

## News in This Quarter

### New JCSDA Physical Retrieval of Sea Surface Temperature used in Upgraded Operational SST Analysis

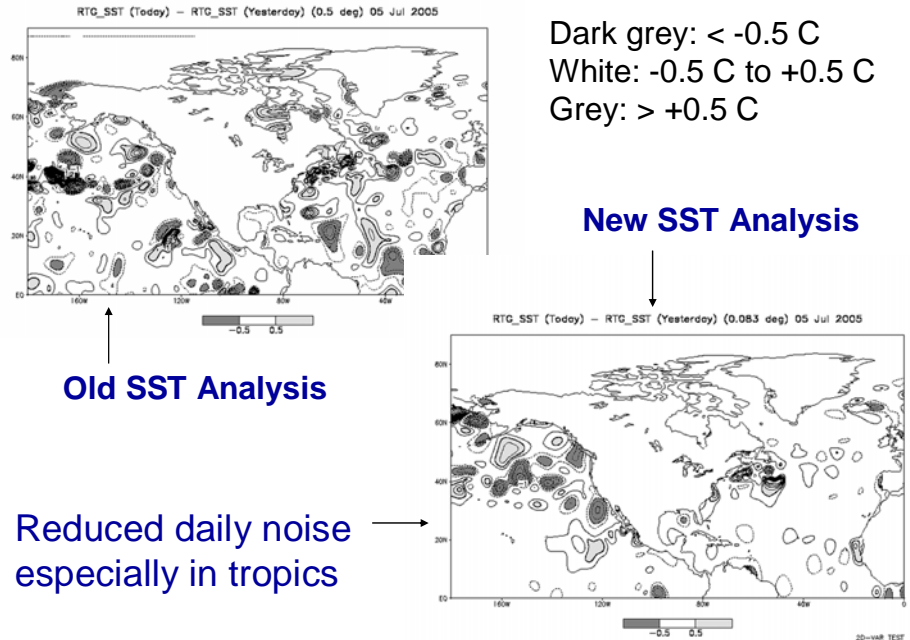
A new SST retrieval method based on a physical retrieval (variational) algorithm running within the structure of the Global Data Analysis System (GDAS) has been developed at the JCSDA. The algorithm generates more accurate and less noisy retrievals and was implemented into a new high resolution global SST analysis at NCEP on September 27, 2005.

The physical retrieval algorithm replaces a regression technique that was based on the relationship between AVHRR satellite brightness temperatures and ocean buoy data. The Navy processes the AVHRR data and produces the observed clear radiances, which are then quality controlled at NCEP. In the assimilation scheme, the cost function minimizes the increment between observed radiances and simulated radiances, and analyzed SST and its first guess. The method uses the JCSDA Community Radiative Transfer Model to simulate brightness temperatures for each channel using SST first guess (previous analysis), and air temperature and water vapor mixing ratio from GDAS. The new SST algorithm produces more accurate and less noisy retrievals that provides for slightly improved SST analyses, as shown in the accompanying diagram.

The new operational SST analysis replaces the daily real-time global sea surface temperature analysis at a 1/2 degree (latitude, longitude grid) horizontal resolution that had been running at NCEP since 2001. The old analysis used fixed and drifting buoy data and satellite AVHRR SST retrievals from only one polar satellite, NOAA 16. The satellite SST retrievals were generated using regression type equations. The new SST analysis scheme was developed as a result of requests to produce daily SST analyses at even a higher resolution in order to better resolve meso-scale ocean feature, coastal areas, bays and inland lakes. Also, it was observed that day to day differences between the SST analyses were sometimes as large as (0.5 – 1.0C).

