P3.21 BRIDGING THE MIDDLE GROUND BETWEEN MEDIUM RANGE WEATHER FORECASTING AND SEASONAL CLIMATE OUTLOOKS: TWO-WEEK DAY-TO-DAY WEATHER FORECASTS AND MONTHLY CLIMATE OUTLOOKS

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1. INTRODUCTION

In Australia, the *Bureau of Meteorology* issues *day-to-day weather forecasts out to the end of week one*, whilst its *Seasonal Climate Outlook (SCO)* is issued about two weeks prior to the beginning of the *season* for which the outlook is valid.

2. PURPOSE

Work aimed at automatically generating *day-to-day weather forecasts out to the end of week two*, based upon statistical interpretation of the output of NOAA's Global Forecasting System 16-day NWP model, is presently underway. Furthermore, work aimed at automatically generating worded *monthly* climate outlooks, based upon statistical relationships between historical monthly climate anomalies and various measures of the ENSO, Indian Ocean Dipole, and Madden-Julian Oscillation phenomena, is also presently underway.

These works have as their motive a desire to bridge the middle ground between medium range weather forecasting and the SCOs. It is the purpose of this paper to report preliminary findings.

3. REAL TIME TRIAL

3.1 *Day-1 to Day-7 forecasts*

A "real-time" trial of a system used to generate Day-1 to Day-7 forecasts, by mechanically integrating (that is, combining) judgmental (human) and automated predictions, has been ongoing since 20 August 2005. The approach yielded an increase in the accuracy of forecasts for a broad range of weather elements.

Enhanced forecast accuracy for various weather elements.

Element	Verification parameter	Human (official)	Combined
All elements	% variance explained	33.40	41.30
Rain or no rain	% correct	70.10	76.80
Rain amount	RMS error ($mm^{0.5}$)	1.05	0.97
Min temp	RMS error (°C)	2.39	2.27
Max temp	RMS error (°C)	2.82	2.49
Thunder	Critical Success Index (%)	17.90	21.60
Fog	Critical Success Index (%)	15.50	17.80

Table 1 ***An increase in accuracy***

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3.2 *Day-8 to Day-10 forecasts*

In August 2006, the forecast period was extended to Day-10, by combining climatology and automated predictions, in order to generate the Day-8 to Day-10 component of the forecasts, which have shown some skill, albeit of a low level, during the ongoing "real-time" trial.

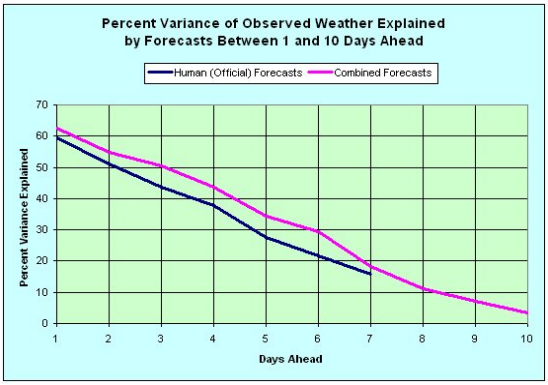

Figure 1 ***Some skill shown by Day-8 to day-10 forecasts***

3.3 *Day-11 to Day-14 forecasts*

In January 2009, the system was extended so as to provide forecasts out to 14 days in order to assess that capability.

To summarise, some skill was possessed by the forecasts out to Day-12 and the skill was shown not to have been achieved by chance, whilst very little skill was possessed by the Day-13 and Day-14 forecasts and that skill could very well have been achieved through chance.

To illustrate, the correlation coefficient between the Day-11 observed and forecast amounts of precipitation (expressed as a departure from normal) was +0.204 and the probability that a correlation coefficient of at least +0.204 was achieved by chance was only 0.92%.

Similarly, the correlation coefficient between the observed and forecast Day-11 maximum temperatures (expressed as a departure from normal) was +0.256 and the probability that a positive correlation coefficient of at least +0.256 was achieved by chance was only 0.15%.

Furthermore, the correlation coefficient between the Day-12 observed and forecast amounts of precipitation (expressed as a departure from normal) was +0.217 and the probability that a

correlation coefficient of at least +0.217 was achieved by chance was only 0.60%.

Similarly, the correlation coefficient between the observed and forecast Day-12 maximum temperatures (expressed as a departure from normal) was +0.198 and the probability that a positive correlation coefficient of at least +0.198 was achieved by chance was only 1.13%.

