OMPS Nadir Stuff

Colin Seftor

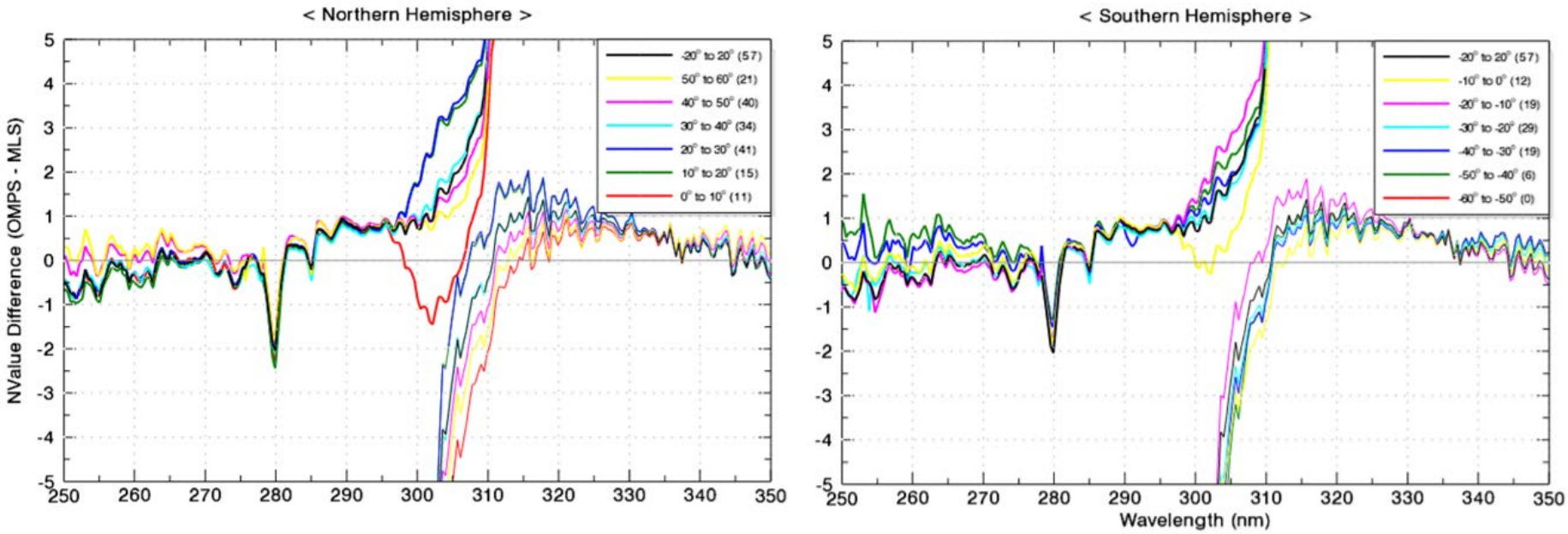
Mark Kowitt, Grace Chen, Michael Haken, Tom Kelly, Liang-Kang Huang, Glen Jaross, ...

Sensor (Level 1B)

Colin Seftor

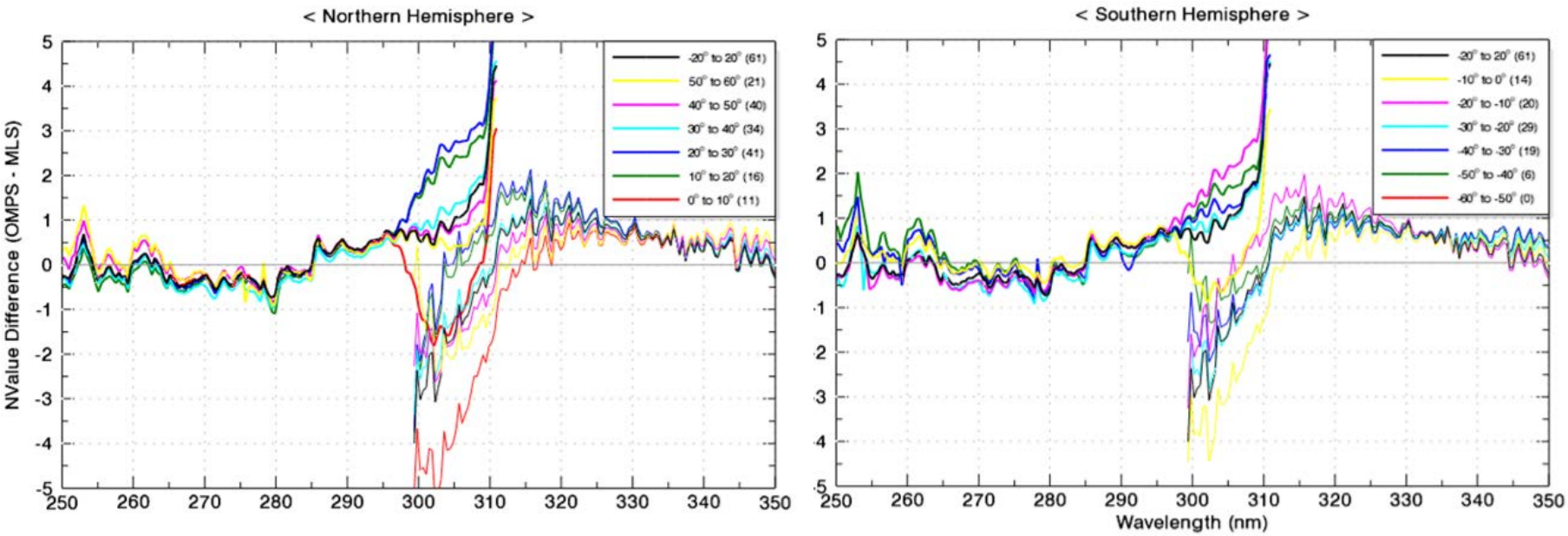
OMPS/MLS comparison

Comparison of normalized radiances calculated using co-located MLS data with OMPS measured NRs

