

Australia's changing climate

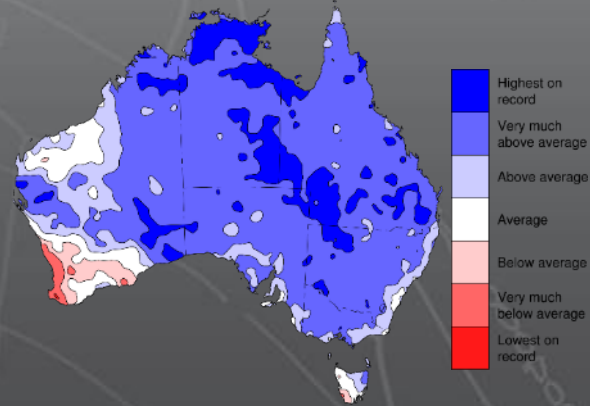
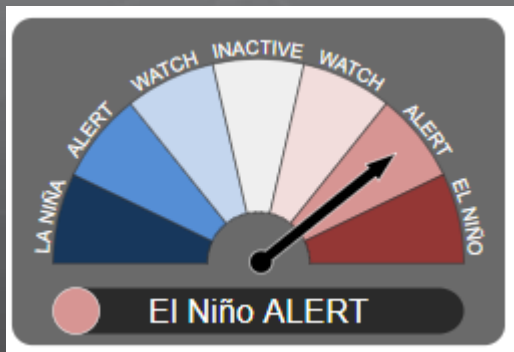
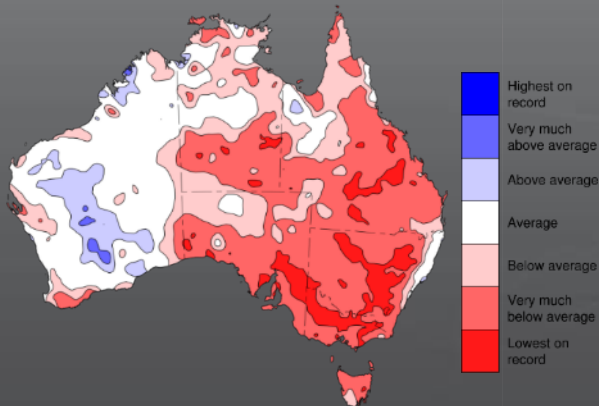
Lynette Bettio
Australian Bureau of Meteorology



