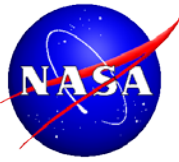
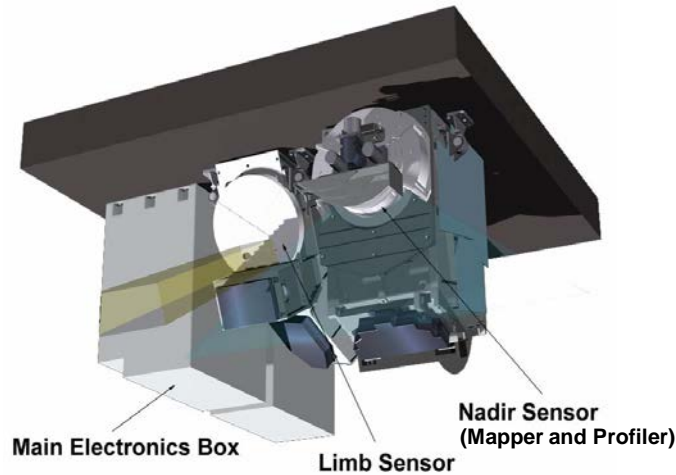


OMPS Limb Performance

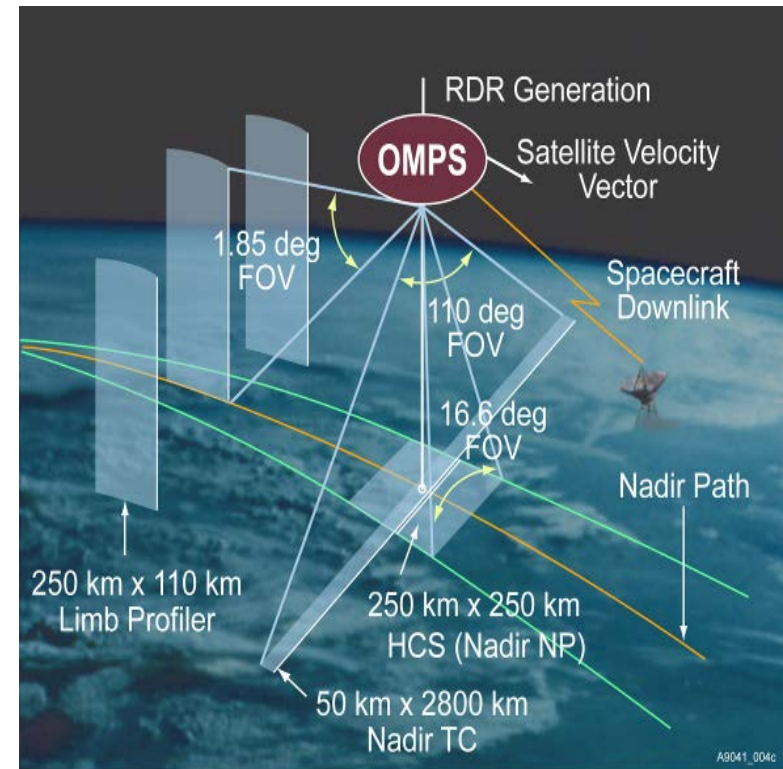


G. Jaross and OMPS Core Team



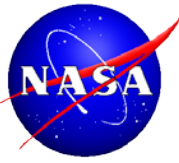
Currently released Level 1 product: v2.0

v2.5 to be released within next few months



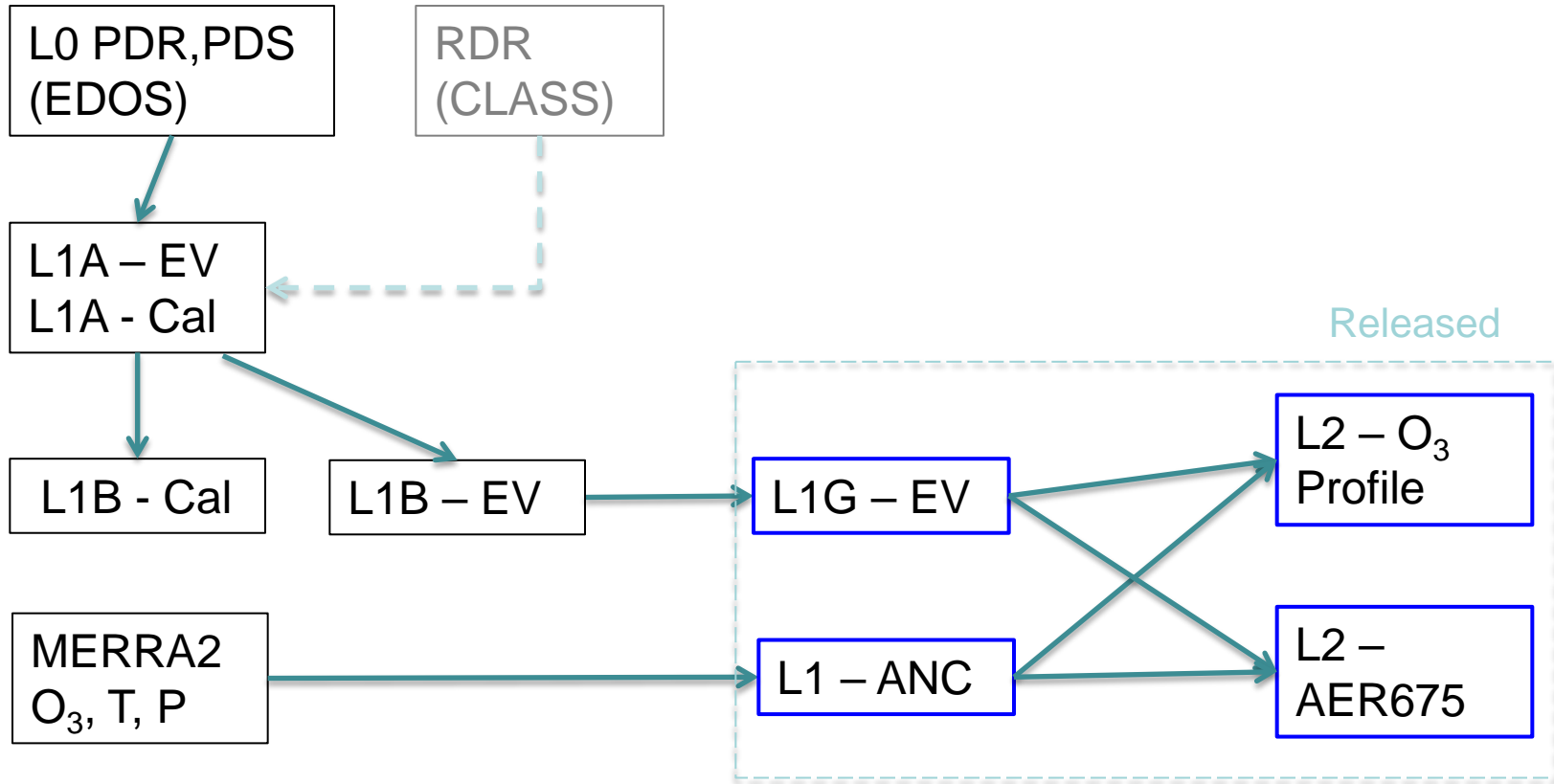
Limb Profiler Sensor (SNPP only)

