JCSDA Quarterly

No. 28, September 2009

Joint Center for Satellite Data Assimilation • 5200 Auth Road • Camp Springs • MD • 20746 *Editor: George Ohring*

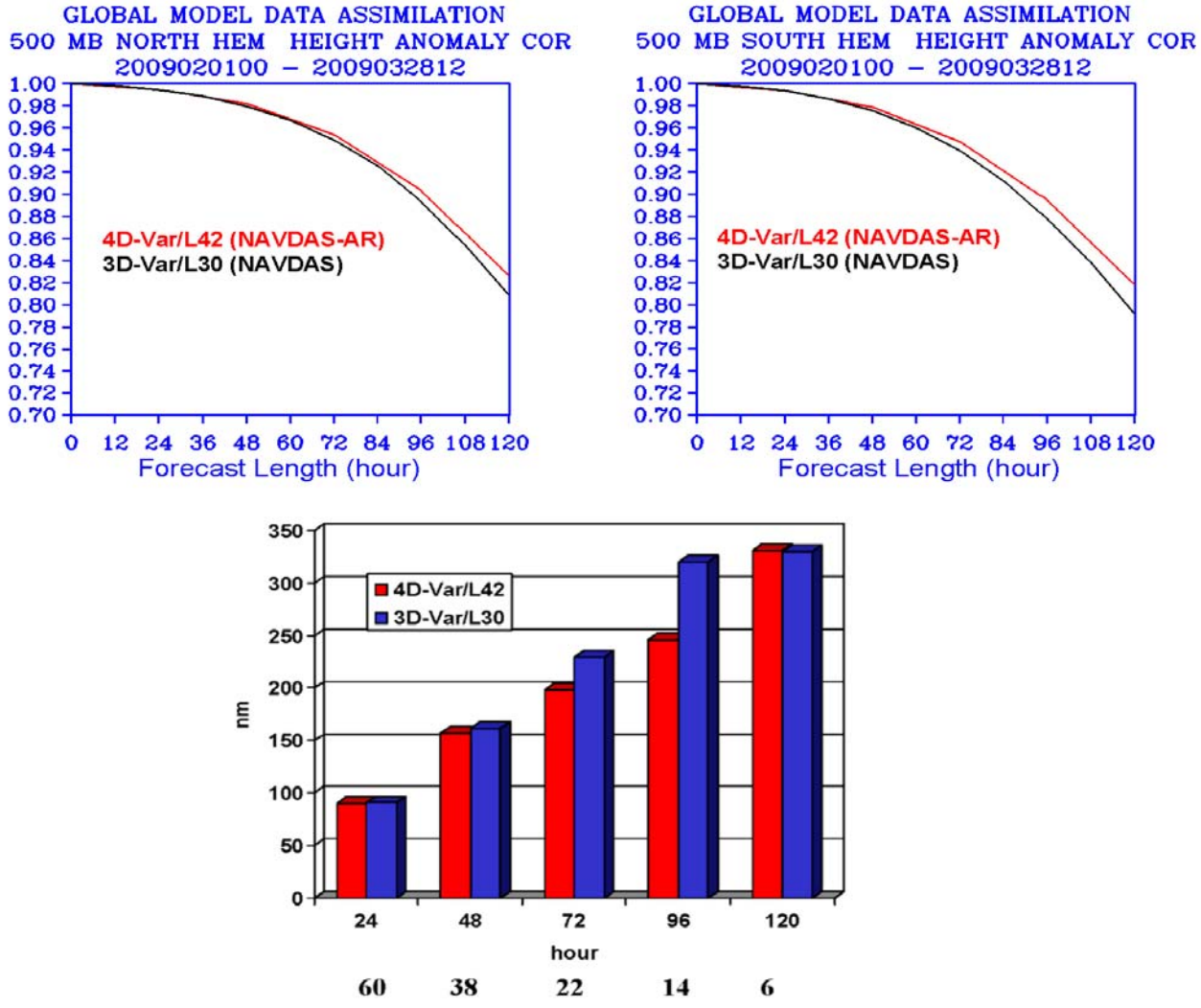
NOAA……..NASA……..US Navy……..US Air Force *Web-site: www.jcsda.noaa.gov*

News in This Quarter

Science Update

Navy Implements 4-Dimensional Variational Data Assimilation System

Impact tests indicate that 5-day forecast skill is extended about 9 hours in the Southern Hemisphere and 4 hours in the Northern Hemisphere, and tropical cyclone track forecast errors are reduced out to 120 hours.



Comparison of 500 hPa forecast height anomaly correlations for the 30-level 3D (NAVDAS) and 42-level 4D (NAVDAS-AR) assimilation systems for the Northern and Southern Hemispheres, February 1 – March 28, 2009 (top). Homogeneous comparison of Tropical Cyclone forecast track error (nm) for the 4D-Var (red) and 3D-Var (blue) systems (bottom). Number of verifying forecasts is given below each forecast length (hour), February 1 - March 31, 2009.

