OMPS NM & NP measurements in the 300 – 310 nm range

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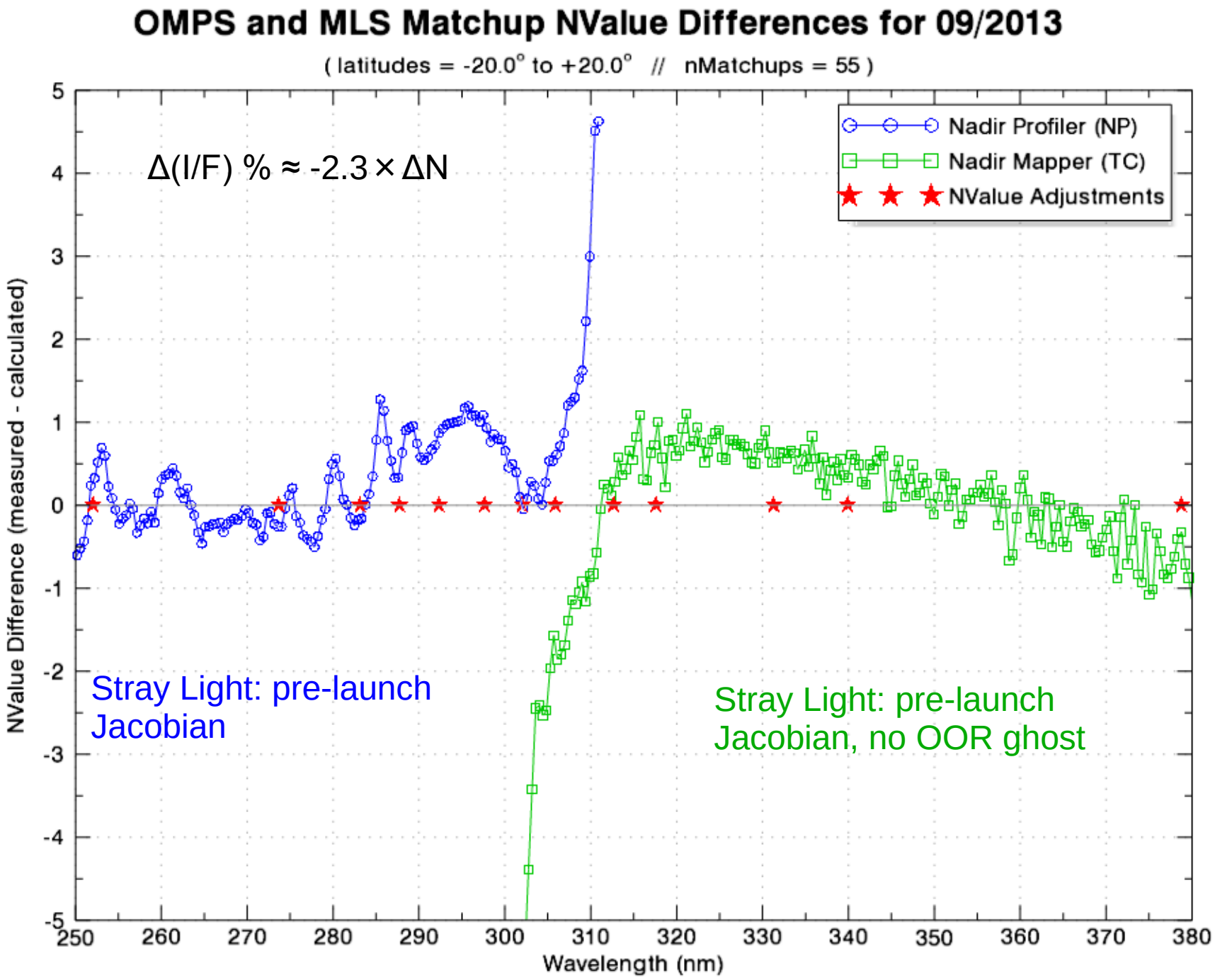
The NM and NP measured TOA reflectances should agree in the overlapping wavelength range. They do not.

- **FOVs are well matched**
- **Simultaneously calibrated sensors (< 2% albedo cal. errors)**
- **Radiances and irradiances have larger calibration errors, but should also agree.**

