



Limb sensor performance summary and Level 1 plans



Summary of L1 changes for v2.5



Earth radiances

- No changes from v2.0

Solar irradiances

- No changes from v2.0

Wavelength registration

- No changes from v2.0

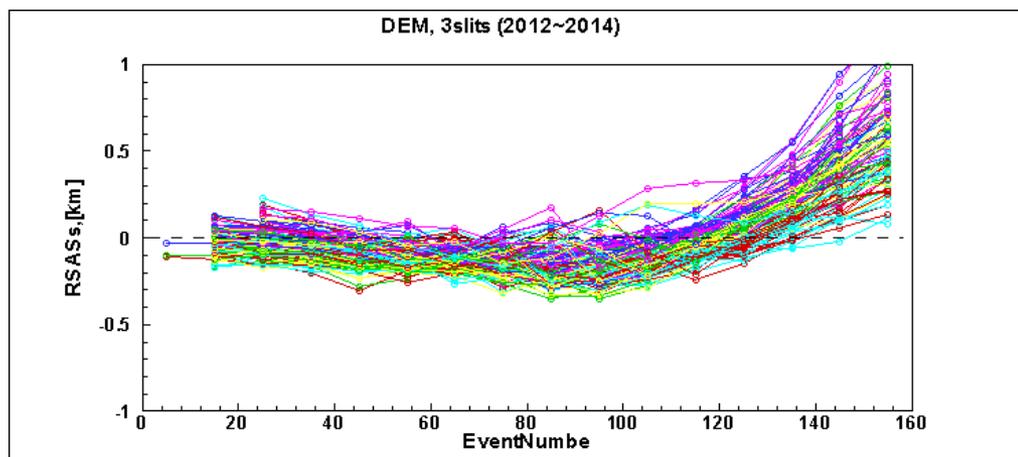
Altitude registration

- 100 to 300 m static shifts to 3 slits
- Introduced 60 m annual cycle in pointing

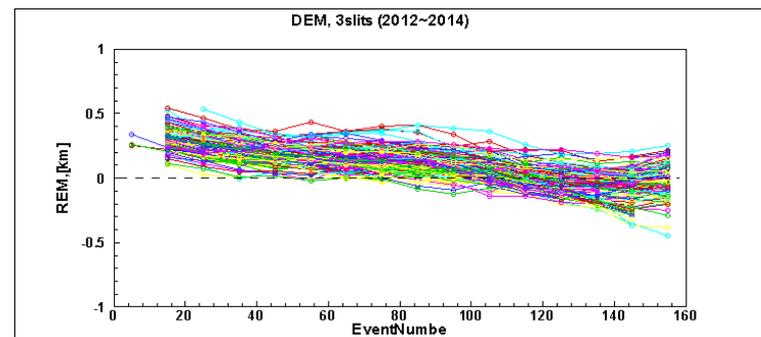
Stray light

- Improved Jacobian generated using flight data
- Ghosts tuned with pitch-up maneuver data

1. V2.5 plans discussed in Dec. meeting
2. Static, independent adjustments to 3 slits based on refined 350 nm NRR (RSAS); no changes to HG-LG offsets
3. Post-correction results



305 nm residual results indicate remaining intraorbital variation



We understand pointing changes caused by internal mirror shifts (using slit edge images). What part of 350 nm radiance observations is unexplained?

Slit Edge offsets (km)

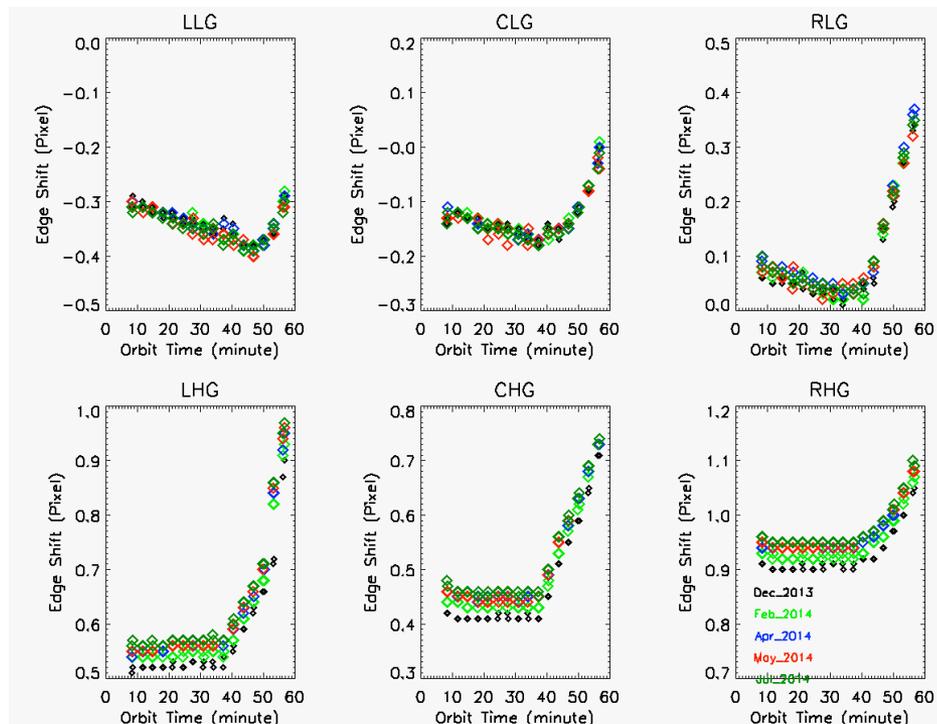
	L	C	R
Low Gain	-0.30	-0.10	0.10
High Gain	0.55	0.45	0.95

350 nm Scene-based offsets (km)

