



Courtesy of Fred Hanselmann

ISSUE 2

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Transitions

Newsletter Summer 2013

ASSISTING WITH THE TRANSITION OF PROMISING NWP TECHNIQUES FROM RESEARCH TO OPERATIONS

The 2013 Hurricane WRF

As the 2013 hurricane season continues in the North Atlantic and eastern North Pacific basins, a newly minted HWRF model is providing forecasts for the National Hurricane Center (NHC) on a new machine and with significant code additions.

On July 24, the operational HWRF went live on the Weather and Climate Operational Supercomputing System (WCOSS). A research version for testing continues in use on the jet computers at the NOAA ESRL Global Systems Division. New, more efficient code promises to provide quicker processing, allowing timely forecasts and the opportunity to use more sophisticated physics routines.

This year's HWRF has several new features and options. Among the most significant are:

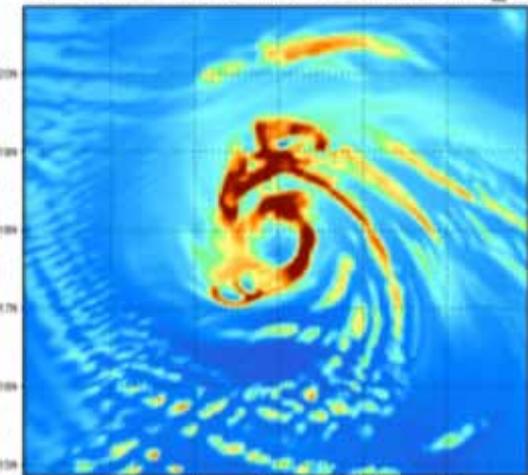
1. New data assimilation options. The HWRF can now assimilate wind information from the tail Doppler radar (TDR) on hurricane flight aircraft.
2. Use of hybrid data assimilation system, which allows better use of observations to initialize the model.
3. Increased code efficiency, which allows physics packages to run at 30 second intervals as compared to last year's 90 seconds.

.....
"Ambitious plans for HWRF in 2014 and beyond include new data and multiple moving nests."
.....

Additionally, this year's HWRF public release, for the first time, supports idealized tropical cyclone simulations and hurricane forecasts in basins beyond the eastern North Pacific and North Atlantic.

The DTC conducts testing and evaluation of HWRF, and also serves as an accessible repository for HWRF code. Software version control assures that HWRF developers at EMC, GSD, and other operational and research institutions obtain consistent results. (Continued on page 2.)

HWRF SSMIS 37GHz: DORIAN 2013072612_f12



HWRF simulated satellite image of TC Dorian

Director's Corner

Dear Colleagues,

The end-to-end modeling systems in the NOAA operational numerical guidance suite are scientifically based, and research results must and do cross the "Valley of Death" into operations. However, the operational and research communities need to make this journey more efficient and cost effective. That's one reason why we have testbeds like the DTC. During 20 years as a research scientist at NASA, I had the opportunity to work closely with NWS forecasters in Huntsville and offices across the Southeast. When I accepted a job at NOAA with EMC, I thought my understanding of what it takes to work in an operational environment was sound based on these earlier experiences. However, it soon became apparent that my perceptions about the transition of research into operations were woefully incomplete.

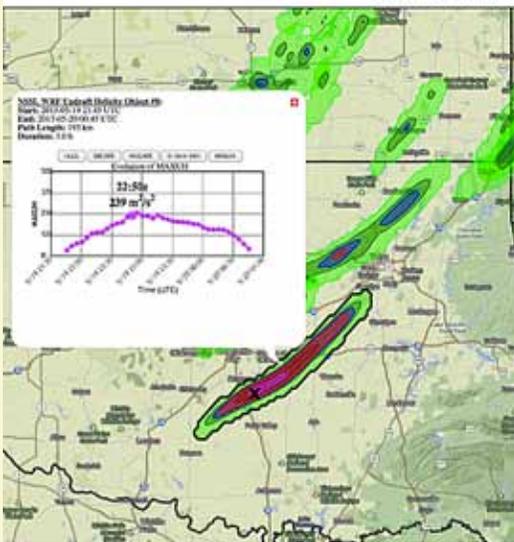
I believe that there are many ways NOAA can build a better transition process between research and operations, and I would like to share my thoughts associated with the upgrade process at EMC in future releases of the DTC Newsletter. ■



Bill Lapenta
Acting Director EMC

Did you know...

