STAR’s Presentations at the 2008 AMS Annual Meeting
New Orleans, LA
20 – 24 January 2008

1. I. Guch (Introduction)
2. K. Pryor
3. T. Schmit (2)
4. L. Wang
5. S. Goodman
6. W. Wolf
7. L. Zhou
8. D. Lindsey
9. R. Brummer
10. B. Connell
11. M. DeMaria
12. L. Grasso
13. D. Hillger
14. M. Sengupta
15. Y. Yu (3)
16. B. Kuligowski
17. C. Davenport
18. X. Zhan
19. X. Liang
20. D. de Alwis
21. R. Ferraro
• The GOES-sounder derived microburst products diagnose risk based on conceptual models of prototype environmental profiles.

• The GOES Microburst Windspeed Potential Index (MWPI) algorithm incorporates CAPE, and the temperature lapse rate and dew point depression difference between 670 and 850 mb. 670 mb represents the typical level of a convective cloud base over the U.S. Great Plains.

• Initial validation during the 2007 convective season indicated a strong correlation between MWPI values and observed surface downburst wind gusts.
  – Correlation ($r = .78$) is statistically significant at the 97% confidence level.
  – Represents a physical relationship between the MWPI and the strength of downburst wind gusts observed at the surface.
The ABI (Advanced Baseline Imager) on GOES-R

Timothy J. Schmit
NOAA/NESDIS

- The ABI is the next generation geostationary imager on GOES-R+.
- ABI improves over the current GOES imager by a factor of 3 spectrally, a factor of 4 spatially and a factor of 5 temporally.
- ABI will improve every product from the current Imager and will allow many new products.
- Synthetic and satellite data are being used to prepare for the ABI.

"Information volume"
Imager and ABI: Current attributes defined to be 1.
GOES-10 [usually] routinely scans the southern hemisphere with both the Sounder and Imager instruments. Many uses of the GOES-10 data stream through out the hemisphere.

CIMSS at University of Wisconsin-Madison experimental Sounder products:
http://cimss.ssec.wisc.edu/goes/rt/goes10.php

CIMSS improved GOES sounding algorithm was provided to INPE (Brazil) for GOES-10 Sounder processing in South America (SA), as part of the GEOSS-America’s capacity building.

GEOSS Americas/Caribbean Remote Sensing Workshop given [Nov 26-30] in Cachoeira Paulista, São Paulo, Brazil. There were lectures and hands-on laboratory exercises. Participates were from Argentina, Brazil, Bolívia, Chile, Colombia, Costa Rica, Equador, México, Paraguai, Peru, Uruguay and Venezuela.
http://www.ssec.wisc.edu/rss/SaoPaulo2007/
• Spectral convolution
  – IASI radiance convolved with GOES SRF
  – Focus on channel 3: spectral sensitive channel

• Spatial collocation
  – Both sensor’s SZA < 10°
  – SZA diff. < 1°
  – Observational time diff. <15 min
  – Uniform constrain: stdev(BT)/mean(BT) <0.001
  – One IASI footprint (4 pixels) compared with GOES pixels falling into IASI footprint

• Time Period
  – Sample number: 282

• Purpose
  – Fundamental support to the GSICS and GOES-R Cal/Val
GUC V and 3rd Conference on Meteorological Applications of Lightning Data
Oral – Geostationary Lightning Mapper for GOES-R and Beyond
Steven Goodman/ORA, Richard Blakeslee/NASA MSFC, William Koshak/NASA MSFC

• Mission Requirements
  – Provide continuous, full-disk lightning measurements for storm warning and nowcasting.
  – Provide early warning of tornadic activity
  – Accumulate a long-term database to track decadal changes [of lightning]

• NASA Lead Role for Instrument
  – Implementation Award Dec. 2007 to Lockheed Martin ATC for 1 Prototype, 4 Flight models