On September 23, 2009, the Navy's Fleet Numerical Meteorology and Oceanography Center initiated operational use of the Naval Research Laboratory's (NRL) 4-Dimensional variational data assimilation system to provide the analysis for its Navy Operational Global Atmospheric Prediction System (NOGAPS). The 4D NRL Atmospheric Variational Data Assimilation System – Accelerated Representer (NAVDAS-AR) replaced the global 3D NAVDAS, which had been operational since 2003. As part of this transition, a NOGAPS/L42 (42 vertical levels) model replaced NOGAPS/L30, increasing the model top to 0.04 hPa, for better assimilation of satellite radiances.

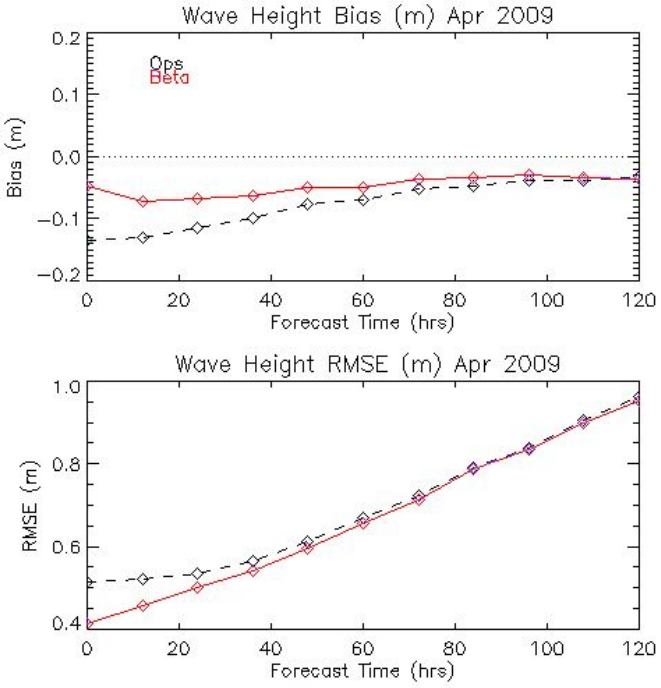
The figure illustrates the positive impact of NAVDAS-AR on 5-day NOGAPS forecasts, using the 500 hPa geopotential height anomaly correlation and Tropical Cyclone (TC) forecast track error. 5-day forecast skill is extended about 9 hours in the Southern Hemisphere and 4 hours in the Northern Hemisphere, and TC track forecast errors are reduced out to 120 hours.

An adjoint-based observation impact monitoring system, NAVDAS-AR adjoint Observation monitoring System (NAVOBS), became operational at the same time. NAVOBS shows the impact of individual observations (or satellite channels) and observation types on global forecast error, aiding decisions regarding quality control and observation selection. NAVOBS was based on theoretical work by Baker, Langland, and Daley, with the web-based product development supported by JCSDA.

Daley, along with Xu and Rosmond laid the foundation for NAVDAS-AR. Its successful deployment marks the beginning of advanced data assimilation methods for the Navy. Unlike the model-space 4D-Var algorithms implemented elsewhere, NAVDAS-AR is an observation-space algorithm based on a variant of the representer algorithm pioneered by Prof. A. Bennett. This system can optimally determine the most likely 4D state of the atmosphere from observations, numerical forecasts, error statistics, and atmospheric dynamics through minimizing a generalized 4D cost function. It is advantageous to search for the minimum of the 4D cost function in observation-space in the presence of model errors, because the size of the control variables (equal to the number of assimilated observations) is always the same--whether we assume the model is perfect (strong constraint) or imperfect (weak-constraint). Besides assimilating the conventional in situ and satellite observations (including geostationary rapid-scan and feature-tracked winds; winds from QuikScat, WindSat, ASCAT, ERS-2, AVHRR, MODIS, SSM/I and SSMIS; and total precipitable water from WindSat, SSM/I and SSMIS), NAVDAS-AR assimilates remotely-sensed microwave and infrared sounder radiances from AMSU-A, SSMIS, and AIRS. Additional sensors, such as IASI and AMSU-B/MHS are routinely assimilated in the research versions of NAVDAS-AR, and will be added to the operational system over the next several months.

In addition to the late Dr. Roger Daley's innovative work while a UCAR distinguished visiting scientist at NRL, the following scientists helped to make this development and transition a success: Drs. L. Xu, N. Baker, B. Ruston, T. Hogan, P. Pauley, R. Langland, and Mr. S. Swadley, NRL; Drs. T. Rosmond (NRL, retired) and B. Chua, both SAIC; Dr. R. Pauley and Mr. L. Lyjak, FNMOC.
(L. Xu and N. L. Baker, NRL)

Navy Implements Data Assimilation Capability for its Wave Forecasting Model



Comparison of bias and RMSE of significant wave height as a function of forecast time for the free running OPS (dashed line) and the new assimilative Beta (solid line) Wavewatch III model runs.

