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NOAA……NASA……US Navy……US Air Force *Editor: George Ohring* *web-site: www.jcsda.noaa.gov*

News in This Quarter

Science Update

Assimilation of AIRS Radiance Data within the Rapid Refresh Mesoscale Model System

Atmospheric Infrared Sounder (AIRS) data have been assimilated into the Rapid Refresh (RAP) mesoscale model system to assess their potential impact on short-range RAP forecasts. A series of 9-day 3-hourly cycled RAP retrospective runs have been completed, in which the full coverage of AIRS data (i.e., ignoring data loss due to the long data latency and the short RAP data cutoff time) have been assimilated. In these experiments, we have focused on two key issues for regional satellite assimilation: bias correction (BC) and channel selection. Because of the relatively low RAP model top, a set of 68 AIRS channels (from the 120 global channel set) has been selected for RAP assimilation (based on an adjoint/Jacobian analysis). Impact studies (not shown) have documented an overall positive impact from applying this channel selection procedure for the RAP, and it is used here to assess the impact of AIRS data and the bias correction procedure on the RAP forecasts.

It is well known that radiance bias correction in regional models is a difficult challenge, due to limited and non-uniform data coverage in space and time. In order to effectively assimilate AIRS radiance data into the RAP, an extensive spin-up retrospective run is performed to obtain improved bias coefficients. The initial air mass and angle bias coefficient files are from the GDAS global system from July 2012. A 9-day (8 – 16 May 2010) retrospective run, using multiple applications of the GSI per cycle, is performed to spin-up the bias coefficients. For each analysis cycle, 30 successive GSI runs are completed with angle bias correction coefficients updated from the previous GSI run. After the full spin-up is completed, the updated bias coefficient files are available for use as the initial files for the retrospective test.

Three sets of retrospective runs, designed to assess the impact of AIRS data on the RAP, as well as evaluate the bias correction spin-up, are conducted:

1) Control run (3-h cycling with conventional data only);
2) Experiment without spin-up (conventional data plus AIRS data using the coefficient files from GDAS);
3) Experiment with spin-up (conventional data plus AIRS data using the coefficient files from spin-up run).

