



***The Land, Atmosphere Near-real-time Capability for EOS  
(LANCE)***

***Earth Science Data and Information System Project (ESDIS)  
Code 423, NASA GSFC***

***Aerosol Observability Workshop***

***April 27-29, 2010***

***Monterey, CA***

***Karen.Michael@nasa.gov***



## ***What is LANCE?***

- LANCE was initiated by the NASA Flight, Research, and Applied Sciences Programs at NASA Headquarters in order to ensure the availability of NASA satellite data products to those partners who have grown to rely upon NASA for data for their decision support systems.
- LANCE will also provide a developmental processing capability for the prototyping of new NRT products and services to encourage the use of NASA technologies by new users.
- LANCE has been implemented with a distributed approach and consists of 4 Near-real-time systems that are managed by ESDIS and developed by the GES DISC, OMI SIPS, MODAPS, and the AMSR-E SIPS
  - AIRS and MLS NRT systems were developed by the GES DISC and the respective science teams and emerged out of post-launch requests from the science teams and did not have formal requirements
  - OMI NRT developed by KNMI and the OMI SIPS was originally planned by the OMI science team prior to Aura launch
  - MODIS and AMSR-E NRT was developed by MODAPS at the request of NASA HQ and emerged from requests based on experience with the existing NOAA NRT (NRTPE) system
  - AMSR-E NRT will be transitioning to the AMSR-E SIPS at GHRC



## ***LANCE Points of Contact***

- ESDIS Project: Karen Michael, [Karen.Michael@nasa.gov](mailto:Karen.Michael@nasa.gov), 301-614-5286  
Kevin Murphy, [Kevin.J.Murphy@nasa.gov](mailto:Kevin.J.Murphy@nasa.gov), 301-614-5580
- MODIS: Ed Masuoka, [Edward.J.Masuoka@nasa.gov](mailto:Edward.J.Masuoka@nasa.gov), 301-614-5515  
Mike Teague, [michael.teague@sigmaspace.com](mailto:michael.teague@sigmaspace.com), 301-385-8398
- MLS, AIRS: Bruce Vollmer, [Bruce.E.Vollmer@nasa.gov](mailto:Bruce.E.Vollmer@nasa.gov), 301-614-5373  
Mike Theobald, [Michael.L.Theobald@nasa.gov](mailto:Michael.L.Theobald@nasa.gov), 301-614-6580
- OMI: Curt Tilmes, [Curt.Tilmes@nasa.gov](mailto:Curt.Tilmes@nasa.gov), 301-614-5534  
Phil Durbin, [pdurbin@sesda2.com](mailto:pdurbin@sesda2.com), 301-352-4673
- AMSR-E: Helen Conover, [HConover@itsc.uah.edu](mailto:HConover@itsc.uah.edu), 256-961-7807  
Kathryn Regner, [kregner@itsc.uah.edu](mailto:kregner@itsc.uah.edu), 256-961-7791



## **LANCE GOALS**

- Gather multiple independent NRT systems under a common umbrella to increase consistency of service
- Deliver products within 3 hours of observation
- Provide high availability
- Increase awareness of the availability of various NRT data sets
- Provide better feedback and metrics to NASA HQ and improve management oversight
- Provide better communications with the user community and the science teams
- Improve the user experience when dealing with the various NRT systems with things like a common website and user registration structure

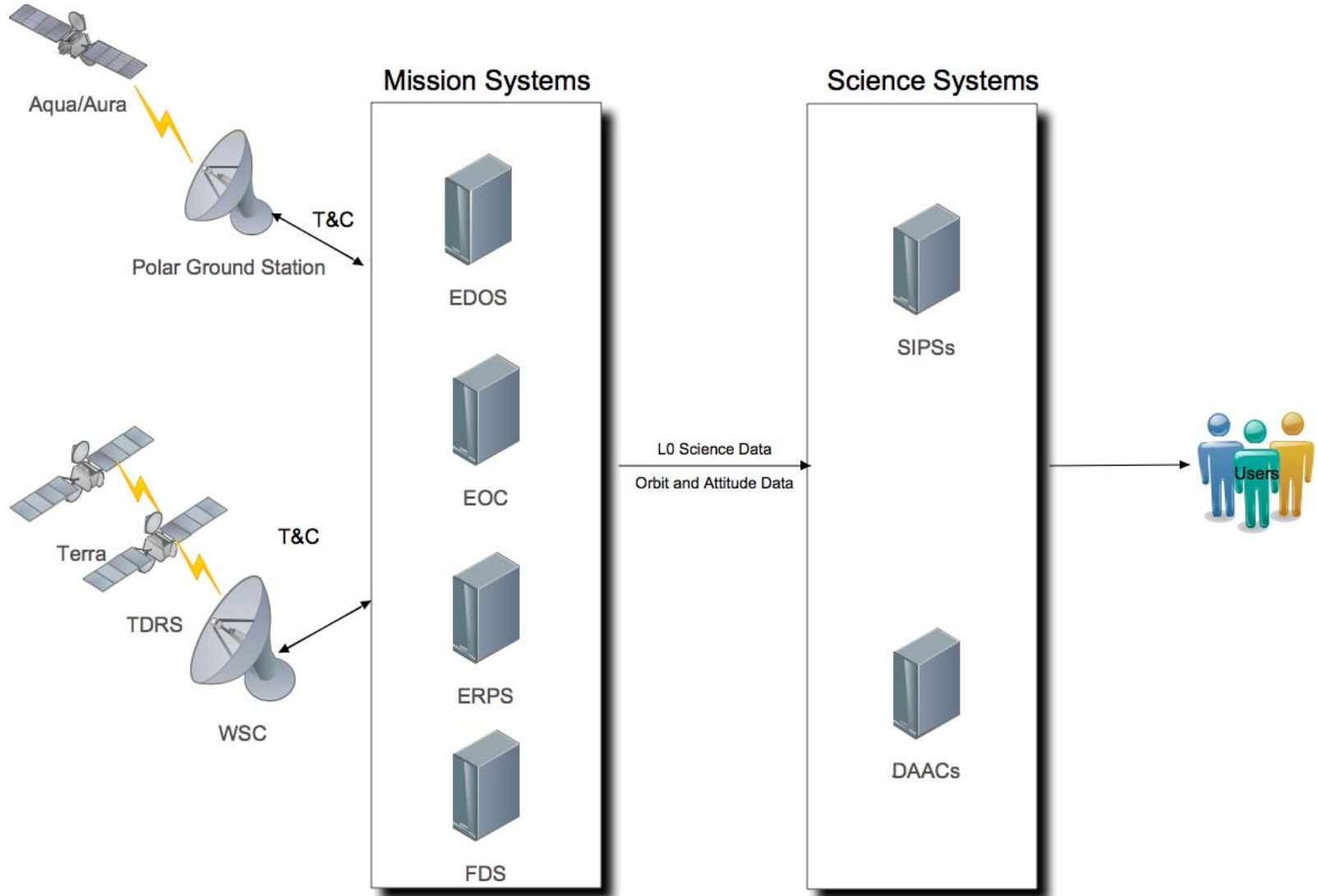


## ***LANCE REQUIREMENTS***

- Provide a 5-7 day rolling archive
- Provide User Registration and User Notifications
- Distinguish NRT products from standard science products
- Provide Subscription Services
- Provide User Services M-F 9am-5pm local time and limited weekend support for special campaigns
- Provide Metrics on latency and distribution
- Support the User Working Group
- Provide a LANCE website which provides ftp pull data access, documents the differences between NRT and standard products, provides FAQ
- Implement system redundancy to provide high availability



# EOS Ground System Architecture





## ***LANCE Overview***

- All LANCE data originates from the Terra, Aqua, and Aura spacecraft.
- Terra provides MODIS data; Aqua provides MODIS, AMSR-E, and AIRS data; Aura provides OMI and MLS data.
- Terra data is down-linked to White Sands, New Mexico via TDRSS
- Aqua and Aura data are down-linked to the Polar Ground Stations (PGS) in Norway and Alaska.
- Data from all three spacecraft are processed by the EOS Data and Operations System (EDOS) to Level 0 and distributed to LANCE in near-real-time typically within 85-130 minutes of observation.
- EDOS generates 2 basic types of products:
  - Contact/Session Based Products (typically used for NRT processing)
    - Rate Buffered Data Sets (RBD)
    - Session Based PDS Data Sets (S-PDS)
  - Time Based Products (typically used for standard science processing)
    - Production Data Sets (PDS)
    - Expedited Data Sets (EDS)

