2nd Ocean Carbon from Space workshop

24-26 November 2025 Online

Regionalized Algorithms for Phytoplankton Functional Type Estimation in Optically Complex Seas: Applications in the Baltic and Black Seas

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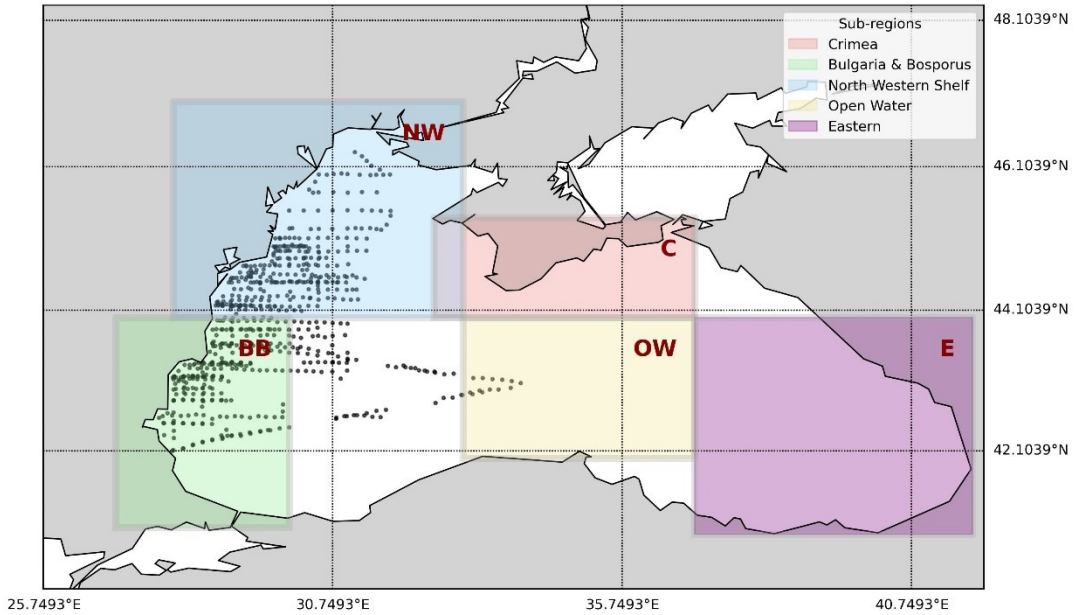
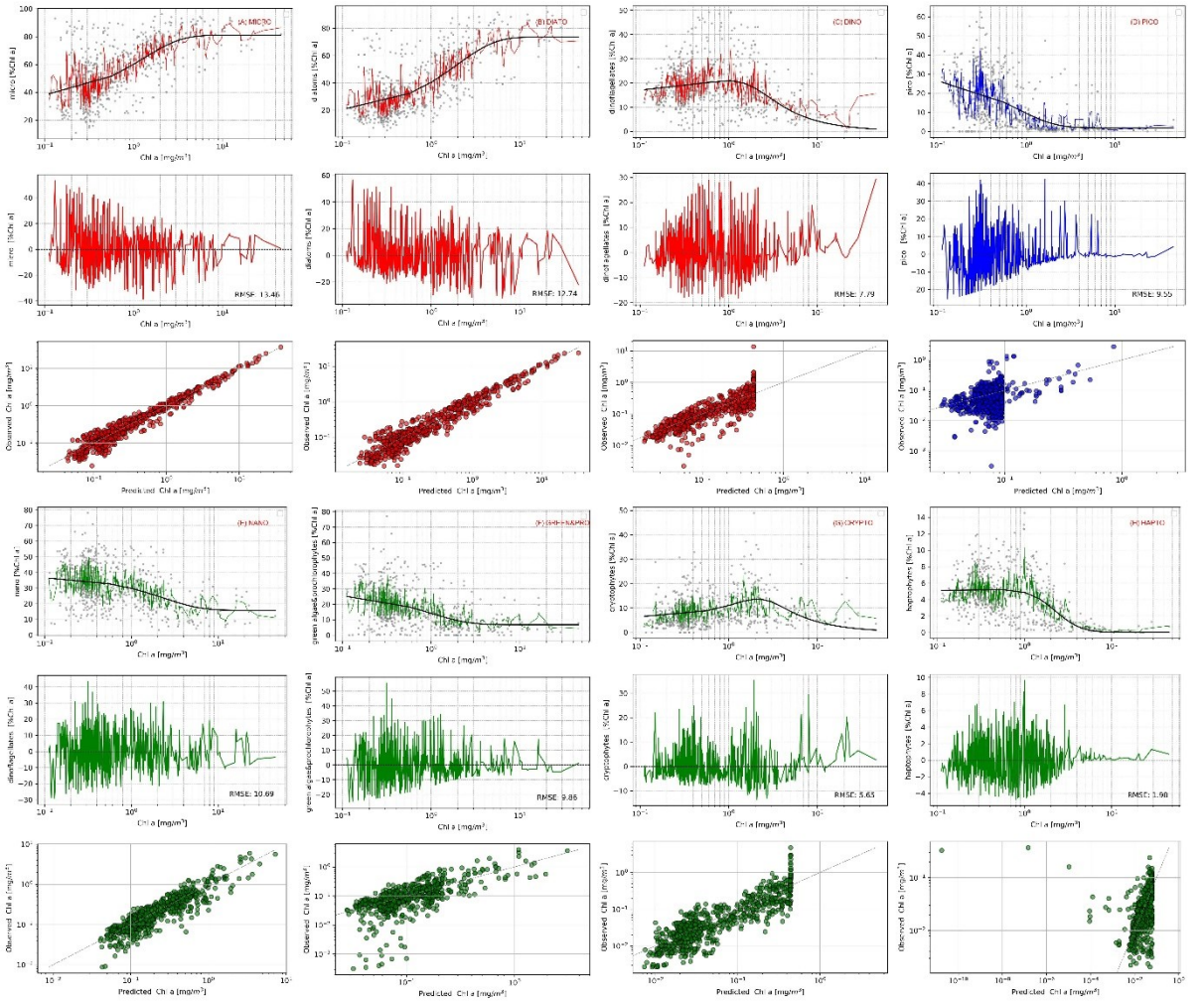
24/11/2025

