JOINT CENTER FOR SATELLITE DATA ASSIMILATION

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NEWS IN THIS QUARTER

SCIENCE UPDATE

Data Assimilation Changes in the January 2015 GFS Model Upgrade at NOAA

On January 14, 2015, an operational upgrade to the NOAA National Centers for Environmental Prediction (NCEP) Global Forecast and Analysis (GFS/GDAS) was implemented. The forecast model has been changed significantly, most notably by a change from Eulerian to Semi-Lagrangian dynamics and an increase in resolution from Eulerian T574 (~27 km) to Semi-Lagrangian T1534 (~13 km). The full list of model changes can be found at http://www.nws.noaa.gov/om/notification/tin14-46gfs.htm

Before this upgrade, the analysis was performed on a linear grid that corresponds to the model truncation T574 (1152x576 grid boxes) while the 80-member ensemble that prescribes 75 percent of the solution was at T254 (512x256). For the new system, both the GSI analysis and the members of the ensemble are computed at T574, so now the resolution of the main background error term (and therefore the typical resolution of the increments) is consistent with the analysis. The increment is then transformed into wave space and added to the full-resolution background. This approach is more consistent with what is done at most other NWP centers, although the observation innovations are still calculated at the truncated resolution—which should be addressed in future upgrades.

The Ensemble Kalman Filter (EnKF) members themselves benefited from the addition of stochastic physics to help address system

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uncertainty in the forecast model. This supplements, but does not entirely remove, the need for additive inflation.

On the satellite radiance side, the first-guess departure (O-B) statistics for low-peaking microwave channels have benefited from significant improvements to the FASTEM microwave sea surface emissivity module in the CRTM. Figure 1 demonstrates how both the position of the peak of the histogram and the dependence on wind speed of the O-Bs for AMSU-A channel 2 are much improved on going from FASTEM-1 (the previous default version in the GSI) through FASTEM-4 to FASTEM-5.

Further improvements to the bias characteristics of this and other satellite measurements are coming from improvements to the radiance bias correction scheme (Zhu et al., 2014). This scheme removes the requirement for the previous two-step bias correction scheme (where the scan-dependent component is calculated outside of the variational framework) by including extra

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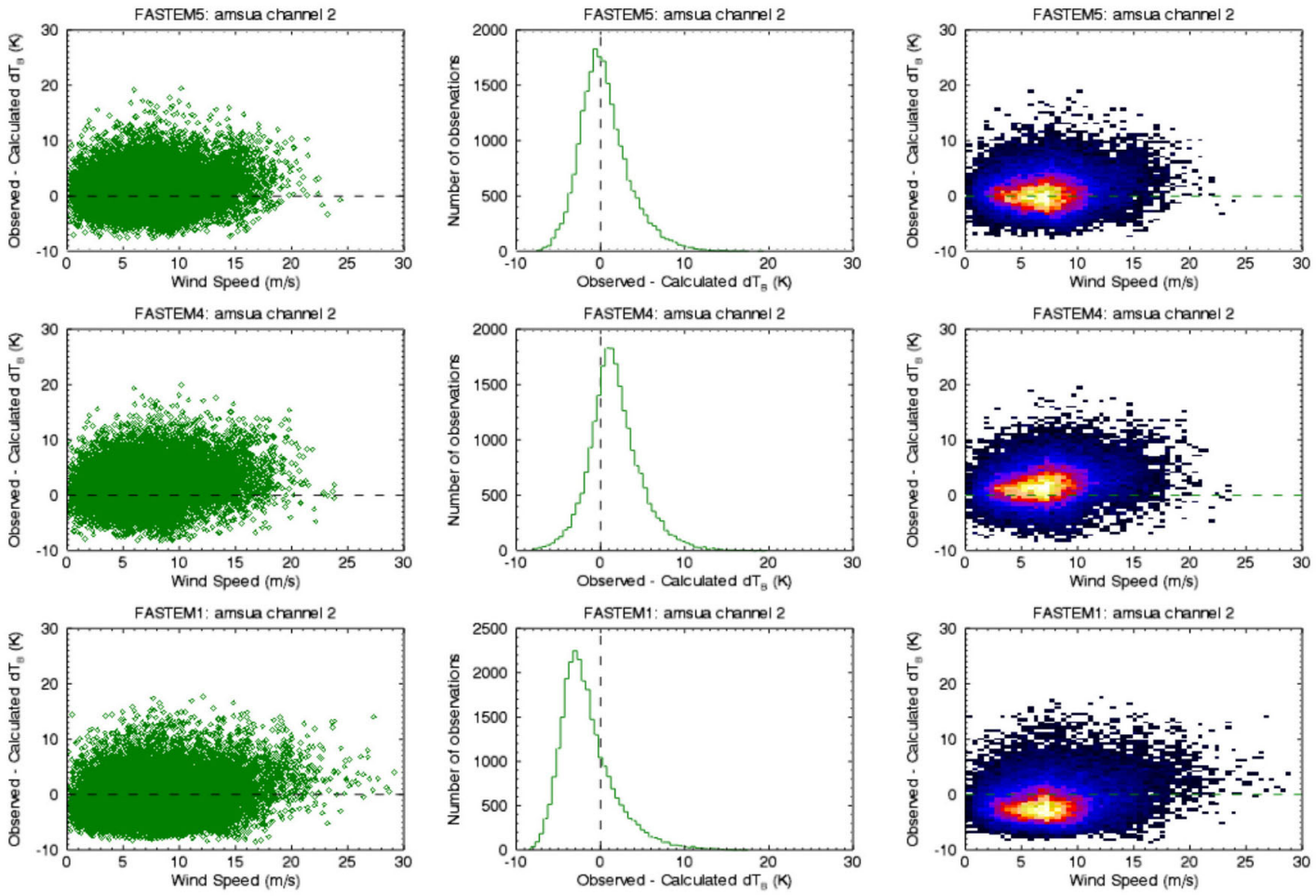

Figure 1: *The improvement in the innovation statistics for AMSU-A channel 2 on changing the CRTM microwave sea-surface emissivity algorithm from FASTEM-1, through FASTEM-4 to FASTEM-5.*

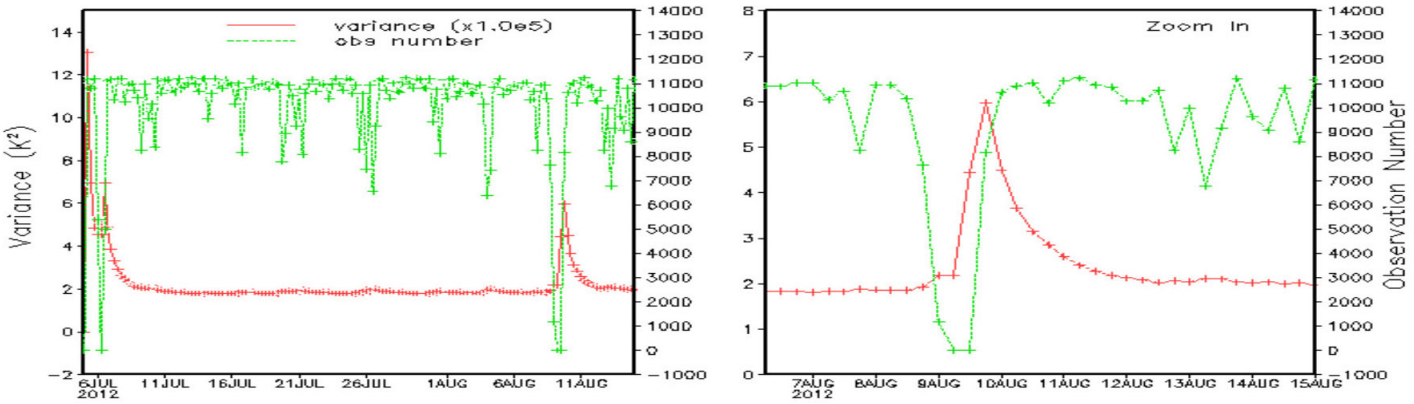

Figure 2: *An illustration of how a temporary loss of data results in an increase in the error variance used to calculate the bias correction coefficients once the data return—allowing the bias correction scheme to react to possible changes in instrument characteristics.*

predictors to describe this through a fourth-order polynomial of scan angle. In addition, the pre-conditioning for the bias-correction coefficients is now prescribed based on the Hessian rather than through pre-specified parameters (which greatly improves convergence); new bias correction predictors have been introduced to handle large land-sea differences and for SSMIS; automatic initialization of new data is performed; and improved handling of data that go missing and then recover is introduced (see Figure 2).

