

Beta Maturity for NOAA-20 OMPS

L. Flynn and NOAA-20 OMPS EDR and SDR Teams

March 15th, 2018

April 18th, 2018

Disclaimer

"The contents of this presentation are mine personally and do not necessarily reflect any position of the US Government or the National Oceanic and Atmospheric Administration."

Beta maturity stage definition:

- Product is minimally validated, and may still contain significant identified and unidentified errors.
- Information / data from validation efforts can be used to make initial qualitative or very limited quantitative assessments regarding product fitness-for-purpose.
- Documentation of product performance and identified product performance anomalies, including recommended remediation strategies, exist.

Summary of Findings for Total Ozone EDR

- NOAA-20 OMPS Nadir Mapper / V8TOz EDR*
 - EOF analysis of measurements shows good SNRs, similar intra-orbit wavelength shift and expected patterns of information content.
 - EDRs show good results for this stage of maturity.
 - EDRs produced for lowxlow and lowxmedium FOV granules: 35x5 and 35x15
 - Version 3 Revision 1 tested at STAR for mediumxmedium 103x15.
 - Stray light – need additional check of measurements in the overlap region from 300 nm to 310 nm with NP for validation.
 - 16-image granule SDR Processing error due to variable processing times; Code fix tested at STAR. Missing SDR granules will not produce EDR products.
 - Mismatch in current Medium to Low SDR FOV Cross-track aggregation leads to FOV blurring for EDR products. Will be resolved with new OMPS NM tables.
 - Team needs 8-day averages with corrected SDRs to compute cross-track bias statistics and validate versus S-NPP.

* Version 3 Revision 0 at NDE Operations and I&T

Summary of Findings for Ozone Profile EDR

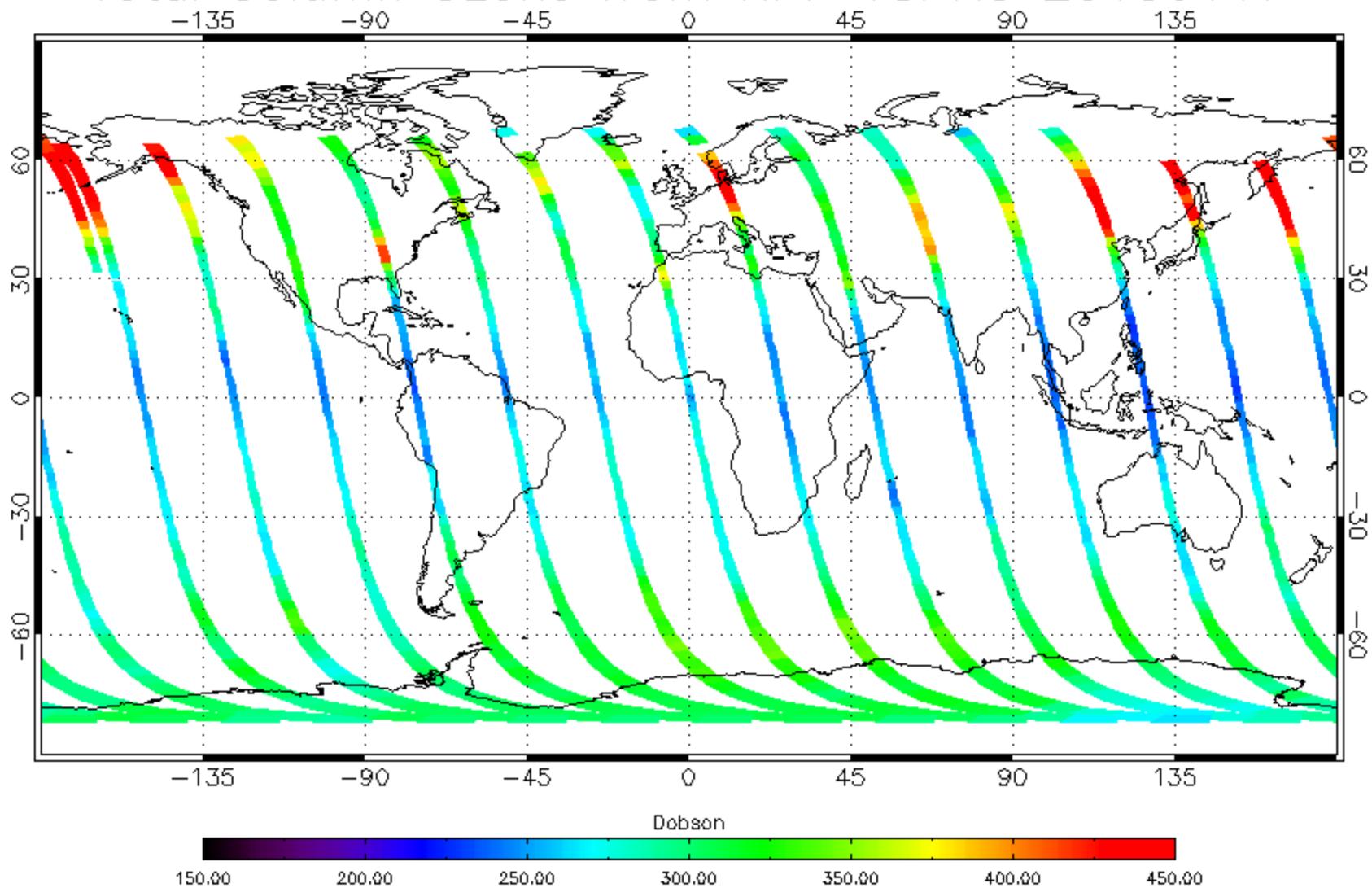
- NOAA-20 OMPS Nadir Profiler / V8Pro EDR*
 - EOF analysis of measurements shows good SNRs. Outliers are larger by linear factors in FOV size not square root factors. EDRs will be adversely affected by this noise.
 - EDRs show good results for this stage of maturity.
 - Output error for Profile Error Code 8 cases (Excessively large initial residual – Flag is correctly set). Code fix will be delivered to NDE with Provisional Table updates.
 - Code error in cross-track macropixel computation; fix expected at IDPS in July 2018.
 - New OMPS Nadir Profile sample table needed to match OMPS Nadir Mapper FOV.
 - Temporal aggregation of 15-scan NM RDRs to 5-scan RDRs causes offset between NM and NP. This was resolved with 15-scan SDR products in use since 3/30/2018.
 - Radiation in the SAA has a large effect on radiances for 50x50km² FOVs, some just outside of geographic flagged region.
 - Some cases of negative radiances are found in the auroral oval.
 - Dichroic effects on wavelength/bandpass and on calibration from 0.2-nm shift not yet accounted for in SDR calibration tables or EDR bandpass adjustments.
 - Possible overcorrection for stray light (not shown) leads to negative correlation between reflectivity and upper level ozone.

* Version 3 Revision 1 at NDE Operations and I&T

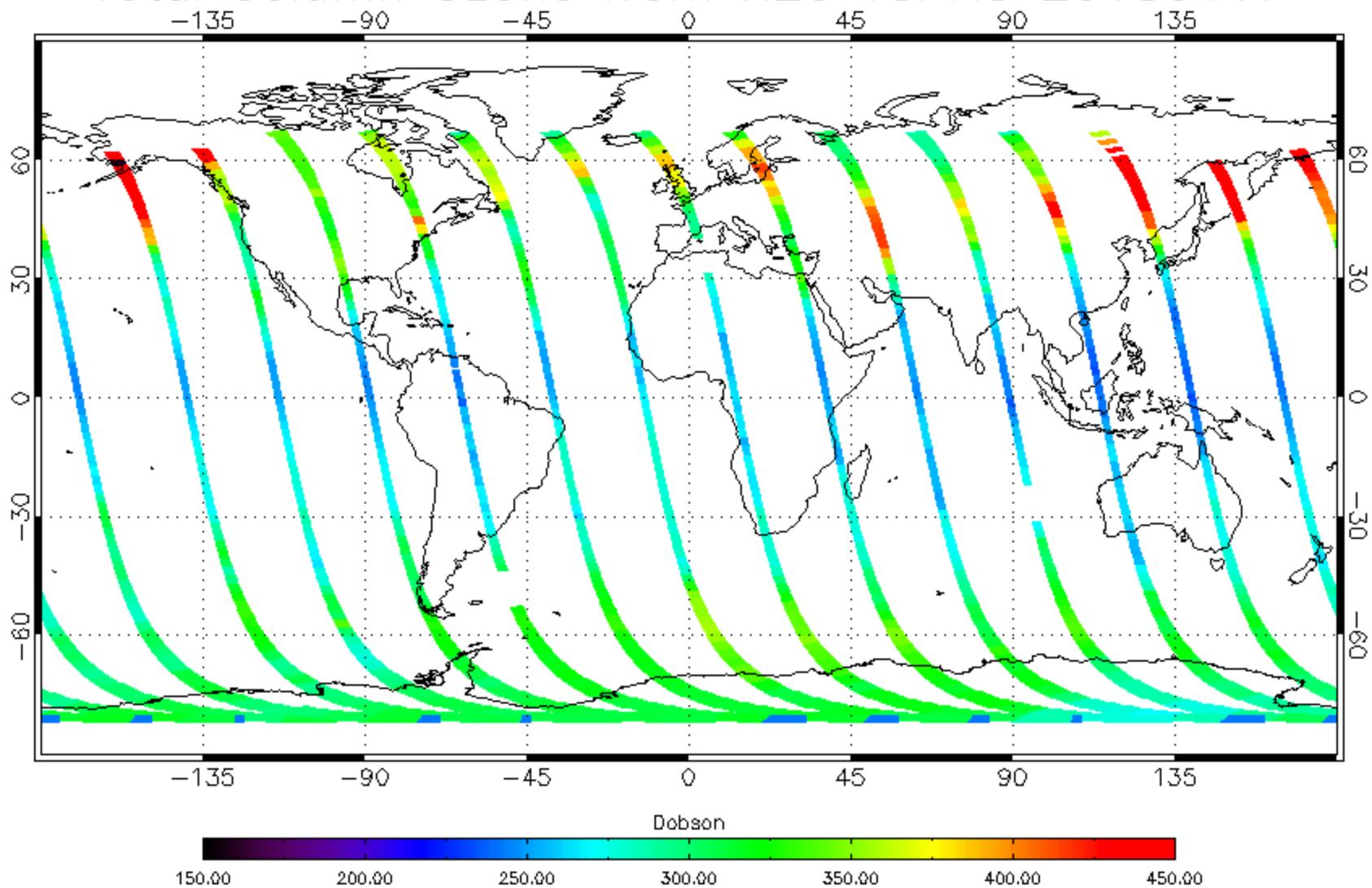
Provisional Delivery to NDE planned for May