Regionalized Algorithm: Black Sea

690 stations, HPLC dataset (2006–2019)





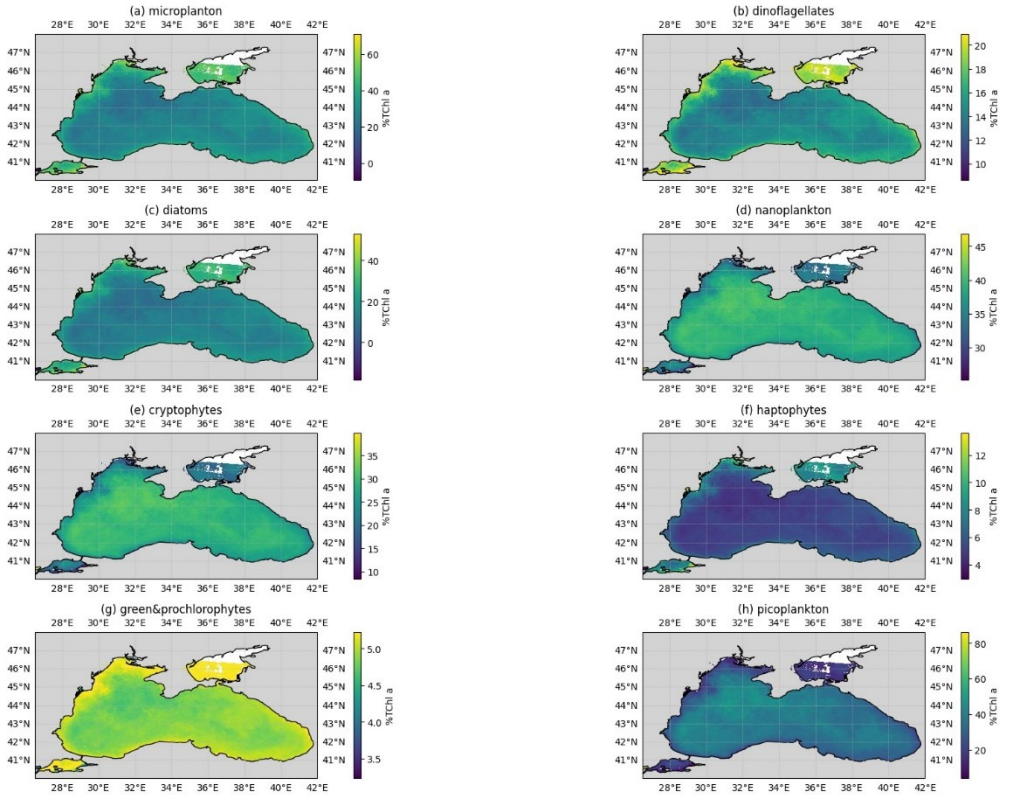
ΣDP =1.33·Fuco+2.42·Peri+2.94·Allo+2.78·Chl-*b*+0.15·Hex+0.34·But+2.30·Zea