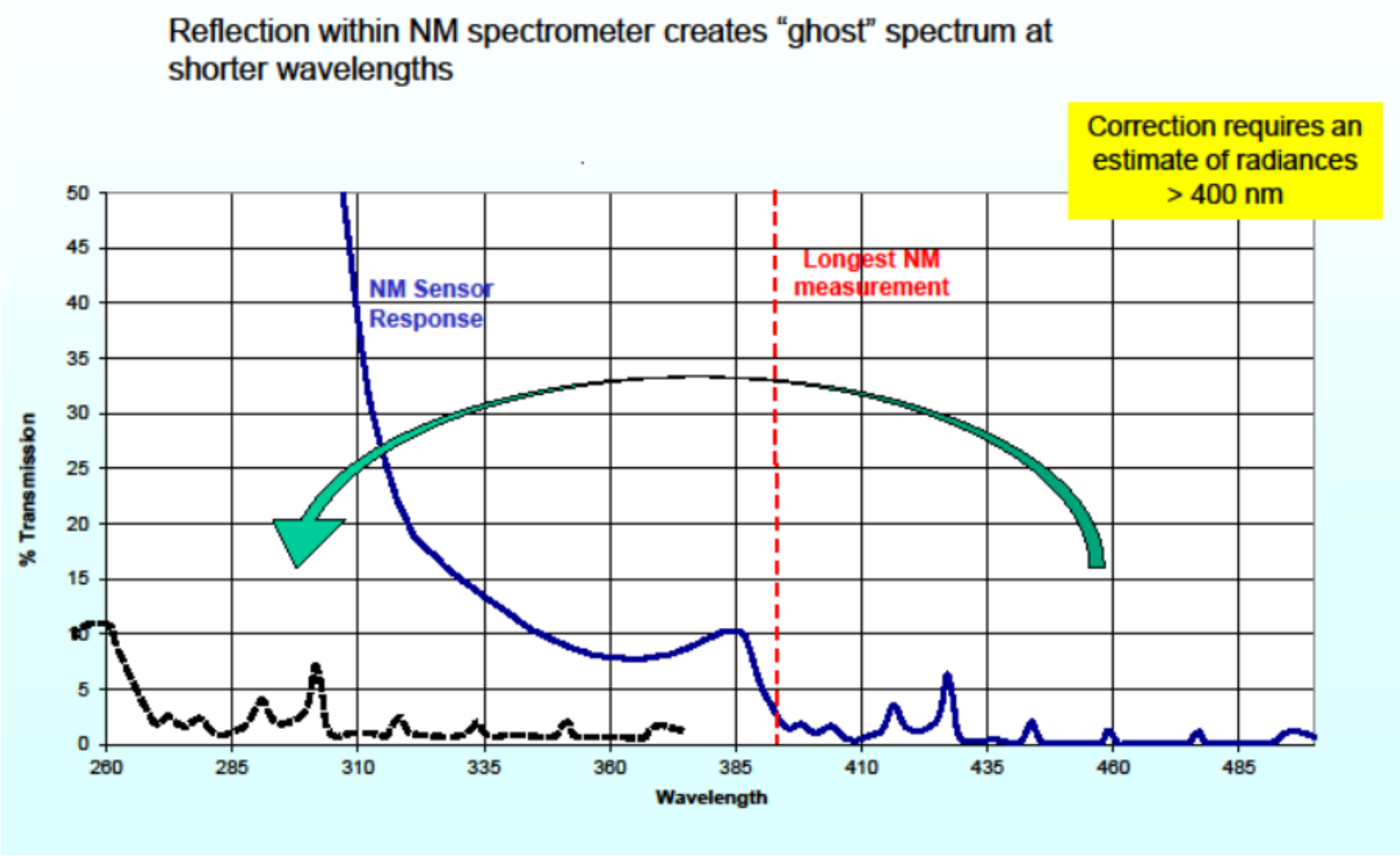


OMPS/MLS comparison

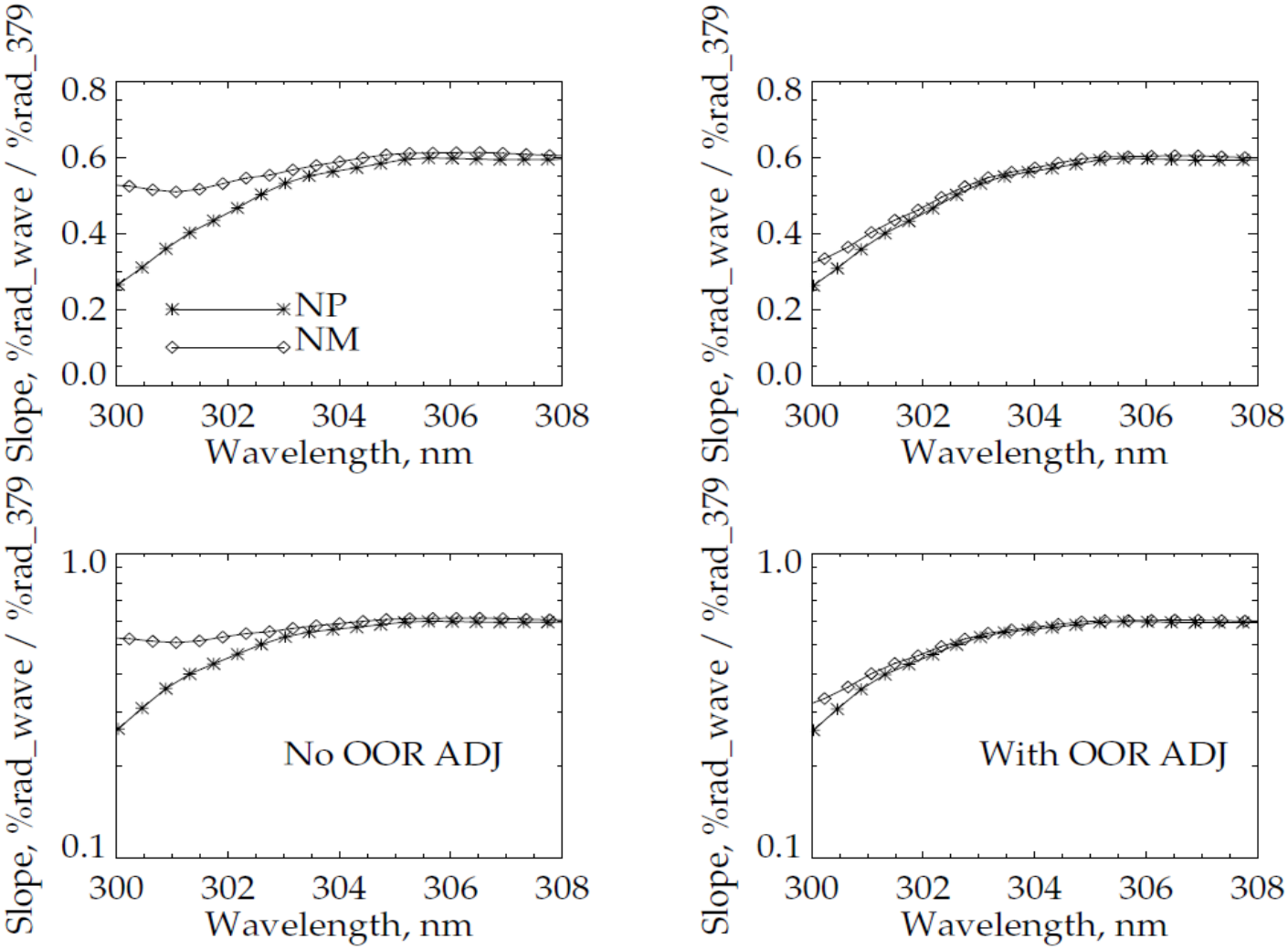
Apply original stray light correction



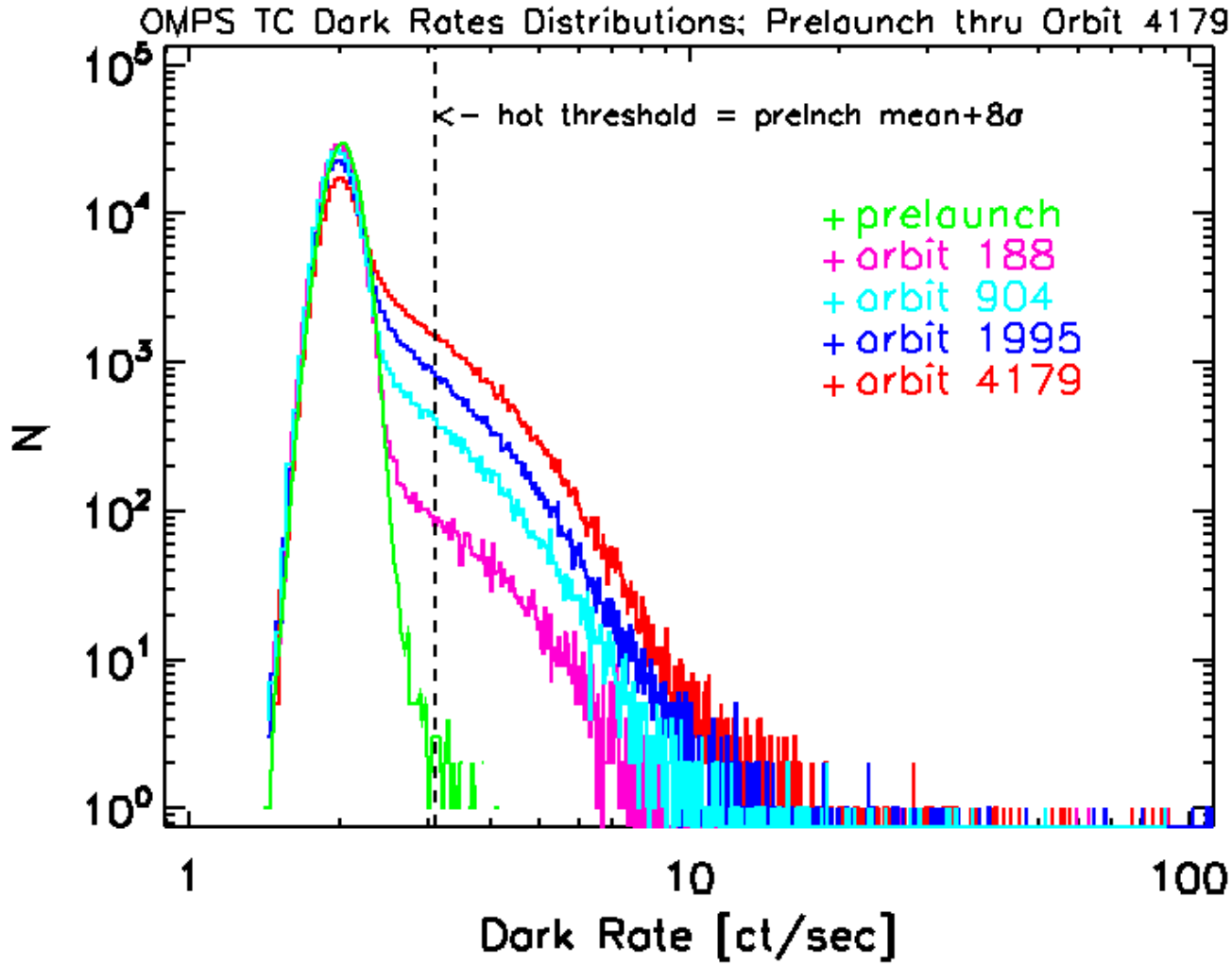
NM ghost significant for wavelengths < 310 nm



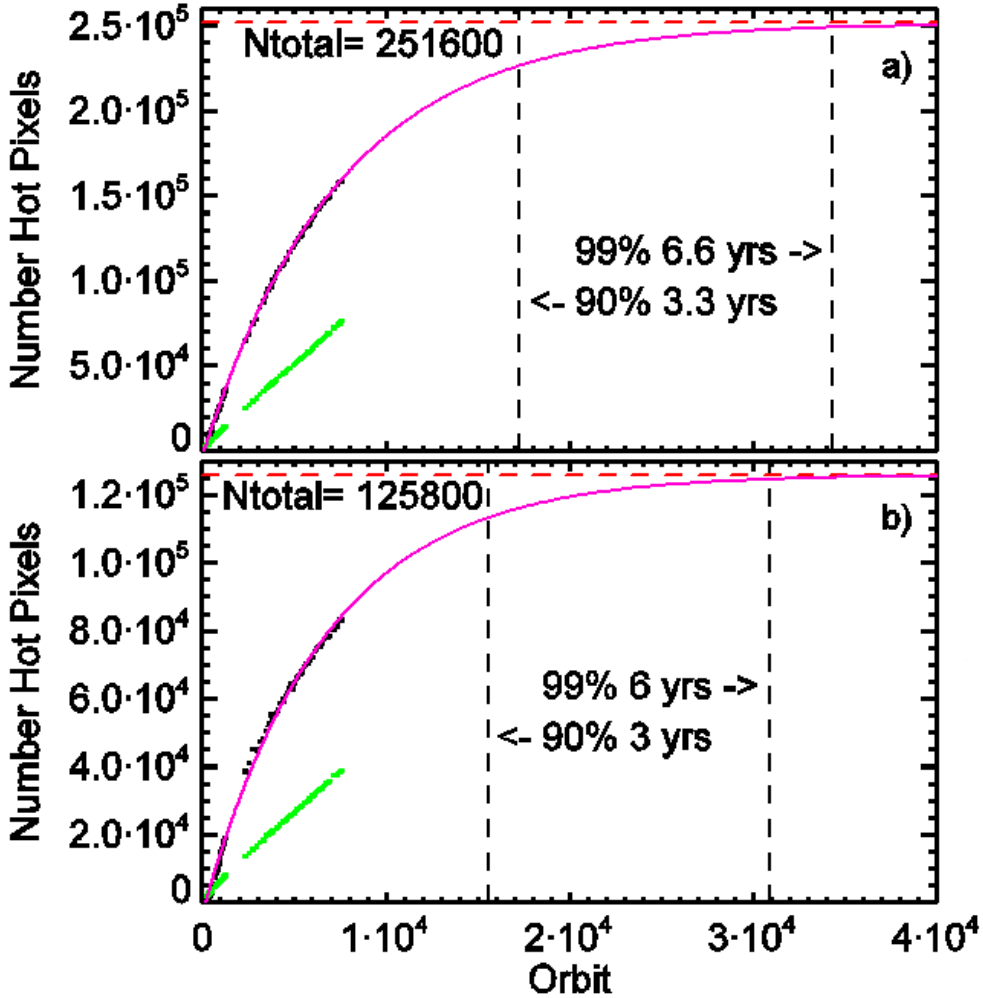
Validation for stray light correction



Evolution of OMPS NM Dark Current



Evolution of OMPS NM Dark Current



Green curve assumes

$N_{damaged} = N_{tot}$ – (area under scaled prelaunch Gaussian)

Not good fit to actual data

Purple curve assumes

$N_{damaged} = N_{tot} (1 - e^{-x/x_0})$

Provides good fit to data

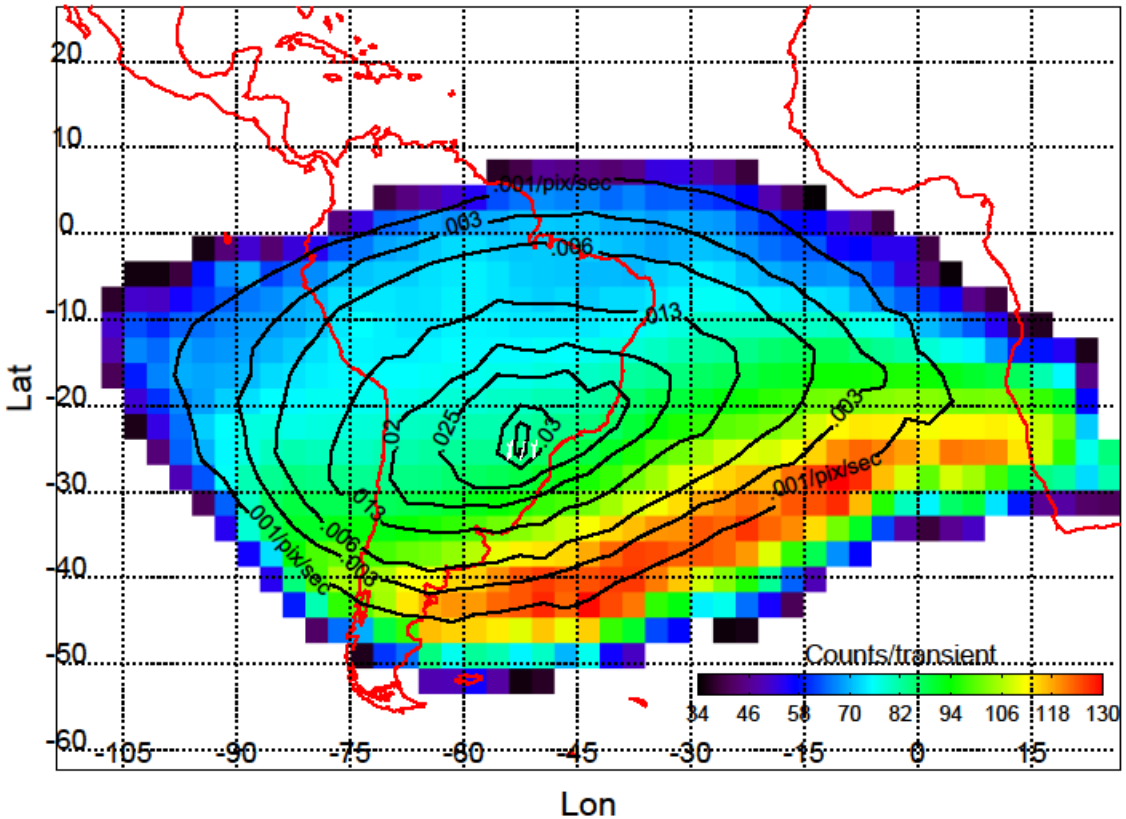
Extrapolating fit predicts fraction of damaged pixels will reach:

90% in 3–3.3 years
99% in 6–6.6 years from launch.

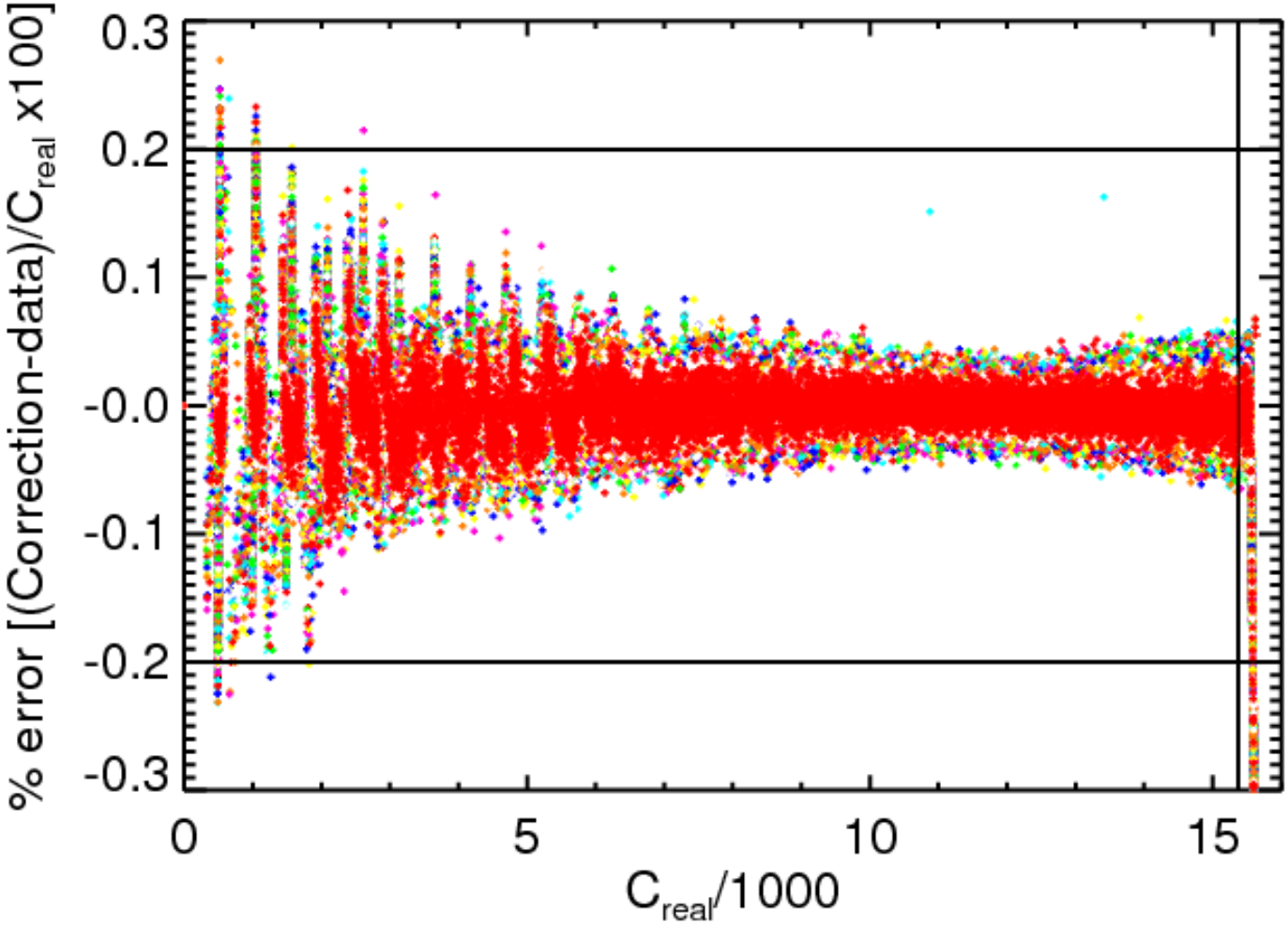
SAA mapped by OMPS LP sensor from Dark cal detected transients analysis

Contours = particle density [pixel^{-1} second^{-1}] – Expected

Colors = mean particle energy [counts] – Surprising!

