



# SNPP/JPSS EDR Products Long-Term Monitoring

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2015 STAR ICVS Instrument Performance Review

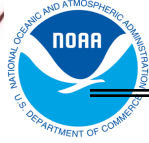
May 8<sup>th</sup> , 2015



# JPSS EDR Long Term Monitoring



- Long term monitoring is a key function of quality assurance for the STAR JPSS Program
- Over the past years, STAR has developed tools to conduct this type of Long Term Algorithm Monitoring
- Enterprise Algorithm/LTM Approach:
  - STAR ICVS set a great example for enterprise LTM
  - STAR teams will be developing/running (by AIT) Priority 3 and 4 EDR algorithms offline before Block 2.0; EDR teams will work with the user community to get feedback on those products
  - Developing visualization tools/libraries will help interaction with users of these products and optimize the community impacts
- Organized EDR LTM Workshop on Oct 28<sup>th</sup>, 2014, all EDR teams presented the SNPP/JPSS product monitoring capabilities
  - <http://www.star.nesdis.noaa.gov/jpss/Teams.php>



# JPSS SST Cal/Val Monitoring Tools



## **SQUAM** - SST Quality Monitor [www.star.nesdis.noaa.gov/sod/sst/squam/](http://www.star.nesdis.noaa.gov/sod/sst/squam/)

- ✓ Monitor SST Products (L2, L3, L4) for Self- and Cross-Consistency; Validate against *in situ* SSTs (*iQuam*)

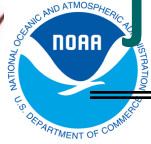
## **iQuam** - In situ Quality Monitor [www.star.nesdis.noaa.gov/sod/sst/iquam/](http://www.star.nesdis.noaa.gov/sod/sst/iquam/)

- ✓ QC *in situ* SSTs, Monitor on Web, Distribute to users
- ✓ Input to SQUAM

## **MICROS** - Monitoring IR Clear-sky Radiances over Oceans for SST [www.star.nesdis.noaa.gov/sod/sst/micros/](http://www.star.nesdis.noaa.gov/sod/sst/micros/)

- ✓ Monitor Clear-sky ocean radiances for Self- and Cross-Consistency; Validate against CRTM simulations

**SST Community Resources, Support JPSS and GOES-R**



# JPSS Ocean Color NRT Monitoring Tools



## VIIRS Global Ocean Color Composite Images

1. Select product, region, month, year



### Viewer option

VIIRS: Chlorophyll-a MODIS: Chlorophyll-a Region: Global October 2014 < > [Return to EDR Team Home](#)

- Chlorophyll-a
- nLw(410)
- nLw(443)
- nLw(486)
- nLw(551)
- nLw(671)
- Kd(490)
- Experimental:*
- PAR
- a(443)
- aph(443)
- adg(443)
- bb(443)
- bbp(443)
- a(551)
- bb(551)

CLM	MON	TUE	WED	THU	FRI	SAT

MSL12-SWIR						
CLM	MON	TUE	WED	THU	FRI	SAT

MSL12-BMW						
CLM	MON	TUE	WED	THU	FRI	SAT

IDPS						
CLM	MON	TUE	WED	THU	FRI	SAT

MODIS-AQUA						
CLM	MON	TUE	WED	THU	FRI	SAT

**Colorbars1**

Chlorophyll-a

nL<sub>w</sub>(410)

nL<sub>w</sub>(443)

nL<sub>w</sub>(486)

nL<sub>w</sub>(551)

nL<sub>w</sub>(671)

K<sub>d</sub>(490)

**Colorbars2**

PAR

a(443)

a<sub>ph</sub>(443)

a<sub>dg</sub>(443)

b<sub>b</sub>(443)

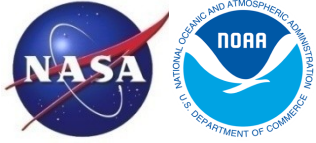
b<sub>bp</sub>(443)

a(551)

b<sub>b</sub>(551)

Colorbar for reference

2. Click on the calendars



# EDR LTM Monitoring Tools Example: Aerosol



- **Maps of aerosol products**

- global

- daily EDR (web-based, currently private)

- gridded daily EDR (web-based, public)

([http://www.star.nesdis.noaa.gov/smcd/emb/viirs\\_aerosol/products\\_gridded.php](http://www.star.nesdis.noaa.gov/smcd/emb/viirs_aerosol/products_gridded.php))

- gridded monthly EDR (web-based, currently private)

- granule EDR and IP – offline; can be downloaded from

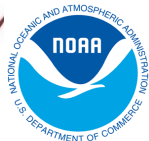
([http://www.star.nesdis.noaa.gov/smcd/emb/viirs\\_aerosol/software\\_vii\\_rs\\_aer\\_granule.php](http://www.star.nesdis.noaa.gov/smcd/emb/viirs_aerosol/software_vii_rs_aer_granule.php))

- IDEA (web-based, public)