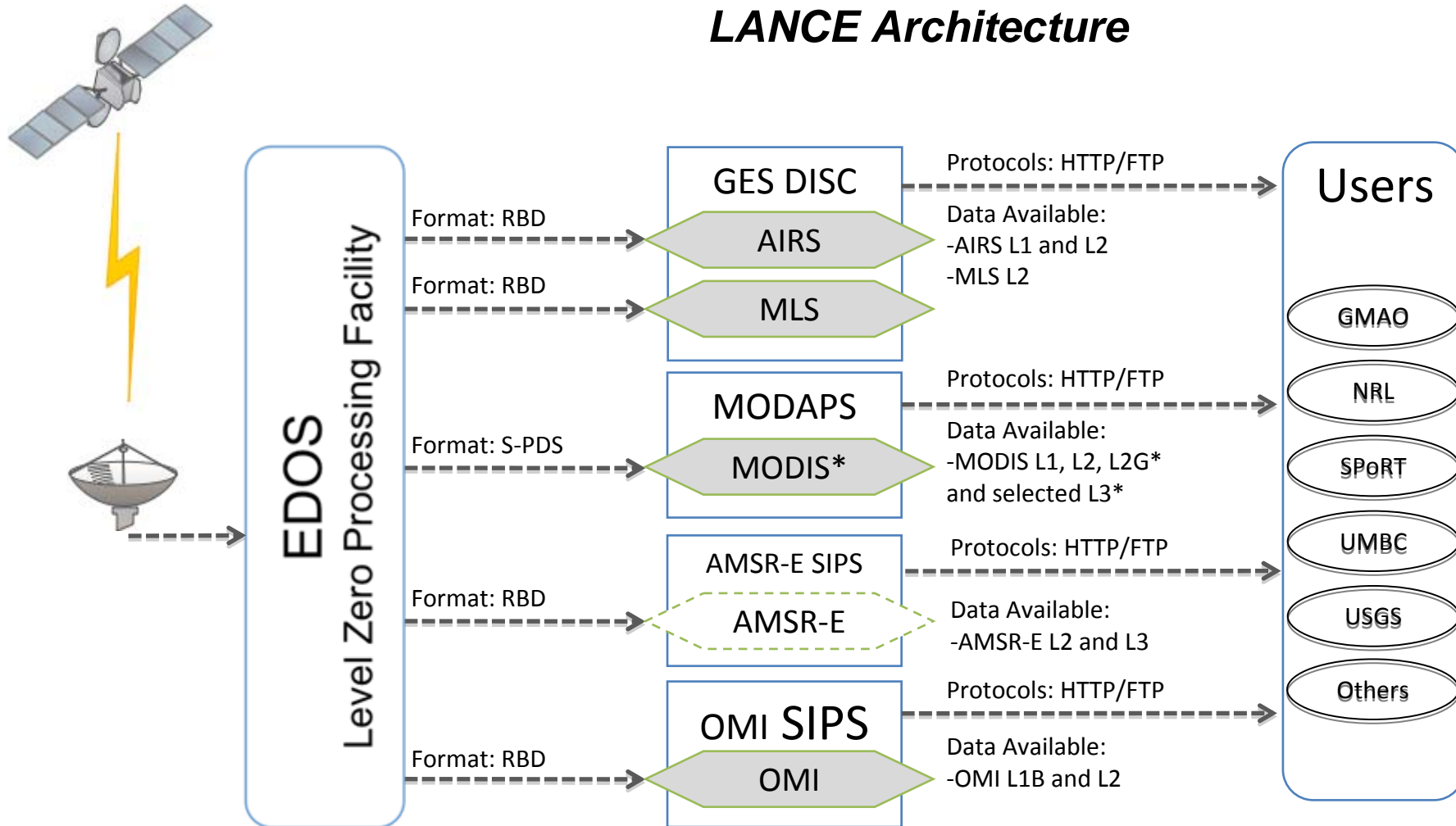


## ***LANCE Overview 2***

- LANCE MODIS (co-located with MODAPS) ingests L0 Data from EDOS and generates MODIS Level 1-Level 3 (LST only) products for distribution to users.
- LANCE AMSR-E (currently co-located with MODAPS) ingests Level 0 Data from EDOS and generates AMSR-E Level 2 products for distribution to users (LANCE AMSR-E is still under development and will be transitioning to the AMSR-E SIPS at GHRC).
- LANCE OMI (co-located with the OMI SIPS) ingests Level 0 data from EDOS and generates OMI Level 2 products for approved users.
- LANCE AIRS and MLS (co-located with the GES DISC) ingests Level 0 data from EDOS.
  - AIRS data is processed to Level 1 & Level 2 and distributed to the AIRS TLSCF (located at JPL) and to users.
  - MLS data is converted to standard science (PDS) format at LANCE and then distributed to the MLS SIPS (located at JPL) where it is processed to Level 2 and sent back to LANCE for distribution to users.


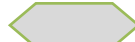


# LANCE Architecture



Observation to availability latency: 30-180 min.

Transfer latency: bandwidth dependent

-  LANCE Element Under Development
-  Operating LANCE Element

RBD: Rate Buffered Data

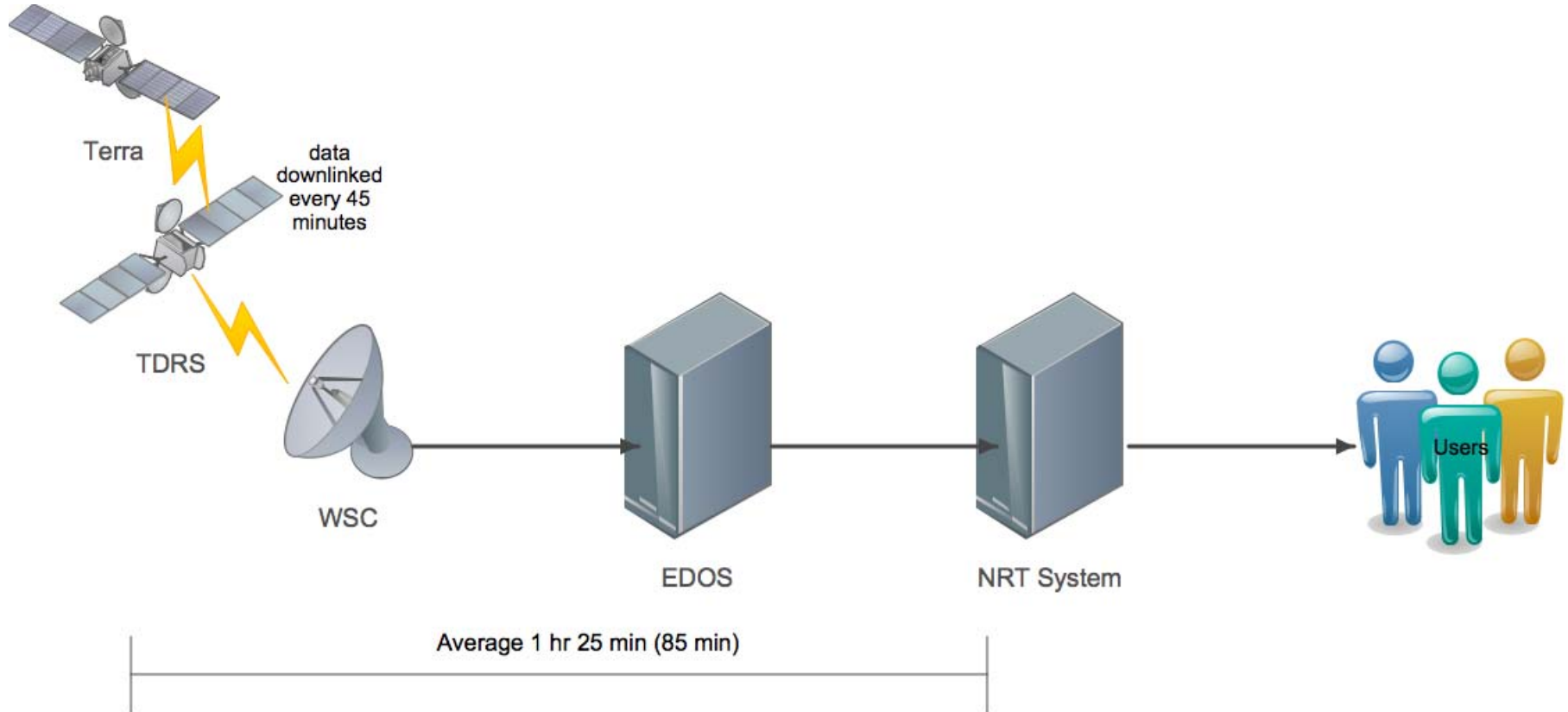
S-PDS: Session Based Production Data Set

\*MODIS L2G and L3 daily products have latency of 27-28 hours. The Climate Modeling Grid (CMG) is the only L3 MODIS product produced by LANCE.



## LANCE Latency for Terra

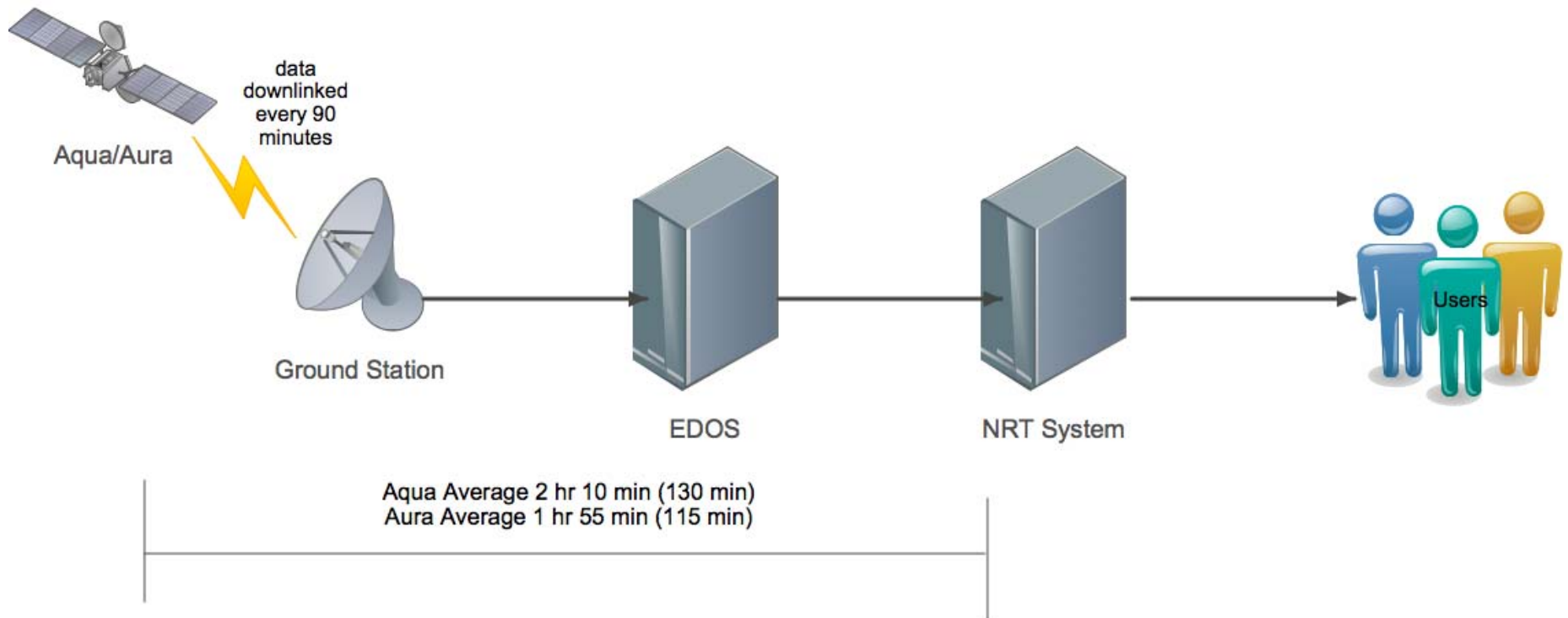
- Since Terra now utilizes two TDRSS contacts per orbit, downlinks are more frequent and latency is less than for Aqua or Aura.