The above two changes plus a fix to a bug in the way AMSU-A radiances are used around the ice edge have resulted in a much improved analysis in the Southern Hemisphere with significant improvement in forecast skill.

This upgrade will also include the assimilation of the sounding channels on SSMIS which were previously not possible to assimilate because of large biases in the data, which were a function of the position of the satellite in its orbit but which also varied with season. This was addressed by adding two new SSMIS-specific bias correction predictors to the bias-correction scheme: *node* x *cos(latitude)* and *sin(latitude)*. Here *node* is +1 for the ascending part of the orbit and -1 for the descending part. The effectiveness of the scheme is illustrated in Figure 3. The inclusion of SSMIS (initially examined as part of the gap mitigation strategy) results in a small but positive impact in the Southern Hemisphere.

Other upgrades to the system include replacing GOES 6-hourly winds with hourly winds plus quality control changes; improvements to the quality control of GPSRO observations in the lower atmosphere where the refractivity has high vertical gradients; turning on the assimilation of IASI on Metop-B; and adjustments to the ATMS observation errors.

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Daryl Kleist (University of Maryland)
John Derber and Russ Treadon (NOAA/NCEP/EMC)
Lidia Cucurull (NOAA/ESRL)
David Groff, Emily Liu, Xiujuan Su, Paul van Delst, and Yanqiu Zhu (IMSG @ NOAA/NCEP/EMC)
Quanhua Liu (NOAA/NESDIS/STAR)
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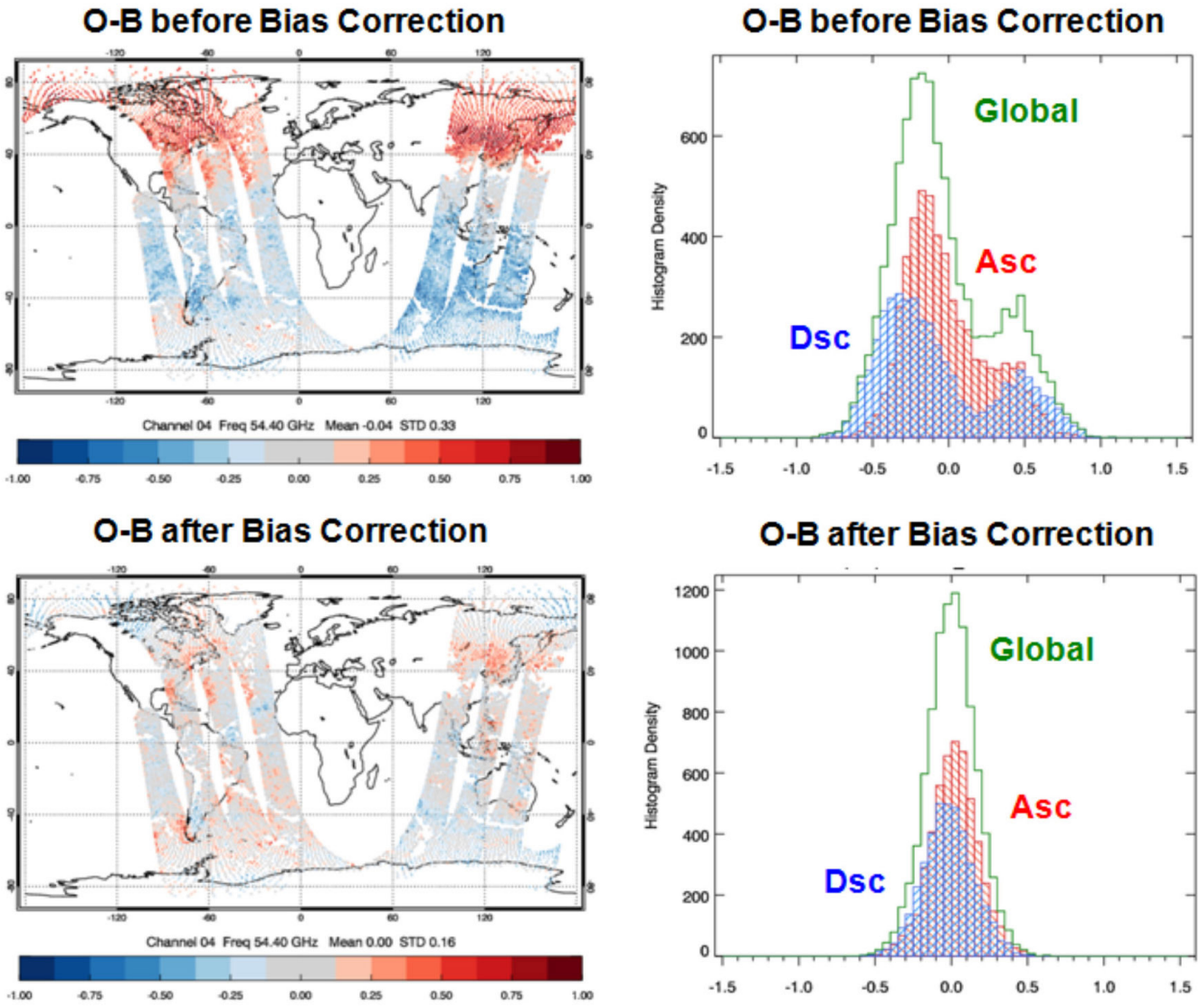

Figure 3: *The spatial coverage and histogram of innovation for F18 SSMIS channel 4 before (top) and after (bottom) bias correction illustrating the removal of the intra-orbit (descending and ascending) biases in these data.*

References:

Zhu, Y., J. Derber, A. Collard, D. Dee, R. Treadon, G. Gayno, G. and J. A. Jung (2014.), Enhanced radiance bias correction in the National Centers for Environmental Prediction's Gridpoint Statistical Interpolation data assimilation system. *Q.J.R. Meteorol. Soc.*, **140**, 1479–1492.

Zhu, Y., J. Derber, A. Collard, D. Dee, R. Treadon, G. Gayno, J. Jung, D. Groff, Q. Liu, P. van Delst, E. Liu, D. Kleist, 2014. Variational bias correction in the NCEP's data assimilation system. *The 19th International TOVS Study Conference (ITSC-19)*, Jeju Island, South Korea. (http://cimss.ssec.wisc.edu/itwg/itsc/itsc19/program/papers/10_02_zhu.pdf)

DMSP F19 SSMIS Cal/Val Findings and UPP Assimilation Results Using NAVGEM

On April 3, 2014, the Defense Meteorological Satellite Program (DMSP) launched the F19 spacecraft from Vandenberg Air Force Base carrying the fourth in a series of five Special Sensor Microwave Imager/Sounder (SSMIS) sensors built for DMSP by Northrop Grumman (formerly Aerojet). Similar to the previous three operational SSMIS instruments, an extensive Calibration and Validation (Cal/Val) program was performed, led by scientists and engineers from the Naval Research Laboratory (NRL) and Aerospace Corporation. NRL's core Cal/Val team specializes in microwave radiometric sensor analysis and in the assessment of radiometric stability, geo-location, ground processing software, environmental retrieval algorithms, and the analysis and calibration of upper atmosphere soundings. In addition, NRL has extensively employed the use of Numerical Weather Prediction (NWP) radiative transfer departure analysis in the SSMIS Cal/Val process, demonstrating its importance in detecting and understanding the physical mechanisms behind calibration anomalies.

The F19 post-launch Cal/Val team verified the radiometric performance and stability of the SSMIS instrument, derived geo-location tuning parameters and offsets, developed scan non-uniformity bias coefficients, and determined that the radiometric data and resulting ocean environmental data products (EDRs) are meeting the required specifications. The F19 SSMIS Cal/Val team also uncovered a cold bias of 8–10 K in the 150 and 183 GHz channels (G band feedhorn). The cold bias was first detected using radiative transfer departure analysis and was subsequently confirmed using cross-sensor calibration methods. The cold bias mitigation strategy developed is similar to the method used to correct for antenna spillover loss, and by using a modified spillover factor for the G band channels, the bias is effectively removed. Figure 1 shows the radiometric performance of operational SSMIS sensors.

