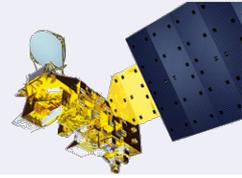


AIRS Project Status

T. Pagano
CalTech NASA JPL
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November 13, 2012



- Instrument Operations and Calibration
 - AIRS Running well. AMSU hanging in there. Aqua Has Fuel to 2022
 - Regular Maintenance and Orbital Maneuvers Performed
 - Channel degradation mitigated with gain table upload in January 2012
 - Calibration Coefficients Update in progress using Moon, Parylene, Earth
- Version 6
 - V6 PGE Complete. Delivered to DAAC for routine processing. Expect public release in first quarter 2012
 - Test Report Complete. Over 145 pages + Appendices
 - User Guides, ATBD, Validation Report in process
- Additional V6 Work Remainig
 - Level 1C, Level 3, 3v (for visualizations)
 - V6 Carbon Dioxide Mid and Strat
 - Operational SO2 Product
 - Update Website

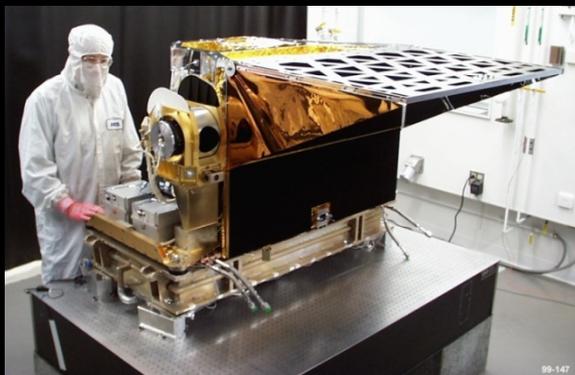


The EOS Aqua Spacecraft

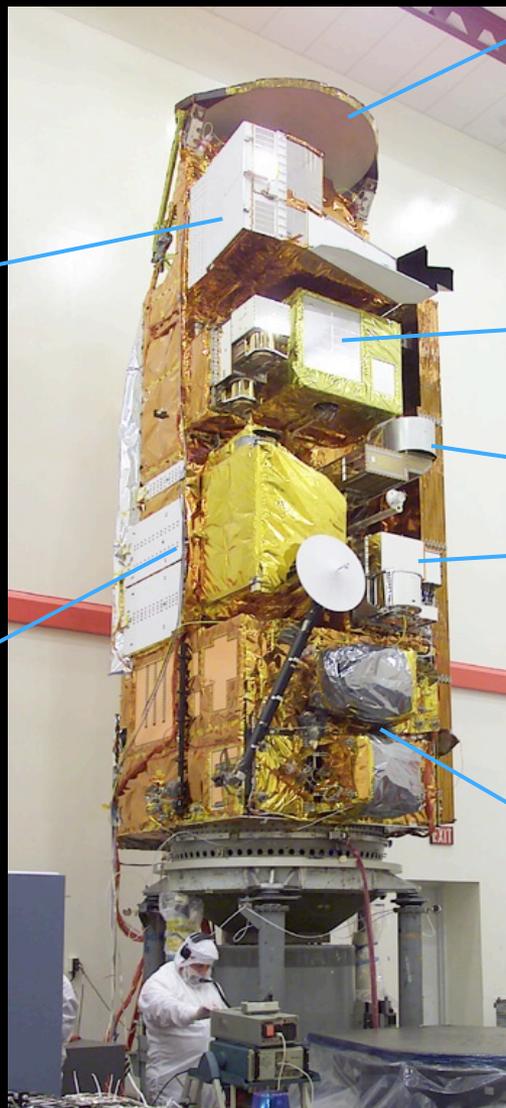
Launched May 4, 2002



Moderate Resolution Imaging Spectroradiometer (MODIS)
GSFC/Raytheon



Atmospheric Infrared Sounder (AIRS)
JPL/BAE SYSTEMS



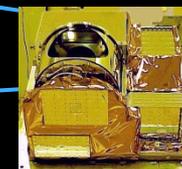
AQUA Spacecraft
GSFC/NGST



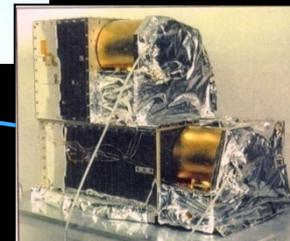
Advanced Microwave Scanning Radiometer (AMSR-E) MSFC/JAXA



