape Cod Commission in 2001-2022
- Analysis method: Random Forest Machine Learning (RFML) models







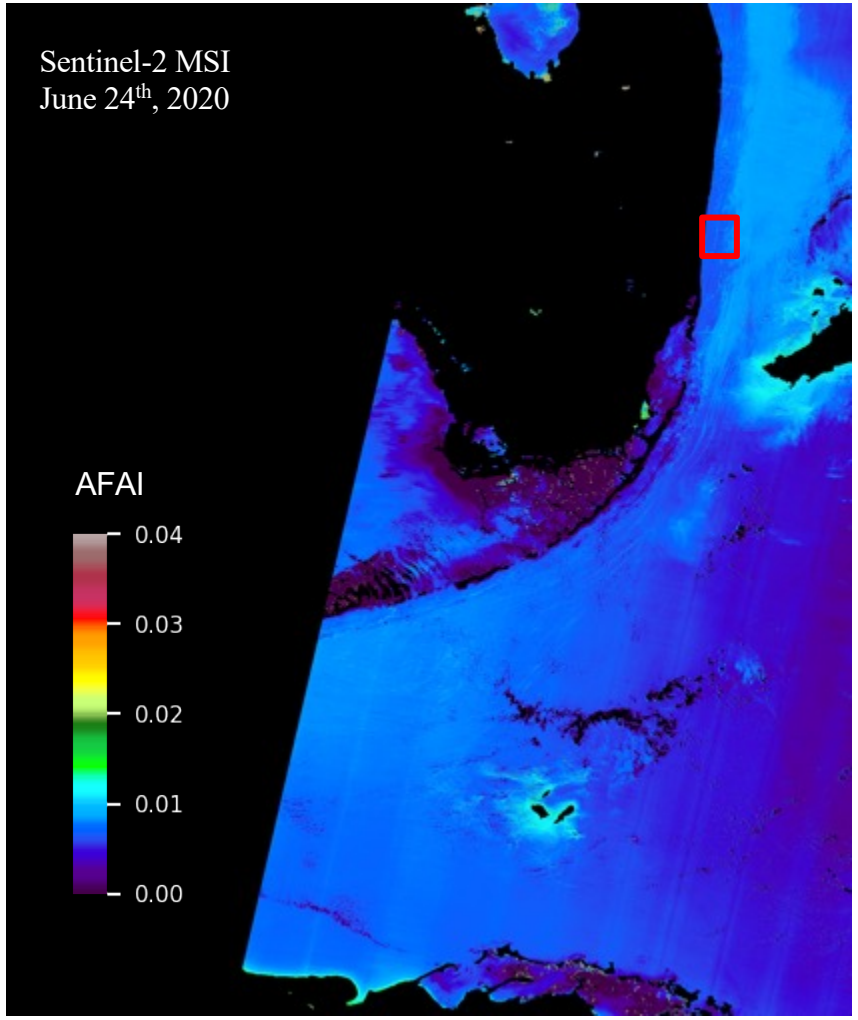
- RFML models predict SDD with high accuracy
- Predicted SDD demonstrate interannual trends:
  - Increasing water clarity (65%)
  - Decreasing water clarity (12%)

No. 121

Tracking pelagic *Sargassum* in the Florida Keys and Bahamas using Sentinel-2 imagery and a Deep Learning model

Sarah Sullivan[1], Lin Qi[2], Yuyuan Xie[1], Brian Barnes[1], Jennifer Cannizzaro[1], Chuanmin Hu[1]

[1] *College of Marine Science, University of South Florida, Optical Oceanography Lab,*
[2] *National Oceanic and Atmospheric Administration, Center for Satellite Applications and Research*


Sentinel-2 MSI
June 24th, 2020
AFAI
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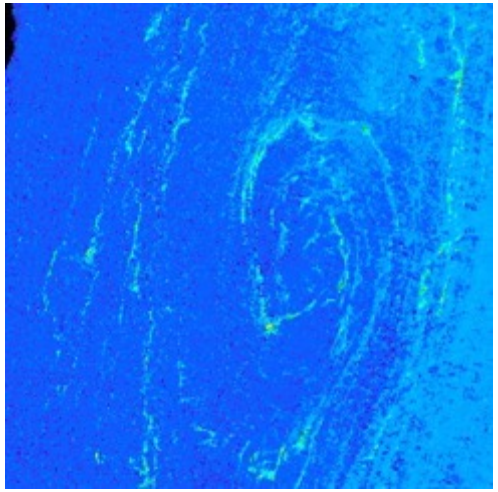

