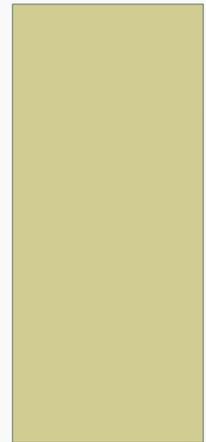


Model Evaluation Tools

MET

WORK WITH MET



What is MET

- **Model Evaluation Tools (MET)**-a powerful and highly configurable verification package developed by DTC offering:
 - Standard verification scores comparing gridded model data to point-based observations
 - Standard verification scores comparing gridded model data to gridded observations
 - Spatial verification methods comparing gridded model data to gridded observations using neighborhood, object-based, and intensity-scale decomposition approaches
 - Ensemble and probabilistic verification methods comparing gridded model data to point-based or gridded observations
 - Aggregating the output of these verification methods through time and space

What is MET

- 10 verification tools grouped into three categories

-Reformat

(Tools designed to convert the data into MET-readable formats)

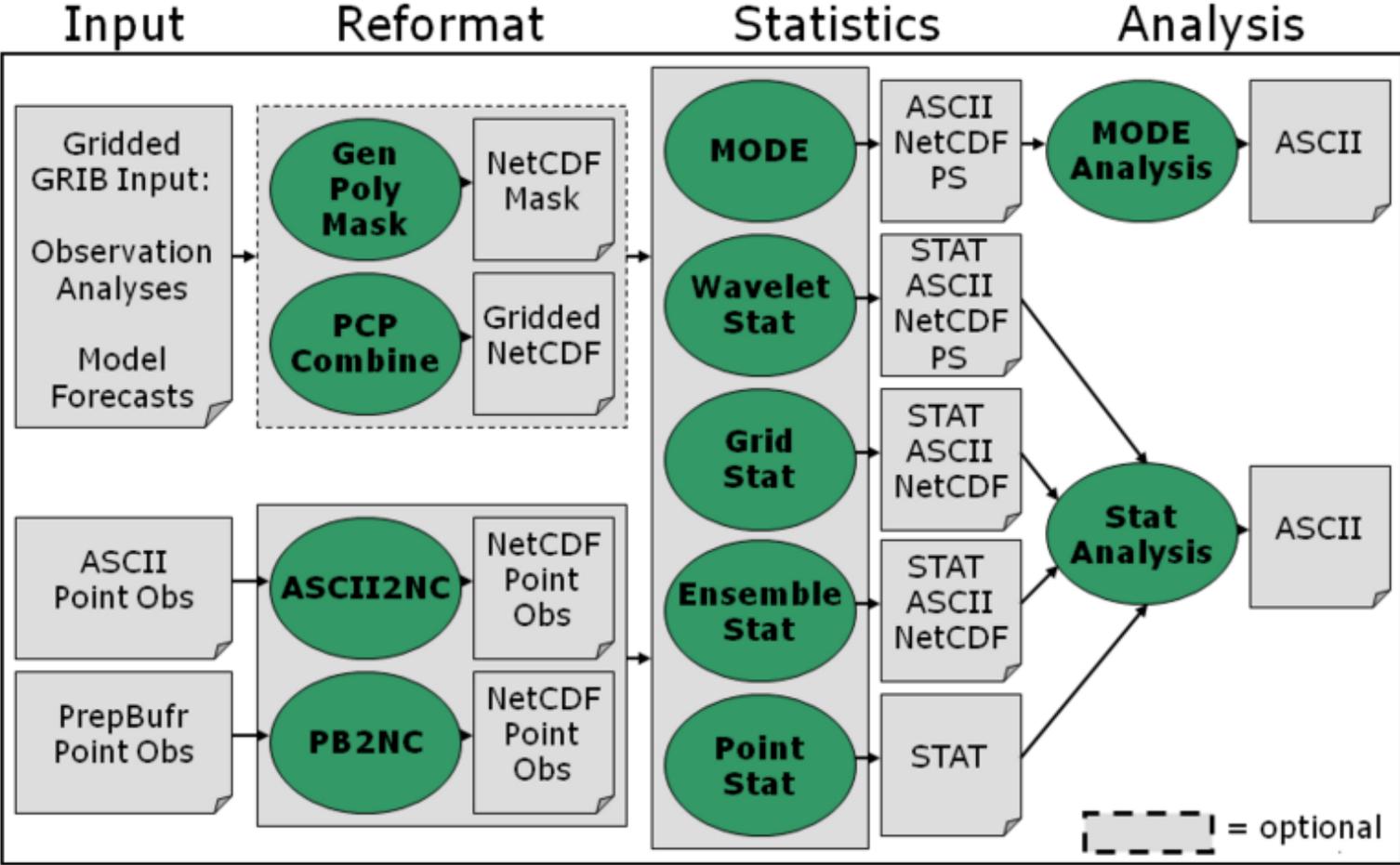
-Statistics & Computation

(Tools which perform verification and calculate statistics)

-Analysis

(Tools which aggregate/sort/filter results for users)

What is MET



MET Steps

- Formatting:

MET accepts gridded* GRIB 1 files as well as NetCDF files.