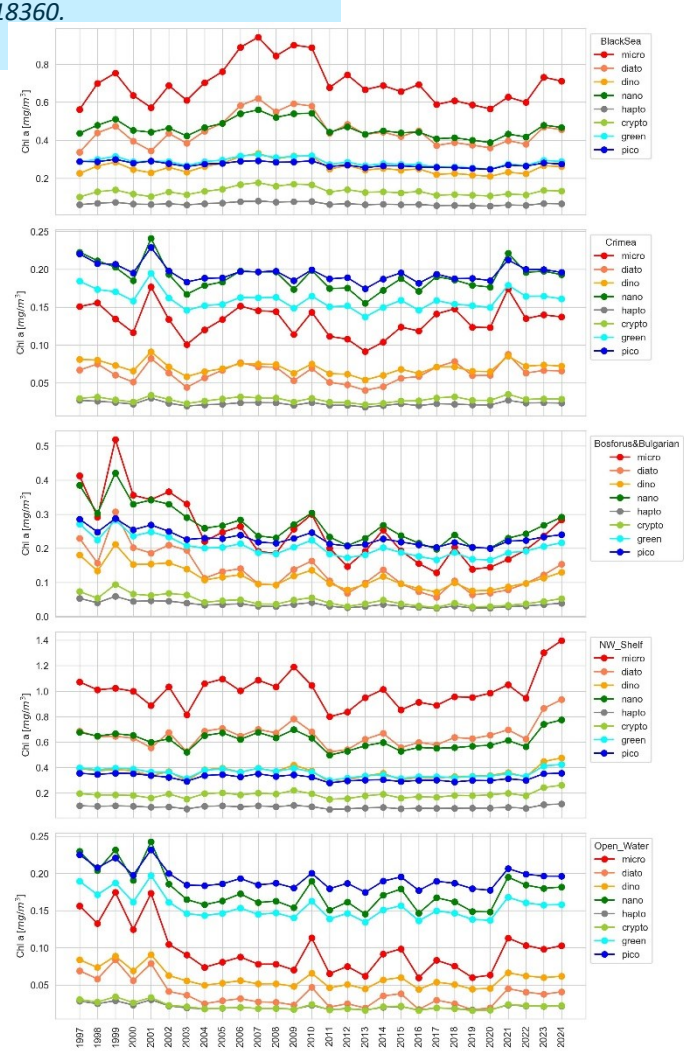
DESC	Equation	Parameters		
		a	b	c
micro	a·exp(-b·x) + c	-0.460	0.785	0.811
diatoms	micro-dino	- -	- -	- -
dinoflagellates	1 / (exp(a·x + b) + c·x)	-0.921	1.818	2.329
nano	a·exp(-b·x) + c	0.215	0.427	0.158
green&prochl	a·exp(-b·x) + c	0.206	1.018	0.067
cryptophytes	1 / (exp(a·x + b) + c·x)	-0.891	2.805	2.272
haptophytes	1 / (exp(a·x + b) + c·x)	0.558	2.989	-14.190
pico	a·exp(-b·x) + c	0.276	1.292	0.018

