

# JPSS DPA Program Annual Review

## SDR Team Accomplishment Highlights

- *Coordinated and worked closely with CalVal community*
- *Established a peer-reviewed process for NPP products*
- *All SDR products have reached or passed the beta version and SDR teams are planning for the provisional product review in October 2012*
- *Submitted more than 500 DRs and resolved many software processing bugs in IDPS*
- *Engaged in broader community through JPSS SDR/EDR presentations*
- *Enhanced operational capability through STAR ICVS LTM*s
- *Developed innovative calval sciences for JPSS program*
- *Published one paper in JGR and one in IEEE GRSL*
- *Planning for NPP CalVal Special Issue on IEEE TGRS*



September 18, 2012





# Summary of Suomi NPP TDR/SDR Algorithm Schedule

| Sensor | Beta              | Provisional (planned) | Validated (planned) |
|--------|-------------------|-----------------------|---------------------|
| CrIS   | May 7, 2012       | December, 2012        | 2013                |
| ATMS   | February 22, 2012 | December, 2012        | 2013                |
| OMPS   | March 12, 2012    | December, 2013        | 2013                |
| VIIRS  | May 2, 2012       | December, 2012        | 2013                |

## NPP SDR Product Maturity Levels

### 1. Beta

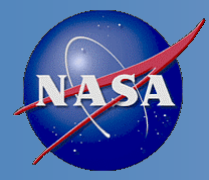
- Early release product.
- Initial calibration applied.
- Minimally validated and may still contain significant errors (rapid changes can be expected. Version changes will not be identified as errors are corrected as on-orbit baseline is not established)
- Available to allow users to gain familiarity with data formats and parameters
- Product is not appropriate as the basis for quantitative scientific publications studies and applications

### 2. Provisional

- Product quality may not be optimal
- Incremental product improvements are still occurring as calibration parameters are adjusted with sensor on-orbit characterization (versions will be tracked)
- General research community is encouraged to participate in the QA and validation of the product, but need to be aware that product validation and QA are ongoing
- Users are urged to contact NPOESS NPP Cal/Val Team representatives prior to use of the data in publications

### 3. Validated/ Calibrated

- On-orbit sensor performance characterized and calibration parameters adjusted accordingly
- Ready for use by the Centrals and in scientific publications
- There may be later improved versions
- There will be strong versioning with documentation

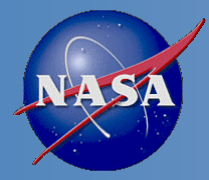


# JPSS DPA Program Annual Review

**ICVS&LTM Team**

September 18, 2012

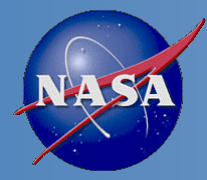




# Outlines



- STAR Team Membership
- FY-12 Accomplishments
- Scientific Advancements
- Issues, Challenges, Setbacks
- FY-13 Schedule and Milestone
- Path Forward (FY-14 thru FY-16)
- Summary



# STAR Team Membership



- Science Lead  
Fuzhong Weng

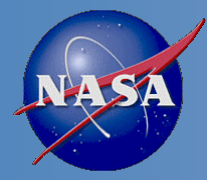
- System Lead  
Ninghai Sun

- ATMS  
Lin Lin

- CrIS  
Xin Jin

- VIIRS  
Tim Chang

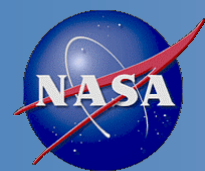
- OMPS  
Mike Grotenhuis



# FY-12 Accomplishments



- LTM system enhancements and New Capability:
  - Added NPP spacecraft data in ICVS-LTM
  - Routinely Monitored NPP Instrument Bias
  - Better OMPS
  - Corrected some bugs in NEDT calculations
  - Browsing VIIRS global image
- Delivered:
  - NPP Instrument Performance Monitoring Website (Trending, Bias, and Products)
  - NPP ATMS/CrIS Software Tools (readers, imaging processing, documents, etc.)



# NOAA Instrument Long-Term Monitoring System



**STAR** Center for Satellite  
Applications and Research  
*formerly ORA — Office of Research and Applications*



NOAA Satellite and Information Service  
National Environmental Satellite, Data, and Information Service (NESDIS)

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»Integrated Cal/Val System

»NPP Instruments

»Instrument Performance  
Monitoring - Telemetry >>

- IPP S/C Telemetry
- **IPP ATMS >>**
- IPP CrIS
- IPP VIIRS
- IPP OMPS

- IIOAA-19 AMSU-A
- IIOAA-19 MHS
- IIOAA-19 AVHRR
- IIOAA-19 HIRS

- MetOP-A AMSU-A
- MetOP-A MHS
- MetOP-A AVHRR
- MetOP-A HIRS

- IIOAA-18 AMSU-A
- IIOAA-18 MHS
- IIOAA-18 AVHRR
- IIOAA-18 HIRS

- DMSP F16 SSMIS
- DMSP F17 SSMIS
- DMSP F18 SSMIS

- GOES-11 Sounder
- GOES-12 Sounder
- GOES-13 Sounder
- GOES-14 Sounder
- GOES-15 Sounder

»Instrument Performance  
Monitoring - Bias

»Products Demonstration

Data and images displayed on  
STAR sites are provided for  
experimental use only and are  
not official operational IIOAA  
products. [More information>>](#)