1982

Drivers of Victoria's climate: ENSO

2010-2011



2006 El Niño



1982/83 El Niño



2011 La Niña (Charlton, Mail Times)



1956 La Niña (Murray River flooding)

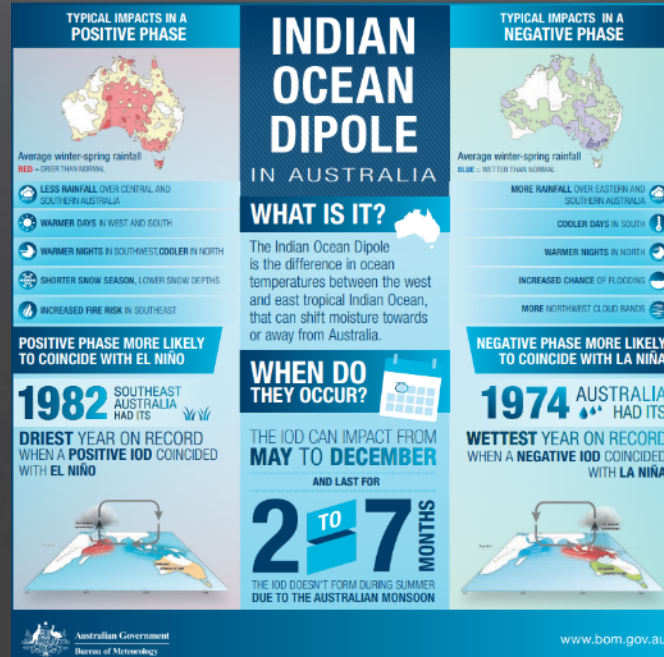


Indian Ocean Dipole also impacts Victoria's climate

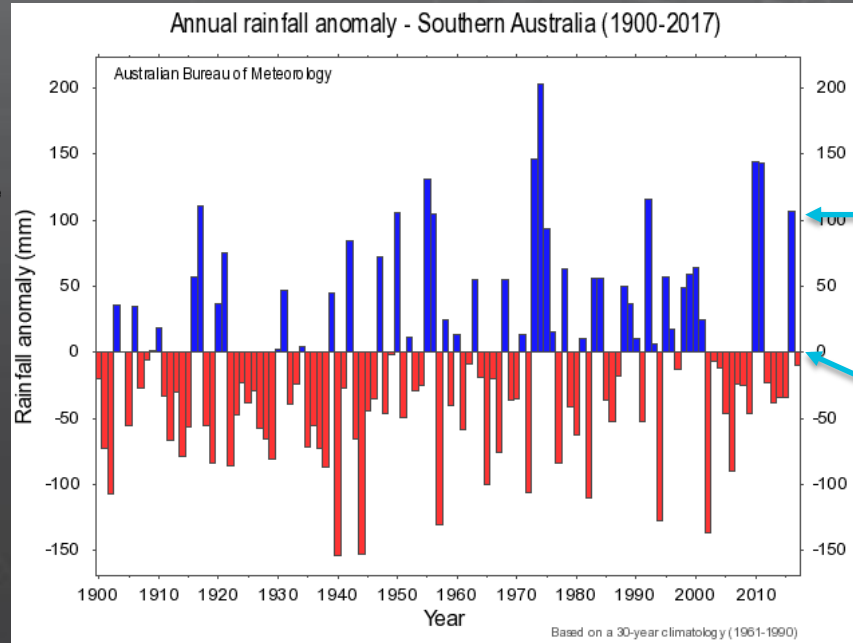
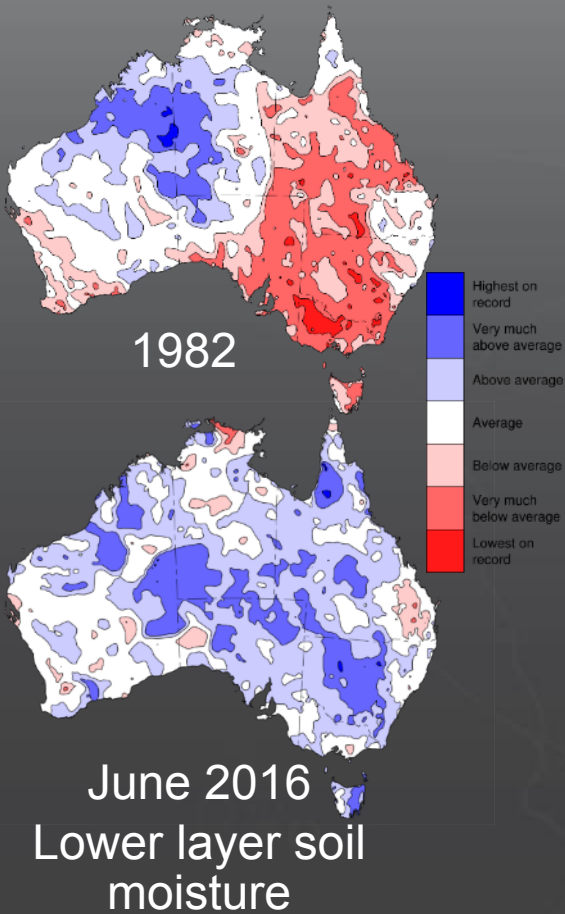
1960 1961 1963 1964 1972 1974 1981 1982 1983 1989 1992 1994 1996 1997 1998 2006 2010 2012 2015 2016

Since 1960, when reliable records of the IOD began, to 2013 there have been 9 negative IOD and 9 positive IOD events.

<http://www.bom.gov.au/climate/iod/>



Managing for variability

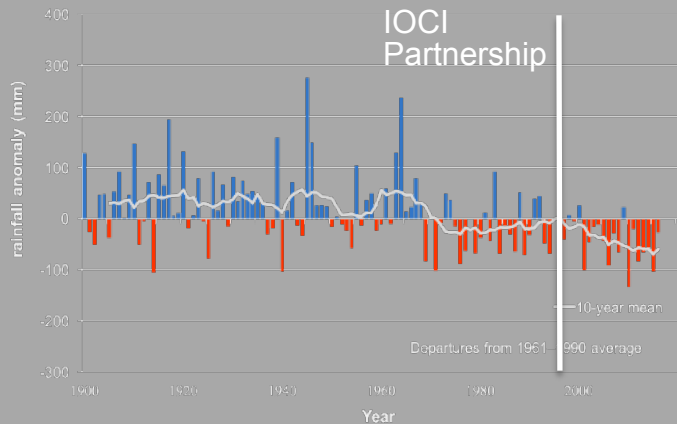


Taking advantage of the good years: 2016 was one of the highest years on record for wheat yield

