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Weather predictability at 8 to 14 day lead times

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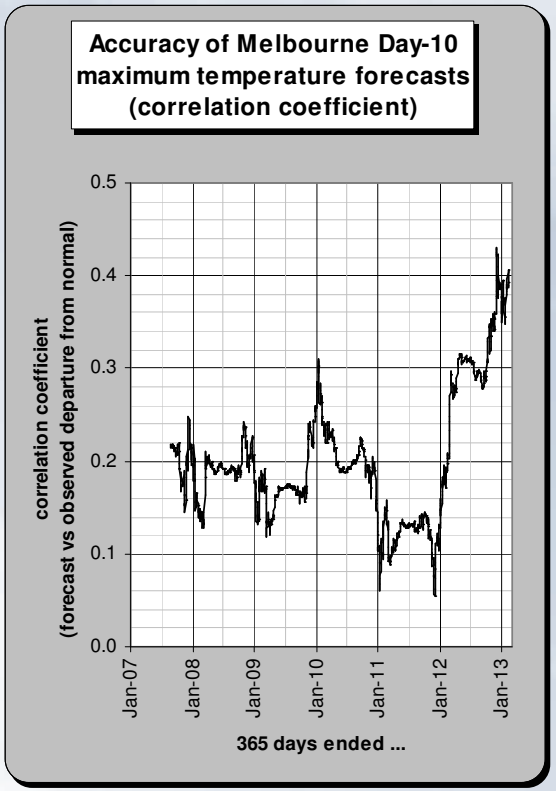

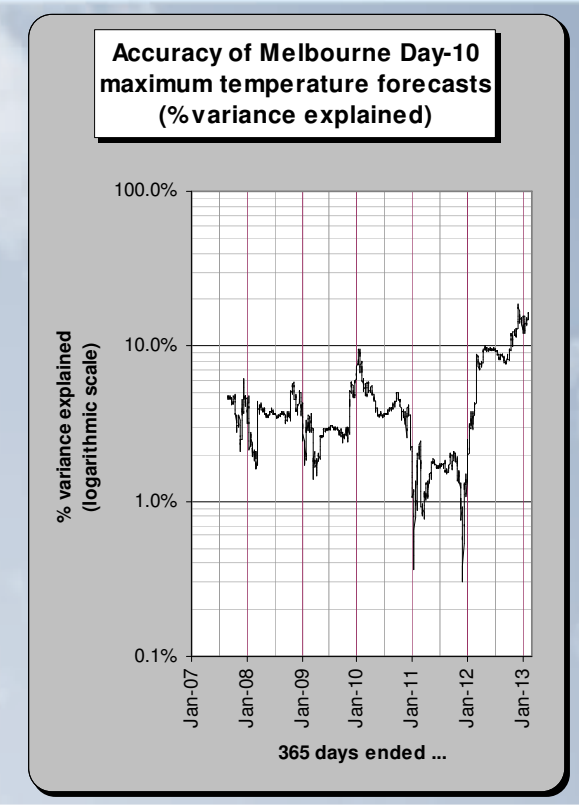

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Focus of the Presentation

The authors are engaged in work involving an analysis of multi-year forecast and observation data sets of real-time subjective (manual) forecasts, NWP model output, statistical predictions, and a set of predictions generated in 'real time' from a blend of these.

The work has three primary goals. These are to:

- (i) document the skill of predictions out to 14 days, and to determine how confident one is that the skill achieved did not occur by chance,
- (ii) establish and record the value of blending subjective and objective forecasts, and
- (iii) evaluate variability in weather forecasting skill, and to explore how this relates to the broad-scale and synoptic-scale circulation, in addition to the fluctuations in key drivers of our climate (e.g ENSO).

The current presentation has as its focus the first of the aforementioned goals, that is, to report on the skill of predictions out to 14 days.

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Background

- Lorenz's proposed 15-day limit to day-to-day predictability.
- Aspiration to bridge 'middle ground' between day-to-day weather forecasts & climate prediction.
- 'Real-time' experiments to establish limits of predictability.
- Developing computer programs with a capacity to read & manipulate data in web documents.
- Incorporating these programs into an existing forecast system so that it mechanically integrates weather observations & predictions from various web-based sources – official, direct NWP model output & statistical – to yield a more accurate product.
- "Real time" trial of the modified system, generating forecasts out to Day-7 (since Aug-05), to Day-10 (since Aug-06) & to Day-14 (since Jan-09).

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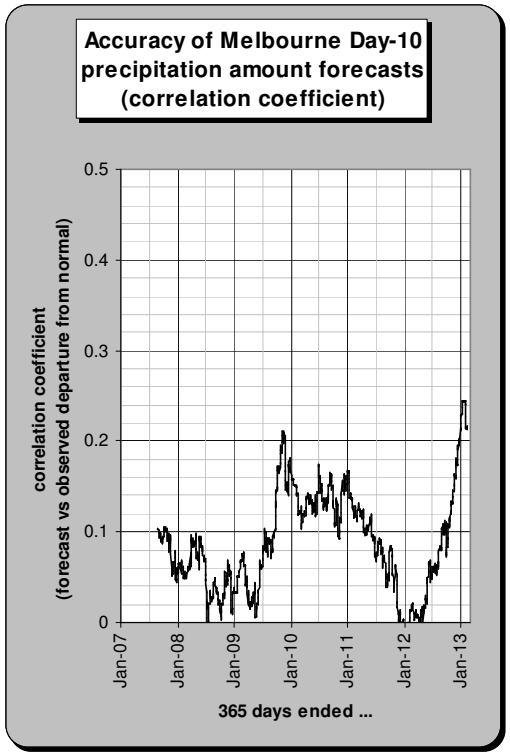
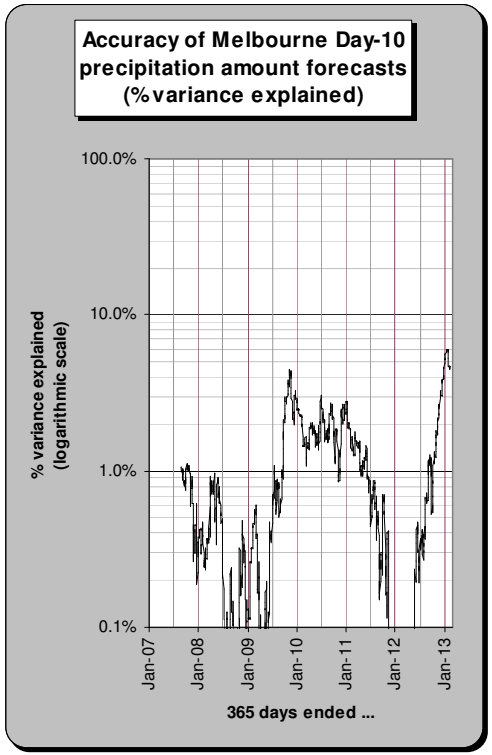
Verification

As measures of forecast skill, the *correlation coefficient* between the forecast & observed departure from normal, and *per cent variance explained* by the forecasts, are interchangeable, the latter being the square of the former (recall the Slide 1 graphics; now view the current graphics).