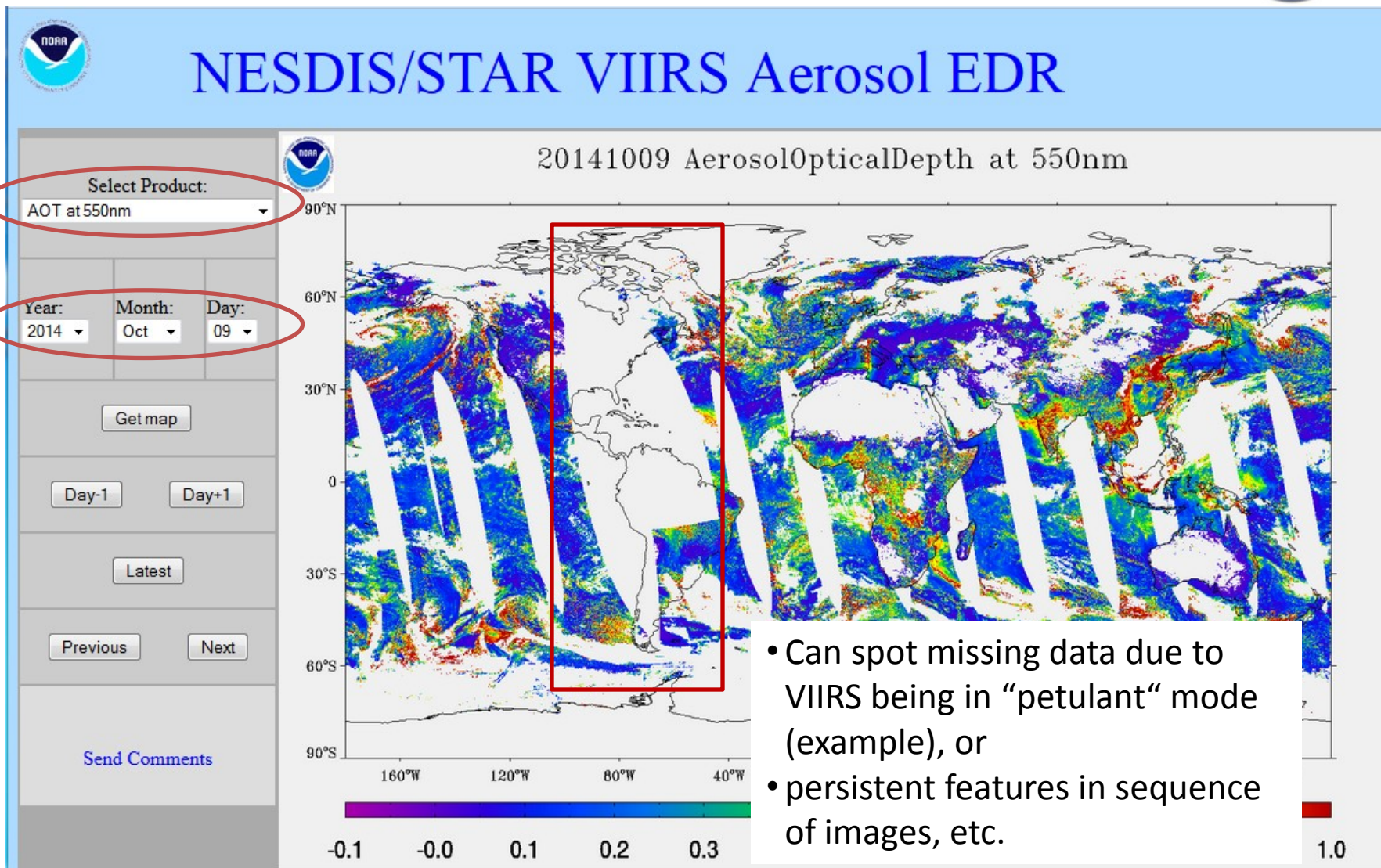
(<http://www.star.nesdis.noaa.gov/smcd/spb/aq/> )

- **Time series**

- six sites (web-based, currently private)



# Monitoring Tools – Map of Daily EDR



## NESDIS/STAR VIIRS Aerosol EDR

**Select Product:**  
AOT at 550nm

Year: 2014    Month: Oct    Day: 09

Get map

Day-1    Day+1

Latest

Previous    Next

**Select Product:**

- AOT at 550nm
- High QF AOT at 550nm
- AOT at 550nm**
- QF AOT Quality
- QF AOT Out of Range
- High QF AE
- AE
- Small Mode Fraction
- QF AE Quality
- QF AE Out of Range
- QF AE Exclusion
- QF Cloud Contamination
- QF Cloud Adjacent
- QF Cloud Shadow
- QF Cirrus Contamination
- QF Fire
- QF Snow/Ice
- QF Sunlint
- QF Land/Ocean
- QF Bad Sdr
- QF Bright\_Sfc/Shallow/Turbid

Previous    Next

**Select Product:**

- AOT at 550nm
- QF Snow/Ice
- QF Sunlint
- QF Land/Ocean
- QF Bad Sdr
- QF Bright\_Sfc/Shallow/Turbid
- QF LowSun 65 < SZA <= 80
- QF LowSun SZA > 80
- QF Land Aerosol Model index
- QF Ocean Large Mode Model
- QF Ocean Small Mode Model
- AOT at 412nm
- AOT at 445nm
- AOT at 488nm
- AOT at 555nm**
- AOT at 672nm
- AOT at 746nm
- AOT at 865nm
- AOT at 1240nm
- AOT at 1610nm
- AOT at 2250nm

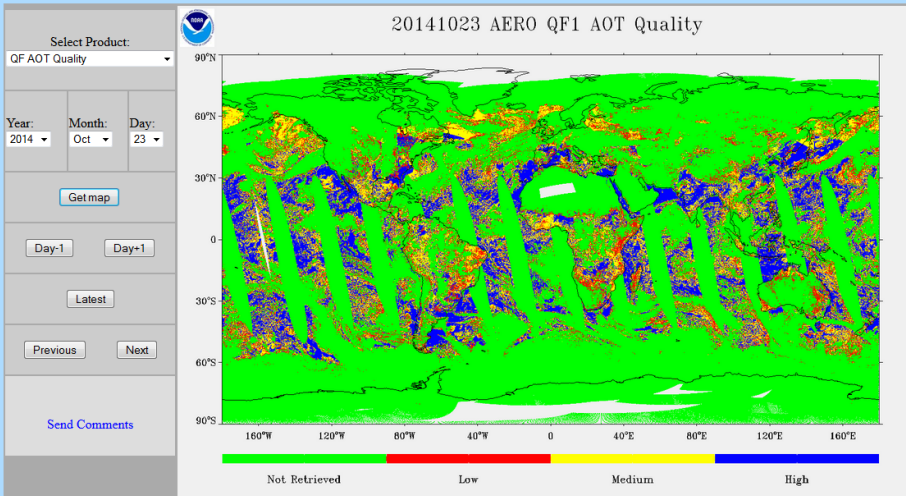
Previous    Next

Large number of parameters can be visualized and monitored.

