



Intercomparison of Phytoplankton functional types dynamics from satellite observations

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A new PFT products will be delivered at the next CMEMS EIS – May 2021



A new PFT product derived from EO (Ocean Colour) is provided at global level (4km, daily) and is using EOF algorithm (see Xi et al. 2020 & Xi et al. 2021) – see dedicated presentation in the same session. It provides concentrations of **Diatoms, dinophytes, haptophytes, green algae, prokaryotes and *Prochlorococcus***.

Here we want to compare different approaches for PFT derivation from EO knowing that:

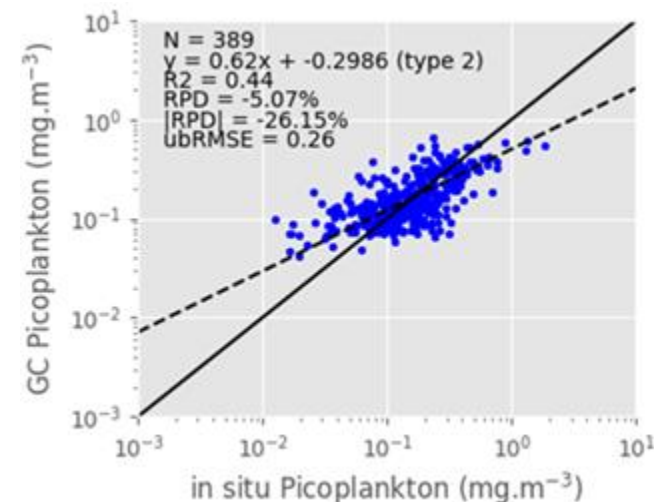
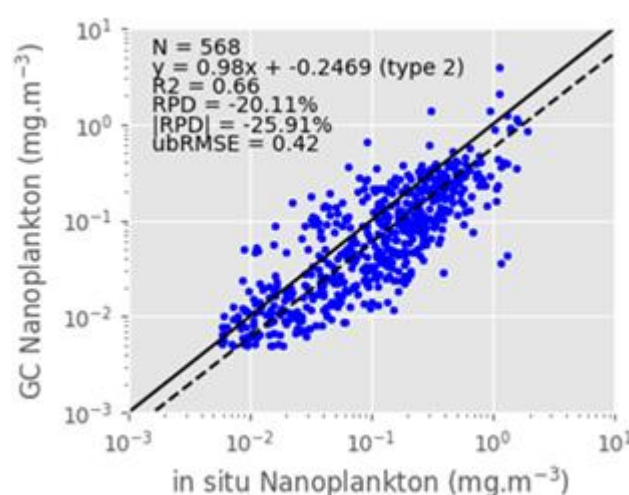
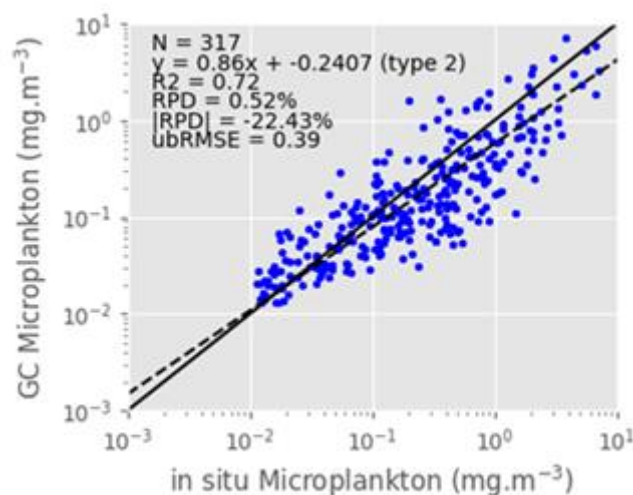
- ✓ PFT refers to Functional Types but are often assimilated to Size Distribution
- ✓ Some retrievals are based on quantitative estimations (e.g concentrations) while others are based on qualitative estimates (e.g dominance of one species in the water mass)

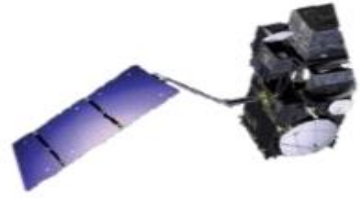
For a first estimates we did some assumptions on the connections between PFT and PSC