Per cent variance explained measures how much uncertainty is eliminated (i.e. the proportion of variability predicted), which relates well to the needs of users, and it is, therefore, the primary verification measure applied here.





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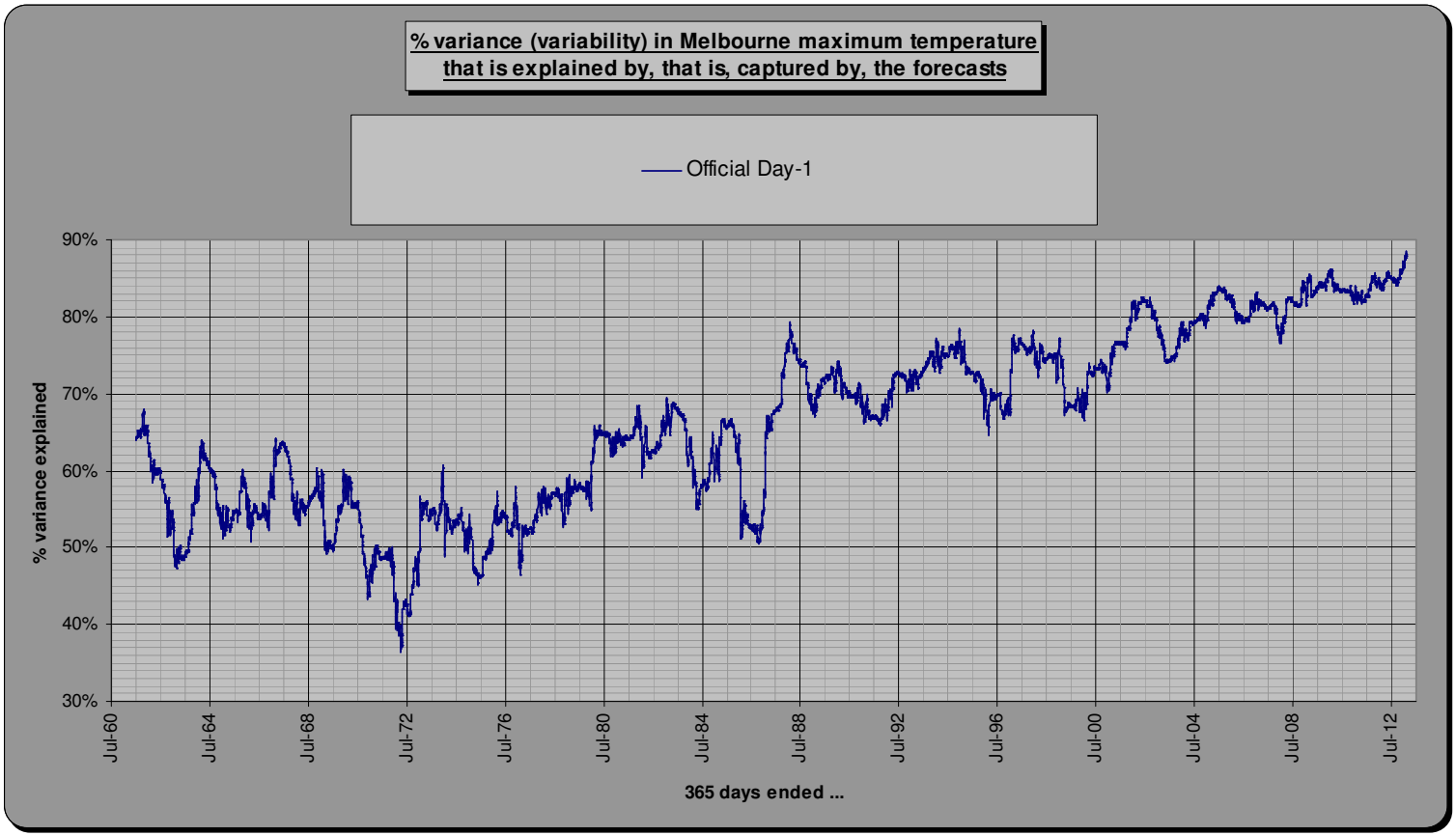
Accuracy of Day-1 Melbourne *Max Temp* Forecasts



% variance explained increases from <50% to >80% between the 1970s and today

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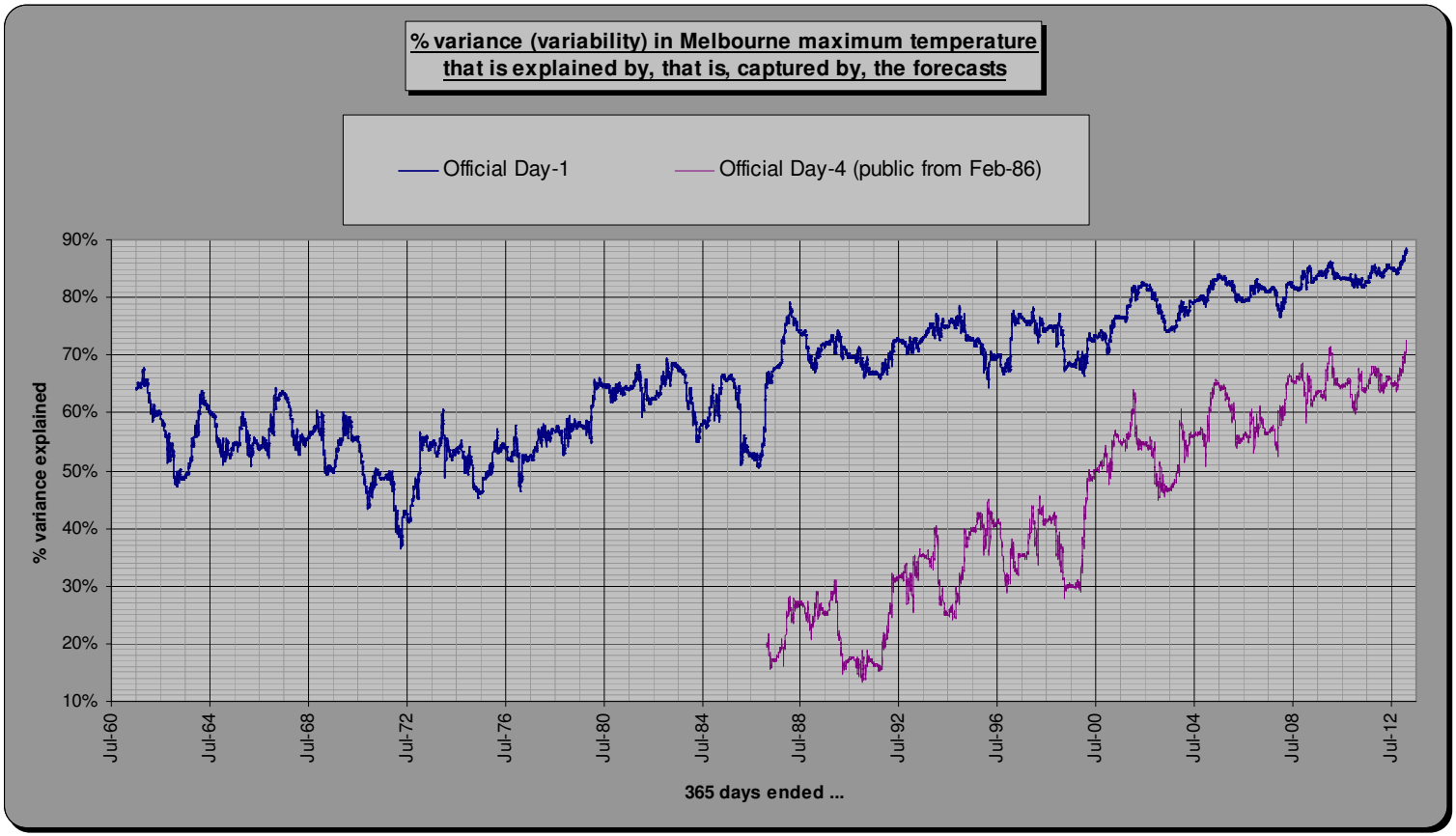
Accuracy of Day-1 & Day-4 Melbourne *Max Temp* Forecasts



