

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

February-March 2006

**1. WRF Model Implementation:**

- **Next WRF operational implementations:**
  - (a) **NCEP** – NCEP’s schedule for implementation of the **North American Mesoscale (NAM) WRF-NMM** has been **delayed until June 2006**. Much progress has been made in balancing the physics parameterizations to the new model, resulting in verification for precipitation and other variables that are mostly comparable or superior to those of the NAM (Eta) for both warm and cold seasons. Model evaluations by NWS forecasters in the field are now underway. Final code delivery to NCEP Central Operations is scheduled for April.
  - (b) **AFWA** – AFWA's **initial operational implementation of WRF-ARW** in its classified domains has been **delayed until June 2006**. The pre-operational WRF-ARW system was upgraded to use WRF version 2.1.2 in March. This version upgrade was implemented due to the identified deficiencies in the previous version. Extended operational testing (EOT) of the WRF-ARW will be re-accomplished for many test cases and is proceeding forward, with verification scores mostly showing improvement over the previous WRF version.
- **Computational performance** of NCEP’s **WRF-NMM** on its IBM Power4 system has been **improved significantly** in recent months. Greatest efficiency gains by EMC scientists and IBM engineers have been due to the introduction of RSL-light for array exchange tasks and reordering of array indices from (i,k,j) to (i,j,k). Net overhead for running the NMM under WRF is now estimated to be roughly as expected by WRF infrastructure developers, although some additional testing is needed to confirm and quantify present performance. Further performance gains are being found through optimization of internal WRF-NMM routines.

**2. Community Support and Outreach:**

- **Release of WRF Reference Code:** NCAR released **WRF version 2.1.2 code** in late January 2006.
- **WRF tutorials:** **Winter tutorials** for new users have been held for **WRF-ARW** (Jan 2006) and **WRF-NMM** (Feb 2006). Both were well attended. The

next tutorials are scheduled for summer: WRF-ARW's tutorial is scheduled for July 24-28; the WRF-NMM tutorial is scheduled (tentatively) for August 8-11.

### 3. WRF Software Development and Model Evaluations

- **NCEP Hurricane-WRF:** Coding of **movable nested grids with two-way interfaces** in the WRF-NMM has been **completed** and is undergoing extensive testing in preparation for the 2006 hurricane season. A non-moving version of the nesting code (one-way and two-way) will be installed in the WRF code repository in April in preparation for its formal release to the community. The movable nested-grid version is expected to be ready for delivery to the repository by late spring or early summer. Hurricane-WRF remains on track for operational implementation in FY07.
- **ARL and NRL in TREX:** During March, ARL and NRL scientists provided products to forecasters and planners involved with the **Terrain-induced Rotor Experiment**. ARL provided **daily 48-h forecast guidance at 2-km** using the **WRF-ARW**. Results compared quite well with those produced by NRL using a 2-km version of its **COAMPS** model. The strong dynamics and terrain forcing in the TREX cases provided especially stressful conditions for testing the capabilities of the models.

### 4. WRF Management

- The next **meeting of the WRF Executive Oversight Board** is scheduled for April 28, 2005, at the Naval Observatory in Washington, D.C. N7C will be the host. Logistical information for meeting attendees will be distributed soon.
- **WRF - ESMF convergence:** The Technical Workshop on WRF-ESMF Convergence was held in Boulder, CO, on 9-10 February 2006. Thirteen experts representing developers, researchers and operations compared technical approaches used by WRF and ESMF to meet user requirements. Overlapping versus unique capabilities and functionalities were identified. The workshop **identified possible convergence strategies** and their pros and cons. The consensus near-term strategy is to allow WRF to run as a component of ESMF. This capability already exists. Other options will take at least several years to attain due to extensive development needed for both ESMF and WRF codes. Several **options for streamlining portions of WRF** were identified by developers and other participants. A final report from the workshop will be delivered shortly to the WRF ExOB and Program Office.

## 5. DTC – OTC

- **WRF Core Intercomparisons:** The Boulder DTC currently is conducting dynamical core intercomparison experiments on the WRF-ARW and WRF-NMM for short-range (0-24 h) forecasts covering warm and cold seasons using a 13-km full-CONUS domain (approximately the RUC domain). The carefully controlled core intercomparisons use identical initial and lateral boundary conditions and the same physics suites. Results will support development of the Rapid Refresh WRF that will replace RUC. Future testing will be necessary to examine core influences during longer forecasts (at least to +84 h), at finer resolutions, and with alternative physics suites and data-assimilations. The first round of tests for the winter months have been completed and preliminary results are expected to be available in time for the WRF ExOB meeting in April.

## 6. WRF and COPC

- The **WRF Joint Implementation Plan** has been reviewed by the three NWP OPCs and forwarded to COPC for a decision, expected at their meeting of April 5-6, 2006.

## 7. WRF and Air Quality Forecasting

- **CMAQ-WRF-NMM:** Retrospective tests have been conducted with the **CMAQ air-quality forecast model using WRF-NMM meteorological inputs**, in preparation for replacement of the Eta model in NCEP's NAM domain in June 2006. A parallel real-time air-quality forecast system is now nearing completion, which will undergo continuous testing and evaluations leading up to simultaneous operational implementation with WRF-NMM.

**Glossary of WRF Acronyms**  
**6 June 2005**

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

**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