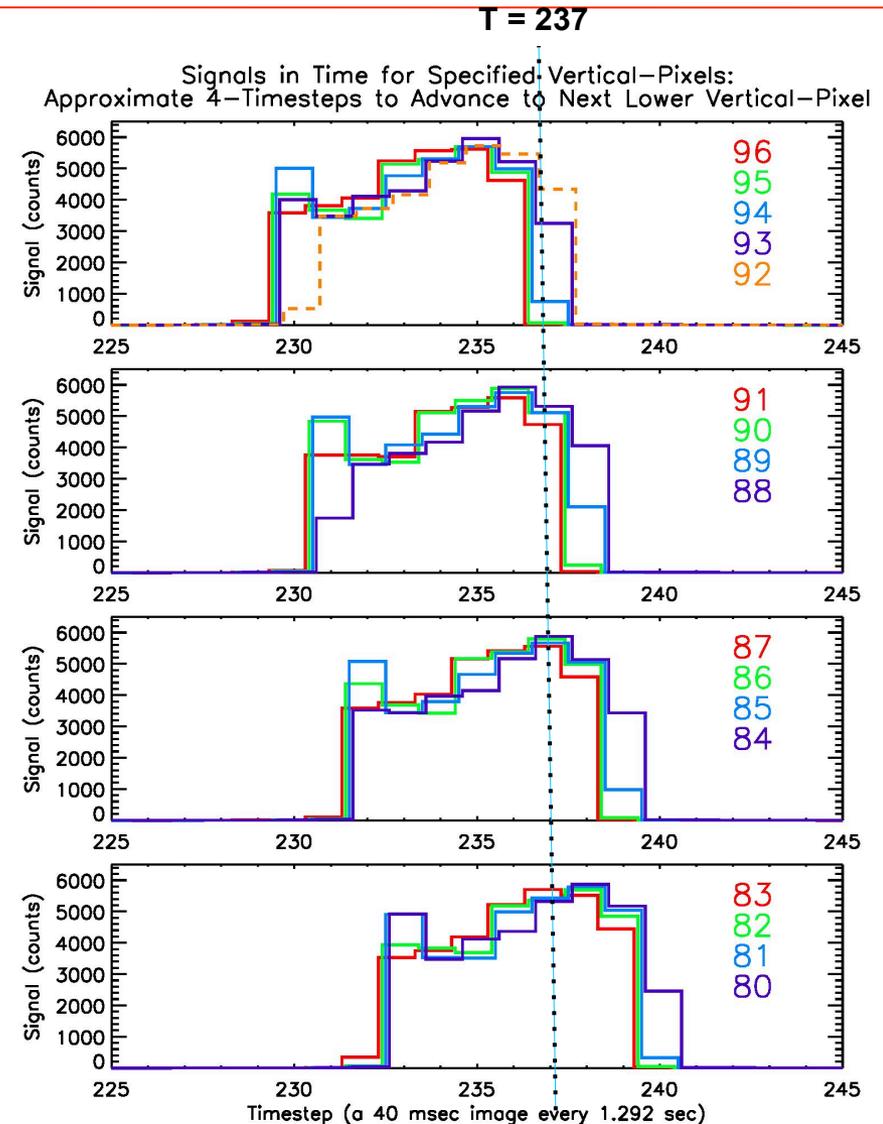
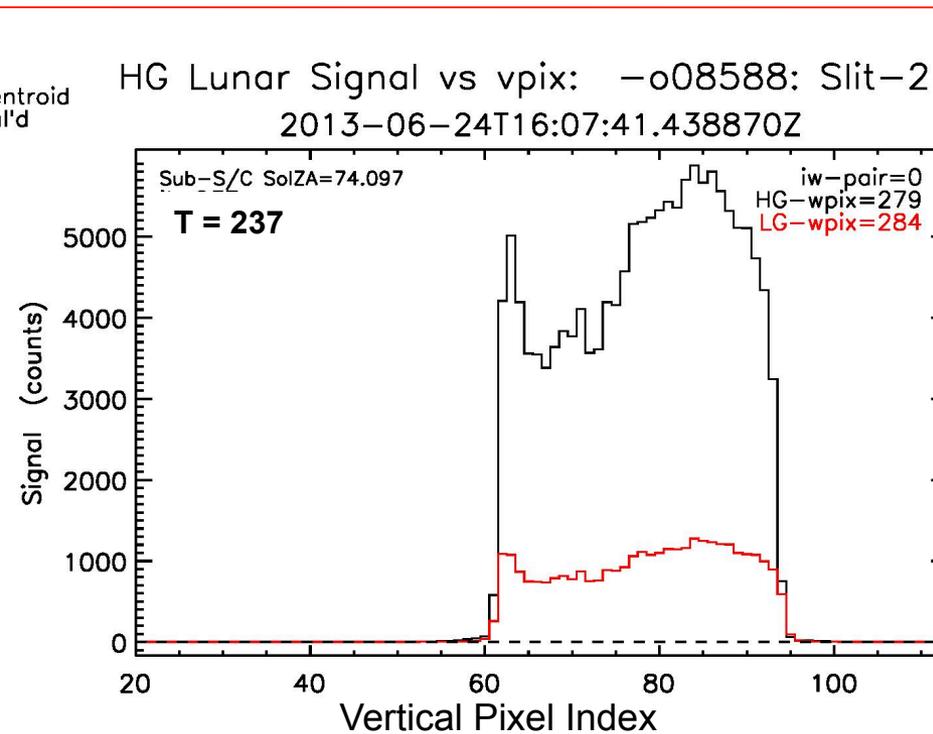
	L	C	R
Low Gain	1.35	1.65	1.90
High Gain	1.75	1.85	2.45

Residual offsets (km)

	L	C	R
Low Gain	1.65	1.75	1.80
High Gain	1.20	1.40	1.50



VIIRS Pitch offset = 212 arcsec
 ≈ 3.5 km



Motion of moon across detector yields multiple measurements of lunar position.

