A Toolkit for Model Evaluation

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DTC/NCAR

Objectives

- Develop a verification package to be used at the Developmental Testbed Center (DTC) to support transfer of technology from research to operations

- Build on capabilities of existing verification packages

- Freely available to the WRF-user community

- Incorporate state-of-the-art *new* verification methodologies from the community

Work Requirements

- Toolkit must include:
  - standard verification approaches
  - confidence intervals
  - initial capability for spatial verification
- Documentation
- Code maintenance
- Way of implementing additional capabilities
- Freely available to interested parties
- Initial beta release 30 June!

Model Evaluation Tool (MET) Overview
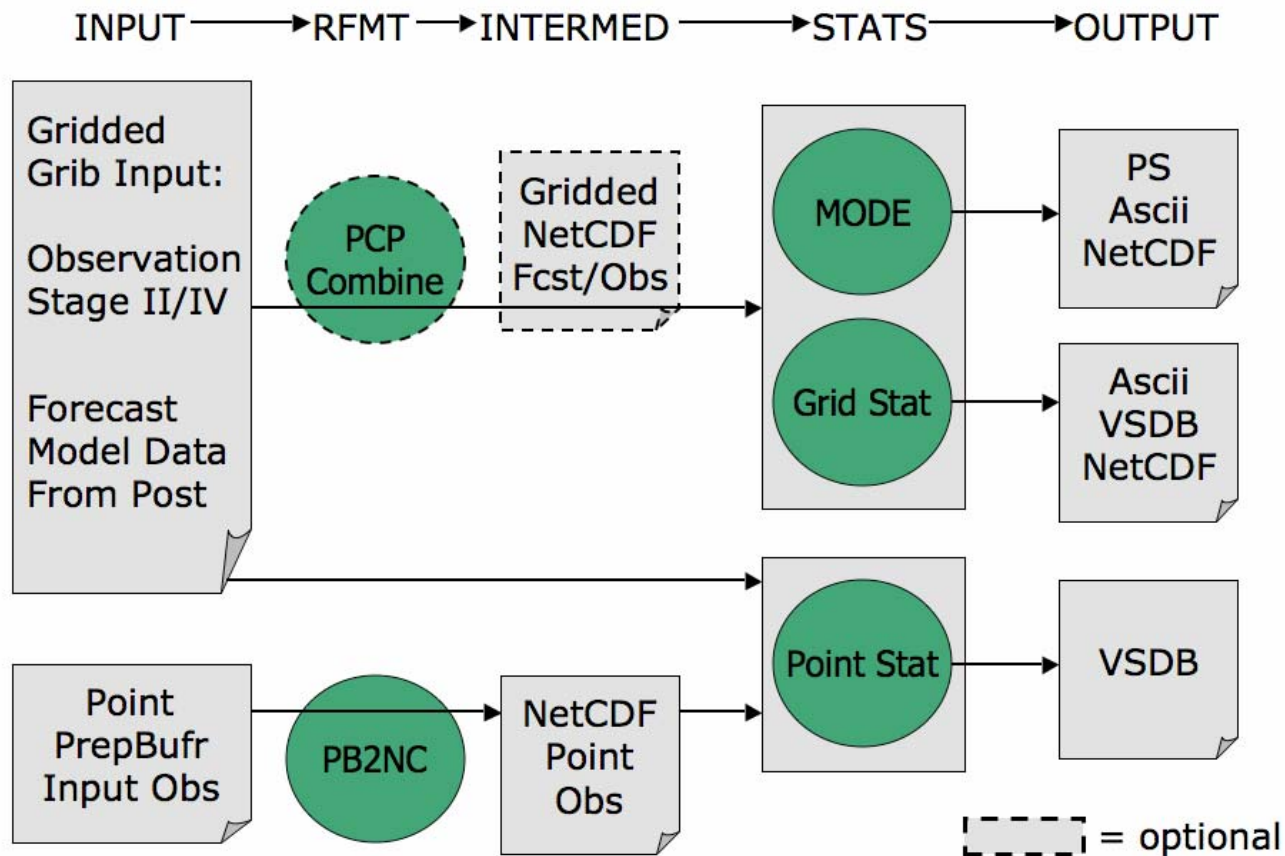
Technical Dependencies

