THE ATMOSPHERIC MODEL EVALUATION TOOL (AMET): METEOROLOGY MODULE

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Outline

- AMET Overview
- Observation-Model Matching Module
- The Relational Database
- Statistical Analysis Module
- Examples of Analysis Products
- Future plans

AMET Overview

- AMET is composed of a MET and AQ component

- Each component consists of an observation-model matching module, relational database, and analysis module

- Evaluations can be automated by scripting, manually generated, or generated by a interactive web-based interface

Observation-Model Matching Module

- Cycles through model output and matches in time and space the model values with observations, and inserts pairs into database

- Coding is in Perl, but several external utilities are used to translate non-NetCDF model output (MM5 and Eta)

- Observation classes currently implemented are surface-based (NWS, FAA, Buoy, Mesonet), NOAA wind profiler and rawinsonde datasets

- Web-based interface to configure new projects and generate script to execute the observation-model matching module

Relational Database

- MySQL
- Open Source, quick and efficient storage of observation-model paired data
- Observation-model pairs are inserted into the database
- Observation site metadata are inserted into database
- Analysis module queries observation-model pairs with numerous user criteria and generates various plots and statistics

Statistical Analysis Module

- Collection of utilities that take user criteria, query database, and generate statistical plots

- Statistics and plotting are done by the open source "R" statistical package

- Web-based (PHP) interactive interface takes user criteria and execute the "R" code, then display results

Examples of the Statistical Analysis Products
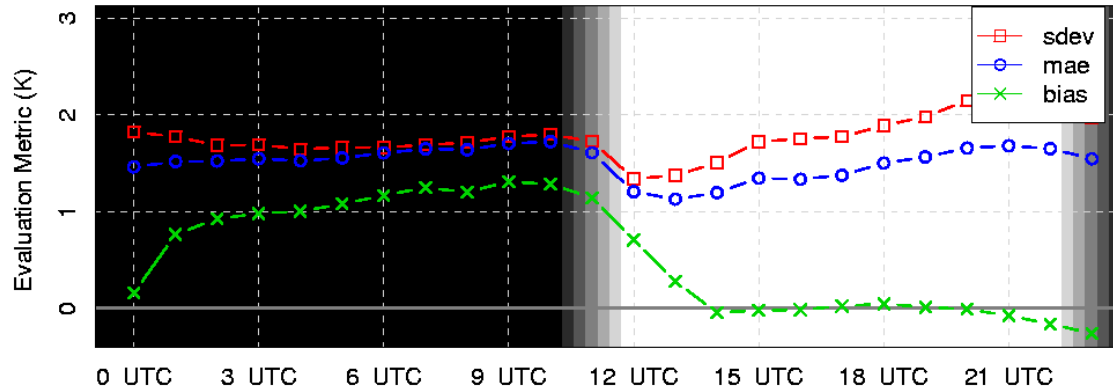
Model Performance Summary