## Satellite Integrated Calibration / Validation System (ICVS)

### ATMS Channel NedT

All Channel Snapshot

### ATMS Channel Gain

All Channel Snapshot

### ATMS Cold Calibration Count

All Channel Snapshot

### ATMS Warm Calibration Count

All Channel Snapshot

### ATMS 4-Wire PRTs

K,Ka,V-Band Sensor

### ATMS Receiver Shelf 2-Wire PRTs

K-Band

### ATMS 2-Wire PRT (27 PRTs)

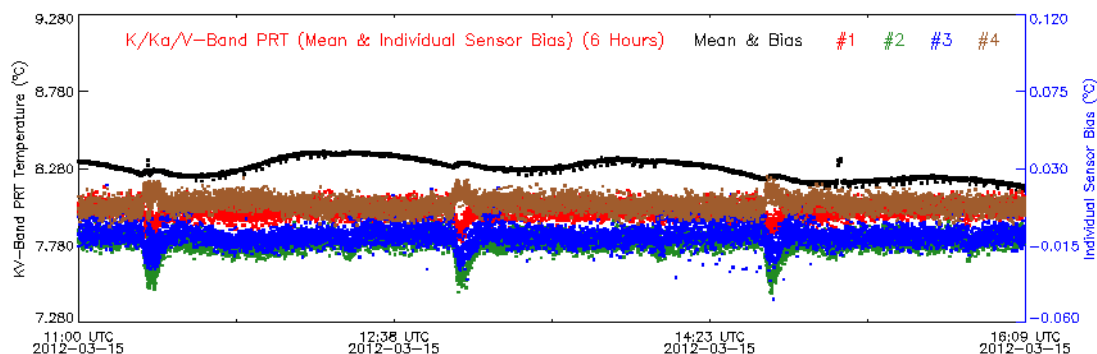
K-Band Receiver Front End Temperature

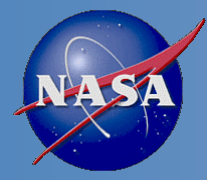
### ATMS Health/Status Analog Parameters (35 Index)

Signal Processing Assembly +5V Secondary Voltage

## NPP ATMS K, Ka, V-Band 4-Wire PRTs Science RDR

(Updated at Thu Mar 15 18:30:56 2012 UTC)

