14 May 2010 - Status of FY10 MDE PDT Deliverables

Legend: ☐ **Deliverable on schedule;** ☑ **Deliverable submitted;** ☐ **Deliverable overdue,** ☐ **Change needed**

Reports on MDE web page – http://ruc.noaa.gov/faa-mde/mde_pubs.cgi

Questions for any MDE labs – CAPS, NCEP, ESRL, NCAR/RAL. Dates that have been modified in last few months.

Task 10.5.1 *Infrastructure Support Related to Operational Running of the non-WRF Rapid Update Cycle system in NCEP Operations* **(ESRL-GSD $90K; NCEP $65K)**

"Deliverable and Related Task"	Due Date	Status	Comment
10.5.1.1 Maintain hourly RUC runs and provide grids of SAV and AHP guidance products.	ongoing	☐	
10.5.1.2 Provide vendors with gridded model data via Family of Services and the FAA Bulk Weather Data Telecommunications Gateway.	ongoing	☐	
10.5.1.3 Provide full grids from RUC runs on NCEP and NWS/OPS servers	ongoing	☐	
10.5.1.4 Maintain access to model verification data.	ongoing	☐	
10.5.1.E1 Perform ingest, quality control and preparation of both existing and new observations in support of the operational RUC runs. (NCEP, GSD)	ongoing	☐	
10.5.1.E2 Perform configuration management for RUC, including thorough documentation, and respond promptly to any code malfunctions or performance issues. (GSD, NCEP)	ongoing	☐	
10.5.1.E3 Monitor RUC performance, respond to any problems detected by GSD, NCEP, or any RUC users, diagnose cause, develop solution to RUC software, test changes and coordinate with NCO on implementation. (GSD, NCEP)	ongoing	☐	

Task 10.5.17 *Infrastructure support for operational running of Rapid Refresh, North American Mesoscale, and HiResWindow (and future HRRR) at NCEP* **(ESRL $95K; NCEP $95K; NCAR $30K)**

"Deliverable and Related Task"	Due Date	Status	Comment
10.5.17.1 Maintain hourly RR runs and four-per-day North American Mesoscale runs and provide SAV and AHP guidance. (NCEP)	ongoing	☐	
10.5.17.2 Maintain four-per-day HiResWindow runs and provide SAV and AHP guidance. (NCEP)	ongoing	☐	

10.5.17.3 Provide vendors with gridded model data via Family of Services and the FAA Bulk Weather Data Telecommunications Gateway. (NCEP)	ongoing	☐	
10.5.17.4 Provide full grids from RR, NAM, and HiResWindow on NCEP and NWS/OPS servers. (NCEP)	ongoing	☐	
10.5.17.5 Maintain access to model verification data. (NCEP)	ongoing	☐	
10.5.17.6 Provide assistance to Inflight Icing, Turbulence, Convective Weather, Ceiling and Visibility and Oceanic Weather PDTs when their algorithms and product generation systems are ready to transition into NCEP's operational Production suite and/or unified model post-processor. (NCEP)	ongoing	☐	
10.5.17.7 Incorporate physics improvements from the user community, GSD, and NCEP into the WRF software infrastructure for use in the Rapid Refresh model. Perform code testing to permit implementation into WRF repository. In collaboration with GSD, assist in the evaluation of those physics schemes for the RR that may be tested using the ARW. (NCAR/MMM)	ongoing	☐	
10.5.17.8 Deliver a WRF Users' Workshop and a WRF tutorial for the user community. (NCAR/MMM)	June 2010	☐	
10.5.17E1 Perform ingest, quality control and preparation of both existing and new observations in support of the operational RR, NAM, and HiResWindow runs. (NCEP, ESRL)	ongoing	☐	
10.5.17E2 Perform configuration management for RR, including thorough documentation, and respond promptly to any code malfunctions or performance issues. (ESRL, NCEP)	ongoing	☐	
10.5.17E3 Monitor RR, NAM & HiResWindow performance, respond to any problems detected by ESRL, NCEP, or any users, diagnose source/cause of the problem, develop solution, test changes and coordinate with NCO on implementation. (ESRL, NCEP)	ongoing	☐	
10.5.17E4 As requested by other PDTs, incorporate new AHP calculations into Operational WRF Model post-processor and product generator (NCEP, ESRL).	ongoing	☐	