Day-4 forecasts go public with % variance explained ~ 20%

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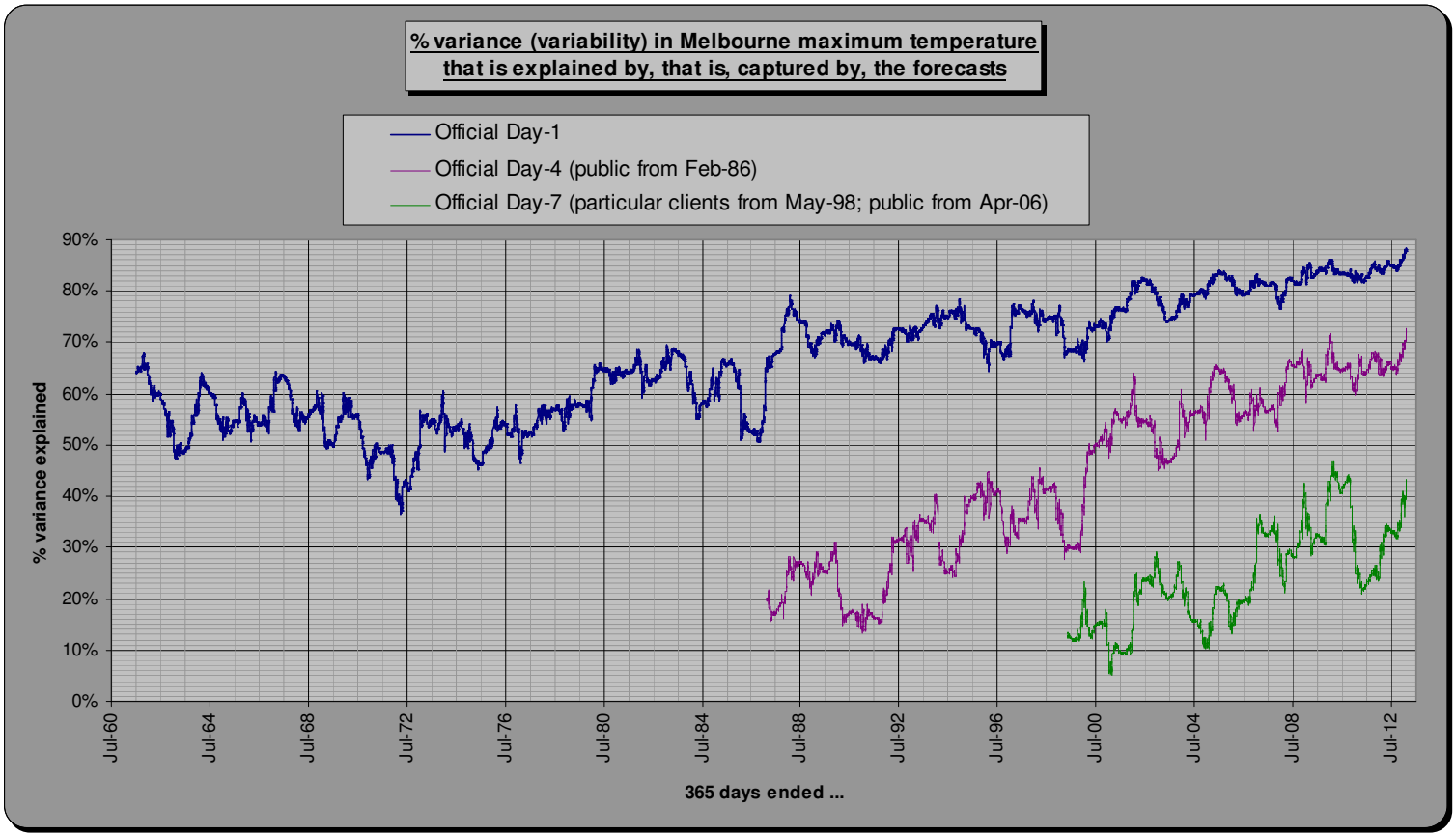
Accuracy of Day-1, Day-4 & Day-7 Melbourne *Max Temp* Forecasts