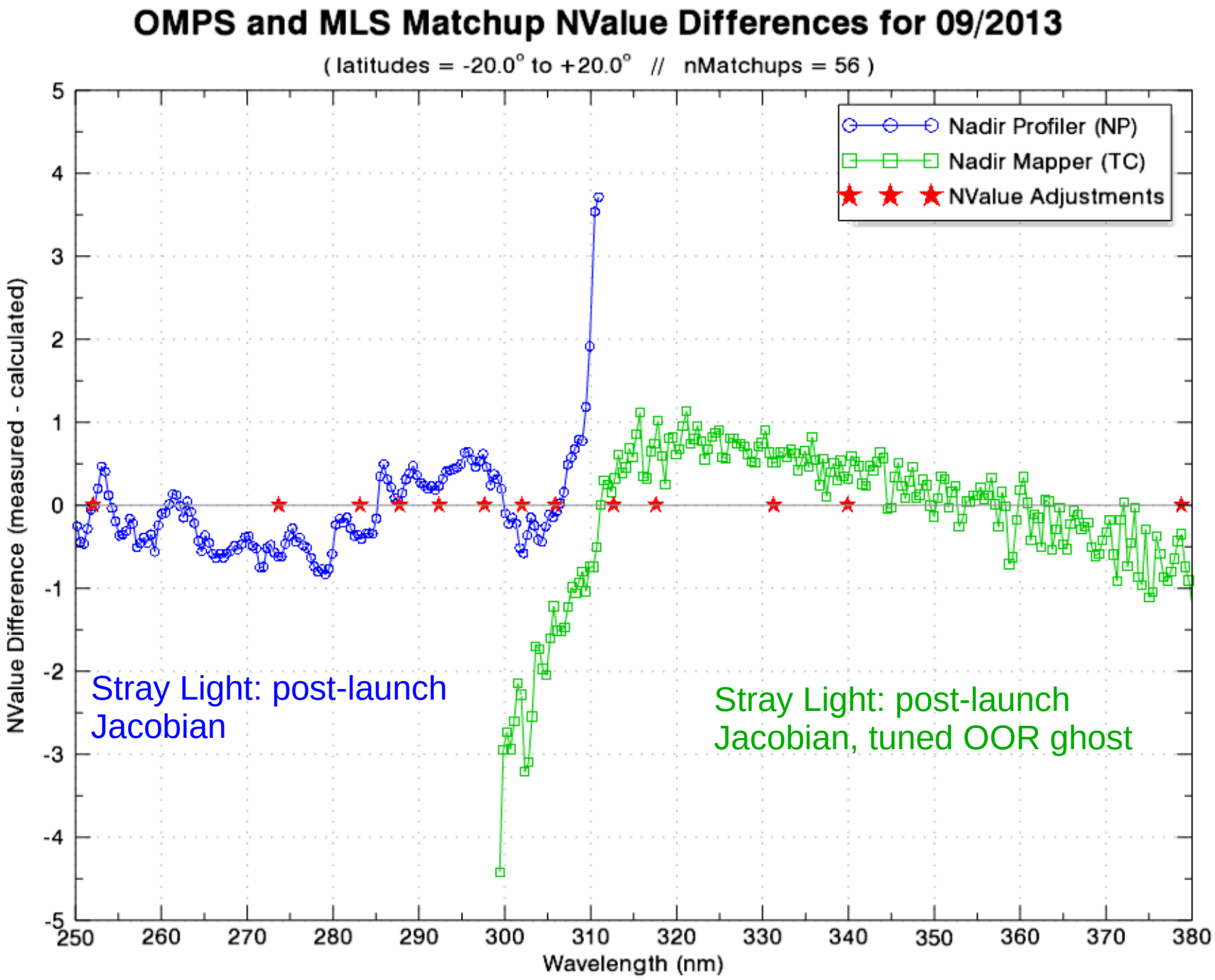
Conclusion: Underlying cause of difference most likely NOT radiometric calibration

Scene content, instrument (or both) have changed from ground to orbit

Goal: Find the underlying causes for mismatch. Correct those errors before applying empirical adjustments.