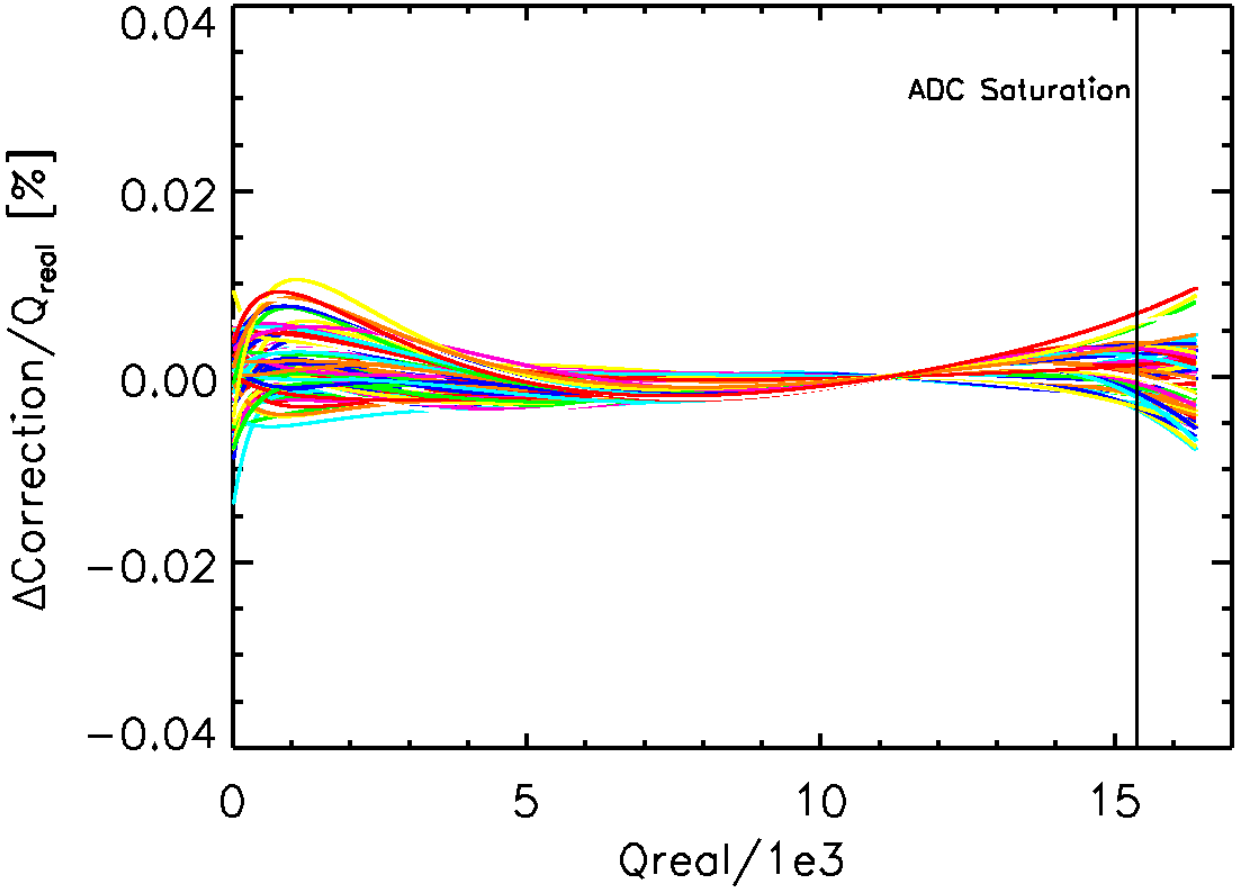


OMPS linearity correction is stable



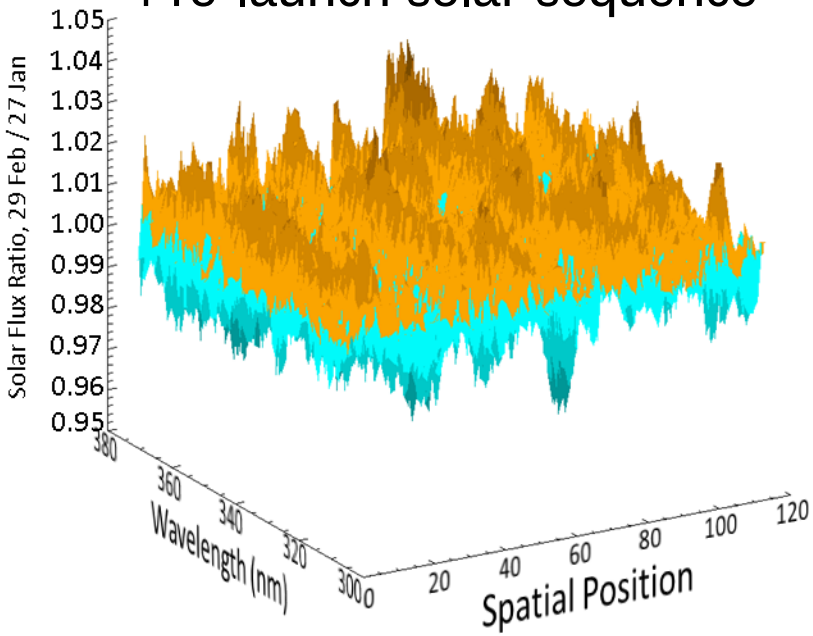
Linearity Correction Stability

Varies less than ±0.01% of signal over 12472 Orbits

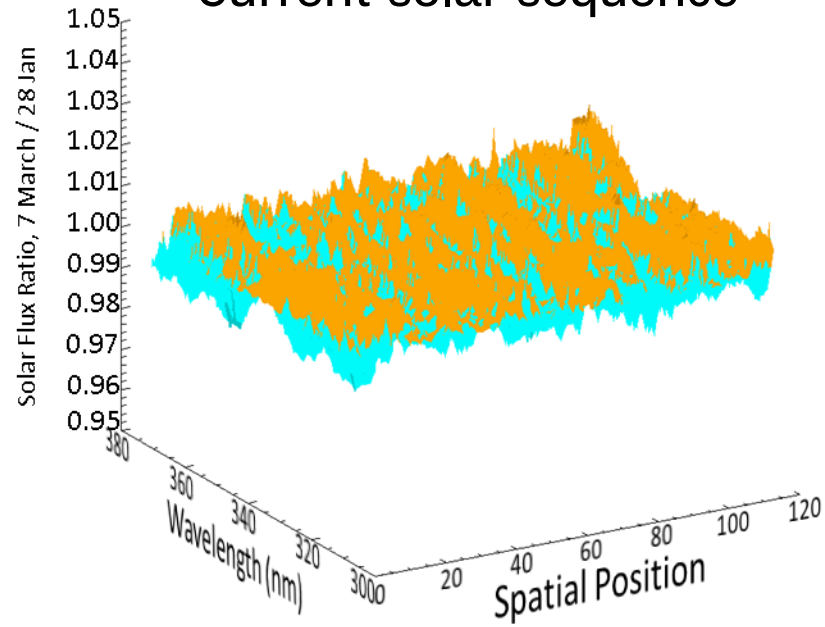


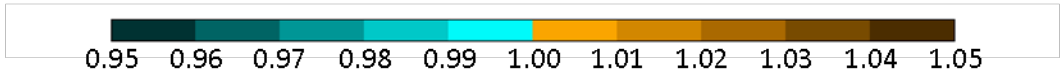
Diffuser features

Pre-launch solar sequence



Current solar sequence



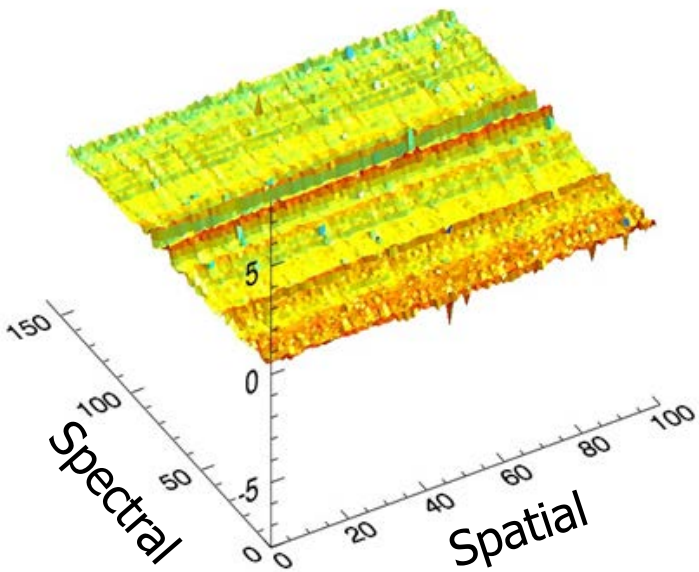


Goniometric solar elevation angle range ≈ 0.9° across 3 measurements

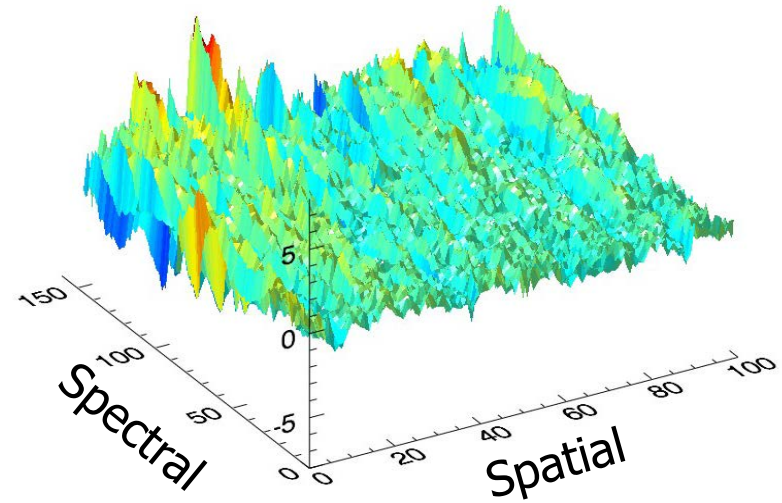
Goniometric solar elevation angle range ≈ 8°

Differences in beta angle significantly effect measurement

NP: Apr-4 / Mar-21
β = 18.95°
σ = 0.189%



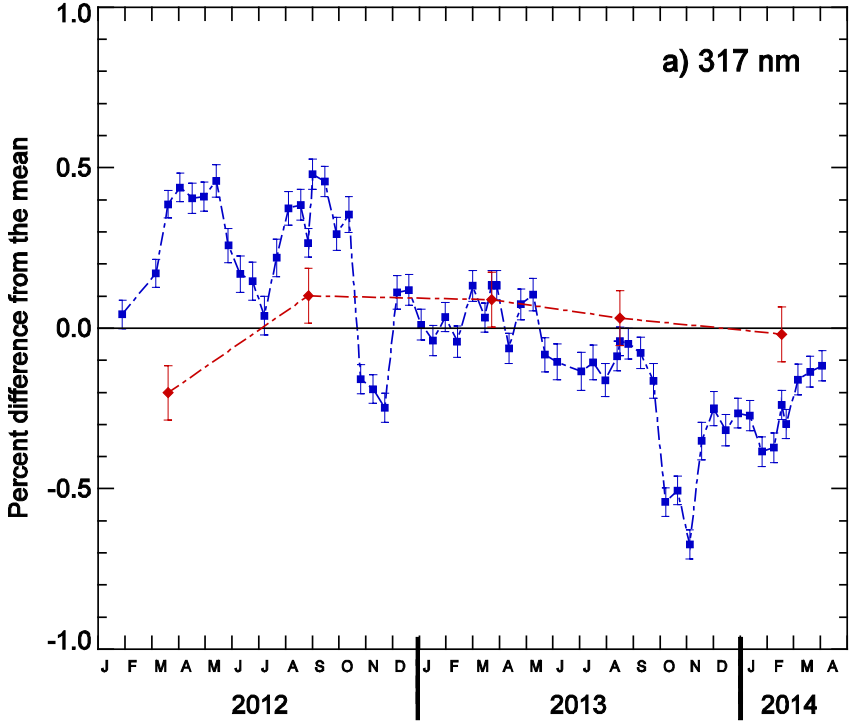
NP: Jun-27 / Mar-21
β = 14.57°
σ = 1.015%

