



J1 Plans for Smaller FOV and Algorithm Refinements

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Outline



- S-NPP/J01 IDPS capable of producing OMPS SDR MedRes NP and NM (MX04 and later)
- JPSS-1 OMPS-NM Low and Medium Resolution SDR
- JPSS-1 OMPS-NP Medium Resolution SDR
- Medium Resolution EDR total ozone products from NDE
- J01 EDR ozone profile enhancements
- Future Algorithm Refinements



Expected J01 SDR Measurements



J01 SDR NM from IDPS in of two configurations:

- 1) NM LowRes, 35 xtrack and 5 scans per granule, 50km x 50km
- 2) NM MedRes, 103 xtrack and 15 scans per granule, 17km x 17km

NP MedRes, 5x5, 5 scans per granule X 5 xtracks. 400 scans per orbit, 150 wavelengths from 250nm to 310nm.

Images shown in this presentation are J01 Proxy data derived from NPP and NPP diagnostic, from off-line ADL runs at NOAA by the OMPS STAR SDR team.

Prior to the L+90 day handover the J1 NM RDR will be done in low, medium, high resolution modes. The IDPS system will aggregate pixels to produce either 35x5 or 103x15. ***Along track aggregation will not be done in nominal operations phase, the short granule problem prevents it.*** Across track aggregation may be done.



NM Low Res SDR Format



- Same number of ground pixels as current nominal NPP SDR. 35X5.
- This is the expected nominal SDR format from L+3 months to L+9 months
- Approximate same wavelength dimensions and coverage as S-NPP 35x5(the RDR will contain measurements beyond 400nm, how many channels depends on the how much data can be brought down).
- There will be a one day per week diagnostic measurement using the medRes config, 17x17km².