A near real-time assimilation trial was performed with the calibrated SSMIS radiance data produced by assimilating Unified Pre-Processor (UPP) spatially averaged radiance data from channels 2–7, 9–11, and 22–24 beginning May 15, 2014, using the Navy Global Environmental Model (NAVGEM). Model resolution was T359L50 with the model top at 0.04 hPa, and the data assimilation system was the NRL Atmospheric Variational Data Assimilation System-Accelerated Representer (NAVDAS-AR). The Community Radiative Transfer Model (CRTM) is used as the fast radiative transfer model in the NAVGEM system. F19 Ocean EDRs Total Precipitable Water (TPW) and Ocean Surface Wind Speed (OSWS) were not assimilated in this trial. The standard deviations of the bias-corrected UPP observations versus the NAVGEM computed radiances for channels 2–7, 22–24 are shown in Figure 2. Results of the trial were quite positive, with F19 SSMIS ranking above the current operational SS-

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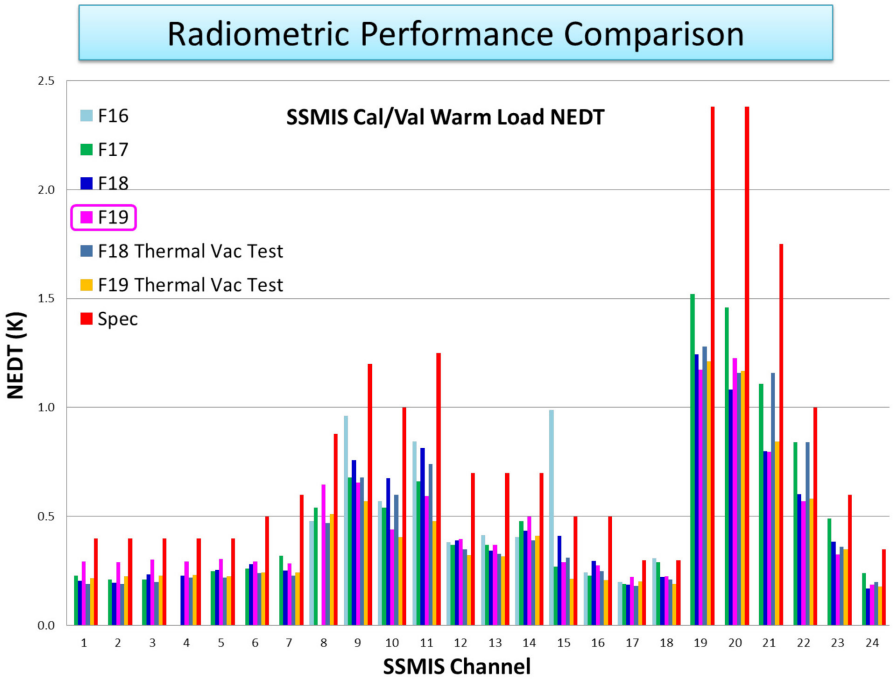

Figure 1: *On-orbit SSMIS radiometric performance computed from the warm load calibration targets as compared to pre-launch thermal vacuum tests and the required noise specification. Note: F16 channels 1–7 and 19–24 are no longer functional.*

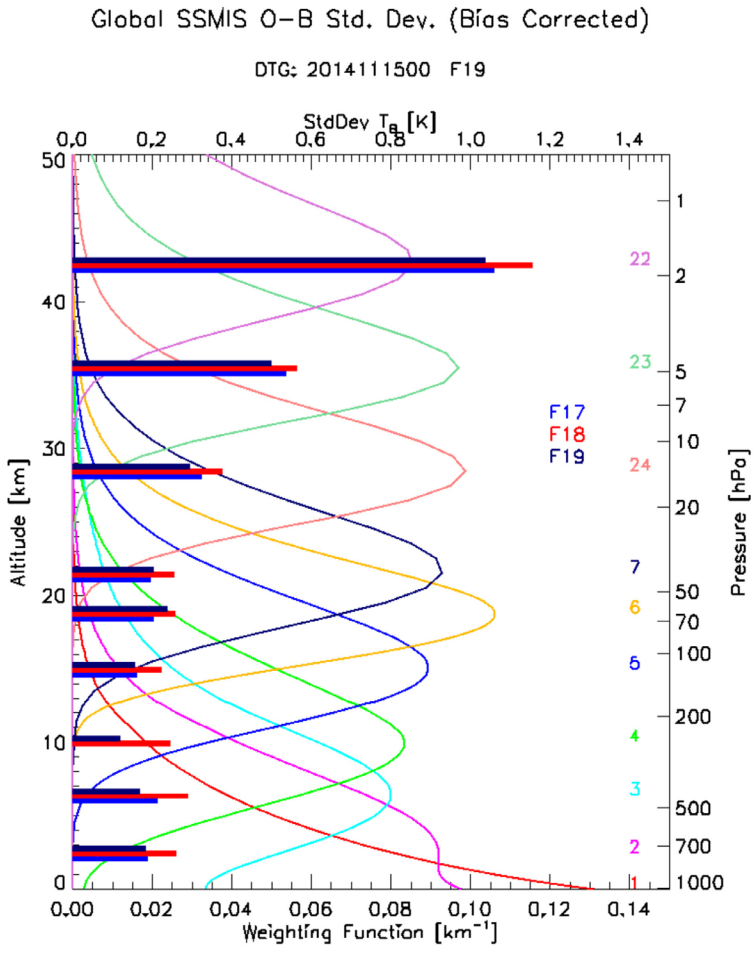

Figure 2*: The standard deviations of the bias-corrected UPP observations versus the NAVGEM computed radiances for channels 2–7, 22–24, and their associated weighting functions for the F19 UPP Assimilation trial.*

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MIS UPP sensor data in both total Forecast Sensitivity Observation Impact (FSOI) and per-observation impact, as shown in Figures 3 and 4.

The SSMIS Cal/Val efforts led by NRL/Aerospace have proven invaluable in maintaining sensor functionality. Additionally, the success of the SSMIS Cal/Val team in understanding the entire spectrum of sensor hardware and software systems has provided the necessary groundwork for developing the mitigation strategies utilized in the SSMIS UPP system run operationally at Fleet Numerical Meteorology and Oceanography Center (FNMOC). The SSMIS UPP radiance data assimilated into NAVGEM continue to show greater impact than comparable radiances from NOAA AMSU-A and MHS sounding systems. Clearly, Navy NWP is

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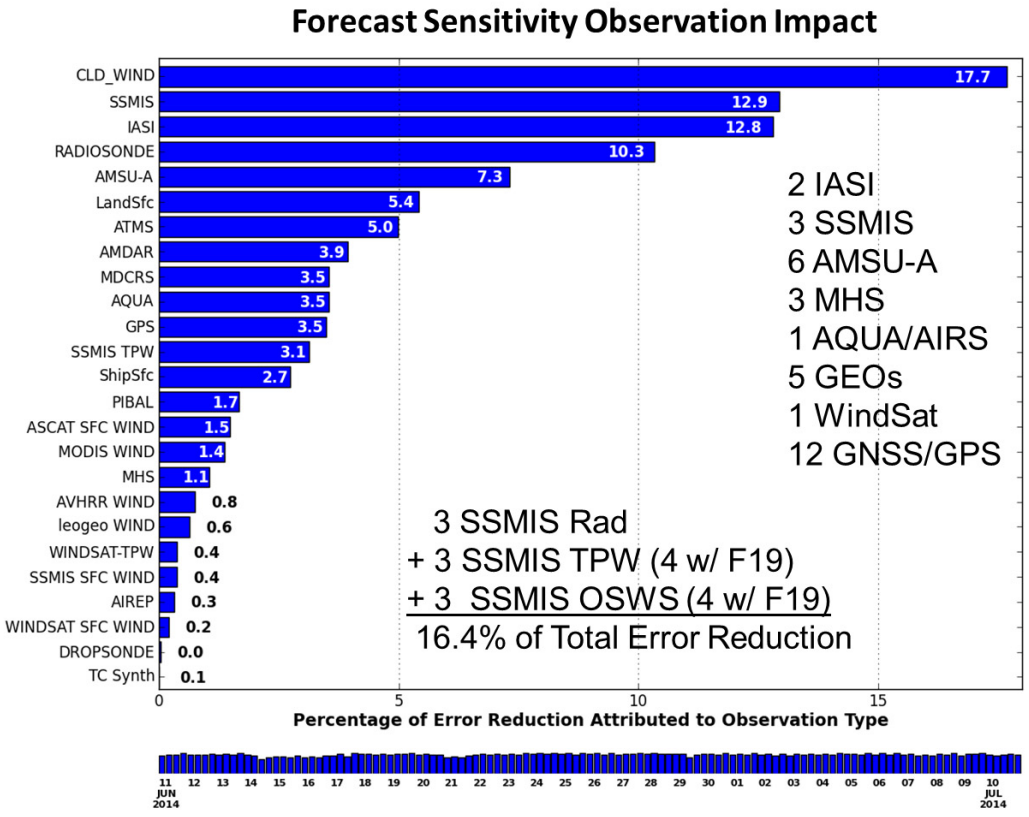