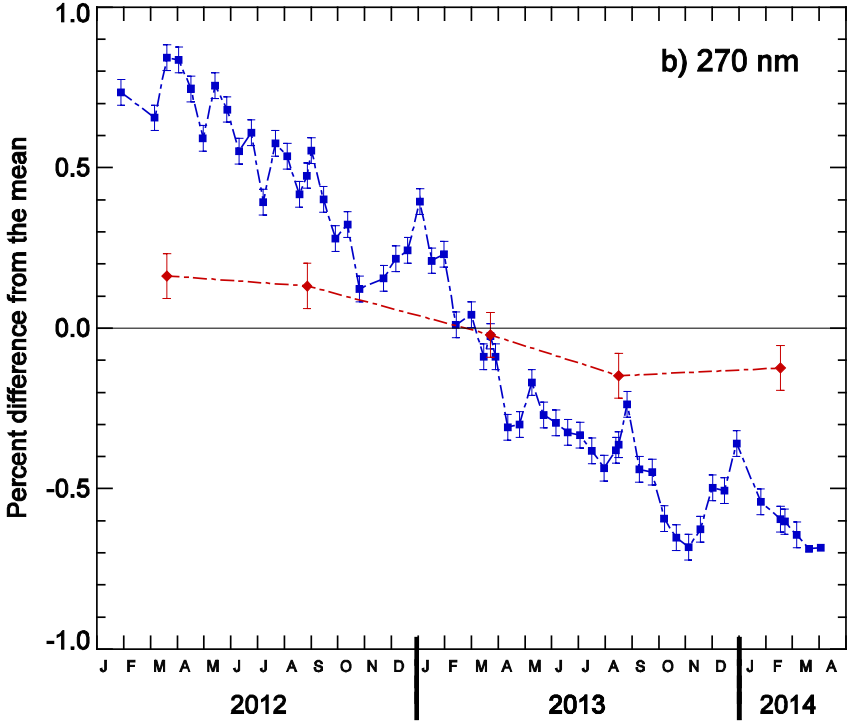


- Working Diff, 3orb observations
- Vertical (z) axes are Percent Difference
- 3 lines near 280 nm are ignored

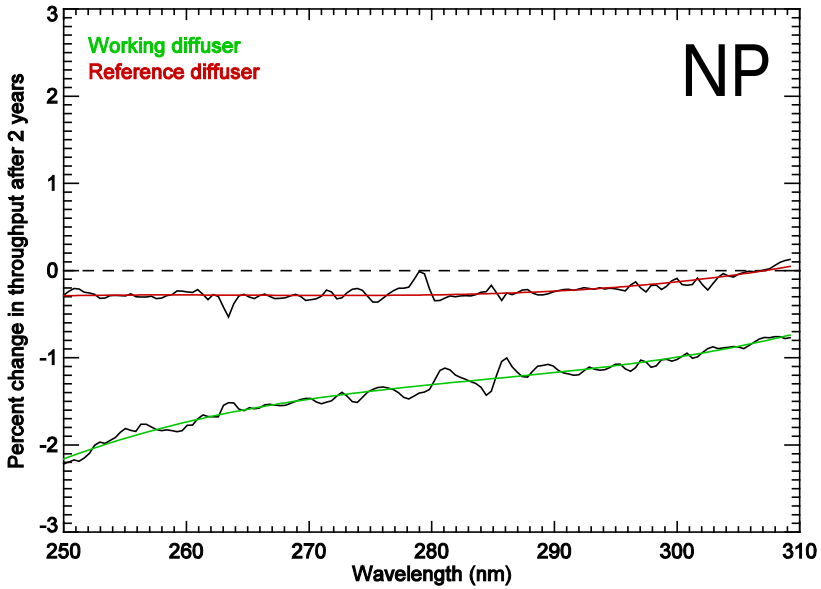
OMPS nadir sensors very stable

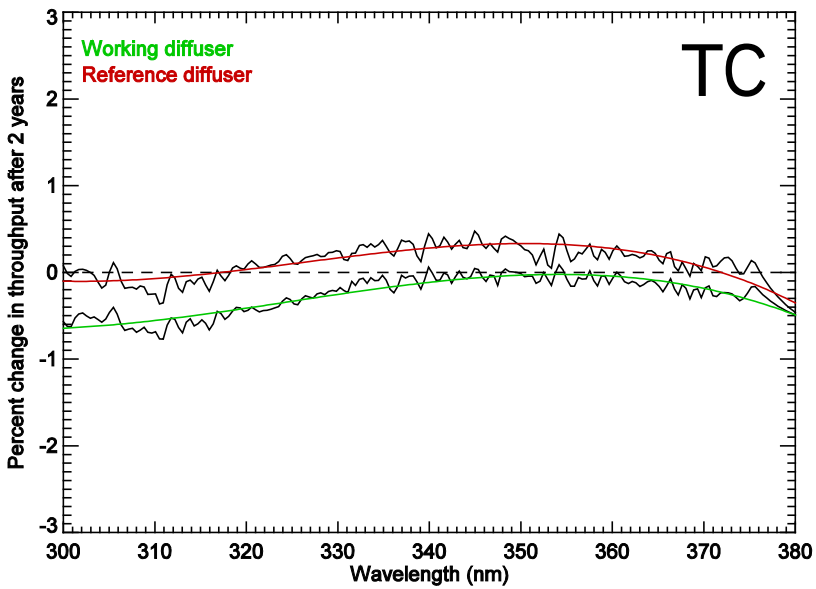
Blue points are working diffuser
Red points are reference diffuser





OMPS nadir sensors very stable

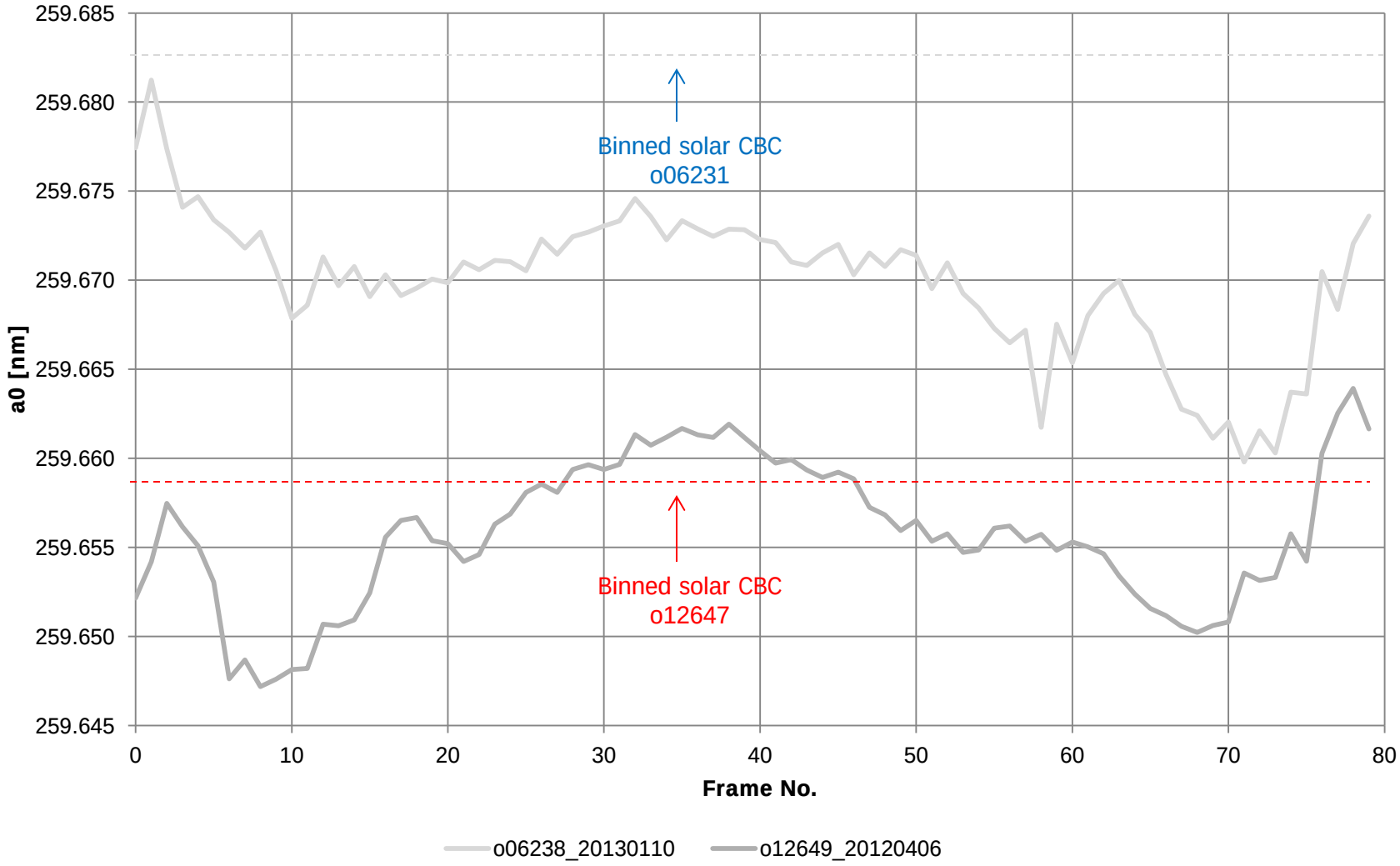




- Corrected for Solar Activity
- No wavelength shift correction applied

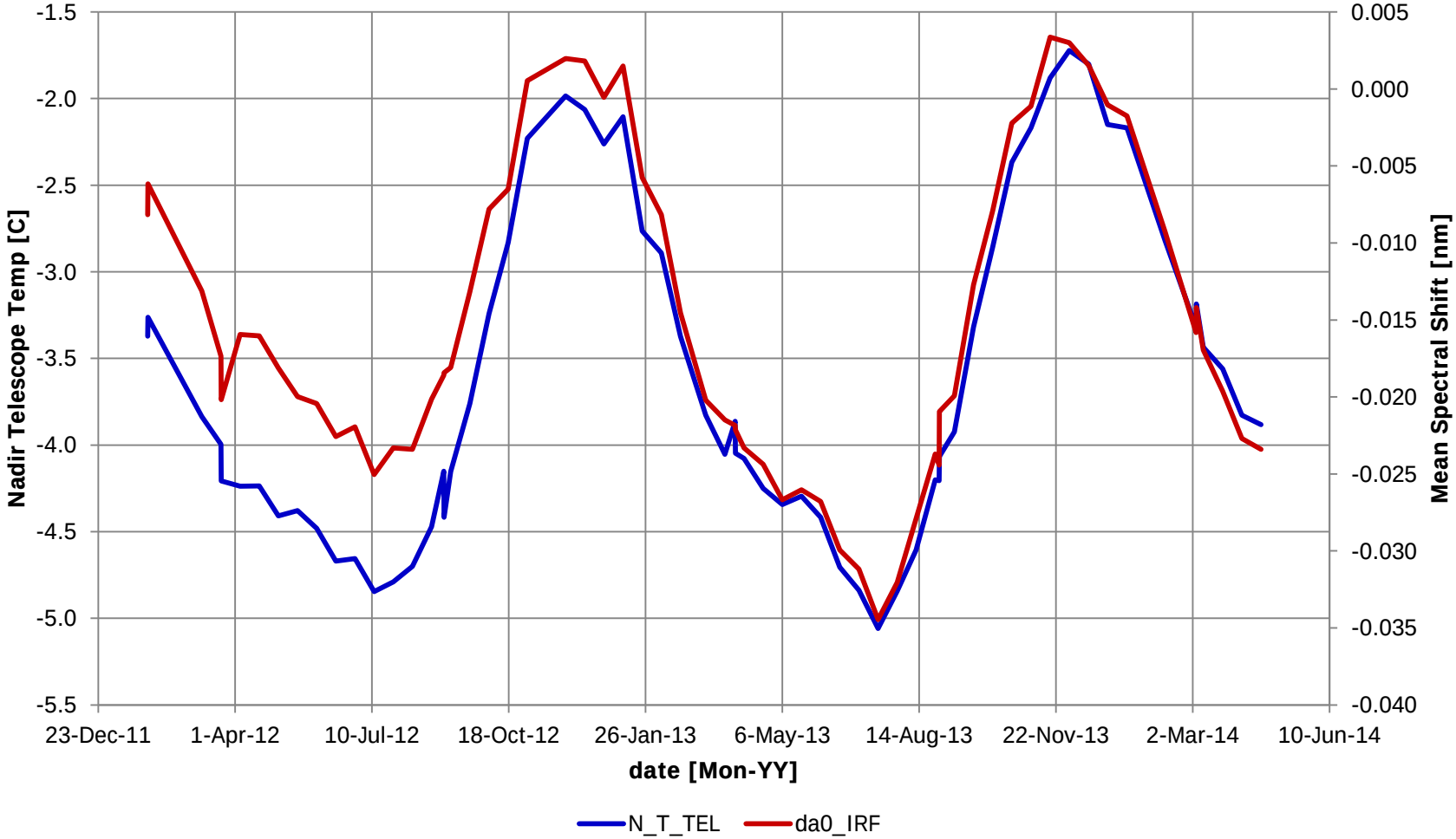
- No corrections for Solar Activity
- No wavelength shift correction applied

