

News in This Quarter

JCSDA Director Receives NASA's Highest Science Award



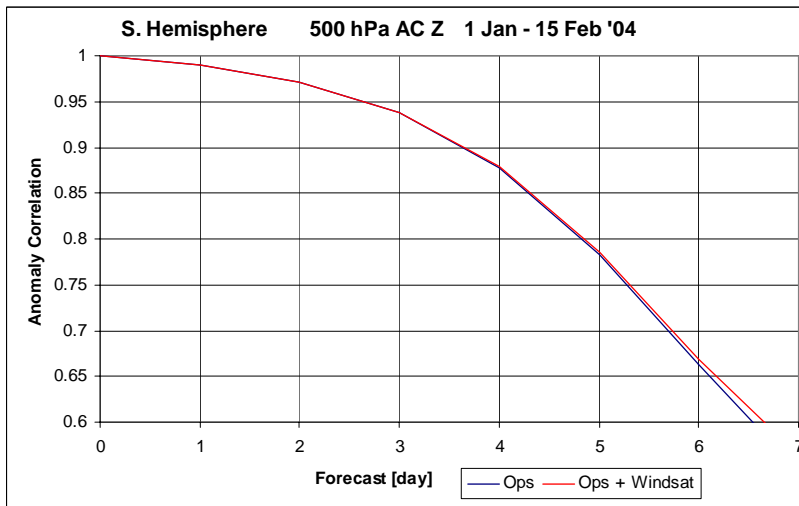
Dr. Le Marshall receives the award from Dr. Charles Elachi, Director of JPL and Dr. Colleen Hartman, Deputy Associate Administrator for NASA Science Mission Directorate

Dr. John Le Marshall, Director of the NASA-NOAA-DoD Joint Center for Satellite Data Assimilation was awarded the NASA Exceptional Scientific Achievement Medal in a ceremony held at the Jet Propulsion Laboratory in Pasadena California on Wednesday June 7, 2006. The award to Dr. Le Marshall was presented in recognition of his "Innovative use of AIRS hyperspectral data in numerical weather prediction models, demonstrating, for the first time, significant weather forecasting improvement in both hemispheres". This is NASA's highest award in recognition of "unusually significant scientific contributions toward achievement of the NASA mission."

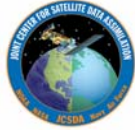
Congratulations, John.