Advanced Microwave Sounding Units (AMSU-A/B) JPL/Aerojet

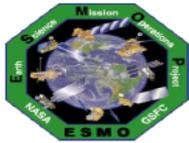
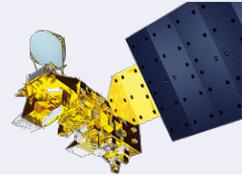


Humidity Sounder from Brazil (HSB) JPL/Aerojet

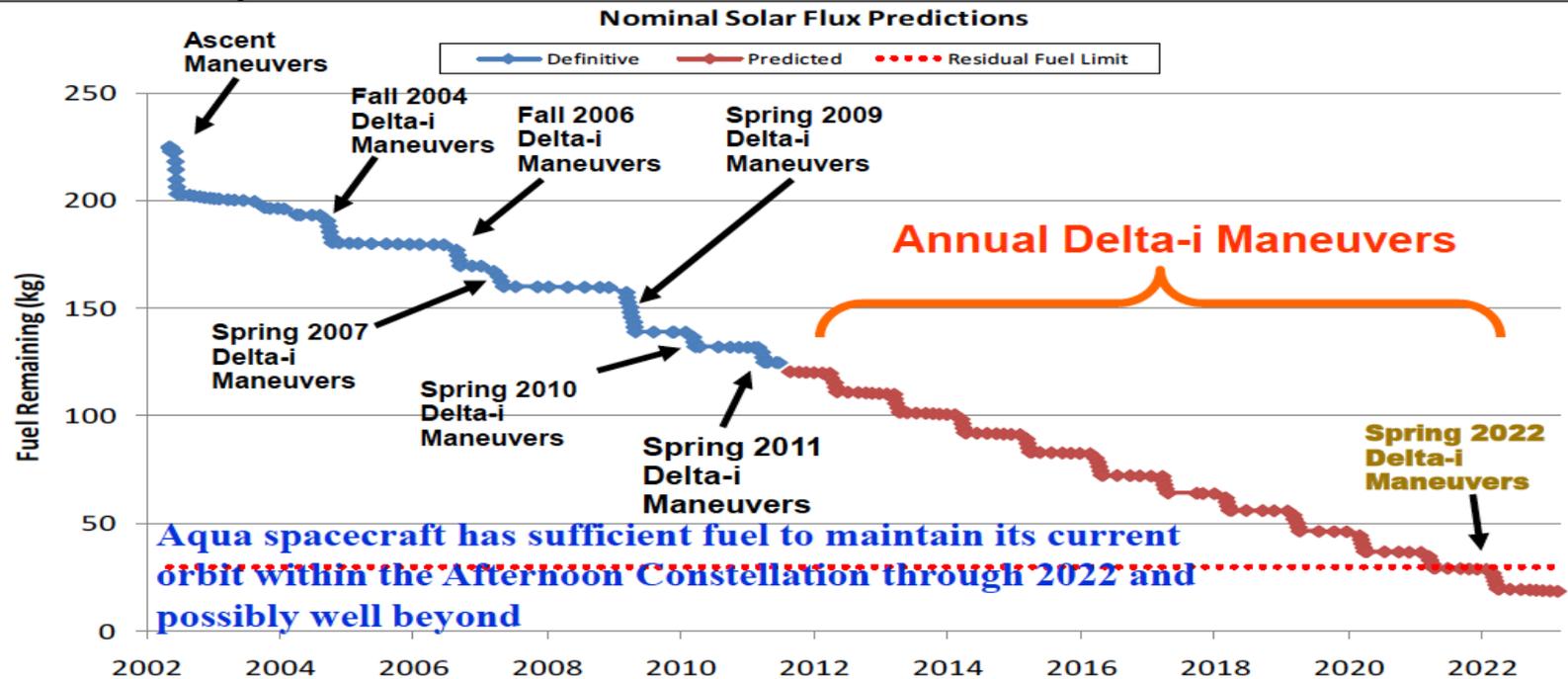


Clouds and Earth Radiant Energy System (CERES) LaRC/NGST

AIRS Expected to Operate For Life of Spacecraft through 2022

