Ocean Color Reprocessing

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and the

Ocean Biology Processing Group

Contents

- Overall Scope and Timeframe
- Current Processing Status
- Changes Planned for Reprocessing
- Summary

The Great Ocean Color Reprocessing

Scope:

- sensors: MODISA, MODIST, SeaWiFS, OCTS, CZCS
- suites: **OC**, PAR, CLCT, FLH, POC, ZEU, IOP
- *software & analysis by Sep, processing by end of 2008*

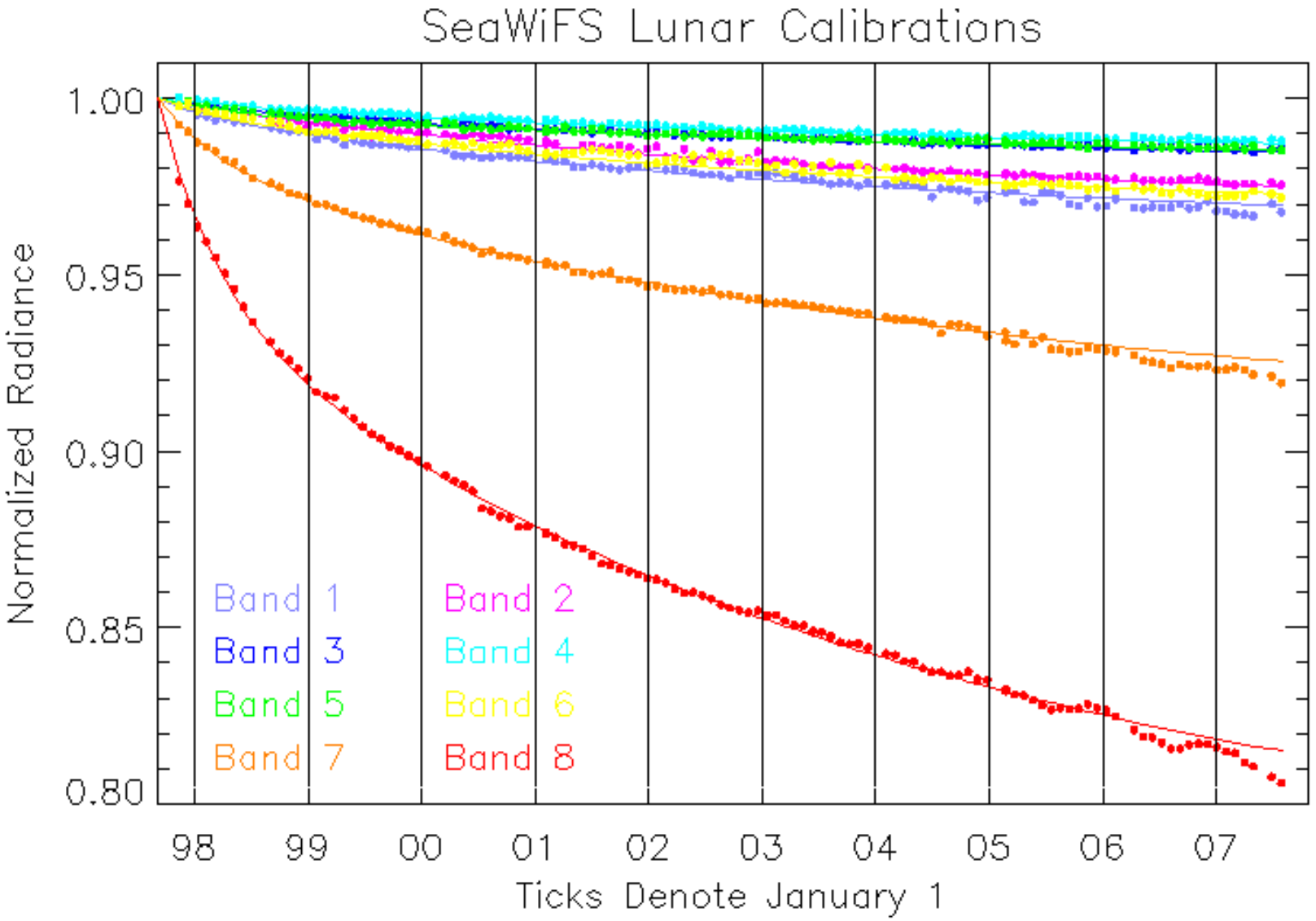
Goals:

- improve absolute accuracy of derived products (L2 & L3)
- reduce instrumental artifacts (temporal & spatial)
- improve agreement between sensors
- update product format & content, filenames, flags/masks
- comprehensive product and software documentation

Previous (Re)processings

Sensor	Date	Version
SeaWiFS	Jul 2005	5.1
MODIS-Aqua	Aug 2005	1.1
OCTS	Oct 2006	1.0
CZCS	Oct 2006	1.0 (+nav update)
MODIS-Terra	Jan 2007	0.0 (forward only)

Since 2007: focusing on MODIS-Terra characterization, coastal processing, new products, new missions, publication


SeaWiFS Lunar Calibrations
Normalized Radiance
1.00
0.95
0.90
0.85
0.80
Band 1
Band 2
Band 3
Band 4
Band 5
Band 6
Band 7
Band 8
98
99
00
01
02
03
04
05
06
07
Ticks Denote January 1