The new daily real-time global sea surface temperature high resolution analysis at a 1/12 degree latitude, longitude grid

### Day to Day Sea Surface Temperature Difference



Reduced daily noise especially in tropics

uses the same buoy and ship data as before, but now includes satellite data from both NOAA 16 and NOAA 17, and the SST retrievals are now generated from the variational algorithm of JCSDA.  
 (W. Gemmill, NCEP)



### International Items: The EUMETSAT NWP Satellite Applications Facility

The Satellite Applications Facility for Numerical Weather Prediction (NWP SAF) is one of 8 SAFs that form part of the distributed ground segment of EUMETSAT. The NWP SAF is led by the Met Office (UK) in partnership with ECMWF, KNMI and Météo-France. The SAF began in 1999, and is now in its Initial Operational Phase (2004 -7). The activities of the SAF are 75% funded by EUMETSAT and 25% by the 4 collaborating European NWP centers.

The SAF's mission is to improve and support the interface between satellite data/products and European activities in



global and regional NWP. This is achieved through the development, distribution and support of software packages for processing and assimilating satellite data, and of satellite data monitoring reports. The SAF builds upon substantial internal activities of its partners in satellite data assimilation. (See March and June JCSDA Newsletters for summaries of activities at ECMWF and the Met Office.) The additional resources from EUMETSAT are used to co-ordinate common software developments and to build them into robust, well-supported software packages suitable to export to other centers. Although the SAF responds primarily to requirements of EUMETSAT member states, all its software packages are freely available to a world-wide user community.

### NWP SAF products

**ATOVS and AVHRR Pre-processing Package (AAPP).** This software performs the ingest and pre-processing of direct broadcast ATOVS and AVHRR data, and also pre-processing of global level 1B ATOVS data received from NESDIS. The latest version (5.1) supports NOAA-18 data, including the new MHS instrument. Version 6 will support ATOVS instruments on METOP and will also contain a major extension for IASI data.

**The fast radiative transfer model, RTTOV.** This software is used by NWP centers for several applications, including radiance assimilation. It performs radiative transfer simulations, for microwave and thermal infra-red wavelengths, as functions of variable profiles of temperature and humidity (and optionally ozone and carbon dioxide) and includes a sea-surface emissivity model. It also includes modules for simulating the effects of cloud in the infra-red, and cloud and rain in the microwave. Originally built for TOVS, RTTOV now supports a wide range of sounding and imaging instruments.

**One-dimensional variational (1D-Var) retrieval schemes.** Three schemes are currently supported. One is a generic harness suitable for many instruments, with the user providing key modules (e.g., radiative transfer scheme). The other two are complete schemes suitable for processing: (1) ATOVS, AIRS or IASI data, and (2) SSMI, SSMIS or AMSU data.

**The Quikscat Data Processor (QDP).** The QDP takes as input the NOAA Quikscat product in BUFR and performs: quality control, pre-processing, wind retrieval and ambiguity removal. The next version, the **Scatterometer Data Processor (SDP)** will process data from the ERS scatterometer, ASCAT on METOP, and Seawinds on Quikscat and NSCAT.

**Satellite data monitoring reports.** The NWP SAF website contains, or links to, an enormous range of satellite data monitoring information, much of it near real-time, including observation coverage plots, and maps and statistics of

observed-forecast differences from one or more NWP centers. Data types covered are: ATOVS, SSMI, AIRS, geo radiances, Atmospheric Motion Vectors, scatterometers, and ozone data from SBUV and Envisat.

**Support to the EUMETSAT ATOVS Re-transmission Service (EARS).** The NWP SAF supports this important service through development and maintenance of AAPP (which is used at EARS reception sites) and through real-time data monitoring to check consistency between EARS data, global data from NESDIS, and data received locally by Météo-France at Lannion.

For further information on these products visit the NWP SAF website:  
<http://www.metoffice.gov.uk/research/interproj/nwpsaf/index.html>

### Future work and wider collaboration

Collaboration between four European NWP centers, with support from EUMETSAT, has permitted the development, delivery and support of software modules for satellite data processing and assimilation, and of data monitoring services. Over the next few years the NWP SAF will contribute to the exploitation of data from new instruments important for NWP, including those on METOP, NPP and NPOESS. To achieve this, collaboration with the international community will be needed to ensure that we cover new instruments, in a timely manner, without unnecessary duplication.