- Wavelength range: 280 nm to 1000 nm
- Prism spectrometer w/CCD detector
- Spectral resolution: 1 nm – 30 nm
- 3 profiles separated by 250 km in longitude
- Vertical : 5 – 80km at 1km sampling



Limb Data Products

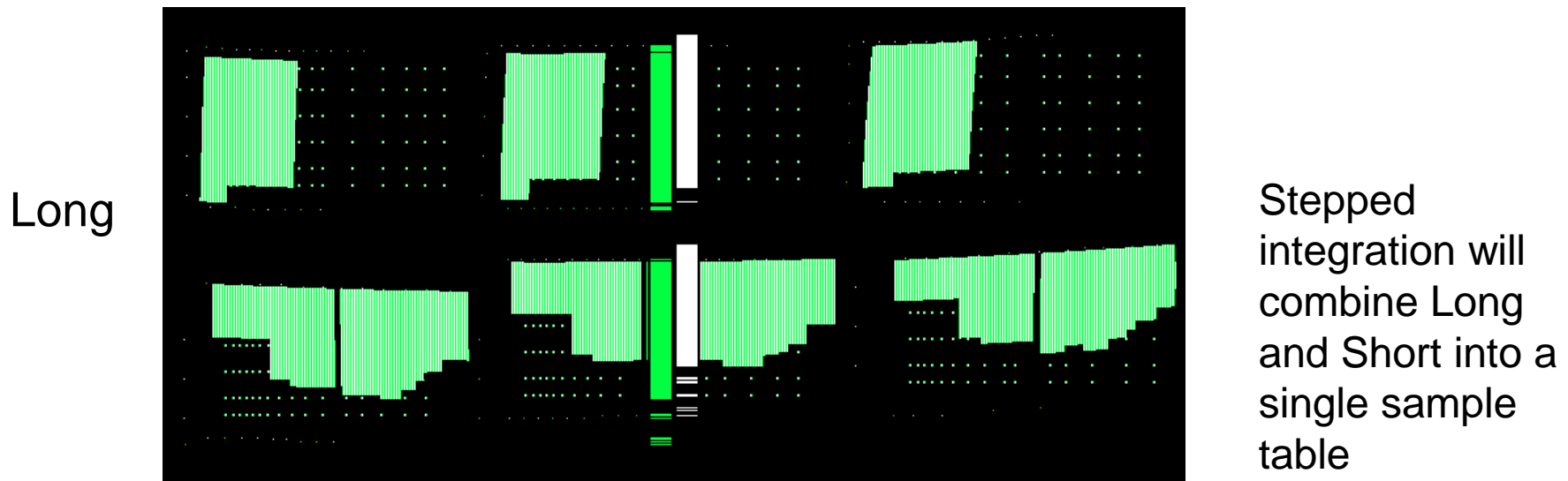
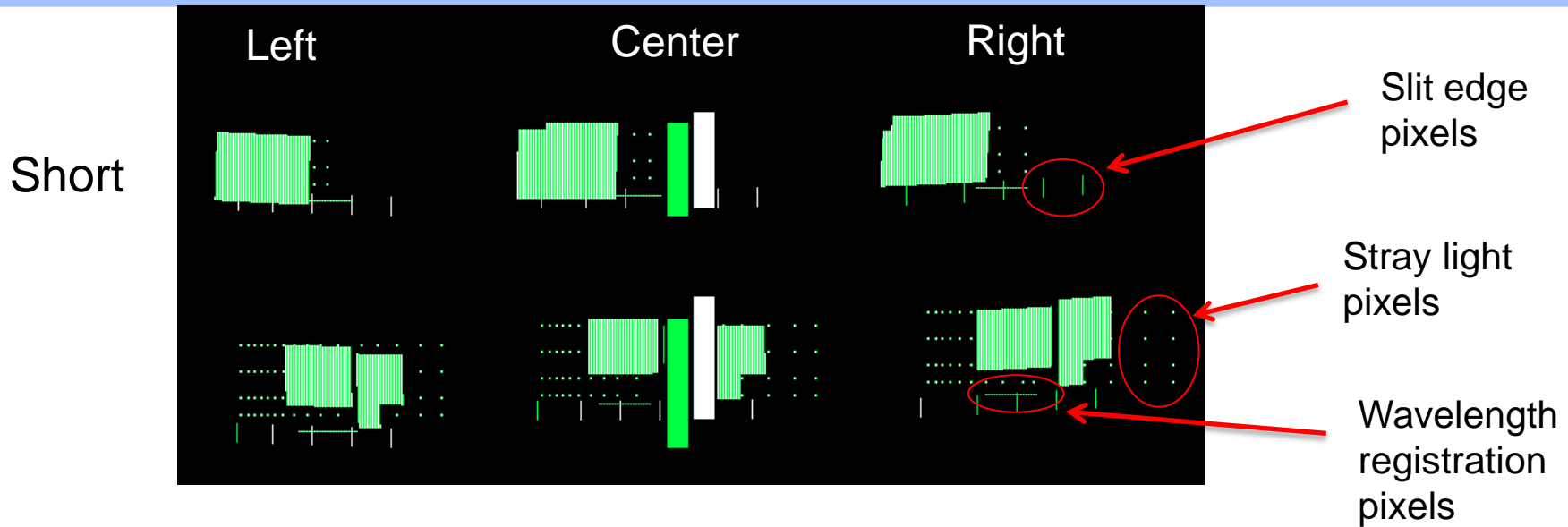
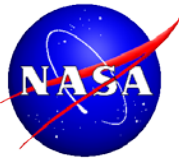
APIDs : 562, 563, 566, 578, 579, 582



The Level 1G product :

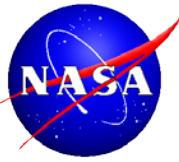
- Interpolates TOA reflectances to uniform altitude grid and non-uniform wavelength grid
- Consolidates Low and High Gains for each slit

