EKDMOS Implementation and Spread Calibration

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MDL

6th NCEP Users Workshop

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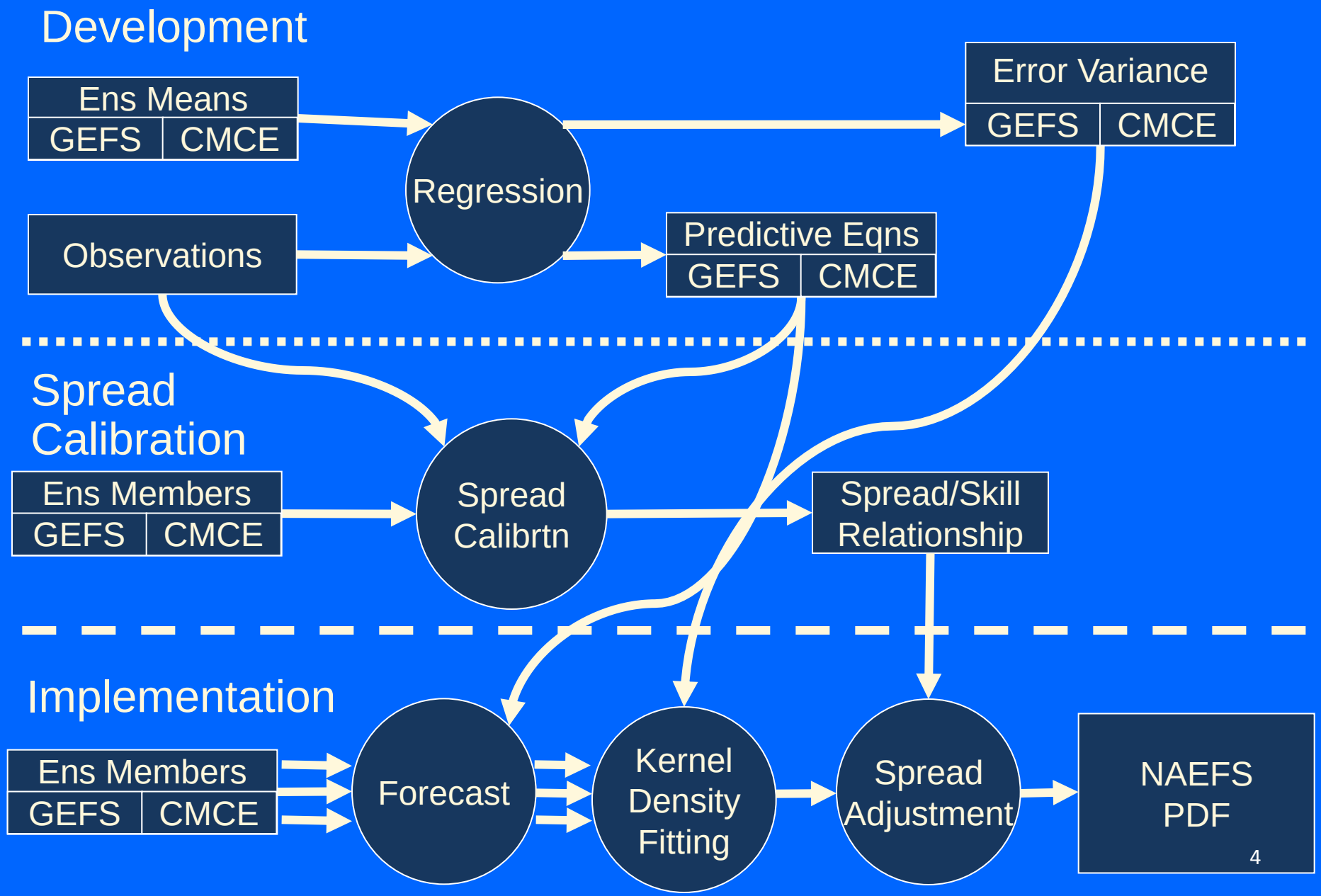
EKDMOS Implementation

- Initial Implementation
  - 2-m temperature, dewpoint, daytime maximum temperature, nighttime minimum temperature
  - Disseminated as 11 percentile values and the ensemble mean
  - 2.5 km grid over CONUS
  - ~3 km grid over Alaska
  - Use spread-skill relationships to generate a reliable probability distribution

EKDMOS Implementation

- Parallel production test on NCEP's CCS from March 27 through May 10
- Currently seeking feedback before May 16
  - Submit comments on our web page: http://www.mdl.nws.noaa.gov/~naefs_ekdmos/
  - Email Chris.Caruso.Magee@noaa.gov