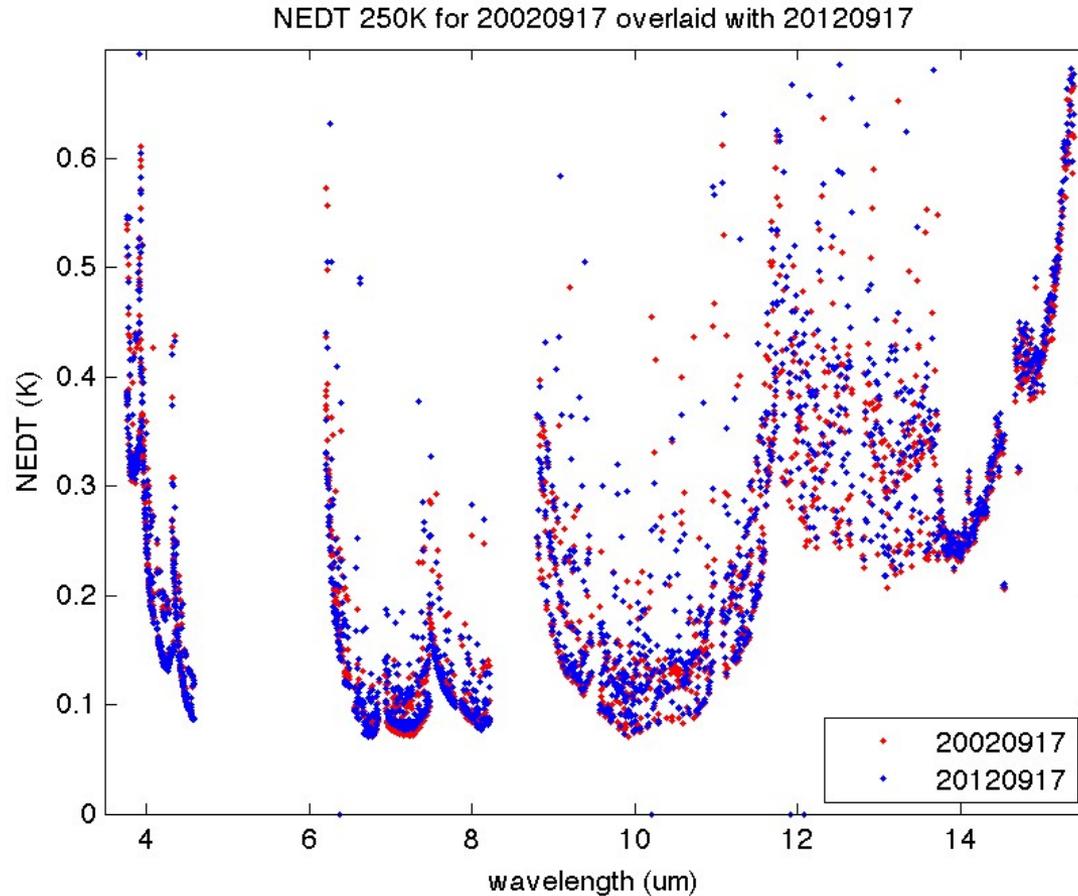
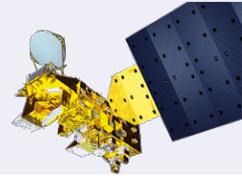


Aqua Fuel Usage: Actual & Predicted (Updated September 2011) **NO CHANGES**



To be updated after Spring 2012 Inclination Adjustment

NEdT's Stable over 10 Year Period for Most Channels



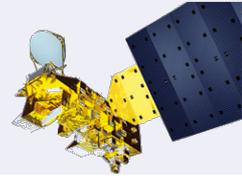
Pre-Launch:

1856 Channels “Good”

180 were “Poor”: High Noise but Usable

68 were “Bad”: Non-Gaussian Noise, Un-usable

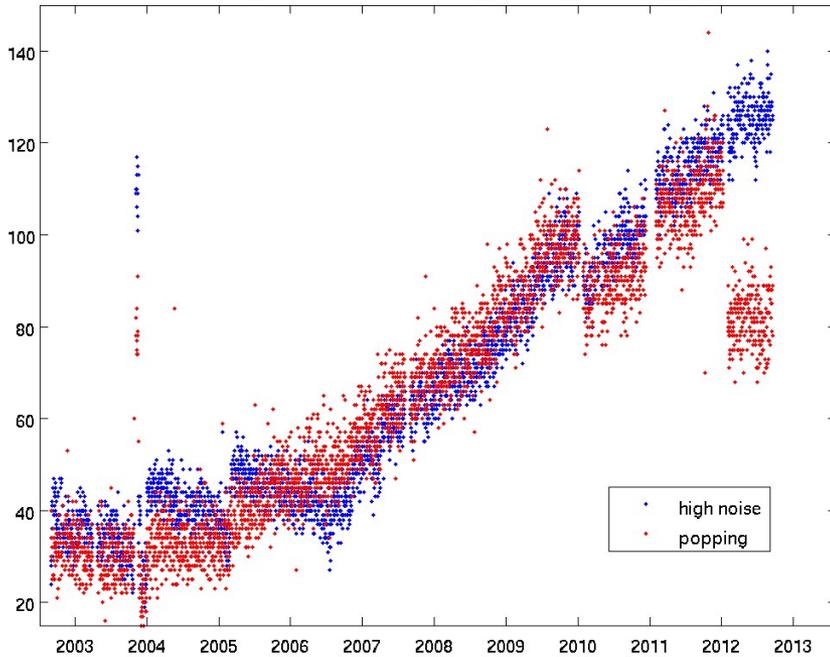
Several Channels Degraded in Noise Performance over Mission Life



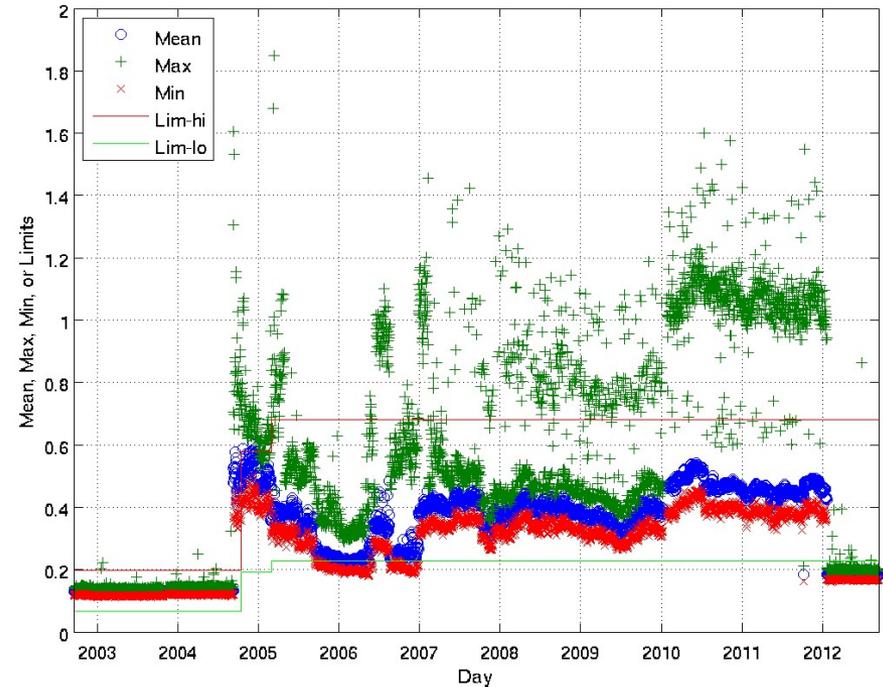
80-100 Channels Degraded in Noise Performance over Course of Mission

Example Channel Noise Impact due to Single Event Upset (SEU)

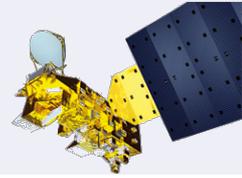
L1BQA flags: Number of channels flagged for high noise, popping



AIRS NEdT Data 20020917-20120930 Channel 758



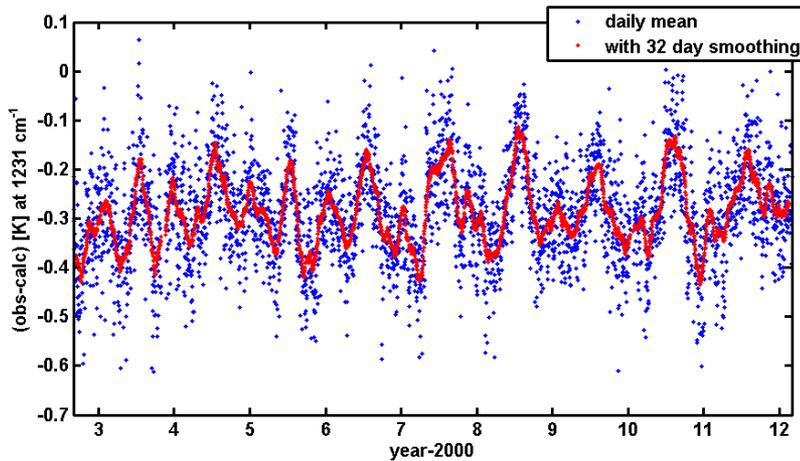
New Gain Table Modified 100 Channels A/B States
Reduced Noise and Recovered about 50 Channels



