THE ACCURACY OF WEATHER PREDICTIONS, FROM THE NEXT DAY TO THE NEXT SEASON – AN ILLUSTRATION FROM AUSTRALIA

Location of Melbourne

Introduction

The purpose of this paper is to consider, in detail, the accuracy of predictions for Melbourne of four weather elements, out to the end of Week 4.

The four elements considered are:

- minimum temperature;

- maximum temperature;

- probability of precipitation; and,

- amount of precipitation.

The accuracy of official seasonal climate outlooks for Australia is also considered.

Example of a Forecast

Saturday 7 January

Min **18**   Max **34**

Shower or two developing.

Possible rainfall: **1 to 6 mm**

Chance of any rain: **60%**

Melbourne area

Partly cloudy. Medium (60%) chance of showers. Winds northerly 25 to 35 km/h shifting south to southwesterly 20 to 30 km/h during the day.

3

Interpretation

What does the possible rainfall amount mean?

Possible rainfall: **5 to 10 mm**

The possible rainfall amounts help to show how rainfall might vary according to the type of weather in a given time period. Both numbers relate directly to a chance of receiving at least that amount of rain.

The first number (5 mm in this example) represents a 50% chance of at least that amount of rain occurring.

The second number (10mm in this example) represents a 25% chance of at least that amount of rain occurring.

On days where we expect showers or thunderstorms, the possible rainfall amounts might be quite different, for example, 5 to 30 mm. When steady rainfall is expected over a wide area, the possible rainfall amounts might be similar, for example, 10 to 15 mm.

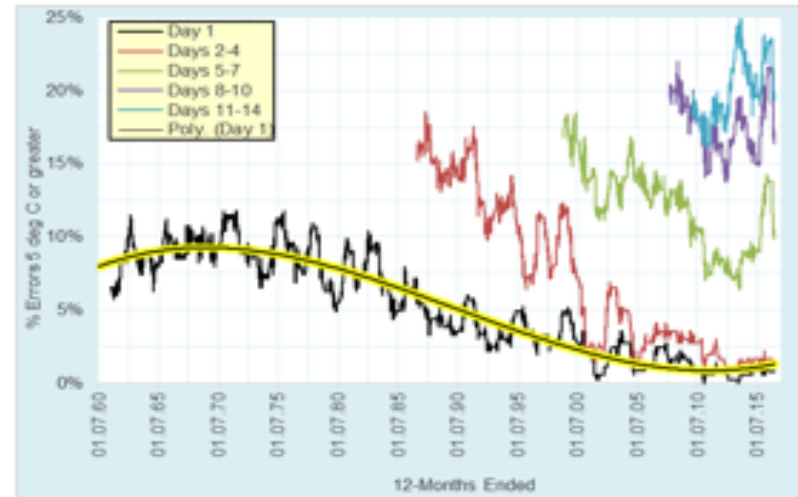**FIGURE 1** Trends in the accuracy of *minimum temperature* forecasts: % errors 5 deg C or greater.

FIGURE 3 Trends in the accuracy of *maximum temperature* forecasts: % errors 5 deg C or greater.
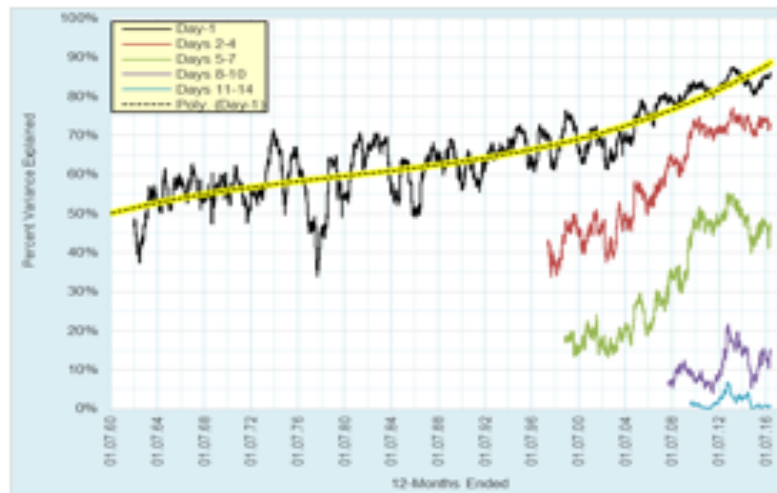

