WRF-Var/WRF Test Suite Scripts

WRF Tutorial Presentation

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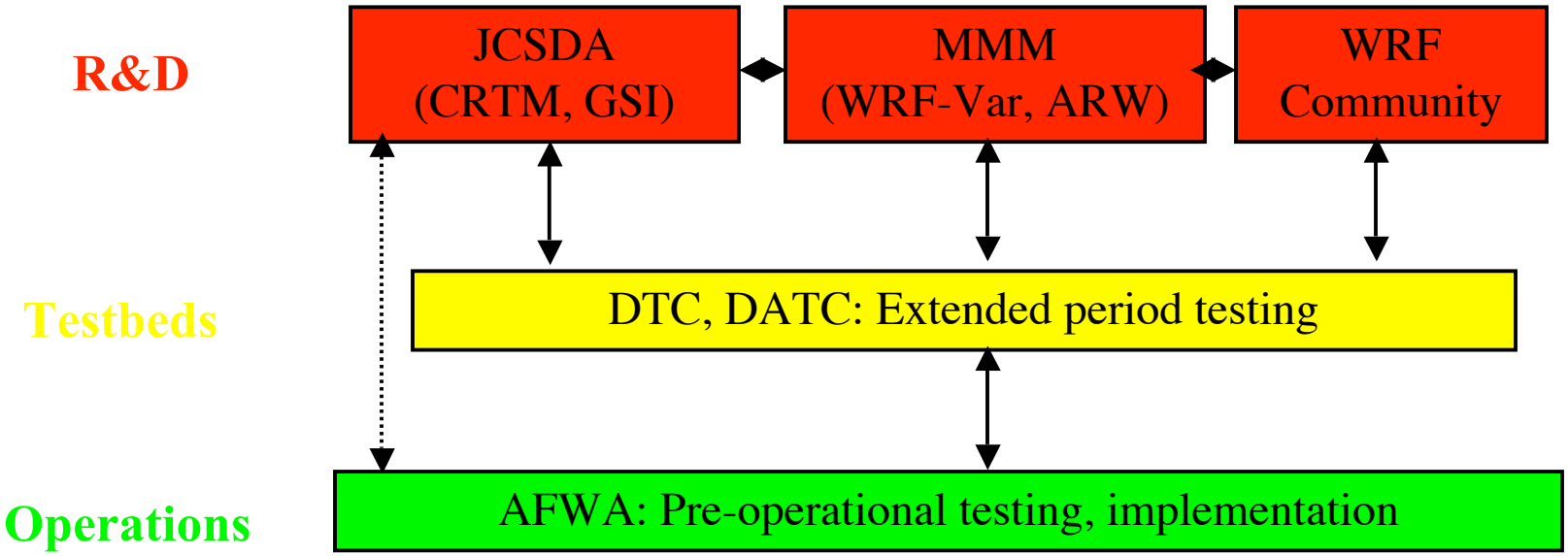
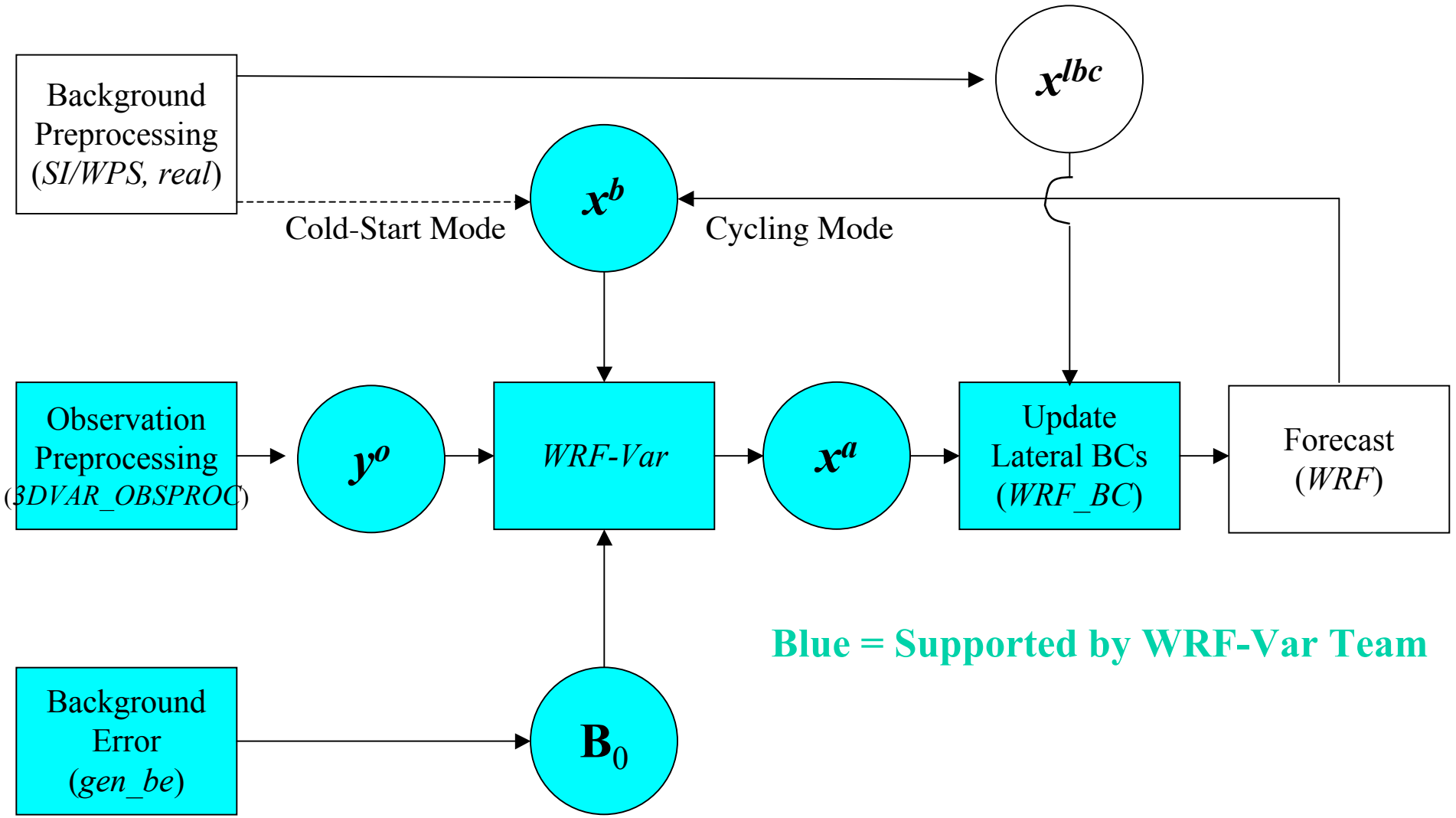
Dale Barker (dmbarker@ucar.edu)