Day-7 forecasts go to particular clients with % variance explained ~ 15%

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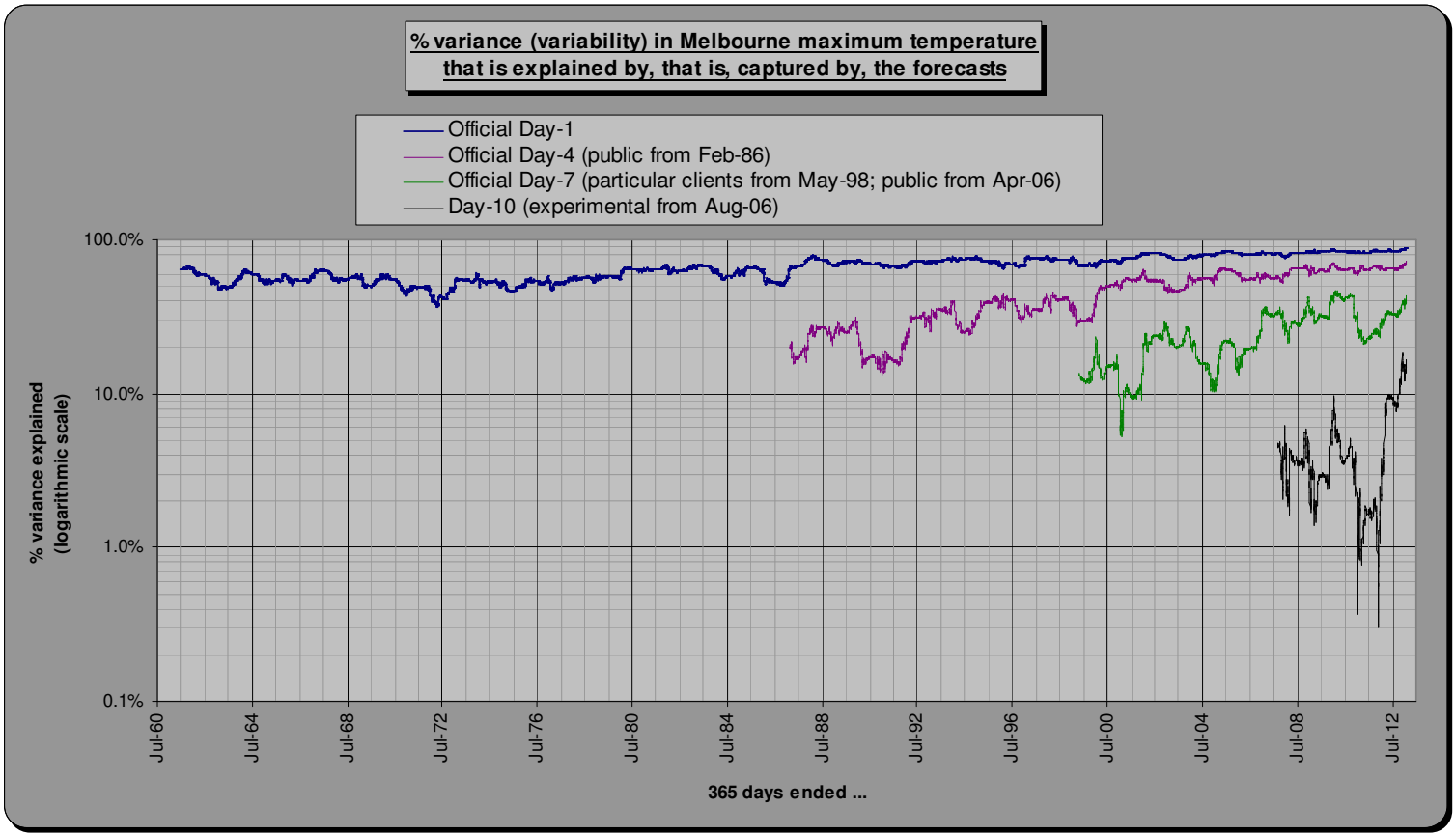
Accuracy of Day-1, Day-4, Day-7 & Day-10 Melbourne *Max Temp* Forecasts



Day-10 forecasts currently have 15% variance explained. Note the temporary 'dip' in performance during the very wet 2010/2011 "La Niña" event

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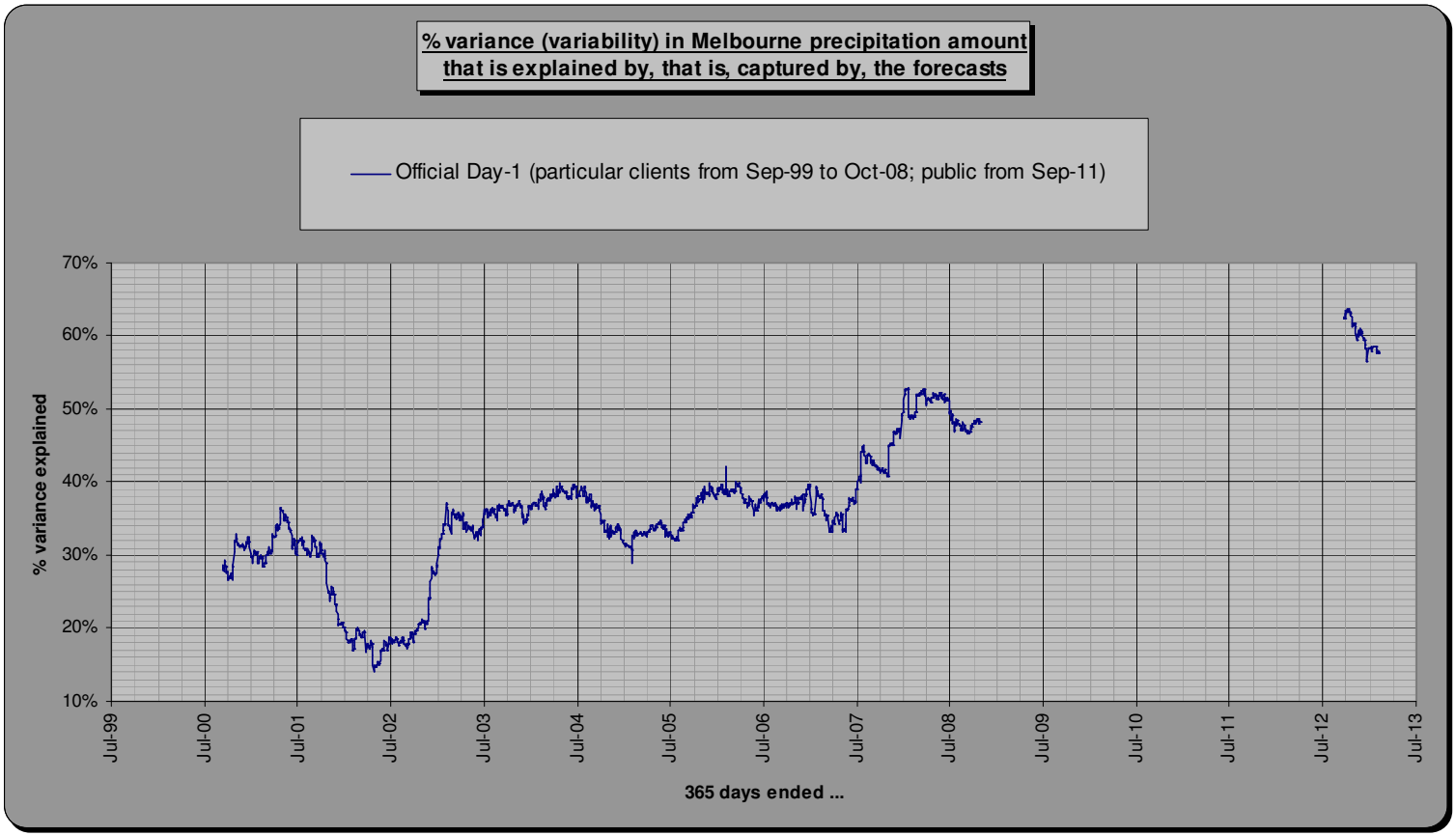
Accuracy of Day-1 Melbourne *Precip Amt* Forecasts