NP EV intra-orbital wavelength shift



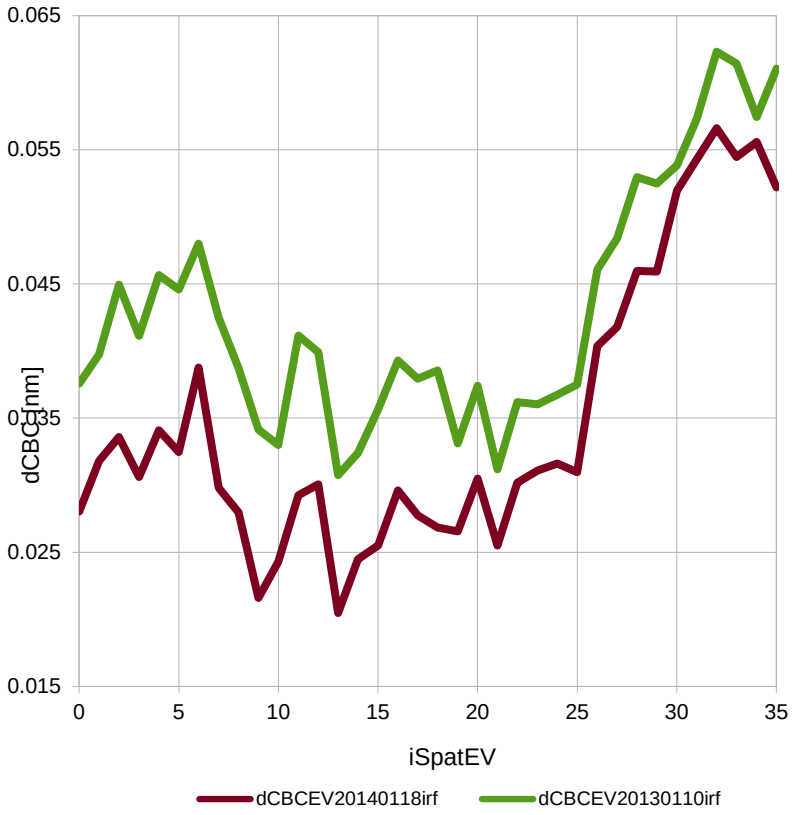
NP “seasonal” wavelength shift

Spectral shift in red
Telescope temperature in blue

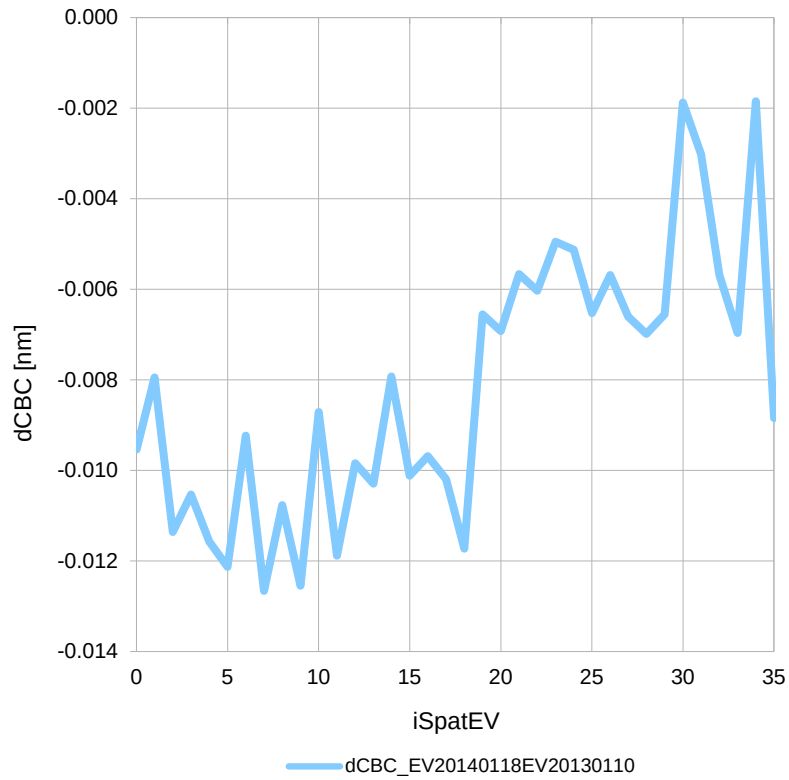


NM EV cross-track bias in wavelength when compared to solar flux

- TC cross-track offset -- mid-EV - IRF at EV resolution, EV orbits 6238, 11531



- dCBC for TC: mid-EV, Jan 2014 – Jan 2013, orbits 6238,11531

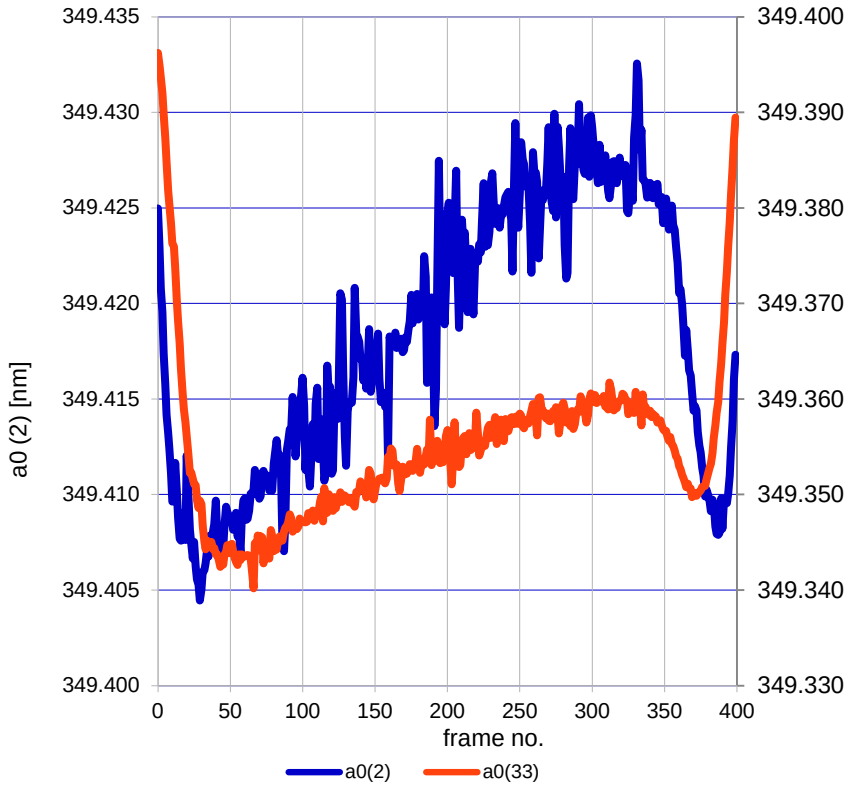


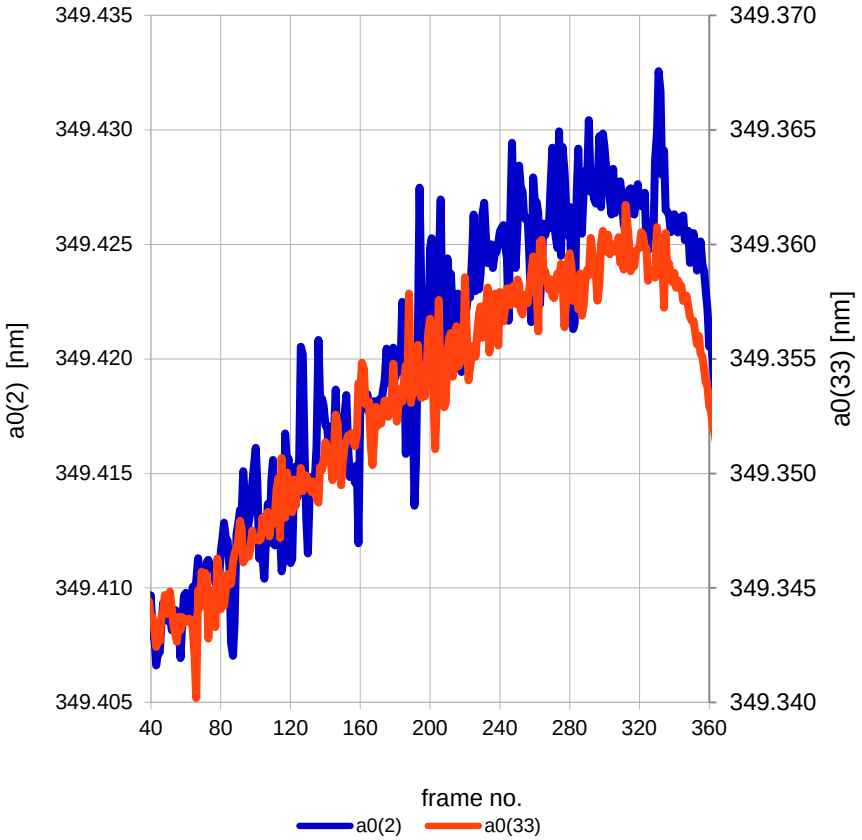
NM EV intra orbital shift

Full EV (400 frames)

First and last 40 frames clipped

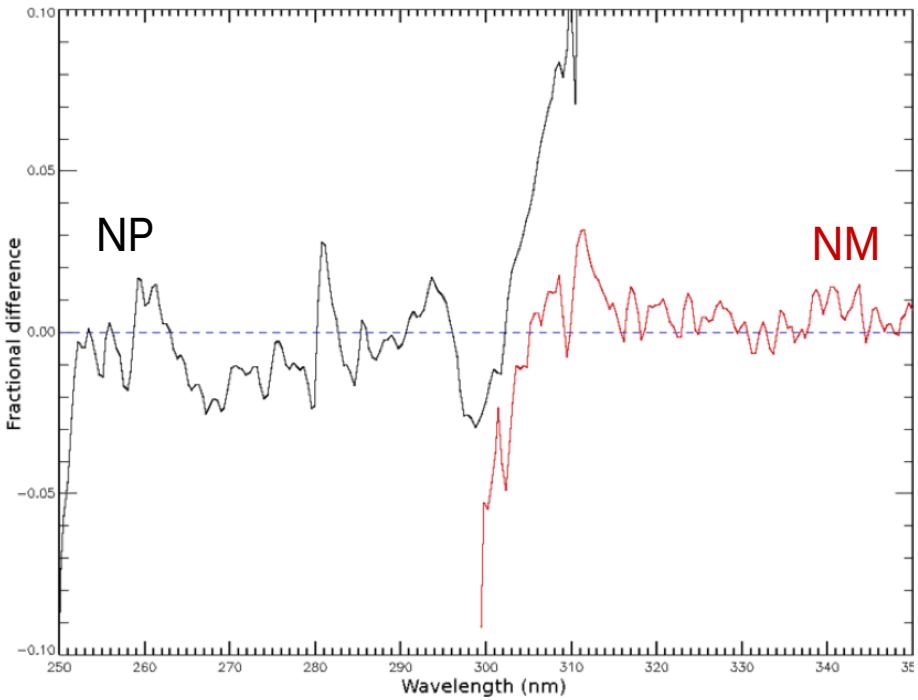
Blue is FOV 2
Red is FOV 33

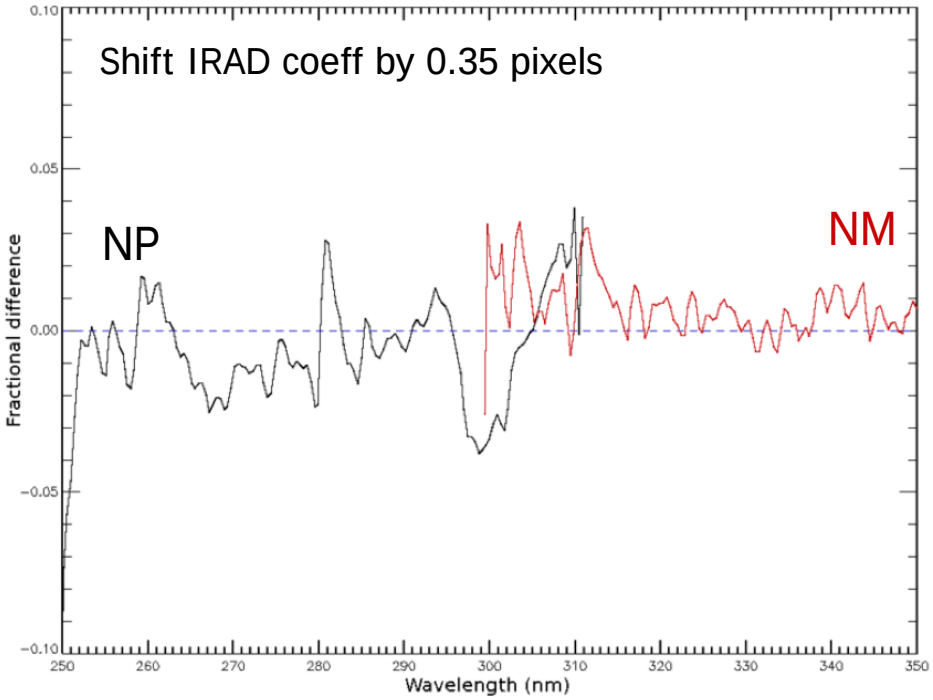




Problems in 300 – 310 nm transition region

Measured vs Synthetic Solar Flux





Analysis steps before nadir reprocessing

- New CBC (wavelength map) for solar
- New SL_{cor} RAD & IRD for NM (take into account ghosts)
- Incorporate changing CBC for earth view
  - L1B incorporates a wavelength map for each swath
  - Intra-orbital change major component for NM
  - Seasonal change major component for NP
- Ground-to-orbit (g-to-o) λ shift effect on RAD & IRD
- Effect on RAD and IRAD of g-to-o temperature change on dichroic IRD
- Create new Day 1 solar flux
- Soft calibration
  - Shift coefficients in transition region to flatten solar data
  - Ice radiance for absolute
  - MLS comparison for relative