## LANCE Latency for Aqua/Aura

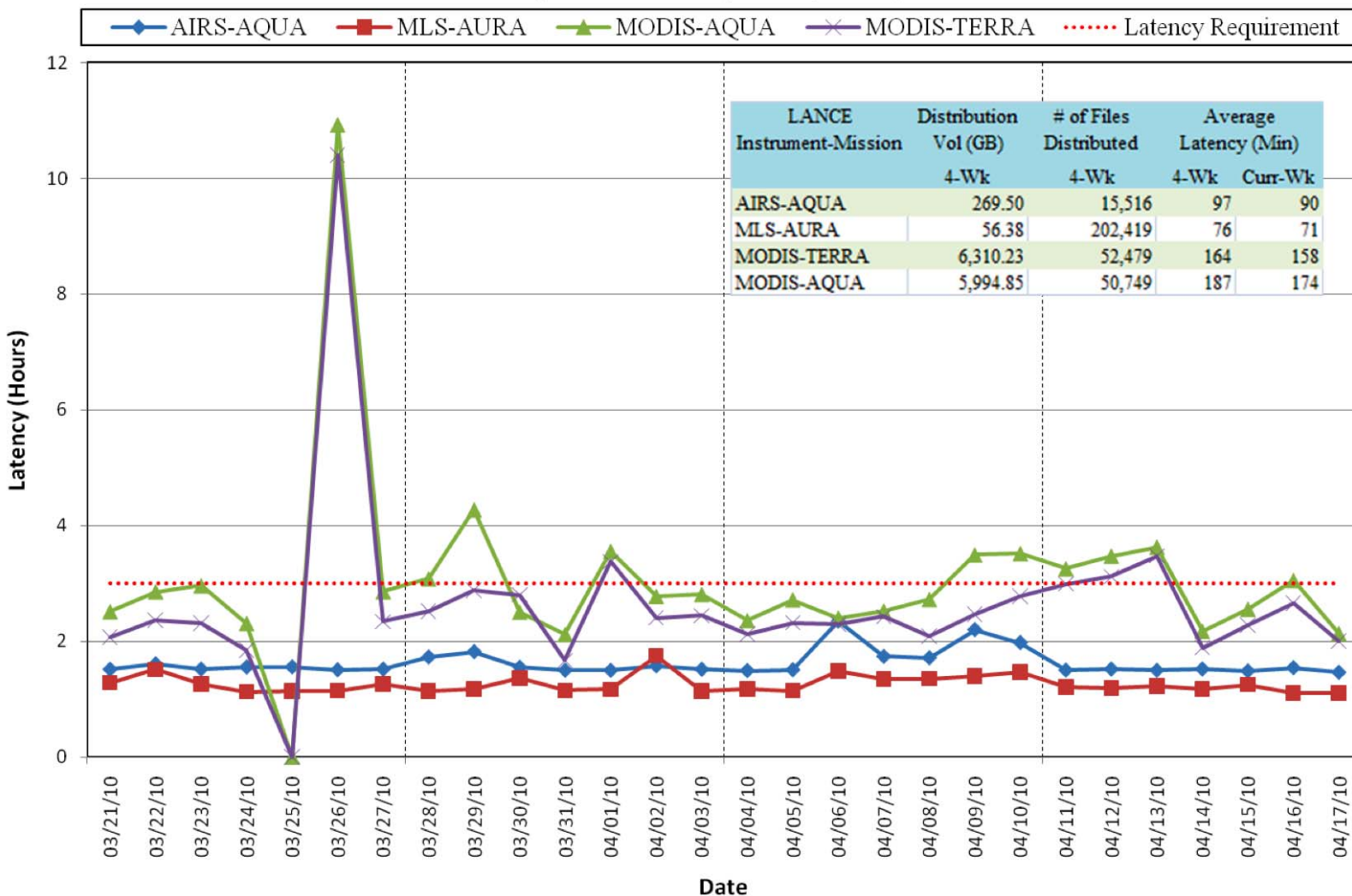
- Aqua and Aura use the Polar Ground Stations in Alaska and Norway to downlink data which introduces more latency than for Terra since contacts are less frequent.





# LANCE LATENCY METRICS

**Four Week LANCE-Wide Latency and Distribution Trend for Orbital Products**  
(March 21 - April 17, 2010)





## ***LANCE What's New? and Near Term Plans***

- LANCE central website is available and further development continues
- Interim User Registration is underway at LANCE MODIS now and will be in place at all the other LANCE elements this year
  - Will allow us to identify who our users are and inform them of system changes or any planned or unanticipated downtime
- System Redundancy will be enabled at all LANCE elements this year (including dual feeds of L0 data from EDOS for MODIS, OMI, AMSR-E)
- LANCE MODIS
  - Land Surface Temperature products will be available by July (both cloud-cleared and non-cleared)
  - Parameter sub-setting, geographic sub-setting, band sub-setting, re-projection, mosaicing, masking, GeoTiff and NetCDF formats will be available this year. Web Coverage Server will be added early next year that will obviate the need for the user to specify their requirements in advance.
  - The Rapid Response system functionality will be transferred to the LANCE-MODIS system this year and a Web Mapping Service and Google Earth capability will be added early next year
  - Collection 5, 6 algorithm succession plan in place. Collection 5 and Collection 6 will be made available in parallel until all the Collection 5 data has been reprocessed.



## ***LANCE What's New? and Near Term Plans***

- **LANCE AIRS/MLS**

- AIRS L1B channel subsets are available in BUFR
- Data quality of AIRS L2 has been improved using NOAA/NCEP Global Forecast System (GFS) in place of static background climatology
- System redundancy in place for processing and distribution

- **LANCE OMI**

- OMI NRT products to be made available through LANCE to registered users soon including OMT03 (Total Column Ozone) and OMSO2 (Sulphur Dioxide)

- **LANCE AMSR-E**

- Contract initiated to implement LANCE at the AMSR-E SIPS at GHRC (Co-location with the AMSR-E SIPS, SCF; well established relationships with the AMSR-E Science Team. The AMSR-E SIPS currently produces the L2 & L3 standard products.)
- Hardware procurement is underway
- NRT code compiled and linked on temporary platform
- Plans to implement initial AMSR-E NRT capability equivalent to NOAA & MODAPS this year



# LANCE Data Access

---

- **LANCE Central Website (under development)**
  - URL: <http://lance.nasa.gov>
- **LANCE-MODIS Web Site (and temporary access to AMSR-E)**
  - URL: <http://LANCE-MODIS.eosdis.nasa.gov>
  - Access through the LANCE central website will be available to registered users in May
- **LANCE-AIRS,MLS Web Site**
  - URL: <http://disc.gsfc.nasa.gov/nrt>
  - Access through the LANCE central website will be available in June to registered users
- **LANCE-OMI**
  - Currently OMI NRT data is only available to users via subscription based on approval from the OMI Science Advisory Board
  - Access through the LANCE central website will be available in May to registered users
- **LANCE-AMSR-E (at MSFC)**
  - Access through the LANCE central website will be available in July to registered users



# MODIS Products for LANCE

Short-name	PGE Description	Product Description
MxD01	L1A Raw Radiances and Geolocation	MODIS Raw Radiances in Counts 5-Min L1A Swath
MxD03	L1A Raw Radiances and Geolocation	MODIS Geolocation Fields 5-Min Swath, 1km
MxD021KM	L1B Calibration	MODIS Calibrated Radiances 5-Min L1B Swath 1km
MxD02HKM	L1B Calibration	MODIS Calibrated Radiances 5-Min L1B Swath 500m
MxD02QKM	L1B Calibration	MODIS Calibrated Radiances 5-Min L1B Swath 250m
MxD07_L2	L2 Cloud Masks/Atmospheric Profiles	MODIS Temperature and Water Vapor Profiles 5-Min L2
MxD35_L2	L2 Cloud Masks/Atmospheric Profiles	MODIS Cloud Mask and Spectral Test Results 5-Min L2
MxD04_L2	L2 Atmosphere	MODIS Aerosol 5-Min L2 Swath 10km
MxD05_L2	L2 Atmosphere	MODIS Total Precipitable Water Vapor 5-Min L2 Swath 1km
MxD06_L2	L2 Clouds	MODIS Clouds 5-Min L2 Swath 1km and 5km
MxD10_L2	L2 Snow Cover	MODIS Snow Cover 5-Min L2 Swath 500m
MxD10L2C	L2 Snow Cover	MODIS Coarse Snow Cover 5-Min L2 Swath 5km
MxD29	L2 Sea Ice	MODIS Sea Ice Extent 5-Min L2 Swath 1km
MxD29L2C	L2 Sea Ice	MODIS Coarse Sea Ice Extent 5-Min L2 Swath 5km





# MODIS Products for LANCE

Short-name	PGE Description	Product Description
MxD09	Land Surface Reflectance	MODIS Surface Reflectance 5-Min L2 Swath 250m, 500m and 1km
MOD09CMA/MOD09CMG	L3 Daily Land Surface Reflectance	MODIS Surface Reflectance L3 5-min Tile Climate Modeling Grid
MxD09GST/GHK/GQK	L2G Land Surface Reflectance	MODIS L2G Daily, tiled 1km/500m/250m surface reflectance
MxD09GA/GQ	L2G Land Surface Reflectance	MODIS Light L2G Daily, tiled 500m and 1km/250m
MxDTBGD	L2G Land Surface Reflectance	MODIS L2G Daily, tiled daytime thermal bands 1km
MxD14	L2 Thermal Anomalies/Fire	MODIS Thermal Anomalies/Fire 5-Min L2 Swath 1km
MxD00F	Session-Based L0 PDS file splitter	Session-Based L0 PDS file, 5-min Swath
MxD00S	Session-Based L0 PDS	Original Session-Based L0 file from EDOS
MxD02SSH	L1B Calibration	5 km subsampled L1B
MYDGB0	Aqua Attitude and Ephemeris	Aqua Attitude and Ephemeris in Session L0 format



# AMSR-E Products for LANCE

**\*\* Currently Available, ^^ Not intended for NRT distribution**

Short-name	Product Description
AMSREL1A ^^	AMSR-E/Aqua L1A Raw Observation Counts (not distributed)
AMSREL1B ^^	AMSR-E/Aqua L1B Global Brightness Temperatures (not distributed)
AE_L2A **	AMSR-E/Aqua L2A Global Swath Spatially-Resampled Brightness Temperatures (Tb)
AE_Land **	AMSR-E/Aqua L2B Surface Soil Moisture, Ancillary Parm, & QC EASE-Grids
AE_Land3	AMSR-E/Aqua Daily L3 Surface Soil Moisture, Interpretive Parm, & QC EASE-Grids
AE_Rain **	AMSR-E/Aqua L2B Global Swath Rain Rate/Type GSFC Profiling Algorithm
AE_Ocean **	AMSR-E/Aqua L2B Global Swath Ocean Products derived from Wentz Algorithm
AE_DyOcn	AMSR-E/Aqua Daily L3 Global Ascending/Descending .25x.25 deg Ocean Grids
AE_DySno	AMSR-E/Aqua Daily L3 Global Snow Water Equivalent EASE-Grids
AE_SI6	AMSR-E/Aqua Daily L3 6.25 km 89 GHz Brightness Temperature (Tb) Polar Grids
AE_SI12	AMSR-E/Aqua Daily L3 12.5 km Tb, Sea Ice Conc., & Snow Depth Polar Grids
AE_SI25	AMSR-E/Aqua Daily L3 25 km Tb, Sea Ice Temperature, & Sea Ice Conc. Polar Grids



# AIRS, MLS Products for LANCE

<b>AIRABRAD_NRT</b>	<b>Aqua/AIRS Level 1B AMSU-A1 and AMSU-A2 Combined Geolocated and Calibrated Brightness Temperatures</b>
<b>AIRIBQAP_NRT</b>	<b>Aqua/AIRS Level 1B Infrared (IR) Quality Assurance Subset</b>
<b>AIRIBRAD_NRT</b>	<b>Aqua/AIRS Level 1B Infrared (IR) Geolocated and Calibrated Radiances</b>
<b>AIRVBQAP_NRT</b>	<b>Aqua/AIRS Level 1B Visible/Near Infrared (VIS/NIR) Quality Assurance Subset</b>
<b>AIRVBRAD_NRT</b>	<b>Aqua/AIRS Level 1B Visible/Near Infrared (VIS/NIR) Geolocated and Calibrated Radiances</b>
<b>AIRI2CCF_NRT</b>	<b>Aqua/AIRS FINAL AIRS Level 2 Cloud Clear Radiance Product</b>
<b>AIRX2RET_NRT</b>	<b>Aqua/AIRS Level 2 Standard Final Retrieval Product</b>
<b>AIRX2SUP_NRT</b>	<b>Aqua/AIRS Level 2 Support Product</b>
<b>AIRIBRAD_NRT_BUFR</b>	<b>324 channel subset of L1B geolocated radiances in BUFR format</b>
<b>PM1EPHND_NRT</b>	<b>Preprocessed Aqua Platform Definitive Ephemeris Data from FDS in Native format</b>
<b>PM1ATTNR_NRT</b>	<b>Preprocessed Aqua Platform Refined Attitude Data in Native format</b>
<b>ML2O3_NRT</b>	<b>Aura/MLS L2 Ozone (O3) Mixing Ratio</b>
<b>ML2T_NRT</b>	<b>Aura/MLS L2 Temperature</b>
<b>AURATTN_NRT</b>	<b>Preprocessed Aura platform attitude product</b>
<b>AUREPHMN_NRT</b>	<b>Preprocessed Aura platform ephemeris product</b>