- Planned code, script and table changes at NDE
 - Given the range of SDR FOV sizes, we will provide dynamic SDR sizing adjustment for NM SDRs in codes, not control scripts. That is, the NDE operator will not need to know when the SDRs have switched to new sample tables and make manual adjustments to the scripts.
 - Improved handling of end of orbit, end of day, and duplicate granules
 - Fix for Profile Error Code 8 output EDR content for V8Pro.
 - Check FOV alignment accuracy for NM and NP within code by computing average latitude and longitude of contributing FOVs.
 - New adjustment tables for V8TOz and V8Pro
 - Requires access to SDRs with better sample tables
 - Requires access to SDRs with better stray light corrections
 - Test data processing to confirm LFSO2 is ready for smaller FOV V8TOz EDRs from NOAA-20 and improve 15-granule processing.

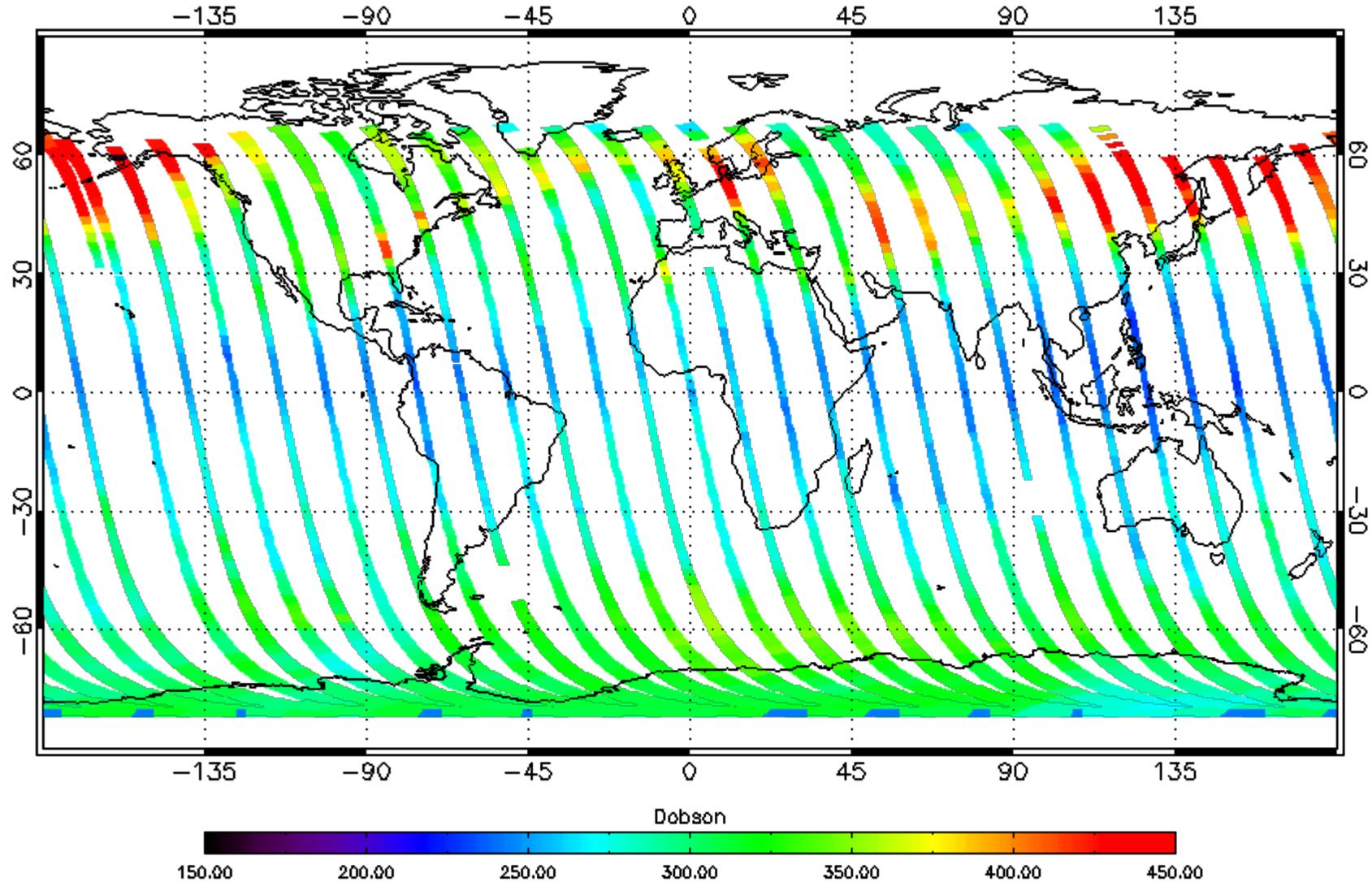
Total Column Ozone from NPP V8PRO 20180117