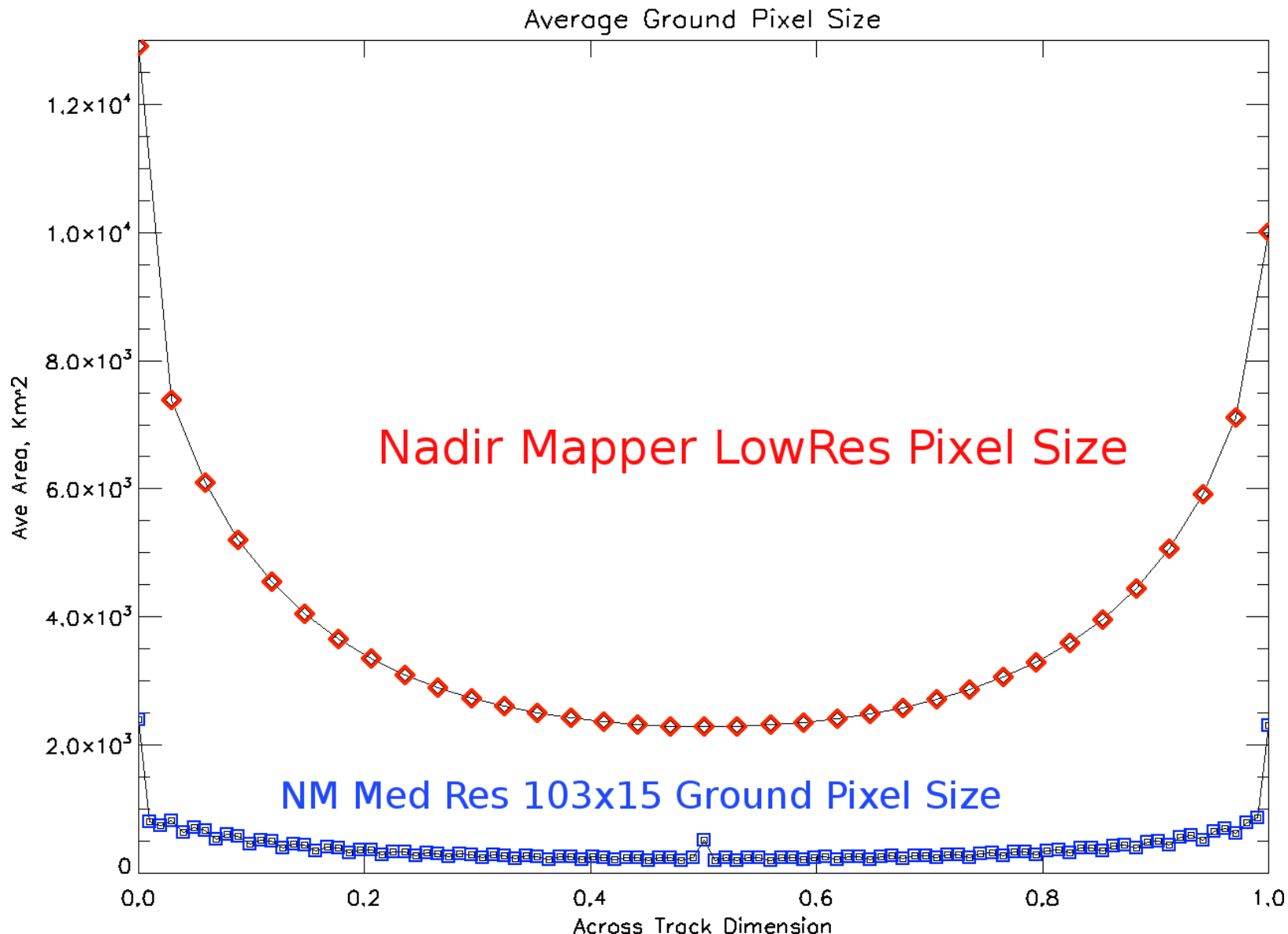


NM Med Res SDR Format

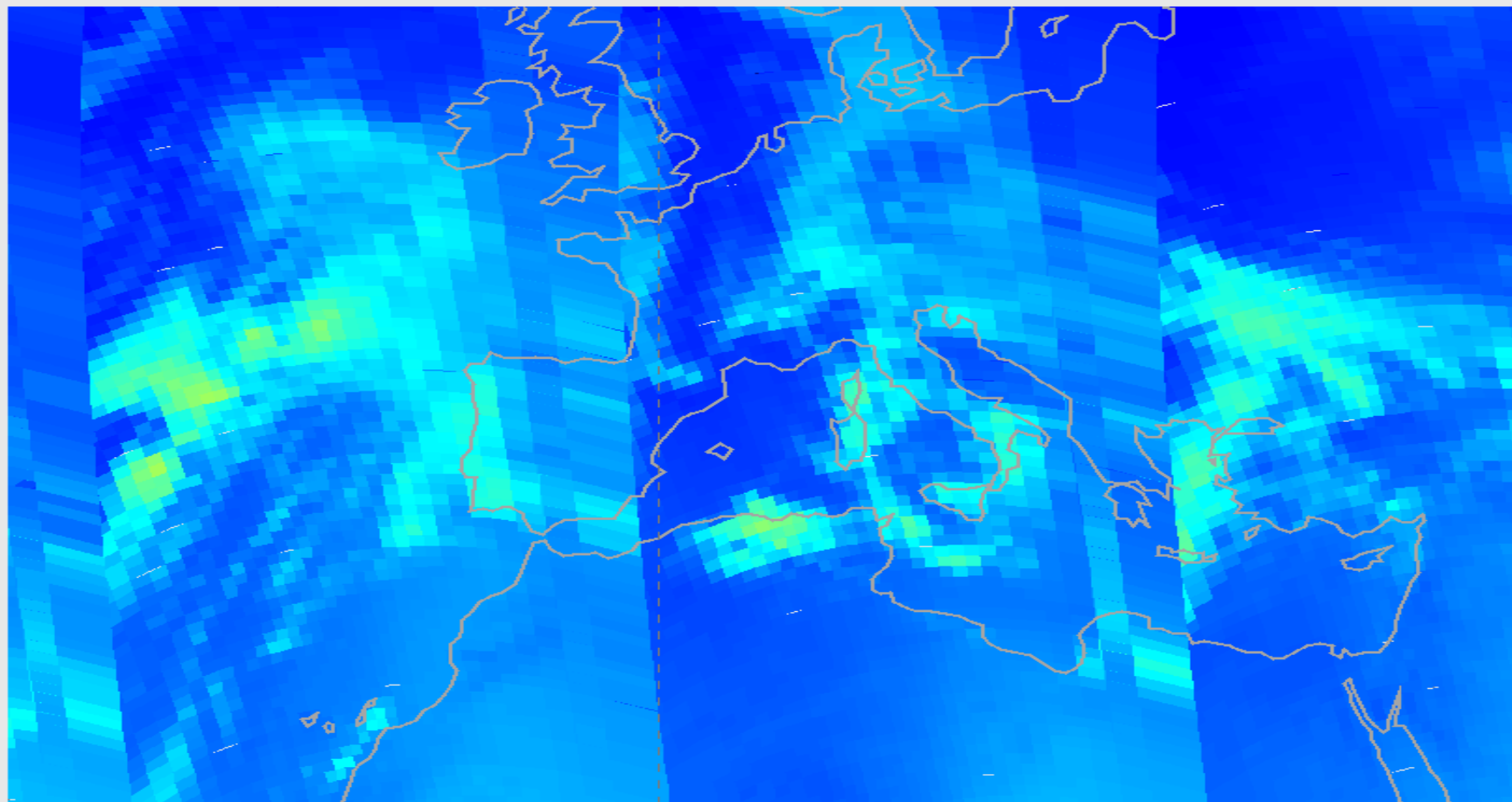


- This is the expected nominal SDR format from L+9 months onward(depends on approval).
- 15 scans per granule, 103 xtrack pixels, 17km by 17km at nadir.
- Approximate same wavelength dimension and range as current IDPS generated NPP NM SDR.