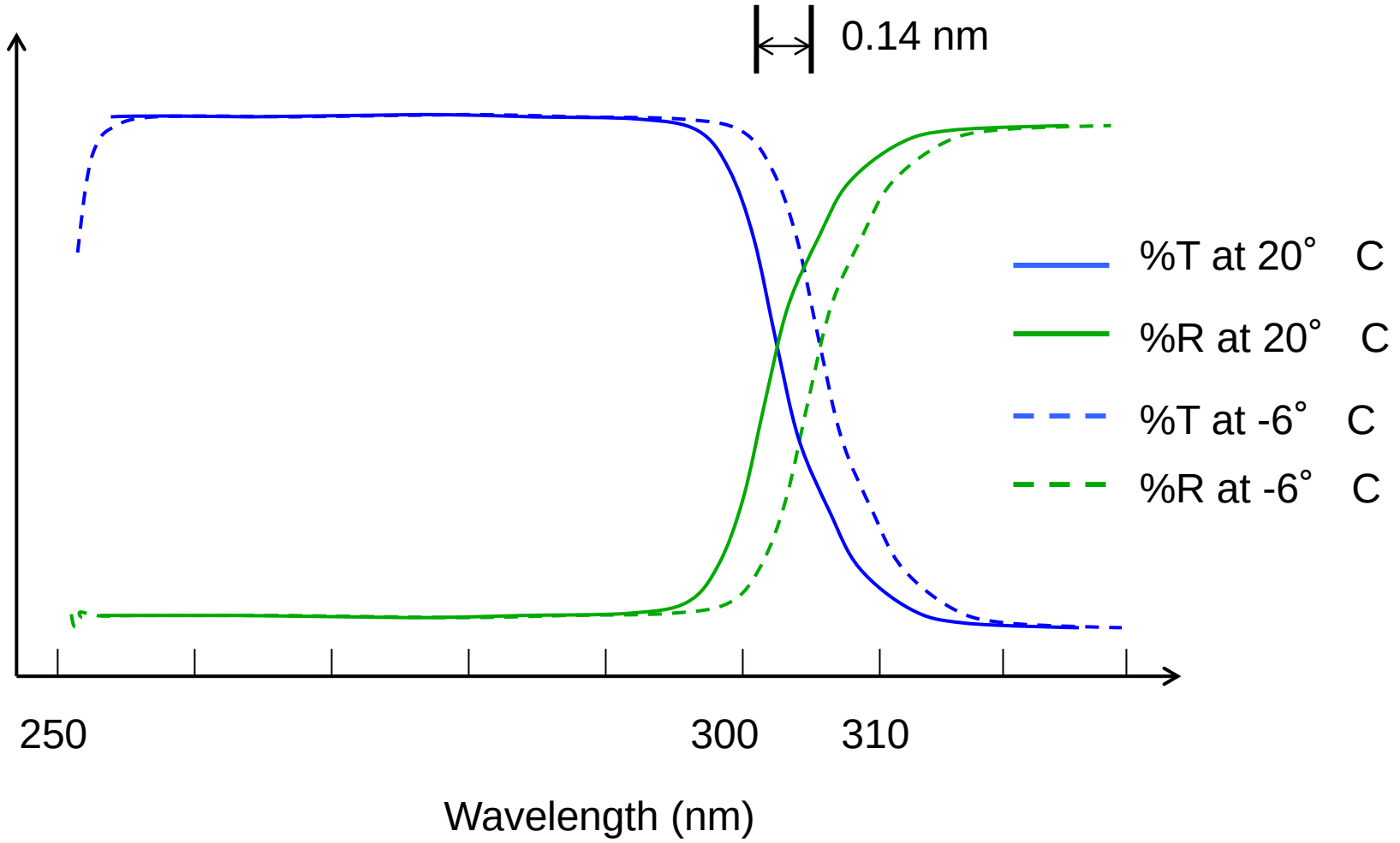


NP_SLT_V001, TC_SLT_V001



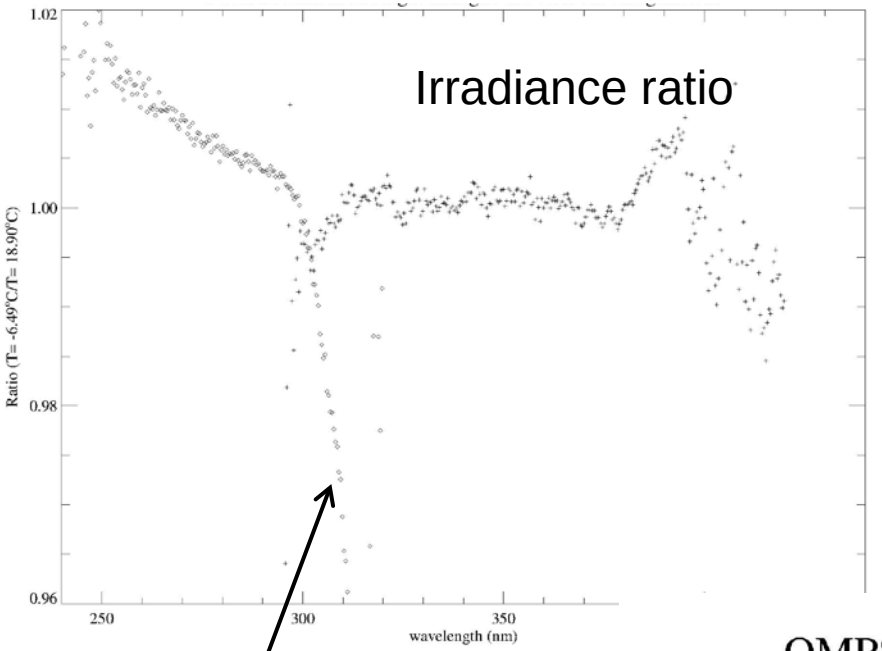
NP_SLT_V003, TC_SLT_V005

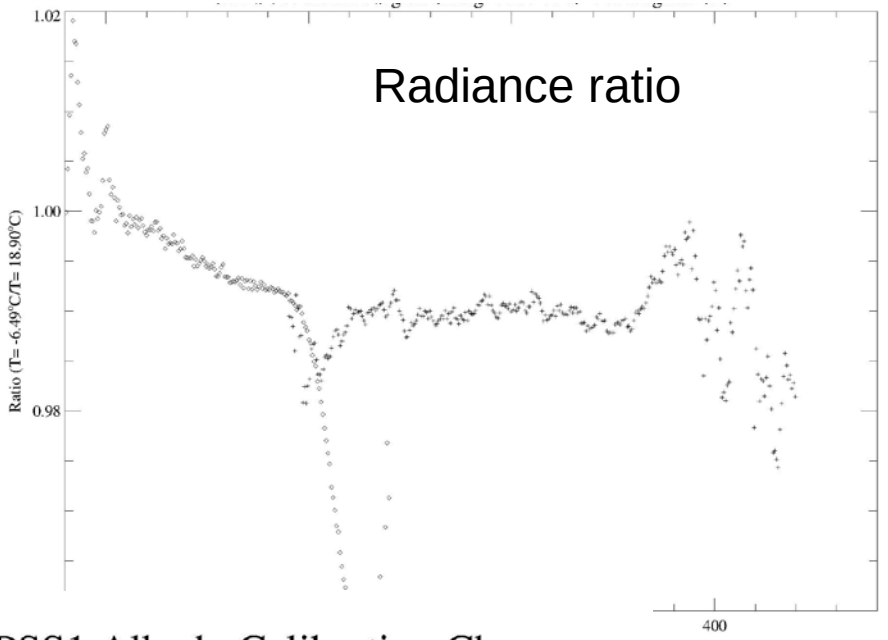
Dichroic filter Trans/Refl curves shift longer at flight temperatures