*Copygb is recommended for gridding GRIB files

More information can be found in the MET tutorial on page 26 (Section 3.1)

MET Steps

- Configuration:

A configuration file* (specific to each MET tool) detailing the different verification settings needs to be configured and supplied prior to a MET verification run.

- ASCII text format

- All settings are explained in comments in the file

- Can be reused for multiple runs

*More info on all of the settings in the configuration file can be found in the MET Tutorial PDF, available at <http://www.dtcenter.org/met/users/docs/overview.php>

MET Steps

- Running selected MET Tool:

- MET Tool name
- Forecast data file
- Observation data file
- Configuration file
- Output directory
- Additional arguments

Example for GRID-STAT:

```
METv3.0.1/bin/grid_stat "$FCST_FILE" "$OBS_FILE" "$CONFIG_FILE" -outdir  
"$OUTPUT_DIRECTORY" -v 2;
```

Example for POINT-STAT:

```
METv3.0.1/bin/point_stat "$FCST_FILE" "$OBS_FILE" "$CONFIG_FILE" -outdir  
"$OUTPUT_DIRECTORY" -v 2;
```

MET Automation

- Without automation, MET verifies 1 forecast file with 1 observation file and is nearly impossible to use for actual data sets. Usually only used for testing.
- Shell Scripts provide:
 - Speed (MET tools are run thousands of times over entire data sets)
 - Control (MET is run using specified settings or only if conditions are met)
 - Data collection, formatting and conversion
 - Ideal bookkeeping (Based on time, settings, etc)
 - Custom, correct, and consistent output filenames
 - Tree-like folder structure ideal for METViewer
 - Easily adjusted to run over different models and/or times

MET Automation

- Depending on usage, automation scripts can vary greatly. However, most tend to have a general structure:
 1. Set settings (period, domain, initialization times, etc)
 2. Gather forecast data
 3. Gather observation data
 4. Reformat forecast and observation data to be MET-readable
 5. Iterate over time, computing forecast and observation filenames
 6. If a match is found in step 5, run MET tool with given parameters from step 1
 7. Aggregate and reformat output data
 8. Repeat for different models

Graphics

- MET does not have a built in way to display the computed statistics
- MET outputs all statistics in ASCII text files which can be plotted by many different software packages if desired, or METViewer can be used
- METViewer is a separate software package which visualizes MET output and is highly configurable

More Information

- MET & METViewer on FAB Website:
<http://laps.noaa.gov/met/>
- DTC Online MET Tutorial:
http://www.dtcenter.org/met/users/support/online_tutorial/METv3.0/index.php

SUMMER WORK

WORK WITH MET & MET VIEWER



MET work

An example of using MET

- Automating MET on JET

- Verify reflectivity retrospectively for ewp (all ensemble members) for May 2011.

- Ewp consisted of 10 members and was run every 2 hours with each forecast lasting for 6 hours.

- Forecast data was saved in NetCDF .

- Data was then saved into tarballs and archived on Mass Store on JET.

- Process results into METViewer on FAB side so that a database is created and any number of interesting plots can be created on the fly.

MET work

An example of using MET-Steps

- Find obs and model data and select appropriate MET tool
Obs data is q2 data for May.
Forecast data is NetCDF data for ewp for May
Tool of choice is GRID STAT
- Create config file for GRID STAT tool
A text file with a lot of command line settings. More information on that can be found here:
http://www.dtcenter.org/met/users/support/online_tutorial/METv3.0/config/GridStatConfig_default
- Run a test case
Run GRID STAT for with only 1 forecast file matched to one observation.
Forecast file is first re-gridded to Obs grid using copygb.
Check the results to ensure correct setup of MET.
- Create an automation script
Script explained on next slides
- Import MET data into METViewer
Will not be covered in this presentation.