NM Ground Pixel Sizes

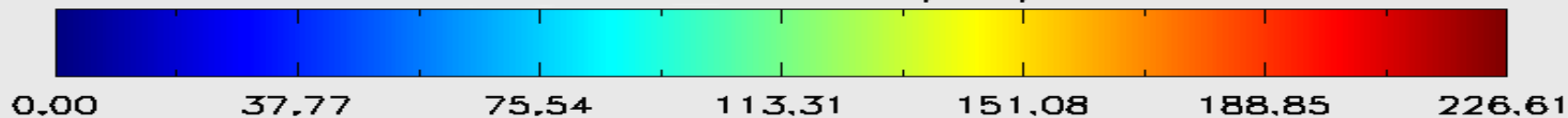


LowRes Radiance

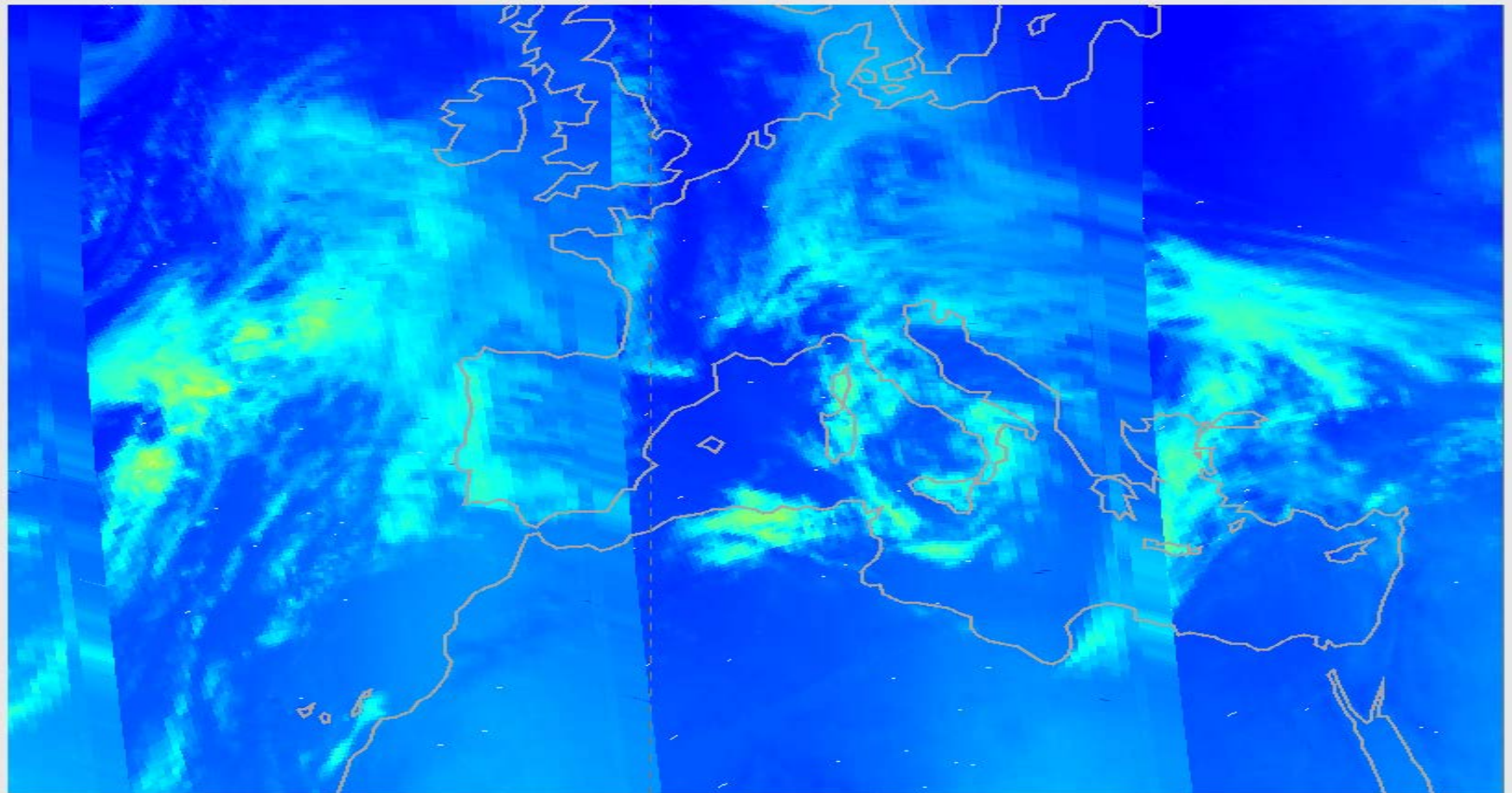


J01 OMPS

2014/04/05 at 317.8nm

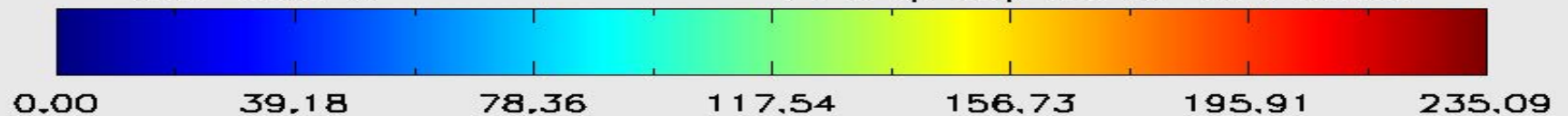


Med Res Radiance

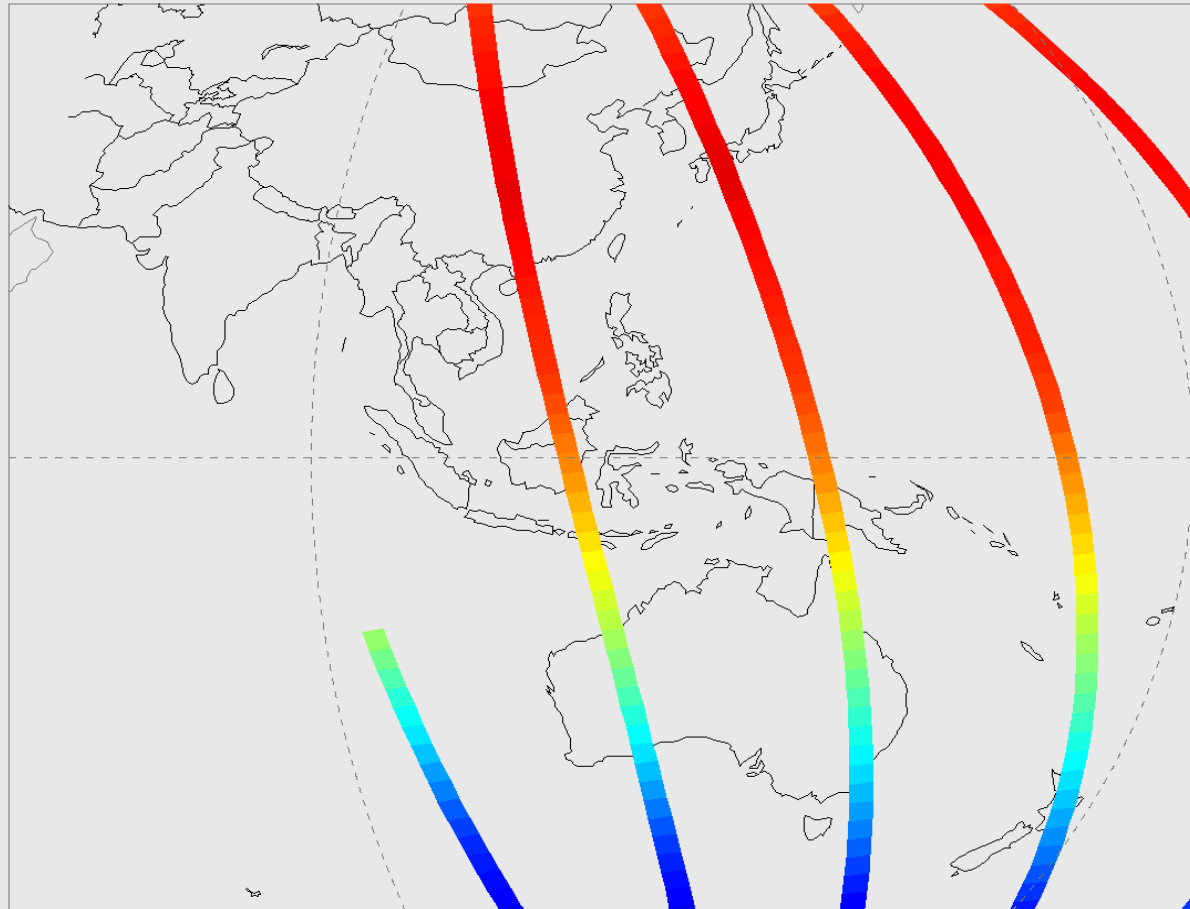


J01 OMPS

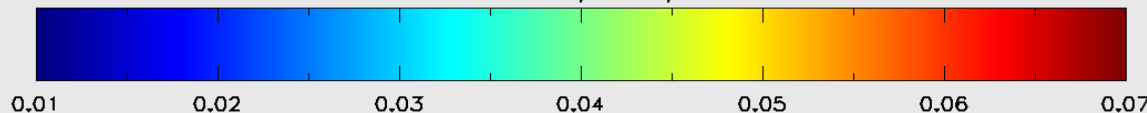
2014/04/05 at 317.9nm



J01 and S-NPP NP SDR



S-NPP OMPS NP Radiance Watts/cm³/Sr Radiance at 267.23nm



S-NPP Configuration

Ground pixel size:
250Km . 250Km