• NOAA Lead Role for L2 Algorithms
  – Clustering Algorithm
    • Description: takes events and creates groups and flashes
    • Pros: TRMM LIS and OTD heritage
    • Cons: non yet extended/optimal for GEO
  – Cell Tracking Algorithm
    • Description: groups lightning to storm cells
    • Pros: LISDAD and RDT heritage, SCIT has limitations
    • Cons: technically challenging, needs AWIPS implementation for optimal utility
  – Flash Trending “Jump” Algorithm
  – Other Application Team Uses of GLM
    • Hydology-Precipitation
    • AQ-NOx/Ozone
    • Clouds-Cloud Type/TRW, Hurricane Intensification
    • Aviation-Turbulence, Convective Initiation, Volcanoes

Global Distribution of Lightning

Data from the heritage NASA OTD and LIS instruments-
Successful Transition from NASA research to NOAA operations
The GOES-R Algorithm Working Group (AWG) Product Processing System Framework is under development at NOAA/NESDIS/STAR.

The goal is to develop a processing system where GOES-R AWG algorithms can be developed and tested in a well defined and organized manner.

Details of the framework will be presented:
- Framework description
- Algorithm information and how it is applied to the framework
- Input configuration files
- Interface between the framework and the product algorithms
- Hardware and software infrastructure
The Algorithm Integration Team (AIT) is building a framework that can process all the GOES-R Level 2 products. The framework being built will be used to test the algorithms individually as well as a complete system with all products.

- Quality assurance activities will be performed throughout the GOES-R system software development life cycle.
  - Coding and Documentation Standards
  - Revision Control
  - Monitoring and Visualization
  - Verification and Validation

- The systematic approach for the quality assurance will enable faster and more efficient research to operation transitions.
Simulated GOES-R ABI data is being used to develop severe weather products.

One example is a boundary layer moisture depth product.

Principle Component Analysis is applied to the simulated data to determine which spectral bands provide the most information about boundary layer water vapor.

- Early results show that simply using the 10.35 µm and 12.3 µm bands provide the best signal.

Figure: PC1 in a simulated domain in which moisture depth increases from west to east and temperature increases from north to south.
Poster: **GOES-R Mesoscale Product Development**

Renate Brummer, Bernie Connell, John F. Dostalek, Dusanka Zupanski - CIRA
Mark DeMaria and John A. Knaff – NOAA/NESDIS

- Prototype Hazard and Fire Products
- Mesoscale Weather Database
- Synthetic GOES-R data generation and analysis
- Tropical Cyclone Product Development
- Severe Weather and Winter Weather Product Development
- Information content analysis using MLEF data assimilation
- Training Activities

**GOES-R Proxy Data:**
Synthetic GOES-R Imagery (10.35 μm)

Hurricane Lili Oct02   Lake Effect Snow Feb03
Poster 1.54 – International focus group – virtually there with VISITview
B. Connell, V. Castro, M. Davison, A. Mostek, B. Fallas, K. Caesar, T. Whittaker

- Monthly bi-lingual virtual weather briefings
  - Collaborators: CIRA, CIMSS, RMTCoE in Costa Rica and Barbados, NOAA NWS Training and NCEP/HPC International Desk.
  - Participants: forecasters, researchers, and students from Central and South America and the Caribbean.
  - Utilize VISITview software and voice through the Internet.

- Keys to Success
  - (come find out what they are)
4th Annual Symposium on Future NPOESS: Tropical Cyclone Applications of NPOESS Soundings
M. DeMaria, R. DeMaria, D. Hillger, R. Mazur

• Three TC applications
  – T/q analysis in the storm environment
  – Hurricane eye soundings
  – Wind structure analysis

• AIRS/AMSU retrievals used as proxy for ATMS/CrIS

• NPOESS soundings will be very useful for TC analysis

Comparison of minimum pressure
From AIRS/AMSU eye sounding Analysis and aircraft recon for Hurricanes Isabel and Lili
5th GOES Users’ Conference:
Synthetic GOES-R Imagery Development and Uses
Louie Grasso, Daniel Lindsey, Manajit Sengupta, and Mark DeMaria

GOES-R AWG PROXY DATA
FOR MESOSCALE WEATHER EVENTS.