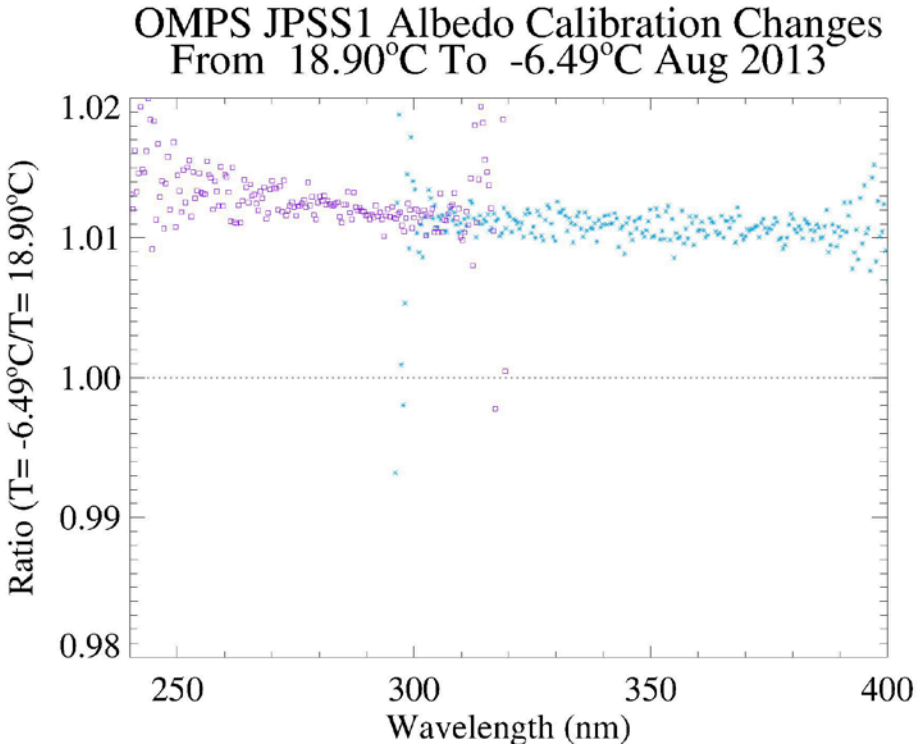
Effect on coefficients is same for Radiance and Irradiance
(no significant on-orbit temperature differential)

J1 OMPS test confirms cancellation of shift effects in Albedo ratio





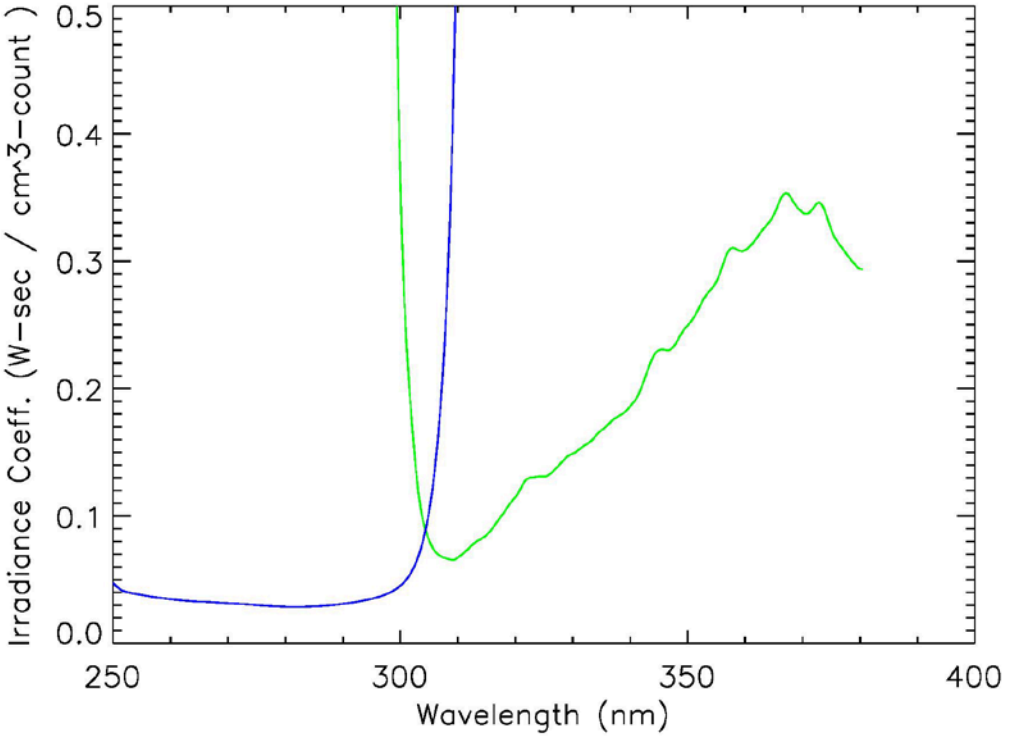
Result is opposite that seen on NPP (see solar irradiance slide)