<sup>1</sup>All datatypes appended with \_NRT to denote difference from production datatypes



## OMI NRT Products

**\*\* Initial release for NRT, ^^Not intended for NRT distribution**

<b>Short Name</b>	<b>Description</b>
OML1BRUG ^^	OMI Geolocated Earth Radiances for 716 UV Channels (264-383 nm)
OML1BRVG ^^	OMI Geolocated Earth Radiances for 751 Visible Channels (349 - 504 nm)
OMCLDO2	OMI/Aura Cloud Pressure and Fraction, O2-O2 Absorption Algorithm
OMDOAO3	OMI/Aura Ozone (DOAS Technique) Total Column
OMAERO	OMI/Aura Multi-Wavelength Aerosol Optical Depth and single Scattering Albedo
OMNO2A	OMI/Aura Nitrogen Dioxide Total and Tropospheric Columns (KNMI)
OMCLDRR	OMI/Aura Cloud Pressure and Fraction, Raman Scattering Algorithm
OMTO3 **	OMI/Aura Ozone (TOMS-like Algorithm) Total Column and Aerosol Index
OMSO2 **	OMI/Aura Sulphur Dioxide (SO2) Total Column
OMAERUV	OMI/Aura Near-UV Aerosol Optical Depth and single Scattering Albedo
OMTO3G	OMTO3 Level 2 Daily Gridded product
OMTO3d	OMTO3 Level 3 Daily Gridded product 1x1 degree
OMTO3e	OMTO3 Level 3 Daily Gridded product 1/4x1/4 degree



# Acronyms

---

AIRS	Atmospheric Infrared Sounder
AMSR-E	Advanced Microwave Scanning Radiometer-EOS
APID	Application Process Identifier
BUFR	Binary Universal Form for the Representation of meteorological data
CADU	Channel Access Data Unit
DAAC	Distributed Active Archive Center
EDOS	EOS Data and Operations System
EDS	Expedited Data Sets
EMS	ESDIS Metric System
EOC	EOS Operations Center
EOS	Earth Observing System
ERPS	EOS Real Time Processing System
ESDIS	Earth Science Data and Information System
FAQ	Frequently Asked Questions
FDS	Flight Dynamics System
FTP	File Transfer Protocol
GDAS	NCEP 1-Degree Global Data Assimilation Model
GES DISC	GSFC Earth Sciences Data and Information Services Center
GHRC	Global Hydrology Resource Center
GSFC	Goddard Space Flight Center



# Acronyms

---

KNMI	Royal Dutch Meteorological Institute
L0	Level 0
L1	Level 1
L2	Level 2
L3	Level 3
LAADS	Level 1 and Atmosphere Archive and Distribution System
LANCE	Land, Atmosphere Near-Real-Time Capability for EOS
LDOPE	Land Data Operational Product Evaluation
LSR	Land Surface Reflectance
MLS	Microwave Limb Sounder
MODAPS	MODIS Adaptive Processing System
MODIS	Moderate-Resolution Imaging Spectroradiometer
NISE	Near Real Time SSM/I EASE-Grid Daily Ice Concentration and Snow Extent
NRT	Near Real Time
NRTPE	Near Real Time Processing Effort
NSIDC	National Snow and Ice Data Center
OMI	Ozone Monitoring Instrument
PDR	Product Delivery Record
PDS	Production Data Sets
PGS	Product Generation System



# Acronyms

---

PGS	Polar Ground Station
QA	Quality Assurance
RBD	Rate Buffered Data
REYNSST	NCEP Reynolds Blended SST Weekly Product
S-PDS	Session-based Production Data Sets
SIPS	Science Investigator-led Processing System
SSI&T	Science Software Integration and Test
T&C	Telemetry and Command
TDOPF	Time Dependent Operational Parameter File
TDRSS	Tracking Data Relay Satellite System
TLSCF	Team Led Science Computing Facility
TOAST	Total Ozone Analysis using SBUV/2 and TOVS
USNO	United States Naval Observatory
UWG	User Working Group
WMS	Web Map Service
WSC	White Sands Complex



***Additional LANCE Information and LANCE Product Quality Information***





# Land Browse Products for LANCE-MODIS

Terra

Julian Day		Top-of-the-atmosphere Visible Radiance Bands 1,4,3 (MOD02)	Daily Land Surface Reflectance Bands 1,4,3 (MOD09)	Daily Snow Cover (MOD10_L2)	Daily Daytime Active Fire Detection (MOD14)	Daily Daytime Sea Ice (MOD29)	Daily Nighttime Sea Ice Surface Temperature (MOD29)
2009 329	Orbits 11/25						
11/25							
2009 328	Orbits 11/24						
11/24							
2009 327	Orbits 11/23						
11/23							
2009 326	Orbits 11/22						
11/22							
2009 325	Orbits 11/21						
11/21							
2009 324	Orbits 11/20						
11/20							
2009 323	Orbits 11/19						
11/19							
Julian Day		Top-of-the-atmosphere Visible Radiance Bands 1,4,3 (MOD02)	Daily Land Surface Reflectance Bands 1,4,3 (MOD09)	Daily Snow Cover (MOD10_L2)	Daily Daytime Active Fire Detection (MOD14)	Daily Daytime Sea Ice (MOD29)	Daily Nighttime Sea Ice Surface Temperature (MOD29)





# Atmosphere Browse Products for LANCE-MODIS

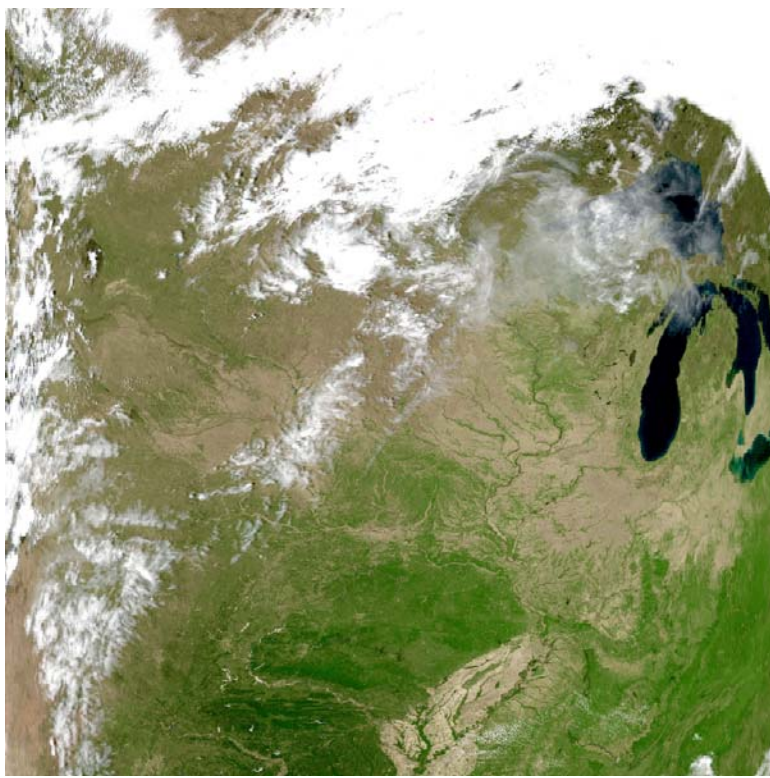
Terra

Julian Day	Orbits	Areosol Optical Depth (MOD04)	Areosol Optical Depth Ratio Small (MOD04)	Cloud Optical Thickness (MOD06)	Cloud Effective Radius (MOD06)	Cloud Top Pressure (MOD06)	Cloud Fraction (MOD06)
2009 335 12/1	Orbits	Not Available	Not Available	Not Available	Not Available	Not Available	Not Available
2009 334 11/30	Orbits						
2009 333 11/29	Orbits						
2009 332 11/28	Orbits						
2009 331 11/27	Orbits						
2009 330 11/26	Orbits						
2009 329 11/25	Orbits						
Julian Day		Areosol Optical Depth (MOD04)	Areosol Optical Depth Ratio Small (MOD04)	Cloud Optical Thickness (MOD06)	Cloud Effective Radius (MOD06)	Cloud Top Pressure (MOD06)	Cloud Fraction (MOD06)

