



# Climate risk management A Queensland perspective (September 2013)

# Questions, comments?

Type your questions  
here anytime



The screenshot shows the GoToWebinar interface. On the left is a vertical toolbar with icons for chat, microphone, video, and a hand. The main window has a menu bar with 'File', 'View', and 'Help'. Below the menu bar is a section titled 'Audio' with two radio buttons: 'Telephone' (selected) and 'Mic & Speakers'. Below these are the dial-in details: 'Dial: 1 800 990 166', 'Access Code: 288-349-760', and 'Audio PIN: 101'. A red banner below the details says 'If you're already on the call, press #101# now.' Below the 'Audio' section is a section titled 'Questions' with a large text area for typing questions. Below the text area is a smaller input field with the placeholder text '[Enter a question for staff]' and a 'Send' button. At the bottom of the window, it says 'Webinar Now' and 'Webinar ID: 248-976-062', followed by the 'GoToWebinar' logo.

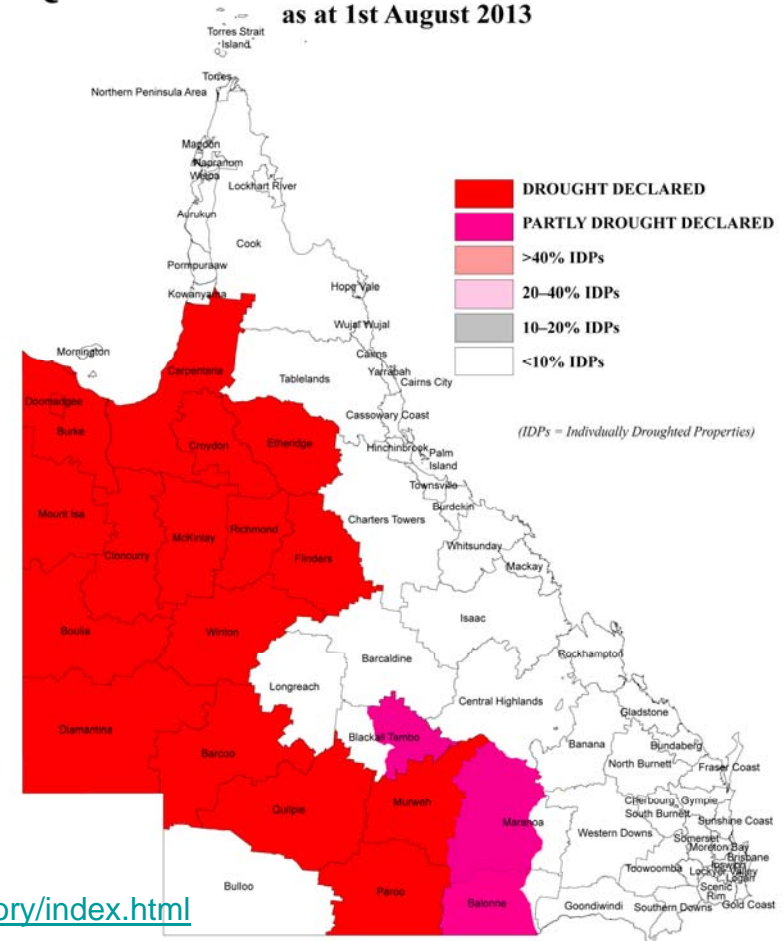
# Today's topics

- Our variable climate
- Key drivers of that variability
- Seasonal outlooks
- Using climate information
- Available tools and more information

# Examples of a variable climate

- Severe drought and resulting land degradation events have been recorded in Australia during the 1890's, 1920's, 1930's, 1940's, 1950's, 1960's, 1970's and 1980's (McKeon et al., 2004)

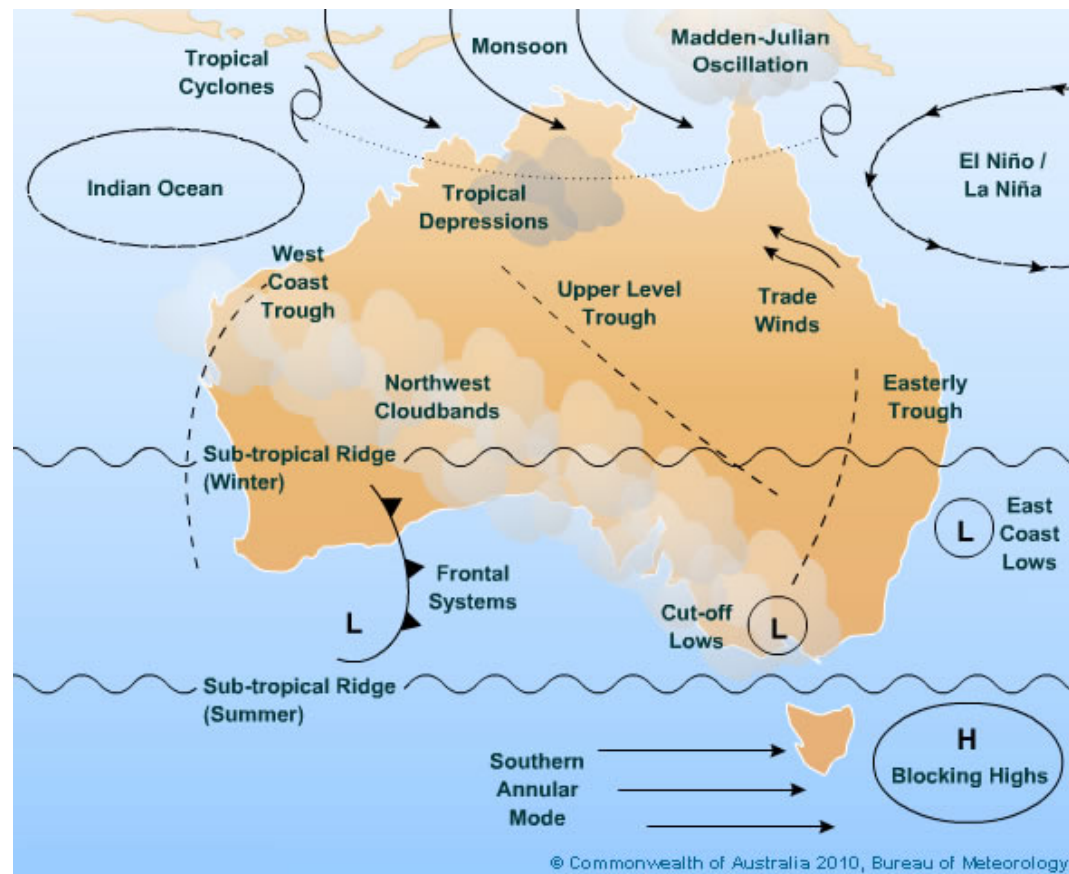
## QUEENSLAND DROUGHT SITUATION as at 1st August 2013



