

# Did Melbourne Forecasts Improve as a Consequence of GFE Implementation?

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Recently, there have been several changes to the forecasting process in the Victorian Office of the Bureau of Meteorology. Probably the greatest of these was the implementation of a system based upon the U.S. Gridded Forecast Editor (GFE) (in 2008), with its focus on point forecasts.

On the basis of official forecasts alone, it is difficult to establish whether or not the implementation resulted in more accurate forecasts. Ideally, one would need to have maintained a team of forecasters using the "old" methodology, and to compare that team's performance with that of the team using the "new" methodology.

We do not have two such teams.

What we do have is an automated experimental forecasting system that, since 20 August 2005, has generated predictions in 'real time' by combining sets of official and other forecasts (this system is hereafter referred to as the *Combined Forecasts System*).

The *Combined Forecasts System* has operated essentially unchanged since implementation and it was therefore used as a "benchmark" to compare official forecasts with.

The skill displayed by predictions of four different weather elements (minimum and maximum temperature, amount and probability of precipitation) were calculated for the first year of *Combined Forecasts System's* operation (from 20 August 2005 to 19 August 2006) and also for the sixth (from 20 August 2010 to 19 August 2011).

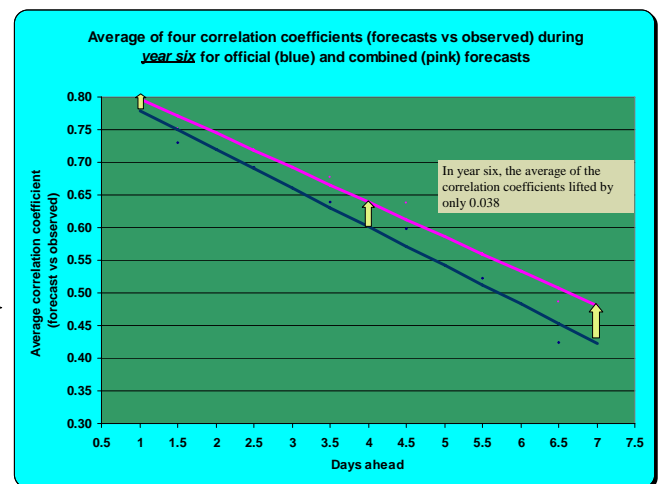
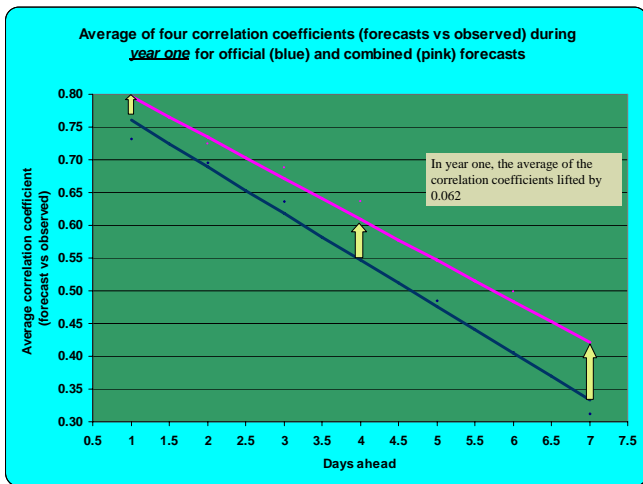
The measure of skill used was the correlation coefficient between predictions and observations, expressed as departures from normal.

During the first year, the average of the four correlation coefficients associated with official forecasts was 0.547 (the *Combined Forecasts System* was able to improve these forecasts, such that the average was lifted to 0.609 – an increase of 0.062

During the sixth year, the average of the four correlation coefficients associated with official forecasts was 0.601 (the *Combined Forecasts System* lifted the average to 0.639 – an increase of 0.038

That the average associated with the official forecasts increased between year one and year six might be attributed to forecasts in the latter year being less difficult.

However, that the *Combined Forecasts System* was able to increase the skill displayed by much less in the sixth year than in the first year suggests that the official forecasts have undergone a real improvement. Furthermore, that the largest recent change to how official forecasts are prepared was the implementation of GFE, it is concluded that they improved (at least in part) as a consequence of the GFE implementation.



## ABOUT COMBINING FORECASTS

There is an increasing interest in the question of what might be the appropriate future role for the human in the forecast process. It is asserted that computer generated forecasts are unable (by themselves) to fully replicate the decision-making processes of human forecasters. Similarly, it is also asserted that human forecasters are unable (by themselves) to optimally integrate into the forecasting process, guidance from computer-generated predictions.

However, there is the accepted mathematical concept that two or more inaccurate but independent predictions of the same future events may be combined to yield predictions that are, on the average, more accurate than either of them taken individually. Automated and human forecasts might be expected to "bring to the table" different knowledge sets, and this suggests the development of a weather forecasting system that mechanically combines human and computer-generated predictions.

Indeed, such a system has been developed. It generates forecasts, by mechanically integrating (that is, combining) judgmental (human) and automated predictions and a 'real-time' trial of its performance has been ongoing since 20 August 2005. For more details of the system, you may refer to:

Stern H (2007) *Improving forecasts with mechanically combined predictions*, *Bulletin of the American Meteorological Society (BAMS)*, June 2007, 88:850-851.