WRF DA Research To Operations



- NCAR/AFWA DA Program initiated in August 2006.
- MMM Division responsible for WRF-Var development and initial testing.
- JCSDA provides Community Radiative Transfer Model (CRTM), etc.
- WRF Community contributions include radar, radiance (RTTOVS).
- Data Assimilation Testbed Center (DATC) responsible for extended-period testing.

WRF-Var in the WRF Modeling System



WRF-Var/WRF Scripts

WRF-Var V2.2 includes scripts to tie WRF components together.

Three types of scripts:

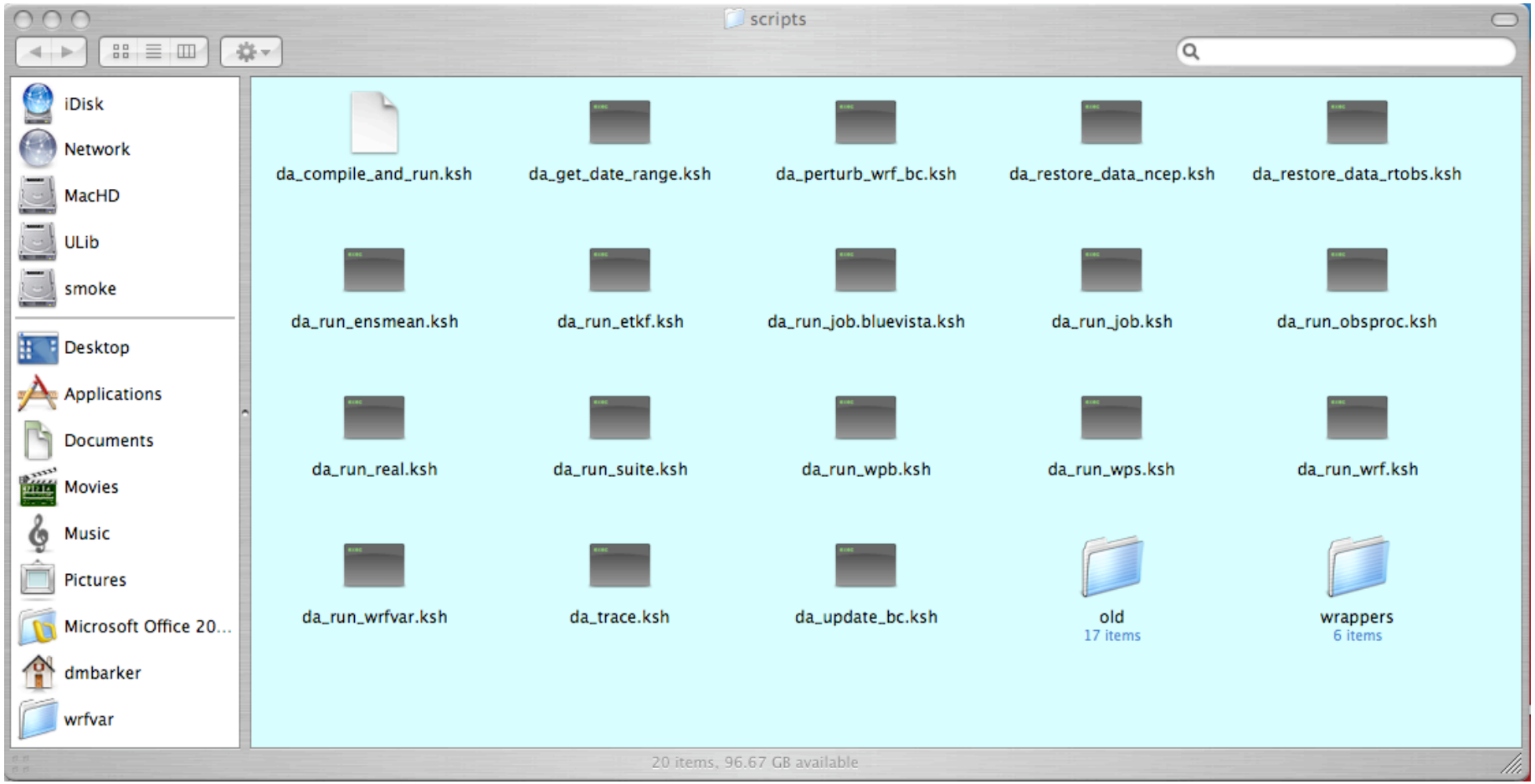
- **Building blocks -** Run a particular component of WRF, e.g. run WPS with da_run_wps.ksh.

- **Test Suites -** Tie building blocks together for use in end-to-end and extended period tests, e.g. da_test_suite.ksh.

- **Suite Wrappers -** Define suite configuration for a particular application (e.g. da_test_suite_wrapper_afwa.ksh)

Note: Ideally user should only need to change their suite wrapper.

wrfvar/scripts (latest code)