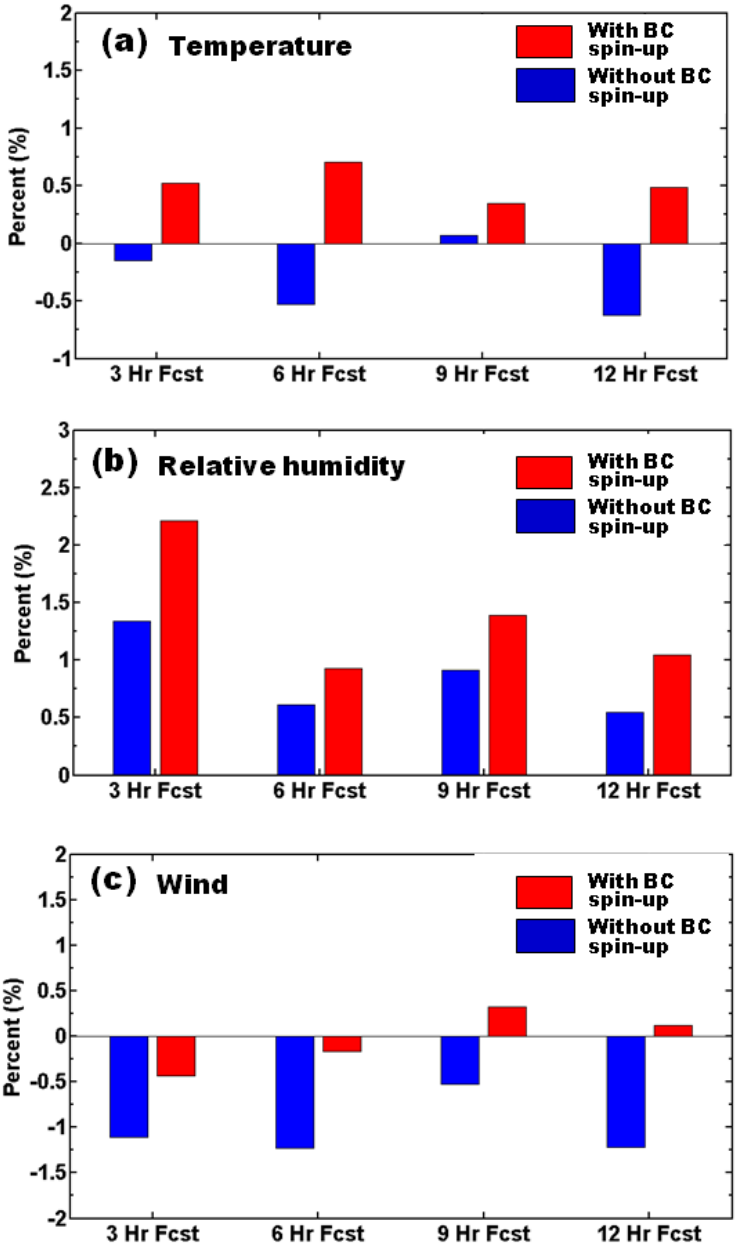


Figure 1: *Normalized error reduction relative to the control run [(CNTL – EXPT)/CNTL] (%) for AIRS assimilation experiments with (red) and without (blue) bias correction spin-up for (a) temperature, (b) relative humidity, and (c) wind. Positive values indicate reduced error from the assimilation of AIRS data. Statistics are computed against radiosondes for 1000-100-hPa layer over a national domain.*

The impact of using the spin-up procedure to better initialize the BC coefficients is evaluated by comparing brightness temperature (BT) Observation-Background (O-B) differences after BC for experiments with and without the BC spin-up. We find that the experiment with the BC spin-up has more observations assimilated and more O-B values around zero, most likely due to more accurate BC with the spin-up, leading to smaller innovations and allowing more observations to pass the quality control (QC), which in turn causes a positive feedback on BC.

Figure 1 (above) shows the forecast impact from the assimilation of the AIRS data with and without the spin-up procedure. The impact metric used is the mean percent reduction in forecast RMS error [(CNTL – EXPT)/CNTL] relative to the control experiment, for AIRS assimilation experiments with (red) and without (blue) the BC spin-up procedure. Positive values indicate reduced error from the assimilation of AIRS data. With the BC spin-up, temperature impacts (Fig. 1a) are positive for all forecast lengths, while without the BC spin-up, temperature impacts are near neutral or negative. For relative humidity (Fig. 1b), positive impacts from the BC spin-up are larger for all forecast lengths. Similarly, for wind (Fig. 1c), all forecast impacts from the BC spin-up are less negative or more positive than without the BC spin-up.

A reduced channel set of AIRS radiance data (assuming no data loss from a short data cutoff window) has been successfully assimilated into the RAP mesoscale model system, yielding mostly positive impact for short-range forecasts. The experiment beginning with spun-up bias correction coefficients shows better forecast skill than the one without spun-up bias correction coefficients. Impacts from real-time assimilation of AIRS data would be smaller, because significantly less data would be available due to the data latency/cutoff issue. Also, long term cycling of the RAP system would reduce the advantage of initializing with spun-up bias correction coefficients.

(Haidao Lin, CIRA and NOAA-ESRL/GSD, Steve Weygandt and Stan Benjamin, NOAA-ESRL/GSD)

Research Enabled by the Center's New Supercomputing Facilities

About two years ago, the Joint Center started to use its own dedicated supercomputing facilities: the JCSDA in a Big Box (JIBB) at NASA's Goddard Space Flight Center and one-third of the capacity of the NESDIS S4 system at the University of Wisconsin. Until that time, the Center had to rely on the availability of computer time and resources at its partner agency operations. The new capabilities allow Center supported researchers to test their proposed upgrades in satellite data assimilation using the current operational data assimilation and NWP models, which are resident on the facilities. In this and the following issue of the Newsletter, we will highlight some of the research that has been enabled by these resources. The first two articles follow.

1. Impacts on Global Forecasts: Conventional vs Satellite Data

Observing System Experiments (OSEs) are used to quantify the contributions to the forecast made by conventional in-situ and remotely sensed satellite data. The analysis and forecast model used for the observing system experiments reported on here is a Linux version of the operational National Centers for Environmental Prediction (NCEP) Global Data Assimilation/Forecast System (GDAS/GFS) implemented in May 2011. The NCEP operational resolution of T574 (about 28 km horizontal res.)-64 layers was used along with all non-restricted data types in the NCEP operational observation dataset. The experiments were run on the JIBB computer.

Two time periods− August -September 2010 and December 2010-January 2011 – were chosen. The control simulation consists of almost all data types routinely assimilated in the GDAS. The two experimental runs have either all the conventional in-situ data denied (NOCONV) or all the remotely sensed satellite data denied (NOSAT). All diagnostics exclude the first 14 days of each seasonal time period. This delay in evaluating the statistics allows for the impact of the denied data to be removed from the model initial conditions. Excluding the first 14 days reduces the two seasonal windows to 47 and 48 days for Aug-Sep and Dec-Jan respectively. Differences between the control and experimental runs were accumulated over these periods and analyzed with respect to the control analysis to demonstrate the forecast impact.