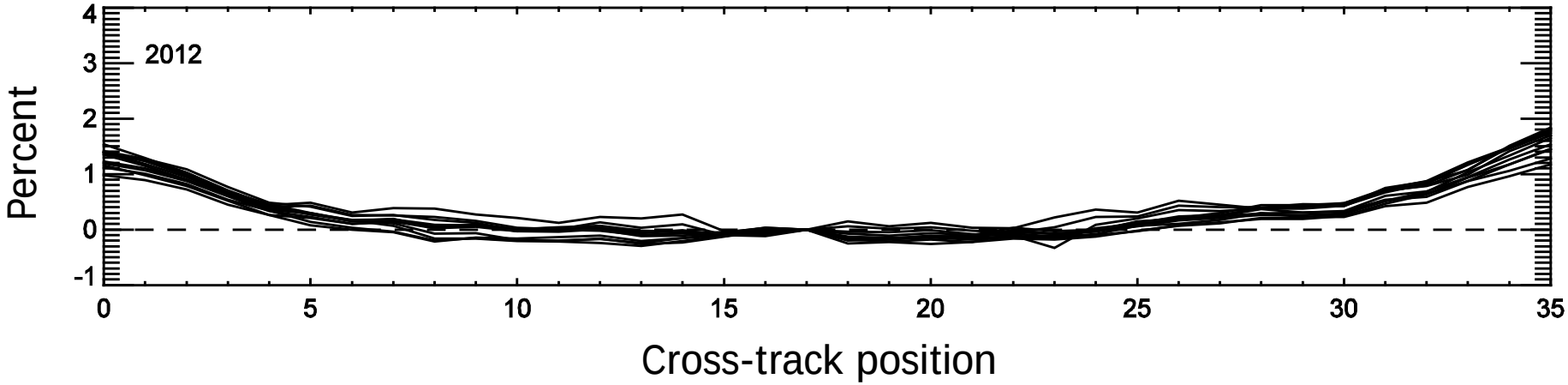
- Sample reprocessing?

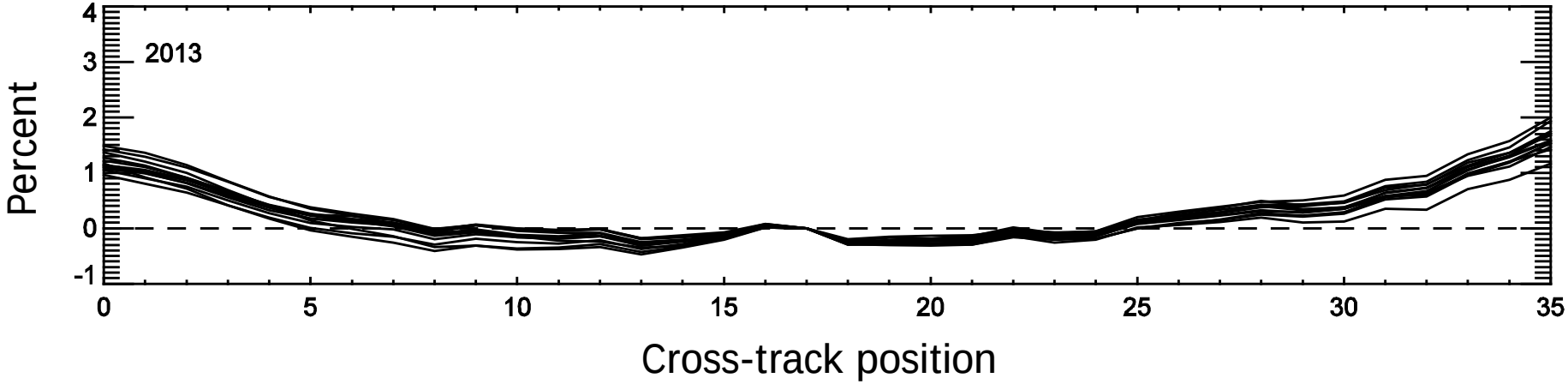
Level 2 / Level 3

Colin Seftor

OMPS Cross-Track Dependence

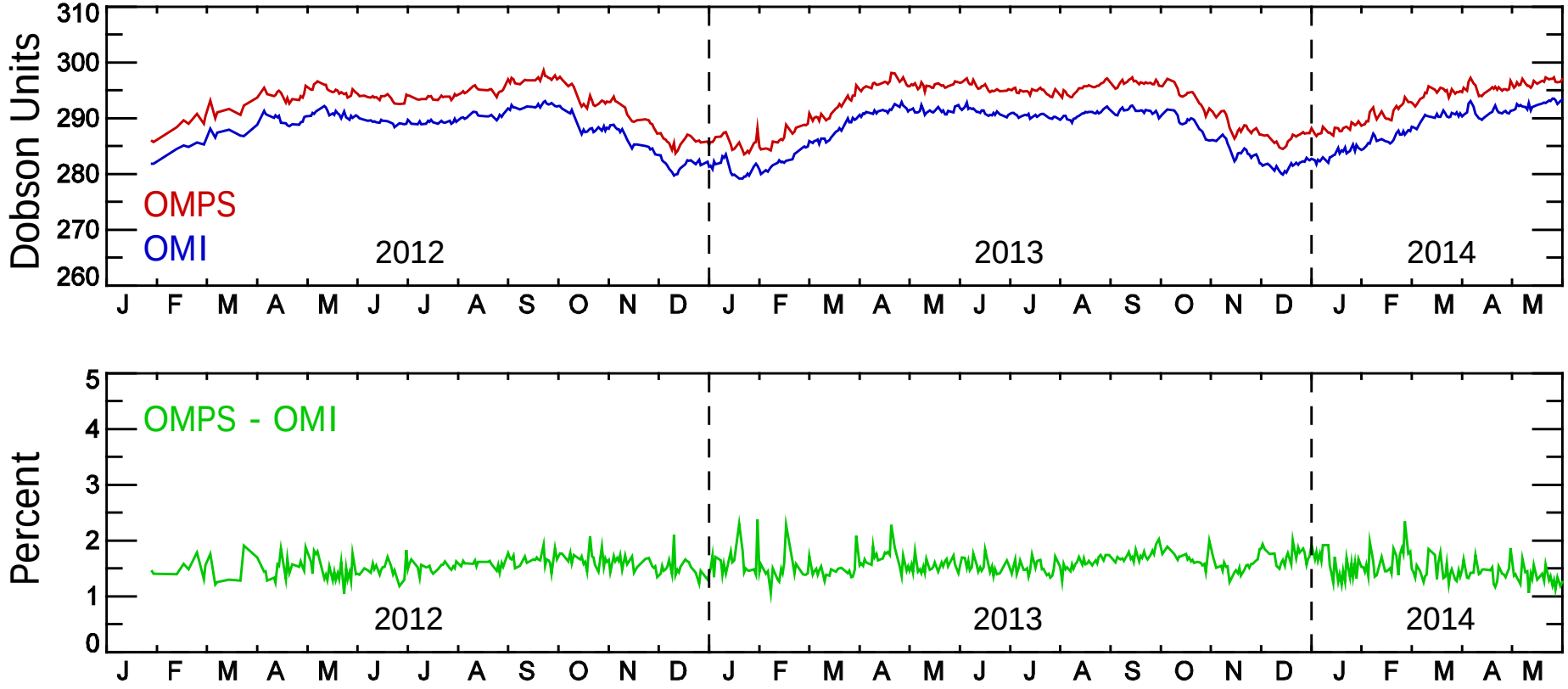
Average, 10 deg south to 10 deg north latitude



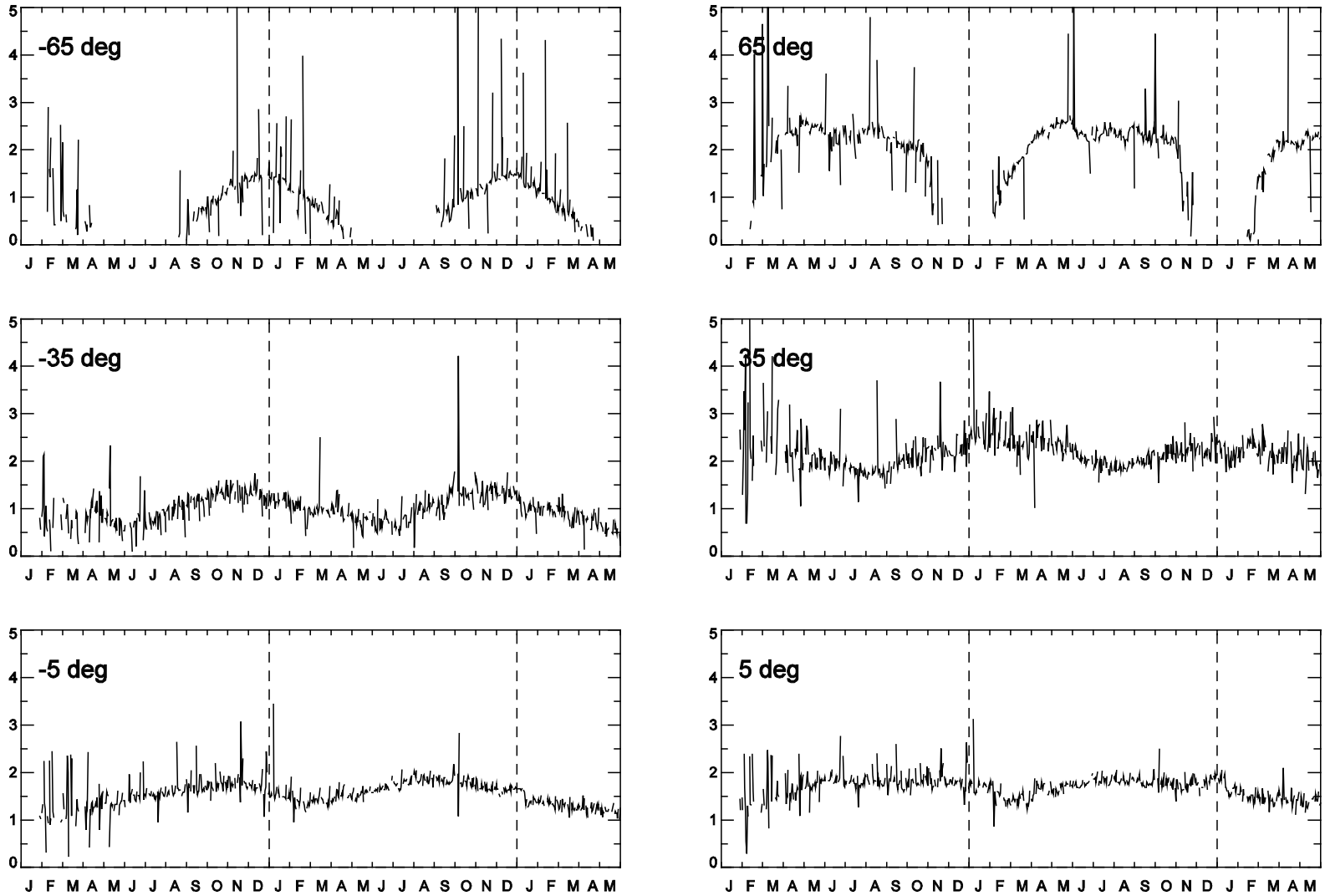


Comparison of OMPS to OMI Total Ozone

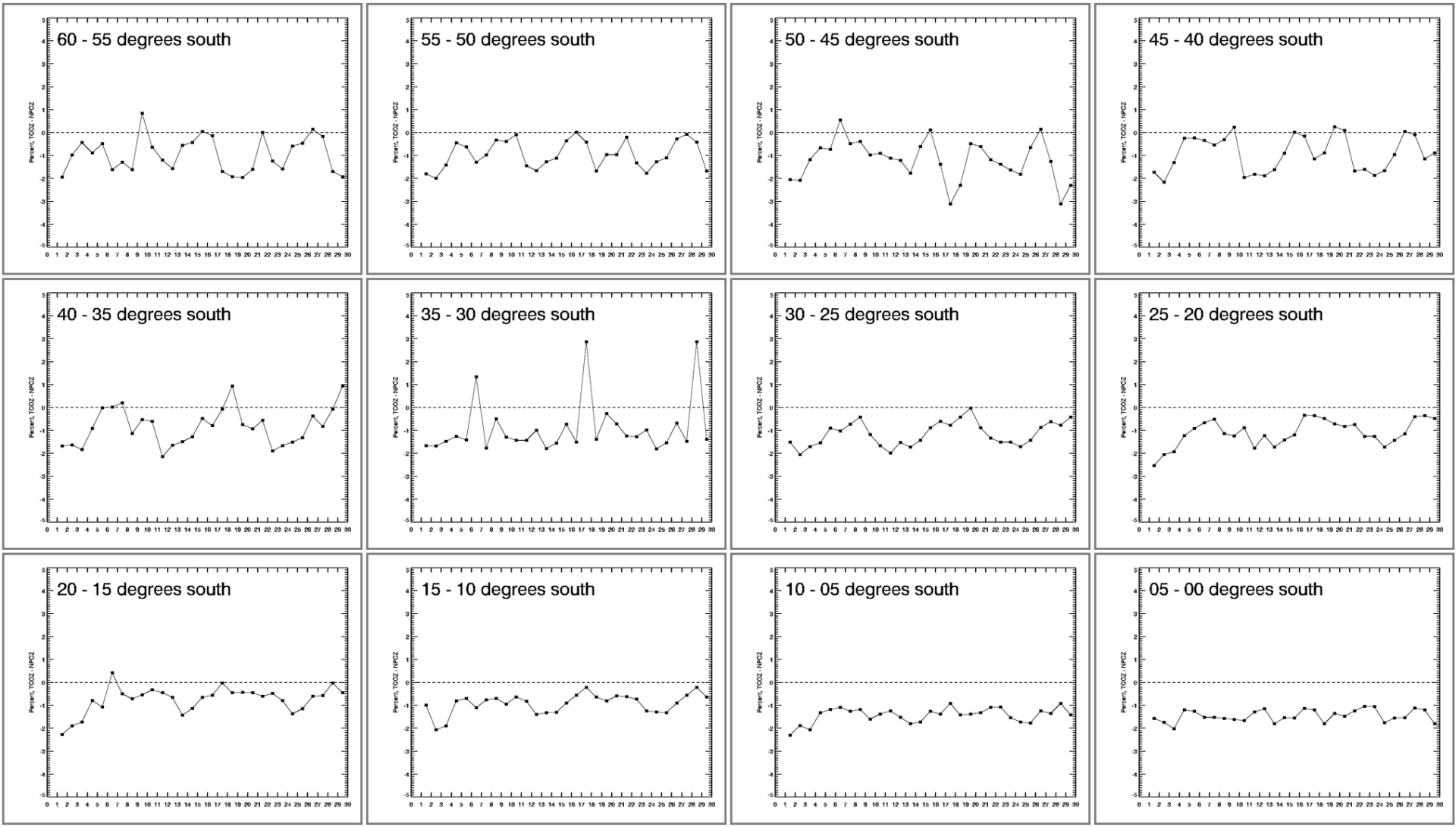
Level 3 average total ozone, 60 deg south to 60 deg north latitude



