JOINT CENTER FOR SATELLITE DATA ASSIMILATION

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JCSDA Quarterly

NOAA | NASA | US NAVY | US AIR FORCE

NEWS IN THIS QUARTER

SCIENCE UPDATE

A Near Real-Time Regional Satellite Data Assimilation System for High Impact Weather Research and Forecasts

Under the NOAA JPSS, GOES-R and JCSDA support, scientists from the Cooperative Institute of Meteorological Satellite Studies (CIMSS) at the University of Wisconsin-Madison have recently developed a near real-time (NRT) regional Satellite Data Assimilation system for Tropical storm forecasts (SDAT). The purpose of SDAT is primarily to demonstrate the use of JPSS and GOES-R observations toward forecast improvement of these high impact weather events.

The core of the SDAT system is the community Gridpoint Statistical Interpolation (GSI) assimilation system and the advanced Weather Research and Forecast (WRF) model. Figure 1 shows the system flowchart. The SDAT system mainly consists of both data preparation and assimilation/forecast functions. Real-time Global Forecast System (GFS) outputs from the NOAA National Centers for Environmental Prediction (NCEP) are used as the SDAT background fields and initial/boundary conditions. The system runs a 6-hour cycling assimilation followed by a 72-hour forecast. In addition to assimilating conventional and satellite radiances obtained from NCEP BUFR files which contain GOES, AMSUA/AMSUB, HIRS, MHS, ATMS, AIRS and IASI radiances, the system is also able to assimilate satellite-derived

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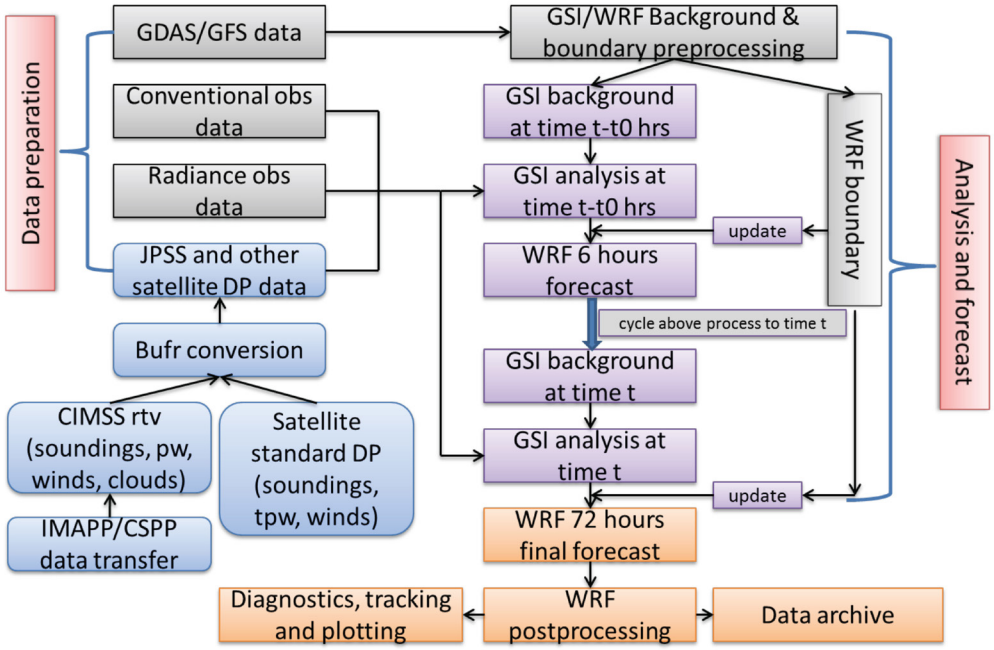

Figure 1. *SDAT system flowchart.*

products such as hyperspectral IR retrieved temperature and moisture profiles, and total precipitable water (TPW). Current developments in progress focus on adding GOES Sounder layer precipitable water (LPW) and GOES Imager atmospheric motion vector (AMV) products, leading to future capability to assimilate both satellite observed and derived data (radiance/retrieval).