GOES-R AWG PROXY DATA
FOR FIRE HOT SPOTS.
Simulated GOES-R Advanced Baseline Imager (ABI) products developed at RAMMB/CIRA are being ported to the Web, as in the accompanying screen shot. 
http://rammb.cira.colostate.edu/rmsdis/online/goes-r.asp

Current products include a daytime fog/stratus product and a blowing dust product, both generated from ABI-equivalent MSG bands.

Future additions include other product variants, as in the image to the right, as well as experimental products for smoke from fires and volcanic ash.
Slide 15

5th GOES Users Conference
Poster– Quantifying Uncertainties in Fire Size and Temperature Measured by GOES-R ABI
Manajit Sengupta, Louie Grasso, Don Hillger, Renate Brummer and Mark DeMaria

- Create Point Spread function for GOES-R ABI at high resolution.
  Extract information from low resolution tables provided by MIT Lincoln Labs/U Wisconsin.
  Use the information as constraint to create high resolution normalized point spread function assuming bivariate normal distribution.

- Create brightness temperatures distributions to characterize fire uncertainty
  Compute brightness temperatures for 3 GOES-R ABI channels using assumed atmospheric profile and varying fire temperature.
  Create distributions of GOES-R ABI pixel brightness temperatures for varying sub-pixel fire location within a GOES-R ABI pixel keeping the fire size and temperature constant.
  Analyze uncertainty based on the brightness temperature distributions for different fire sizes and temperatures.
Activities of GOES-R Land Applications Working Group Team

- Dan Tarpley, Yunyue Yu, Kevin Gallo, Felix Kogan, Mitch Goldberg
- Peter Romanov, Konstantin Vinnikov, Elain Prins, Chris Schmidt, Jeff Privette
- Hui Xu, M. K. Rama Varma, Raja, Wei Guo, Yuhong Tian, Shuang Qiu

Tasks

<table>
<thead>
<tr>
<th>Tasks</th>
<th>Responsible Personnel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fire/Hot Spot Imagery</td>
<td>Elaine Prins, Chris Schmidt, Yunyue Yu</td>
</tr>
<tr>
<td>Surface Temperature</td>
<td>Yunyue Yu, Dan Tarpley, Jeff Privette, Rama Varma Raja, Konstantin vinnikov, Hui Xu</td>
</tr>
<tr>
<td>Vegetation Index</td>
<td>Dan Tarpley, Peter Romanov, Hui Xu, Yunyue Yu</td>
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<tr>
<td>Clear Sky Radiance</td>
<td>Dan Tarpley, Peter Romanov, Hui Xu, Yunyue Yu</td>
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<td>Vegetation Health Index</td>
<td>Felix Kogan, Wei Guo, Yuhong Tian</td>
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<tr>
<td>Vegetation Fraction</td>
<td>Felix Kogan, Yunyue Yu, +TBD</td>
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<tr>
<td>Surface Albedo/Reflectance</td>
<td>Yunyue Yu, +TBD</td>
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<tr>
<td>Flood/Standing Water</td>
<td>Yunyue Yu, +TBD</td>
</tr>
<tr>
<td>Ground Validation Support</td>
<td>Kevin Gallo, Konstantin vinnikov, Rama Varma Raja</td>
</tr>
<tr>
<td>Software Development and Integration Support/Coordination</td>
<td>Hui Xu, Shuang Qiu, Yunyue Yu</td>
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Future Planning

- More Algorithm Developments
  - Land Surface Albedo/Reflectance
  - visible and near infrared band
  - Flood/Standing Water
  - Vegetation Fraction
- Algorithm Calibration and Validation
  - Satellite-Ground Match-up Database
  - Ground Site Characterization
  - Multi-satellite Data Comparisons
Applying Split Window Technique for Land Surface Temperature Measurement from GOES-R Advanced Baseline Imager

Yunyue Yu, Dan Tarpley, M.K Rama Varma Raja, Hui Xu, Konstantin Vinnikov

• Algorithm
Nine candidate SW algorithms were analyzed and tested using MODTRAN radiative transfer model.

