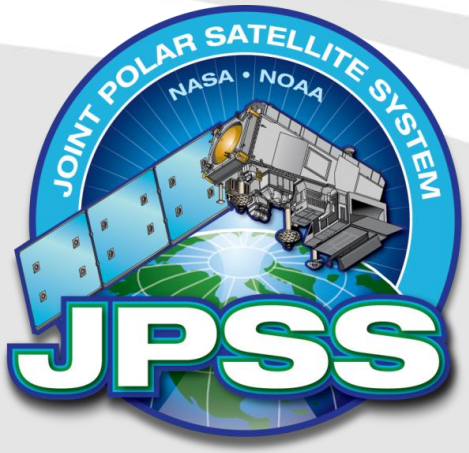


# JPSS Proving Ground and Risk Reduction

**Mitch Goldberg, JPSS Program Scientist (NOAA)**
**John Furgerson, JPSS User Liaison (NOAA)**
**Ingrid Guch, STAR JPSS PGRR Co-Chair**

# TOPICS

## Scope of JPSS PGRR Program

## Call for New Proposals

## Selection Process

# GOAL

The JPSS Proving Ground and Risk Reduction program's primary objective is to maximize the benefits and performance of NPP/JPSS data, algorithms, and products for downstream operational and research users (gateways to the public) through:

- Detailed characterization of data attributes such as uncertainty (accuracy and precision) and long-term stability
- Engaging users to enhance their applications (and develop new ones) by working together to facilitate optimal utilization of JPSS data, algorithms and products in combination with other data sources through onsite/offsite testbeds, experimental data streams, and intercomparisons of enhancements with baselines
- Education, Training and Outreach
- Facilitating transition of improvements (new algorithms/applications) to operations.

# Call for proposals due Jan 20, 2012

## Introduction

- Identify and describe end user application(s) and importance, and the benefit JPSS data can provide
- Identify and describe any current limitation(s), requiring additional research and/or feedback to further realize this benefit.
- Identify a user that will be engaged, and describe how you will engage the user, regularly, to understand JPSS products, provide test datasets and to obtain feedback.

## Proposed Work and Technical Approach

- Describe methodology to use JPSS data (and other data sources, if necessary) to improve the identified user application.

## Milestones and deliverables

# Projects need to be supportive of NOAA Goals

NOAA

OFFICE OF PROGRAM PLANNING AND INTEGRATION

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

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## NOAA's Goals

Climate Adaptation and Mitigation | Weather-Ready Nation | Healthy Oceans | Resilient Coastal Communities and Economies

An informed society anticipating and responding to climate and its impacts

- Long-term goal: Climate Adaptation and Mitigation
- Objective: Improved scientific understanding of the changing climate system and its impacts
- Objective: Assessments of current and future states of the climate system that identify potential impacts and inform science, service, and stewardship decisions
- Objective: Mitigation and adaptation efforts supported by sustained, reliable, and timely climate services
- Objective: A climate-literate public that understands its vulnerabilities to a changing climate and makes informed decisions
- NOAA Partnerships for Climate Adaptation and Mitigation

**Society is prepared for and responds to weather-related events**


## Long-term goal: Weather-Ready Nation

### Objective: Reduced loss of life, property, and disruption from high-impact events

Increasing the use of weather-related information by making it more relevant to citizens, businesses, and Government can reduce the impact of weather-related events on lives and livelihoods.

To achieve this objective, NOAA will focus its efforts on service, which will require a deeper understanding of user needs through continuous user engagement; alignment of products, services, research, and development to user needs; and an improved capacity to monitor and evaluate service performance and outcomes. Specifically, NOAA will provide forecasts and information that compare weather risk to user-defined risk tolerance and redefine warnings to be applicable to a broad range of high-impact events. This is especially important in densely populated urban areas where cities impact and are impacted by weather and climate events. Cities increase heat stress, exacerbate poor air quality, increase flood hazards, alter precipitation patterns, and are responsible for greenhouse gas emissions. In collaboration with its partners, NOAA will provide direct, interpretive support to public sector officials and emergency responders, and expand environmental education and weather safety programs. Key science and technology needs to achieve this objective include improving forecasts of hurricanes, severe weather, space weather, fire weather, and greater knowledge of the weather-climate linkage. Other needs include a better understanding of human behavior and decision-making during weather-related events and the formulation and communication of forecast uncertainty, or forecast confidence. Improving forecast and decision-support tools, NOAA Information Technology (IT) infrastructure, and data architecture (including the four-dimensional environmental information database known as the 4-D Cube, which is discussed further below) will ensure data and information are available, accessible, and timely.

Over the next five years, evidence of progress toward this objective will include:

- Fewer weather-related fatalities;

- Improved community preparedness leading to fewer weather-related fatalities; and

- Avoidance of economic loss from property damage and unnecessary evacuations.

# Application Areas

- Cal/Val Applications
- Tropical Cyclone Applications
- Cryosphere Applications
- Severe Weather/Aviation Applications
- Ocean/Coastal Applications (Coral Bleaching, Harmful Algle Bloom alerts)
- Land Applications (Agriculture, Droughts)
- Hazards Applications (Smoke, Fire, Aerosols, Air Quality, Flash Floods)
- Data Assimilation Applications
- Imagery/Visualization Applications
- Climate Applications

# Developer - User Application Teams (DUAPs)

NWP Team

Tropical Cyclone Team

Fire Weather & Air Quality Team

Severe Weather and Transportation Hazard Team

Ocean Ecosystems Team

Land Ecosystems Team

Cryosphere Team

Hydrology Team

Testbed Team

# Proposal Selection Process

Review board consisting of NOAA representatives knowledgeable of NOAA priorities and operational activities

Board:

- JPSS Program Scientist (PGRR Chair)
- JPSS User Liaison
- JPSS STAR JPSS PGRR Co-Chair
- JPSS STAR EDR Chair
- GOES-R Program Scientist
- NESDIS OSPO Representative
- NWS representatives (Data Assimilation /Nowcasting)
- NOS representative
- OAR representative
- Climate representative

# Current Projects

# JPSS Current Portfolio of User Engagement activities

- **JCSDA CrIS/ATMS Radiance Assimilation Experiments**
  - POCs – Sid Boukabara (NOAA), Nancy Baker(NRL)
  - Outcome - Impact assessments and improved utilization of radiances
- **Alaska High Latitude Proving Ground**
  - POC – Gary Hufford/Tom Heinrich
  - Outcome - Upgrade X-band receiver, generate NPP products, forecaster training, product evaluation and feedback, compare operational products with alternative products using CSPP.
- **Community Satellite Processing Package (CSPP)**
  - POC – Allen Huang/Liam Gumley
  - Outcome - Software package/testbed containing IDPS algorithms and capability of alternative algorithms for intercomparisons