In many respects the NWP SAF in Europe is the “sister” organization of the JCSDA in the USA. Co-operation between the two has already been fruitful via visiting scientist activities. Opportunities for extending this co-operation will be explored in order to meet the formidable challenges in satellite data assimilation that face the international community.

(J. Eyre, Chair of the NWP SAF Steering Group)

## Navy Goes Operational with NOAA-18 AMSU-A Radiance Assimilation

Less than one month after being declared operational on August 30, 2005, AMSU radiances are being assimilated in the global NWP model of the Navy’s Fleet Numerical Meteorology and Oceanography Center. Results from pre-operational parallel testing at FNMOC showed significant improvement for the Southern Hemisphere when NOAA-18 AMSU observations were added to all the other conventional and satellite observations assimilated by the model. This again underscores the importance of satellite observations for the ocean hemisphere. Operational use of AMSU radiances at FNMOC began on September 28, 2005.

(Nancy Baker, FNMOC)



## Operational Trial Completed for Assimilation of Six New Satellite Data Types

NCEP has completed an operational trial for the assimilation of six new satellite data types. The data types are:

- AIRS data – version 2. warmest (clearest) field of view
- Terra and Aqua MODIS atmospheric motion vectors
- NOAA-18 AMSU-A radiances
- NOAA-18 MHS radiances
- NOAA-17 SBUV total ozone
- NOAA-17 ozone profile

Use of these data resulted in more accurate forecasts, including improvement of some occasional poor forecasts. The new system has been transferred to NCEP Central Operations for implementation.

## JCSDA Director Presents Keynote Address at 15<sup>th</sup> National Symposium of Remote Sensing of China



At the invitation of the Chinese National Committee for Remote Sensing, JCSDA Director John Le Marshall gave the keynote address at the 5<sup>th</sup> Chinese Conference on Remote Sensing in Guiyang City, Guizhou Province, China. The Meeting was concerned with the development and planning of future remote sensing in China as well as recent scientific advances. The developments, mission, goals, and achievements of the JCSDA were of great interest and referred to in

discussions related to future directions for the remote sensing community. The Director was also invited to visit the Chinese Meteorological Agency. There he provided a seminar on the JCSDA and had discussions concerning the Center and the transition of satellite activities from research to operations, an area for which considerable planning has been undertaken in China. Detailed discussions on satellite activity and the effectiveness and accomplishments of the JCSDA were undertaken, along with related discussions concerning the strong Chinese satellite meteorology program.

## Meet Masahiro Kazumori



Masahiro joined the JCSDA in May 2005 as a Visiting Scientist. During his 2-year stay, he will be working on an ocean microwave emissivity model and AMSR-E radiance assimilation in the NCEP Gridpoint Statistical Interpolation

(GSI) 3D-Var system. He is developing improved quality control for radiance data and investigating the impacts of NASA AQUA AMSR-E radiance assimilation on analyses and forecasts.

He has a Master's degree in Science (Physics) from the University of Tokyo and began his research career with the Japanese government in 1997. Since 2001, he has been working for Numerical Prediction Division of the Japan Meteorological Agency (JMA). In his research, he found positive impacts of ATOVS radiances and MODIS polar winds in the JMA global data assimilation system and successfully implemented them into the JMA operational system in 2004.

Masahiro's wife, Yuki, and two children joined him in September 2005.

## JCSDA Federally Funded Opportunities (FFO) Status

### *FY 2005 Selections*

The FY 05 FFO selections for the JCSDA have been approved by the NOAA Grants Management Division. Five new projects are being funded for periods of one to three years, with average annual support of ~ \$ 90K per investigation. The conclusion of the FY 05 process signals that the JCSDA competitive FFO program has reached maturity, with first, second, and third year projects being conducted simultaneously. In all, 19 investigations received a total of \$1.6 M FY 05 support through the FFO program. These efforts are being conducted at a variety of universities, independent research institutions, government agencies, and private firms, and include all of the priority research areas defined by the JCSDA.