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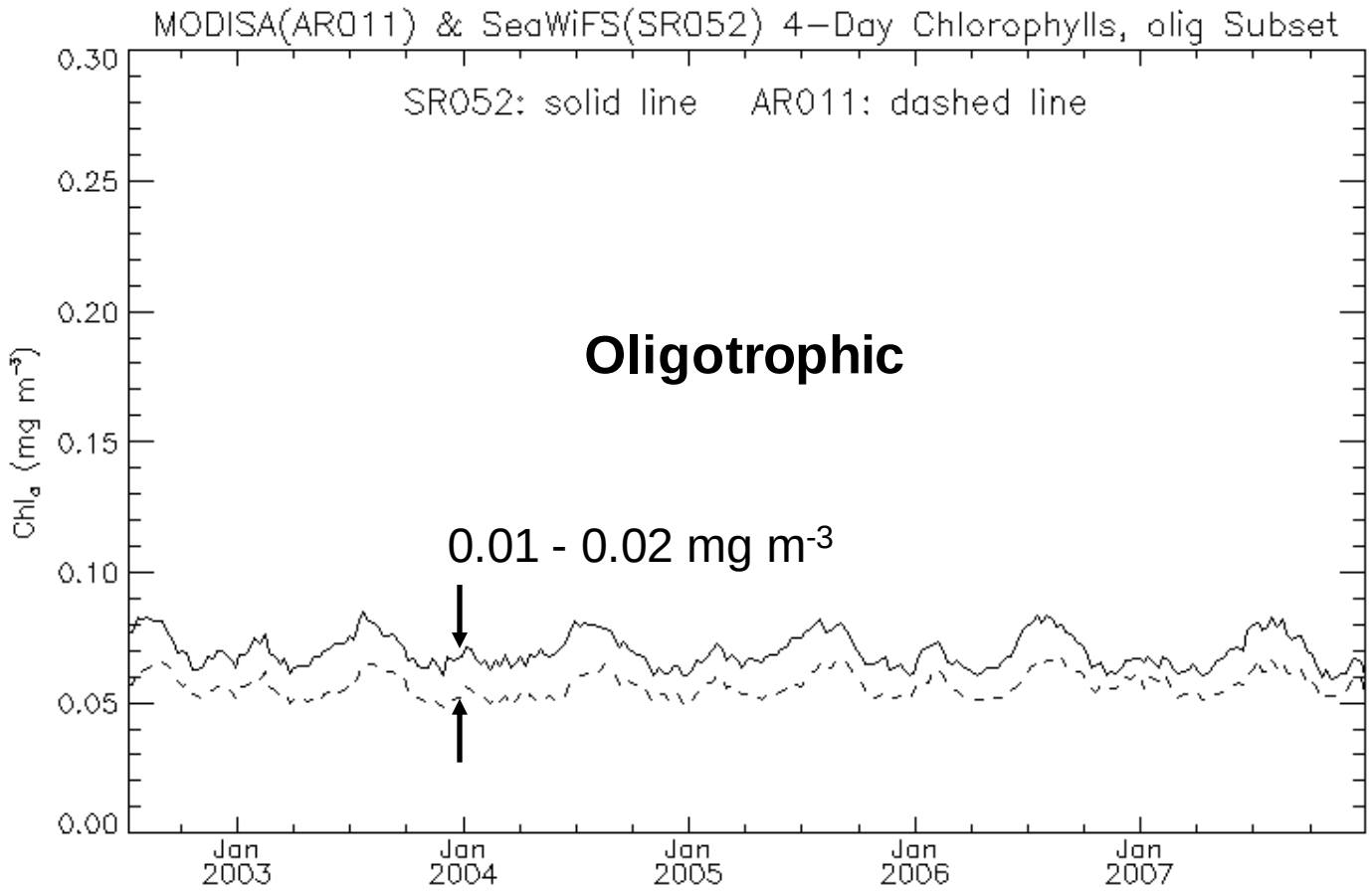
MODIS-Terra	Jan 2007	0.0 (forward only)
SeaWiFS	Jul 2007	5.2

SeaWiFS R5.2
- updated instrument calibration
- updated vicarious cal, latest MOBY dataset, filtering

Chlorophyll Differences MODIS/Aqua - SeaWiFS



Planned Calibration Updates

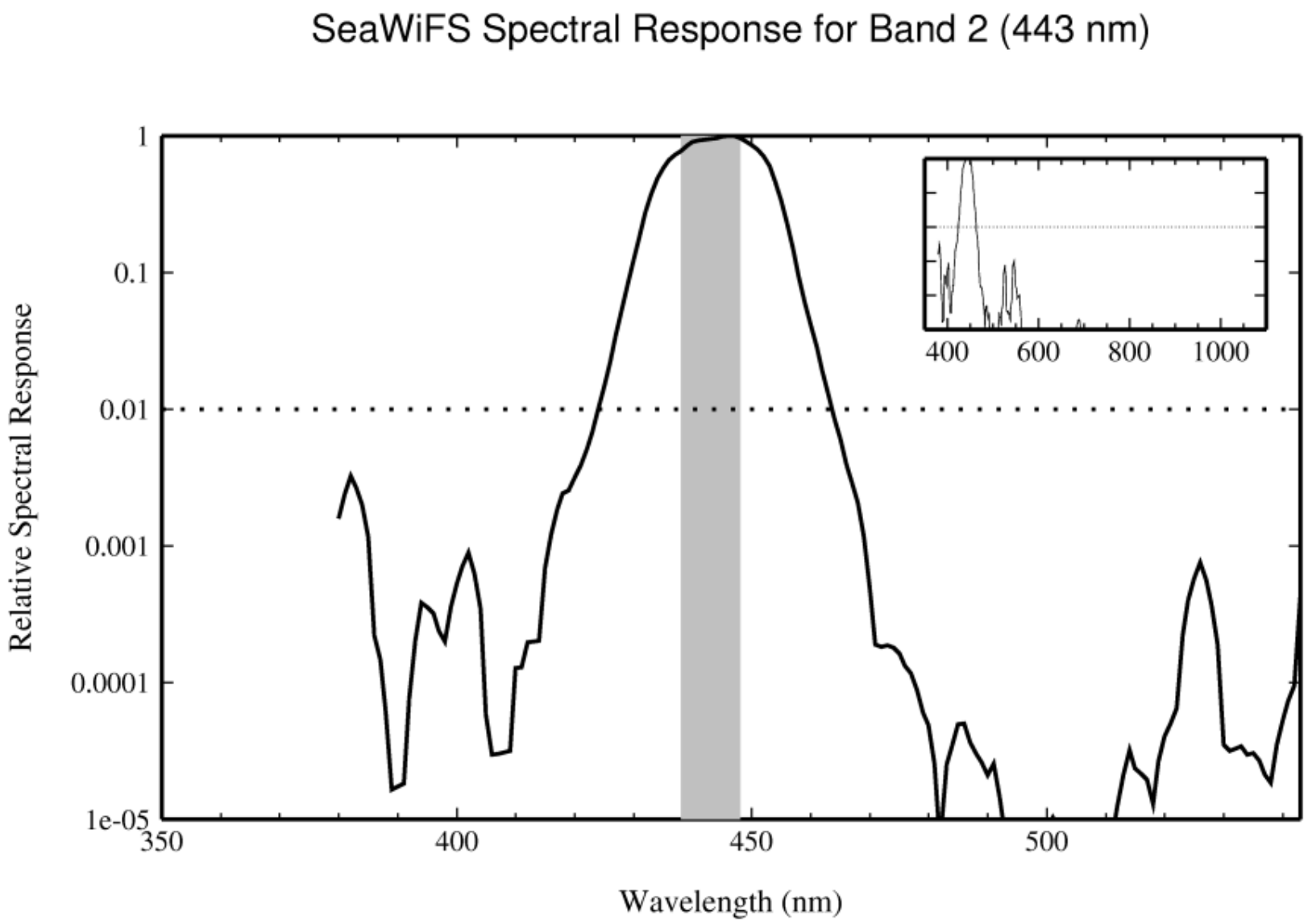
- SeaWiFS instrument calibration
  - time & temperature, revised pre-launch cal
- MODISA instrument calibration
  - OBC LUT update, RVS shape, red bands
- MODIST instrument calibration
  - vicarious characterization
- OCTS, CZCS instrument calibration
  - no updates
- Vicarious cal
  - update MOBY Lw from source, new filtering technique