# JPSS Current Portfolio of User Engagement activities

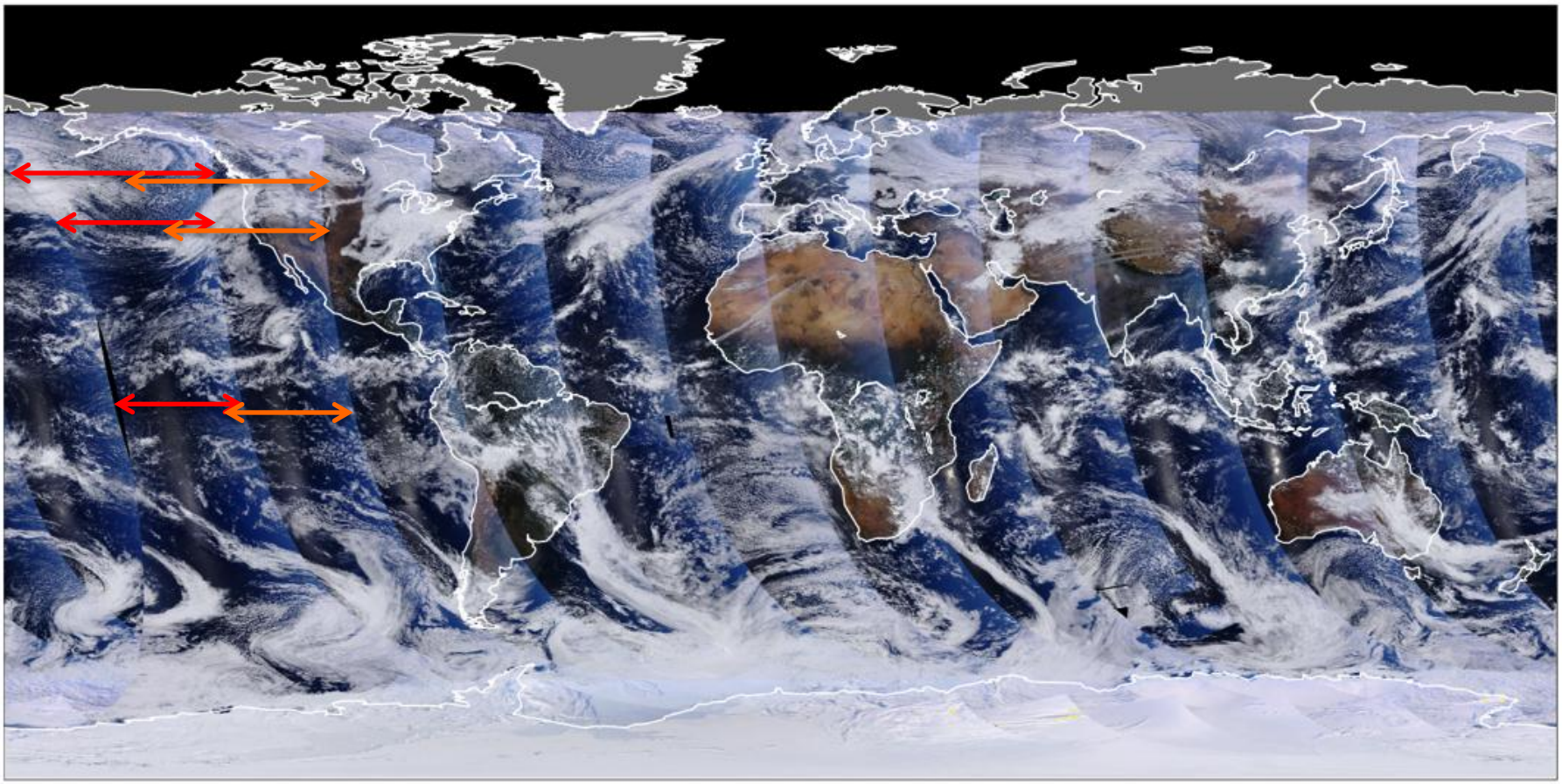
- **Utility of NPP/JPSS Data to Improve Situational Awareness and Short-term Forecasts in WFO Operations**
  - ✓ POC – Gary Jedlovec, SPORT
  - ✓ Outcome - AWIPS/AWIPSII plug-ins for VIIRS SDRs/EDRs, RGB products, training of selected WFOs by adapting current MODIS and AIRS modules, feedback, close coordination with Alaska Proving Ground, and with NRL, CIRA and CIMSS.

**SPoRT will use established collaborative partnerships to disseminate VIIRS data and products to various WFOs to engage forecasters in an evaluation of selected products to address specific forecast challenges.**

# JPSS Current Portfolio of User Engagement activities

- **Application of JPSS Imagers and Sounders to Tropical Cyclone Track & Intensity Forecasting**
  - POC – Mark DeMaria, John Knaff, Steve Miller
    - Users – Brennan, Beven (NHC), Fukada (JTWC)
  - Outcome - VIIRS will improve center location, Soundings from CrIS and ATMS to improve intensity forecasting. Information used in existing operational statistical-dynamical intensity forecast model. Strong user engagement with forecasters at NHC and JTWC.
- **NRL/CIRA NEXSAT VIIRS Imagery Demonstrations**

# First Global VIIRS Image



VIIRS RGB (True Color), 20111122

R : M05 (0.672 $\mu$m); G : M04 (0.555 $\mu$m); B : M02 (0.445 $\mu$m)

