How did DAWA seasonal forecasts go in 2003?

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Introduction

Over the last two years the Department of Agriculture WA, has been developing an analogue forecasting system for southern Australia. All through 2002 we issued analogue years (similar years in the past) that were typically El Nino years and/or droughts. In 2003, we were confident that the El Nino would decay. This paper discusses the forecasts that were issued and how they related to what happened at Birchip in 2003.

Background

DAWA's new forecasting system is based on the sequence of pressure and sea surface temperatures (SST) observed in the Australian/Pacific region. Called an ENSO sequence system, this approach monitors the "big picture" and predominately tracks longer-term trends in pressure from the equator to the southern mid-latitudes. To do this, some new forecasting indices have been developed: a longer-term El Nino Prediction Index (EPI), a midlatitude Southern Oscillation Index (MLSOI), and a MeanSOI (average of an Equatorial SOI (EQSOI), the SOI at 15 ^{o} S, and the MLSOI at 30 ^{o} S). Originally, analogue years were manually selected from index time-series, but in the second half of 2003 this was automated with a computer program. These analogues form the basis of seasonal outlooks that are being developed and tested at DAWA. Analogues and indices are being loaded monthly on DAWA's climate website www.agric.wa.gov.au/climate

Discussion

In February 2003, Dr Stephens gave a presentation at the Birchip Climate Workshop with the following message: "The very dry El Nino weather pattern over Australia appears to be breaking down and we should see a gradual trend to La Nina or neutral conditions. If this occurs, average to above average rainfall seems most likely, but smaller areas of the wheat belt may be affected by drier weather." This forecast was based on the selected analogues: 1958, 1964, 1966, 1970 and 1995. Of these years, three became La Nina events (1964, 1970 and 1995) and two were neutral (1958, 1966). Rainfall was average to above average in four of these years in Victoria between April-November, with only 1966 being below average ie. 80% confidence of a better season than 2002.

As 2003 progressed it became apparent that stronger higher pressure systems situated over south-eastern Australia were slow to weaken compared to other post-El Nino situations. The following graph (Figure 1) was sent to various farming groups in south-eastern Australia on May 7 with the following message "The attached graph shows …the downward trend in pressure has been slower than other post-El Nino years, but overall the long-term prognosis looks good with lower pressure expected in coming months. Many other indicators are looking positive. So the short-term prognosis would suggest that there is a higher chance of a delayed start to seeding programs in Southern Australia…longer term conditions for rainfall should gradually improve."

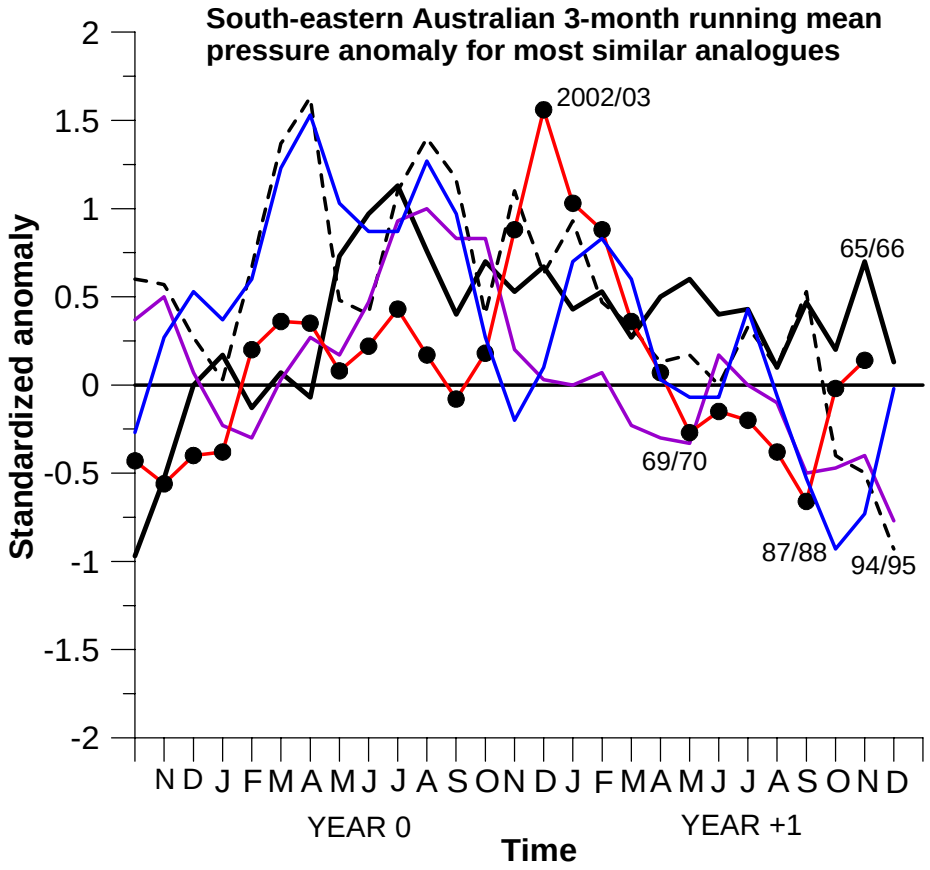

Figure 1. South-eastern Australian 3-month mean pressure anomalies averaged at Mildura and Alice Springs for the similar analogous situations in the past. Pressures for 2002/03 are plotted with solid dots.