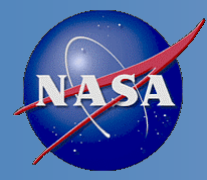




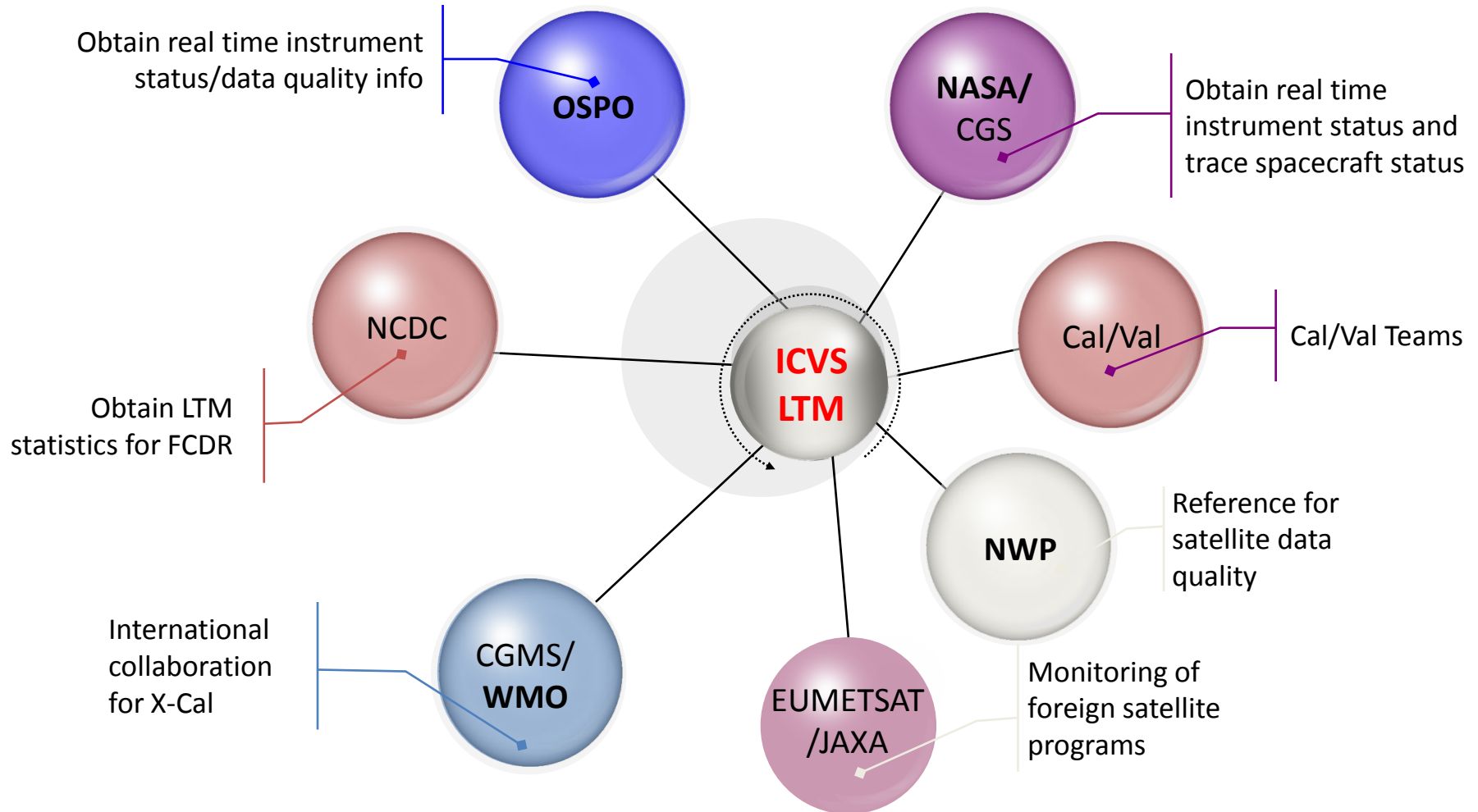
# Major Benefits from Instruments LTM



- 1. Identify bugs and flaws in ground processing systems**
- 2. Characterize the instrument in-orbit performance (e.g. noise for NWP)**
- 3. Update the processing coefficient files (PCT) and lookup table (LUT)**
- 4. Detect instrument anomaly and provide the root-cause analysis**
- 5. Provide the alert and warning to user community on satellite data quality**

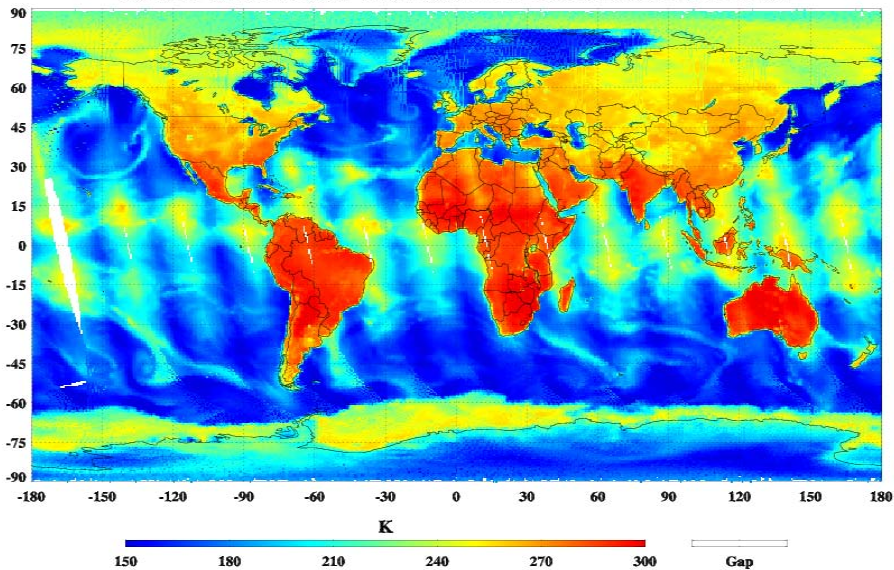


# LTM Primary Users



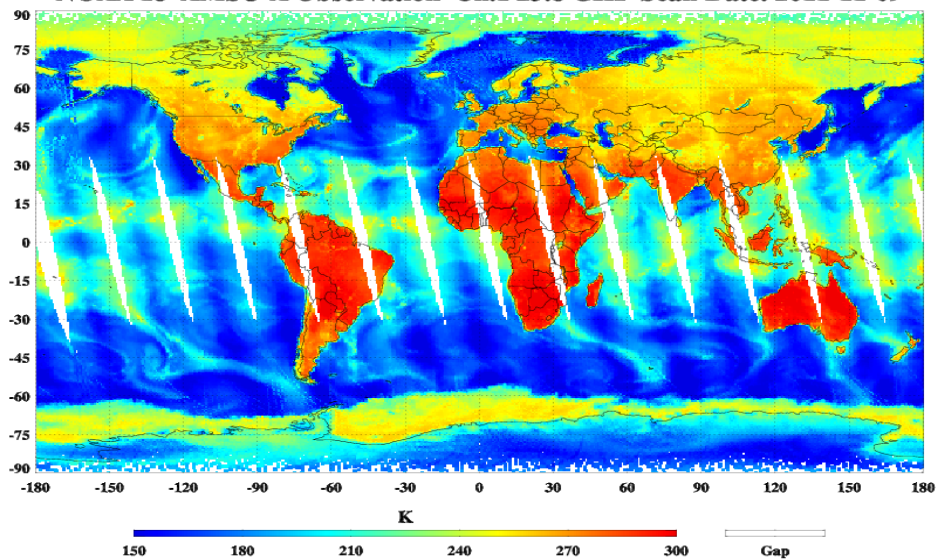
## ATMS Observation Ch.1 Ascending

ATMS Observation Ch.1 23.8 GHz Scan Date: 2011-11-09



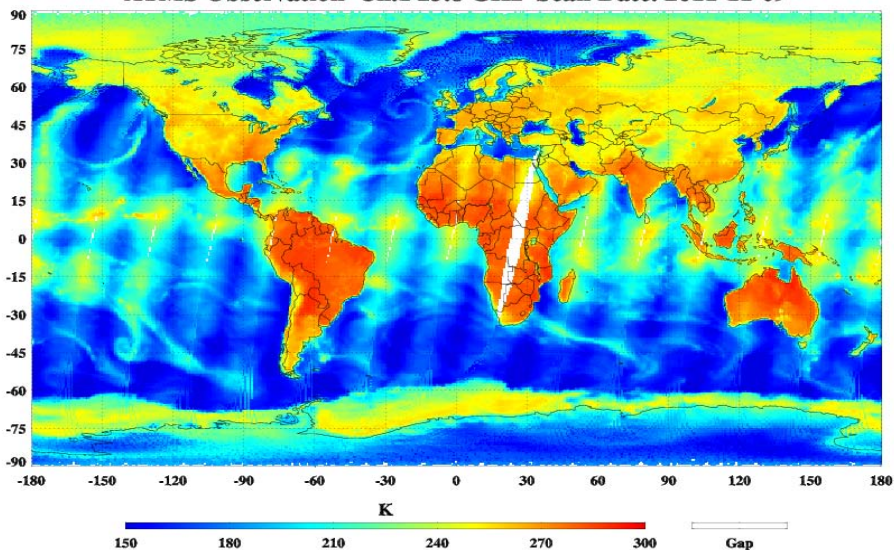
## NOAA 18 AMSU-A Observation Ch.1 Ascending