Using SDAT as a research testbed, studies have been conducted on improving the use of satellite data in NPW models. One study in particular demonstrates how to perform better cloud detection for hyperspectral IR sounder radiance assimilation. Improved cloud detection could reduce the incorrect detection of clear fields-of-view (FOVs) and hence improve the assimilation of IR radiances. In hyperspectral IR radiance assimilation, currently most operational numerical weather prediction (NWP) centers are using IR sounder data alone for clear pixel detection or clear channel detection (e.g., by comparing observations and forward calculations from the background), which could result in treating some cloudy footprints as clear in the assimilation and therefore cause residual bias in the analysis. We have studied the synergistic use of high spatial resolution imager (e.g., MODIS) and high spectral resolution sounder (e.g., AIRS) data for improving the assimilation of sounder radiance in NWP models. Based on the spatially and temporally collocated high spatial resolution (1 km) MODIS cloud mask, the AIRS clear FOVs can be accurately derived (Li et al. 2004). There are four possible categories for one MODIS pixel: confidently clear, probably clear, uncertain, and cloudy. Only the AIRS sub-pixels filled with the MODIS confidently clear mask are considered clear footprints. After the sub-pixel cloud detection collocated with the 1 km MODIS cloud mask product, the AIRS clear radiances are assimilated in the GSI system. By comparing with AIRS stand-alone cloud detection, forecast experiments for Hurricane Sandy in

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2012 indicated that both hurricane track and intensity are substantially improved when the collocated high spatial resolution MODIS cloud mask is used for AIRS sub-pixel cloud detection for assimilating AIRS radiances. This is mainly due to the stand-alone cloud detection method failing to reject some cloudy pixels and instead assimilating them as clear sky radiances. As a result, these cloud-contaminated radiances cause a cold bias in the temperature field and a wet bias in the moisture field, and further affect hurricane track and intensity forecasts. The major results have recently been published in Geophysical Research Letter (Wang et al., 2014).

A second experiment has compared results between radiance assimilation and the assimilation of retrieved products. Due to the development of variational data assimilation techniques, operational NWP centers like NCEP and the European Centre for Medium-range Weather Forecasts (ECMWF) have been successfully assimilating radiance directly. However, it is still difficult to utilize full spectral information from advanced sounders due to the complexity and nonlinearity of radiance assimilation. A theoretical study suggests that there is equivalence between the radiance and retrieval assimilation (Migliorini, 2012), and the assimilation of transformed retrievals may be particularly advantageous for hyperspectral IR sounders which have a high number of channels. Our preliminary study confirmed the equivalence to some extent. A pair of experiments was designed: one assimilated AIRS radiances, while the other assimilated the single field of view AIRS retrieved temperature and moisture profiles from CIMSS (Li et al., 2007). In addition, the conventional data and AMSU radiances from four satellites (NOAA 15, NOAA 18, Aqua and MetOp-A) were also included. Using Hurricane Sandy in 2012 as a case study, data were assimilated every 6 hours beginning 06 UTC 25 to 00 UTC 27 October 2012 and then 72-hour forecasts were followed after each assimilation step. The Hurricane Sandy track and maximum wind speed forecast RMSE show that AIRS radiance and retrieval assimilation has a similar impact on intensity forecasts, while retrieval assimilation provides better track forecasts than radiance assimilation. This might be due to the fact that more AIRS channels are used in sounding retrievals than in radiance assimilation.

Since August 2013, the SDAT system has been running in NRT over a domain spanning the CONUS and North Atlantic Ocean. Supercomputing is conducted on the NOAA/NESDIS-funded Supercomputer for Satellite Simulations and Data Assimilation Studies (S4) physically located at UW-Madison's Space Science Engineering Center (SSEC). Due to the dependence on GFS data, the SDAT system generally starts no earlier than 4 hours after analysis time. We are working on improving the latency in order to produce SDAT forecast and disseminate no later than 6 hours after analysis time. The standard GFDL vortex tracker program has also been installed onto the system. During the hurricane season the hurricane track and intensity will be automatically calculated in the same manner as is done at the NOAA National Hurricane Center. A dedicated website (http://cimss.ssec.wisc.edu/sdat) has been designed for users to access the forecast results. In 2013, there were few hurricanes the Atlantic basin. Figure 2 shows the life-cycle track forecasts for Hurricane Humberto from SDAT

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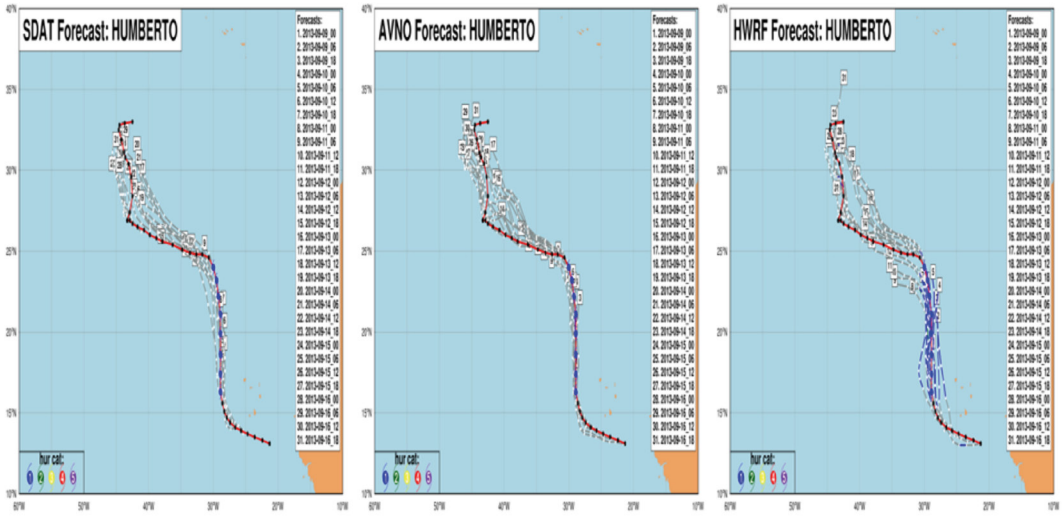