Through its Visitor Program, the DTC is currently working with Adam Clark, a scientist at the Cooperative Institute for Mesoscale Meteorological Studies (CIMMS), on a project that involves using the Method for Object-based Diagnostic Evaluation – Time Domain (MODE-TD) for identification, tracking, and visualization of simulated supercells in high-resolution



models, which will be applied and tested during annual NOAA/Hazardous Weather Testbed Spring Forecasting Experiments. Supercells are identified using updraft helicity (UH) extracted at 5-minute intervals from an experimental 4-km grid-spacing version of the WRF model run in real-time at the National Severe Storms Laboratory (NSSL), which is known as the NSSL-WRF. The UH extraction is done using a newly developed technique that minimizes data volume, and supercells are defined based on maximum intensity and longevity criteria applied to UH objects identified by MODE-TD. Geographic information and object attribute information are then combined into the GeoJSON file format and displayed using an experimental web interface developed in collaboration with Chris Karstens of CIMMS/NSSL, known as the NSSL Experimental Data Explorer. The image above is a screenshot from the data explorer showing the path as depicted by UH and associated attributes of a simulated supercell over central Oklahoma 19 May 2013.

Contributed by Adam Clark ■

(Continued from page 1.) Particular attention has been paid to facilitate the inclusion of new research developments into the operational configuration of all HWRP components. For instance, updated model routines for the Princeton Ocean Model for Tropical Cyclones (POM-TC), developed at the University of Rhode Island, can be seamlessly introduced.

Ambitious plans for the HWRP in 2014

and beyond include code allowing multiple moving nests in the same run, additional targets for data assimilation (dropsondes, etc.), and post-landfall forecasts of ocean surge, waves, precipitation, and inundation.

See the HWRP v3.5a public release announcement in this issue.

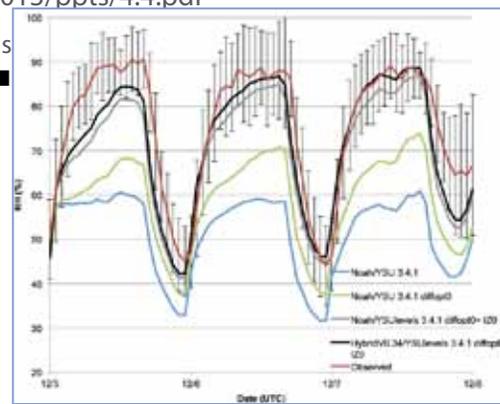
Contributed by Ligia Bernardet. ■

VISITORS AT THE DTC

Cold Pools and the WRF

Robert Fovell and Travis Wilson from the University of California/Los Angeles recently completed a visitor project titled "Improvements to modeling persistent surface cold pools in WRF", aspects of which will be part of Travis' PhD work. Travis spent nine months working at the DTC in Boulder, much of the time with his DTC host Jamie Wolff, and Rob visited for two weeks in March and June. A principal motivation for their study was the occasionally poor prediction in numerical models (including in WRF) of the formation and breakup of fog in the Central Valley in California and the possibility that better land surface models would improve those predictions. One significant result of their study is the development of a hybrid land surface model that convolves the complexity of the Noah land surface model's soil moisture formulation with the simplicity of a thermal diffusion (slab) heat transfer model. Some of their results were presented at the recent WRF Users Workshop in Boulder and can be linked to at <http://www.mmm.ucar.edu/wrf/users/workshops/WS2013/ppts/4.4.pdf>