NOAA 18 AMSU-A Observation Ch.1 23.8 GHz Scan Date: 2011-11-09



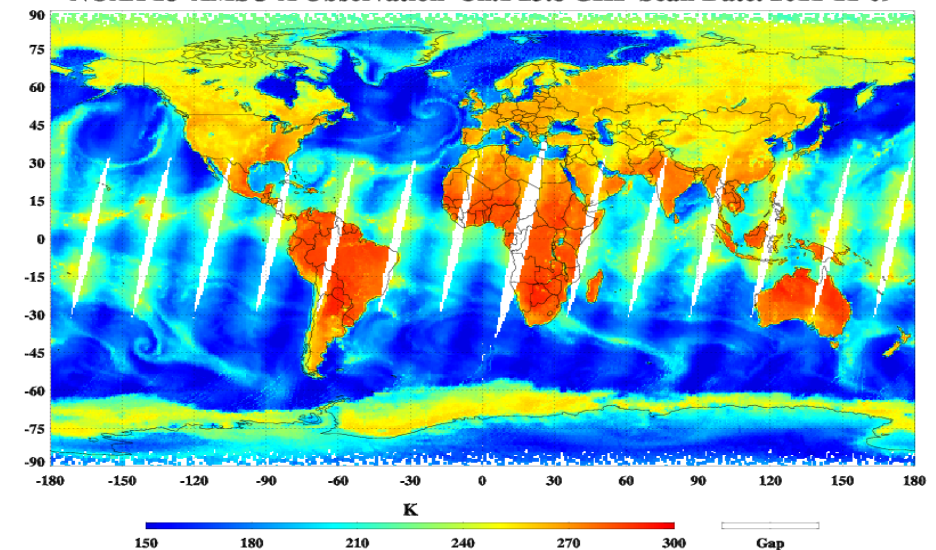
## ATMS Observation Ch.1 Descending

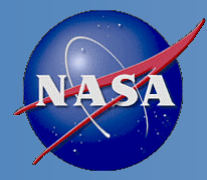
ATMS Observation Ch.1 23.8 GHz Scan Date: 2011-11-09