Creation date: 2011-11-26 07:19:26 Z

# VIIRS has a very large cross track and near constant spatial resolution

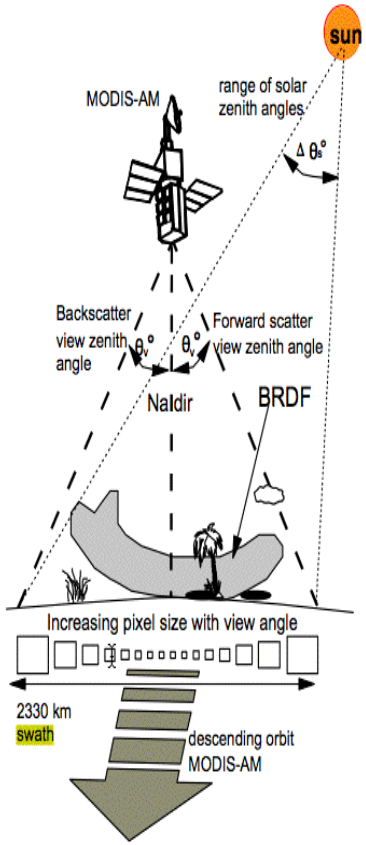
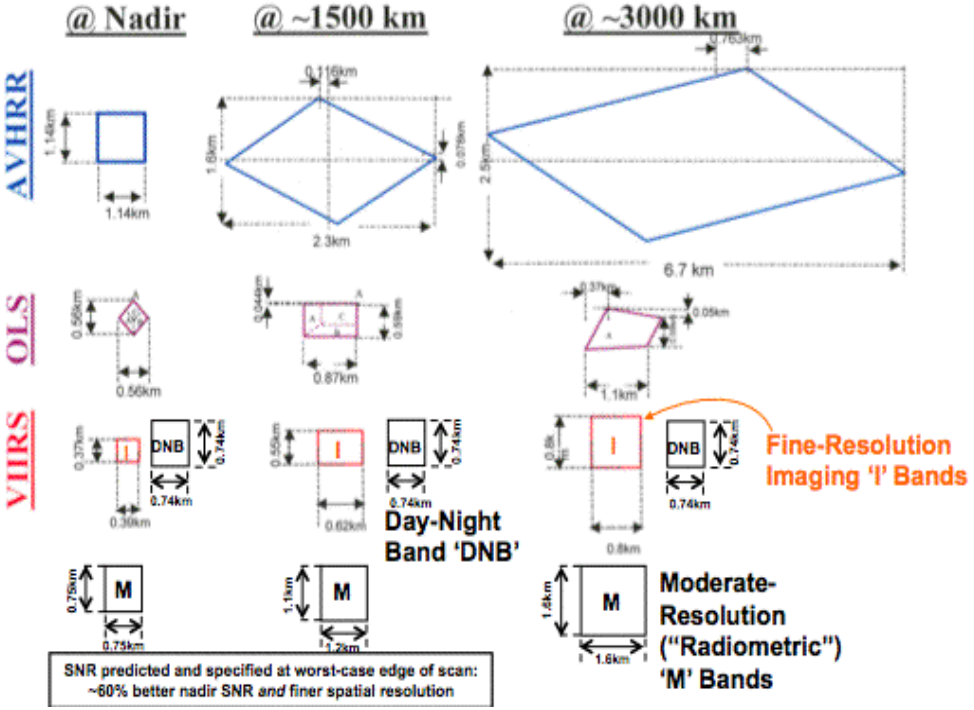


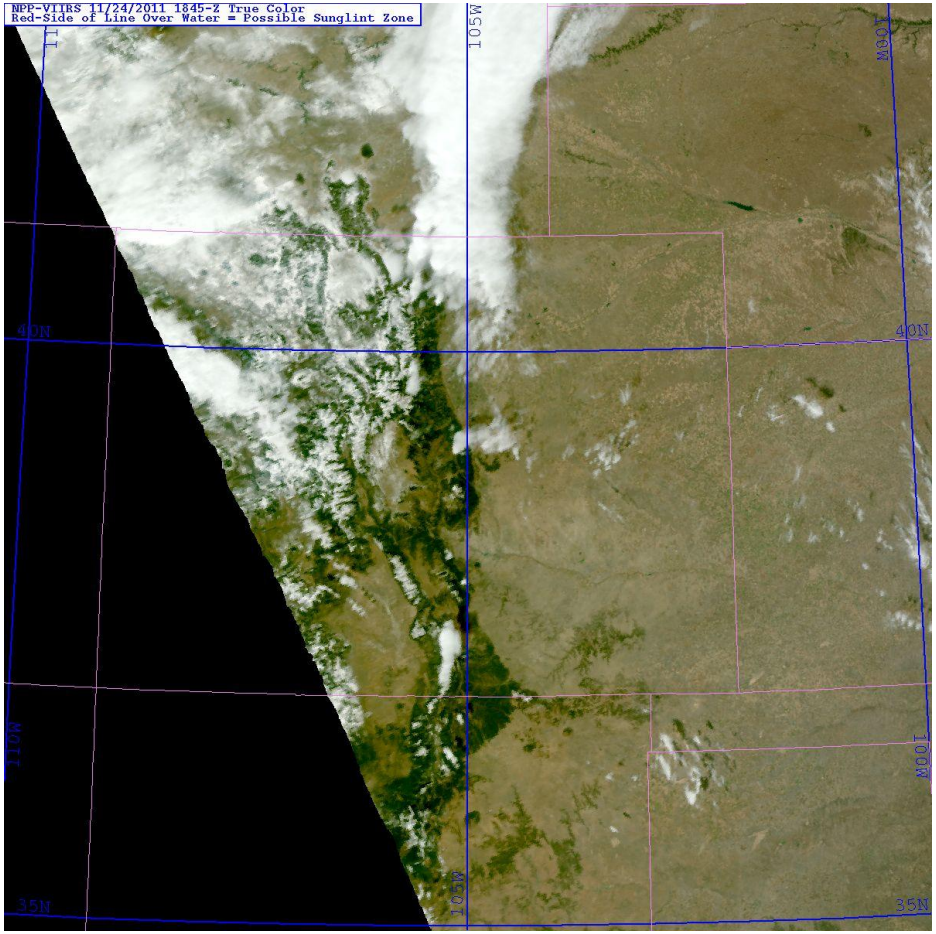

*Figure 3.2.3: Illustration of MODIS data acquisition on the EOS-AM platform (not to scale). The bidirectional reflectance distribution function (BRDF) changes with view and sun geometry. Notice the shadow caused by clouds and canopy. MODIS pixel dimensions, cross-track and along-track, change with scan angles: 0° - 250 x 250 m; 15° - 270 x 260 m; 30° - 350 x 285 m; 45° - 610 x 380 m*