On September 16, 2009, a data assimilation capability for Wavewatch III (WW3) – the Navy's operational wave forecasting model – developed by the Naval Research Laboratory (NRL) was implemented operationally at the Fleet Numerical Meteorology and Oceanography Center. This capability uses the NRL Coupled Ocean Data Assimilation (NCODA) system to assimilate significant wave height (SWH) observations from radar altimeters into WW3. NCODA updates the model 2D spectra at every grid point with the analyzed SWH increments. The assimilative version of the model uses a 6 hour update cycle to allow for the assimilation of altimeter SWH data at 00, 06, 12 and 18 UTC using 6-hour synoptic time windows centered on the analysis time. SWH observations from 3 altimeter instruments (Jason1, Jason2, and ENVISAT) are routinely assimilated. Jason1 is currently in an interleaved orbit with

Jason2, which provides an ideal sampling pattern of simultaneous altimeter tracks at half of the normal Jason track separation.

Wind forcing for WW3 is provided from the Navy Operational Global Atmospheric Prediction System, with a forcing time step of 3-hours. Progress in wave model data assimilation has not been as dramatic as compared to advances made in data assimilation for atmospheric or oceanographic prediction models. One of the primary reasons for this is because wave model forecasts are so strongly constrained by the wind forcing. The assimilation corrects the wave model initial conditions but the initial wave field loses its influence after a relatively short period of time due to errors in the winds. Hence the solutions of a free running and an assimilative wave model are expected to converge with forecast time. Validation studies indicate that the [globally averaged] impact of assimilating altimeter SWH data lasts about 4 days in terms of correcting systematic errors (bias) but less than 2 days for random errors (root mean square error). Similar forecast error trends are seen for other WW3 model variables, such as peak wave period.
(James Cummings, NRL Oceanography Division, Monterey and Paul Wittmann, Fleet Numerical Meteorology and Oceanography Center, Monterey)

(CPTEC), the Japanese Meteorological Agency (JMA), the Korean Meteorological Agency (KMA), the Chinese Meteorological Agency (CMA), and the Bureau of Meteorology (Australia). There are three data archive centers, at the National Center for Atmospheric Research (tigge.ucar.edu); ECMWF (tigge.ecmwf.int); and CMA (wisportal.cma.gov.cn/tigge/). Each of these sites provides information on the data that has been archived and facilities for sub-setting the data and downloading what is desired. The archive contains most common fields, including mandatory level data and commonly requested surface data. The data are not available in real time, but are accessible approximately 2 days later. Users must sign an agreement that the use of the data is for research purposes.

An article providing an overview of the TIGGE data set will be published in an upcoming issue of the *Bulletin of the American Meteorological Society*. In the interim, interested researchers are encouraged to visit the web sites listed above for more details on this unique data set.

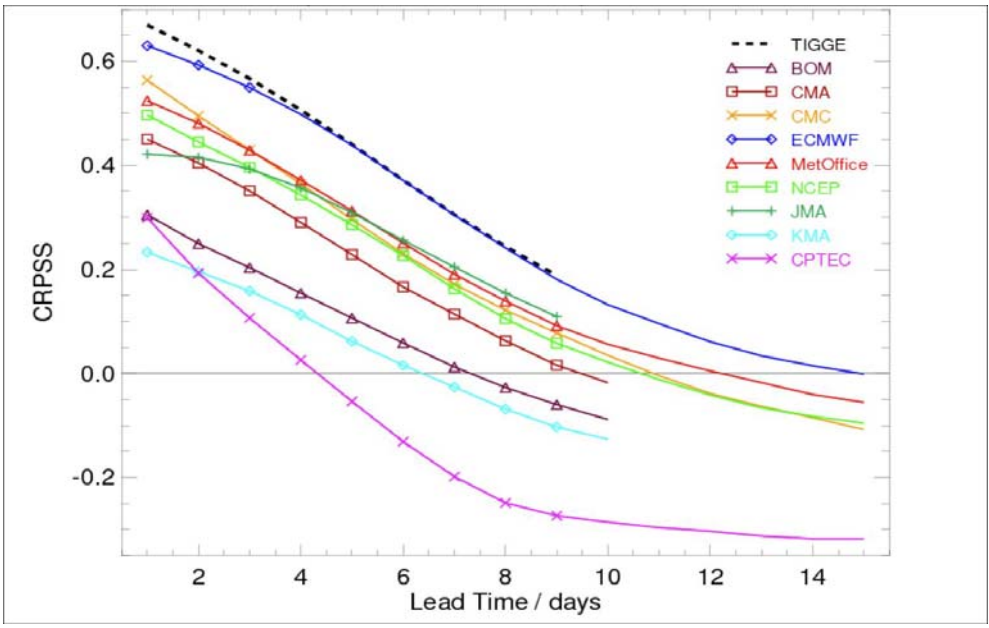
In other THORPEX news, the Third THORPEX International Science Symposium was recently held in Monterey, CA. Approximately 150 scientists from across the world attended.
(Tom Hamill, OAR)

Global Atmospheric Research Programme
THORPEX

TIGGE: The THORPEX Interactive Grand Global Ensemble Database

A new database of operational global ensemble predictions and analyses is available. It will facilitate the verification and comparison of models and ensemble prediction systems among a wide community, including the private sector, university researchers, and government labs. It can be used to design and validate multi-model forecast products that may set the stage for future operational products (see Figure).