## NOAA 18 AMSU-A Observation Ch.1 Descending

NOAA 18 AMSU-A Observation Ch.1 23.8 GHz Scan Date: 2011-11-09

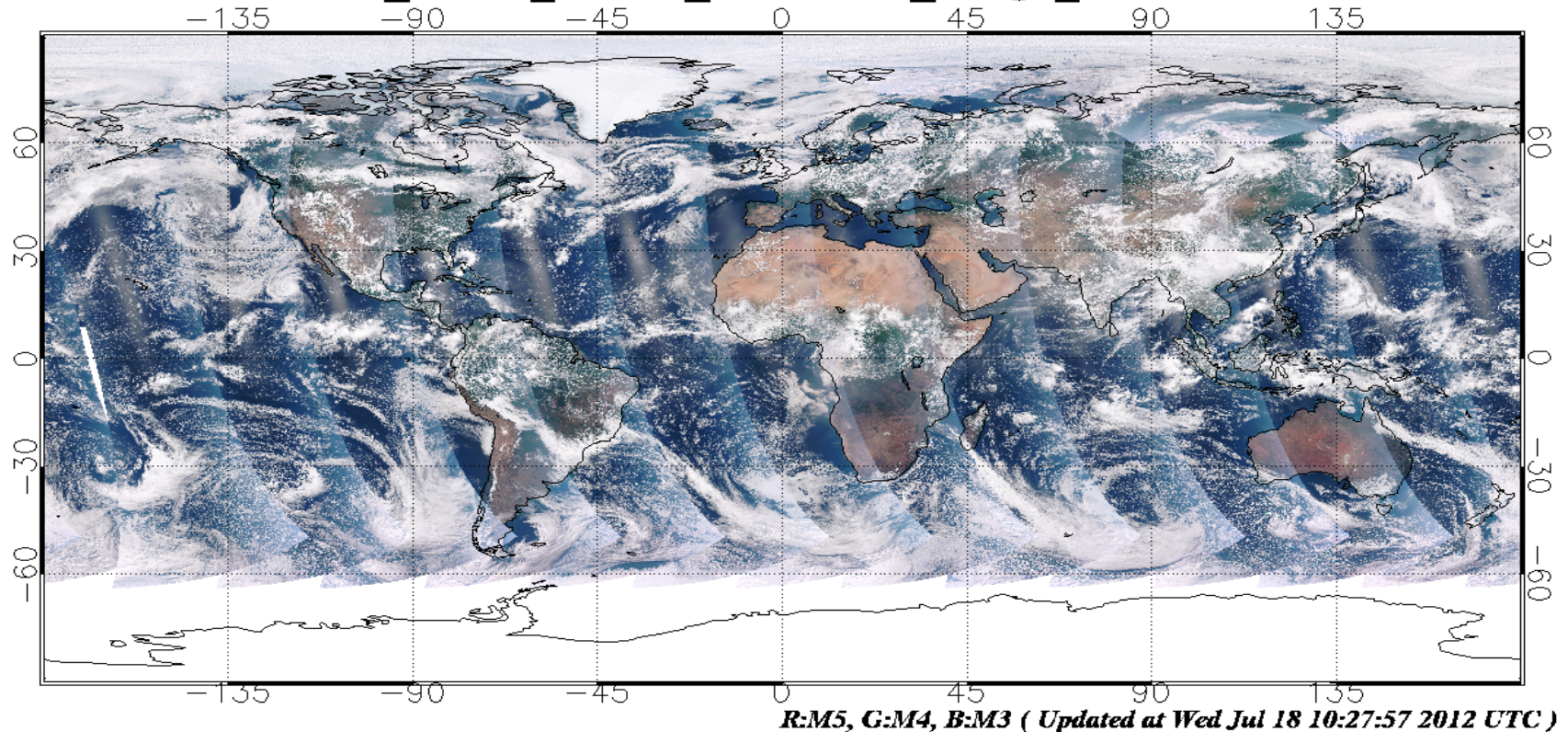


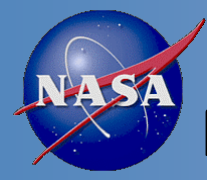


# FY-12 Accomplishments (example: On-line Browsing of VIIRS RGB True Color)

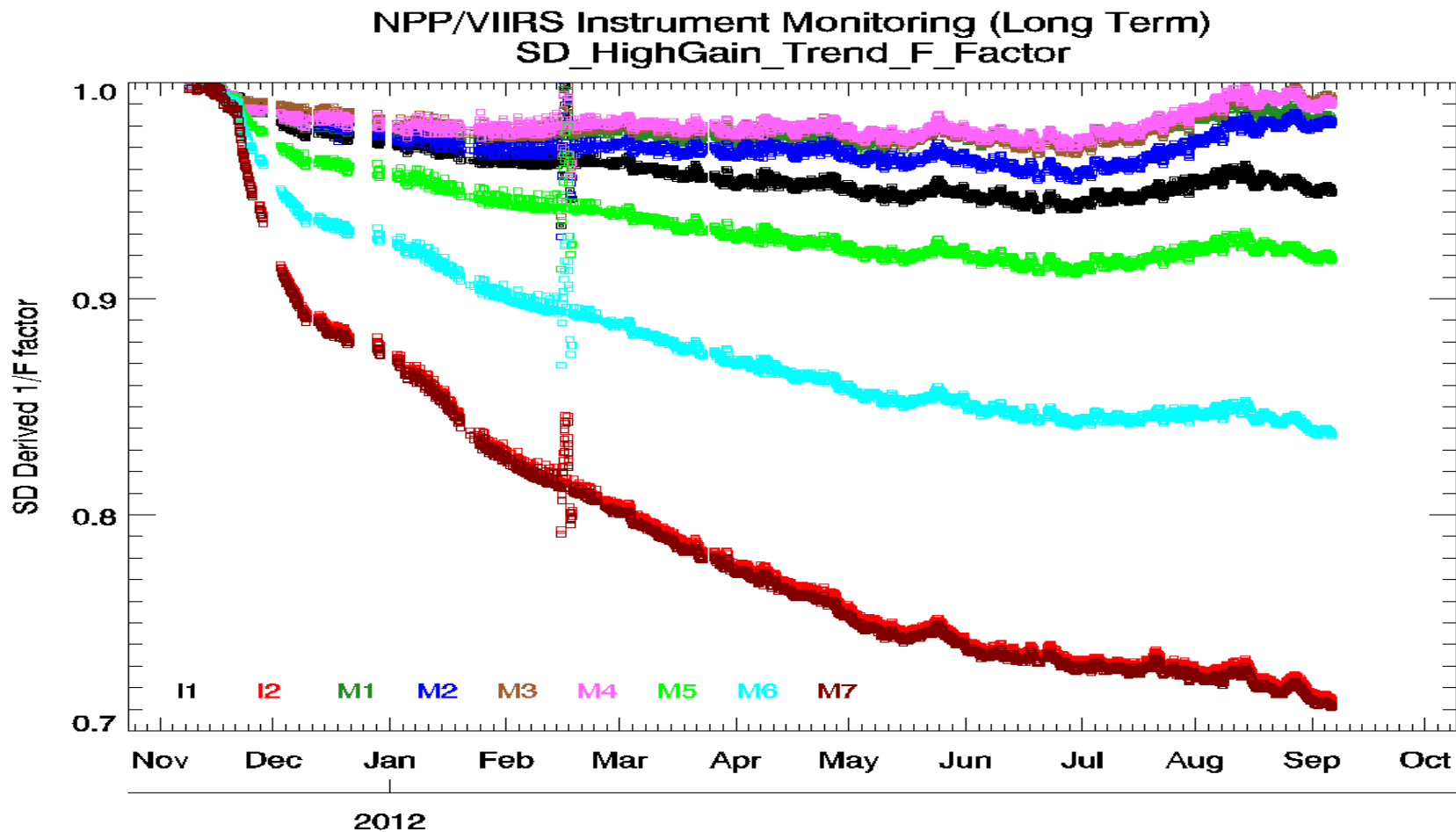


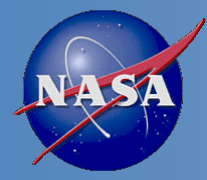
*NPP\_VIIRS\_Global\_TrueColor\_Image\_20120716*