<http://www.longpaddock.qld.gov.au/about/publications/learningfromhistory/index.html>

# Key climate drivers include

- El Nino/Southern Oscillation
- Pacific Decadal Oscillation
- Indian Ocean Dipole
- Madden-Julian Oscillation

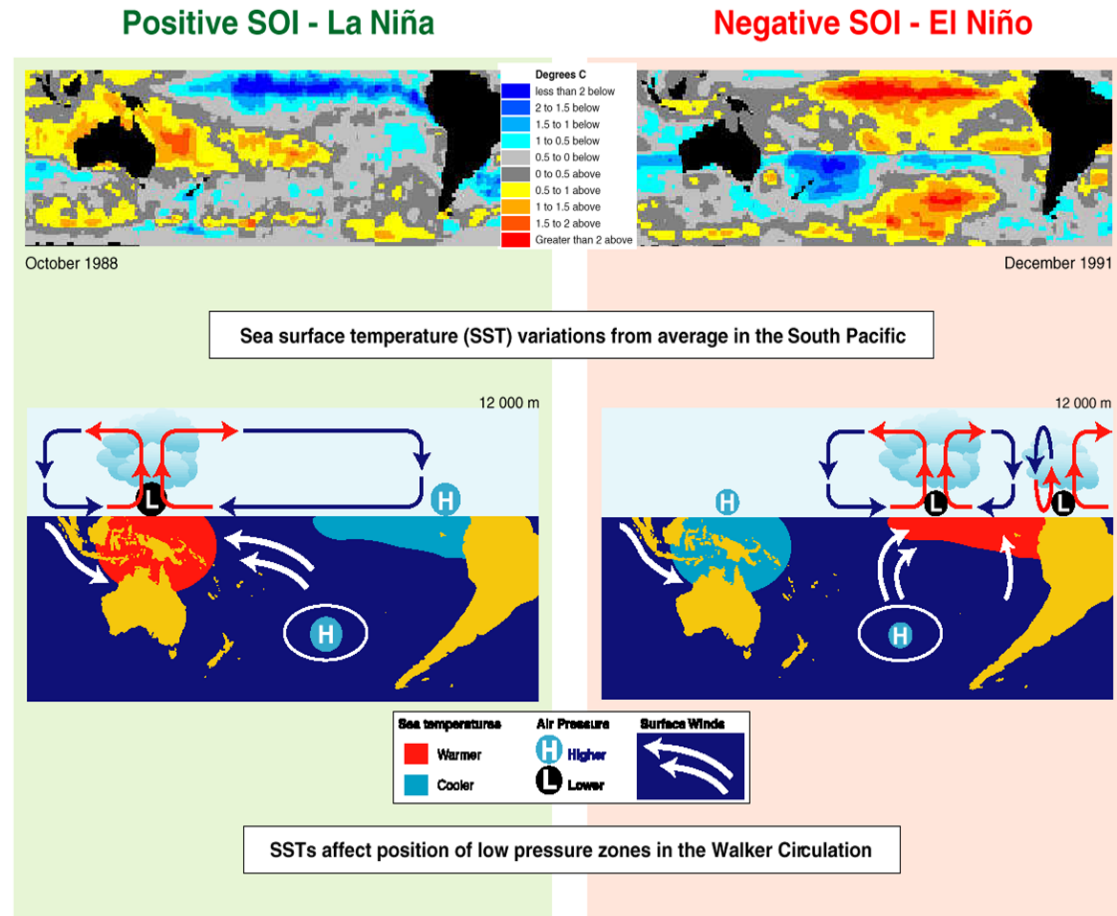


<http://www.bom.gov.au/watl/about-weather-and-climate/australian-climate-influences.shtml>

# La Niña/El Niño (ENSO)

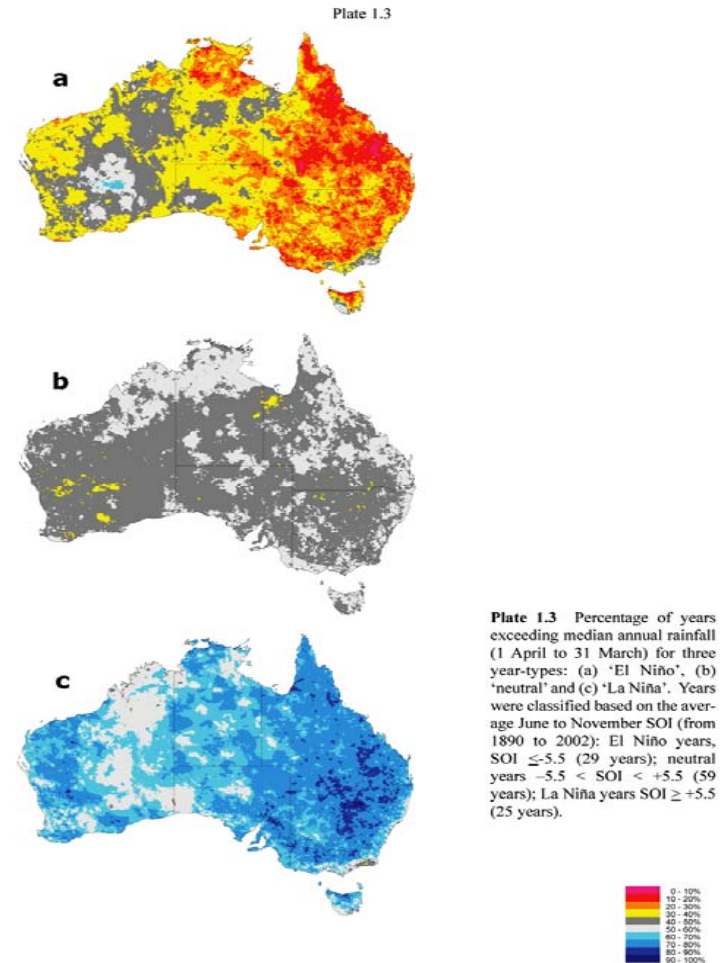
## The Walker Circulation

- Coupled global ocean and atmospheric system
- Changes in SST patterns along the equatorial Pacific drive changes in the global circulation patterns such as the Walker Circulation that influence our local climate