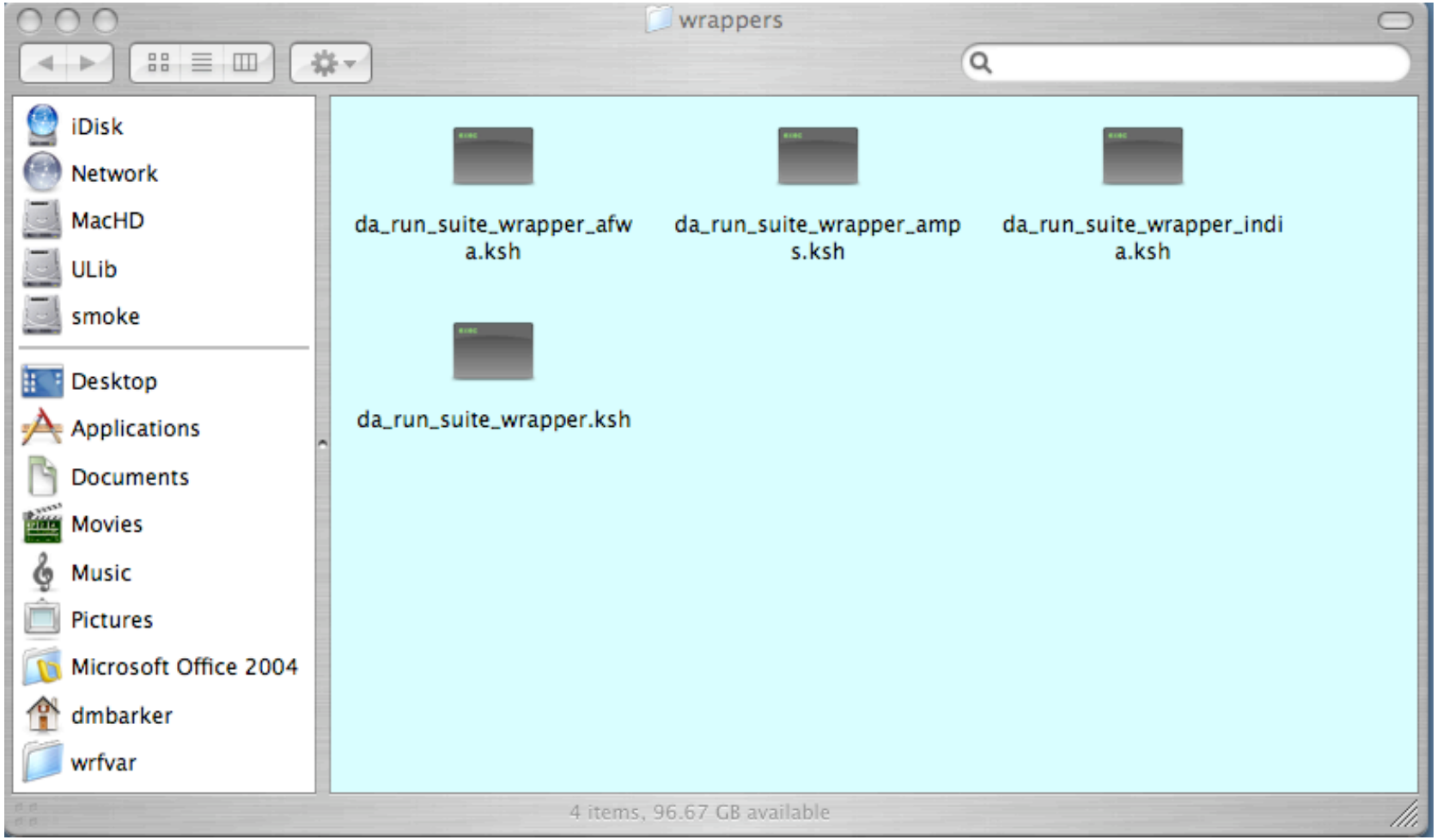
Example: da_run_suite.ksh

- Defines default namelist, directories, run options via environment variables (e.g. export RUN_WRF=true, export NL_DX=200).