# FY-12 Accomplishments (Example: Preliminary Online Trending of VIIRS F-/H-factors)





# NPP Data Collocation with COSMIC



- **Time period of data search:**

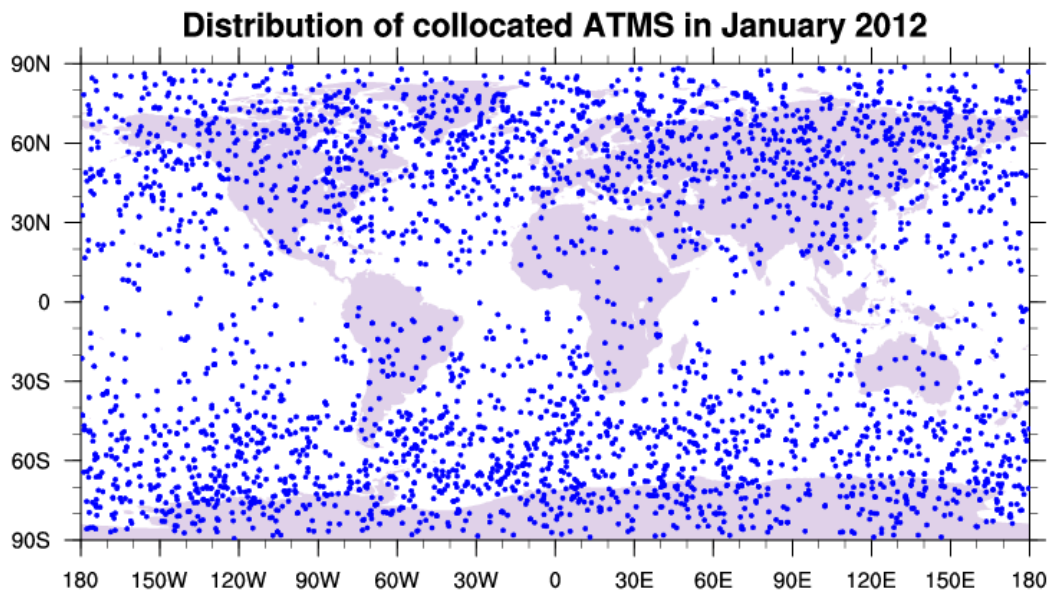
January, 2012

- **Collocation of CloudSat and COSMIC data:**

Time difference  $< 0.5$  hour

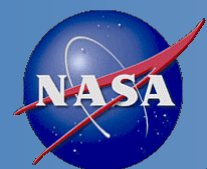
Spatial distance  $< 30$  km

(GPS geolocation at 10km altitude is used for spatial collocation)