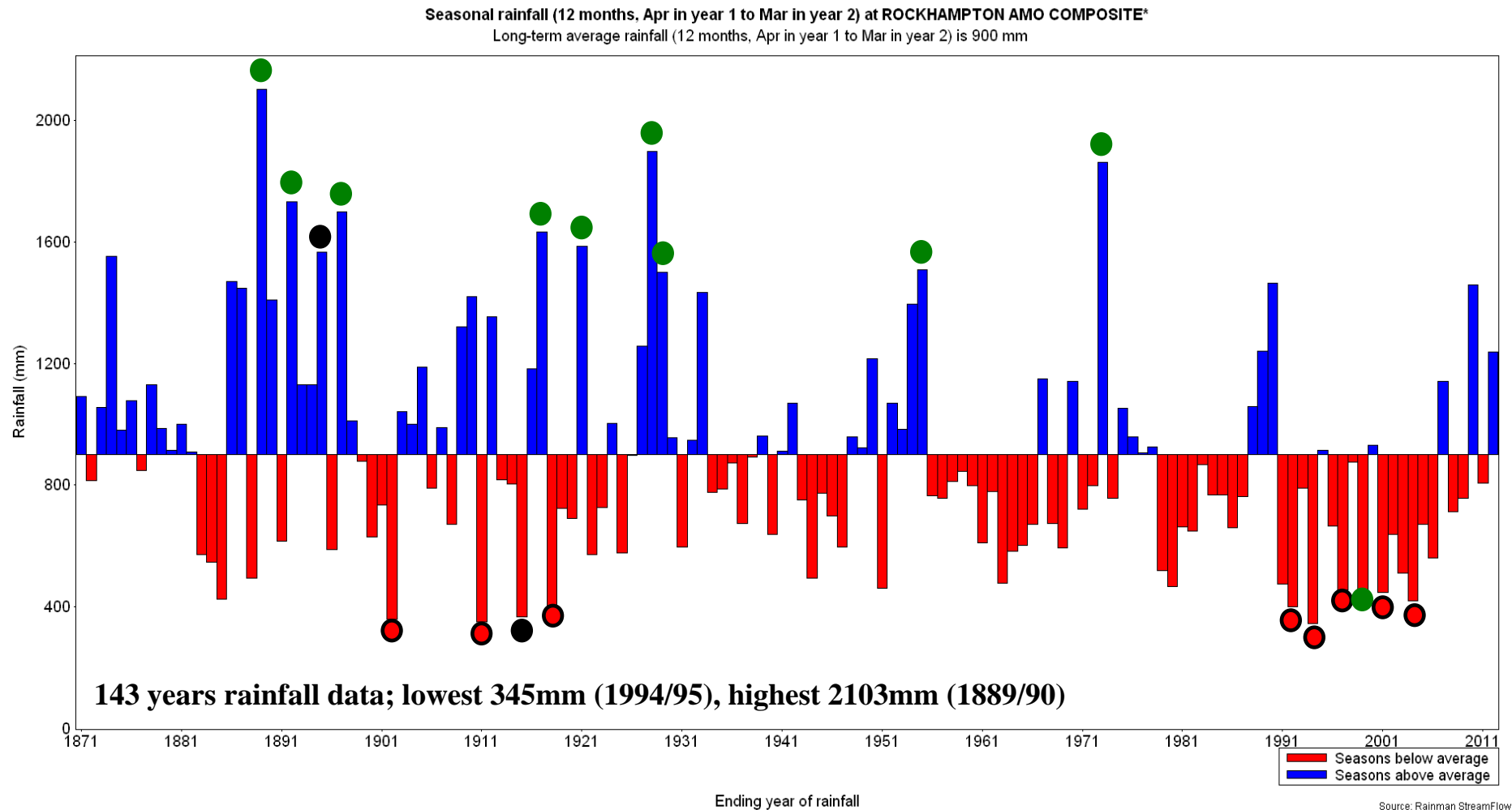


# La Niña/El Niño historical rainfall

- Typically El Niño events are associated with below median rainfall
- Typically La Niña events are associated with above median rainfall



# The historical context



Source: Rainman StreamFlow



# The Southern Oscillation Index (SOI)

- The SOI can be simply referred to as the difference in barometric air pressure between Darwin and Tahiti
- Correlations between annual SOI and annual rainfall can be used to explain as much as 60% of the variance in eastern Australia rainfall (Partridge, 2001)

[www.longpaddock.qld.gov.au/seasonalclimateoutlook/southernoscillationindex/soidatafiles/index.php](http://www.longpaddock.qld.gov.au/seasonalclimateoutlook/southernoscillationindex/soidatafiles/index.php)

# SOI and rainfall

- Example of SOI impact on number of rain day events at Bungunya (south west Darling Downs).

Median numbers of days per year at Bungunya with daily rainfall equal to or greater than	Years with the SOI below minus 5	All Years	Years with the SOI above plus 5
1mm	43 days	48 days	59 days
8mm	18 days	20 days	26 days
20mm	6 days	8 days	9 days
30mm	2 days	3 days	5 days
(Data Source: Rainman StreamFlow)			