80 ground pixels per orbit

Viewing Zenith Angle
Approximately zero°

J01 Configuration

J01 Ground Pixel size:
50Km . 50Km

2000 pixels per
orbit=80*5*5

Viewing Zenith Angle
ranges from -7.5° to 7.5°⁹

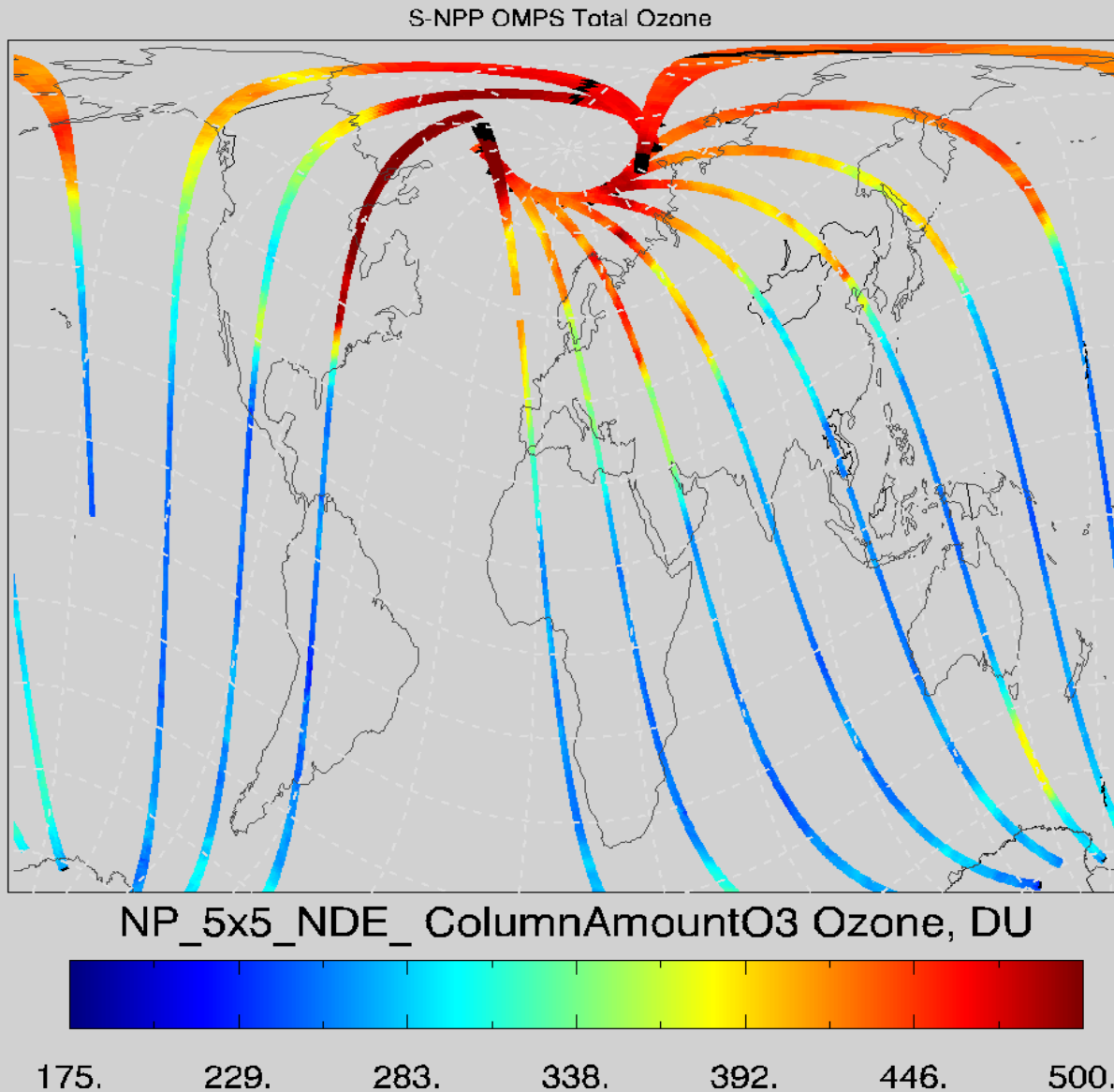


Research V8PRO Version



- Based on the V8SBUV version 8.
- Sized to 5x5 output, netcdf-4.
- 2000 profiles per orbit.
- RT lookup tables include VZA index. Total ozone computation uses VZA,RAZA.
- Profile single scatter RT code uses modified path length: assume we are looking Nadir but a longer path length: $1/\cos(VZA) + 1/\cos(SZA)$.
- Reasonable approximation since max VZA is 7.5°
- Our implementation relaxes some SBUV/2 specific constraints in the V8SBUV code: grating drive, 12 monochromator & 12 photometer paired measurements, nadir only. There was a major rewrite done to the SBUV/2 code.
- We can account for separate viewing geometries in the NM, NP SDR inputs. This was developed using OMI inputs: UV1,UV2 differences.

