Poster Session II

Wednesday April 29, 2015

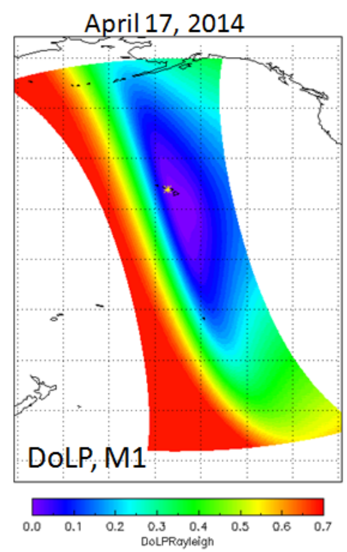
10:30 AM & 3:00 PM

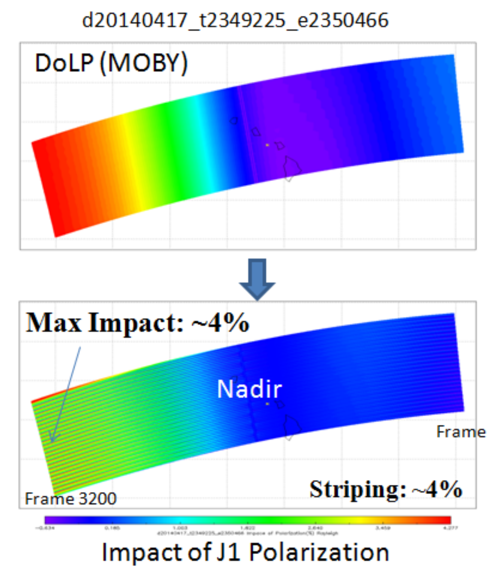
Assessment of J1 VIIRS Polarization Sensitivity Impacts on Sensor Data Records

[1]Wenhui Wang, [2]Changyong Cao, and [1]Aaron Pearlman

[1]Earth Resource Technology, Inc; [2]NOAA/NESDIS/STAR
College Park, MD

- The impacts of J1 polarization sensitivity was studied using prelaunch polarization characterization data and 6SV simulations:
  - The impact on band M1 TOA reflectance may be as large as ~4%;
  - Band M1 Stripping due to detector level polarization sensitivity differences may also be ~4%.



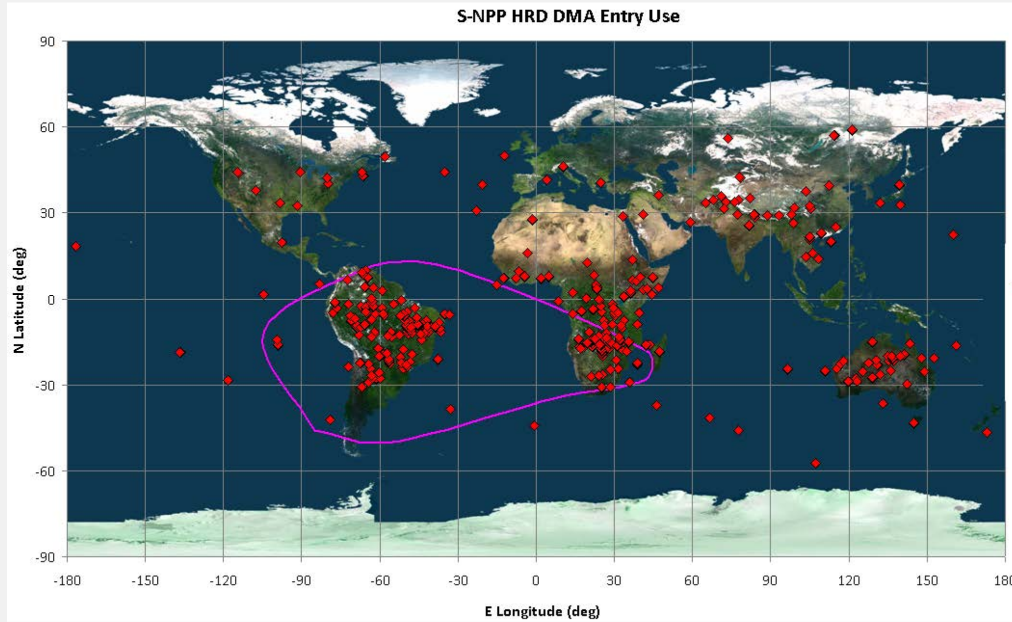


Poster # 2.1

Direct Broadcast and Stored Mission Data Behavior in Relation to CrIS Full Spectrum for S-NPP

Kevin Gross • Sean Lyons
NOAA OSPO

To receive CrIS full length interferograms in the SWIR and MWIR bands, the APID to VCID mappings were modified to prevent Direct Broadcast or SMD data buffer overflow and resulting data loss



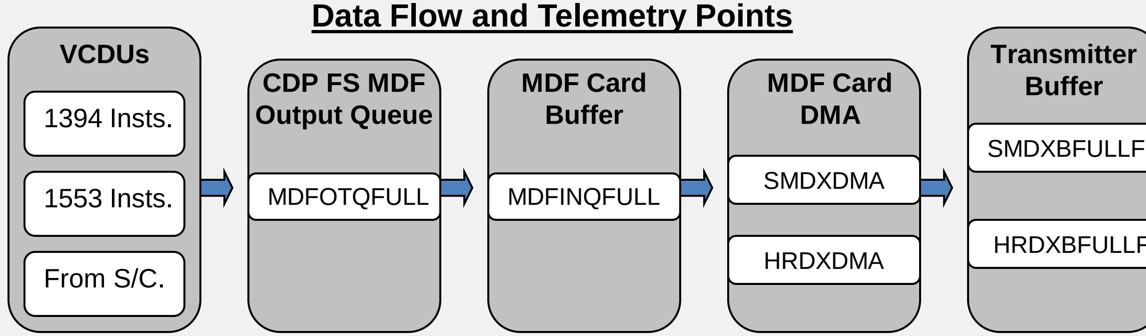
Behavior Before

- SSR fills at slower rate
- Shorter SSR dump time
- Data loss during CrIS FS Test
- Buffer overflow during CrIS FS Test

Behavior After

- SSR fills at higher rate
- No increase in HRDXDMA instances
- No data loss after CrIS FS
- No buffer overflow after CrIS FS

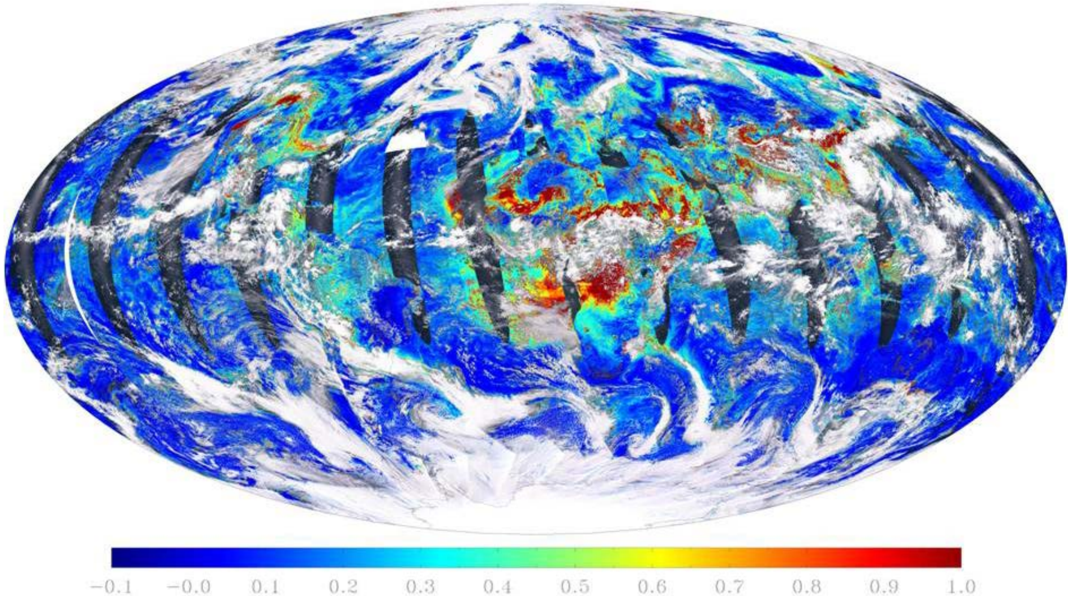
Data Flow and Telemetry Points



Evaluation of the VIIRS Risk Reduction Aerosol Optical Thickness Algorithm

Hongqing Liu(1) and Istvan Laszlo(2)
(1) I.M. Systems Group, Inc. (2) NOAA/NESDIS

- The VIIRS risk reduction algorithm improves aerosol optical thickness retrieval
  - Extended spatial and measurement range
  - Updated aerosol models
  - Scene-dependent surface spectral reflectance relationship
  - Improved accuracy and precision
  - Can be driven by both VIIRS and ABI observations



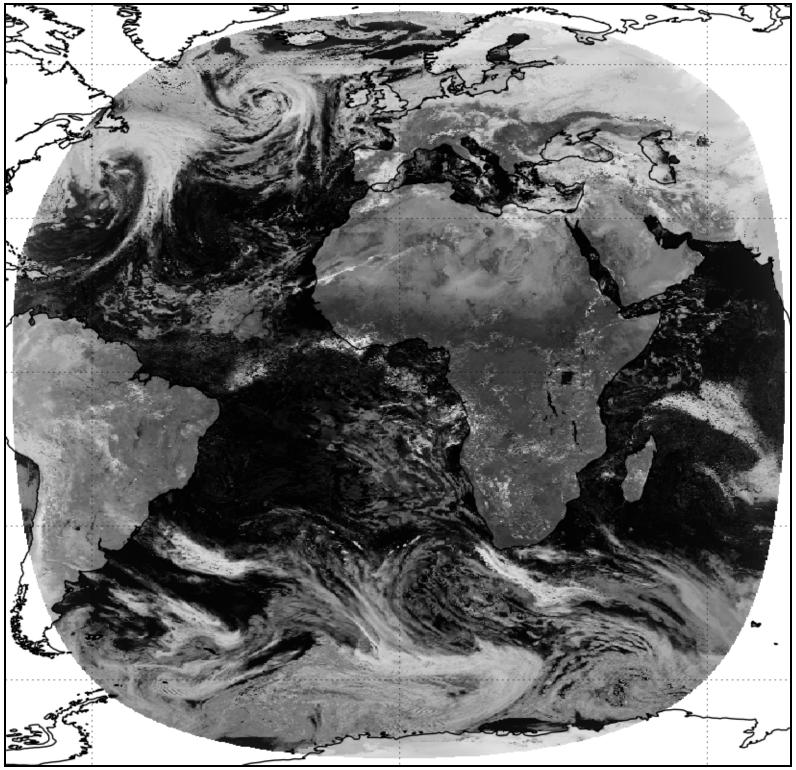
Retrieved aerosol optical thickness by the VIIRS risk reduction algorithm

Poster # 2.5

Simulated Satellite Imagery: Verifying NWP model analyses and forecasts

Thomas Blackmore
Met Office
Exeter, UK

- Interpreting NWP model analyses and forecasts and presenting them as if they were satellite images.
  - Direct comparison with observations.
  - Uses Met Office NWP models and a fast radiative transfer model (RTTOV-11).
  - Applications in Operational meteorology and NWP research.



Simulated MSG Visible channel imagery from Global model

Poster #
2.7

Facilitation of OMPS Dark Table Production Transition to GRAVITE by STAR Algorithm Integration Team (AIT)

Bigyani Das[1], Weizhong Chen[1], Kristina Sprietzer[1], Walter Wolf[2]
[1]IMSG, Rockville, MD 20852, USA
[2]NOAA/NESDIS/STAR, College Park, MD 20740, USA

- OMPS Dark Tables are produced on GRAVITE by using a master Perl script that combines the 4 main steps:
  - Step 1: Creating L1A files from Raw Data Record (RDR) files
  - Step 2: Using those L1A files to produce Sensor Data Record (SDR) files
  - Step 3: Using SDR files to create DARK files in HDF5 format
  - Step 4: Using the above HDF5 files to produce the final binary files

GRAVITE: Government Resource for Algorithm Verification, Independent Test, and Evaluation

Steps in the DARK Generation Process

RDR Files Generated by IDPS
RNSCA-RONPC
RNSCA-RONPC

Step 1: Uses 8 APPs
ORBDEF File

L1A Files
OMPS-NPP-NP_L1A_CAL
OMPS-NPP-NP_L1A_CAL_DIAG

Step 2: Uses 15 APPs
L1A_CAL_DIAG file for p061 file
L1A_CAL file for p058 file

SDR Files
OMPS-NPP-NP_SDR_CAL_NASA-p058
OMPS-NPP-NP_SDR_CAL_NASA-p061

Step 3: Uses 6 APPs
Both p061 and p058 files used

Dark File
OMPS-NPP-NP_DRK-p058

Step 4: Uses 1 APP
Uses DRK-p058 file and L1A_CAL file

Binary Dark for IDPS
OMPS-NP-DARKS-GND-PI_npp

Poster # 2-11

Suomi-NPP VIIRS Imagery Update

Donald W. Hillger, NOAA/NESDIS, Fort Collins, CO; and C. J. Seaman, S. D. Miller, T. J. Kopp, R. Williams, and G. Mineart

VIIRS Imagery is <u>excellent</u>:

The I-bands provide <u>high-resolution imagery</u> of tropical storms, thunderstorms, RGB imagery, etc., depicting details in cloud formations or features on the ground which were not seen before (as noted in many of the VIIRS Blogs and VIIRS Imagery websites).

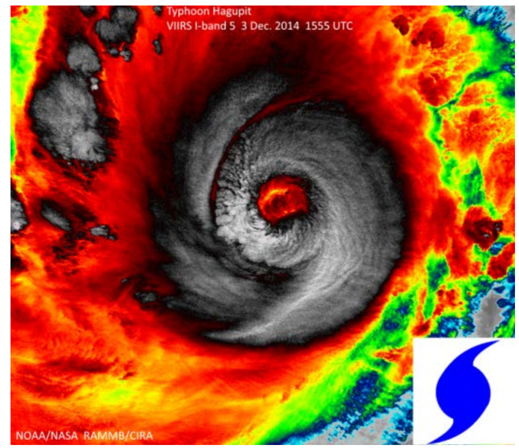
Users especially like <u>DNB and/or NCC.</u>

Some Improvements in VIIRS Imagery are possible:

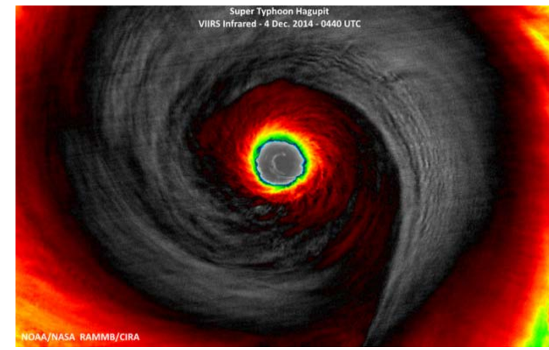
Additional (all 16) M-band EDRs desired (currently only 6 M bands)

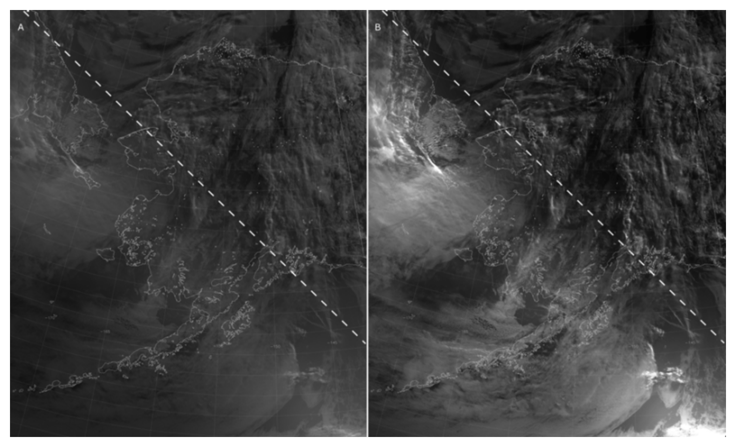
<u>Improved "erf-dynamic scaling" (EDS) DNB</u>

<u>Data latency</u> is main realtime usage issue (6 hour delay is not user friendly).



