# WRF Model Version 3.2 : Known Problems and Fixes

Thompson Scheme (posted 12/13/10)

**Problem**: WRF Versions 3.2 and 3.2.1 contain a MAJOR bug in the Thompson et al microphysics option number 8. The bug applies for ALL simulations using this option but is worst for high resolution convective cases because it involves the production of graupel from rain and snow collisions. Any users of this scheme should not trust the results of simulations using these code versions because, instead of creating graupel due to rain/snow collisions, the bug was causing the removal of graupel. This bug is NOT found in earlier versions of WRF.

Besides the bug fix for graupel, other changes have been made to the scheme including a more subtle bug related to rain evaporation that has existed in ALL WRF code versions containing the Thompson et al (2008) scheme since late 2006. This bug was minor in comparison but is fixed in the new code. Any users wishing to fix the rain evaporation bug (involves 2 lines of code) in previous WRF versions may contact the author for details to include this change only.

Also, the intended bug fix replacement file contains a new method to determine the graupel Y-intercept parameter as a design change as well as changes to handle mass/number imbalance checks, especially related to sedimentation. The latter changes are better mathematically and should be hardly visible in real simulations, but came about due to testing the sedimentation scheme in isolation from the rest of the code. The bug-fix code should also be released as part of the next standard WRF code release, though further changes are possible between now and Spring 2011.

**Solution**: Download a new copy of [module\_mp\_thompson.F.fixed](http://www2.mmm.ucar.edu/wrf/src/fix/module_mp_thompson.F.fixed) and replace the one in phys/ directory. Recompile.

Uninitialized Variable Problem (posted 5/5/10)

**Problem**: A problem with potentially uninitialized ProcOrient field in linked lists of state variables is uncovered in V3.2. This could lead to sporadic hanging of MPI jobs.

**Solution**: Download [gen\_allocs.c](http://www2.mmm.ucar.edu/wrf/src/fix/gen_allocs.c) file and replace the same file in WRFV3/tools/ directory, and do a full recompile that begins with 'clean -a'.

Grid-nudging File Generation Error (posted 4/20/10, updated 9/7/10)

**Problem**: There is an error introduced in V3.2 that causes some fields being incorrectly zeroed out in the real program when writing out the wrffdda files.

**Solution**: download [reg\_parse.c](http://www2.mmm.ucar.edu/wrf/src/fix/reg_parse.c) file and replace the one in WRFV3/tools/ directory. Do 'clean -a' (note, one must use '-a'), and recompile.

If you are compiling with WRF-Chem, there is another change needed in Registry.EM\_CHEM: search for string 'igr', and change it to 'i{10}r'. Do 'clean -a', and then recompile.

Additional namelist Required To Specify IO Format Option (posted 4/20/10)

Due to expanded IO capability in V3.2 (runtime IO and increased IO streams), several runtime options require additional namelist.

1. sst\_update: it requires io\_form\_auxinput4 = 2 in &time\_control  
2. find\_input\_stream: it requires io\_form\_auxinput2 = 2 in &time\_control

Other namelists like io\_form\_history, io\_form\_input, io\_form\_boundary and io\_form\_restart are also required in the namelist.input.

Possible Performance Hit with V3.2 code (Posted 4/2/10)

**1**: Two fixes introduced in V3.2 may result in performance hit. One of them is the change for RRTM longwave radiation option. Since the fix involves adding model layers above model top, the lower the model top (p\_top), the more likely to see a slow down.

**Solution**: One solution is to increase the time interval to call the scheme hence maintain the same wallclock time. The other solution is to modify phys/module\_ra\_rrtm.F, line 31, and change layer depth *deltap* from 4 mb to a larger value. However with larger layer depth, one may not obtain optimal results.

**2**: The other performance hit is related to adding semi-lagrangian fall terms in all WSM/WDM schemes. This could affect finer grid model run more.