Day-1 % variance explained increases from ~25% to ~60% between the early 2000s and now
Note: Formal Precip Amt forecasts temporarily discontinued in Oct-08

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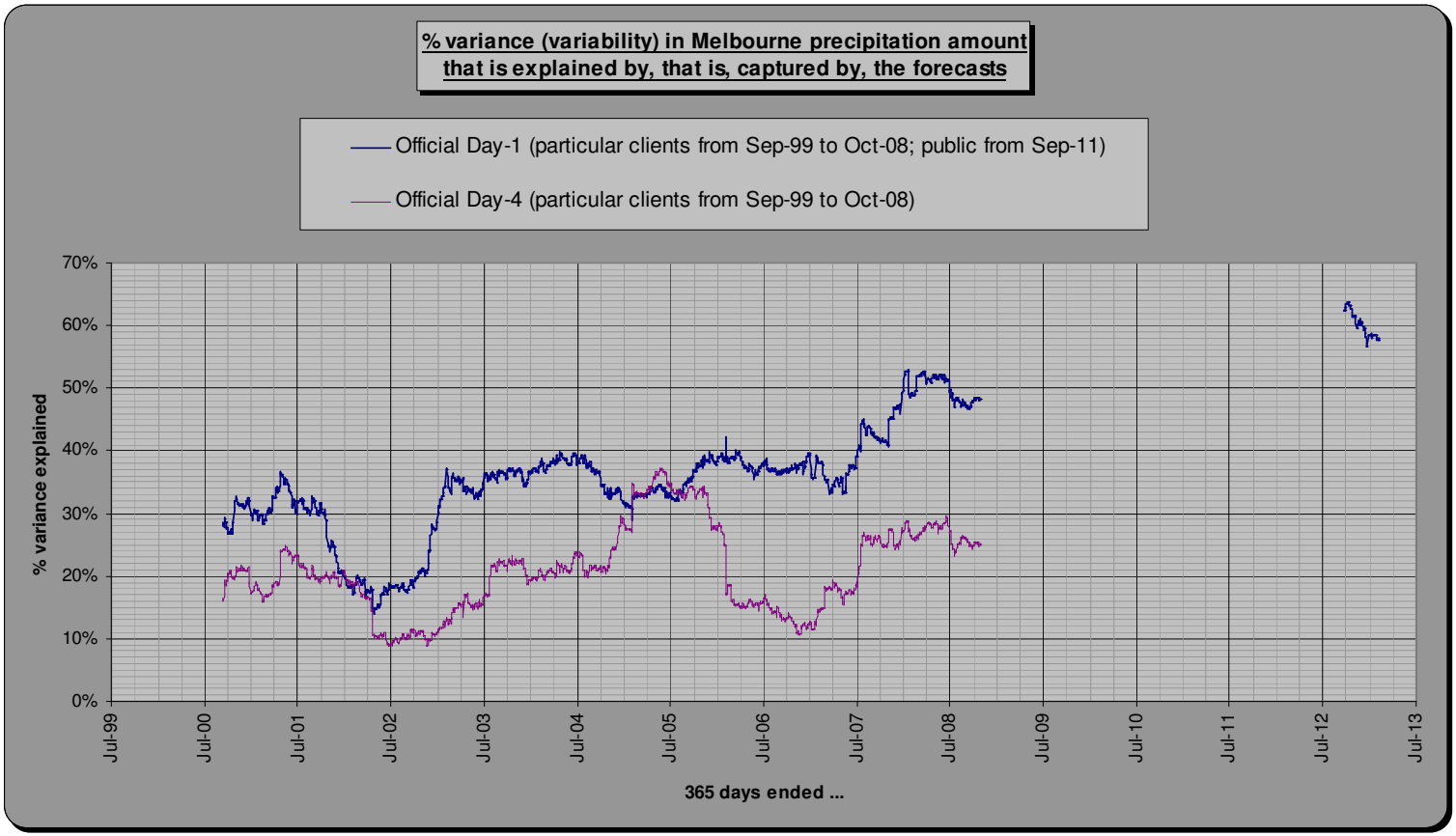
Accuracy of Day-1 & Day-4 Melbourne *Precip Amt* Forecasts