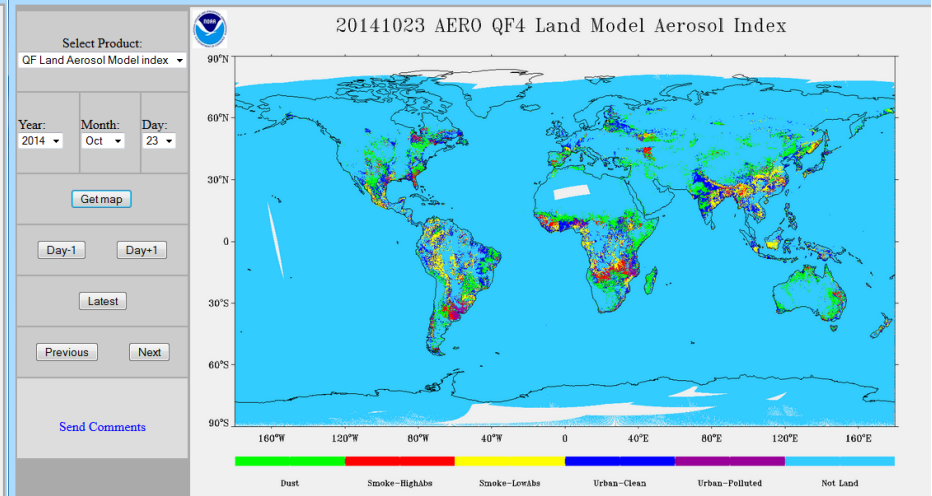
# Monitoring Tools

## Map of Daily EDR - Examples

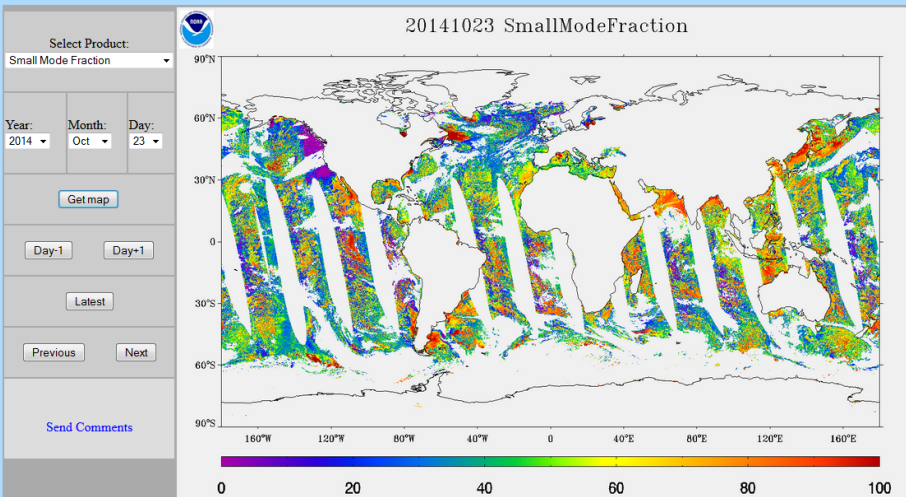
NESDIS/STAR VIIRS Aerosol EDR



NESDIS/STAR VIIRS Aerosol EDR



NESDIS/STAR VIIRS Aerosol EDR

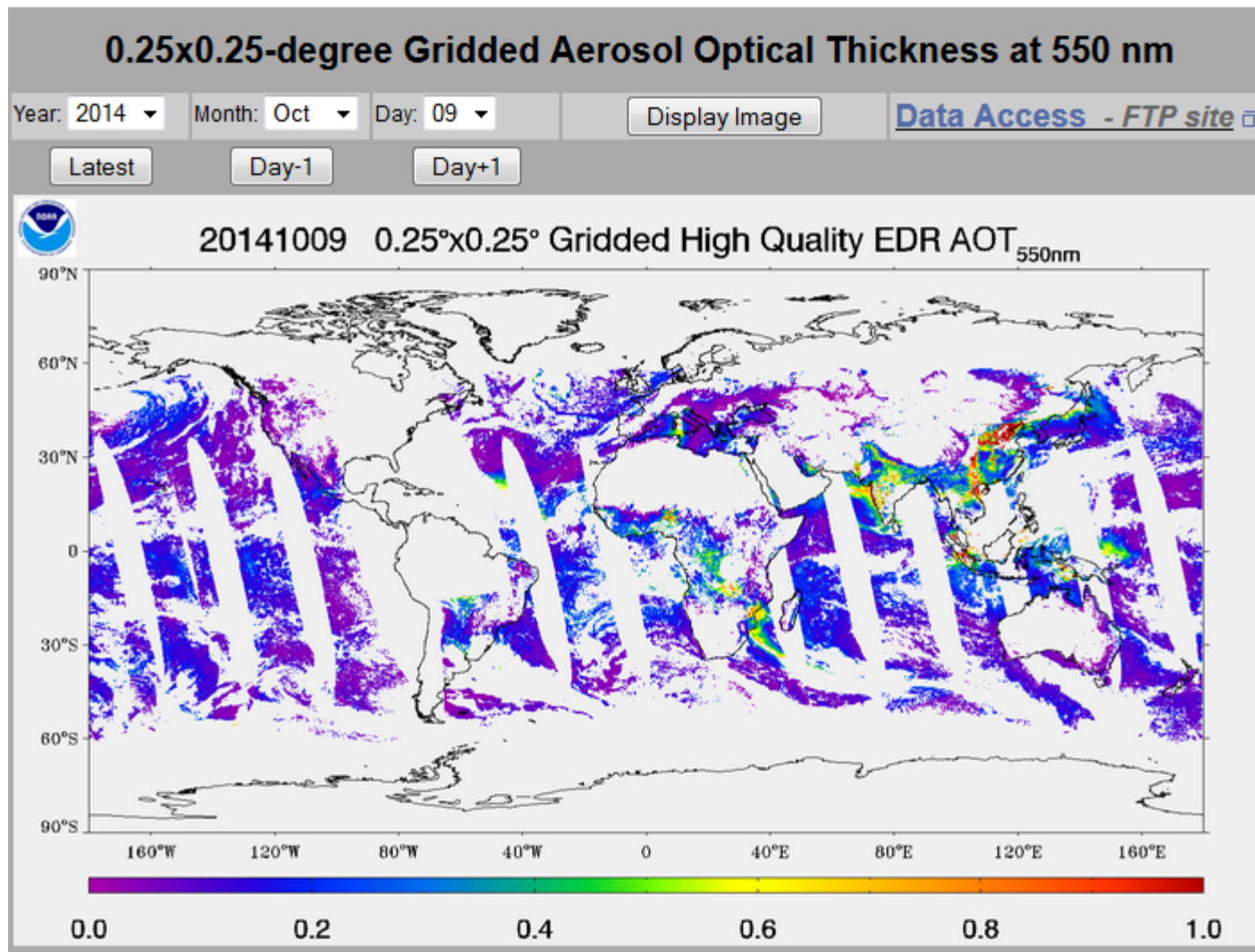