Task 10.5.4 *Develop, test, implement, and improve the Rapid Refresh* **(ESRL $250K; NCEP $75K)**

"Deliverable and Related Task"	Due Date	Status	Comment
10.5.4.2 Continue to solicit input from In-flight Icing, Turbulence, National Ceiling/Visibility, and Convective Weather PDTs and NWS forecasters in Alaska and Puerto Rico, on performance of pre-implementation Rapid Refresh. (ESRL, NCEP)	Nov 2009	☑	
10.5.4.3 Updated report on status of tactical planning for making RR-WRF ARW model code for 2013 in compliance with Earth System Modeling Framework (ESMF) in agreement with the Sept 2007 Rapid Refresh MOU between NCEP and GSD. Work in this area will commence in FY11 (ESRL, NCEP, NCAR)	Jul 2010	☐	
10.5.4.4 Complete pre-RFC evaluation of Rapid Refresh in accordance with NCEP pre-implementation checklist for major implementations. Respond to evaluation questions, present information on Rapid Refresh pre-implementation testing and evaluation results in various forums, as required. (ESRL, NCEP)	1 Sept 2010	☐	1 Sept is our best current estimate for completion of the pre-RFC evaluation.
Report on ESRL RR status (ESRL) (agreed by Warren, Mark G. (AWO), Stan, Steve Weygandt – 3/23/2010)	6/1/10	☐	
Report on NCEP RR status (ESRL) (also agreed – GSD, AWO – 3/23/10)	7/15/10	☐	

Task 10.5.5 *Develop, test, and implement improvements to the operational data assimilation supporting Rapid Refresh and North American Mesoscale runs* **(ESRL $170K; NCEP $120K; OU $80K)**

"Deliverable and Related Task"	Due Date	Status	Comment
10.5.5.1 Refine the radial velocity analysis component of GSI and determine the optimal decorrelation scales for different analysis passes. (OU, NCEP)	Dec 2009	☑	
10.5.5.2 Report on statistical evaluation of pre-implementation Rapid Refresh forecasts initialized with the GSI, including examination of upper-level winds, surface fields, and precipitation. (ESRL)	Feb 2010	☑	Report on MDE web page
10.5.5.3 Report on testing of 2DVAR GSI assimilation of high spatial and temporal mesonet surface data using analysis grids with 2.5-km or finer resolution. (NCEP and ESRL)	May 2010	☐	
10.5.5.4 Establish hourly cycled NDAS-like assimilation system on NOAA R&D computer at NCEP (machine called "vapor") using GSI and NMMB within NEMS to be adapted to a NEMS- and ARW-based RR by GSD. (NCEP)	Jun 2010	☑	Complete Jan 10

10.5.5.5 If authorized by NCEP Director, implement initialization of HiResWindow runs using CAPS/Shun Liu improved techniques for radial velocity analysis in GSI together with Diabatic Digital Filter use 88D reflectivity Mosaic. (NCEP)	Aug 2010	☐	Needs to be moved to Aug per Geoff D.
10.5.5.6 Based on case-study testing and refinement of the research quality code, deliver result in an 'experimental' code for an upgrade package (e.g. improved satellite channel bias correction, improved use of WSR-88D radial wind and/or satellite radiances and/or retuned co variances to the GSI for FY2011 change package to the NAM. (NCEP)	Jul 2010	☐	
10.5.5.7 Report on testing of FY11 version of GSI for late FY11 Rapid Refresh upgrade package ready for submission to NCO. (ESRL)	Aug 2010	☐	We wish to remove this milestone. With the RR implementation scheduled about this same time, it is premature to report on the FY11 version.
10.5.5E1 Further refinement to the radial velocity analysis component of GSI for Rapid Refresh configuration. (ESRL and OU)	Dec 2009	☑	
10.5.5E2 Complete report on Rapid Refresh performance, including that from the GSI component of the RR, in comparison with the operational RUC. (ESRL, NCEP)	Jan 2010	☑	Complete–Dec09 ppt to NCEP, update in Mar10. Reports on MDE web page
10.5.5E3 Pending EMC, and NCEP Center initial recommendations, Requests for Change (RFCs) are filed to submit GSI code as part of Rapid Refresh software to NCO. (ESRL, NCEP)	16 Sept 2010	☐	16 Sept – current estimate – Stan B.
10.5.5E4 New version of GSI including revised radial wind assimilation for late FY11 RR upgrade package. (ESRL and OU)	Aug 2010	☐	
10.5.5E5 Subject to NCEP Director approval implement NEMS/NMMB version of GSI (e.g. strong constraint, revised bkg+obs errors) in NAM/NDAS. (NCEP)	Sep 2010	☐	Now planned for Q2 FY2011 (per Geoff D)
Report on ESRL RR status on data assimilation (ESRL) (agreed by Warren, Mark G. (AWO), Stan, Steve Weygandt – 3/23/2010)	6/1/10	☐	
Report on NCEP RR status on data assimilation (ESRL) (also agreed – GSD, AWO – 3/23/2010)	7/15/10	☐	