Current Limb sample tables

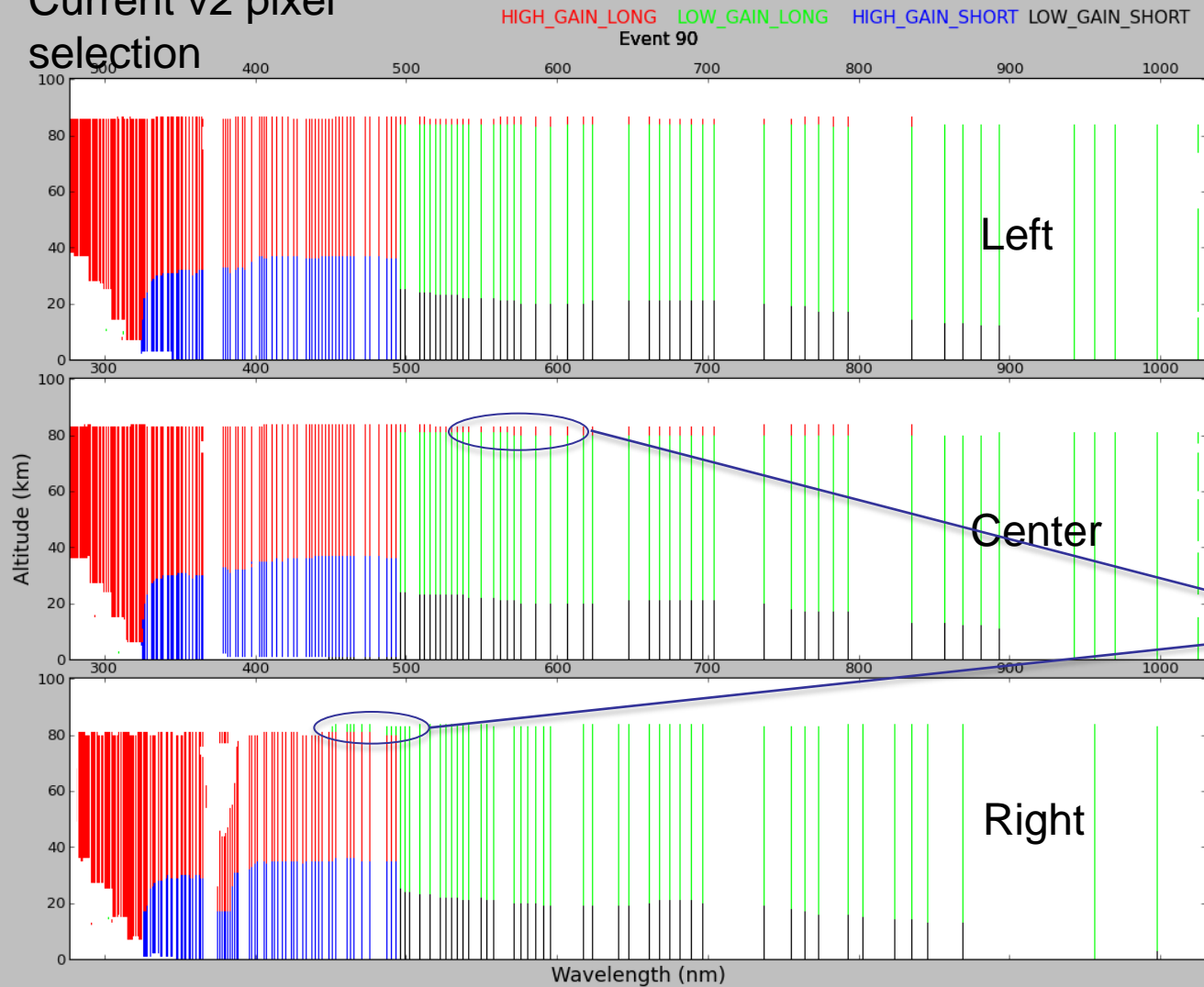


← Wavelength

Gridded radiances have few spectral gaps



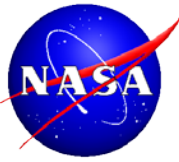
Current v2 pixel selection



Changes for v2.5

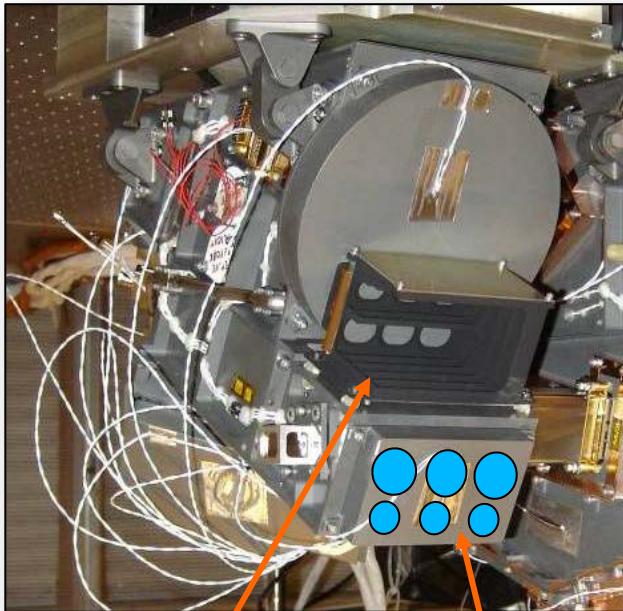
- Lower HG/LG switch to 450nm
- Change from HG priority (280-450nm), LG priority (450-1000nm) to HG-only, LG-only. Eliminates high altitude intrusions

Focal plane image shifts



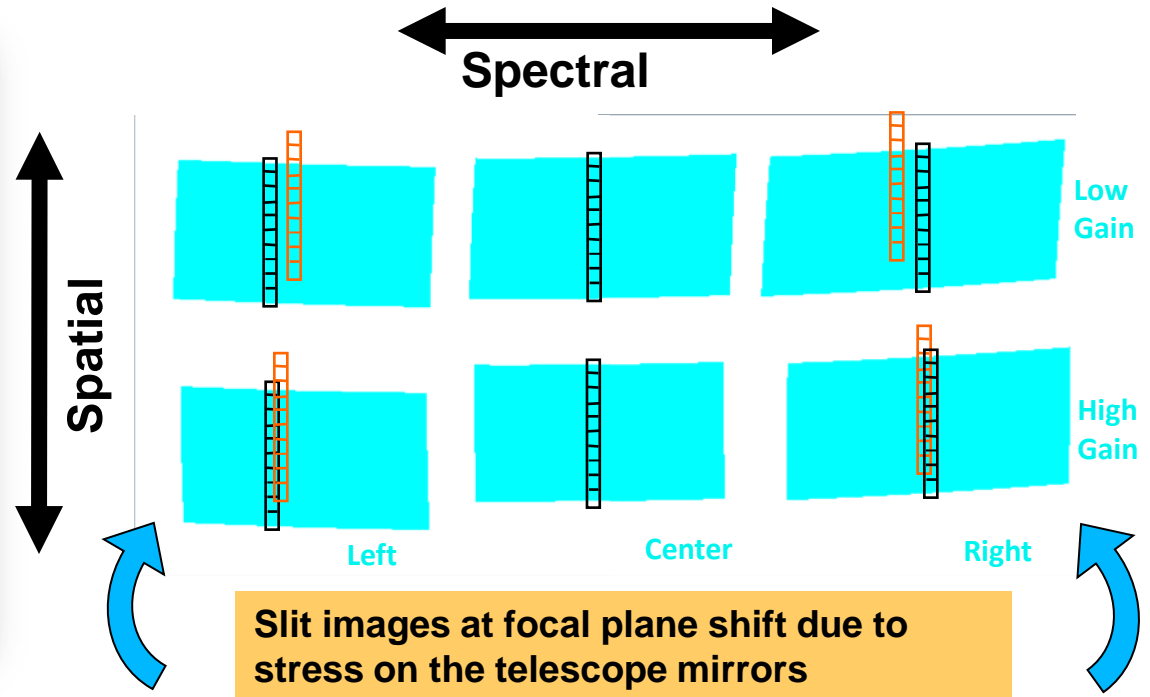
Spectral/Spatial shifts are ground-to-orbit, intra-orbital, and seasonal