- By comparing maps of different parameters and quality flags problems can be spotted, consistencies can be checked.

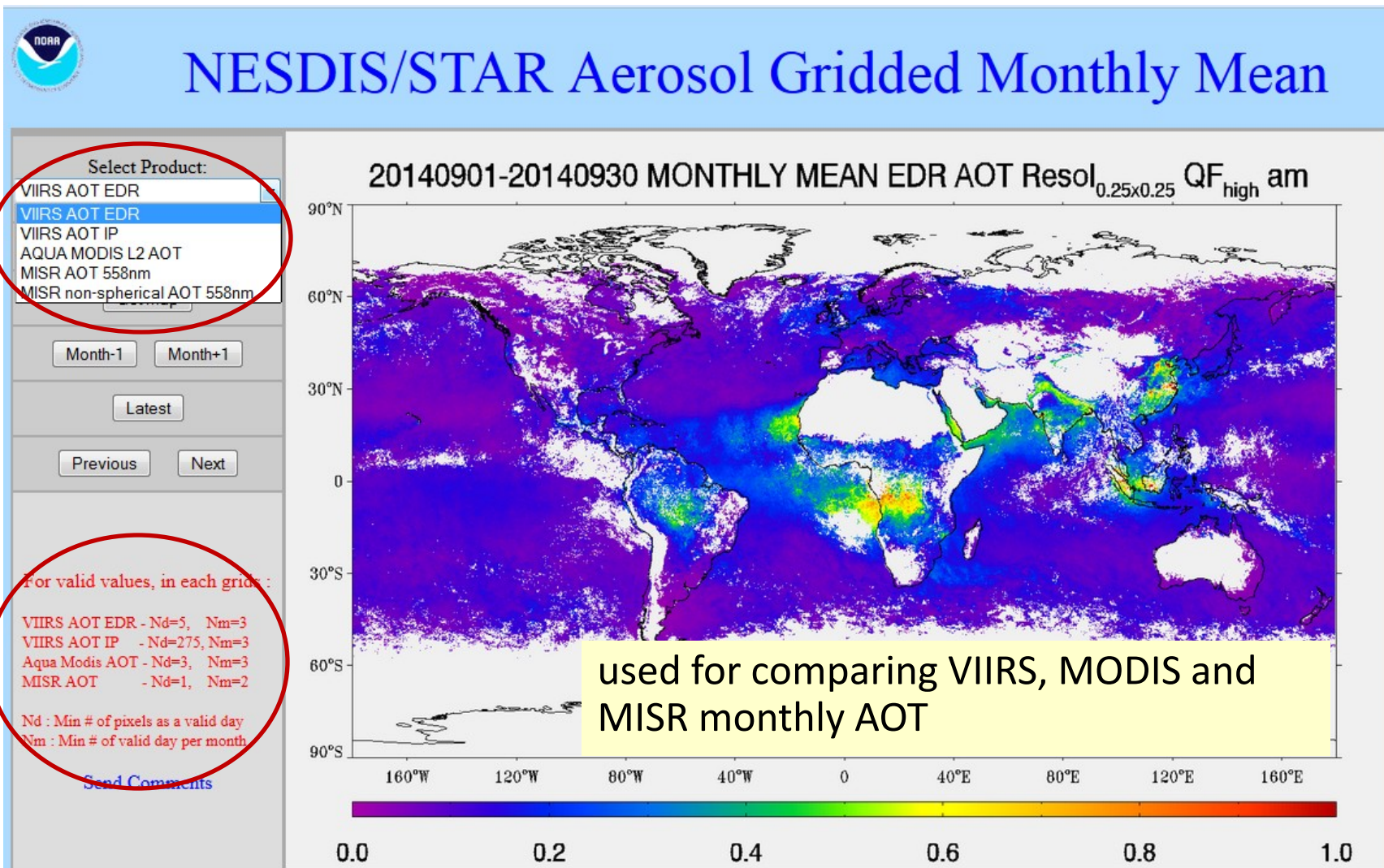


# Monitoring Tools

## Map of Daily Gridded EDR



- designed primarily for users who prefer gridded data
- can also be used for monitoring
- displays only high quality EDR AOT at 550 nm



