

**Monthly Report
of the WRF Program Coordinator
to
Executive Oversight Board**

November 2005

1. WRF Model Implementation:

- **Next WRF operational implementations:**
 - (a) **NCEP** – The expanded 21-member multi-model Short Range Ensemble Forecast (**SREF**) system with **6 WRF members** has been approved to become operational in December (1Q) 2005. SREF will be the 2nd operational system at NCEP to use both WRF dynamical cores and physics suites. WRF members have introduced broader spread in the ensemble and have resulted in higher skill in the ensemble scores.
 - (b) **AFWA** – Extended Operational Tests of the WRF-ARW are proceeding well. Preparations for AFWA's **initial operational implementation of WRF-ARW** in its classified domains remain **on track** for March 2006.
- NCEP's implementation of the **North American Mesoscale (NAM) WRF-NMM** in March 2006 remains **on track**. Computational performance of the model on the NAM domain has been improved significantly in the past month. Testing continues to focus on improving the balance among physical processes.
- With important assistance from NCAR on software configurations, AFWA is running and **evaluating performance of WRF-ARW** versus its operational MM5 system for **10 Pacific tropical cyclones** as part of its retrospective testing leading up to implementation of WRF.

2. Community Support and Outreach:

- **Release of WRF Reference Code:** NCAR released **WRF version 2.1.1 code** on November 11, 2005. The new release contains both WRF-ARW and WRF-NMM versions and a number of upgrades and bugfixes.
- **WRF tutorials:** **Two upcoming winter tutorials** are scheduled: a WRF-ARW tutorial is planned for January 2006 and a WRF-NMM tutorial for February 2006. Exploratory discussions are being held with the objective of coordinating and eventually merging the tutorials.

3. WRF Software Development and Evaluations

- **NCEP Hurricane-WRF:** Development of a **two-way interface** for moveable nested grids in the WRF-NMM has continued in November. Hurricane-WRF remains on track for operational implementation in FY07.
- **NCAR WRF-ARW for Hurricanes:** NCAR is conducting evaluations of its **hurricane simulations** performed during the 2005 hurricane season. The tests used a **vortex-following nested-grid configuration of WRF-ARW with a 4-km inner domain**. Recent results from WRF-ARW simulations of Hurricane Wilma are available at <http://www.rap.ucar.edu/~bwb/wilma-2005/>
- NCAR has developed a **channel-model configuration of WRF-ARW** in which the northern and southern boundaries can be imposed or driven by analyses. The channel model version will be used to run multi-year nested WRF-ARW **simulations of regional climate**. The regional climate work is part of a **global WRF-ARW development** effort being undertaken by NCAR.
- AFWA is testing the value added by assimilation of **observations from Global Hawk Weather Scout UAVs in WRF-ARW** runs. For these tests, the UAV obs are applied in the inner grid of a moveable nested domain that uses the NCAR auto-vortex following capability. NCAR has provided critical help in preparing model codes for the assimilation tests.
- Under the Battlespace Environments Institute (BEI) sponsored by AFWA, **benchmarking and optimization of WRF-ARW** is being done by NCAR and hardware vendor personnel. AFWA has obtained additional funding for ARW software optimization work from the DoD HPC Modernization Program Office, to be carried out by Texas Advanced Computing Center (TACC).
- NCAR is **evaluating results** obtained from its WRF-ARW during the NSSL/SPC **2005 Spring Forecast Experiment**. Improvements in the WSM6 **microphysics** and **HRLDAS land surface moisture assimilation** appear to have been important for improving representation of convective system structure, timing and location in 4-km ARW forecasts in 2005 versus 2004. Evaluations are ongoing.

4. WRF Management

- The next **meeting of the WRF Executive Oversight Board** is scheduled for January 5, 2005, at NCAR. Logistical information for meeting attendees will be distributed very soon.
- **WRF - ESMF convergence:** Planning continues to move ahead for a WRF-ESMF technical workshop on convergence strategies, expected to be held in February 2006. The workshop will be at NCAR and a final date is close to selection.