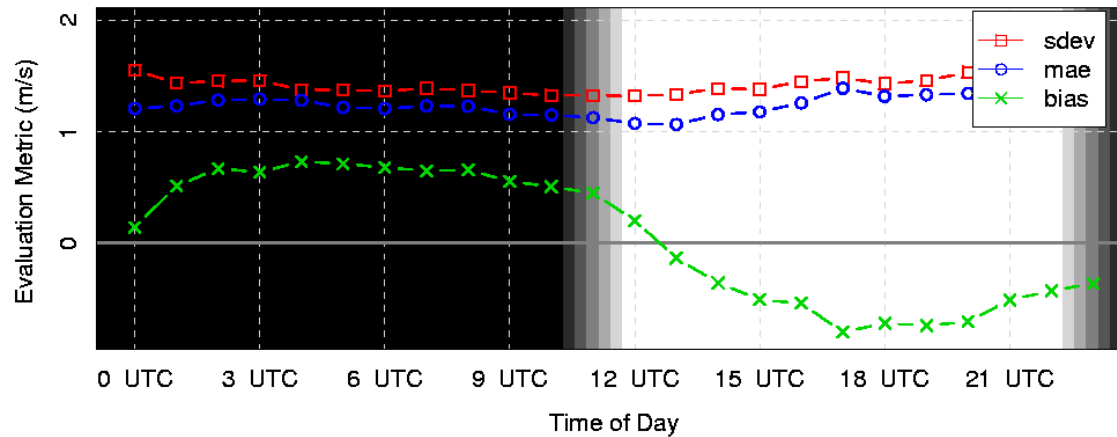## Summer N.C. Temperature
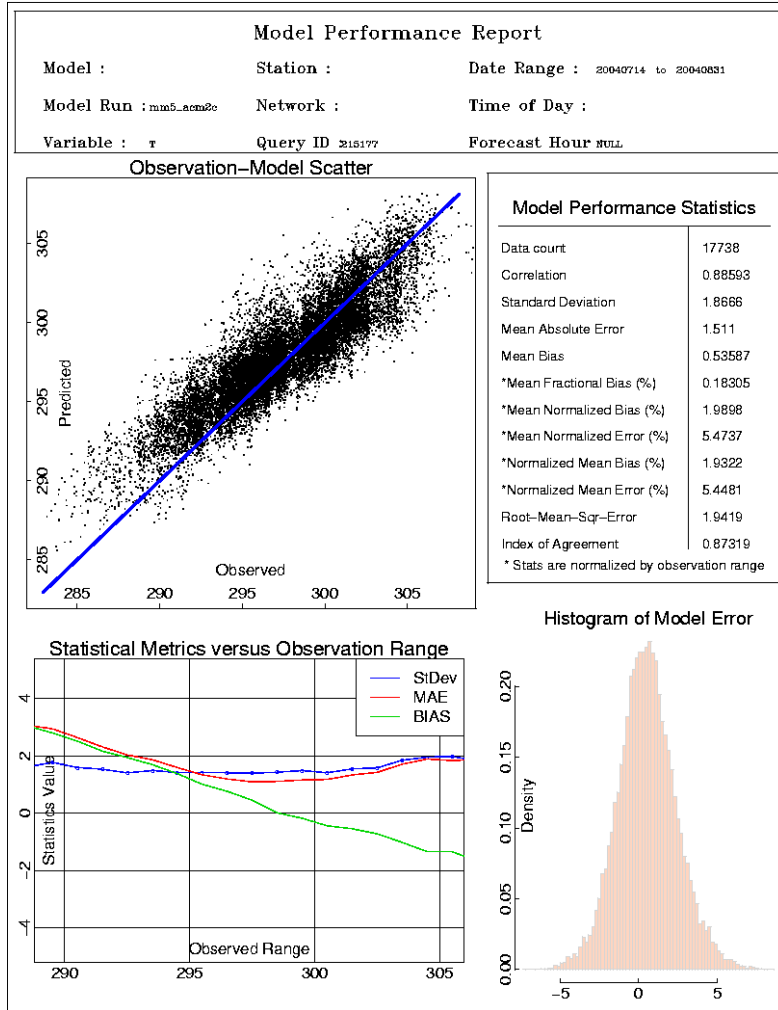
Summer N.C. Wind Direction
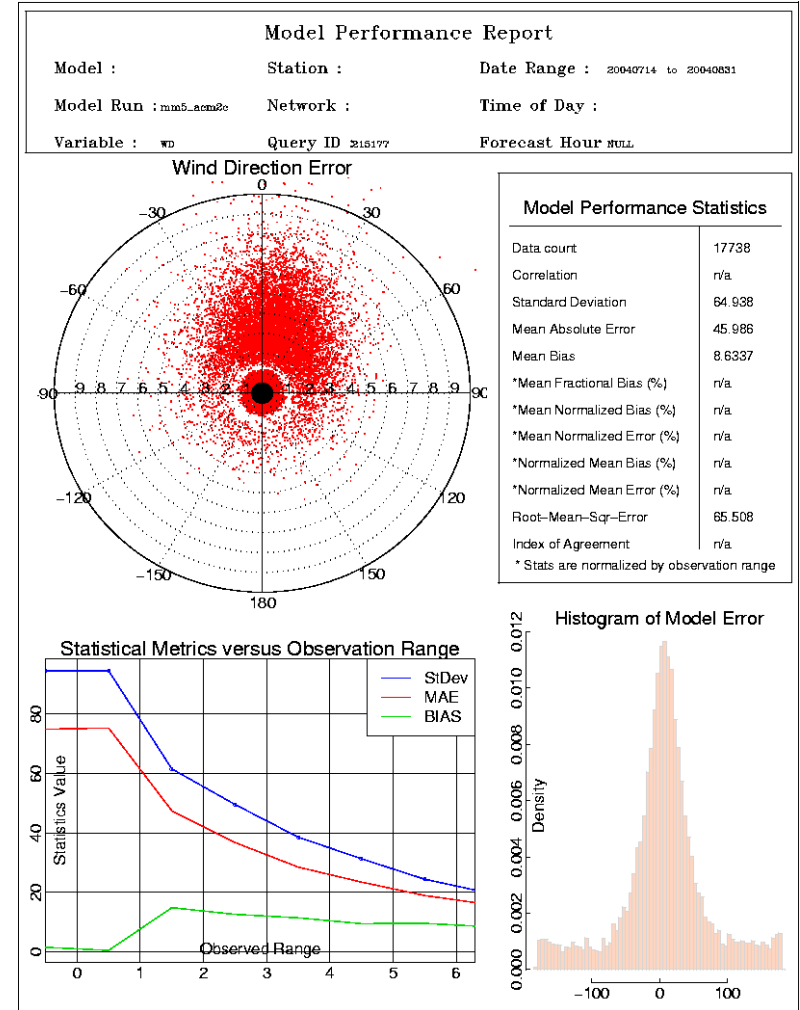
Diurnal Statistics