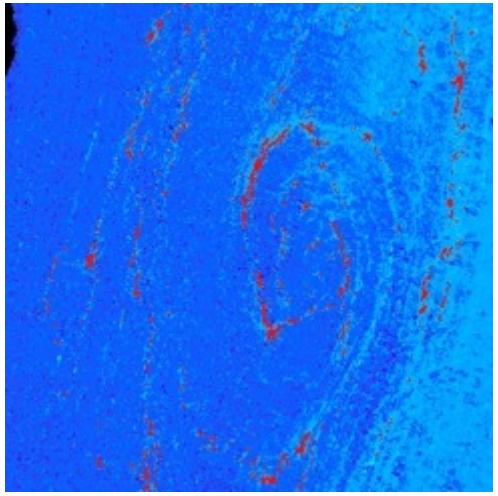

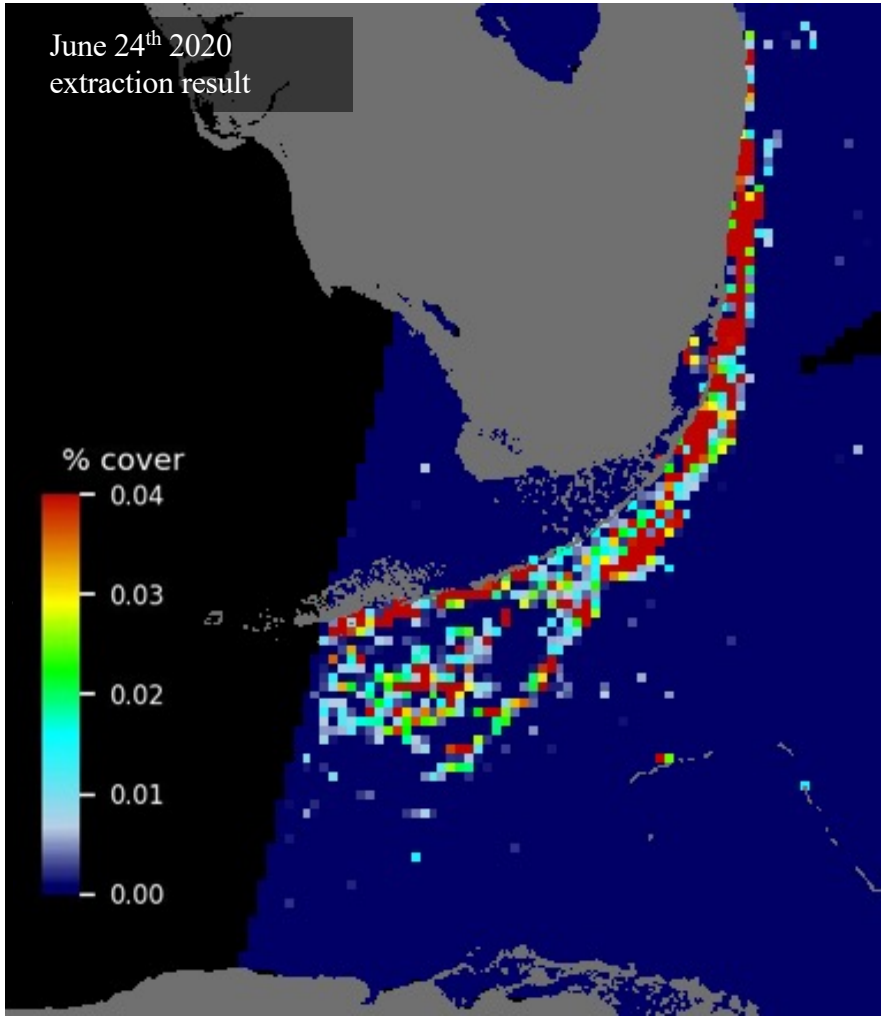
June 24th 2020
extraction result
% cover
0.04
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0.02
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0.00

Hyperspectral & polarimetric ocean observations from space!