• Sensitivity Study
Algorithm sensitivities to surface emissivity, atmospheric water vapor content, satellite zenith angle, coefficients miss-use were analytically estimated and demonstrated.

• Evaluation
Algorithm is applied to the GOES-8 and GOES-10 data. The derived LSTs were compared to the ground LSTs estimated from six sites of SURFRAD stations, for the year 2001.

• Summary
  – Split window technique is applied for generating GOES-R LST product, which is simple, robust, yet accurate enough to meet the mission requirement.
  – Coefficients of the LST algorithm should be stratified for daytime, nighttime and dry, moist atmospheric conditions.
  – Two biggest errors are the surface emissivity uncertainty and the atmospheric absorption at very moist atmospheric conditions and/or large satellite zenith angle.
  – The evaluation done is primarily, yet promising.

Scatter plot comparison of GOES-8 LST and SURFRAD LST of all the match-up data. Better statistical results of the LST differences are observed (not shown here) after removing residual noises using seasonal and annual signals.
The Manual Cloud Filtering of GOES-satellite data through combined use of satellite and ground measurements

**Abstract**

The Advanced Baseline Imager (ABI) instrument onboard the GOES-12 series satellites, which is expected to be launched in the year 2014, has considerable potential for providing accurate retrievals of Land Surface Temperature (LST) at mid-infrared (MIR) and near-infrared (NIR) wavelengths. These algorithms are being evaluated through radiative transfer model simulations as well as through ground-based data for the ground-truth evaluation. The LST algorithms have been applied to one year of GOSAT and GOES-12 measurements in the year 2001, and then compared with coincident LST estimates from SURFRAD Surface Radiation Network (SURFRAD) measurements. This paper describes a manual cloud filtering method which we developed for the SURFRAD-GOES data comparison purpose.

**Methodology**

The spatially closest GOES pixel is chosen for cloud filtering. The spatially closest pixel is identified as the one with minimum radiometric distance to SURFRAD site. Once the ground Closer-Cloud Relation (CCR) pixel has been chosen, the corresponding AVHRR time series is used for this cloud filtering procedure. The SURFRAD site identifier, channel number (e.g. Ch1, Ch4) and the time of observation are used to select the appropriate channel reflectance data. The SURFRAD pyranometer down-looking PIR (Precision Infrared Radiometer) measures the up-welling radiation in the spectral range from 3 microns to 50 microns. LST is estimated from this up-welling irradiance measurements. Similarly the up-looking PIR measures the down-welling sky irradiance in the same spectral range. The pyranometers from Pennsylvania State University sites are shown in Figure 2 & 6.

**Results:**

The Manual Cloud Filtering of GOES-satellite data through combined use of satellite and ground measurements

**Summary:**

The Manual Cloud Filtering of GOES-satellite data through combined use of satellite and ground measurements

**Figure 1:** Time-series curve for SURFRAD down-looking infra-red irradiance. Time-series of SURFRAD solar irradiance. GOES Channel 4 brightness temperature. This figure shows the close correspondence between the GOES and SURFRAD data for the satellite measurements over GOES site during the period. The channel 4 brightness temperature curve is used forComparing GOES and SURFRAD data.

**Figure 2:** Time-series curve for SURFRAD down-looking infra-red irradiance. Time-series of SURFRAD solar irradiance. GOES Channel 4 brightness temperature. This figure shows the correlation between the GOES and SURFRAD data for the satellite measurements over GOES site during the period. The channel 4 brightness temperature curve is used for validating GOES data.

**Figure 3:** Time-series curve for SURFRAD down-looking infra-red irradiance. Time-series of SURFRAD solar irradiance. GOES Channel 4 brightness temperature. This figure shows the close correspondence between the GOES and SURFRAD data for the satellite measurements over GOES site during the period. The channel 4 brightness temperature curve is used for validating GOES data.

