STAR Science Forum – 91st AMS Annual Meeting Presentations

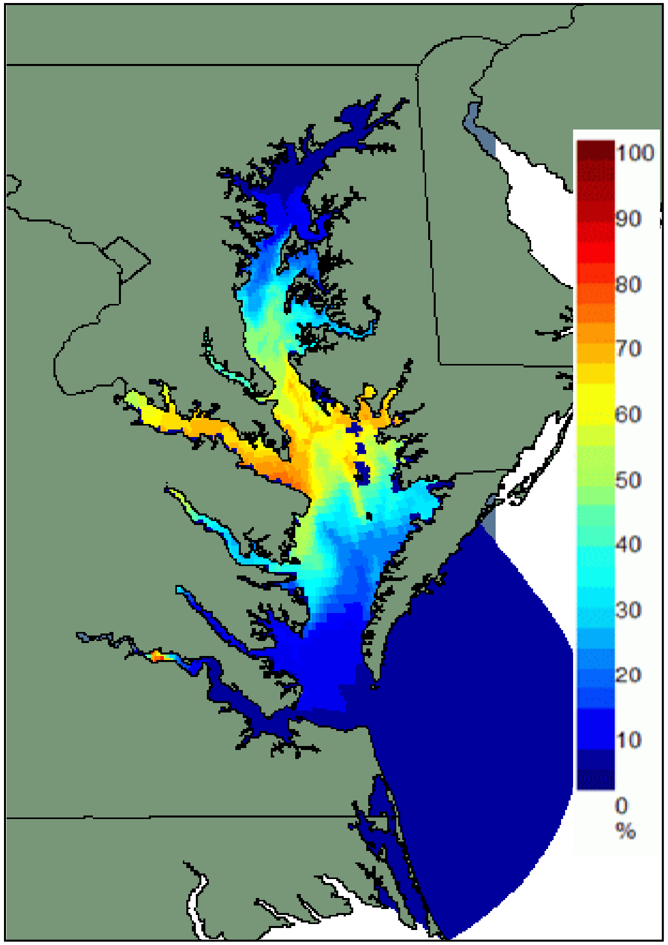
1. Chris Brown
2. Jerry Zhan
3. Changyong Cao
4. Jonathan Darnel
5. Murty Divakarla
6. Andy Heidinger
7. Tim Schmit
8. Yong Han
9. Eileen Maturi
10. Tony Reale
11. Ninghai Sun
12. William Rowland
13. Don Hillger
14. Don Hillger
15. Mark DeMaria
16. Fuzhong Weng
17. Ralph Ferraro
18. Ralph Ferraro

1st Conference on Transition of Research to Operations: Successes, Plans, and Challenges

"Establishing an Ecological Forecasting System: Predicting Sea Nettles in the Chesapeake Bay"

C. W. Brown and D. S. Green

- Ecological Forecasting (EF): An Emerging Service
- Challenges
  - Requires multi-line office collaboration
  - Corporate framework for transitioning to operations lacking
- EF: Transition Objectives
- Pathfinder Project: Forecasting Sea Nettles in Chesapeake Bay
  - Demonstration Project
  - Engaging NWS OSIP
- Recommendations



Forecast of likelihood of encountering sea nettles, *C. quinquecirrha*, on August 17, 2007

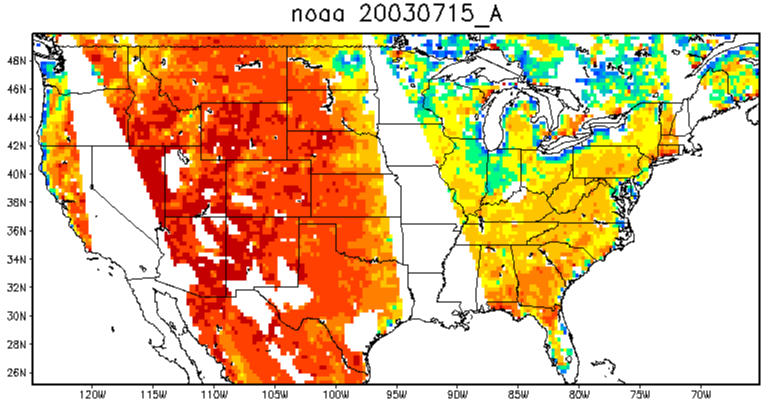
STAR Center for Satellite Applications and Research

25th Conference on Hydrology (Thursday AM):

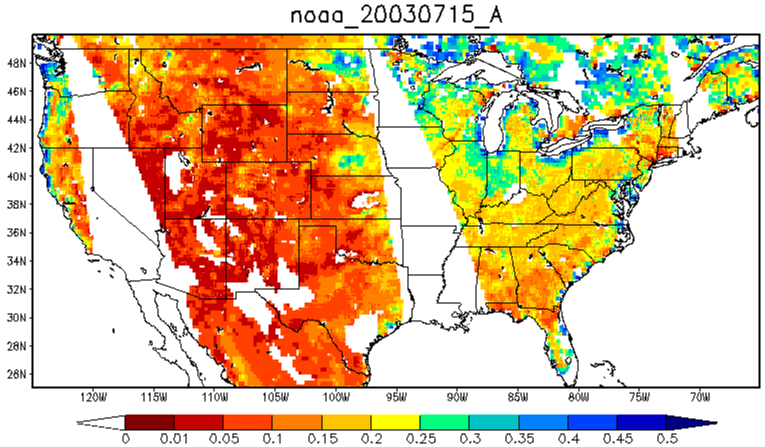
Oral – "**Combining Thermal and Microwave Satellite Sensor Observations for a Moderate Resolution Soil Moisture Data Product**"

X. Zhan, C. Hain, J. Liu

- SM data resolution issue:
  - PM sensor: coarse/accurate.
  - GOES: finer/less accurate.
- Merging methodology:
  - *$SM_f = SM_c + K*(\underline{SM_f} - \underline{SM_c})$*
    - *K is related to err rates of $\underline{SM_f}/\underline{SM_c}$*
  - Assume AMSR-E SM err rate stable (~4%) and GOES-ALEXI to be adjustable.
  - Minimize disaggregated SM err.
- Validation and Result:
  - in situ data & map comparison.