How the NASA PACE Mission will advance water resource management and advance societal applications

Erin Urquhart, Natasha Sadoff

Ocean Ecology Laboratory, NASA Goddard Space Flight Center at SSAI

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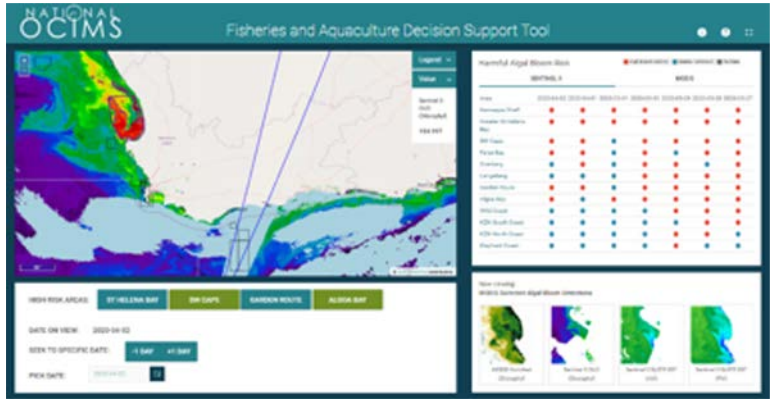
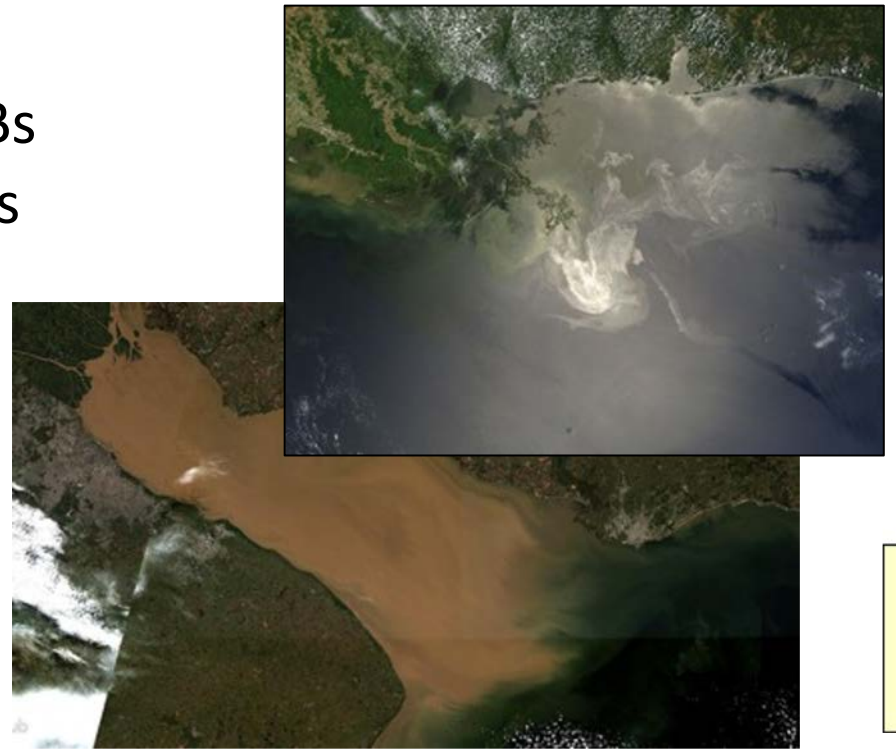
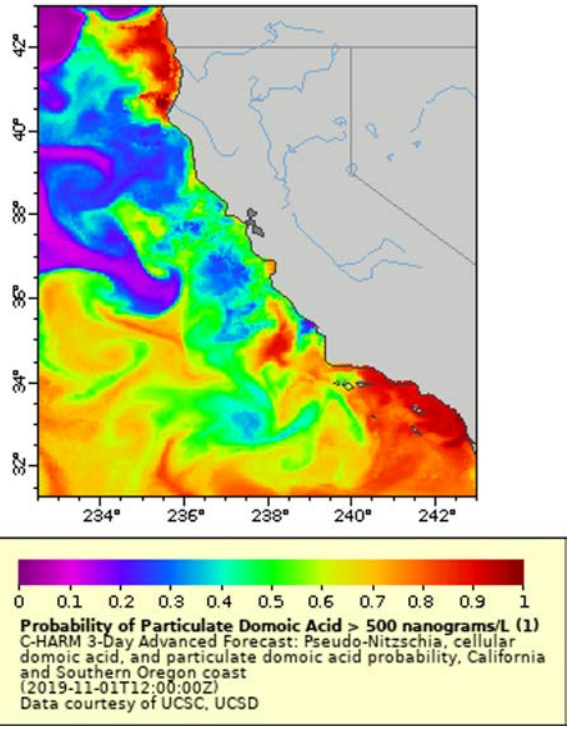
PACE Applications- Water Resources & Aquatic Ecosystems