**Figure 4:** Time-series curve for SURFRAD down-looking infra-red irradiance. Time-series of SURFRAD solar irradiance. GOES Channel 4 brightness temperature. This figure shows the close correspondence between the GOES and SURFRAD data for the satellite measurements over GOES site during the period. The channel 4 brightness temperature curve is used for validating GOES data.

**Figure 5:** Time-series curve for SURFRAD down-looking infra-red irradiance. Time-series of SURFRAD solar irradiance. GOES Channel 4 brightness temperature. This figure shows the close correspondence between the GOES and SURFRAD data for the satellite measurements over GOES site during the period. The channel 4 brightness temperature curve is used for validating GOES data.

**Figure 6:** Time-series curve for SURFRAD down-looking infra-red irradiance. Time-series of SURFRAD solar irradiance. GOES Channel 4 brightness temperature. This figure shows the close correspondence between the GOES and SURFRAD data for the satellite measurements over GOES site during the period. The channel 4 brightness temperature curve is used for validating GOES data.

**Figure 7:** Time-series curve for SURFRAD down-looking infra-red irradiance. Time-series of SURFRAD solar irradiance. GOES Channel 4 brightness temperature. This figure shows the close correspondence between the GOES and SURFRAD data for the satellite measurements over GOES site during the period. The channel 4 brightness temperature curve is used for validating GOES data.

**Figure 8:** Time-series curve for SURFRAD down-looking infra-red irradiance. Time-series of SURFRAD solar irradiance. GOES Channel 4 brightness temperature. This figure shows the close correspondence between the GOES and SURFRAD data for the satellite measurements over GOES site during the period. The channel 4 brightness temperature curve is used for validating GOES data.

**Figure 9:** Time-series curve for SURFRAD down-looking infra-red irradiance. Time-series of SURFRAD solar irradiance. GOES Channel 4 brightness temperature. This figure shows the close correspondence between the GOES and SURFRAD data for the satellite measurements over GOES site during the period. The channel 4 brightness temperature curve is used for validating GOES data.

**Figure 10:** Time-series curve for SURFRAD down-looking infra-red irradiance. Time-series of SURFRAD solar irradiance. GOES Channel 4 brightness temperature. This figure shows the close correspondence between the GOES and SURFRAD data for the satellite measurements over GOES site during the period. The channel 4 brightness temperature curve is used for validating GOES data.

**Figure 11:** Time-series curve for SURFRAD down-looking infra-red irradiance. Time-series of SURFRAD solar irradiance. GOES Channel 4 brightness temperature. This figure shows the close correspondence between the GOES and SURFRAD data for the satellite measurements over GOES site during the period. The channel 4 brightness temperature curve is used for validating GOES data.

**Figure 12:** Time-series curve for SURFRAD down-looking infra-red irradiance. Time-series of SURFRAD solar irradiance. GOES Channel 4 brightness temperature. This figure shows the close correspondence between the GOES and SURFRAD data for the satellite measurements over GOES site during the period. The channel 4 brightness temperature curve is used for validating GOES data.

**Figure 13:** Time-series curve for SURFRAD down-looking infra-red irradiance. Time-series of SURFRAD solar irradiance. GOES Channel 4 brightness temperature. This figure shows the close correspondence between the GOES and SURFRAD data for the satellite measurements over GOES site during the period. The channel 4 brightness temperature curve is used for validating GOES data.

**Figure 14:** Time-series curve for SURFRAD down-looking infra-red irradiance. Time-series of SURFRAD solar irradiance. GOES Channel 4 brightness temperature. This figure shows the close correspondence between the GOES and SURFRAD data for the satellite measurements over GOES site during the period. The channel 4 brightness temperature curve is used for validating GOES data.