Radiometric Stability

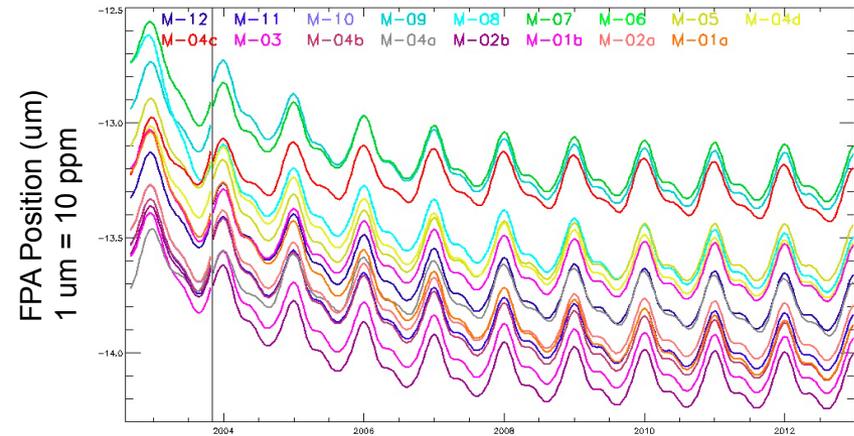
Channel 1231 cm^{-1} : $+4 \pm 1\text{ mK/yr}$

Channel 2616 cm^{-1} : $< 16\text{ mK/year}$



Spectral Stability

$< 5\text{ ppm}$ over mission

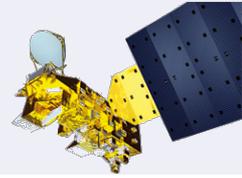


Aumann, H. H., D. Elliott, S. Strow, "Validation of the Radiometric Stability of the Atmospheric Infrared Sounder." Proc. SPIE 8510-28, August, 2012

Strow, L. L., S. E. Hannon, S. De-Souza Machado, H. E. Motteler, and D. C. Tobin (2006), "Validation of the Atmospheric Infrared Sounder radiative transfer algorithm", J. Geophys. Res., 111, D09S06, doi:10.1029/2005JD006146

AIRS V6 Testing Complete

Lower RMS error and trend than V5



Version 6 Test Report

AIRS/AMSU/HSB Version 6 Level 2 Performance and Test Report

Edited by:
H. Van T. Dang
Contributions by:

Evan Manning¹, Sun Wong¹, Fedrick Irion¹, H. Van T. Dang¹,
Glynn Hulley¹, Joel Susskind², Lena F. Iredell², John M.
Blaisdell², Gyula Molnar², Bjorn H. Lambrigtsen¹, Brian H. Kahn¹,
Xiaozhen Xiong³, Juying Warner⁴, Baijun Tian¹, Larrabee Strow⁵,
Joao Teixeira¹

¹Jet Propulsion Laboratory, California Institute of Technology
²NASA Goddard Space Flight Center
³NOAA

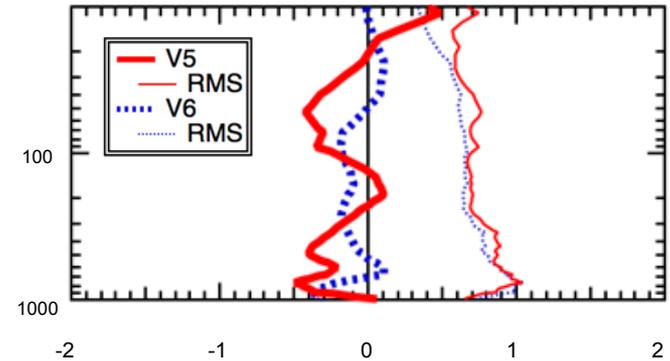
⁴Dept. of Atmospheric & Oceanic Sciences, University of Maryland
⁵Physics Department, UMBC