MET work

An example of using MET-Script

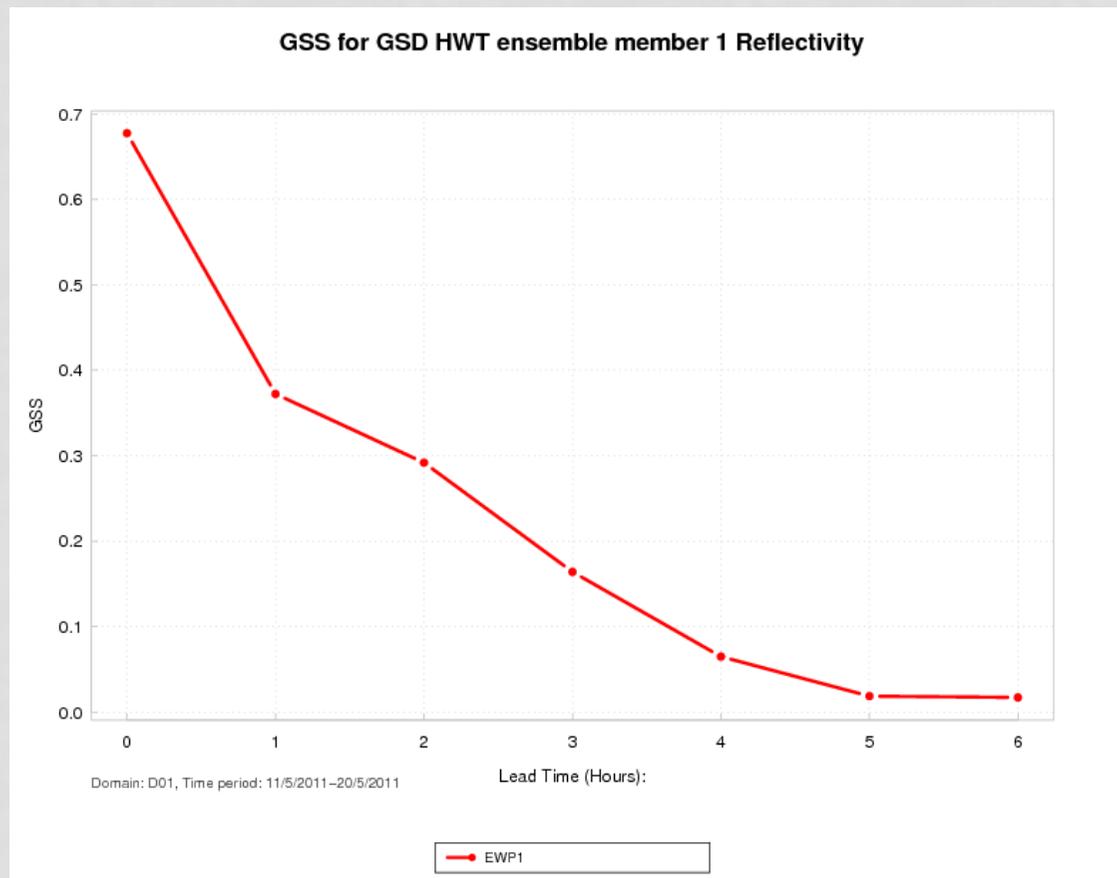
- Korn shell script designed to do the following:
 - Locate matching Forecast data from Mass Store on JET
 - Locate matching observation data from Mass Store on JET
 - Sync filenames and dates to ensure Forecast and Observation data match and account for any missing data files.
 - Unpack forecast data
 - Re-grid forecast to observation grid using copygb
 - For every ensemble member, given time period and other parameters run GRID STAT on matching forecast and observation data files
 - Create directory and filename structure that conforms to MET Viewer importing style so that importing into METViewer is easier.
 - Clean up temporary file cache and move on to next member
 - Set up another instance of the script so that it can run faster or if JET is cutting off task due to time constraints (Optional).

Script can be found at:

MET work

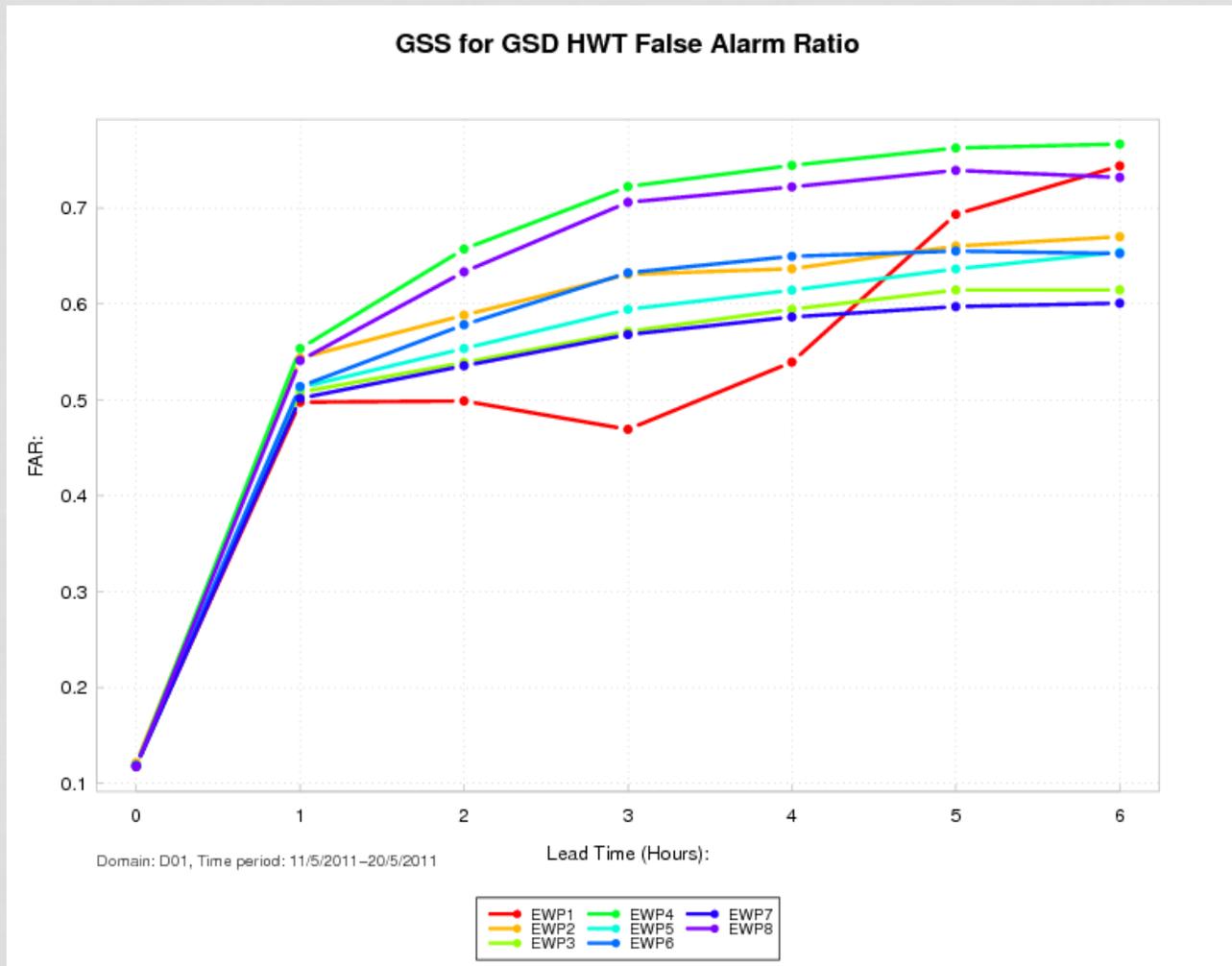
An example of using MET-Results

- A database called mv_hmt_ed_2011 was created on the FAB METViewer accessible anywhere at: <http://lark.fsl.noaa.gov:8080/metviewer/metviewer.jsp>