EKDMOS Method



Spread Calibration

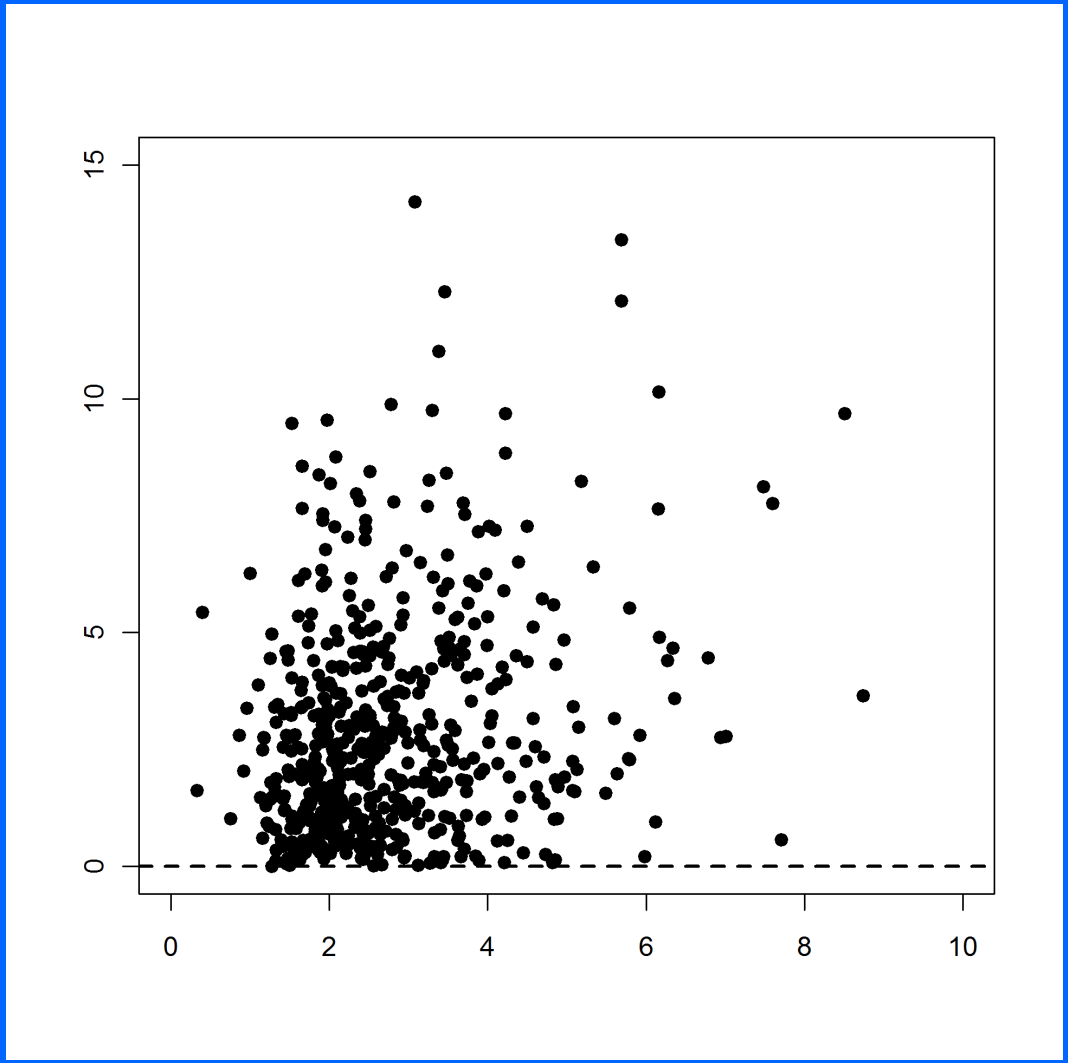
- We develop station-specific spread-skill relationships

$$\sigma_{Calibrated} = \beta_0 + \beta_1 \sigma_{Ensemble}$$

- Where β_0 and β_1 are determined by relating the skill of the ensemble mean to the spread of the ensemble members using the development dataset
- Currently use a binning method to estimate the parameters
- Investigating an alternative technique which avoids binning

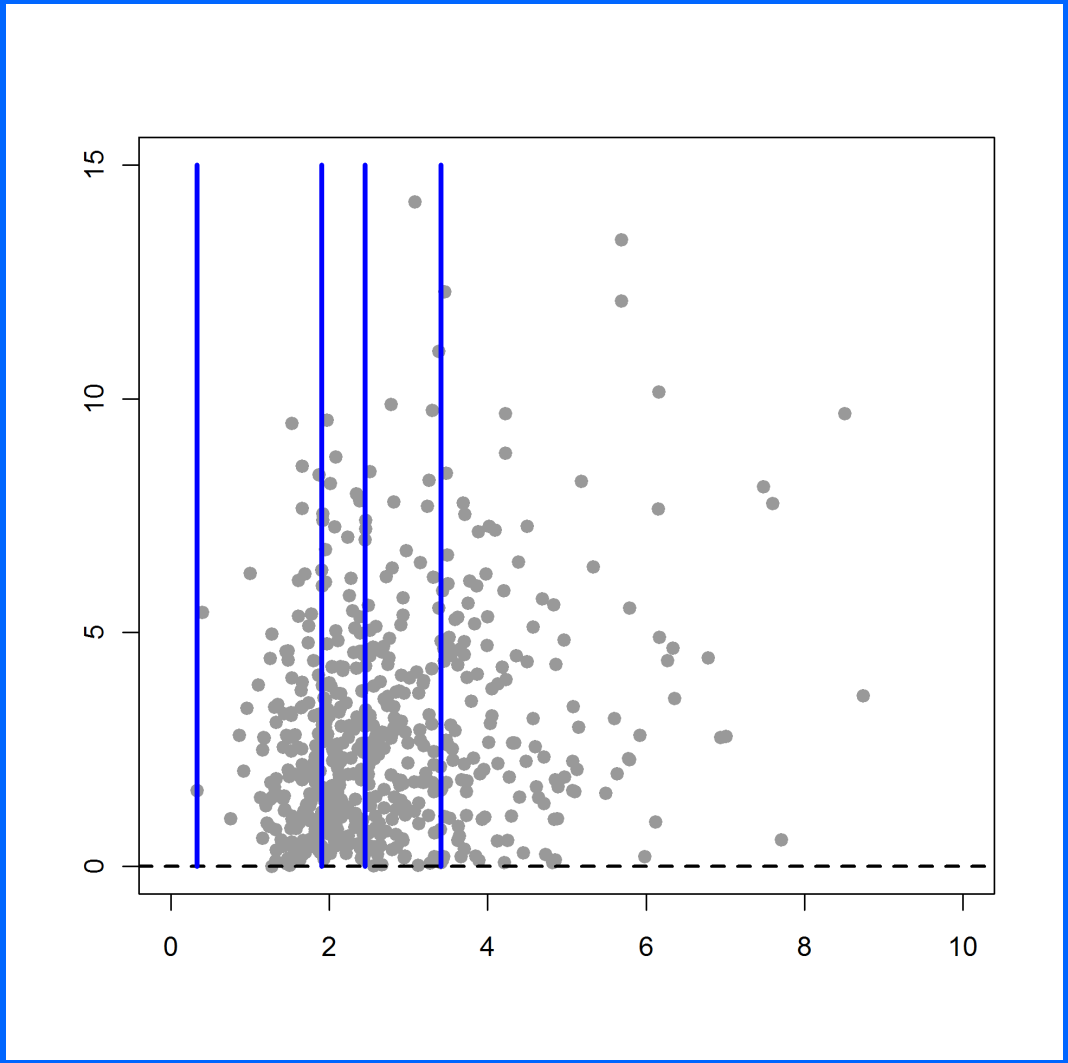
Developing Spread-Skill Relationships

- Plot of ensemble-member standard deviation vs the absolute error of the ensemble-mean.
- Each point is one forecast case