Updated nLw Bandpass Corrections

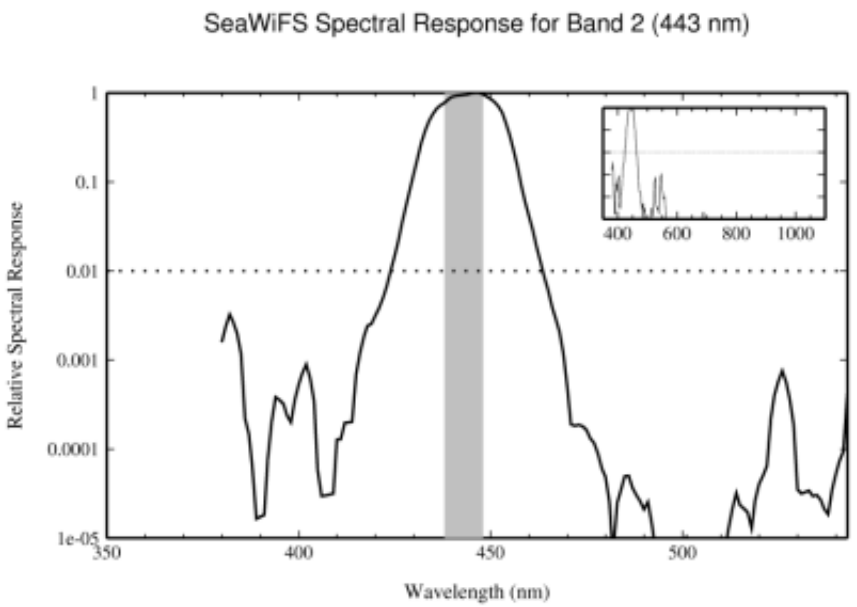
Revise Nominal Band Centers

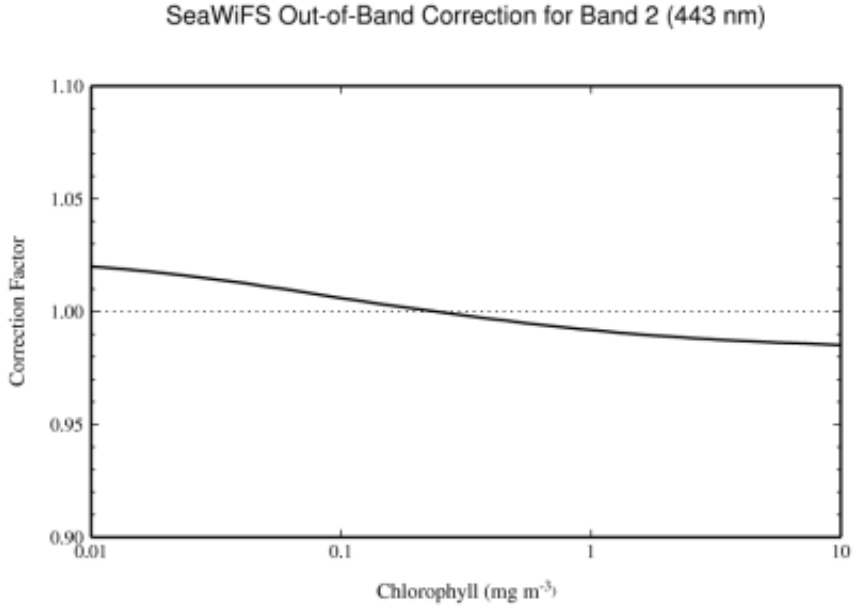
nLw(551) → **nLw(547)**

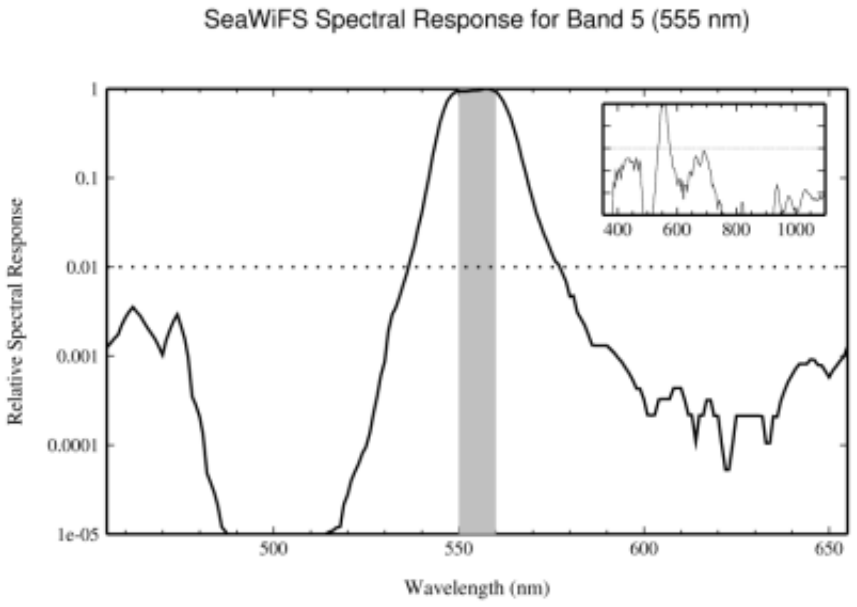
SeaWiFS Relative Spectral Response

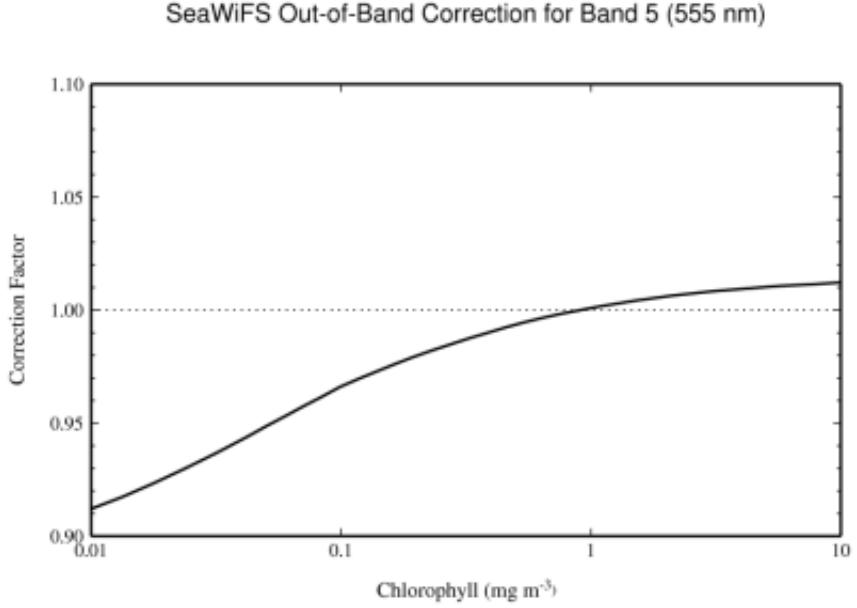


SeaWiFS nLw Bandpass Corrections



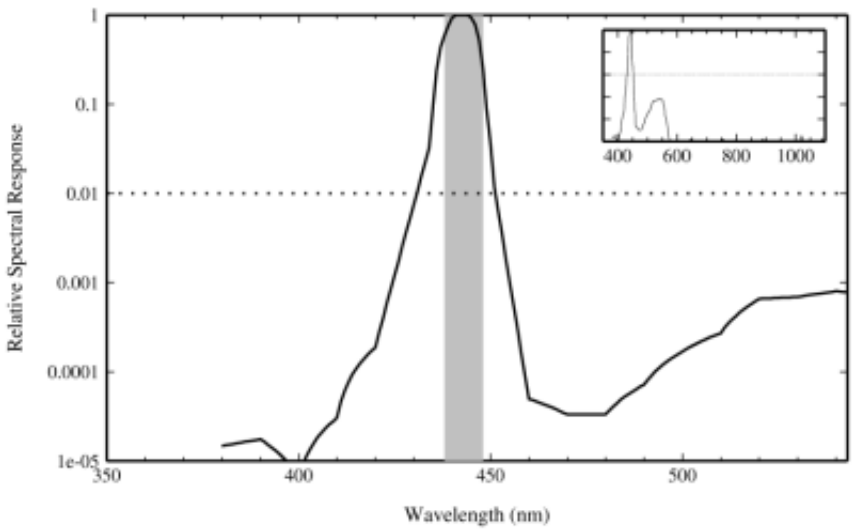