VIIRS I-band-5 Image of Typhoon Hagupit: rapidly-intensifying 1555 UTC on 3 Dec 2014, maximum intensify 0440 UTC on 4 Dec 2014.





VIIRS DNB and NCC images of a twilight scene on the night following a last quarter moon (13:23 UTC 19 July 2014). A) DNB image produced using the EDS method. B) NCC image. The dashed lines in (A) and (B) represent the 89° solar zenith angle contour with daylight in the upper right corner and night in the lower left corner.

Poster
2-12

Modeling Suomi-NPP VIIRS Solar Diffuser Degradation due to Space Radiation

Changyong Cao (NOAA/NESDIS/STAR) and Xi Shao (UMD)

- Solar diffuser is made of Spectralon ™ (one type of fluoropolymer) and was chosen because of its controlled reflectance in the VIS-NIR-SWIR region and its near-Lambertian reflectance profile.
- Spectralon ™ is known to degrade in reflectance at the blue end of the spectrum due to exposure to solar UV radiation and energetic protons.
- VIIRS uses a SDSM to monitor the change in the Solar Diffuser reflectance in the 0.4 – 0.94 um wavelength range and provide a correction to the calibration constants.
- The H factor derived from SDSM reveals that reflectance of 0.4 to 0.6um channels of VIIRS degrades faster than the reflectance of longer wavelength channels.
- A model is developed to derive mean SD surface roughness height (*l*) and *autocovariance length (σ)* of SD surface roughness from the long term spectral degradation of SD reflectance.
- These parameters are trended to assess surface roughness change of the SD of VIIRS.

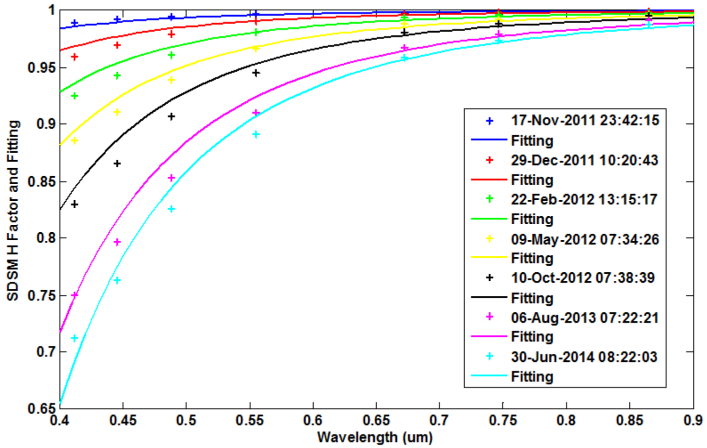


Figure 1: Fitting of VIIRS SD spectral reflectance time series with Elson surface roughness model.

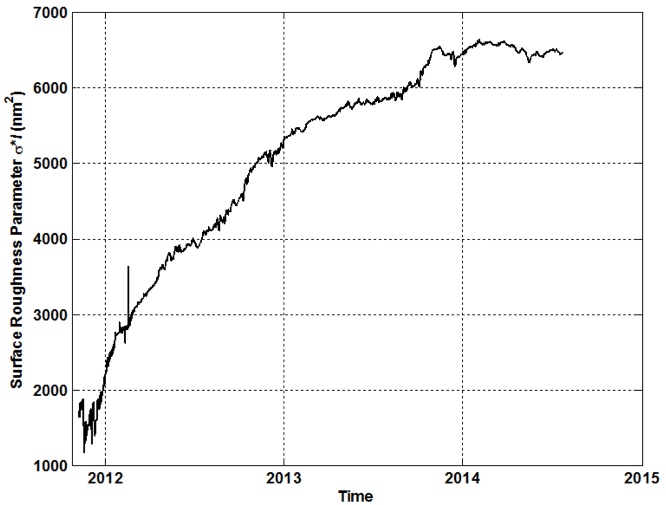


Figure 2: Trending of VIIRS SD surface roughness characteristic parameter σl

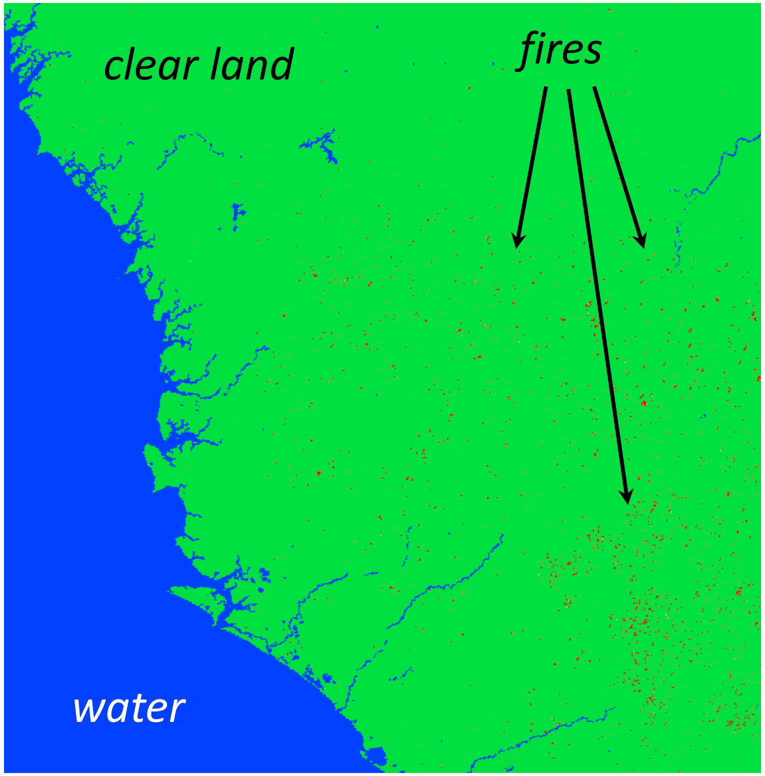
Poster # 2-14

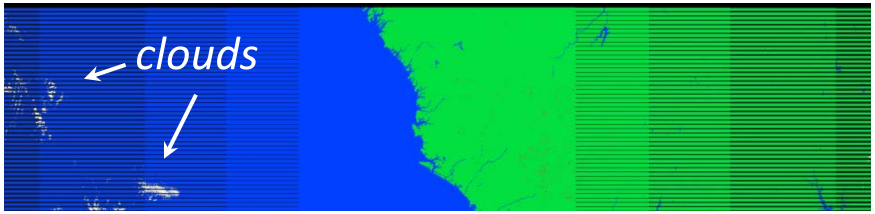
Latest developments related to the improvement of the operational NOAA VIIRS active fire product

I. Csiszar[1], L. Giglio[2], W. Schroeder[2] and E. Ellicott[2]
[1]NOAA/NESDIS/STAR; [2]University of Maryland Department of Geographical Sciences
College Park, MD

- A new 750m VIIRS fire algorithm is transitioning into NOAA operations
  - global mask of thematic classes including water, cloud, non-fire clear land and fire at three confidence levels
  - fire radiative power for each fire-affected pixel
  - new algorithm elements to improve detection performance
- The product is tailored subset of the NASA science product for real-time NOAA operations

VIIRS fire mask over West Africa on 3/1/2015 at 14:15 UTC





Data processed by STAR AIT from IDPS input

Poster # 2.15

Neural Network Technique for Gap-Filling of Satellite Ocean Color Observations for use in Numerical Modeling

Sudhir Nadiga[1], Vladimir Krasnopolsky[2], Avichal Mehra[2], Eric Bayler[3], and David Behringer[2]
[1]IMSG at NOAA/NCEP/EMC, NCWCP, College Park, MD; [2]NOAA/NCEP/EMC, NCWCP; [3]NOAA/NESDIS/STAR

- A Neural Network (NN) Technique is used to estimate VIIRS ocean color fields using multiple independently observed inputs
  1. Training Period: 01/2012-11/2013
  2. NN accurately estimates chlorophyll-a (Chl-a) fields for many months subsequent to the training period.
  3. NN inputs are:
     - daily satellite sea-surface height (SSH)
     - daily satellite sea-surface temperatures (SST)
     - daily satellite sea-surface salinity (SSS)
     - gridded Argo monthly vertical profiles of temperature (T) and salinity (S)
     - Output is daily Chl-a values.
  4. Shows great promise for gap-filling when other independent observations (SSH, SST, SSS, T, S, etc.) are available
- More sensitivity tests are required to obtain the optimal configuration of the NN technique
  1. Seasonality in the root-mean-square error (RMSE) and in the cross-correlation between NN and VIIRS data.
  2. Cross-correlation is highest in mid-latitudes and lowest in the equatorial Pacific Ocean.
  3. Data points with Chl-a > 1 are less than 1% of points, but removing these noisy points (mostly in shallow waters), helped NN performance.

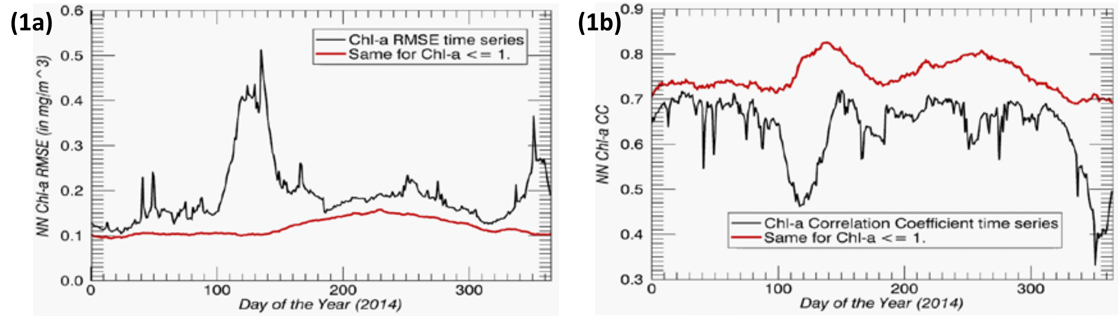


Figure 1: a) Chlorophyll-a root-mean-square error (mg m^{-3}) for NN (black) and with Chl-a > 1 mg m^{-3} removed (red); b) cross-correlation between NN and VIIRS data (black) and with Chl-a > 1 mg m^{-3} removed (red). The data for 2014 were not included in the NN training.

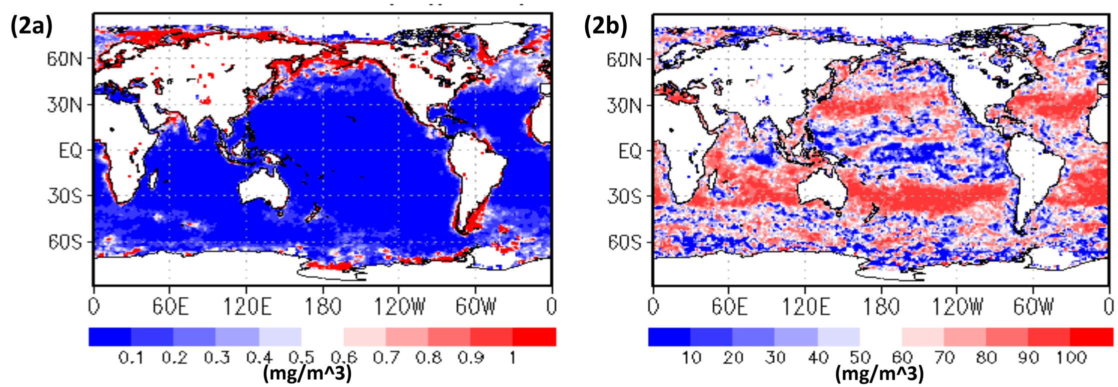


Figure 2: (a) 2014 chlorophyll-a root-mean-square error (mg m^{-3}) for NN estimates; and (b) cross-correlation (percent) between NN and VIIRS data at zero time lag. The data for 2014 were not included in NN training.

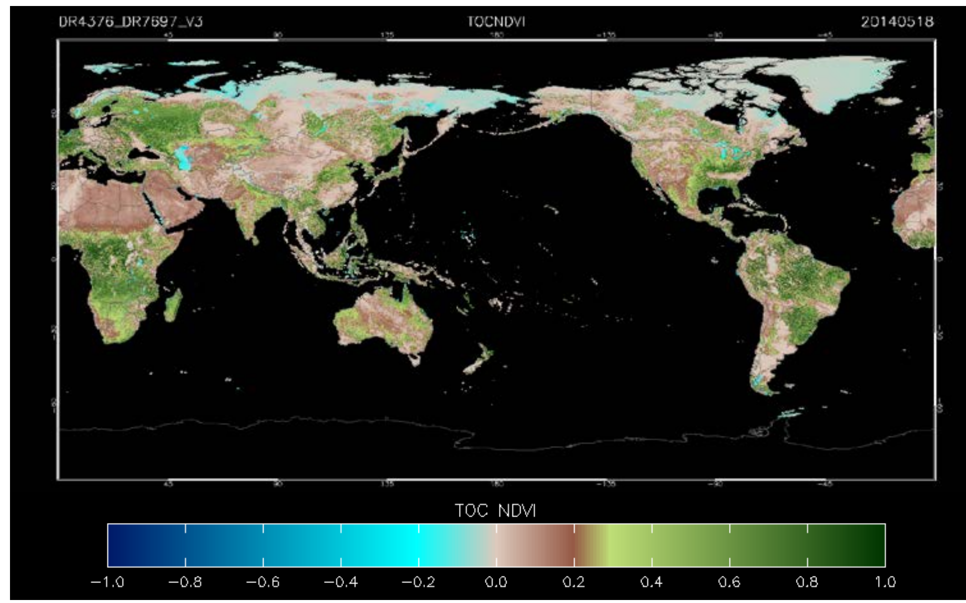
Poster # 2.18

Integrating Changes to VIIRS Vegetation Index Algorithm using Algorithm Development Library (ADL)

Qiang Zhao[1], Bigyani Das[1], Weizhong Chen[1], Marina Tsidulko[1], Valerie Mikles[1], Walter Wolf[2]

[1]IMSG, Rockville, MD; [2]NOAA/STAR, College Park, MD

- A new product, the TOC NDVI, has been developed and integrated into the VIIRS VI algorithm suite
  - Extensively tested through a series of ADL algorithm chain runs for two days of VIIRS data
  - Comparison studies were conducted to evaluate the impacts of upstream aerosol and surface reflectance algorithms changes on the VI products.