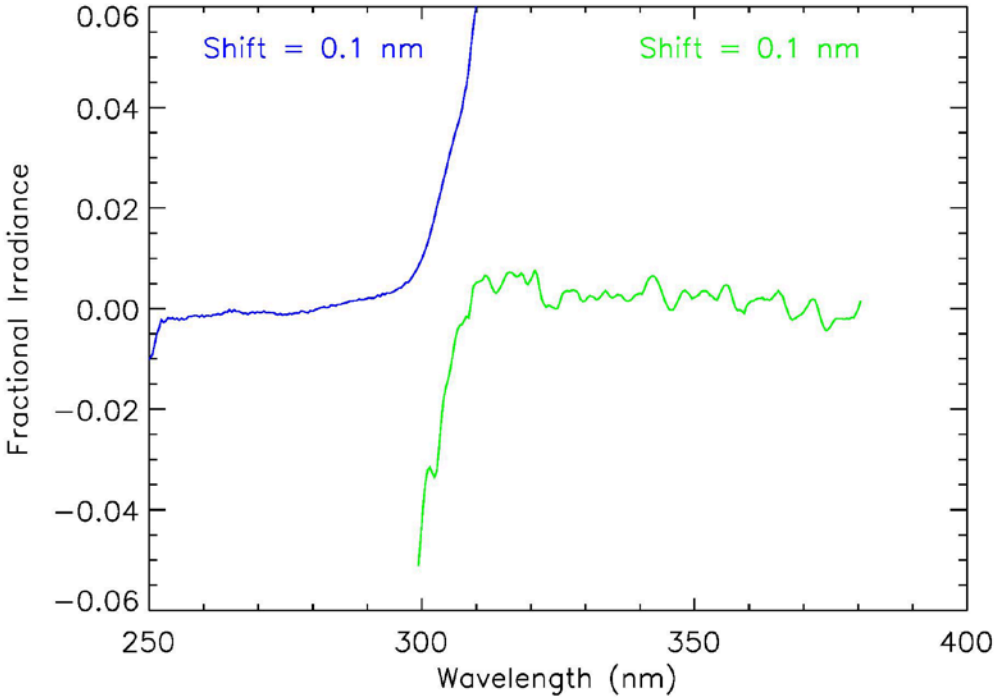
Ground-to-orbit λ shift causes radiometric calibration error

- Error largest where sensitivity gradients are high
- NP shift: -0.1 to -0.13 nm (seasonally variant)
- NM shift: solar -0.1 nm, EV -.07 to -.04 nm (cross-track variations)

