MODEL DEVELOPMENT AND ENHANCEMENT
PRODUCT DEVELOPMENT TEAM
Monthly Report for February 2007
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Executive Summary

Task 07.5.1: Infrastructure support related to operational running of the RUC and North American Mesoscale (NAM) operational modeling systems.

- Summer RUC change package -- RUC analysis (including mesonet winds, radar reflectivity), model changes (RRTM longwave radiation and updated convection), and postprocessing enhancements (forecast radar reflectivity and tropopause theta) nearly ready to go to NCEP.

Task 07.5.4: Develop, test, and implement Rapid Refresh configuration of the WRF modeling system.

- Real-time WRF-RR 12-h cycle now running on full North American domain and CONUS domain (GSD)

Task 07.5.5: Develop, test, and implement improvements to the operational WRF 3DVARs for Rapid Refresh and North American Mesoscale runs.

- Good progress toward option to derive ensemble-based background error covariances for use in GSI (NCEP)
- Work continues on merging GSD and ARPS cloud/hydrometeor analyses and understanding sensitivity to microphysics scheme

Task 07.5.6: Develop, test, and evaluate the performance of the nonhydrostatic WRF modeling System.

- Progress toward correcting interactions between boundary-layer schemes and Ferrier microphysics

Task 07.5.8: Improve model physics for aviation forecasts

- RRTM longwave radiation implemented in development RUC with successful results for improving nighttime near-surface forecasts in warm and cold seasons. RRTM will now be included in the RUC summer change package.

07.5.15: Develop improved methods of cloud and moisture analysis for use in the WRF Modeling System.

- Real-time cycled tests of radar-based latent heat nudging in RUC diabatic digital filter initialization substantially improve 0-6 h precipitation forecasts.
- Retrospective cycled tests of combined RUC/ARPS cloud analysis (assimilating METAR cloud and GOES-cloudtop data) within GSI-WRF framework.

Detailed report – MDE – February 2007

Task 07.5.1: Infrastructure Support Related to Operational Running of the RUC and North American Mesoscale (NAM) Systems

NCEP

Dennis Keyser reports that Cooperative Agency Profiler (CAP) and RASS data are not yet available through an alternate ERSL MADIS feed. A new version of the BUFR archive library was implemented on 6 February. GOES-11 layer precipitable water retrievals and GOES-11 cloud-top pressure data were made available to the RUC assimilation on 6 February. GOES-12 satellite-derived wind quality was degraded from 20-21 February due to problems in the image calibration resulting from the activation of an anti-ice heater on the satellite. Three new subproviders (TELLURIDES, ABASINSA and ASPENSKICO) were added to the Colorado Avalanche Information Center (CAIC) mesonet on 14 February.

GSD

GSD efforts during February have focused mainly on finishing the 2007 change package for the RUC prior to its transfer to NCEP for pre-implementation testing.

This RUC analysis/model change package (planned for implementation at NCEP by early summer 2007) is currently running in the 13km dev RUC (http://ruc.noaa.gov/pig.cgi?13km_D2). A number of additional changes were developed and implemented in the devRUC13 during February, including:

- Improved diabatic assimilation of 3-d radar reflectivity via diabatic digital filter initialization.
- Addition of column-maximum (i.e., composite) reflectivity product in RUC post-processing. This is now being shown in real-time products for both the devRUC13 and the backup RUC13 (without radar reflectivity assimilation). Comparison of the radar-reflectivity from devRUC13 and backup RUC13 products has been especially effective in showing improvements from radar-reflectivity assimilation.
- Addition of lightning assimilation to complement the 3-d radar reflectivity assimilation. This adds building of convective areas where lightning strokes are evident and there is no 3-d radar reflectivity data (i.e. over oceans, outside of CONUS).
- RRTM longwave radiation package replacing current Dudhia longwave package. This change improves nighttime forecasts over snow cover (cold-season) and especially a long-standing warm bias in particularly moist areas (warm season, discussed in the FY06Q4 MDE Report).

Previous changes noted in last month's report and planned for inclusion in the RUC change package are shown below. These are also running in the devRUC13 at GSD.