Participating centers include US National Centers for Environmental Prediction (NCEP), Environment Canada, the European Center for Medium-Range Weather Forecasts (ECMWF), the UK Met Office, Météo-France, Brazil



The Continuous Ranked Probability Skill Score (CRPPS) of 2-meter temperature forecasts from the TIGGE database, evaluated relative to the ECMWF Interim Reanalysis. The skill of bias-corrected ensemble members from each center are plotted, where the bias correction is calculated from the difference between ensemble-mean forecasts and analyses during the prior 30 days. A multi-model ensemble skill score ("TIGGE") is also plotted. Points with symbols are statistically significantly different from the multi-model TIGGE result, with significance determined from a block bootstrap algorithm. Data and analysis provided courtesy of Renate Hagedorn, ECMWF. Data from December 2008 – February 2009

International Items:

Update on Satellite Data Assimilation System at Météo-France

Significant improvements in global forecasting have been achieved at Météo-France in recent years, largely due to the progressive insertion of new satellite data types, the continuous increase in the data quantity used, and the way the satellite information is assimilated.

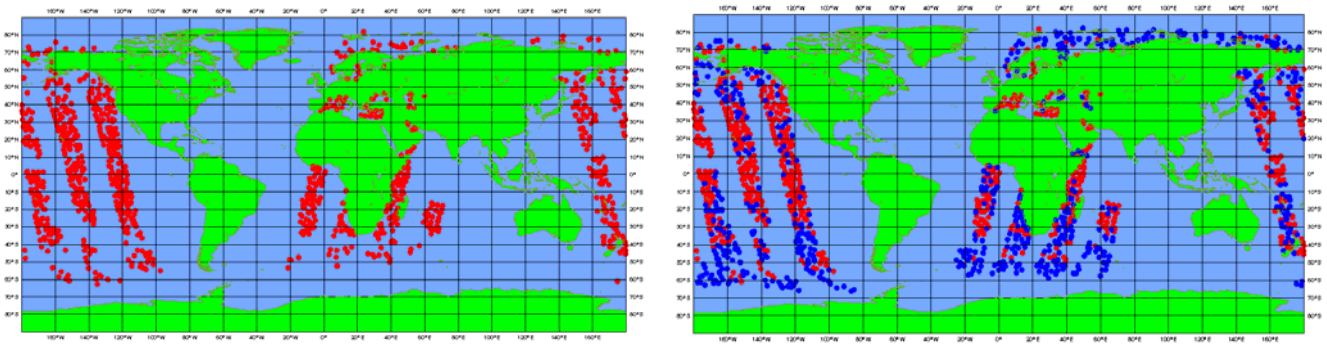


Figure 1: Typical coverage of active observations for AIRS channel 239 (mid-troposphere, 717.99 cm^{-1}) when assimilating only clear channels (left panels), and channels affected by low to mid-level clouds in addition to clear ones (right panels). Clear channels are in red dots, cloud-affected channels are in blue dots.

As of September 2009, the operational global spectral forecasting model of Météo-France named "ARPEGE" runs four times a day with 60 levels in the vertical and a variable T538 horizontal resolution enabling a 15 km grid resolution over France but decreasing to 90 km at the antipodes. The data assimilation system is a Four-Dimensional Variational scheme (4DVAR), performed on 6h time windows. Météo-France also operates a 3DVAR assimilation (6h cycling) to initialize a limited-area model called "ALADIN-FRANCE" at a 9 km horizontal resolution and a new fine-mesh model called "AROME" at a 2.5km horizontal resolution over France. The code development is performed in collaboration with ECMWF. The three models – global, regional and meso-scale – use similar satellite data, with additional fine scale observations in the limited area models, such as radar data in AROME. The analyses use different types of satellite observations: satellite winds (Atmospheric Motion Vectors and surface winds from scatterometers), satellite radiances and GPS radio-occultation data.

Developments in terms of satellite data usage that took place in the last couple of years are summarized below. Instruments from the MetOp satellite have gradually been inserted in 2007 and 2008 (ATOVS, ASCAT and IASI). At present, 54 AIRS channels and 64 IASI channels are assimilated in operations. They provide information on temperature from 50 hPa down to 650 hPa. Additionally, the assimilation of AIRS radiances affected by low clouds inside the 4DVAR assimilation scheme has been implemented in February 2009. The approach is based on the use of cloud parameters, the cloud-top pressure and the effective emissivity calculated offline by the cloud-characterization algorithm CO2-Slicing (Dahoui et al, QJRMS, 2005). These cloud parameters are then provided to the radiative transfer model RTTOV to simulate cloudy radiances from the background into the observation operator (Pangaud et al, MWR, 2009). Assimilating cloud-affected channels on top of clear ones provides good additional geographical coverage, especially at mid-latitudes (Figure 1 depicts this coverage enhancement). The data from the hyperspectral sounders AIRS and IASI are found to have a very positive impact on the forecast in the global model for standard scores and also in the fine-mesh models for precipitation forecasts.