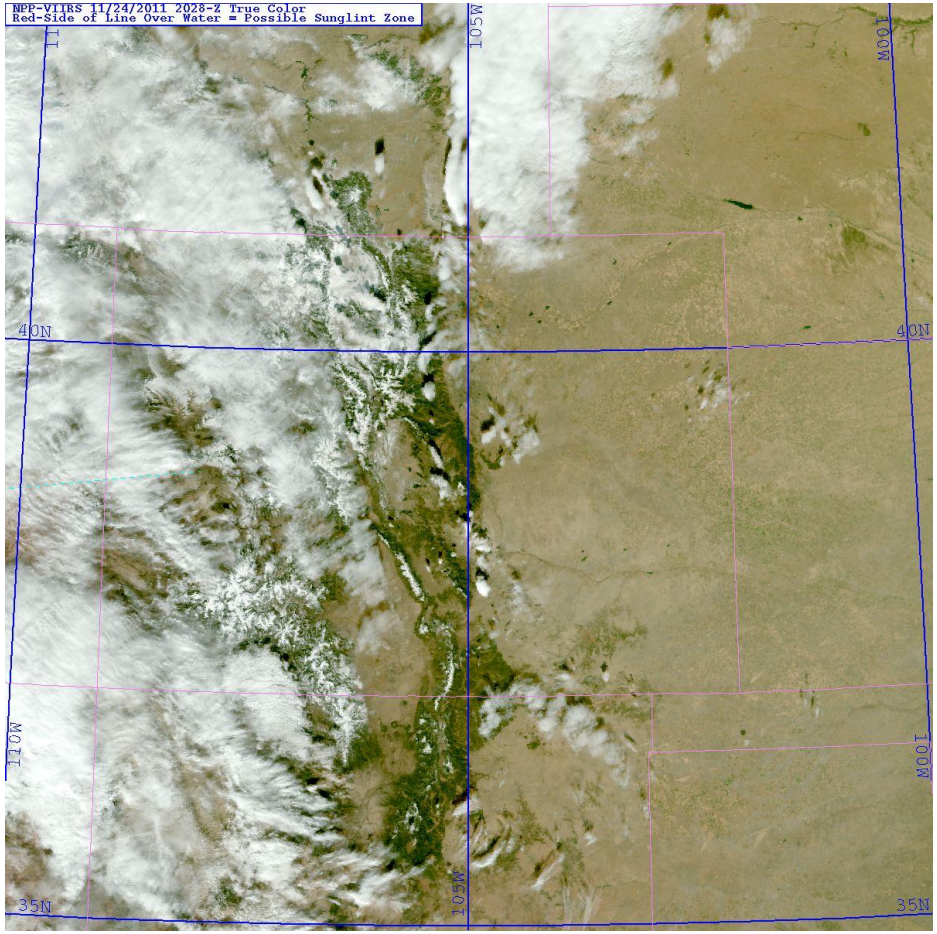
# NPP VIIRS True Color Examples

## Colorado

11.24.2011 1845 Z, Near Edge of Scan



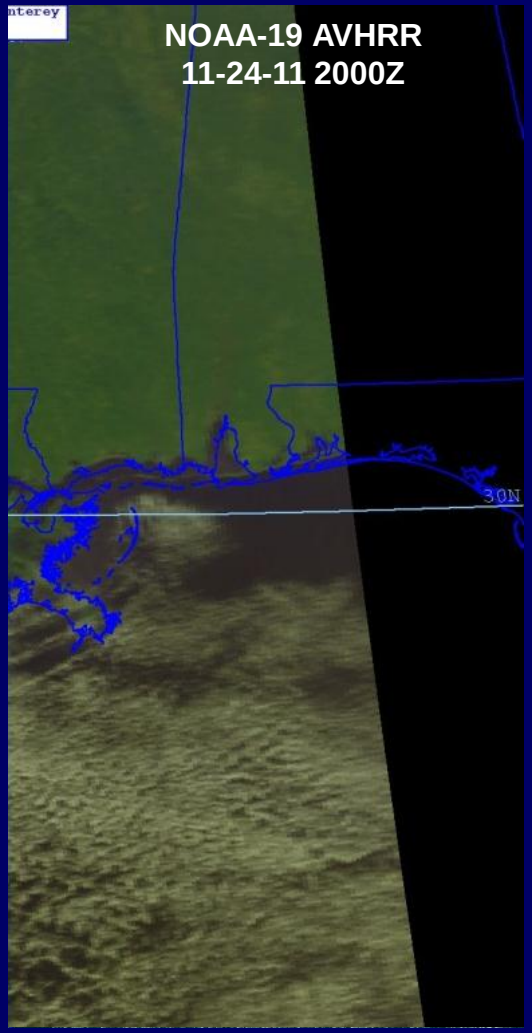

11.24.2011 2028 UTC, Near Nadir

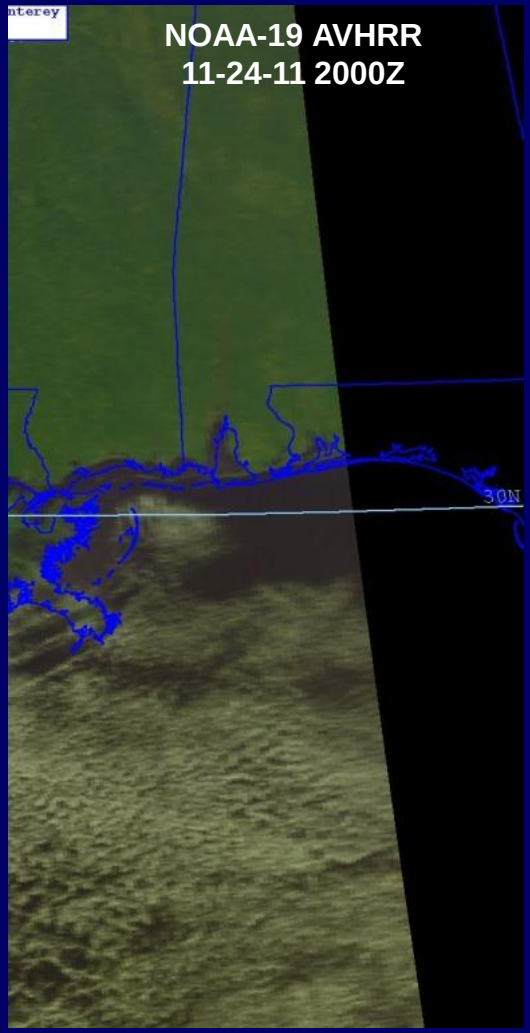



→ VIIRS maintains similar spatial resolution quality at edge of 3000 km swath