Figure 2. *The life-cycle track forecasts for Hurricane Humberto from 00 UTC 09 September 2013 to 18 UTC 16 September 2013: SDAT (left), GFS (middle) and HWRF (right).*

(left pane), GFS (middle) and HWRF (right). It indicates that SDAT has similar track forecast capability to GFS, and better intensity forecasts than GFS. HWRF has the best intensity forecasts but the track forecasts are not as good as GFS and SDAT in this case. The SDAT forecasts for other tropical cyclones, such as Gabrielle and Karen, are also very promising. For example, Hurricane Karen was the only hurricane to make landfall on the CONUS in 2013. It is found that SDAT forecasts are closer to the observations than other dynamical models, and are very close to the official guidance (see Figure 3).

CIMSS scientists will continue to explore new applications in satellite data assimilation. The experience and strategy learned

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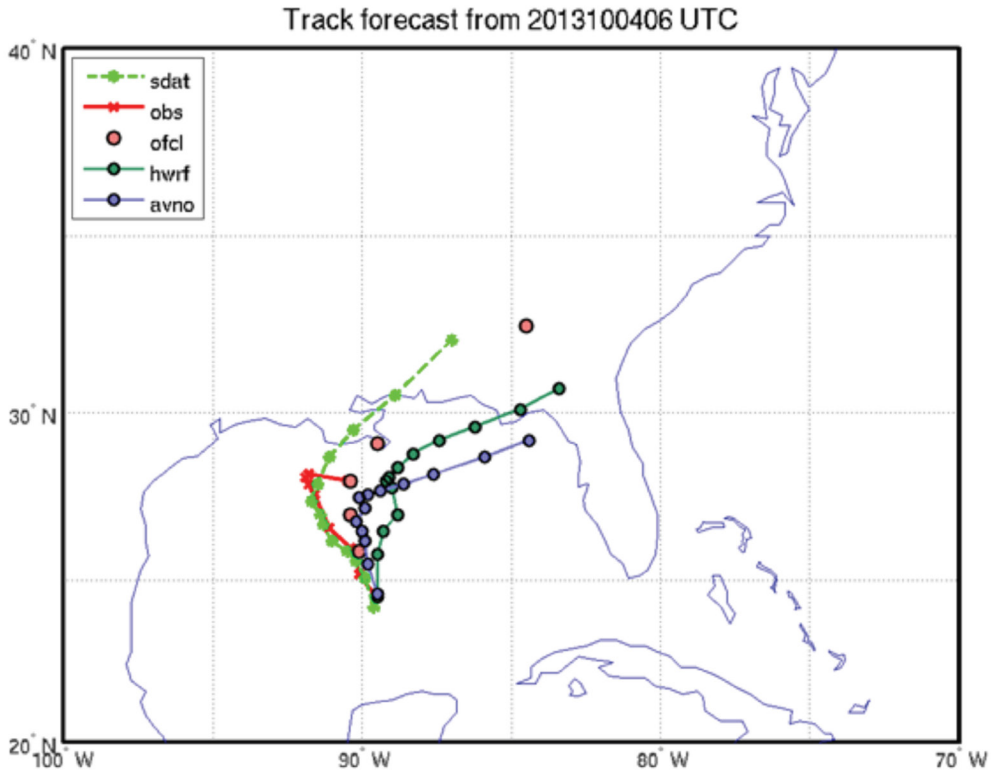

Figure 3. *The track forecasts of Hurricane Karen are from SDAT (light green), NHC official guidance (pink), HWRF (dark green) and GFS (purple) along with the best track data (red). The forecasts started at 06 UTC 04 October and are valid until 06 UTC 07 October 2013. The observations (best track) are only available until 06 UTC 06 October 2013.*

from the studies presented here will ultimately help us to make better use of satellite sounder data in data assimilation systems and improve the forecasts of high impact weather events.