5. DTC – OTC

- **DTC FY06 Task Plan:** The Boulder DTC nodes have developed their coordinated FY06 Task Plan, based on available resources and prioritization of proposed DTC activities provided by the DTC Advisory Board and DTC sponsors.
- **Terrain-Induced Rotor Experiment (TREX):** NRL-MRY DTC, NCAR-DTC and ARL are coordinating plans for participation in the spring 2006 TREX over Owens Valley, CA. NRL plans to run **near-real-time forecasts of COAMPS at 3-km** and ARL is exploring the possibility of running **WRF-ARW on a 1 km grid**. ARL also hopes to investigate diurnal evolution of surface and PBL characteristics, especially during stable nocturnal conditions, using TREX cases.

6. WRF and COPC

- Following review by the Joint Action Groups for Operational Community Modeling and Central Communications Management, the **WRF Joint Implementation Plan** has been forwarded for formal review by COPC's Committee for Support and Backup (CSAB).

7. WRF and Air Quality Forecasting

- **CMAQ-WRF-NMM:** Peer review of the FY06 air-quality forecast system development plan in October endorsed tasks to **adapt the numerics of CMAQ to align closely with those of WRF-NMM**. Additional changes will introduce more of the WRF-NMM meteorological fields into CMAQ to better **align the physics of the two models**. These measures should improve AQ forecast accuracy and reduce mass imbalances found in the existing CMAQ-Eta system.

Glossary of WRF Acronyms
6 June 2005

AFWA	Air Force Weather Agency
AIP	Agreement In Principle
AO	Announcement of Opportunity
ARL	Army Research Laboratory
AWRP	FAA's Aviation Weather Research Program
BAMEX	Bow Echo And MCV Experiment
COAMPS	Coupled Ocean-Atmosphere Mesoscale Prediction System™
COMET	Cooperative Program for Operational Meteorology, Education and Training
CONUS	CONTinental United States
COPC	Committee for Operational Processing Centers
DTC	Development Testbed Center
DWFE	DTC Winter Forecast Experiment
ESMF	Earth System Modeling Framework
ESRL	Earth System Research Laboratory
ExOB	Executive Oversight Board
FSL	Forecast Systems Laboratory
FTE	Full-Time Equivalent
FNMOC	Fleet Numerical Meteorology and Oceanography Center
GFS	NCEP Global Forecast System
GSD	Global Systems Division of ESRL, formerly FSL
GSI	Gridpoint Statistical Interpolation
JCSDA	Joint Center for Satellite Data Assimilation
MCV	Mesoscale Convective Vortex
MMM	NCAR Mesoscale and Microscale Meteorology division
NAM	NCEP North American Mesoscale domain
NCAR	National Center for Atmospheric Research
NCEP	National Center for Environmental Predictions
NCOM	Navy Coupled Ocean Model
NOGAPS	Navy Operational Global Atmospheric Prediction System
NOAA	National Oceanic and Atmospheric Administration
NRL	Naval Research Laboratory
NSSL	National Severe Storms Laboratory
NWS	National Weather Service
OAR	NOAA/Office of Oceanic and Atmospheric Research
OST	NWS/Office of Science and Technology
OTC	Operational Testbed Center
POP	Princeton Ocean Prediction model
QPF	Quantitative Precipitation Forecast
RAMS	Colorado State University Regional Atmospheric Modeling System
RR	Rapid Refresh version of WRF
RUC	Rapid Update Cycle
RTVS	Real Time Verification System

SPC NCEP Storm Prediction Center
SREF Short Range Ensemble Forecast
TOR Terms of Reference
USWRP US Weather Research Program
WRF Weather Research and Forecast modeling system and program
WRF-ARW WRF Advanced Research WRF dynamical core
WJIP WRF Joint Implementation Plan of COPC
WRF-NMM WRF Nonhydrostatic Mesoscale Model dynamical core
WRF-SI WRF Standard Initialization