- For each time in the sequence (e.g. 2003010100 to 2003012800), optionally run e.g.:

  - da_restore_data_ncep.ksh
  - da_restore_data_rtobs.ksh
  - da_run_wps.ksh (or da_run_wrfsi.ksh)
  - da_run_real.ksh
  - da_run_obsproc.ksh
  - da_run_wrfvar.ksh
  - da_run_update_bc.ksh
  - da_run_wrf.ksh

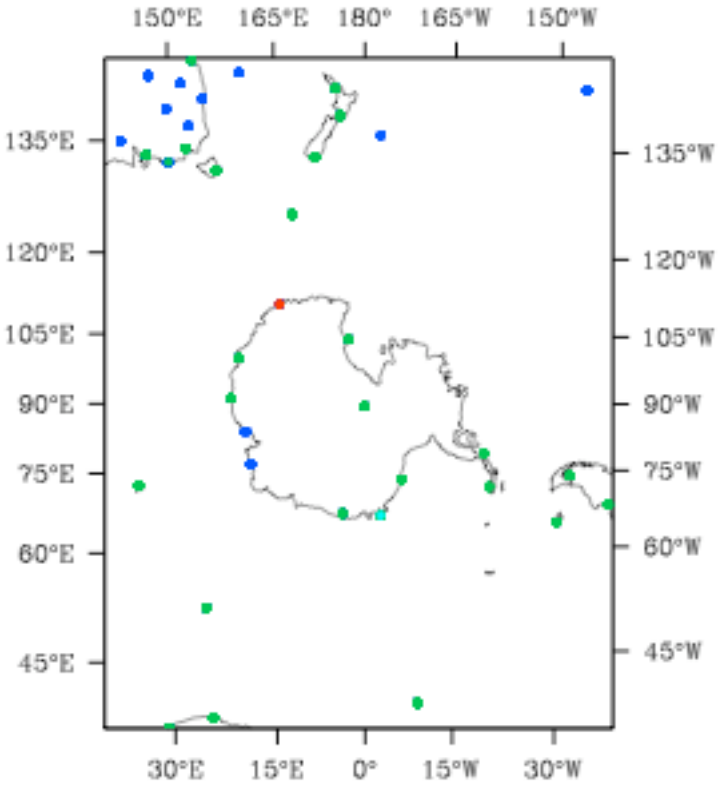
wrfvar/scripts/wrappers (latest code)



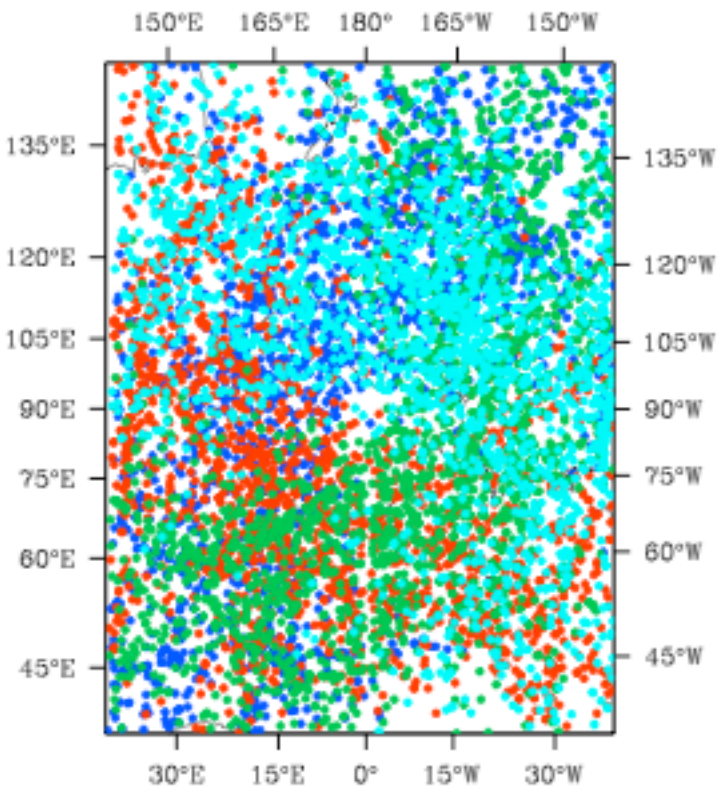
DATC Antarctica Testbed

- Use Antarctic Mesoscale Prediction System (AMPS)' 60km domain.
- 1 - 31st October 2006 test period. 6 hourly cycling.
- Initial studies: Tuned polar error covariances, COSMIC impact.