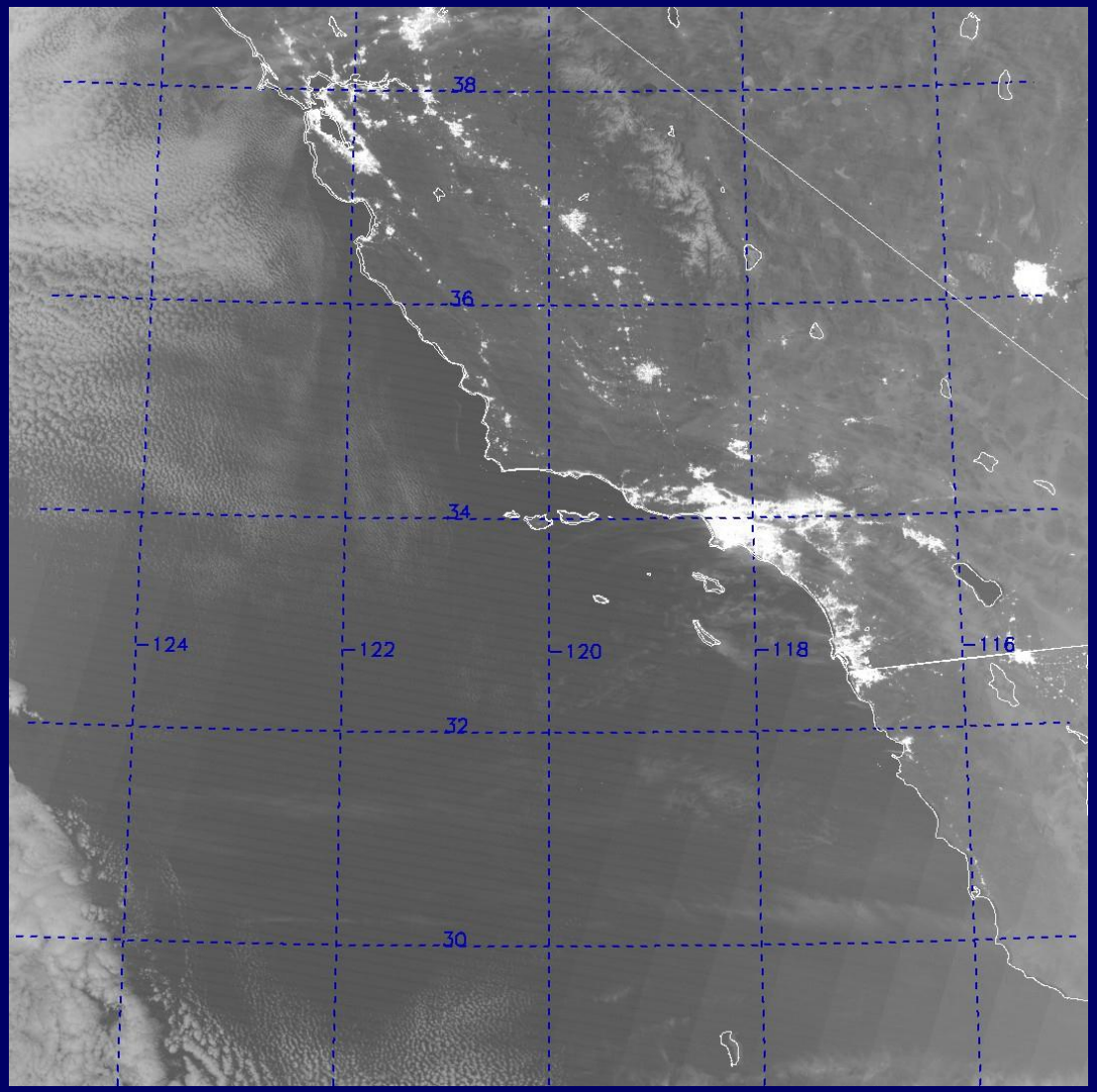
# NPP VIIRS True Color Examples

## Edge of Scan Intercomparisons

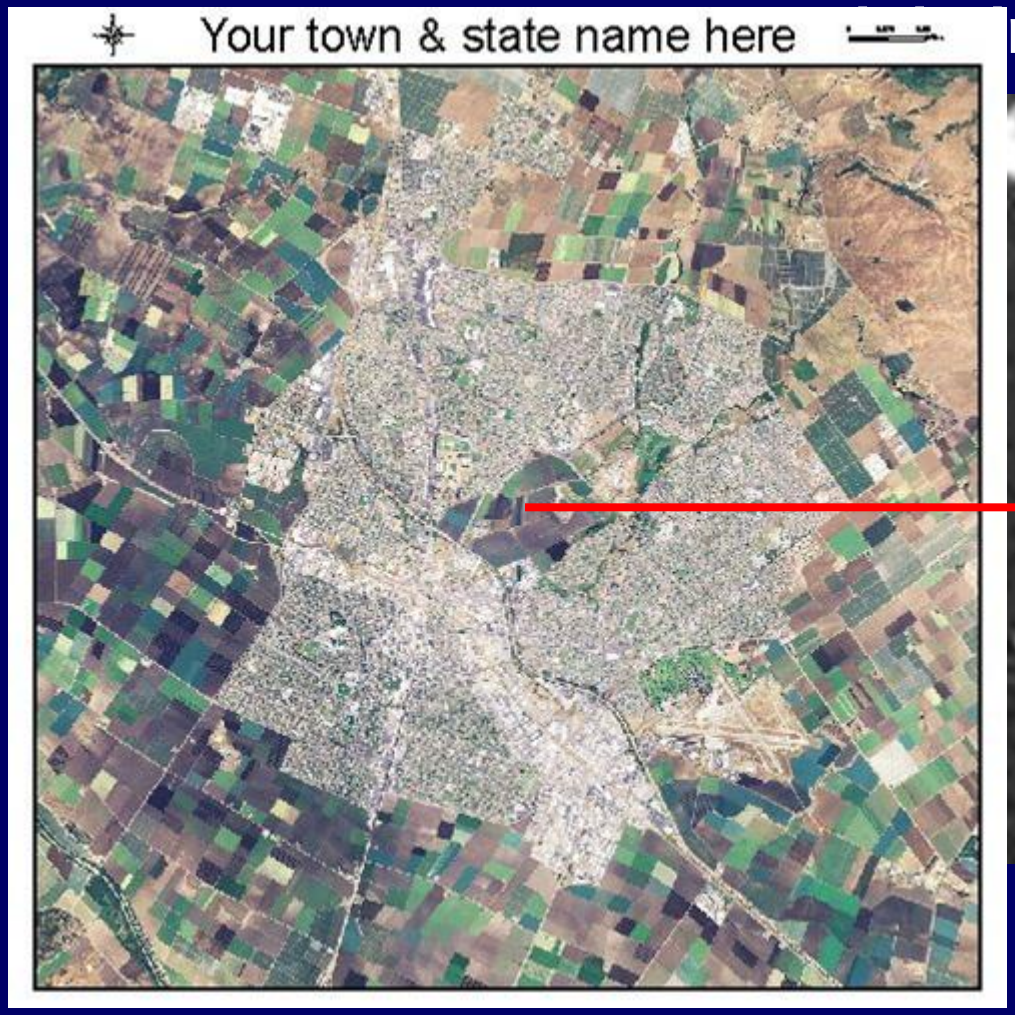



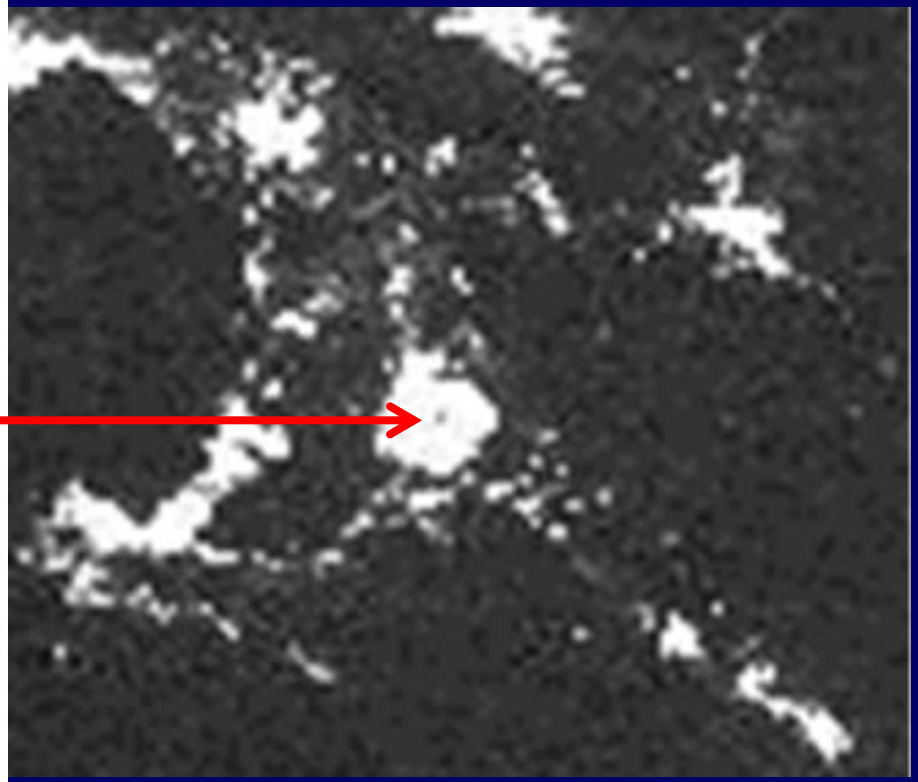
# NPP VIIRS DNB Example



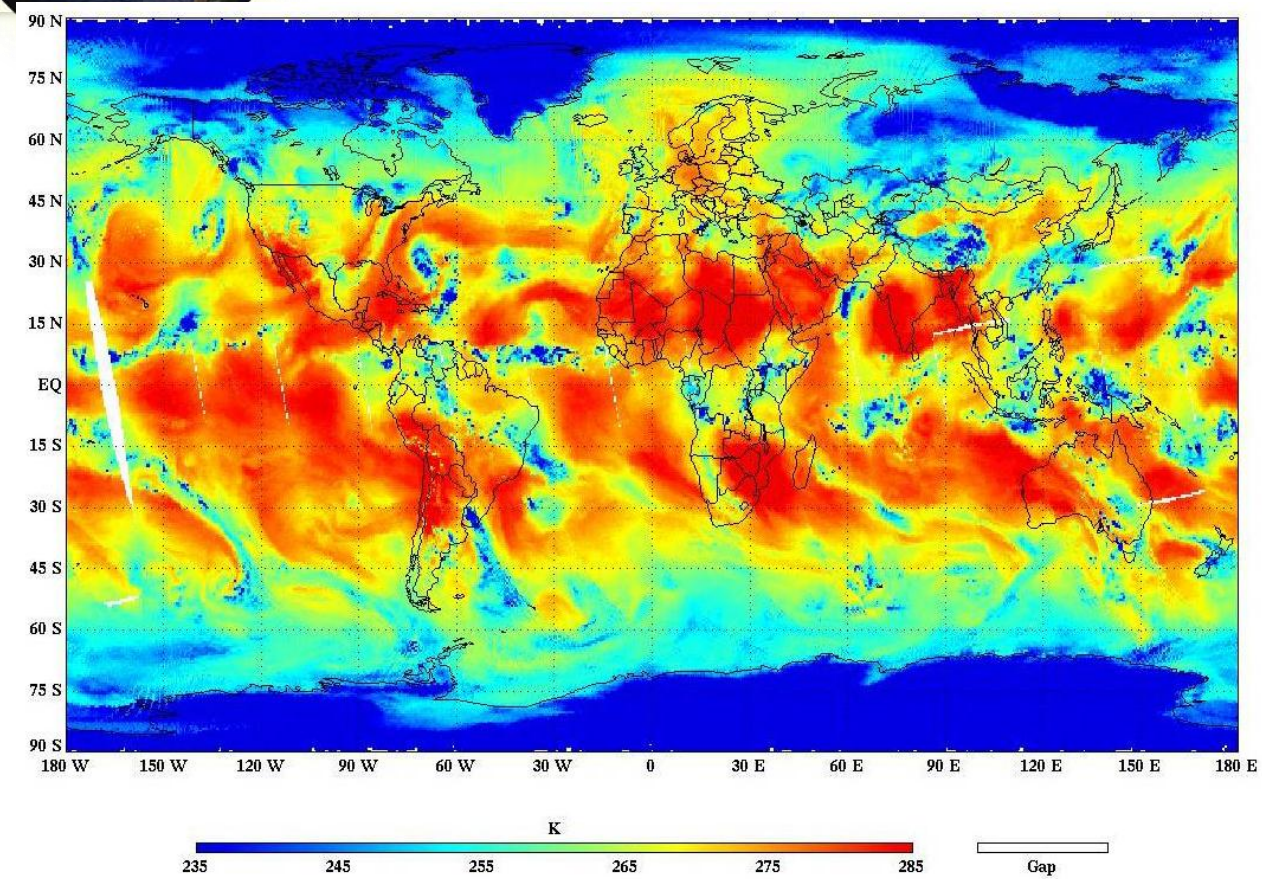
# NPP VIIRS DNB Examples

## Agriculture “hole” in