FIGURE 2 Trends in the accuracy of *minimum temperature* forecasts: % variance in the observations explained.
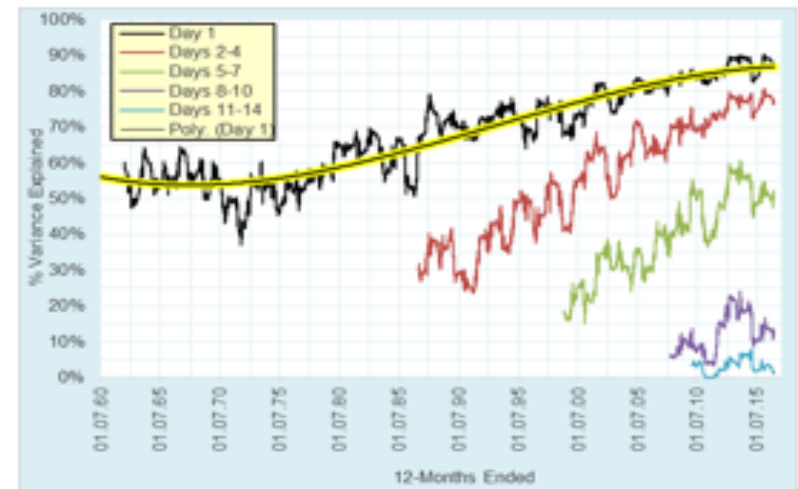

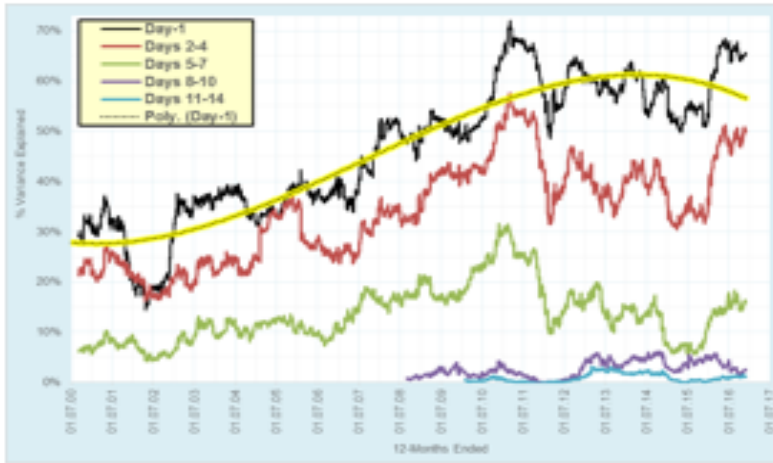**FIGURE 4** Trends in the accuracy of *maximum temperature* forecasts: % variance in the observations explained.

FIGURE 5 Trends in the accuracy of *rainfall amount* forecasts: % variance in the observations explained.
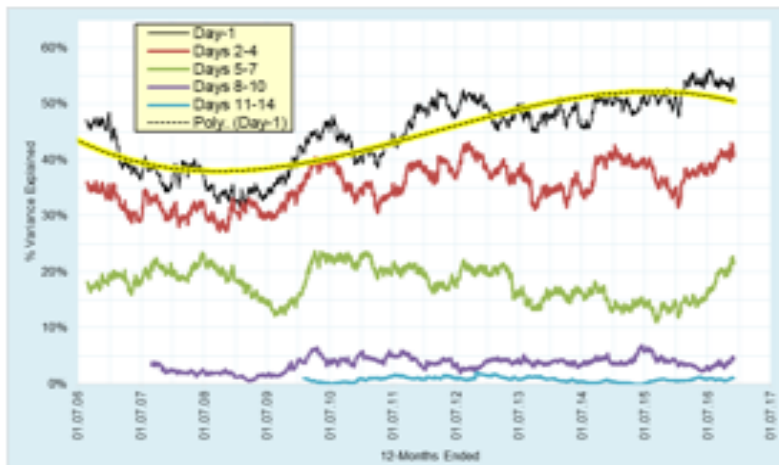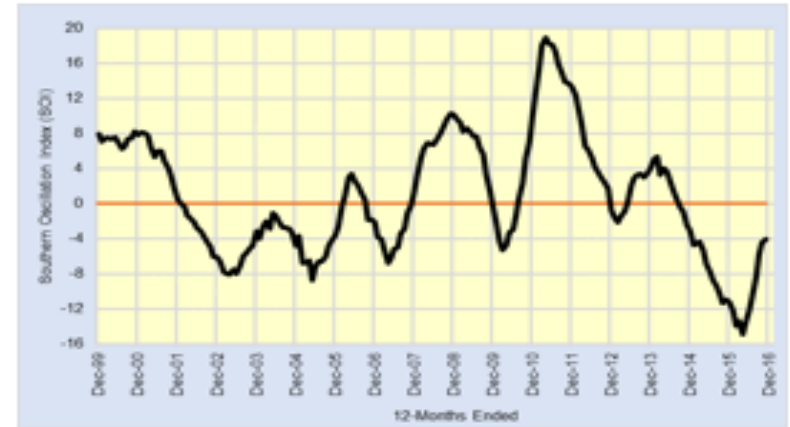

