

# Ocean Carbon From Space Workshop

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Summarised in bullet points are the challenges, gaps and opportunities from the session 'Phytoplankton and primary production' as provided by the session chairs, poster presenters, oral presenters and during the discussion session on Thursday 17<sup>th</sup> of February 2020.

## Session chairs

- Linking surface satellite measurements to vertical distribution
- Accurate representation of the spatial and temporal variability of model parameters
- Uncertainty estimation and trends of primary production estimates
- Unifying the integration of primary production across interfaces

## Poster presenters

- Need for more and high quality *in situ* data
  - o Standard conversion factors and protocols, including those for ancillary measurements
  - o Use of novel *in situ* platforms
  - o Continuous measurements
  - o Uncertainty characterisation
- Eliminate data gaps in satellite observations
  - o More frequent satellite observations to avoid cloudy pixels
  - o Improve coverage in Polar regions
  - o Assimilation of satellite data into models
- Resolve vertical structure of PP, Chl, PAR
- Need for higher spatial and temporal resolution products
  - o To study for example diurnal variability
  - o Regional models/algorithms with aim to merge/nest models for larger scale estimates
- Use of emerging (hyperspectral) sensors
  - o Need for hyperspectral algorithms that partition phytoplankton composition
- Better understand relationship between PP, community structure and environment

## Oral presenters

- Need for more and better quality *in situ* data
  - o Continued financial support for *in situ* observations
  - o Synergy across data sources (multiplatform sensors, satellite data)
  - o Use of active fluorescence based methods
- Resolve vertical structure of PP, Chl, PAR
- Use of emerging (hyperspectral, geostationary) sensors
- Benefit from enhanced computational capacity
- Include inland and coastal waters
- Meet challenges of the UN Ocean Decade

## Discussion session

- Need for consistent and continuous satellite records for climate research
- Need for more, high quality *in situ* data for development and validation of satellite algorithms
  - o Formulate priorities for funding (long-term time series, novel measurements)

- Coordination at international level is required
- Consider carbon footprint of different data sources
- Continuous validation is crucial (not just after launch of a satellite sensor)
- Need for better physical products, such as MLD, including uncertainties
- Understand feedbacks between physics and biology, how biology affects the carbon cycle, if primary production affects anthropogenic carbon at global and/or regional scales
- Understand the fate of primary production, i.e. secondary and export production
- Better understand the interactions between different components of the Earth System
- Deal with noise in non-linear systems (for example to assess the impact of extreme events)