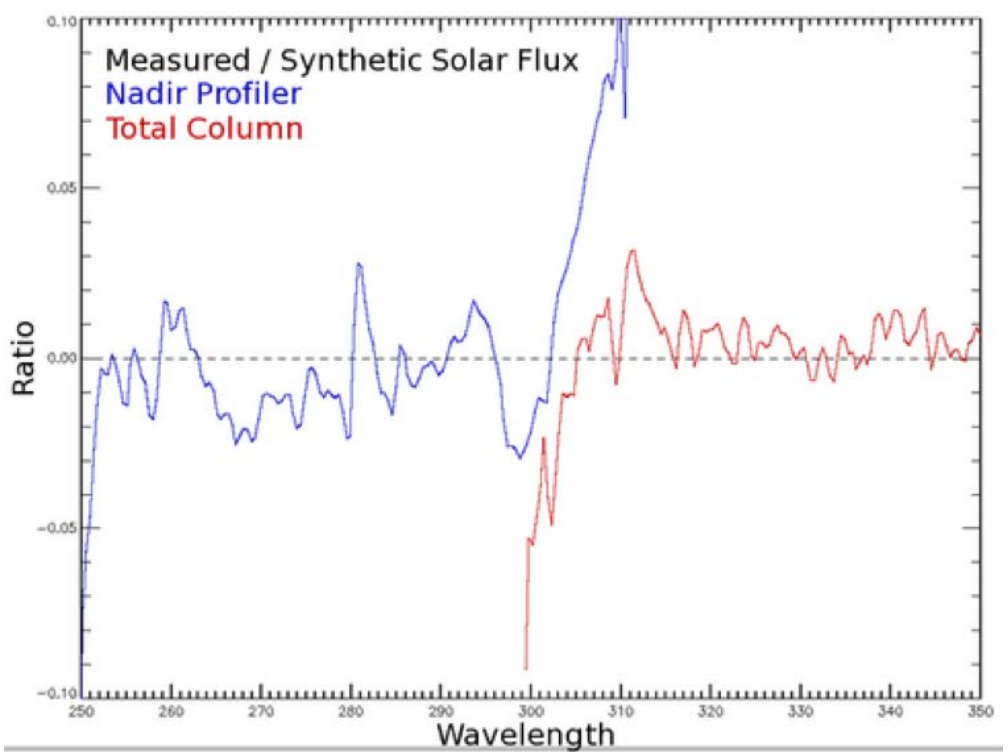
Irradiance Calibration Coefficients

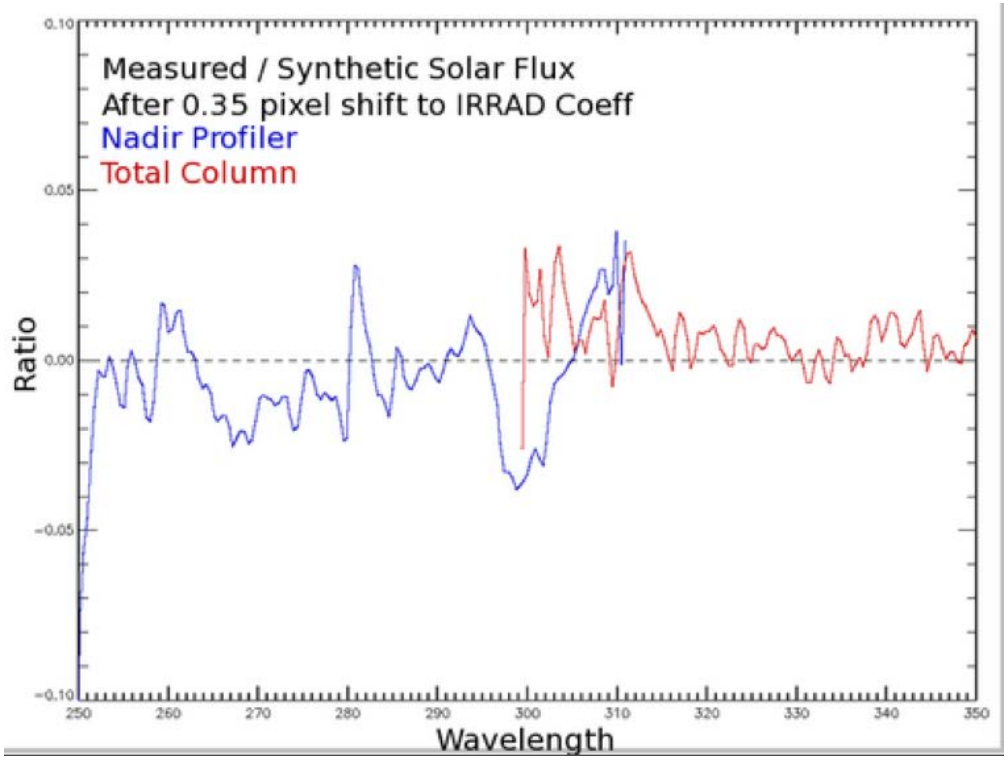


Estimated Calibration Error

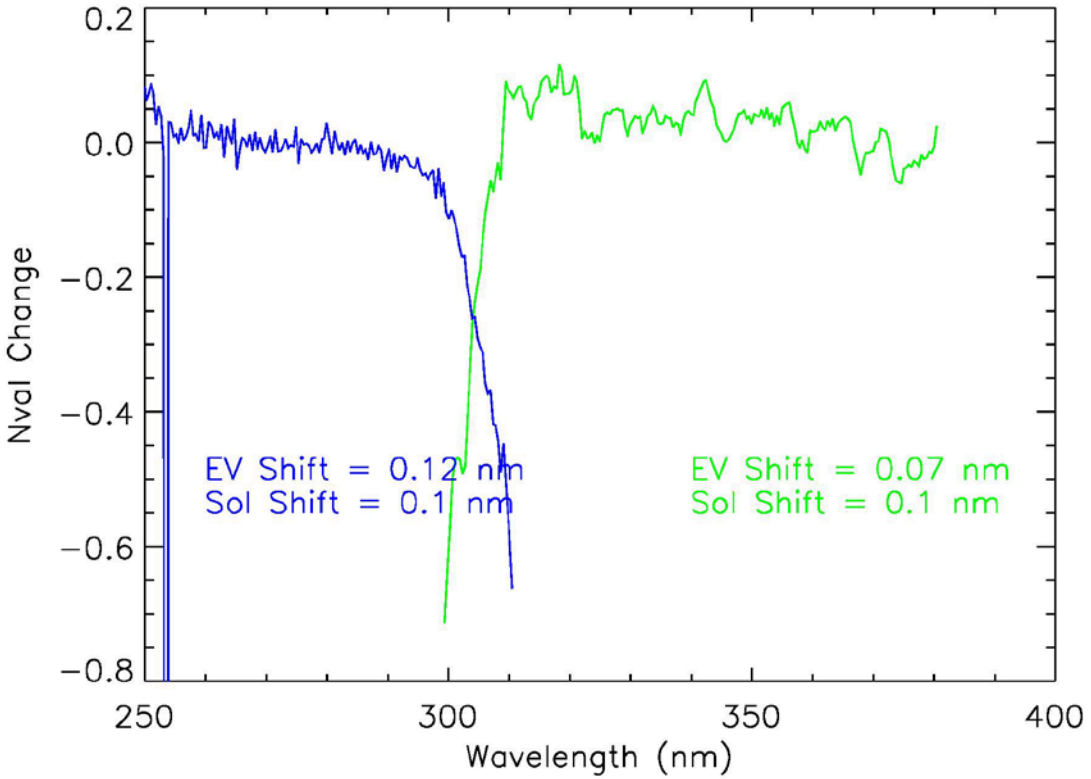


By adjusting the irradiance coefficients for a λ shift, we demonstrate that such a correction will result in accurate solar irradiance measurements