Figure 3. *Percentage of error reduction attributed to observation type. Forecast Sensitivity Observation Impact for the combined radiance data, TPW and OSWS from all operational SSMIS sensors, including F19 UPP data, accounts for 16.4% of total 24 hour forecast error reduction.*

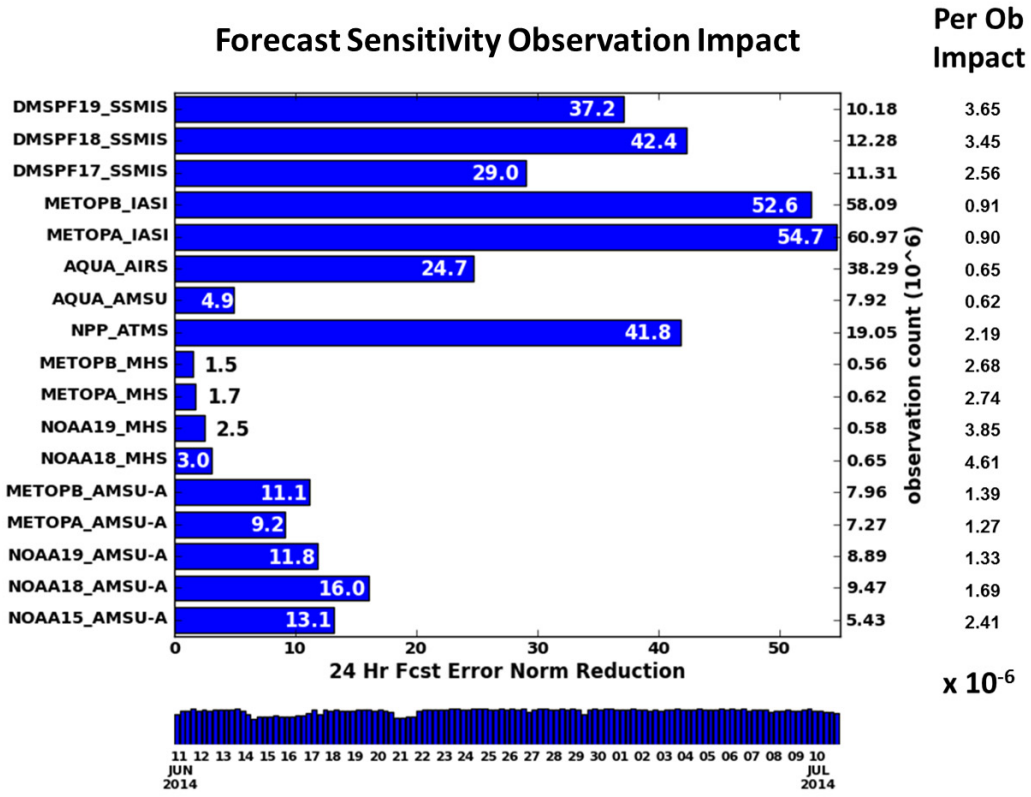

Figure 4. *Twenty-four hour forecast error norm reduction (J/kg) for satellite radiance sensors used in the F19 UPP assimilation trial. DMSP F19 SSMIS ranks near the top compared to other MW sensors in both Forecast Sensitivity Observation Impact and per-observation impact.*

maximizing the impact from SSMIS data as a direct result of collaboration between NRL Data Assimilation scientists and the NRL/Aerospace SSMIS Cal/Val teams. The addition of F19 SSMIS to the array of operational DMSP sensors will provide enhancement to an already successful assimilation system.

The NRL SSMIS Cal/Val team would like to acknowledge the Aerospace Cal/Val team members: Donald Boucher, Eun-Sung Park, Bruce Thomas, and Ye Hong, as well as the U.S. Navy PEO C41 PMW-120 and the U.S. Air Force Remote Sensing Systems Directorate.

Steve Swadley and Gene Poe (NRL Marine Meteorology Division)
Tanya Maurer and Philip Shen (DeVine Consulting) and Al Uliana (SAIC)

Impact of Loss of NOAA Microwave and Radio Occultation Observations in Operational NWP in Support of the U.S. Data Gap Mitigation Activities[1]

Satellite radiances from the Advanced Technology Microwave Sounder (ATMS) on the Suomi National Polar-orbiting Partnership (NPP) satellite began operational assimilation in NCEP's Global Data Assimilation System starting in May 2012. The ATMS instrument on Suomi NPP represents an advanced follow-on capability to the Advanced Microwave Sounding Unit-A (AMSU-A) and Microwave Humidity Sounder (MHS) temperature/moisture sounding suite combined. Suomi NPP was placed in the early-afternoon orbit, providing similar information to the existing polar orbiting satellites with microwave (MW) sounders.

As the U.S. polar-orbiting satellites NOAA-15, 18, and 19 and NASA's AQUA reach the end of their life, there may be a loss in redundancy between their MW soundings and ATMS. With the expected delay in the launch of the next generation of U.S. polar-orbiting satellites from the Joint Polar Satellite System (JPSS) program, there may also be a loss in at least some of the U.S. MW data.

In addition to the possible loss of the NOAA MW sounders, there may be a significant loss of radio occultation (RO) observations. RO observations complement the microwave (and infrared) sounders by providing information on the temperature, water vapor and pressure with high accuracy and precision, and in all weather. RO observations have, since 2006, shown a significant positive impact on global NWP forecasts at NCEP and other global weather prediction centers.

We have investigated the impacts on the skill of NCEP global forecasts due to a loss of the NOAA and AQUA MW and all RO soundings. These gaps are potentially important because atmospheric sounders from satellites form the backbone of the global observing system. We only consider the MW sounder on Suomi NPP because the Cross-track Infrared Sounder (CrIS) instrument was not yet being assimilated at NCEP at the time of the study. We consider two extreme scenarios. First, we assume that the MW instruments from NOAA-15, NOAA-18, NOAA-19 and AQUA have not reached the end of their life before JPSS-1 is launched and second; we assume the loss of all of these instruments. Furthermore, we consider the impact of losing all RO observations.

We conducted two sets of data denial experiments; the first set includes three parallel runs CTL, noRO, and noATMS. CTL is the operational configuration at the time of the study (March–April 2013) and it includes all the observations used operationally at NCEP. In noRO, all RO observations were removed from CTL, while in experiment noATMS, MW satellite radiances from ATMS were removed from CTL. This set of experi-

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[1] Summary of a paper submitted to *Weather and Forecasting* and in review.

ments provides a measure of the value of ATMS or RO with all the other observations present, or degradation in global forecasts if we lose ATMS or RO before losing the U.S. microwave soundings.

Another scenario is that the earlier launched U.S. satellites will reach the end of their life before ATMS or RO are lost. In order to evaluate this scenario, we repeated the experiments above, but assuming that there are no longer other NOAA satellite MW radiances nor AMSU-A from AQUA, leaving no U.S. AMSU sounders in the early afternoon orbit and a reduction of MW sounders in the morning orbit. In this second set of experiments, noUSAMSU is identical to CTL except that AMSU-A and MHS from NOAA-18/19, and AMSU-A from AQUA and NOAA-15 were removed from the assimilation system. Experiment ATMS Only removes RO data from noUSAMSU, and experiment RO Only removes ATMS data from noUSAMSU. All the experiments ran from February 21 to April 30, 2013. The horizontal resolution of the operational NCEP Global Data Assimilation System (GDAS) at the time of this study was T574 (~27 km) with 64 levels in the vertical. All the experiments used the hybrid version of the NCEP GDAS.