Variable			Metrics						
	Name	Units	N	r ²	Slope	Intercept	Bias	RMSD	ubRMSD
PFT	Diatoms*	mg/m ³	412	0,72	0,85	-0,28	0,13	0,44	0,42
	Dinoflagellates*	mg/m ³	378	0,61	0,79	-0,29	0,01	0,40	0,40
	Haptophytes*	mg/m ³	568	0,66	0,98	-0,25	0,23	0,42	0,35
	Green algae*	mg/m ³	413	0,59	0,71	-0,38	-0,01	0,33	0,33
	Prokaryotes*	mg/m ³	544	0,29	0,41	-0,56	-0,11	0,36	0,34
	<i>Prochlorococcus</i> *	mg/m ³	232	0,24	0,30	-1,06	-0,06	0,28	0,28
PSCs)	Microphytoplankton*	mg/m ³	317	0,72	0,86	-0,24	0,15	0,39	0,36
	Nanophytoplankton*	mg/m ³	568	0,66	0,98	-0,25	0,23	0,42	0,35
	Picophytoplankton*	mg/m ³	389	0,44	0,62	-0,30	-0,02	0,26	0,25

See CMEMS - QUID

CMEMS-OC-QUID-009-030-032-033-037-081-082-083-085-086-098



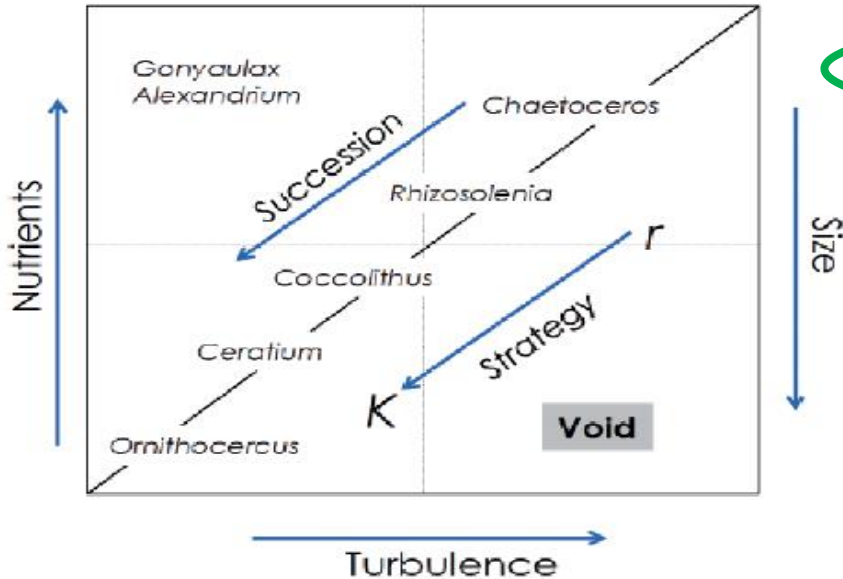


Ecological

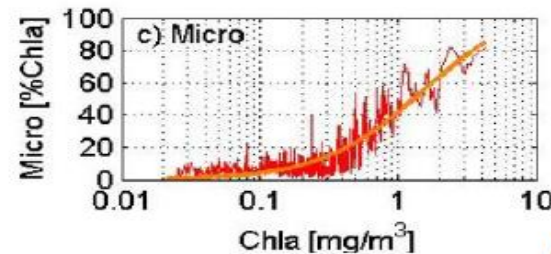
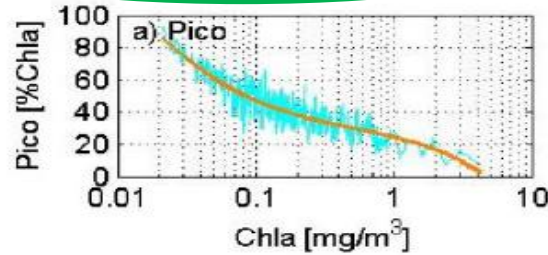
PSC/PFT