2 techniques yield inconsistent results for HG-LG offset



Post-v2.5 Level 1 Plans



Wavelength registration

- Derive L-T & seasonal changes from operational solar data

Sun-normalized radiances

- Provide Day 1 irradiance at EV band center wavelengths for every image
- Switch L1G from gridded radiances to reflectances (to support similar changes in L2)
- Eliminate L1G product once L2 code starts using L1B directly
- Begin providing unified bandpass functions

Transient flagging

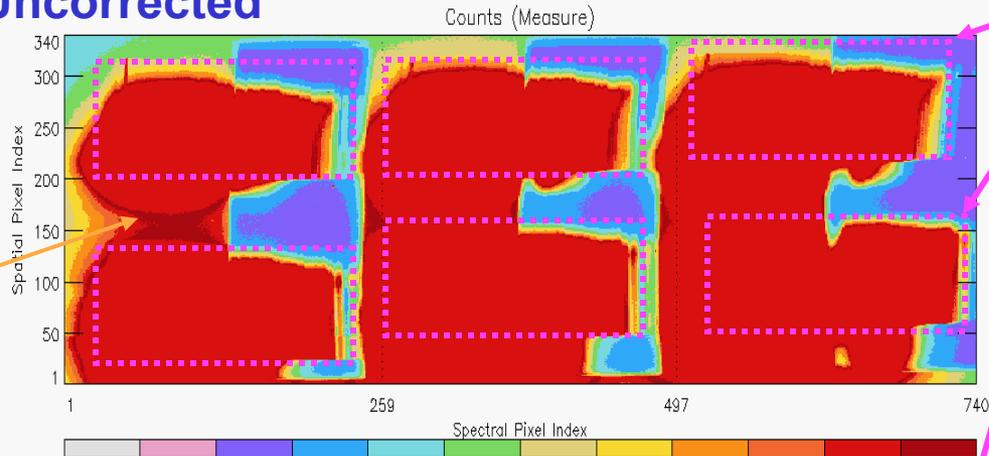
- Based on smooth variations (spectral, spatial, temporal) in $\log(I/F)$