Poster # 2-19

Automated JPSS Products Processing of the Algorithm Development Library (ADL) by using Chain Run Scripts

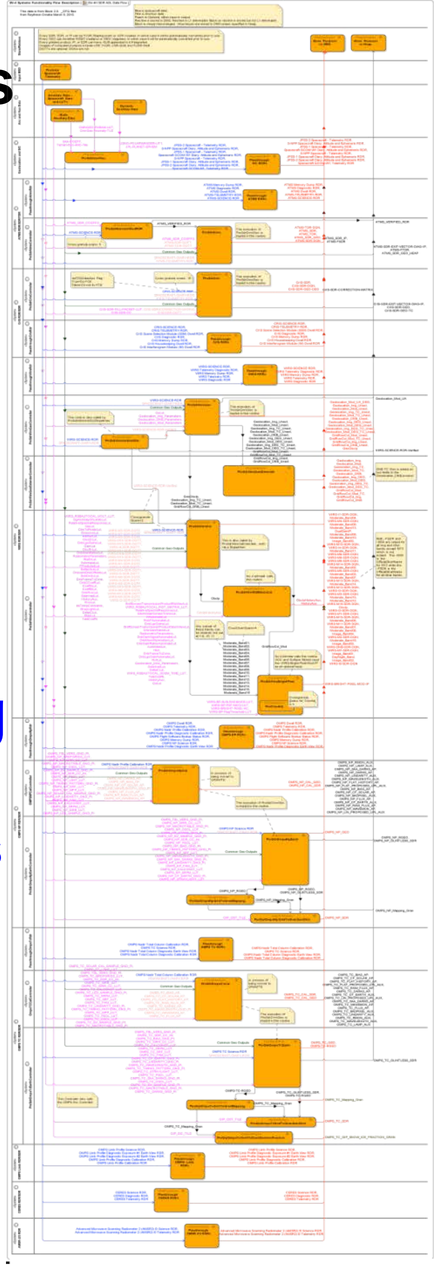
Weizhong Chen
NOAA/NESDIS/STAR
College Park, MD

- The ADL Chain Run script is developed by the STAR AIT.
- The ADL chain run script is mainly Perl script to automate the staging and processing of multiple JPSS SDR and EDR products.
- The script calls ADL's "runADLChainRunner.pl" to process data.
- The script uses a specified date with time range and/or a specified granule ID as an option to identify and stage input data.
- The VIIRS Cloud Mask, Aerosol, Surface Reflectance and Vegetation Index will be used as examples to show how to use this script to process JPSS data.

Poster
2-20

Accurate Data Flow Management Tool Facilitates Operational Stability and Risk Management in a Dynamic Science Processing Environment

Laura Ellen Dafoe, Jeffrey Hayden
Jeffries Technology Solutions, Inc in support of JPSS



- **Talk about an Eye Chart!** See what this diagram is saying by visiting Poster 2-21. (hint: JPSS SDRs)

- **Data Flow Model of JPSS Science Processing**
  - **Accurate and Current: Built from Block 2.0 ADL code**
  - Uses Operational Process Names & Collection Short Names
  - Critical for Determining Data Product Dependencies
  - Expandable to Include NDE and GOES-R Processing
  - Tracks Senders and Receivers of all JPSS Data Products
  - **Covers flight science data, ground ancillary and auxiliary data, intermediate products and EDRs.**

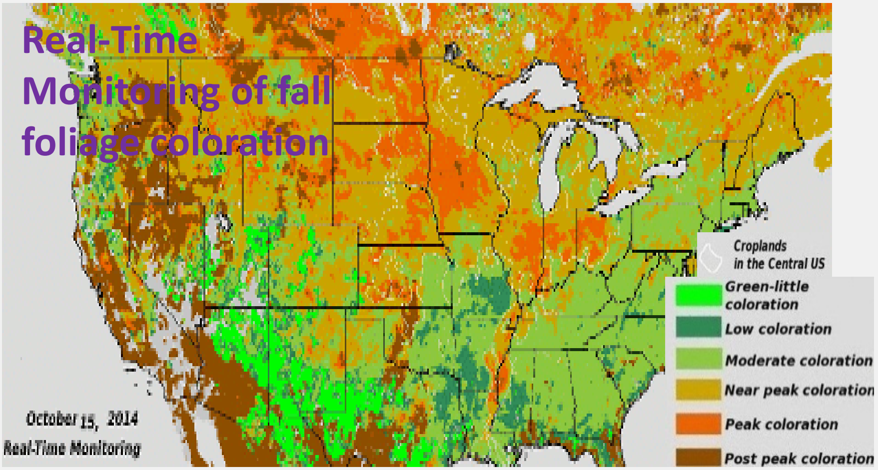
Poster # 2-21

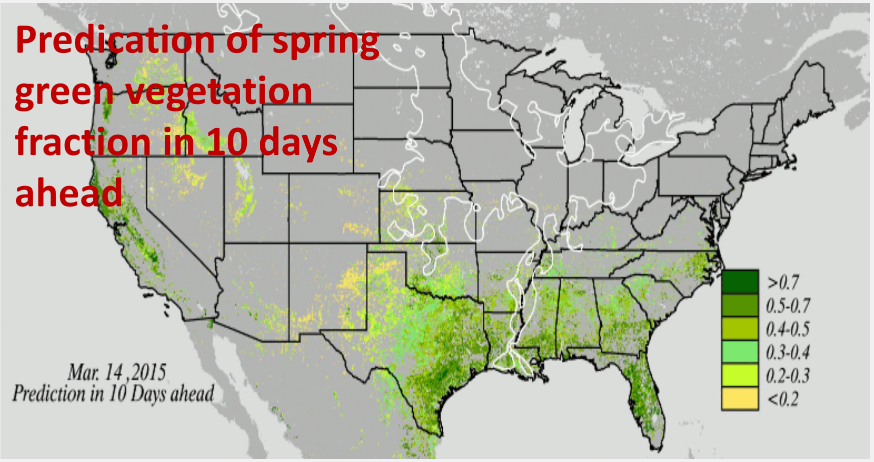
Real-time Monitoring Land Surface Vegetation Phenology from VIIRS Observations

Xiaoyang Zhang[1], Lingling Liu[1] & Yunyue Yu[2]

[1]GSCE, South Dakota State University, Brookings, SD; [2]NOAA/NESDIS/STAR, College Park, MD

- **Collect timely available daily JPSS VIIRS observations**
- **Generate a set of potential temporal trajectories of vegetation development at a given time and pixel**
- **Monitor in near real time and forecast in 10 days ahead the spring green vegetation growth and autumn color foliage status and uncertainties**
- **GOES-R ABI could improve the monitoring quality of temporal foliage development greatly**





Poster # 2-22

THE DEVELOPMENT OF

GOES Early Fire Detection System to Reduce Disaster Vulnerability

Alexander Koltunov,
B. Quayle, S. Ustin,
E. Prins,

GOES-EFD goal:

Timely Initial Detection of Wildfire Ignitions

- Urgently needed to support first responders
- Feasible from GOES, but not an objective of WF-ABBA
- Requires a specialized algorithm focusing on fire starts

GOES-EFD (Alpha) prototype

- Detects new ignitions faster than WF-ABBA
- Can provide *the earliest alarm* for many incidents

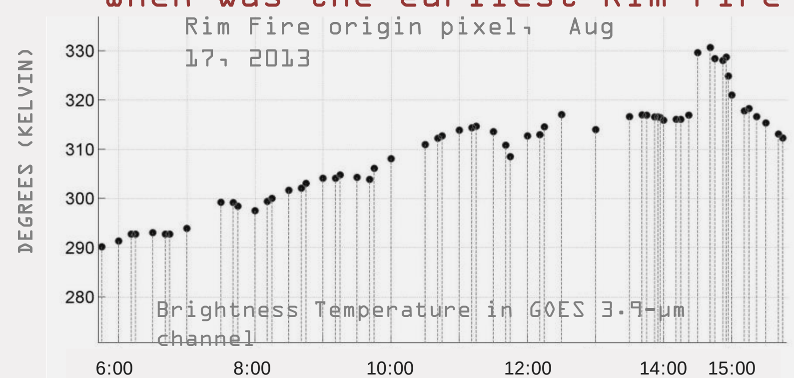
GOES-EFD offers an opportunity for NOAA
to maximize the GOES Program contribution
to wildfire disaster reduction

CONTACT Alex Koltunov, akoltunov@ucdavis.edu

Can you tell which one image has the Rim Fire start signal?

Brightness Temperature in GOES 3.9-μm channel

When was the earliest Rim Fire



HOURS: PST (Pacific Standard Time)

Poster # 2-23

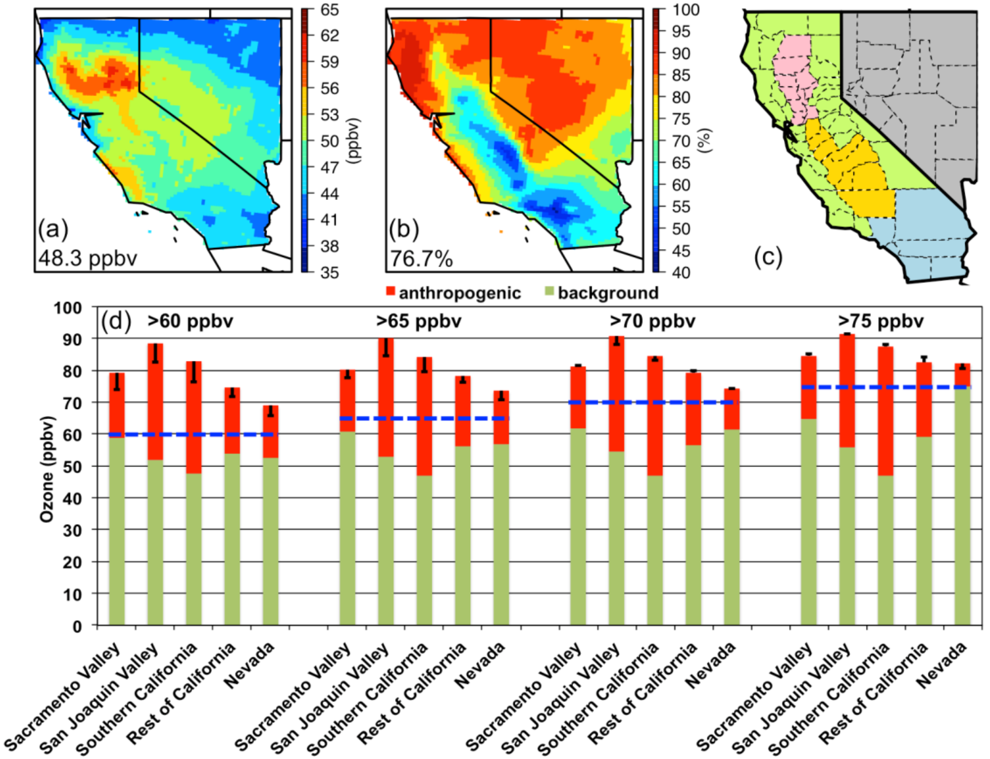
Evaluate and constrain modeled ozone and its source contributions in the US using satellite trace gas observations (also in JGR paper doi:10.1002/2014JD022993)

Min Huang et al., NOAA Air Resources Laboratory (ARL), College Park, MD

We used satellite chemical observations to improve total and background ozone estimates in a multi-scale modeling and assimilation system, which advanced our knowledge of policy-relevant science.

-Background ozone normally relies on pure model simulations and could be highly uncertain.

-Observation-constrained regional period-mean background O_3 and its contribution to the modeled total O_3 are ~48 ppbv and ~77%, respectively (a-b), 2.4 ppbv lower than products from a free-running modeling system, as a result of a 3.3 ppbv increase in the non-local source contributions offset by a 5.7 ppbv of decrease in the local biomass burning source contributions.



Satellite observation-constrained background ozone

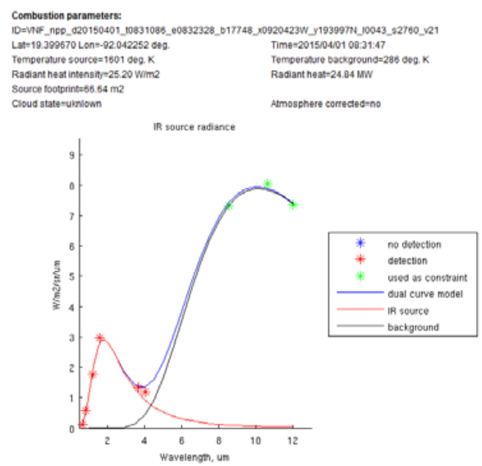
Poster # 2-25

VIIRS Boats, Lights, Fires and Flares

Christopher D. Elvidge
NOAA/NESDIS National Centers for Environmental Information – Boulder
Kimberly Baugh, Feng-Chi Hsu, Mikhail Zhizhin, Tilottama Ghosh
Cooperative Institute for Research in the Environmental Sciences

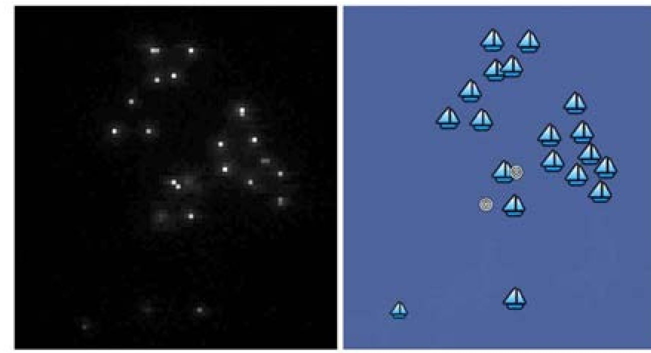
Global Nighttime Lights

- World Bank monitoring of electrification projects
- USAID Power Africa project
- NASA Urban growth studies
- USGS mapping of impervious surfaces



Global Gas Flaring

- World Bank annual ranking of national gas flaring levels
- Monitoring gas flaring reduction projects
- Mapping carbon emissions for NOAA's carbon tracker program



Fishing Boat Detections

- Support to State Dept. "Our Oceans Initiative"
- Technical assistance to Indonesia's fishery agency combating IUU fishing (USAID funded)

Poster # 2-26

Development of the Visible Detector Assembly for the Flexible Combined Imager on MTG

J. Endicott, J. Pratlong, A. Pike, W. Hubbard, P. Jerram, A. Walker, D. Davies
e2v technologies, Space Imaging

- e2v has been involved in many Solar Physics and Solar Weather satellites, Hinode (Solar-B), SETERO, SDO, IRIS and SUVI both in Europe and across the pond! We have also supplied many of Europe's Earth monitoring weather and atmospheric satellites such as Envisat, Sentinel-2, 3 and now 4 and 5. We have supplied detectors into OMI for NASA's Aura satellite and OMPS for NPOESS.
- Here we report our development of the Visible Detector Assembly for the Flexible Combined Imager on Meteosat Third Generation, MTG FCI VisDA. e2v has successfully passed the Preliminary Design Review for the detector and has demonstrated in silicon that the detector is latch-up free up to the maximum energy of our test facility, 67.7MeV/mg/cm^2.