Total Column Ozone from N20 V8PRO 20180117

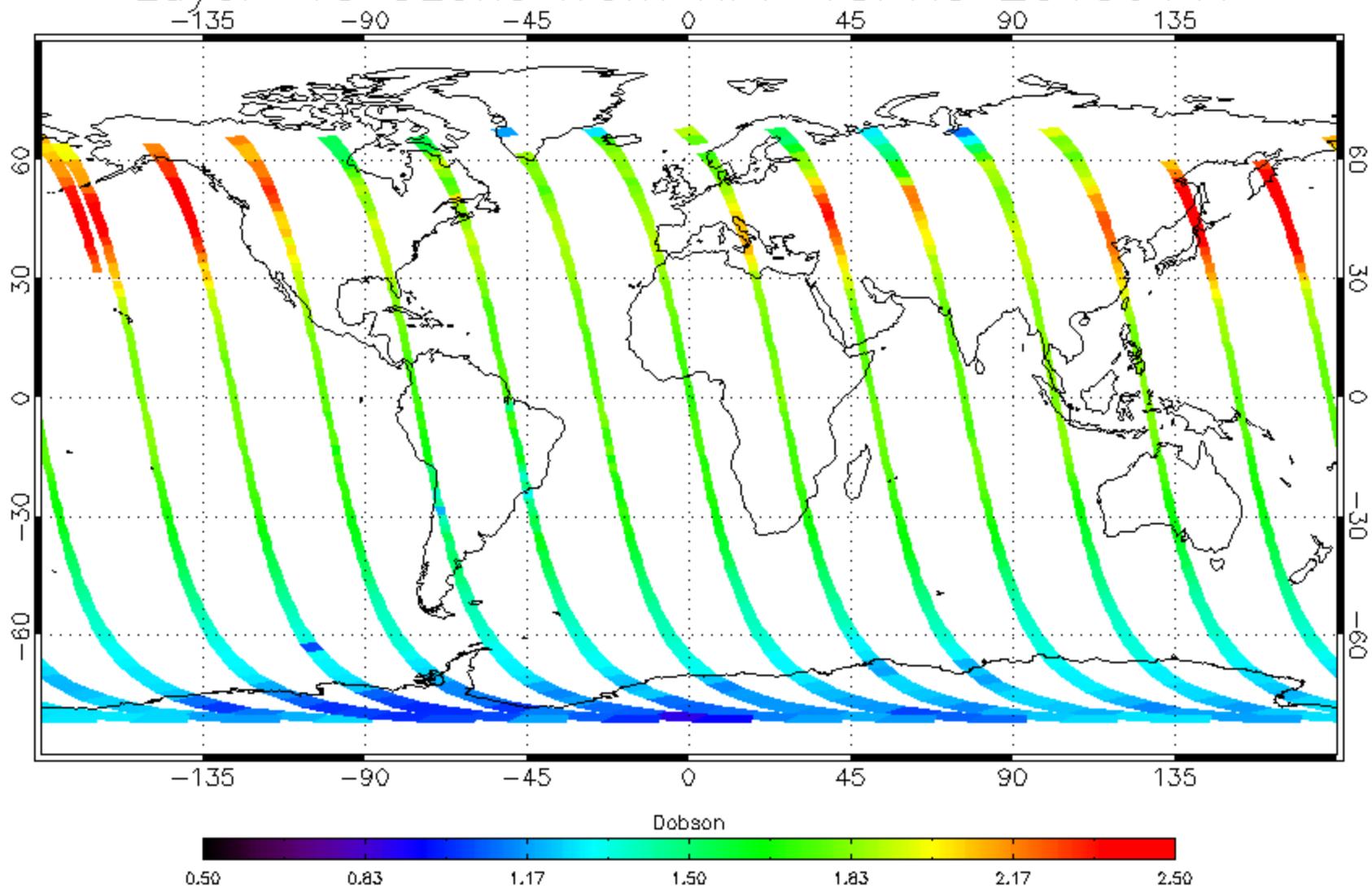


Total Column Ozone from N20 V8PRO 20180117

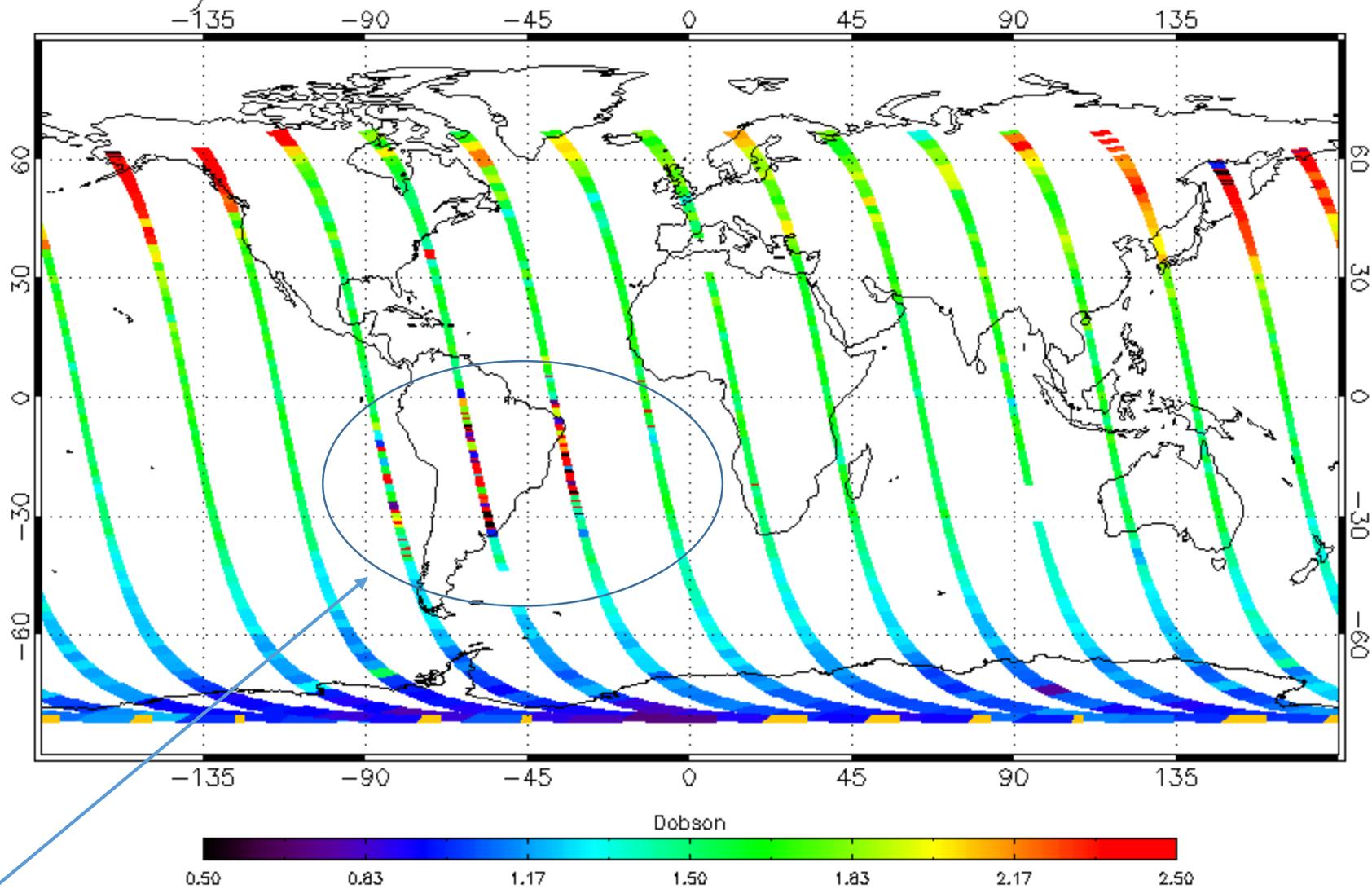


S-NPP and NOAA-20 OMPS Nadir Profile Total Column EDRs show good consistency.