Stray light correction

- Working on improvements

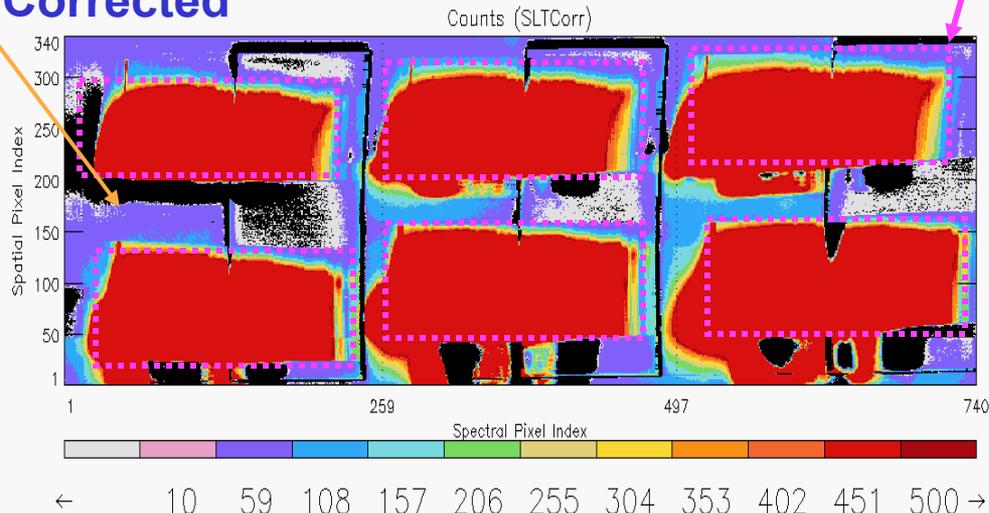
Optical Region

Uncorrected

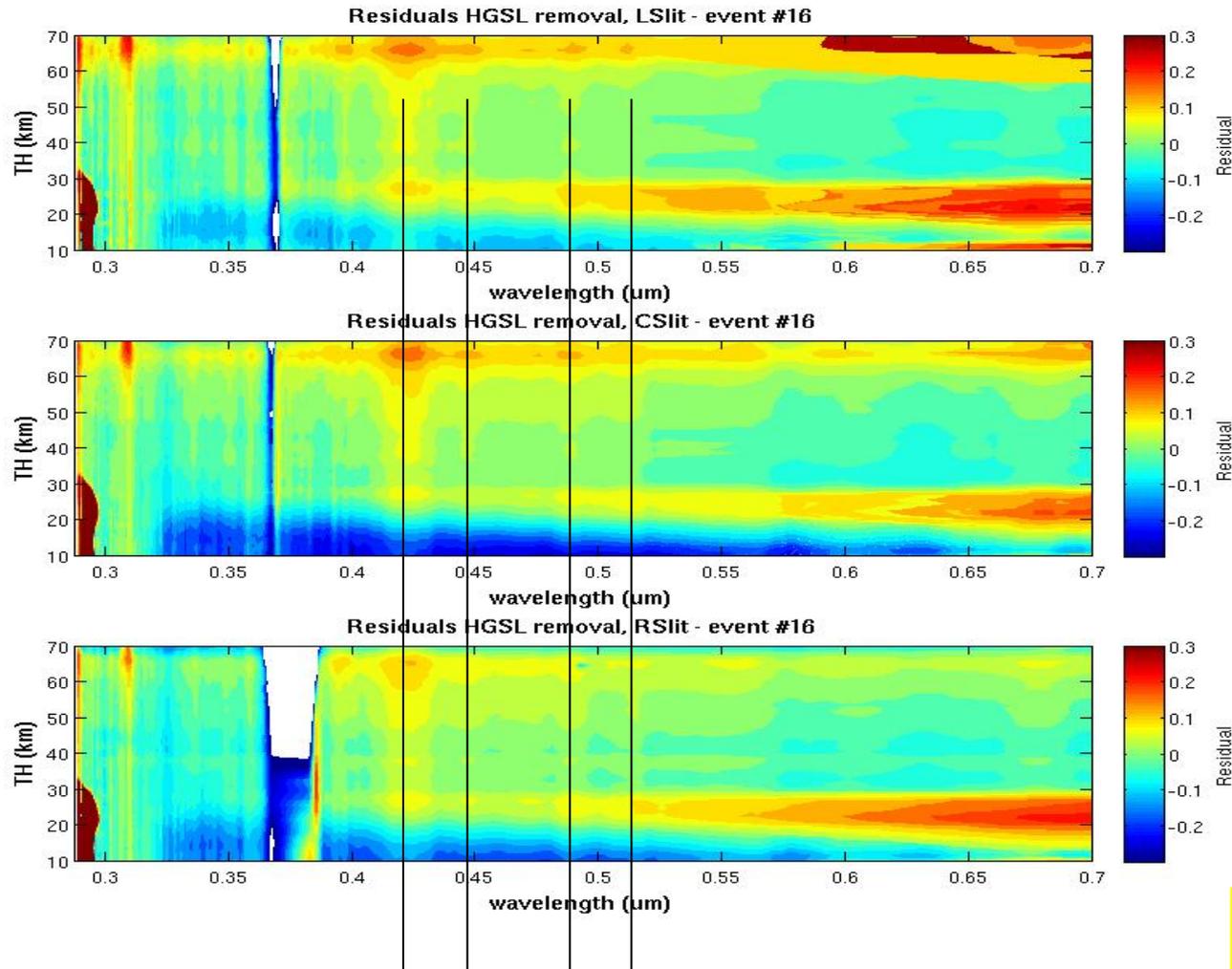


Stray light correction evaluated using non-optical regions on detector

Corrected

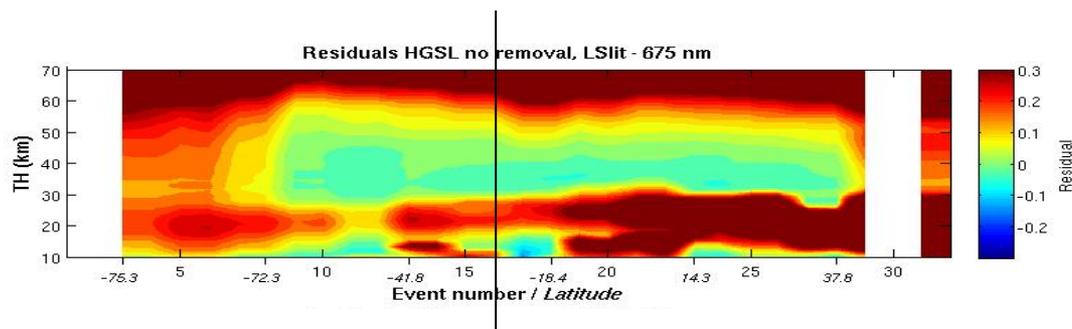
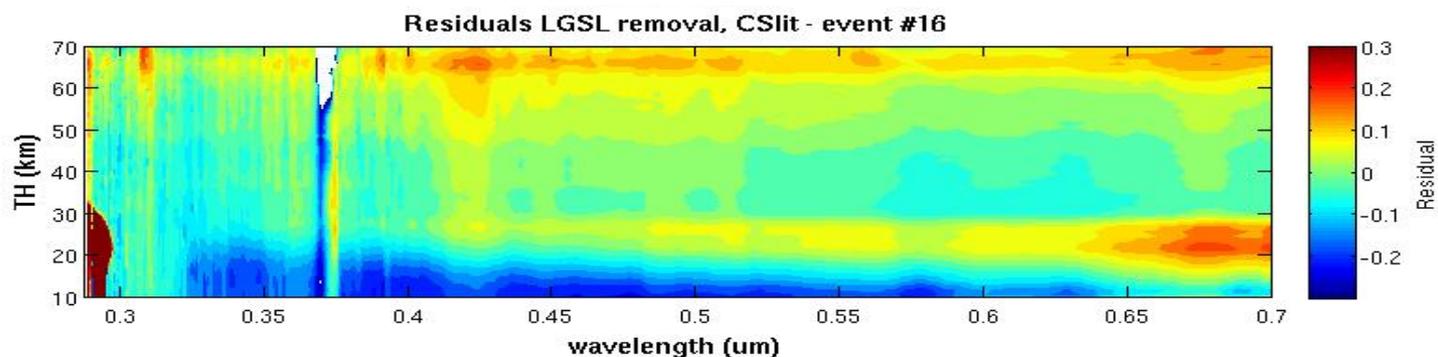
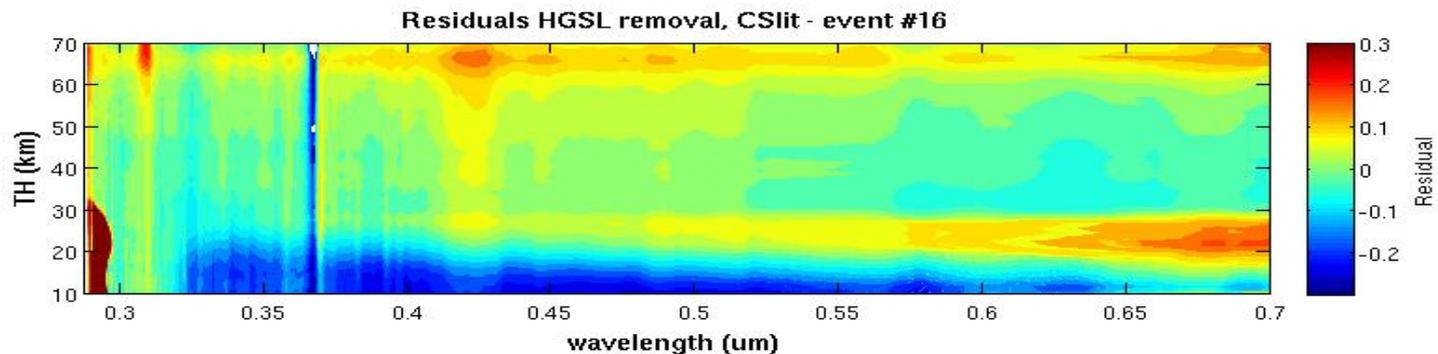