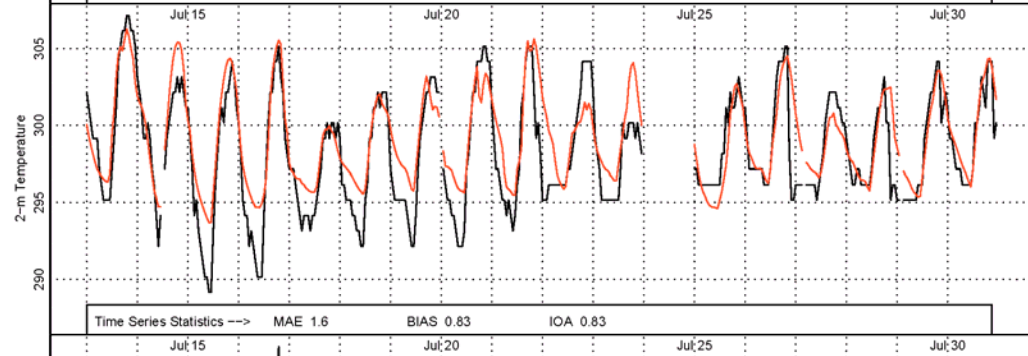Diurnal Statistics for 2 m Temperature

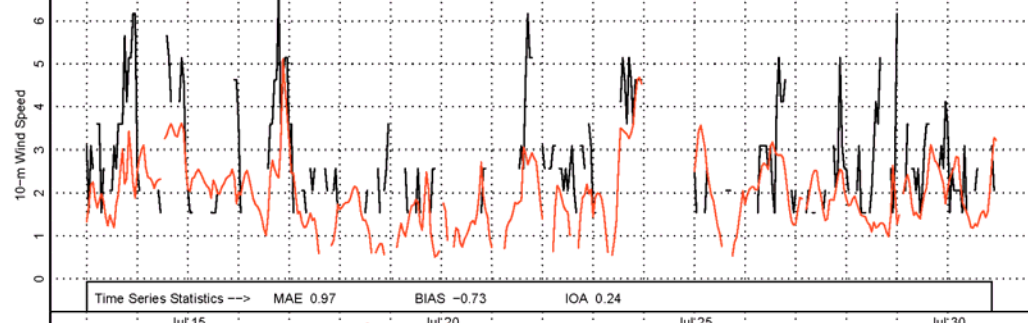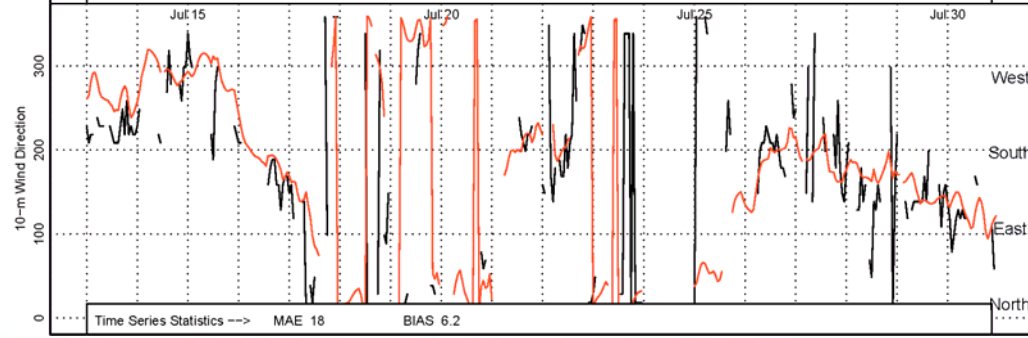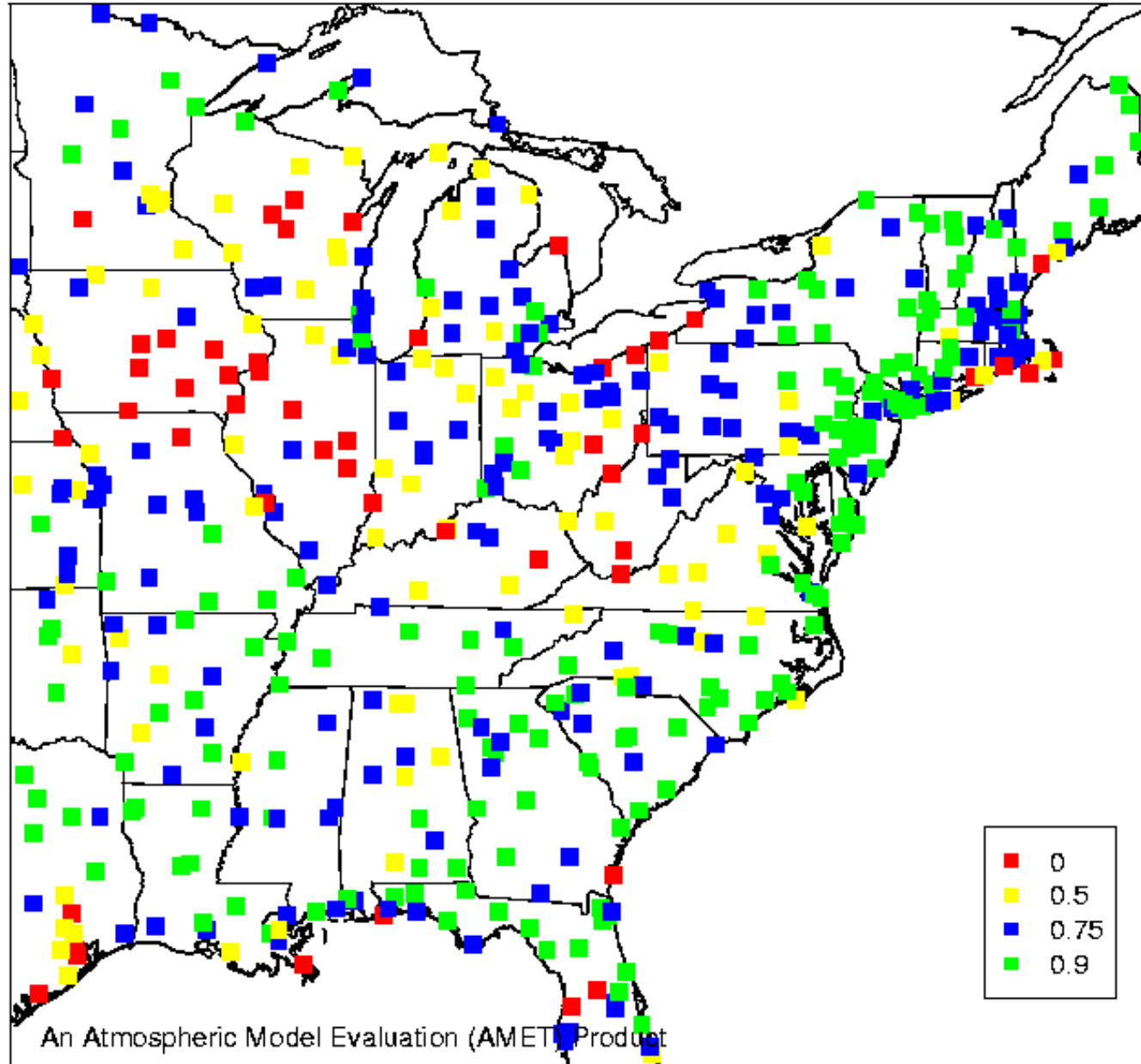Diurnal Statistics for 10 m Wind Speed