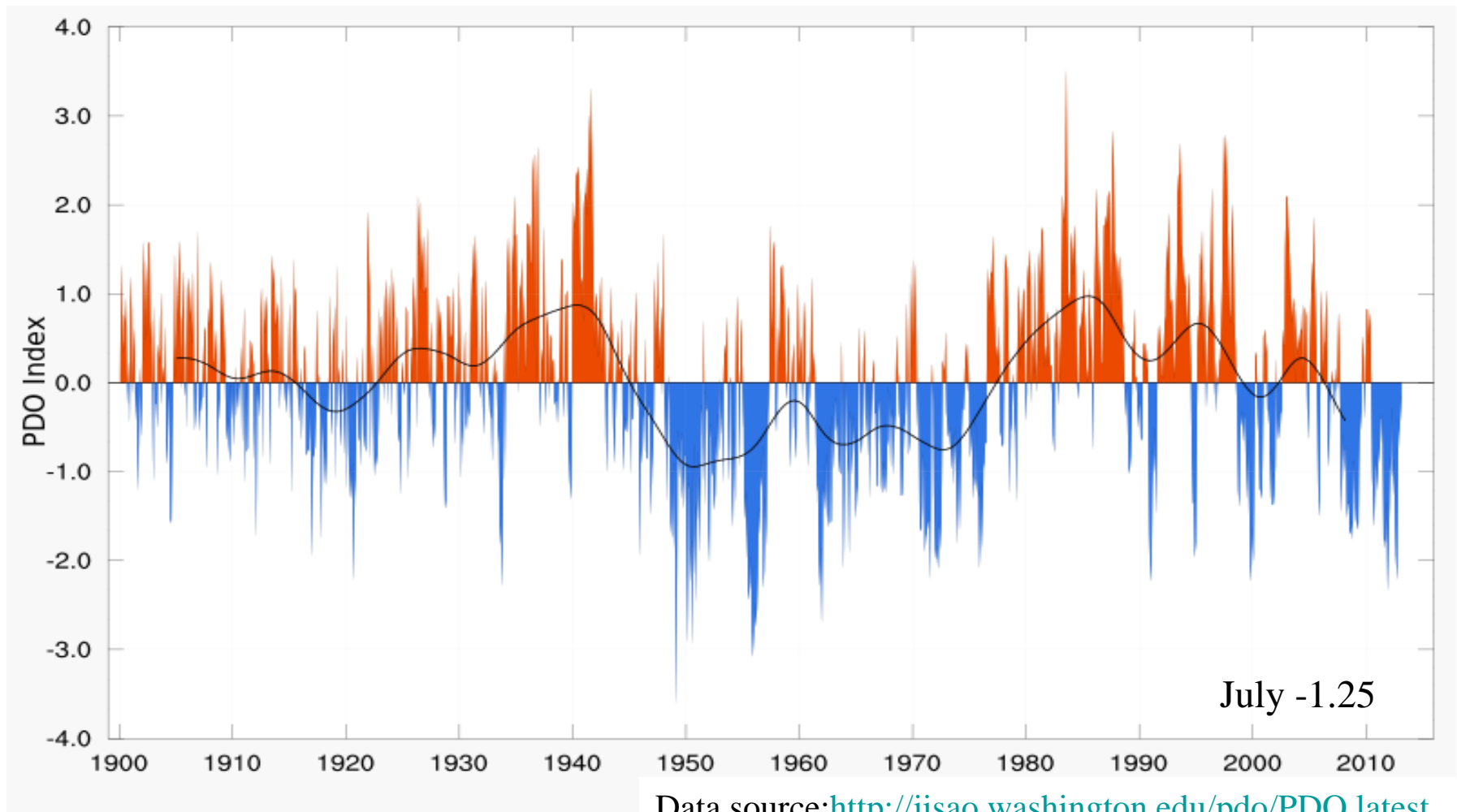


# Pacific Decadal Oscillation (PDO/IPO)

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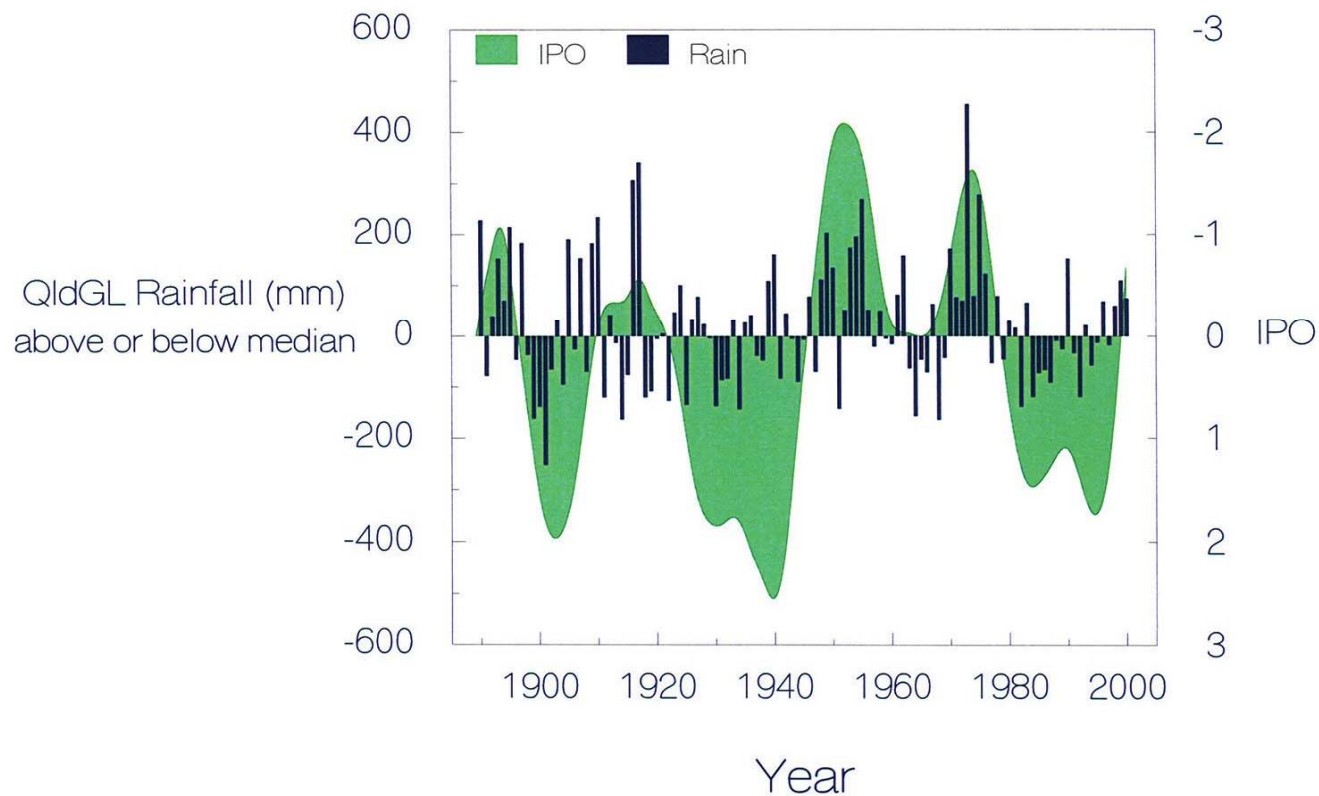
- Is a long-lived ENSO-like pattern of Pacific climate variability. (similar spatial climate fingerprints - very different behaviour in time).
- Moderates the effect of ENSO