(Jinlong Li, Jun Li, and Pei Wang, CIMSS/ University of Wisconsin-Madison)

References:

Li, J., W. P. Menzel, F. Sun, T. J. Schmit, and J. Gurka, 2004, AIRS subpixel cloud characterization using MODIS cloud products. *J. Appl. Meteorol.*, 43, 1083–1094.

Li, J., J. Li, E. Weisz, and D. K., Zhou, 2007, Physical retrieval of surface emissivity spectrum from hyperspectral infrared radiances. *Geophys. Res. Lett.*, 34, L16812.

Migliorini, S., 2012, On the equivalence between radiance and retrieval assimilation. *Mon. Weather Rev.*, 140, 258-265.

Wang, P., J. Li, J. Li, Z. Li, T. J. Schmit and W. Bai, 2014, Advanced infrared sounder sub-pixel cloud detection with imagers and its impact on radiance assimilation in NWP. *Geophys. Res. Lett.*, 41, 1773-1780.

Unsolicited articles for the JCSDA Quarterly Newsletter are encouraged, as are suggestions for seminar speakers or topics. Please send them to Kevin.Garrett@noaa.gov.

OTHER NEWS

Summary of Awarded Projects through NASA ROSES for FY14

The FY14 NASA Research Opportunities in Space and Earth Sciences (ROSES) call for proposals focused on more widespread use of NASA satellite observations with a strong focus on application to operational weather forecasting and Earth system modeling. Five key areas for soliciting proposals in support of JCSDA efforts were highlighted in the call: 1) Developments to facilitate assimilation of cloudy and/or precipitating radiances from CrIS and preparatory work for the assimilation of GPM observations; 2) Assimilation of soil moisture observations from SMOS in preparation for the launch of SMAP; 3) Aerosol assimilation; 4) Data impact studies using new MISR winds product; and 5) Assimilation of satellite data in JCSDA partner ocean data assimilation systems. Three projects received two-year awards. The Principal Investigators (PIs) of each project have submitted a brief summary for the Quarterly. A list of all ROSES awards in support of JCSDA may be viewed on the JCDSA website at http://www.jcsda.noaa.gov/externalResearch.php.

Assimilation of All-sky Satellite Radiances from CrIS and GPM: from Research to Operations

PI: Thomas Auligne (NCAR)

The proposed work will address the challenges related to the assimilation of satellite observations in all-sky conditions including clear, cloud, and rain-affected radiances. In Year 1, we will perform a detailed evaluation of the accuracy of the Community Radiative Transfer Model (CRTM) in clear and

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cloudy areas using CrIS and proxy GPM-GMI observations. This analysis for all-sky conditions will provide a solid basis for future improvements in cloudy radiative transfer modeling by quantifying errors and uncertainties for cloud-affected radiances. Primarily in Year 2, we will develop new procedures to assimilate CrIS and GPM-like observations, including improved quality control methods, a new cloud detection scheme for the Infrared (IR) sensors both day and night, and improved bias correction for all-sky observations. These developments will be implemented within the Gridpoint Statistical Interpolation (GSI) data assimilation system to initialize global Numerical Weather Prediction (NWP) models such as the Global Forecasting System (GFS), the Goddard Earth Observing System Model version 5 (GEOS-5), and the Model Prediction Across Scales (MPAS).

The proposed approach focuses on updating the model microphysical species (e.g. cloud liquid water, ice, rain, snow). These are three-dimensional model fields, and we propose to include them in the analysis control variable through a state augmentation technique, which expands the analysis variable to allow for a joint and multivariate update of clouds together with other meteorological variables such as temperature, moisture, pressure, and winds. The recently developed modular architecture of the GSI analysis variable (i.e. the "bundle" control variable introduced by NASA/GMAO in the GSI trunk code) is particularly suited for this approach, which differs from the one employed at the European Centre for Medium-range Weather Forecast (ECMWF), where a partitioning scheme involving linearized physics is required to retrieve individual hydrometeor variables. We will transition the most promising developments regarding the assimilation of cloud- and precipitation-affected radiances from current cloud analysis prototypes at NCAR to the GSI system with a clear path for quick implementation into operations at NOAA/NCEP, NOAA/ESRL, NASA/GMAO, and the Air Force Weather Agency (AFWA).

Preparatory Work for Assimilation of Precipitation-affected GPM Observations into Numerical Weather Prediction Model

PI: Jean-Luc Moncet (AER, Inc.)
Co-Is: Alan Lipton (AER, Inc.), Thomas Nehrkorn (AER, Inc.)