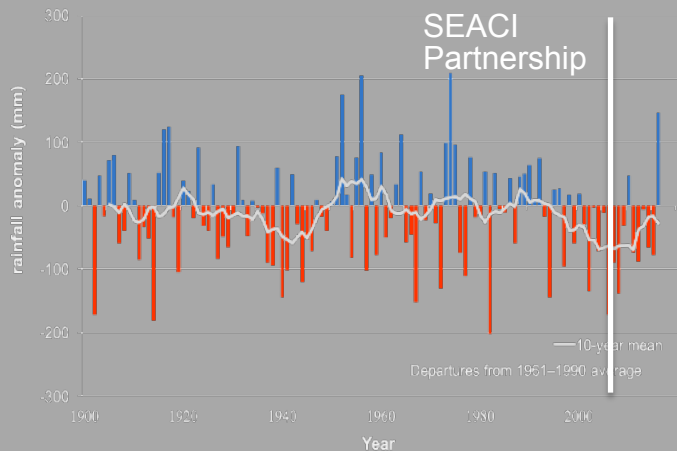
Average is 395 mm

www.bom.gov.au/climate/change/

Long term trends: Drying over southern Australia

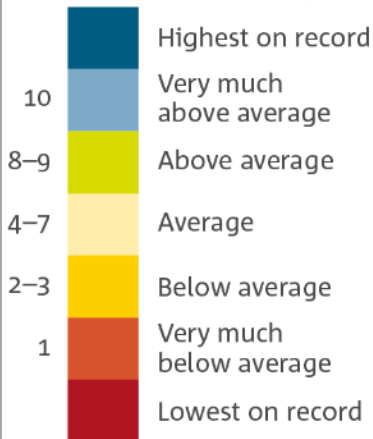


Southwest WA winter rainfall anomalies

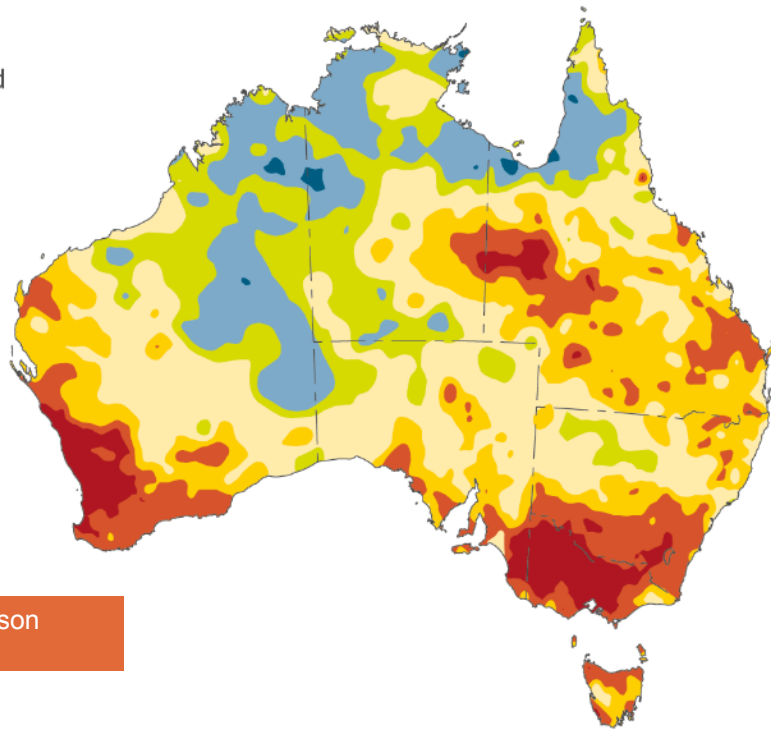


Southeast Apr-Oct rainfall anomalies

Rainfall decile ranges



Southern growing season
rainfall 1996-2015

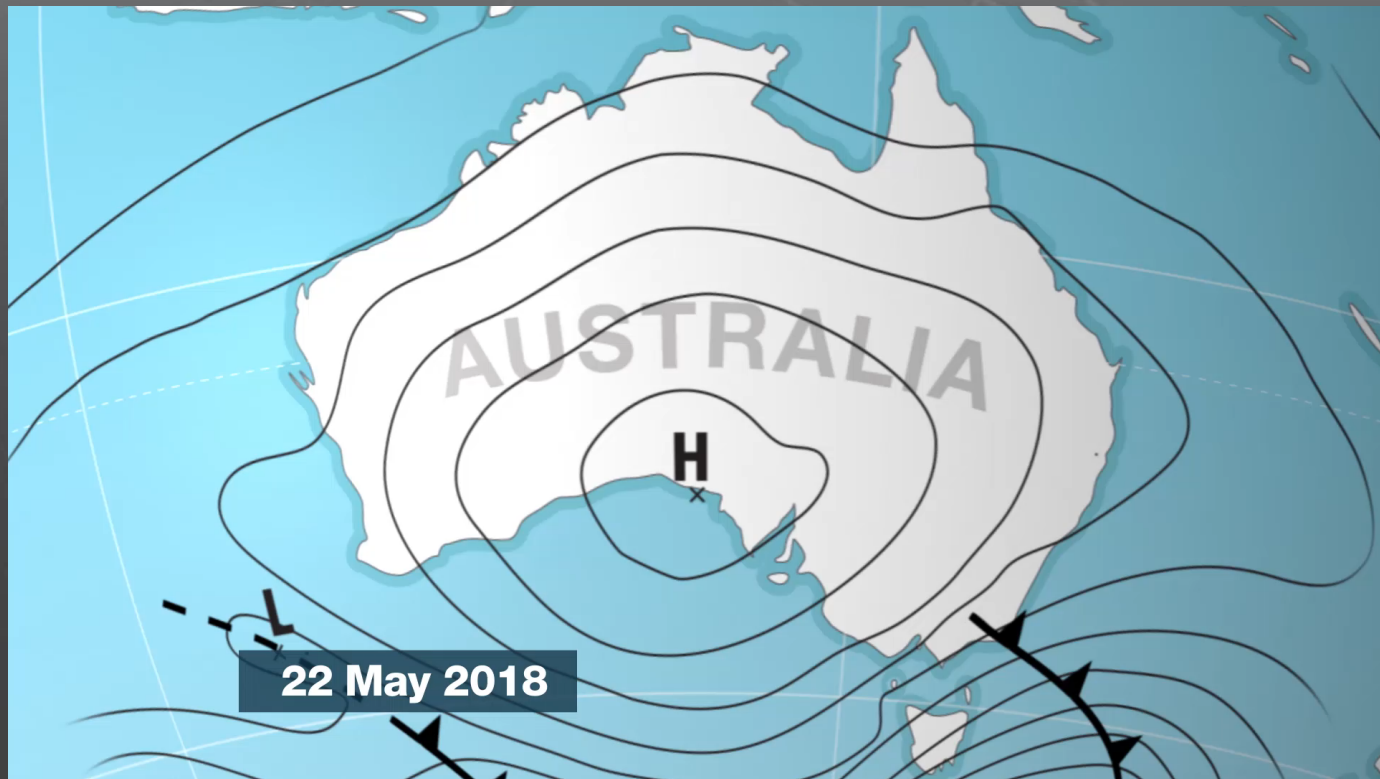


Source: Bureau of Meteorology



Why was recent rainfall below average?

- Higher pressure than normal over Australia
- Rain bearing fronts pushed further to the south



Climate change: Drought forces farming methods re-think

The Weekly Times April 11, 2018

IT WAS the millennium drought that made Peter Holding sit up and take notice of the changing climate.

"You can change your variety, you can do direct drilling, or you can go to controlled traffic and precision farming, and all these things will help you get a better yield and all the rest of it. But since about 2010 yields have stalled.