A slight loss of accuracy in the Northern Hemisphere (NH) extratropics forecast occurs with the loss of all U.S. MW data, and this loss in skill is not mitigated with the RO observations at that time (Figure 1a). However, the situation is quite different in the Southern Hemisphere (SH) extratropics, where the loss of RO data produces a much larger negative impact on the forecasts than

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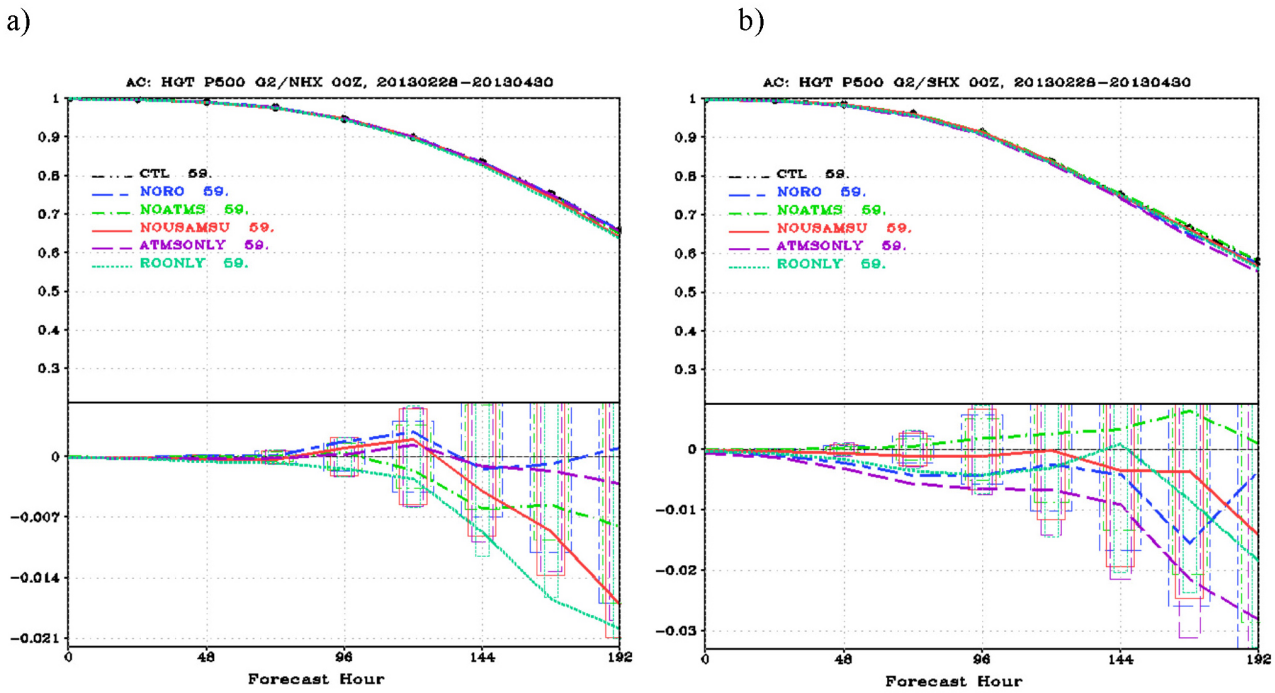

Figure 1. *Top: Anomaly correlation score as a function of the forecast length for the 500-mb geopotential heights in the (a) NH and (b) SH. The analyses used for verification are a consensus between the NCEP, UK Met Office and ECMWF analyses. Bottom: Difference of AC scores with respect to CTL in the (a) NH and (b) SH. Vertical bars indicate limits of statistical significance at the 95% confidence levels; curves within the corresponding bars are not statistically significant.*

does the loss of the U.S. MW observations (Figure 1b). The role of ATMS in mitigating the loss of the other MW sounders is mixed, but generally neutral. Also, our results confirm the significant anchoring effect of RO observations and associated reduction in analysis and forecast biases in temperature (Figure 2). Overall, the negative impact of the potential loss of RO observations is greater than the potential loss of the MW observations in these experiments.

Lidia Cucurull (NOAA/ESRL) and Richard A. Anthes (UCAR)

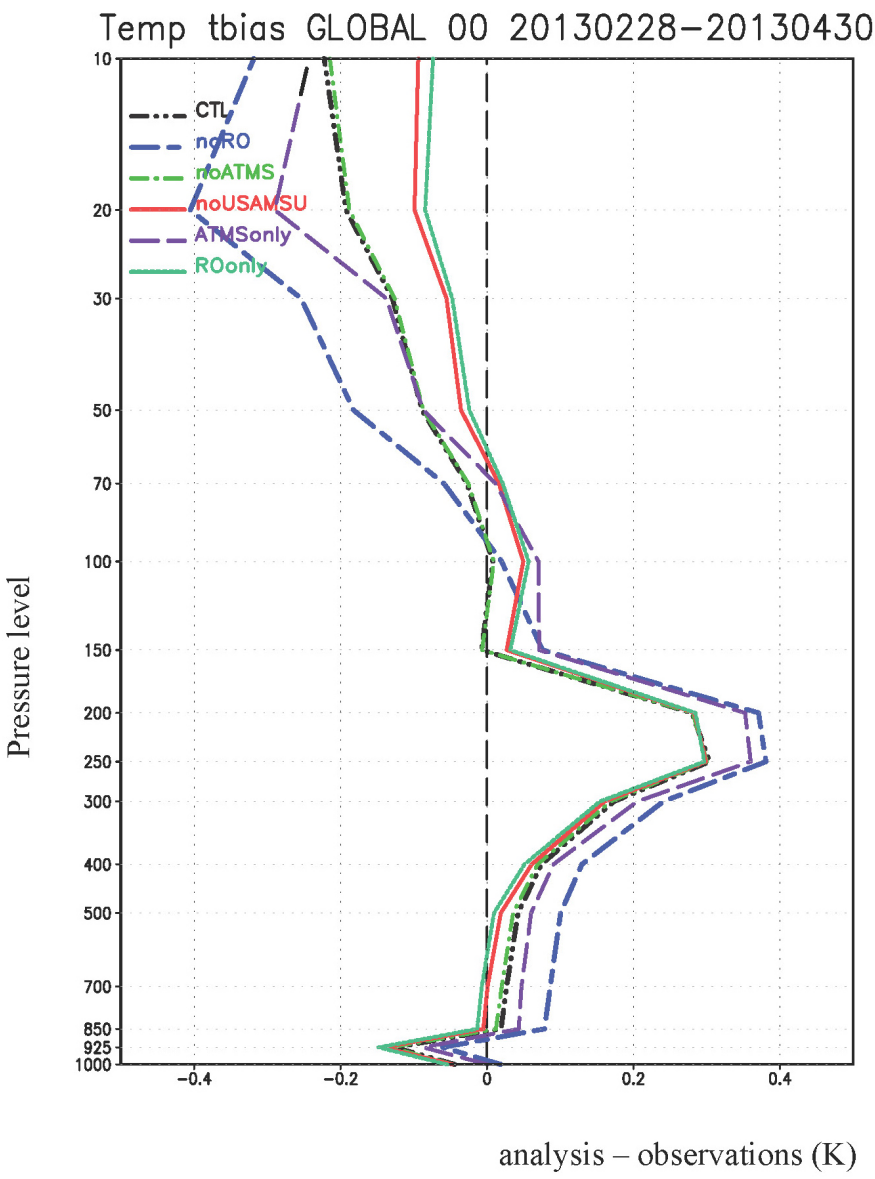

Figure 2. *Global temperature biases of analyses relative to radiosondes in all six experiments.*

The 7-km GEOS-5 Nature Run for OSSEs

The Global Modeling and Assimilation Office (GMAO) at NASA Goddard Space Flight Center has released a 2-year non-hydrostatic 7-km global mesoscale simulation produced with the Goddard Earth Observing System (GEOS-5) atmospheric general circulation model. The simulation was produced as a Nature Run for conducting observing system simulation experiments (OSSEs).

Generation of the 7-km GEOS-5 Nature Run (7km-G5NR) was motivated in part by the desire of the OSSE community for an improved high-resolution sequel to an existing Nature Run produced by the European Centre for Medium-Range Weather Forecasts (ECMWF), which has served the community for several years. The intended use of the 7km-G5NR in this context is for generating simulated observations to test proposed observing system designs regarding new instruments and their deployments. Because NASA's interest in OSSEs extends beyond traditional weather forecasting applications, the 7km-G5NR includes, in addition to standard meteorological components, a suite of aerosol types and several trace gas concentrations, with emissions downscaled to 10 km using ancillary information such as powerplant location, population density, and night-light information.

The 7km-G5NR (http://gmao.gsfc.nasa.gov/global_mesoscale/G5NR/) has produced nearly 4 petabytes of data at 30-minute intervals throughout the 2-year simulation, and was completed in just over 75 days of dedicated computation on the "Discover" cluster at the NASA Center for Climate Simulation (NCCS).

Increasing computational capability over the last several years has allowed global atmospheric models like GEOS-5 to push horizontal resolutions down to just a few kilometers and into the realm of convection-permitting resolutions. Atmospheric models with horizontal resolutions in the range of 15 to 1 km fall squarely in the so-called "gray zone," where the large-scale dynamics begin to resolve some aspects of the physical processes associated with clouds and convective transport while some level of parameterization still remains. Great care has been taken to allow GEOS-5 to automatically adapt to this regime through scale-aware dynamics and physical parameterizations. These adaptations include:

- The adaptation of a non-hydrostatic, finite-volume dynamical core.
- Constraining the Relaxed Arakawa-Schubert (RAS) deep convective parameterization using a stochastic increase in the threshold of minimum entrainment.
- Increasing the critical relative humidity within the total water probability distribution function (approaching 1.0 as resolution increases).
- The reduction of the variance of the orography in the gravity wave parameterization as topography becomes better resolved.