AMSR-E soil moisture map

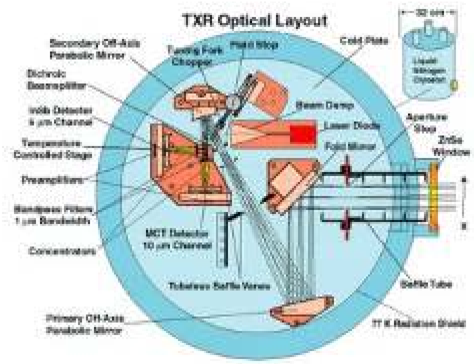


Disaggregated soil moisture map

Poster – Ensuring the SI Traceability of Satellite Measurements from the Next Generation Geostationary Imager GOES-R/ABI

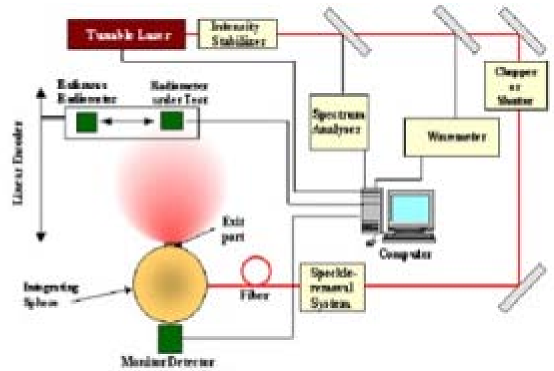
C. Cao, E. Shirley and NIST colleagues, D. Young and CLARREO scientists,
M. Weinreb, J. Clarke, D. Chesters, B. Pfarr, M. Goldberg, and S. Goodman

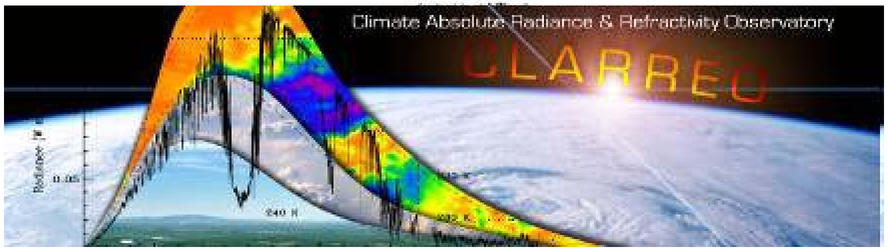
- Importance of SI traceability
  - Ensure credible climate data records
  - Foster interoperability across countries and systems
- Prelaunch SI traceability
  - Vendor follows industry best practices in instrument development and testing
  - Government oversight in laboratory tests with NIST technologies
    - Reflective solar bands: VXR
    - Infrared bands: TXR
    - System level: SIRCUS
    - Other
- Postlaunch SI traceability
  - Rigorous intercomparison /intercalibration
  - Leveraging GSICS capabilities
  - CLARREO for SI traceability



TXR has been deployed to ABI vendor facility as of Jan 2011 with CWG member participation

SIRCUS is currently being scheduled for ABI



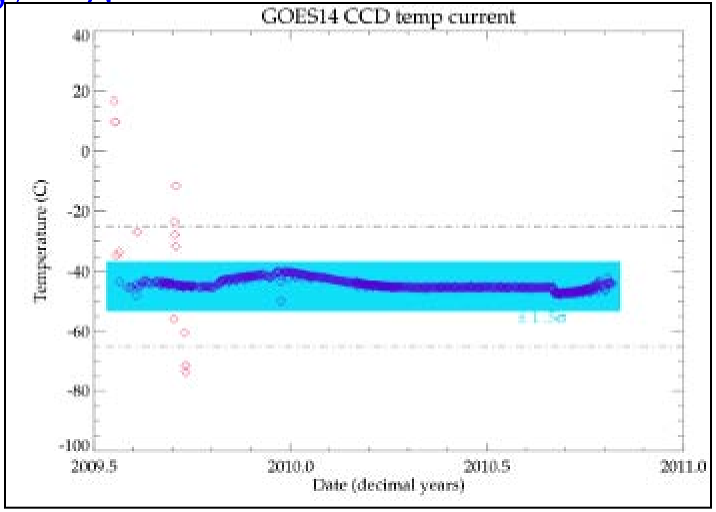


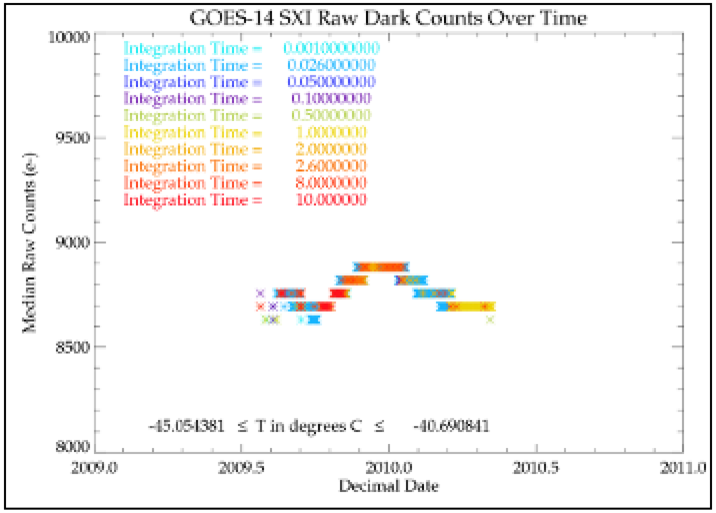
Developing collaboration with the CLARREO science team

8th Conference on Space Weather:

Poster – "Calibration Toolkit Development for the GOES-R Solar UltraViolet Imager" – Jonathan Darnel & Changyong Cao

- Track/Trend Operational Parameters
  - Temperatures
  - Voltages
  - Currents
- Track/Trend Calibration Parameters
  - Detector Noise
  - In-band Flat fields using KLL algorithm
  - Creating and Maintaining the bad pixel database for GOES-R series SUVI





Seventh Annual Symposium on Future
Operational Environmental Satellite Systems: Poster Number #571.

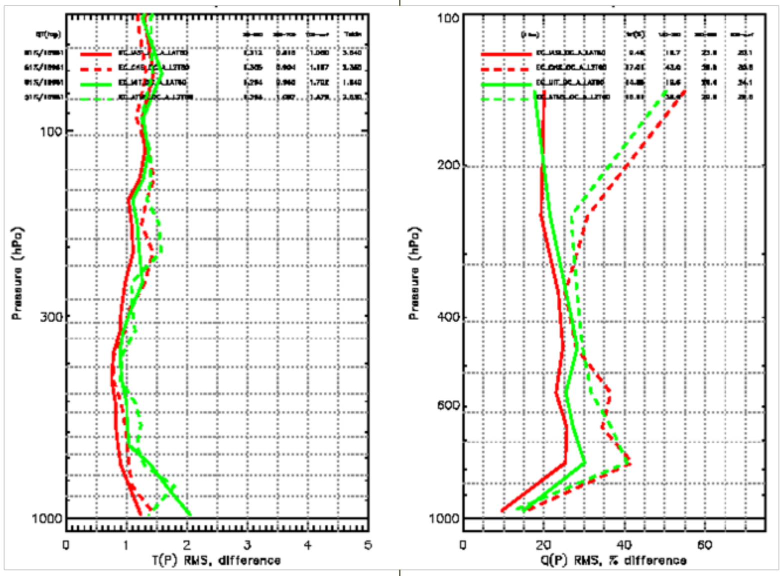
Poster – "Validation of CrIMSS EDR products with matched ECMWF Analysis, RAOB Measurements, and IASI retrievals"