The observations denied for the NOCONV experiment include: rawinsonde and dropsonde observations of temperature, wind and specific humidity; Aircraft reports (AIREP), Aircraft to Satellite Data Relay (ASDAR), Meteorological Data Collection and Reporting System (MDCRS) and Pilot Report (PIREP) aircraft temperature and wind; Aviation Routine Weather Report (METAR), ship and buoy temperature, humidity and wind; profiler, Next Generation Radar (NEXRAD) Vertical Azimuth Display (VAD), and pibal wind. The observations denied for the NOSAT experiment include: High Resolution Infrared Radiation Sounder (HIRS) radiances, Atmospheric InfaRed Sounder (AIRS) radiances, the Infrared Atmospheric Sounding Interferometer (IASI) radiances, Geostationary Operational Environmental Satellite (GOES) Sounder radiances, the Advanced Microwave Sounding Unit (AMSU-A) and Microwave Humidity Sensor (MHS) radiances, ozone information from the Solar Backscatter Ultraviolet (SBUV) sensors, Global Positioning System – Radio Occultation (GPS-RO) observations, and Atmospheric Motion Vectors (AMVs) from geostationary and polar orbiting satellites.

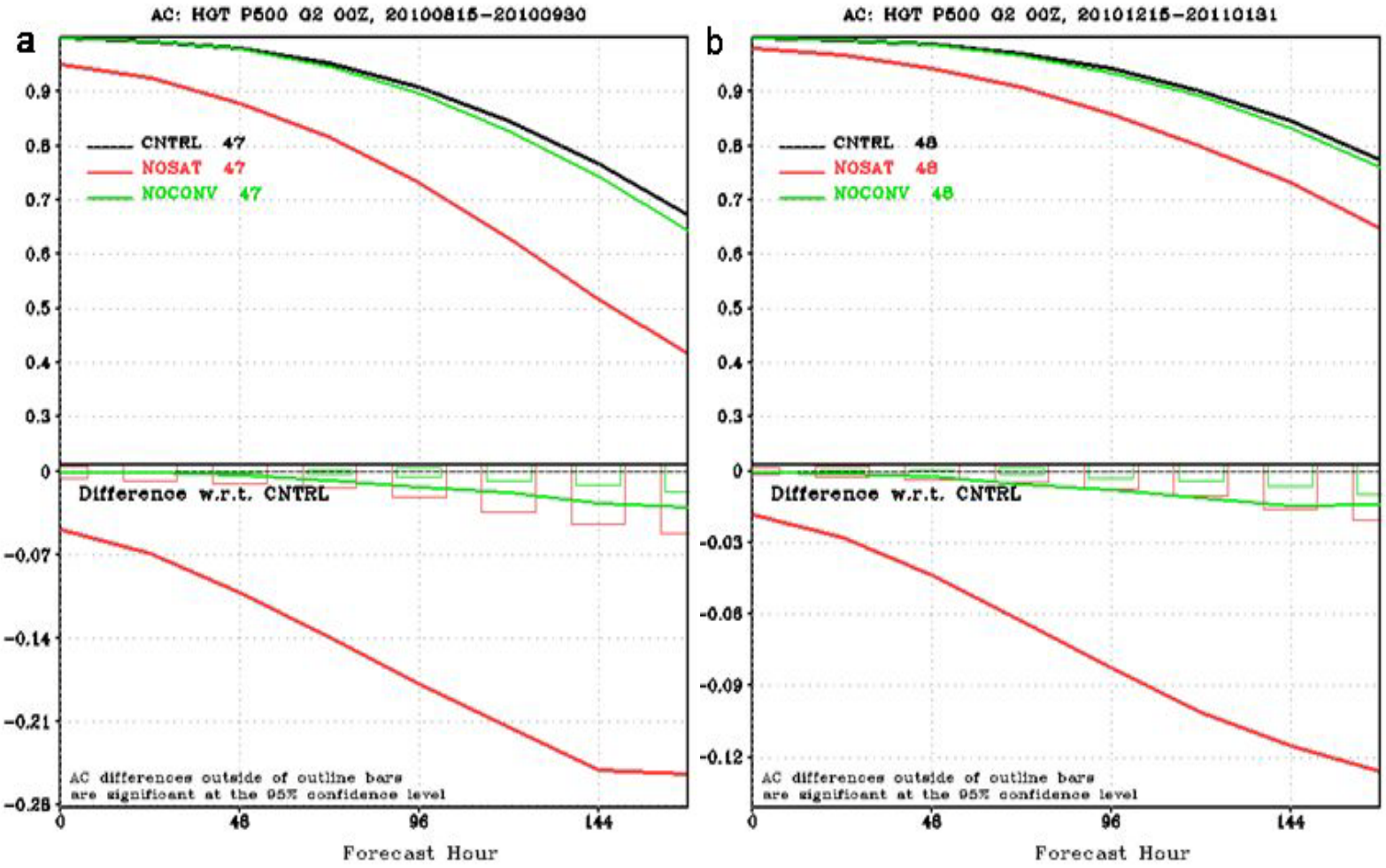


Figure 1 *Analysis through day 7 die off curves of anomaly correlations for geopotential heights during (a) August – September 2010 and (b) December 2010 – January 2011. The Control is in black, the no satellite data experiment is in red and the no conventional data experiment is in green. The lower panel curves are differences with respect to the control. Lines outside the same color box are statistically significant at the 95% level.*