The Global Precipitation Measurement (GPM) mission will rely on a constellation of cooperative research and operational satellites on multiple low-altitude Earth orbits (both polar and low inclination orbits) to offer frequent temporal sampling for global precipitation estimates. The member agencies of the JCSDA are preparing to assimilate cloud/precipitation-affected measurements from GPM instruments, including those of the GPM "core observatory," which carries an advanced radiometer/radar system that is essential for the unification of the suite of microwave sensors aboard the GPM constellation, into Numerical Weather Prediction (NWP) models in order to improve cloud/precipitation forecasting capabilities.

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As part of this effort, AER is tasked to prepare an observation operator based on the JCSDA Community Radiative Transfer Model (CRTM) for the advancement of the assimilation of cloud/precipitation-affected radiances from the GPM sensors into the Naval Research Lab (NRL) NAVY Global Environmental Model (NAVGEM). Before implementing the CRTM within the NRL Atmospheric Variational Data Assimilation System – Accelerated Representer (NAVDAS –AR) 4DVAR assimilation system, the observation operator will be evaluated in a 1DVAR framework by testing our ability to simultaneously fit radar/radiometer observations by first using constraints derived from climatology and local ensemble runs from regional models. In particular, we will assess the impact of assumptions relative to cloud microphysical and scattering properties on the skills of the forward operator.

For future operations, it is also critical to ensure that the various sensors in the constellation provide consistent information. Bias correction schemes employed in assimilation are designed to effectively "calibrate" the sensors using a common reference (i.e., the forecast model fields). In the clear-sky, we traditionally operate under the assumption of horizontal homogeneity (the plane parallel assumption) and it is assumed that dependence of radiances on viewing angle is entirely explained by variations in atmospheric path. The availability of coincident information from sensors on different orbits will allow us to assess how fine scales in the cloud structure impact measurements made under different viewing conditions.

Strategies for dealing with dynamic land surface conditions due to the impact of precipitation on surface emissivity will also be investigated. A preliminary assessment of the quality of the NWP forecast fields used as background in the assimilation process will be made. The results of this work are important in particular for the quality control of the incoming observations, and for assessing background and forward model error statistics. Although this effort focuses on the NAVGEM, results of this study will apply to other NWP models as well. The findings related to the modeling of cloud properties will be reflected in future versions of the CRTM, and thus will benefit the broader user community.

Assimilation and Evaluation of Multi-Angle Imaging Spectrometer (MISR) Cloud Tracked Winds with GEOS-5 Operational Data Assimilation System

PI: Junjie Liu
(Jet Propulsion Laboratory, NASA)
Co-I: Kevin Mueller
(Jet Propulsion Laboratory, NASA)

The MISR instrument aboard EOS-Terra has observed cloud-tracked winds (CTW) since early 2000, and observations are expected to continue until at least 2020. MISR CTW are provided with, at most, a 3-hour observational latency, making it feasible to assimilate them in near real-time. Amongst the strengths of MISR winds are their 17.6 km resolution, their wind heights at 330 m precision, and their global pole-to-pole coverage that includes the 50°-70° N/S latitude gap present between the traditionally assimilat-

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ed data from geostationary and polar-orbiting satellites (Horvath, 2013). Recently, the Naval Research Laboratory (NRL) has assimilated MISR winds into the NAVy Global Environmental Model (NAVGEM) and obtained positive impacts on the forecast from the assimilation of these data (Baker et al., 2014). This study will further develop an optimal way to assimilate MISR CTW, and will explore methods to accelerate the assimilation of MISR winds in operational numerical weather forecasting by addressing the following questions:

- What are the impacts of MISR CTW on short-range weather forecasts in the GEOS-5 data assimilation system (DAS)?
- How can MISR CTW be most effectively assimilated, given their unique spatiotemporal characteristics and error statistics?
- What are the differences in forecast impacts when MISR CTW are assimilated, relative to different baseline observation networks, especially the wind observation networks?
- What are the impacts of MISR CTW on tropical cyclone track and intensity forecasts, and on simulations of tracer distributions?

At the end of this study, we will deliver an optimal MISR CTW assimilation strategy, and inform the JCSDA about the impacts of MISR CTW in the GEOS-5 operational DAS, and about the dependency of these impacts on the assimilation approach.

References

Baker, N. L., P. M. Pauley, R. H. Langland, K. Mueller, and D. Wu, 2014, An assessment of the impact of the assimilation of NASA TERRA MISR atmospheric motion vectors on the NRL global atmospheric prediction system. *Second Symposium on the Joint Center for Satellite Data Assimilation, 94th American Meteorological Society Annual Meeting*. Atlanta, Georgia, Georgia World Congress Center.

Horváth, Á., 2014, Improvements to MISR stereo motion vectors. *J. Geophys. Res-Atmos.*, 118, 5600–5620.