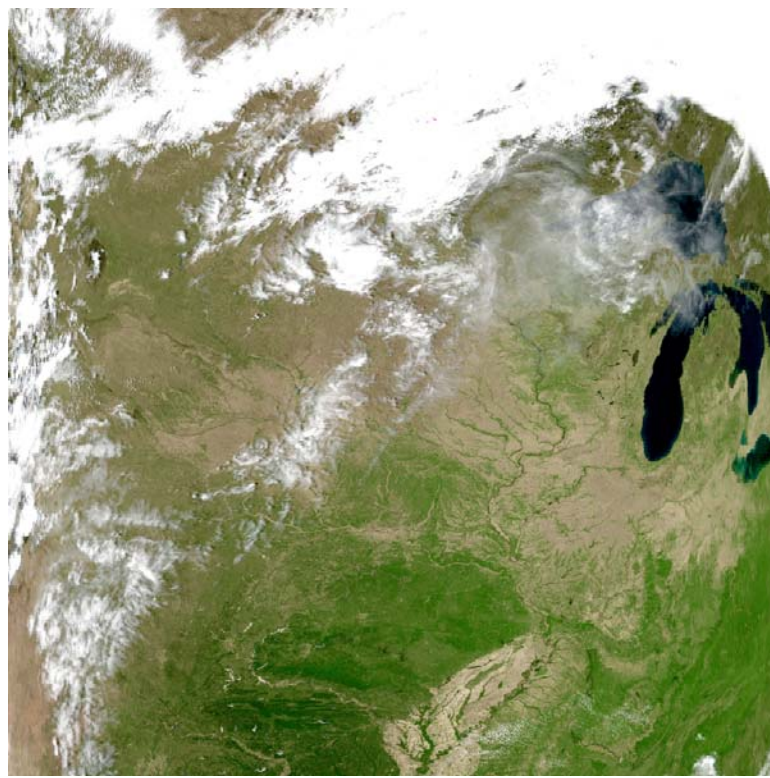




# Comparison of MODIS Standard and NRT Products

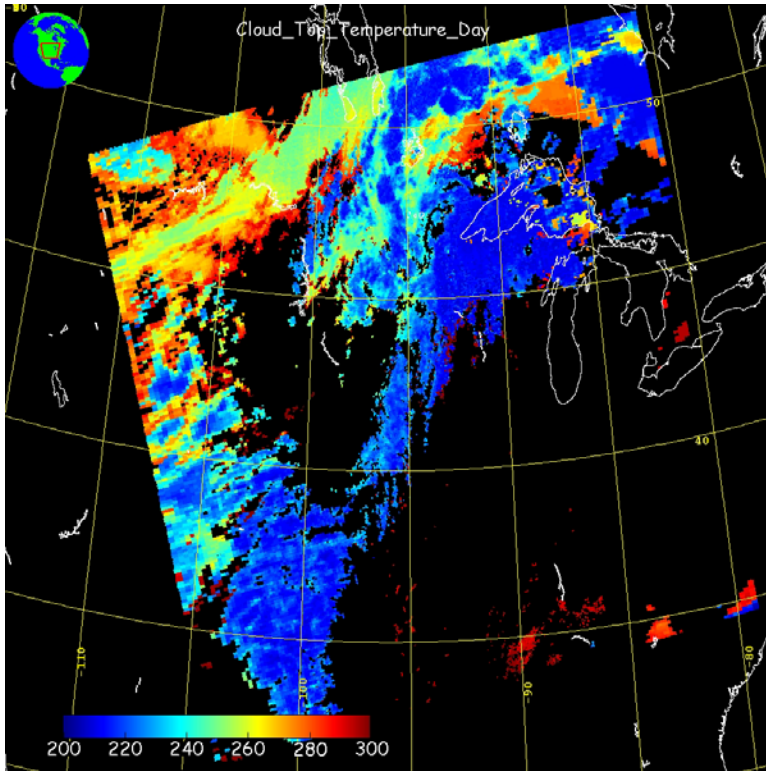


Standard Processing

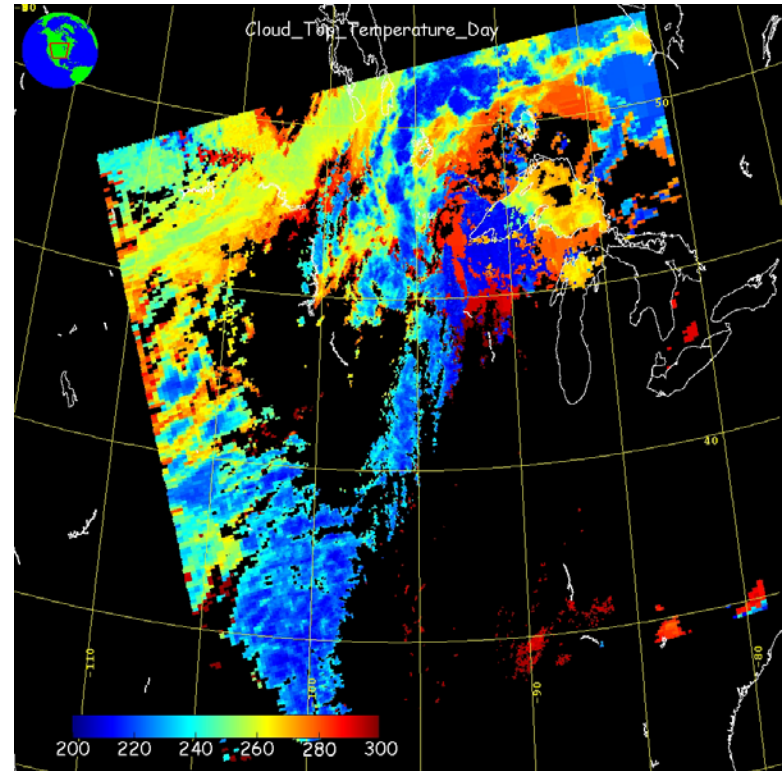


Near-Real-Time Processing

Land Surface Reflectance over Midwest. Slightly more haze is visible in NRT view West of Great Lakes.



Standard Processing



Near-Real-Time Processing

Cloud top temperature over the Midwest. Thin clouds over lake Superior show sensitivity to GDAS ancillary data



## Comparison of MODIS Standard and NRT Products

Short Name	Science Data	Match (% Global)	#pixel (%Global)	Omission Error #pixel (%)	Commission Error #pixel (%)
MOD09	LSR-B1	98.94	N/A	N/A	N/A
MOD09	LSR-B2	99.12	N/A	N/A	N/A
MOD09	LSR-B3	99.32	N/A	N/A	N/A
MOD09	LSR-B4	99.16	N/A	N/A	N/A
MOD10	L2 Snow	99.97	31831094 (2.1%)	39751 (0.13%)	44255 (0.14%)
MOD29	L2 Sea Ice	99.95	14471848 (5.5%)	8383 (0.06%)	14812 (0.1%)
MOD14	L2 Fire	99.97	3207 (0%)	2 (0.06%)	3 (0.09%)

- For LSR the Match is the percentage of NRT data with <1% error margin when compared to the operational Collection 5 codes
- For Snow, Sea Ice, and Fire, the Match is the exact pixel to pixel match between NRT and operational Collection 5 codes
- Omission and Commission errors are computed as a percentage of the snow, sea ice, fire in the operational Collection 5 products



## ***AIRS NRT Data Product Quality***

---

Same PGEs used to produce Standard Data Products used in NRT processing

NRT L1 data nearly identical to L1 Standard Product

- Some minor differences in geo-location due to use of predicted ephemeris

- Occasional minor differences in granules along contact session boundaries (~0.1 K)

- Processing option: retain data at session boundaries to ensure data overlap when generating L1B

- To date data latency has superseded minor quality improvement

NRT L2 products compare favorably to the L2 Standard Data Products.

NRT system used to use surface climatology in place of dynamic ancillary data (GFS) as input to science data processing. With the recent changes to ancillary data usage for AIRS L2 NRT processing the AIRS NRT Data Quality Comparisons document is being revised and will be posted to the NRT site by 5/1/2010.

- Surface Air Temperature differences within 1 K for areas where sfc pressure is approximated by climatology, otherwise differences can be as much as 10 K in selected areas

- Total Water Vapor differences within 5% over most of the globe; as much as 15 -20% where large surface pressure differences are observed, particularly at high latitudes



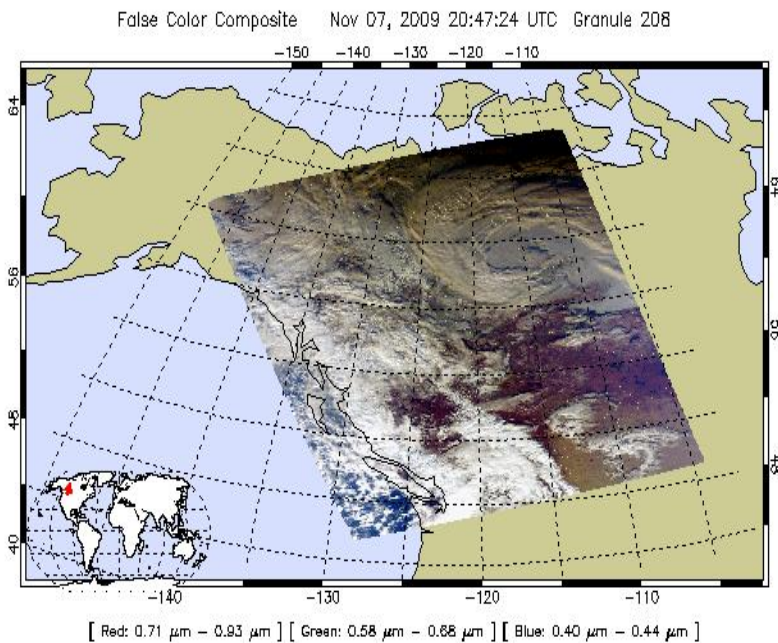
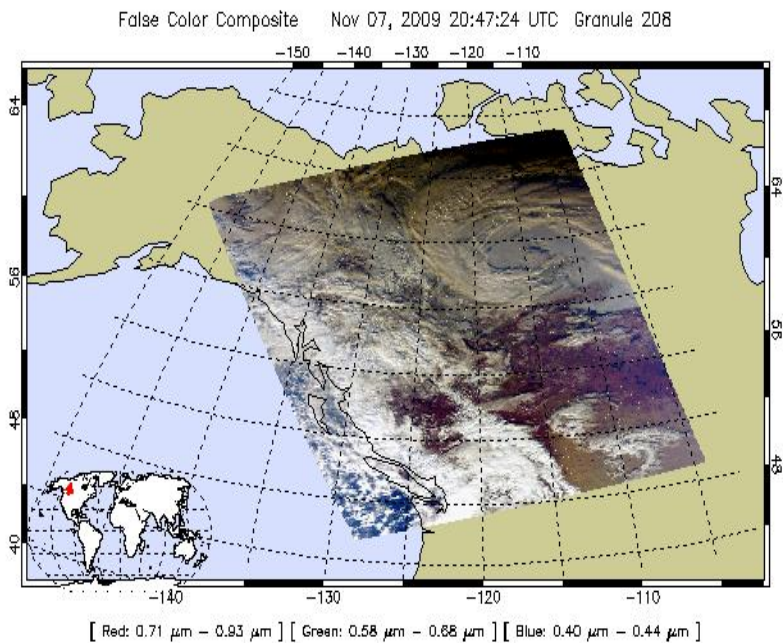


# AIRS L1 Product Quality

## AIRS Level1-B VIS/NIR Quick Browse Image

Standard Product

Near-Real Time



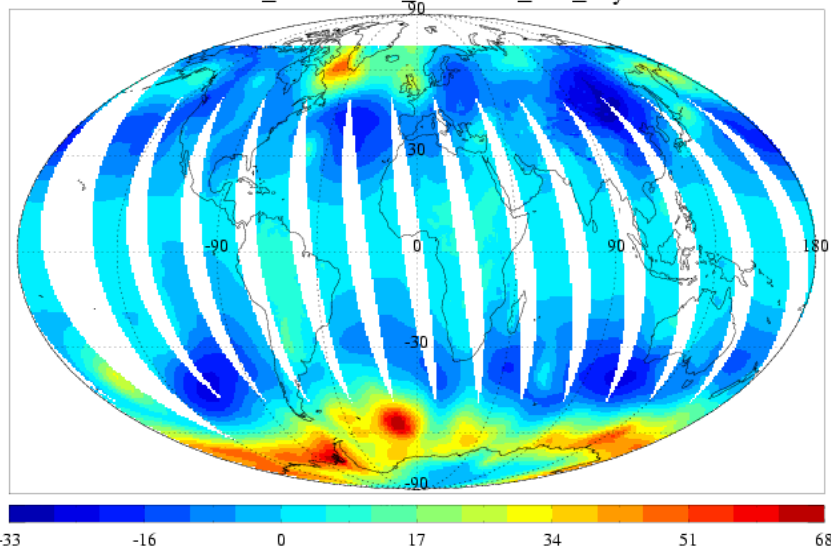
Granule Id = AIRS\_2009.11.07.208L1R1MS\_Red.v5.0.0.0.G00319110959.hdf