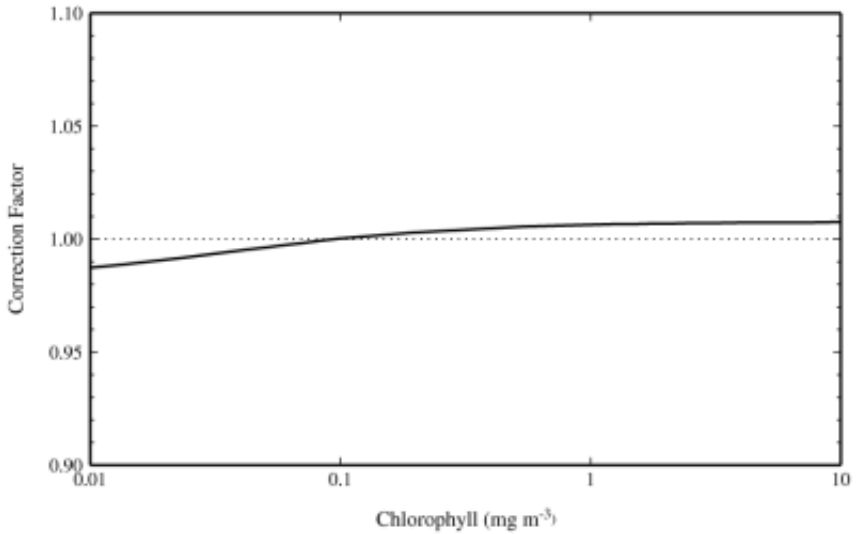


Aqua nLw Bandpass Corrections

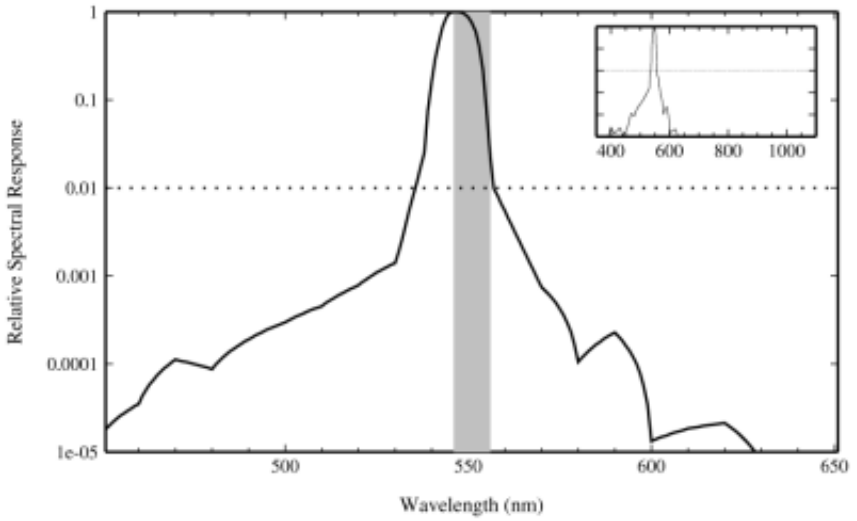
Aqua Spectral Response for Band 9 (443 nm)



Aqua Out-of-Band Correction for Band 9 (443 nm)



Aqua Spectral Response for Band 12 (551 nm)



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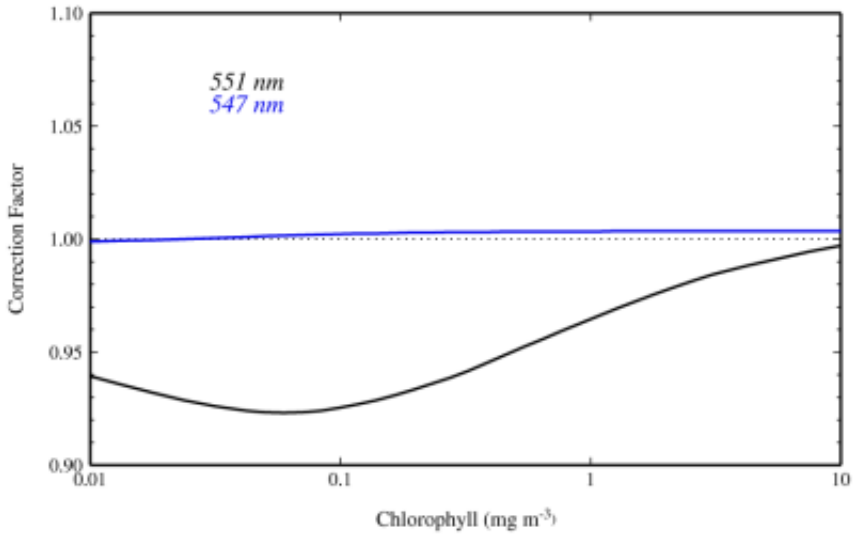
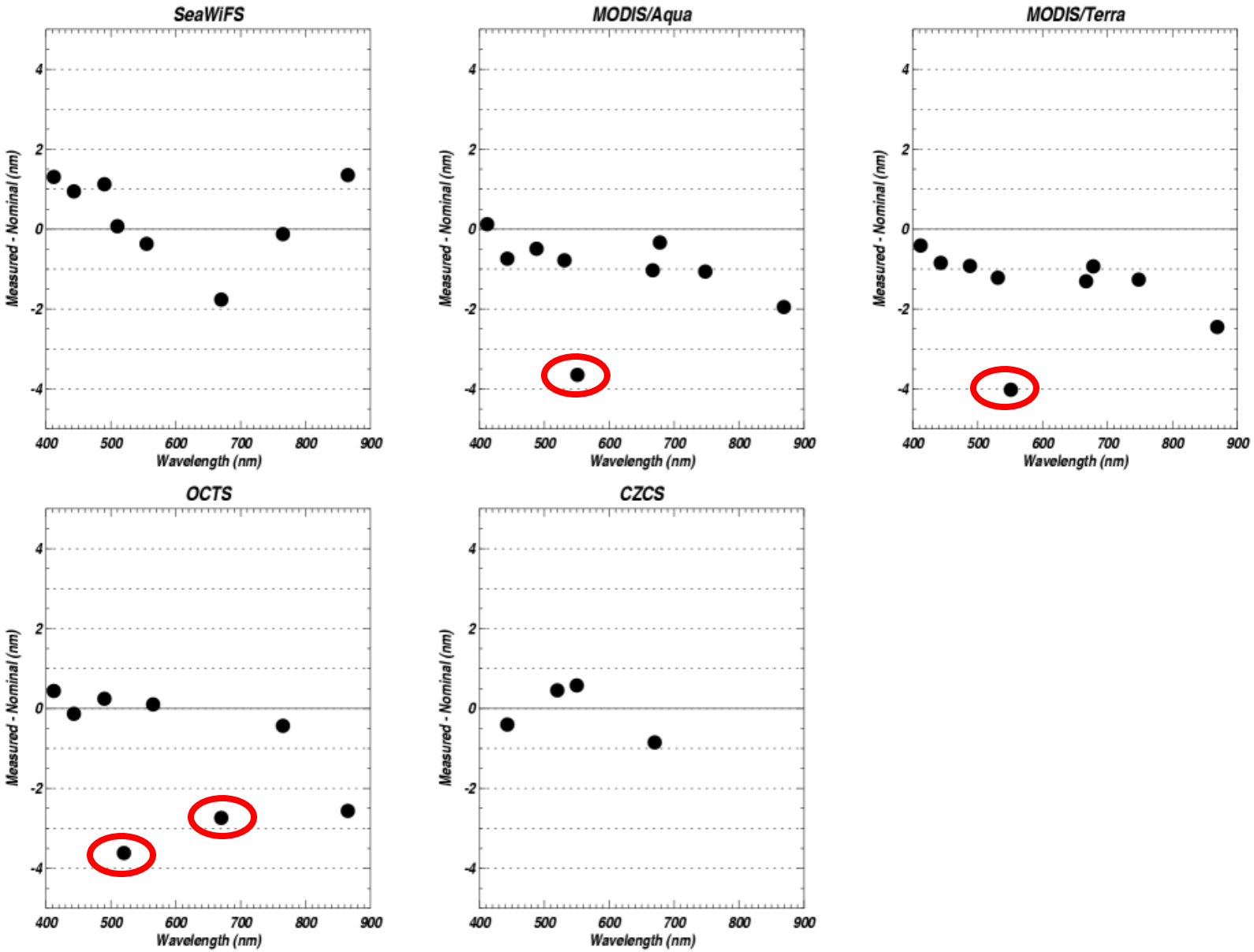