Task 10.5.8 *Improve physical processes in the WRF (RR and HRRR) and NAM models, especially those that affect aircraft icing.* **(ESRL $60K; NCAR $60K)**

"Deliverable and Related Task"	Due Date	Status	Comment
10.5.8.1 Complete systematic ESRL evaluation of physics performance in GSD 1-hour RR cycles for initial RR implementation. (ESRL)	Nov 2009	☑	Init review complete
10.5.8.2 Report on research and testing on addition of the new explicit aerosol variable(s) in initiating cloud water and ice. Computer storage and run time considerations will be considered as a constraint on the development. (NCAR)	Jul 2010	☐	
10.5.8.3 Test and evaluate upgrades of RUCLSM to handle sea ice and snow cover on sea ice under wintertime conditions. (ESRL)	Apr 2010	☑	Included in WRFv3.2 just released.
10.5.8.4 Continue exploring possibilities for enhancing treatment of sea ice and tundra (including albedo changes and spring-time ponding) in Rapid Refresh domain toward a FY11 Rapid Refresh upgrade. (ESRL)	Aug 2010	☐	
10.5.8.5 Evaluate the new aerosol based ice initiation scheme that was implemented into WRF during the previous year using available case studies, including ICE-L and IMPROVE II. (NCAR)	Jul 2010	☐	
10.5.8.6 Develop a scheme to explicitly predict the number of cloud droplets based on an assumed aerosol/CCN spectrum. This includes testing various droplet activation schemes in the recent literature based on updraft, general turbulence characteristics, super saturation, and aerosol properties. These changes will enable improved prediction of the size distribution of water droplets, including when freezing drizzle will occur. (NCAR)	Aug 2010	☐	
10.5.8.7 Begin testing at ESRL of latest version of microphysics for Rapid Refresh upgrade in FY2011. (ESRL, NCAR)	Sep 2010	☐	
10.5.8E2 Pending EMC, and NCEP Center initial recommendations, Requests for Change (RFCs) are filed to submit upgraded WRF model physics code as part of Rapid Refresh software to NCO. (ESRL, NCEP)	16 Sept 2010	☐	16 Sept – current estimate – Stan B.
10.5.8E3 Provide an improved microphysics scheme to ESRL for evaluation toward the FY11 RR upgrade. (NCAR)	Jul 2010	☐	
Report on ESRL RR status on physics (agreed by Warren, Mark G. (AWO), Stan, Steve Weygandt – 3/23/2010)	6/1/10	☐	

Report on NCEP RR status on physics (also agreed – GSD, AWO – 3/23/2010)	7/15/10	☐	

Task 10.5.15 *Develop improved methods of cloud and moisture analysis for use in the Rapid Refresh and NAM Modeling Systems* **(ESRL $60K)**