Stray light errors remain in high-altitude VIS / NIR



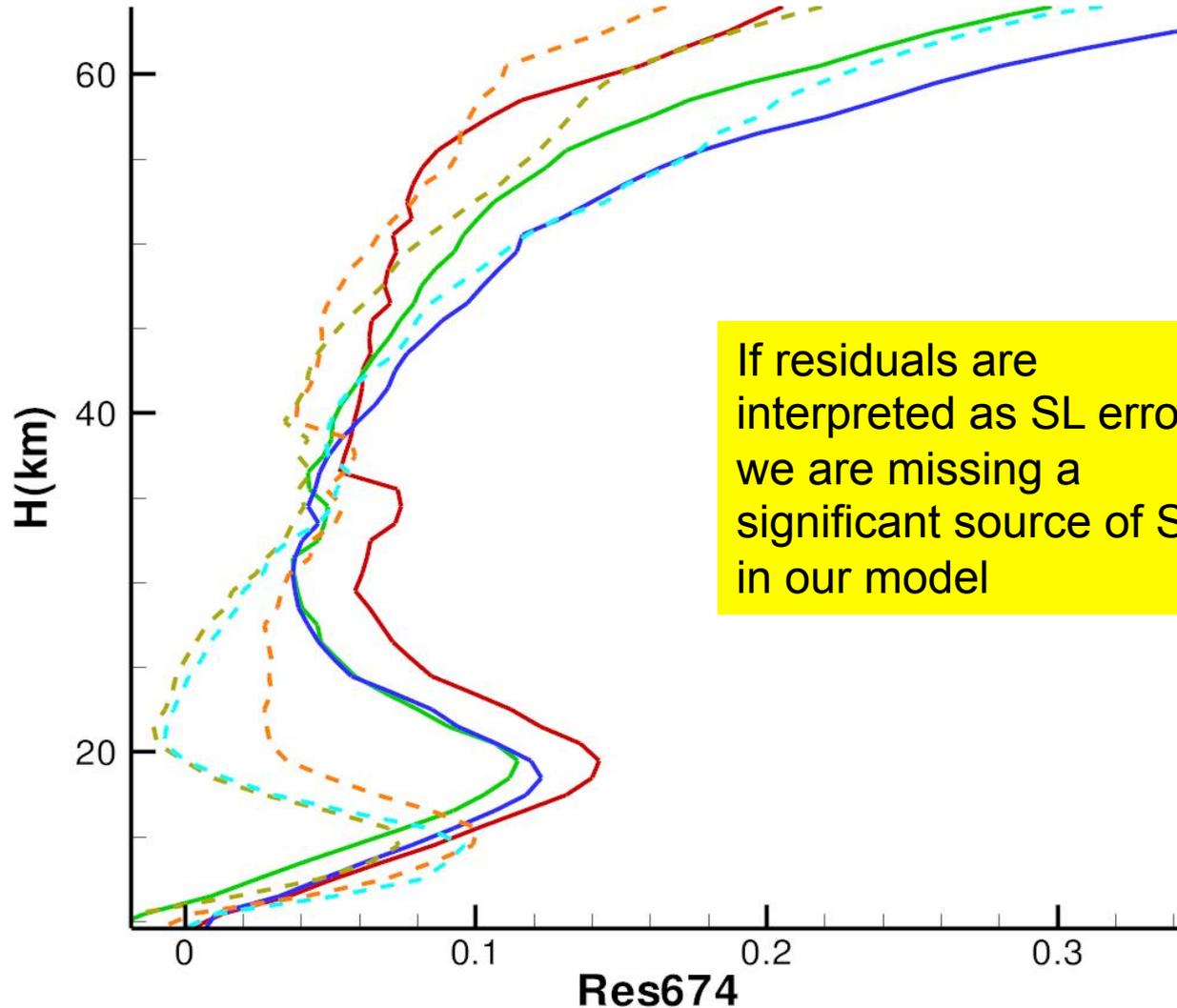
Solar Fraunhofer Lines

Results in VIS
consistent with
additive error



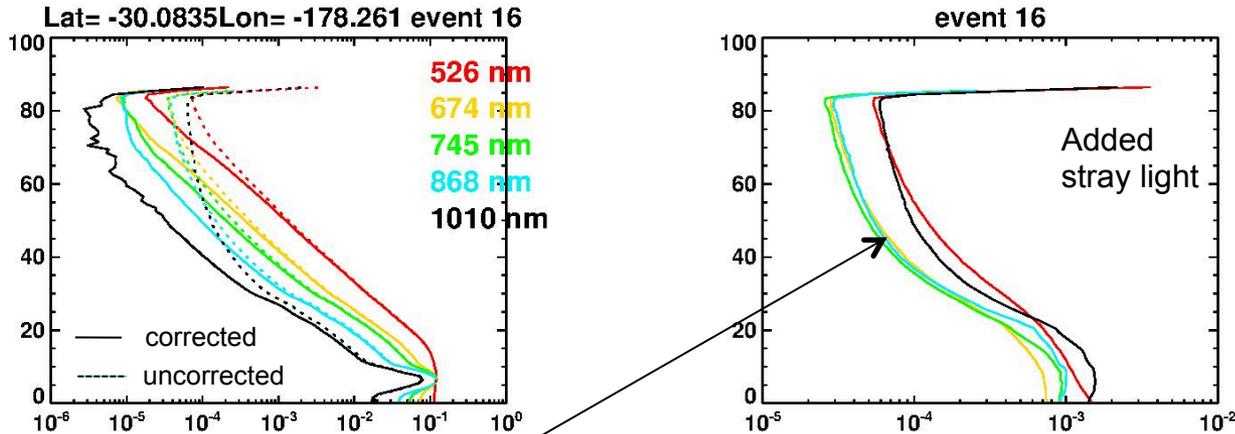
No large differences between HG and LG

Residual 674 nm for Frame 20, Daily average for March 25 and October 13 (dashed)
, 2013



If residuals are interpreted as SL error, we are missing a significant source of SL in our model