# PDO/IPO



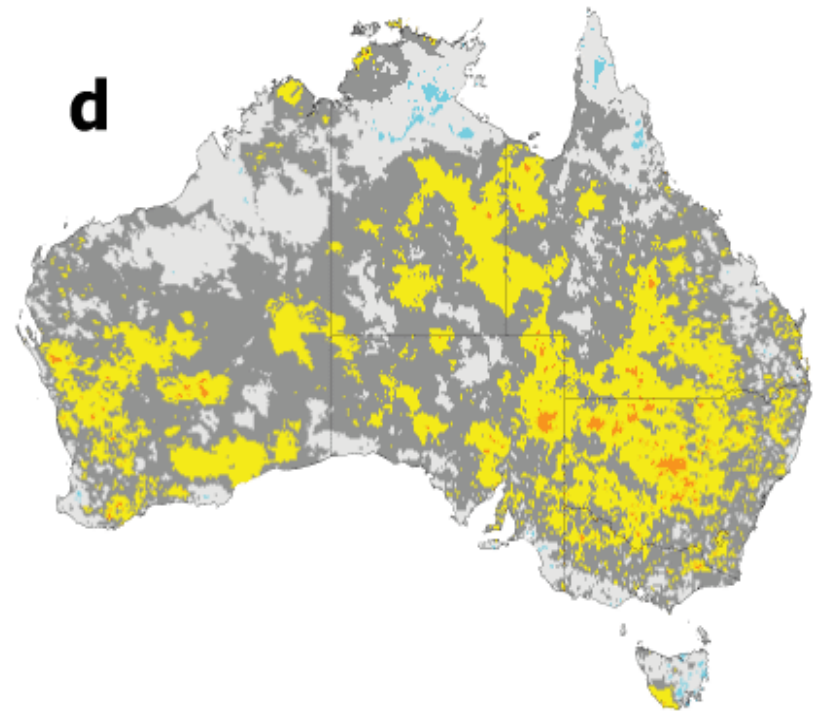
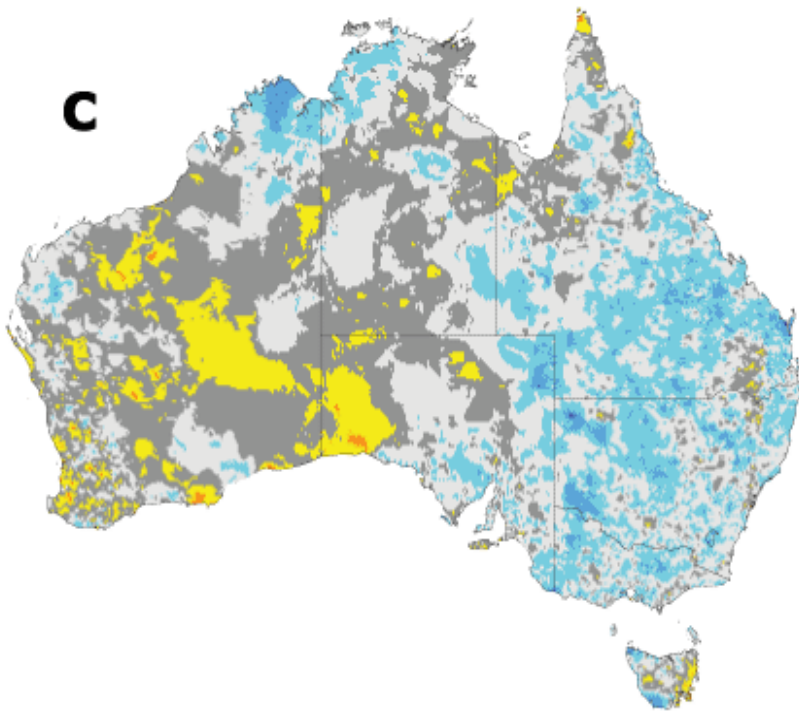
# PDO/IPO influence

Qld Grazing Lands Rainfall  
and Inter-Decadal Pacific Oscillation



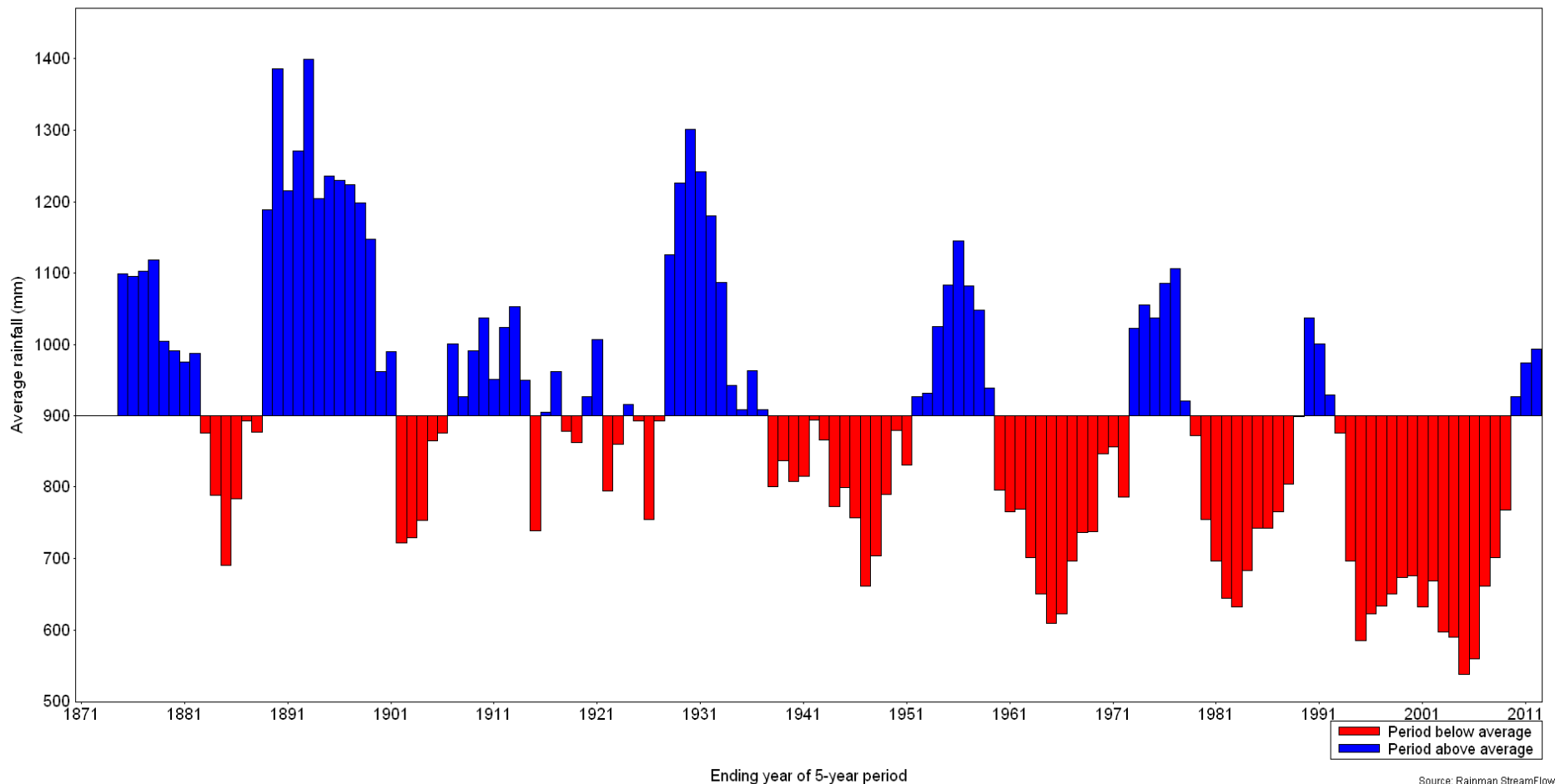
# PDO/IPO influence

- c is SOI neutral, IPO negative. d is SOI neutral, IPO positive. Years 1890 to 1997 (McKeon et al., 2004).