Spectral

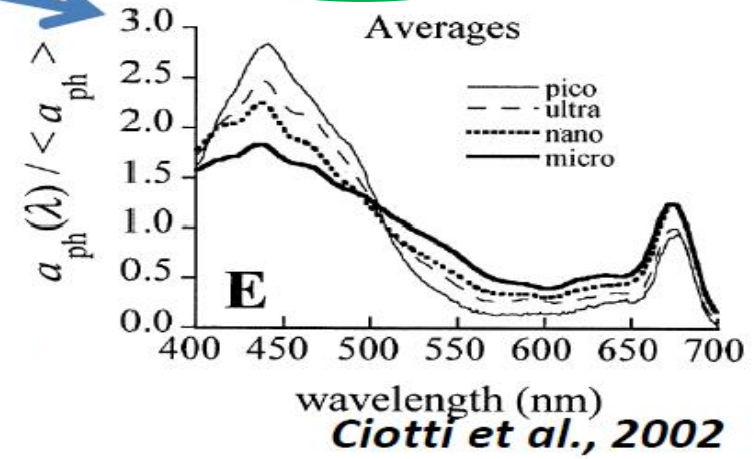
Abundance based



Glibert, 2016

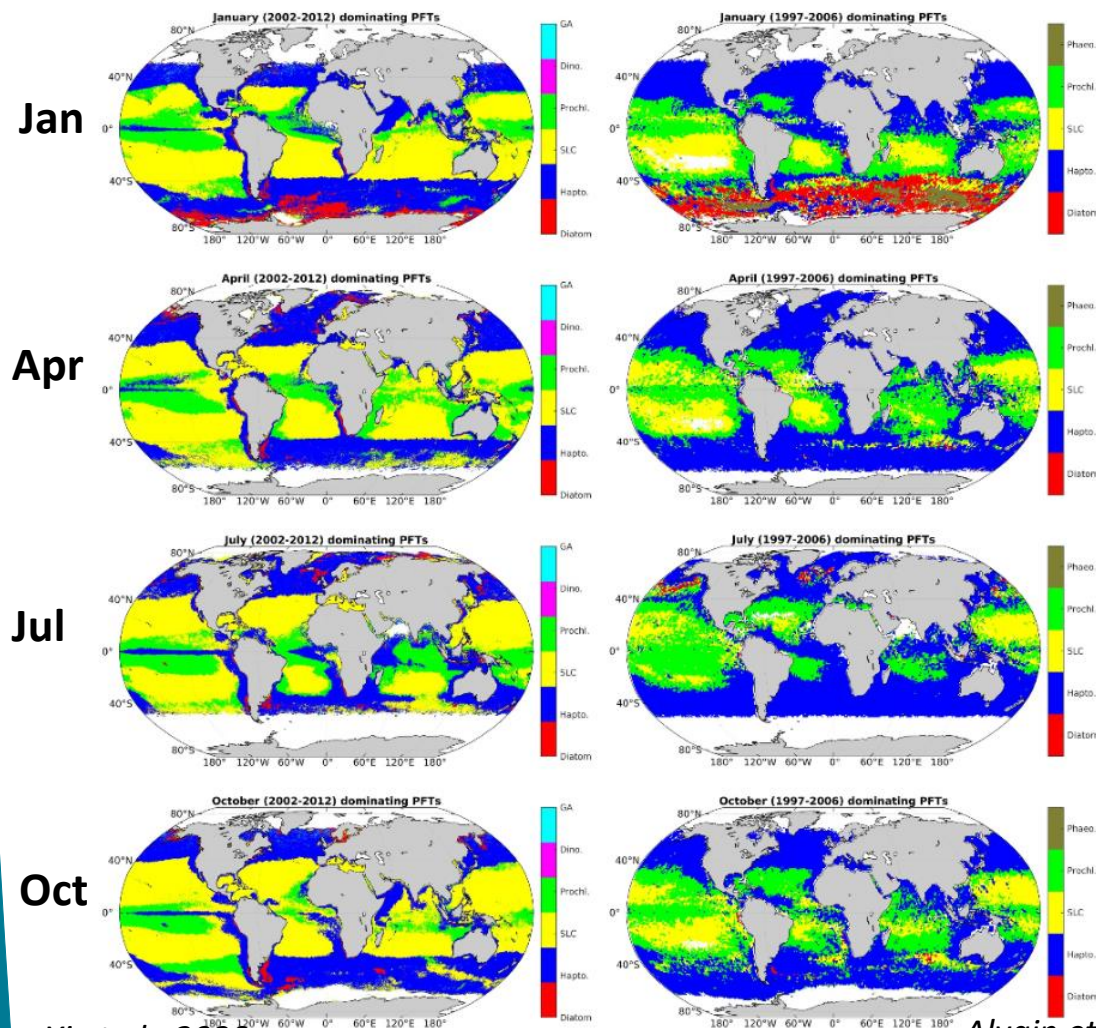


Hirata et al., 2011



2 PFTs algorithms compared (Alvain et al., 2008 and Xi et al., 2020), both based on spectral approach

Xi et al., 2020 is available on CMEMS ([OCEANCOLOUR_GLO_CHL_L3_REP_OBSERVATIONS_009_085](#))