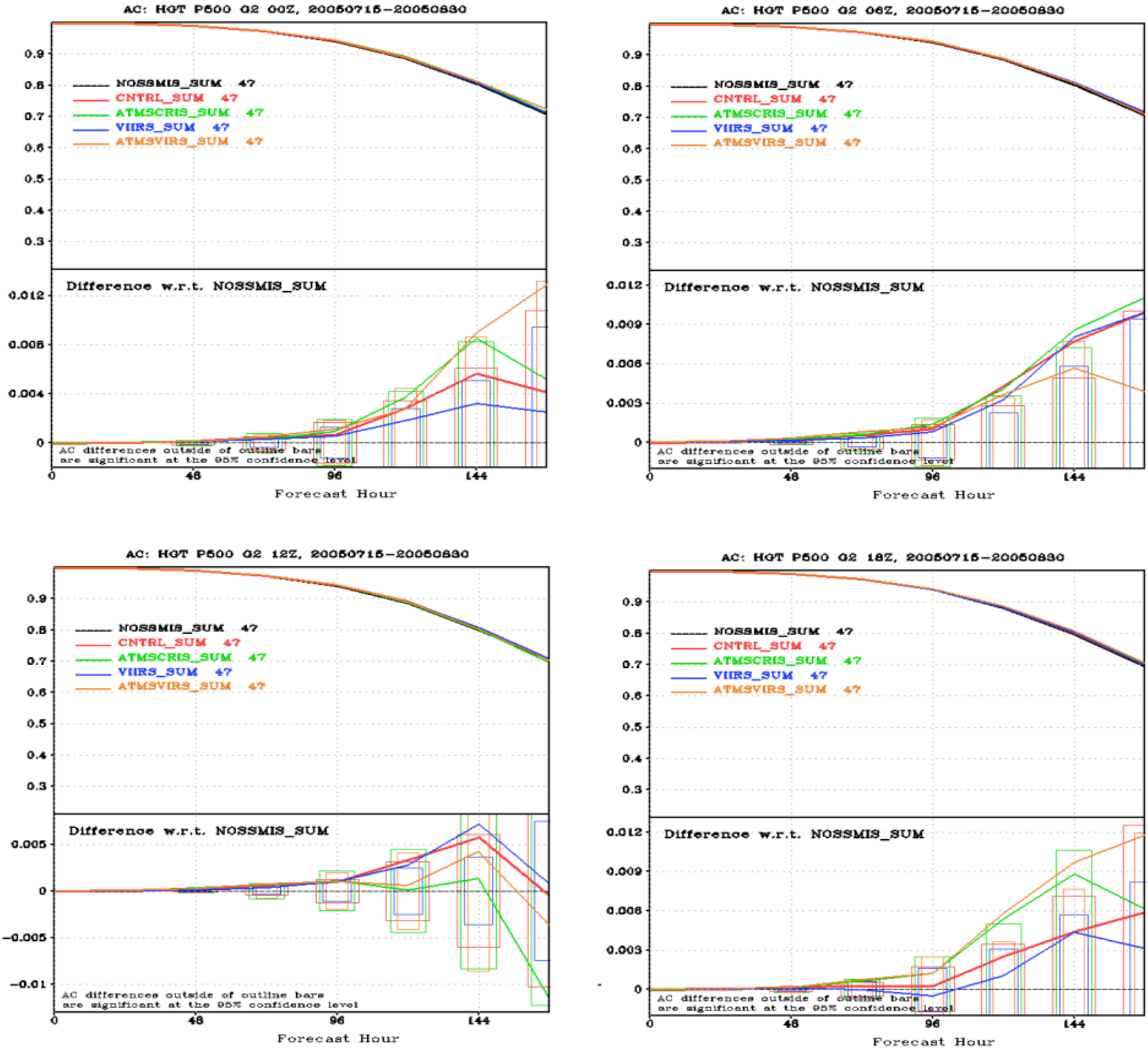
Figure 1 shows the global mid-latitude (20^o – 80^o Northern and Southern Hemisphere) average 500 hPa geopotential height anomaly correlation (AC) scores for the control (black curve) and two experiments (NOCONV-green curve and NOSAT-red curve) through forecast day 7. The summer results are in Fig. 1a, the winter results in Fig.1b. Scores lower than the control values indicate a reduction in forecast skill when the data are removed. Note the large degradation in the forecasts when the satellite data are deleted. The bottom portions of Figure 1 illustrate the application of statistical significance tests. They show the reduction in AC when conventional data are deleted (green curve) and when satellite observations are deleted (red curve). These reductions are significant at the 95% confidence level when the curves fall below their corresponding color boxes, as they do, especially for the satellite denial experiment.