# PDO/IPO influence

5-year moving average rainfall (12 months, Apr in year 1 to Mar in year 2) at ROCKHAMPTON AMO COMPOSITE\*  
Long-term average rainfall (12 months, Apr in year 1 to Mar in year 2) is 900 mm



Source: Rainman StreamFlow





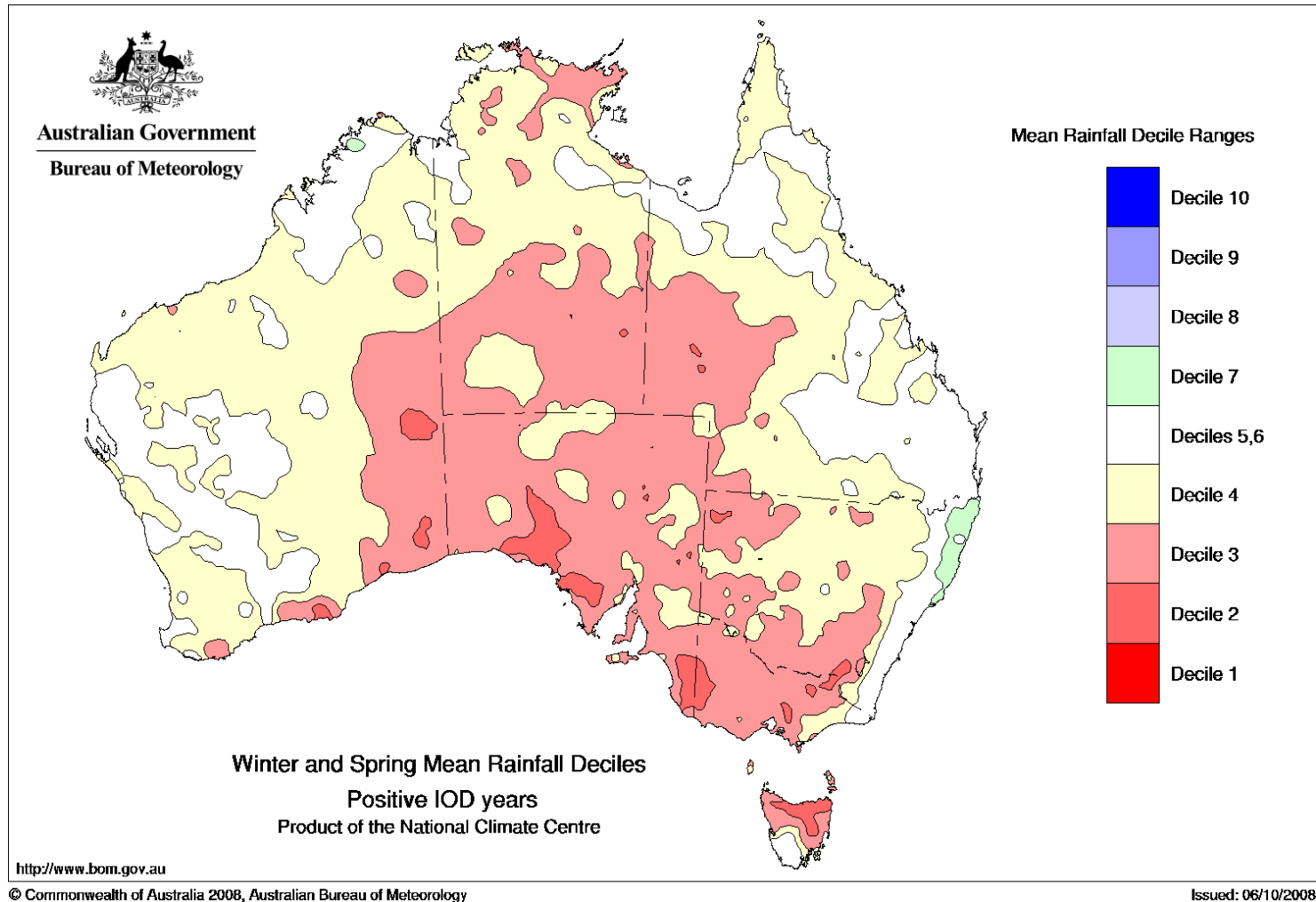
# Indian Ocean Dipole

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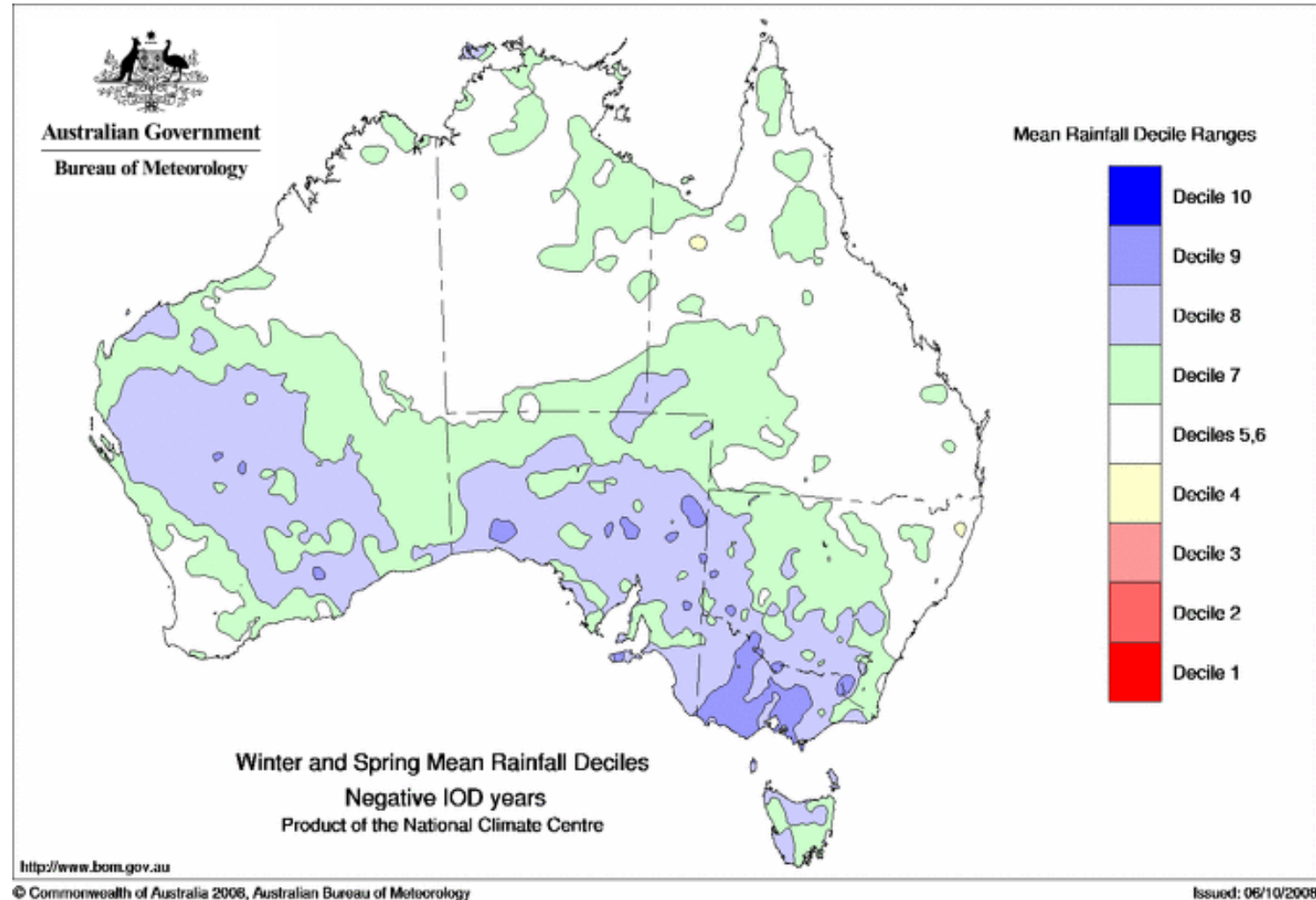
- Influence during May to November
  - Positive IOD events have been associated with drier conditions over much of southern and central Australia
  - Negative IOD events have been associated with wetter conditions particularly south east Australia (Saji et al. 1999)