Contributed by Travis Wilson (inset photo). ■



NEWS FROM THE DTC

Announcements and Publications

Bill Kuo elected Fellow. Bill Kuo was elected as a Fellow of the Meteorological Society of the Republic of China (Taiwan) in March 2013. ■

WORKSHOP ANNOUNCEMENT

The **6th NCEP Ensemble User Workshop** 16-18 October 2013, NCWCP, College Park, MD. See <http://www.dtcenter.org>

The **3rd Joint DTC-EMC-JCSDA Gridpoint Statistical Interpolation (GSI) Data Assimilation System Tutorial and 2nd GSI Workshop** (week of August 5-9) was held at the NCWCP, College Park, MD. See <http://www.dtcenter.org/com-GSI/users/tutorials/2013.php> ■

SOFTWARE RELEASE

MET v4.1, Verification package 22 May 2013. Available for download from the MET Users web page: <http://www.dtcenter.org/met/users/index.php>

HWRP v3.5a, Hurricane modeling system on 14 Aug 2013. The release includes all components of HWRP.

Users can go to <http://www.dtcenter.org/HurrWRF/users/index.php> to download codes, acquire datasets, and get documentation about HWRP. ■

Who's who

Ligia Bernardet



When a DTC pioneers' plaque is eventually installed, Ligia's name will be on it. She was involved with DTC activities even before it formally existed, assessing the feasibility of high resolution ensemble systems with Steve Koch. At the moment she is principally working on tropical storm forecast models as lead of the DTC Hurricane Task. For insider information about the new HWRF release and its assessment, she is the first call to make.

Ligia's interest in meteorology and numerical modeling was first developed at the University of São Paulo, Brazil, where as an undergraduate she helped provide rainfall forecasts for the local television station and the state environmental agency. As she tells it, this was a trial by fire certainly, but also an eye-opening experience with the operational side of meteorology that stuck with her, and she credits these forecasts as preventing many deaths and injuries in urban regions where landslides pose a very serious risk. After PhD studies at Colorado State University and a subsequent postdoc in Boulder, she returned to Brazil and the operational arena for a 2-year stint on a tiger team that got a numerical modeling system going in the National Weather Service. Since her return to Boulder in 2003, she has worked at the DTC and at the Global Systems Division of ESRL on several numerical model, data assimilation, and forecast evaluation projects, including projects to choose the dynamic core of the Rapid Refresh model and to improve the air-sea fluxes in Hurricane WRF.

Ligia remembers Pedro Silva Dias, one of her undergraduate professors, saying that the relationship between research and operations, via R2O, should be a glass door with an equal dose of O2R, not a 'valley of death' as it can sometimes seem. After these early experiences with operations and then several twists and turns along research paths, she is often amazed to have come nearly full circle at the DTC. ■

COMMUNITY CONNECTION

Object-based Verification at WPC

The Weather Prediction Center (WPC) at NCEP has been using MODE to supplement its traditional verification techniques since April 2010.

The Method for Object-based Diagnostic Evaluation (MODE), a utility that is part of the MET verification package, has been developed with substantial support from the DTC. Both are systematically expanded and maintained for specific DTC tasks and an array of outside users.

MODE output is available to WPC forecasters in real time through an internal website that displays graphical verification for forecasts of 24 hr precipitation valid at 1200 UTC (see the figure). Forecasters can select the forecast lead time (Day 1 – 36 hr, Day 2 – 60 hr, or Day 3 – 84 hr) and precipitation threshold (0.50 in, 1.0 in, and 2.0 in), then view the corresponding

verification for WPC forecasts and 9 numerical models.

The graphical nature of the MODE verification allows for a quick comparison of forecasts in a way that goes beyond traditional threat scores and bias values to consider other measures of forecast quality (distance between forecast and observed objects, differences in angle of orientation and object size, etc.). The most recent update to the website attempts to better quantify these qualities by adding statistical comparisons of the interest value and the displacement distance between matched objects to complement the traditional graphical comparisons. Future plans include additional statistical information on the website, including longer term summaries (monthly, annually, etc.), and making the website available to the public.