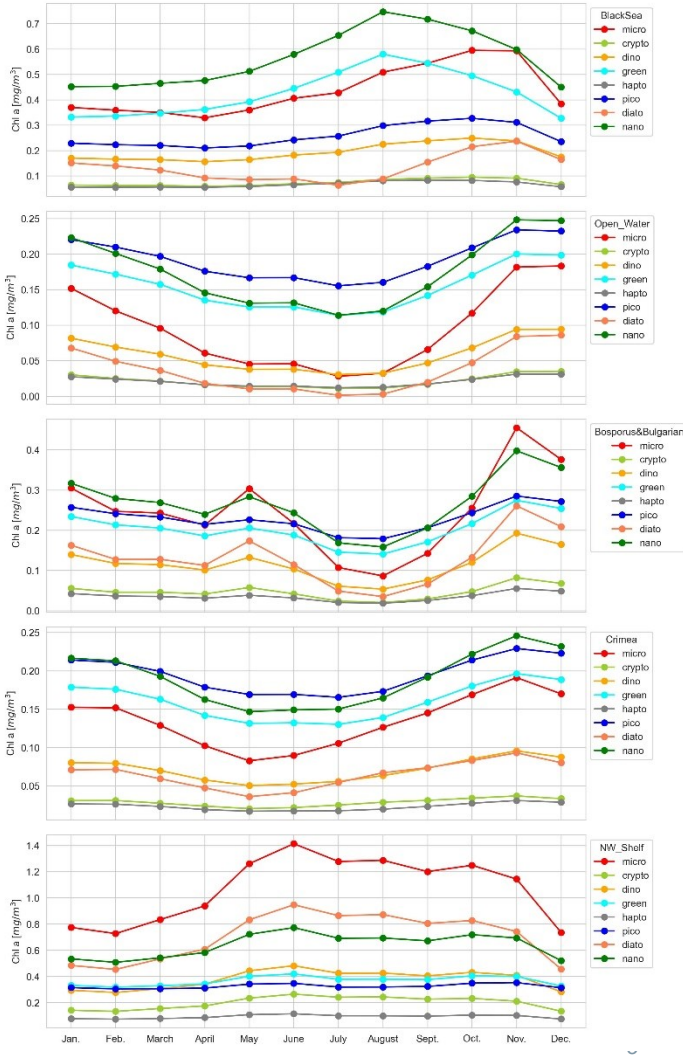
Regionalized Algorithm: Black Sea

Canuti, E. (2025). Phytoplankton functional types in the Black Sea: A regionalized algorithm for improving ecosystem monitoring by integrating in-situ HPLC pigment analysis and satellite observations. Marine Pollution Bulletin, 220, 118360. https://doi.org/10.1016/j.marpolbul.2025.118360