**MTG is an ESA programme*

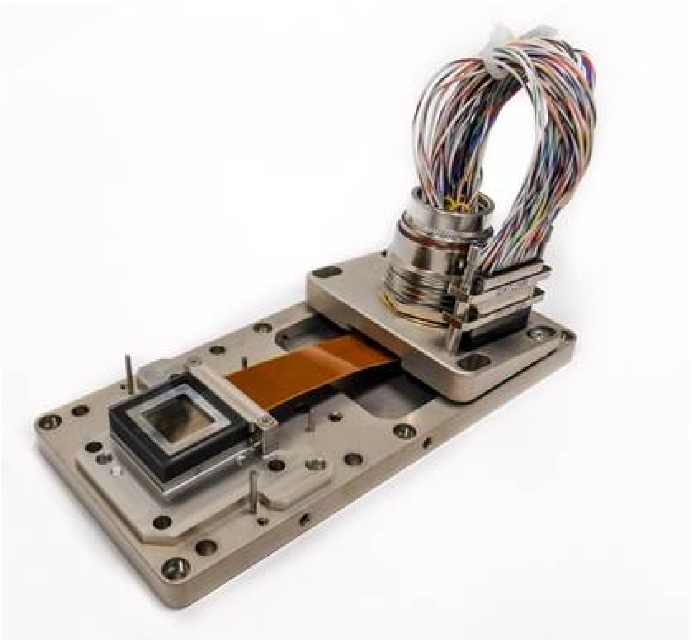


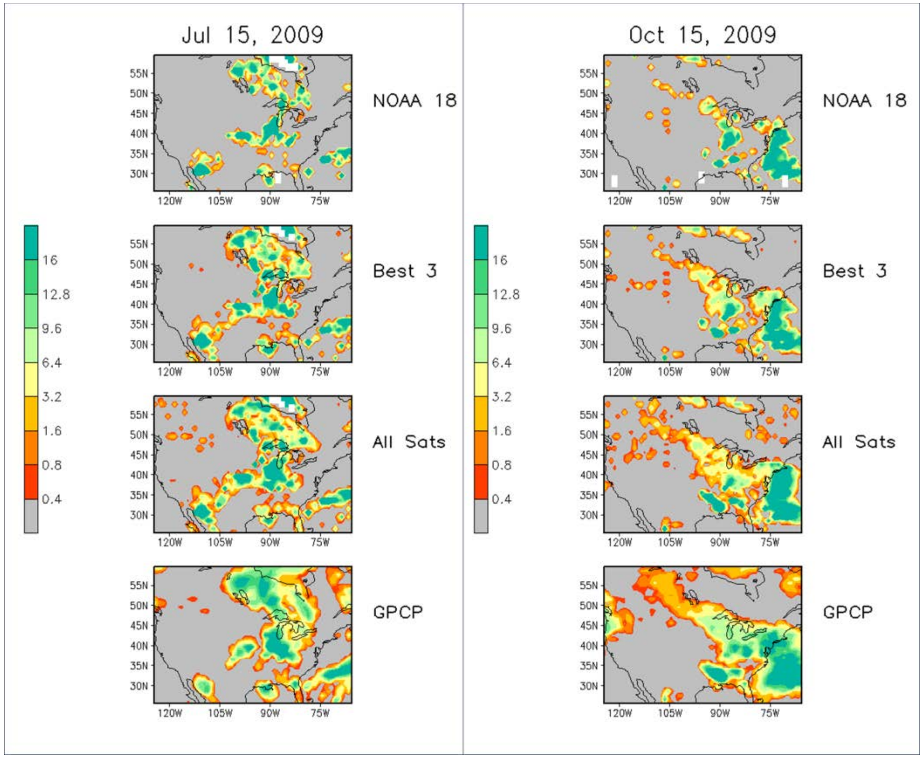
Image of a breadboard assembly for irradiation

Poster
2-27

Impact of AMSU Derived Hydrological Products on Merged Precipitation Products

Thomas Smith, Ralph R. Ferraro, Huan Meng, and Wenze Yang
NOAA/NESDIS/STAR and ESSIC/CICS, College Park, MD

- Sampling Experiments for Satellite Precipitation
  - Daily precipitation estimates with different numbers of satellite inputs
  - Testing in a region with gauge and satellite estimates
  - Multiple satellites give better resolution of the daily cycle
  - Daily cycle is not fully resolved by the available satellite inputs



Daily precipitation estimates for 2 days in 2009 using 1 satellite, 3 satellites, 5 satellites, and GPCP validation

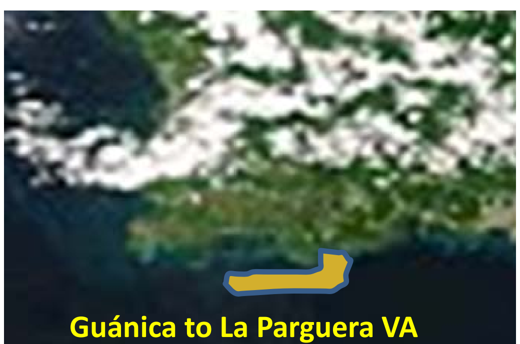
Poster # 2-28

Developing VIIRS Ocean Color Products for Coral Reef Ecosystem Managers

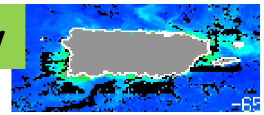
AE Strong[1], M Wang[2], CM Eakin[1], W Hernandez[3], M Cardona[3] and E Geiger[1]
NOAA/NESDIS/STAR Coral Reef Watch[1] & VIIRS Ocean Color Team[2]
With University of Puerto Rico's Bio-Optical & Oceanography Lab[3]

VIIRS will be used to help coral reef managers assess land-based sources of pollution flowing over reefs in Puerto Rico, Hawaii, and American Samoa using:

- Derived anomalies of $K_d(490)$, Chl-***a***, and SST over manager-defined Virtual Areas (VA) located along stream outflow over reefs

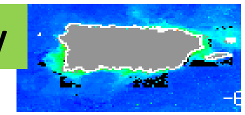


Daily



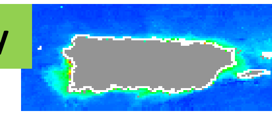
K_d - 22 Dec 2014

Weekly



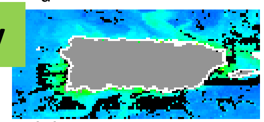
K_d – 19-26 Dec 2014

Monthly



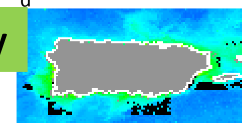
K_d – Monthly Dec 2014

Daily



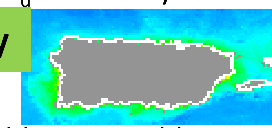
Chl-***a*** - 22 Dec 2014

Weekly



Chl-***a*** – 19-26 Dec 2014

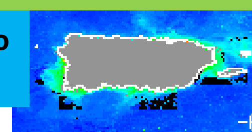
Monthly



Chl-***a*** – Monthly Dec 2014

Weekly K_d - All Three Major US Coral Reef Task Force Watersheds

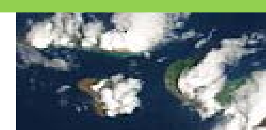
Puerto Rico



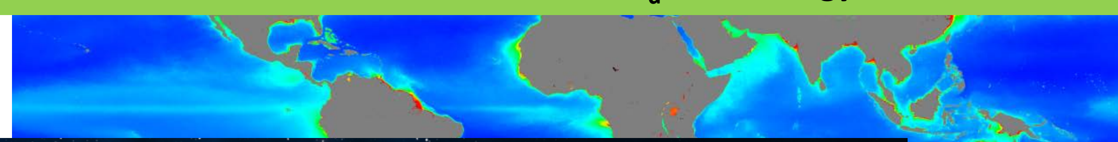
Maui Hawaii

American Samoa

True Color- All Three Major US Coral Reef Task Force Watersheds



Mar 2012 to Oct 2014 – K_d Climatology

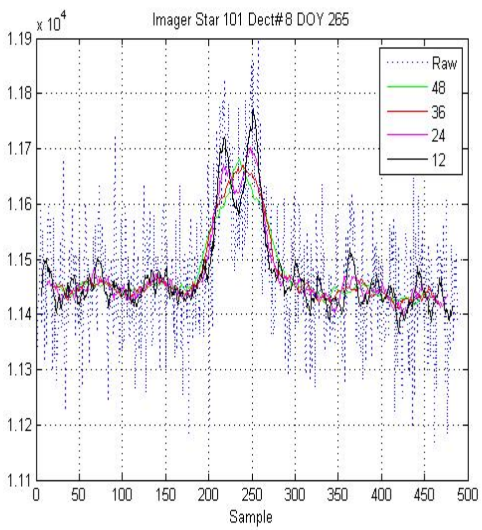


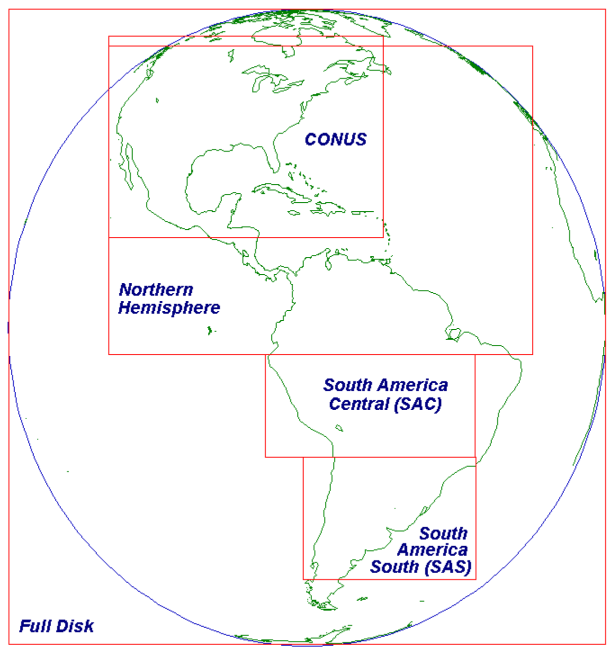
Poster # 2.29

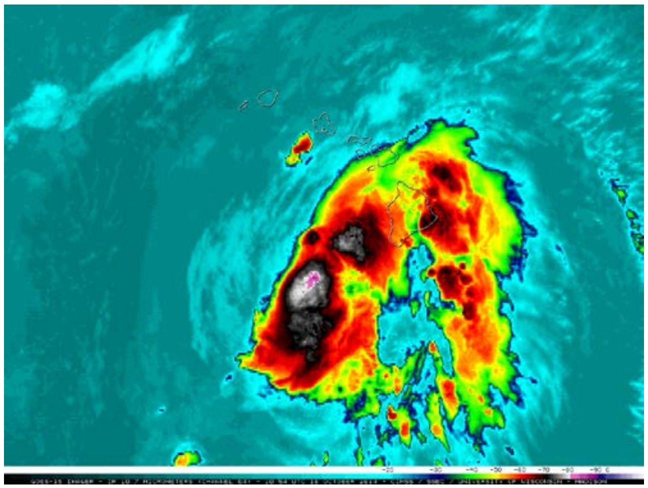
Survey of OSPO Efforts to Improve Operational GOES Imagery

S. Hadesty*, K. Ludlum**, N. Sanders*, C. Thomas*
* ASRC Federal Contractor – Engineering and Mission Operations Support Service (EMOSS) GOES INR Engineer
** NOAA Federal – National Environmental Satellite Data and Information Service (NESDIS) Office of Satellite and Product Operations (OSPO) Mission Operations Division (MOD) Support Branch

- Improved geometric calibration of imagery through recovery of degraded navigation measurements
- Increased image data quantity through schedule optimization and reduced payload idle durations
- Restored special frames for rapid scans





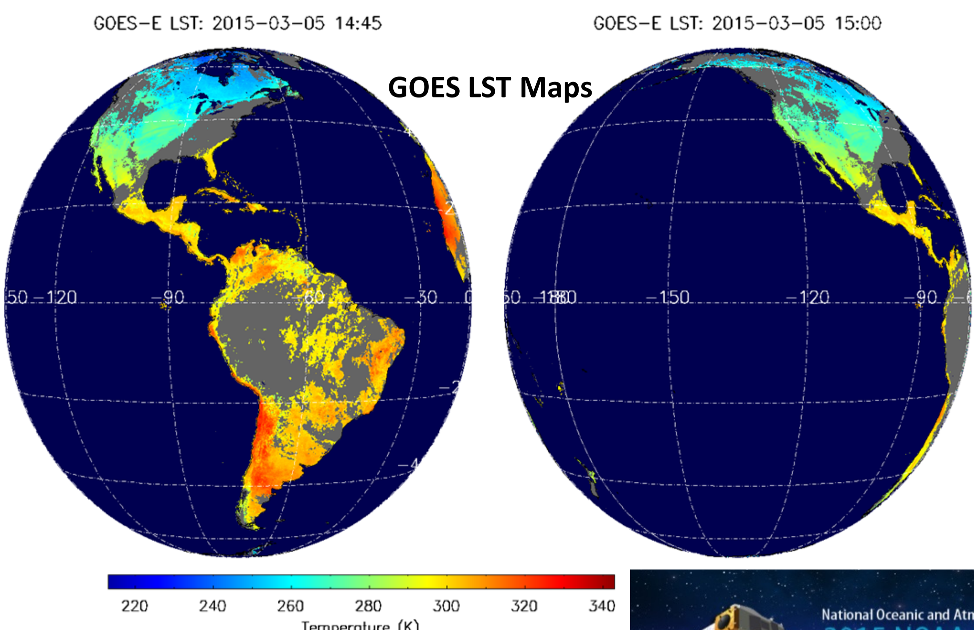


Poster # 2.31

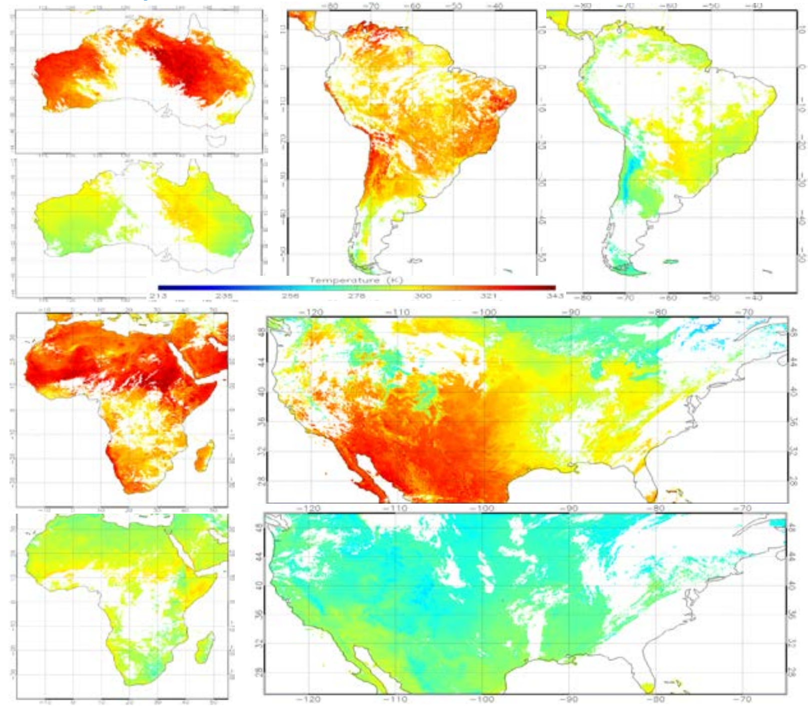
Production of Satellite Land Surface Temperature Dataset at STAR

Yunyue Yu[1], Yuling Liu[1,2], Peng Yu [1,2], Yuhan Rao[1,2], Ivan Csiszar[1]
[1]NOAA/NESDIS/STAR, [2]Univ. of Maryland