Running MODE on a national scale at an operational center like WPC can present some unique challenges since



MODE must be able to correctly identify precipitation objects from meteorological phenomena as varied as cool season synoptic scale storms to warm season convection. Determining the ideal configuration is still a work in progress, but it is an essential

piece of the puzzle in order to build forecaster confidence in the utility of object-based verification.

Contributed by Faye Barthold, NCEP WPC. ■

OPPORTUNITIES

DTC and Our Community

There are several ways to connect with the DTC. Here are a few.

1 Meet us at an event

Summer-Fall 2013 events

AMS Summer Community Mtg(CO) Aug 13-15
DTC Science Advisory Mtg (CO) Sep 25-27
6th Symposium on DA (Col Pk, MD) Oct 7-11

2 Ask a question

For this issue, we address questions about DTC verification **Q:** What are the advantages to using MET for model comparisons?

A: MET is a fully supported package; it is updated regularly and email help is available to aid with implementation and application of the MET tools. MET also includes a full suite of methods for model evaluation and comparison (including traditional and diagnostic approaches, such as a variety of spatial methods) so the user can select among the methods and apply those that are most appropriate to answer the verification questions of interest. Finally, MET includes methods for measuring the uncertainty in the verification measures to determine

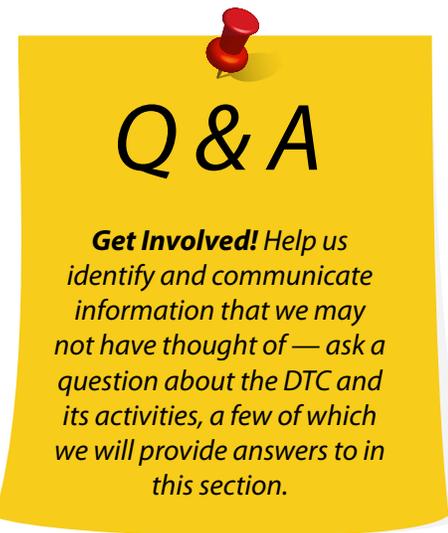
whether the statistics for two different models are statistically distinct. In addition to these attributes, application of MET allows consistent verification analyses to be applied by a variety of users.

Q: Are there plans for the DTC to provide options for MET to create plots from the statistical output?

A: The DTC has developed a database and display system for MET (called METViewer) that is currently used mainly for DTC internal testing activities. This system is also being used by a couple of other users but is not generally available to the community. If resources are available in the future, the DTC may investigate options to make METViewer available to other users. Turning METViewer into a community tool would require development of a more user-friendly version of the software, as well as documentation and other aspects of user support.

3 Become part of the visitor program

The DTC Visitor Program supports visitors to work with the DTC to test new forecasting and verification techniques, models and model components for numerical weather predic-



tion (NWP). The next Announcement of Opportunity for the DTC visitor program will be available in Sept 2013 at www.dtcenter.org/visitors/

4 Visit the website

See www.dtcenter.org for news on the DTC. There you will find DTC-related AMS presentations, DTC Visitor Program, the DTC newsletter archive, DTC directory listing and more.

5 Submit an article or question for the Newsletter

Please contact dtc-editor@noaa.gov to send questions and ideas for articles. We also welcome comments/reactions/questions about information in this newsletter at the same email address. ■

In the next issue

- An assessment of value added to the SREF forecasts by decreasing horizontal grid spacing
- Questions from our readers
- More DTC news



Sponsors

DTC primary sponsors are the National Oceanic & Atmospheric Administration (NOAA), the Air Force Weather Agency (AFWA), the National Center for Atmospheric Research (NCAR), and the National Science Foundation.



The DTC is a distributed facility where the NWP community can test and evaluate new models and techniques for use in research and operations.

This newsletter is published by:

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