Microwave observations from AMSU-A & AMSU-B (or MHS) instruments have been widely used in Numerical Weather Prediction (NWP) to improve the initial conditions for short-range forecasts, but additional efforts need to be devoted to assimilate more observations with a variety of surface conditions. Priority had been given to the use of AMSU measurements over seas together with measurements for which the contribution of the surface is negligible. In July 2008, a new land surface emissivity parameterization (Karbou et al., QJRMS, 2006) was developed at Météo-France and introduced into the operational systems. The land emissivity parameterization is based on a dynamic retrieval of the land surface emissivity at selected window frequencies (very sensitive to the surface) taking into account satellite observations and radiative transfer simulations of the atmosphere contribution to the radiometric signal. It has been shown that the use of this improved description of the land surface emissivity allows the assimilation system to take

advantage of the information content of AMSU temperature and humidity sounding channels over land: the observation operator performances are improved and the number of assimilated observations is increased (Karbou et al. WAF, 2009). Figure 2 shows how the density of assimilated observations from AMSU-A channel 7 was improved when Météo-France moved to the new surface emissivity parameterization (Figure 2.b) compared with the old operational system (Figure 2.a).

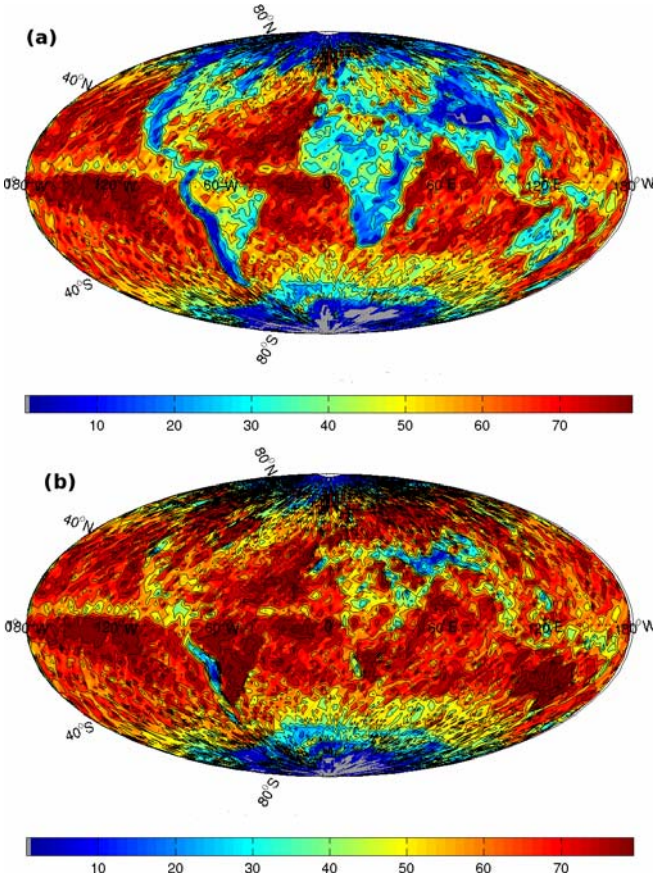
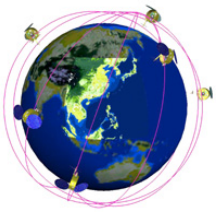


Figure 2: Map of density of assimilated observations from AMSU-A channel 7 (sensitive to temperature at 8-10 km of altitude). The density values have been computed by counting the number of assimilated observations falling in a grid cell of 2° x2° size and during August 2006. Results are for (a) the old operational system and (b) the new operational system since 2008.

Our future efforts in satellite data assimilation will be geared towards the use of more satellite radiances in cloudy conditions, over land, and over polar areas (Rabier et al, BAMS, 2009) and to the preparation for Megha-Tropiques, Oceansat-2, NPP and ADM-Aeolus

(Florence Rabier, with contributions from Aurélie Bouchard, Nadia Fourrié, Elisabeth Gérard, Stéphanie Guedj, Vincent Guidard, Fatima Karbou, Patrick Moll, Thomas Pangaud and Christophe Payan, Meteo-France and CNES)



Cosmic Corner:

The National Space Organization (NSPO) and the Central Weather Bureau (CWB) in Taipei (Taiwan) hosted a workshop on Observing System Simulation Experiments (OSSEs) for GPS Radio Occultation (RO) data during 3-4 September 2009. The goal of the workshop was to provide a forum for discussion on GPS RO OSSEs to address some questions for a follow-on COSMIC mission. Scientists from national and international institutions attended the workshop. Representatives from NOAA/Office of Systems Development, NOAA/NCEP, and JCSDA participated in the workshop. Drs. Uccellini, Masutani, and Cucurull gave invited presentations. An agenda of the conference can be found at: http://www2.nspo.org.tw/OSSE/program.html

Two days of management meetings followed the scientific workshop. Invited attendees from NSPO, CWB, NOAA, and UCAR discussed the requirements for a follow-on COSMIC mission. The next management meeting will take place in Boulder, CO during the fourth Formosat-3/COSMIC Data Users Workshop (27-29 October, 2009).