Courtesy of Ball Aerospace



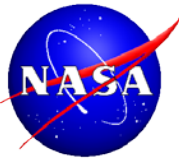
Thermally expanding entrance baffle

Telescope mirrors

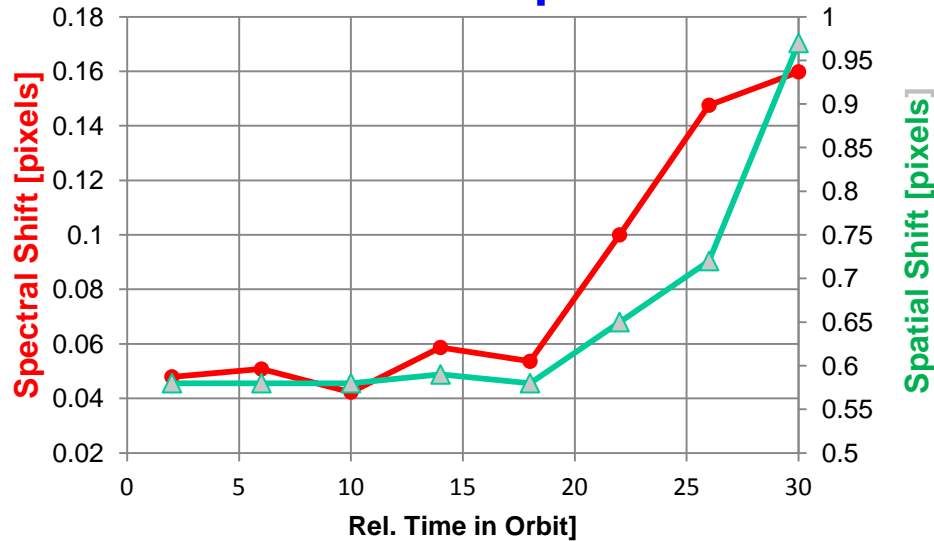


Shifts occur when sunlight illuminates the entrance baffle

Image shifts are mostly corrected



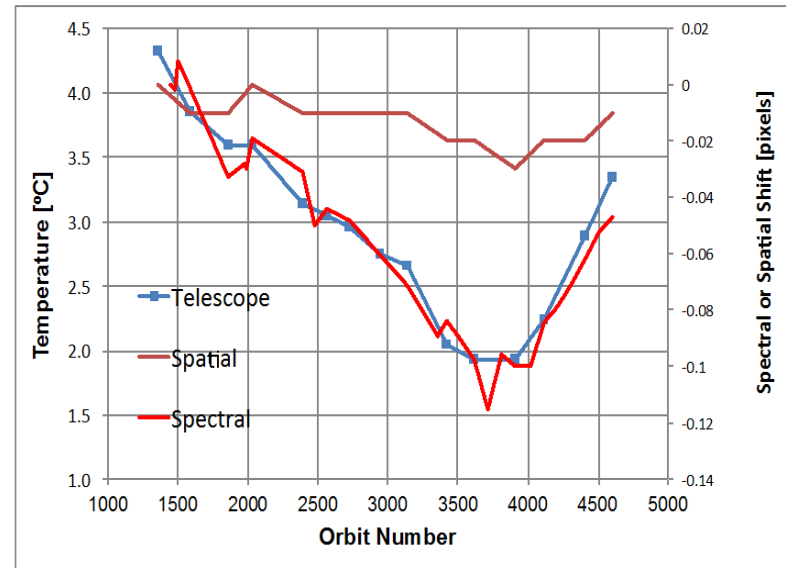
Intra-orbital focal plane shifts



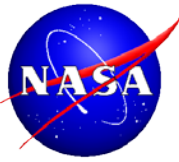
Corrections mostly unchanged from v2.0 to v2.5

- Intra-orbital spectral/spatial uses time in orbit
- Seasonal spectral/spatial uses solar beta angle
- Small seasonal spatial shift (60m) added in v2.5

Seasonal focal plane shifts



TOA Reflectance (I / F)



V2.0

- Wavelengths follow EV radiances
- Day 1 solar is static

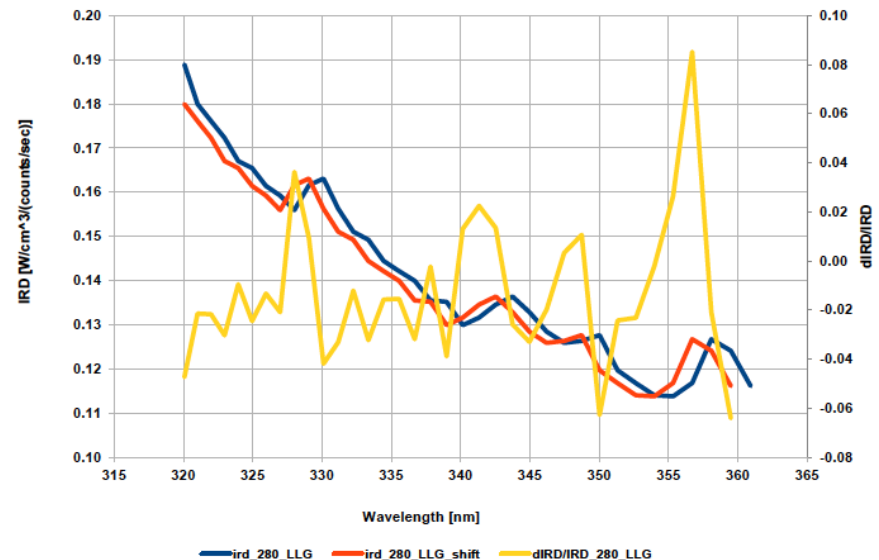
V2.5

- Day 1 solar is adjusted dynamically to EV wavelength scale

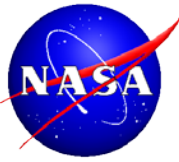
Future

- Day 1 solar adjusted (one time) for Gnd-to-Orb spectral shift
- EV radiance coeffs. adjusted dynamically for spectral shifts

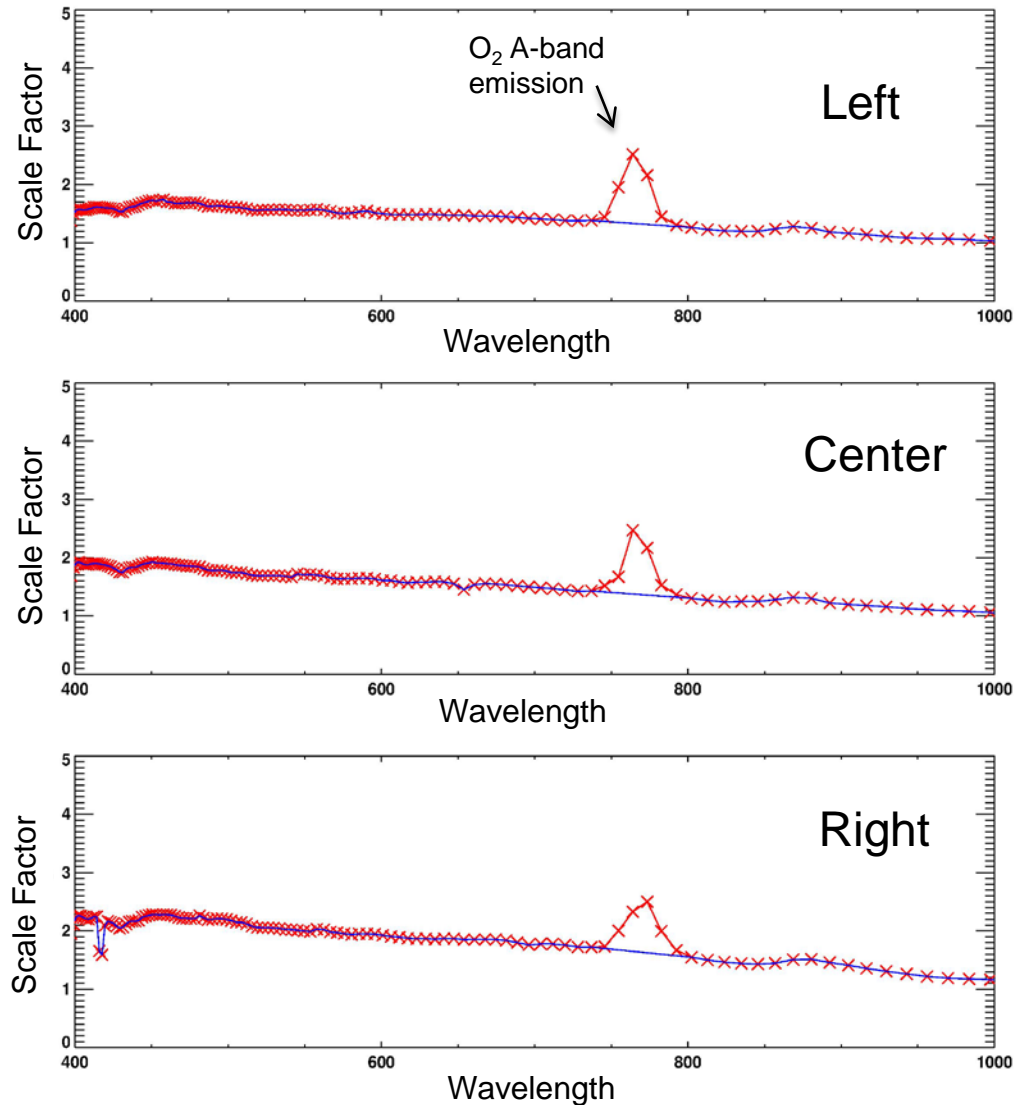
LP LLG IRD and (shifted IRD / IRD) - 1 for iSpatFF=280; shifted by 1 pixel