FIGURE 7 Fluctuations in the value of the *Southern Oscillation Index (SOI).*

FIGURE 6 Trends in the accuracy of *rainfall probability* forecasts: % variance in the observations explained.
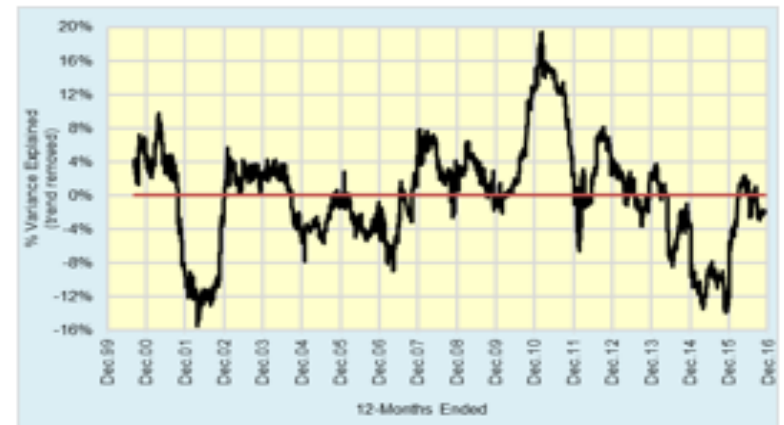

FIGURE 8 Fluctuations in the % variance in the *rainfall amount* observations explained by the forecasts (trend removed).

RAINFALL FORECAST ACCURACY FLUCTUATIONS
versus
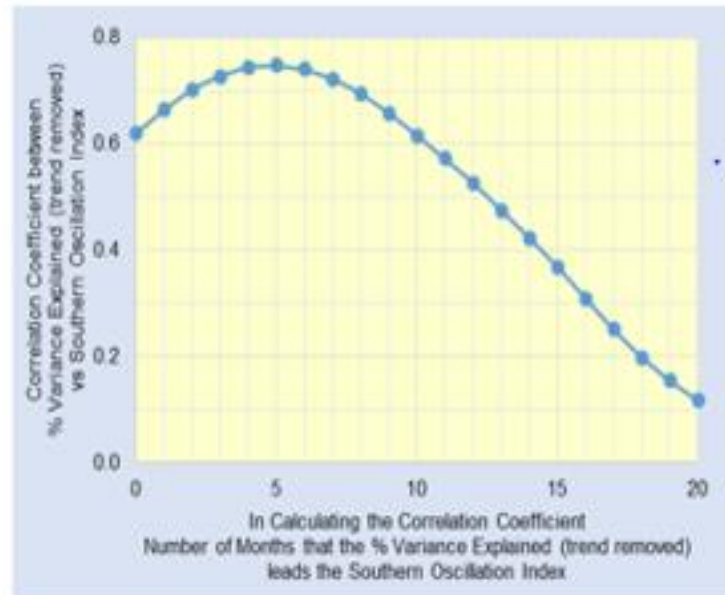# CORRESPONDING FLUCTUATIONS IN THE SOI

FIGURE 9 Dependence of the correlation coefficient between

% variance in daily observed rainfall that is explained by rainfall predictions over the past year
and
the average Southern Oscillation Index (SOI) over the past year

on number of months that the % variance explained leads the SOI

SEASONAL OUTLOOK ACCURACY: BY SEASON

FIGURE 10 The accuracy of seasonal predictions of *minimum temperature* [2000-2016], by season.

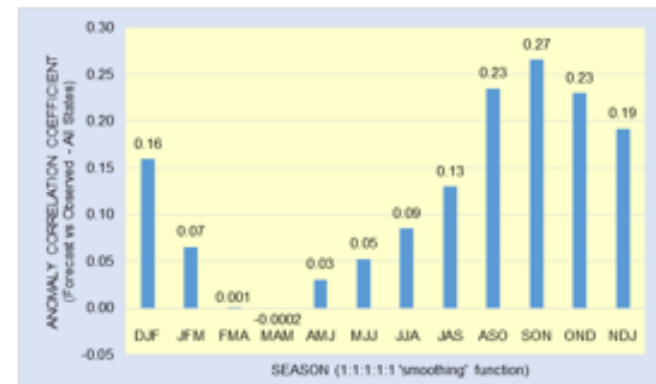**FIGURE 11** The accuracy of seasonal predictions of *maximum temperature* [2000-2016], by season.