**Figure 15:** Time-series curve for SURFRAD down-looking infra-red irradiance. Time-series of SURFRAD solar irradiance. GOES Channel 4 brightness temperature. This figure shows the close correspondence between the GOES and SURFRAD data for the satellite measurements over GOES site during the period. The channel 4 brightness temperature curve is used for validating GOES data.

**Figure 16:** Time-series curve for SURFRAD down-looking infra-red irradiance. Time-series of SURFRAD solar irradiance. GOES Channel 4 brightness temperature. This figure shows the close correspondence between the GOES and SURFRAD data for the satellite measurements over GOES site during the period. The channel 4 brightness temperature curve is used for validating GOES data.

**Figure 17:** Time-series curve for SURFRAD down-looking infra-red irradiance. Time-series of SURFRAD solar irradiance. GOES Channel 4 brightness temperature. This figure shows the close correspondence between the GOES and SURFRAD data for the satellite measurements over GOES site during the period. The channel 4 brightness temperature curve is used for validating GOES data.

**Figure 18:** Time-series curve for SURFRAD down-looking infra-red irradiance. Time-series of SURFRAD solar irradiance. GOES Channel 4 brightness temperature. This figure shows the close correspondence between the GOES and SURFRAD data for the satellite measurements over GOES site during the period. The channel 4 brightness temperature curve is used for validating GOES data.

**Figure 19:** Time-series curve for SURFRAD down-looking infra-red irradiance. Time-series of SURFRAD solar irradiance. GOES Channel 4 brightness temperature. This figure shows the close correspondence between the GOES and SURFRAD data for the satellite measurements over GOES site during the period. The channel 4 brightness temperature curve is used for validating GOES data.

**Figure 20:** Time-series curve for SURFRAD down-looking infra-red irradiance. Time-series of SURFRAD solar irradiance. GOES Channel 4 brightness temperature. This figure shows the close correspondence between the GOES and SURFRAD data for the satellite measurements over GOES site during the period. The channel 4 brightness temperature curve is used for validating GOES data.

**Figure 21:** Time-series curve for SURFRAD down-looking infra-red irradiance. Time-series of SURFRAD solar irradiance. GOES Channel 4 brightness temperature. This figure shows the close correspondence between the GOES and SURFRAD data for the satellite measurements over GOES site during the period. The channel 4 brightness temperature curve is used for validating GOES data.

**Figure 22:** Time-series curve for SURFRAD down-looking infra-red irradiance. Time-series of SURFRAD solar irradiance. GOES Channel 4 brightness temperature. This figure shows the close correspondence between the GOES and SURFRAD data for the satellite measurements over GOES site during the period. The channel 4 brightness temperature curve is used for validating GOES data.
• GOES-R Algorithm Working Group (AWG) Hydrology Algorithm Team (AT)
  – Provide recommended, demonstrated, and validated algorithms for processing GOES-R observations into
    • Probability of rainfall (0-3 h)
    • Rainfall potential (0-3 h)
    • Rainfall Rate / QPE
  – Members from NOAA, NASA, ESSIC, UC-Irvine

• Current Status
  – Four rain rate estimation and three nowcasting algorithms were modified by the developers using SEVIRI data as an ABI proxy
  – Developers provided evaluation fields to the Hydrology AT for 16 days in January, April, July, October 2005 over selected regions
  – Intercomparison is underway; selection will be completed by end of February 2008

• Next Steps:
  – Derive the probability of rainfall algorithm from the selected rain rate and nowcasting algorithms by calibrating against ground validation data
  – Integrate the source code from the selected algorithms into the AWG processing framework, meeting requirements for code format and for internal and external documentation
XXII\textsuperscript{nd} Conference on Hydrology:
An improved GOES parallax correction scheme for rainfall estimation
J. C. Davenport and R.J. Kuligowski

- **Dated parallax adjustment scheme**
  - Standard atmosphere
  - Rounded off
  - High clouds only

- **New scheme**
  - Lookup with NAM model
  - All clouds
  - Preserves cloud morphology

- **Verification**
  - Much improved match between paired east/west images
22nd Conference on Hydrology:
Blending Soil Moisture Retrievals from TMI, AMSR-E and WindSat Observations and Noah LSM Simulations for a Combined Soil Moisture Data Product
X. Zhan, J. Liu, T. J. Jackson, J. Meng, M. Cosh, F. Weng, and K. Mitchell

- **Objectives:**
  - How sensors are compared.
  - Feasibility for one SM data set.