# Granule Visualization Tool

Combination Plot Selection

Select Variable: Aerosol Optical Thickness (IP) at 550nm

AND/OR

Select Quality Flag: IP AOT Quality

- AOT/APSP EDR Quality Flag
- Suspended Matter EDR Quality Flag
- AOT IP Quality Flag
- Cloud Mask IP Quality Flag

IP AOT Quality: High, Degraded, Excluded, Not Produced

Parameters can be filtered by quality flags in a Combination Plot

By clicking inside the map numerical values of large number of parameters can be explored for single pixels.

VIIRS Aerosol Granule Visualization

Granule File Display Options Values

VAOOO\_npp\_d20140717\_t1201390\_e1203031\_b14090\_c2014071720105065

Aerosol Optical Thickness at 550nm

2014.07.17 NPP000862704

Pixel Retrieval Values

Save

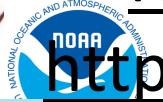
Click and move cursor over image to show pixel values

VIIRS Retrievals

- EDR Longitude: 0.89
- EDR Latitude: 43.73
- Aerosol Optical Thickness at 550nm: 0.197583
- Solar Zenith Angle [Degree]: 22.5770
- Satellite Zenith Angle [Degree]: 56.6254
- Solar Azimuth Angle [Degree]: -179.397
- Satellite Azimuth Angle [Degree]: 68.8269
- Surface Height [m]: 159.336
- Relative Azimuth Angle [Degree]: 111.176
- Scattering Angle [Degree]: 113.087
- Angstrom Exponent: 0.630305
- Fine Mode Fraction (Over Ocean): NaN
- Aerosol Optical Thickness at 412nm: 0.245761
- Aerosol Optical Thickness at 445nm: 0.231452
- Aerosol Optical Thickness at 489nm: 0.215545
- Aerosol Optical Thickness at 555nm: 0.197583
- Aerosol Optical Thickness at 672nm: 0.176095
- Aerosol Optical Thickness at 746nm: 0.168877
- Aerosol Optical Thickness at 865nm: 0.162330
- Aerosol Optical Thickness at 1240nm: 0.158373
- Aerosol Optical Thickness at 1610nm: 0.157294
- Aerosol Optical Thickness at 2250nm: 0.146550
- AOT Product Quality: High
- Angstrom Exponent Product Quality: High
- AeroEDR - Land/Ocean: Land
- AOT Out of Range Flag: False
- Angstrom Exponent Out of Range Flag: False
- AeroEDR - Cloud Contamination Flag: False
- AeroEDR - Cloud Adjacent Flag: False
- AeroEDR - Cirrus Contamination Flag: False
- AeroEDR - Bad SDR Flag: False
- AeroEDR - Sun Glint Flag: False
- AeroEDR - Cloud Shadow Flag: False
- AeroEDR - Snow/Ice Flag: False
- AeroEDR - Fire Flag: False
- AeroEDR - Low Sun (65<SZA<=80): False
- AeroEDR - Low Sun (SZA>80): False
- AeroEDR - Bright Land Surface or Turbid Water: False
- AeroEDR - Excluded Angstrom Exponent (AOT550<0.15): False
- Land Model Aerosol Index: Dust
- Small Mode Aerosol Model (Ocean Only): Not Ocean
- Large Mode Aerosol Model (Ocean Only): Not Ocean
- Pixel Longitude: 0.89
- Pixel Latitude: 43.73