Sonde Coverage

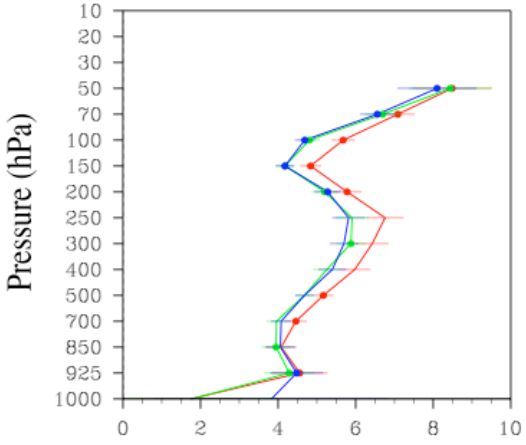


COSMIC Coverage



Hui Shao, DATC

Antarctica Testbed: 36hr Forecast Verification Against Obs

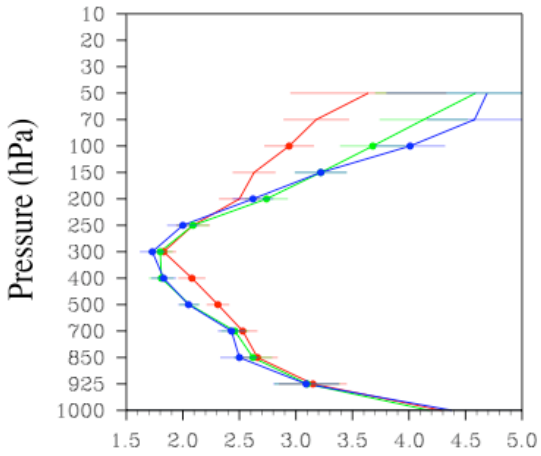


U RMSE (m/s)

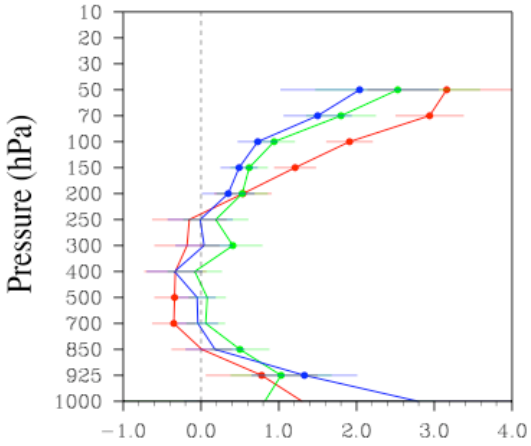
Conventional Obs

Conv. + COSMIC

Conv. + COSMIC + Tuned BE

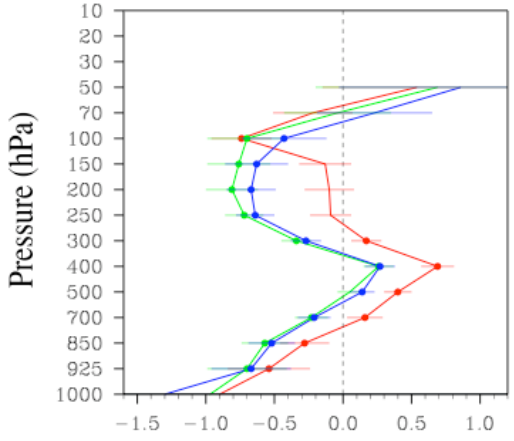


T RMSE (degK)