Layer-15 Ozone from NPP V8PRO 20180117

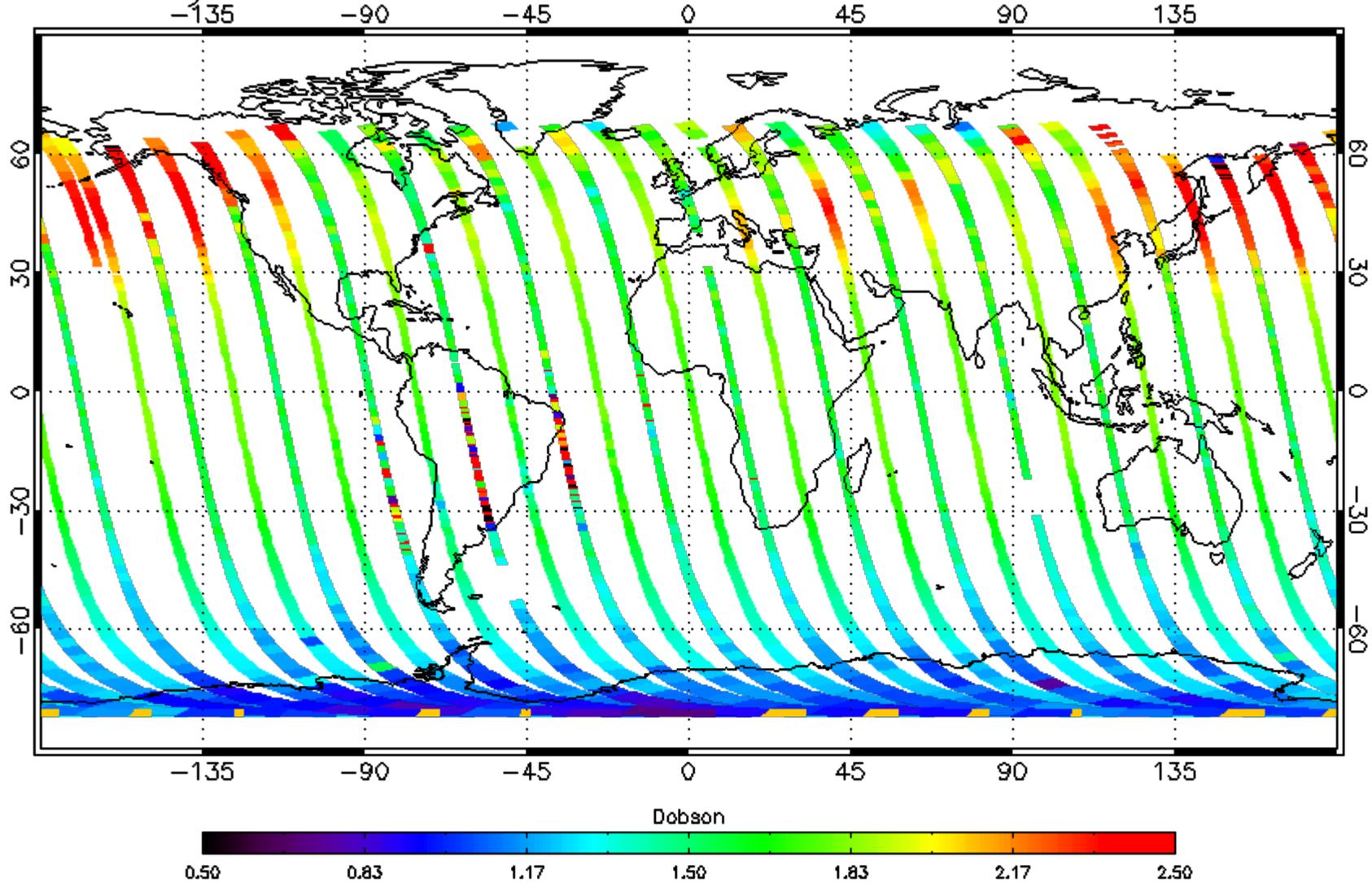


Layer-15 Ozone from N20 V8PRO 20180117



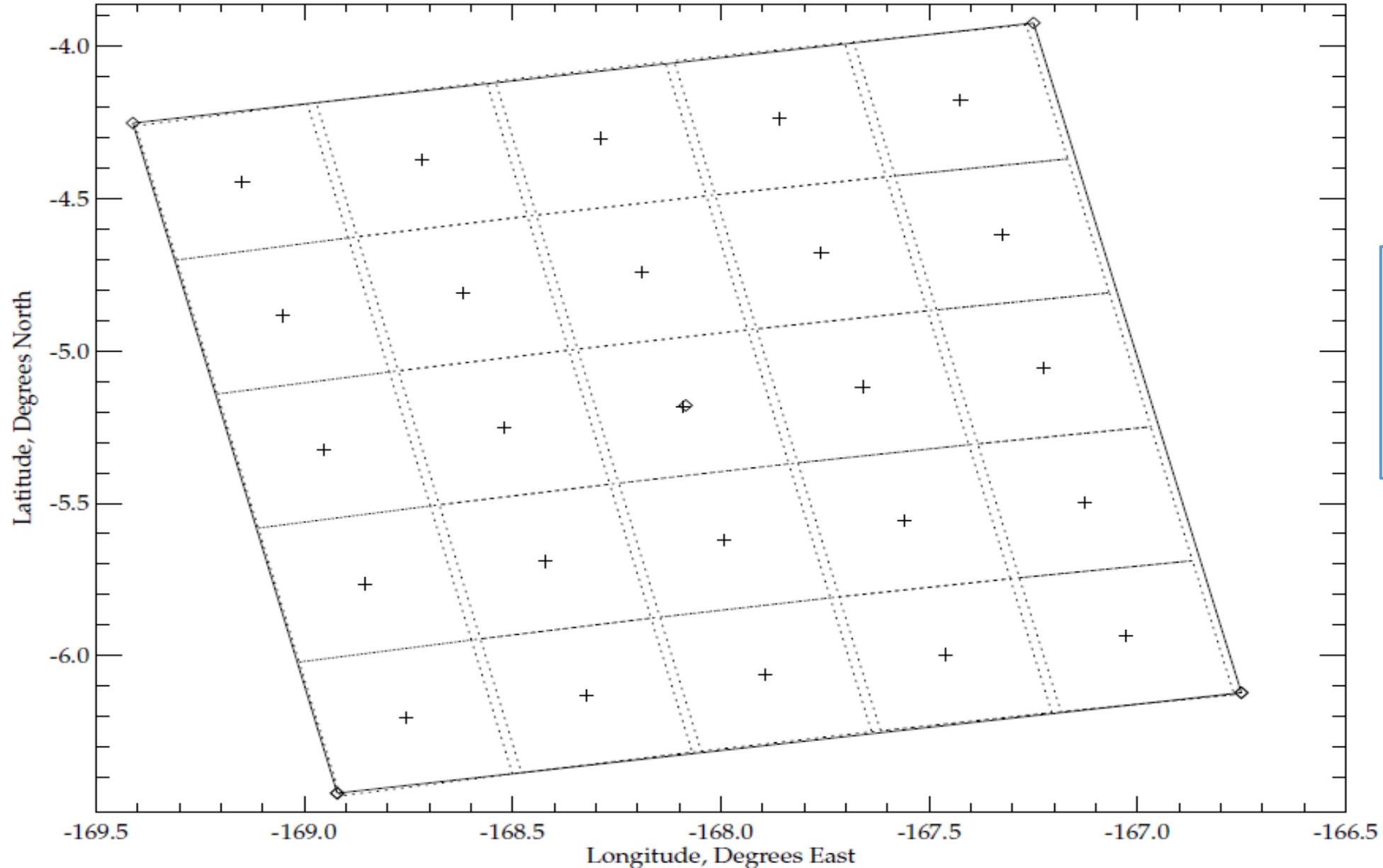
South Atlantic Anomaly

Layer-15 Ozone from N20 V8PRO 20180117



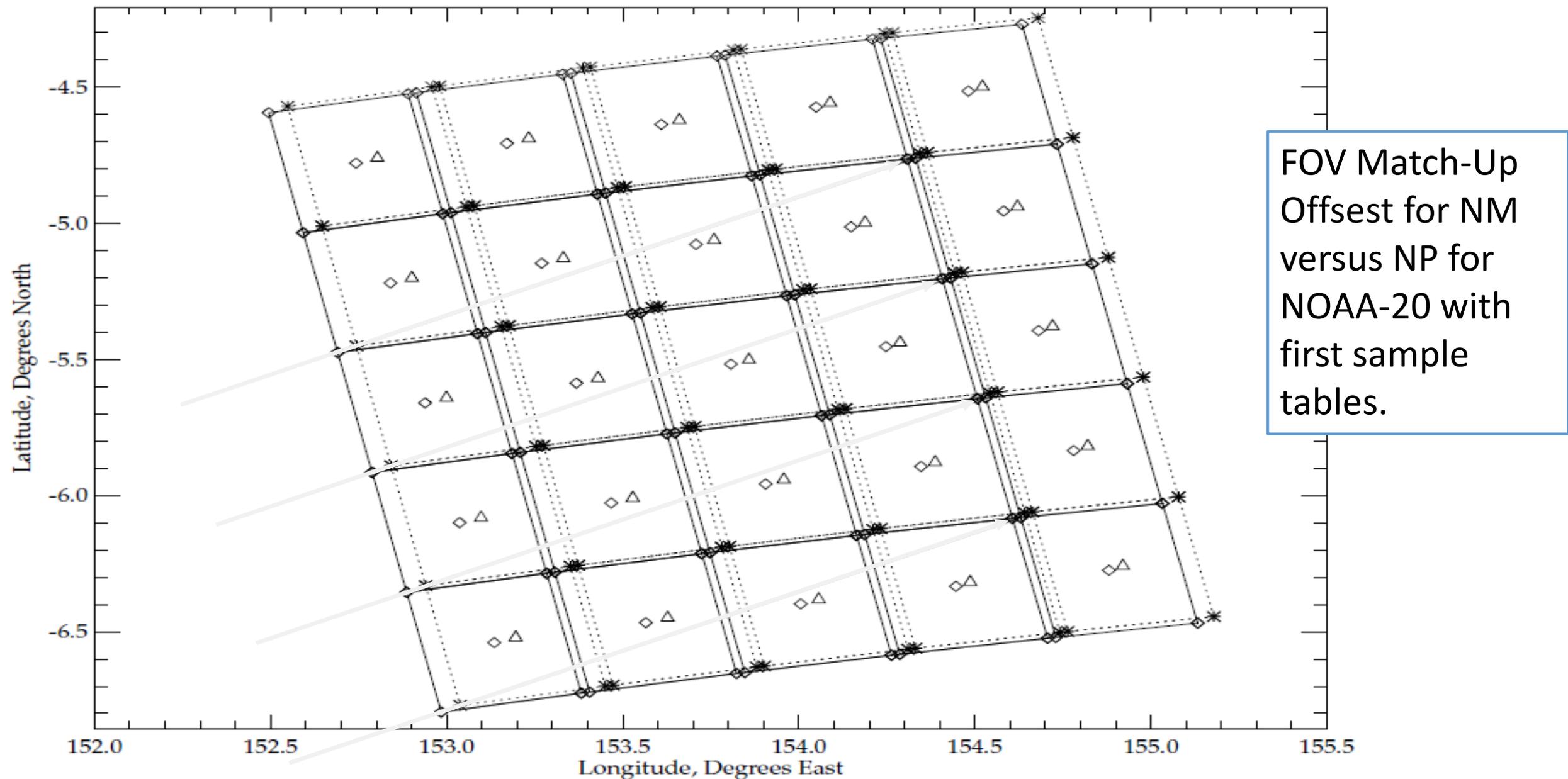
S-NPP and NOAA-20 OMPS Nadir Profile Layer Ozone EDRs show good consistency.