Salinas (dark spot in mage)



# First global ATMS image showing the channel 18-microwave antenna temperature at 183.3 GHz on November 8, 2011



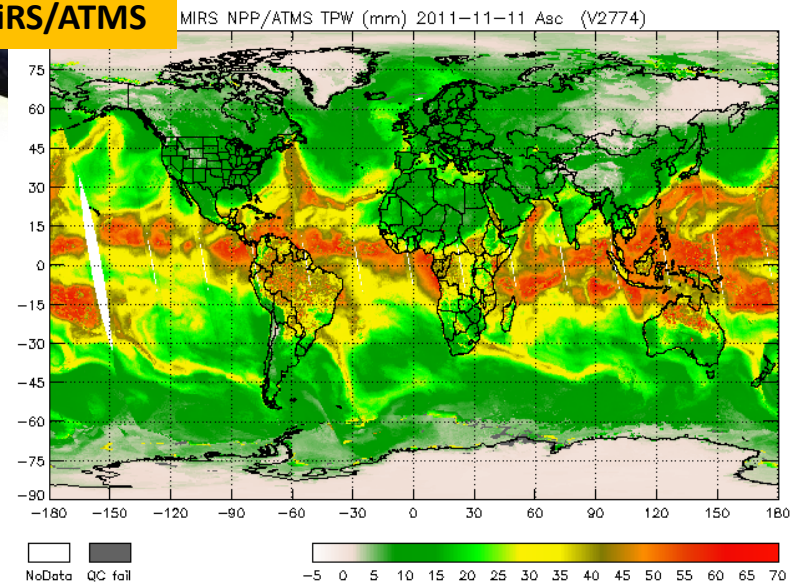

**The ATMS data were processed at the NOAA Satellite Operations Facility (NSOF) in Suitland, MD and the image was generated by STAR**