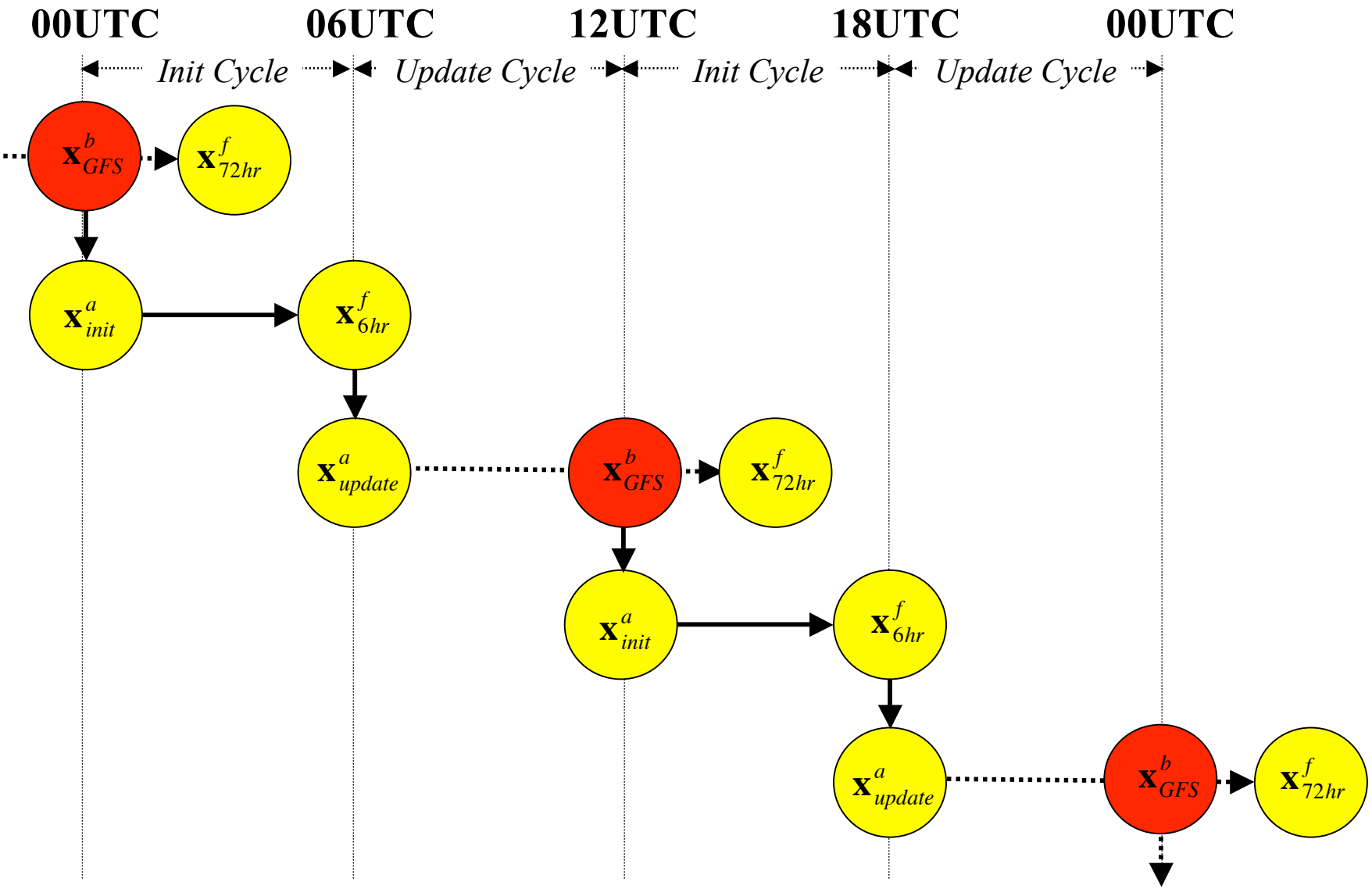
U Bias (m/s)

- COSMIC improves polar wind forecasts.
- COSMIC improves tropospheric temperatures.
- COSMIC degrades stratospheric temperatures.
- "2nd generation" tuned BE has small impact.