Granule Id = AIRS\_2009.11.07.208L1R1MS\_Red.v5.0.14.0.P093111R0259.hdf

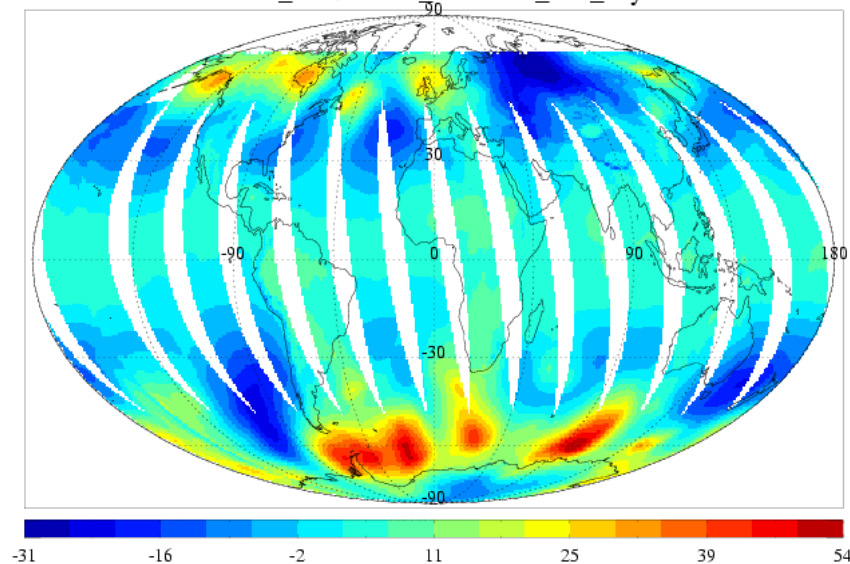


# AIRS Surface Pressure Differences (hPa) (NRT – Standard Product)

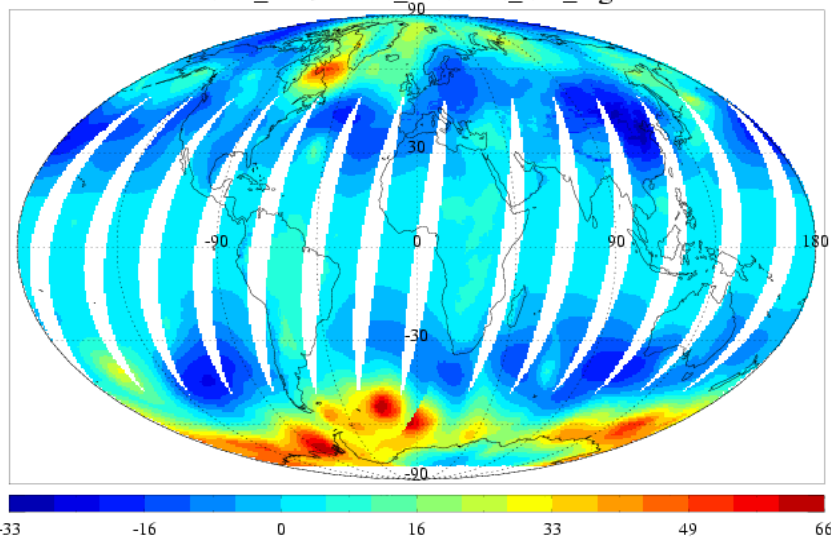
NRT\_2009.11.01\_PSurfStd\_diff\_day



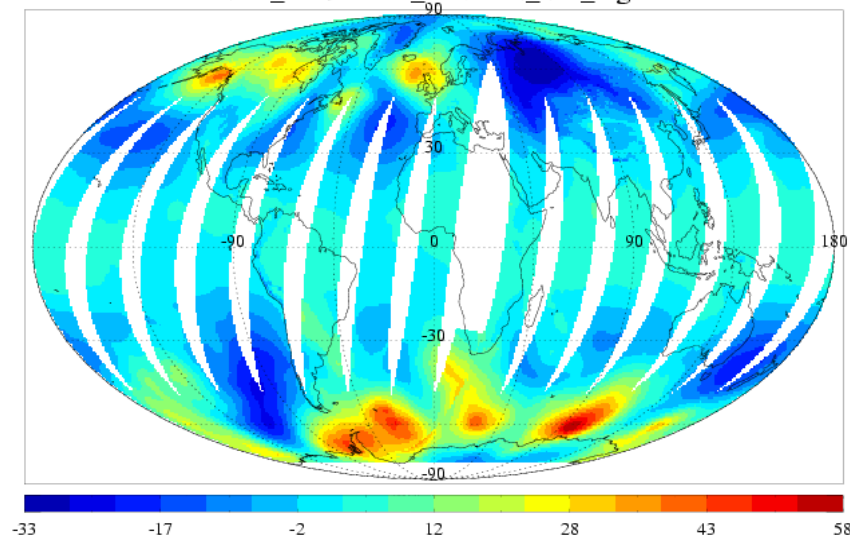
NRT\_2009.11.07\_PSurfStd\_diff\_day



NRT\_2009.11.01\_PSurfStd\_diff\_night



NRT\_2009.11.07\_PSurfStd\_diff\_night

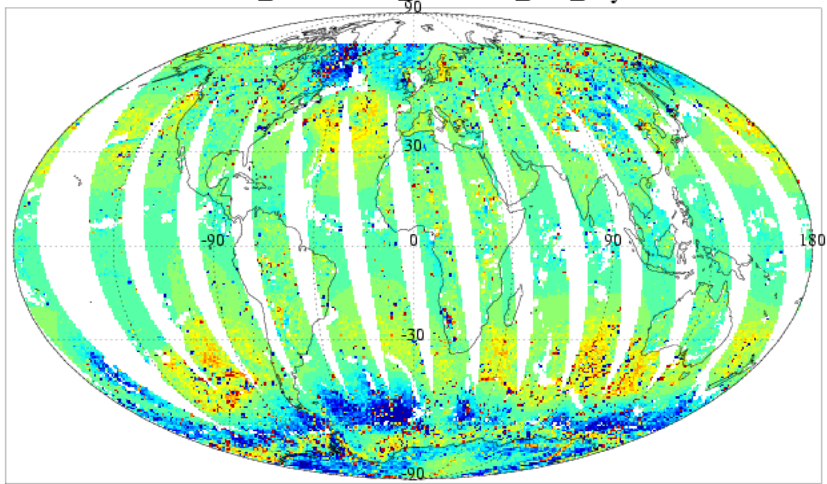






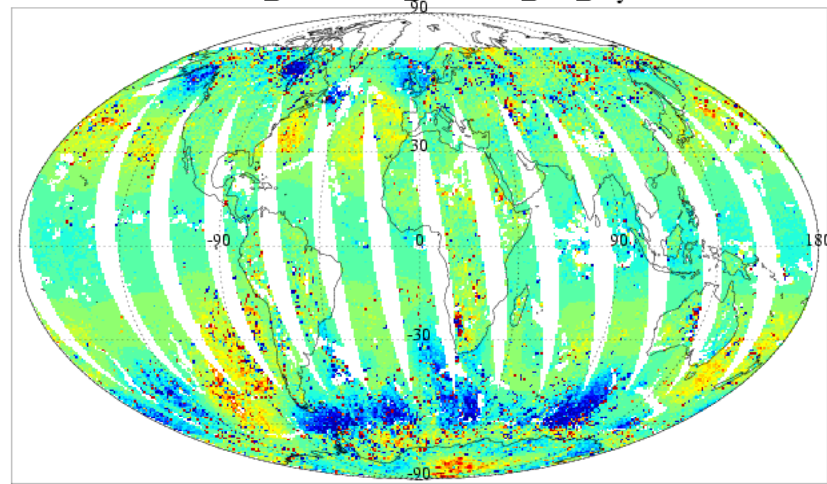
# AIRS Temperature Differences (Sfc Air) K

NRT\_2009.11.01\_1SurfAir\_diff\_day



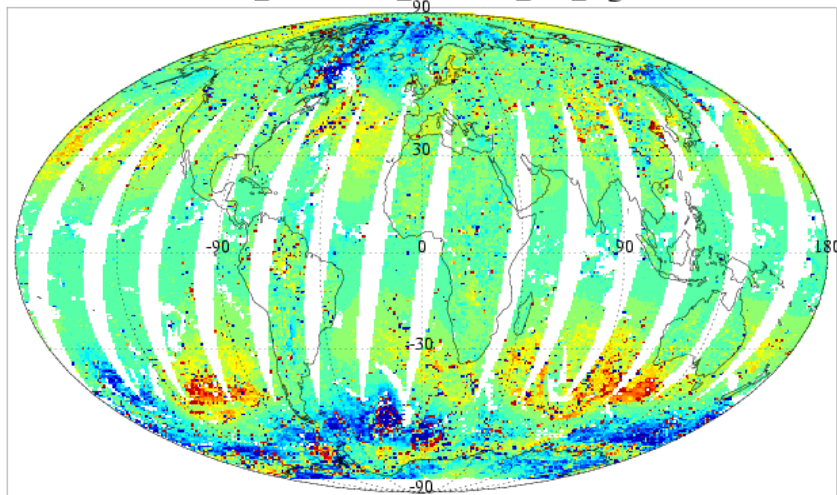
-1.0000 -0.6667 -0.3333 0.0000 0.3333 0.6667 1.0000

NRT\_2009.11.07\_1SurfAir\_diff\_day



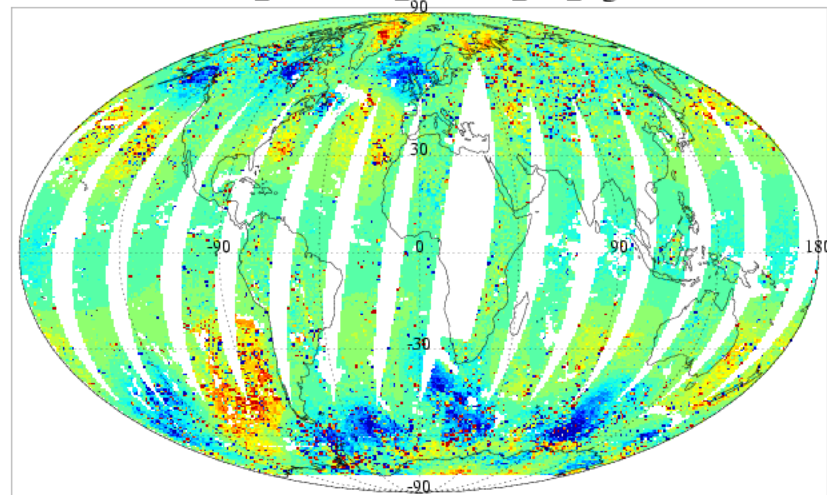
-1.0000 -0.6667 -0.3333 0.0000 0.3333 0.6667 1.0000