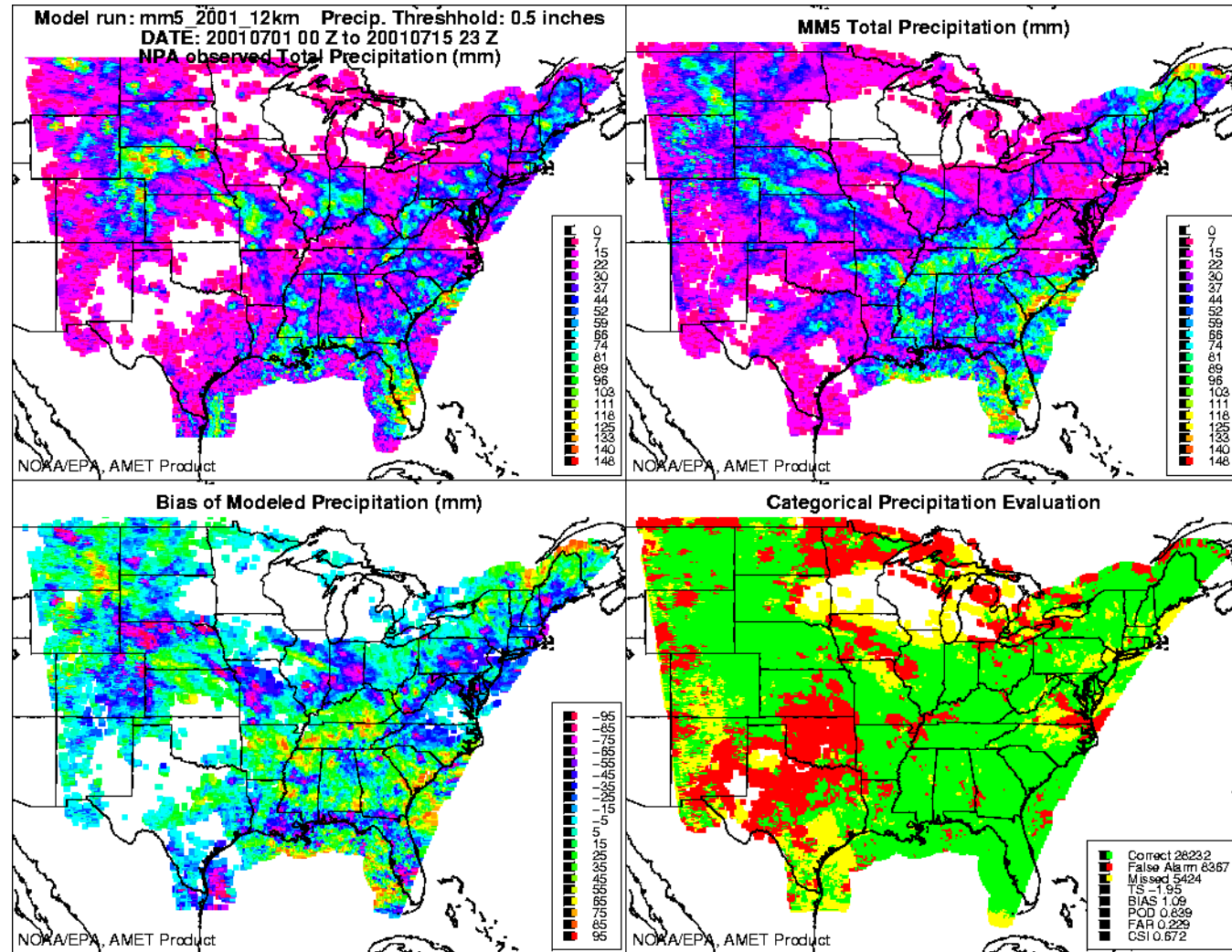# Time Series

2-m Mixing Ratio ⟶
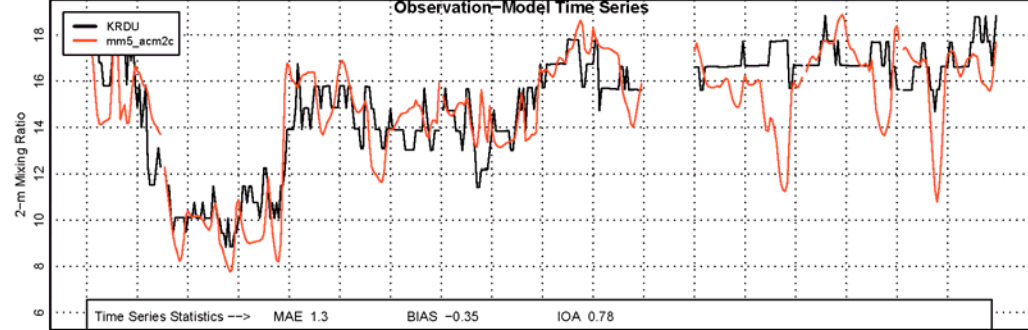
2-m Temperature ⟶

2-m Wind Speed ⟶

2-m Wind Dir. ⟶