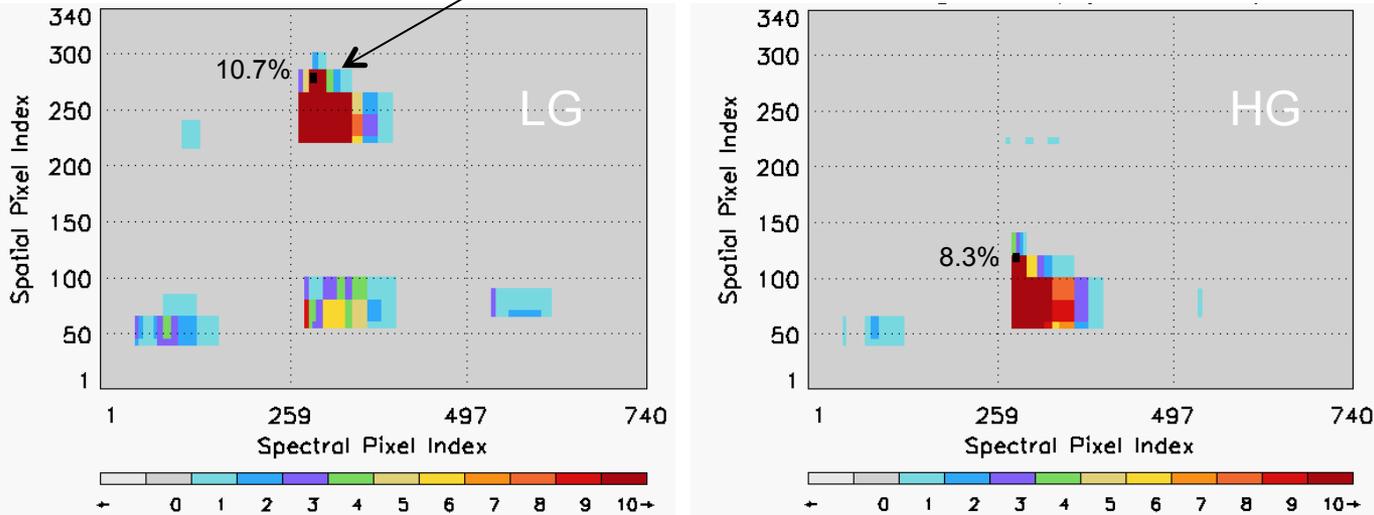
SL corrections in Low Gain



Cannot simply adjust the shape of the SL contribution till residuals go to zero.

Need to know source.

SL sources at 675 nm, 45 km



Proceed by computing SL counts required to explain residuals

Current Timing:

Short – 0.04 s x 15
 Long – 1.25 s x 10 } *interleaved*

time of median photons close to half of report interval

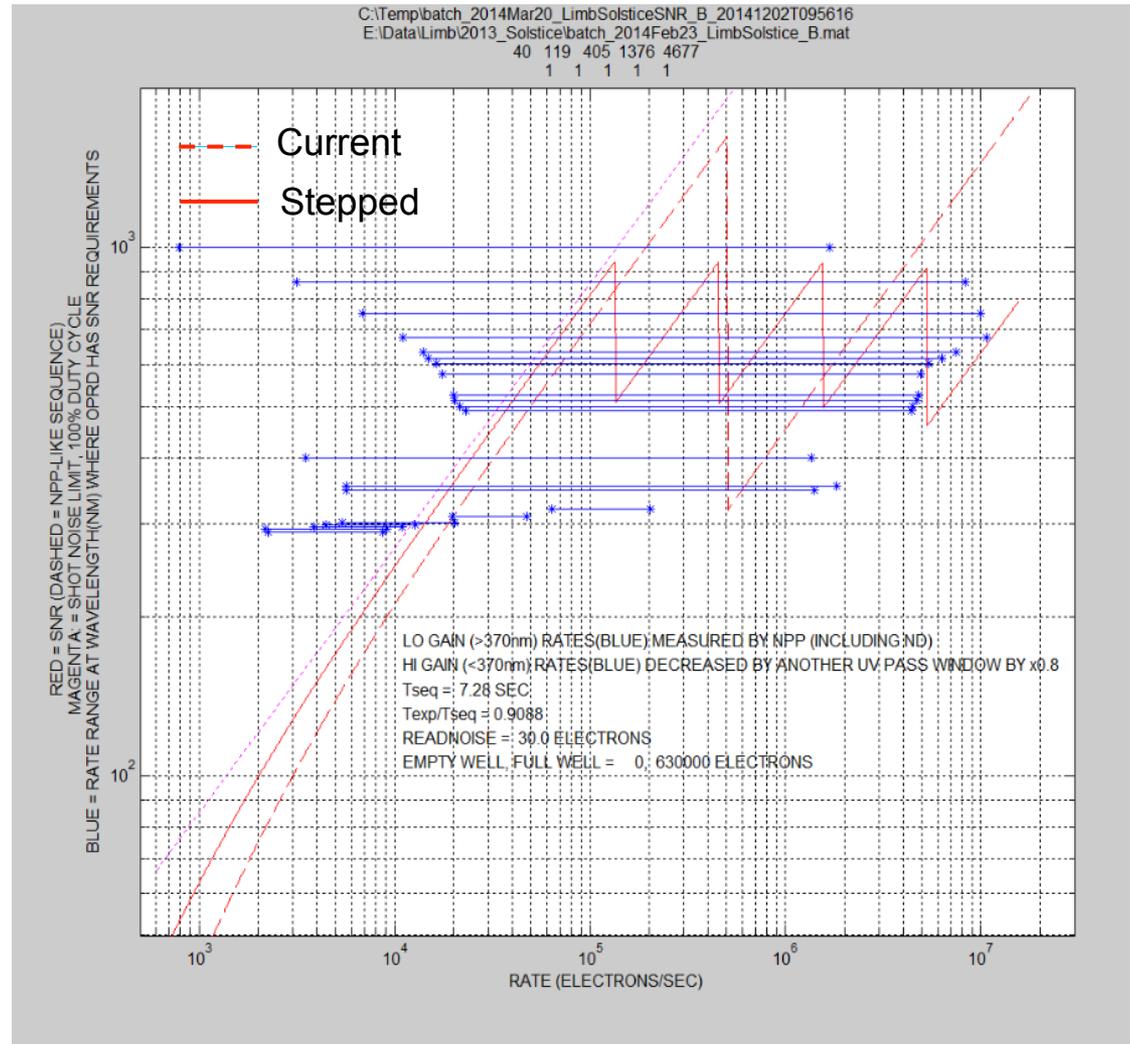
Flight hardware has the ability to discard saturated ITs