NRT\_2009.11.01\_1SurfAir\_diff\_night



-1.0000 -0.6667 -0.3333 0.0000 0.3333 0.6667 1.0000

NRT\_2009.11.07\_1SurfAir\_diff\_night

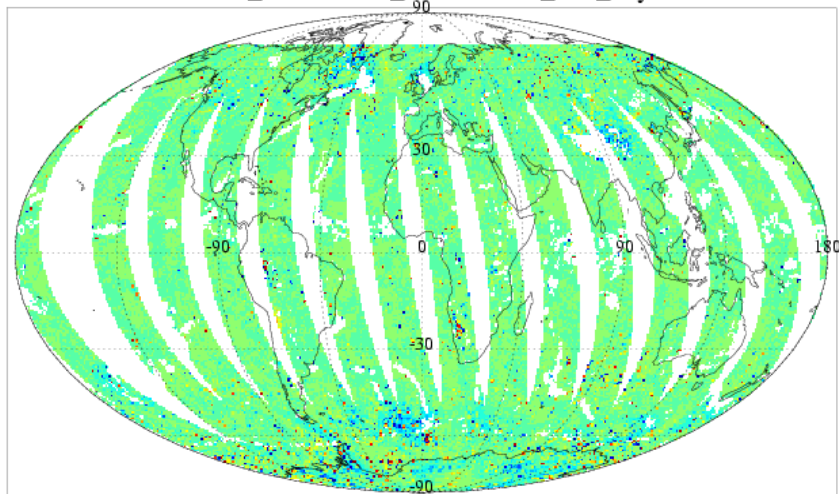


-1.0000 -0.6667 -0.3333 0.0000 0.3333 0.6667 1.0000



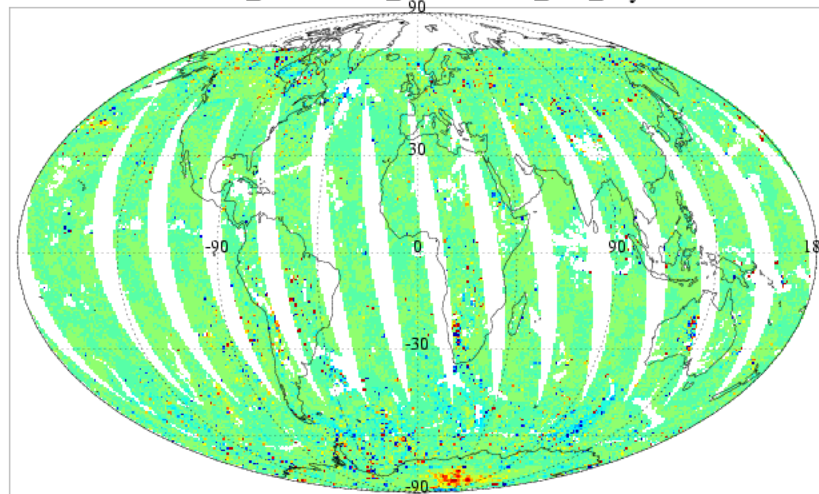
# AIRS Temperature Differences (500 hPa) K

NRT\_2009.11.01\_1AirStd500\_diff\_day



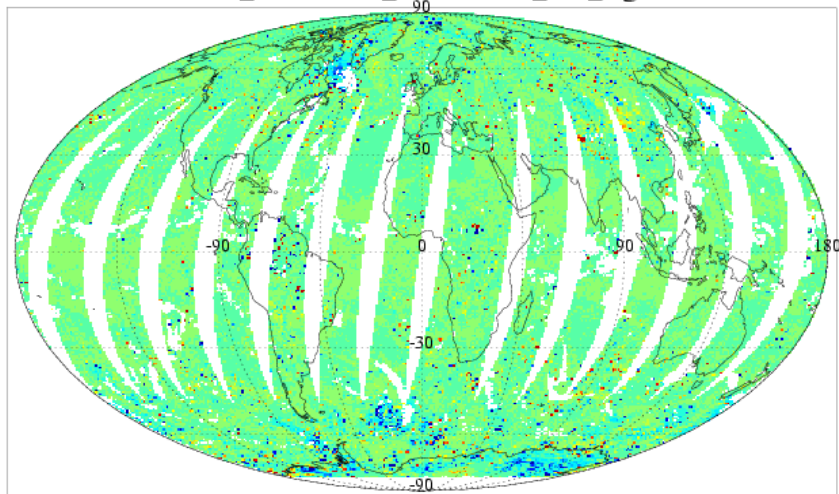
-1.0000 -0.6667 -0.3333 0.0000 0.3333 0.6667 1.0000

NRT\_2009.11.07\_1AirStd500\_diff\_day



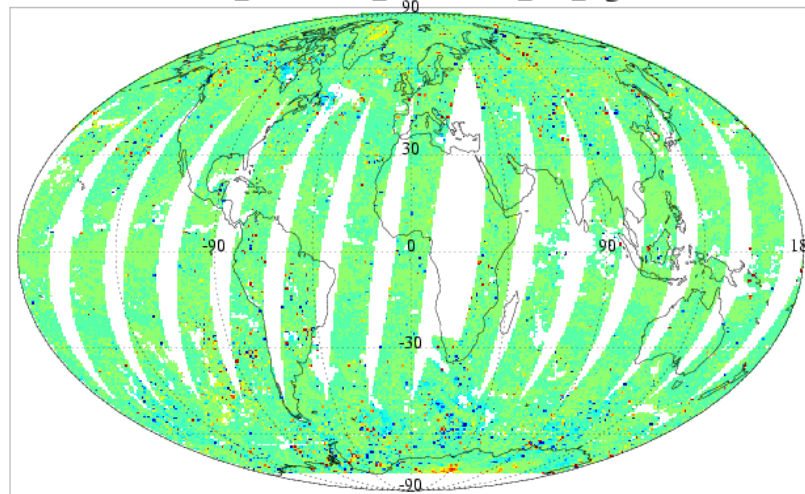
-1.0000 -0.6667 -0.3333 0.0000 0.3333 0.6667 1.0000

NRT\_2009.11.01\_1AirStd500\_diff\_night



-1.0000 -0.6667 -0.3333 0.0000 0.3333 0.6667 1.0000

NRT\_2009.11.07\_1AirStd500\_diff\_night



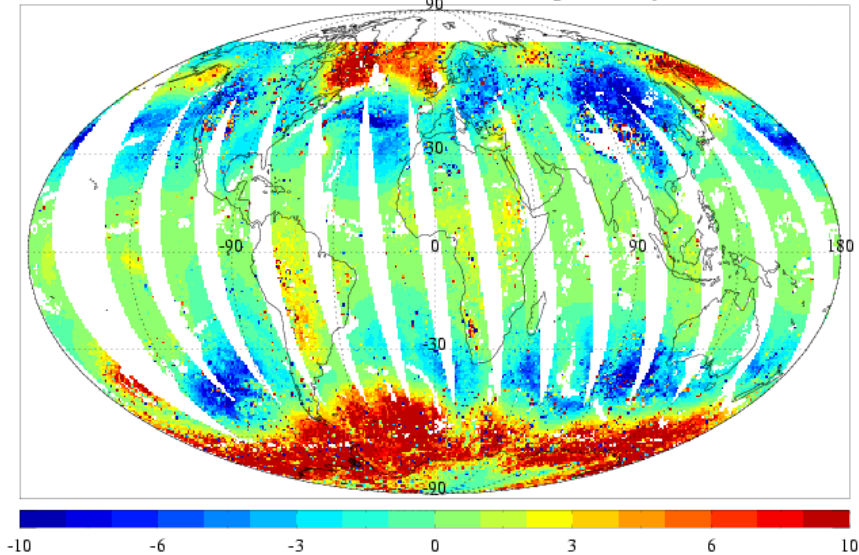
-1.0000 -0.6667 -0.3333 0.0000 0.3333 0.6667 1.0000