Anomoly Correlation of Daily 2 m Temperature (C)   Date: 20040722

Daily Spatial Statistics

■	0
■	0.5
■	0.75
■	0.9

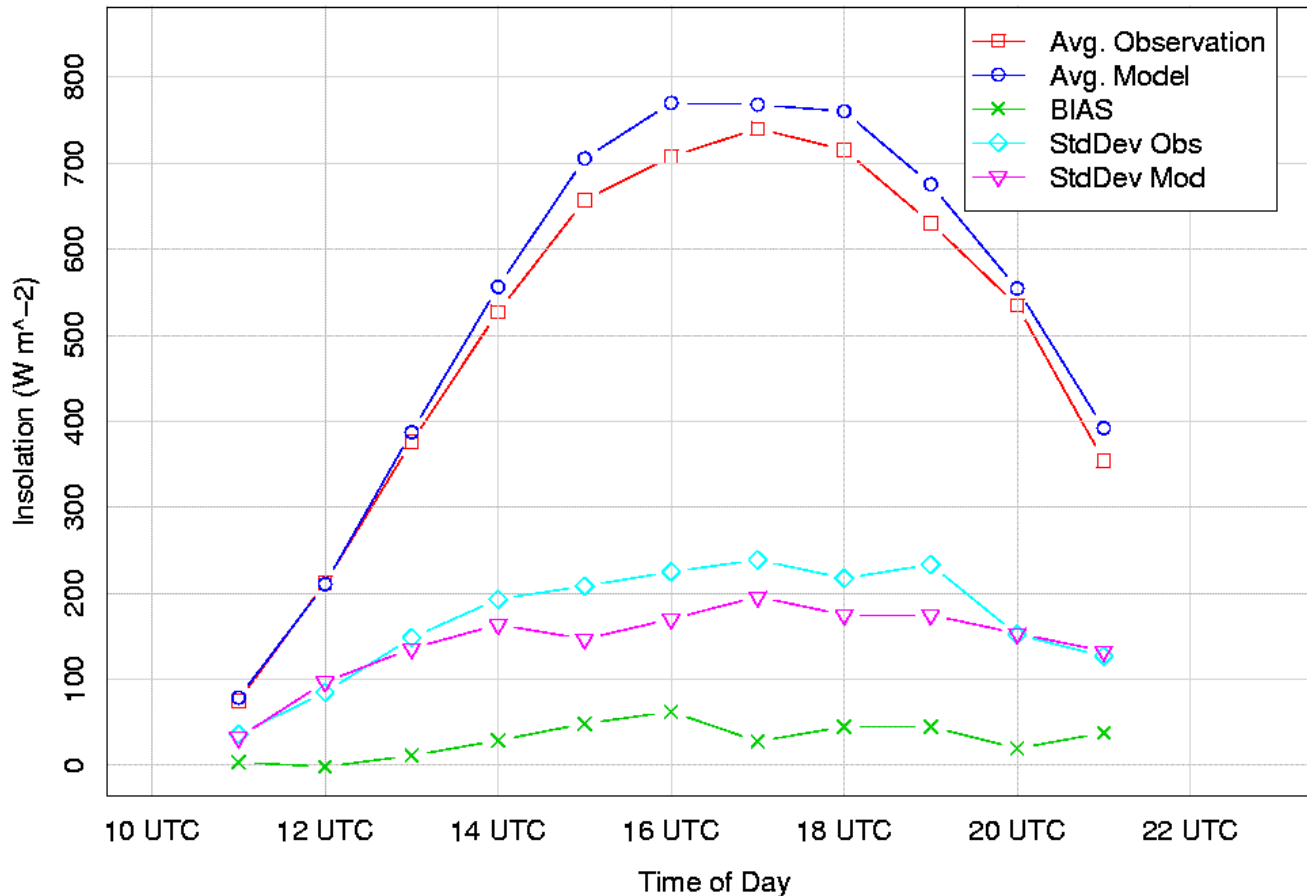An Atmospheric Model Evaluation (AMET) Product