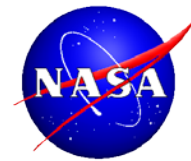
Stray light correction boosted in VIS



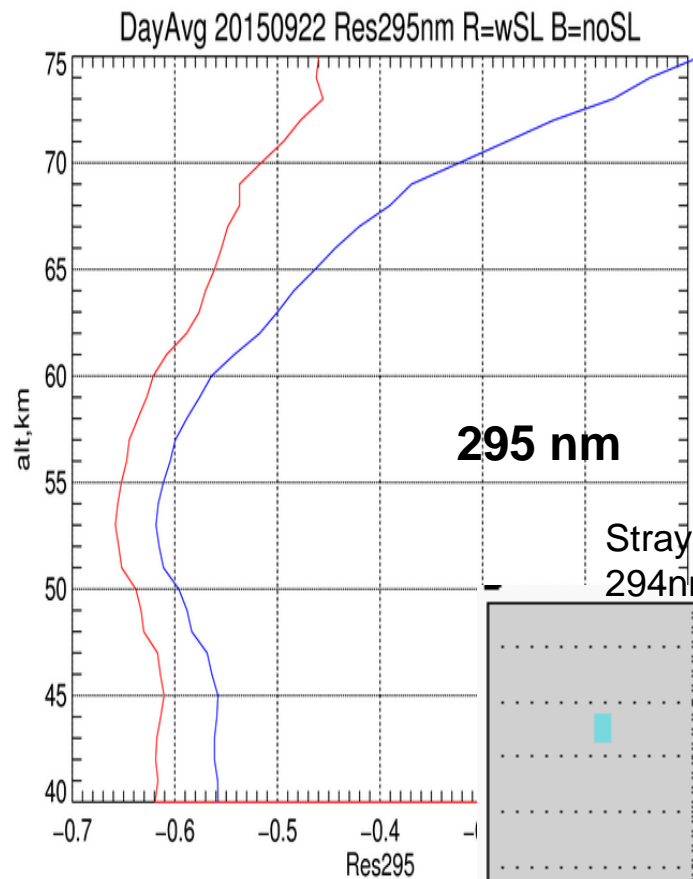
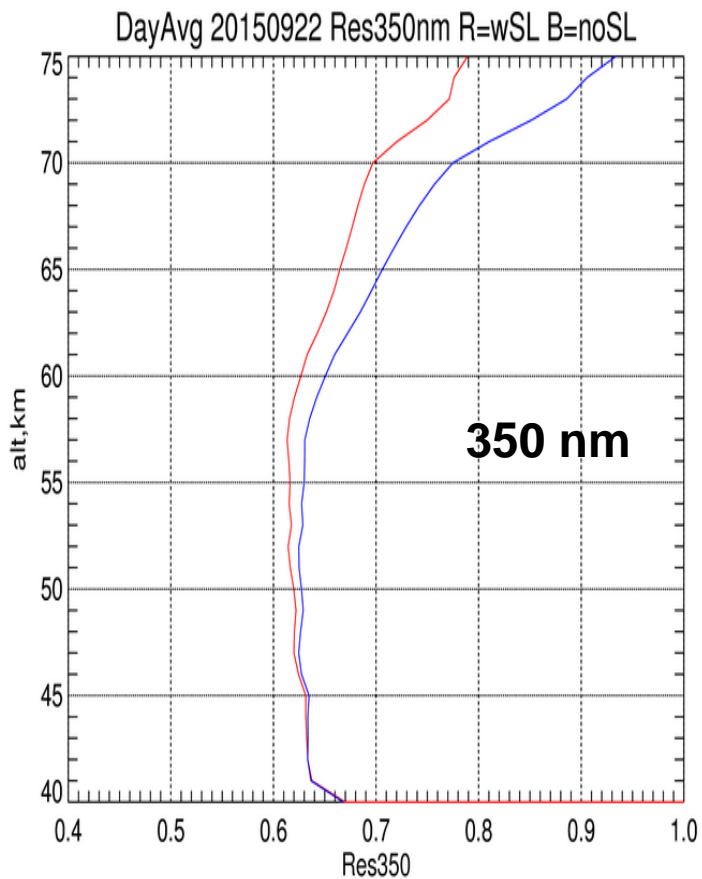
- Interim adjustment for the benefit of aerosol product; has small effect on O_3
- Based on analysis of high altitude radiance gradient (forced exponential)
- Scale factor applied to existing SL correction at all altitudes
- No adjustment in UV



Residual stray light in UV



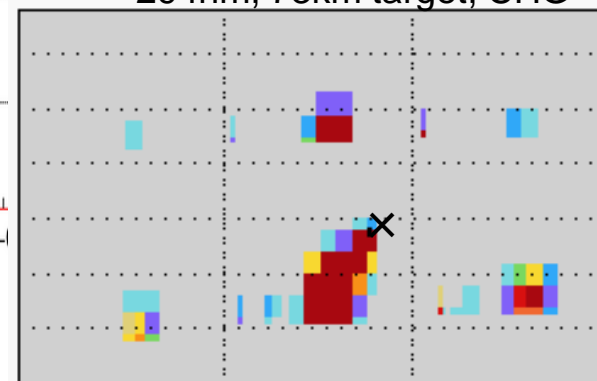
Radiance residuals relative to MERRA2
assimilated P, O₃ profiles