MEETING REPORTS

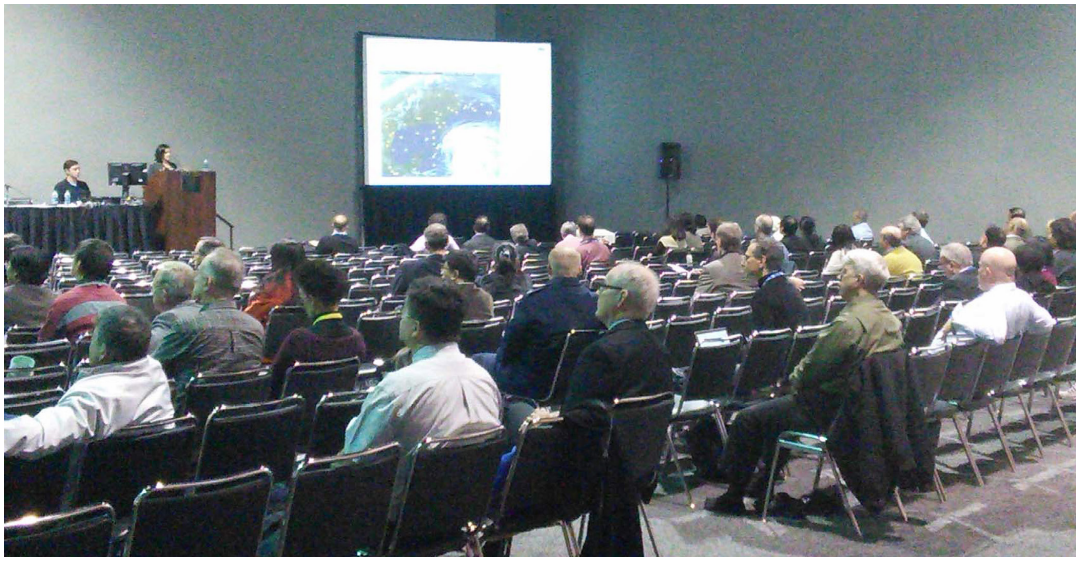
Summary of the Second Symposium on the Joint Center for Satellite Data Assimilation

The Second Symposium on the Joint Center for Satellite Data Assimilation was held during the 94th Annual Meeting of the American Meteorological Society (AMS) in Atlanta, Georgia in early February. The JCSDA session was conducted jointly with the 10th Annual Symposium on New Generation Operational Environmental Satellite Systems, facilitating exchanges between the communities preparing to launch new satellites such as the initial JPSS and GOES-R series, and those who are preparing to exploit the new observational capabilities carried by those spacecraft through effective assimilation in operational environmental analyses and models.

The JCDSA Symposium consisted of both a poster session on Wednesday and Thursday, and four oral presentation sessions on Thursday. Presentations and posters addressed topics spanning the JCSDA science priorities, and contributors represented the JCSDSA partner agencies, external investigators supported via opportunities sponsored by one or another of the JCSDA partners, and the broader satellite data assimilation community. We were fortunate that travel restrictions for U. S. Federal government employees were relaxed in time for representatives of the partners to participate and interact with current and potential collaborators. Despite being held on the final day of the AMS meeting, and running in parallel to other satellite data, environmental modeling, and data assimilation sessions, the JCSDA sessions were well-attended.

Preparations are already underway to host the Third Symposium on the JCSDA at the 95th AMS Annual Meeting in Phoenix, AZ in January 2015. Reminders and links to information for contributors will be provided in subsequent editions of the JCSDA Quarterly Newsletter.

(Jim Yoe, NCEP, JCSDA Chief Administrative Officer)



Dr. Lidia Cucurull of NOAA/OAR/ESRL addresses the JCSDA Symposium on advances in assimilating GPSRO observations to improve NWP.

PEOPLE

Dr. Nancy L. Baker Named Associate Director for Navy for the JCSDA

Nancy joined the Naval Research Laboratory (NRL) Marine Meteorology Division (MMD) in Monterey, CA in 1985 and has been Data Assimilation Section Head since 2004. Nancy received her B.S. in Atmospheric Sciences from Oregon State University in 1981, her M.S. in Atmospheric Sciences from the University of Washington in 1985, and her Ph.D. in Meteorology from the Naval Postgraduate School in 2000. Nancy is an internationally recognized expert in the assimilation of atmospheric data into Numerical Weather Prediction (NWP) models. Her specialties are very broad, and encompass many aspects of data assimilation, including 3D and 4DVar, and hybrid ensemble-variational assimilation. As Head of the Data Assimilation Section, she led the NRL's program to develop, implement, and refine the Navy's operational data assimilation systems, NAVDAS, NAVDAS-AR, and COAMPS-AR. The adjoint-based observational impact technique she co-developed has been adopted by several NWP centers. She led the Division's efforts to assimilate various satellite sensor observations, such as AMSU-A, SSMIS, MHS, IASI, AIRS, GNSS, MODIS AOD, and WindSat, into Navy operational DA systems. Recently, her group successfully developed the capability for the Navy to assimilate Suomi-NPP data.