Compile V3.2 with ifort (posted 4/2/10)

With the new code, one must ust at least ifort 10 to compile

Restart Issue (posted 4/2/10, updated 8/18/10))

**Problem**: There are problems with restart produing idential results as continous run for physics options level 3 MYNN PBL, and BEP urban option.

**Solution**: Do not use restart when these options are used.

OpenMP And MPI For Some Physics in V3.2 (posted 4/2/10)

**Problem**: Certain physics options do not work correctly with OpenMP or MPI compile. These are

- mp\_physics = 9 (Milbrandt-Yau scheme) (OpenMP)  
- sf\_urban\_physics = 2 (BEM) (OpenMP)  
- ishallow = 1 (MPI)

There is no known problem with these physics options if OpenMP or MPI is not used.

**Solution**: Do not attempt to use the above listed options with OpenMP or MPI compile.

# WRF Model Version 3.3 : Known Problems and Fixes

Problem with Program real.exe (posted 5/27/11)

**Problem**: There is a bug in program real which was introduced in V3.3. If you have getting a seg fault running program real, or having trouble running wrf.exe, this might be the cause.

**Solution**: Please download [module\_initialize\_real.F.fix-3.3](http://www2.mmm.ucar.edu/wrf/src/fix/module_initialize_real.F.fix-3.3) to WRFV3/dyn\_em/ directory. Recompile.

Problem with New Configure Script (posted 4/8/11)

**Problem**: There is a problem with the new configure script on Opensuse and Ubuntu Linux. It will fail on creating configure.wrf file, and may result in file removal in the top WRFV3/ directory. If configure.wrf is successfully created, then this fix doesn't affect you.

**Solution**: If files are removed from WRFV3 directory, you will have to redownload the V3.3 tar file, or re-untar the file. Then download the [configure\_fix.tar](http://www2.mmm.ucar.edu/wrf/src/fix/configure_fix.tar) file in the WRFV3 directory. This file contains a new configure script, and a new arch/configure\_new.default file.

Bug in SKEB code (posted 4/6/11)

Problem: A bug is reported to use SKEB (stochastic kinetic-energy backscatter scheme) with a variable (idiv) used but not defined.

Solution: The change is to add

idiv = 7

after line 889 of dyn\_em/module\_stoch.F. Or download the file [here](http://www2.mmm.ucar.edu/wrf/src/fix/module_stoch.F.fix).

Compile V3.3 with ifort (posted 4/6/11)

**Problem**: With the use of ifort 10.1, the model may seg fault with CAM and RRTMG radiation options with default compiler option.

**Solution**: Reduce the optimization level from -O3 to -O2 appears to resolve the problem.

OpenMP And MPI For Some Physics in V3.3 (posted 4/6/11)

**Problem**: Certain physics options do not work correctly with OpenMP or MPI compile. These are

- mp\_physics = 9 (Milbrandt-Yau scheme) (OpenMP)  
- sf\_urban\_physics = 2 (BEM) (OpenMP)  
- ishallow = 1 (OpenMP and MPI)

There is no known problem with these physics options if OpenMP or MPI is not used.

**Solution**: Do not attempt to use the above listed options with OpenMP or MPI compile.

# WRF Model Version 3.3.1: Known Problems and Fixes

Bug Fix for Morrison Microphysics Option (posted 11/16/11)

**Problem**: A bug was introduced in V3.3.1 in Morrison microphysics scheme. The bug affects cloud ice fallspeed, and hence cirrus lifetime and radiative forcing. The effect of the bug is less in shorter simulations, but significant in terms of high cloud cover and LW radiative forcing in longer-term climate runs. This bug is not present in V3.3 and earlier.

**Solution**: Edit phys/module\_mp\_morr\_two\_moment.F, and change line 1289 to

AIN(K) = (RHOSU/RHO(K))\*\*0.35\*AI

Or download the routine [here](http://www2.mmm.ucar.edu/wrf/src/fix/module_mp_morr_two_moment.F.fix).