MET work

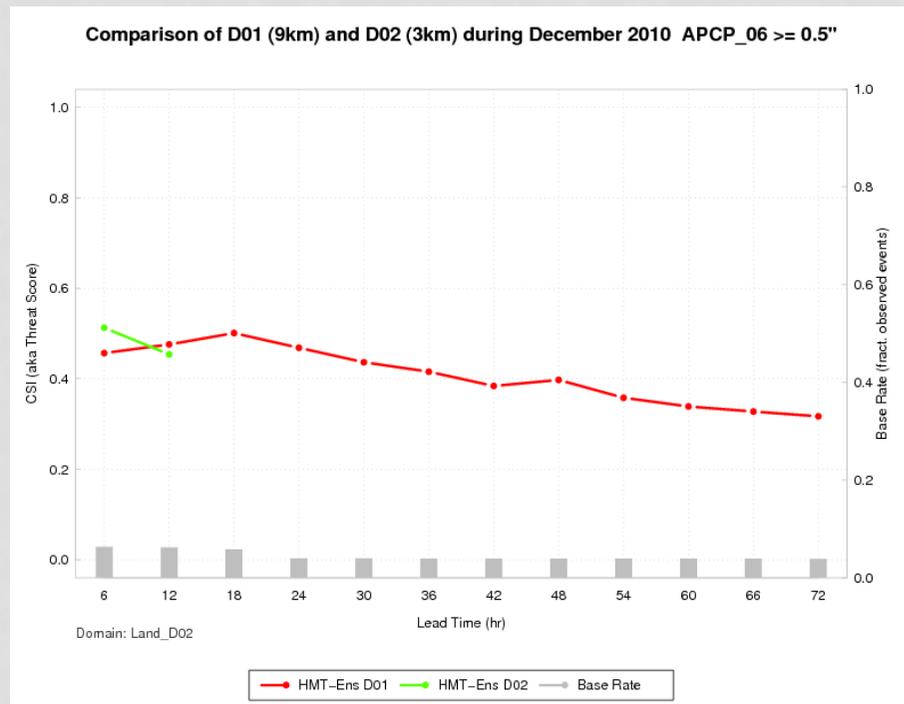
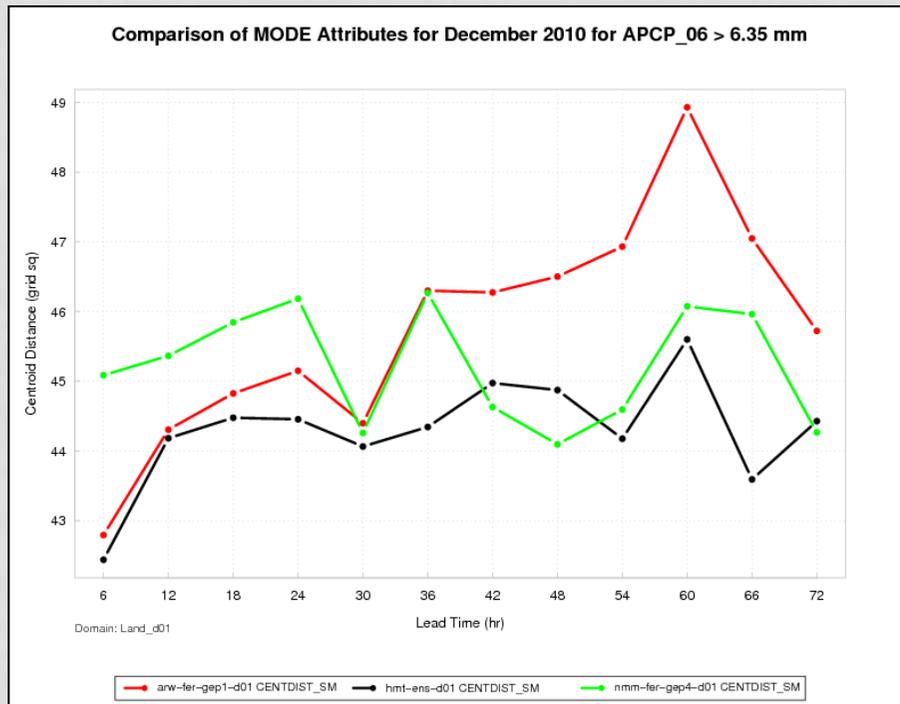
An example of using MET-Results



Other work

METViewer

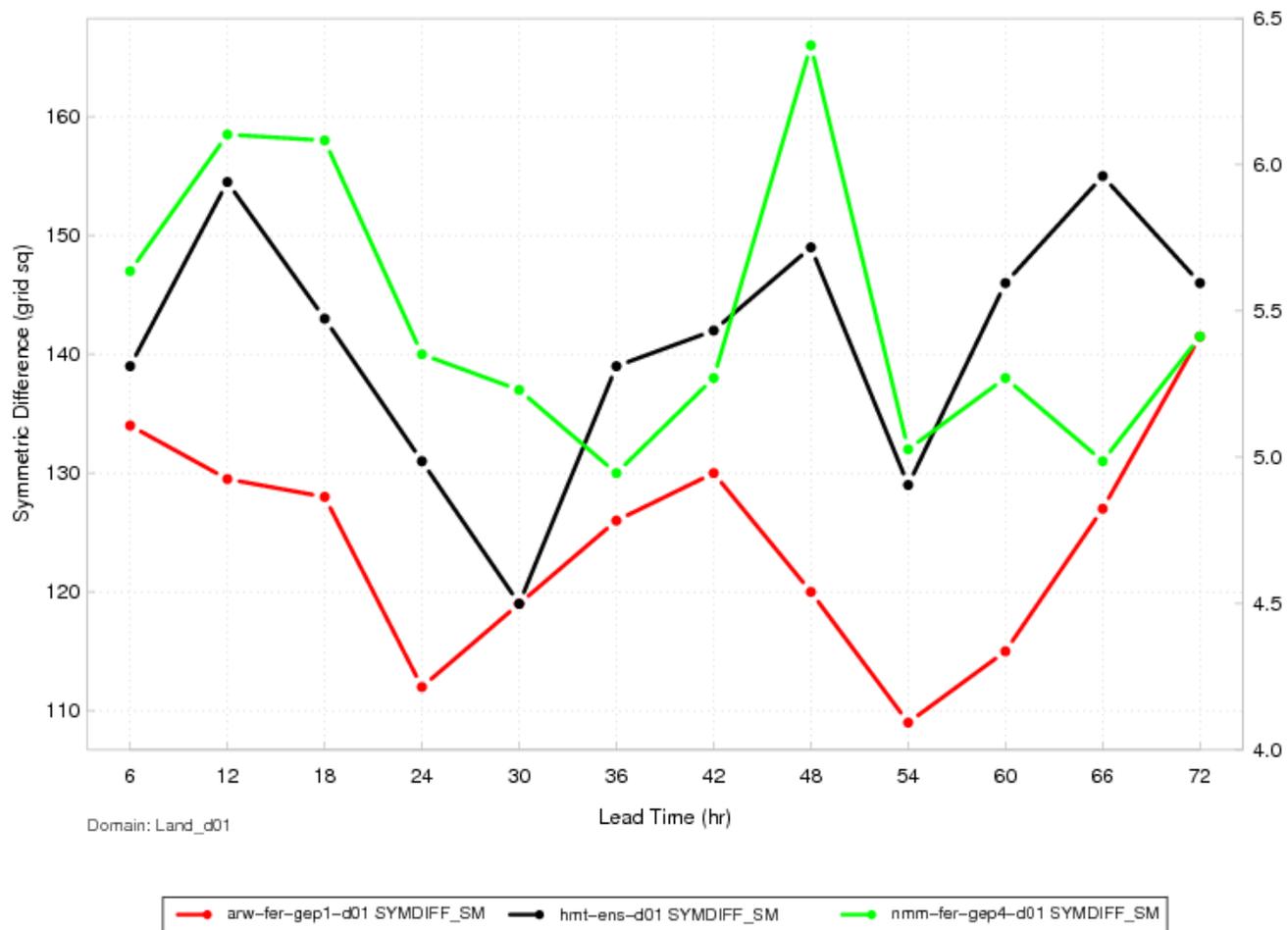
- A large number of METViewer graphs for Ed using the DTC METViewer databases



