

# Characterising the Building Blocks of Our Ocean

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## What is ocean biogeochemistry?

Ocean biogeochemistry primarily focuses on the interactions between chemical elements (e.g. nitrogen, carbon) and biological organisms (e.g. plankton) in the oceans. Its study is important because:

- Biological processes (e.g. phytoplankton growth) and chemical cycling in the ocean are the underlying processes on which all ocean life depend.
- These processes have a huge effect on the carbon cycle, they influence the composition of marine ecosystems and they are subject to major modifications with climate change.
- Today observations are restricted to ship-based sampling and some fixed buoys.

## Key project objectives

The EU FP7 funded OSS2015 project focuses on nowcast, forecast and climatology of the biogeochemical properties of the ocean mixed layer.

Key objectives are:

- Assimilate Earth Observation and *in situ* ocean colour data into models
- Enhance and validate a number of biogeochemical products
- Develop an "on-demand" user service for product delivery to complement MyOcean

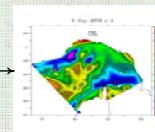
## Benefits of combining *in situ* and EO data

- Bio-profiler and Earth Observation data are combined in order to relate remotely detected surface optical properties and chlorophyll to their vertical distribution.
- Model outputs and EO data can be used to optimise *in situ* field campaigns and glider deployment to most important areas.
- Mix of models, EO and *in-situ* data allows development of diagnostic indices to describe the state, health and general characteristics of marine ecosystems.

New profilers such as bio-Argo measure Chlorophyll, coloured dissolved organic matter (CDOM) and irradiance at depth.



Sentinel-3 (launch 2014) will build on ESA's and other agencies history of ocean colour measurements (e.g. MERIS, MODIS, SeaWiFS).



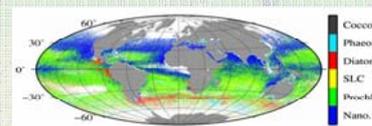
## A range of global improved biogeochemical products

**Net Primary Production (NPP):** the quantity of carbon fixed by phytoplankton through photosynthesis.

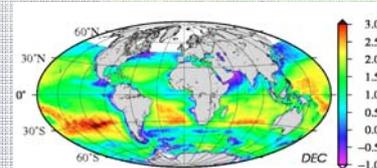
**Phytoplankton Functional Type (PFT):** knowledge of spatial and temporal distribution and variability of different phytoplankton groups and their biogeochemical role is crucial to understand and predict the role of the ocean in climate change.

**Water Particle Organic Carbon (POC):** crucial to assess carbon budgets and fluxes globally.

**Index of Particle Size Distribution (PSD):** used to assess contributions made by phytoplankton functional groups to primary production, particle sinking, and carbon sequestration.



Global climatology of phytoplankton groups (PFT) over the 1997-2010 SeaWiFS period based on the identification of specific signatures in the water-leaving radiance measurements spectra (nLW) from ocean colour sensor measurements (PHYSAT-SOM approach – Hubert Loisel, ULCO).

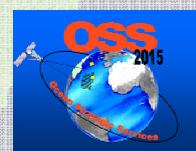


Global monthly distribution (December 2005) of the slope of the backscattering coefficient derived from SeaWiFS data. The slope is a proxy for the dominant particle size (PSD) of an assemblage. (Algorithm – Hubert Loisel, ULCO).



## Flexibility for the user

Ocean Strategic Services Beyond 2015 (OSS2015) will complement MyOcean (the GMES Marine Core Service). However it will allow users to select data sources to be processed into derived products and provide a wider suite of biogeochemical products.



The research leading to these results is receiving funding from the European Commission's 7<sup>th</sup> Framework Programme FP7/2007-2013 under grant agreement No. FP7-SPA.2011.1.5-03/Collaborative project No. 282723 (OSS2015)

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Project Duration: 2011-2014