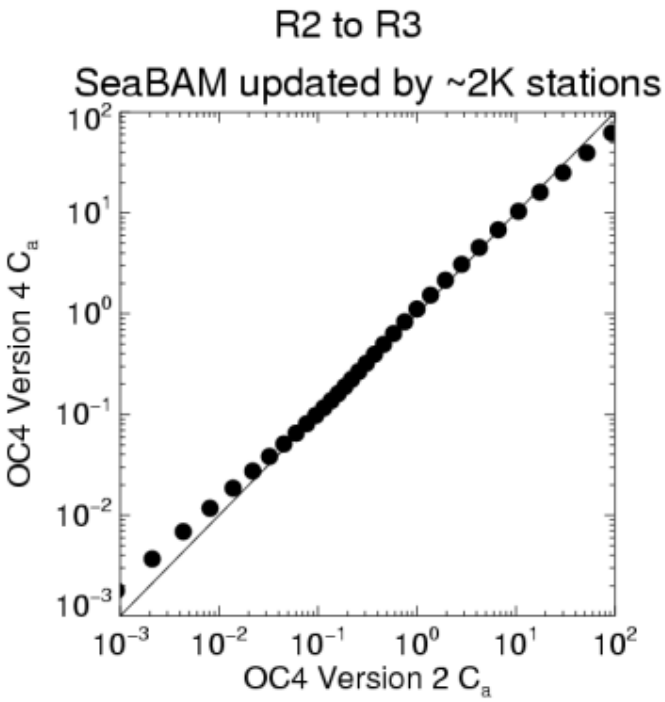
Measured vs Specified Band Centers

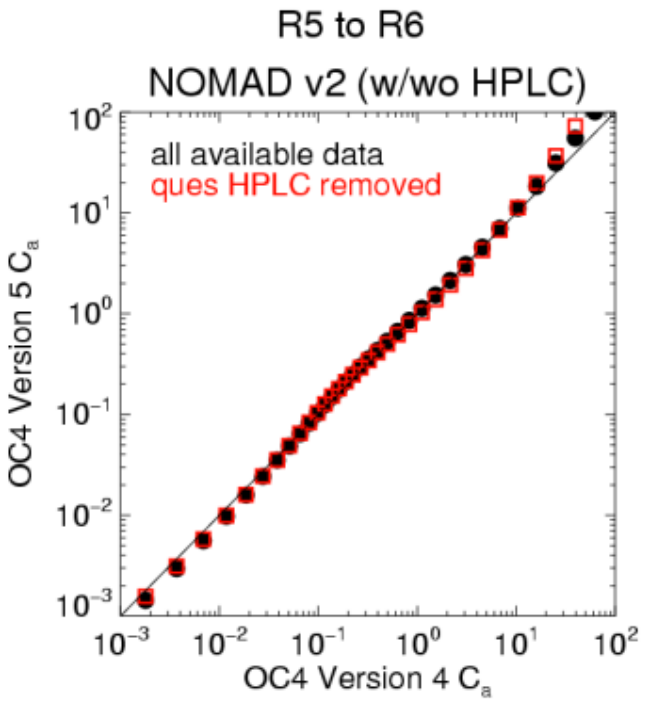


Rederive OC chlorophyll algorithms

- OC3: CZCS, MODISA, MODIST, OC4: SeaWiFS, OCTS
- empirical max band ratio algorithms fit to NOMAD v2