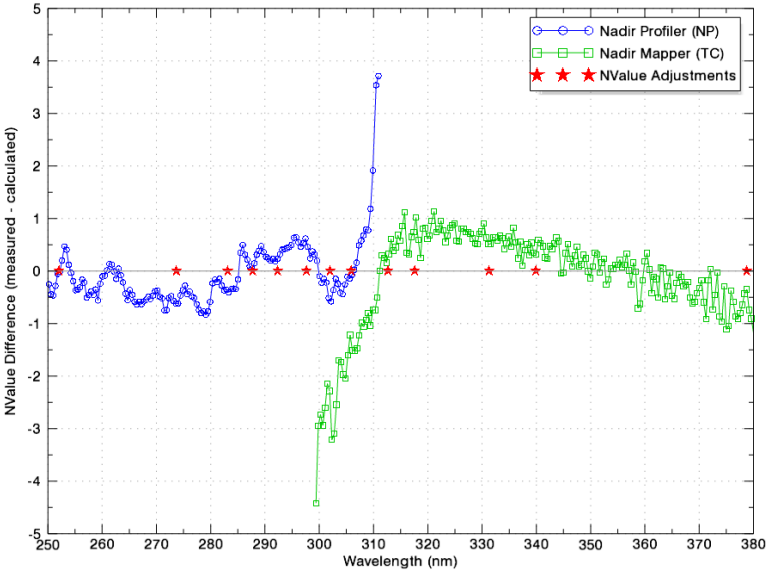




Predicted error in TOA reflectance based on ground-to-orbit wavelength shift



Observed

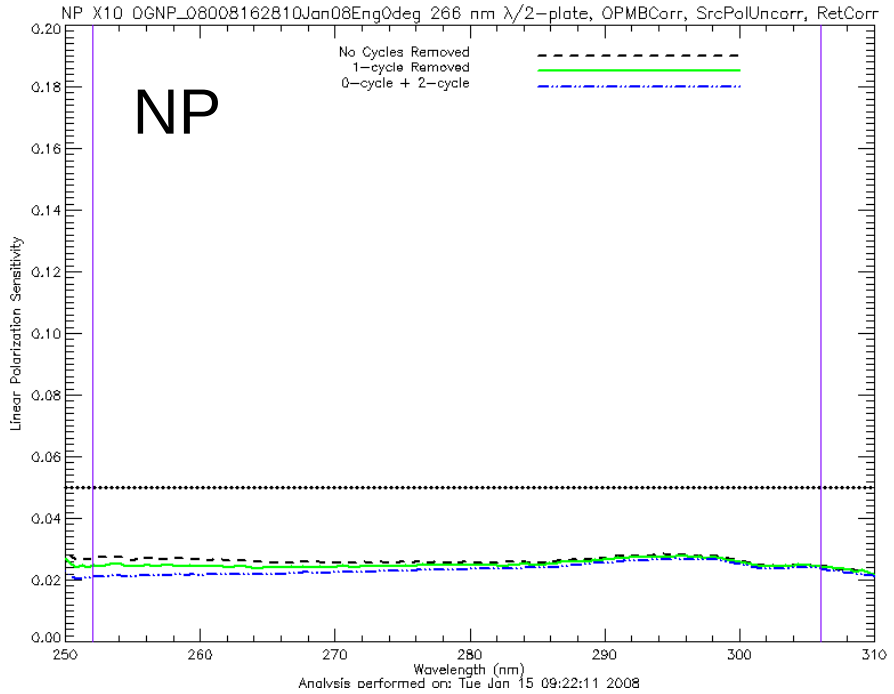


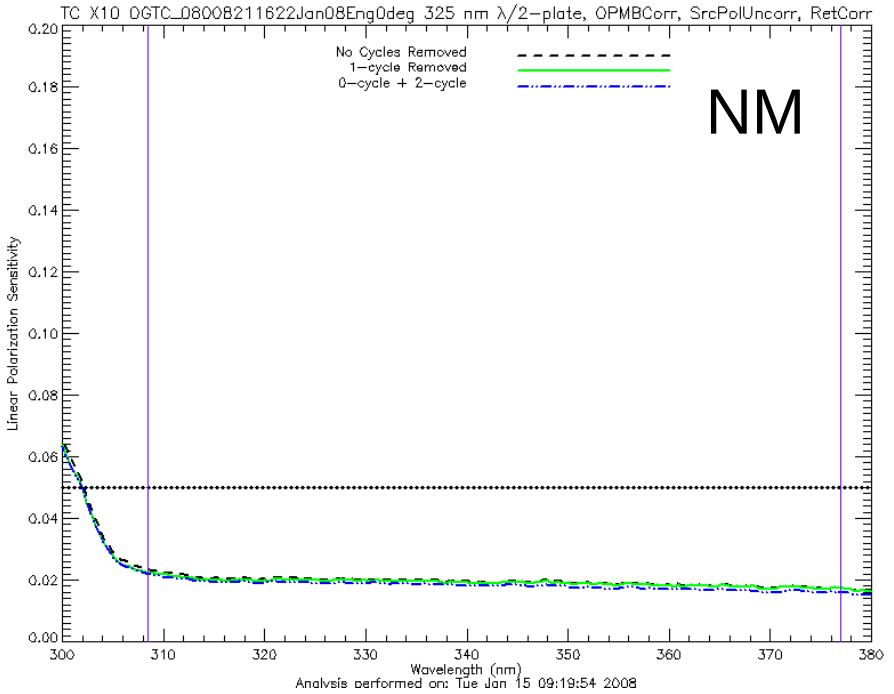
Not nearly enough differential shift to explain observation (NP prediction is opposite)

Polarization sensitivity could explain NM behavior, but not NP

- Polarization sensitivity to solar irradiance is calibrated, but not Earth radiance
- Multiple scattering decreases as O_3 absorption increases
- Dichroic filters are highly polarizing and polarization sensitive