Other work

METViewer

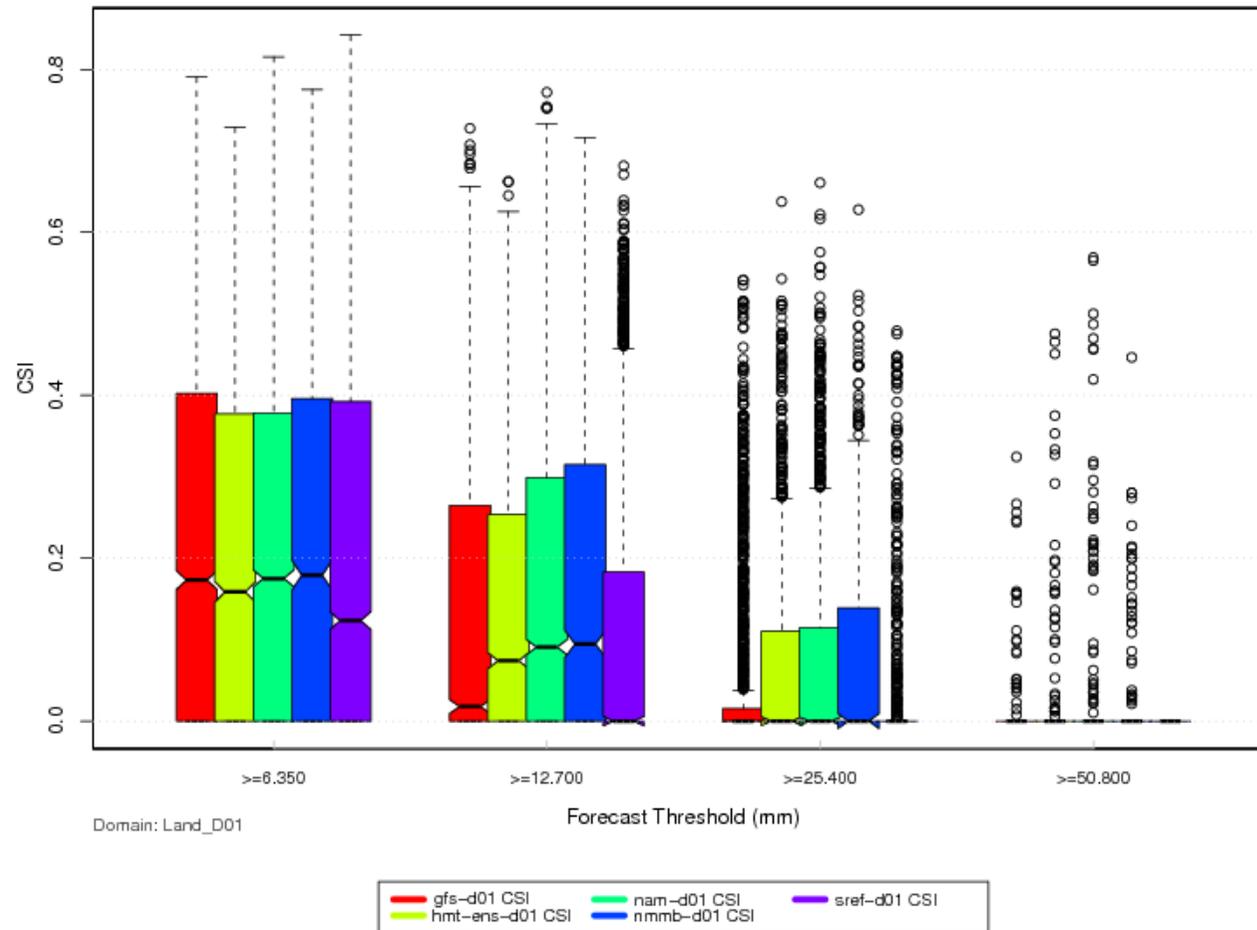
Comparison of MODE Attributes for December 2010 for APCP_06 > 6.35 mm