Murty Divakarla, Chris Barnet, and colleagues

- Generation and Evaluation of CrIS/ATMS Proxy SDRs for the Focus Day (October 19, 2007)
  - Transformation of IASI SDRs to CrIS SDRs
  - AMSU/MHS Observations - to ATMS SDRs
  - Evaluation of CrIS/ATMS SDRs with Source SDRs
- Generation and Evaluation of CrIMSS EDR Products with Proxy CrIS/ATMS SDRs
  - Empirical Bias Tuning
  - Retrieval of AVTP & AVMP EDRs
  - Evaluation of EDRs Using ECMWF Analysis Fields and IASI EDRs
- Assessment of CrIMSS EDR Algorithm for Launch-Readiness
  - CrIMSS EDRs agree reasonably well with ECMWF and IASI EDRs.
  - Post-Launch Exercises with Pre-Launch Proxy SDRs

Ocean-only Cloud_Cleared

AVTP- RMSD (K)	AVMP RMSD (%)



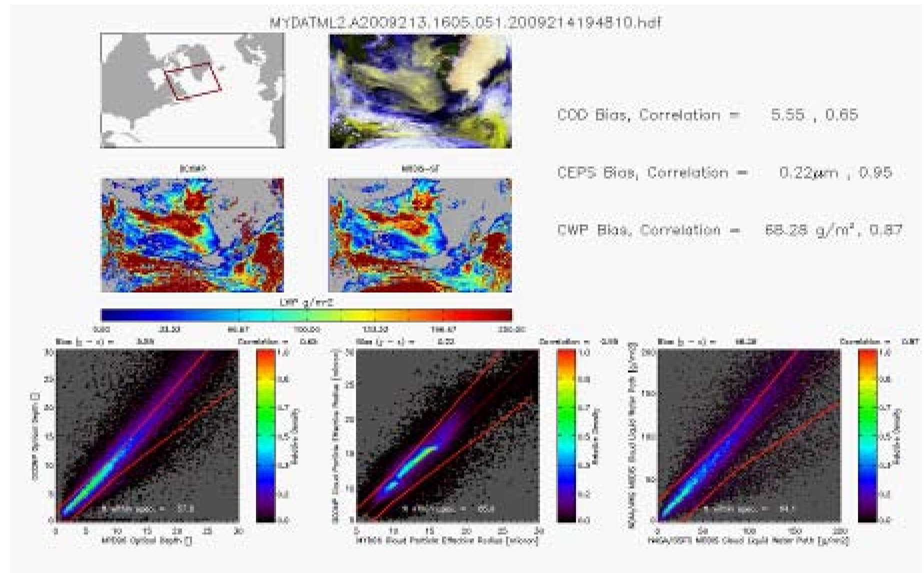
_____ IASI (IR) -------- CrIMSS (IR+MW)
_____ IASI(MW) -------- CrIMSS(MW-Only)

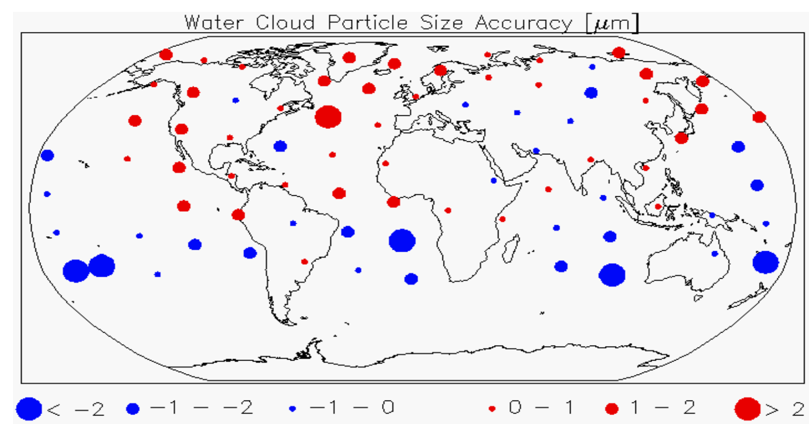
3.5 Future Operational Environmental Satellite Systems:

Oral – "Applicability of GOES-R AWG Cloud Algorithms for JPSS/VIIRS"

Andrew K. Heidinger and Andi Walther

- The JPSS cloud team intends to validate NGAS cloud products generated on NPP.
- To date, little data is available to verify NGAS cloud products.
- GOES-R AWG cloud products will be run in parallel to aid that effort.
- If NGAS algorithms fail to meet the needs of NOAA customers, GOES-R AWG algorithms should be ready to fill that void.
- Global comparisons of GOES-R AWG cloud products run on MODIS using only VIIRS channels to standard NASA MODIS and CALIPSO products indicate good global performance of the AWG algorithms.



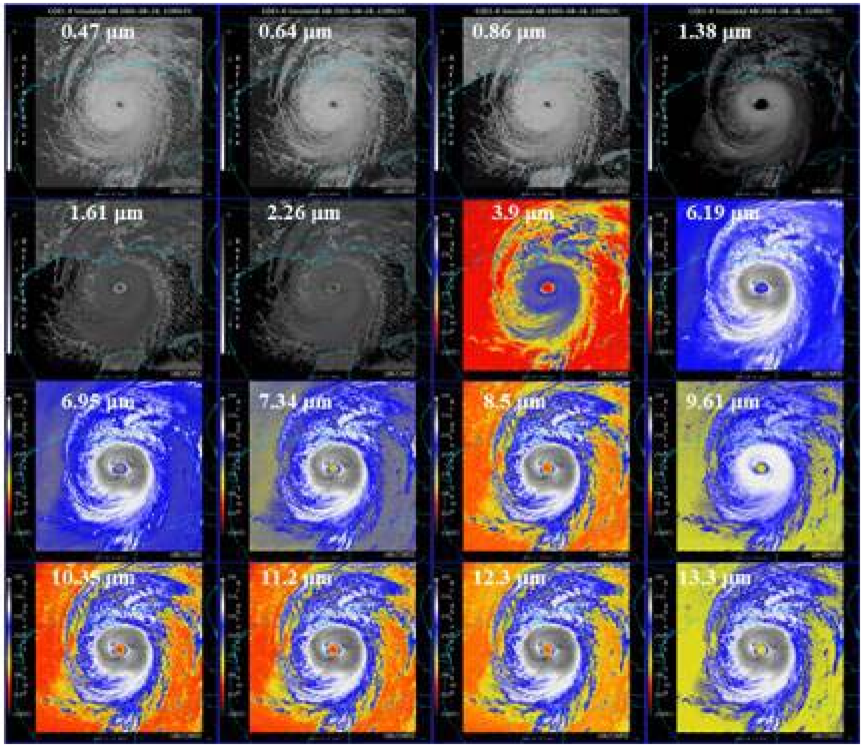


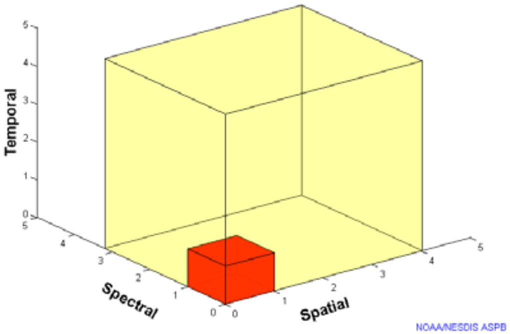
7th Symposium on Future Operational Environmental Satellite Systems:

Oral – "The improved imagery of the ABI on GOES-R"

Timothy J. Schmit and colleagues

- The ABI on GOES-R/S will greatly improve over the current instrument
  - Spectral, spatial, and temporal on orders of 3, 4 and 5, respectively
  - Improved image navigation and registration and radiometer performance
  - These critical improvements will provide a host of applications and new products





STAR Center for Satellite Applications and Research

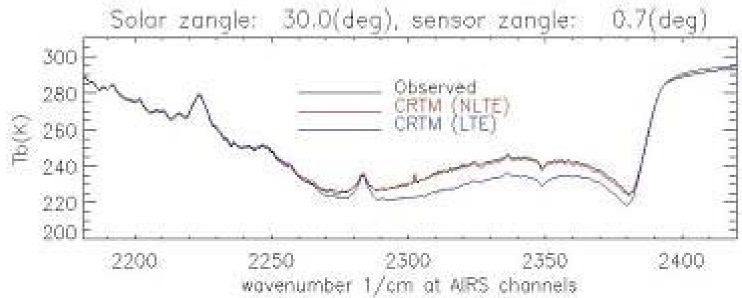
(Poster) **Recent Improvements to the Community Radiative Transfer Model (CRTM) for GOES-R and JPSS/NPP Applications"**

Yong Han, Paul Van Delst, Fuzhong Weng, Quanhua Liu, Dave Groff and Yong Chen

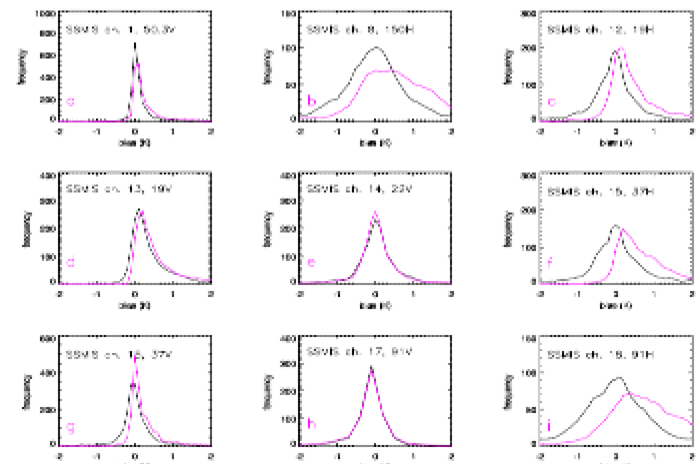
Seventh Annual Symposium on Future Operational Environmental Satellite Systems

Outline

- **CRTM Applications**
- **CRTM Modules and Supported Sensors**
- **Recent Improvements**
  - **New Transmittance Model (ODPS)**
  - **Improved Microwave Ocean Emissivity Model (FASTEM-4)**
  - **Coefficients for GOES-R and JPSS/NPP Sensors**
  - **Vis/UV Components**
  - **NLTE Model**
  - **IR Ocean BRDF Model**
- **CRTM Next Release and Download Site**



AIRS shortwave radiance spectral simulated with (red) and without (blue) the NLTE model compared with the observation (black).



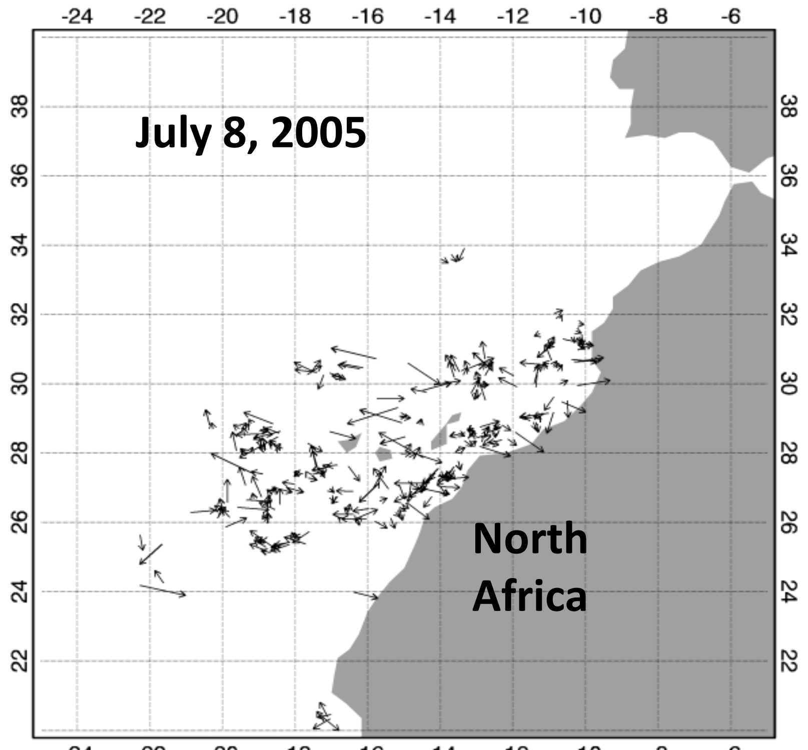
Histograms of the differences between simulated and observed brightness temperatures for six SSMIS channels. Red curve – CRTM with FASTEM-3; black curve – CRTM with FASTEM-4

Future Satellites Conference

Poster – Ocean Dynamics Algorithm GOES-R AWG

Eileen Maturi, NOAA/NESDIS/STAR/SOCD, Igor Appel, STAR/IMSG, Andy Harris, CICS, Univ of Maryland

- Background
  - A motion vector product (0.3 $m.s^{-1}$ accuracy) is required for GOES-R
  - Meteosat-SEVIRI can be used as a proxy for GOES-R ABI
- Methodology
  - Track thermal features in image triplets similar to atmospheric motion vector processing
  - Optimal Match for 5x5 target
    - Uses Sum-of-Squared Differences
    - **QC** based on gradient strength & vector agreement
- Validation
  - Compare with Global NCOM assimilation runs
    - V-component meets 100% Spec with weak gradient constraint
    - U-component requires gradient cut off of 0.5 K
  - Because relative motion between scenes is small, results are heavily dependent on geolocation accuracy
- Future
  - Further validations against HYCOM assimilation runs
  - Investigate impact of geolocation errors in proxy data
  - Investigate impact of alternative cloud mask
  - Investigate alternative pattern matching and data assimilation approaches (with OSU/CIOSS)



Example Ocean Current Vectors derived from MSG-SEVIRI image triplet centered at 12Z

Vector length indicates derived current strength (1 degree = 1 $m.s^{-1}$)

Shows upwelling off N Africa, combined with complex current pattern in the vicinity of the Canary Islands