- Land-surface model changes for improved 2m temperature over snow cover
- Change to Grell-Devenyi convective parameterization with improved (decreased) areal coverage for light convective precipitation (see 07.5.8 on both topics).
- Analysis changes to:
    - Assimilate mesonet winds using a new "mesonet provider uselist"
    - Differentiate wind observation error between GPS rawinsondes and non-GPS rawinsondes
    - Assimilate TAMDAR aircraft observations, if they become available for operational use
- Post-processing changes – tropopause theta.

In addition to the work on the RUC change package, GSD continued to monitor real-time RUC performance among the operational NCEP version and 4 different experimental GSD versions, using observations from rawinsondes, surface stations, GPS precipitable water, and precipitation. A new verification capability developed by Bill Moninger to verify RUC (and other) models against rawinsondes at 10-mb intervals instead of the usual mandatory-level intervals is increasingly utilized for monitoring these different RUC versions.

INTERFACE WITH OTHER ORGANIZATIONS:
Discussion between GSD and NCEP/EMC on upcoming RUC changes.
Discussions between GSD and RUC users in NWS and private sector on RUC performance.

Subtasks

07.5.1.1 Maintain hourly RUC runs and provide grids of SAV and AIV guidance products.

07.5.1.2 Provide vendors with gridded model data via Family of Services (FOS), and the FAA Bulk Weather Data Telecommunications Gateway (FBWDTG).

07.5.1.3 Provide full grids from RUC runs on NCEP and NWS/OPS servers.

07.5.1.4 Maintain access to model verification data.

Deliverables

07.5.1.E1 1 October 2006 - 30 September 2007 EMC (Rogers, Manikin, Keyser)
Perform observation ingest, quality control, and preparation in support of the operational RUC runs.

CURRENT EFFORTS:
Ongoing

Task 07.5.4: Develop, test, and implement Rapid Refresh configuration of the WRF modeling system.

NCEP
Steve Lord, director of EMC, has provided documents (Requirements for Maintenance, Enhancement and Transition to Operations for the Rapid Refresh System in the context of the more general document Requirements for Maintenance, Enhancement and Transition to Operations at the NCEP Environmental Modeling Center) to make clear the responsibilities and ramifications of the choice of dynamic core for Rapid Refresh.

GSD

GSD, NCAR and the DTC have reviewed and discussed the "Requirements" documents from NCEP referenced above and appended to last month's report, and have drafted a document describing how these requirements would be met by GSD and by NCAR should the ARW be the WRF core used in the initial Rapid Refresh implementation. Responsibilities for GSD regarding maintenance of the Rapid Refresh will be similar to those with the current RUC model, but with some responsibility taken also by NCAR, particularly regarding the ARW dynamical core and WRF software infrastructure, if the ARW core is selected.

GSD continues to run and verify WRF forecasts initialized with RUC over the CONUS domain and cycled with GSI over the RR domain; see details below. Three abstracts dealing with various aspects of work toward the RR (overall review of RR status, the RR Core Test results, and GSI progress) were submitted to the American Meteorological Society Conference on Weather Analysis and Forecasting/Numerical Weather Prediction scheduled for June at Park City UT. An additional paper dealing with diabatic initialization in RUC (but having RR application) was also submitted.

PLANNED EFFORTS: NCEP will decide on which dynamical core to use for the RR pending outcome of further discussions with GSD, NCAR and the DTC on the implications of choosing the ARW.

PROBLEMS / ISSUES ENCOUNTERED OR ANTICIPATED: None.

INTERFACE WITH OTHER ORGANIZATIONS: DTC, NCEP, NCAR

UPDATES TO SCHEDULE: None.

Subtasks

07.5.4.1 15 Nov 2006 (original due date), deferred to 15 Jan 2007. COMPLETE as of 10 Dec 2006. (GSD)

Begin real-time cycling of RR model with GSI over RR domain at degraded resolution.

CURRENT WORK: The Rapid-Refresh real-time cycle is ongoing on the IJET supercomputer at ESRL. As of 12 February 2007, the new ESRL supercomputer (WJET) became available for use. We have been testing various components of the RR system on WJET and can now complete the full migration to WJET. There remain, however, some issues with GSI on WJET (setting the endian and compiling the libraries) that Dezso Devenyi, Jacques Middlecoff and the computer staff are still working to resolve. WJET will provide increased capacity compared to IJET, so once these problems are overcome we can increase the cycle frequency from the current once per12h.

