

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?

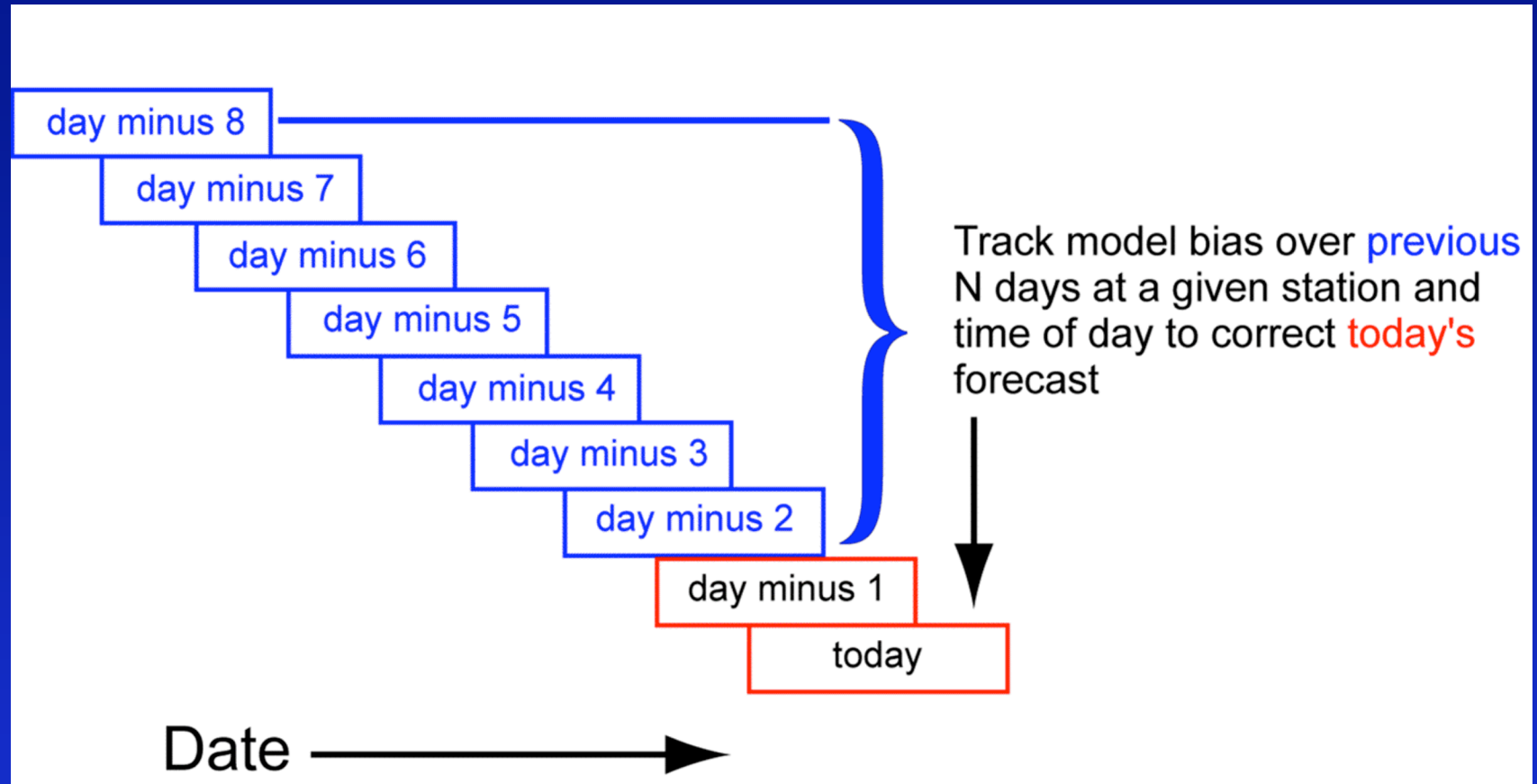
- ❖ Traditional MOS requires:
 - i. A “frozen” weather forecast model (no upgrades).
 - ii. Lengthy data archive for “training” MOS equations.
- ❖ Implications:
 - MOS system must be completely “re-trained” whenever model is upgraded—difficult and very time consuming.

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.

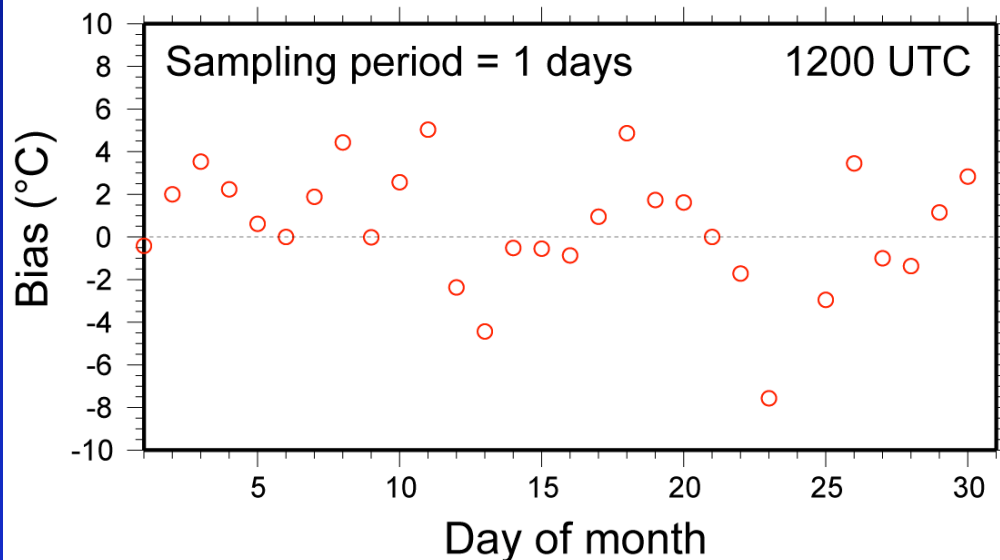
Schematic of Running-mean Bias Correction