# Near Real Time VIIRS AOT from DB Data at

<http://www.star.nesdis.noaa.gov/smcd/spb/aq/>



VIIRS CONUS True Color (RGB) and Aerosol Images

select date

SELECT PLOT

PREVIOUS FORECAST DAY

NEXT FORECAST DAY

select date 20140127 Go

Product Description

select version of AOT and quality flags



zoom in/out

Select AOT & Quality

EDR High

EDR High & Medium

IP High

IP High \*

IP High & Degraded

change RGB/AOT opacity

RGB Opacity

AOD Opacity

Toggle Dust Mask

Toggle Fire Hotspots

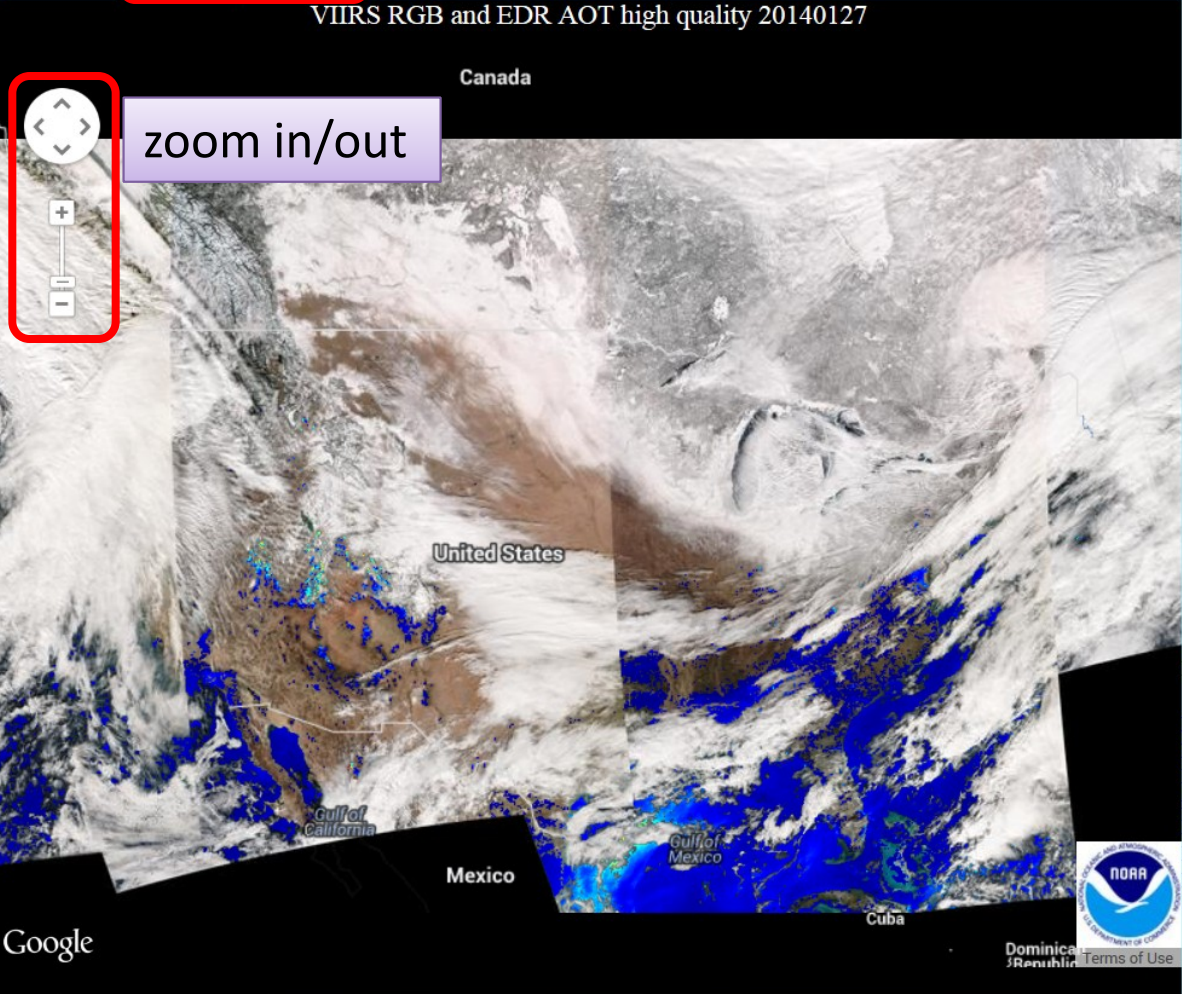
Toggle County

visualization options

Image Files Download:

- RGB
- RGB & EDR AOT (high)
- RGB & EDR AOT (high and medium)
- RGB & IP AOT (high)
- RGB & IP AOT (high\*)
- RGB & IP AOT (high and degraded)