- **Methodology:**
  - SCO of TMI, AMSR-E, WindSat.
  - Use consistent retrieval algorithm.
  - Assimilate retrievals to Noah LSM.

- **Preliminary Results:**
  - Tbs over land are different from different sensors.
  - Resulting emissivity and soil moisture differences could be large.
  - Calibration is needed for long term.
  - Assimilated SM with Noah LSM compare better against field data.
Poster – Validation of the Community Radiative Transfer Model (CRTM) against nighttime AVHRR Clear-Sky Processor for Oceans (ACSPO) radiances for improved cloud detection and physical SST retrievals

XingMing Liang¹,², Alexander Ignatov¹, Yury Kihai¹,³, Andrew Heidinger¹, Yong Han¹, Yong Chen¹,²
¹NOAA/NESDIS/STAR  ²Colorado State University/CIRA  ³QSS Group Incorporated

• **Objective**
  To document CRTM/GFS implementation in ACSPO v.1 and to evaluate the “Model minus Observation” (M-O) brightness temperature (BT) biases in three bands (3.7, 11 and 12 μm) of four AVHRR/3 instruments onboard NOAA-16 through 18 and MetOp-A.

• **Methodology**
  – **Implement** CRTM for accurate BT modeling with different atmospheric and surface states
  – **Validate** CRTM by analyzing M-O BT biases as a function of environmental parameters, view zenith angle, and latitude.

• **Conclusions**
  – M-O bias is significantly reduced by an accurate implementation (Consistent treatment of finite GFS layers, and using Fresnel’s surface models and Reynolds SST)
  – CRTM is a fast model, it closely reproduces AVHRR BTs and shows a good cross-platform consistency
  – N16/Ch3B is out-of-family, likely due to its inaccurate spectral response functions
  – The residual warm M-O biases leave margin for future inclusion of aerosols, using skin SST (instead of bulk) and minimizing possible residual cloud in the AVHRR Clear-Sky Radiances

• **Future plans**
  – Add daytime data analysis
  – Add aerosol data
  – Explore physical SST
Objective

Matchup files

Cal/Val Flowchart
  - Subsetting & QC of matchup

Calibration results
  - Input
  - SST Coefficients

Validation results
  - Histograms of Val statistics
  - Mapping Outliers

Conclusions
  - Validation bias ≤ ± 0.2°C
  - RMSD 0.38 to 0.53°C during the day
    0.32 to 0.48°C at night.

(3a) VAL: Statistics

Matchup data after outlier removal are used to assess the accuracy of operational SST. The validation statistics verify the product quality and consistency over the history of the satellites.

Statistics of $T_{sat} - T_{in situ}$ using the first month's coefficients (first point in the time series shown in section 2b). The validation dataset has been screened using the median ± 4 RMSDs (MAD/0.6745) criterion.
A new precipitation data set for climate studies has been developed that has the following attributes:

- It uses all available passive microwave satellite data.
- It uses the latest version of GPROF for use with SSM/I, TMI and AMSR-E.
- It uses the latest version of the AMSU precipitation product.
- It uses an Optimum Interpolation (OI) scheme to combine the data, which has been gridded to an hourly, 0.25 degree grid.

Preliminary results:

- Product comparable in quality to GPCP, CMORPH, etc.
- Some artifacts exist.
  - Bias between GPROF and AMSU?

Data set will be excellent to investigate “other” climate signatures:

- Changes in rainfall distributions on 6-hr to monthly time scale.
- Shifts in diurnal cycle of rainfall.