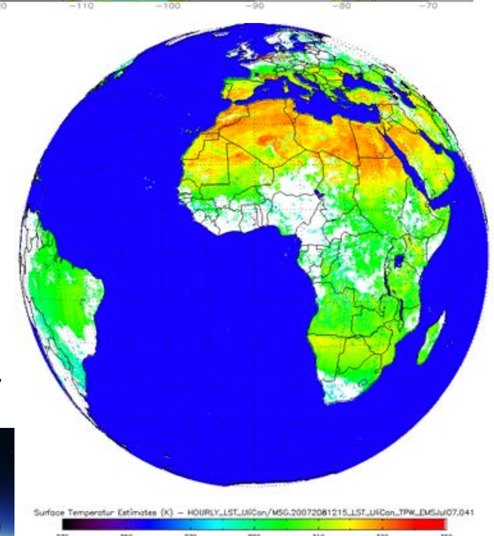
- *Land surface temperature (LST) data is critical on understanding climate change, modeling the hydrological and biogeochemical cycles, and is one of prime candidate parameters for numerical weather prediction assimilation models.*
- *The LST team at STAR is responsible for developing/improving/validating LST products for JPSS, GOES and the future GOES-R satellite missions.*
- *We present details on our activities and accomplishments along with the above satellite missions. Also, we desire to obtain feedbacks from NOAA LST user community.*



GOES LST Maps



LST maps from JPSS VIIRS LST EDR



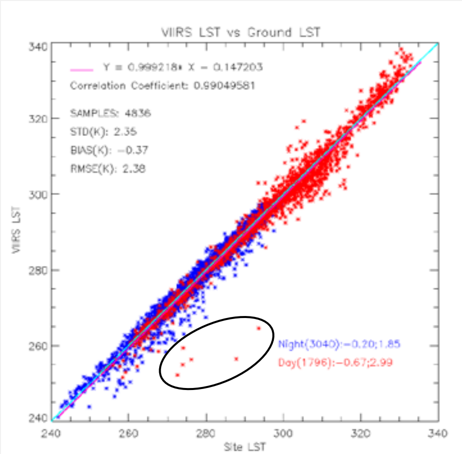
GOES-R LST Tested using SEVIRI as proxy

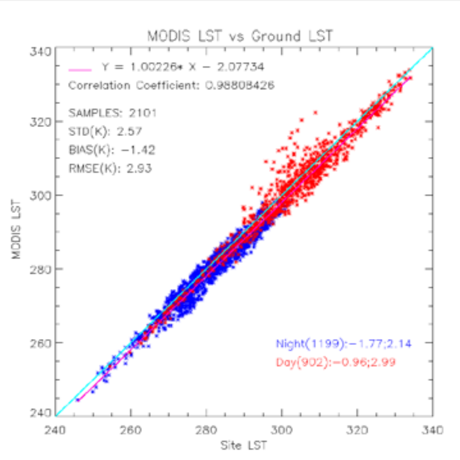
Poster # 2.32

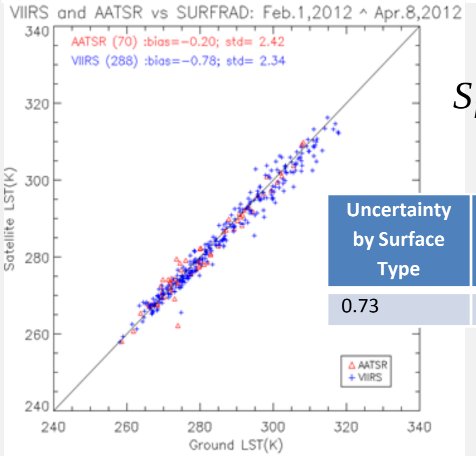
Quality Assessment of S-NPP VIIRS Land Surface Temperature Product

Yuling Liu[1], Yunyue Yu[2], Peng Yu[1] and Zhuo Wang[1]
[1] CICS/ESSIC/UMD, [2]NOAA/NESDIS/STAR

- Multi sensor LST comparison: VIIRS, MODIS and AATSR
  - Cross comparisons against the ground observations from SURFRAD indicate an overall good agreement among VIIRS LST, MODIS LST and AATSR LST.
  - Cloud contamination, particularly the cloud detection error over snow/ice surface, show significant impacts on LST validation quality.
  - VIIRS LST quality is strongly dependent on a correct classification of the surface type, which suggests that the ST dependent algorithm should be replaced with an Emissivity explicit algorithm for future satellite. e.g. J1.
- VIIRS LST Uncertainty
  - The sensor noise, surface type accuracy as well as algorithm uncertainty causes an overall VIIRS LST uncertainty of 0.9K.
  - *VIRIS LST V1 result is based on limited in-situ data.*
  - *VIIRS LST EDR is ready for scientific use of the data.*







Multi sensor LST comparison

$$S_{lst} = \sqrt{S_{sf}^{\ 2} + S_{bt}^{\ 2} + \delta_{alg}^{\ 2}}$$

Uncertainty by Surface Type	Uncertainty by Sensor Noise	Algorithm Uncertainty	Overall LST product Uncertainty
0.73	0.198	0.46	0.88

LST V1 Product Uncertainty

Poster # 2.33

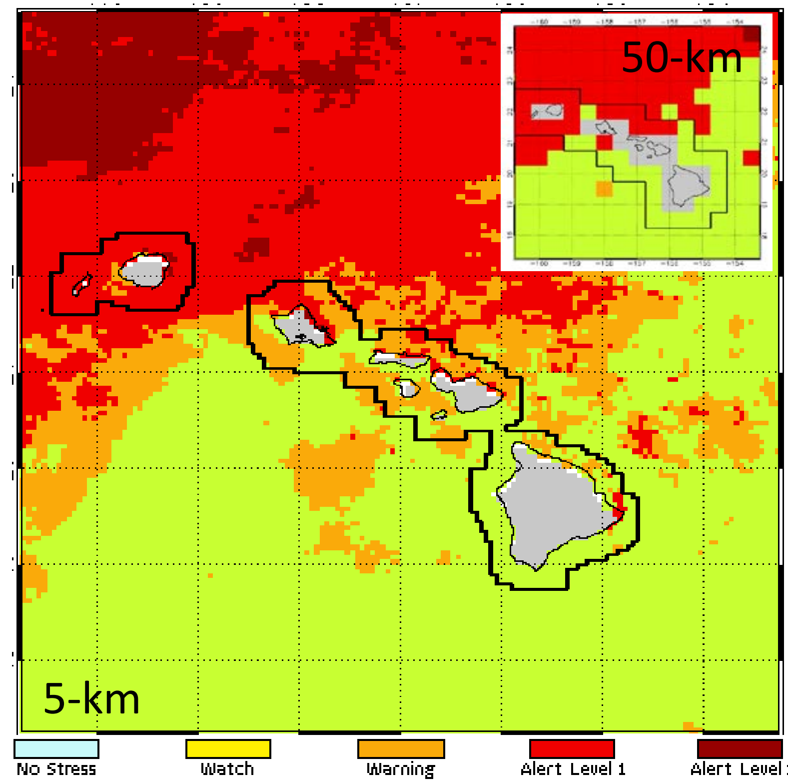
Addressing User Demands:

Enhancing NOAA Coral Reef Watch's Satellite Decision Support System for Managers

EF Geiger, CM Eakin, G Liu, JL De La Cour, SF Heron, WJ Skirving, AE Strong
NOAA/NESDIS/STAR/CRW and GST

- **New coral bleaching thermal stress monitoring:**
  - Daily, 5-km resolution, global coverage
  - More accurate alerts at or near reef scale
  - Uses NESDIS operational 5-km Blended SST
  - Climatology based on NOAA's Pathfinder SST

- **Future direction:**
  - Daily, 1-km resolution, regional products
    - *Caribbean, Coral Triangle. Great Barrier Reef*
  - To use NESDIS 1-km Blended SST based on
    - *Sub-km SSTs from VIIRS*
    - *2-km SSTs from Himawari-8 and GOES-R*



New 5-km and heritage 50-km Bleaching Alert Area products for Hawaii

Coral Reef Watch

Global Science & Technology, Inc.

Poster #
2.35

Updates on Operational Blended TPW Products

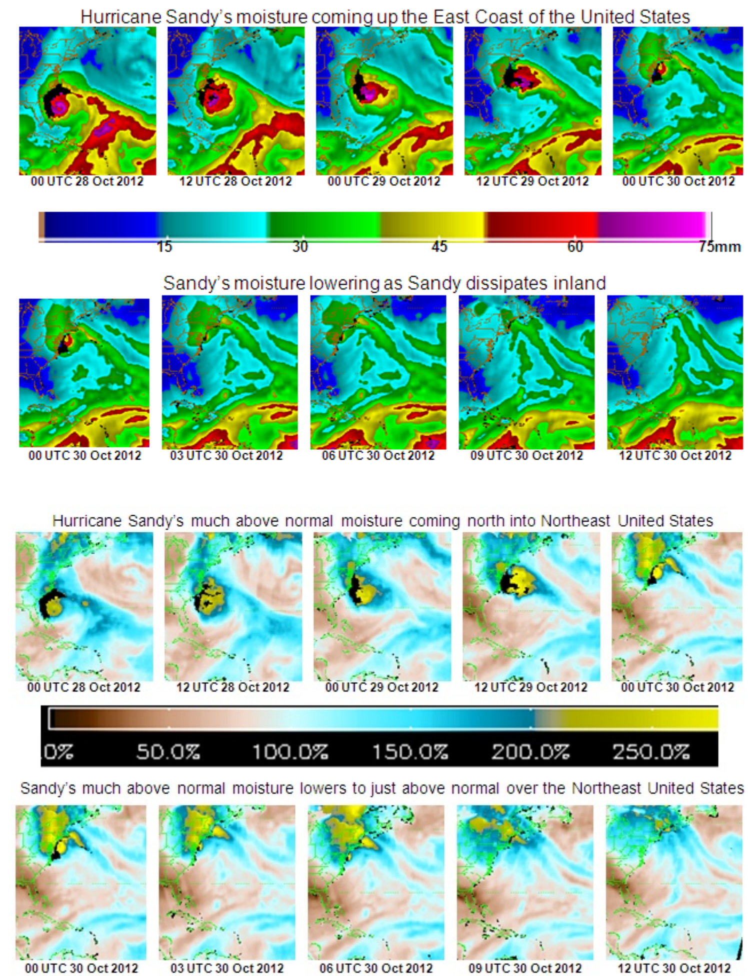
Limin Zhao[1],
Sheldon Kusselson[1], Stanley Kidder[2], John Forsythe[2], Andrew Jones [2], Ralph Ferraro[3], Clay Davenport[4], Stephen Quinn[5]
[1]NOAA/NESDIS/OSPO/Satellite Products and Service Division
[2]Cooperative Institute for Research in the Atmosphere, [3]NOAA/NESDIS/STAR; [4]SGT

- **Blended Total Precipitable Water (TPW) - a multi-satellites/sensors merged product**
  - Eliminates the bias of retrievals from various sensors/retrieval algorithms through histogram matching (Kidder and Jones, 2007)
  - Provides a unified, meteorologically significant moisture field for satellite analysts and weather forecasters.
  - Its companion, Percentage of TPW Normal, provides TPW anomaly from climatology

- **Current Data Sources**
  - **Ocean** – TPW from NOAA-15, -18, -19 and Metop-A & -B, DMSP F17 and F18
  - **Land** – TPW from NOAA-18, -19, Metop-A & -B and DMSP 18 over global, and also GOES-West & East and GPS-Met over CONUS
  - **Upcoming**: S-NPP, GCOM-W1 and GPM
  - **Near Future:** JPSS1, GOES-R, etc.

- **Applications**
  - Improving analysis and prediction of heavy precipitation and flash flood
  - Getting more timely and continuous spatial information about moisture transfer/ "surges".
  - Monitoring of the "atmospheric rivers" (ARs)

2-36



Hurricane Sandy observed from bTPW

Poster # 2.36

GOES-R GRB Direct Readout at NWS National Centers

J. Harlan Yates, Liz Nielsen & Allan Weiner
Harris Corporation - Melbourne, FL

- **WxConnect™ is a powerful, reliable, and scalable delivery platform for your mission critical satellite imagery needs.**
- **With WxConnect™, you will discover the value of more timely and higher resolution new generation imagery.**
- **WxConnect™ is easily adaptable to emerging mission needs; e.g., now supporting GOES-R GRB and HimawariCast.**

Poster #
2.37

Weather Satellite Data in Federal Aviation Administration Operations

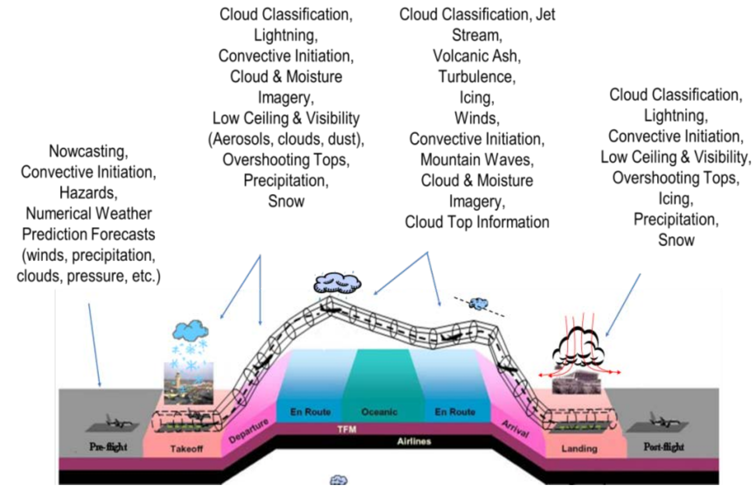
Randy Bass and Steve Abelman

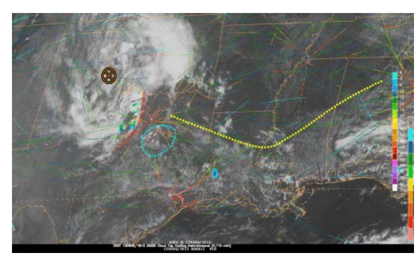
Aviation Weather Division, Federal Aviation Administration

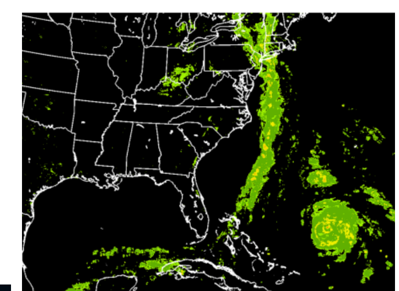
Washington, DC

Weather satellites support the FAA mission to provide the safest, most efficient aerospace system in the world

- Aviation weather analyses and forecasts, primarily provided by NOAA, support all aspects of flight from planning, departure and takeoff, en route, and through arrival and landing
- Detect phenomena such as thunderstorms, turbulence, icing, clouds, visibility, space weather, and volcanic activity that adversely impact the National Airspace System
- Research into utilizing satellite imagery in a capability to provide a real-time, radar-like estimate of precipitation offshore where NEXRAD radar does not exist, and transmitting satellite imagery into the cockpit to provide improved situational awareness for pilots beyond radar coverage







Poster # 2.39

Testing of Emissivity Explicit Retrieval Algorithms for VIIRS Land Surface Temperature

Peng Yu[1], Yunyue Yu[2], Yuling Liu[1], and Zhuo Wang[1]
[1] CICS/ESSIC, UMD, [2]STAR/NESDIS, NOAA

- Testing of VIIRS LST retrieval algorithms
  - VIIRS LST EDR is in V1 maturity status
  - Current VIIRS LST retrieval algorithm in operation is surface type dependent
- Preliminary testing results of candidate retrieval algorithms
  - Nine different emissivity-based algorithms listed in GOES-R LST ATBD have been tested
  - Algorithm 1, 6, and 8 were selected as potential candidate algorithms and have been adapted for further testing
  - High quality emissivity data is needed.