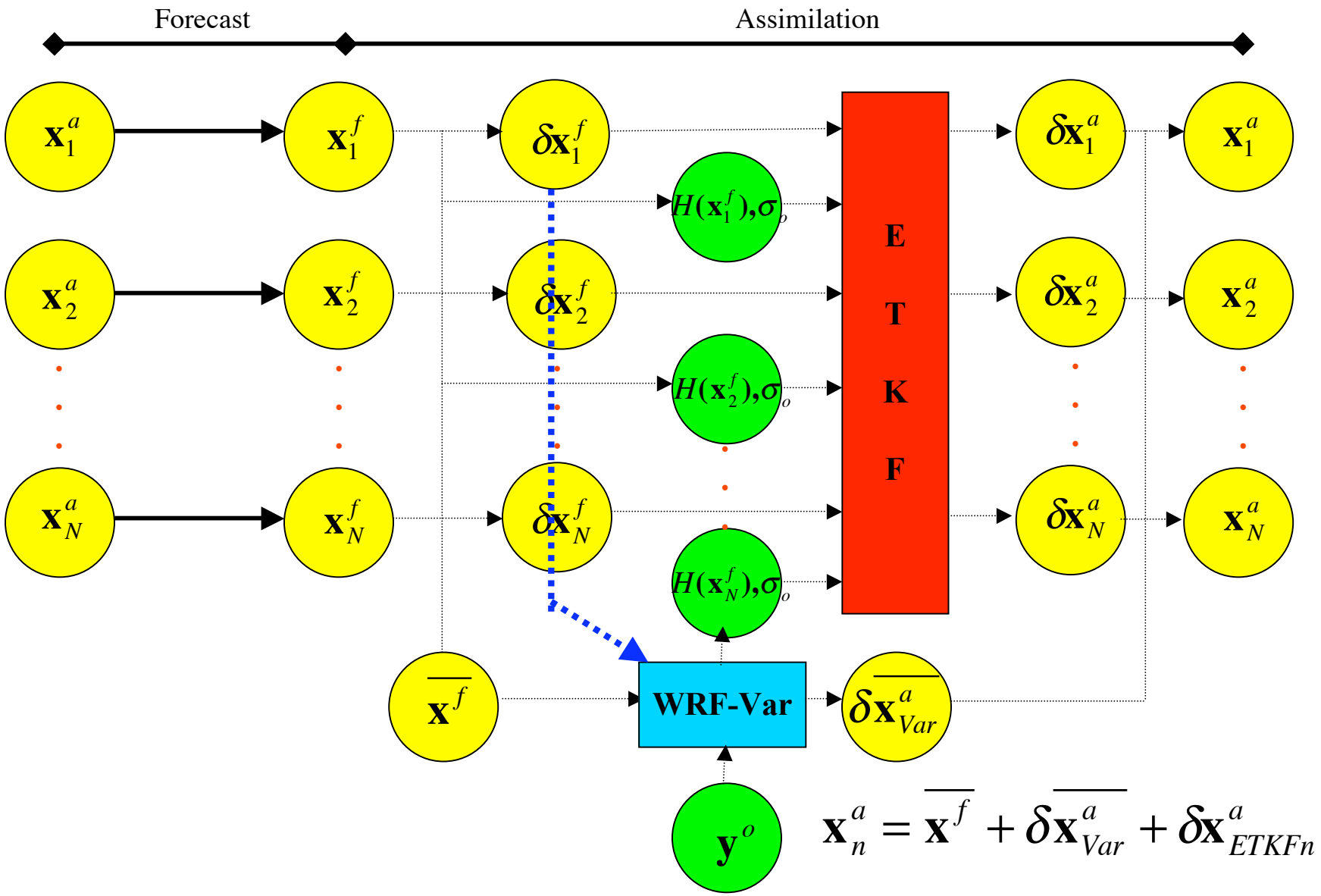


T Bias (degK)

Example Wrapper: AFWA Testbed (Update/Init)



Example Wrapper: Coupled WRF/ETKF



Conclusions

1) Cycling forecast and assimilation leads to larger impacts (see overview talk).

2) Extended period (weeks to months) testing required for real-world NWP.

3) Downside is additional complexity and resources.

4) WRF-Var V3.0 includes “test suites” to reduce complexity.

5) Scripts for running e.g. WPS, OBSPROC, WRF-Var, and WRF included (more TBD).