Daily, Weekly, Monthly

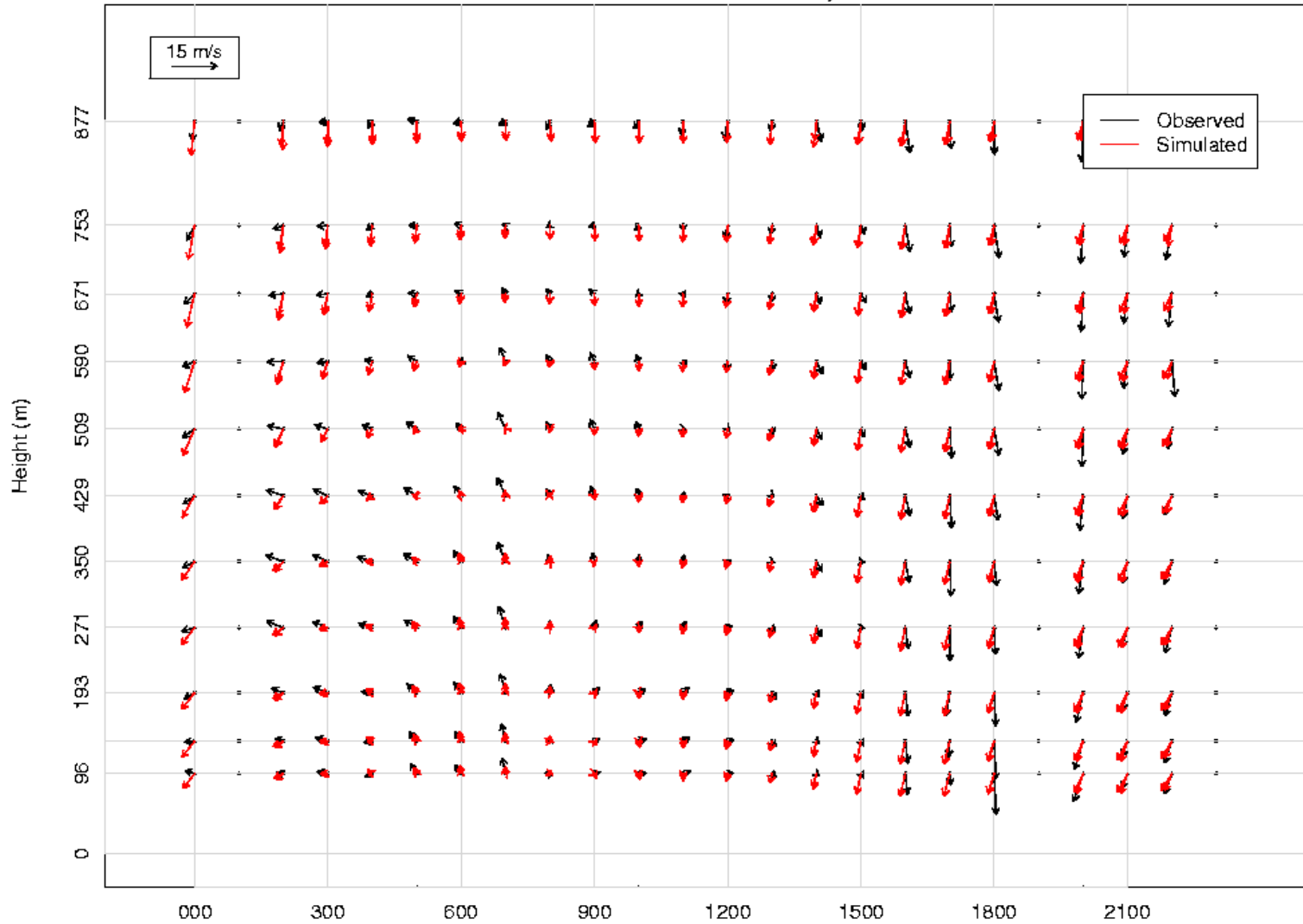# Precipitation Evaluation

Diurnal Insolation Comparison

Diurnal Insolation Statistics at SURFRAD site: bon

Wind Profile Comparison

Observed–Simulated Wind Profile, Site: MIDFL
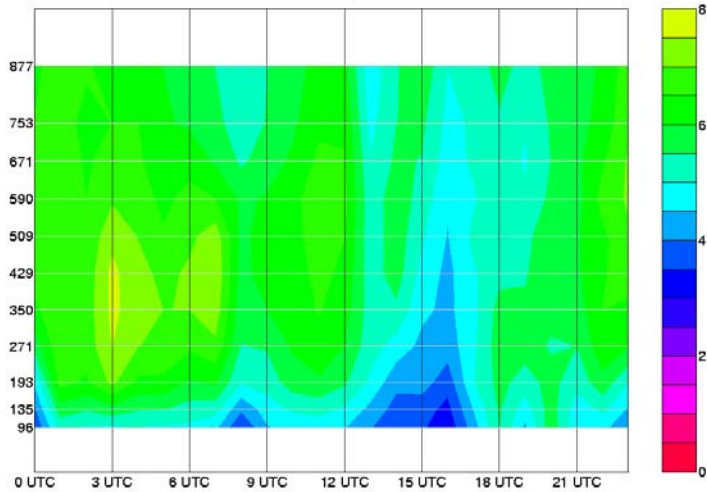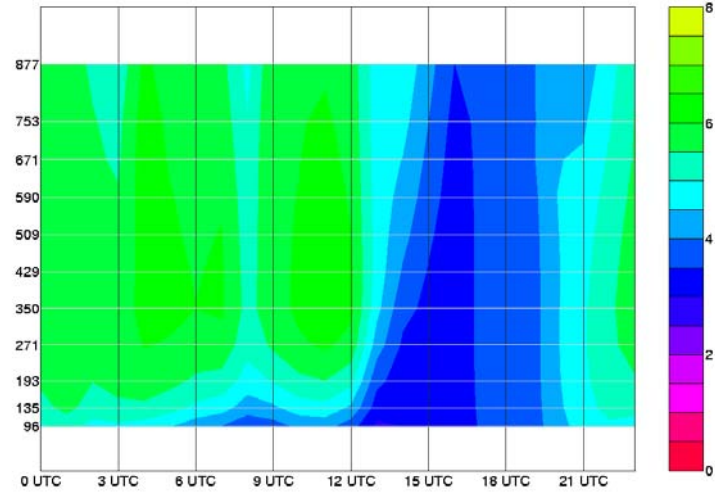
Time (UTC) on July 22 , 2004
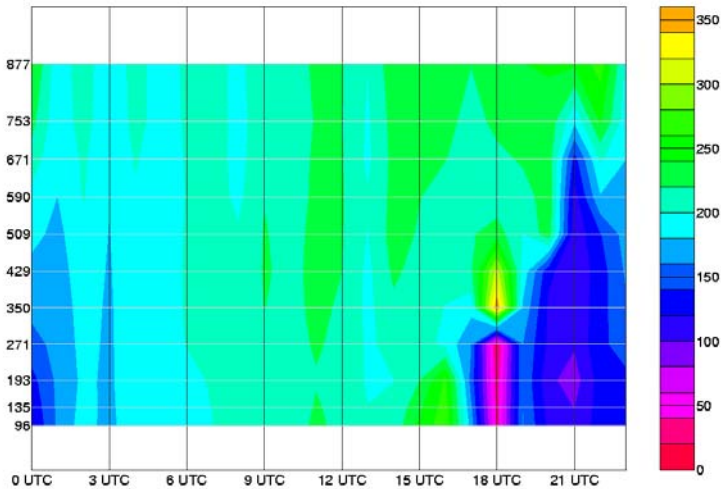
Mean Diurnal Wind Profile Comparison

