Met Office

Consistency

Some thoughts on consistency between raw and post-processed forecasts

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Contents

This presentation covers the following areas

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Introduction

What makes a good forecast?

- Useful
- Accessible
- Relevant
- User confidence
- Accuracy
- Consistency

Types of consistency

Types of consistency

- Self-consistency between parameters
  - E.g. sunny and warm - yes
  - E.g. sunny, warm and snow - no!!
- Run-to-run consistency
  - ‘flip-flopping’ forecasts undermine confidence
- Consistency with latest observations
  - Do early parts of forecast agree with reality?
- Consistency with other products
  - E.g. between gridded and site products

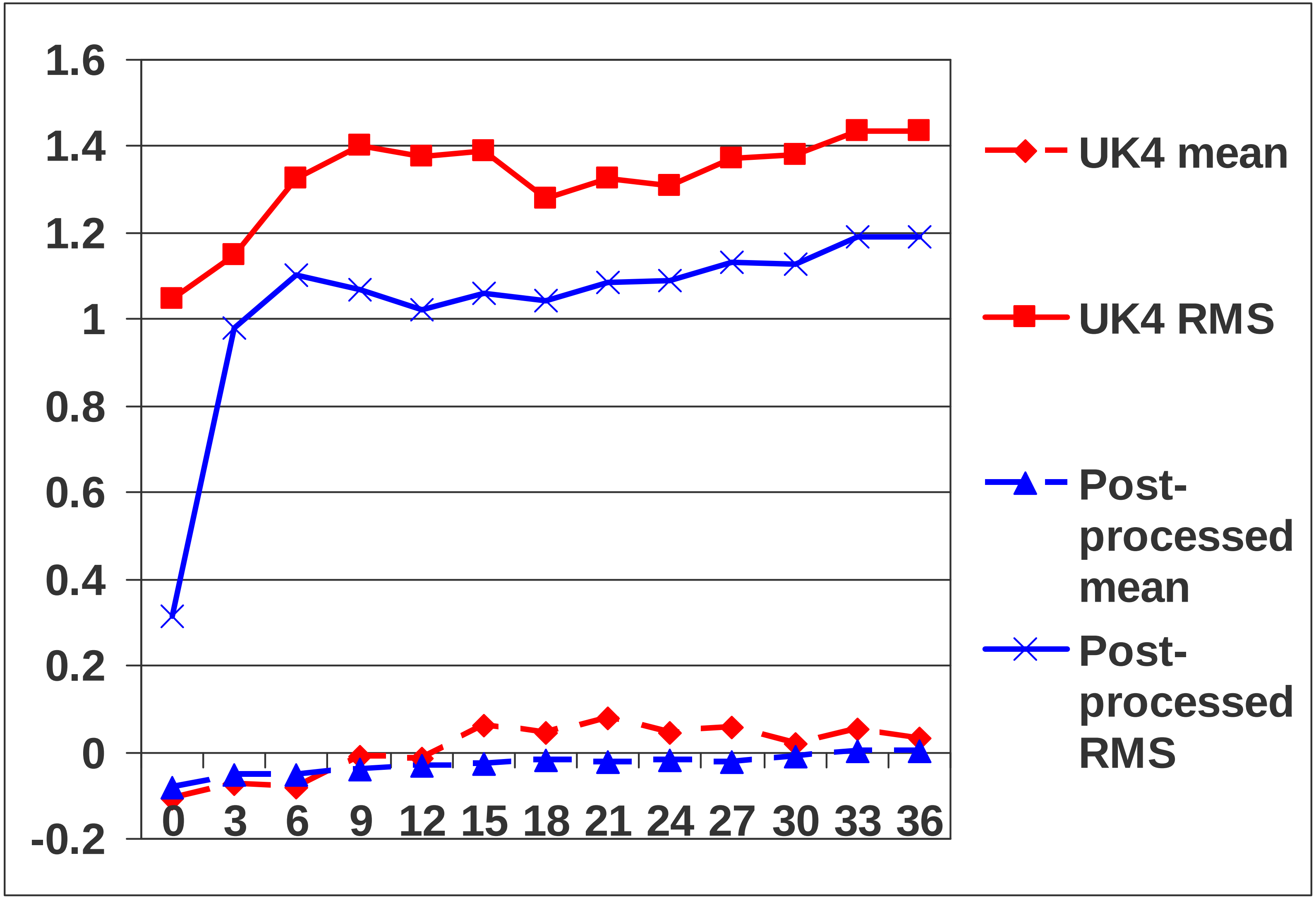
Consistency between gridded and site values

- Consistency between gridded and site forecasts if …
    - Site values taken directly from grid
    - No additional processing applied
- However
    - Some parameters strongly dependant on sub-grid orography (e.g. T1p5m, 10m winds)
    - Not all parameters might be available on grid