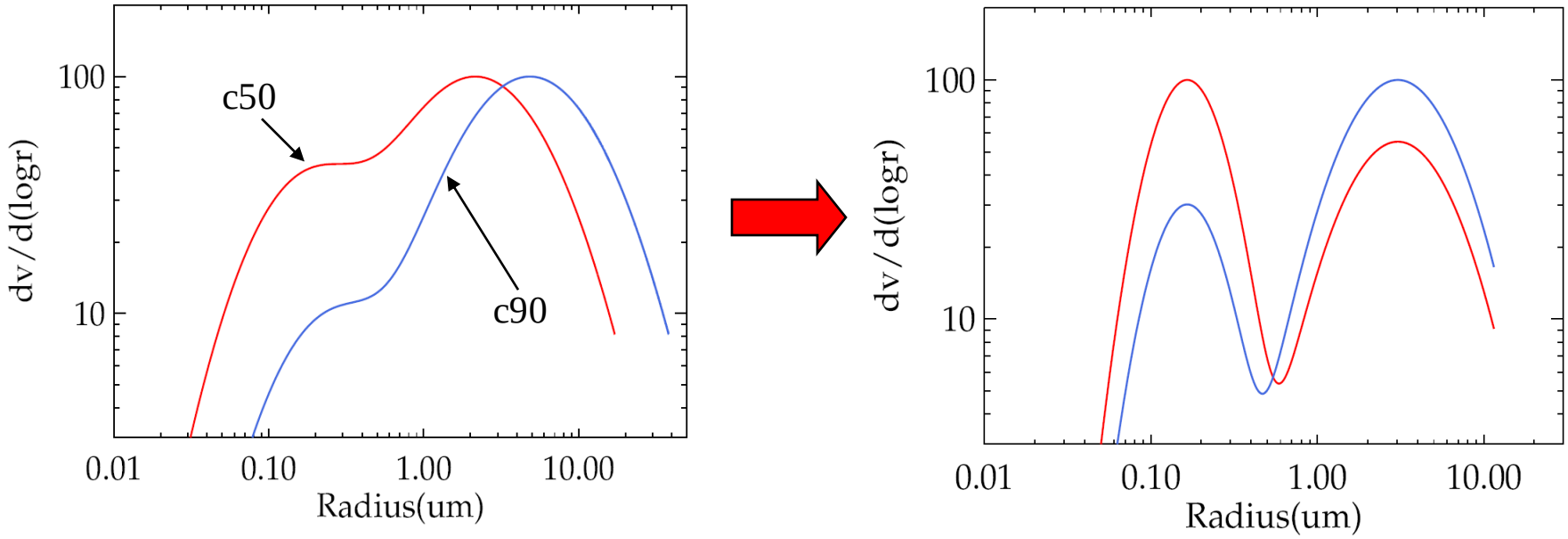
- NOMAD v2
  - remove suspect HPLC C*a* (~33% of total Rrs,Ca matchups)





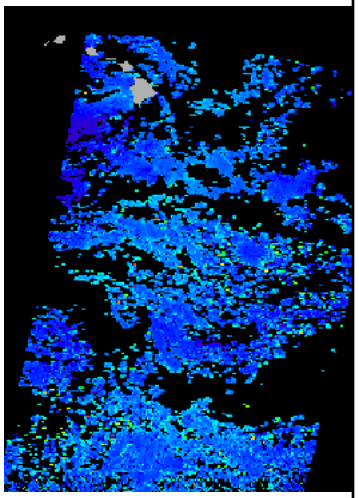
New Aerosol Model Suite

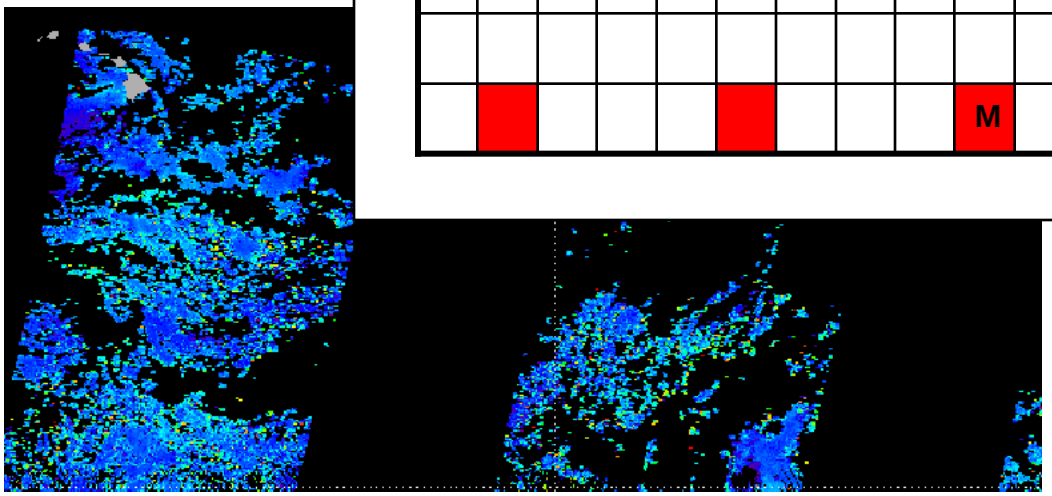
- based on AERONET size distributions, SSA
- accounting for polarization in the RT
- revised band centers
- need to assess impact to global products
- see poster by Z. Ahmad



SeaWiFS Speckling

$L_{wn}(555)$





$b_{bp}(443)$

S. Maritorena, OCRT, 2007

Other Considerations

- flags & masks
  - add bad-value meta-data to L2 products, mask in L3
  - allow negative radiances in binner
- can we improve on nLw(NIR) model?
  - lessons learned from SSR modeling
  - also applies to CZCS red nLw
- f/Q corrections
  - yes or no
  - table updates?
- Gordon BRDF correction for diffuse transmittance
  - yes or no

Legacy Missions

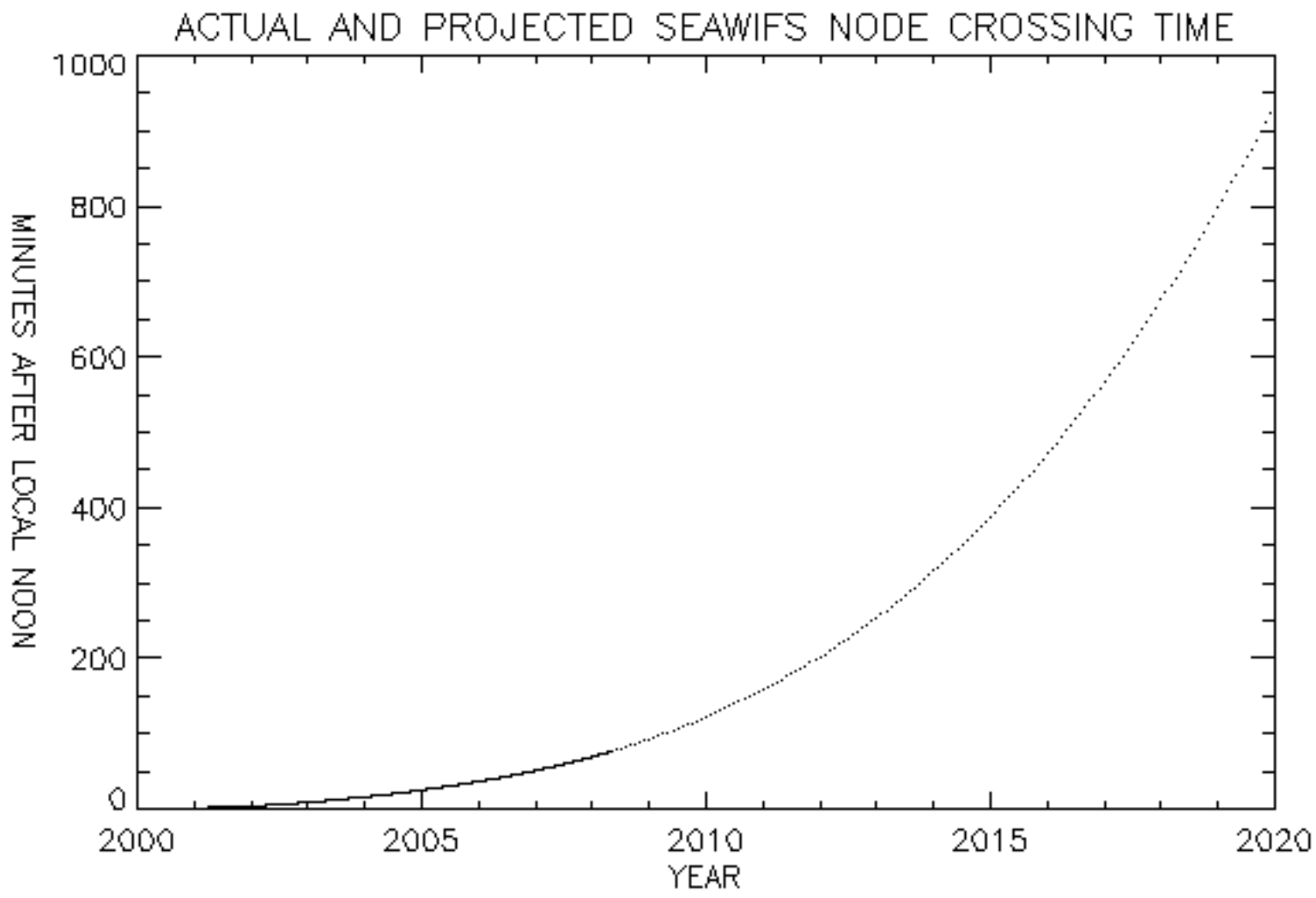
- CZCS
  - update vicarious calibration (model-based)
  - update Lw(670) model (revised Lw(NIR) model)
  - reprocess with latest tables, algorithms, flags & masks