Day-4 % variance explained increases only slightly between 2000 and 2008

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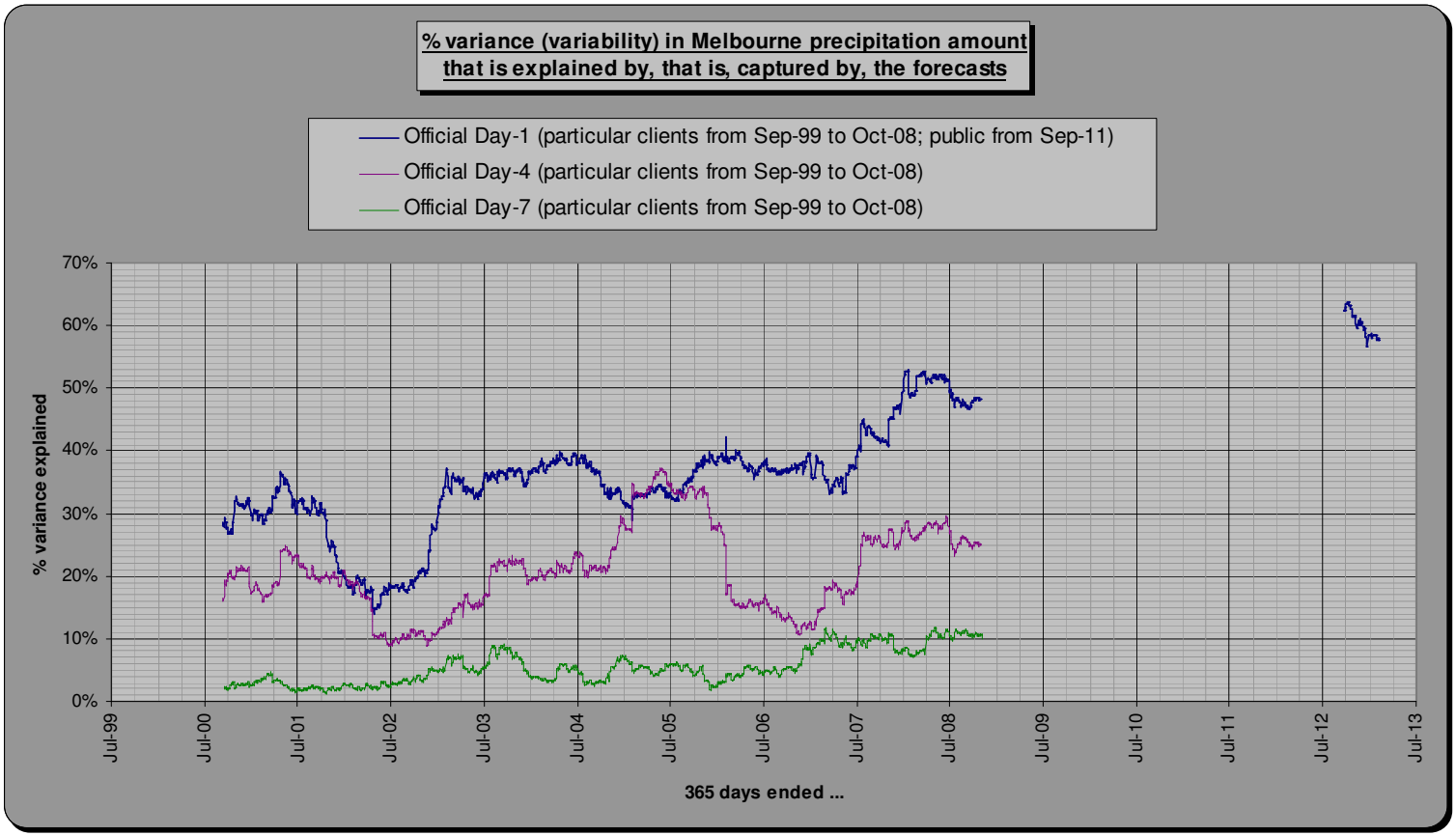
Accuracy of Day-1, Day-4 & Day-7 Melbourne *Precip Amt* Forecasts



% variance explained by Day-7 forecasts only 2% when first provided to particular clients

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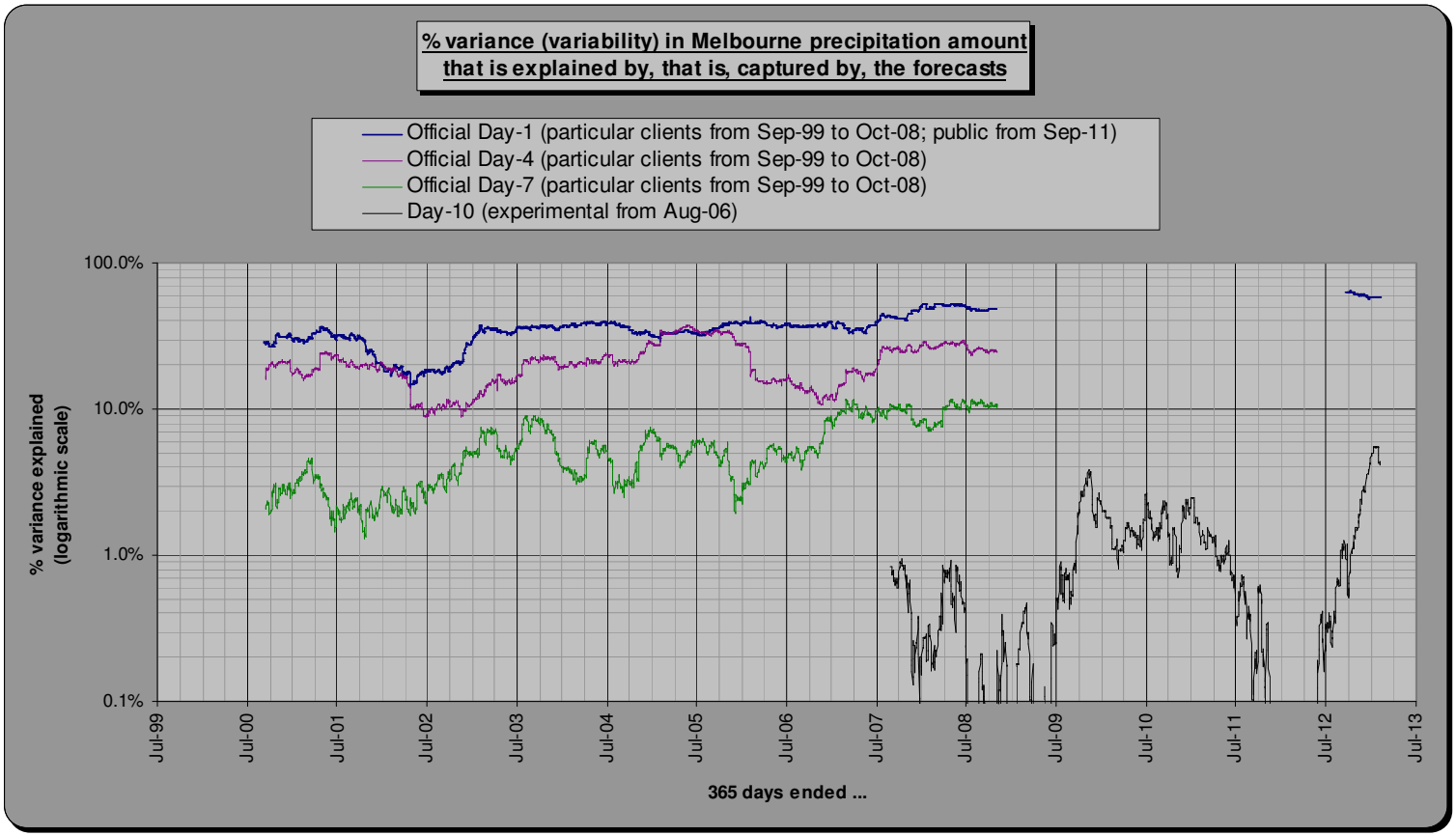
Accuracy of Day-1, Day-4, Day-7 & Day-10 Melbourne *Precip Amt* Forecasts



% variance explained by Day-10 forecasts currently about 4%. Once again, note the temporary 'dip' in performance during the very wet 2010/2011 "La Niña" event.

