Quantifying uncertainties in phytoplankton absorption coefficients for accurate validation of the PACE ocean color sensor: moving towards satellite retrieved phytoplankton functional types (PFTs)

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So in thinking about my project objectives I worked my way backward

- Invert ocean color signal to retrieve hyperspectral phytoplankton absorption coefficients
- Requires capability to validate with uncertainties

http://wamis.meraka.org.za/modis-basics
Step 1. Retrieved phytoplankton absorption spectrum validated against exponentially-weighted profile of spectral phytoplankton absorption

Collaboration: Ackleson

- 2. $K_d(\lambda, z)$
- 3. Profile $a(\lambda)$
  - Environmental considerations
  - Spatial temporal scales
- 4. No scattering error
- 5. Phytoplankton signal extracted
Step 4. Profile of hyperspectral absorption with minimized scattering error, quantified uncertainty

Collaboration
Twardowski, Sullivan, Boss

- Hyperspectral, but scattering error
  - WETLabs acs
- No scattering error, but multispectral
  - Turner ICAM
Step 5. Extract phytoplankton absorption signal from total absorption from existing (and new) models, quantifying model uncertainties

Collaboration: Stramski, Reynolds

\[ a_T = a_w + a_{phyt} + a_{nap} + a_{cdom} \]
Step 6. Validate model estimation against in situ phytoplankton absorption spectra determined spectrophotometrically on glass fiber filter pads, quantifying uncertainty in QFT

**Collaboration**
Stramski, Reynolds
Mitchell?

- 7. filter pad absorption configuration
  - scattering error
  - beta correction
- 8. Retrospective reprocessing
Conclusions

Pigment-based Phytoplankton Functional Types

Hyperspectral Phytoplankton Absorption Coefficients

Modeled from in situ profiles of total absorption

spectrophotometric analysis discrete filter pad samples,

Uncertainties in PFT approach

Uncertainties in situ measured absorption

Uncertainties in phytoplankton absorption models

Uncertainties spectrophotometric analysis

Environmental Uncertainties

Measurement Uncertainties

Scattering loss Uncertainties

Amplification Uncertainties