- OCTS
  - update vicarious calibration (model-based)
  - reprocess with latest tables, algorithms, flags & masks

Summary

- Multi-mission ocean color reprocessing by end of 2008
- Instrument calibration & characterization updates
- SeaWiFS speckling
- Bandpass corrections and revised band centers
- Chlorophyll algorithms updated to NOMAD-v2
- Aerosol models updated to match AERONET

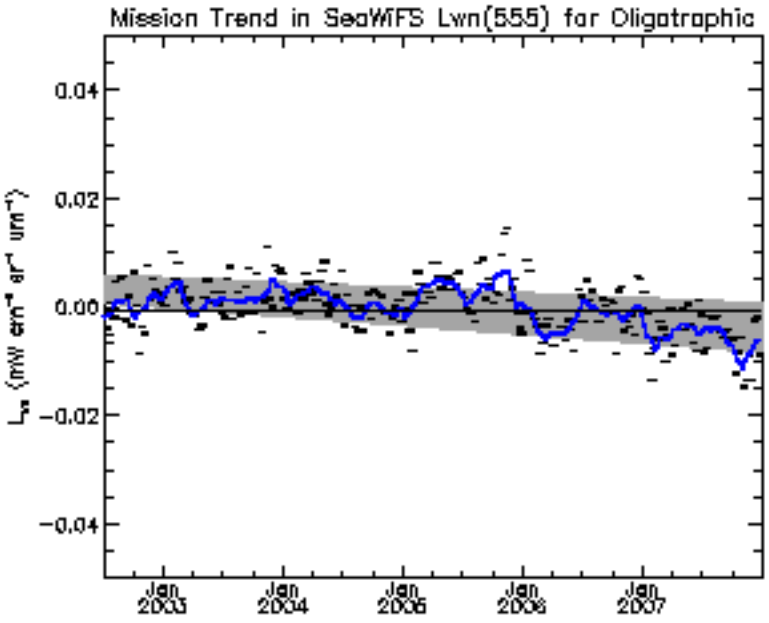
Thank you


ACTUAL AND PROJECTED SEAWIFS NODE CROSSING TIME
MINUTES AFTER LOCAL NOON
1000
800
600
400
200
0
2000
2005
2010
2015
2020
YEAR

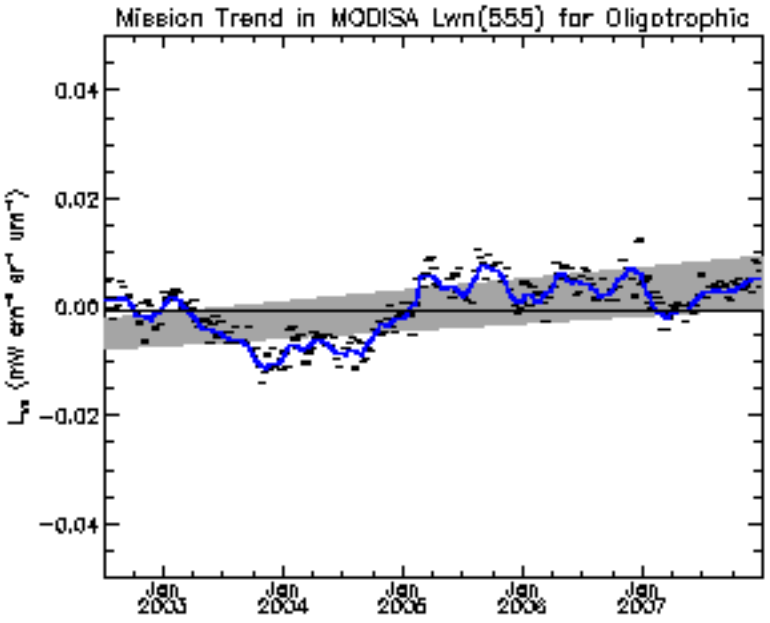
Seasonal Anomaly Trends

nLw(55x) in Oligotrophic Waters

SeaWiFS



MODIS/Aqua



Vicarious Characterization of Instrument RVS and Polarization

MODIS – vicarious TOA radiance (unpolarized)

$$L_l(\lambda) = [\, L_r(\lambda) + L_a(\lambda) + tL_f(\lambda) + TL_g(\lambda) + t_d(\lambda)L_w(\lambda) \,] \cdot t_g(\lambda)$$

(air, aerosol, whitecap, glint, water, gas)

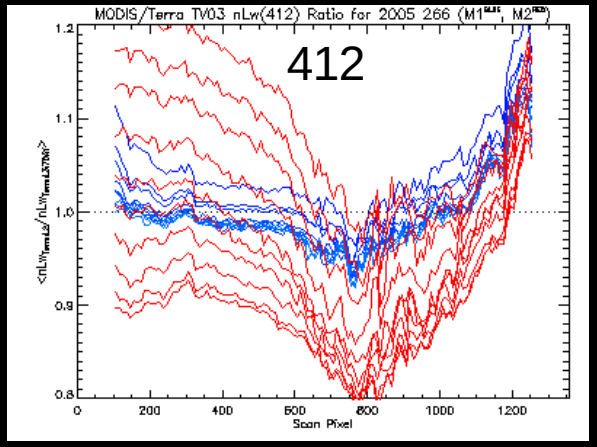
$$\sum L_t(\lambda) - [M_{11}L_I(\lambda) + M_{12}L_Q(\lambda) + M_{13}L_U(\lambda)]$$