Delayed seeding affected many farmers in southeastern Australia. On June 9 Harm van Rees emailed the following message:

> "Any update? It is looking worse over here - worst ever dust storms here last Friday - wind blasting was horrendous and in the Mallee crops have been buried - visibility in Bendigo was down to 500m - unheard of in winter! The 30 day SOI is now -10; does this mean it is looking grim for your indices as well?"

With the DAWA indices, the MLSOI and EQSOI had risen dramatically in April and May, whilst the SOI had remained quite negative. On the basis of the positive trend in the MeanSOI the following average rainfall forecast was made for June-November rainfall for Birchip (Figure 2) and the statement "With pressures averaged over southeastern Australia now more near normal we just have to wait for conditions to improve".

Rainfall did improve and actual rainfall at Birchip between June and November was 208mm, which compared well with 228mm average of the analogues 1966, 1970, 1995 and 1988. Only a dry finish in late October and November and some frosts reduced crop yields from very good potentials. The dry finish was related to strengthening high pressures in November (see Figure 1).

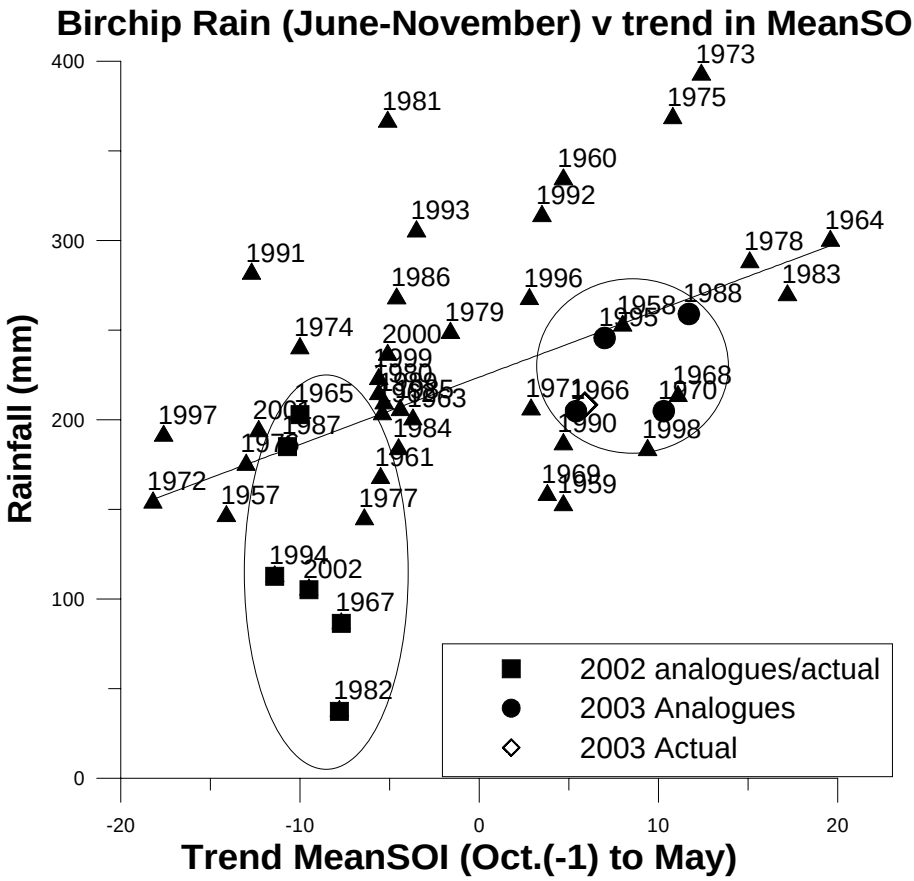

Figure 2: Birchip June to November rainfall versus the trend in the MeanSOI from October (year previous) to May. Analogues in 2002 and 2003 are circled.

Conclusion

The El Nino drought pattern of 2002 broke down slowly in south-eastern Australia in 2003 as the Pacific returned to neutral (normal) conditions. Good rainfall was recorded once the El Nino decayed and pressures in southern Australia returned to more normal values. These results highlight the importance of monitoring a number of climate indices, rather than just the SOI alone. Local atmospheric pressure anomalies appear to be vital for more regional forecasting and a 3-year GRDC project will investigate this further.

Future Developments

As we head into 2004 there are some early indications that an El Nino could re-develop later in the year. Strong westerly winds (easterly wind anomalies) along the equatorial Pacific have contributed to a pulse of subsurface warming, known as a Kelvin wave, which is moving towards South America. At this stage, the analogue years selected by our system include a number of drier years, so we are suggesting farmers act cautiously until autumn when prospects for the cropping season become more certain.