download imagery



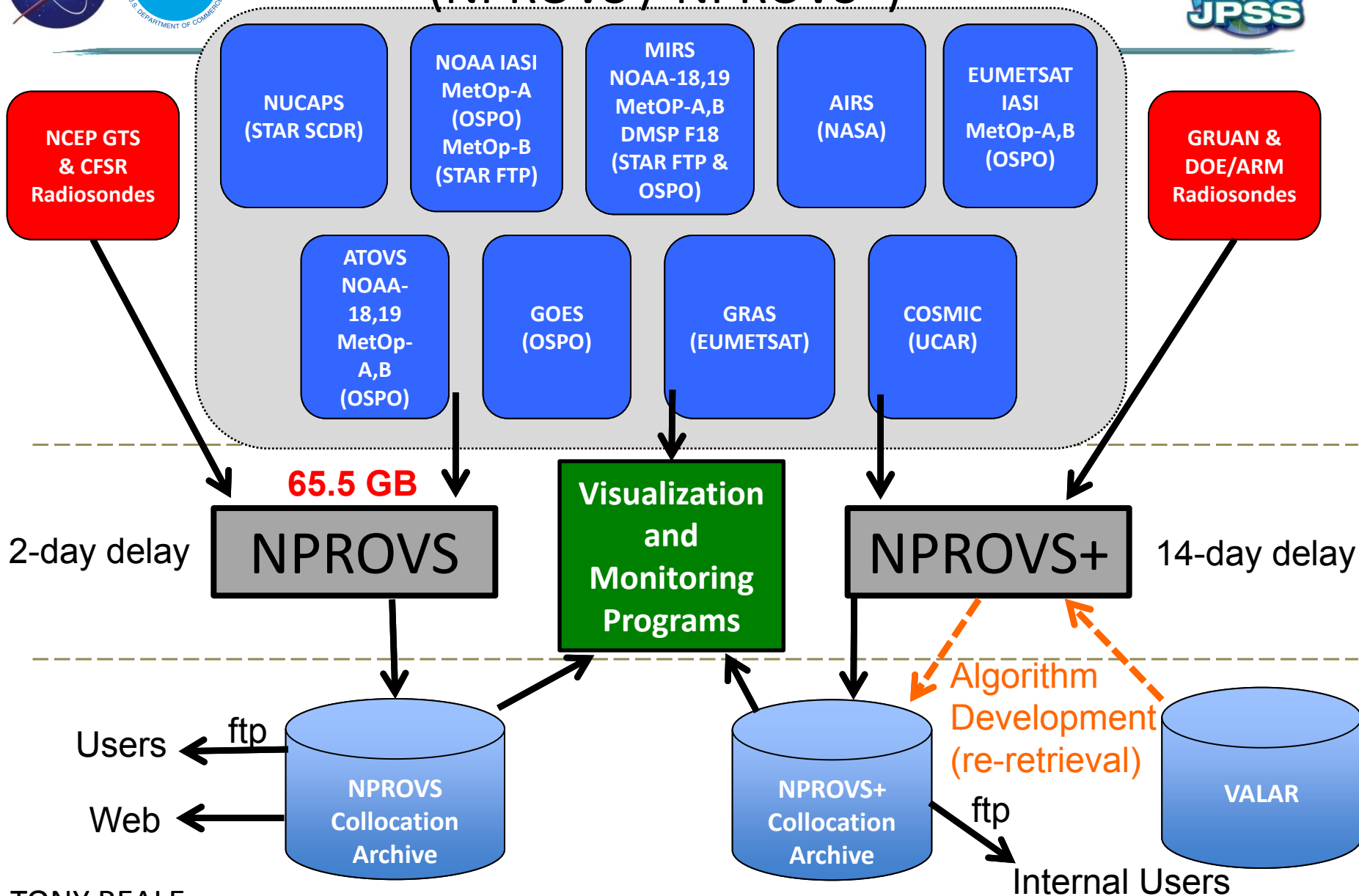
Google



Terms of Use



# NOAA Products Validation System (NPROVS / NPROVS+)

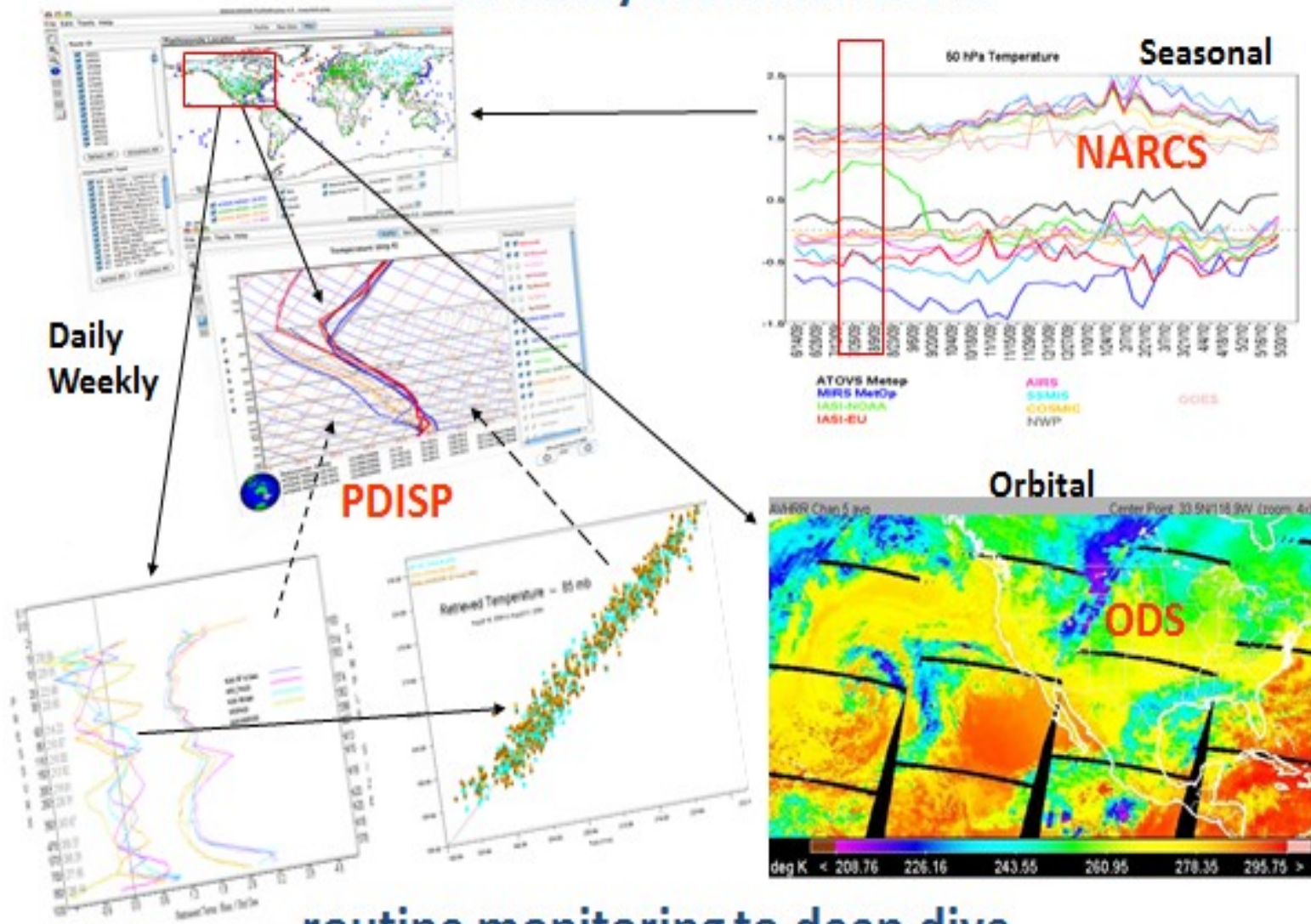




# NOAA Products Validation System (NPROVS / NPROVS+)



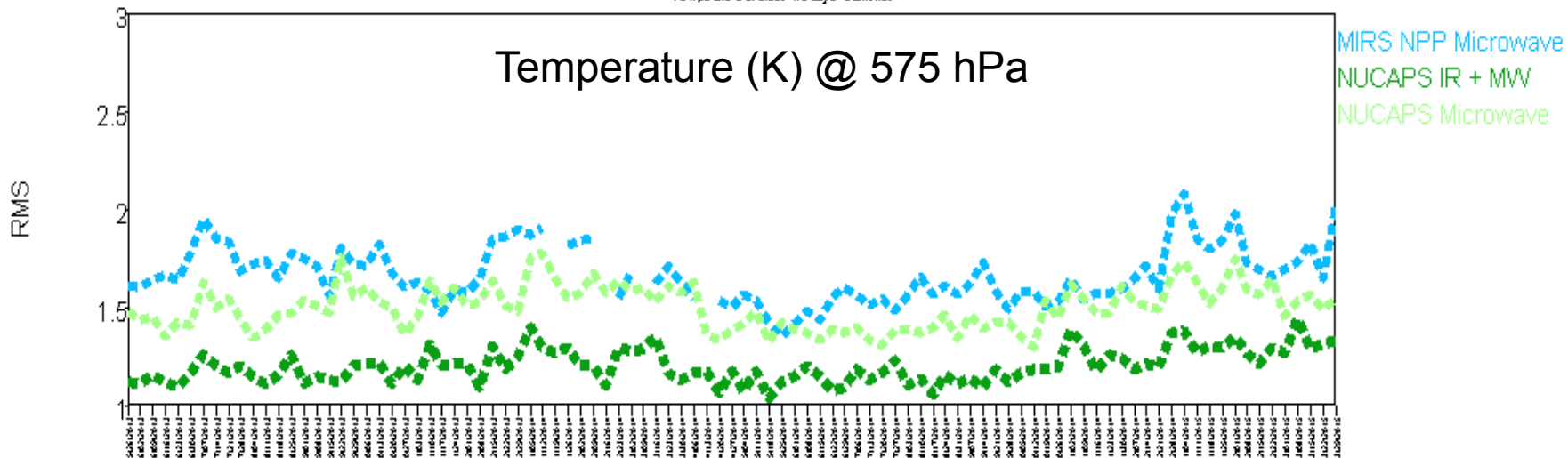
## EDGE Analytical Interface ...



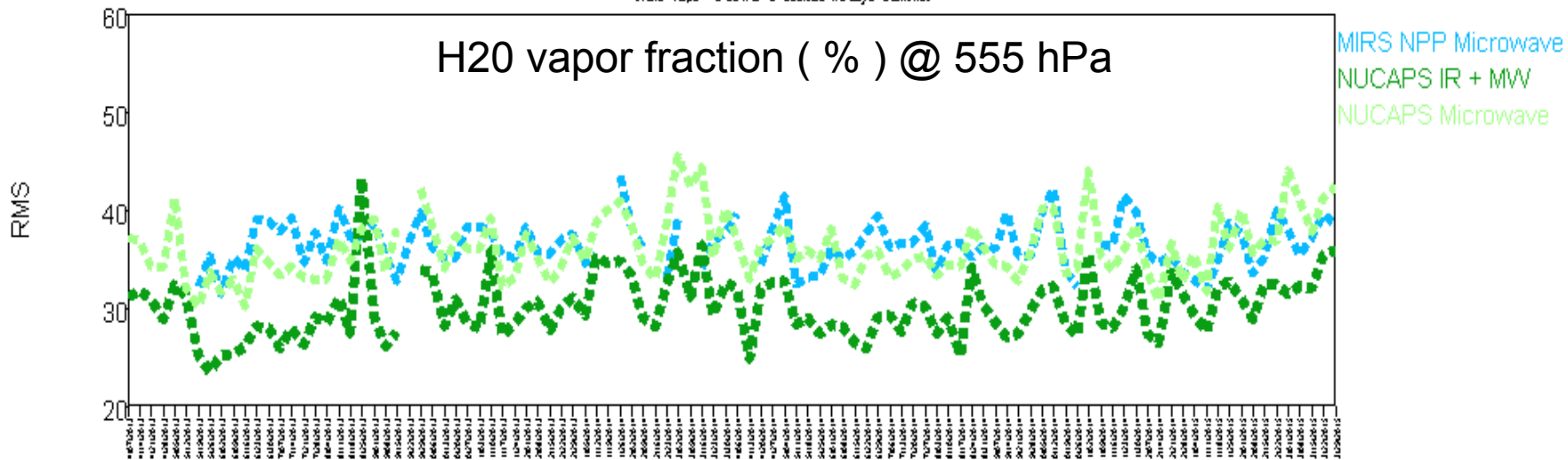
... routine monitoring to deep dive

# NARCS for LTM ... SAT-minus-RAOB

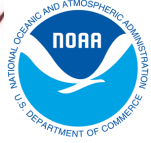
Temperature 575.089 m b Layer Statistics



Water Vapor Percent Error 555.025 m b Layer Statistics



**Maritime ... April 2013 - April 2015**  
(weekly averages)



# Expansion for LST EDR Monitoring Planned



- Develop routine access/integration of ground truth LST target observations (ie SURFRAD) into NPROVS
- Investigate candidate global LST targets (ie GRUAN, BSRN)
- Routinely access/integrate LST EDR from VIIRS (S-NPP) and also from MODIS (NASA-EOS) and GOESR into NPROVS
- Design, develop and demonstrate LTM of LST consistent with guidance from LST EDR developers at STAR
- Coordinate/integrate with (ICVS) monitoring capabilities





# JPSS EDR LTM Path Forward



- Similarly to ICVS SDR monitoring, integrated routine EDR monitoring will be established
- Leverage the heritage of GOES-R and NDE product monitoring system
- Enterprise Development Approach
  - Simple Interface
  - Common Utilities
  - Easy to add more products
  - User friendly
- FY15 Milestones:
  - Design EDR LTM System (July 2015);
  - implement LST/Albedo (possible other EDR products) into the System (Sept 2015)