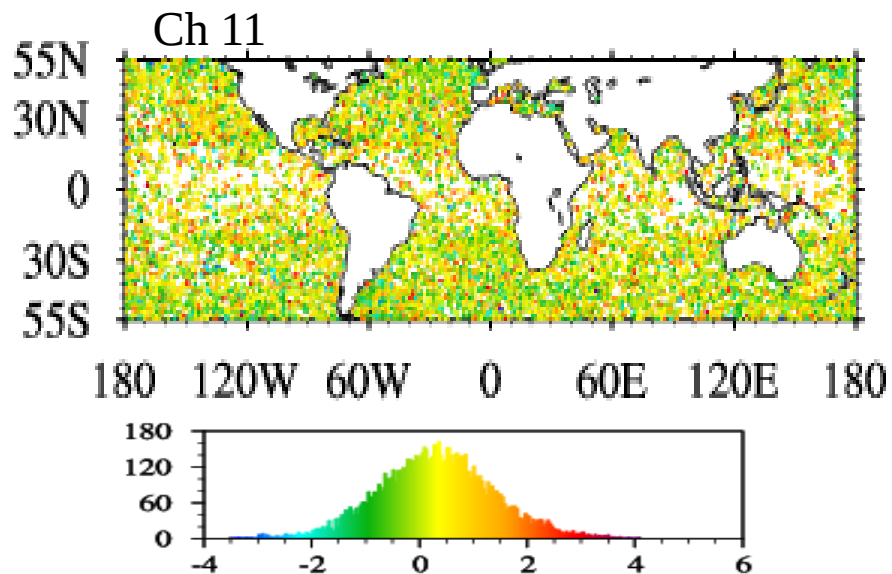
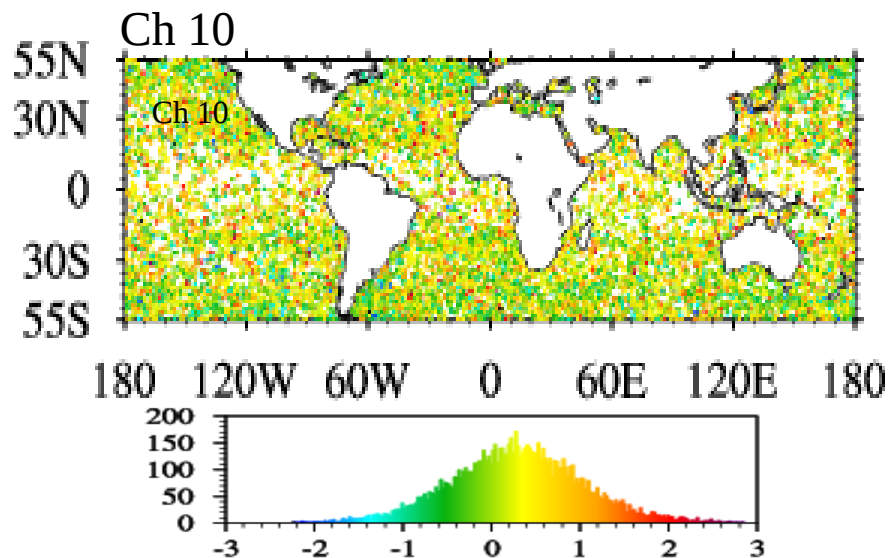
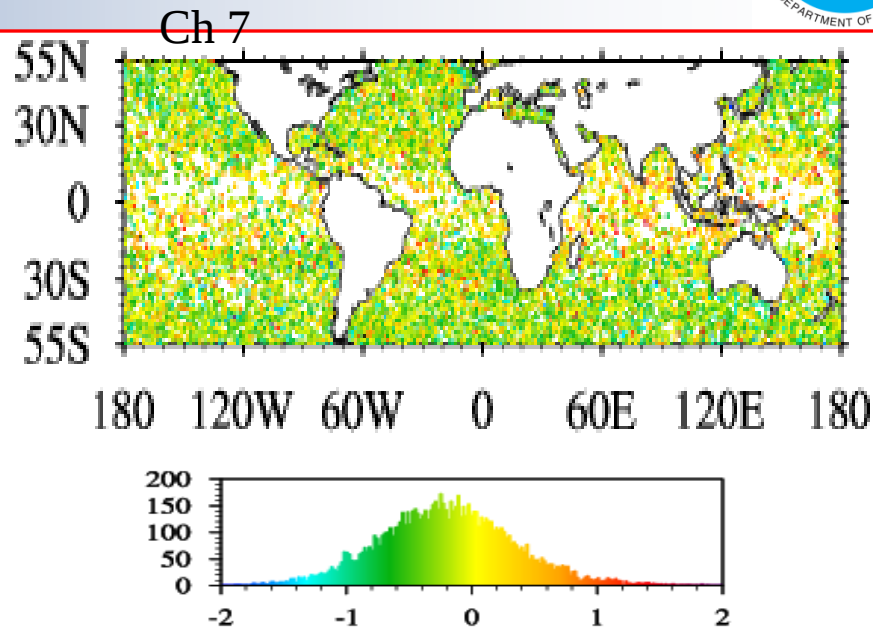
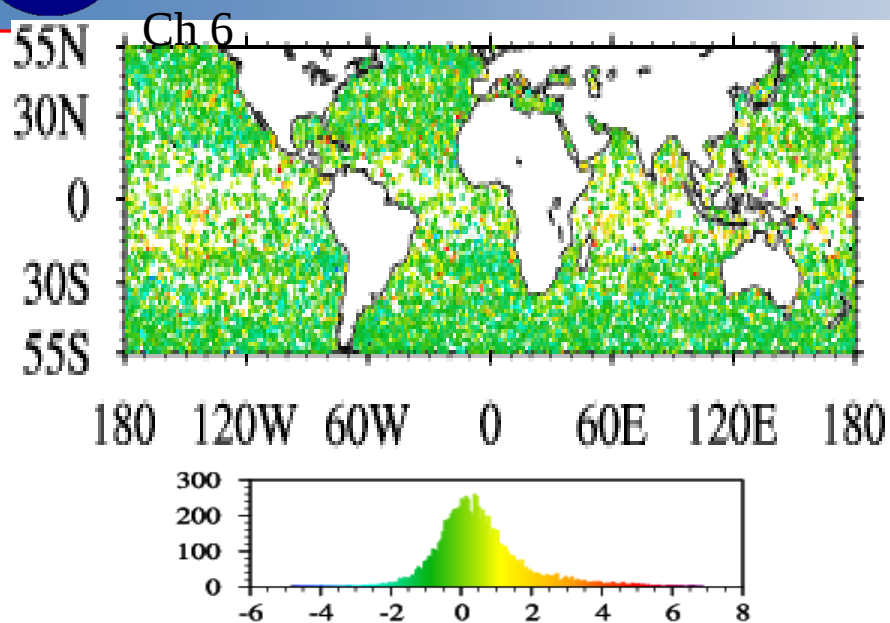