The objectives of the scientific workshop are:

- Dialogue between data providers and data users
- Update the user community on the status of the mission
- Status of CDAAC data processing and data availability
- Scientific investigations with COSMIC data
- Results obtained with GPS, TIP and TBB data
- Data validation experiments
- Comparison with other sensors - including other RO missions (CHAMP, SAC-C, GRACE, TerraSAR-X, METOP/GRAS, TechSat-21)
- Status of Precise Orbit Determination and Excess Atmospheric Phase Processing - Algorithm improvements and validation studies
- GPS RO retrieval improvements
- Data assimilation into numerical models - Impact studies from NCEP, ECMWF, UKMO and other leading weather centers
- Climate studies with RO data
- Use of the data in ionospheric models - early operational tests
- Future plans for validation experiments, campaigns, or other projects in the neutral atmosphere and ionosphere
- Discussions related to COSMIC-II Follow-On mission

Details on the workshop can be found at: http://www.cosmic.ucar.edu/oct2009workshop/index.html

(Lidia Cucurull, JCSDA)

JCSDA Summer 2009 Colloquium on Data Assimilation

The JCSDA Summer Colloquium on Data Assimilation was held in Stevenson, WA, July 7 – 17, 2009. The objective of the program was to foster the education of the next generation of data assimilation scientists. Thirty six doctoral students and postdocs from the United States and seven other countries participated. Twenty data assimilation experts from the United States and Europe gave lectures in their respective areas of expertise.

A total of 33 lectures were given, two each morning, two each afternoon, and one on the final morning, which allowed ample time for discussion and informal interactions. Topics included: data assimilation fundamentals, including variational and ensemble techniques, satellite data applications, including infrared and microwave observations, overviews of atmospheric, ocean, and land data assimilation, and an overview of the global observing system. Many of the lecturers stayed at the Colloquium for several days, interacting with the participants and joining in the extracurricular activities, which contributed to a stimulating environment for all attendees. The lectures are posted at http://www.jcsda.noaa.gov/meetings_2009SummerColloq.php

To obtain feedback on what they liked about the Colloquium, their suggestions for changes, whether the information presented was at an appropriate level or not, the length of the program, etc., the participants completed a participant feedback survey. The JCSDA will use this feedback to improve future Colloquia.
(Wayman Baker, JCSDA)

People

Wayman Baker Retires

After 30 years of service to NOAA and the federal government, Dr. Wayman Baker, Chief Administrative Officer of the JCSDA, retired on September 30, 2009.

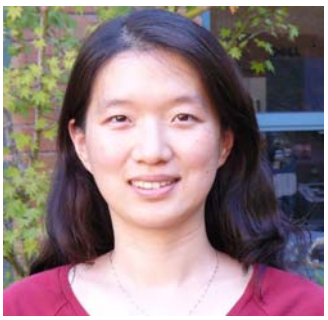
Dr. Baker received his Ph.D. in atmospheric science from the University of Missouri in 1978 after completing his dissertation at NCAR as a member of the NWP Section. He joined the Global Modeling and Simulation Facility at the NASA Goddard Space Flight Center as a research meteorologist later that year. In 1988, Dr. Baker became Deputy Director of NCEP's Environmental Modeling Center (Development Division at that time). He then served for 12 years as Deputy Director of NCEP's Central Operations before joining the Joint Center for Satellite Data Assimilation as Chief Administrative Officer in 2005.

Dr. Baker has advocated the deployment of a space-based Doppler wind lidar in order to improve the initial conditions for numerical weather forecasts since 1985 and chaired the

NASA Laser Atmospheric Wind Sounder (LAWS) Science Team from 1989 until 1993. He then chaired the Lidar Working Group from 1994 until stepping down in June 2009.

Best wishes for a happy, healthy, and productive retirement, Wayman.

Li Bi Joins Naval Research Laboratory



Dr. Li Bi will continue her association with JCSDA as a University Corporation for Atmospheric Research Visiting Scientist at the Data Assimilation Section of the Naval Research Laboratory (NRL). Li will work with the NRL data assimilation group to evaluate the current quality control procedures and thinning routines used for QuikSCAT, WindSat and ASCAT data for potential improvements. Li also plans to collaborate with UW/Cooperative Institute for Meteorological Satellite Studies scientists to resolve the ambiguity in scatterometer-observed ocean surface wind vectors within NRL's Atmospheric Variational Data Assimilation System (NAVDAS) and the 4D Accelerated Representer based system, NAVDAS-AR, as well as within NCEP's Gridpoint Statistical Interpolation (GSI) system.