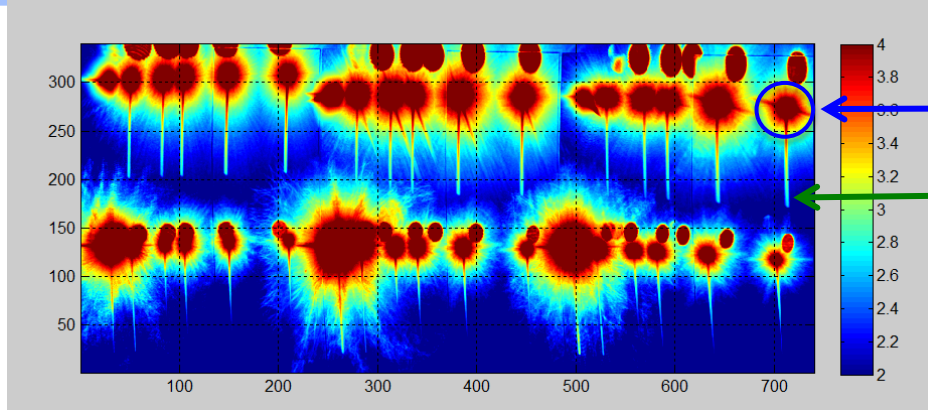
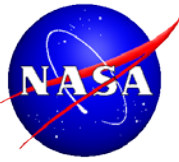
Residual SL
(~8% at 75km)
appears to be
independent of
wavelength

295nm SL
sources are out-
of-band

Stray Light Sources
294nm, -73km target, CHG

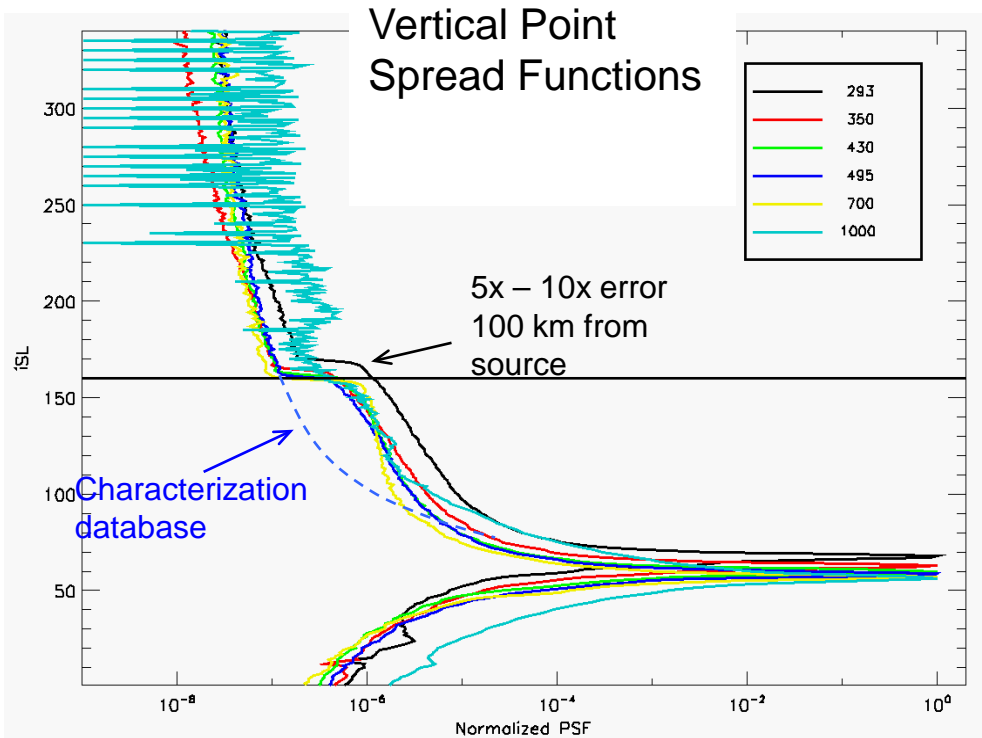


Future plans to remove more SL



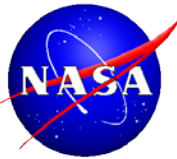
Spectrometer scatter

Primary mirror (telescope) scatter

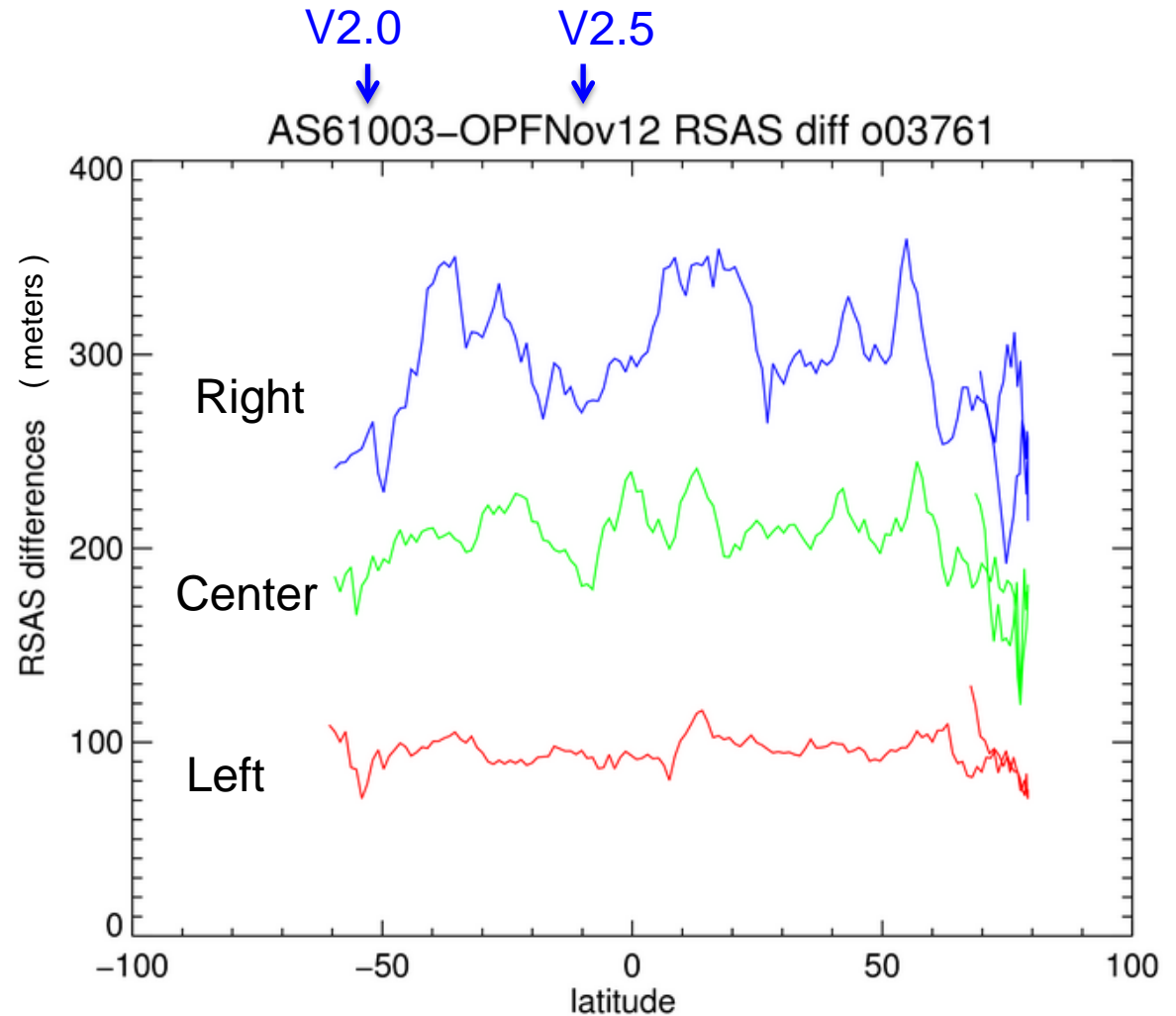


Telescope scatter was ignored in pre-launch measurements and is probable source of additional error