Before the millennium drought we used to have 12-18-month droughts:

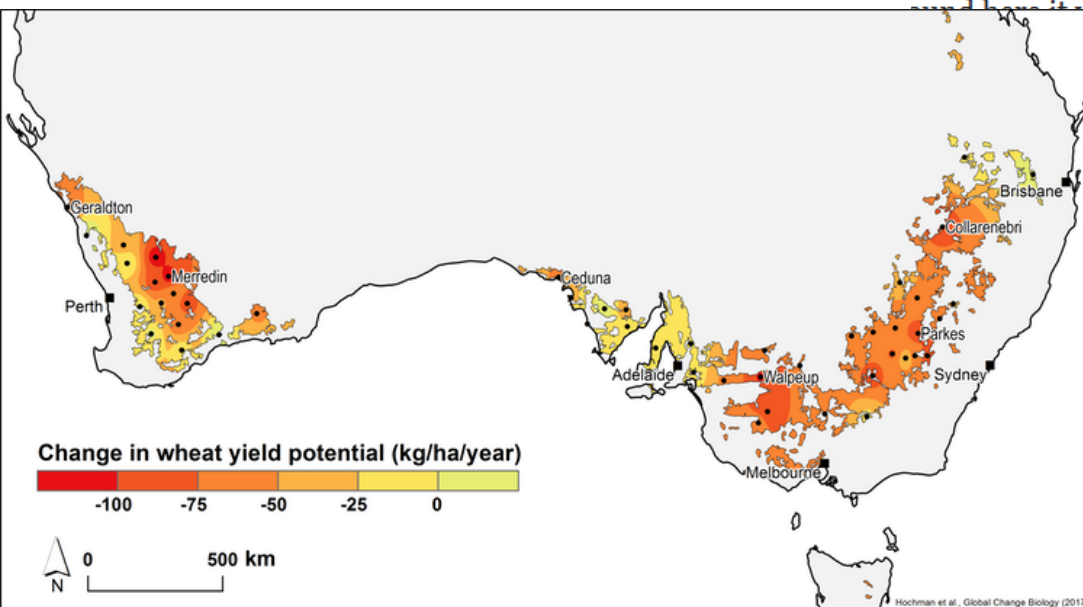
as pretty rare not to be able to grow a crop," the third-generation farmer from southern NSW says.

It went from spring to the next spring, and then it broke. It was a lot of problems — there was dust flying around everywhere and in Melbourne — but it only went for a bit over 12 months. The drought started in about 2002 and just got drier and drier (until 2010).

"In the drought year in 10 we suddenly had nine years (of drought) — it made you realise something had to change."

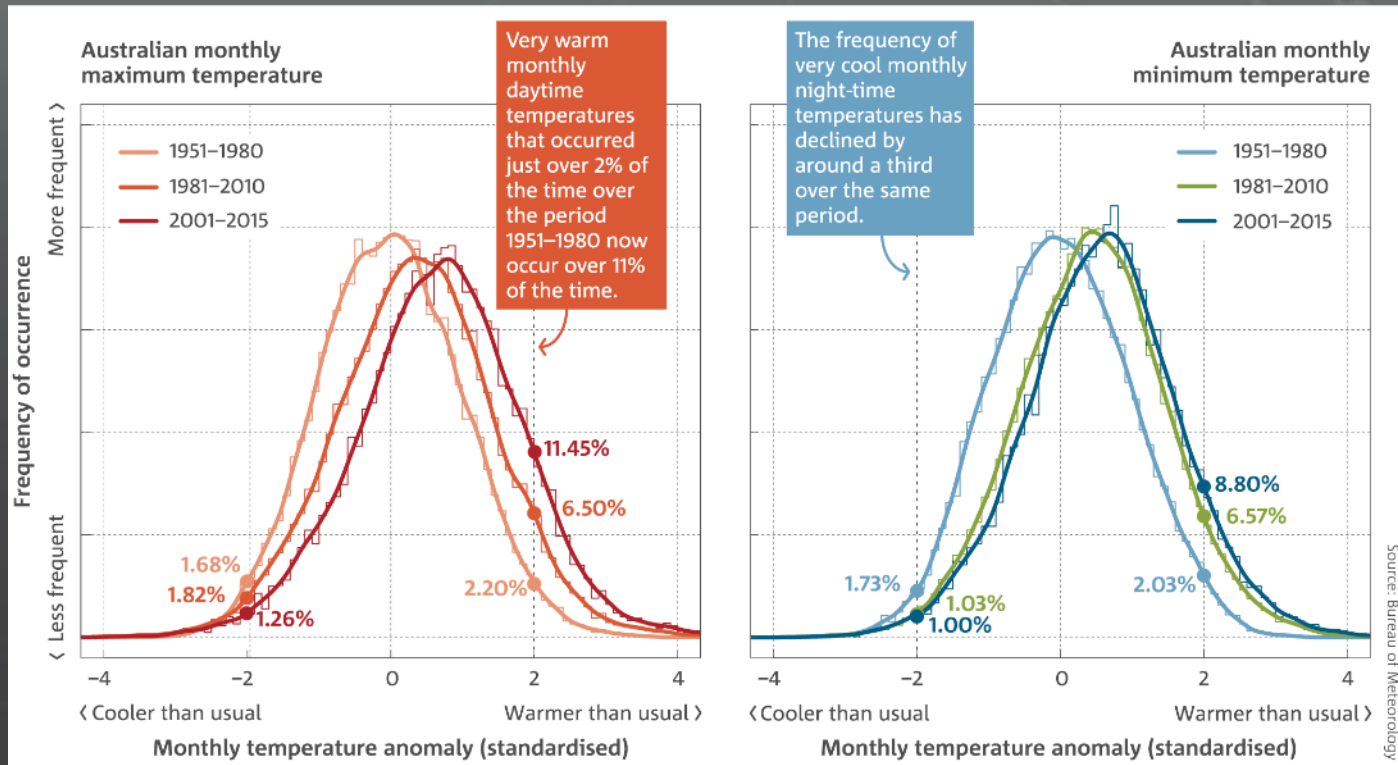
After he became involved with Climate Champions — among others, the Bureau of Meteorology, Meat and Livestock Australia and the Grains Research and Development Corporation to help

develop a range of measures such as direct drilling and precision farming to make the most of