October, 2012
Version 1

Page 1

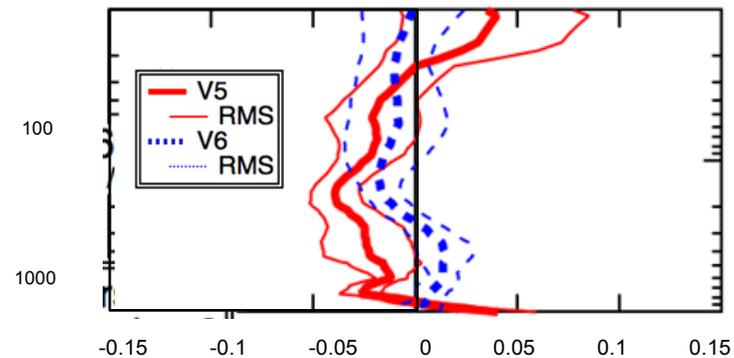
Bias and RMS (30°-60°)



AIRS-Sonde Modified by
AIRS Averaging Kernel (K)

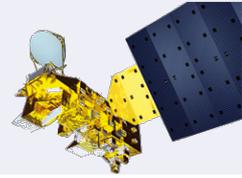
W. Irion (JPL)

Annual Drift (30°-60°)

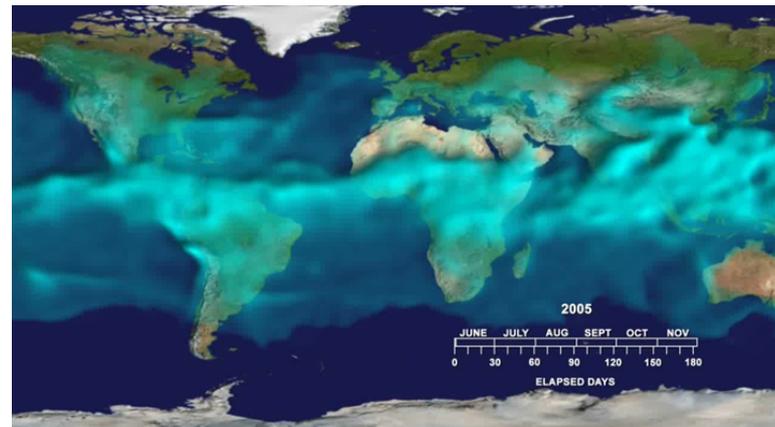


AIRS-Sonde Temperature
Bias Drift (K/yr)

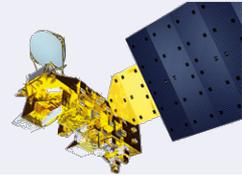
What's Next: Product Development and Utilization



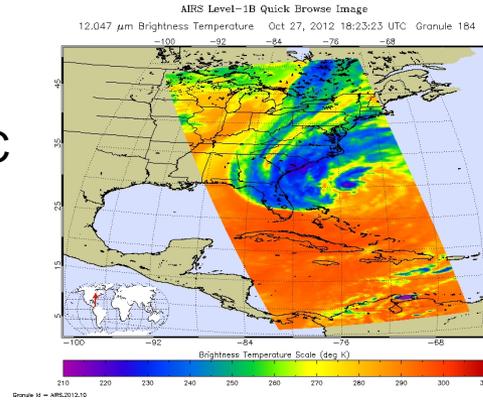
- Product Development (V7)
 - Improved Error Estimation
 - Improved Cloud Clearing Algorithm
 - Retrieval of Cloud Properties
 - Higher Spatial Resolution
 - Explore use of data sets from other instruments
 - Composition Products
- Support Weather Forecasting
 - Assimilation of Cloudy Radiances
- Additional Work
 - Retrieval of CO₂ Profile
 - Climatologies of all AIRS Products; Including Error Estimates
- Radiance Calibration
 - Radiometric/Polarimetric Coefficient Update
 - CrIS/IASI Comparisons