FIGURE 12 The accuracy of seasonal predictions of *rainfall* [1989-2016], by season.

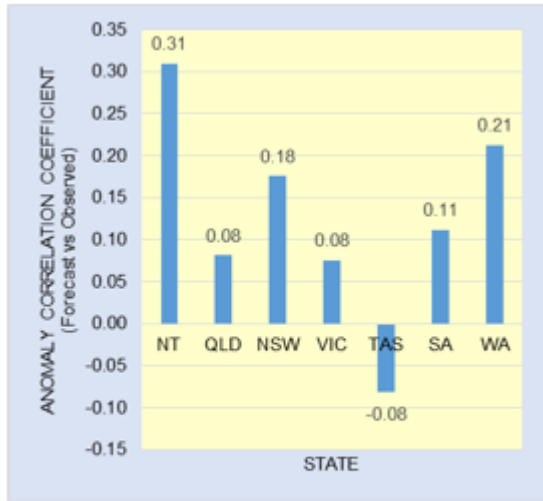# SEASONAL OUTLOOK ACCURACY: BY STATE

FIGURE 13 The accuracy of seasonal predictions of *minimum temperature* [2000-2016] by State.
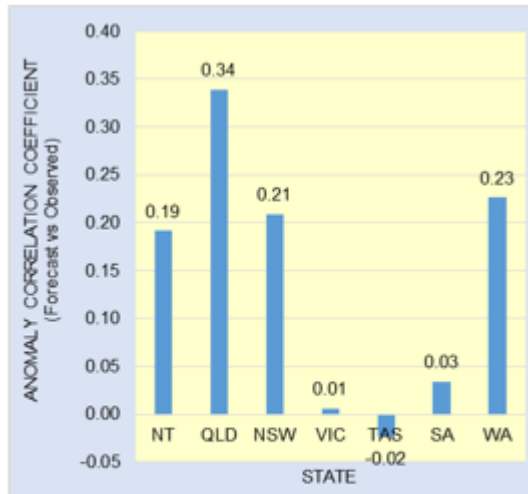

FIGURE 14 The accuracy of seasonal predictions of *maximum temperature* [2000-2016] by State.
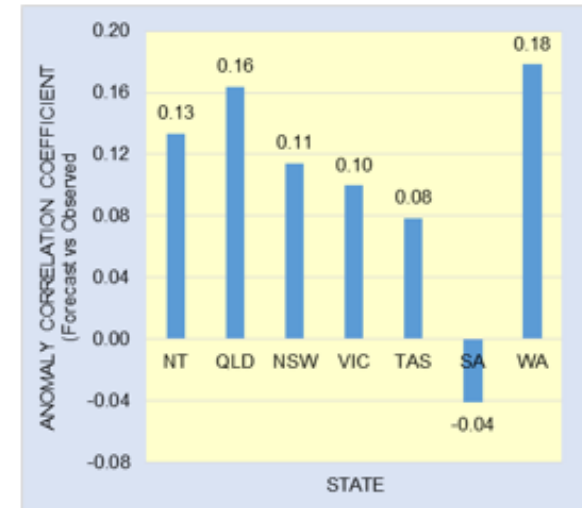

FIGURE 15 The accuracy of seasonal predictions of *rainfall* [2000-2016] by State.

TRENDS IN
SEASONAL OUTLOOK ACCURACY

FIGURE 16 Trends in the accuracy of seasonal predictions of *minimum temperature*.

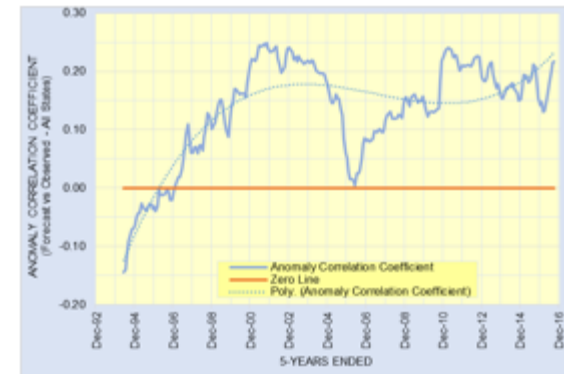**FIGURE 17** Trends in the accuracy of seasonal predictions of *maximum temperature*.