As a post-doc at the University of Wisconsin Space Science and Engineering Center prior to her move to Monterey in August, 2009, Li collaborated with JCSDA and NCEP on studying the impact of assimilation of ocean surface winds vectors on forecasts. Her work led to the operational implementation of WindSat data in the NCEP weather forecast model in the fall 2008 GSI release.

Li received her B.S. degree in Meteorology from the Ocean University of China in 2000 and the M.S. degree in Meteorology from the University of Oklahoma in 2003. In 2008, she received her PhD in Atmospheric and Oceanic Sciences from the University of Wisconsin-Madison, where her thesis was focused on the impact study of ASCAT and WindSat surface wind retrievals in the NCEP global data assimilation system.
(Pat Phoebus, NRL)

JCSDA is pleased to have Dr. Bi retain her status as a JCSDA scientist who will be performing research of interest to the joint partners.
(Pat Phoebus, NRL)

Opportunities

Deadline Extended for JCSDA FY10 Federally Funded Opportunity

The deadline for submitting proposals to the JCSDA FY10 Federally Funded Opportunity (FFO) grants program has been extended to October 20, 2009. The Joint Center's goal is to accelerate the abilities of NOAA, DOD, and NASA to ingest and effectively use large volumes of data from current satellite-based instruments and planned satellite missions over the next 10 years. This announcement calls for proposals for scientific projects in six areas described in the full announcement, namely: radiative transfer models, advanced instruments, clouds and precipitation, oceans, land, and aerosols/trace gases. For further information, please consult the JCSDA web site http://www.jcsda.noaa.gov/ where a link to the full public announcement can be found.
(Sid Boukabara, JCSDA)

New JCSDA Short Term Visiting Scientist Program

The Joint Center for Satellite Data Assimilation announces a new short-term visiting scientist program for Fiscal Year 2010 (starting October 1st 2009). Scientists from institutions of higher education and other nonprofits; for profits; international organizations; foreign institutions, state, local and Indian tribal governments; and Federal agencies are invited to apply for an appointment of up to 3 months to work on qualifying projects with scientists at the JCSDA. Proposed work should be in the areas of data assimilation, radiative transfer, transition to operations of new science and new sensors or improvements to existing sensors, or any other project jointly identified to be of value to the JCSDA by the host scientist and the visiting scientist. Interested scientists are encouraged to identify and coordinate with hosts scientists from JCSDA. This will help identify a commonly beneficial project to JCSDA and the visiting scientist. Positions are located in Camp Springs, MD. Complete information can be found at http://www.jcsda.noaa.gov/visitingScientist2010.php. There is no deadline for applying to this short-term visiting scientist program.
(Sid Boukabara, JCSDA)

JCSDA Visiting Scientist Position in Observing System Simulation Experiments

The JCSDA seeks a scientist to conduct Observing System Simulation Experiments (OSSEs) with Global Positioning System-Radio Occultation (GPS-RO) data. The purpose of the project is to develop and implement the capability to run OSSE experiments to test different RO satellite configurations.

The position is located at the Joint Center for Satellite Data Assimilation (JCSDA) in Camp Springs, MD. The incumbent will work with other scientists of the JCSDA and will also collaborate with University Corporation for Atmospheric Research (UCAR) scientists.

The incumbent will evaluate the impact of several possible GPS-RO constellation configurations through OSSE experiments. This will include simulating the observations, characterizing the observation error, running parallel assimilation tests, and evaluating the results. Since, in the OSSE framework, observations need to be simulated for the other observing systems, the incumbent will work with other OSSE scientists within the group to ensure the success of the project.

The research will be conducted within the Joint OSSE Project. The Joint OSSE is an international effort for collaborative OSSEs, where many centers share the same Nature Run with different data assimilation systems. Verification of the Nature Run and simulation of observations consumes a significant amount of resources. By using the same Nature Run, the different centers can compare results and assure reliable OSSE conclusions. Several centers from the US and Europe are members of the Joint OSSE project, which is coordinated by the JCSDA. Testing of the impact of RO data with possible satellite configurations will take place with the NCEP's global data assimilation system (GSI/GFS).

The position is for 1 to 2 years and is part of the UCAR visiting scientist program. To apply, send a curriculum vitae and a letter of interest with the names of three references to:

Dr. Lidia Cucurull
JCSDA/ NOAA Science Center
5200 Auth Road
Camp Springs, MD 20746

Email: Lidia.Cucurull@noaa.gov

Community Gridpoint Statistical Interpolation (GSI) Data Assimilation System Released to Public

The Developmental Testbed Center (DTC), a facility supported by NOAA, the Air Force Weather Agency, the National Science Foundation, and the Federal Aviation Agency, released the first version of the Community Gridpoint Statistical Interpolation (GSI) Data Assimilation System to the public on September 25, 2009. This release is the result of the joint efforts of the NOAA/National Centers for Environmental Prediction (NCEP) and the DTC through the support of NOAA, AFWA, and NSF. More information regarding the community GSI system and its tutorial, support, and documentation can be found on the DTC's GSI website at:
http://www.dtcenter.org/com-GSI/users/index.php.