**Quality of the image is superb, no indication of instrument artifacts, and by design no orbital gaps**

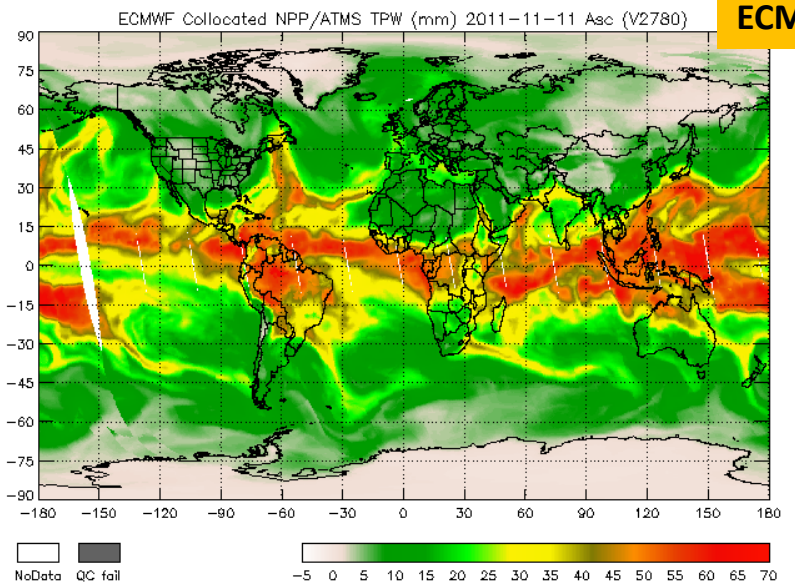
**This channel measures atmospheric water vapor; note that Tropical Storm Sean is visible in the data, as the blue patch due to heavy precipitation, in the Atlantic off the coast of the Southeastern United States.** ***ATMS provides critical water vapor information for weather forecasting and storm intensity assessments***

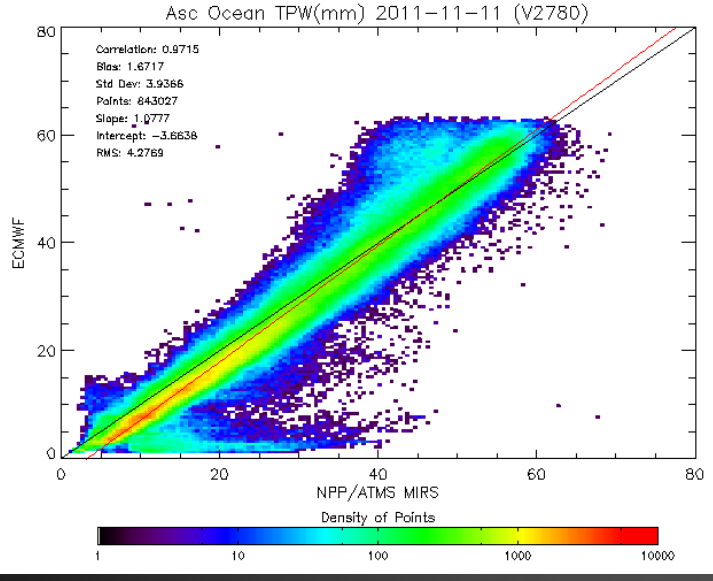
# ATMS Preliminary Assessment
# Total Precipitable Water

**MiRS/ATMS**

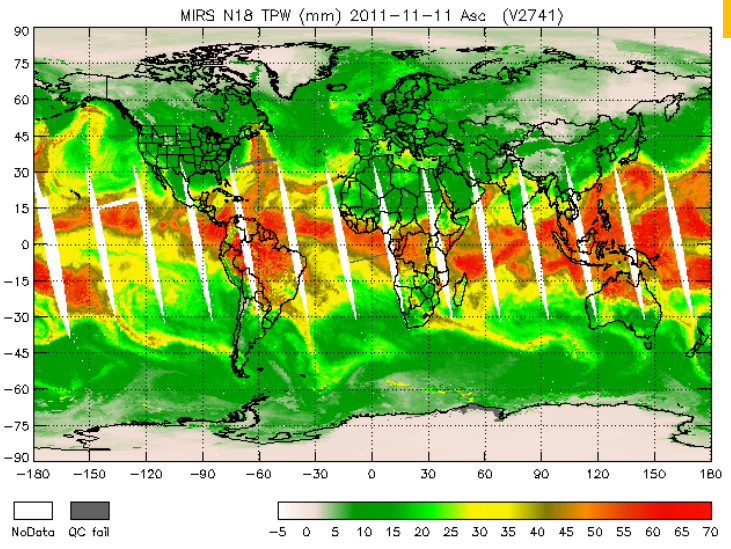



**ECMWF**




**MiRS/N18**





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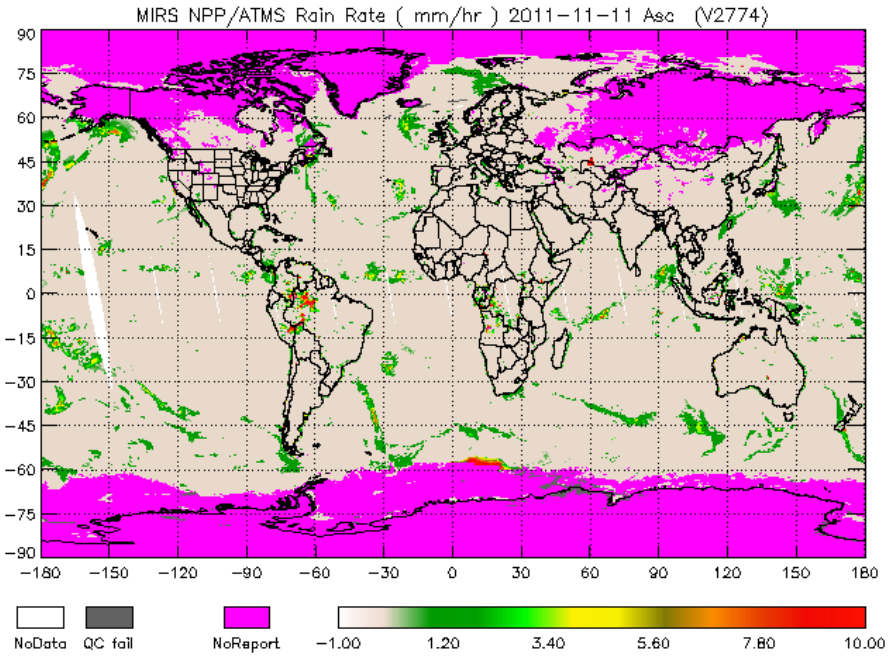
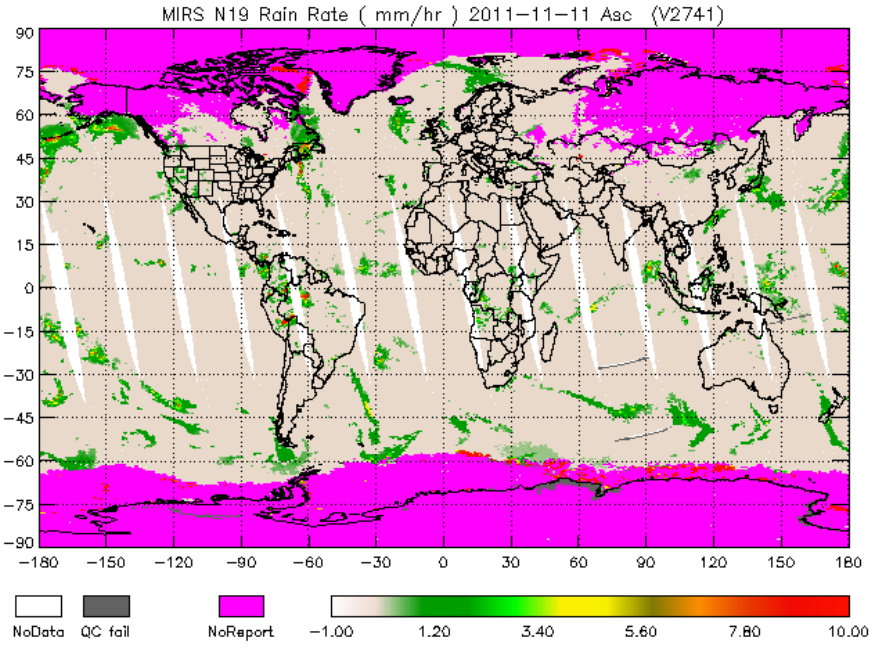
# ATMS Preliminary Assessment
## *(Rainfall Rate)*