STAR Center for Satellite Applications and Research

7th Annual Symposium on Future Operational Environmental Satellite Systems

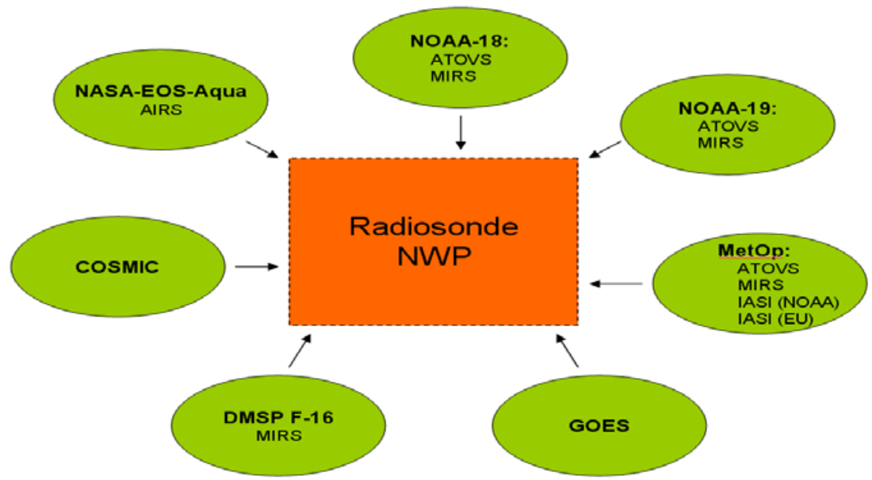
NOAA Products Validation System (NPROVS)

(Reale (STAR), Sun (IMSG), Pettey (IMSG), Tilley (IMSG) and Brown (IMSG)

Poster 567
Wednesday

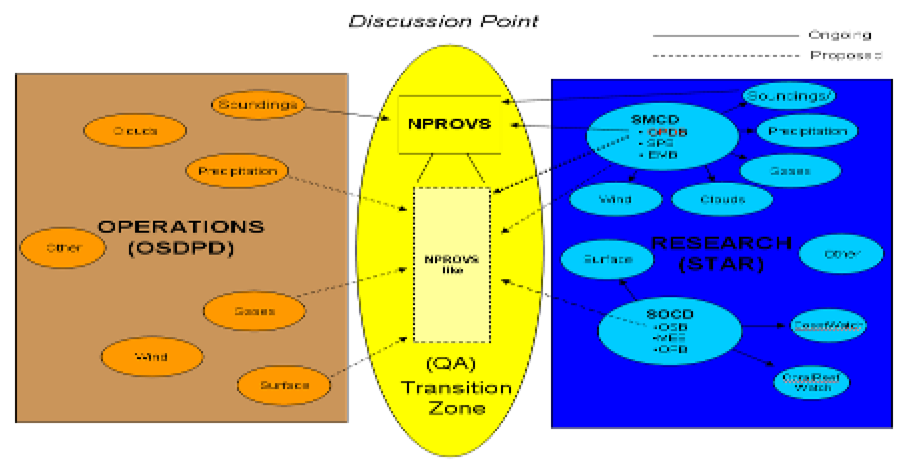
NPROVS Web Site: http://www.star.nesdis.noaa.gov/smcd/opdb/poes/NPROVS.php

- NPROVS
  - Product Suites
  - Collocation / Sampling Strategies
  - Monitoring Results
    - Vertical Stats
    - Trends



- Research
  - Publications
  - Special Measurements
    - GRUAN
    - AEROSE (Nalli ….)
    - CIMO China 2010 …

- QA (QC) at STAR
  - Independent Program
  - STAR / Operations Interface



… Proposed Independent NOAA Product QC (QA) Program at STAR
Operational Products Development (Implementation?) Branch (OPDB) …

*** Demonstration at NOAA Exhibit**

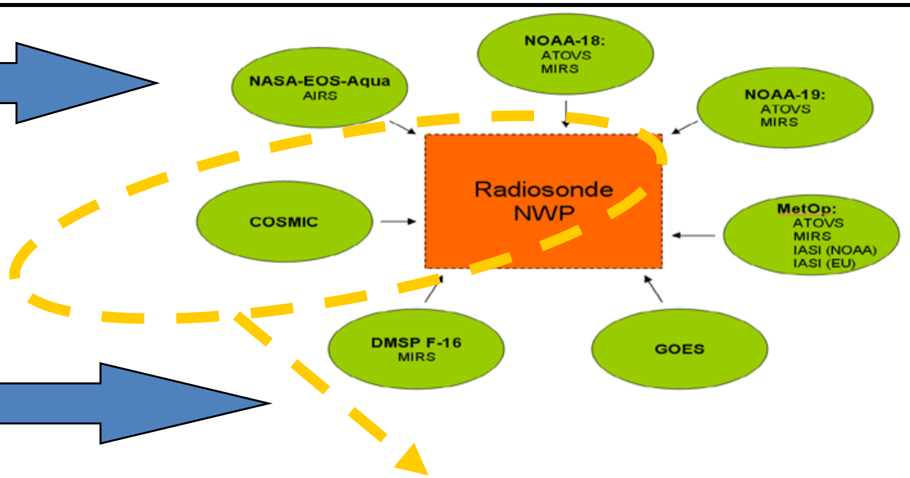
Oral 6.2, Wed., 1:45

15th Symposium on Integrated Observing and Assimilation Systems for the Atmosphere, Oceans and Land Surface (IOAS-AOLS)

Using GPS Radio Occultation Data to Examine Radiation Induced Errors in Global Radiosonde Data

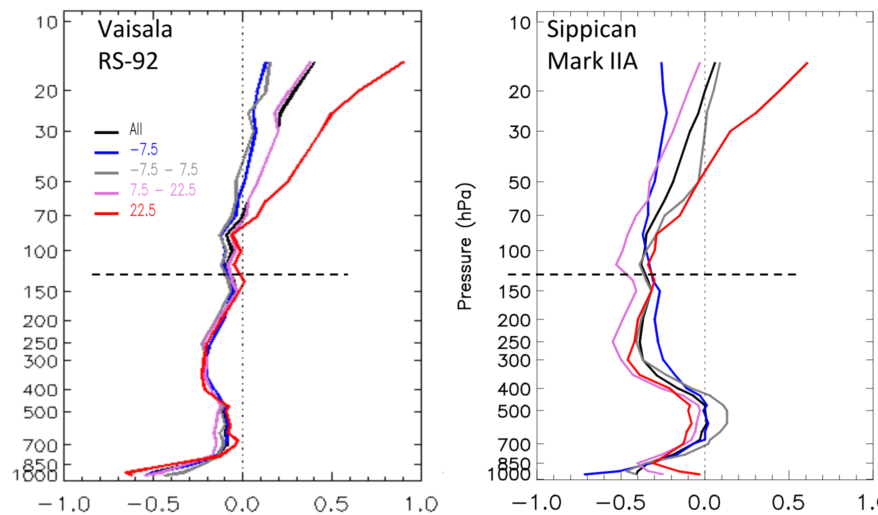
(Sun (IMSG), Reale (STAR), Seidel (ARL), Ballish (NCEP), Cucurull (NCEP), Schroeder (Texas A&M))

- NPROVS
  - Satellites / sonde
  - April 08 to present



- COSMIC
  - 2000 profiles per day
  - Reference T above 150mb
    - **Tdry**
- Sonde Radiation Error
  - Quantified
  - *Derive Corrections*