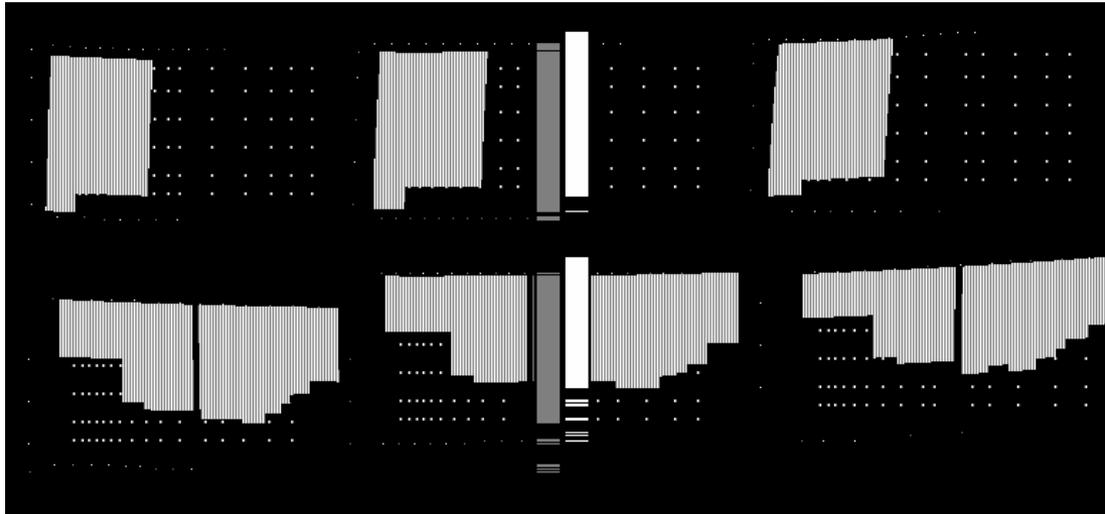
Proposed Timing:

12.7 s
 1.13 s
 0.04 s
 0.34 s
 0.10 s
 3.78 s } *sequential*

time of median photons varies with altitude and wavelength

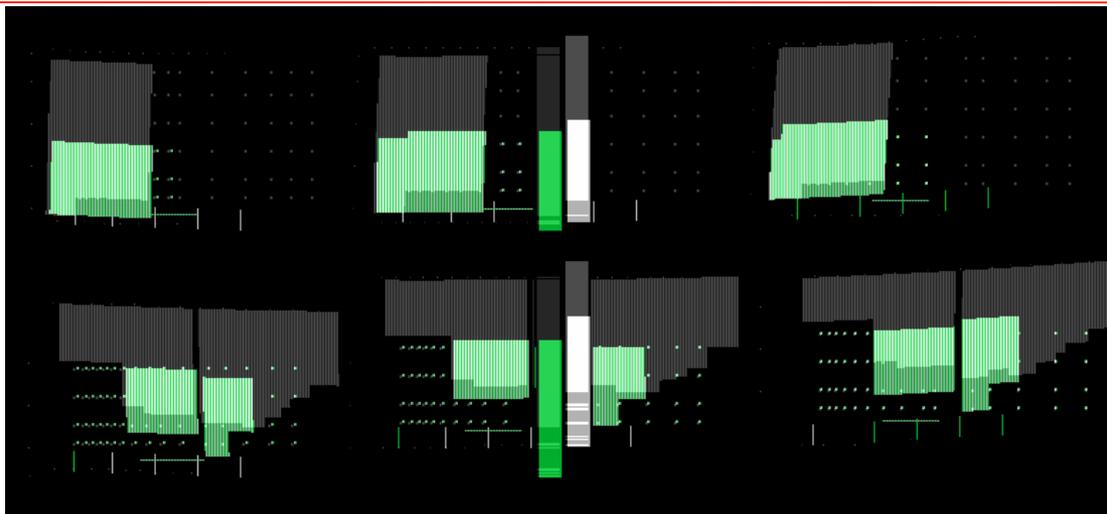
SNR vs. Signal Rate





Current v0.8 Sample Tables

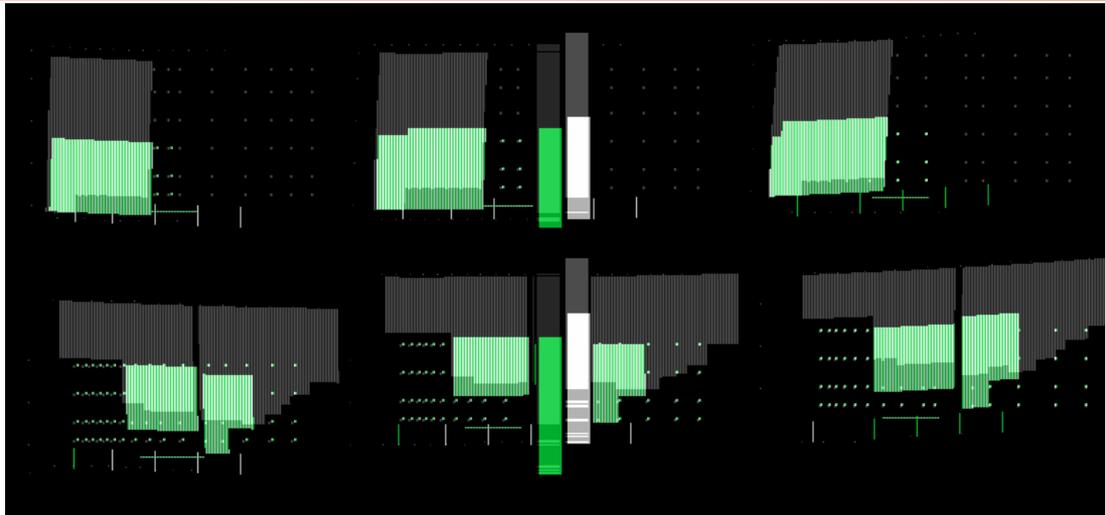
- Long: 62,000 pixels



Current v0.8 Sample Tables

- Long: 62,000 pixels
- Short: 26,500 pixels

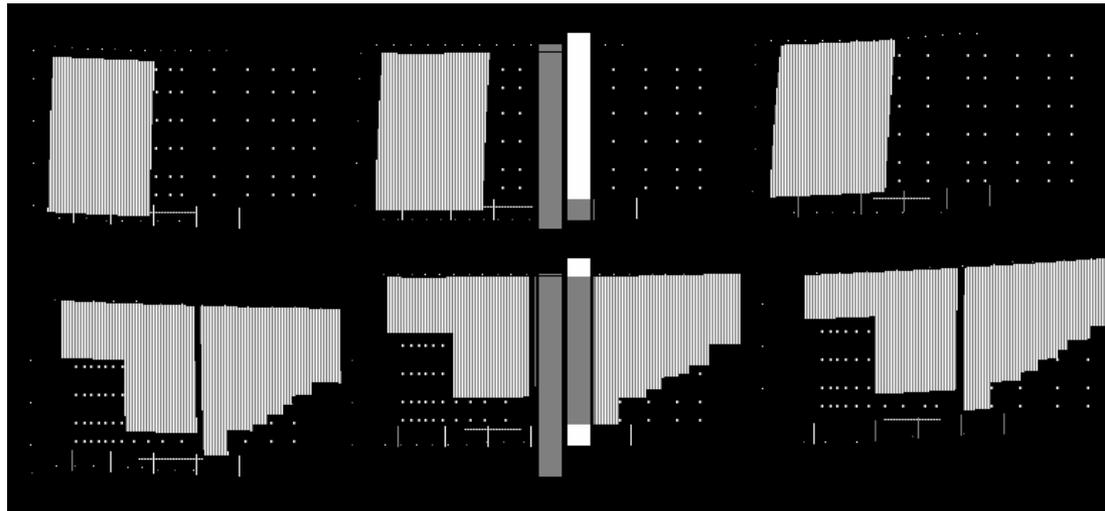
Total: 88,500 pixels



Current v0.8 Sample Tables

- Long: 62,000 pixels
- Short: 26,500 pixels

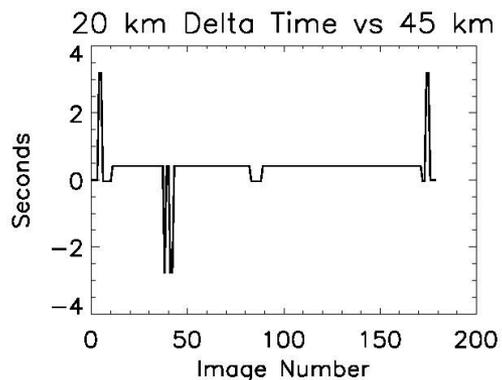
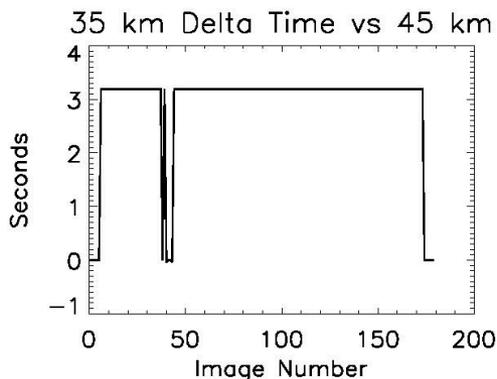
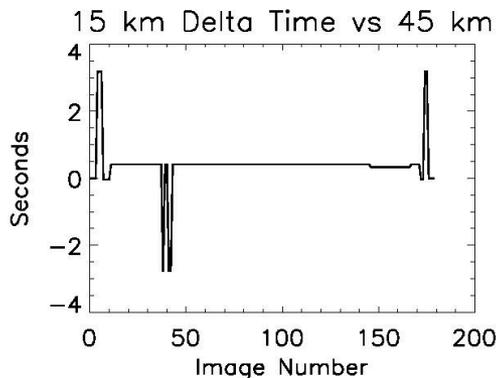
Total: 88,500 pixels



Stepped IT Sample Table

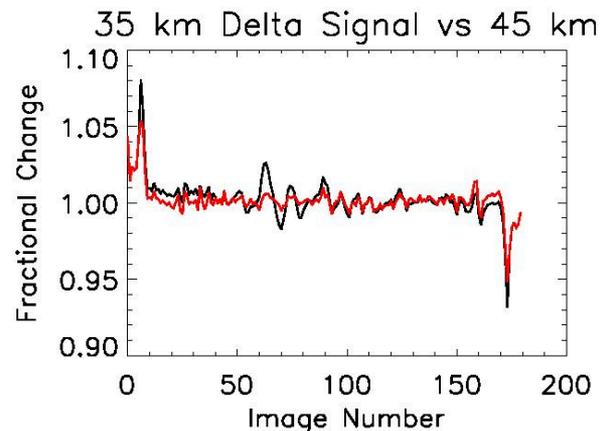
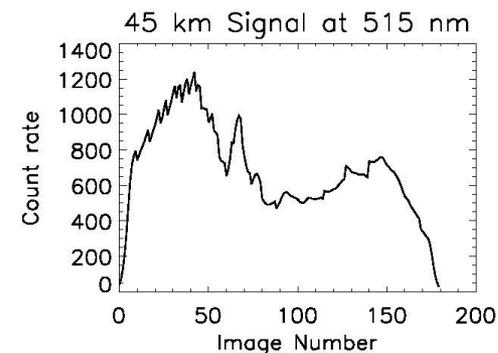
- Merged Long + Short
- 68,400 pixels
- Could eliminate high alt. VIS / NIR
- Could eliminate 2 UV slits

515 nm median photon time differences



No error at most altitudes.

±2% error at 35 km



— $t @ X km / t @ 45 km$

— $t @ 45 km / t @ 45 km$

IT Sequence: 12.7, 1.13, 0.04, 0.34, 0.10, 3.78 sec