5x5 Ozone Retrieval NP



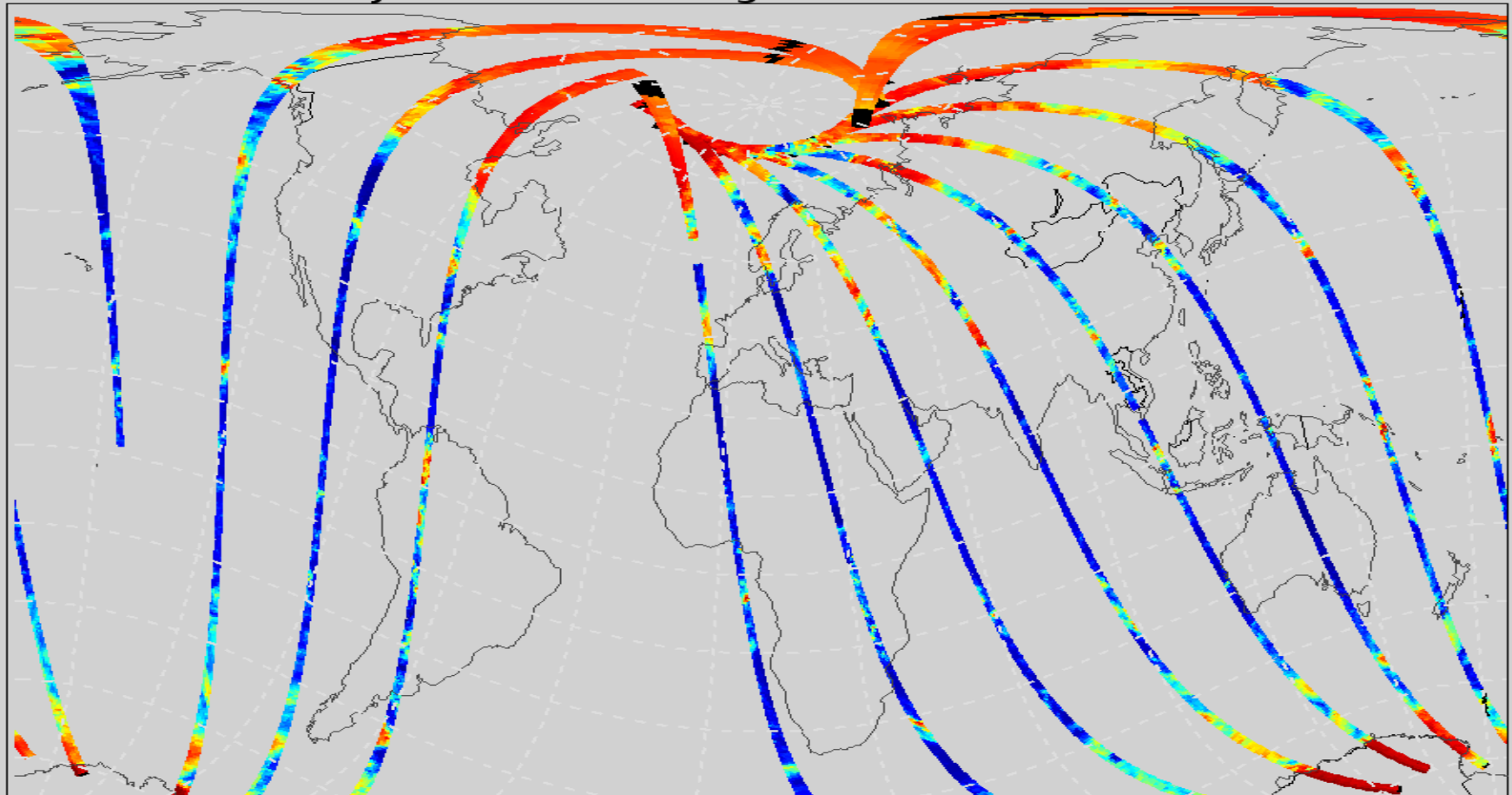
5x5 Ozone retrieval
Example.

We took S-NPP
diagnostic data and
converted to Nominal.
Then it is processed
through ADL BLK2.0 to
SDR level.

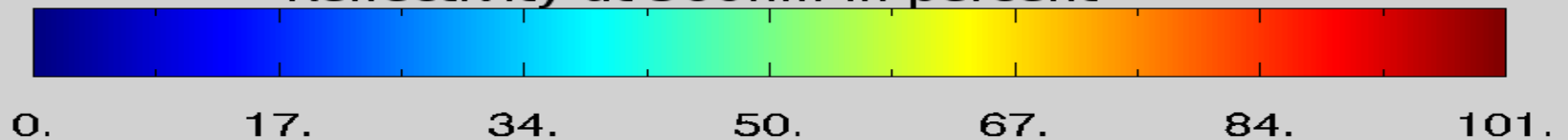
The image is created by
the V8Pro ozone profile
retrieval code step3 total
ozone field.

