Trends in the Accuracy of Weather Predictions – An Update

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Recently completed is a piece of work exploring trends in the skill of weather prediction at lead times of 1 to 14 days for Melbourne, Australia:

Trends in the skill of weather prediction at lead times of 1–14 days
by Harvey Stern & Noel E Davidson
Quarterly Journal of the Royal Meteorological Society
Volume 141, Issue 692, pages 2726-2736, October 2015 Part A
Article first published online: 25 MAY 2015 DOI: 10.1002/qj.2559
http://onlinelibrary.wiley.com/doi/10.1002/qj.2559/abstract

Official Australian Bureau of Meteorology forecasts were used to establish these trends at shorter lead times - out to Day-7. The system that was used to establish these trends at longer lead times - out to Day-14 - was, in part, based upon an algorithm that statistically interpreted the United States' Global forecasting system (GFS) Numerical Weather Prediction (NWP) model output to generate local weather forecasts.

More recently, the application of other NWP models towards determining predictability limits has also been explored. To this end, the authors presented results to the 2016 American Meteorological Society Annual Meeting about what had been achieved using a statistical interpretation of the output of other NWP models, including the European Centre for Medium range Weather Forecasts (ECMWF) monthly control NWP model (which generates predictions out to Day-32):

On the limits of predictability of day to day weather forecasts for Melbourne Australia
by Harvey Stern & Noel E Davidson
Special Symposium on Seamless Weather and Climate Prediction
- Expectations and Limits of Multi-scale Predictability
New Orleans, LA, 10-14 Jan. 2016, Amer. Meteor. Soc.
https://ams.confex.com/ams/96Annual/webprogram/Paper284192.html

The aforementioned papers found skill to be evident at predicting day-to-day fluctuations in weather out to at least Day-10. However, little skill was found in regard to predictions of the weather beyond Day-14. The purpose of the current work is to provide an update (to May-2016) of the results documented in the aforementioned papers.

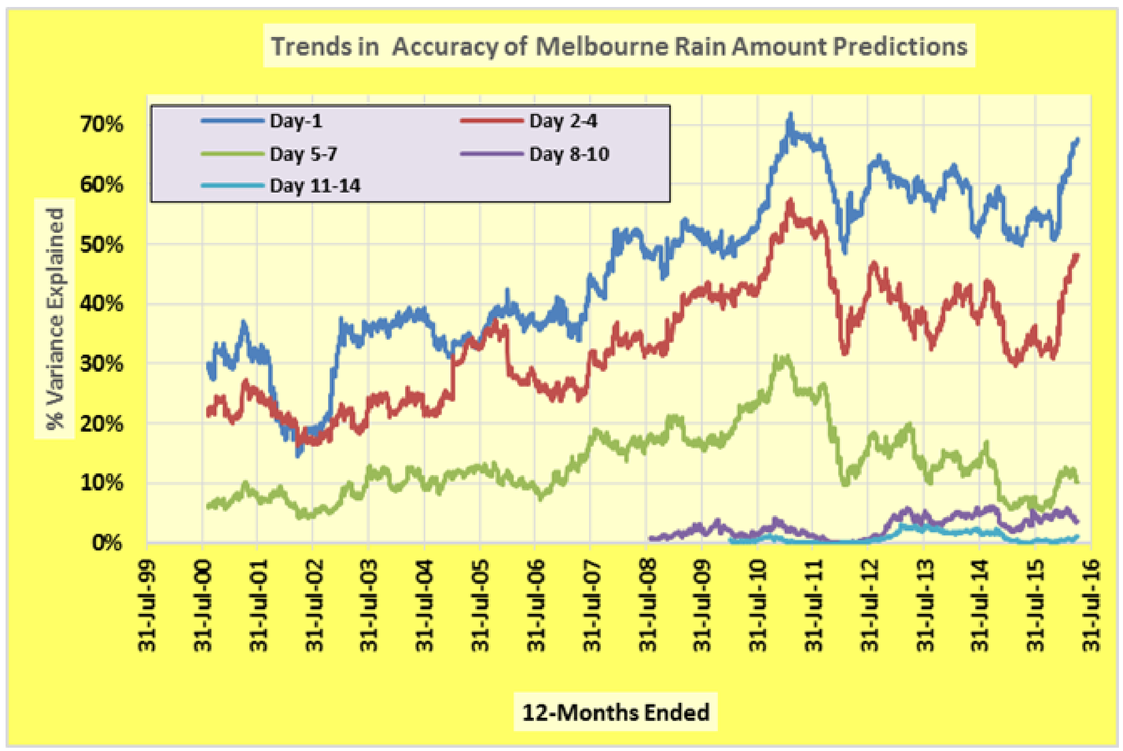

Figure 1 Rainfall Amount:

An overall increase in accuracy is evident, albeit somewhat unsteady, with a peak shown during the very wet summer of 2010-2011 when some extreme events were very well predicted.

