Statistical Correction of Model Forecasts

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Motivation: An ATEC Forecast Challenge

- Test directors often require accurate, temporally detailed forecasts.
- This is a challenging task at the ATEC ranges, where the meteorological conditions often exhibit dramatic variability from place to place.
Why implement a statistical correction?

Real world

Model representation

- Imperfect
- Small-scale features not resolved
Why Not Use a Traditional MOS Approach?

- Traditional MOS requires:
  i. A “frozen” weather forecast model (no upgrades).
  ii. Lengthy data archive for “training” MOS equations.

- Implications:
  - MOS system must be completely “re-trained” whenever model is upgraded—difficult and very time consuming.
One Alternative

Running-mean bias correction

❖ Advantages:
  a. Improve/upgrade model at **any** time.
  b. Long data archive not needed.
  c. Relatively easy to implement.
  d. **Significant** increase in forecast accuracy.
Schematic of Running-mean Bias Correction

Bias correction computed as function of station location and time of day.
Why not use yesterday’s bias to correct today’s forecast?

Example:

**Bias 11 June** = +6 °C  (too warm)

**Bias 12 June** = -3.5 °C  (too cold)

Obs temp 12 June = 18 °C

**Fctst temp 12 June** = 14.5 °C

Correct the 12 June forecast using previous day’s (11 June) bias:

**BC** = **14.5 °C − 6 °C** = 8.5 °C

Our goal was to correct the Forecast toward the Observation, but…

**We have made correction in the wrong direction!**
How do we choose length of sampling period for computing bias correction?

Main Goal: produce the most accurate result on average
Bias Correction Provided for:

- 2 m AGL temperature
- 2 m AGL dew point temperature
- 2 m AGL relative humidity
- 10 m AGL wind direction
- 10 m AGL wind speed
Demo

Aberdeen Test Center