PROBLEMS / ISSUES ENCOUNTERED OR ANTICIPATED: Delayed task is now completed

INTERFACE WITH OTHER ORGANIZATIONS: NCEP

UPDATES TO SCHEDULE: This task for which we previously requested a 2-month delay (from 15 Nov 2006 to 15 Jan 2006) is now complete.

07.5.4.2 15 Jan 2007 (GSD, DTC) – Completed 5 Jan 2007

Build retrospective period capability including different seasons for testing of RR with cycling.

CURRENT WORK: The retrospective period chosen is the 10-day period 26 November to 6 December 2006. This period includes a good variety of weather, including a severe snow/ice storm and severe weather on 29-30 November over the Plains and Midwest. This retrospective period is being used for testing impact of TAMDAR observations under non-MD&E funding. It is also available for testing the summer-2007 RUC change package, if needed.

07.5.4.4 15 Nov 2006 (GSD) – Completed 15 Nov 2006.

Build graphics and web viewing capability for display of GSD RR real-time and retrospective runs.

CURRENT WORK: Web-viewing capability became available for real-time RR cycled runs over the CONUS domain in October, and is being extended to cover the full North American domain. Images and graphics from this can be viewed at http://www-frd.fsl.noaa.gov/mab/wrfruc. Limited objective verification is now available over the CONUS.

07.5.4.5 Ongoing (GSD)

Further enhancement to WRFpost version for Rapid Refresh application, including modifications to generation of RUC-specific fields.

CURRENT WORK: Tanya Smirnova has begun modifying the 2.1.2 version of WRFpost used in the RR Core Test last year so it can be used to generate grib output over the full RR domain.

07.5.4.6 Ongoing (GSD, NCAR later)

Ongoing evaluation of performance of real-time and retrospective runs of RR system for SAVs, AIVs.

07.5.4.7 1 Nov 2006 (GSD) - ongoing

Start to solicit input from other PDTs and NWS forecasters in Alaska and Puerto Rico regarding how they wish to use the RR and particular forecast challenges for which the RR might be able to provide guidance.

CURRENT WORK: Followup contacts have continued. This resulted in an invitation from James Partain, Chief of the Alaska Region Scientific Services Division, to discuss RR current development and plans with forecasters and others at the Great Alaska Weather Modeling Symposium in Fairbanks in March. The RR-relevant outcomes of this gathering will be discussed in the FY07Q2 report due next month.

INTERFACE WITH OTHER ORGANIZATIONS: NWS--Alaska Region

Deliverables

07.5.4.E1 15 October 2006 (GSD)
Complete a technical report describing the GSD preliminary real-time and retrospective testing of the WRF Rapid Refresh system.

Completed 1 September 2006. GSD report was sent to NCEP (see FAA-AWRP MD&E FY06 Q4 report) and made available on the web at http://ruc.fsl.noaa.gov/coretest2 /

07.5.4.E2 15 July 2007 (GSD)
Deliver report to NCEP on progress with WRF Rapid Refresh code toward FY09 Rapid Refresh implementation.

Task 07.5.5: Develop, test, and implement improvements to the operational WRF 3DVARs for Rapid Refresh and North American Mesoscale runs.

NCEP

Manuel Pondeca has made substantial progress in adding the option to generate ensemble-based background error covariances to the GSI-regional. The input ensemble fields, which can come either from the regional or the global ensemble system, are used to prescribe the local aspect tensor of the anisotropic component of the error covariances.

Wan-Shu Wu did some experiments in an attempt to reduce the impact of satellite radiances on moisture analysis. As reported last month, much of the NAM spindown appears to be associated with satellite data with the sign of the moisture increment opposite to that from conventional observations. To reduce the impact, conventional observation and background moisture error were decreased, since it was not obvious how to change the error of satellite radiances to achieve the same effect. Results of tests were neutral to slightly negative. Sensitivity tests to fine tune the magnitude of divergence damping in the model are also ongoing. While a value of 5x was used in the December crisis change bundle, forecasts are degraded when values less than 5x are used and seem optimal at 6x.