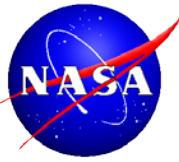
Fine tuning Day 1 pointing in v2.5



RSAS results vary with latitude and season, $\pm 200\text{m}$



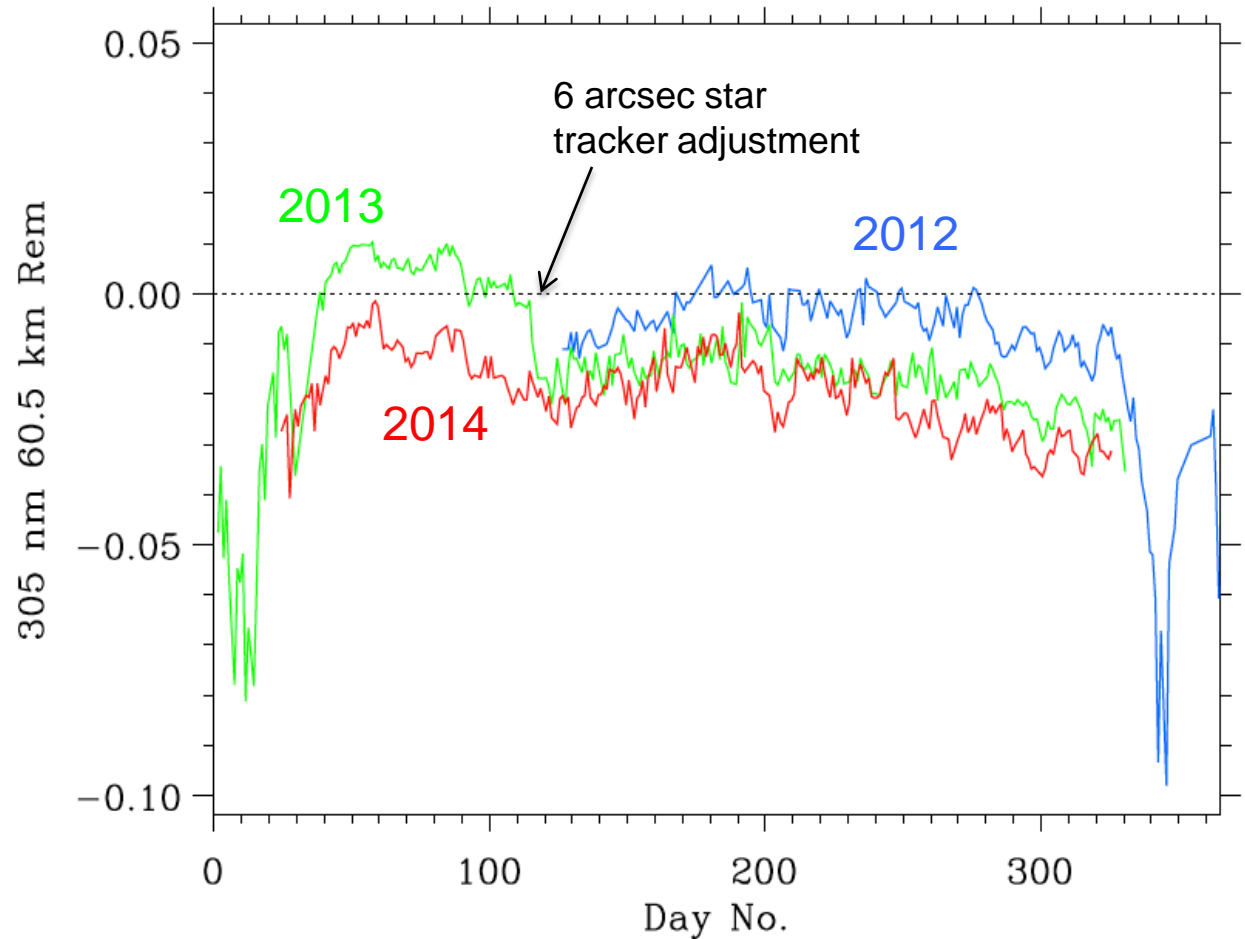
295 nm “Remainder” validates TH time dep.



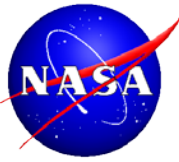
Center slit
Event nos: 20-25 +0.03 cal adj

The 295REM is insensitive to O_3 errors, SL errors, surface refl. variations

The 295REM also suggests 400m (linear) latitude dependence in TH that is not corrected.