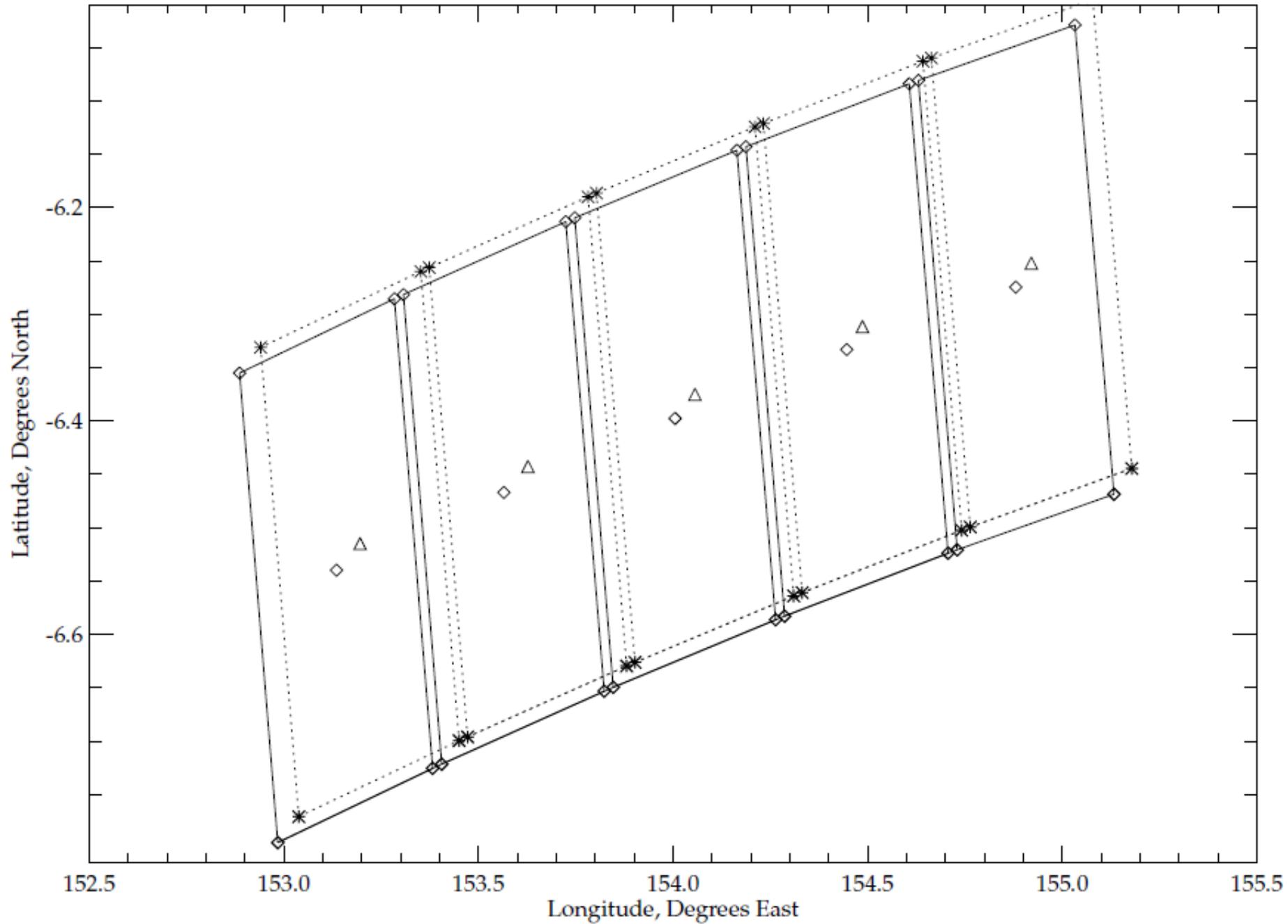
Sample Matchup of FOVs for one Granule of S-NPP Nadir Mapper (Dotted and +) and S-NPP Nadir Profiler (Solid and <>)



Boundaries
match
within one
pixel width

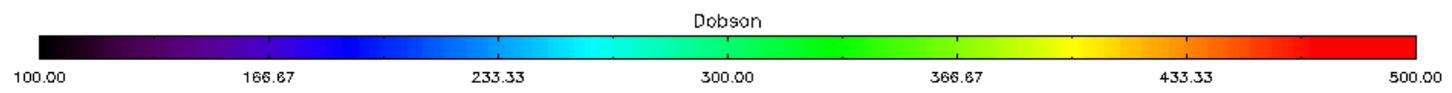
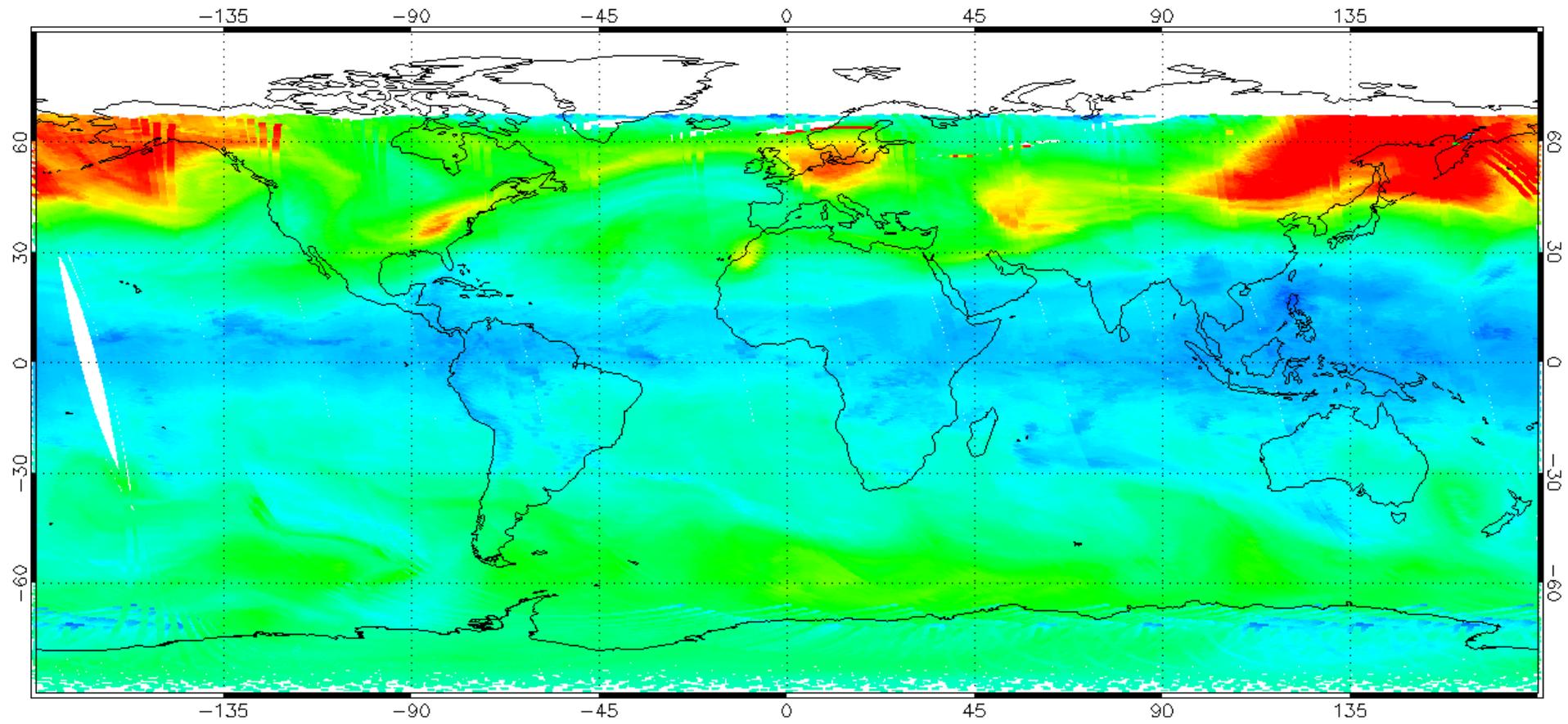
Sample Matchup of FOVs for one Granule of NOAA-20 Nadir Mapper (Dotted & Δ) and NOAA-20 Nadir Profiler (Solid & $\langle \rangle$)