Dave Parrish reports that the regional strong dynamic constraint was introduced into the NAMX parallel for comparison against the operational NAM. Results after 3 weeks are mixed. There is general improvement in RMS height out to 48 hrs, but degradation by 84hrs. RMS winds are neutral to slightly positive over the entire range of forecasts. RMS temperatures are neutral to slightly worse, but always better at 100mb. Threat scores and bias degrade somewhat for heavy amounts. One consistent result appears to be that 10m winds are improved significantly over the western US, but slightly degraded over the east. The threat scores are also neutral to slightly improved for heavy precip over western US, but the opposite over the east. The current strong dynamic constraint is adiabatic. Over the western US, the constraint yields a net improvement because orographic effects are dominant and accurately included in the constraint. However, in the eastern US surface mixing may be dominant over orographic effects. A surface parameterization has been tested with GSI in global mode (M. Rancic), and we plan to introduce this in the regional mode constraint.

GSD

07.5.5.1 15 Oct 2006 (GSD and CAPS) – Completed 15 Oct 06
Report on testing of RUC-like cloud/hydrometeor assimilation (including GOES cloud-top data and METAR cloud/visibility/weather data) within WRF-GSI on the full Rapid-Refresh domain.

Report was completed 15 October 2006 and is available at http://ruc.noaa.gov/pdf/Verification_RUC_ARPS.pdf (Note that this is a 24Mb document; loading is very slow.)

Collaborative work continues between GSD and Ming Hu of CAPS to combine the ARPS and RUC cloud analysis and further test it within the RR-GSI CONUS environment, using Chris Harrop's workflow manager. Ming Hu from CAPS has recently completed an experiment with Lin microphysics scheme and is comparing it with Thompson scheme, which will be used for the Rapid Refresh (see details in 07.5.15.E3). As part of the inclusion of a model-derived forecast reflectivity in the RUC, John Brown has created a program to determine the radar

reflectivity for various values of precipitation hydrometeors based on the Thompson microphysics version used in RUC. This program will be used to assist with the comparison of the Lin and Thompson microphysics.

07.5.5.2 Based on parallel testing and refinement of the experimental code, deliver a "pre-implementation" version of WRF-GSI to replace Eta 3DVAR in NAM /NDAS (Oct '06)

07.5.5.3 Report on testing of 2DVAR WRF-GSI assimilation of high spatial and temporal mesonet surface data using analysis grids with 5km resolution and higher. (15 Dec '05)

07.5.5.4 15 January 2007 (CAPS/ NCEP)
Further refine the radial velocity analysis component of GSI in response to model resolution changes. Consider issues on data quality, super-obbing, and optimal decorrelation scales.

07.5.5.5 Development efforts will produce a "research quality" code for an upgrade package (improved covariance and use of WSR-88D satellite radiances and covariances) to the WRF-GSI. (15 May '07)

07.5.5.6 Based on case-study testing and refinement of the research quality code, deliver resulting an "experimental" code for an upgrade package (improved covariance and use of WSR-88D satellite radiances and covariances) to the WRF-GSI for the March 2008 change package to the NAM-WRF. (Jul '07).

07.5.5.7 15 Dec 2006 (ESRL) Completed 15 Dec 2006
Report on testing of RUC-like surface observation assimilation (including use of inferred PBL depth, terrain and land mask constraints, and soil temperature/moisture adjustment) within WRF-GSI on the full Rapid-Refresh domain.

Dezso Devenyi continues work on the anisotropic aspect of the Sept. 2006 version of GSI, in collaboration with Manuel Pondeca and Jim Purser of NCEP. He is incorporating the PBL height (computed as in the RUC) into the parameterization of the vertical correlation scale for the surface observation assimilation. This method will prevent intrusion of surface observation effects above the PBL. Dezso is also investigating the Monte Carlo based normalization applied in the GSI filter package. Due to the increased computation cost for the anisotropic filter package, all experiments are being done with a grid coarsening factor of four.