## Response to FY 2006 FFO Announcement

The Announcement for the 2006 FFO was published in July. In response 32 Letters of Intent (LOIs) were received by the JCSDA Program Office. Following screening reviews, 24 of the prospective applicants were encouraged to submit full proposals. The deadline for these to be received is Monday, October 3 at 5:00 p.m. EDT. The review process is expected to be completed by the end of December, 2005, and the selections submitted for approval to NOAA Grants Management Division by January 31, 2006.

(Jim Yoe, NESDIS)

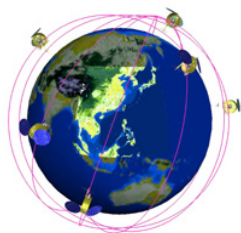


The first meeting of the THORPEX Executive Board (EB), chaired by David Burridge, took place 1-2 September in Geneva. The EB developed a long list of action items, including organization of workshops and other meetings, interfacing with other programs such as the International Polar year, organization of field programs, establishment and use of an ensemble forecast archive, and necessary administrative tasks. During the past quarter, THORPEX International Science Working Groups and panels were established. The leaders of these working groups, along with the regional committee chairs and other experts constitute the EB. The EB reports to the International Core Steering Committee (ICSC) of THORPEX; its next meeting will be held in March 2006. Meanwhile, the US representative on the ICSC, Rick Rosen of NOAA, has established the US THORPEX Executive Council with representatives from the National Science Foundation, NASA, the US Navy, and NOAA to facilitate coordination between US Federal agencies with an interest in THORPEX.

For more information on THORPEX: <http://www.wmo.int/thorpex/>

(Zoltan Toth, NWS)

## Cosmic Corner



### Data Pathway Established

Preparations for COSMIC and other upcoming operational Global Positioning System Radio Occultation (GPSRO) missions continue apace. During August arrangements were completed for the NESDIS Office of Satellite Data Processing and Distribution (OSDPD) to receive RO data in BUFR code from the COSMIC Data Analysis and Archive Center (CDAAC) at UCAR and to distribute them to NCEP and other JCSDA users. This data pathway is now being used routinely to deliver CHAMP GPSRO data to the JCSDA, and it will provide COSMIC data in near-real time when they become available after launch.



## GPS/RO Data Users Workshop



The Second GPS/RO Data Users Workshop was held at the National Conference Center in Lansdowne, VA August 22-24, 2005. The meeting was co-sponsored by UCAR and NESDIS, and organized by Bill Kuo, UCAR, and Jim Yoe, NESDIS. The workshop was attended by over 55 scientists, engineers, and program managers representing many American, Asian, and European nations. Lidia Cucurull, Martin Lohman, John LeMarshall, and Jim Yoe reported on the development of refractivity and bending angle assimilation codes, error characterization and quality control, and plans for end-to-end system testing at the JCSDA. Break-out sessions were devoted to mission status reports, data processing and real-time distribution, retrievals, assimilation, climate, and space weather. The presentations and posters from the workshop may be viewed by following the link: <http://www.cosmic.ucar.edu/gpsro2/index.html> (Jim Yoe, NESDIS)

## Outlook for Next Quarter

### Upcoming JCSDA Seminars



10/19/05	Helen Wood	Senior Advisor for Systems and Services, NESDIS	The Global Earth Observing System of Systems (GEOSS)
11/16/05 Tentative Date	L. Larrabee Strow	UMBC	Update on IR Spectroscopy

Suggestions for speakers and topics are always welcome: please send them to [george.ohring@noaa.gov](mailto:george.ohring@noaa.gov).

Please submit news items 2 weeks prior to the end of each quarter to [george.ohring@noaa.gov](mailto:george.ohring@noaa.gov)