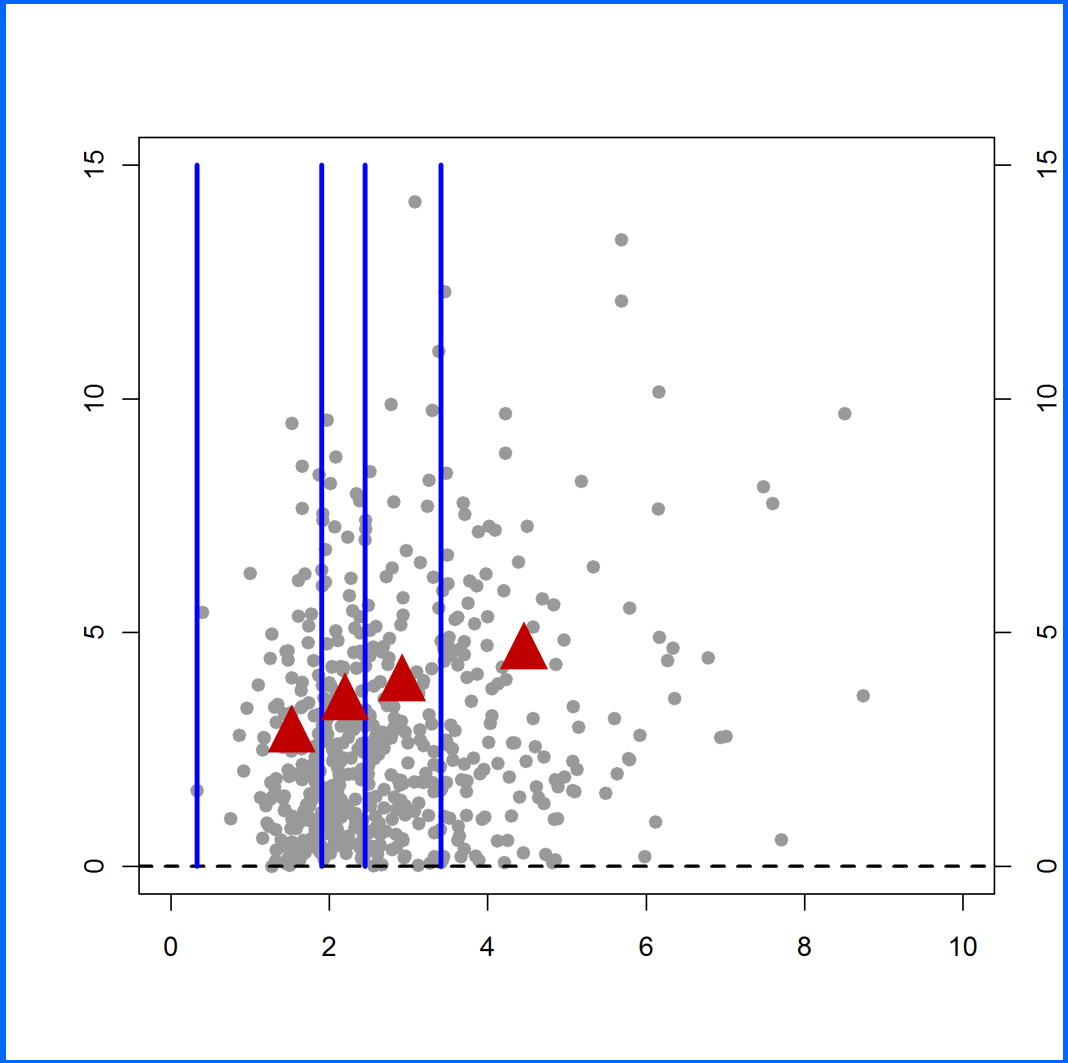
Developing Spread-Skill Relationships

- Group cases into equal case count bins shown by the blue lines



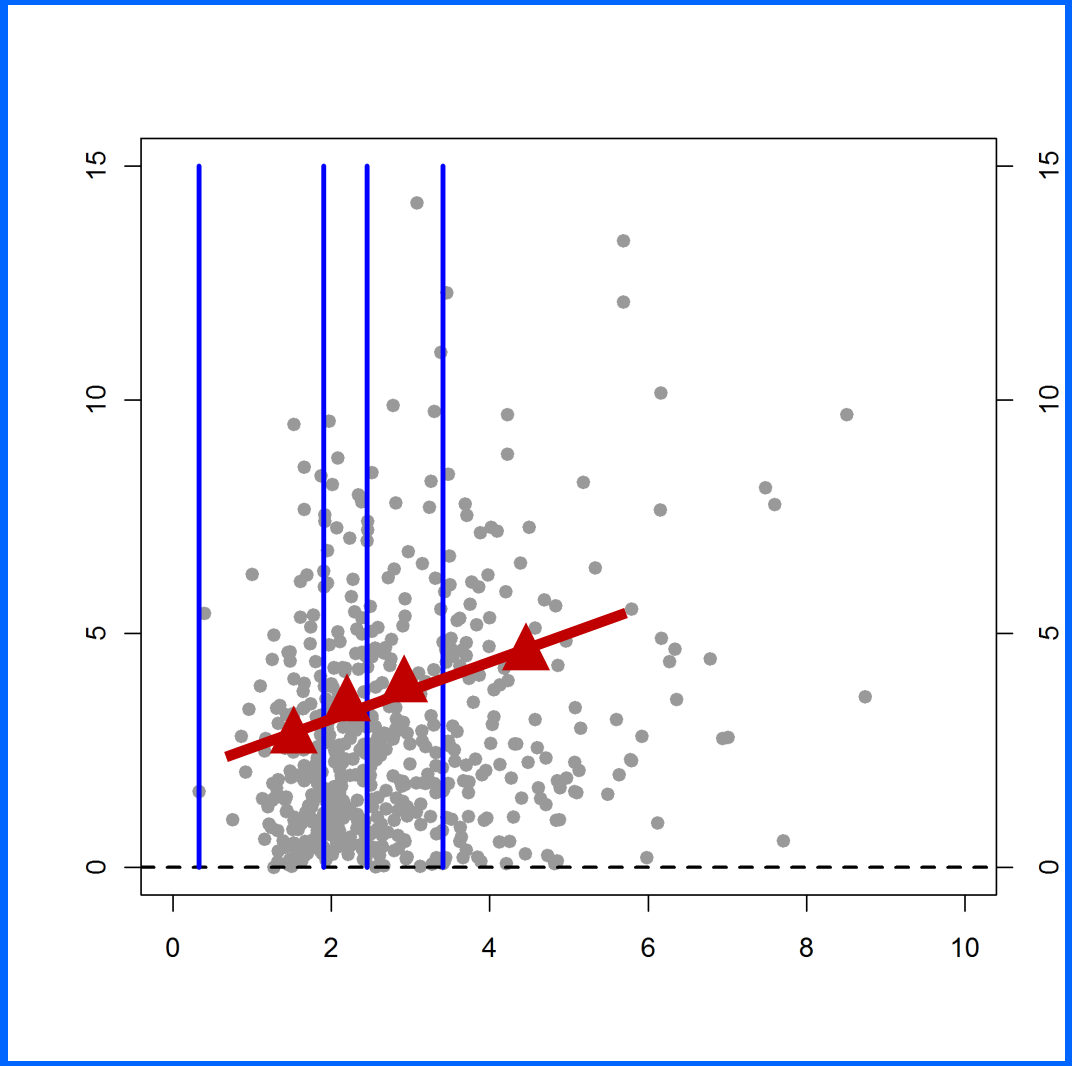
Developing Spread-Skill Relationships

- For each bin calculate the ensemble-mean standard error