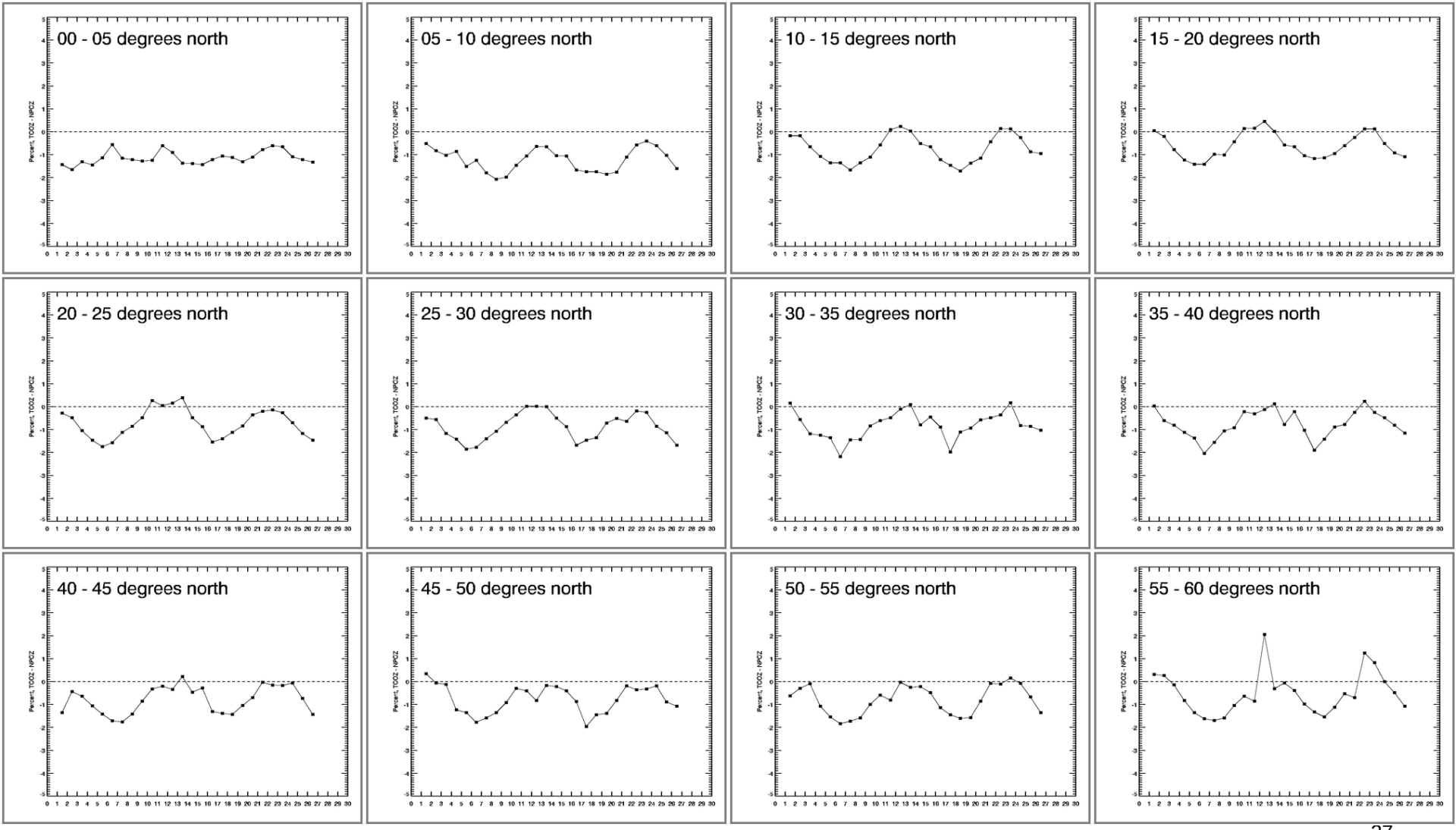
Comparison of OMPS to OMI Total Ozone



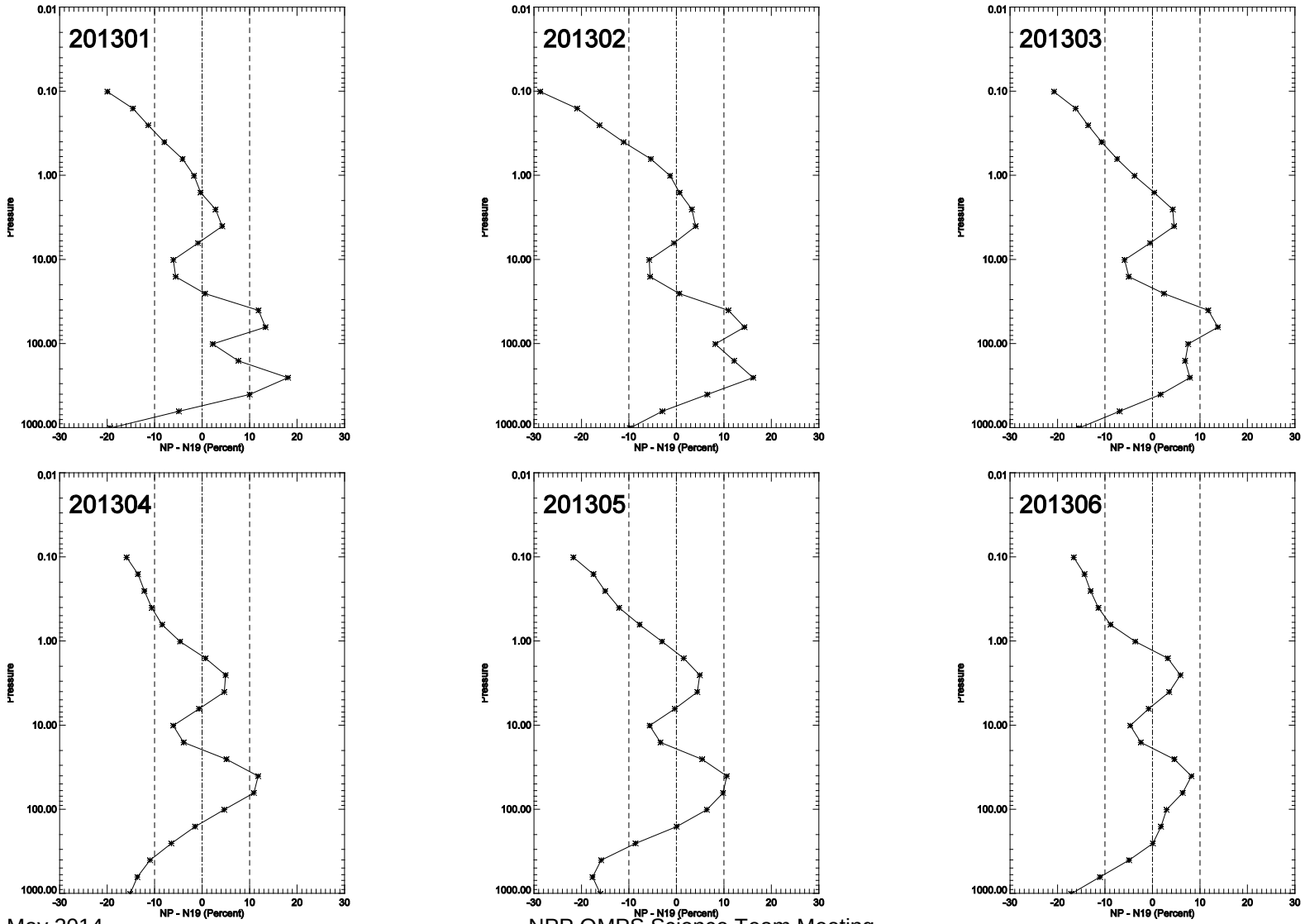
NM – Sum of NP profile



NM – Sum of NP profile



NP vs N19 – monthly zonal means
0 – 5 deg N latitude



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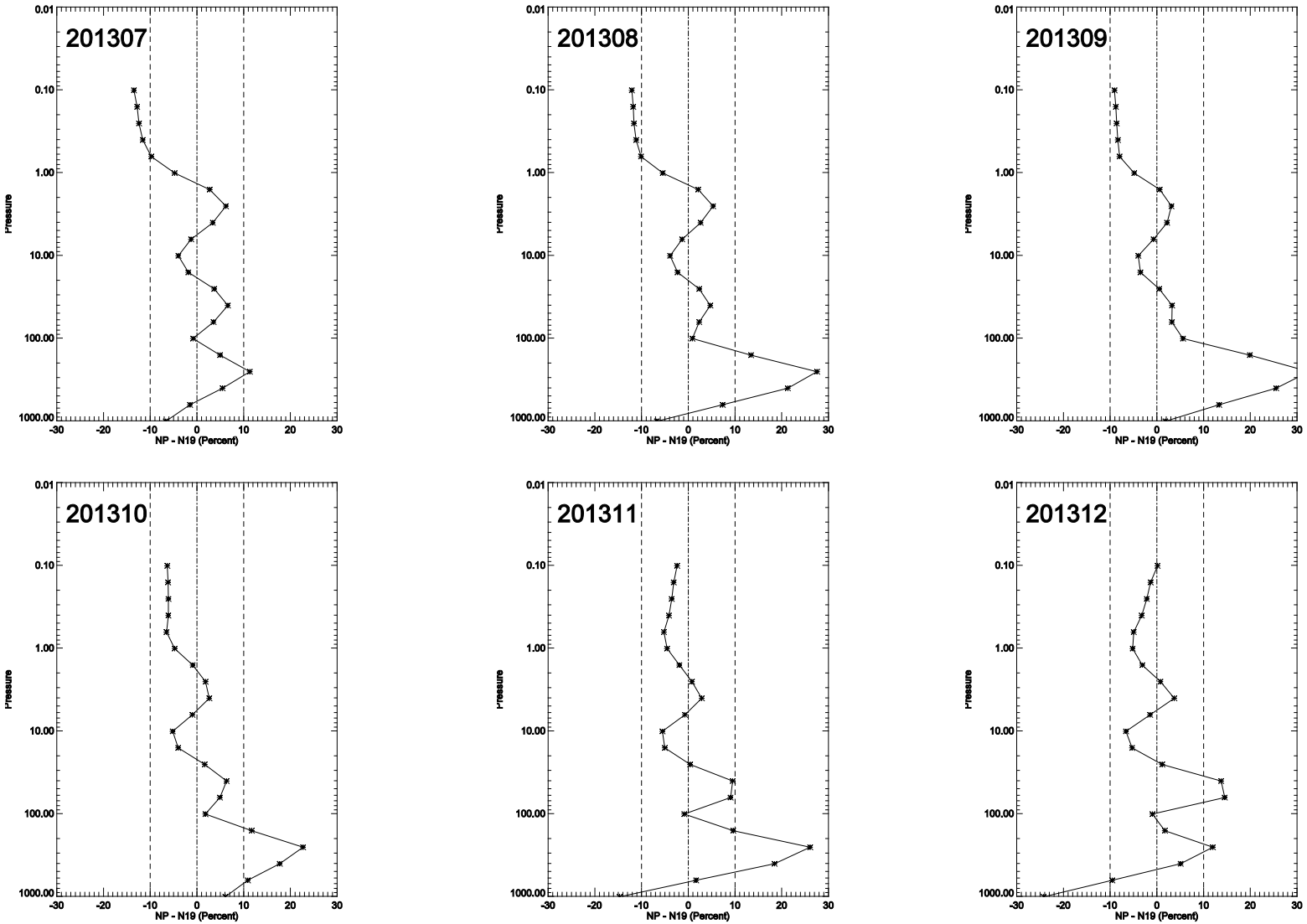