The distribution of the annual change in wheat yield potential from 1990 to 2015. Each dot represents one of the 50 weather stations used in the study. David Gobbett, Zvi Hochman and Heidi Horan,

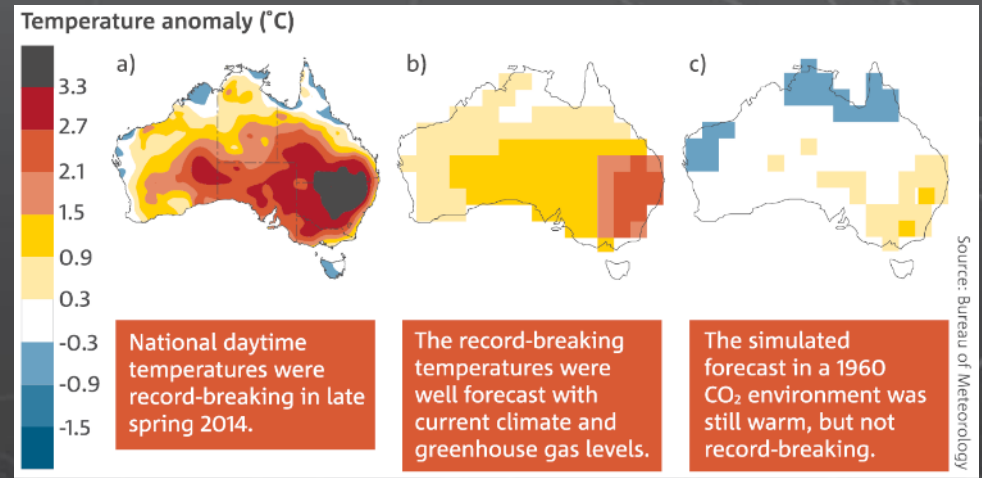
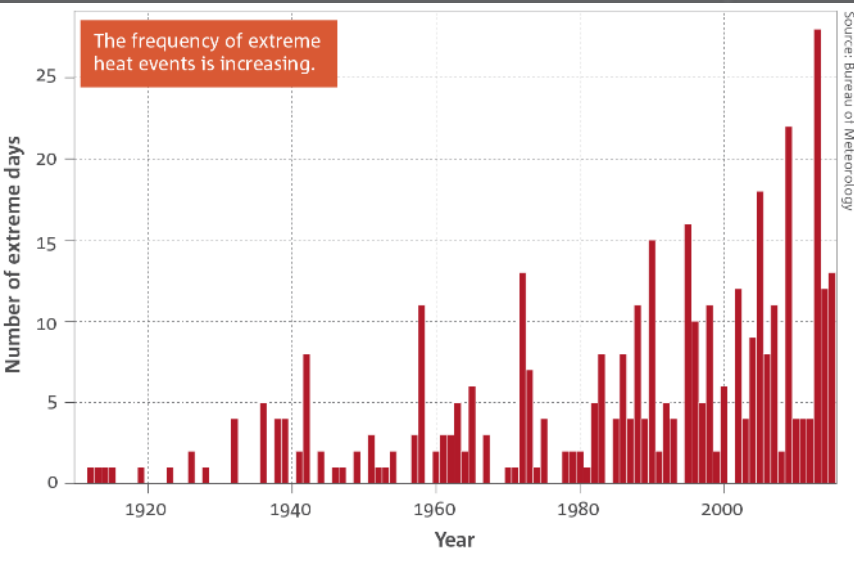
Australia's changing climate: temperature



A small shift in the mean can change the frequency of extremes



Increasing frequency of heat events and getting more extreme



Summer heatwaves

Black Saturday 2009

Record-breaking heatwave across
southeastern Australia

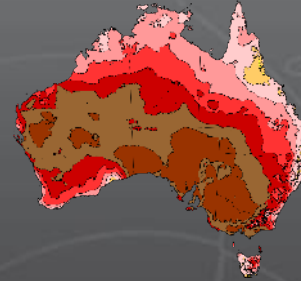
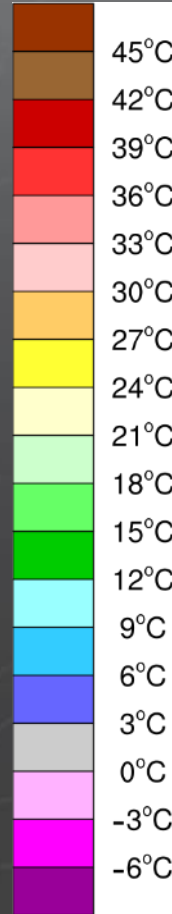
Many all-time daily records set

January 2013

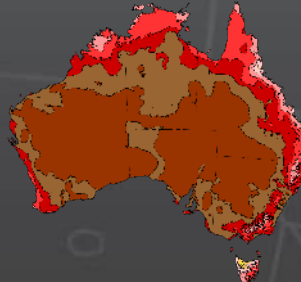
- Over 70% of the continent recording temperatures in excess of 42 °C
- Broke every sequential national heat record from 1 day through to 1 month

February 2017

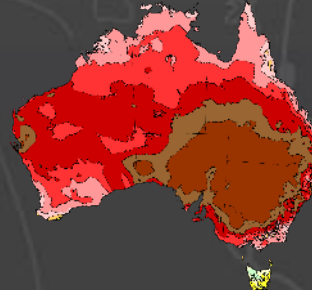
- Broke area-averaged records for NSW maximum temperatures