Nancy has served as a member of the American Meteorological Society Committee on "Satellite Meteorology and Oceanography," and as a committee member for the National Academy Panel on "NOAA's Role in Space-Based Global Precipitation Estimation and Application." She has served as a research advisor for both the National Research Council and the American Society for Engineering Education (ASEE). She has been a technical liaison for the Navy to the JCSDA since 2002.

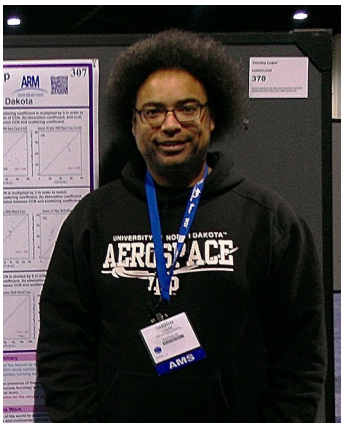
Welcome, Deyong Xu

Deyong Xu joined NOAA/NESDIS/STAR in support of JCSDA in February 2014 as a Support Scientist. His key responsibility is to work on the improvement of satellite data assimilation systems. Within the research-to-operations (R2O) environment, he will help to optimize the assimilation of DMSP SSMIS data including imaging channels.

Before joining STAR, Deyong was a Senior Software Engineer at SMRC Inc., developing a Level-2 processing Shortwave Radiation Budget (SRB) algorithm, a Sounding Legacy Atmospheric Profiles (LAP) algorithm, and an ABI Cloud and Moisture Imagery (CMIP) algorithm for GOES-R. Deyong comes back to NOAA/NESDIS with significant operational experience spanning eight years at the Office of Satellite Products and Operations (OSPO). At OSPO, he maintained the GOES Ingest NOAAPORT Interface (GINI) system to ingest GOES image data, and he implemented many applications into operations. *(continued on page 11)*

He also worked on numerical model forecast systems when he started his career at the National Meteorological Center, Beijing, China in 1995. There he worked on improvements to the existing Typhoon Weather Forecast System (TWFS) by adding a bogus vortex into the typhoon center field in order to build a stronger typhoon structure, and by simulating the typhoon's asymmetric structure by adding the pre-leading flow of the typhoon into the typhoon structure.

Deyong holds a B.S. in Meteorology from Peking University, Beijing, China, and an M.S. in Computer Science from Southeastern University, Washington, DC.



Tim Logan Wins Best Student Poster Award at AMS Annual Meeting

For the second year in a row, an alumnus of the 2012 JCSDA Summer Colloquium in Santa Fe, NM has garnered AMS Annual Meeting honors for his work. Tim Logan, a graduate student at the University of North Dakota, presented a poster entitled "Aerosol Physical and Chemical Properties and Their Relationship with CCN at the AMF Azores Site," along with co-authors Baike Xi and Xiquan Dong. This work was named Best Student Poster Presentation - 6th Symposium on Aerosol-Cloud-Climate Interactions. Tim is pictured here with the poster; a handout version is available from the AMS website: https://ams.confex.com/ams/94Annual/webprogram/Paper238512.html

A journal article based on the same work is expected soon. Congratulations, Tim, and best of luck as you go forward in your career!

CAREER OPPORTUNITIES

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

NASA

The JCSDA is pleased to announce an opening for the position of Director, through the support of its NASA partner. The JCSDA Director is responsible for the strategic direction of the Center, as well as for representing the Center in various national and international contexts, as well as for providing scientific leadership and developing programs to fully exploit the assimilation of satellite data for operational and research purposes. The Director will be hired into a full-time position with the University of Maryland (UMD) Earth System Science Interdisciplinary Center (ESSIC) and will be based in the NOAA Center for Weather and Climate Prediction in College Park, MD.

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 passive microwave radiance, geostationary radiance, and Atmospheric Motion Vector (AMV) assimilation. These positions are full-time, permanent contract positions with Riverside Technology, Inc. and located at the NOAA Center for Weather and Climate Prediction in College Park, MD.