However, the correlation coefficient between Day-13 observed and forecast amounts of precipitation (expressed as a departure from normal) was +0.090 and the probability that a correlation coefficient of at least +0.090 was achieved by chance was 15.14%

One may therefore be justified in asserting that, not only was the level of skill that was achieved during the trial at forecasting precipitation amount for Day-13 relatively small, that skill could very well have been achieved through chance.

Similarly, the correlation coefficient between the observed and forecast Day-13 maximum temperatures was +0.022, and the probability that a correlation coefficient of at least +0.022 was achieved by chance was 39.92%.

One may therefore be justified in asserting that, not only was the level of skill that was achieved during the trial at forecasting maximum temperature for Day-13 relatively small, that skill could very well have been achieved through chance.

Furthermore, the correlation coefficient between Day-14 observed and forecast amounts of precipitation (expressed as a departure from normal) was +0.068, and the probability and the probability that a correlation coefficient of at least +0.068 was achieved by chance was 21.88%.

One may therefore be justified in asserting that, not only was the level of skill that was achieved during the trial at forecasting precipitation amount for Day-14 relatively small, that skill could very well have been achieved through chance.

Similarly, the correlation coefficient between the observed and forecast Day-14 maximum temperatures was +0.088, and the probability that that a correlation coefficient of at least +0.088 was achieved by chance was 15.69%.

One may therefore be justified in asserting that, not only was the level of skill that was achieved during the trial at forecasting maximum temperature for Day-14 relatively small, that skill could very well have been achieved through chance.

4. MONTHLY CLIMATE OUTLOOKS

The monthly climate outlooks have been generated on a daily basis since 12 May 2009, a far too short a period to obtain a realistic performance measure. However, a high level of correlation is displayed between *historical* monthly climate anomalies, and various measures of the ENSO, the Indian Ocean Dipole, and Madden-Julian Oscillation phenomena, suggesting that useful skill should be displayed by the monthly outlooks.

It is planned to publish performance statistics regarding this product at the conclusion of 12 months of operation.

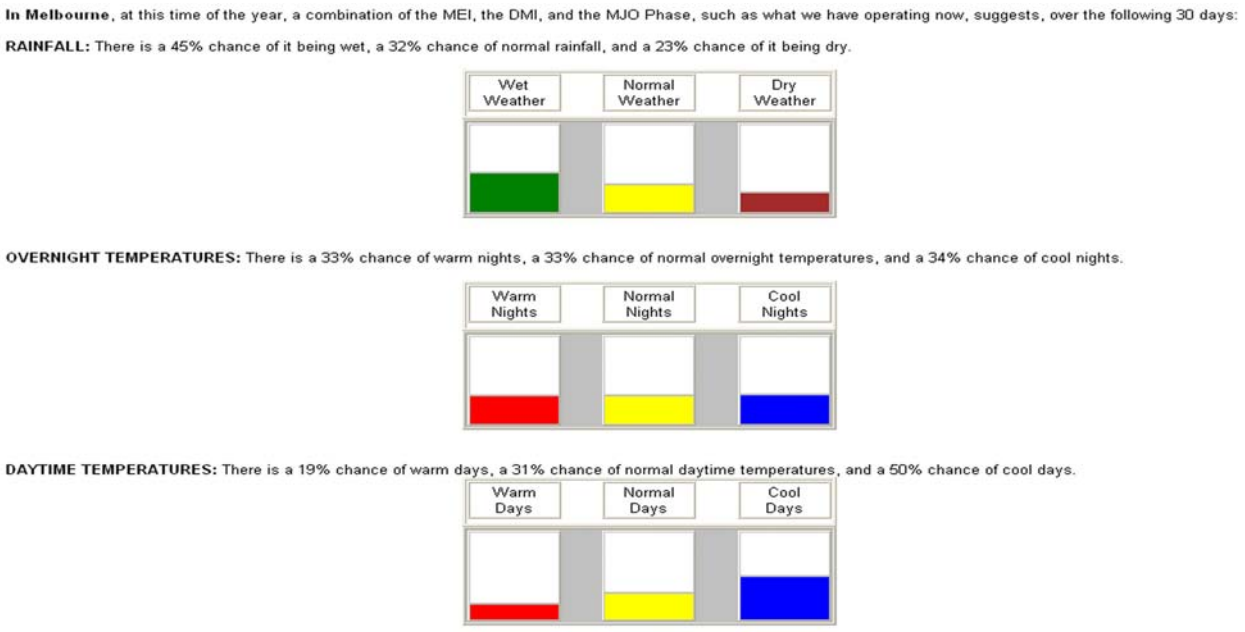

Figure 2 ***Illustrating the monthly climate outlook***