PFT dominance (cf. Xi et al., 2020)

- Haptophytes
- Diatoms
- *Prochlorococcus*
- SCL

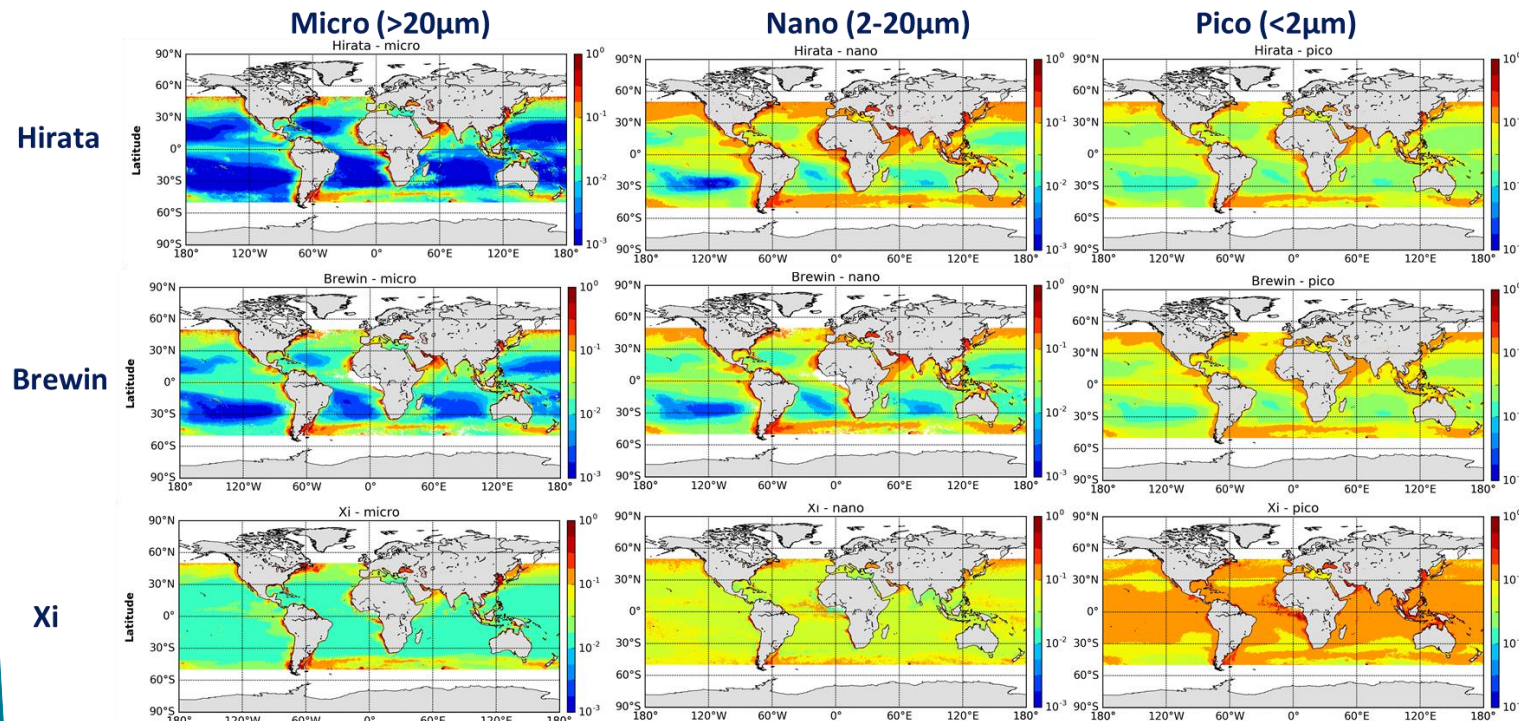
→ Good agreement between algorithm regarding the PFT dominance

- General dominance of Haptophytes
- Diatoms bloom in austral summer

→ Relatively lower seasonal pattern in Xi

3 PSCs algorithms compared (Hirata et al., 2011; Brewin et al., 2015 and Xi et al., 2020)

Xi et al., 2020 is available on CMEMS ([OCEANCOLOUR_GLO_CHL_L3_REP_OBSERVATIONS_009_085](#))