The results are a dramatic demonstration of the importance of satellite data in NWP. Eliminating all conventional observations results in a decrease of 6 hours in forecast skill at day 7, but eliminating all satellite data results in an almost 3 day decrease in skill. In other words, the addition of the satellite data makes the 7 day forecast about as skillful as the 4 day forecast without satellite data.

A negative forecast impact is found in both seasons when the conventional and satellite data are removed. The negative forecast impacts from removing the conventional data are of similar magnitude during both seasons but removing the satellite data has a considerably greater negative impact on the anomaly correlations during Aug-Sep than Dec-Jan. The importance of satellite data also generally increases at longer forecast times relative to conventional data.

These results were presented at the Fifth WMO Workshop on the Impact of Various Observing Systems on NWP hosted by the Joint Center 22-25 May 2012 in Sedona, Arizona.
(Jim Jung, CIMSS/JCSDA)

2. Observing System Simulation Experiments for an Early-Morning-Orbit Meteorological Satellite



Global impacts on 500 hPa geopotential height anomaly correlation (AC), for forecasts valid at (above left) 00Z, (above right) 06Z, (below left) 12Z, and (below right) 18Z. Upper portions of each diagram represent the AC for each experimental run; lower portions are the differences in AC with respect to the NO SSM/IS (no early morning satellite) forecasts. AC differences outside of their corresponding color bars are significant at the 95% confidence level.

Following the reconfiguration of the nation's most important future meteorological satellite program into two separate programs, the Joint Polar Satellite System (JPSS; NASA/NOAA) and the Defense Weather Satellite System

(DWSS; DoD), the agencies implementing these new systems are now in the process of reassessing the expected impacts of their respective systems. In the case of polar orbiters, one of the primary applications is data assimilation and numerical weather prediction (NWP), and the impact on forecast skill of numerical models is therefore one of the most important assessment metrics.

Since 2006, the Joint Center for Satellite Data Assimilation has coordinated Joint Observing System Simulation Experiment (OSSE) activities across a number of groups within NASA and NOAA. The backbone of the collaboration is the shared use of a simulated realization of a long sequence of atmospheric states—the "Nature Run" in OSSE terminology—provided by the European Centre for Medium-Range Weather Forecasts, and coordinated validation, simulation of observations, and calibration of the OSSE systems.

The Joint Center in collaboration with the OSSE Testbed has made this Joint OSSE capability available to the DoD for assessment of the expected consequences of a variety of possible programmatic decisions regarding, e.g., an instrument payload located in the so-called "early morning orbit" (0530 Local Equatorial Crossing Time). This orbit has traditionally been covered by the Defense Meteorological Satellite Program (DMSP), and was one of the two orbits intended to be covered by the NPOESS program.

The basic question addressed through the impact experiments described here is the following: What is the expected impact on medium-range forecast skill of the Nation's primary global operational numerical weather prediction system, namely the NCEP Global Forecast System. In order to assess this, the following five baseline experiments have been performed:

1. A control run in which all relevant observations from observing systems (conventional and space-based) are assimilated (cntrl)
2. Same as 1., but without any early morning orbit coverage (nossmis)
3. Same as 2., but with CrIS and ATMS added in the early morning orbit (atmscris)
4. Same as 2., but with VIIRS polar winds in the early morning orbit (viirs)
5. Same as 2., but with VIIRS and ATMS in the early morning orbit (atmsvirs)

Summer (July 15-August 30) experiments have been completed at T382 resolution (about 38 km) using the May 2011 implementation of GDAS; winter experiments (January 15-February 28) are ongoing. The accompanying figure (above) shows global 500 hPa geopotential height anomaly correlation (AC) statistics for the experiments, comparing experiments 1 and 3-5 as defined above to experiment 2 (the no early-morning-orbit coverage case). AC is the anomaly correlation between the forecast and the nature run, which represents the verifying analysis. Rectangles in the lower portion of the figures denote the 95% confidence interval; curves above or below these rectangles are said to be statistically significant, while curves within the rectangles are considered non-significant to two standard deviations. All comparisons are with respect to the nature run.