WindSat: Initial Tests Positive

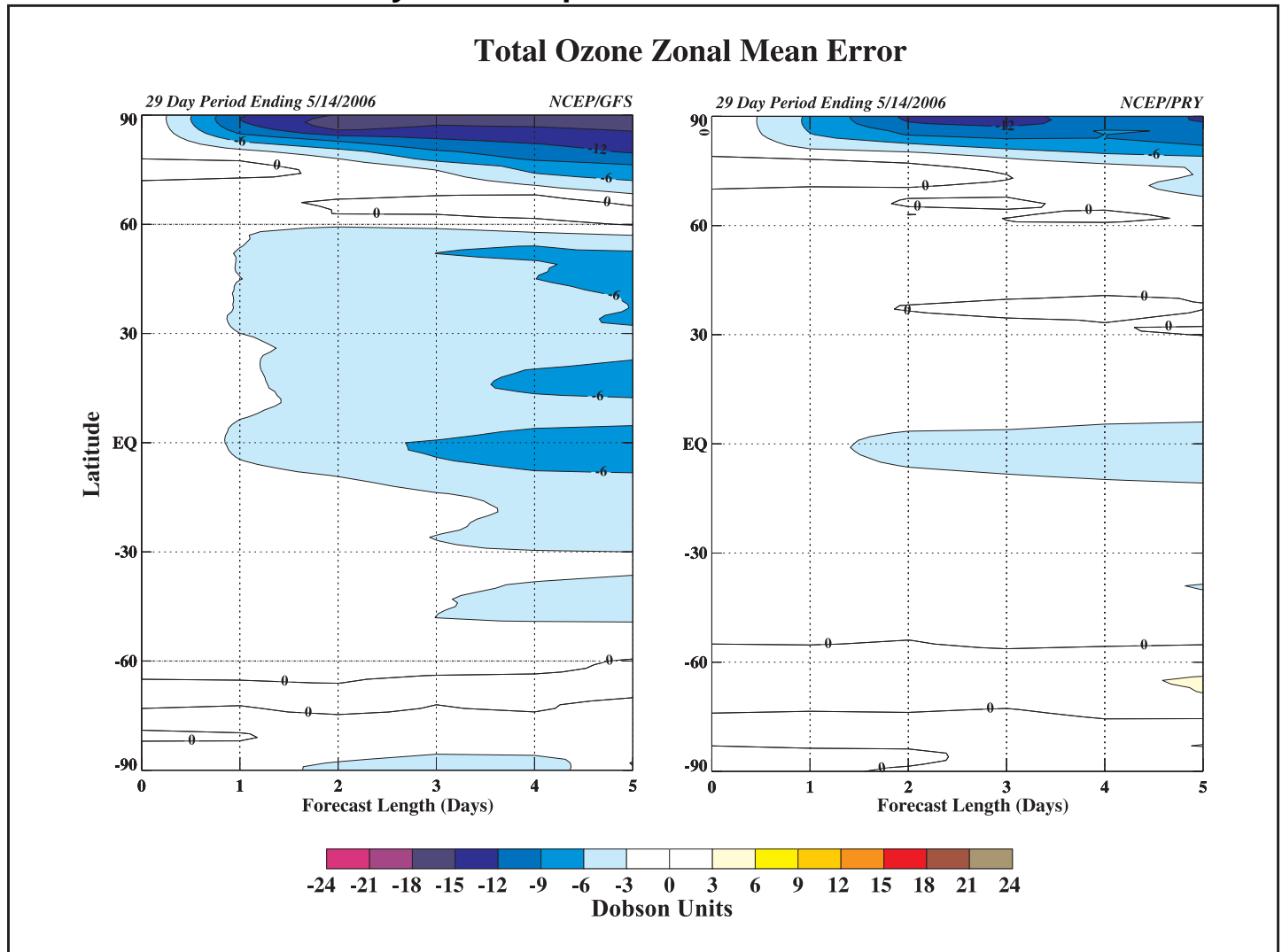
Initial studies examining the effect of assimilating WindSat ocean surface wind vector observations into a version of NCEPs Operational Global Data Assimilation System are yielding positive forecast impacts. The studies, conducted by scientists from the Joint Center for Satellite Data Assimilation, the Cooperative Institute for Meteorological Satellite Studies, and the University of Wisconsin, are designed to quantify the utility of these data for operational NWP. The initial experiments have involved the use of WindSat wind vectors generated at NRL (WindSat v.2). In these initial trials for the period 1 January to 15 February 2004, a modest positive impact compared to Operations has been recorded, as shown in the Southern Hemisphere 500hPa anomaly correlation diagram below. It should be noted Operations uses the full operational database including QuikSCAT wind data which cover much of the area observed by WindSat. A study during the Northern Hemisphere summer has commenced and will be followed by an experiment involving the direct assimilation of radiances. A recent study at NRL with the NOGAPS model has found similar results.



WindSat is an interagency cooperation success story. The Naval Research Lab, with cooperation from NASA, the Air Force, and the NPOESS program, is demonstrating the concept of polarimetric radiometry to measure ocean surface wind speed and wind direction. WindSat measures the ocean surface wind field at a horizontal resolution of 25 km using a 1.9-m diameter reflector that is almost three times as large as the antenna on the DMSP Special Sensor Microwave Imager (SSMIS). Similar technology had been planned for the NPOESS CMIS instrument.
 (J. Le Marshall, JCSDA)



New NRL Photochemistry Model Improves NCEP Ozone Forecasts



Test runs of the NCEP Global Forecast System (GFS) using the new Naval Research Laboratory CHEM2D Ozone Photochemistry Parameterization (NRL CHEM2D-OPP) show dramatic reductions in total ozone forecast errors as compared to the current operational GFS ozone forecasts. These tests are part of a JCSDA-sponsored research initiative to improve the representation of stratospheric ozone in the numerical weather prediction (NWP) models and data assimilation systems used by NCEP and the US Navy.

Currently, ozone photochemistry in the GFS is parameterized using zonally averaged seasonally varying production and loss rates. The CHEM2D-OPP parameterization similarly specifies the net ozone photochemical tendency (i.e., production minus loss) plus its sensitivity to local changes in ozone mixing ratio, temperature and overhead ozone column based on off-line calculations from the NRL CHEM2D middle atmospheric photochemical transport model.