"Deliverable and Related Task"	Due Date	Status	Comment
10.5.15.1 Complete improved version of generalized cloud/hydrometeor assimilation (including GOES cloud-top data and METAR cloud/visibility/weather data) within a cycled GSI on the full Rapid Refresh domain. (ESRL)	Jan 2010	☑	Complete on time, but not surprisingly, some additional mods in Mar10.
10.5.15.2 Complete improved diabatic digital filter initialization (DDFI) in the 13-km RR WRF model including assimilation of radar reflectivity data. (ESRL)	Jan 2010	☑	Complete on time, but not surprisingly, some additional mods in Mar10.
10.5.15E1 Complete testing of GSI generalized cloud analysis for Rapid Refresh and deliver code to NCEP as part of Rapid Refresh package delivered to EMC, pending availability of NCEP testing capability. (ESRL)	16 Sept 2010	☐	16 Sept – current estimate – Stan B.
10.5.15E2 Complete testing of revised cloud analysis for part of FY11 change package to Rapid Refresh. (ESRL)	Aug 2010	☐	
Report on ESRL RR status on cloud assimilation (agreed by Warren, Mark G. (AWO), Stan, Steve Weygandt – 3/23/2010)	6/1/10	☐	
Report on NCEP RR status on cloud assimilation (also agreed – GSD, AWO – 3/23/2010)	7/15/10	☐	

Task 10.5.24 *Develop, test, and improve the 3-km WRF-based High-Resolution Rapid Refresh* **($320K ESRL; $185K NCAR)**

"Deliverable and Related Task"	Due Date	Status	Comment
10.5.24.1 Design the assimilation/modeling configuration for the HRRR during the 2010 summer convection forecasting (CoSPA) exercise. (ESRL, NCAR, NCAR/MMM, CAPS, MIT/LL)	Jan 2010	☑	
10.5.24.2 In collaboration with ESRL, NCAR/MMM will work to evaluate convection-permitting (e.g., 3-km) forecasting by the ARW core for ultimate application in the HRRR. It will perform and evaluate convection-permitting forecasts using the radar-enhanced	Aug 2010	☐	

RR (13-km) grids from ESRL for initial conditions, in order to identify strengths and weaknesses of the model at high resolution. This will include analyses, for selected cases, of the evolution of convective storm mode during first 1–3 h of model transition from 13-km resolution to 3-km resolution. NCAR will collaborate with ESRL in the process and submit a summary of results. (NCAR/MMM, ESRL)			
10.5.24.3 HRRR summer exercise using modeling and assimilation modifications determined in 2010 exercise. Collaborate on analysis of HRRR tests and deliver summary of results. (ESRL, NCAR)	Sep 2010	☐	
10.5.24.4 Conduct sensitivity runs with respect to physical parameterization schemes and initial conditions for multiple high-impact weather days, collaborating with ESRL. Examine possible reasons for forecast success (or not) for these cases with regard to storm location, timing, intensity, and structural organization. (NCAR)	1 July 2010	☐	Warren, based on NCAR work on this starting, I suggest 1 July.
10.5.24.5 Analyze and evaluate the results with regard to sensitivity for prediction of turbulence, icing, and winter weather (including ground de-icing) conditions. Collaborate with relevant PDT members on evaluation of results. (ESRL)	Jul 2010	☐	Defer on this task until FY11 – NCAR cannot yet ftp 3-d HRRR data there due to volume. Also, too much work this summer on RR implementation.
10.5.24E1 Complete FY10 test (likely with full CONUS domain) with 3-km High-Resolution Rapid Refresh running every 1 h. • Conduct real-time summer 2010 HRRR forecasts using 3-km WRF initialized with radar-enhanced Rapid Refresh over full CONUS domain, monitor performance, modify code/scripts as needed, maintain high reliability working with ESRL computer facility • Coordinate with other AWRP users and other collaborators, including coordination of HRRR grid transfers • Provide project management • Lead writing of report on summer 2010 HRRR experiments (NOAA/ESRL)	Sep 2010	☐	
10.5.24E2 Collaborate with ESRL on analysis of convection-permitting forecast cases for 3-km ARW initialized with RUC-RR radar-initialized DFI grids. Draft and deliver summary of conclusions and results. (NCAR)	Sep 2010	☐	

10.5.24E3 Deliver report summarizing all HRRR experimental results on sensitivity to physical parameterizations, initial conditions and assessment of HRRR results for key case studies from high impact weather days. (NCAR)	Sep 2010	☐	
10.5.24E4 Complete a report on initial applications of HRRR forecasts to icing, winter weather, and turbulence forecasts. (NOAA/ESRL)	May 2010	☐	Defer on this task until FY11 – NCAR cannot yet ftp 3-d HRRR data there due to volume. Also, too much work this summer on RR implementation.
Draft of White Paper – rationale for 3km HRRR resolution to support NAS	4/7/10	☑	Complete – 4/13
Final version of White Paper – rationale for 3km HRRR resolution to support NAS	5/4/10	☐	