Overall efforts in this area, including work by Dezso Devenyi, Tom Schlatter and Steve Weygandt were summarized in the following report, available at http://ruc.fsl.noaa.gov/pdf/RR-GSI_sfc_assim_dec06.pdf:

Devenyi, D., T. Schlatter, S. Weygandt, and S. Benjamin, 2006: "Assimilation of surface data in the PBL for Rapid Refresh within the GSI analysis system", 11 pp.

07.5.5.8 15 Feb 2007 (GSD) Completed 15 Feb 07
Development efforts produce an 'experimental' version of the GSI suitable for Rapid Refresh application (e.g. includes RR-specific modifications for cloud hydrometeor and surface observation assimilation).

Experimental versions of the combined RUC/ARPS cloud analysis and the anisotropic surface observation assimilation have both been included in an experimental version of the GSI and testing and refinement continues. Ming Hu of CAPS continues work on the cloud analysis and Dezso Devenyi is doing additional tests with the anisotropic surface observation assimilation. These tests demonstrate that this milestone for this experimental version of GSI is complete, but further development will continue to refine these techniques.

Deliverables

07.5.5E1 30 March 2007 (NCEP)
Subject to NCEP Director approval implement upgrade to WRF-GSI used in NAM/NDAS.

07.5.5E2 15 July 2007 (ESRL)
Based on real-time parallel and retrospective testing and refinement of the experimental code, report to NCEP on progress toward a 'pre-implementation' version of WRF-GSI suitable for Rapid-Refresh application (to replace RUC 3DVAR in FY09).

Work continues on testing and refinement of Rapid-Refresh specific aspects of the GSI package (See 07.5.5.1 and 07.5.5.7) and refinements to real-time test cycles running on ESRL computers (see 07.5.4.1 and 07.5.4.5). Within the RR test cycle, we have switched the conventional observation feed to use the NAM observation file. Tanya Smirnova has been modifying WRFPOST version 2.1.2 for use on the full RR domain.

Task 07.5.6: Develop, test, and evaluate the performance of the nonhydrostatic WRF modeling System.

GSD, in collaboration with NCAR/MMM and NCEP/EMC

WRF v2.2 was completed as reported in January. A version of WRF-Chem compatible with WRF v2.2 and developed under other-agency funding is now ready to be introduced to the WRF repository (Grell and Peckham).

NCAR

NCAR has scheduled and has begun planning of the 8th WRF Users' Workshop. This will be held June 11-15 in Boulder at NCAR's Center Green facility. Initial abstracts will be due in April. Some NCAR personnel contributed talks to the NMM tutorial put on by the DTC in February.

Dudhia of NCAR finalized code to fix the interaction of the PBL ice mixing and the microphysics (both in ARW and NMM), and the PBL microphysical tendency interaction with the Ferrier microphysics (ARW). For ARW and NMM, related issues occur with the interaction of cumulus cloud outputs and the Ferrier microphysics, and work started on addressing these in collaboration with the NCEP physics team.

Dudhia helped to develop a minor bugfix for the Grell-Devenyi cumulus scheme for occasional blow-ups due to a logic flaw. This solved a problem found by the DTC in AFWA-related testing. He also conveyed a bugfix from Greg Thompson (RAL) for the Thompson microphysics into the repository. In separate cumulus scheme work, Dudhia begin development of a simplified parameterization as part of the WRF-Var simplified physics suite. This would be for use in adjoint code, and follows from work on simplified PBL friction and simple large-scale condensation treatments addressed in the last six months for the WRF-Var system.

Dudhia visited UCLA to collaborate with Prof. Y. Xue and his post-doc on their adaptation of the Simple SiB land-surface model to the WRF physics interface. This LSM may be an option in a future release.

07.5.6.E1 Conduct a WRF Users' Workshop and tutorials on the ARW core (NCAR) and the NMM core (DTC) for the user community 30 June 2007 (NCAR, DTC)

Task 07.5.8: Improve physics in the WRF model, especially including those that affect aircraft icing.

GSD

In addition to the efforts on the Grell-Devenyi scheme discussed below, GSD has also continued to evaluate the real-time performance in both WRF and RUC of a revised version of the Smirnova 2-layer snow model planned for the summer RUC change bundle. This revised scheme reduces excessively cold nighttime temperatures over freshly fallen snow when temperatures are already cold. This is achieved by increasing the density of freshly fallen snow once it is on the ground from an unrealistically low value previously used.