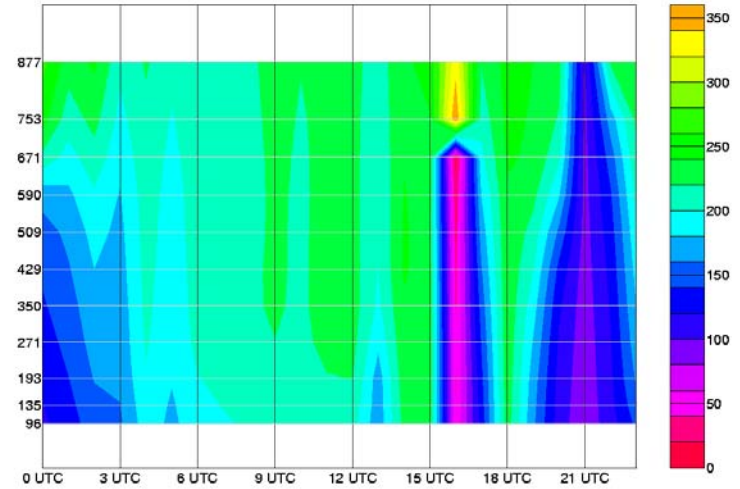Time–Height Mean Observation of Wind Speed (m/s)
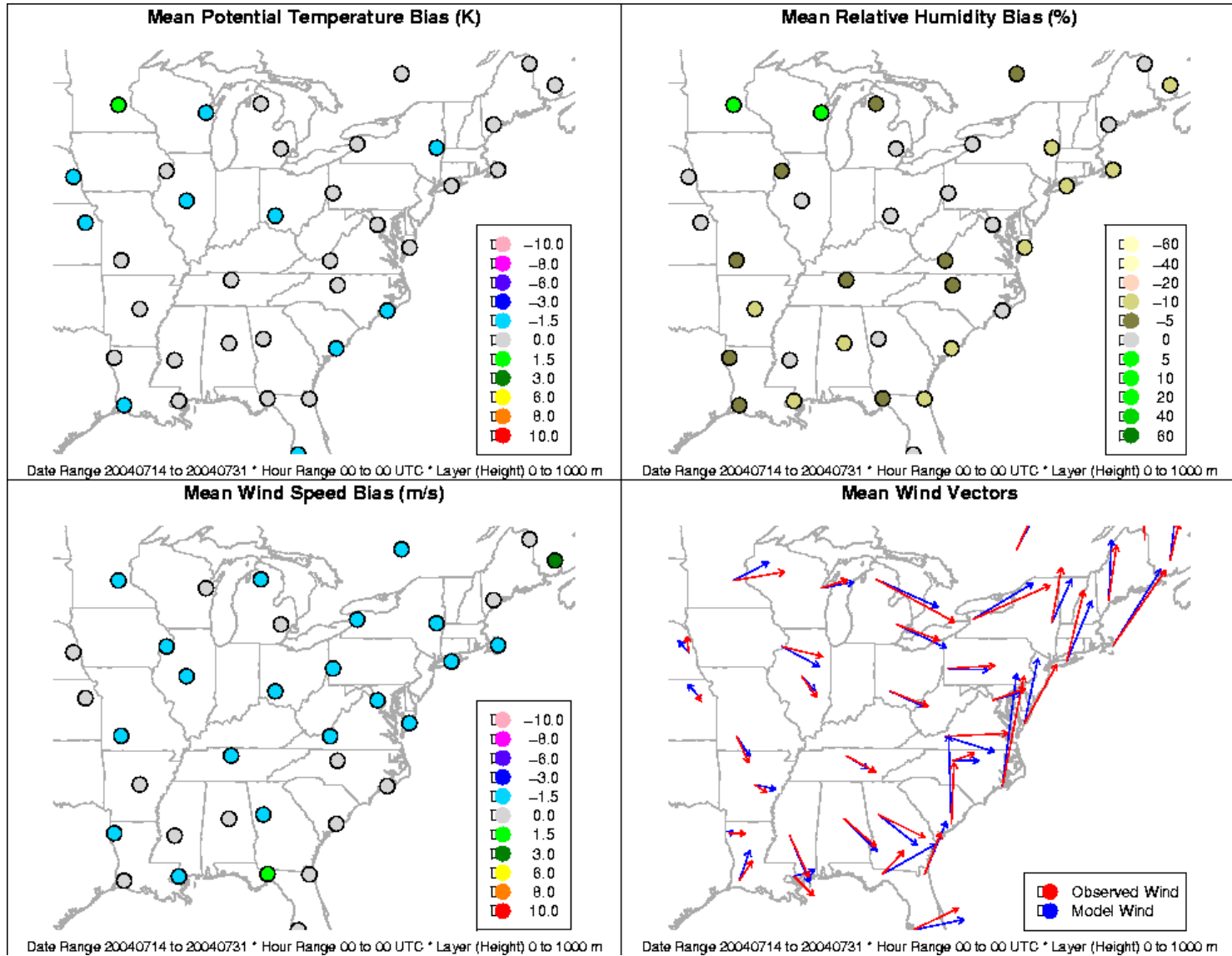
Time–Height Mean Model of Wind Speed (m/s)

