

DTC WRFv3.3.1 RRTMG Sensitivity Test - Archive Overview

The WRFv3.3.1 RRTMG Sensitivity Test consisted of a year-long retrospective time period from 2 June 2008 – 31 May 2009. Forecasts initialized every 36 h and run out to 48 h were generated on a 15-km grid for two configurations of the WRF-ARW with output files written every 3 h. The initialization times included both 00 and 12 UTC for a total of 243 cases. The dates for which forecasts were generated are listed below.

00 UTC Initialization	12 UTC Initialization
June 2008: 4, 7, 10, 13, 16, 19, 22, 25, 28	June 2008: 2, 5, 8, 11, 14, 17, 20, 23, 26, 29
July 2008: 1, 4, 7, 10, 13, 16, 19, 22, 25, 28, 31	July 2008: 2, 5, 8, 11, 14, 17, 20, 23, 26, 29
August 2008: 3, 6, 9, 12, 15, 18, 21, 24, 27, 30	August 2008: 1, 4, 7, 10, 13, 16, 19, 22, 25, 28, 31
September 2008: 2, 5, 8, 11, 14, 17, 20, 23, 26, 29	September 2008: 3, 6, 9, 12, 15, 18, 21, 24, 27, 30
October 2008: 2, 5, 8, 11, 14, 17, 20, 23, 26, 29	October 2008: 3, 6, 9, 12, 15, 18, 21, 24, 27, 30
November 2008: 1, 4, 7, 10, 13, 16, 19, 22, 25, 28	November 2008: 2, 5, 8, 11, 14, 17, 20, 23, 26, 29
December 2008: 1, 4, 7, 10, 13, 16, 19, 22, 25, 28, 31	December 2008: 2, 5, 8, 11, 14, 17, 20, 23, 26, 29
January 2009: 3, 6, 9, 12, 15, 18, 21, 24, 27, 30	January 2009: 1, 4, 7, 10, 13, 16, 19, 22, 25, 28, 31
February 2009: 2, 5, 8, 11, 14, 17, 20, 23, 26	February 2009: 3, 6, 9, 12, 15, 18, 21, 24, 27
March 2009: 1, 4, 7, 10, 13, 16, 19, 22, 25, 28, 31	March 2009: 2, 5, 8, 11, 14, 17, 20, 23, 26, 29
April 2009: 3, 6, 9, 12, 15, 18, 21, 24, 27, 30	April 2009: 1, 4, 7, 10, 13, 16, 19, 22, 25, 28
May 2009: 3, 6, 9, 12, 15, 18, 21, 24, 27, 30	May 2009: 1, 4, 7, 10, 13, 16, 19, 22, 25, 28, 31

The archive resides on the NCAR High Performance Storage System (HPSS). The following paragraphs describe the overall directory structure of this archive.

/DTCRT/INPUT_DATA: Root directory for all data used to generate the initial and lateral boundary conditions for the retrospective forecasts. The input files are grouped into subdirectories named **yyyymmdd**, where *yyyy* corresponds to the year of the forecast cycle, *mm* corresponds to the month, *dd* corresponds to the day. The following types of files are archived under the **INPUT_DATA** subdirectory:

yyyymmdd_ihh_GFS004.grb2.tgz: contains GFS forecast grids initialized every 36 h (starting on 20080602 12 UTC) with the file naming convention *yyyymmdd_ihh_fhhh_GFS004.grb2*, where *yyyy* corresponds to the year *mm* corresponds to the month, *dd* corresponds to the day, *hh* corresponds to the hour of the

forecast initialization (00 or 12 UTC) and *hhh* corresponds to the forecast hour (available every 3 h from 000 to 048)..

agrmnet.grib.03hr.yyyyymmddhh.Z: AGRMET analysis grids where *yyyy* corresponds to the year, *mm* corresponds to the month, *dd* corresponds to the day, and *hh* corresponds to the hour of the forecast initialization (00 or 12 UTC).

navysst.Z: SST analysis grids valid at 12 UTC daily.

/DTCRT/RCv3.3.1/RRTMG: Root directory for all output files, METViewer plots, code, scripts, and static files.

static: Subdirectory containing all time-independent namelists used to run the forecast system.

Subdirectory **DOMAINS** has the files **AFWAref_static.tar.gz** and **RRTMG_static.tar.gz**, which contain the namelists to run the WRF Pre-Processor (WPS), the WRF model, and the Unified Post-Processor (UPP) for the two configurations of the ARW dynamic core.