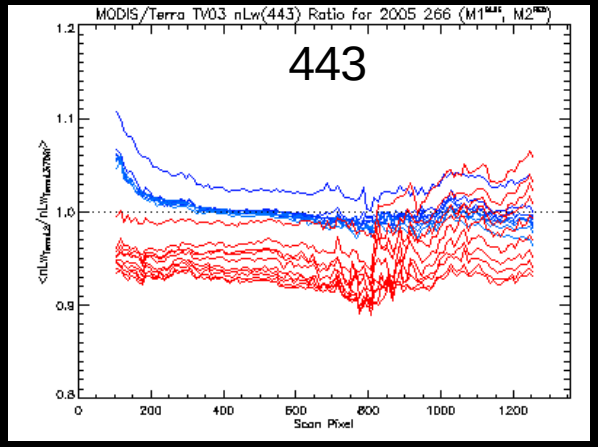
minimize over global distribution of path geometries to find best M_{11}, M_{12}, M_{13} per band, detector, and mirror-side

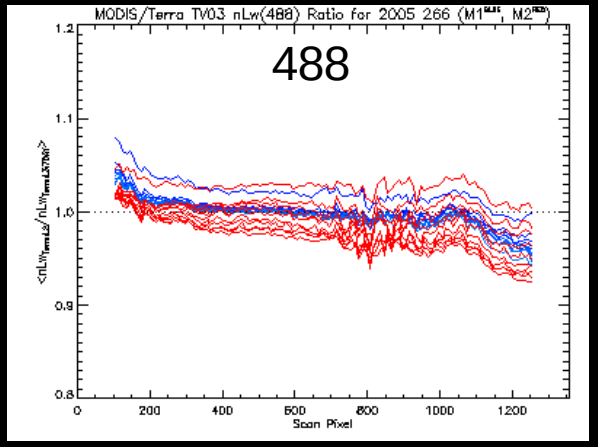
do this for one day per month over the mission lifespan

MODIS-Terra Residual RVS in nLw

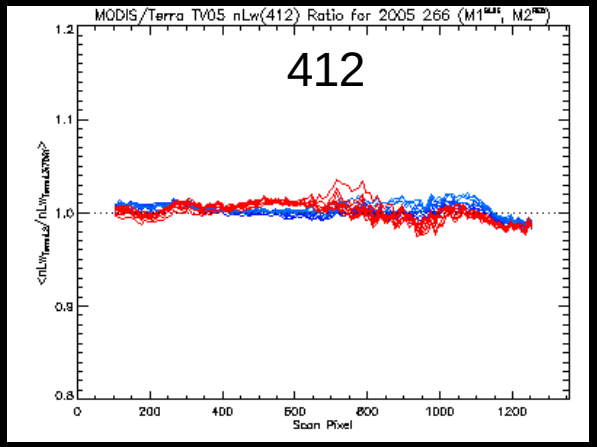
Before Vicarious Characterization

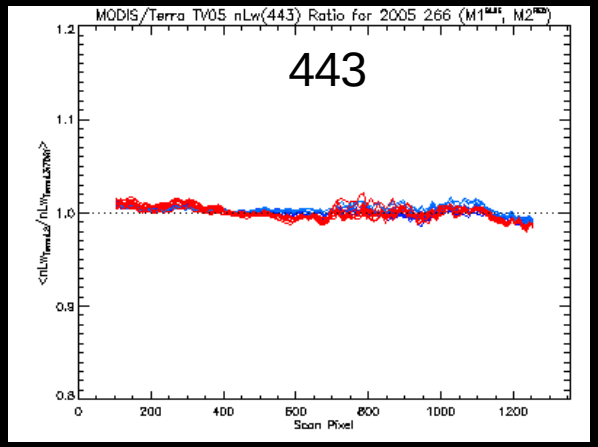


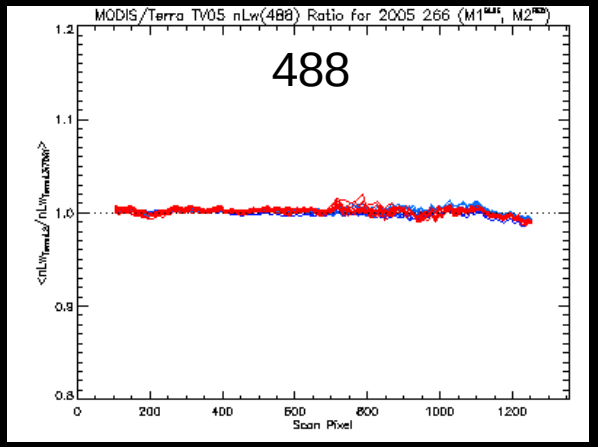




After Vicarious Characterization

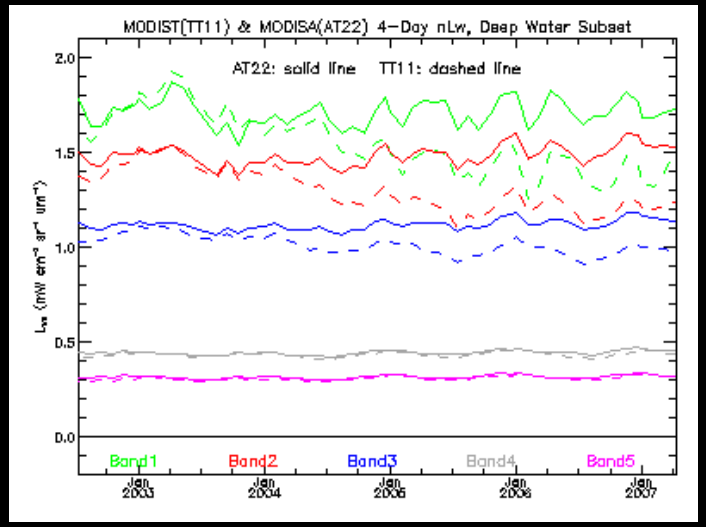


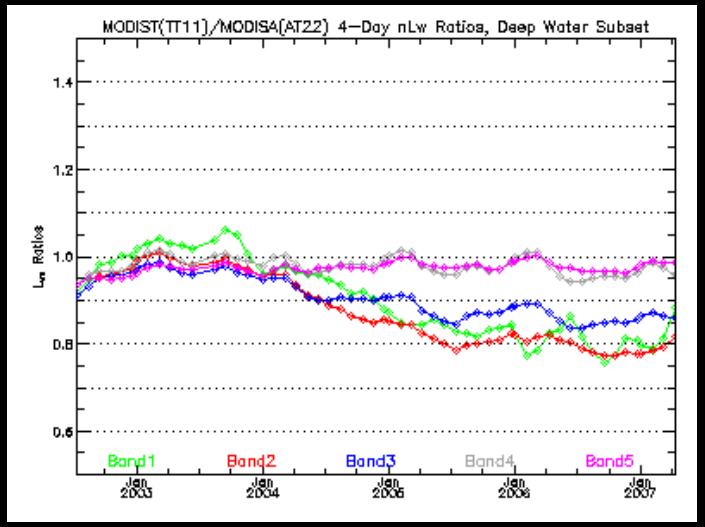




MODIS-Terra and MODIS-Aqua nLw

Before Vicarious Characterization





After Vicarious Characterization