**MiRS/ATMS**




**MiRS/N19 AMSU-MHS**





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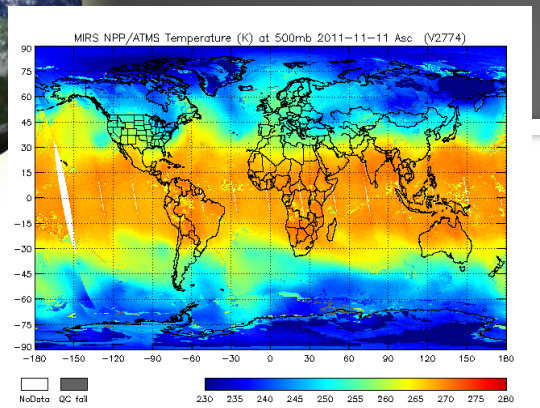
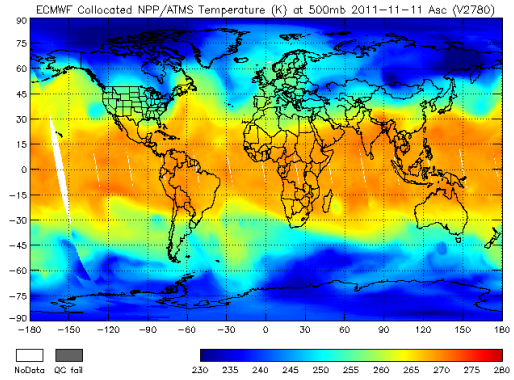
# ATMS Preliminary Assessment

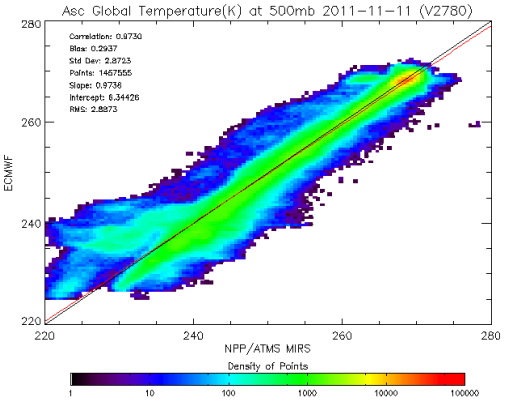
*(Temperature Soundings Using ECMWF as a reference)*

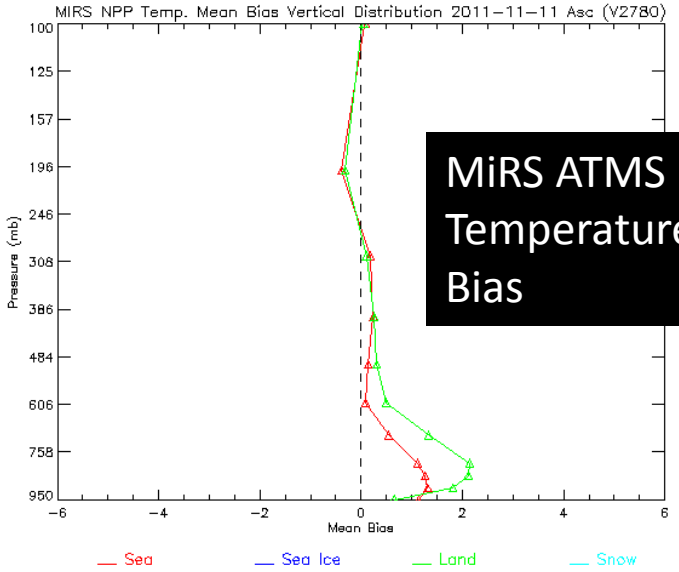
MiRS ATMS
500 mb T



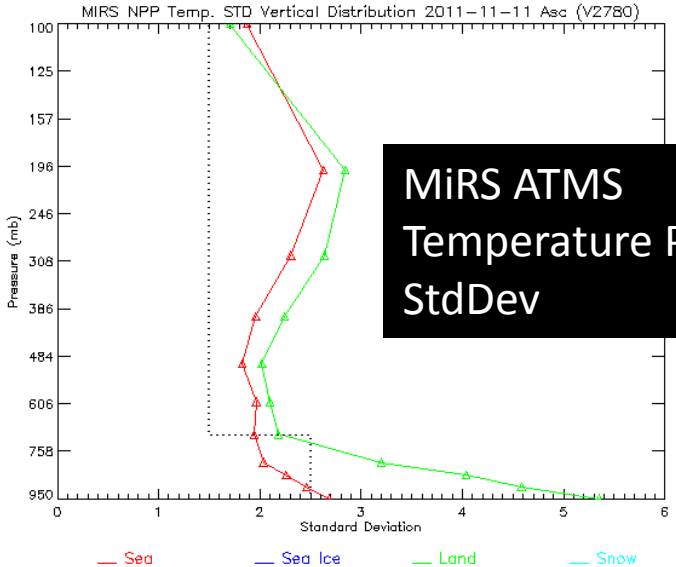

ECMWF
500 mb T




MiRS ATMS
Temperature Profile
Bias




MiRS ATMS
Temperature Profile
StdDev



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