Site	Record No.	Bias	STD	RMSE
IDPS	1802	-0.61	2.31	2.39
1	1802	-0.16	2.40	2.40
2	1802	0.18	2.59	2.60
3	1802	-0.21	2.44	2.45
4	1802	-0.19	2.43	2.44
5	1802	-0.81	2.53	2.66
6	1802	-0.19	2.45	2.45
7	1802	-0.21	2.44	2.45
8	1802	-0.22	2.44	2.45
9	1802	-0.19	2.48	2.48
1’	1802	-0.10	2.37	2.37
6’	1802	-0.13	2.41	2.41
8’	1802	-0.15	2.41	2.41
11	1802	-0.16	2.33	2.35
12	1802	-0.16	2.34	2.35

Testing results of different retrieval algorithms

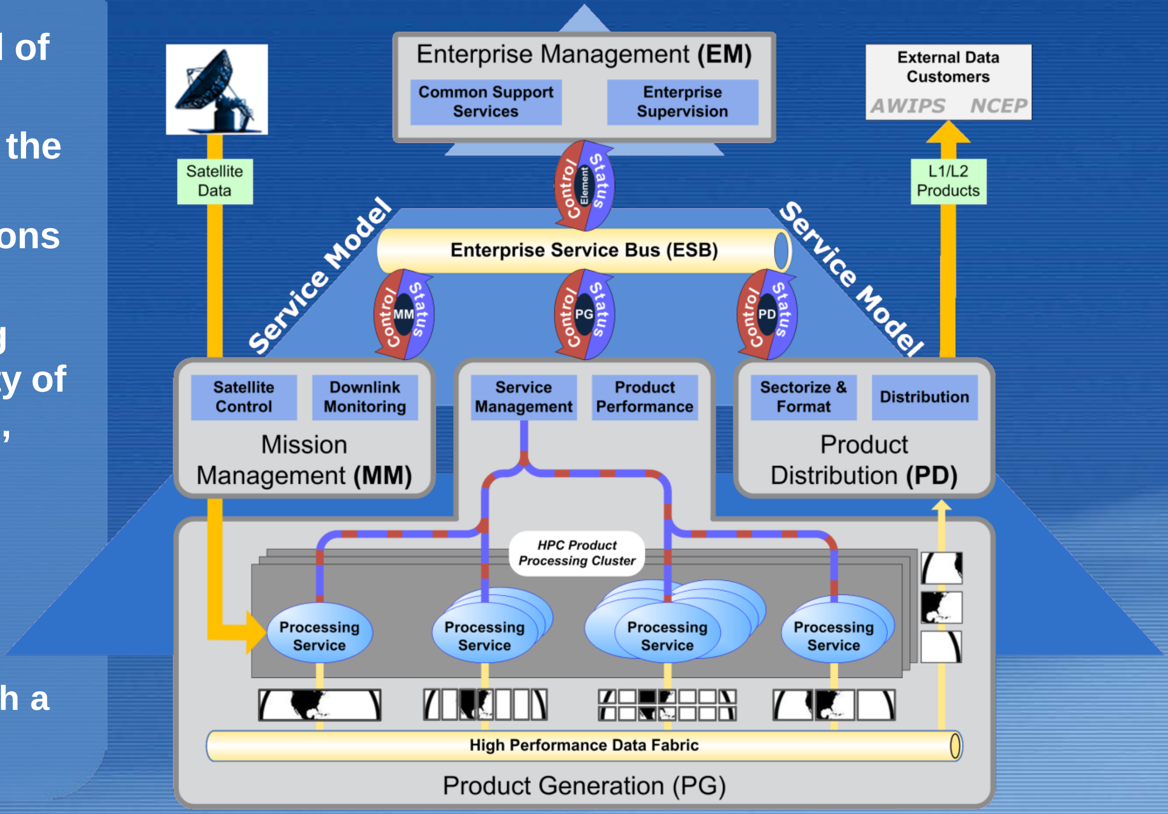
Poster # 2.40

GOES-R Impact on NCEP Computing: Enterprise Framework for High Performance Environmental Processing

James Gundy, Gregg Kowalski, Bradley Brown-Bergtold & Allan Weiner
Harris Corporation - Melbourne, FL

- The Harris SOA Based Ground System Architecture is composed of Services for EM, MM, PG, & PD
- Fault Tolerant Data Movement via the Ground System's ESB ensures NOAA's Mission Critical Applications run reliably
- Fast, Reliable Product Processing efficiently manages the complexity of NOAA's GOES-R Science Mission, leveraging Multiple HPC & High Reliability Technologies:
  - Parallel Processing at the Image Block Level in an HPC Cluster
  - Redundant, High Bandwidth, Low Latency Data Access through a High Performance Data Fabric

Enterprise Framework for Ground Processing



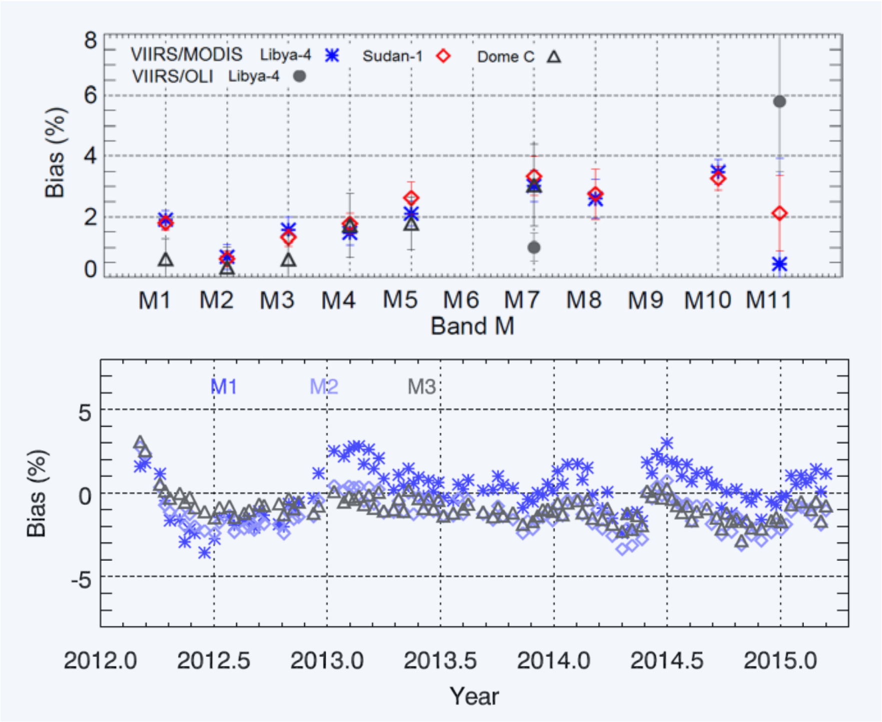
Poster # 2.41

Suomi NPP VIIRS Reflective Solar Band On-orbit Radiometric Performance Assessment

Sirish Uprety[a] Changyong Cao[b]
[a]CIRA, Colorado State University, [b]NOAA/NESDIS/STAR

Poster
2.43

- VIIRS on-orbit radiometric performance is regularly monitored and analyzed using calibration sites (such as Libya-4, Sudan-1, Dome C) and through the inter-comparison with AQUA MODIS and Landsat 8 OLI.
  - VIIRS moderate resolution reflective solar bands radiometric stability is within 1% ± 0.5%.
  - VIIRS Bias relative to MODIS: 2% ± 1% for M1 through M5 while M7 and M8 suggest nearly 3%. VIIRS bias at three sites agrees to within 1%.
  - VIIRS and OLI inter-comparison over Libya-4 for SWIR band M11 suggests more than 5% bias.
- VIIRS Radiometric performance is also analyzed through SNO-x based intercomparison with MODIS over low latitude North African desert and ocean.
  - VIIRS bias relative to MODIS for bands M1-8 is mostly within 2% ± 1% however the short term bias are sometimes larger by as much as 3.5%.



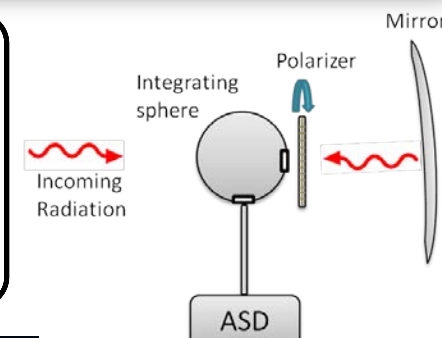
Top: VIIRS bias (M1-8) at Libya-4, Sudan-1 and Dome C; Bottom: VIIRS Bias using SNO-x for M1-3.

Improved Ground-Based Polarization Sensitivity Measurement Capability for Next-Generation Environmental Remote Sensing Systems

Aaron Pearlman[1], Francis Padula[2], Raju Datla[1], Changyong Cao[3], & Xiangqian Wu[3]
[1]ERT Inc., [2]GeoThinkTank LLC, [3]NOAA/NESDIS/STAR

- The spectral polarimeter will be deployed to support next generation system validation of L1b and L2+ products.
- The polarimeter has been upgraded to:
  - Extend the polarimeter's wavelength range (to 350-2500 nm)
  - Allow automation of the measurements
  - Remove the impacts of the spectrometer's polarization sensitivity

Spectral Polarimeter
Incident radiation reflects off the mirror and propagates through the polarizer, integrating sphere, and collected by the ASD spectrometer's fiber bundle.



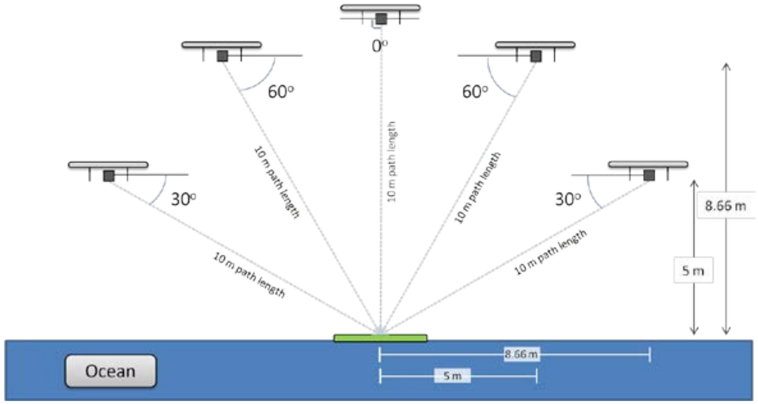
Poster
2.44

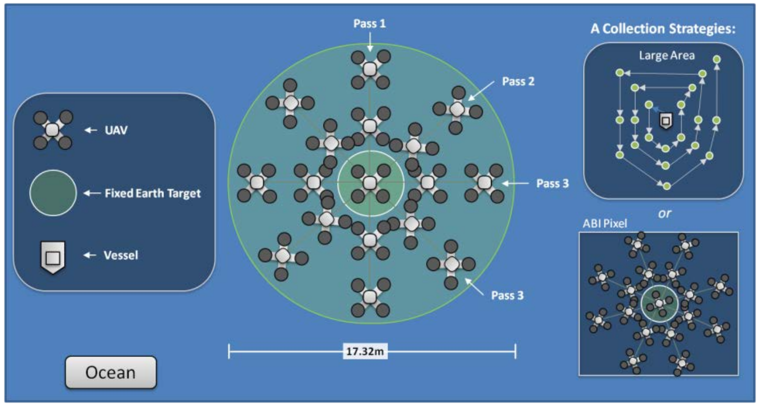
Evaluation of Near Surface UAV Capabilities for the GOES-R Field Campaign

Francis Padula[1], Changyong Cao[2], Istvan Laszlo[2], Yunyue Yu[2], Steve Goodman[3]

([1]GeoThinkTank LLC; [2]NOAA/NESDIS/STAR; [3]NOAA/NESDIS/GOES-R Program Office)

- Near surface UAV systems are being evaluated to address several heritage limitations and gaps in surface measurement and ground truth validation capabilities in support of post-launch validation of L1b and L2+ products
- Two unique systems were investigated for near surface (≤ 20 m above ground level) collection:
  1) Rotary UAV system to facilitate the collection of high quality goniometric observations of Earth surface targets
  2) Fixed-wing UAV system to facilitate the collection of surface observations of Earth targets over extended regions



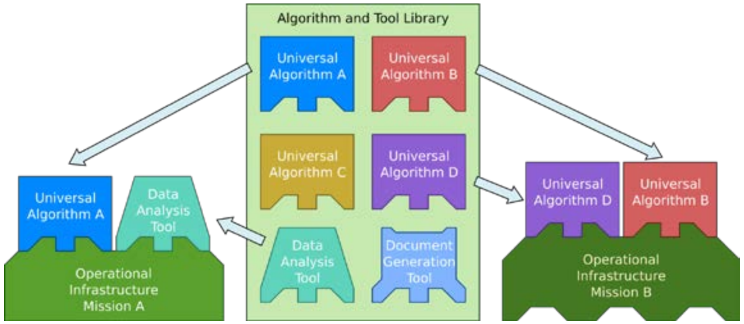


Poster # 2.45

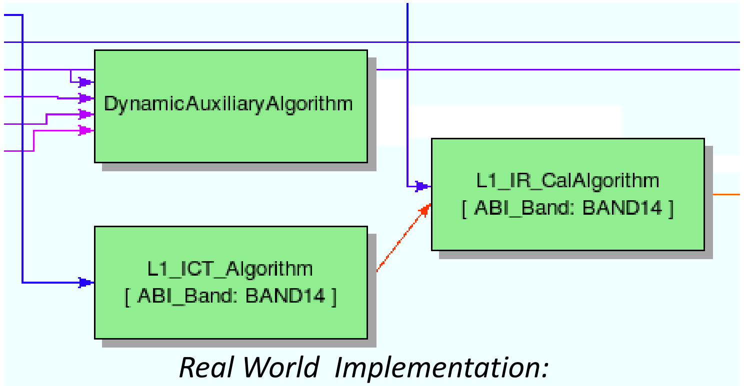
The Algorithm Workbench

Alexander Werbos, David Hogan, Daniel Hunt, Erik Steinfelt, T. Scott Zaccheo
Atmospheric and Environmental Research (AER)
Lexington, MA

- Dynamic algorithm design, test and processing framework
- Speeds algorithm development and transition of Research to Operations
- Provides
  - Database-oriented approach to describe algorithm input data and output products
  - Software for automatic algorithm tree generation, visualization, and execution
  - Template approach for running C++ and FORTRAN algorithms
  - Extensible infrastructure for new user algorithms and tools



Concept Architecture



Real World Implementation:
Algorithm Architect Tool Visualizer

Poster
2.46

Improved Engineering Analysis for GOES-R

Engineering Analysis (EA) is more than just a plotting program.

EA encompasses both Trending and Analysis – Two very different paradigms.

Trending

The <u>comprehensive</u> review of telemetry to:

- Observe changes in nominal behavior and detect impending failures
- Quantify periodic variations so that they can be optionally removed in order to observe residual behavior
- Quantify and track expected changes in spacecraft characteristics (e.g. mass properties modeling)

Proactive — Comprehensive — Predictive — Automated

Analysis

The <u>targeted</u> review of telemetry to:

- Identify
- Characterize
- Explain and
- Workaround

an observed anomaly or failure in a timely fashion.

Reactive — Targeted — Investigative — Interactive

How can such diverse requirements be met in a safe and cost effective way?

A mission needs a telemetry system <u>designed for analysis</u>!