While the "best" performing experiment changes depending on the time of forecast initialization, some general trends are noted. Overall, the addition of an early-morning-orbit satellite brings the model analyses closer to the nature run. While most differences are within the 95% confidence interval, some results are statistically significant. In particular, cases atmscris and atmsvirs show significant impacts in five- and six-day forecasts at 00, 06 and 18Z. Interestingly, case viirs shows significant impacts at 06 and 12Z as well. The cntrl case (i.e., with SSMI/S) also shows significant impact at 06Z.

Only one metric is shown here, but readers are encouraged to visit the Verification Statistics Data Base (VSDB) results page at:
http://www.jcsda.noaa.gov/vsdb/users/scasey/ossesum/
to view other statistics. In general, these OSSE experiments show that, without replacement, losing the early-morning-orbit of SSMI/S coverage would have a negative effect on operational forecasts, and that of three potential new configurations tested, either a combination of ATMS & CrIS or a combination of ATMS & VIIRS would have the greatest impacts.

(Sean P.F. Casey, Lars-Peter Riishojgaard, Michiko Masutani, Jack Woollen, Tong Zhu and Robert Atlas, Joint Center for Satellite Data Assimilation)

Other News

NASA Research Announcement for JCSDA External Investigators

A Fiscal Year 2014 Opportunity for JCSDA external investigators is now available under the NASA *Research Opportunities in Space and Earth Sciences (ROSES)* 2013 Solicitations. The NASA Research Announcement A.33 NASA Data for Operation and Assessment (Solicitation NNH13ZDA001N-NDOA**,** see http://tinyurl.com/aedfk9a), Section 2.2, calls for proposals relevant to the JCSDA. A primary measure of potential impact in the solicitation will be the acceleration of satellite data usage into NOAA and DoD global forecast systems and the improvement of forecasts from those systems. The priority areas identified in the solicitation are:

1. Developments to facilitate assimilation of cloud- and/or rain-affected radiances from CrIS; and preparatory work for assimilation of GPM observations.
2. Assimilation of soil moisture observations from

SMOS in preparation for the launch of SMAP.

3. Aerosol assimilation, particularly improvements to the accuracy and computational performance of scattering codes in the CRTM to support radiance assimilation, and global estimation of anthropogenic emissions for atmospheric composition.
4. Data impact study for new MISR winds product.
5. Assimilation of satellite data in JCSDA partner ocean data assimilation systems, particularly derived products from ocean color data from VIIRS and implementations to support direct assimilation of MW radiances for sea-ice concentration and sea-ice surface temperature.

More details are provided in the solicitation. Total funding is anticipated to be approximately $500,000 per year. Three to four projects may be awarded in the form of Cooperative Agreements or contracts of 2-year duration.

Notices of Intent (NOI) to propose were due by March 15. The 2013 NASA Guidebook for Proposers (available from http://www.hq.nasa.gov/office/procurement/nraguidebook/) states: "A late NOI that contains (i) the name and identifier for the NRA of interest, (ii) the name and address of the applicant, and (iii) the key information listed [above] for an NOI may be submitted by email directly to the program officer identified in the NRA." Full proposals are due by May 15, 2013. Proposers should follow submission directions spelled out in the NRA and the Guidebook.

(POC: Tsengdar Lee, NASA/HQ, tsengdar.j.lee@nasa.gov)

Heads Up: Gridpoint Statistical Interpolation (GSI) Tutorial and Workshop, Aug 5-8, 2013

The JCSDA would like to bring your attention to the upcoming data assimilation events: the 2013 Joint DTC-EMC-JCSDA Gridpoint Statistical Interpolation (GSI) Tutorial and GSI Workshop, scheduled for the week of Aug 5-8, 2013 at the National Oceanic and Atmospheric Administration (NOAA) Center for Weather and Climate Prediction (NCWCP), College Park, Maryland.

This marks the third annual GSI Tutorial and the second GSI Workshop since the GSI became a community model in 2009. It will be the first time the JCSDA is co-hosting these two events with the Developmental Testbed Center (DTC) and the National Centers for Environmental Prediction (NCEP) Environmental Modeling Center (EMC) on-site at NOAA, where the primary GSI developers are located.

GSI is the operational data assimilation (DA) system being used by various national operational and research centers, including NOAA and the National Aeronautics and Space Administration (NASA). It is a three-dimensional variational DA system and has been extended run with advanced features, including the hybrid ensemble-variational data assimilation technique and the four dimensional DA framework.

The GSI Tutorial will be a three-day event scheduled for August 5-7, 2013. This tutorial features basic and advanced topics introducing state-of-art DA techniques to the attendees, such as introduction of DA, background error estimation, radiance/cloudy radiance DA, and hybrid DA. These topics should be of great interest and relevance to both new and advanced GSI and other DA system users. The invited speakers are from the primary GSI development teams, including the DA experts working at and with NOAA, JCSDA, NASA, the National Center for Atmospheric Research (NCAR), and the DTC. The GSI will also features hands-on sessions, which will teach essential skills to run the GSI system.