Time–Height Mean Observation of Wind Direction (Deg)

Time–Height Mean Model of Wind Direction (Deg)

Rawinsonde-Model, Mean Bias (Layer-Time)

Mean Potential Temperature Bias (K) | Mean Relative Humidity Bias (%) | Mean Wind Speed Bias (m/s) | Mean Wind Vectors

Date Range 20040714 to 20040731 * Hour Range 00 to 00 UTC * Layer (Height) 0 to 1000 m

Mean (layer-time) Rawinsonde-Model Comparison
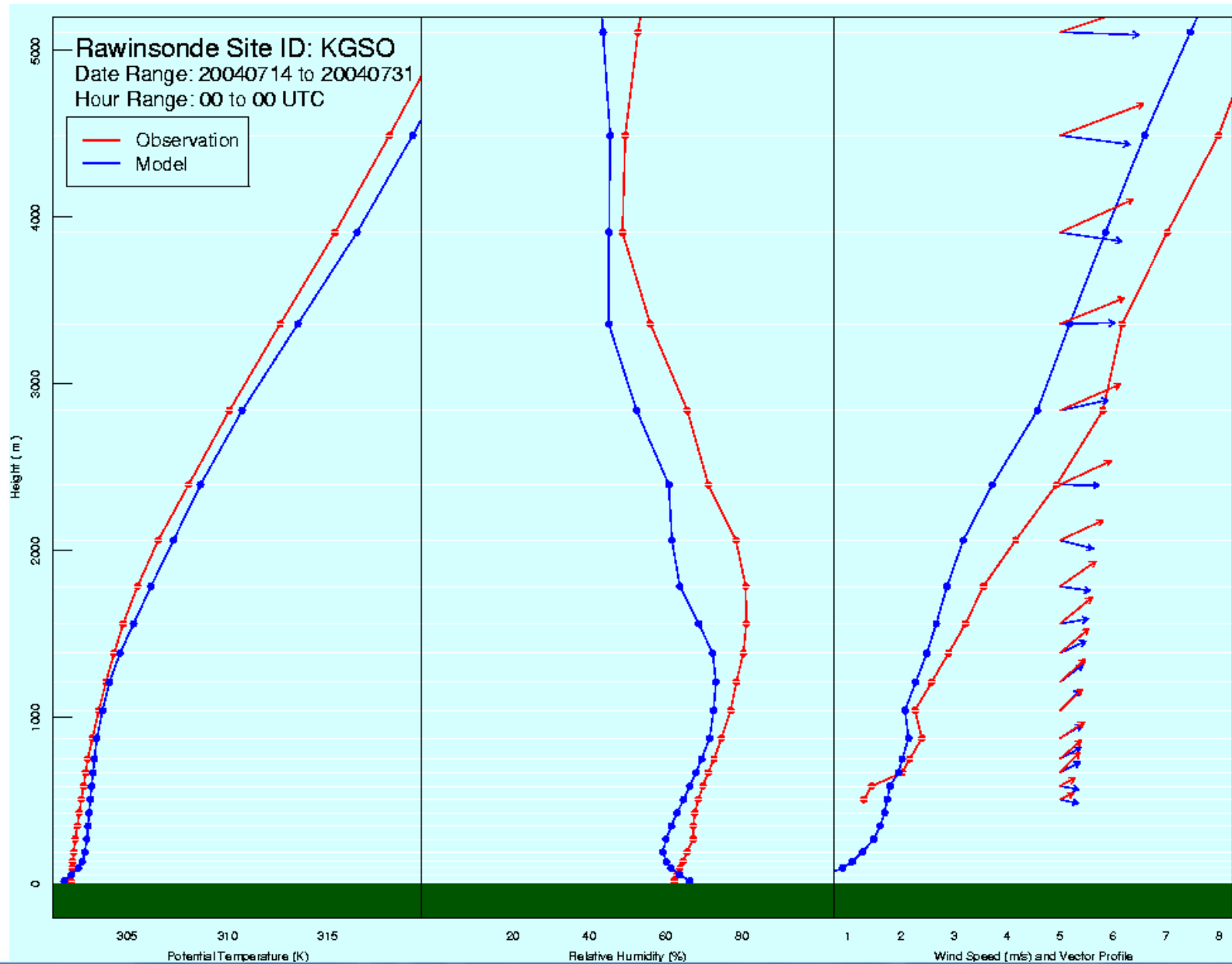
Rawinsonde Site ID: KGSO
Date Range: 20040714 to 20040731
Hour Range: 00 to 00 UTC

Observation
Model

Future Additions/Improvements

- Various coding improvements
- Improved installation procedures
- Improved documentation
- Additional observation "classes" to match with model output
- More flexibility in "look-and-feel" of analysis plots
- Merge certain MET evaluations with AQ evaluations