The accompanying figure plots zonal mean total ozone errors as a function of forecast length averaged over a 29-day period ending 14 May 2006. On the left are the operational GFS total ozone forecast errors, on the right are the forecast errors from a series of parallel forecasts (PRY) using a preliminary version of CHEM2D-OPP without the temperature or ozone column terms. The PRY forecast model also employs a new hybrid vertical coordinate. At Day 5, the GFS total ozone forecasts for this test period under-predict total ozone by more than 6 Dobson Units (DU) between 10°S - 50° N, and by more than 15 DU near 90° N. The PRY total ozone forecasts



using CHEM2D-OPP photochemistry reduce the Day 5 total ozone forecast errors at most latitudes by as much as 50% for this 29-day evaluation period.

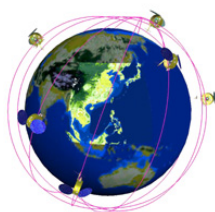
These improvements in NCEP GFS ozone forecasts will increase the accuracy of products such as the surface ultraviolet (UV) index. Accurate stratospheric ozone forecasts can also improve operational radiance assimilation, provide better specification of upper tropospheric and lower stratospheric winds through correlations between ozone and dynamics, and improve model stratospheric heating rates. Future work will include testing the complete CHEM2D-OPP formulation in both the NCEP GFS and the Navy Operational Global Atmospheric Prediction System (NOGAPS) to determine how the temperature and column ozone terms impact ozone forecast skill.

More information on CHEM2D-OPP is available at:

http://uap-www.nrl.navy.mil/dynamics/html/chem2dopp/chem2d_opp.html

(J. McCormack, T. Hogan, NRL; M. Iredell and C. Long, NCEP)

Cosmic Corner



About two months after the successful launch of COSMIC, the six satellites are making good progress in deployment. Spacecraft 5 is now orbiting on its own at 600 km, away from the other 5 which are generally at an altitude of around 515 km. Orbit raising will start soon on spacecraft 1 and 2. A new load of software for the GPS radio occultation (RO) receivers is being prepared and should be loaded in the next few days. The healthy status of the mission and the data distribution policy were evaluated at the last Inter-Agency Meeting, held in Silver Spring on June 5th 2006.

In preparation for operations, the JCSDA is receiving the available COSMIC profiles in real time. This pre-operational phase is necessary to check the formats and to assure that the end-to-end data flow, from the satellites to the NCEP's Data Assimilation System, is working properly. The early COSMIC data look reasonable and the values are comparable to those of German CHAMP GPS mission, launched in 2000; however, COSMIC provides a larger number of observations penetrating deeper into the lower troposphere as a result of an improvement in the GPS RO tracking algorithm for the COSMIC receivers.

Experiments with the assimilation of CHAMP GPS observations (in non-real time) are continuing at the JCSDA. The purpose of these studies is to understand the sensitivity of the Data Assimilation System to different parameters (i.e., quality control checks, model resolution, error characterization, etc.). The experience gained from these results will accelerate the understanding and tuning of the system for the COSMIC data.

(Lidia Cucurull, JCSDA)



The U.S. THORPEX Science Steering Committee (USTSSC) has now been formed and is beginning work on revising the U.S. THORPEX Science and Implementation Plan. It is hoped that a near final draft will be completed in time to provide substantive input to the North American THORPEX Science and Implementation Plan, which will be presented to the international community at the 2nd THORPEX International Science Symposium in early December in Germany. The USTSSC also submitted a proposal for a session on THORPEX at the American Meteorological Society's Annual Meeting in January 2007 in San Antonio, Texas. The co-chairs of the USTSSC are Prof. Jim Hansen (MIT, but soon at the Naval Research Laboratory in Monterey) and Prof. Lance Bosart (SUNY-Albany).

A weather-climate meeting was held at NCEP on April 27, 2006, sponsored by NOAA THORPEX. The meeting brought forward ideas on how to bridge the gap between the initial value problem in numerical weather prediction with the boundary value problem in climate prediction (10 to about 60-day forecasting period). In addition, a North American THORPEX Regional Committee meeting was held in Montreal at which the planning for the THORPEX Pacific-Asian Campaign (TPARC) was discussed. Connected with this meeting was a North American Ensemble Forecasting System (NAEFS) Workshop. The representative from Mexico joined the U.S. and Canada in the discussions, which included the possible expansion of NAEFS to include other operational forecast centers such as the UK Met Office, the Japan Meteorological Agency, and the Korean Meteorological Agency. The Navy's Fleet Numerical Meteorology and Oceanography Center will likely join NAEFS in about one year.