The GSI Workshop will be a one-day event scheduled for Aug 8, 2013. Speakers will be invited to talk about the GSI and other related data assimilation techniques, system development, and research.

More information about the tutorial and workshop, including the agenda, speakers and registration will be available at the GSI tutorial/workshop website at: http://www.dtcenter.org/com-GSI/users/tutorials/2013.php

For more information regarding the GSI system, please visit: http://www.dtcenter.org/com-GSI/users/index.php

(Hui Shao, JCSDA/DTC)

People

Joint Center Colloquium Student Receives Best Paper Award

Aishwarya Raman

In a recent issue of the Quarterly Newsletter, I wrote enthusiastically about the students who participated in the 2012 JCSDA Summer Colloquium, having been impressed by their talent and enthusiasm and the topically varied but consistently high-quality research that they are engaged in. It was encouraging to encounter a number of them again at the 93rd Annual American Meteorological Society (AMS) Meeting

in Austin, TX in early January, and to see many of them making presentations and posters. It comes as no surprise but is nonetheless a singular pleasure to receive word that one of these students, Ms. Aishwarya Raman of the University of Arizona, and her co-author, Ave Arellano, have been recognized by the AMS with a Best Paper Award for their oral presentation, "Modeling and Data Analysis of 2011 Phoenix Dust Storm."

Using aerosol optical properties and mass concentrations derived from satellite observations (MODIS and CALIPSO) as well as from in situ data for verification, they demonstrated the capability of the Weather Research and Forecasting model with chemistry (WRF-CHEM) to simulate the spatio-temporal evolution of a massive summer dust storm (Haboob) event (see photo below) in Arizona in 2011. Results from WRF-Chem looked promising in terms of meteorology and the patterns of air quality parameters associated with the Haboob. But the magnitudes of dust concentrations were underestimated by the model. Their future goal is to extend operational weather forecasts in

Massive summer dust storm (Haboob) in Arizona in 2011 (Photo credit: Mike Olbinski)

Arizona to include size-resolved dust and other aerosols, noting that satellite data offering better spatial and temporal coverage (compared to the polar platform observations used in their study) for such extreme events are needed.

Aishwarya's award was presented to her as part of 15th Conference on Atmospheric Chemistry Student Awards program. Papers for these awards must primarily focus on research completed while the presenter was a student. Her paper received a third place award, which, in addition to a formal award certificate, included a $50 travel expense grant. The paper is available at:
https://ams.confex.com/ams/93Annual/webprogram/Paper214743.html
both as a recorded presentation and in poster .pdf format.

Aishwarya anticipates completing her Masters degree in May 2013. Her future plans and ambitions include working towards her Ph.D. in Atmospheric Science and contributing more to the field of modeling of atmospheric chemistry and air quality. We congratulate her on her accomplishment and look forward to hearing more of her future work!

(Jim Yoe, Chief Administrative Officer, JCSDA)

Fuzhong Weng Appointed Associate Editor of Journal of Geophysical Research

The Director of Publications of the American Geophysical Union, Brooks Hanson, has appointed Dr. Fuzhong Weng, JCSDA Senior Scientist, to the position of Associate Editor of JGR-Atmospheres for the period March 2013 to December 2016. Fuzhong will be responsible for papers on satellite cal/val, radiative transfer, data assimilation, and remote sensing. The AGU's highest priority is to maintain and enhance the quality of its journals. Attracting the best papers and assuring that they receive prompt and thoughtful reviews are critical to achieving these goals, and as Associate Editor, Fuzhong will focus on these objectives. As his first initiative, he is planning a Special Issue of JGR-Atmospheres on the Suomi NPP satellite.

Lidia Cucurull Joins NOAA's Oceanic and Atmospheric Research Office (OAR)

For the most of the last 11 years, Lidia Cucurull has led the development of GPS-RO assimilation systems for the Joint Center, working as a UCAR researcher under NCEP management. She recently accepted a position with NOAA/OAR, where she will work directly under Scott Hausman, Acting Director of OAR's Global Systems Division. In this position, Lidia will continue her work with GPS RO assimilation, but also plans to extend it to OSSEs, and assimilation of ground-based GPS. She also plans to continue developing algorithms to improve the assimilation of GPS RO data within the Gridpoint Statistical Interpolation assimilation system. For much of her eleven year association with the Joint Center, she wrote the Cosmic Corner column for the Quarterly Newsletter – not missing a single issue. In 2011, Lidia won NOAA's David Johnson Award, which recognizes achievements of young professionals who have show outstanding innovation in the use of satellite data for operational environmental applications. Lidia was chosen for her "Innovative contributions to weather prediction through developing and implementing a methodology to assimilate satellite-based Global Positioning System-Radio Occultation observations

into the National Weather Service's operational global weather prediction model and demonstrating how these data improve the skill and extend the range of weather forecasts."