Micro- and nanoplankton pattern similar between approaches

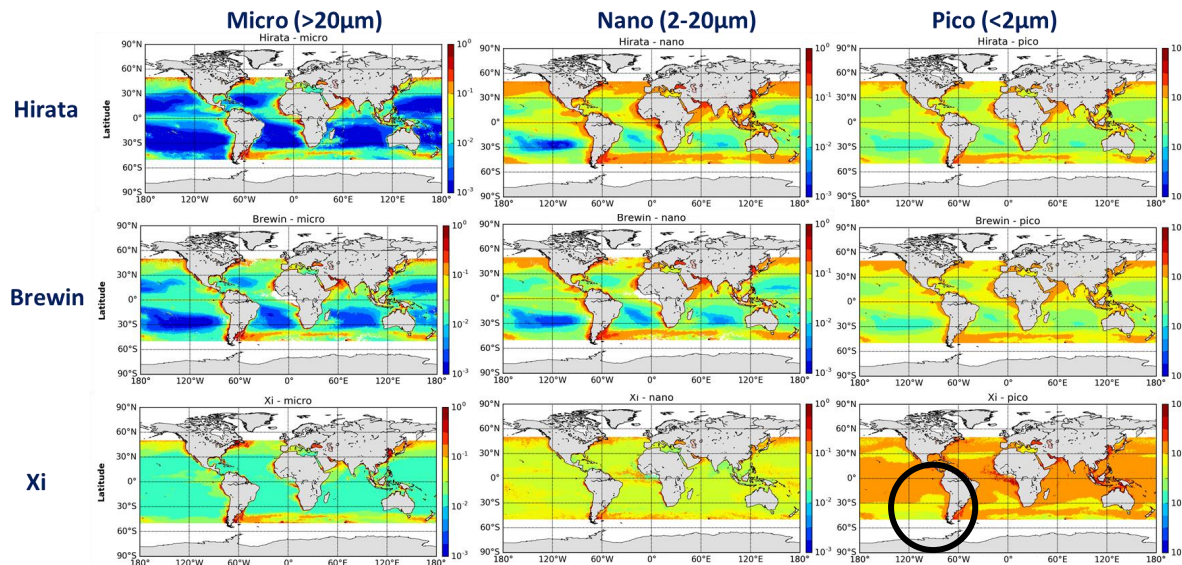
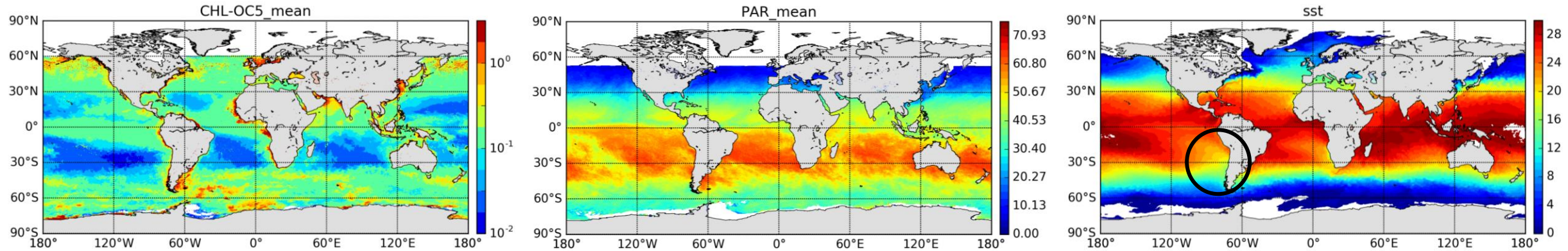
Strong similarities in abundance-based approaches

Potential underestimate in oligotrophic waters (concentration below 0,001 mg.m⁻³) for abundance-based

PSCs concentration smoother for Micro and Nano with Xi than Hirata and Brewin

Noticeable differences in Picoplankton concentration

Phytoplankton groups spatial repartition and environmental conditions



Strong influence of the chlorophyll concentration

SST explaining some patterns for Pico from Xi

This intercomparison analysis is a start that put in evidence the difficulty to quantitatively compare parameters under different types of “assemblage”.

After having here intercompared different datasets, next steps are started in order to:

- **Identify common matchups for all PFT sources and do the intercomparsion only for these matchups**
- **Make use of known (when known) uncertainties to do the comparison**



Thank you for your attention

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