and the average ensemble-member standard deviation
- Shown by the red triangles

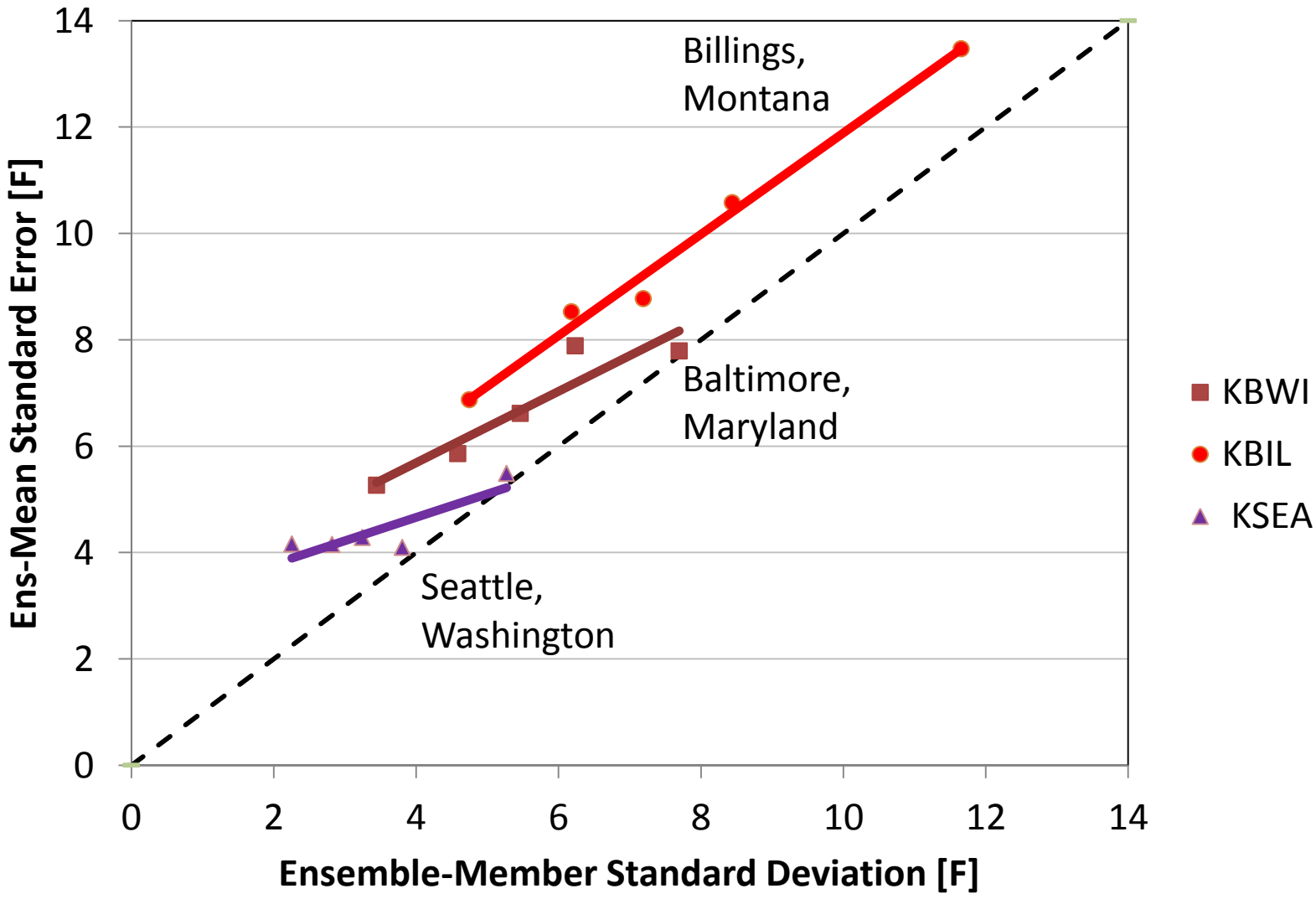


Developing Spread-Skill Relationships

- Fit a regression line to the ensemble-mean standard error values
- The regression line is the spread-skill relationship