The GSI system was initially developed by NOAA/NCEP as a next generation global/regional analysis system. It became operational as the core of the North American Data Assimilation System (NDAS) in June 2006 and the Global Data Assimilation System (GDAS) in May 2007 at NOAA. The GSI is also being used in other NCEP operational systems, such as the real-time mesoscale analysis (RTMA) and Hurricane WRF (HWRF). The system was adopted by NASA/Goddard GMAO as their primary atmospheric analysis system and they have been contributing to the development of the GSI. Lately, the NOAA Earth System Research Laboratory/Global Systems Division (NOAA/ESRL/GSD) and the National Center for Atmospheric Research/Earth & Sun Systems Laboratory/Mesoscale & Microscale Meteorology Division (NCAR/ESSL/MMM) joined the development efforts of the GSI to support the upcoming Rapid Refresh (RR) and AFWA applications. The DTC is currently maintaining and supporting a community GSI system that includes the various capabilities developed by all the GSI developers.

The DTC is a distributed facility resident at NOAA and NCAR. It currently supports a few community numerical weather prediction (NWP) codes jointly with other partners, including the Weather Research and Forecasting-Nonhydrostatic Mesoscale Model core (WRF-NMM), WRF Postprocessing (WPP), HWRF and GSI. It is the goal of the DTC to link research and operational communities by providing a platform for the NWP community to test and evaluate new models and techniques for use in research and operations. More information about the DTC can be found at http://www.dtcenter.org/.
(Hui Shao, JCSDA)

A Note from the Director

Based on the feedback from both participants and lecturers, the JCSDA Summer Colloquium in Stevenson WA in July was a very successful event. For family reasons I could only participate in the first week of it, but based on what I saw there the nature of the interaction between students and lecturers did live up to our high expectations. My colleagues in the Joint Center Executive and Management Oversight Boards seem to be overwhelmingly in favor of doing a follow-on event at some point in the future, so stay tuned for 2011! Of course there will always be things that could be improved, and among the recurring suggestions we received were to (i) make the slides for the lectures available to the students ahead of time, and (ii) accompany the lectures by hands-on problem solving sessions. I promise that we will do what we can to address both these concerns at our next major training event.

As mentioned in the previous edition of this newsletter, the Joint Center plans to keep a low profile on training activities for 2010. However, we now have preliminary dates for the joint "ECMWF-JCSDA Workshop on Assimilating Satellite Observations of Clouds and Precipitation into NWP Models", scheduled to take place at ECMWF in Reading on June 15-17, 2010. As many of us saw during the recent EUMETSAT Meteorological Satellite Conference in Bath, this field is now teeming with activities, and next year's Workshop will therefore be very timely. Several groups around the world are now able to do very realistic model simulations of geostationary imagery, a capability that is one of the prerequisites for making good use of these observations in data assimilation. At the same time most of the major NWP centers are moving away from using hyperspectral infrared radiances from AIRS and IASI exclusively over clear areas or well above the cloud tops and are going after observations in the cloudy areas themselves. We look forward to being able to go more in depth with both these and other related areas of activity during the Workshop in Reading next year.

After a one-year hiatus, we are happy to be in a position to have the JCSDA External Research Program spin up a new round of projects. The FFO (Federal Funding Opportunity) announcement was published in early July, and we received 26 letters of intent in response. We reviewed the response and discussed it extensively in the JCSDA Executive, and those of you who responded should now have received your feedback. We look forward to receiving the proposals in a few weeks.

Several of you may have heard me talk in a number of different venues about the need for the US data assimilation community to become more competitive not only in terms of data utilization but also from a system development point of view. I am therefore delighted to note that our Navy partners have gone operational with their AR (accelerated representer) system on September 23 (see the article on page 1 of this issue). The AR algorithm is basically a variant of 4D-VAR, and it is the first such system used operationally for global NWP in this country. While it is still too early to tell how big the immediate impact of this change will be on Navy forecast skill, it is nevertheless a very encouraging development that will open a range of new possibilities also for satellite data activities. Congratulations to NRL/Monterey and FNMOC!

Lars Peter Riishojgaard, Director, JCSDA

Outlook for Next Quarter

JCSDA Seminars

JCSDA seminars are generally held on the third Wednesday of each month in Room 707 of the World Weather Building. Presentations are posted at http://www.jcsda.noaa.gov/JCSDASeminars.php prior to presentation and off-site personnel may listen in via conference call. A complete listing of past and future seminars is at the above web-site.

Date	Speaker	Affiliation	Title
Oct. 1, 2009	Liang Xu	NRL Monterey	Operational Implementation of 4D-VAR Assimilation for the U.S. Navy
October 20, 2009	P.K. Bhartia	NASA GSFC	Promises and Challenges in Assimilating Aura/OMI Satellite Data to Study Global Air Quality
Nov. 18, 2009	Dara Entakhabi	MIT	The NASA Soil Moisture Active Passive Mission
Dec. 16, 2009	Chris Kummerow	Colorado State University	Cloud and Precipitation Observations from Space - Retrievals versus Radiance Assimilation

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.