In a reverse feed from WRF back to RUC, the RRTM used extensively in WRF is now in parallel RUC testing as a candidate to replace the old Dudhia lwrad scheme. See 07.5.1 for more discussion.

Subtasks

07.5.8.4 30 January 2007 (GSD) COMPLETE
Carefully evaluate candidate convective schemes and their interaction with other physics for RR application.

CURRENT WORK: An outcome of earlier work reported on last month was a new version of the Grell-Devenyi scheme. This is planned to be part of the RUC change bundle discussed under task 07.5.1, and is currently under test in the devRUC13 cycle at GSD. This change has also been introduced into the WRF RR cycles at GSD. The main effect of the change is to reduce the areal coverage of light convective precipitation, and to delay the onset of convection in situations where it is initiated by daytime heating. This is accomplished primarily by requiring as a condition for the existence of convection in a grid column that candidate updraft air parcels reach their LFC at a pressure level closer to the level of their LCL than previously.

07.5.8.5 30 June 2007 (GSD)
Improve handling of moist processes in candidate PBL scheme for use in the RR-WRF.

As part of his responsibilities with the WRF Physics working group, John Brown is collaborating in evaluation of existing WRF boundary-layer schemes. As noted above under Task 07.5.6, Dudhia of NCAR (and also a member of the physics working group) has been working toward making the existing WRF boundary-layer schemes more thermodynamically consistent under conditions of vapor saturation and in their feedbacks with the microphysics schemes.

07.5.8.6 1 August 2007 **(NCAR)**
Test and evaluate current stratocumulus parameterizations for the prediction of icing and if necessary develop a new parameterization for the formation of icing including freezing drizzle in stratocumulus clouds. This will involve comparison to observations of well observed cases such as January 31 case from Cleveland, Ohio as part of the NASA/Glenn in-flight icing field studies and the use of LES modeling with WRF to simulate the processes forming super-cooled liquid water and drizzle. This task will be linked to the aerosol task due to the finding that CCN concentration often plays a dominant role in the formation of drizzle in these types of clouds.

Modeling work with the January 31 case from Cleveland have shown that changes to the simulation of supercooled liquid water the stratocumulus cloud for this case is sensitive to details of the Planetary Boundary Layer scheme. Future work will focus on exploring whether improving the PBL scheme can improve the simulation of icing in stratocumulus clouds.

07.5.8.8 15 August 2007 (GSD, NCAR/RAL)
In collaboration with NCAR/RAL, investigate potential for RR application of existing physics schemes that combine PBL processes with prediction of PBL-driven stratocumulus or shallow cumulus.

Deliverables
07.5.8.E2 15 June 2007 (GSD)
Report to NCEP and AWRP on testing of revised versions of microphysics and other physical parameterizations into WRF Rapid Refresh model

07.5.8.E3 30 June 2007 (GSD)
Report on overall performance of physics parameterizations in pre-implementation version of RR at annual WRF Workshop in Boulder, CO.

07.5.8.E4 30 September 2007 (NCAR)
Report on development of a predictive capability in the NCAR microphysics for aerosol concentration and mixing ratio that can be used to determine CCN and IN as a function of cloud updraft velocity, temperature, pressure, and background aerosol concentration. Sources and sinks of aerosol particles will need to be taken into account. This task will be closely linked to the stratocumulus task given above.

Task 07.5.15 Develop improved methods of cloud and moisture analysis for use in the WRF Modeling System.

Subtasks

07.5.15.2 15 May 2007 (GSD)
Develop and evaluate performance of diabatic digital filter initialization (DDFI) in the RR WRF model for initial cloud and hydrometeor fields.

GSD continues to evaluate and refine the code for radar reflectivity assimilation into the diabatic digital filter initialization (DFI) within the 13-km RUC model (prototype for WRF-RR DDFI). An experimental version of this algorithm was introduced into a real-time RUC parallel cycle on 9 Feb 2007. Qualitative assessment of the forecast fields and quantitative precipitation verification continue to indicate significant improvement in short-range precipitation forecasts. Comparisons of model-derived forecast reflectivity from cycles with and without the radar-assimilation in the DDFI also suggest substantial improvement. GSD and NCEP are discussing including this technique in a summer 2007 upgrade to the operational RUC at NCEP and a formal requirement statement for the national radar mosaic data has been submitted to NCEP. This work will serve as the basis for the inclusion of a similar technique in the WRF-based Rapid Refresh.