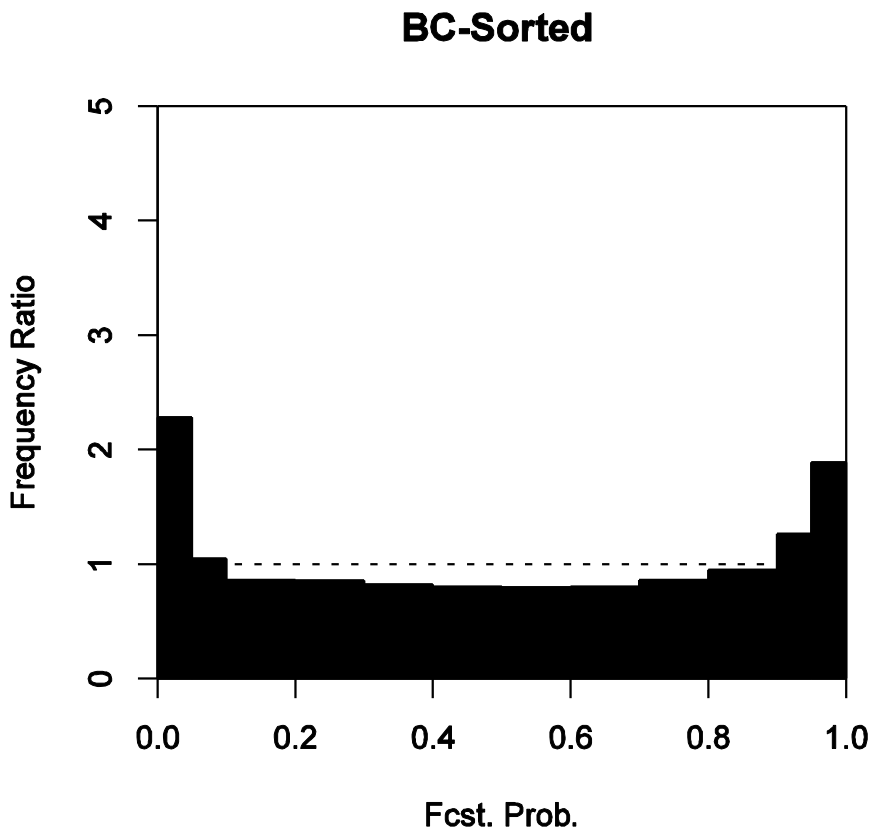
Example Spread-Skill Relationships
192-h 2-m Temperature, Cool Season