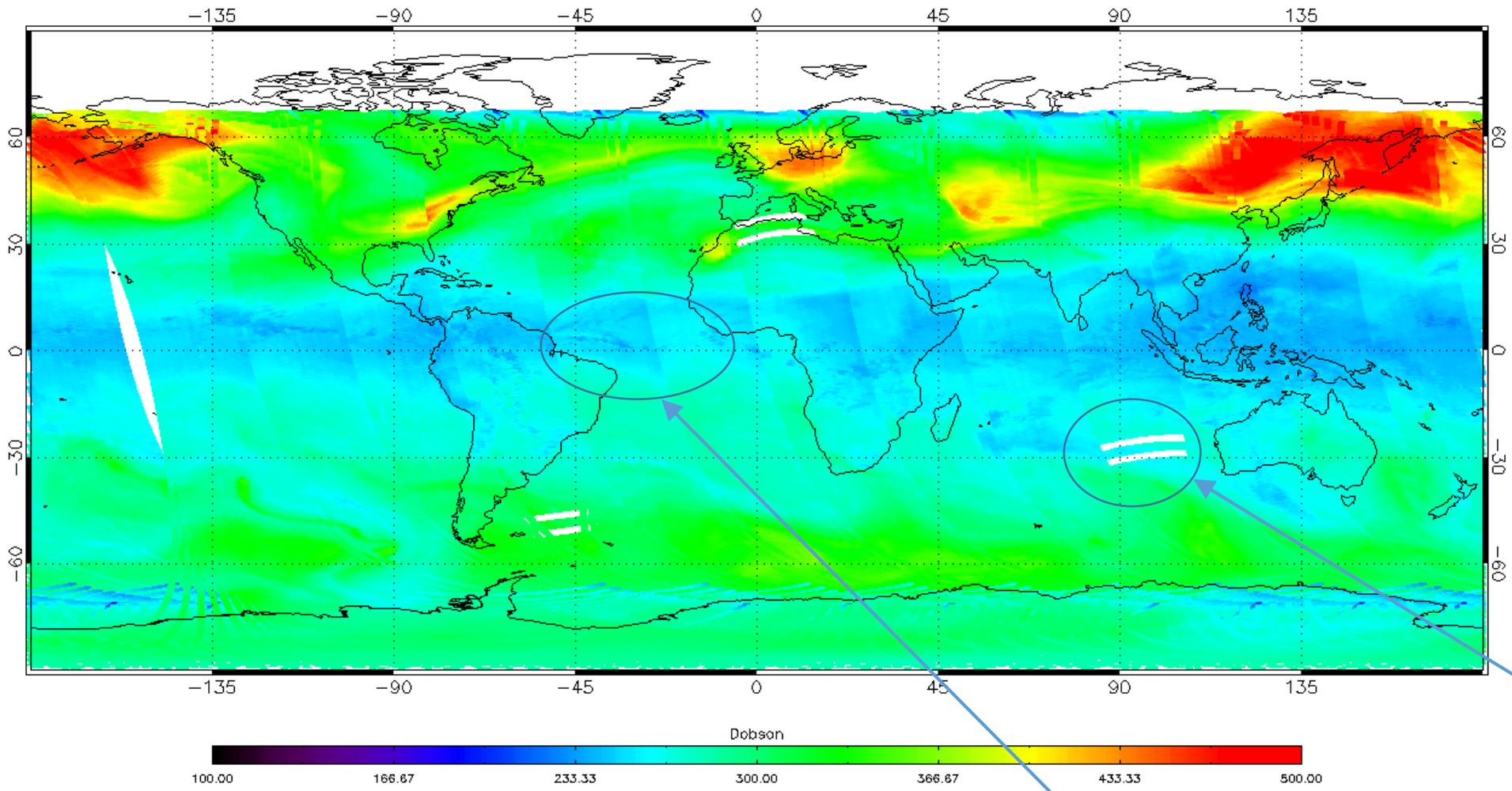


FOV Match-Up:
Same as Slide 14
but just for the
lowest row / first
scan. Note the
along-track
offsets – top and
bottom shifts of
~2 km.

V8TOZ Total Column Ozone NPP 20180117



V8TOZ Total Column Ozone N20 20180117



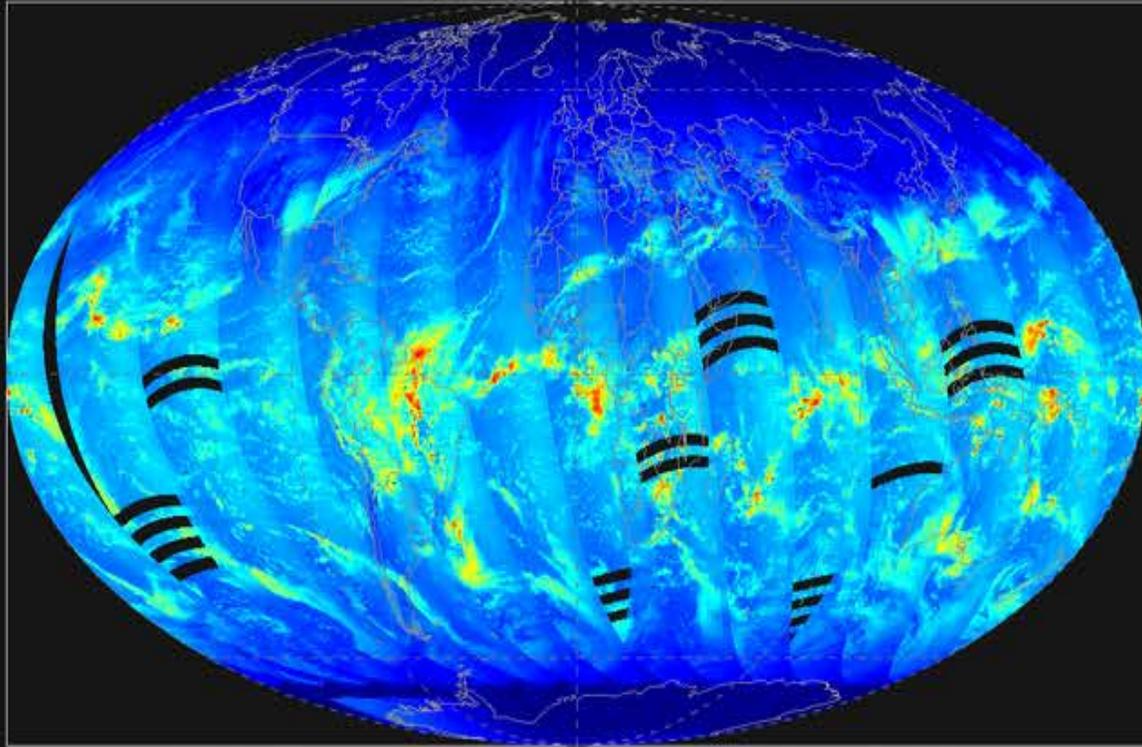
16-Image Granule Errors

Cross-Track Bias

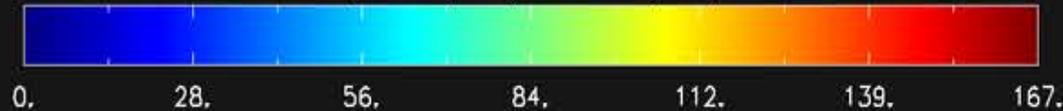
NOAA-20 Total Column Ozone results are in-family with S-NPP products (on the preceding slide) with known deficiencies.

Raytheon-devised Cross-granule retrieval fix for 16-Image RDRs tested at STAR by SDR Team