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**Solution**: Reduce the optimization level from -O3 to -O2 appears to resolve the problem.

OpenMP And MPI For Some Physics in V3.3 (posted 4/6/11)

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- mp\_physics = 9 (Milbrandt-Yau scheme) (OpenMP)  
- sf\_urban\_physics = 2 (BEM) (OpenMP)  
- ishallow = 1 (OpenMP and MPI)

There is no known problem with these physics options if OpenMP or MPI is not used.

**Solution**: Do not attempt to use the above listed options with OpenMP or MPI compile.

"HANGING" PROBLEM FOR SOME MACHINES

For machines with relatively small per-processor memory, such as blue gene, this fix removes the problem of just "hanging" when trying to open netcdf files.  For users who have no troubles with the current netcdf IO, this fix is not required.

Solution: Reduce the MaxTimes variable to ten thousand from nine hundred thousand. Please look at code external/io\_netcdf/wrf\_io.F90 (or external/io\_pnetcdf/wrf\_io.F90 if you run parallel netCDF). Change line 44 from:

**integer   , parameter      :: MaxTimes         = 900000**

to:

**integer   , parameter      :: MaxTimes         = 10000**

The code needs to be recompiled (no ./clean -a is necessary).

PGI dmpar compile not giving bit-for-bit results between two identical runs (posted 12/31/13)

**Problem**: When compiling with PGI in dmpar, the results will not be identical from one run to the next, using the exact same namelist configuration.

**Solution**: In the arch/configure\_new.defaults file, you will see the following line:

FCOPTIM = -fastsse -Mvect=noaltcode -Msmartalloc -Mprefetch=distance:8 -Mfprelaxed # -Minfo=all =Mneginfo=all  
  
Comment out '-fastsse' so that it reads:   
  
FCOPTIM = -O3 #-fastsse -Mvect=noaltcode -Msmartalloc -Mprefetch=distance:8 -Mfprelaxed # -Minfo=all =Mneginfo=all   
  
You will then need to do a './clean -a' and then reconfigure and recompile.

# WRF Preprocessing System Version 3.2: Known Problems and Fixes

Known Problems in Version 3.2 and 3.2.1

**Problem**: There is a processing error in degribing grib 2 NCEP 1/12 degree SST data (rtg sst 0.083 degree data). The difference errors (.08333333 - .083) accumulate from west to east so the error is about 1.5 degrees longitude at 359 deg east. The sst errors are significant along the east and west coasts of the U.S. as well as in the Great Lakes. If you have this data in grib 1 format, it is fine.

**Solution**: Download the modified [rd\_grib2.F](http://www2.mmm.ucar.edu/wrf/src/fix_wps/rd_grib2.F) to WPS/ungrib/src.

PROBLEM USING GFS REAL-TIME DATA SINCE MAY 22, 2012:

**Problem**: NCEP has updated its real-time GFS GRIB2 files, beginning 2012-05-22\_12:00:00. This is causing ungrib to extract incorrect data for surface fields. If your domain includes a pole or the Prime Meridian (0° longitude), program real may abort. If your domain lies elsewhere, the real program may not abort, but you will likely get incorrect surface fields.

**Solution**: You need to go into the /WPS/ungrib/src/rd\_grib2.F file and search for these lines:  
  
elseif(gfld%ipdtmpl(10).eq.101) then   
! MSL   
level=201300.  
  
Below that, you will need to add the following:   
elseif(gfld%ipdtmpl(10).eq.103) then   
! Height above ground (m)  
if ( (gfld%ipdtmpl(12) .eq. 2. ) .or.  
& (gfld%ipdtmpl(12) .eq. 10.) ) then  
level=200100.  
else  
cycle MATCH\_LOOP  
endif  
  
Once you add this, save the file and recompile WPS. There is no need to perform a 'clean -a' or to reconfigure.