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The 7-km resolution of the G5NR is 16 times finer than the highest resolution operational version of GEOS-5 used within the GMAO to date. This means that weather features are resolved to a level not typically produced in standard GEOS-5 products.

An extensive evaluation has shown that the 7km-G5NR produces realistic representations of extreme weather events in both the tropics and extratropics, including tropical cyclones, nor'easters, and mesoscale convective systems. While there are deficiencies in this simulation, including a weaker than observed Hadley circulation and a higher than observed cloud brightness, the overall assessment is that the 7km-G5NR performs well with respect to: the time mean temperature and wind fields; precipitation and the hydrological cycle; the energy spectra and representation of waves, tropical cyclones and mid-latitude storms; land and ocean surface characteristics; the representation and forcing effects of clouds and radiation; the dynamics of the stratosphere and mesosphere; and the representation of aerosols and trace gases. A detailed evaluation of the 7km-G5NR performance is described in a technical memorandum to be released by NASA in the near future, and will be available in the documents section of the G5NR project website.

Improved resolution in the 7km-G5NR may have the most significant impact on the ability to develop very intense tropical cyclones. These synoptic scale features rely heavily on the development of mesoscale

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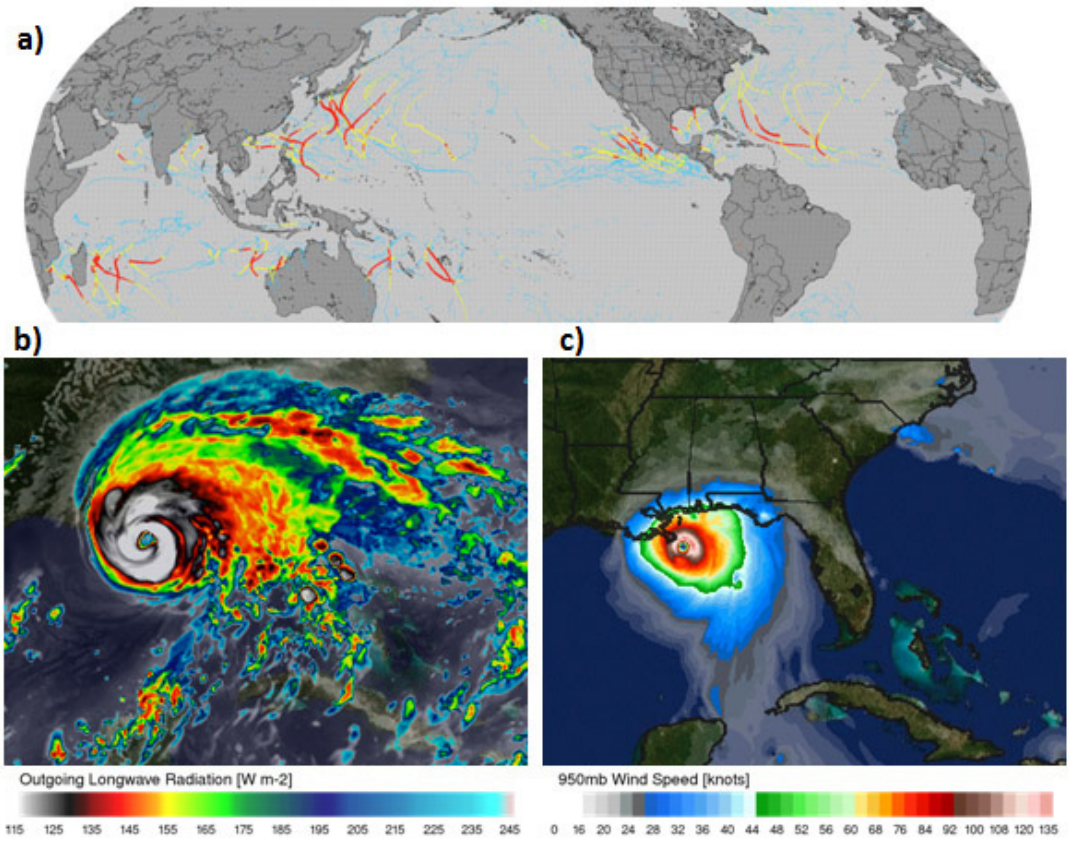

Figure 1: *Global tropical cyclone tracks from the 7km-G5NR from June 2006 to May 2007 (a), weak depressions and tropical storms are denoted in light blue, tropical cyclones with distinct warm cores and surface winds in excess of 74 miles per hour (mph) are colored yellow, major tropical cyclones with winds in excess of 112 mph are colored in red. A snapshot of an Atlantic hurricane showing (b) outgoing longwave radiation and (c) near-surface wind speeds on September 10, 2006 at 21:00Z.*

convection within favorable large-scale environments. Thus, it is critically important that parameterizations in the model adapt to the increased resolution in order to permit feedback between small-scale convective features and developing synoptic-scale storms. The global distribution of tropical cyclone activity in the 7km-G5NR from June 2006 to May 2007 (Figure 1a) highlights the realistic activity and variability of intensity globally across basins. In September 2006 of the 7km-G5NR, a major hurricane made landfall along the U.S. Gulf Coast at Category 4 strength. Outgoing longwave radiation (Figure 1b) highlights the intense banding structure of the mature tropical cyclone feeding into the deep convection surrounding a well defined, compact eye-wall, with strong near-surface wind speeds in excess of 130 knots (Figure 1c).

The release of the 7km-G5NR marks a significant improvement in our ability to maximize the impact of satellite observations in climate, weather, and atmospheric composition prediction. While researchers working on OSSEs have had to rely on regional models to provide such high-resolution Nature Run simulations in the past, the 7km-G5NR provides a new source for experimentation in a comprehensive global context, providing critical value for the design of new Earth-orbiting satellite instruments.

William Putman, Ron Gelaro, and Steven Pawson (NASA/GMA)

Unsolicited articles for the JCSDA Quarterly Newsletter are encouraged as are suggestions for seminar speakers or topics. The deadline for inputs to the Newsletter Spring 2015 issue is March 25. Please send them to Kevin.Garrett@noaa.gov.

OTHER NEWS

Introducing the JCSDA Satellite Winds Working Group

We are pleased to announce the formation of the new JCSDA Satellite Winds Working Group (SWWG)! This working group was recently established by the JCSDA executive team, not only in recognition of the growing number of efforts in the JCSDA partner institutions in this area, but also in an effort to instill and solidify coordination between all JCSDA partners in this area and to leverage each other's efforts. Please welcome Jaime Daniels (NESDIS/STAR) and Pat Pauley (Naval Research Laboratory), who will serve as co-chairs of this new JCSDA working group.

The objective of the newly formed JCSDA SWWG is to provide a forum for JCSDA partners to discuss, coordinate, and collaborate on satellite winds activities. These activities include, but are not limited to, data assimilation techniques, data quality control, OSSEs, verification and validation procedures, and ultimately the transition of these techniques and procedures to operational use.

In the near term, the new co-chairs plan to prepare a charter for the group, as well as build a catalog of information about satellite winds and the related activities currently being pursued or planned by JCSDA partners. This catalog will include details of activities by partners in the above broad categories, details about the availability of current and future geostationary and polar satellite-

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derived wind products, and other relevant information, with the dual goal of informing partners about the current status of satellite wind data assimilation and preparing partners for satellite winds from future instruments (e.g., Himiwari-8, GOES-R ABI, Aeolus Wind LIDAR).

Meet the Co-Chairs of the Satellite Winds Working Group

Jaime Daniels joined NESDIS's Center for Satellite Applications and Research (STAR) in July 1996. In his present position, he serves as the Program Manager for the GOES-R Algorithm Working Group (AWG). He also leads the GOES-R AWG winds application team, and is responsible for the continued development of the new GOES-R winds algorithm and its application to a number of existing (VIIRS, GOES, SEVIRI, AVHRR, and MODIS) and future (GOES-R ABI and Himawari-8 AHI) sensors. He is very focused on ensuring that the NWP community is ready to use the GOES-R ABI wind products soon after the launch of GOES-R. He actively participates as a member of the GOES-R Program's Calibration and Validation and Coordination Team, and serves as the calibration and validation lead for ABI Level-2 products. Since 2008 he has had the privilege of serving as co-chair of the WMO/CGMS International Winds Working Group (IWWG). Jaime holds a B.S. degree in Meteorology from the State University of New York at Oswego and a M.S. degree in Meteorology from the University of Maryland at College Park. Outside of work Jaime enjoys bowling and playing golf and hockey.