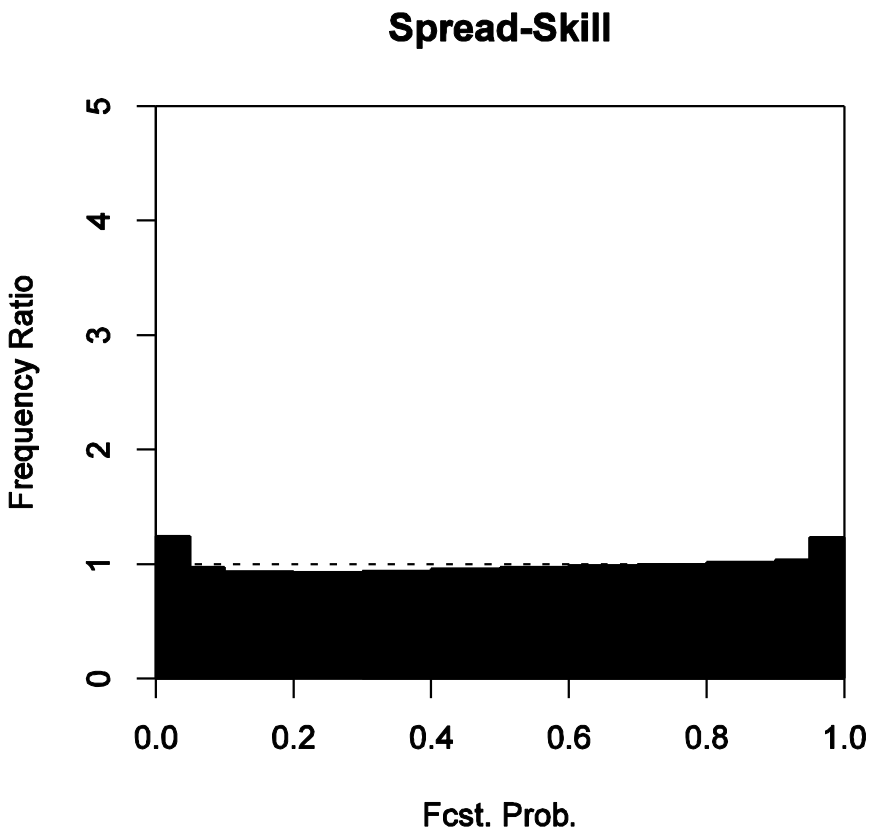


Spread Verification

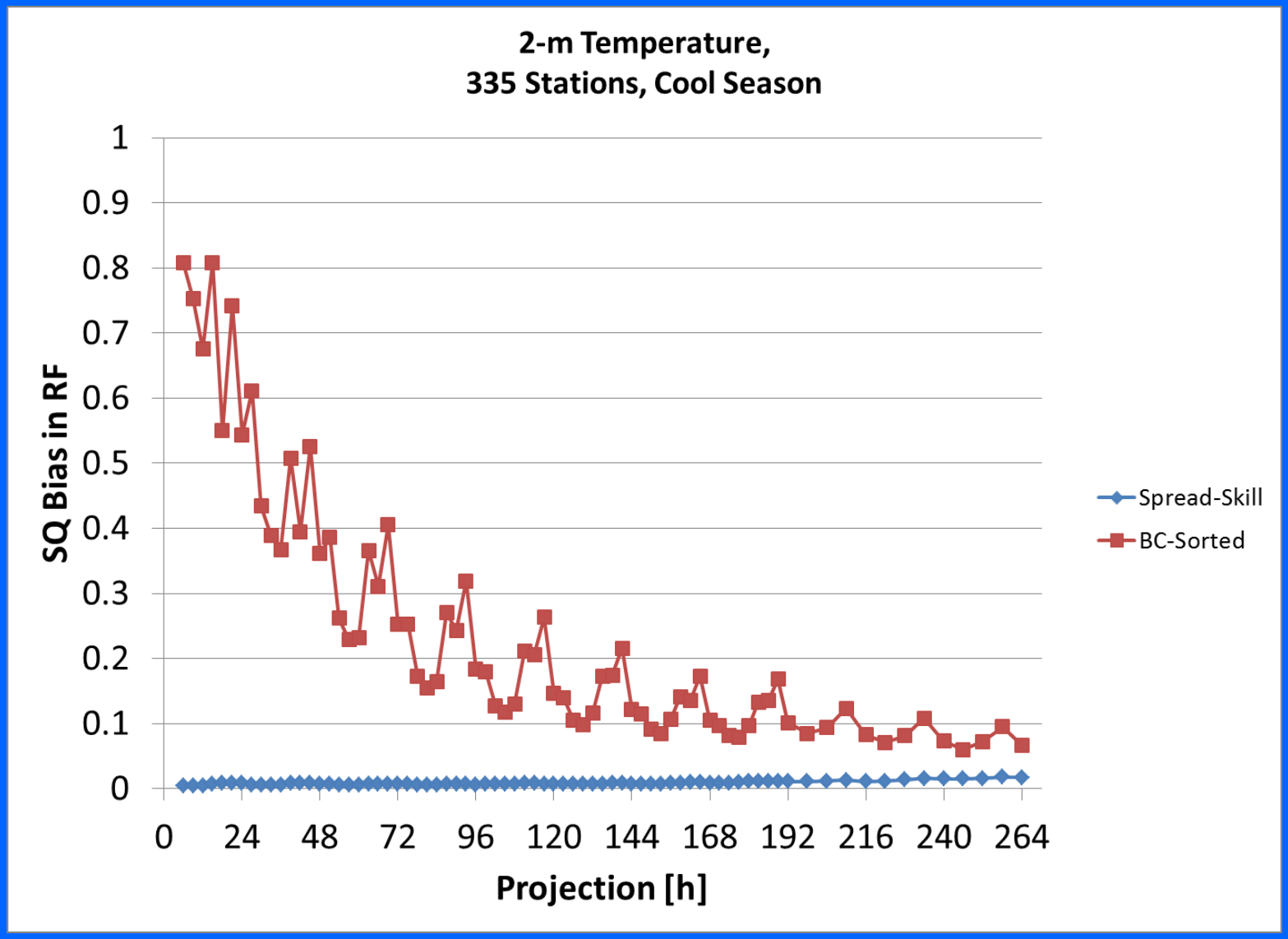
- Cool Season 2-m temperature forecasts
- Cross validated using 3 years of NAEFS forecasts
  - 1 October 2007 – 31 March 2010
  - 335 Stations, CONUS, Alaska, Hawaii, and Puerto Rico
- Bias Corrected Rank Sorted Forecasts (BC-Sorted)
  - Baseline for spread comparison
  - Use direct model output (DMO)
  - Correct distribution center but preserver original ensemble member spread.