Other work

METViewer

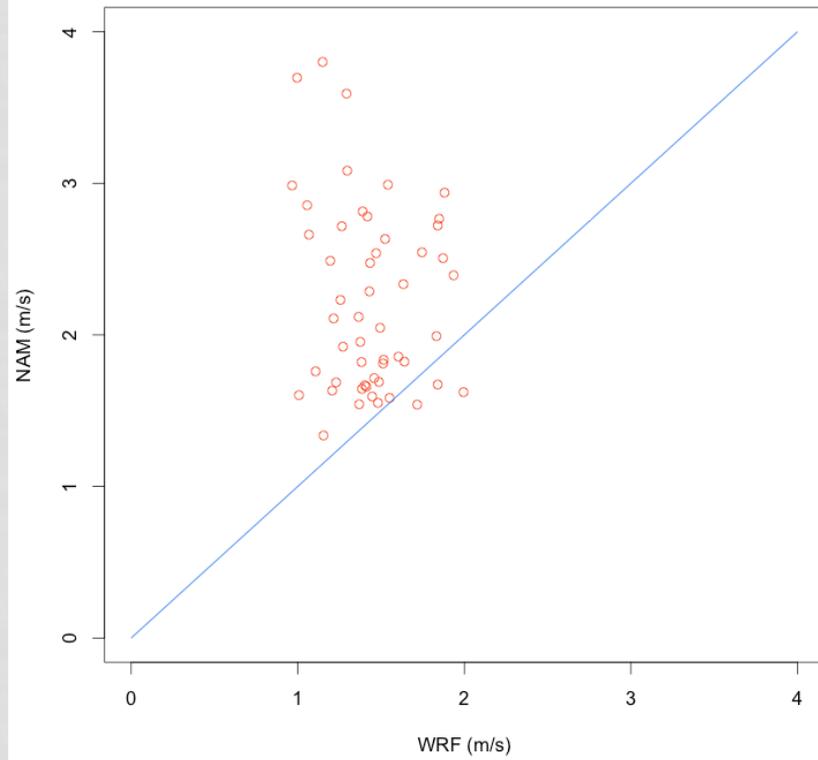
Intermodel Comparison for APCP_06 at ALL Lead Times