Sonde-minus-Tdry

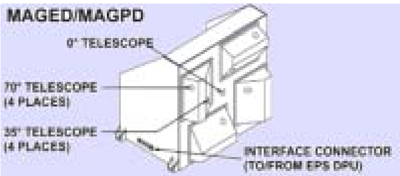


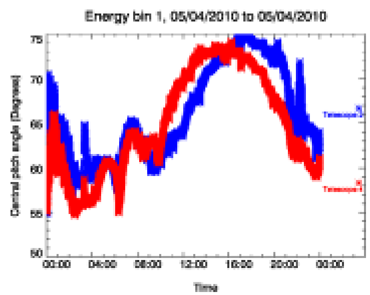
8th Conference on Space Weather:

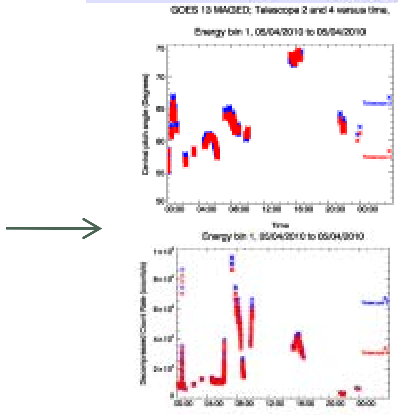
Poster – “Results from a prototype for the GOES Particle Intersensor Analysis Toolkit”

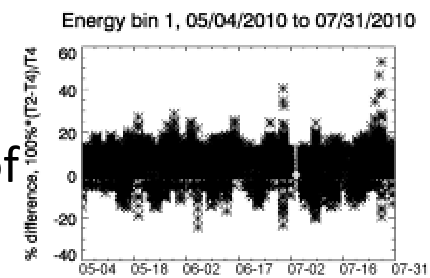
William Rowland, Robert Weigel, Changyong Cao

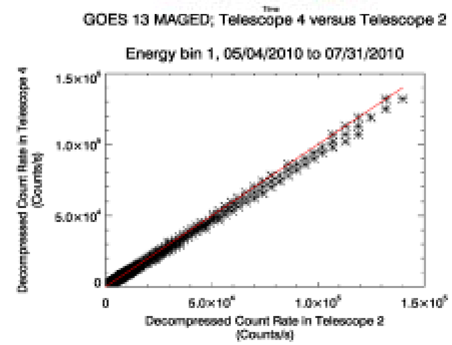
- Intracalibration for instruments with multiple particle telescopes
  - Technique applicable to GOES SEM (MAGED/MAGPD) and GOES-R SEISS (MPS-Lo and MPS-Hi).
  - Calculate central pitch angle viewed by each telescope using
    - Spacecraft Magnetometer data
    - Knowledge of telescope orientation
- Identify comparable data
  - Find times where central pitch angles seen by two telescope match to within 1 degree
    - Store PA data and count rate at each energy for matching telescopes
- Scalable
  - Easily incorporates additional data, will be automated
  - Results currently include 3 months of data









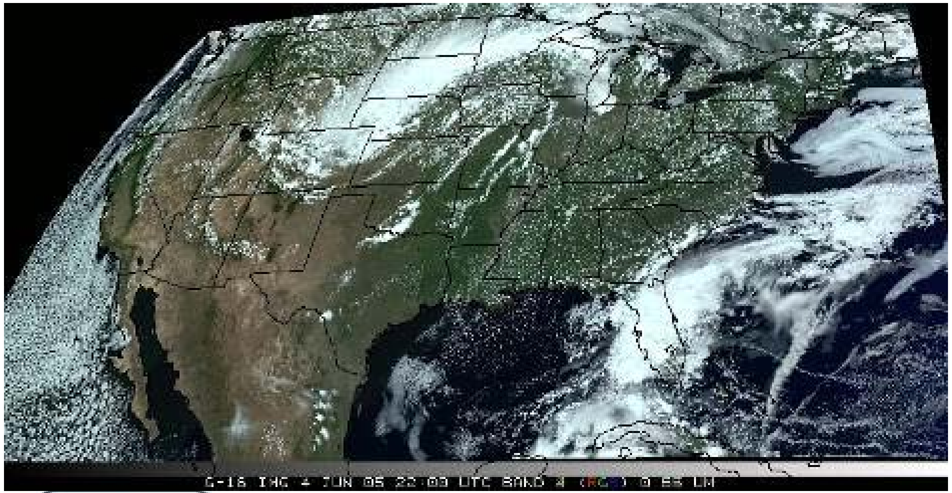


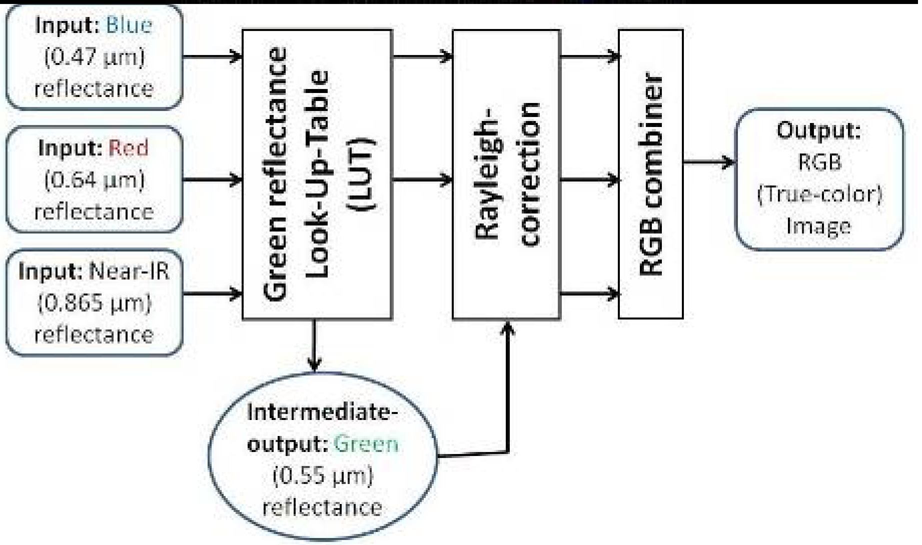
Seventh Annual Symposium on Future Operational Environmental Satellite Systems:

Poster 568 – "GOES-R ABI True-Color Capability"

D.W. Hillger, L. Grasso, R. Brummer, and R. DeMaria

- **ABI does not contain a "Green" visible band**
- **The "Green" band can be *synthesized* from the available ABI Red, Near-IR, and Blue bands**
- **True-color (RGB = Red, Green, Blue) imagery can then be generated [shown at right]**
- **True-color imagery can be used for the detection and retrieval of smoke plumes, volcanic ash, blowing dust, and other aerosols**





- ***For More Information (two submitted papers):***

- **Miller, S., C. Schmidt, T. Schmit, and D. Hillger, 2010: "A case for natural color imagery from geostationary satellites, and an approximation for the GOES-R ABI", submitted to *International Journal of Remote Sensing*.**
- **Hillger, D., L. Grasso, S. Miller, R. Brummer, and R. DeMaria, 2010: "Simulating GOES-R Advanced Baseline Imager True-Color Imagery", submitted to *Journal of Applied Remote Sensing* (of SPIE).**