- WRF Post-processor
- NetCDF libraries
- GNU Science Library (Developer's version)
- C++ and Fortran 77 compilers
- NCEP's Bufrlib
- *cwordsh* (NCEP's Fortran blocking utility)
- Tested on Debian/GNU Linux 3.1 with g++ and f77 compilers
- *copygb* utility recommended

Grid-to-grid verification (*grid_stat*)

- Includes "Standard" stats package

- Used for verifying forecast field with a gridded verification dataset (e.g. Stage II precipitation)

- Provides continuous and discrete statistics

NAM 12 h fcst - 500 mb T
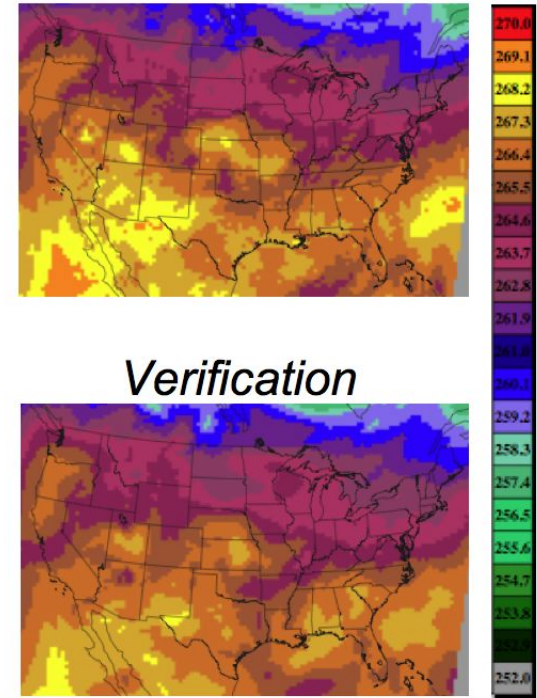
Verification

# Method for Object-based Diagnostic Evaluation (*mode*)

- MODE (Method for Object-based Diagnostic Evaluation) Tool

- Advanced spatial verification methods

- Defines objects in both observation and forecast fields

- Other advanced spatial verification methods included in the future

NAM *Stage IV*
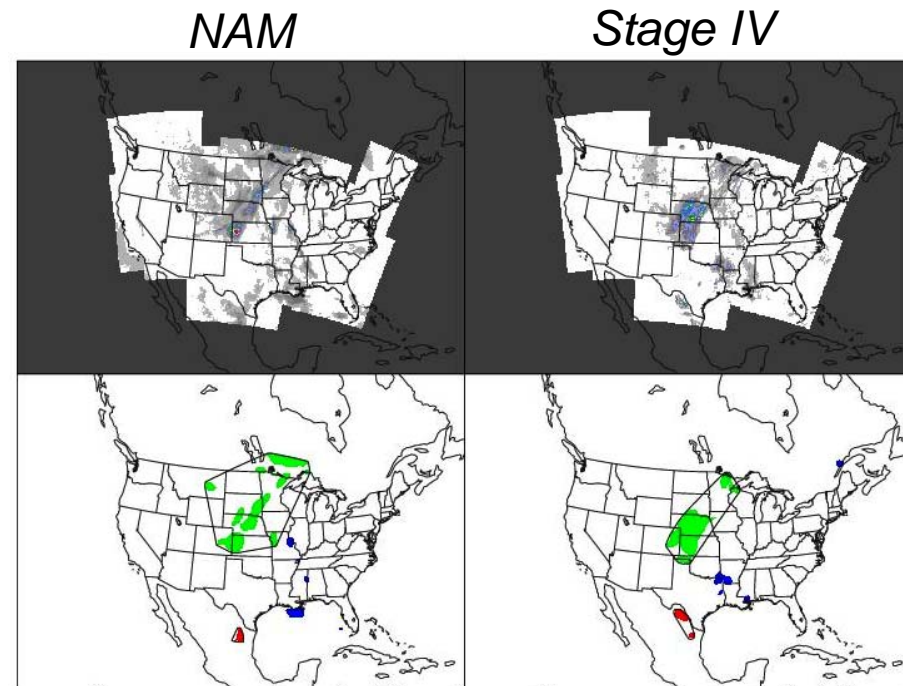
6 h accum. precip.