[http://www.bom.gov.au/climate/IOD/about\\_IOD.shtml](http://www.bom.gov.au/climate/IOD/about_IOD.shtml)

# Indian Ocean Dipole



# Indian Ocean Dipole



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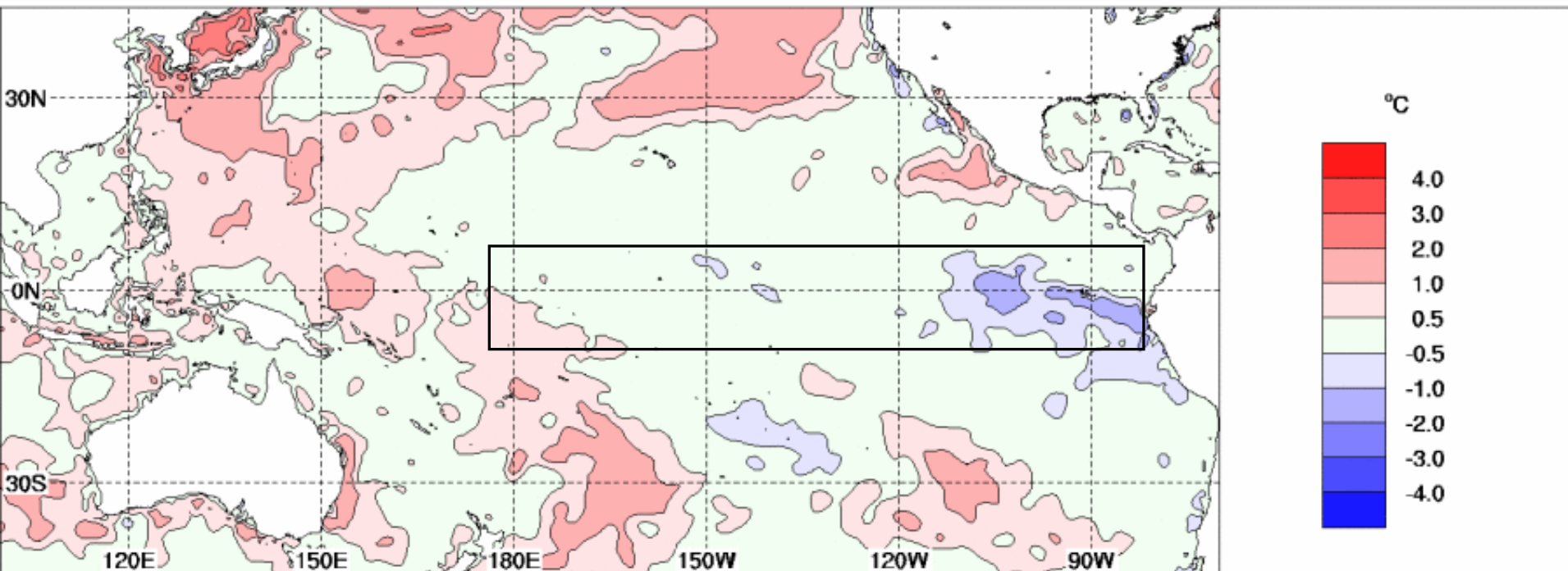
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# Current outlook

# Current SST

SSTA 1.0X1.0 NMOC OCEAN ANOMALIES (C) 20130801 20130831



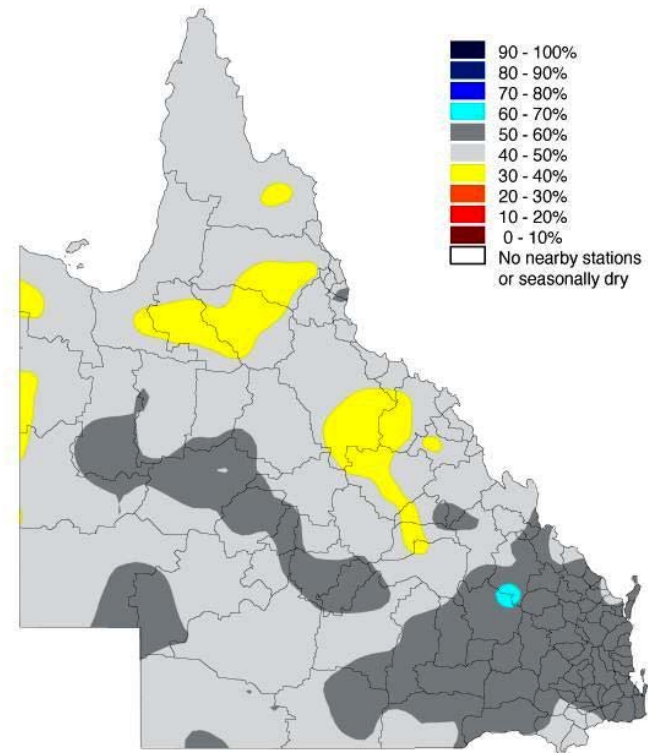
# SOI phase - Qld

- Based on a 'Consistently Near Zero' SOI phase at the end of August there is a 40 to 60% (or near average) chance of getting median rainfall during September to November throughout Queensland.