Dr. Patricia Pauley is a meteorologist in the data assimilation group at the Naval Research Laboratory (NRL) – Monterey, where she has primarily worked on data pre-processing and quality control for conventional observations. She is the author of the aircraft data quality control system that is used operationally at the Fleet Numerical Meteorology and Oceanography Center (FNMOC) and the National Centers for Environmental Prediction (NCEP). She also designed and maintains the quality control and superobbing code used for satellite atmospheric motion vectors for the U.S. Navy's operational NWP models. Her current project is accommodating the transition from traditional formats to BUFR for radiosonde and other data types. After completing her graduate work at Purdue University, Pat served as an assistant professor at the University of Wisconsin-Madison and an associate research professor at the Naval Postgraduate School before joining NRL in 1998. Outside of work, she enjoys spending time at home with her husband and youngest daughter, traveling to spend time with her two older children, playing viola in a community orchestra, and knitting oddities for her granddaughters.

13th JCSDA Technical Review Meeting & Science Workshop on Satellite Data Assimilation May 13–15, 2015

The 13th JCSDA Technical Review Meeting & Science Workshop will take place from May 13–15, 2015, at the NOAA Center for Weather and Climate Prediction in College Park, MD.

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The purpose of the annual JCSDA technical review meeting and science workshop is to review the ongoing and planned scientific development sponsored by the NASA-NOAA-DOD Joint Center for Satellite Data Assimilation and to coordinate these efforts, both internally and with the outside research community involved in satellite data assimilation (especially those directly funded by the JCSDA through FFO and/or ROSES programs). Two and a half days will be devoted to the meeting, with plenty of time for discussions, interactions, scientific exchanges and formal presentations, both among scientists from all JCSDA partners and with JCSDA managers. Formal recommendations from working group discussions that take place during the meeting are reviewed by the JCSDA management on an annual basis and serve as one of the inputs when developing technical directions of the future JCSDA activities.

The workshop will include oral presentations (in plenary session), including invited talks. No parallel sessions will be held. In order to allow for open discussion, plenty of time will be available to presenters to interact with the audience. Adequate visibility will be provided to contributions from all scientific priority areas as well as emerging ones. Externally funded scientists are expected to attend and should give a progress report and indicate what they plan to do over the next year. An oral presentation is expected from the externally funded scientists.

There will also be a dedicated poster session. Note that posters will be mounted on their panels the first morning of the meeting and will remain on display until the end of the meeting. This arrangement will allow scientists to discuss the content of the posters not only during the poster session but also during coffee and lunch breaks.

Participation in the meeting is free of charge. For registration and logistical information, please visit http://www.jcsda.noaa.gov/meetings_Wkshp2015.php.

2015 JCSDA Summer Colloquium on Satellite Data Assimilation

The JCSDA is pleased to announce the Summer Colloquium on Satellite Data Assimilation in 2015, engaging graduate students and individuals with early postdoctoral appointments in the science of data assimilation for the atmosphere, land and oceans. The program will include internationally recognized experts in data assimilation, satellite data use and assimilation, along with opportunities for students to interact with the lecturers in an informal setting. The objective of the program is to foster the education of the next generation of data assimilation scientists. The Colloquium will be held in Fort Collins, CO, with support from the Cooperative Institute for Research in the Atmosphere (CIRA) at the Colorado State University (CSU), during the last week in July and first week in August.

Those interested in learning more about the workshop, including eligibility and how to submit applications, are encouraged to follow links on the JCSDA (http://www.jcsda.noaa.gov) and CIRA (http://www.cira.colostate.edu) websites.

PEOPLE

Colonel Robert T. Swanson, Jr. Appointed to the Management Oversight Board for the JCSDA

Colonel Robert "Rob" Swanson is Chief, Weather Strategic Plans and Interagency Integration Division, Directorate of Weather, Deputy Chief of Staff, Operations, Headquarters U.S. Air Force, Washington, DC. The Division plans weather, climate, and space environmental support for the Air Force Weather functional area and oversees integration of technology and weather into C4I and modeling systems.

Colonel Swanson earned his commission through the Airman Education and Commissioning Program, graduating Summa Cum Laude from Texas A&M University. He enjoys a diverse background that includes prior enlisted time; two Air Force Institute of Technology tours culminating in M.S. and Ph.D. degrees; joint, coalition and special operations assignments; and a series of rigorous leadership, scientific, teaching, and staff positions.

While deployed to Afghanistan as the Chief Meteorological Officer for the International Security Assistance Force (ISAF), Colonel Swanson led 170 international troops across 58 locations delivering expert weather support enabling over 42,000 sorties, 700 ground operations and 1,000 troops in contact events in support of Operation Hamkari—the largest and most decisive surge to date. While there, he was hand-picked to lead the Secretary of Defense's $850 million Persistent Surveillance Systems Operation Enduring Freedom deployment.

Previously, as the Commander of the 607th Weather Squadron in the Republic of Korea, he led combined weather operations during crises occasioned by North Korea nuclear and missile tests. As executive officer to the PACAF Director of Operations, he led support for tsunami-ravaged Indonesia and south Asia.

Finally, as Director of Operations for the 17th Operational Weather Squadron he led the unit to full operational capability while supporting vital Operations Iraqi and Enduring Freedom missions, presidential and Secretary of Defense support, and typhoon evacuation, as well as intelligence, surveillance, and reconnaissance mission support across the entire Pacific Command.

Dr. Hendrik Tolman Named JCSDA Associate Director for the NWS

In November 2014, the JCSDA Management Oversight Board announced the nomination and unanimous approval of Dr. Hendrik Tolman to serve as the JCSDA Associate Director for the National Weather Service (NWS).

Hendrik L. Tolman received his M.Sc. (Dutch Ir. or engineer's degree) in Civil Engineering from the Delft University of Technology in 1985, with a major in coastal engineering

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and a minor in offshore engineering. In 1990, he received a Ph.D. from the Delft University of Technology with a thesis entitled "Wind Wave Propagation in Tidal Sea." In 1990, he moved from the Netherlands to the United States as a National Research Council Resident Research Associate at NASA Goddard Space Flight Center to work on wave modeling for the Short Wave Dynamics Experiment (SWADE). In 1993 he joined the National Centers for Environmental Prediction (NCEP) of the NWS, where he has held various positions as a visiting scientist and contractor. In 2007 he became the Branch Chief of the Marine Modeling and Analysis Branch (MMAB) of NCEP's Environmental Modeling Center (EMC). His team of 25 scientists is responsible for numerical marine modeling for the NWS, including the modeling of wind waves, ocean circulation, sea surface temperatures, and sea ice. Since 2014, he has been serving as Director of EMC, leading the development and the transition to operations of most of the computer models for the atmosphere, land, ocean, waves, and ice for the NWS.

In addition to his distinguished career in NOAA, Dr. Tolman is the original author of the WAVEWATCH III® community wave modeling framework. With this model, Dr. Tolman was on the forefront of introducing community modeling efforts to the NWS, resulting in strong and vibrant worldwide partnerships between the NWS, other national and international government organizations, and academia. In the same context, Dr. Tolman has served an integral role in building relationships and community modeling efforts for ocean and storm surge modeling between the U.S. Government and academia.

Dr. Tolman is a member of the international Global Ocean Data Assimilation Experiment (GODAE) OceanView Science Team, which directs international research on observing and modeling our oceans. He has been the U.S. representative on various expert teams of the Joint WMO/IOP Technical Commission for Oceanography and Marine Meteorology (JCOMM)/United Nations Educational, Scientific and Cultural Organization (UNESCO), examining wind waves, storm surges, and operational ocean forecast systems, and has been actively involved in capacity-building activities for wave modeling and prediction in developing countries. Dr. Tolman has an extensive publication record and has been on the editorial board of various scientific journals.