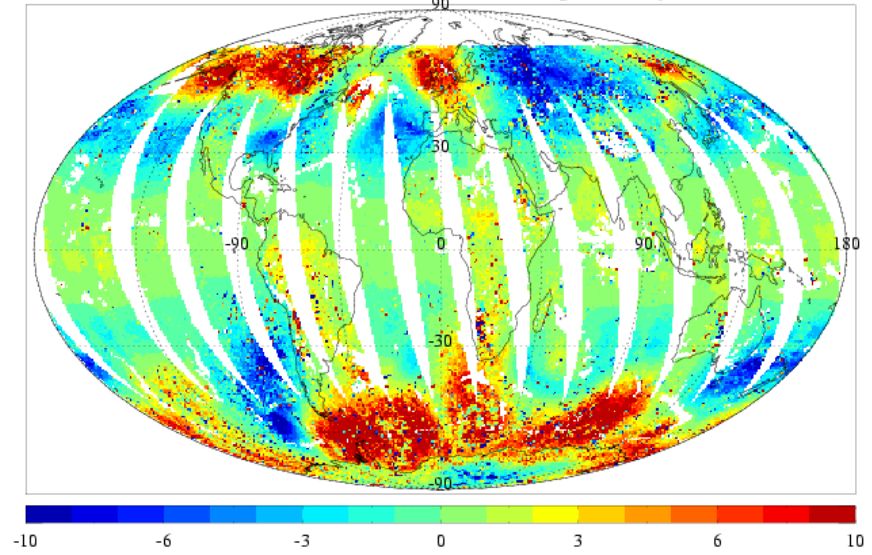


# AIRS Total Water Vapor Difference (%)

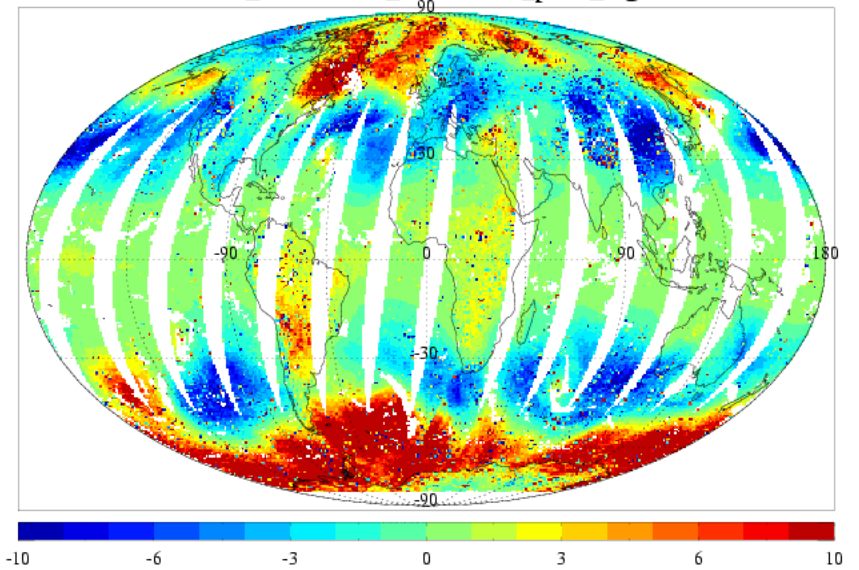
NRT\_2009.11.01\_totH2OStd\_pdiff\_day



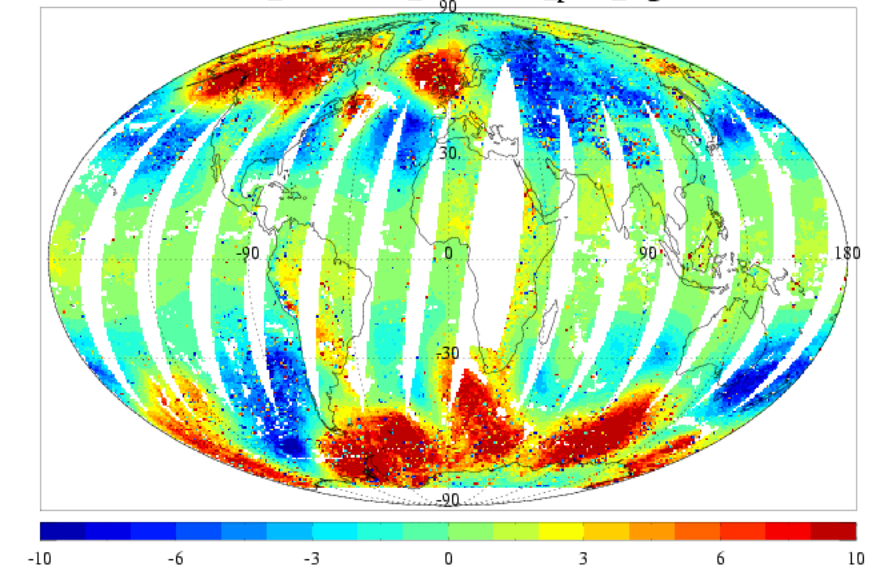
NRT\_2009.11.07\_totH2OStd\_pdiff\_day



NRT\_2009.11.01\_totH2OStd\_pdiff\_night



NRT\_2009.11.07\_totH2OStd\_pdiff\_night





## *MLS NRT Product Quality<sup>1</sup>*

---

The Aura MLS NRT data products are derived from a reduced Level-2 algorithm which uses a fast linearized forward model resulting in computational resource requirements reduced dramatically compared to the standard product processing suite.

NRT Temperatures are within 1-2 K of the MLS standard product

Recommended range for scientific use is 178 hPa to 1 hPa

NRT Ozone is within 5-10% (ppmv) of MLS standard product

Recommended range for scientific use is 68 hPa to 0.2 hPa

Improvements are needed for NRT products to be viable globally for the UTLS region and above the stratosphere for temperature

<sup>1</sup>From presentation by Alyn Lambert (MLS NRT PI) to NASA Hq Aug 2009



## ***Quality Differences between OMI NRT and Standard Science products***

---

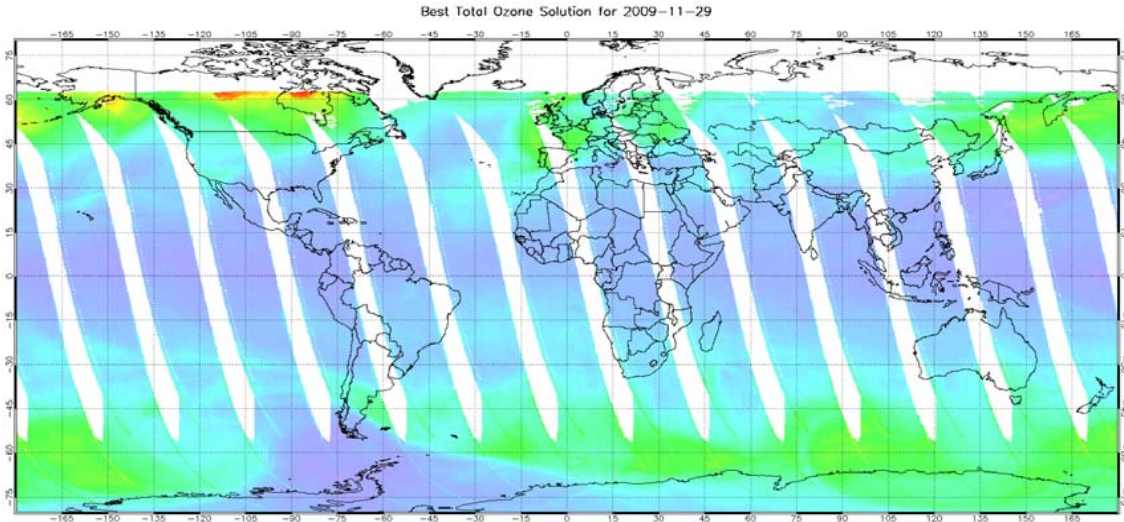
- A number of internal algorithms are bypassed in the Level 1 Processor as compared to forward processing. These include spectral calibration, solar stray light corrections, and some dark current corrections.
- OMI NRT Level 1B and Level 2 products are based on spacecraft contact sessions and estimated orbit definitions. This means the length of a granule can be either larger or smaller than the standard Science products.
- OMI NRT Level 2 products compare favorably to the Science products. There appears to be some variances at high latitudes.



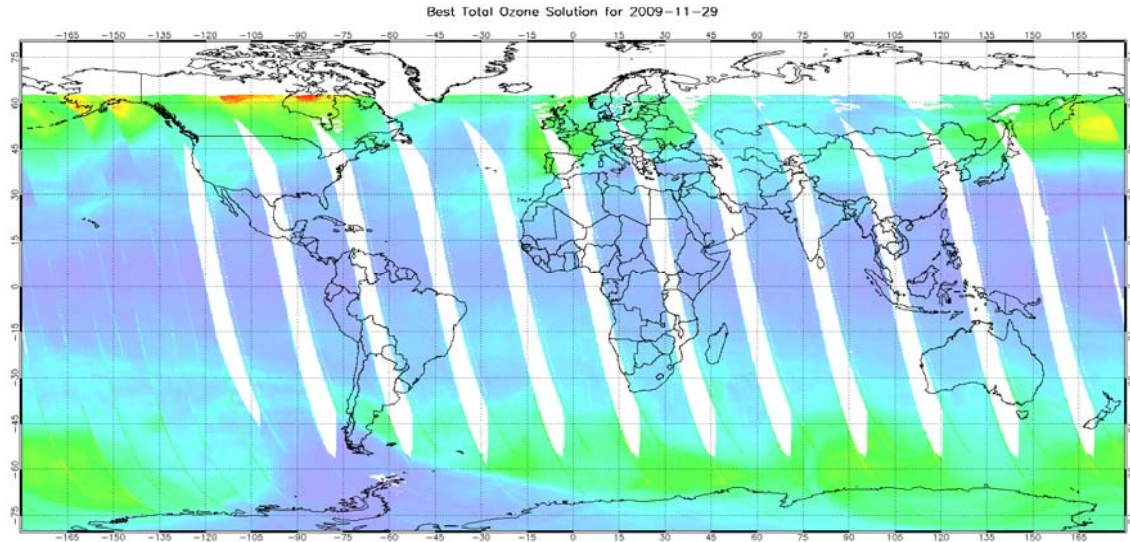


# Comparison of OMI NRT and Standard Products, Ozone

- Std. Ozone



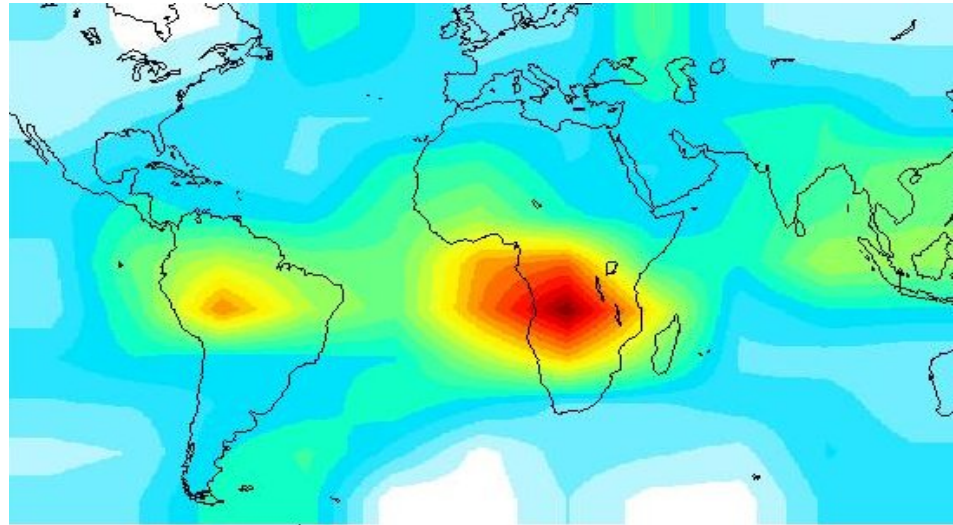
- NRT Ozone



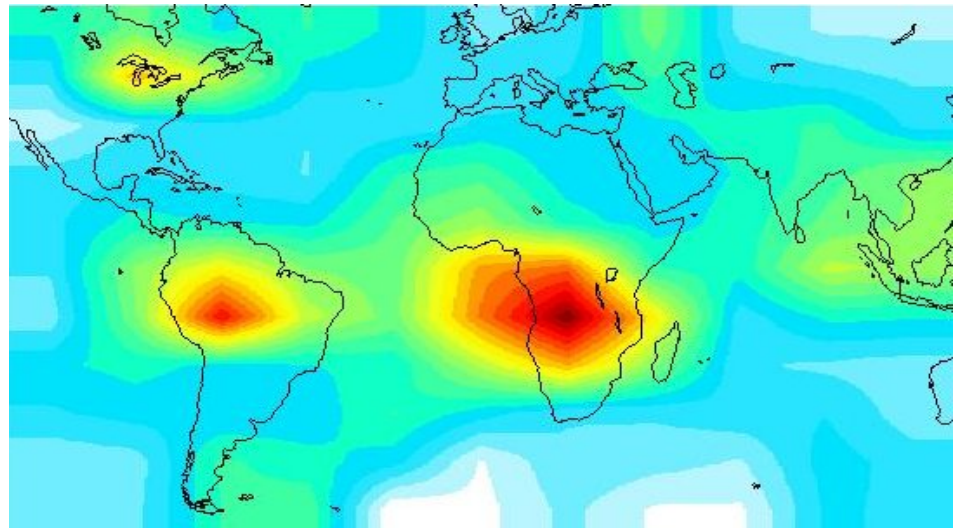


# Comparison of OMI NRT and Standard Products, Aerosols

- Std. Aerosols



- NRT Aerosols





## ***QA- NRT Differences from Level-2 Standard Products***

<b>Product</b>	<b>Variable</b>	<b>Daily Maximum Percentage Difference</b>	<b>Weekly Maximum Percentage Difference</b>
OMTO3	Total Ozone Column	2.64%	1.40%
OMDOAO3	Total Ozone Column	3.60%	0.30%
OMCLDRR	Cloud Fraction	6.02%	1.42%
OMCLDRR	Cloud Pressure	2.82%	0.67%
OMCLDO2	Cloud Fraction	8.83%	1.98%
OMCLDO2	Cloud Pressure	3.49%	0.59%
OMAERO	AOD (388 nm)	18.16%	4.56%
OMAERUV	AOD (388 nm)	5.95%	2.31%



# LANCE Network Connectivity