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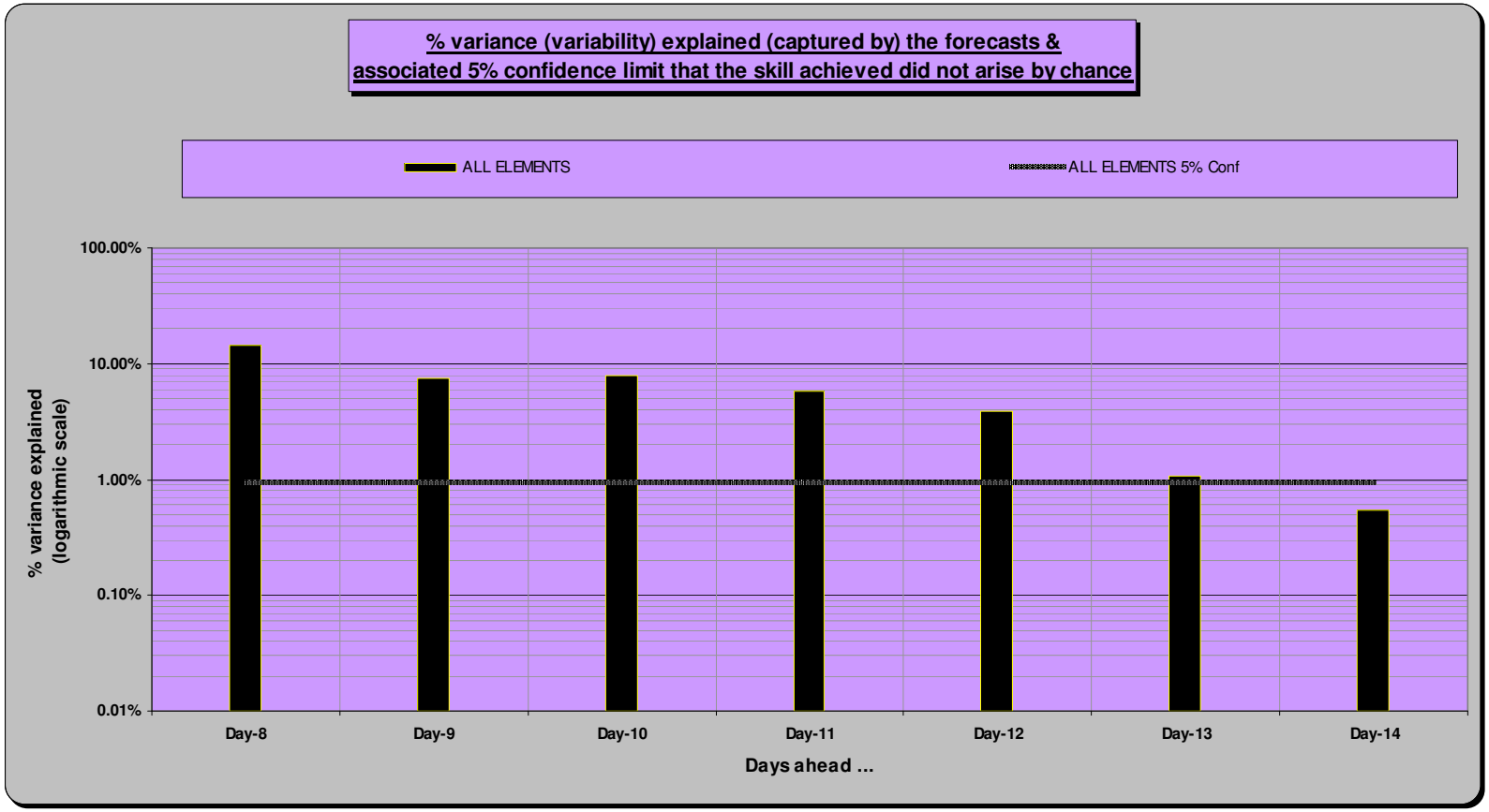
Overall Skill of Melbourne (past 12 months) Day-8 to Day-14 Forecasts: *All Elements*



Overall skill is ‘significant’ (unlikely to have occurred by chance) at the 5% level out to Day-13

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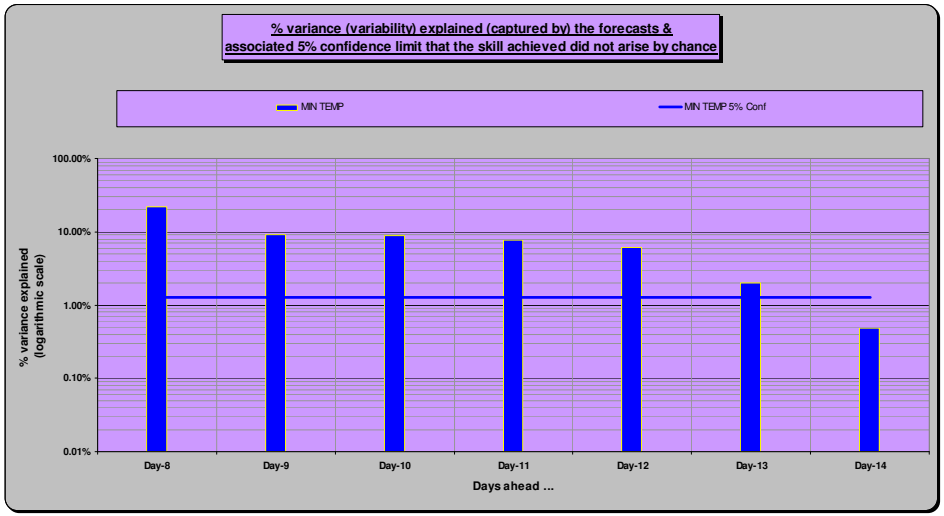
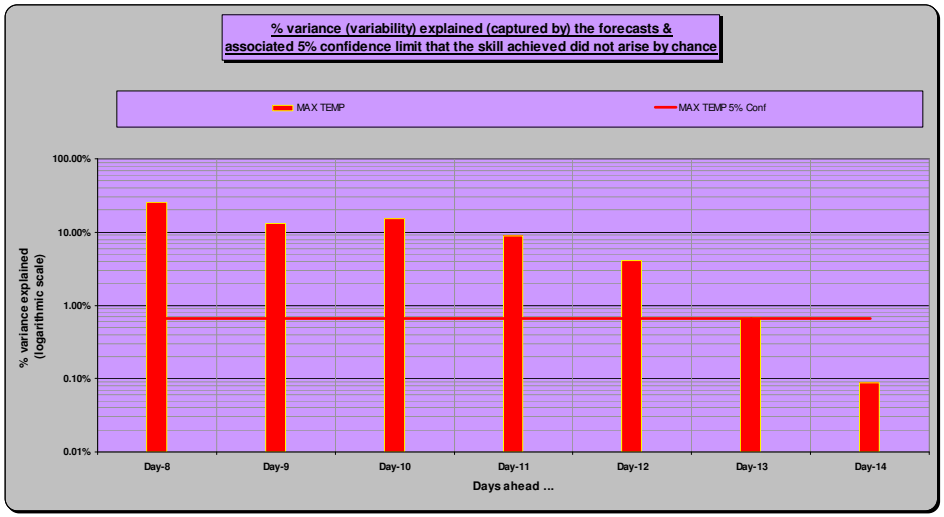
Specific Skill of Melbourne (past 12 months) Day-8 to Day-14 Forecasts: *Min Temp, Max Temp*