Grid-to-point verification (*point_stat*)

- Uses point-based observation types (e.g. rawinsondes, surface stations)
- Several methods for interpolation available to match point-based data
- Matched pair data
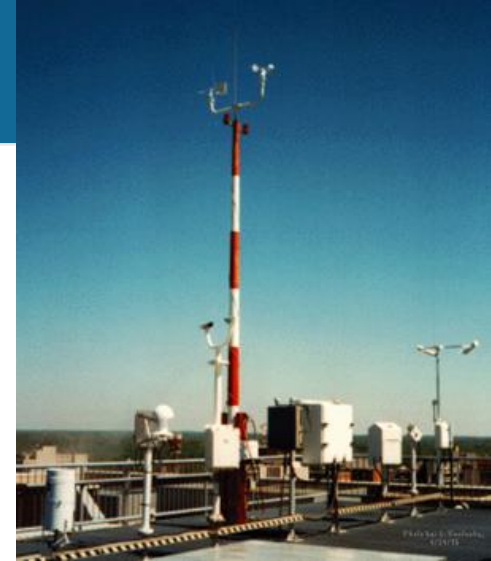
- Provides continuous and discrete statistics
- User selects observation types
- First release uses prepbufr format, reformatted to NetCDF via provided *pb2nc* utility
- User can use other data sources (i.e. not prepbufr) via NetCDF interface
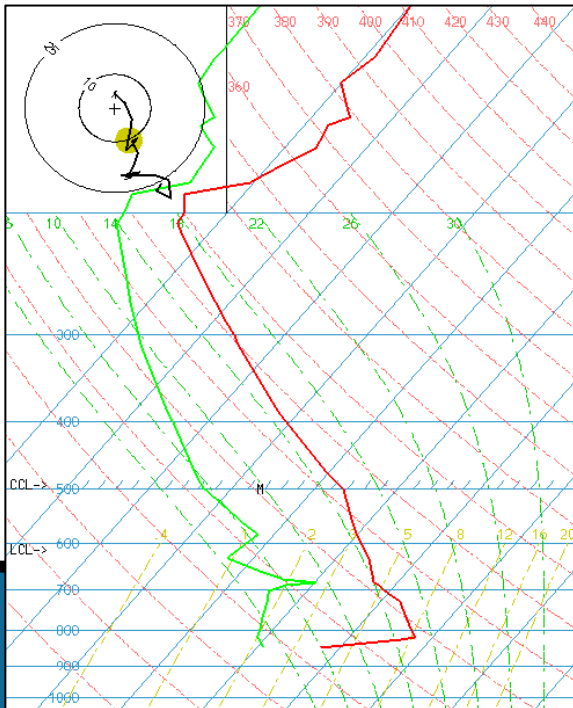
Community Feedback

- WRF User's meeting on the system at AMS in San Antonio (Jan 2007)
    - Less than half respondents were currently using any sort of verification method/tool
    - More than half of respondents said they expected to use verification capabilities on a daily basis
    - Many interested in object-based/features-based approaches
- WRF Verification Workshop (Feb 2007)

Future Work

- Looking for beta testers. Email: lholland@ucar.edu, if interested.
- Identify and implement techniques based on user needs and community feedback
- Continue development of the verification system with controlled successive version releases
- In future, will have capabilities for database interface
- Intercomparison of spatial verification techniques is underway
- Support for additional techniques:
  - Ensembles
  - Extremes
  - Observational error
  - Others

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