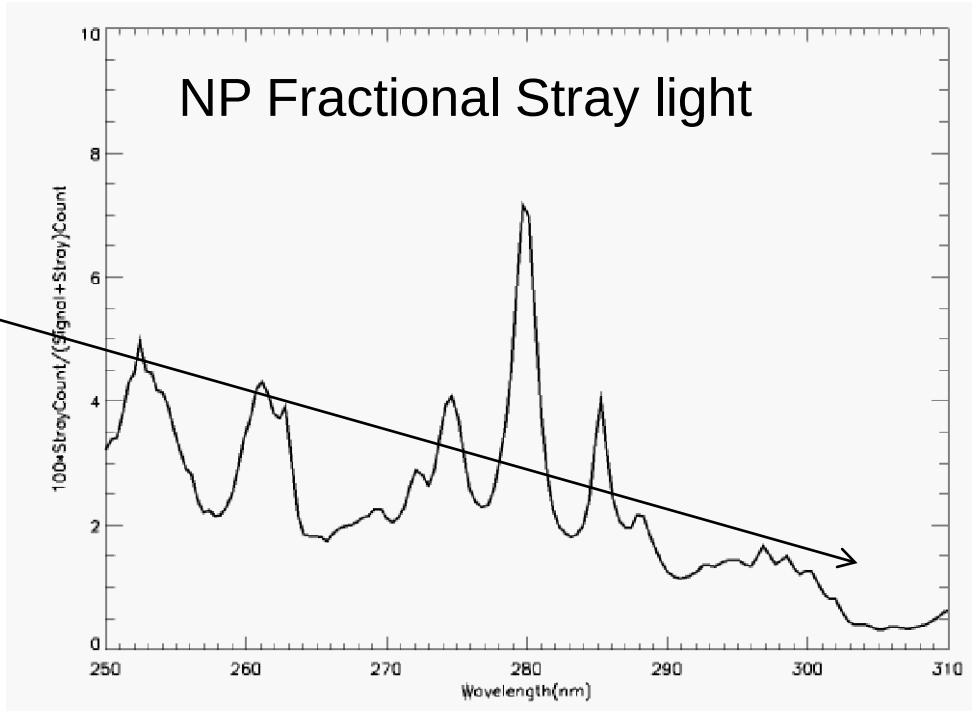
Linear Polarization Sensitivity



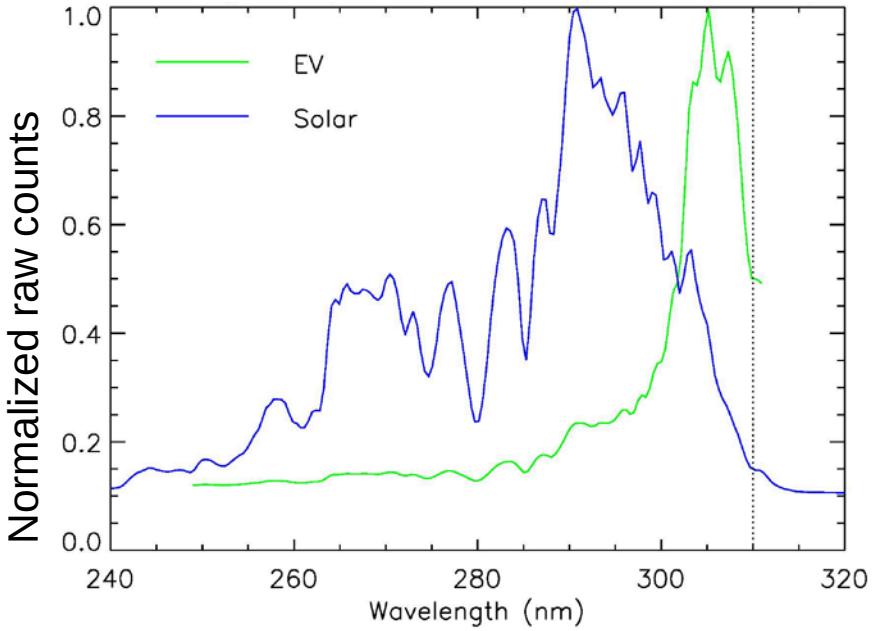


Easiest to focus on NP: Why does it measure TOA reflectance too low ?

- 8 – 9% error at 310 nm
- EV / Sol λ-shift differential results in < 2% error
- EV Stray light content is < 1% at 310 nm
- Correction for Solar S.L. will provide additional reduction (how much ?)



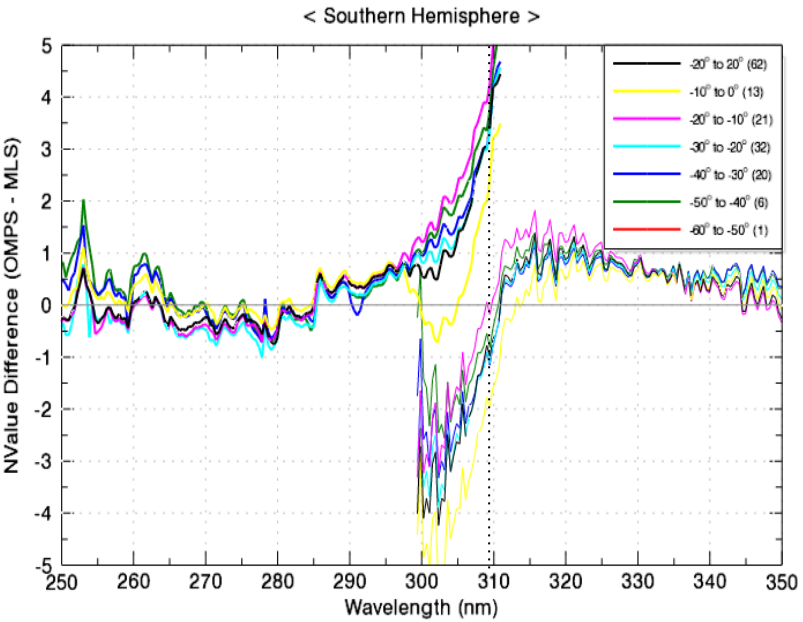
Raw NP Signal



Next Steps

- Focus on explaining NP reflectance errors 300 – 310 nm
  - NM stray light is complicated in this range; intraorbital λ shifts
  - BATC did not adequately correct cal. coefficients for OOR ghost

- After all known NP and NM corrections have been applied …
  - Normalize NP to NM at 310 nm (NM error < 1 Nval)
  - Apply decreasing NP adjustments down to 290 nm
  - Normalize NM (λ < 310 nm) to NP



- Reprocess select data for soft calibration analysis
  - Avoid normalization to MLS
  - D pair may not work well
  - Ascending-descending may not help much
  - Residual analysis