Chl-a, 1 km Level-4, CMEMS

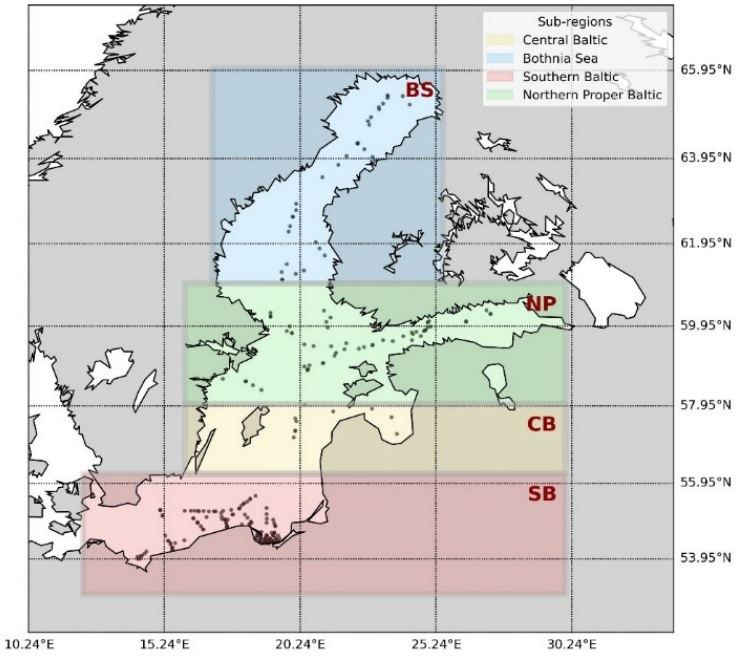






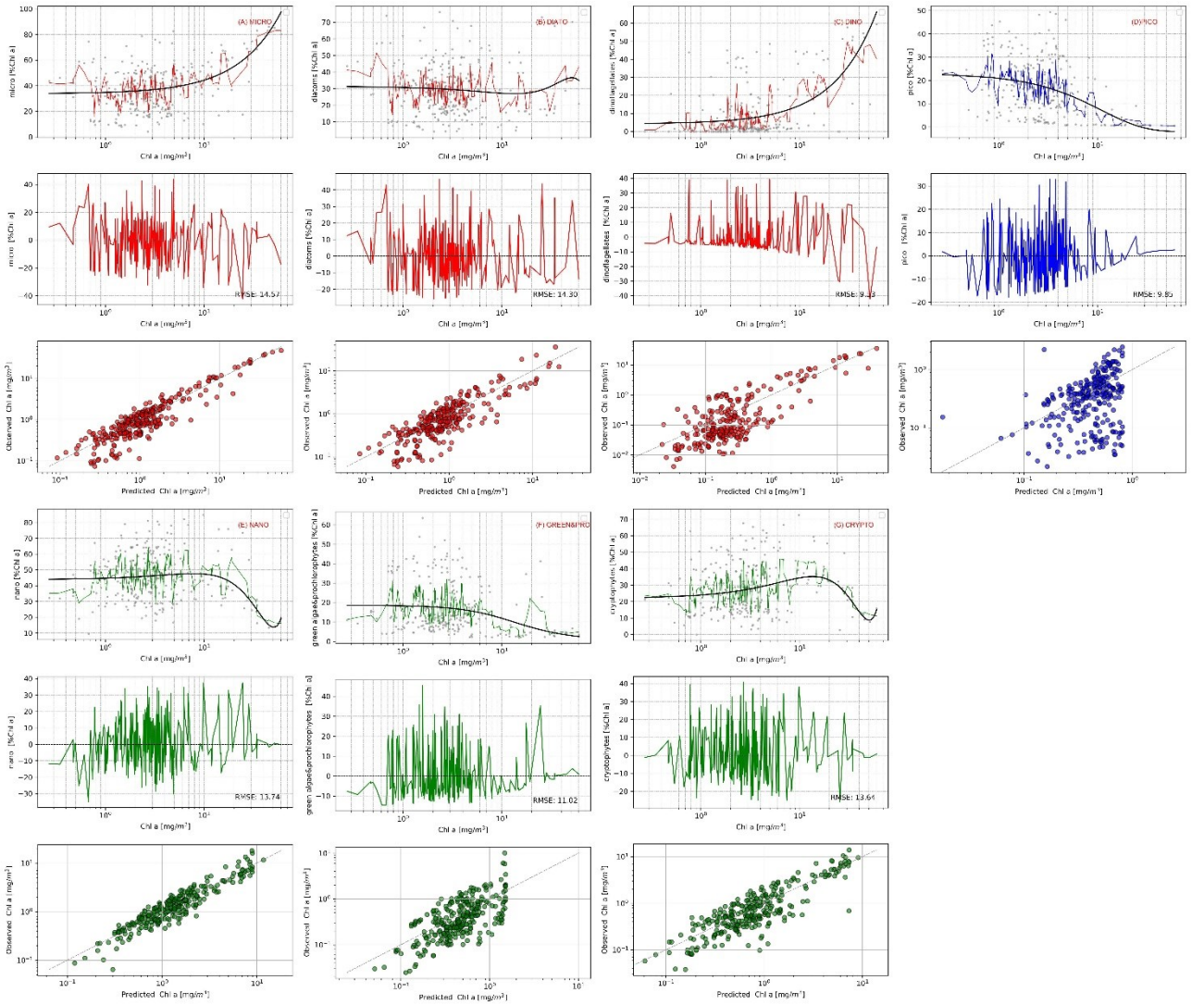
Regionalized Algorithm: Baltic Sea

289 stations, HPLC dataset (2004–2020)