Reflectivity V8pro 2016/04/02

Reflectivity from S-NPP Diagnostic



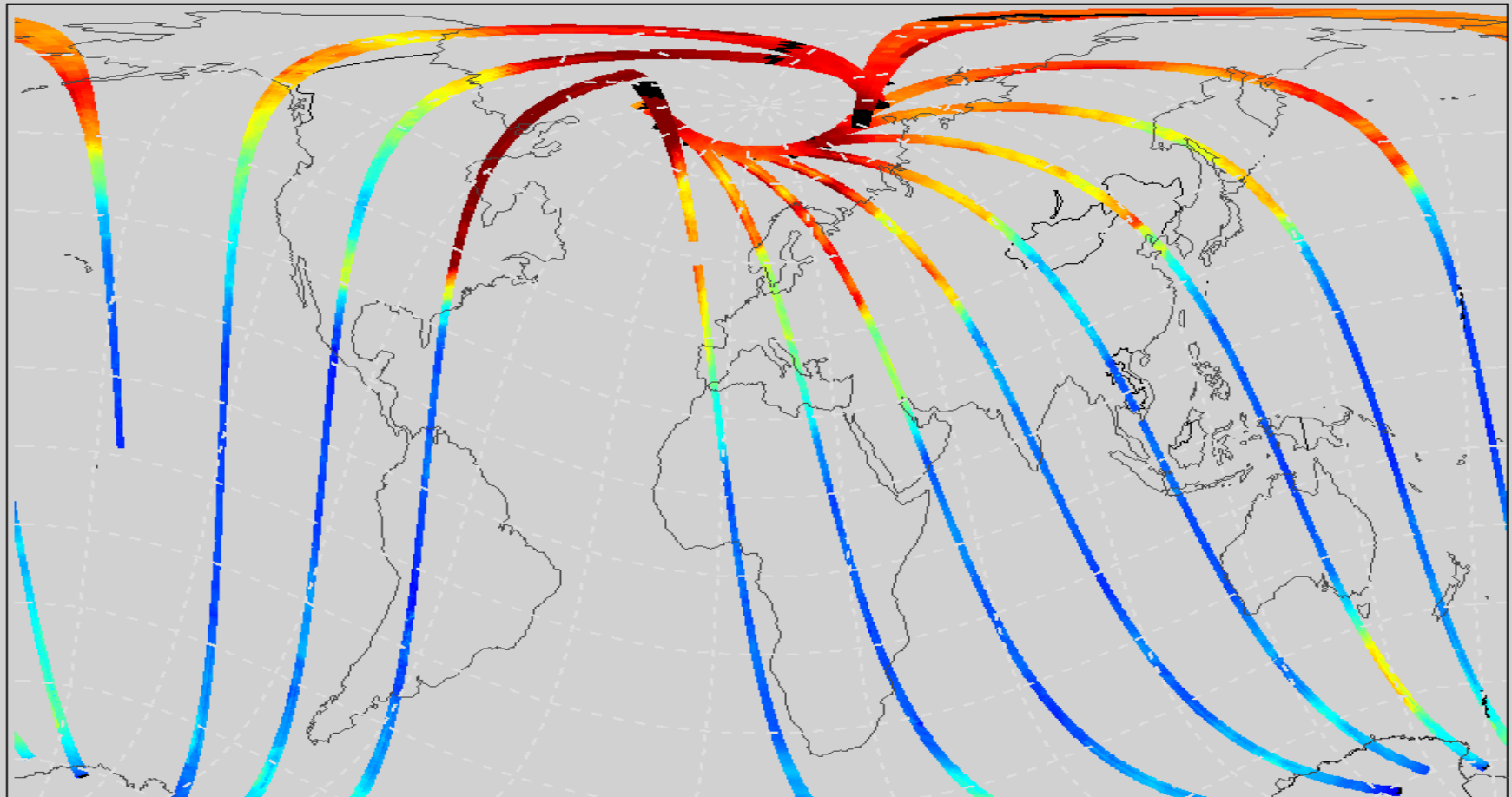
Reflectivity at 360nm in percent



Retrieved Column 2016/04/02

Sum of Retrieved 21 layer profile

S-NPP OMPS Total Ozone



NP_5x5_NDE_ Retrieved Profile Sum, DU



175. 229. 283. 338. 392. 446. 500.



Algorithm Refinements



- Better Snow ice
 - In operational NDE environment there are daily snow/ice maps available.
- Solar Activity
 - Daily Earthview Mg-II indices to scale solar flux for NP
- Information Concentration
 - EOF analysis
 - least square polynomial fits of normalized radiance
- Increased number of single scatter channels ($\lambda_{len} < 290 \text{ nm}$)
 - The primary purpose is noise reduction in the retrieval
 - Currently uses 252nm, 273nm, 282nm, 288nm.
 - Possibly use 12 channels below 290nm.
- Spectrally aggregated pixels in some or all channels
 - Reduces Raman scattering influence
 - Spectral aggregation done in albedo, not radiance.
 - Noise Reduction



Conclusion



- JPSS-1 OMPS-NP SDR will be at medium Resolution field of view
- JPSS-1 OMPS-NM SDR has a path forward to be measured at $17 \times 17 \text{ km}^2$ (1st 9 months at 50 km^2).
- Smaller field of view ozone products
 - Algorithm development needed to achieve medRes ozone profile
 - MedRes total ozone EDR ready but we will be limited by lowRes RDR measurements before L+270 days.