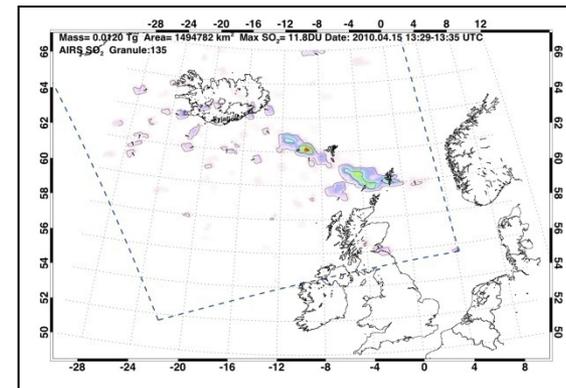
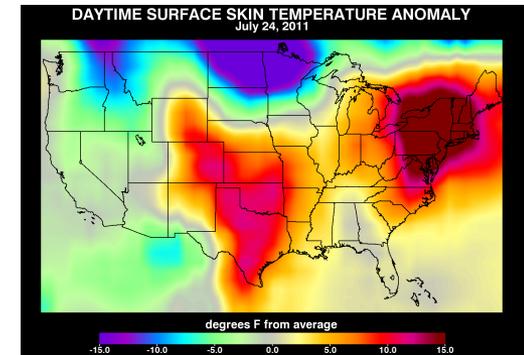
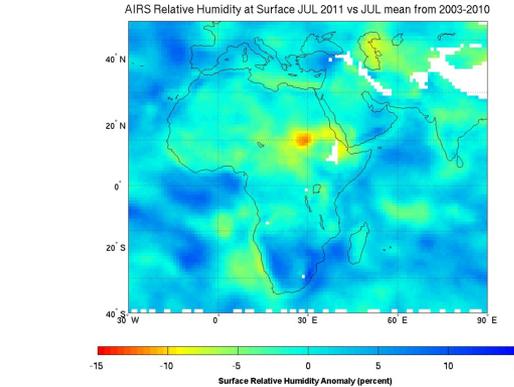
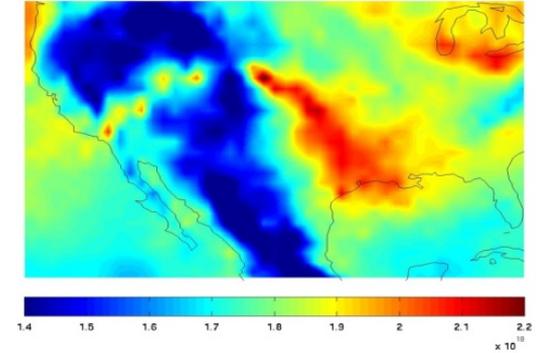
What's Next: Applications

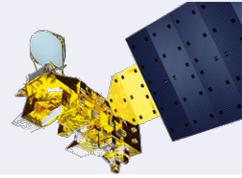


- Near Real Time Products
 - All Level 1B, Level 2 at DAAC
 - L1B Buffer NWP Centers
 - Hurricane Maps
 - CO, SO2 WMS at LANCE
- Under Development
 - Relative Humidity for Forecasters: SPoRT, University of Colorado
 - Temperature Extremes, Inversions (JPL)
 - Near Surface RH, Drought, Mosquitos: JPL
 - Volcanic SO2 and Ash: Fred Prata, OMI
 - Dust: UMBC
 - Carbon Monoxide Air Quality and Fire Assessment: GSFC
 - Ozone Hole, TBD OMI



CO Total Column (mol/cm^2): Aug 30-Sep 02, 2009 2009.09.02





Scott Hannon

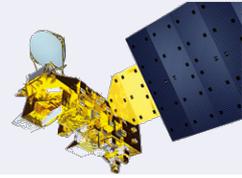


- UMBC
 - Worked with Larrabee Strow on the AIRS Project for last 15 years
- Fast RTA (SARTA)
- Added Non-LTE to SARTA
- Wrote Trace Gas Retrievals

Gvula Molnar



- GSFC - Morgan State University / (GESTAR)
 - Hungary-Oxford-AER
 - Worked with Joel Susskind on the AIRS Project since 2003.
- Climate Research using AIRS
- Susskind, J., G. Molnar, L. Iredell, and N. G. Loeb (2012), Interannual variability of OLR as observed by AIRS and CERES, *J. Geophys. Res.*, doi: 10.1029/2012JD017997, in press.



- AIRS Instrument Running Well; AMSU lost channel 5 but OK
 - Recovered 50+ AIRS channels in last gain table upload
- Version 6 PGE is complete; documentation underway
 - Reduced RMS error, trends and higher yield
- Next major objectives for **AIRS community**:
 - Support assimilation of cloudy radiances
 - Increase number of applications using AIRS data
 - Develop new retrieval system considering continuity amongst instruments
 - Compare AIRS products to CrIS and IASI for climate continuity
 - Future Mission Roadmap
- Logistics
 - Starbucks
 - Lunch Buffet: \$14.95