GOES-R integrates the (COTS) CASSIE™ Telemetry System for a low cost, highly flexible solution which provides:

- A scalable, high-performance telemetry decommuation engine with integrated equations and statistics
- A modular and extensible application infrastructure to efficiently include mission-specific algorithms
- Visualization programs that can be used both interactively and batched for off-line production
- Licensing without replication and per-seat fees

Poster # 2.48

ASRC FEDERAL

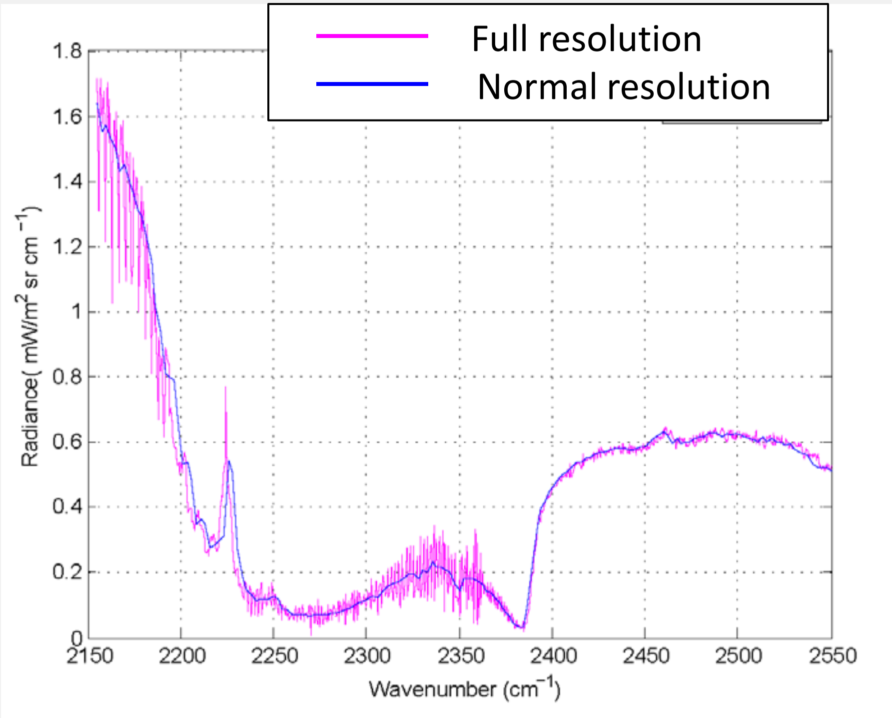
Astrofrontiers, Inc.

Integrating Changes to JPSS Cross-Track Infrared Sounder (CrIS) SDR Algorithm using the Algorithm Development Library (ADL)

Vipuli Dharmawardane, Bigyani Das, Valerie Mikles, Walter Wolf

I. M. Systems Group, NOAA/NESDIS/STAR

- CrIS has used nominal resolution data packets during the S-NPP era
- Currently revisions to the CrIS Sensor Data Records (SDR) algorithm are underway to support production of the full resolution J1 SDRs
  - ADL is the test system that mimics the Interface Data Processing Segment (IDPS) and is used for testing, troubleshooting and integrating algorithm updates.
  - Pre-operational full spectral resolution algorithm is tested by the STAR Algorithm Integration Team (AIT) for product accuracy in the ADL environment before it is submitted to the ground project Data Products Engineering Services (DPES) for the unit testing.



Comparison of Earth Scene full resolution and truncated (normal) resolution data for the short-wave band

Poster # 2.49

Use of JPSS ATMS and VIIRS data to Improve Tropical Cyclone Track and Intensity Forecasting

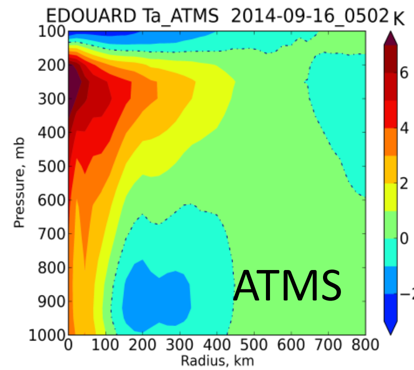
Poster # 2.51

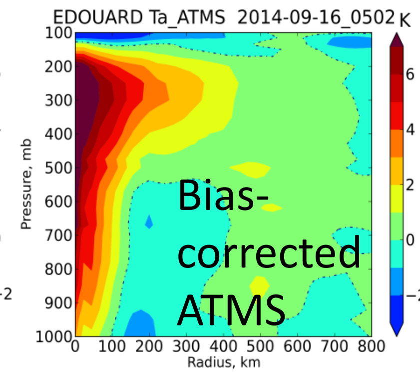
Galina Chirokova[1], Mark DeMaria[2], Robert DeMaria[1], John Knaff[3], Jack Dostalek[1], and John L. Beven[2]

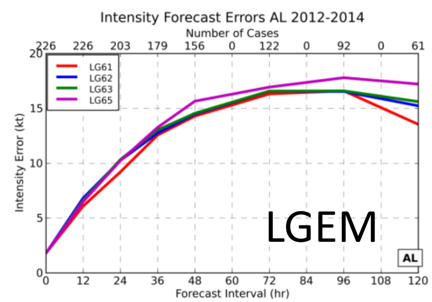
(1) CIRA, Colorado State University, Fort Collins, CO (2) NOAA/NWS/National Hurricane Center, Miami, FL

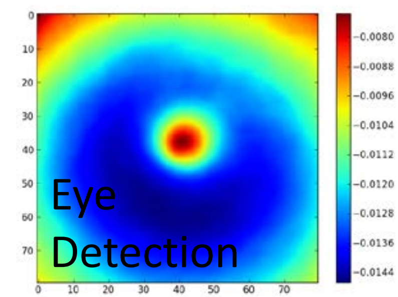
(3) NOAA/NESDIS/StAR, Fort Collins, CO

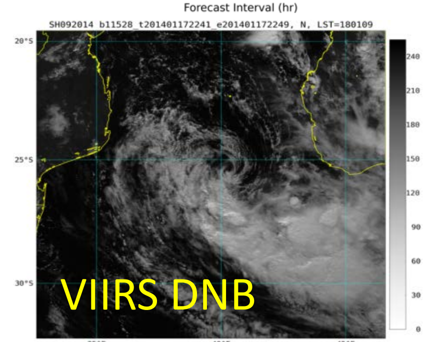
- Use of ATMS and VIIRS data has great potential for improving tropical cyclones track and intensity forecasting:
  - Statistical intensity forecast models and Rapid Intensification Index could be improved with ATMS data
  - Objective automated eye-detection algorithm using VIIRS data could further improve track and intensity forecasts
  - VIIRS DNB imagery provides TC forecasters with unique data

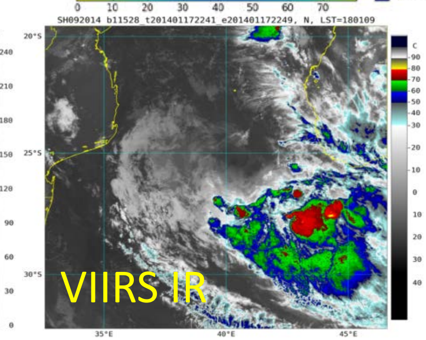












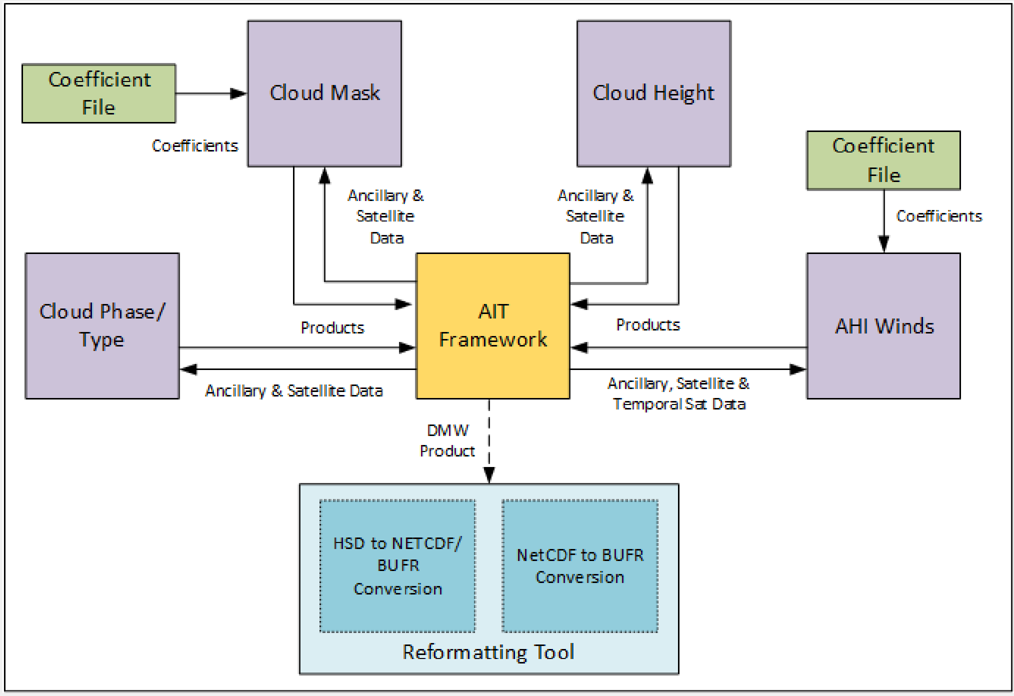
Processing Himawari-8 Geostationary Satellite Data Using GOES-R Algorithms for Algorithm Continuity in Operations

Jonathan Wrotny[1], A. Li[1], H. Xie[1], M. Fan[1], R. Chen[1], T. Yu[1], S. Sampson[1], W Wolf[2], W. Straka[3], A. Heidinger[4], and J. Daniels[2]

[1]IMSG, College Park, MD 20740, USA
[2]NOAA/NESDIS/STAR, College Park, MD 20740, USA
[3]CIMSS, Madison, WI 53706, USA
[4]NOAA, Madison, WI 53706, USA

- The GOES-R Algorithm Working Group (AWG) Algorithm Integration Team (AIT) maintains and updates a data processing framework for GOES-R algorithm processing.

- This poster describes updates made to the GOES-R Framework to process Himawari-8/AHI data for algorithm use.



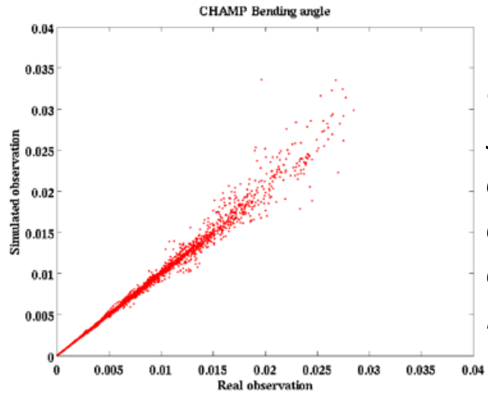
System-level diagram of the AHI Winds Product System

Poster # 2-52

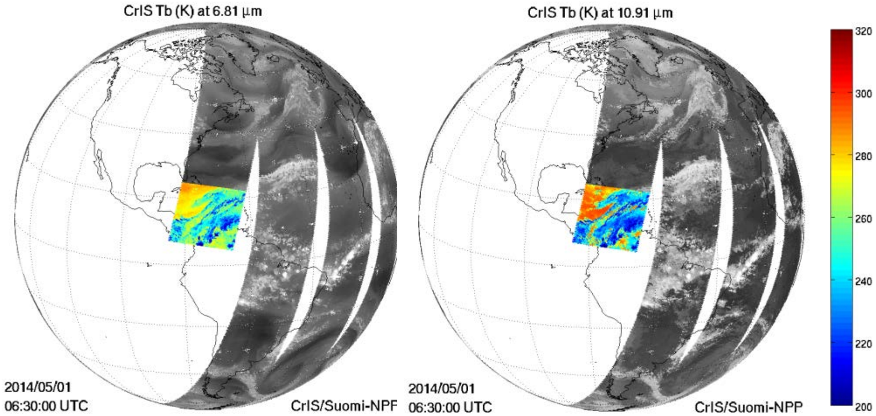
Impact Analysis of LEO Hyperspectral Sensor IFOV size on the next generation NWP model forecast performance

Allen Huang
CIMSS/SSEC Madison, WI

- **To assess the forecast impact obtained from assimilating CrIS observations at half the current spatial resolution**
- **Observing System Simulation Experiment (OSSE)**
  - **G5NR**
  - **GFS @ T1534**
  - **Simulated observations: rawinsondes, aircraft, GPSRO, AMSU-A, MHS, HIRS-4, AIRS, IASI, ATMS, current CrIS and CrIS at half the resolution.**



Comparison of simulated and observed bending angle for CHAMP at he start of the NR.



BT "observed" by flying CrIS in G5NR

Poster #
2.53

Using GOES Imagery as Pointing Truth for TEMPO Image Navigation and Registration

Kerrie Allen[1], James L. Carr[1], Brad Pierce[2], Joseph Fox-Rabinovitz[1], Norman Lo[1], David Zakar[1]

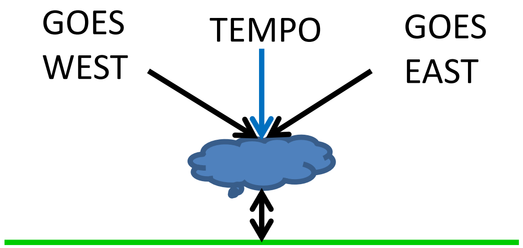
1. Carr Astronautics, Greenbelt, MD
2. NOAA/NESDIS Center for Satellite Applications and Research (STAR), Madison, WI

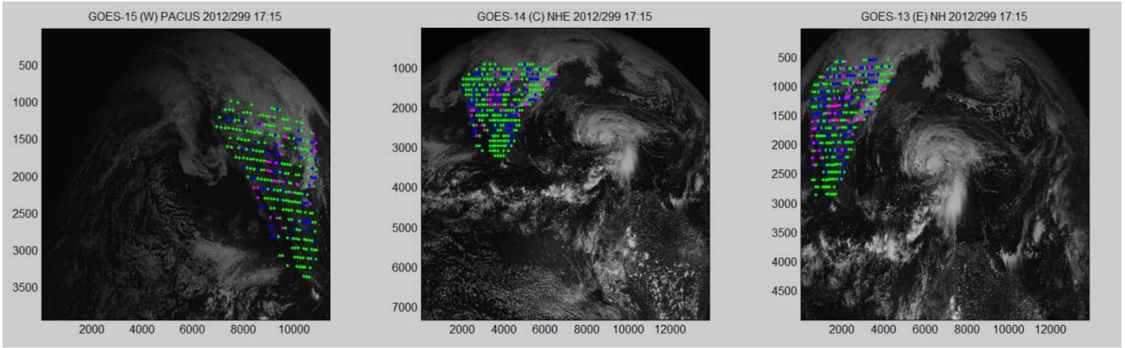
TEMPO is a NASA sponsored Earth Venture Instrument to be flown on a commercial GEO communications satellite as an atmospheric chemistry mission:

- Covers CONUS and parts of Canada and Mexico
- Retrieves trace gas hourly

TEMPO will implement its Image Navigation and Registration (INR) using GOES imagery as a reference for pointing truth rather than using stars or landmarks

- Accurately locating TEMPO pixels geographically is a key INR objective
- Management of parallax due to cloud heights is key





Poster #2.54

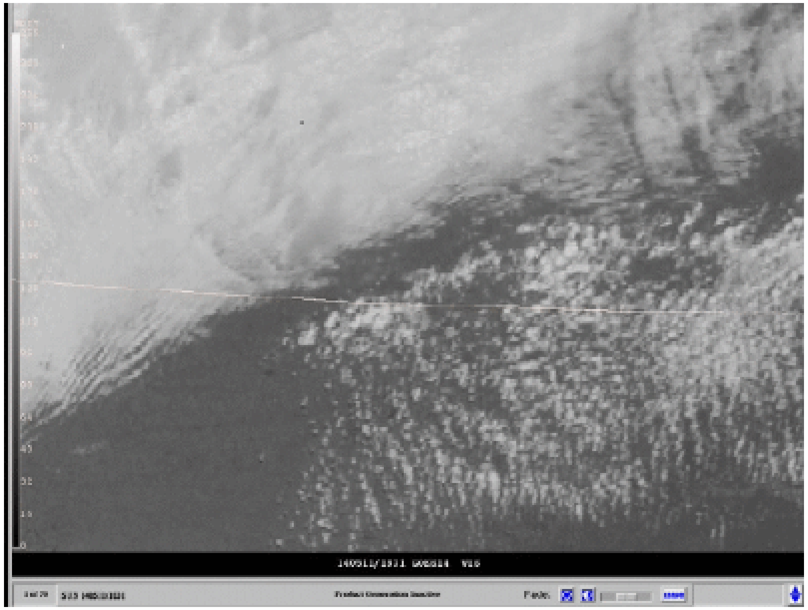
On the Use of 1-Minute Satellite Imagery in the Storm Prediction Center

Bill Line

OU/CIMMS and NOAA/NWS/Storm Prediction Center

Norman, OK

- 1-min satellite imagery from GOES-14 was utilized considerably in SPC operations during parts of Aug 2013, May 2014 and Aug 2014.
  - Benefits to SPC ops were realized during all parts of the convective nowcast cycle.
  - References in SPC mesoscale discussions and convective outlooks
  - "Potentially providing insight into processes important to storm development not currently recognized / diagnosable."
  - "Satellite imagery at 1-min temporal resolution needs to become the new standard for severe weather operations."