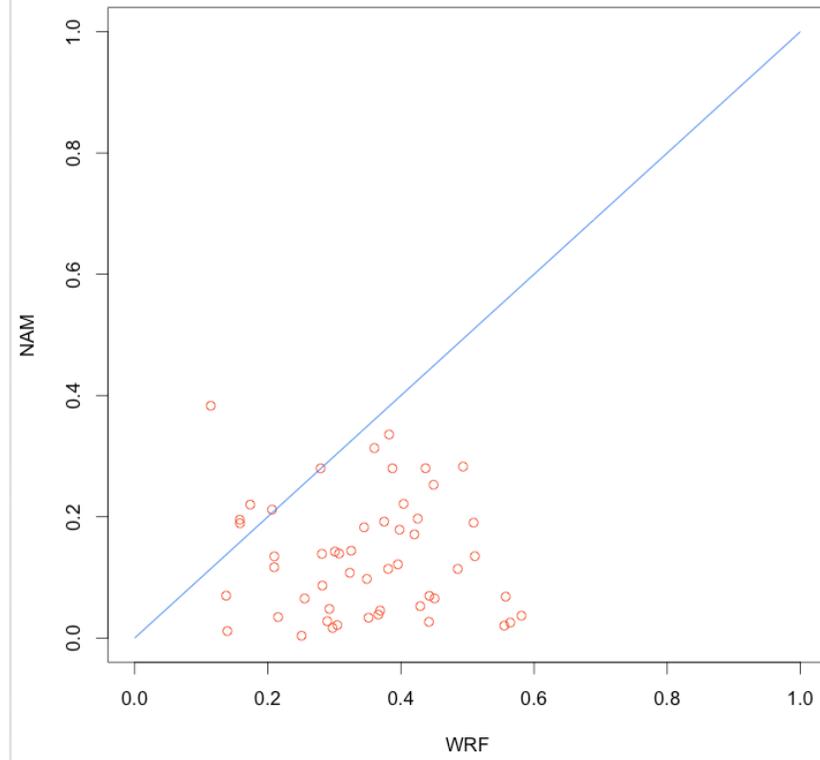
Other work

R

DFW Domain Root Mean Square Error



DWF Domain Windspeed Correlations

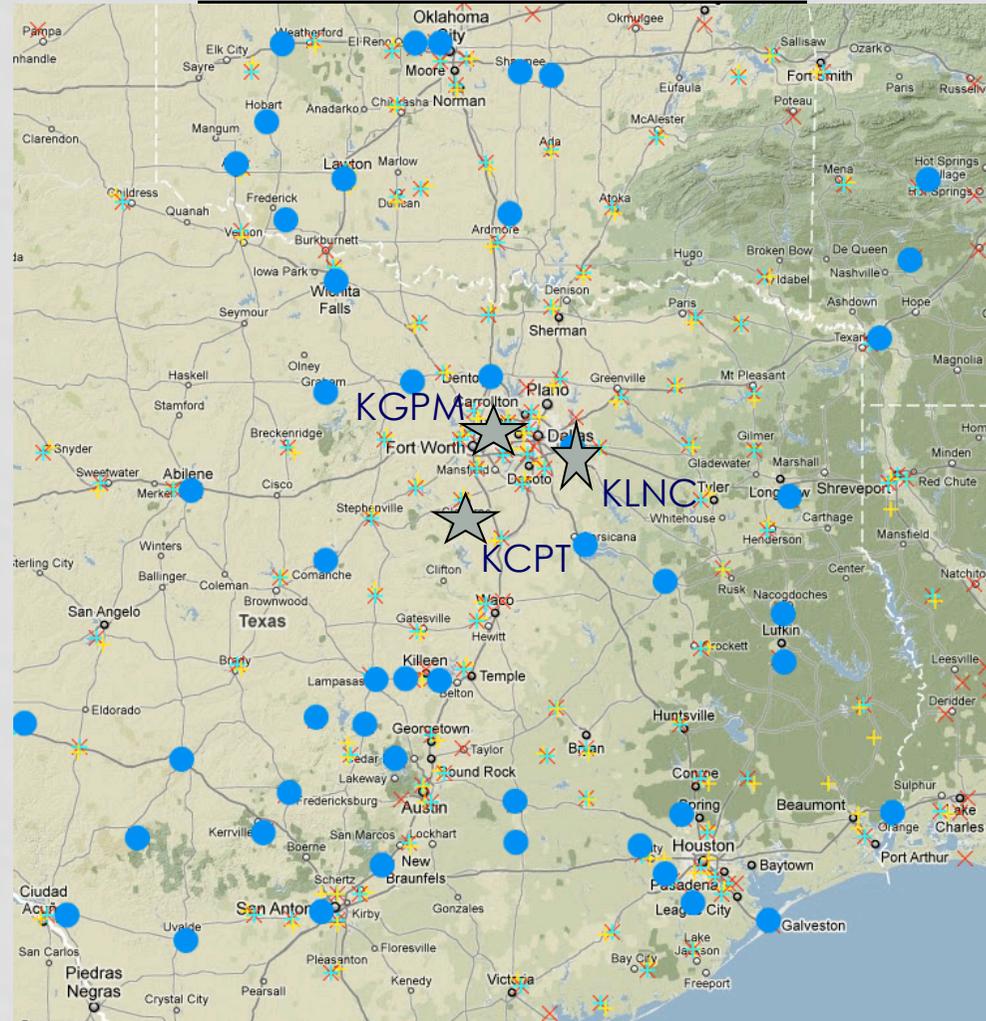


Other work

OBSERVATION SITES (ASOS) IN DFW DOMAIN

- Formatting data and then using it to find stations

ASOS Sites in DFW Domain



Other work

MET website

- Created a website which details MET and is packed with helpful links regarding it's usage

<http://laps.noaa.gov/met/>