Highest maximum
temperature, 27 January –
8 February 2009



Highest Maximum
temperature, first half of
January 2013



Highest temperature,
31 January – 12 February
2017



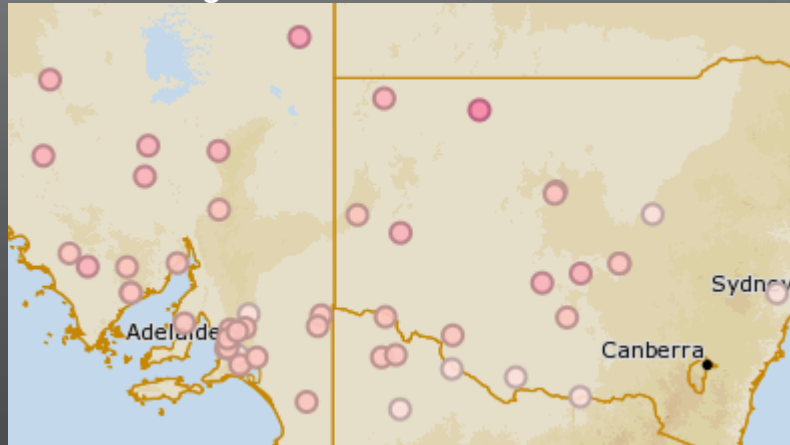
Australian Government
Bureau of Meteorology

April 2018

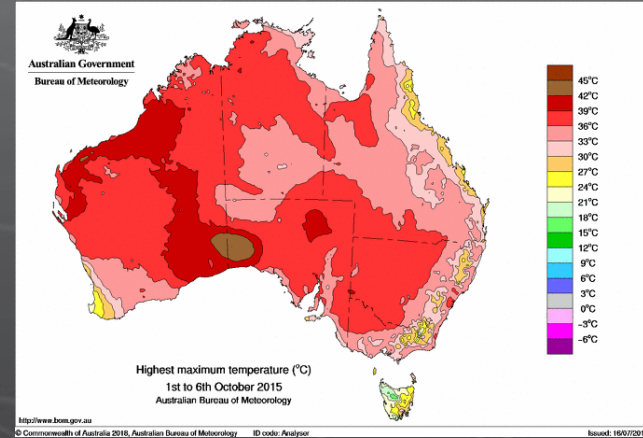
www.bom.gov.au/climate/current/statements/

Out of season heatwaves

October 2015



Mildura, Ouyen and Walpeup all had four consecutive days of 35 °C or above from 8 to 11 April. No Victorian site had previously had more than two consecutive 35 °C days in April.



http://www.bom.gov.au/cgi-bin/climate/extremes/daily_extremes.cgi

Official records for Victoria in April

Records valid as of 15 April 2018

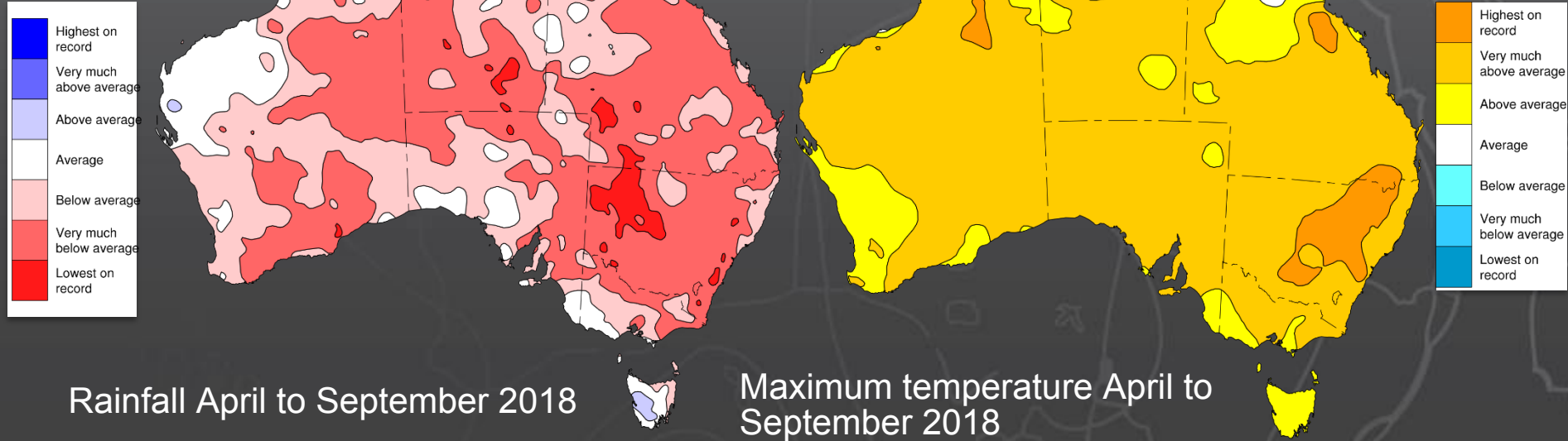
Rank	Value (°C)	Date	Station Name
1	39.3	11 April 2018	Hopetoun Airport
1	39.3	10 April 2018	Mildura Airport
3	39.1	11 April 2018	Kerang
4	39.0	11 April 2018	Swan Hill Aerodrome
4	39.0	10 April 2018	Ouyen (Post Office)
6	38.9	11 April 2018	Ouyen (Post Office)
6	38.9	11 April 2018	Walpeup Research
6	38.9	11 April 2018	Charlton
6	38.9	10 April 2018	Hopetoun Airport
10	38.8	10 April 2018	Walpeup Research

13 highest records for April in Victoria set during event beating previous record 37.8 °C set in 1986.