Generation of an orphan anvil is identified in GOES-14 1-min visible imagery on May 11, 2014 near the Kansas/Nebraska border, signaling imminent convective initiation in the area

Poster # 2-55

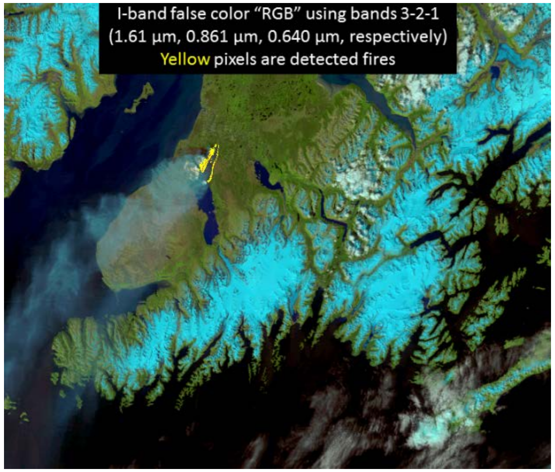
The VIIRS Active Fire Data for Fire Management:

A review of the Proving Ground and Risk Reduction (PGRR) Project efforts

E. Ellicott[1], I. Csiszar[1], L. Giglio[1], W. Schroeder[1] and C. Justice[1]
[1]University of Maryland Department of Geographical Sciences
[2]NOAA/NESDIS/STAR

- The PGRR VIIRS AF project seeks to improve data, algorithms, and products for downstream operational and research users (gateways to the public).
  - The process includes product evaluation, validation, and improvement.
  - Collaboration with the wildland fire user community to develop product understanding, dissemination, and to leverage the VIIRS AF products for active and post-fire management.

Poster # 2-58



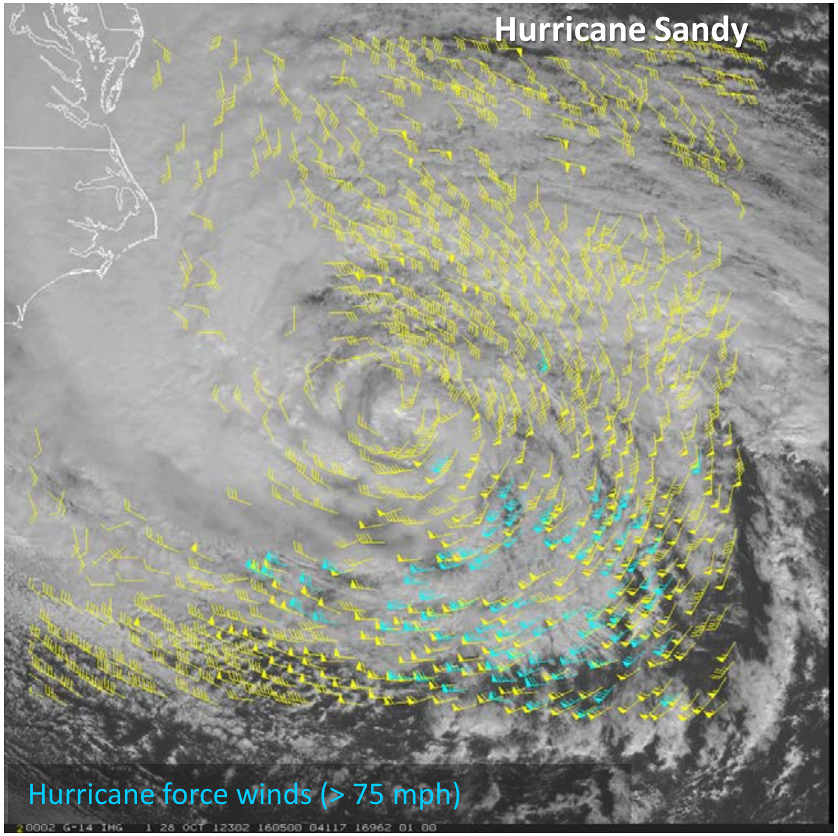
Evaluation of VIIRS AF data for the Funny River fire, Alaska – May 2014

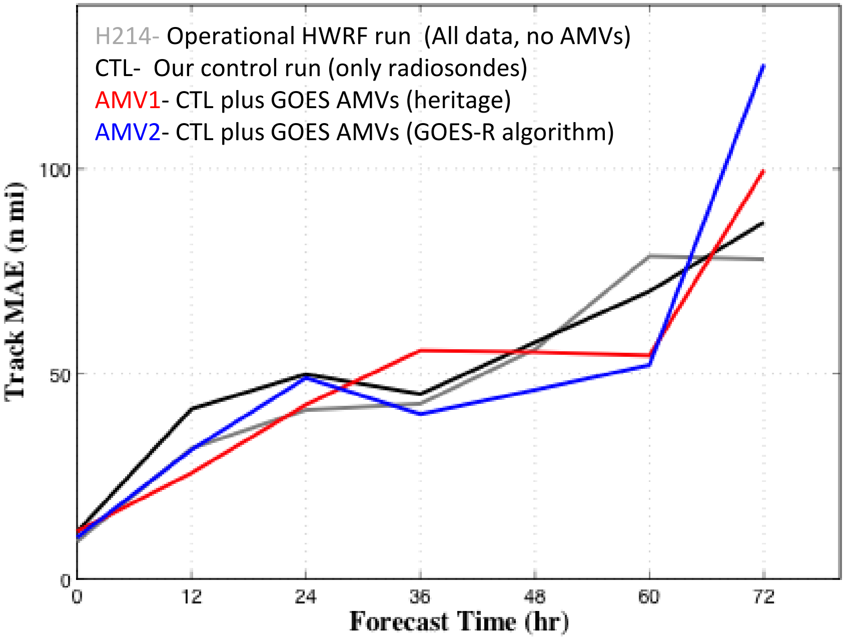
Field & lab experiments to validate VIIRS AF data

High Resolution Atmospheric Motion Vectors (AMVs) for Application in High Impact Weather Events in the GOES-R era

Christopher Velden, Jaime Daniels, Wayne Bresky, Steve Wanzong and David Stettner

Development and optimization of mesoscale Atmospheric Motion Vectors (AMVs) using novel GOES-R processing algorithms on GOES-14 SRSO imagery and demonstrating the impact of assimilating these AMVs in the NCEP HWRF/GSI System





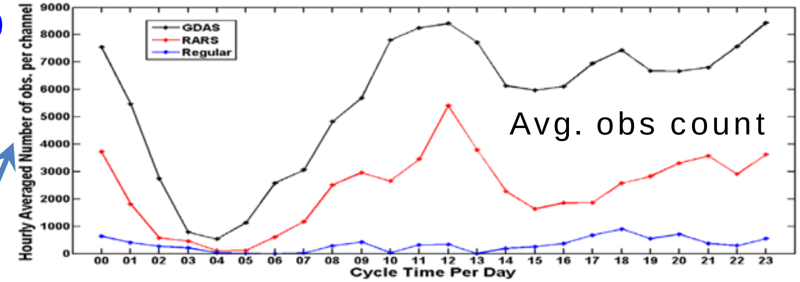
Hurricane Sandy 1-minute mesoscale AMVs (left), and results of Sandy assimilation experiments (above)

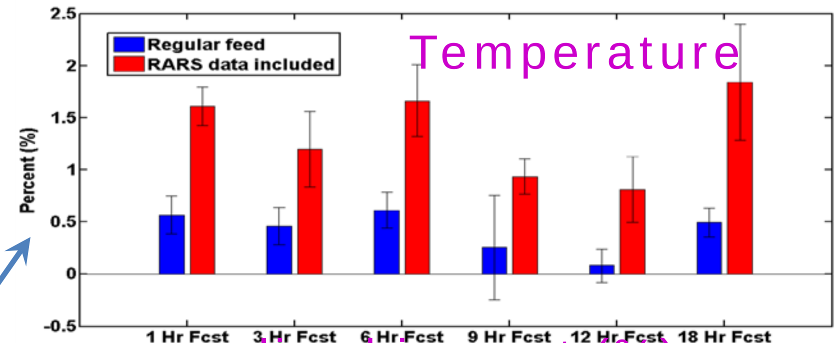
Poster # 2-59

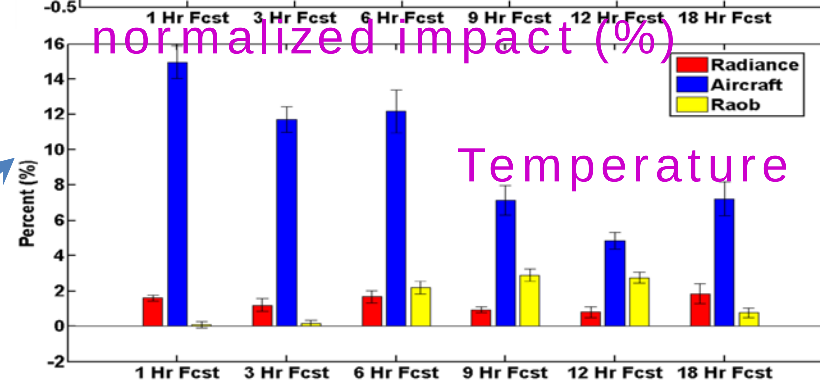
Evaluation of the impact of satellite radiance data within the hourly Rapid Refresh data assimilation system

Haidao Lin, Steve Weygandt, Ming Hu, Curtis Alexander, Stan Benjamin
NOAA/ESRL/GSD

- Satellite radiance data have positive impact within the hourly Rapid Refresh (one-month retro)
  - The RARS direct readout data greatly improve the real-time hourly coverage
  - Larger positive impact (statistically significant) when the direct readout data are included
  - Radiance data impact comparable to raob data impact, but less than aircraft data impact (the largest impact data set in RAP)





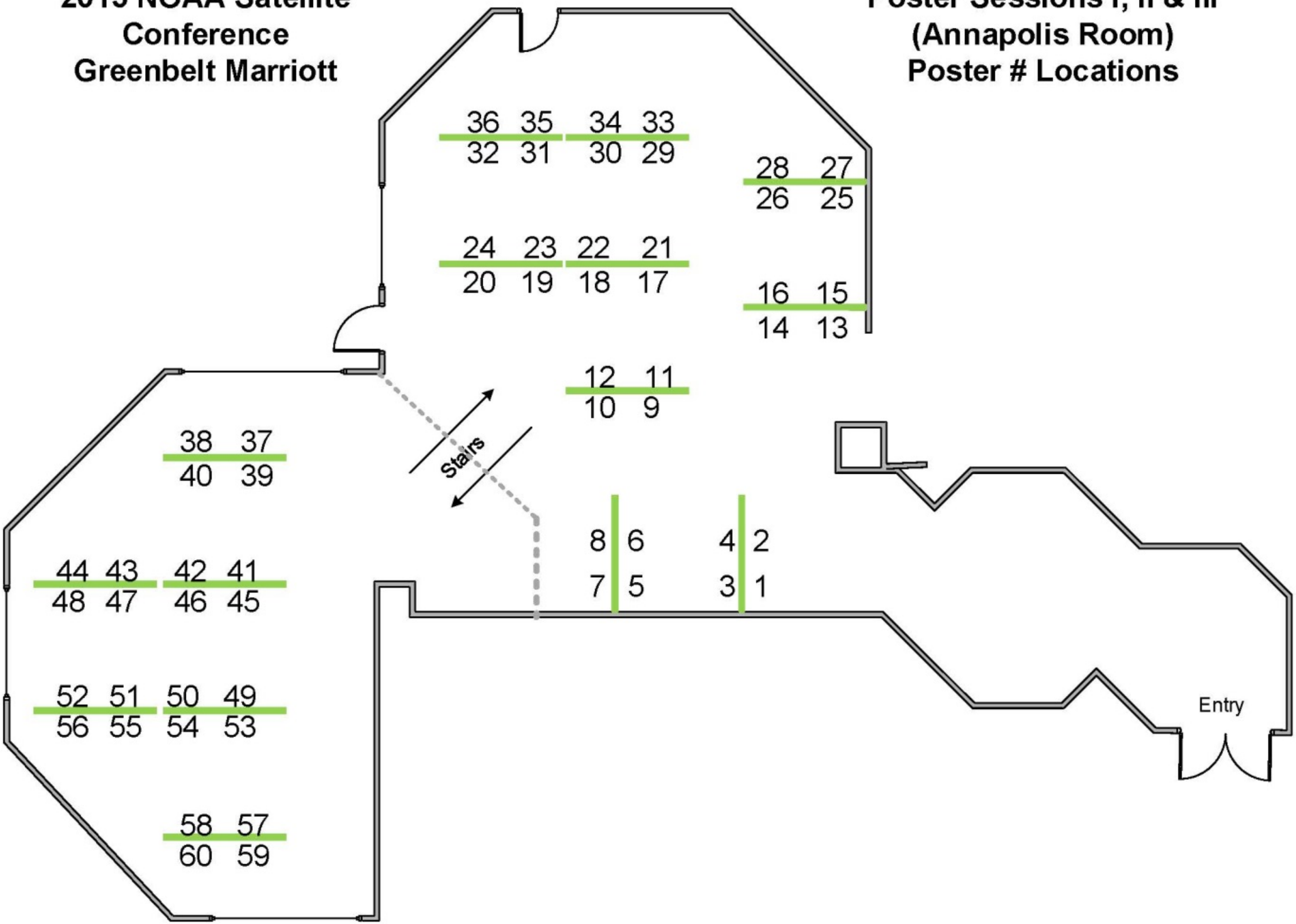


100-850 hPa RMS mean against raob

Poster
2-60

2015 NOAA Satellite Conference
Greenbelt Marriott

Poster Sessions I, II & III
(Annapolis Room)
Poster # Locations



Thank you to all poster presenters!