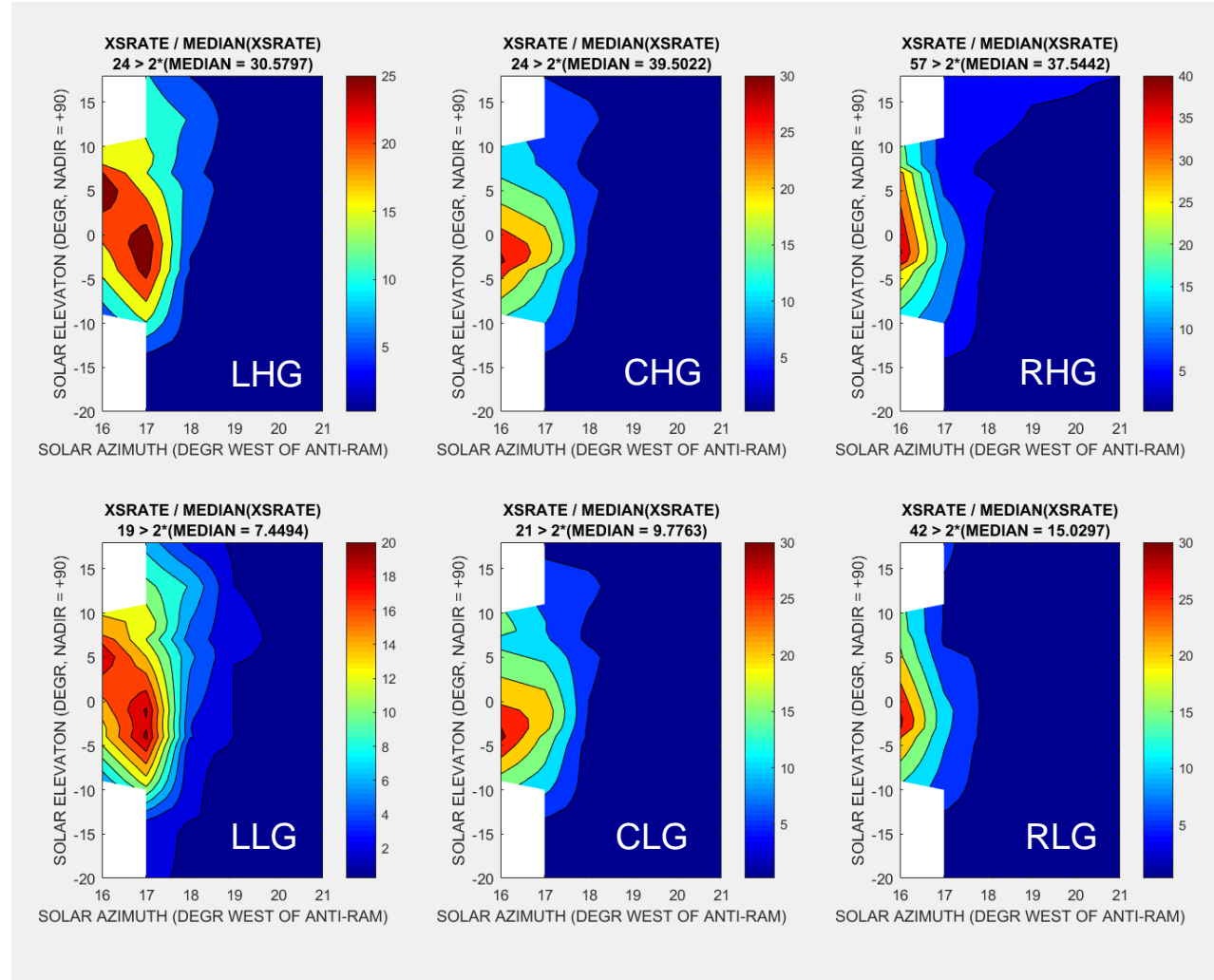


Solar intrusion affects high altitudes, NH

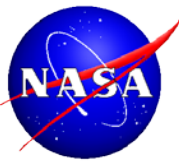


Signal ratio: Above/Below slit edge (~80km)

- Same absolute error at all altitudes
- Signals at 80km can be 20x-40x .gt. normal
- Max. error in July-Aug
- Largest effect in LHG, but intrusion affects more latitudes in RHG

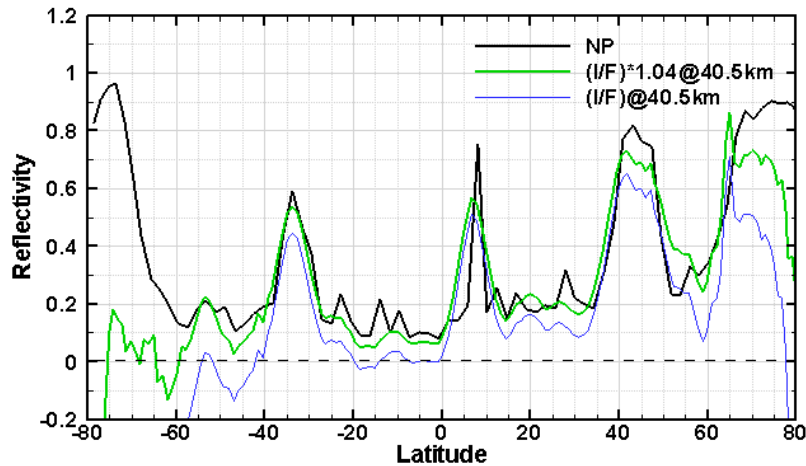


Future adjustments to calibration



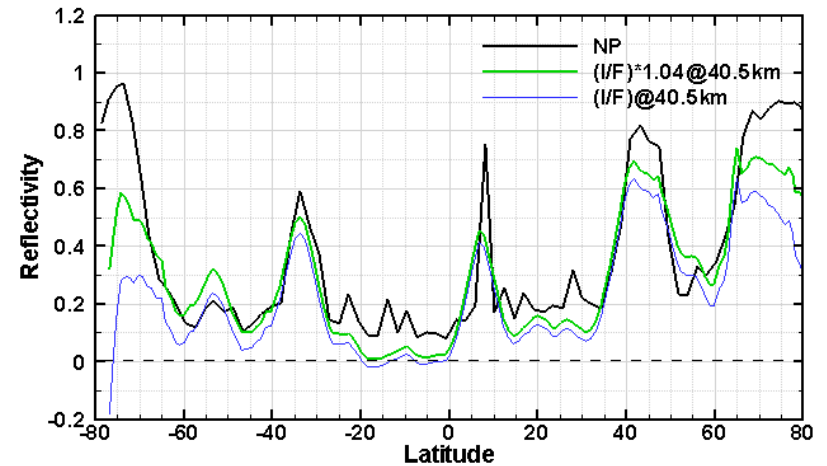
352nm

2015-03-23_O17629s2

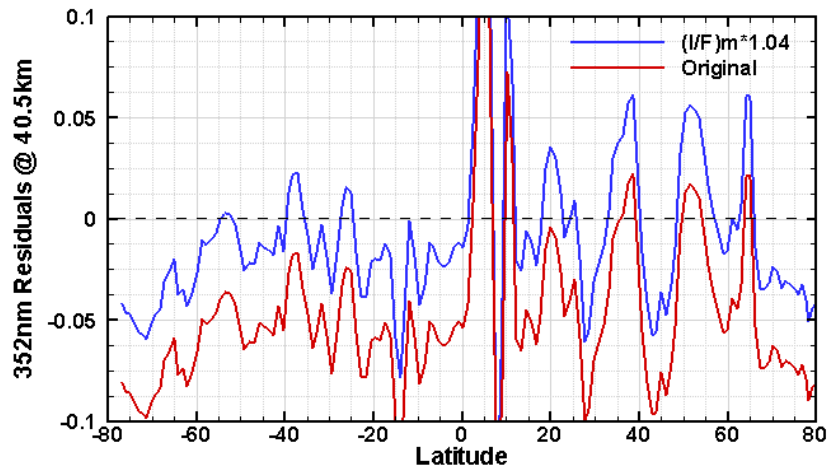


674nm

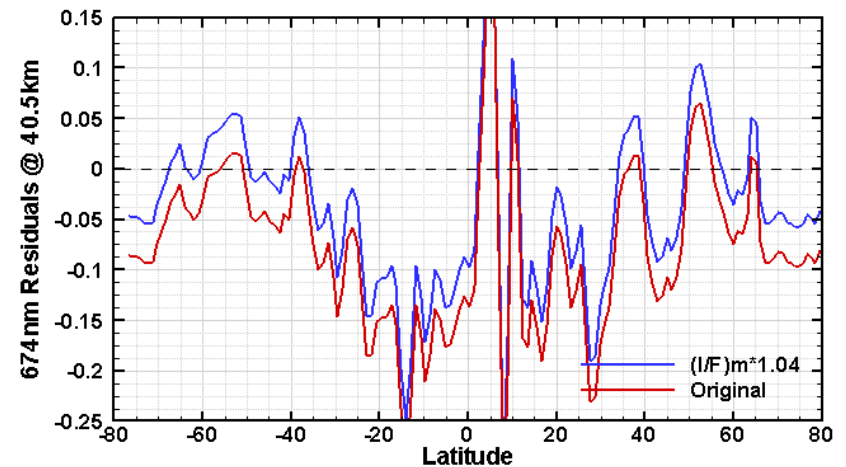
2015-03-23_O17629s2

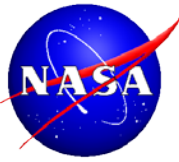


2015-03-23_O17629s2



2015-03-23_O17629s2





- Test new Stepped IT timing pattern
 - will require significant L1B code changes to implement
 - we can drop 20 - 30K pixels from sample table
- Further refine stray light model by removing slit image
 - Long-term goal is to improve correction in IR
- Adjust UV calibration to NP. Develop strategy for VIS calibration adjustments
- Derive a 1st order correction for solar intrusion based on above/below slit edge ratio
- Improve flagging and anomalous pixel rejection (before gridding)