N20 OMPS Nadir Mapper Radiance at 318.0nm

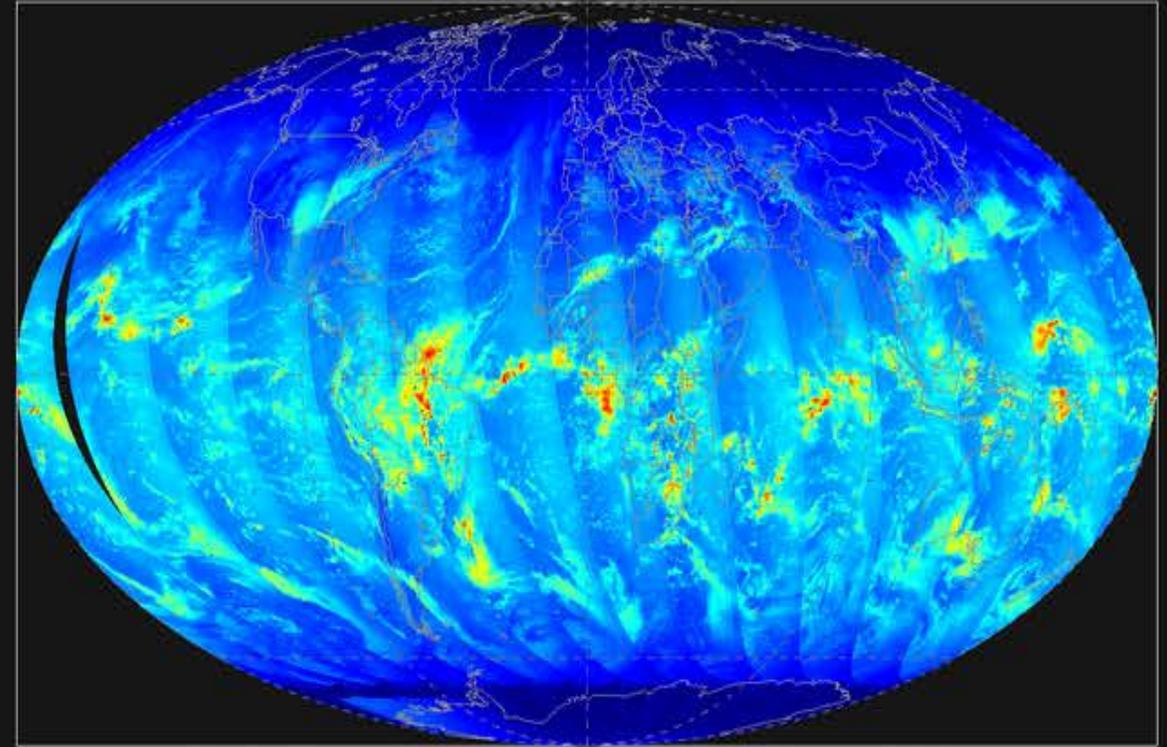


N20 OMPS Watts/cm²/nm/Sr 2018/02/21 at 318.0nm



before_xGran_2018-02-21.png

N20 OMPS Nadir Mapper Radiance at 318.0nm

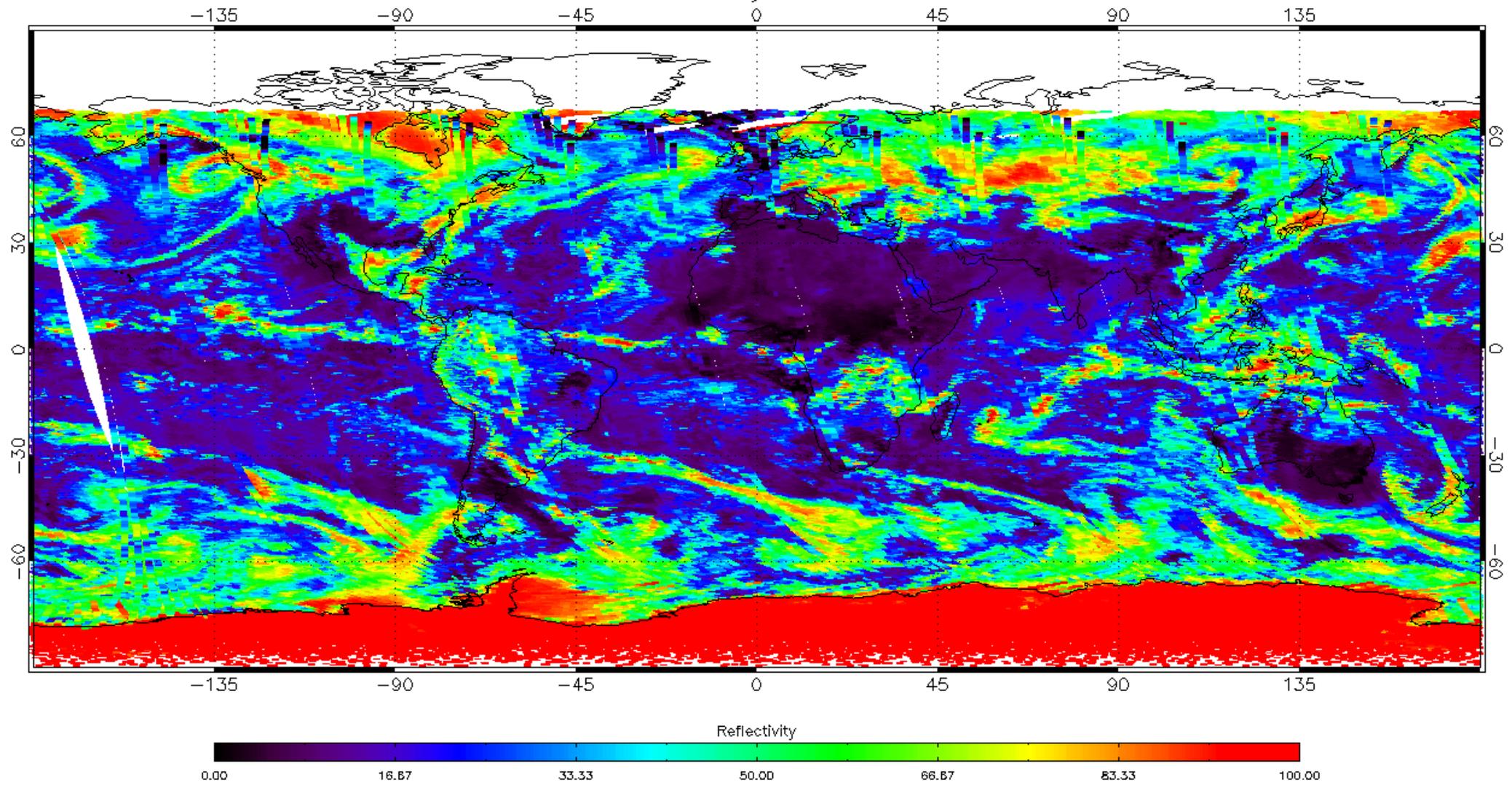


N20 OMPS Watts/cm²/nm/Sr 2018/02/21 at 318.0nm

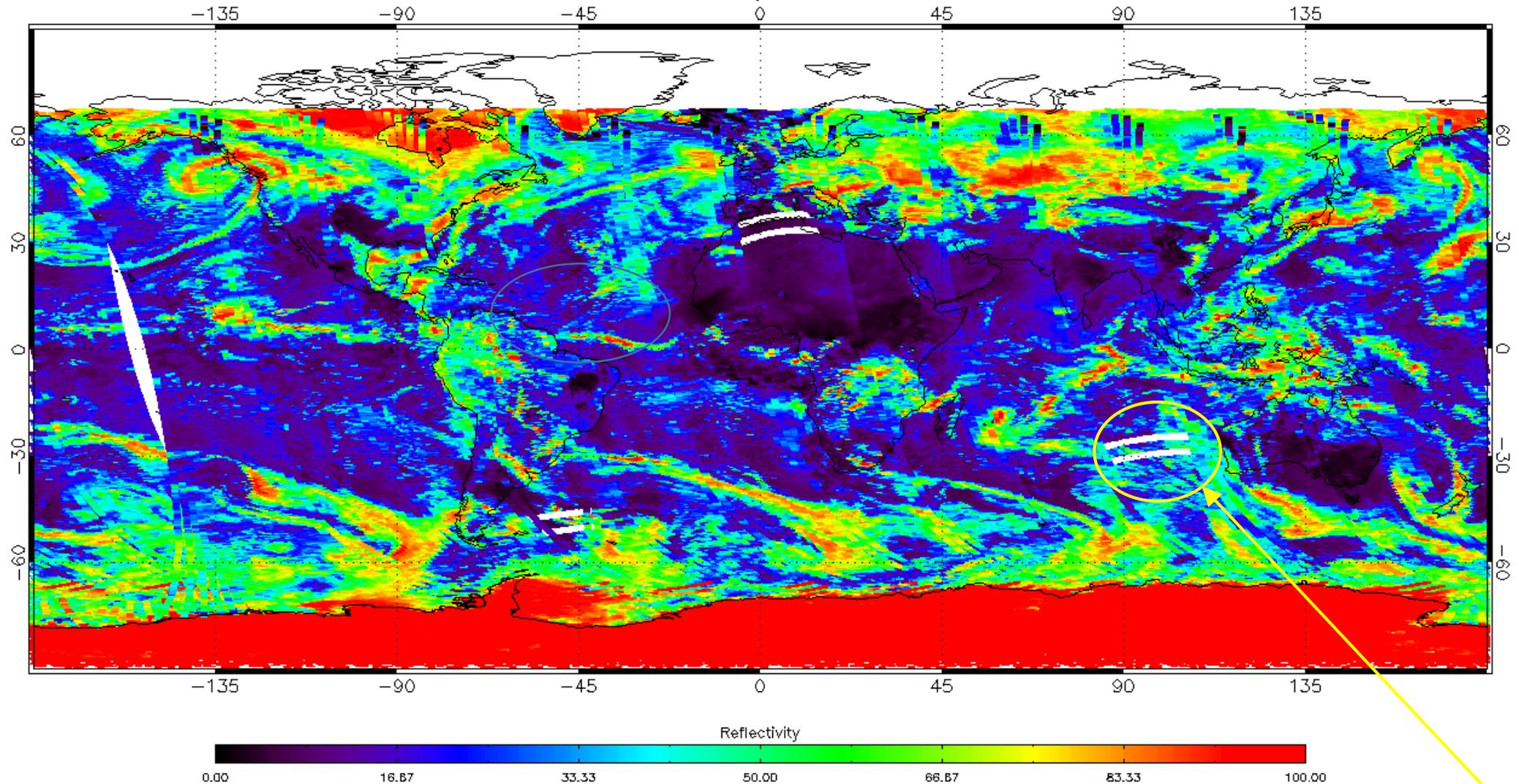


with_xGran_DR_8616_2018_02_21.png

V8TOZ Reflectivity NPP 20180117



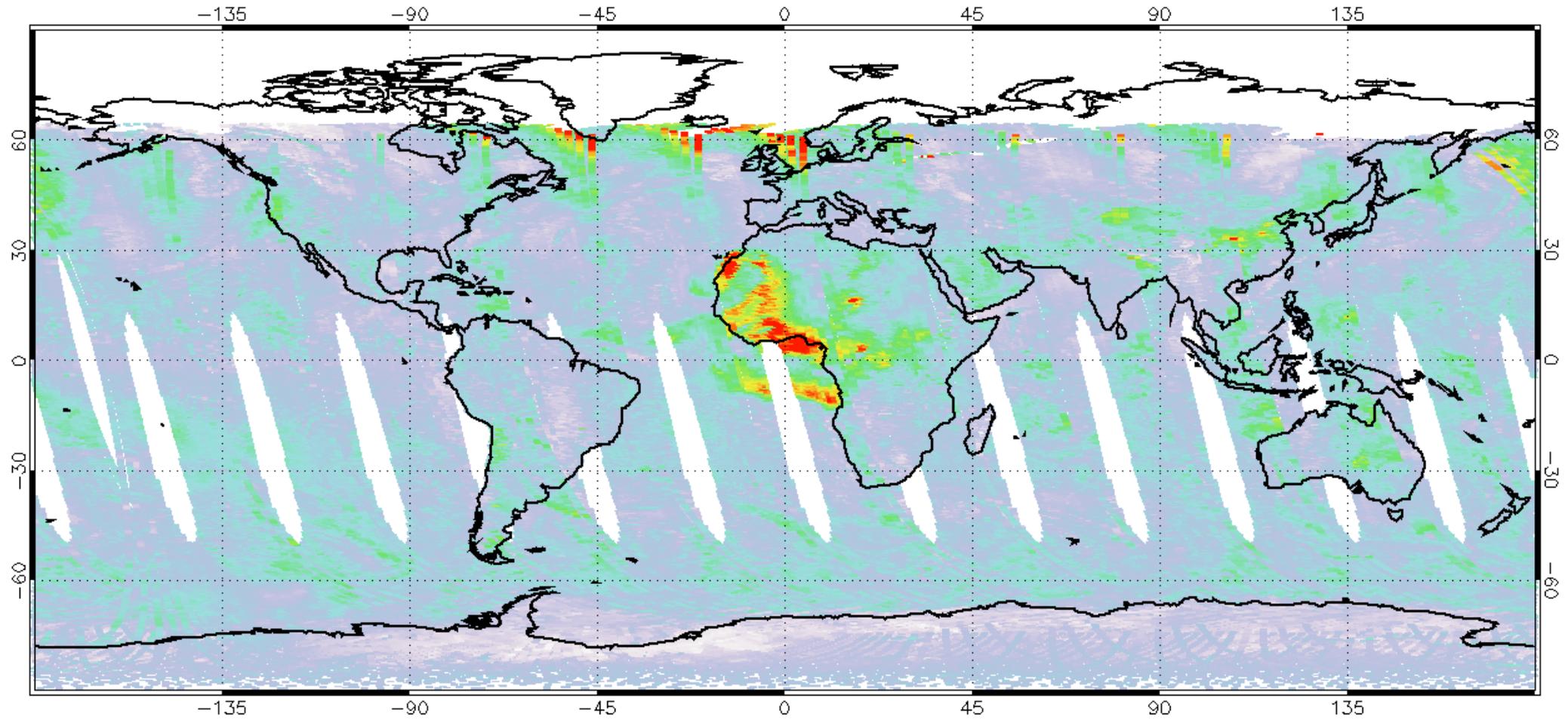
V8TOZ Reflectivity N20 20180117



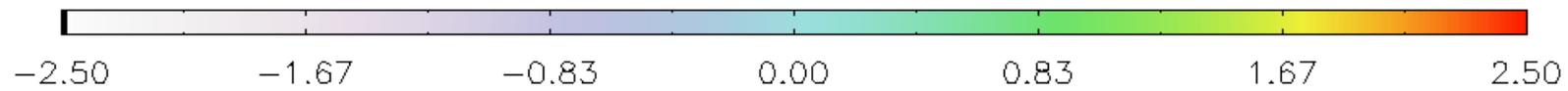
NOAA-20 Effective Reflectivity results are in family with S-NPP products (on the preceding slide) with known deficiencies.

16-Image Granule Errors

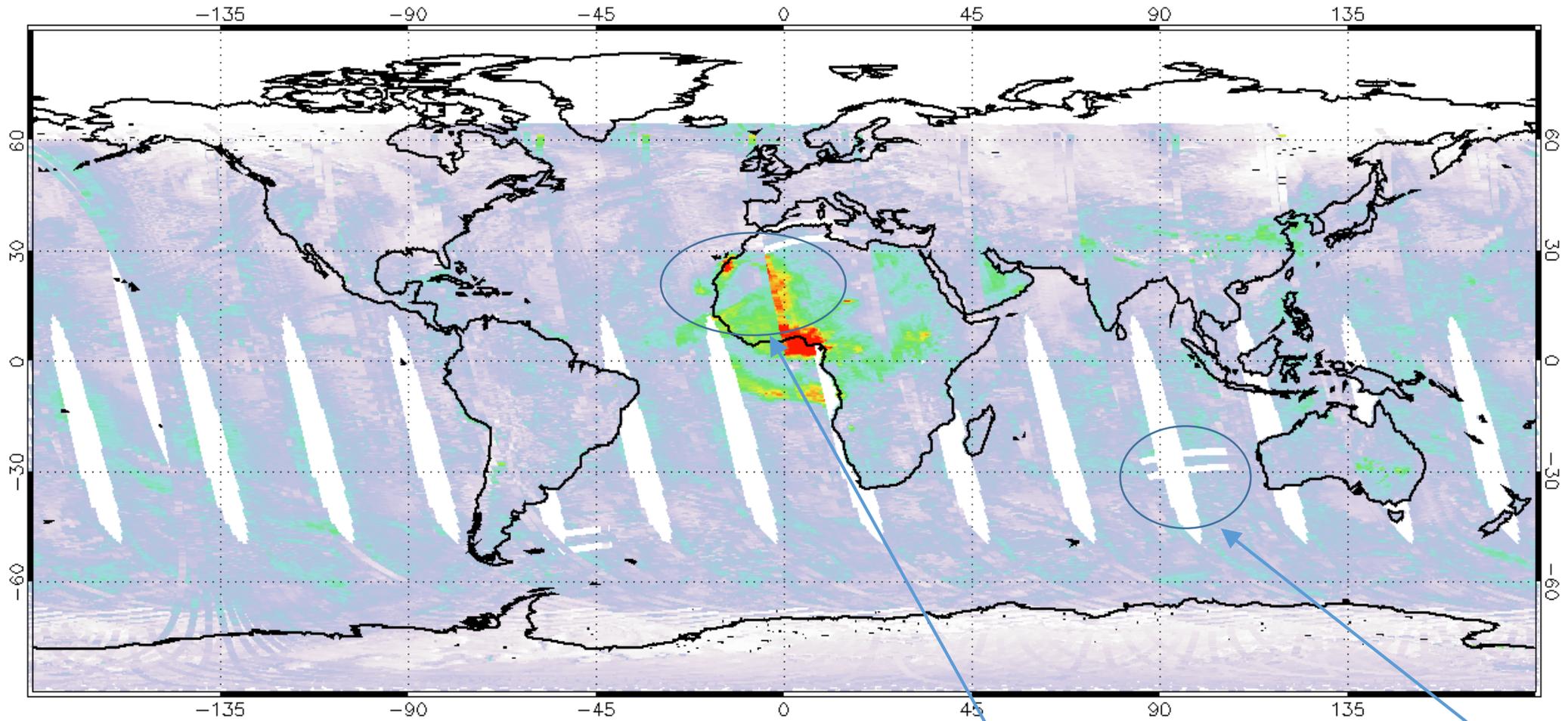
V8TOZ Aerosol Index, NPP 20180117



Aerosol Index



V8T0Z Aerosol Index, N20 20180117



NOAA-20 Absorbing Aerosol Index results are in family with S-NPP products (on the preceding slide) with known deficiencies.

Cross-Track Bias

16-Image Granule Errors

Summary & Conclusions

- The NOAA-20 OMPS Ozone EDR and BUFR products are ready for users to examine. They have proper formatting and reasonable values for content.
- Deficiencies in the OMPS SDRs are known, and the SDR Team has paths forward to improve the products.
- Minor code and script changes will be provided to NDE for the V8Pro, V8TOz and LFSO2 codes in a May 2018 delivery.
- Final adjustment tables for the EDR products will be developed by using off-line STAR SDR processing.
- Product quality will improve as SDR and EDR Team adjustments and corrections enter the IDPS and NDE processing systems.