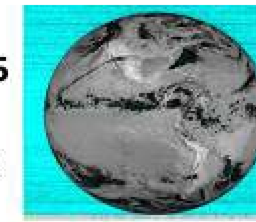
Seventh Annual Symposium on Future Operational Environmental Satellite Systems:

Poster 640 - “NOAA Science Test results from the GOES-14 and -15 Imager and Sounder”

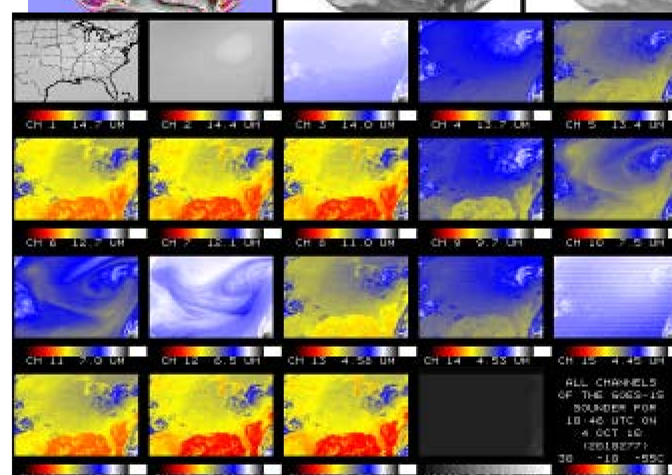
D.W. Hillger, T.J. Schmit, A.S. Bachmeier, M.M. Gunshor, J.A. Knaff, and D.T. Lindsey

- The **Science Test** part of Post Launch Testing for GOES-15 occurred in Aug/Sep 2010.
- Science Test coordination involved CIRA, CIMSS, NASA/MSFC, SAB, and OSDPD (and others).
- GOES-15 Science Test web page http://rammb.cira.colostate.edu/projects/goes-p/ provides test schedules, daily implementation of those schedules, and initial results of the tests.
- Several GOES-15-related issues were addressed:
  - Testing of solar-contamination of images taken during keep out zones
  - Characterization of Sounder striping
- Data flow was tested to AWIPS/NWS level
- Comparisons with AIRS and IASI have found a bias of Imager bands 3 and 6.
- Unique 1-minute rapid scan imagery acquired
- GOES-15 data analysis will continue.
- A *NOAA Technical Report* will be forthcoming.

GOES-15 first images



Last of the GOES-N/O/P series and before start of GOES-R series

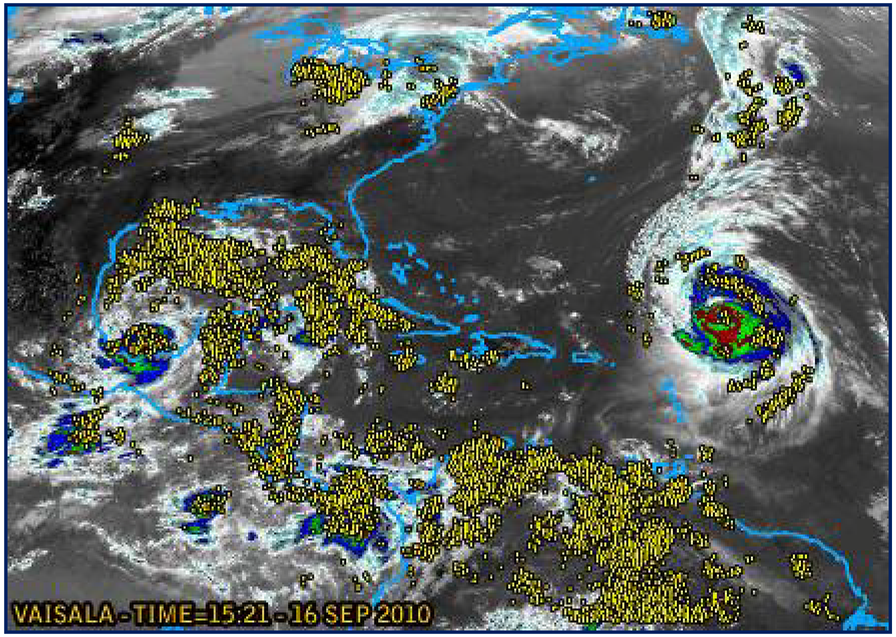


Oral Presentation: Fifth Conference on Meteorological Applications of Lightning Data

Tropical Cyclone Rapid Intensity Change Forecasting Using Lightning Data during the 2010 GOES-R Proving Ground at the National Hurricane Center

Mark DeMaria and John A. Knaff NOAA/NESDIS, Michael Brennan and John L. Beven National Hurricane Center, Nicholas Demetriades Vaisala Inc., Robert T. DeMaria and Andrea Schumacher CIRA/CSU, and John Kaplan NOAA/HRD

- GOES-R will include GLM
  - Near continuous lightning locations over large field of view
  - Can this new information improve hurricane intensity forecasts?
- 2010 GOES-R Proving Ground
  - Experimental algorithm for rapid intensity change forecasts
  - Combines ground-based lightning and model input
  - Real-time runs for NHC in 2010
  - Preliminary results encouraging



Caption: *6 hourly lightning locations centered at 15 UTC on 16 September 2010 from the Vaisala GLD 360 lightning network*

Retrieval of Total Precipitable Water and Cloud Liquid Water Path from Jason-2 AMR Observations

Fuzhong Weng , Wei Yu , Ninhai Sun

- **Introduction and Objectives**
  - **Provide Jason-2 AMR TPW and CLW products**
  - **Inter-satellite Calibration of AMSU and AMR Radiometers**
  - **Provide new tool for retrieval TPW and CLW**
- **Linear Mapping between AMSU and AMR under SNO condition**
  - **Dataset**
  - **Linear Mapping Technique :*Yamr=AXamsu-a***