Bias correction computed as function of station location and time of day

Why not use yesterday's bias to correct today's forecast?

WSMR SAMS 01 June 2003



Time series of bias estimate

Example:

Bias 11 June = +6 °C (too warm)

Bias 12 June = -3.5 °C (too cold)

Obs temp 12 June = 18 °C

Fcst temp 12 June = 14.5 °C

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

$$\text{BC} = 14.5 \text{ °C} - 6 \text{ °C} = 8.5 \text{ °C}$$

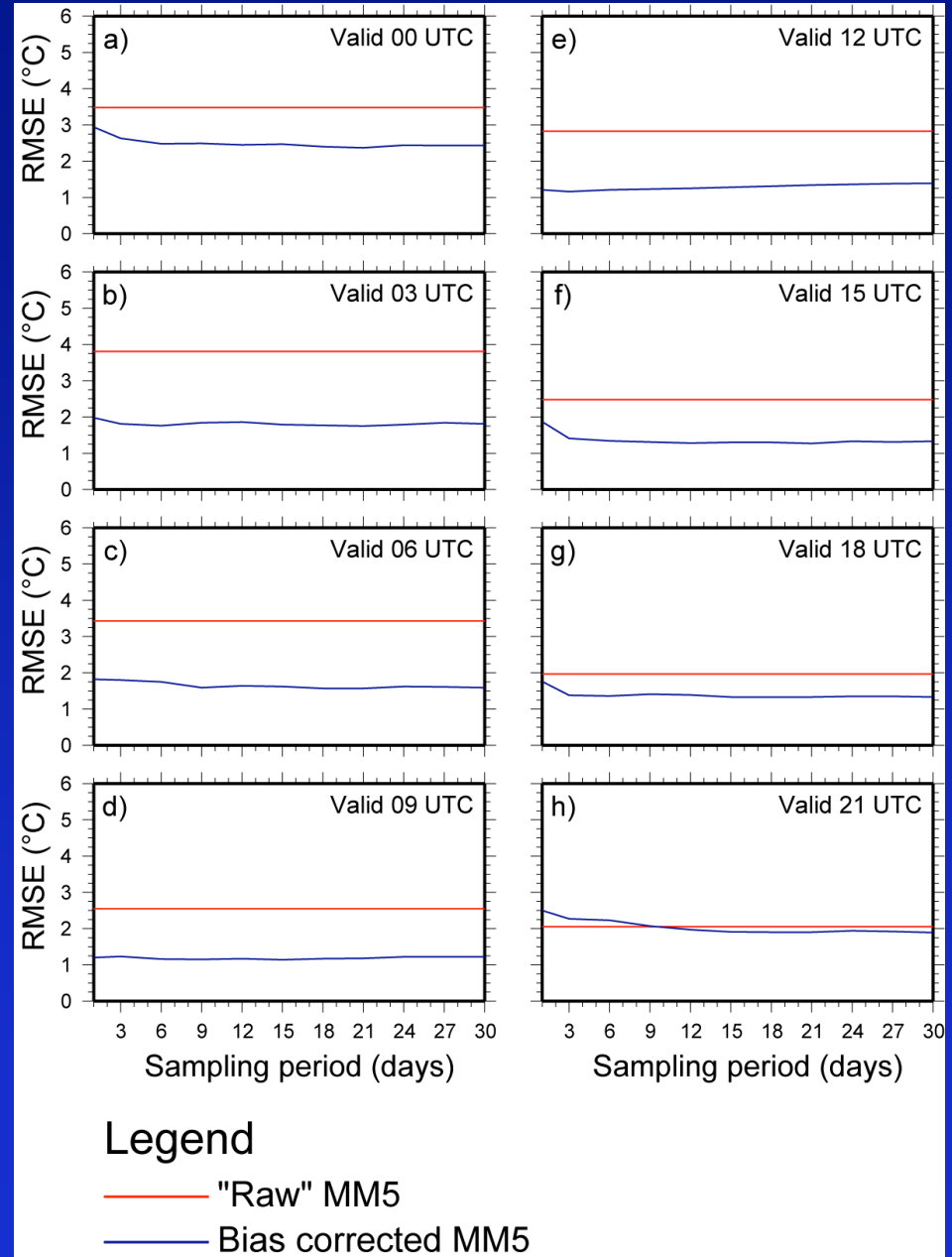
Our goal was to correct the Forecast toward the Observation, but...

We have made correction in the wrong direction!

WSMR S05 for Aug 2003

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](#)