Subdirectory **EXT_DATA** has the files **static.tar.gz**, which contains the geogrid and metgrid TBL files, along with the Variable Tables used to run the ungrib program of the WRF Pre-Processor, and **met_config.tar.gz** which contains the configuration files for running MET.

code: Subdirectory containing all source codes and scripts for end-to-end system. The code used was WPSv3.3.1, WRF v3.3.1, UPP v1.0, and MET v3.0.1. Scripts, workflow manager, and log files are also located in this subdirectory.

yyyymmddhh: Subdirectories contain output files for each forecast cycle, where *yyyy* corresponds to the year of the forecast cycle or initial time of the forecast, *mm* corresponds to the month, *dd* corresponds to the day, and *hh* corresponds to the hour. Three subdirectories exist under each data subdirectory and contain the following data:

AFWAref and **RRTMG:** The subdirectories under these two headings are as follows:

metprd: contains **metverif.tar**, which has all the verification output files. All of these files were produced by the Model Evaluation Tools. The Point-Stat tool statistics files ("point_stat*.stat") contain surface and upper air point verification statistics. The Grid-Stat tool statistics files ("grid_stat*.stat") contain traditional and neighborhood verification statistics for 24-h and 3-h Quantitative Precipitation Forecasts (QPF). The MODE tool statistics files ("mode*_obj.txt" and "mode*_cts.txt") contain the object-based and traditional verification statistics for 24-h and 3-h QPF. The MODE tool postscript output files ("mode*.ps") contain a graphical depiction of the object-based verification method. Also included is the **wrfpcp.tar** file that contains the NetCDF files with 3-h and 24-h precipitation accumulations that have been run through PCP-Combine.

nclprd: contains the file **images.tar**, which has all the image files generated for the forecast.

postprd: contains post-processed output files. All of these files were produced by the WRF Post-Processor and are in GRIB format. The **wrfprs.tar** file contains the GRIB files with 3D grids on pressure surfaces and 2D grids (files used by DTC for verification and image generation), the **wrftwo.tar** file contains the GRIB files with 2D grids, and the **WRFNAT.tar** file contains the GRIB files with the 3D grids on the model native vertical coordinates.

wpsprd: contains final output from WPS process metgrid (**met*** files). WPS was ONLY run for the AFWAref configuration and the output was used as input for both configurations.

wrfprd: contains the raw WRF output files on the native grid (**wrfout***). Output was generated every 3 h over the 48 h forecast with each forecast time (or valid time) written to a separate file. Additionally, this directory contains output files from real (**wrfinput_d01** and **wrfbdy_d01**).

Besides the **AFWAref/** and **RRTMG/**, a third subdirectory (**AFWArefRRTMG**) contains the file **nclprd/images.tar** with the images of the difference fields between AFWAref and RRTMG.

METViewer: Subdirectory containing all load and batch XMLs (**metviewer_xmls.tar.gz**) as well as all vertical level, lead series, and threshold plots for the stand-alone AFWA and RRTMG configurations (v3.3.1), AFWAref-RRTMG (v3.3.1) configuration differences, and AFWAref version differences (v3.3.1/v3.2.1/v3.1.1), named **plots_AFWAref.tar.gz**, **plots_RRTMG.tar.gz**, **plots_AFWAref_RRTMG.tar.gz**, **plots_AFWAref_vdiff.tar.gz**, respectively.

/DTCRT/OBS: Root directory for all the observation files used for the forecast verification. The observation files are collected into subdirectories for each type named **NDAS** (point observations), **RFC8** (gridded 24-h precipitation accumulations valid at 12 UTC), and **ST2** (gridded 3-h precipitation accumulations valid every 3 h). Each has subdirectories named **yyyymmdd**, where yyyy corresponds to the year, mm corresponds to the month, and dd corresponds to the day for which the observations are valid. The following types of files are archived under the observation subdirectory tree:

ndas_prepbufr.yyyyymmdd.nr.tar.gz: contains NDAS prepbufr files used for the surface and upper air point verification every 3 h.

rfc8.yyyyymmddhh.Z: contains NCEP/CPC's 1/8 degree daily precipitation analysis valid at 12 UTC.

st2m_yyyymmdd.tgz: contains Stage-II national multi-sensor hourly precipitation analysis data summed over 3-h intervals.

Data with problems:

Missing forecasts:

Affected Cycle	Missing data	Reason
2008071000	WRF output	Missing SST input data
2008091512	WRF output	Bad SST input data
2008101512	WRF output	Bad SST input data
2008101700	WRF output	Bad SST input data
2008101812	WRF output	Bad SST input data
2008102112	WRF output	Missing AGRMET input data
2008121112	WRF output	Bad SST input data
2009040112	WRF output	Bad SST input data
2009042212	WRF output	Bad SST input data
2008052400	WRF output	Missing SST input data
2008052512	WRF output	Missing SST input data

Missing verification:

Affected Cycle	Missing data	Reason
2008071300	Incomplete sfc/upper-air verification beyond 33 h	Missing Prepbuf data
2008071412	Incomplete sfc/upper-air verification for first 21 h	Missing Prepbuf data
2008101400	Incomplete sfc/upper-air verification beyond 39 h	Missing Prepbuf data
2008110100	Incomplete 3-h QPF verification beyond 21 h	Missing ST2 analysis
2008110212	Incomplete 3-h QPF verification for first 12 h	Missing ST2 analysis
2008012100	Incomplete sfc/upper-air verification for 18 – 21 h	Missing Prepbuf data
2009012700	Incomplete sfc/upper-air verification for 24 – 27 h	Missing Prepbuf data