How useful will the PACE UV bands be for IOP retrievals and atmospheric correction?

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PACE and UV Bands

The addition of UV bands in ocean color sensors is designed to address 2 types of issues:

- Better discriminate between phytoplankton and CDOM absorption
- “Anchor” atmospheric correction at short wavelengths

Proposed Work

1. IOP retrievals from a semi-analytical bio-optical model, with and without UV bands

2. How does noise from atmospheric correction affect marine reflectance spectrally (UV to red) and thus the IOP retrievals

3. QC atmospheric correction and the presence of absorbing aerosols from modeled reflectance in the UV-Blue region.

1. UV Bands and the IOP retrievals from a semi-analytical bio-optical model

New GSM model:

No constant parameters
Rrs = f(bb/a)
18 wavelengths

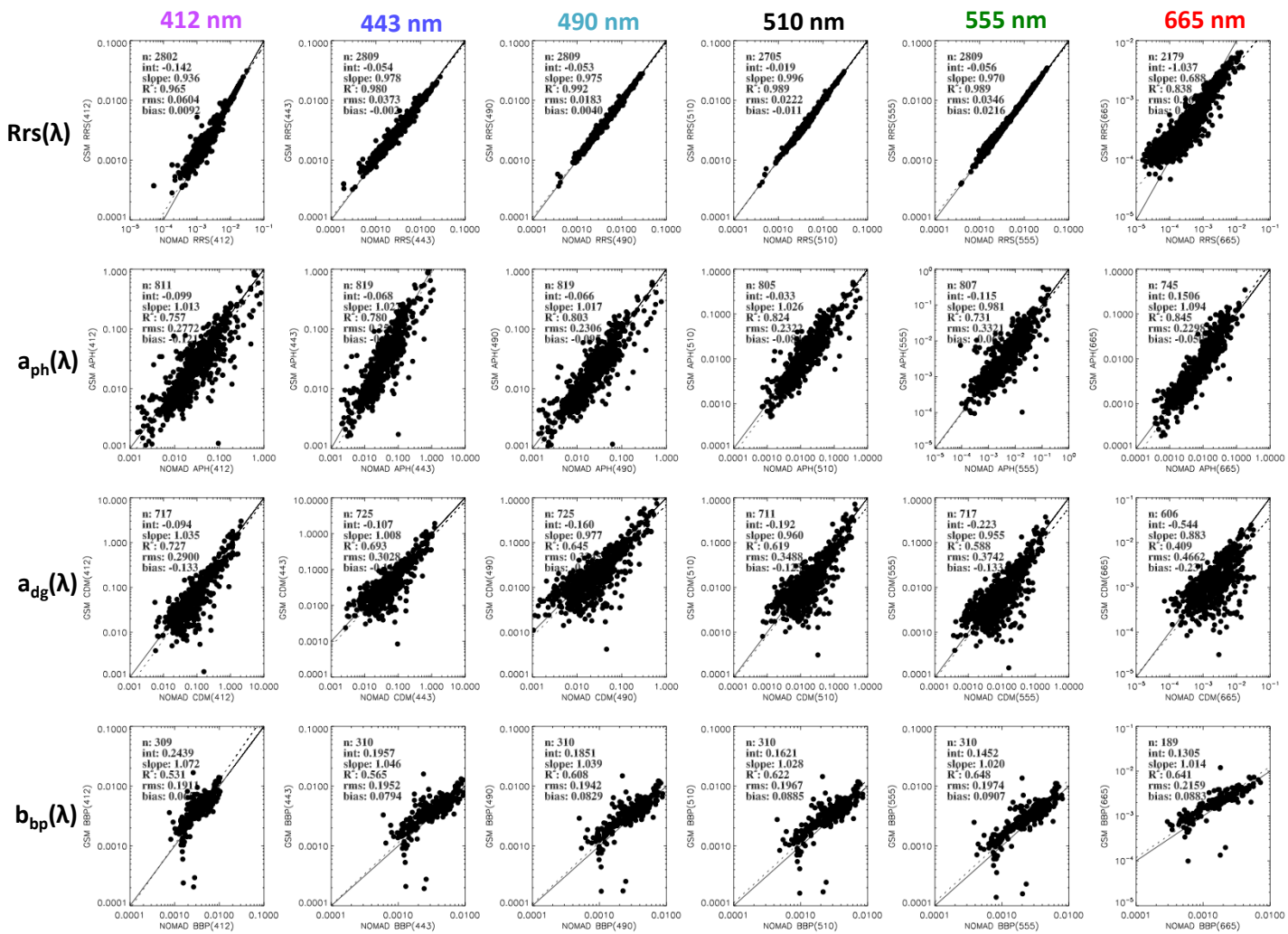
Improved spectral accuracy

UV issues
Location, processing

PACE In situ data Sub-group

PACE IOP Inversion Sub-group

New GSM model – NOMAD data



2. How does noise from atmospheric correction affect marine reflectance spectrally (UV to red) and thus the IOP retrievals ?

Development of some work with Menghua Wang for ACE

1240 | 2130
1240 | 1640
765 | 865

Gaussian random noise
σ = f(1/SNR)

TOA radiance
340-700 nm + AC bands

Atmospheric Correction
- 2 aerosol models
- 4 AOTs (0.05 – 0.3)
- Black Ocean

$Rrs_{ac}(\lambda)$

Chl (0.01-30 mg m^{-3})

Forward model

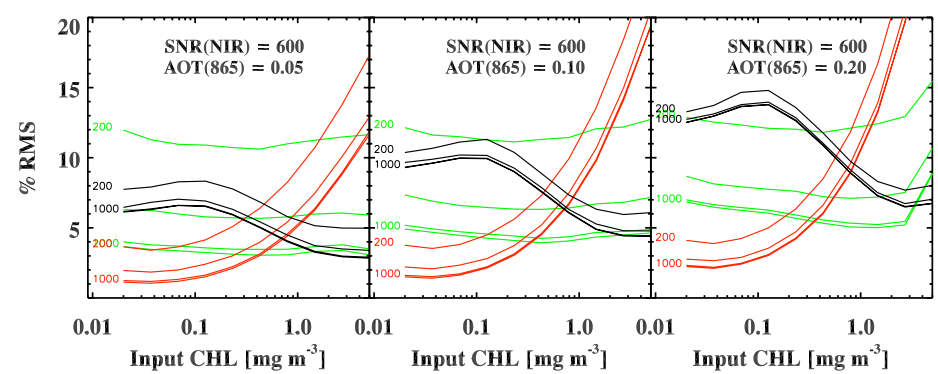
Gaussian random noise

$Rrs_{oc}(\lambda)$

Semi-analytical model

IOPs

Comparison with noise-free case



- Marine model didn't cover the UV
- Analysis restricted to 443 nm
- Forward model not representative of coastal waters

3. QC atmospheric correction and the presence of absorbing aerosols from modeled reflectance in the UV-Blue

Model reflectance at short wavelengths (UV-Blue) from Rrs and IOPs at longer wavelengths

Use Rrs and IOPs from λs little affected by AC errors ($\lambda > 500$ nm) to predict Rrs values at shorter wavelengths (UV-Blue) → "Clean atmosphere" Rrs spectrum

Use the modeled Rrs spectrum to QC the after AC Rrs spectrum.

Investigate long-to-short wavelength relationships in IOPs and Rrs to estimate an "atmosphere free" reflectance at short wavelengths.