Dr. Benjamin Ruston Appointed U.S. Navy Technical Liaison to the JCSDA

Dr. Benjamin Ruston was recently appointed as the Technical Liaison to the JCSDA representing the U.S. Navy. Dr. Ruston received a B.F.A. in music from DePaul University in Chicago in 1994; a B.S. in physics from University of Wisconsin at La Crosse in 1998; an M.S. in atmospheric science in 2000, which focused on water vapor channels from geostationary satellites; and a Ph.D. in atmospheric science from Colorado State

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University in Fort Collins in 2004, which focused on microwave land surface emissivity. He was a National Research Council postdoctoral fellow at the Naval Research Laboratory (NRL) in Monterey, CA, from 2004–2006, and from 2006 to the present has joined the data assimilation section of the Marine Meteorology Division at NRL. His specialties include satellite meteorology, remote sensing from infrared and microwave sensors, and data assimilation for numerical weather prediction. He remains interested in improving the use of satellite data over land surfaces, and actively participates in the International TOVS and Radio Occultation Working Groups (ITWG and IROWG). As Technical Liaison, Dr. Ruston serves as a point of contact for the JCSDA partners and the external research community on satellite data assimilation activities at NRL.

Meet Tanya Maurer

Tanya L. Maurer recently joined the Data Assimilation Section of the Naval Research Laboratory (NRL) in Monterey, CA, as one of the newest members of the Defense Meteorological Satellite Program's (DMSP) F19 Special Sensor Microwave Imager-Sounder (SSMIS) Cal/Val team. Her work has focused extensively on vicarious sensor calibration of F19 SSMIS, as well as F19 SSMIS Early-Orbit monitoring and Environmental Data Record (EDR) verification. She also played a key role in launching assimilation trials for recently calibrated F19 SSMIS radiance data in preparation for operational assimilation into the NRL Atmospheric Variational Data Assimilation System Accelerated Representer (NAVDAS-AR). In addition, she has made technical contributions to the ongoing development of validation tools and algorithm enhancements for a number of space-based ocean surface wind vector platforms, including the recently retired Indian Space Research Organization's Oceansat-2 Scatterometer.

Ms. Maurer received her B.S. degrees in Physical Geography and Environmental Science from the University of California, Santa Barbara, in 2006, and an M.S. degree in Marine Science with emphasis in Physical Oceanography from the California State University System in 2011. Prior to joining NRL, she worked as a research technician at Moss Landing Marine Laboratories and was a member of the Alliance for Coastal Technologies, where she completed numerous performance verification studies for optical oceanographic instrumentation utilized within the broader scientific research community. Ms. Maurer is pleased to apply her technical skills in data analysis and monitoring to the Cal/Val efforts of DMSP F19 SSMIS in support of satellite data assimilation for JCSDA and its partners. She resides in Pacific Grove, CA, with her husband and son.

CAREER OPPORTUNITIES

Further information on career opportunities listed here may be found at
http://www.jcsda.noaa.gov/careers.php

NOAA

The National Oceanic and Atmospheric Administration, Center for Satellite Applications and Research (NOAA/STAR) is currently seeking qualified candidates in support of the JCSDA. Successful candidates will join the Directed Research Team (DRT) to work on high priority data assimilation projects, with focuses on assimilation of passive and active microwave radiance data, geostationary radiance data, and Atmospheric Motion Vectors (AMVs), as well as supporting current efforts on Observing System Simulation Experiments (OSSEs) and the Community Radiative Transfer Model (CRTM) development. These are full-time, permanent positions with Riverside Technology, Inc., Atmospheric and Environmental Research, Inc., the University of Maryland, or Colorado State University, and located at the NOAA Center for Weather and Climate Prediction in College Park, MD.

NOTE FROM THE DIRECTOR

It is only natural that I start this note, with excitement I might add, by informing you that the JCSDA Management Oversight Board (MOB) recently has selected Dr. Thomas Auligne as the new director of the JCSDA. Tom is a well-known and respected figure in the satellite data assimilation community, with a longtime affiliation to the Joint Center, in addition to being a longtime colleague and friend to many of us. Tom has not assumed the reins of the JCSDA yet, but will begin doing so informally during the next couple of months and will step into his new capacity officially just in time to be introduced during the upcoming JCSDA annual workshop on satellite data assimilation. A full series of articles encompassing Tom's biography and the description of his achievements, as well as his vision for the strategic and scientific directions of the JCSDA, will be featured in the next quarterly newsletter(s), so stay tuned. In a similar vein, I would like to personally welcome Dr. Hendrik Tolman as the new representative of NWS in the JCSDA Executive Team and Col. Robert Swanson, Jr. as the new Air Force representative to the JCSDA MOB. On behalf of the JCSDA family, I extend to both a warm welcome. Please note that there are more complete notes introducing each of these new colleagues in this issue.

Speaking of the JCSDA workshop, I would like to remind everyone that the JCSDA first circular has been sent and that online registration is now open. All details can be found on the JCSDA website. If you are involved in satellite data assimilation and have an interest in interacting with peers, and perhaps with scientists and managers from the JCSDA that could help transition your research to operations, we encourage you to participate. We hope to see many of you at the workshop and to hear about your efforts in the area of satellite data assimilation, whether you are directly funded by the JCSDA through the external (or internal) research programs or whether you happen to work on the topic but are funded by different programs. The workshop is an annual event and is intended to allow coordination of internal and external efforts and perhaps allow, through interactions, more rapid R2O transitions.

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To stay on the subject of workshops a little bit longer, I am pleased to announce that efforts are being made to organize the Third JCSDA/ECMWF joint workshop on assimilating satellite observations of clouds and precipitation. Previous workshops on this topic were conducted in 2005 and 2010 in Washington, DC, and Reading, UK, respectively. We believe that the time is ripe for this workshop to be held again, given the significance all-sky data assimilation has gained recently and the major efforts being made among JCSDA partner organizations in this area, particularly the effort in support of the afternoon-orbit satellite data gap mitigation strategy being implemented in NOAA with help from other JCSDA partners. More details will be announced later and advertised on the JCSDA website, but I can say that the workshop has been scheduled for November 18–20, 2015.

Before I end this note I would like to congratulate our NWS colleagues and partners on the very recent (January 15, 2015) and successful operational upgrade of their data assimilation and forecast system, with increased spatial and vertical resolutions. We look forward to future successes and to the next upgrades and science implementations. JCSDA is always interested in and does its best linking operational systems to the research community through its O2R initiative (JIBB and S4), in order to facilitate and optimize the potential for successful R2O undertakings.

Finally, I want to remind those of you interested in working closely with the JCSDA that the external research funding opportunity through the FFO program is still open—and thank you for the numerous optional Letters of Intent (LOIs). It is not clear whether this newsletter will reach you on time to submit full proposals before the deadline (January 26), but even if does not I would like to highlight the fact that we are working hard to keep the pace of one opportunity a year and that the FY16 JCSDA external research opportunity will hopefully be initiated soon, this time through the NASA ROSES program. So if you missed this year's call, or if your LOI did not score high and you decided against submitting a full proposal, we hope you will maintain your interest in the JCSDA and not despair, and will consider submitting a proposal for the FY16 opportunity. But remember there are many ways besides direct funding that the JCSDA can help you coordinate your research with NWP operational centers—such as through providing access to the O2R environment to help in your R2O efforts, through funding your short-term visit (and hosting you) to come for a few weeks/months in one of the participating JCSDA partner institutions, through facilitating and coordinating your research closely with operational centers or triggering a new area of collaboration, or through membership in the JCSDA technical working groups.

Take care,
Sid Boukabara (Acting Director, JCSDA)

SCIENCE CALENDAR

UPCOMING EVENTS

JCSDA seminars are generally held on the third Wednesday of each month at the NOAA Center for Weather and Climate Prediction, 5830 University Research Court, College Park, MD. Presentations are posted at http://www.jcsda.noaa.gov/JCSDASeminars.php prior to each seminar. Off-site personnel may view and listen to the seminars via webcast and conference call. Audio recordings of the seminars are posted at the website the day after the seminar. If you would like to present a seminar contact Erin.Jones@noaa.gov.

JCSDA SEMINARS			
DATE	**SPEAKER**	**AFFILIATION**	**TITLE**
25 February, 2015, 2 p.m.	Krzysztof Wargan	NASA/GMAO	The Tropopause Inversion Layer: What Can We Learn from Data Assimilation
MEETINGS OF INTEREST			
DATE	**LOCATION**	**WEBSITE**	**TITLE**
23-27 February, 2015	Boulder, CO		2015 NOAA Satellite Science Week
27 April - 1 May, 2015	Greenbelt, MD	http://satelliteconferences.noaa.gov/2015/	2015 NOAA Satellite Conference
13-15 May, 2015	College Park, MD	http://www.jcsda.noaa.gov/meetings_Wkshp2015.php	The 13th JCSDA Workshop on Satellite Data Assimilation
21-25 September, 2015	Toulouse, France	http://www.eumetsat.int/website/home/News/ConferencesandEvents/DAT_2305526.html	2015 EUMETSAT Meteorological Satellite Conference