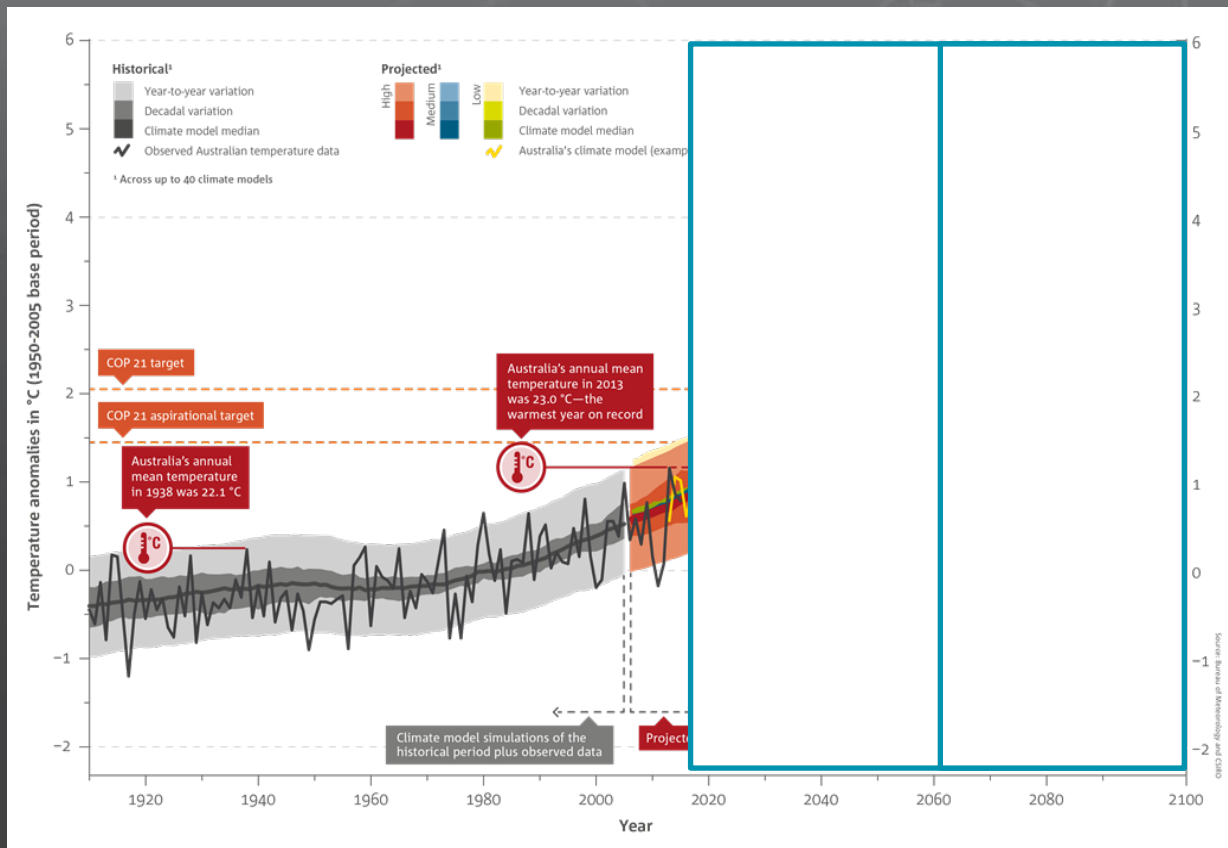
JAMES WAGSTAFF, *The Weekly Times*

October 12, 2016 12:00am: When *The Weekly Times* caught up with Birchip farmer John Ferrier this time last year it was to discuss the impact of a devastating early October heatwave, which had ruined tens of thousands of hectares of local crops and sapped the potential of others.

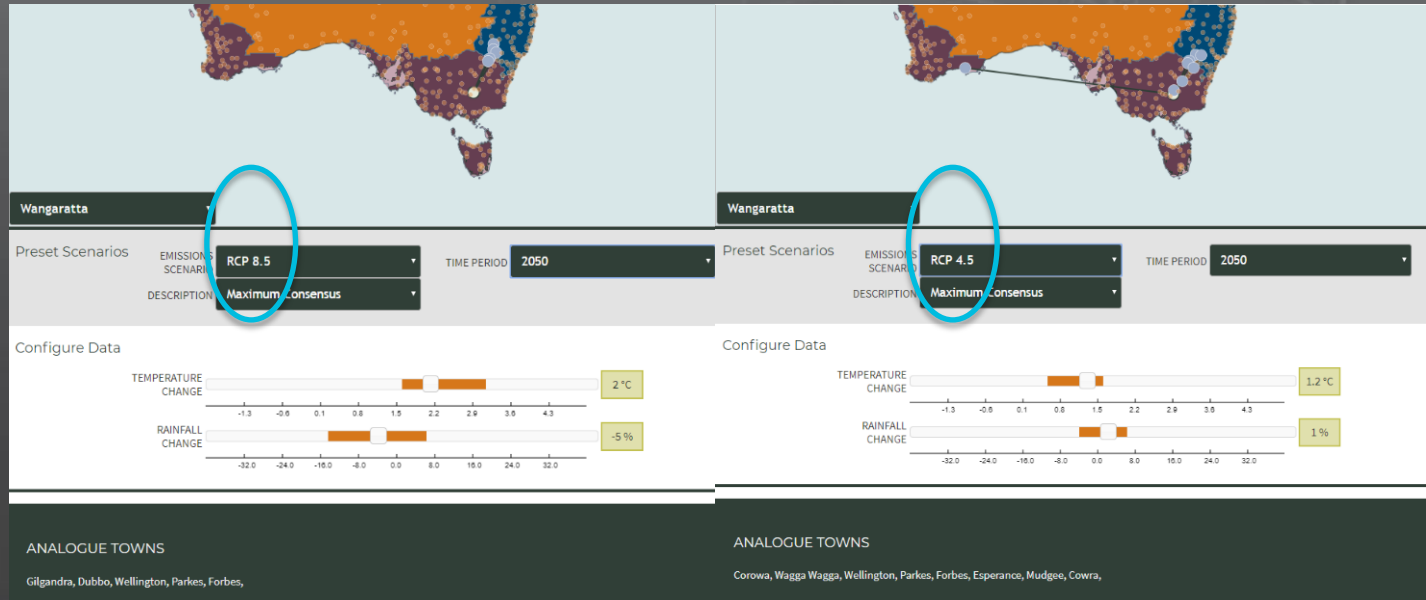
Conditions in 2018



Future changes



Your future local climate



www.climatechangeinaustralia.gov.au/en/climate-projections/climate-analogues/analogues-explorer/