**3056** collocated  
measurements

*Courtesy of Lin Lin, STAR*

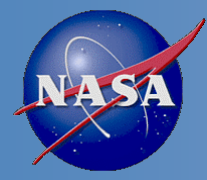


# ATMS Bias Obs (TDR) - GPS Simulated

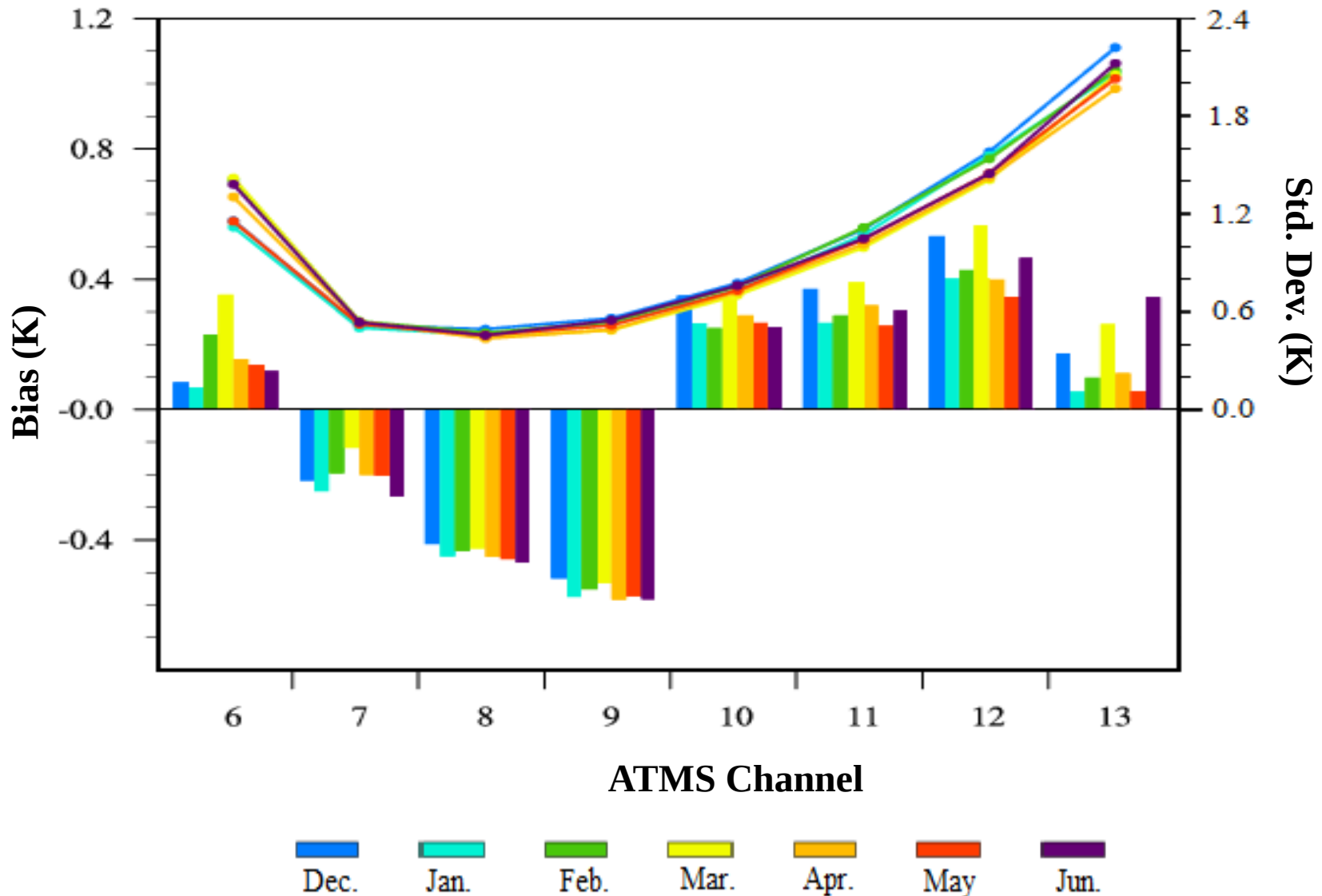


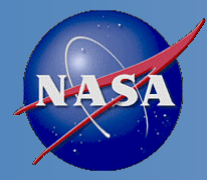
O-GPS (K)

O-GPS (K)



# FY-12 Accomplishments ( Example: Monitoring of ATMS Sounding Channels Bias)

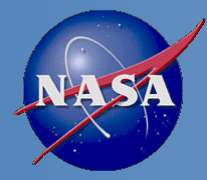




# Scientific Advancements



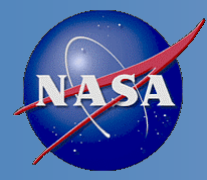
- Updated LBLRTM for CrIS and ATMS spectral calibrations with updated SRFs
- Updated the community radiative transfer model (CRTM) for VIIRS striping studies in RT channels
- Developed ATMS cloud liquid water algorithms for routine quality control of radiances biases



# Issues, Challenges, Setbacks



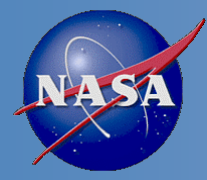
- Increasing volumes of trending meta data files requires more storages
- Transition various monitoring tools from SDR team members in different platforms and software languages into STAR operational site



# FY-13 Schedule and Milestones



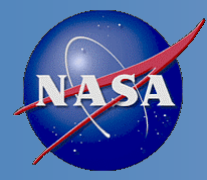
- Improve ICVS/LTM performance
  - More spacecraft status monitoring
  - More instrument Status and Performance
  - Better data quality controls
  - Verification of LUT/PCT using ICVS
- Integrate multiple LTM packages to STAR ICVS
  - SDL CrIS radiometric monitoring package
  - NGAS ATMS/CrIS radiometric monitoring package



# Path Forward (FY-14 thru FY-16)



- Improve user experience of current system for easy access and understanding
- Integrate latest instrument trending analysis of each SDR group into ICSV
- Improve the bias monitoring capability including more detailed analysis (e.g. biases wrt angular, scene, type)
- Prepare ICSV/LTM for J1 and J2 missions
- Provide periodical instrument performance analysis report to JPSS program and CGMS



# Summary



- STAR LTM system is developed for NPP/JPSS Integrated Calibration/Validation
- Advanced SDR sciences and algorithms are transitioned into operations
- The updates for NPP LUT/PCT files and IDPS processing are automated
- The calval reports related to instrument anomalies are self-generated
- Users from broader community (e.g. NWP, forecasters) are now benefited greatly from STAR LTM system