



# AIRS and CIRAS Project Status

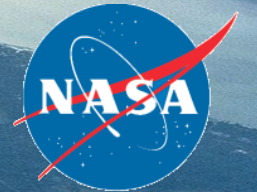
October 2<sup>nd</sup>, 2020

NASA Sounder Science Team Meeting

Thomas S. Pagano  
and the AIRS and CIRAS Project Team  
Jet Propulsion Laboratory, California Institute of Technology

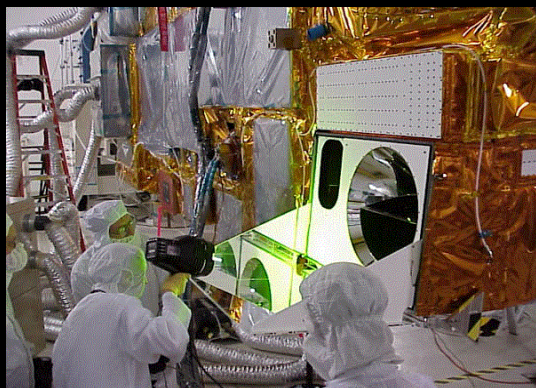
*Sponsors:*

*NASA Earth Science Division, SMD  
NASA Earth Science Technology Office (ESTO)  
NOAA Office of Projects, Planning and Analysis (OPPA)*

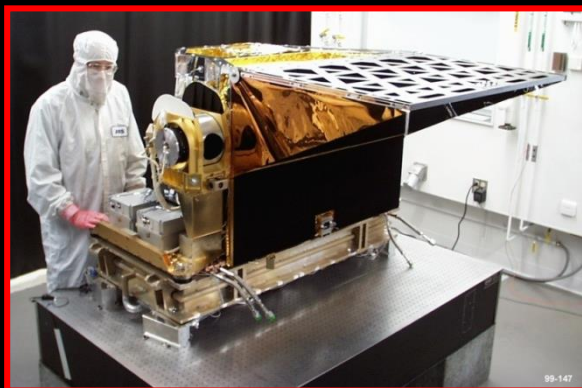




# AIRS/AMSU/HSB on the Aqua Spacecraft



Moderate Resolution Imaging Spectroradiometer (MODIS)  
GSFC/Raytheon



Atmospheric Infrared Sounder (AIRS)  
JPL/BAE SYSTEMS



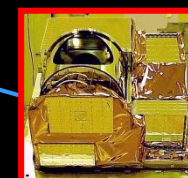
AQUA Spacecraft  
GSFC/NGST



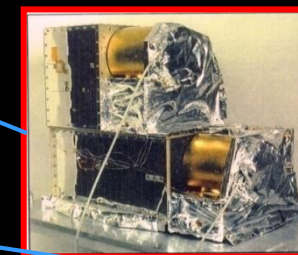
Advanced Microwave Scanning Radiometer (AMSR-E)  
MSFC/JAXA



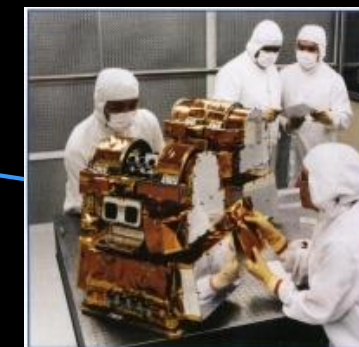
Advanced Microwave Sounding Units (AMSU-A/B)  
JPL/Aerojet



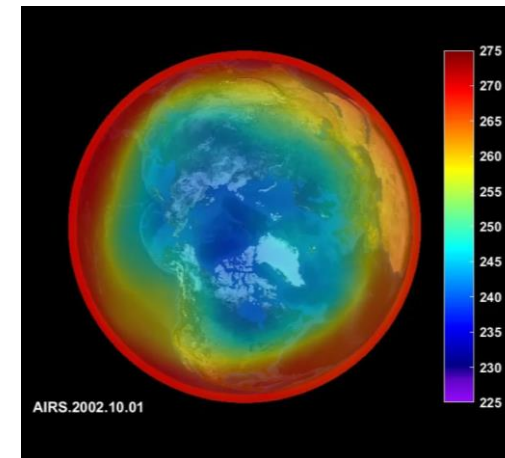
Humidity Sounder from Brazil (HSB)  
JPL/Aerojet



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



- Project Management:
  - The AIRS and Aqua Project ranked favorably in the 2020 NASA Sr. Review
  - AIRS Project delivered Version 7 of the L2/L3 Retrieval System in July of 2020
  - ARS Project delivered V6.7 Level 1C in March of 2020.
  - Priority now is release of CLIMCAPS-Aqua by the end of the year and Level 1B/1C Version 7 early next year
- Instrument Operations
  - AIRS health is good, no instrument anomalies since September 2016.
  - IR detectors continue to perform well. Gain table upload in October 2019
  - AMSU: 10 of 15 channels still providing good data.
  - Aqua: health is good. Recent Solid State Recorder anomaly resolved after 17 days.
- Instrument Calibration
  - The AIRS Calibration Team continues to refine the radiometric, spectral and spatial calibration
  - AIRS continues to be used a Si-Traceable reference sensor in GSICS



Arctic 600mb Air Temp.  
2003-2018 (NASA, AIRS)

- Product Assessment and Validation:

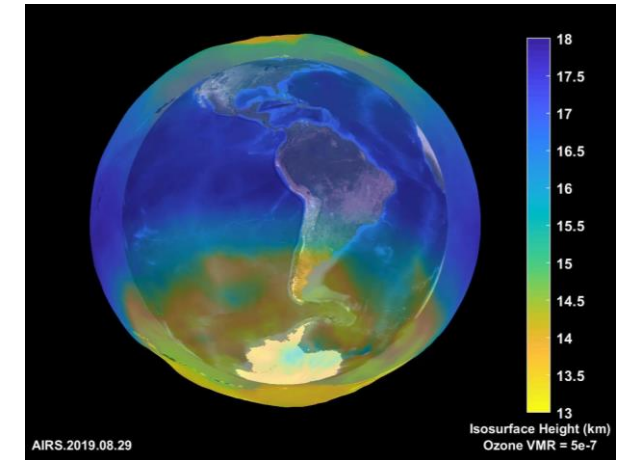
- AIRS V7 test/validation report completed and released to the public
- Assessment of CLIMCAPS/Aqua under way, expected to be complete by middle of November, leading to a publicly released report
- Up Next: Assessment of AIRS single-FOV retrieval system & AIRS-SNPP data fusion products

- Data Fusion

- Fused AIRS/CLIMCAPS-SNPP (CrIS) near-surface temperature, water vapor and vapor-pressure deficit product for CONUS in 2019 complete.
- Fused AIRS/CLIMCAPS-SNPP (CrIS) temperature and water vapor profile product for sub-tropical oceans for 2019 is in process
- Simulation-based uncertainty quantification machinery for AIRS temperature and water vapor profiles over CONUS in 2019 is nearly complete.

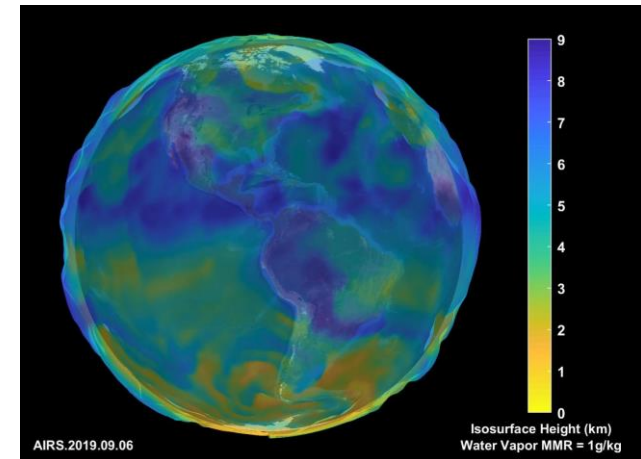
- Applications

- AWIPS - Working with SPoRT and STC to get AIRS into AWIPS via NUCAPS
- Drought - Workshop for US Drought Monitor authors and community is in the works to produce use cases and best practices when using the AIRS drought products
- Influenza – Collaborating with LA County Dept of Public Health on humidity-based influenza forecasting using AIRS data



Ozone Hole Formation  
2019 (NASA, AIRS)

- AIRS TLSCF & Product Development Support
  - Increased the archive capacity by over 1000 TB. Migrated all of AIRS data from tape to spinning disk
  - Added a couple new servers to increase our processing power
  - Implemented a 'data pull' system from GES DISC to replace the 'data push' from GES DISC.
  - Assisted and coordinated effort between AIRS and Xianglei Huang, at Univ of Mich, to archive and make publicly available at the GES/DISC an AIRS Spectral OLR product to support on-going tasks.
- User Services
  - Website recently updated. Easier access to presentations, visualizations, product information
  - User Guide Goes Digital - On track for a web based version of the User Guide for the CLIMCAPS release in early November.
  - Continued release of hurricane imagery, volcano alerts and carbon monoxide imagery of fires
  - Over 1140 peer reviewed publications that use AIRS data

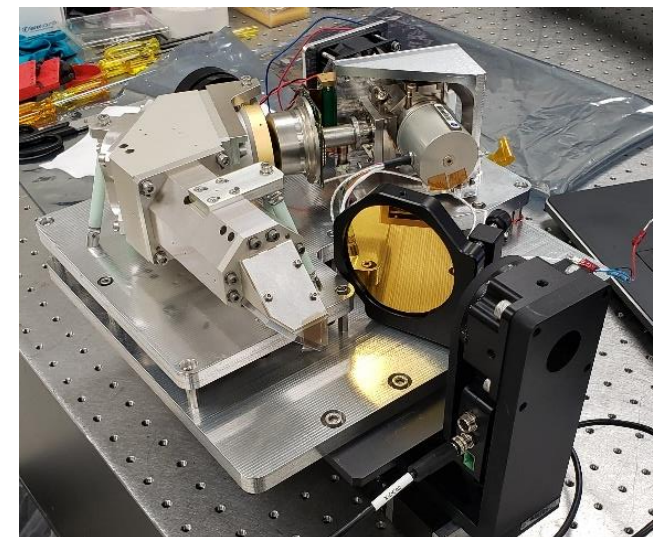


Global Daily Water Vapor  
2019 (NASA, AIRS)

# CubeSat Infrared Atmospheric Sounder (CIRAS) Status

- 2016 NASA ESTO Sponsored Initial Development
- 2016 & 2018 NOAA Sponsored Tech Maturation
- Current Status
  - System Prototype Developed
  - Ball Aerospace Telescope / Spectrometer
  - JPL Grating, Slit, HOT-BIRD FPA
  - Ambient Testing Complete
- Performance
  - Optics transmission and Detector QE looks good
  - Spatial response excellent < slit width (2 pixels)
  - Spectral Resolution demonstrated through air-path test. CO<sub>2</sub> and water vapor absorption visible
- Next Steps
  - TVAC & Space demonstration recommended
  - Explore NASA and NOAA Applications of CIRAS
  - Explore LWIR CubeSat IR Sounder
  - Explore IR Sounding on Mars/Venus

CIRAS Ambient Test Setup



CIRAS Measured and Ideal Atmospheric Absorption  
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