The Climate Outlooks service :Managing risk

www.bom.gov.au/climate/ahead/

- Monthly and seasonal outlooks
- Temperature and rainfall
- Localised forecasts
- Improved communication
 - videos shown on national Ag television program and website
 - Monthly briefings
- Education

Climate outlooks – monthly and seasonal

Issued: 17 December 2015 – Next issue: 28 January 2016

Text view

Archive

Subscribe

Feedback

- Overview
- Rainfall
 - Summary
 - Chance of above median
 - Outlook scenarios
 - Chance of at least
 - Medians
 - Past accuracy
- Temperature

Rainfall - The chance of above median for January to March

January

February

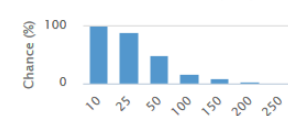
January to March

Outlook for January to March at North Cascade

Rainfall

Median 50 mm
Chance of above median Equal likelihood

Rainfall total of at least (mm)

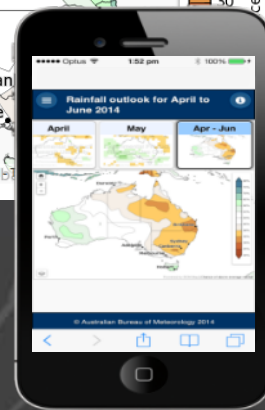


Past accuracy

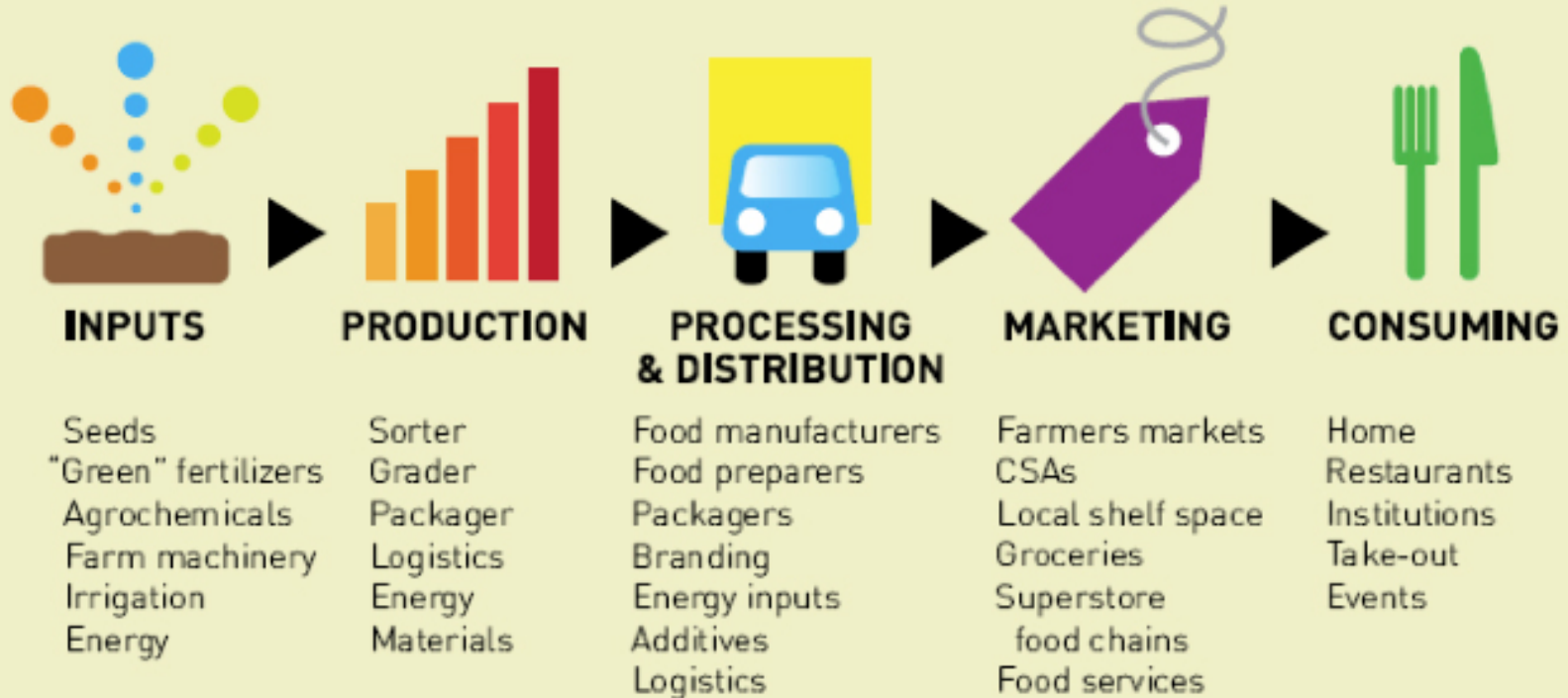
Low

Interpreting climate outlooks

- Animations, videos, case studies and quizzes about the Bureau's Climate Outlook service. Registration free, via [COMET-MetEd](#)



The Bureau's Agriculture Program – addressing the whole cycle of production with an individual focus



Thankyou

Lynette.Bettio@bom.gov.au Climate variability and trends

Karl.Braganza@bom.gov.au Head of Climate Monitoring

Andrew.Watkins@bom.gov.au Head of Climate Prediction

Peter.Stone@bom.gov.au Head of Agriculture