Days 1-7: Verification is based upon official Bureau of Meteorology (BoM) predictions**.

Days 7-14: Verification is based upon a statistical interpretation of the output of the GFS NWP model.

Day-15 & beyond: Verification based upon a statistical interpretation of the output of the ECMWF NWP control model reveals minimal skill over the verification period Aug-2014 to May-2016 – negligible variance of the day-to-day rainfall is explained for both Week-3 (Days 15-21) and Week-4 (Days 22-28).

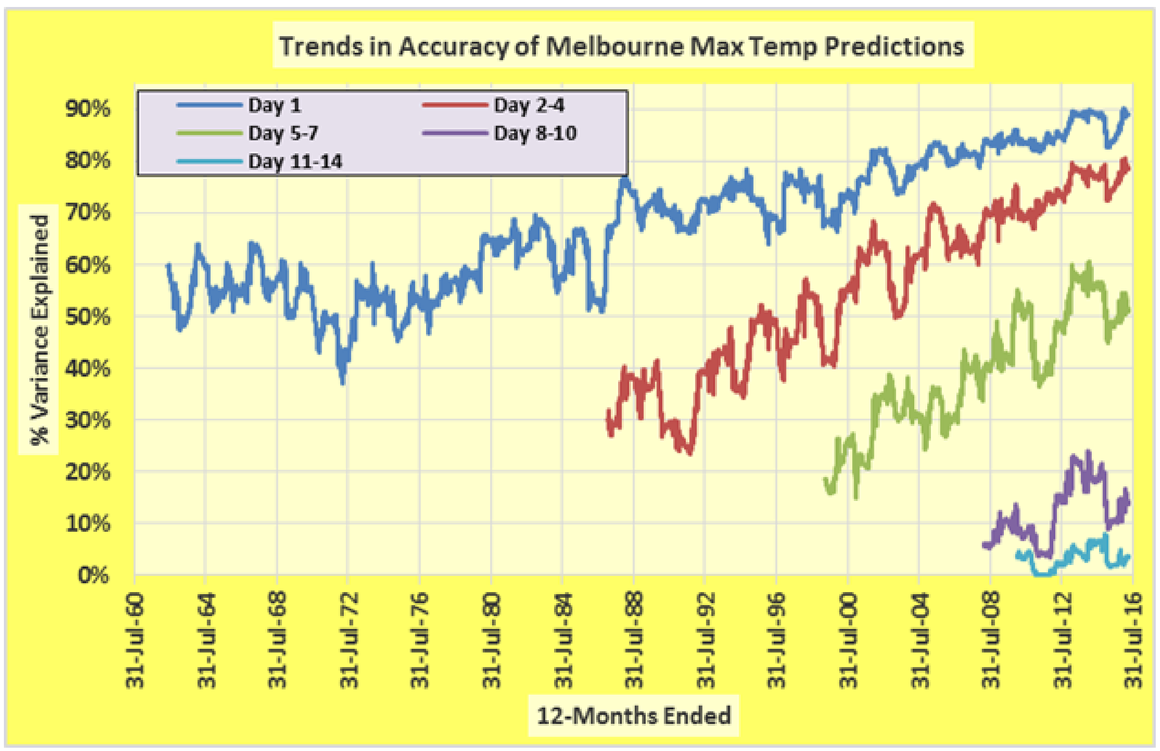

Figure 2 Maximum Temperature:

A steady increase in accuracy is evident over the past 50+ years - at Day 1 from 50% to 90%; for Days 2-4 from 35% to 75%; and, for Days 5-7 from 20% to 50%).

Days 1-7: Verification is based upon official Bureau of Meteorology (BoM) predictions.

Days 7-14: Verification is based upon a statistical interpretation of the output of the GFS NWP model.

Day-15 & beyond: Verification based upon a statistical interpretation of the output of the ECMWF NWP control model reveals minimal skill over the verification period Aug-2014 to May-2016 – negligible variance of the day to day temperature is explained for both Week-3 (Days 15-21) and Week-4 (Days 22-28).

***BoM predictions of '0 mm', when made with an accompanying Probability of Precipitation (PoP) prediction of at least 50%, result from 'rounding off'. They are accordingly 'adjusted' :*

- *to 0.2 mm, when accompanied by a PoP of 50%; and,*
- *to 0.4 mm, when accompanied by a PoP of greater than 50%.*