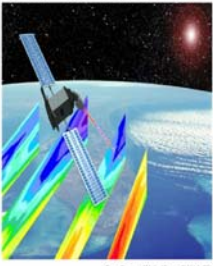
THORPEX is an international research program to accelerate improvements in the accuracy of 1 to 14 day weather forecasts for the benefit of society and the economy.

(John Gaynor, OAR)



Lidar Winds Update

Wind—The Final Frontier



Dr. Oliver Reitebuch, from the Institute of Atmospheric Physics at DLR, gave a seminar at the JCSDA on May 15, 2006, entitled “Atmospheric Wind Sensing with Doppler Lidar: Results of Impact Studies of Airborne Wind Lidar Observations and Progress Towards the Space Mission ADM-Aeolus.”

ESA’s ADM, or Atmospheric Dynamics Mission, will fly the first Doppler Wind Lidar (DWL) in space and is scheduled for launch in late 2008. One of the highlights of Dr. Reitebuch’s seminar was the forecast impact test performed with actual airborne DWL data assimilated with the ECMWF global Model (Weissman and Cardinali, 2006, *Quart. J. Roy. Meteorol. Soc.*, in press). A 3% reduction in the 48 h 500 hPa

forecast error was obtained with DWL data, and a 3.5% reduction was obtained at 72 h.

Approximately 30 scientists and lidar specialists attended the 26th meeting of the Working Group on Space-Based Lidar Winds (Lidar Working Group), held in Welches, Oregon, June 27 – 30, 2006. Highlights of the meeting included significant advances in laser efficiency for the 1 μ direct detection lidar technology which will allow the wind measurement requirements for the upper troposphere and lower stratosphere to be met with more modest on-orbit weight and power resources. Also, productive discussions were held on a possible U.S. space-based DWL demonstration mission following the ESA ADM mission noted above. Further information about the Lidar Working Group, including previous and future meetings, may be obtained at: <http://space.hsv.usra.edu/LWG/Index.html> (Wayman Baker, JCSDA)

1st Workshop on Remote Sensing and Modeling of Surface Properties



Participants in the First International Workshop of Remote Sensing and Modeling of Surface Properties called for development of a community surface emissivity modeling framework that can be used by all NWP centers. Without accurate surface emissivity models, satellite measurements that are sensitive to the surface and lower atmosphere cannot be assimilated into NWP models.

The workshop, an activity of the International TOVS Working Group and sponsored by the NOAA/NESDIS/Office of Research and Applications and Observatoire de Paris, was held in Paris, France from June 20-22, 2006. The meeting was well attended by 62 international specialists and scientists,

including representatives of the major NWP centers: NCEP, ECMWF, the Met Office, Meteo France, and Meteorological Service of Canada.

While advances have been made in developing surface emissivity models for satellite data assimilation, major problem areas exist:

1. The utilization rate of satellite surface sensitive data over land, sea ice and snow conditions remains low due to poor accuracy of existing models.



2. Assessments and intercomparisons of the models are difficult because they need to be integrated with atmospheric radiative transfer models to compute top of the atmosphere radiances.
3. Emissivity and reflectivity models developed by some groups include several radiometric parameters that are not directly related to the physical parameters in NWP models.

In addition to development of a common emissivity modeling framework, the workshop recommended the archival and documentation of all existing land surface emissivity data bases from IR and microwave wavelengths at a centralized website for public access and validation of the emissivity models.

Workshop presentations are posted at <http://geo.obs-pm.fr/workshop/> (Fuzhong Weng, NESDIS)

JCSDA Annual Science Workshop

The fourth JCSDA Science Workshop was held at the Marriot Hotel in Greenbelt, MD on May 31 and June 1, 2006. Over 50 attendees took part and 34 scientific presentations were made, covering almost all of the projects supported by the JCSDA Federal Funding Opportunity and Directed Research Initiatives. The quality of the presentations was very good. The choice of venue made it possible to minimize the use of parallel sessions, enabling all participants to gain a broader understanding of the on-going activities addressing each of the JCSDA science priority areas, and how they fit together as a comprehensive program. The final afternoon was devoted to six breakout sessions in which the status of progress and future directions within each priority area were discussed and summarized. The full set of presentations is available for viewing at: <http://www.jcsda.noaa.gov/WorkShop4/index.html> (J. Yoe, JCSDA)

Federal Funding Opportunity

The selection process for the 2006 JCSDA Federal Funding Opportunity (FFO) has been completed. Four new projects have been selected for support totaling almost \$500 K during the first year. The principal investigators and their institutions are expected to receive word of their selection from the NOAA Grants Management Division in the near future.