Task 10.5.19 *Develop and refine techniques to assimilate radar radial velocity and reflectivity data through GSI and Rapid Refresh toward the HRRR* **(OU $180K; ESRL $100K; NCEP $50K; NCAR $40K)**

"Deliverable and Related Task"	**Due Date**	**Status**	**Comment**
10.5.19.1 Select initial case studies from summer 2009 for 3-km HRRR data assimilation case studies. (ESRL, NCAR, OU)	Dec 2009	☑	Primary work on 29-31 July 09 period.
10.5.19.2 Run case studies from 2009-2010 using 3-km HRRR on ESRL jet computer using different RR-based initial conditions • Radar-DFI enhanced RR • Test of 3-km radar-enhanced diabatic digital filter initialization (DDFI) (ESRL, NCAR)	Aug 2010	☐	
10.5.19.3 Complete new 3-km GSI data assimilation experiments toward improved assimilation of radial wind. (OU)	Sep 2010	☐	
10.5.19.4 Develop and test improved DFI assimilation of radar reflectivity at 3-km using observation-based specification of latent heating within WRF-DFI developed by ESRL and NCAR in FY09. (ESRL)	Sep 2010	☐	
10.5.19E1 Provide new radial wind assimilation in 13km GSI designed specifically to improve HRRR initial conditions to be applied in summer 2010 HRRR exercise. (OU)	Apr 2010	☐	

10.5.19E2 Report on results from improved version of 13km/3km radar assimilation techniques for demonstration in FY10 exercise. (ESRL, OU, NCAR)	Sep 2010	☐	
10.5.19E3 Provide additional report on radar assimilation results for HRRR from winter 2009-10 case studies under the lead of ESRL with contributions from each organization. (ESRL, OU, NCAR)	Aug 2010	☐	
10.5.19E4 Demonstrate on development computer mini-NDAS data assimilation system using HRRR-like design constructed to precede HiResWindow runs or Matt Pyle's SPC runs using hourly updates with GSI. (NCEP)	Sep 2010	☐	Words added – this can by done offline but not in operations – 4/14 - GeoffD
10.5.19E5 Report on the design and initial development of an ensemble Kalman filter system (OU, NCEP and ESRL)	Sep 2010	☐	
Report on HRRR status on radar assimilation (agreed by Mark G. (AWO), Stan, Steve Weygandt – 3/27/2010)	7/15/10	☐	This is new as of 3/27 per MarkG's request.

Task 10.5.20 *Develop ensemble-based probabilistic products for aviation users* **(ESRL $180K; NCEP $140K)**

"Deliverable and Related Task"	Due Date	Status	Comment
10.5.20.1 Complete 'research quality' version of upgrade to SREF (e.g. higher resolution, NEMS members and more physics diversity or stochastic physics) for consideration in November 2010 SREF upgrade package. (NCEP)	Jan 2010	☑	Report upcoming in Q2 MDE report
10.5.20.2 NCEP visits AWC to conduct continued training and education on SREF applications, receive feedback on existing guidance, and to acquire new requirements (fully depending on FAA funding). (NCEP)	Feb 2010	☑	NCEP visit in Nov 2009.
10.5.20.4 Based on case-study testing and refinement of the research-quality code, deliver the upgrade SREF codes to NCO for November 2010 SREF upgrade package. (NCEP)	Aug 2010	☐	
10.5.20.5 Improve preliminary (developed in FY09) procedure appropriate for aviation users from Very Short-Range Ensemble Forecast (VSREF) system using high-resolution RR and NAM existing runs toward a future High-Frequency Probabilistic Forecast (HFProb) generator to be used in NextGen, including common post-processor, obs-based statistical post-processing, optimized member weighting (ESRL and NCEP)	30 April 2010	☐	

10.5.20.6 Further calibrate probabilities and potential echo-top (improve statistical reliability) ensemble cumulus information. (ESRL and NCEP)	Jul 2010	☐	SteveW, Geoff - This can be based partly or mostly on HCPF. Was this the intent?
10.5.20E2 Demonstrate products from experimental VSREF probabilistic forecasts updated hourly (ESRL and NCEP)	Aug 2010	☐	VSREF site