NASA strategies for PFT algorithm validation

International Ocean Colour Science Meeting 2019

Breakout WS2: Coming to rapid consensus on science requirements for assessing phytoplankton composition from satellite imagery

> Ryan Vandermeulen NASA Goddard Space Flight Center

Pressing Needs for Validation

- Ensure consistent data quality for *in situ* records of taxonomic data.
- Establish repository for PFT data, cross-validation/integration.
- Maximize in situ data coverage, geographically and temporally.
- Integrate algorithm development into software for community use.
- Obtain unambiguous metric(s) of phytoplankton diversity alongside 'gold standard' metric of Ocean Color (AOPs/IOPs).





Proposed Level 1b data format for taxonomic data sets

• **GOAL:** Develop standards and practices for processing phytoplankton taxonomic and size class data collected from automated imaging technologies, including imaging-in-flow cytometry, and reporting these data types to public repositories.



- Prescribes common format, standardized units.
- Serves as a platform for further processing data into higher level products (e.g., abundance, biovolume, carbon products).
- Identification assignment uses namespaces (i.e., ID codes representing taxonomic or object identification, rather than uncontrolled, spelled-out, text naming).



INTEGRATION OF PFT/PSC ALGORITHMS INTO SEADAS

- Incorporate multiple PFT/PSC algorithms into l2gen/SeaDAS to help facilitate community vetting and validation efforts.
- Enables import/overlays of in situ data, time-series analysis, statistical tools, etc. for a broad base of users.
- Expecting PFT algorithms to be proposed to PACE Science Team.

2111260



From laboratory to Top of atmosphere: Developing spectral libraries to detect globally significant algal groups from space



A. Mannino¹, A.R. Neeley¹, R.A. Vandermeulen¹, **M. Lomas² (Pl)** ¹Ocean Ecology Laboratory (616) NASA GSFC, ²Bigelow Laboratory for Ocean Sciences



This work demonstrates collaborative efforts between NASA and the Bigelow Laboratory for Ocean Sciences, to develop an extensive ocean phytoplankton (algae) spectral library. Each phytoplankton group has a unique role in biological carbon cycling, as well as a unique spectral signature, and each component of that signature is individually measured in the laboratory. The results will be coupled with satellite radiance products to improve our ability to observe and predict changes in several algal groups in response to climate change.

NASA PFT validation

- Production of data standards for taxon-resolved phytoplankton observations via OCB Taxonomy Working Group (Sosik et al.)
- Incorporation of PFT imaging data into SeaBASS, BCO-DMO format (Proctor/Neeley et al.)
- Development of theoretical background linking IOPs/AOPs to individual/mixed phytoplankton cultures, with environmental stressor experiments (Mannino et al.)
- Increasing taxonomic resolution via integration of multiple technological platforms (EXPORTS Particle Characterization WG, Karp-Boss et al)
- Implementation of PFT/PSC algorithms into I2gen/SeaDAS
 (PACE Science Team)