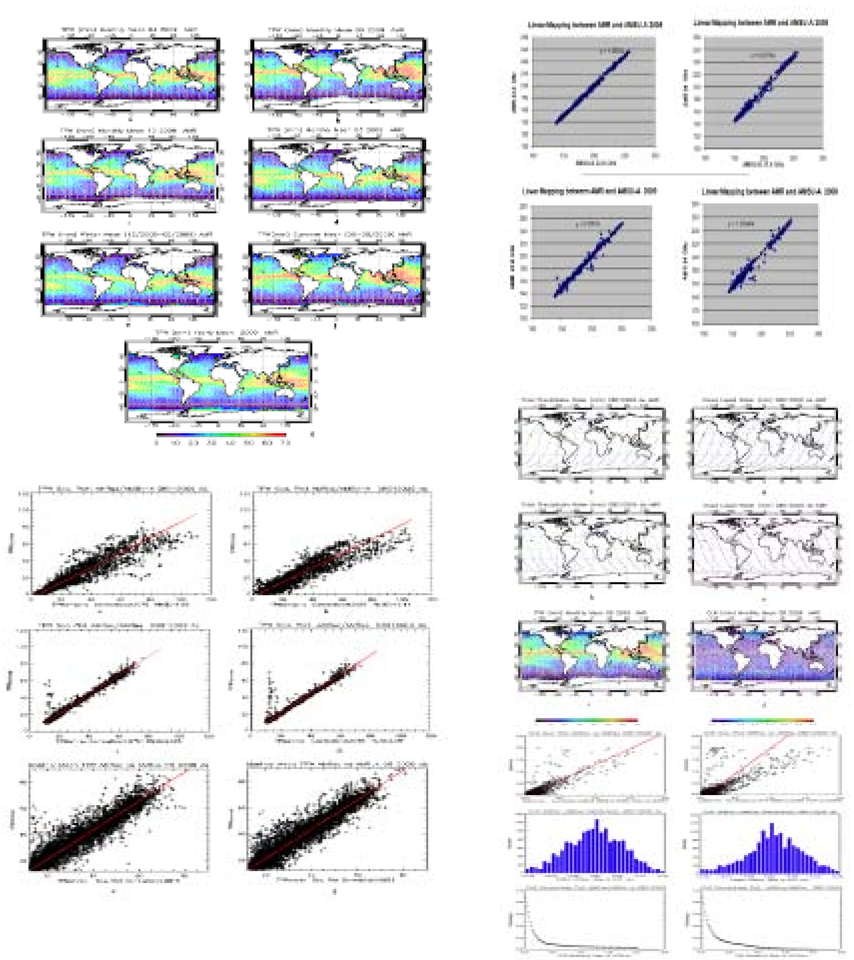
    TB23amr = 1.0002TB23amsu-a , ***TB34amr=0.9778TB31amsu-a*** **(2008)**

    TB23amr = 0.9991TB23amsu-a , ***TB34amr=1.0246TB31amsu-a*** **(2009)**
- **AMR TPW and CLW Retrievals**
  - **AMSU Water Vapor and Cloud Algorithms**

$$L = a_0 \mu \left[\ln(T_s - TB_{31}) - a_1 \ln(T_s - TB_{23}) - a_2\right]$$

$$V = b_0 \mu \left[\ln(T_s - TB_{31}) - b_1 \ln(T_s - TB_{23}) - b_2\right]$$

  - **TPW and CLW retrieval**
- **Results and Conclusion**
  - **Preliminary Results**
  - **AMR Linear Mapping Algorithm Performance**
  - **Conclusion**

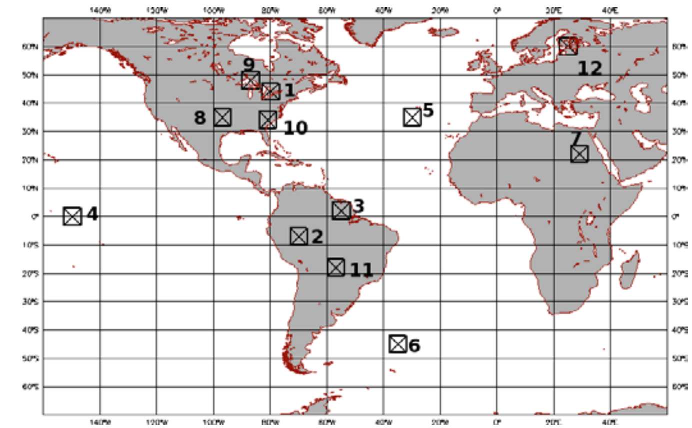


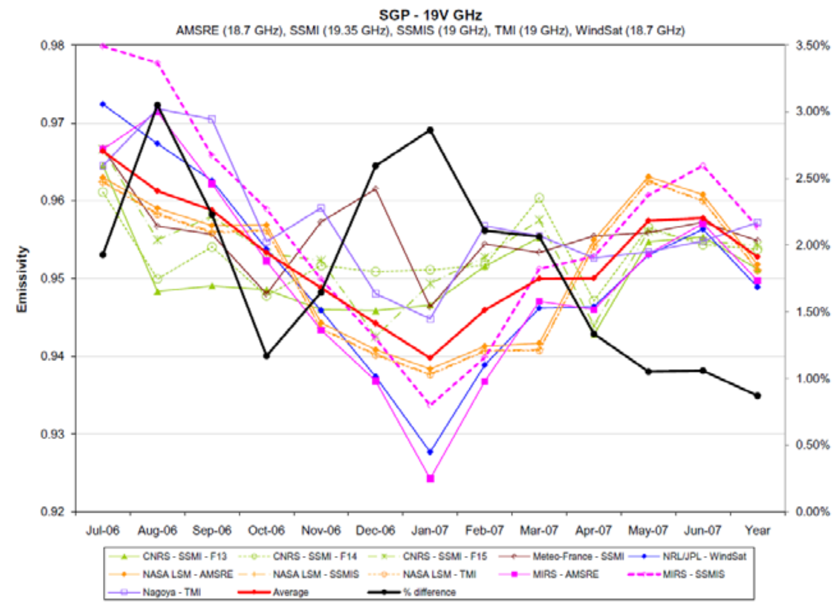
25th Conference on Hydrology:

Oral– Evaluation of passive microwave land surface emissivities for improved precipitation retrievals over land for GPM-era algorithms—Part I: comparison of inversion methods

R. Ferraro, C. D. Peters-Lidard, G. Skofronick-Jackson, N-Y. Wang, K. Gopalan, and C. Hernandez

- Passive MW precip. retrievals over land are limited due to Є variations
  - Larger than precip. signal
  - "Dynamic" changes when raining
- NASA PMM Science Team's Land Surface Working Group
  - Emissivity intercomparison
    - 8 different groups participating
  - "Diverse" targets
    - Clear, cloudy, raining
  - AMSR-E, AMSU, SSMI, SSMIS, TMI, WindSat
    - GDAS, ISSCP, CMORPH, etc.
- Preliminary results over CONUS include
  - Є estimates closer under vegetated, clear sky
  - Greater variability when
    - Precipitating
    - Complex surfaces like snow cover
    - Frequencies > 85 GHz
- Journal submission by March 2011





1st Conference on Transition of Research to Operations:

Oral– NOAA's Preparation for NASA's Global Precipitation Measurement (GPM) Mission – Successes and Obstacles

R. Ferraro, C. Kondragunta, J. Pereira, D. Mamula, and K. Hampton

- GPM is essentially "TRMM-plus"; GPM will provide useful data for NOAA
  - GMI and DPR
  - Level "1C" constellation radiometer data
  - Advanced precipitation products
  - Additional products derived from GMI
    - TPW, OSWS, radiances
- NRC 2007 report suggests NOAA's early involvement with NASA on GPM
  - Be prepared for data use soon after launch
  - Consider transition from NASA to NOAA
- Engaged w/NASA for several years
  - Successes
    - NOAA's Precipitation Steering Group
    - NOAA's involvement on GPM Science Team
    - GMI channel selection/design
    - GSICS
  - Obstacles
    - Dedicated funding lines
    - Internal NOAA "resistance" and "education"
    - Some interagency "difficulties"