PIT Histograms, 120-h 2-m Temperature

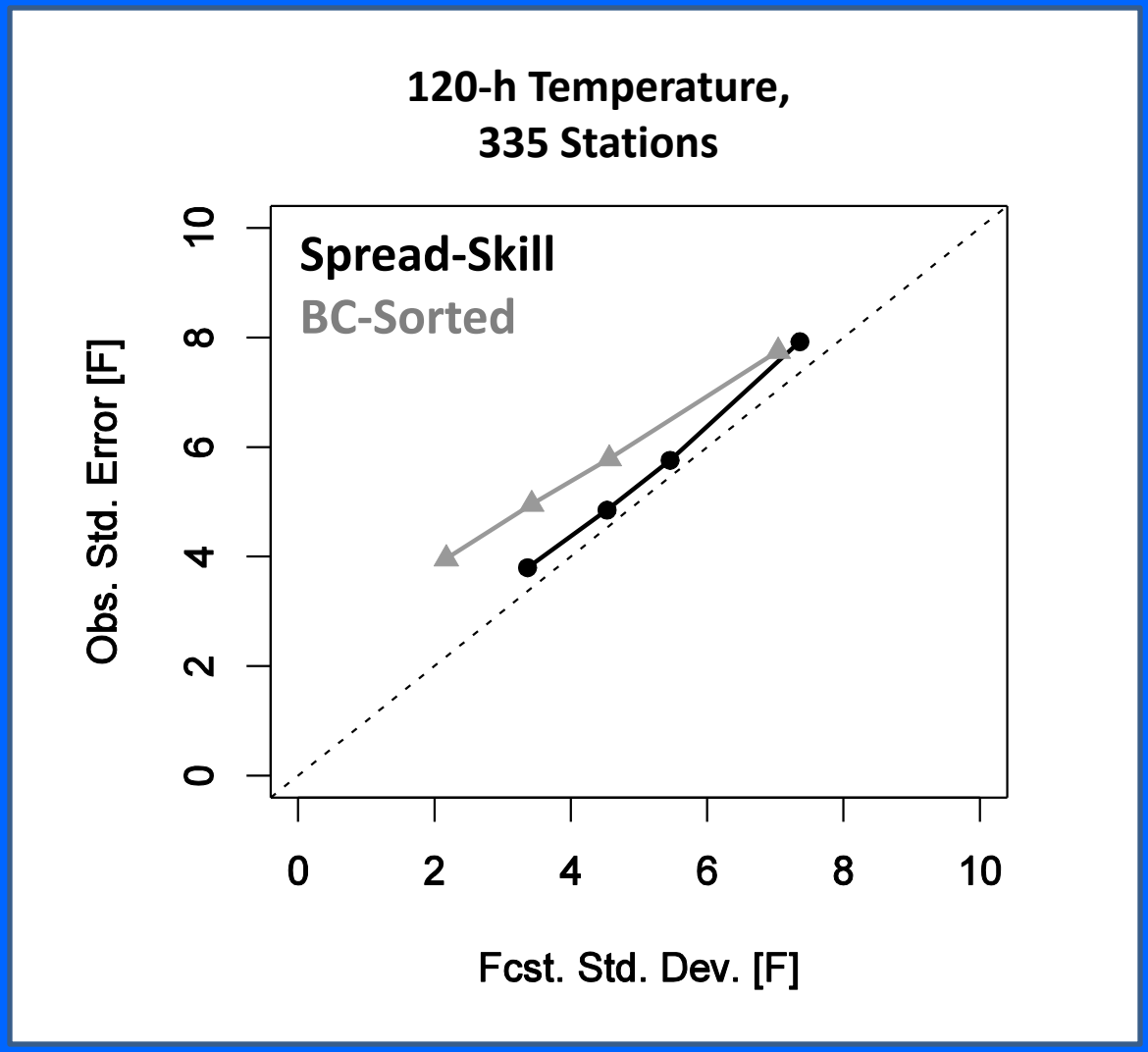




Squared Bias in Relative Frequency



Spread-Error Verification Diagrams



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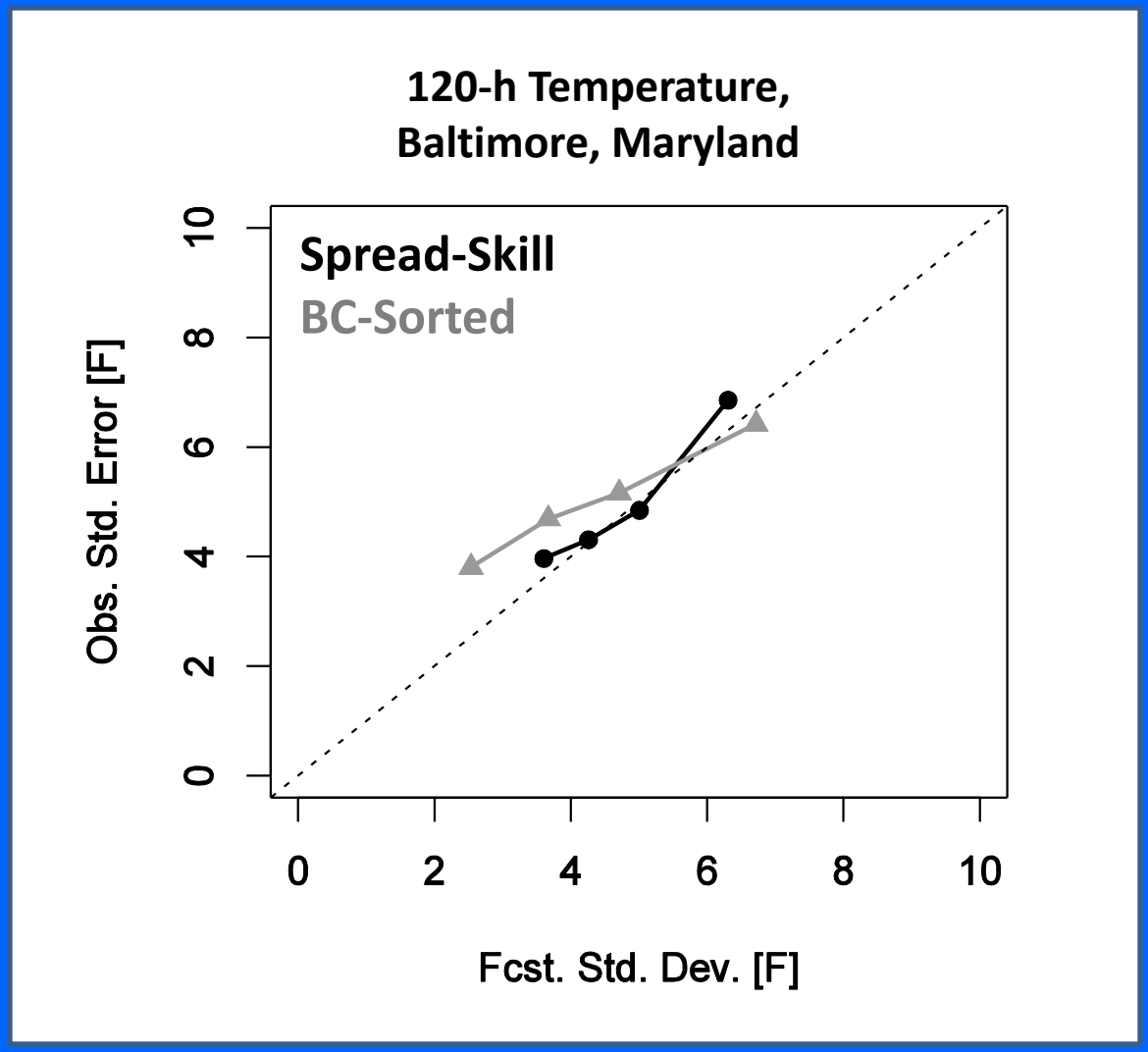

