An automated weather forecast system that:

- provides timely, accurate forecasts
- is dynamic and modular so as to easily adapt to a rapidly changing forecasting environment
- uses state-of-the-art scientific and engineering principles
An adaptively weighted linear model employing principles of fuzzy logic
Forecast modules

Each module creates forecasts for the same set of sites, variables, and times

- Dynamic MOS (DMOS) Modules
- Applied to NCEP ETA and AVN Models
- NWS MEX, MAV, and NGM MOS Modules
- FSL Ensemble Models
Dynamic MOS (DMOS)

- Linear regression-based statistical method
- Similar to NWS MOS, but regressions built dynamically
- Can be applied to any NWP forecast model fairly easily
- Uses “default equations” if statistical model fails.
**Forecast Integrator Objectives**

To combine forecasts from a set of models:

- Combines forecasts from many forecast modules
- *Discovers the “best” combination of models for a given forecast time and location.*
- *Computationally simple and robust.*
- Can easily adapt to the addition of new models or removal of obsolete models.
Forecast Integrator

Forecast error as function of $W_1$ & $W_2$
RWFS Principles

(Why does it work?)

• Mimics human forecasters approach
  • Considers diverse inputs
  • Learns from experience the strengths and weaknesses of each input
  • Values “better” forecasts more highly

• Consensus forecasts have been shown to add skill
MDSS fcst-mos weighted average rms of 21z T forecast errors from 218 to 505
MDSS fcst-mods weighted average rms of 21z dewpt forecast errors from 218 to 505

RWFS Result
MDSS fcst-mods weighted average rms of 21z wind-speed forecast errors from 218 to 505

RMS of error

Lead Time

RWFS Result
MDSS fcst-mos weighted average rms of 21z prob-precip06 forecast errors from 218 to 505

RMS of error

Lead Time

RWFS Result
Mesoscale Model Evaluation

- Do supplemental models add value?
  - Intuitively, yes
  - Data from ’02 is inconclusive
    - Small region and time period for evaluation
    - Little time to develop and tune DMOS to new model output
    - Full ensemble not yet available
  - Little improvement for T, Dewpt, Wind Spd
  - Seems to help for precipitation
Integrated fcst-mods weighted average rms of 21z T forecast errors from 218 to 505

Average rmse value over entire time series:

int-4: 2.31087
int-6: 2.30116
Integrated fcst.mods weighted average rms of 21z dewpt forecast errors from 218 to 505

Average rmse value over entire time series:

- int-4: 2.57385
- int-6: 2.53413
Integrated fcst-mods weighted average rms of 21z wind-speed forecast errors from 218 to 505

Average rmse value over the entire time series:

int-4: 1.72774
int-6: 1.67230
MDSS fcst-mods weighted average rms of 21z prob-precip06 forecast errors from 218 to 505
Summary

• RWFS is a robust forecast technology

• RWFS has already been commercialized

• RWFS has proven skill over individual forecast ingredients

• New forecast models and sites can be easily added