Congratulations, Lidia, and all the best in your new position.

A Note from the Director

The mixture of good news and bad news continues for the Joint Center and for our partners in the Federal Government. As you can imagine, the sequestration has added a good deal of financial strain to our partners as well as some uncertainly in the planning and execution of many of our projects. On the positive side, the US Congress recently passed the Hurricane Sandy Relief Bill, and while we still do not have the details on how those funds will be spent, it is likely that at least some of them will be directed at improving the use of satellite data in the initialization of the numerical models used for predicting these dangerous storms. It is therefore likely that the Joint Center will have a role to play in this activity.

I am pleased to be able to report that the Special Symposium on the Joint Center for Satellite Data Assimilation held during the 2013 AMS Annual Meeting in Austin was a resounding success. We kicked off with a Panel Session Tuesday morning during which agency executives (or their representatives) gave their thoughts on the Joint Center and its role for their own agency, and the rest of the day was devoted to contributed presentations highlighting various aspects of satellite data assimilation both inside and outside JCSDA. Given the remote location of our cavernous ballroom with respect to the bulk of the other meeting rooms, the scientific presentations were well attended, and a sizeable crowd showed up to take advantage of a sponsored luncheon and Dr. David Titley's presentation about the challenges of managing acquisition programs in times of tight budgets. Thanks again to everybody involved, panelists, keynote speaker, contributors and sponsors!

Unfortunately building on this success in preparing for next year's AMS Annual Meeting in Atlanta is proving to be more difficult than expected. This is not due to a lack of willingness on either side, AMS or the Joint Center, but rather caused by unfortunate circumstances regarding the venue for the 2014 Meeting in Atlanta. There simply are not enough rooms available to accommodate even the already existing AMS Sessions and Symposia, so at this point it appears likely that the JCSDA presence will have to be scaled back significantly with respect to what we had in 2013. We are still working with AMS to find a solution, and in any case we will plan to have a full-scale Symposium for the 2015 Meeting.

A new initiative for this year is our collaboration with the Developmental Testbed Center on the Annual GSI Colloquium. This training event has become instrumental in broadening the community use of the Gridpoint Statistical Interpolation (GSI) analysis algorithm. JCSDA is both a user of and a contributor to the GSI and we are therefore extremely pleased with collaborating with the DTC on this event. Additional details are included in an announcement in the "Other News" section of this Newsletter.

Finally, let me congratulate Dr. Louis Uccellini on his recent appointment as Director of the National Weather Service. In fact I think it would be appropriate to also congratulate the National Weather Service for this. Of course everyone in our community knows that Louis was the Director of NCEP for the last 15 years or so. What perhaps not as many of you know is that during that time he was a key driving force behind the formation and development of the Joint Center. Upon the retirement of Franco Einaudi from NASA a few years ago, Louis became the longest-tenured member of the JCSDA Management Oversight Board, and with his exit the last member of the original "Gang of Four" has now left the MOB (the gang members were the authors of the White Paper that led to the creation of the Joint Center, Franco Einaudi, Louis Uccellini, Jim Purdom and Sandy MacDonald). While we will miss Louis here in the building and on the JCSDA MOB, it is certainly good to know that we have old friends in high places. Good luck with your new gig, Louis!

Lars Peter Riishojgaard, Director, JCSDA

Upcoming Seminars

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.

Upcoming seminars are listed below. Check: http://www.jcsda.noaa.gov/JCSDASeminars.php for updates.

Upcoming Seminars

Date	Speaker	Affiliation	Title
April 19, 2013	Lars Isaksen	ECMWF	Data Assimilation Progress and Plans at ECMWF
May 22, 2013	Shobha Kondragunta	NOAA/STAR	Using Satellite Data to Improve Operational Air Quality Forecasting Capabilities
July 17, 2013,	Clara Draper	NASA Goddard Space Flight Center, GMAO/GESTAR	Assimilation of Land Surface Skin Temperature Observations into the GEOS-5 Atmospheric Modeling and Assimilation System
Sept 18, 2013	Min-Jeong Kim	NOAA/NCEP	Cloud and Precipitation Assimilation Activities at the JCSDA.

Editor's Note: Unsolicited articles for the JCSDA Quarterly Newsletter are encouraged as are suggestions for seminar speakers or topics. Please send them to George.Ohring@noaa.gov.