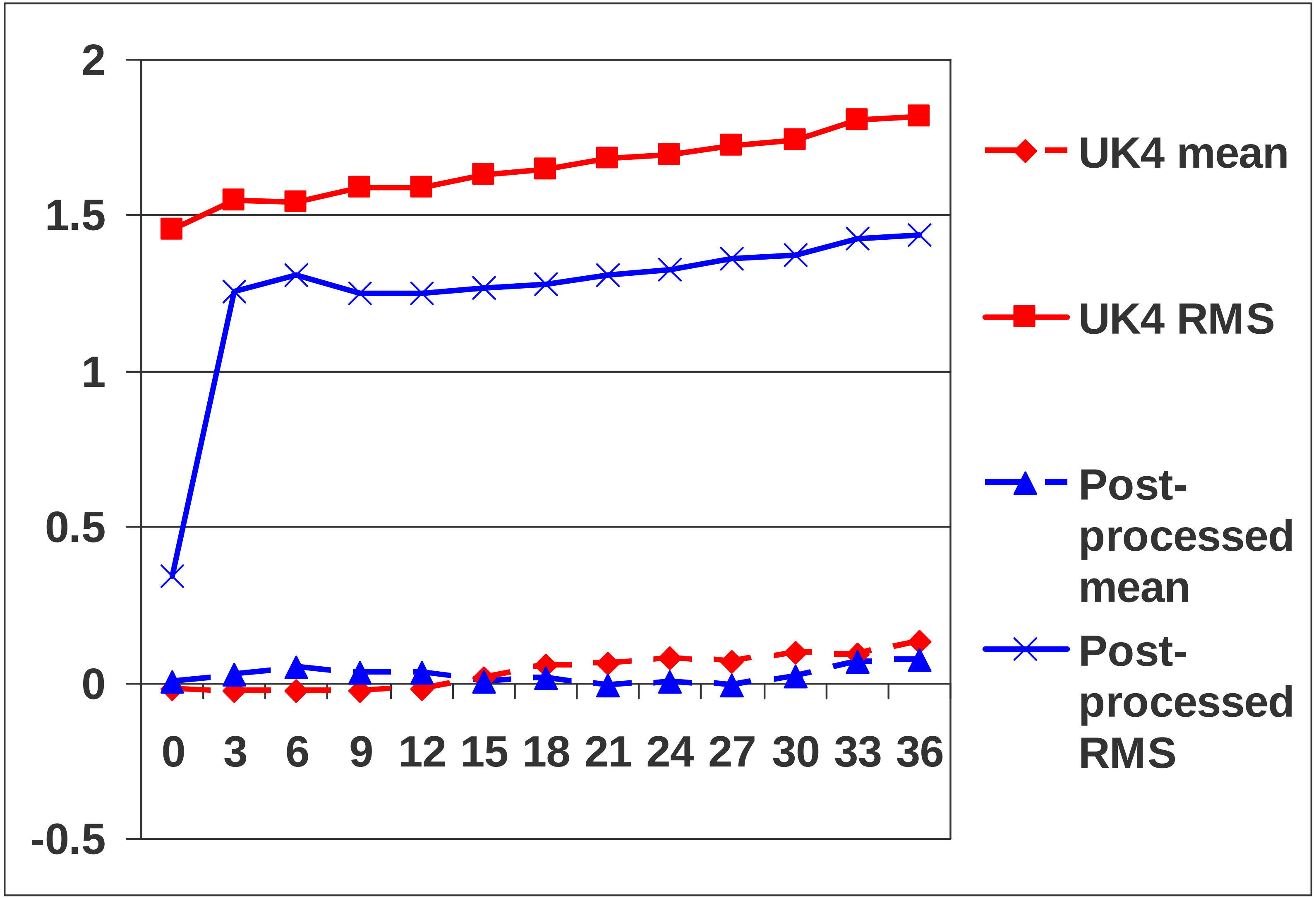
Apply corrections to improve forecast

- Possible adjustments for screen temperature and 10m winds include -
  - physically-based correction for height differences
  - Time lagging
  - Statistical correction (e.g. Kalman filter or MOS)
  - Nowcasting

UK Screen temperatures – August 2011



UK 10m Windspeeds – August 2011



But …

- Improving accuracy of site forecasts reduces consistency
- Now Tscreen inconsistent with Tstar, screen visibility, rain/snow mix, etc
  - May not be an issue for most users
  - Applications that require consistent, physically balanced data should couple closely or directly to NWP model
- Difference between site-specific and gridded temperatures typically ~ 0.5 to 1.0 degC
  - We display data on our public website to nearest degree, so difference between gridded and site data not apparent to user