Skill of both Min Temp and Max Temp forecasts are 'significant' (unlikely to have occurred by chance) at the 5% level out to Day-13

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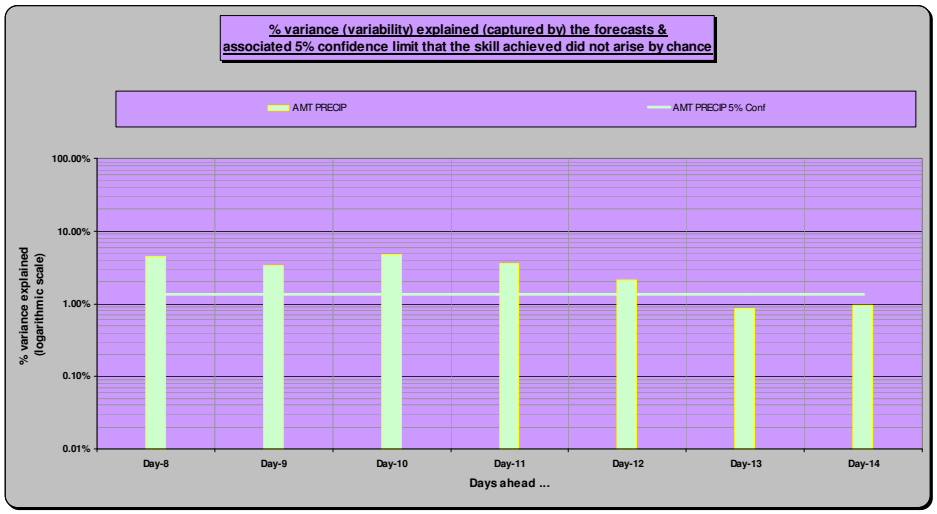
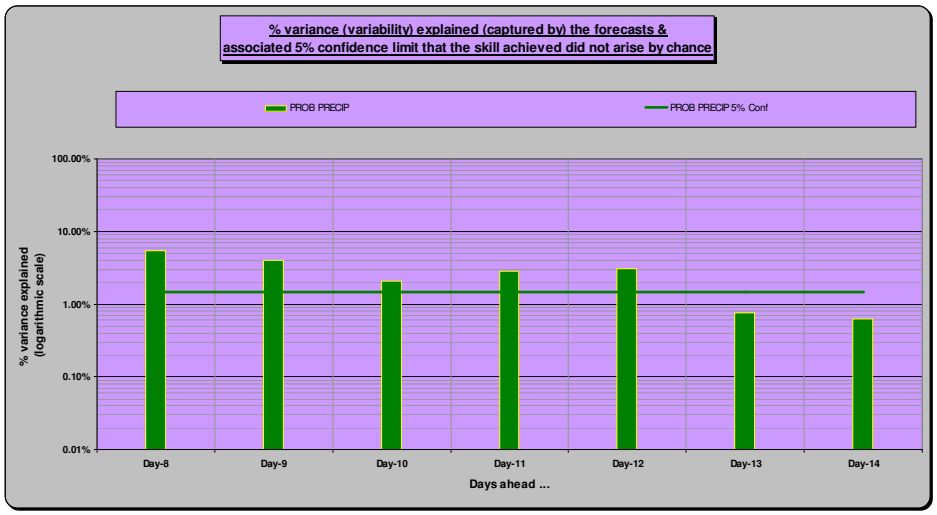
Specific Skill of Melbourne (past 12 months) Day-8 to Day-14 Forecasts: *Precip Amt, Precip Prob*





Skill of both Precip Amt and Precip Prob forecasts are 'significant' (unlikely to have occurred by chance) at the 5% level out to Day-12

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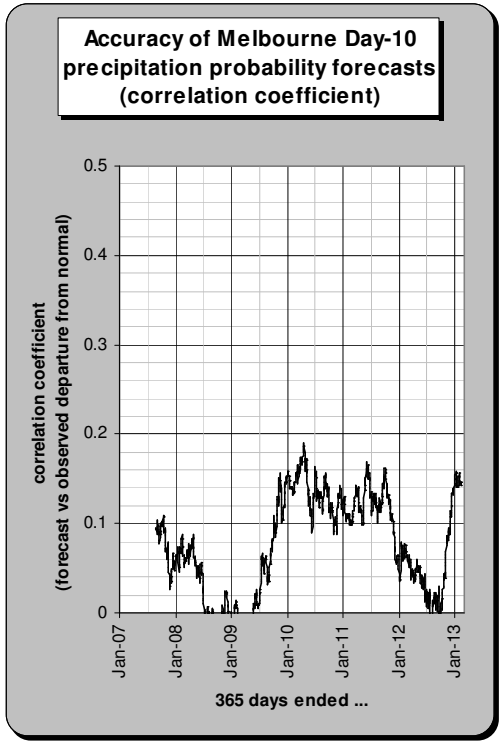
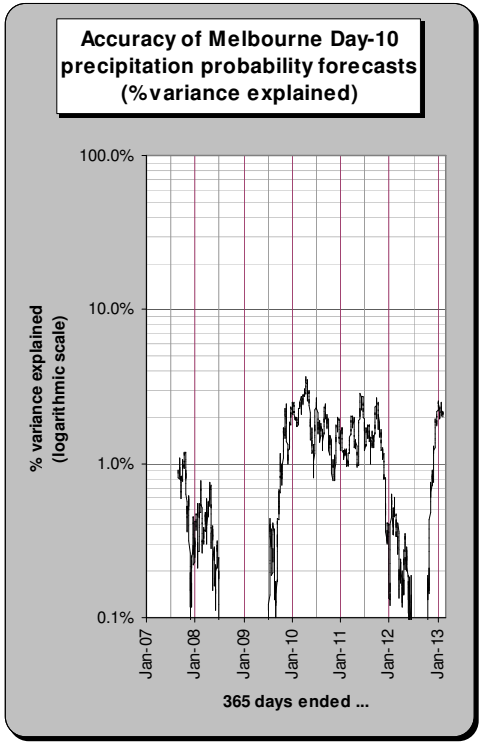
Concluding Remarks

- The skill displayed by the experimental forecasts out to Day-12 during the 'real-time' trial is most unlikely to have occurred by chance.
- Current skill levels at Day-10 are comparable to those prevailing at the time:

- When Day-4 maximum temperature forecasts were first issued officially to the public;
- When Day-7 maximum temperature forecasts were first issued to particular clients; and,
- When Day-7 precipitation amount forecasts were first issued to particular clients.





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Thank You

Any Questions?