07.5.15.4 15 July 2007 (GSD and CAPS)
Develop a revised version of the GSI cloud assimilation treatment of satellite and METAR cloud data in its cloud analysis.

Work continues in collaboration with Ming Hu of CAPS (see 07.5.15.E3 and 07.5.5.1)

Deliverables
07.5.15.E2 15 July 2007 (GSD)
Report on progress of GSI cloud analysis code to NCEP to be part of FY08 Rapid Refresh.
(see subtask 07.5.5.1. and below)

07.5.15.E3 15 September 2007 (GSD and CAPS)
Complete further revisions and testing of the generalized cloud analysis package within GSI for stratiform cloud (using GOES cloud top and METAR cloud data) and initial treatment for convective cloud at parameterized scale assimilating radar reflectivity.

Ming Hu of CAPS conducted a new experiment with the assimilation cycles that use the microphysics option of Lin scheme instead of Thompson scheme in the WRF-ARW for the 13 March 2006 central US squall lines case. The ARPS cloud analysis scheme is employed in the new experiment as an example to study the impact of microphysics schemes on the application of cloud analysis in RR. Through the comparison of the experiments with the same cloud analysis scheme but different microphysics schemes, it is found that the choice of microphysics scheme can significantly impact the effect of the cloud analysis in the assimilation. Ming Hu is studying the details of Thompson scheme to check if it is compatible with the radar reflectivity equations used in the cloud analysis.

Task 07.5.17 Infrastructure support for running operational WRF model in Rapid Refresh, North American Mesoscale and HiResWindow modes at NCEP.

NCEP

Dennis Keyser reports that in addition to work noted in Task 07.5.1 above, the full complement of NEXRAD Level 2 radial wind data were again available for assimilation on 6 February (these had not been processed since late September due to an upstream formatting change). Also, METEOSAT-5 visible winds were once again assimilated on 6 February (visible winds had not been used for over two-years due to TOC to NCEP communication line problems which were corrected last year). European AMDAR aircraft data were unavailable 12-20 February due to a decoding problem at NCEP resulting from the addition of moisture information to the incoming BUFR data. EUMETSAT replaced METEOSAT-5 with METEOSAT-7 as the operational "east" satellite on 13 February.

Subtasks

07.5.17.1 Maintain four-per-day North American Mesoscale runs and provide SAV and AIV guidance.

07.5.17.2 Maintain four-per-day HiRes Window runs and provide SAV and AIV guidance.

07.5.17.3 Provide vendors with gridded NAM model data via Family of Services and the FAA Bulk Weather Data Telecommunications Gateway.

07.5.17.4 Provide full grids from NAM, and the HiRes Window on NCEP and NWS/OPS servers.

07.5.17.5 Maintain access to model verification data. (see subtask report under Task 07.5.1.4)

07.5.17.6 Provide assistance to In-Flight Icing, Turbulence, Convective Weather, C&V and Oceanic Weather PDT when their algorithms and product generation systems are ready to transition into NCEP's operational production suite.

Deliverables

07.5.17.E1 1 October 2006 - 30 September 2007 EMC (Parrish, Derber, Wu, Keyser)
Perform observation ingest, quality control and preparation in support of the operational North American Mesoscale WRF runs.

CURRENT EFFORTS:
Ongoing.

0.5.17.E2 1 October 2006 - 30 September 2007 EMC (Parrish, Derber, Wu, Keyser)
As requested by other PDT's, incorporate new AIV calculations into Operational WRF Model post-processor and product generator.

CURRENT EFFORTS:

PLANNED EFFORTS:

PROBLEMS / ISSUES ENCOUNTERED OR ANTICIPATED: None

INTERFACE WITH OTHER ORGANIZATIONS: GSD & NCO

UPDATES TO SCHEDULE: None