FIGURE 18 Trends in the accuracy of seasonal predictions of *rainfall*.
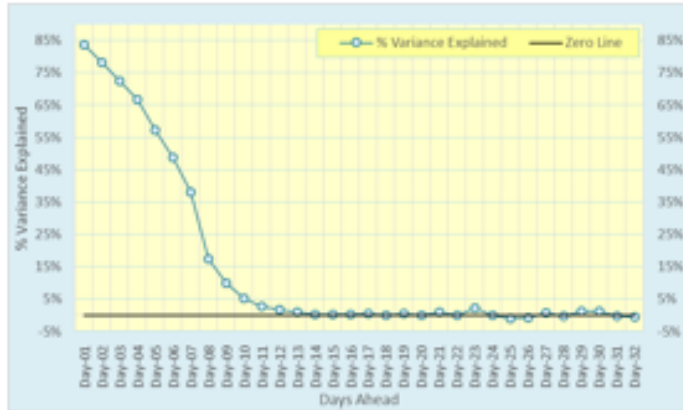
Day 1-32 PREDICTIONS

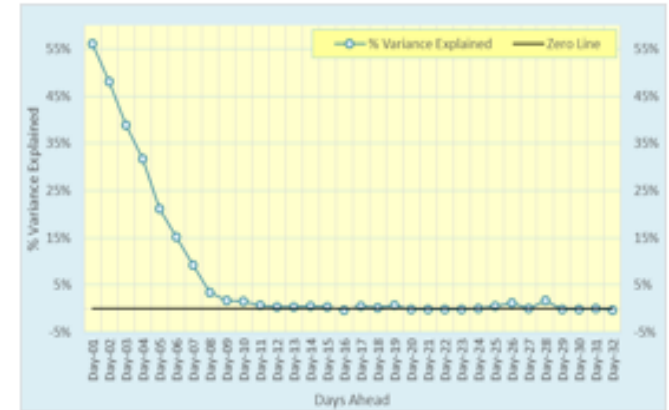**FIGURE 19** The accuracy of Day 1-32 predictions of *minimum temperature*.

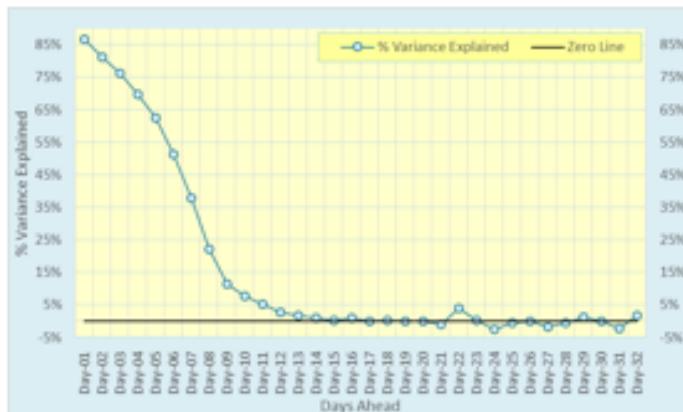**FIGURE 21** The accuracy of Day 1-32 predictions of *rainfall amount*.

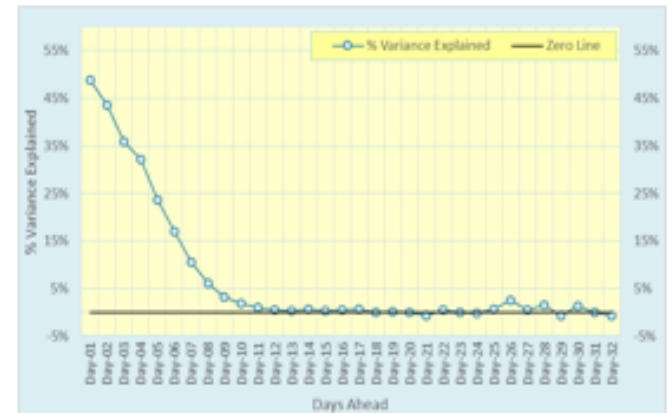**FIGURE 20** The accuracy of Day 1-32 predictions of *maximum temperature*.

FIGURE 22 The accuracy of Day 1-32 predictions of *rainfall probability*.

Summary

The frequency of major temperature forecast errors has declined substantially, whilst the percentage variance explained by these forecasts has increased.

The percentage variance explained by rainfall forecasts has also increased, albeit somewhat unsteadily, with the variance explained being related to the phase of the ENSO phenomenon.

There is little skill displayed by forecasts of day-to-day weather beyond week two.

The accuracy of seasonal outlooks varies from State to State and is a function of the time of the year for which the forecasts are issued.

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Thank You