Phytoplankton functional types in marine services

Antoine Mangin
am@acri.fr
Phytoplanton Functional Types depend on the function (IOCCG report#15)

Pragmatically, we share into:

- PFT for global approach: climate, PP, acidification
- PFT for « biological » cycle and ecological « modelling » (habitats, recruitment, aquaculture..)
- PFT in environmental and hazards monitoring ((H)AB)
- PFT in BGC modelling (not used so far – some attempts (Astrid))
There is a very big potential to use “EO PFT” in ecological modelling.

This potential is emerging thanks to a number of project promoting EO (not only Ocean Color) for fisheries and aquaculture.

Example – SAFI – FP7-EU project
Moreover with a large-scale statistical law:

- Fig. 1: Yearly mean of GSM_CHL1 from 2003-2013
- Fig. 2: Scatter plot of chlorophyll concentration vs. average annual weight of Mytilus edulis over 2 years
- Fig. 3: Map of potential habitat for Mytilus edulis

Thomas et al. 2011

\[ y = 11.439x - 4.4148 \]
\[ R^2 = 0.8738 \]
Life is not so simple, and a large number of research works have been carried out to make the link between maturity, fish farming location, ... and PFT

Raby et al. 1997

There is a large underuse of these results, and EO-PFT could get a good role in this type of « modelling »
The same observation can be done for oysters farming (Dupuy et al. 2000)

Statement of under-use applies also for the recruitment and abundance of small pelagic (depending on phytoplankton abundance and seasonal size) for which (EO) PFT is not applied (yet) but could significantly (if reliable) improve the statistical biomass estimation for fisheries ... probably more complicated

Problems of transposability of these results to others areas is, however, open
Several developments in POC retrieval (Loisel et al. 2015) open also the door to a better monitoring of the carrying capacity and of the environmental impact of fish/shrimp farming.

**ESA supported project**

**Sustainable Management of Aquaculture through Remote sensing Technology**
An increasing number of (H)AB can be detected (and/or alert can be triggered) from Ocean Colour – this « characterisation » of waters is of prime importance for farming (site selection and operation), bathing, sanitary purposes, water quality regulation and characterisation of anthropic pressures at coast.

Karenia mikimotoi, Lepidodinium chlorophorum, Coccolithophore, Karenia Brevis ...
• PFT for « biological » cycle and ecological « modelling » (habitats, recruitment, aquaculture..)

Users ; Researchers and emerging services
Maturity/Distribution ; PSD and PFT processed and distributed through GlobColour and OSS2015 dataset
Temporal percentage (green bars, left axis) of each phytoplankton group identified by PHYSAT-Med in the Ligurian Sea. Red and black dots (right axis) represent respectively the HPLC pigments ratio for DYFAMED and BOUSSOLE dataset in the first optical depth.

Navarro et al. 2014

Kostadinov et al., 2009

Number concentration (log scale) for phyto-, micro-, nano- and picoplankton classes
Users / products maturity / distribution

- PFT for « biological » cycle and ecological « modelling » (habitats, recruitment, aquaculture..)

Users ; Researchers and emerging services
Maturity/Distribution ; PSD and PFT processed and distributed through GlobColour

- PFT in environmental and hazards monitoring ((H)AB)

Users ; Researchers and emerging services
Maturity/Distribution ; distributed through various services (e.g. MCGS, Asimuth)

- PFT in BGC modelling

Users ; Researchers
Maturity/Distribution ; through GlobColour (OSS2015)

No PFT products distributed today through the Copernicus Marine Environment Monitoring Service - CMEMS
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Thanks for attention