ΣDP = 2.33*Fuco+1.67*Peri+3.28*Allo+1.7*Chlb+0.85*Hex+1.74*Zea

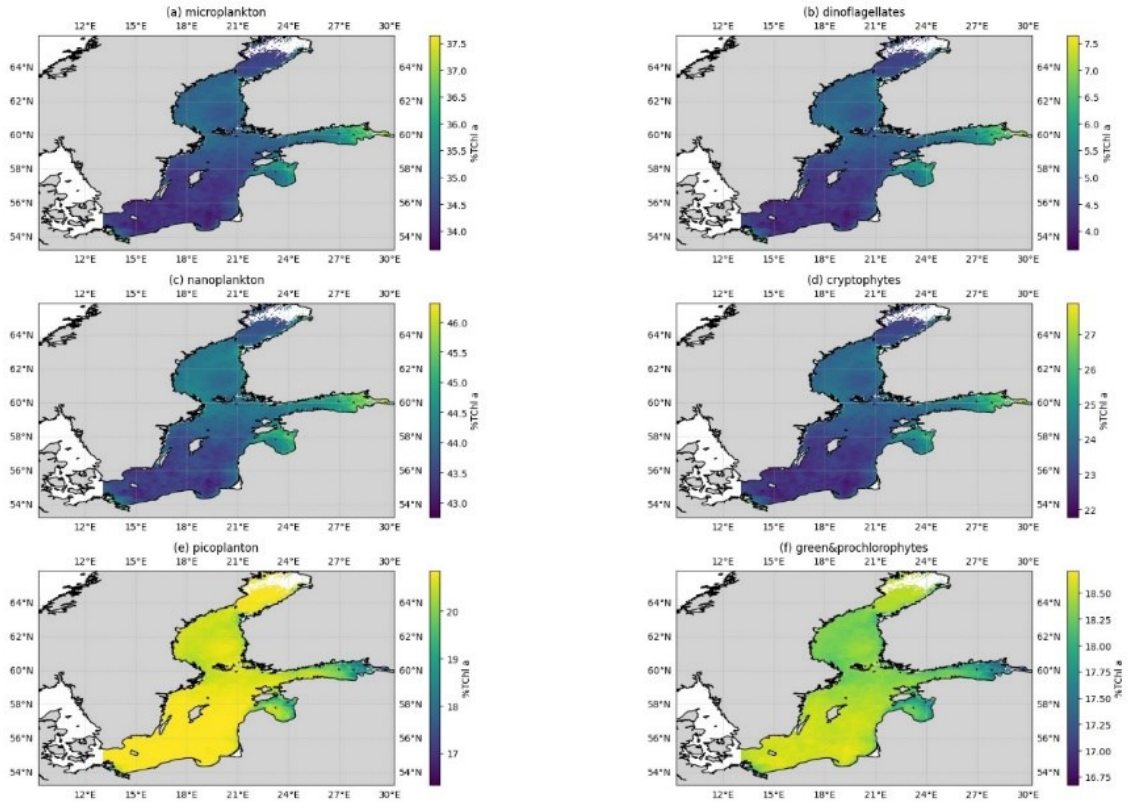
DESC		Parameters		
PSCs/PFTs	equations	a	b	c
micro	a * x + b	0.01	0.34	
diatoms	micro - dino			
dinoflagellates	a * x + b	0.01	0.04	
nano	1 / (exp(a * x + b) + c*x)	-0.07	0.84	0.10
green&prochl	1 / (exp(a * x + b) + c*x)	-0.11	1.68	0.66
cryptophytes	1 / (exp(a * x + b) + c*x)	-0.10	1.50	0.13
pico	1 / (exp(a * x + b) + c*x)	-0.26	1.57	1.17