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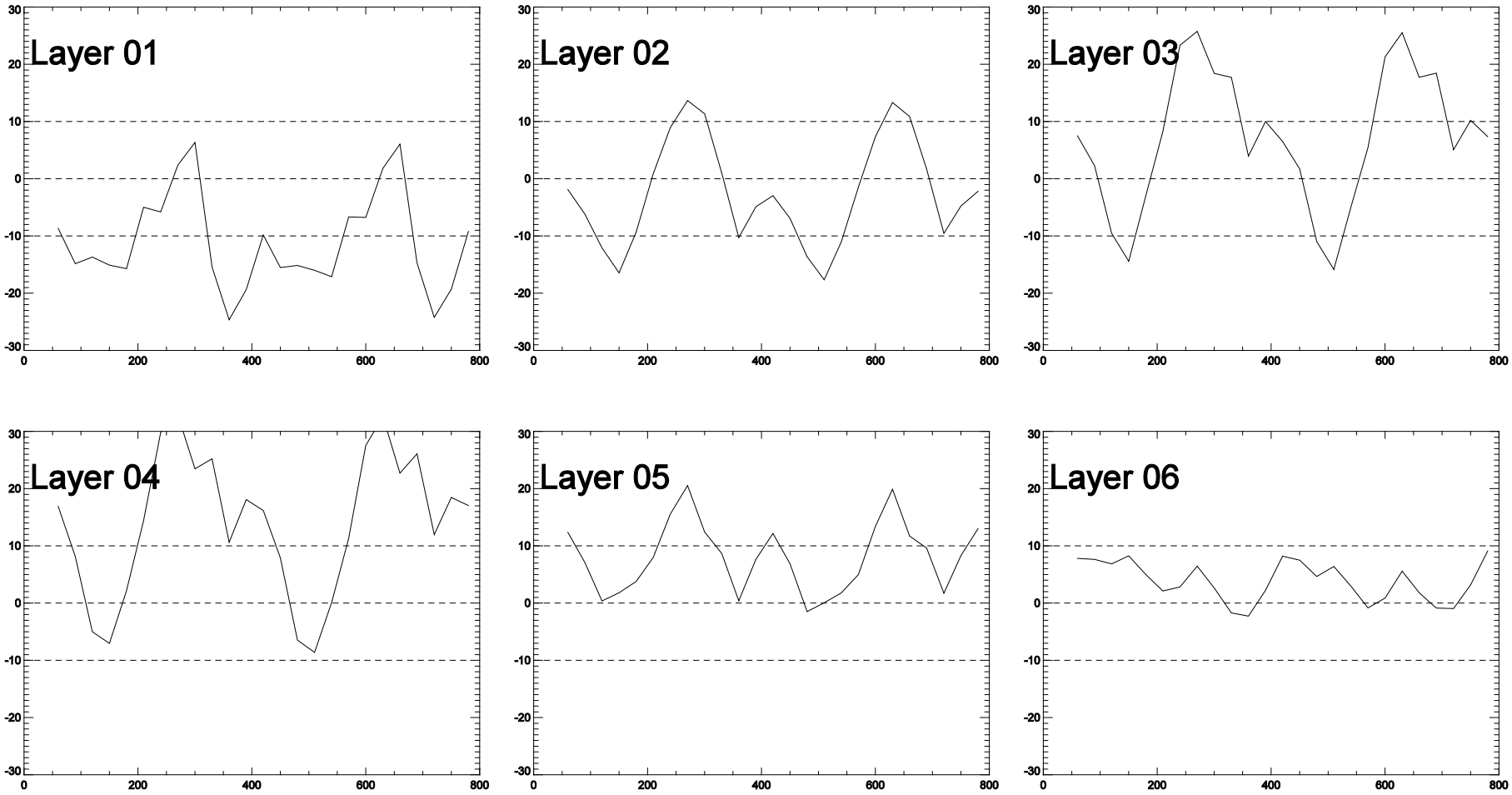

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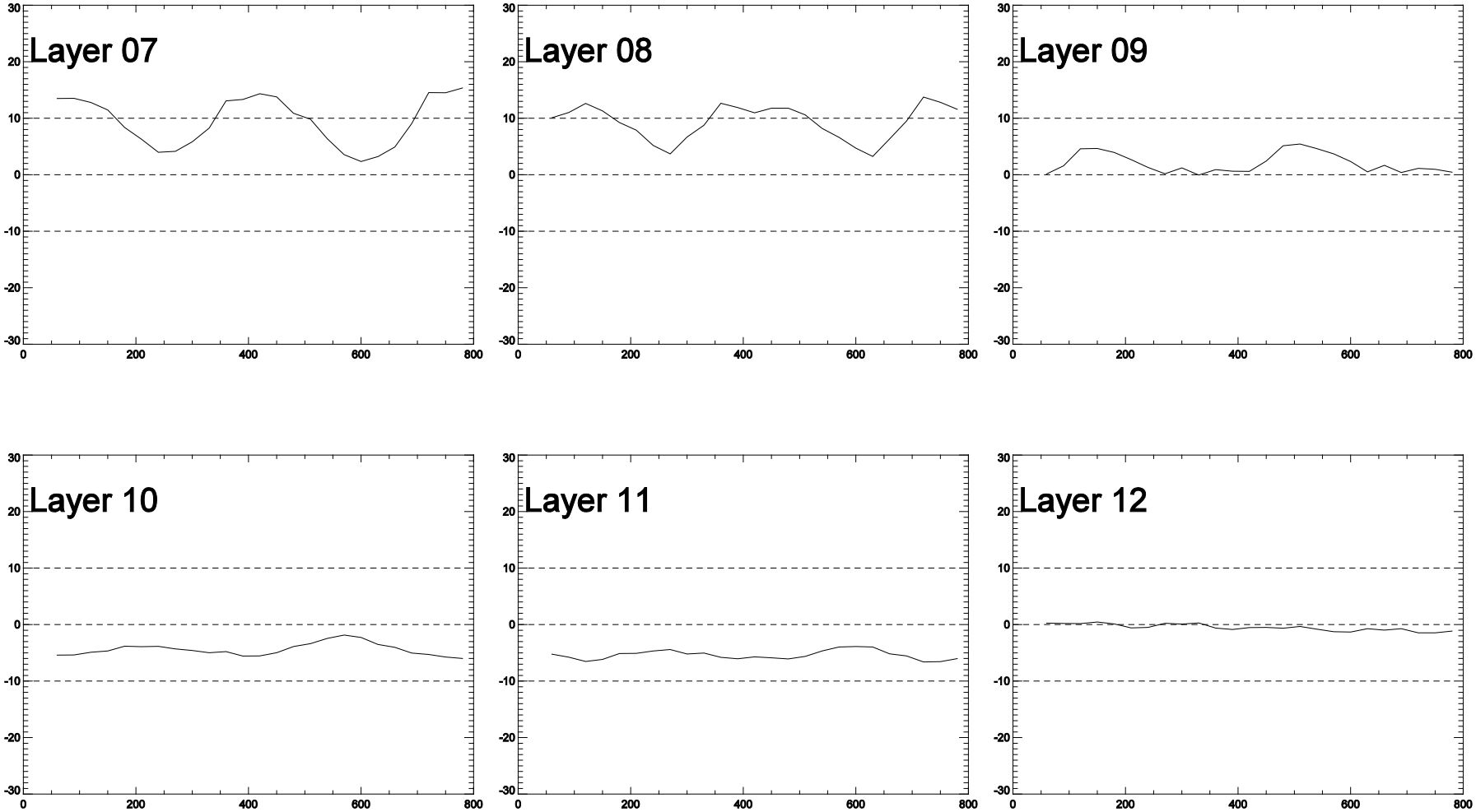

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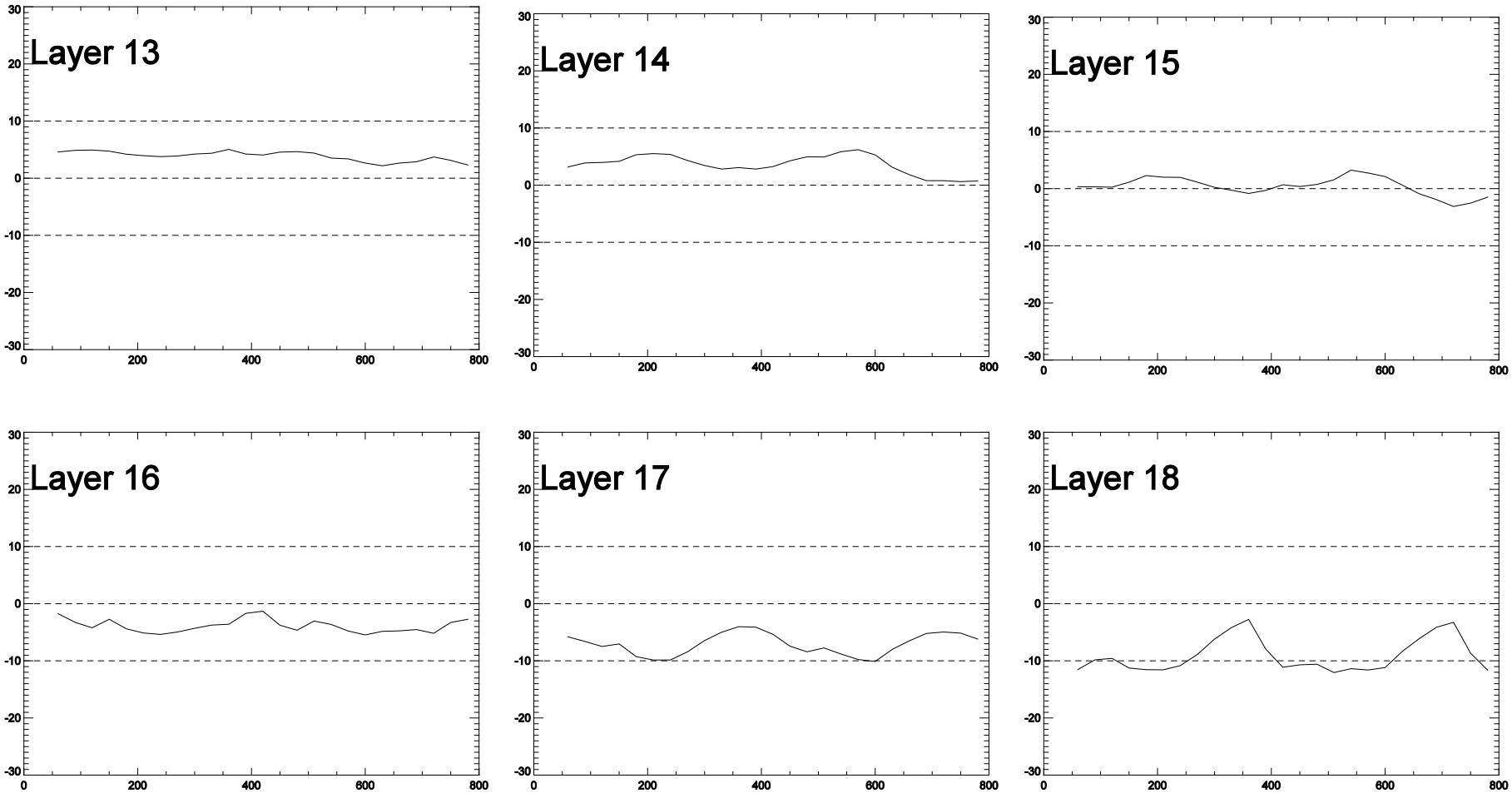
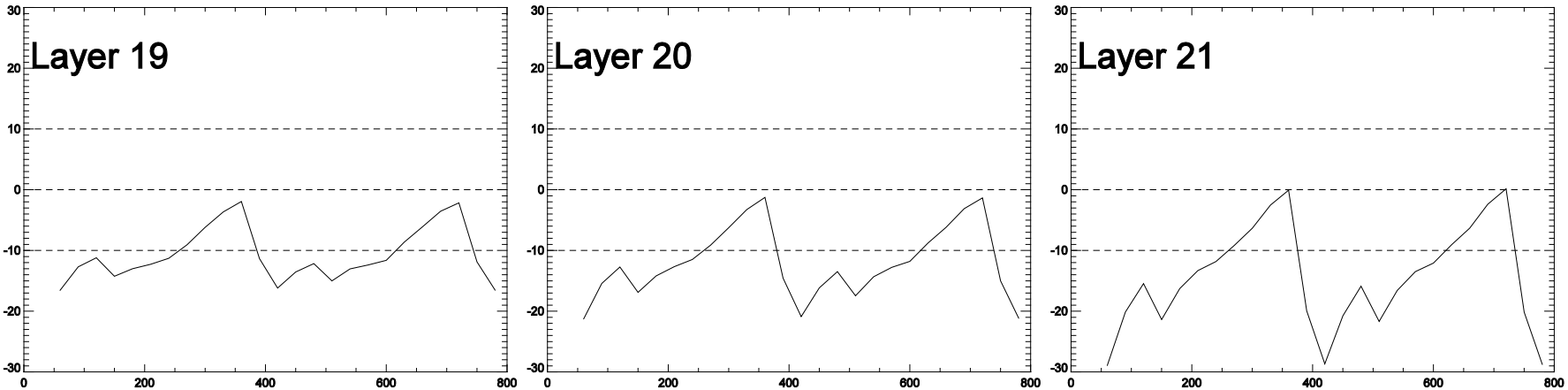
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0 – 5 deg N latitude