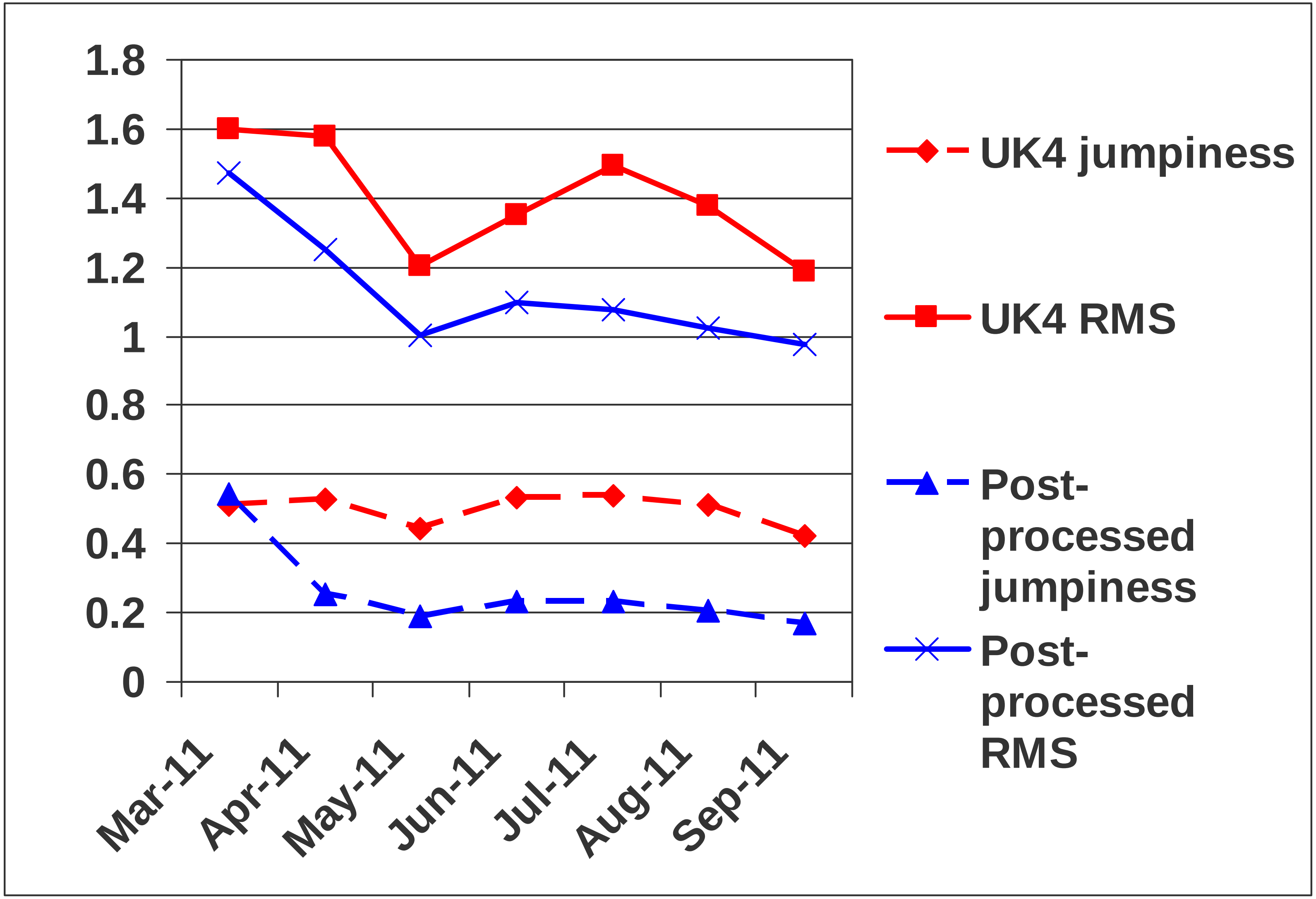
Improving run-to-run consistency

- Use ensemble means
- Use time-lagging
  - Forecast is not latest model run
- Are frequent incremental corrections better than occasional large changes?
- At Met Office
  - Site-specific winds and temperatures are time-lagged
  - Investigating how to time-lag weather code

Improving run-to-run consistency

- Typical difference between a T+12 temperature forecast and a T+18 forecast is around 0.5-0.6C
- Time lagging can reduce this to ~0.25C
- Forecasts also verify better

UK Screen temperatures T+12 RMS error and change from T+18 (jumpiness)



Conclusions

A trade-off?

- We can do many things to improve on raw model data
- These can give better, more reliable forecasts
  - Better verification
  - Better run-to-run consistency
- User has more confidence in the forecast

But …

- But these techniques act on individual parameters
  - Can lose physical consistency between related parameters
  - Need to make post-processed data available to range of products to ensure consistency across these products
  - Need for additional checks to handle obvious inconsistencies?
- Balance between consistencies will depend on application
  - Consider on a case-by case basis
  - Could end up with many post-processing streams for different applications.

Questions and answers