A Net Primary Production (NPP) algorithm for application to PACE OCI

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Goal: To deliver a launch-ready NPP algorithm that capitalizes on the hyperspectral retrievals of the PACE Ocean Color Instrument (OCI). Focus on three tasks:

1. Use of retrieved hyperspectral phytoplankton absorption, $a_{ph}(\lambda)$
   - absorption $>>$ Chl
   - Several inversions for $a_{ph}(\lambda)$ from PACE SAT

2. Use of retrieved hyperspectral particulate backscattering, $b_{bp}(\lambda)$
   - $\gamma_{bbp}$ can be related to PSD and PCC
   - $b_{bp}(\lambda)$ and $\gamma_{bbp}$ can be used to estimate $C_{phyto}$

3. Use of hyperspectral resolution around the chlorophyll fluorescence emission region (~650-750 nm)
   - Improve FLH via dynamic baseline correction
   - Use FLH to correct for iron stress effect on NPP
   - Investigate better ways to quantify fluorescence

* We will also provide estimates of phytoplankton biomass ($C_{phyto}$) and growth rate ($\mu$)

“PACE-analog” field dataset will be used for algorithm development and validation

<table>
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<tr>
<th>Cruise</th>
<th>Region</th>
<th>PACE-analog properties</th>
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<tr>
<td>NAAMES</td>
<td>N. Atlantic</td>
<td>$a_{ph}(\lambda)^1, b_{bp}(\lambda)^2, R_{ys}(\lambda)$</td>
<td>NPP, $\mu^1$, $C_{phyto}^4$, LISST, CC, IFCB</td>
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<td>N. Pacific</td>
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WETLabs – Laser In-situ Scattering and Transmission instrument
1 WETLabs AC-S and filter-pad measurements
2 WETLabs ECO BB3 & WETLabs ECO BB9
3 From dilution experiments [Landry & Hassett, 1982]
4 Graff et al. (2015)
5 WETLabs ECO BB9 & HOBILabs Hydroscat
6 Estimated from cell cycle analysis [Carpenter et al., 1998]