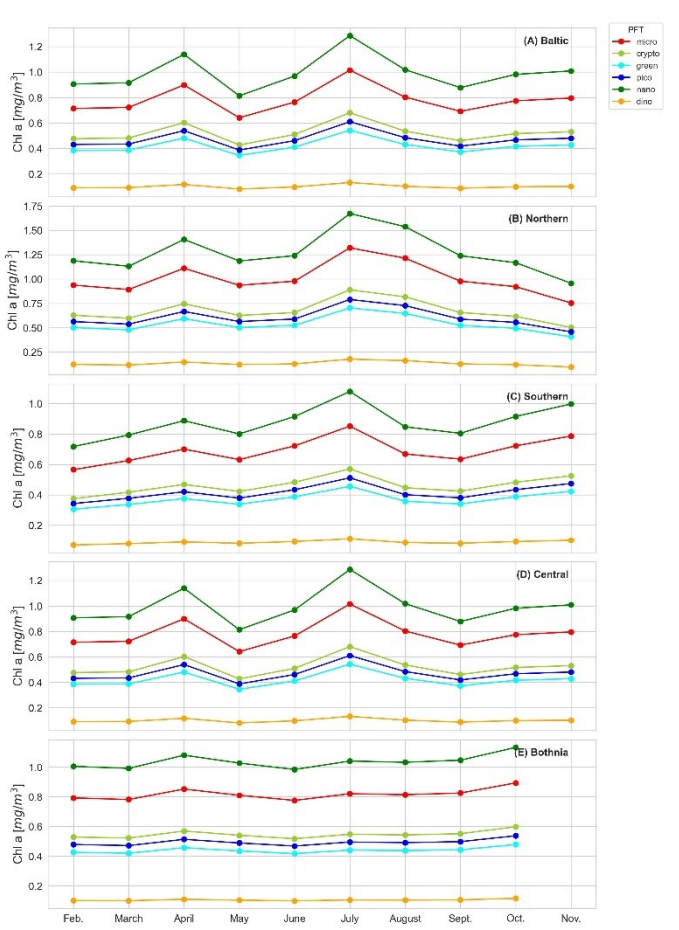


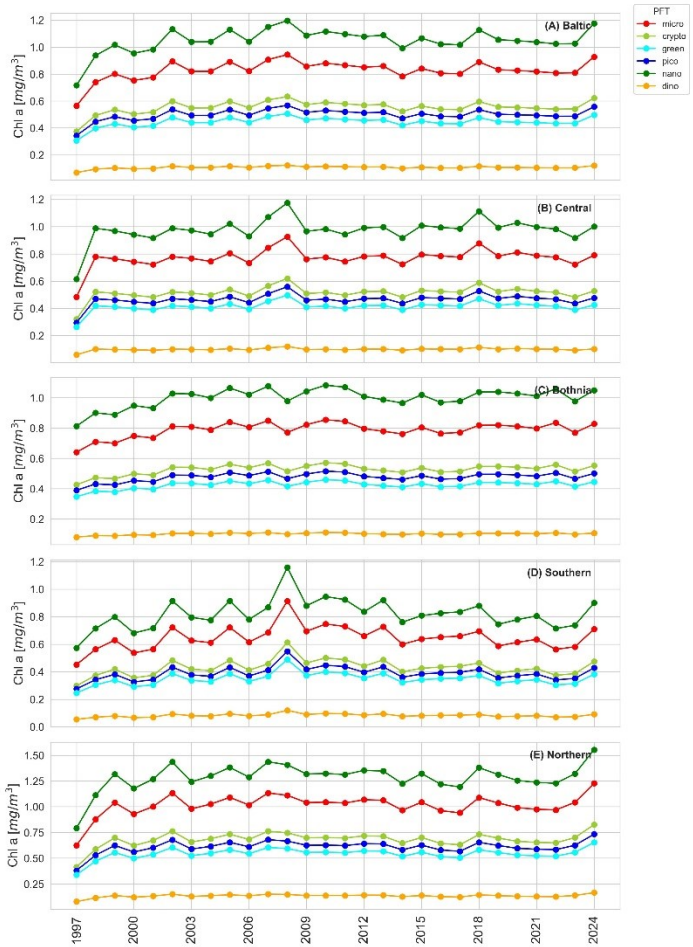
Regionalized Algorithm: Baltic Sea

Canuti, E. (2025, under review) Satellite-Based Estimation of Phytoplankton Functional Types in the Baltic Sea Using a Regionalized Algorithm [Ocean Modelling]

Chl-a, 1 km Level-4, CMEMS







Ocean Carbon from Space – Knowledge Gaps & Strategic Priorities

Time Horizon	Key Knowledge Gaps	Priority Actions
1 Year	- High uncertainty in remote retrievals (POC, DOC) due to limited calibration/validation. - Fragmented metadata, QC practices, and lack of climate-quality datasets.	- Establish community standards for metadata, QC, and uncertainty quantification. - Develop and share prototype retrieval algorithms with explicit error propagation.
5 Years	- Weak coverage and maturity of satellite-derived proxies for internal carbon pools (DIC, alkalinity, DOC). - Limited integration between satellite data, biogeochemical models, and data assimilation.	- Build regional ML/empirical models for DIC, alkalinity, DOC using remote + in situ data. - Implement multi-sensor assimilation frameworks (OC, SST, altimetry, chemical) into flux and budget products. - Expand sustained observing networks (BGC-Argo, moorings, gliders) to resolve vertical carbon structure and episodic events.
10 Years	- No globally consistent, high-resolution satellite-based product for all major ocean carbon pools and fluxes, with quantified uncertainties. - Challenges in closing the global/regional carbon budget with confidence.	- Produce an operational, uncertainty-aware global carbon flux and budget product, updated via reanalysis. - Build global capacity (data infrastructure, training, open tools) to integrate satellite carbon products into policy and climate assessments.