NOTE FROM THE DIRECTOR

Let me start this note by expressing the JCSDA's gratitude to Lars-Peter Riishojgaard, who has directed the JCSDA with enthusiasm and efficiency for the past seven years before deciding last month to move back to Europe, Geneva to be exact, to join the World Meteorological Organization (WMO). Under his leadership, the JCSDA has achieved many successes including the first (and game-changing) acquisition of the JCSDA-affiliated High-Performance Computing (HPC) super-computer (JIBB). Lars-Peter's relentless effort on behalf of the JCSDA was critical for this acquisition three years ago, but also for securing the on-going capacity upgrade. Thank you Lars-Peter: the JCSDA wishes you and your family a smooth transition to Europe and a continued success in your new career chapter with the WMO. The search for a new director for the JCSDA has been initiated and the call for candidates has been formally made. Those interested in this opportunity may find more information below in the Career Opportunities section of this newsletter or on the JCSDA website.

The JCSDA wishes to express many thanks as well to yet another key person in the JCSDA Executive Team, Ms. Pat Phoebus, who has taken on other responsibilities in the Naval Research Laboratory (NRL) in Monterey, CA. Pat has been an energetic supporter of the Joint Center from its inception in 2002 and has played many key roles in her tenure as the Navy Associate Director by tirelessly linking Navy's data assimilation and satellite activities with those from the other JCSDA partners, especially in ocean and aerosols data assimilation as well as CRTM and SSMI/S calibration efforts. We thank you, Pat, for your many contributions to the JCSDA, and our best wishes to you for continued success in your career.

On a positive note, we are happy to announce that Dr. Nancy Baker has been appointed as the new JCSDA Associate Director representing the U. S. Navy. Dr. Baker is well-known in the data assimilation and satellite data utilization community. She is the Head of the Data Assimilation Section at NRL, leading the development and implementation of Navy's operational 3D- and 4D-Var data assimilation systems for NOGAPS, NAVGEM and COAMPS. She has noticeably pioneered work on the adjoint-based observation sensitivity analysis and monitoring that has since been implemented at several NWP centers. Nancy is in no way new to the JCSDA: she has contributed immensely to the JCSDA in many capacities in the past as subject matter expert, reviewer, workshop session chair, Summer Colloquium lecturer, etc. Nancy, we welcome you and we look forward to working with you in the future!

As we are approaching our 12th annual JCSDA technical review meeting and science workshop dedicated to satellite data assimilation, scheduled for May 21-23 in College Park, MD, I would like to encourage those interested in the Joint Center activities and/or in the latest satellite data assimilation developments to consider participating. All necessary information for this purpose could be found on the JCSDA website. We look forward to hearing from the scientists affiliated with all JCSDA partner institutions as well as from those external partners funded by the Joint Center, either through the FFO or the ROSES programs.

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On the High-Performance-Computing (HPC) front, we are eagerly anticipating the imminent upgrade of both the JIBB and the S4 supercomputers. These significant upgrades (double the current performance capacity) are targeted for the spring of 2014 and hopefully will be a reality by the time this newsletter reaches you. These upgrades had become necessary to allow us to keep up with the upcoming increases in vertical and spatial resolutions of some of the partners' assimilation and forecast systems. I am sure many of you involved in the data assimilation experiments will take full advantage of this.

I will end this note by hoping that this newsletter will inspire some of you to reach out to the authors who contributed to it, and to initiate scientific interactions with them, which might lead to a better coordination of all the JCSDA activities, within and outside of the Joint Center partner institutions. This leveraging of efforts and coordination of activities is one of the major objectives of the center. And as usual, we are constantly looking for and accepting suggestions for contributions to the Newsletter, so if you are tempted, let us know.

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 Kevin.Garrett@noaa.gov.

JCSDA SEMINARS			
DATE	**SPEAKER**	**AFFILIATION**	**TITLE**
06 May, 2014, 1:30 PM	Jeff Steward	UCLA/JIFRESSE	Uncertainties in Forward Passive Microwave Brightness Temperatures and What to Do About Them
16 September, 2014, 2 PM	Thomas Nehrkorn and Ross Hoffman	AER	Correction for Position Errors in Variational Data Assimilation
MEETINGS OF INTEREST			
DATE	**LOCATION**	**WEBSITE**	**TITLE**
21-23 May, 2014	College Park, MD	http://www.jcsda.noaa.gov/meetings_Wkshp2014.php	12th JCSDA Technical Review & Science Workshop on Satellite Data Assimilation
14-16 July, 2014	Boulder, CO	http://www.dtcenter.org/com-GSI/users/tutorials/2014.php	2014 GSI Community Tutorial
22-26 September, 2014	Geneva, Switzerland	https://www.eumetsat.int/website/home/News/ConferencesandEvents/DAT_2076129.html	2014 EUMETSAT Meteorological Satellite Conference