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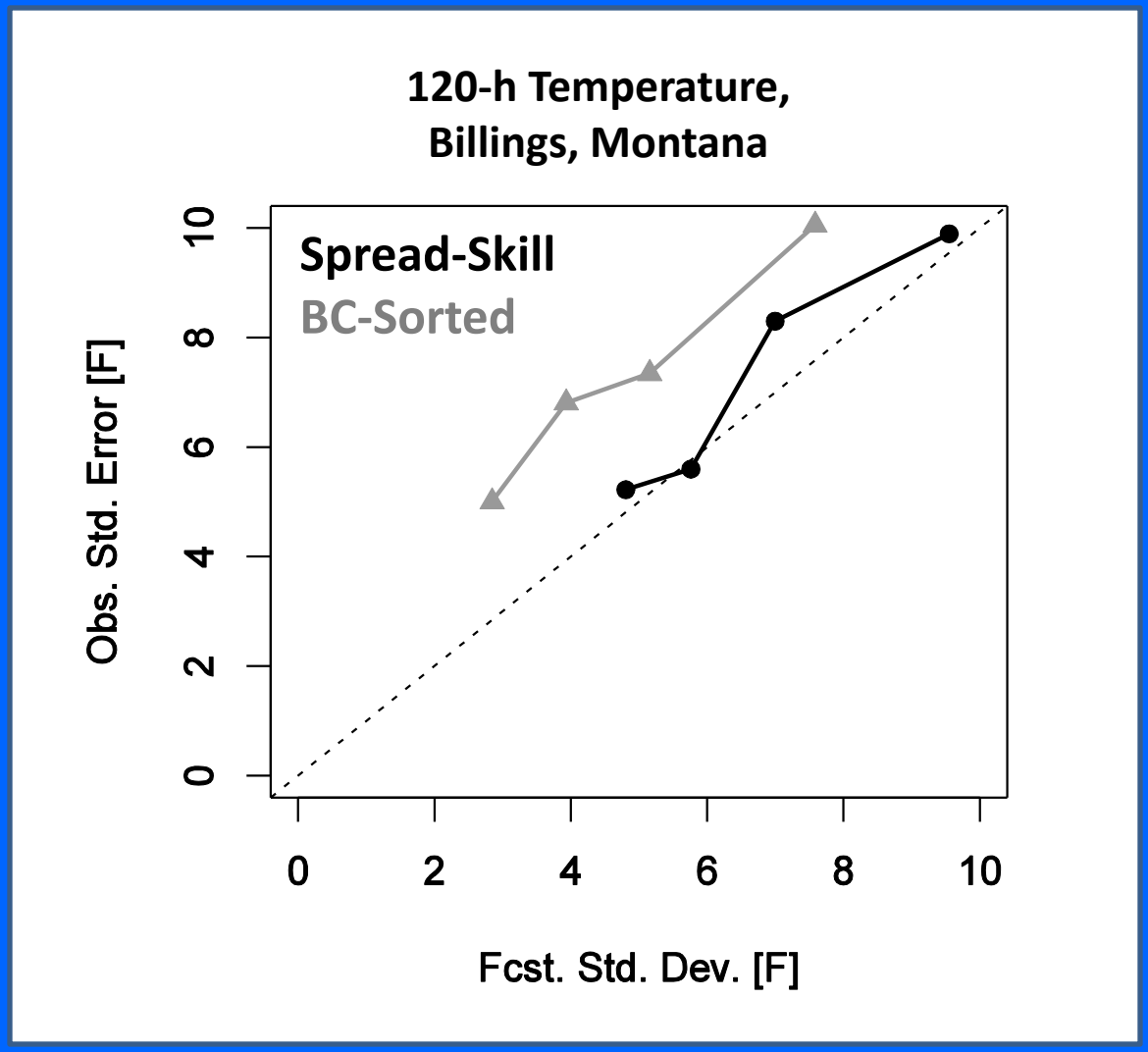

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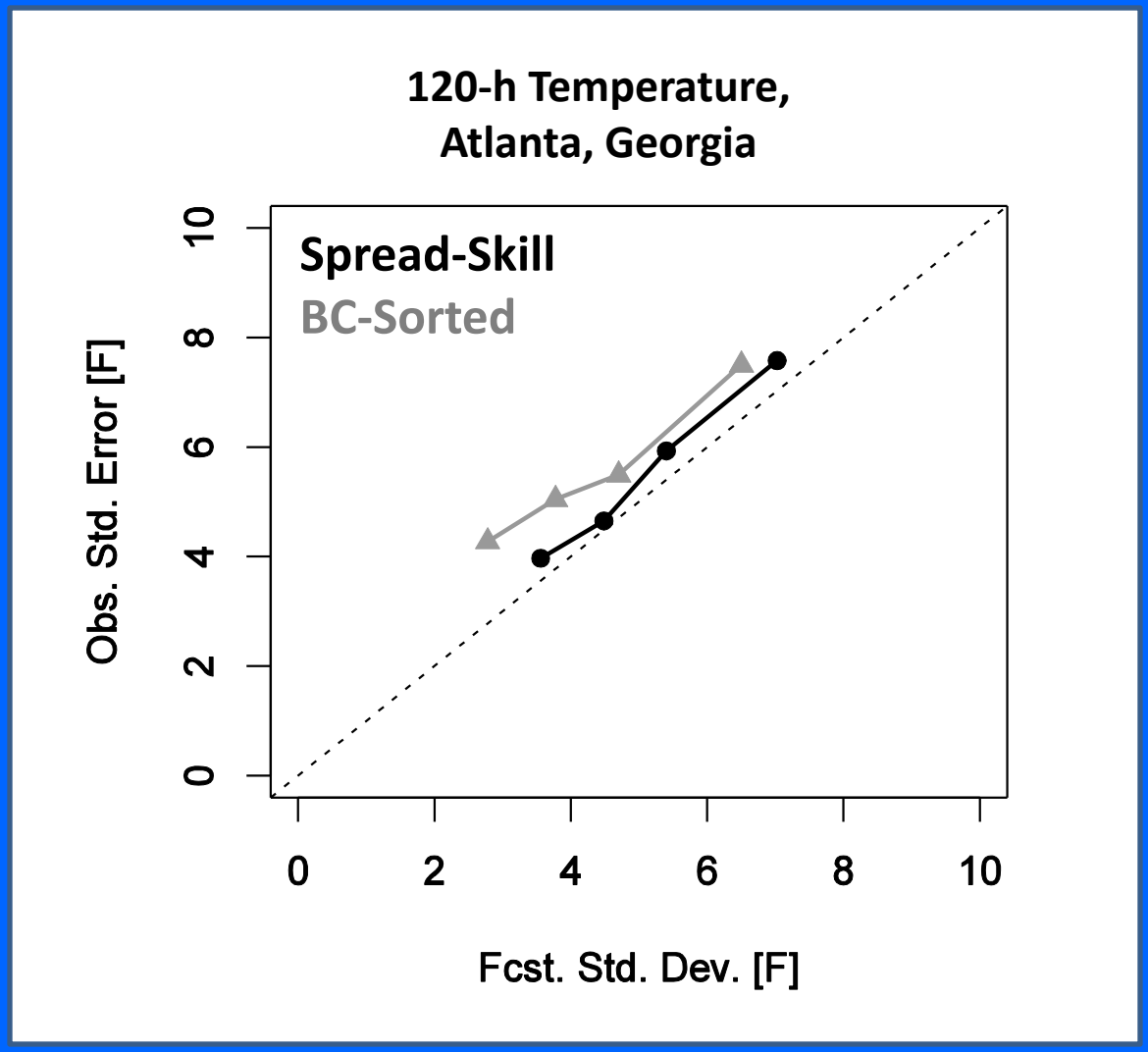

Current Efforts

- Spread calibration testing
- Second implementation
  - Wind speed
  - Apparent temperature
  - PQPF
  - Hawaii grids
- Bayesian Model Averaging