The Announcement for the 2007 FFO has now been published. To view the announcement and download an application package, please follow these instructions:

- 1) Point your browser to

<http://www.grants.gov/>

- 2) Click on “Search for Grant Opportunities” to reach the search page

- 3) On the search page, enter

NESDIS-NESDISPO-2007-2000776

in the box “Search by Funding Opportunity Number:” and click “search”

- 4) Your browser will be directed to a synopsis of the Opportunity and a link is provided to the full announcement. (J. Yoe, JCSDA)

JCSDA Visitor



Roger Saunders of the U.K. Met Office visited the JCSDA from 17 April to 12 May 2006 as a NWP Satellite Applications Facility (SAF) visiting scientist. (For a description of the NWP SAF see Newsletter 12 on the JCSDA website.) During his visit, Roger integrated the fast radiative transfer model, RTTOV, developed and maintained by the NWP SAF, into the JCSDA’s Community Radiative Transfer Model (CRTM). This new capability provides CRTM with several different options for computing the atmospheric transmittance for particular sensor channels within the radiance assimilation system. Additionally, he explored greater collaboration between the NWP SAF and the JCSDA in the future. One outcome: Paul van Delst, the JCSDA CRTM Technical Co-Lead, is planning a reciprocal visit to the NWP SAF.

Taking time out one weekend to run an off-road half marathon, Roger came in second for his age group.

Meet Eric Bayler

As the new Ocean Data Assimilation Plans and Program Manager, Dr. Eric Bayler will be coordinating with the Director and the Executive Deputy Director of the Joint Center for Satellite Data Assimilation (JCSDA) to formulate a program and strategy consistent with starting/expanding the ocean data assimilation components within the JCSDA framework, monitoring the progress and





managing the activities/outcomes for the ocean data assimilation program. This program will consist of multiple ocean data assimilation projects supporting improved environmental modeling and prediction. In conjunction with the JCSDA Director/Executive Deputy Director, Eric will coordinate ocean assimilation activities with both internal NOAA and external organizations.

Eric completed his PhD in atmospheric and oceanic sciences at the University of Wisconsin - Madison in 2002 after retiring from a career as an oceanographer/meteorologist in the U.S. Navy. He subsequently served for four years as the NESDIS/STAR satellite oceanography division chief. Dr. Bayler is interested in broad spectrum application of satellite ocean data.

Meet Will McCarty



Will McCarty, a Ph.D. student at the University of Alabama in Huntsville (UAH), has joined the JCSDA for a two month visit to assist in the development of data assimilation techniques for AIRS radiance data. As part of his dissertation work at UAH, Mr. McCarty is working with NASA scientists at the Short-term

Prediction Research and Transition (SPoRT) Center to develop a methodology to assimilate AIRS radiance data to improve short-term regional weather forecasts. Here at the JCSDA, he will be working on improving methodologies for hyperspectral radiance assimilation over cloudy footprints in the global model by optimizing current JCSDA approaches and those he has developed at the SPoRT Center, for eventual use in the NCEP Gridpoint Statistical Interpolation (GSI) 3d-Var system. Will is a NASA Earth System Science Fellowship recipient. His dissertation work under this fellowship will apply techniques developed at the JCSDA and the SPoRT Center to short-term regional weather forecasting problems using the WRF model.

Outlook for Next Quarter

Upcoming JCSDA Events:

- JCSDA Scientific Steering Committee, August 7 and 8, 2006, at University of Maryland

JCSDA Seminars



The JCSDA Seminar Series will be on vacation during the summer and will resume in September. Thank to all the speakers in the 2005/06 Series for their excellent presentations:

John Le Marshall	Director, JCSDA
Helen Wood	Senior Advisor for Systems and Services, NOAA, and Secretariat Director, Intergovernmental Group on Earth Observations
L. Larrabee Strow	University of Maryland
Eric Wood	Princeton University
Michel Barlange	University of Arizona
Monica Coakley	MIT
Elana Fertig, Hong Li and Junjie Liu (students at UMD) (with Eugenia Kalnay, Ricardo Todling, Dirceu Herdies, Eric Kostelich and Istvan Szunyogh)	University of Maryland
Roger Sunders	UK Met Office
Oliver Reitebuch	German Aerospace Center
James Hansen	MIT

Suggestions for speakers and topics are always welcome; please send them to george.ohring@noaa.gov.

Please submit news items 2 weeks prior to the end of each quarter to george.ohring@noaa.gov