WRF Version 2: 2006 Update

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Version Releases

- Version 2.0 (May 2004)
- Version 2.1 (August 2005)
  - 2.1.1 (November 2005)
  - 2.1.2 (January 2006)
- Version 2.2 (~ September 2006)

New in Version 2.1

- *Thompson et al. (2004) microphysics*
  - *mp_physics = 8*
  - *Contributed by Hall, Thompson, Rasmussen (NCAR)*
  - *Scheme includes graupel and 2-moment ice clouds*
  - *ARW only*
  - *New scheme for ARW and NMM coming (see later)*

New in Version 2.1

- *Updated to 2005 NCEP physics*
  - *BMJ cumulus scheme*
    - *Significant reduction in activity but 2.2 version will restore much of this*
  - *MYJ PBL scheme and surface layer (minor)*
  - *GFDL radiation scheme (minor)*
  - *Ferrier microphysics (minor)*

New in Version 2.1

- *Added GFS physics for NMM core*
  - *Simplified Arakawa-Schubert cumulus*
  - *GFS PBL and surface layer*

Not tested in ARW yet

New in Version 2.1

- *Rayleigh damping for idealized cases (G. Bryan)*
  - *damp_opt = 2*
  - *Relaxation to the given input sounding*
  - *Alternative to the diffusion damping (damp_opt=1)*

New in Version 2.1

- *Sea-surface temperature update*
  - *sst_update = 1*
  - *Reads in SST as model runs*
  - *Needed in long-term integrations*
  - *Not yet able to update sea ice*

New in Version 2.1.1

- *Periodic channel boundary conditions for global channel*
  - *specified = .true., periodic_x = .true.*
  - *Mercator projection only*
  - *Used in Nested Regional Climate Model runs at NCAR*

New in Version 2.1.2

- *Program 'real' updated to handle all nests in a single run*
  - *Avoids renaming files and re-writing namelist when dealing with multiple nested inputs*

Bug-fixes in Version 2.1

- *w-damping reactivated in 2.1 (error since 2.0.3.1)*
- *Charnock ocean-surface roughness length activated in 2.1.1 (wind effect missing till this correction)*
  - *Affects only MRF and YSU PBL*
  - *Important for hurricanes*
- *Cumulus cloud detrainment reactivated in 2.1.2 (missing since 2.1)*
  - *Used by KF and GD cumulus schemes*

Improvements in Version 2.1

- *Noah land surface model emissivity better coupled to radiation (2.1.1)*
  - *Reduces night-time warm bias*
- *Goddard shortwave - minor fix for robustness (2.1.2)*
- *YSU PBL - minor fix for robustness (since 2.1.2, see Known Problems page for downloadable version)*

Improvements in Version 2.1

- *Program 'real' updated to handle all nests in a single run (2.1.2)*
  - *Avoids renaming files and re-writing namelist when dealing with multiple nested inputs*
- *2-way nesting improved by introducing boundary relaxation zone in nests*
  - *Stops streamers emanating from inflow boundary at high levels*

Planned in Version 2.2

- *New pre-processing system for WRF (WPS) - see talk by Dave Gill*
- *Improved post-processing*
  - *GrADS to work with IO API*
  - *NCL ready-made binaries downloadable*
  - *RIP to work with new pre-processor files*

Planned in Version 2.2

- *Urban canopy model as part of Noah LSM - see talk by Mukul Tewari*
- *New Thompson et al. (2006) microphysics - see talk by Greg Thompson*
- *CAM 3.0 radiation package from CCSM*
- *swrad_scat parameter to tune clear-sky scattering in Dudhia (1989) shortwave radiation*

Planned in Version 2.2

- *Grid-nudging FDDA*
  - *2005 workshop talk by Dave Stauffer (PSU)*
  - *First release has*
    - *3d-field U,v,T,q nudging towards time-interpolated analyses*
    - *Weighting may be optionally zero in PBL*
    - *Not yet 2d surface analysis nudging*

Planned in Version 2.2

- *Obs-nudging FDDA - see talk by Yubao Liu (RAL/NCAR)*
- *CSU double-moment microphysics package - see poster by Laura Fowler (CSU)*
- *Update physics to NCEP's 2006 NAM operational implementation suite (BMJ cu, Ferrier mp, MYJ pbl, GFDL rad)*

Planned in Version 2.2

- *Sixth-order horizontal filter - work by Jason Knievel and George Bryan*
- *Positive definite advection for scalars - work by Bill Skamarock*

Planned in Version 2.2

- *Modified version of Grell-Devenyi cumulus scheme*
- *Modified versions of WSM microphysics schemes from Songyou Hong*
- *Modifications for using RUC soil data in WRF*

Ongoing work

- *Physics for high-resolution applications (dx ~ 100 m)*
  - *Bin microphysics - see talk by Barry Lynn*
  - *Large-eddy PBL scheme - WRF-LES work by Chin-Hoh Moeng (NCAR/MMM), for example*
    - *Need to couple TKE-diffusion to surface fluxes in order to replace PBL scheme with resolved-eddy scheme*

Ongoing work

- *Hurricane modeling*
  - *Surface stress and flux formulations*
  - *Ocean mixed-layer column model*
  - *Improving moving nests*

Ongoing work

- *Regional Climate*
  - *Coupling to CCSM's CLM land-surface*
  - *Nesting within CCSM for downscaling*
  - *More in talks by Ruby Leung (NRCM) and Xinzhong Liang (CWRF)*

Other development

- *NASA-Goddard, Naval Research Lab, and EPA, also have WRF physics development projects that may feed into near-future WRF releases*
- *Probably many others not listed here*

Thank you