PACE will provide hyperspectral data, phytoplankton community composition, and more (!!) contributing to the understanding aquatic/ocean ecosystems, which can benefit and/or inform:

- Identification & tracking of HABs
- Assessing the health of fisheries and aquaculture
- Monitoring marine food webs/dynamics
- Studying aquatic biodiversity
- Evaluating & maintaining ecosystem health







NOAA CoastWatch: 25 Years of Satellite Ocean Color Data Products and Applications

Victoria Wegman[1,4], Michael Soracco[2,4], Veronica P. Lance[3,4]

[1]Global Science & Technology, Inc.; victoria.wegman@noaa.gov | [2]Riva Solutions, Inc.; michael.soracco@noaa.gov | [3]NOAA/NESDIS Center for Applications and Research (STAR); veronica.lance@noaa.gov | [4]NOAA CoastWatch

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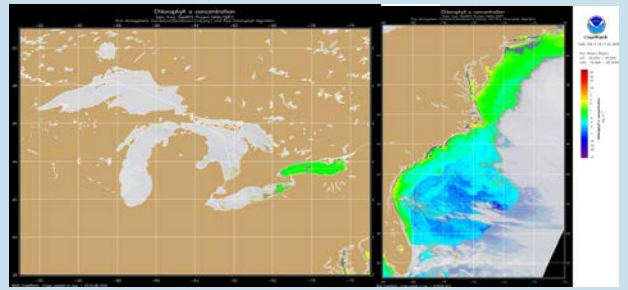
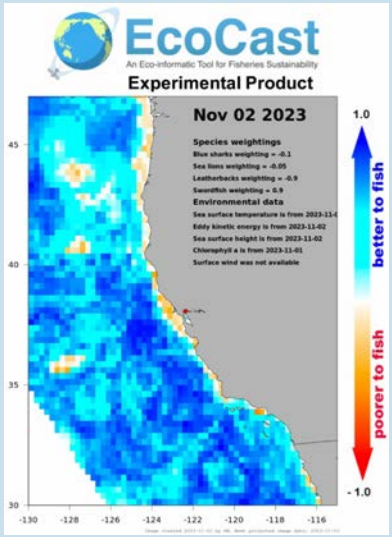
NOAA CoastWatch

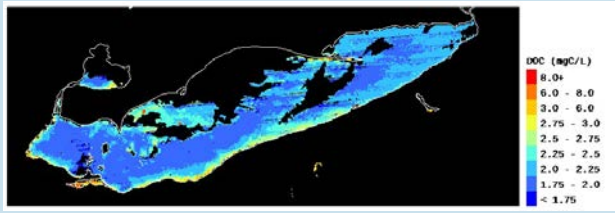
Satellite Data Streams

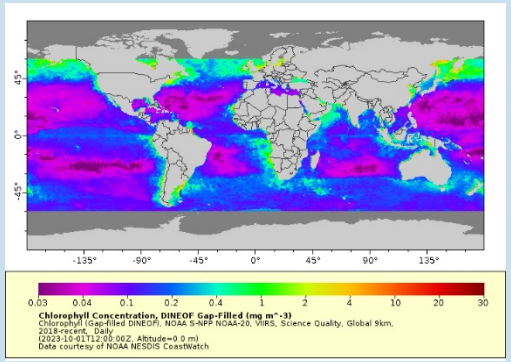


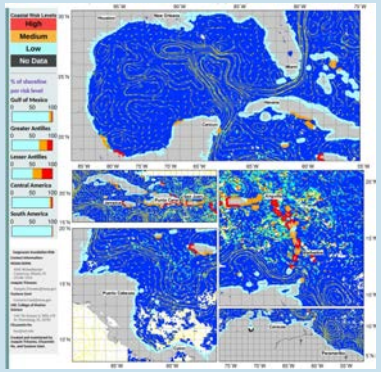
from 1999

to 2023 & Beyond









Value-added satellite data, **services**, and **tools** for **oceanic**, **freshwater**, and **polar** applications

CoastWatch.noaa.gov