<http://www.longpaddock.qld.gov.au/>

## Probability of exceeding Median Rainfall

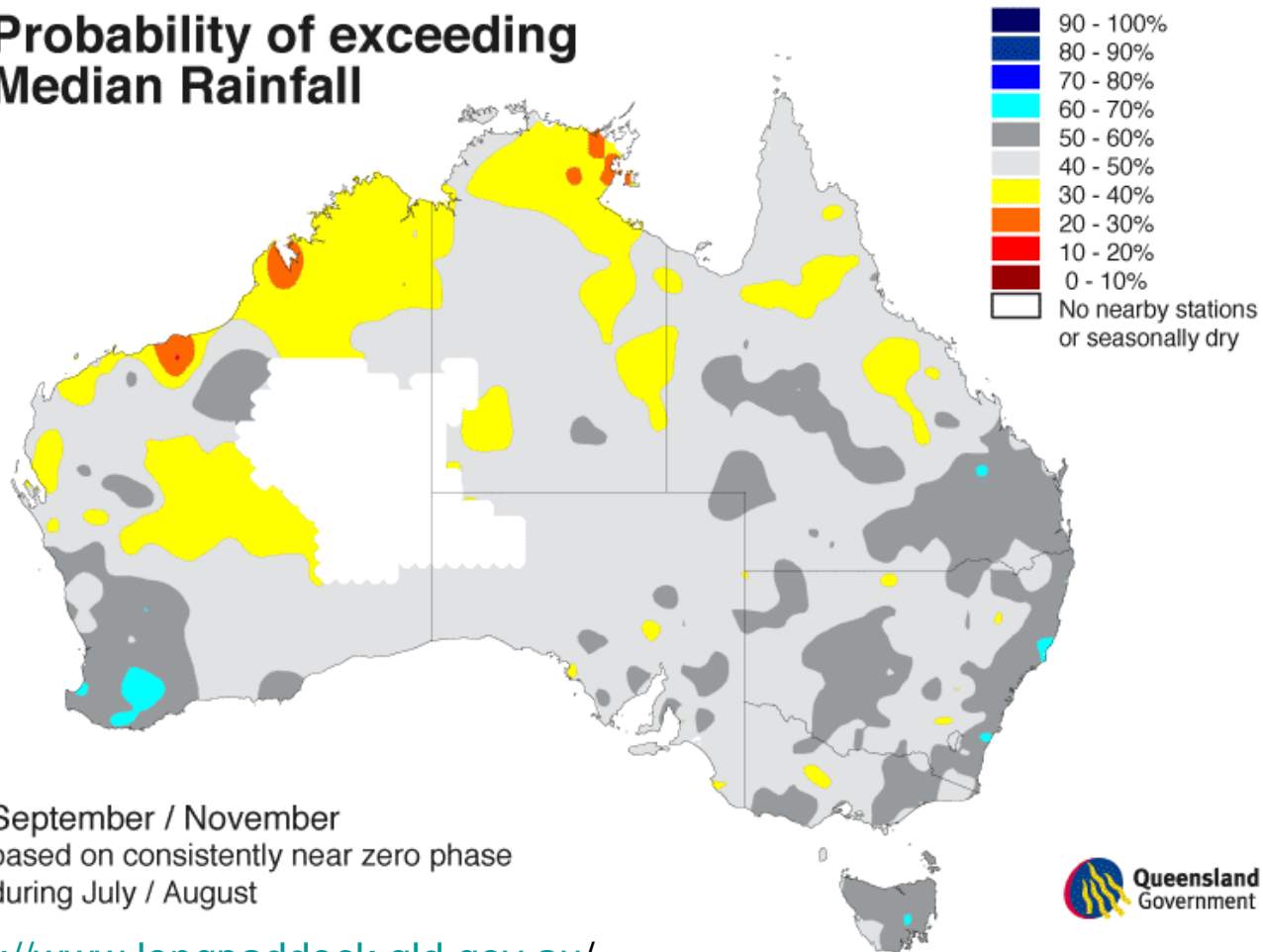
for September / November  
based on consistently near zero phase  
during July / August





# SOI phase - Australia

## Probability of exceeding Median Rainfall



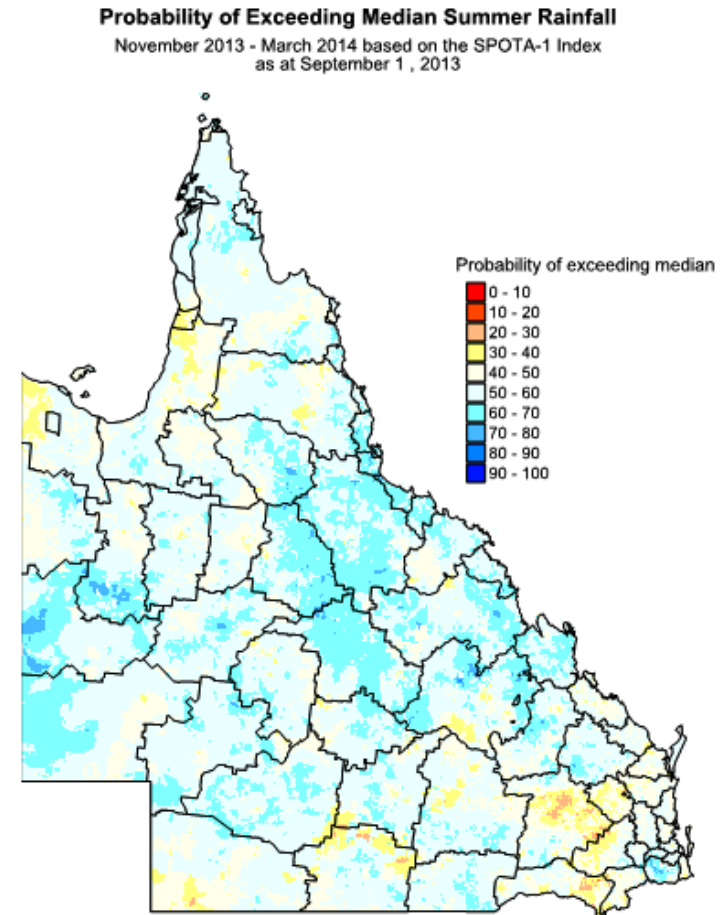
# SOI phase - Roma

<b>Chance of rainfall at ROMA AIRPORT COMPOSITE*</b>						
Analysis of historical data (1878 to 2013) using SOI Phases: Jul to Aug Leadtime of 0 months						
The SOI phases/rainfall relationship for this season is statistically doubtful because KW test is above 0.9 but Skill Score (7.1) is below 7.6 (p = 0.88).						
Rainfall period: Sep to Nov	SOI falling	SOI negative	SOI neutral	SOI rising	SOI positive	All years
% yrs with at least 291 mm	8	0	4	4	10	5
240 mm	15	0	7	16	20	11
190 mm	23	9	16	24	37	21
140 mm	46	14	51	44	53	44
100 mm	54	45	71	72	67	64
60 mm	62	86	87	96	93	87
42 mm	85	86	98	96	100	95
% yrs above median 124 mm	46	27	58	52	53	50
KS/KW probability tests	KS=0.78	KS=0.99	KS=0.73	KS=0.57	KS=0.94	KW=0.96
Significance level	Not significant	**	Not significant	Not significant	#	
Years in historical record	13	22	45	25	30	135
Highest recorded (mm)	317	227	301	303	337	337
Lowest recorded (mm)	22	12	33	39	43	12
Median rainfall (mm)	117	84	145	135	143	124
Average rainfall (mm)	131	98	136	147	166	138

# SPOTA-1 based forecast

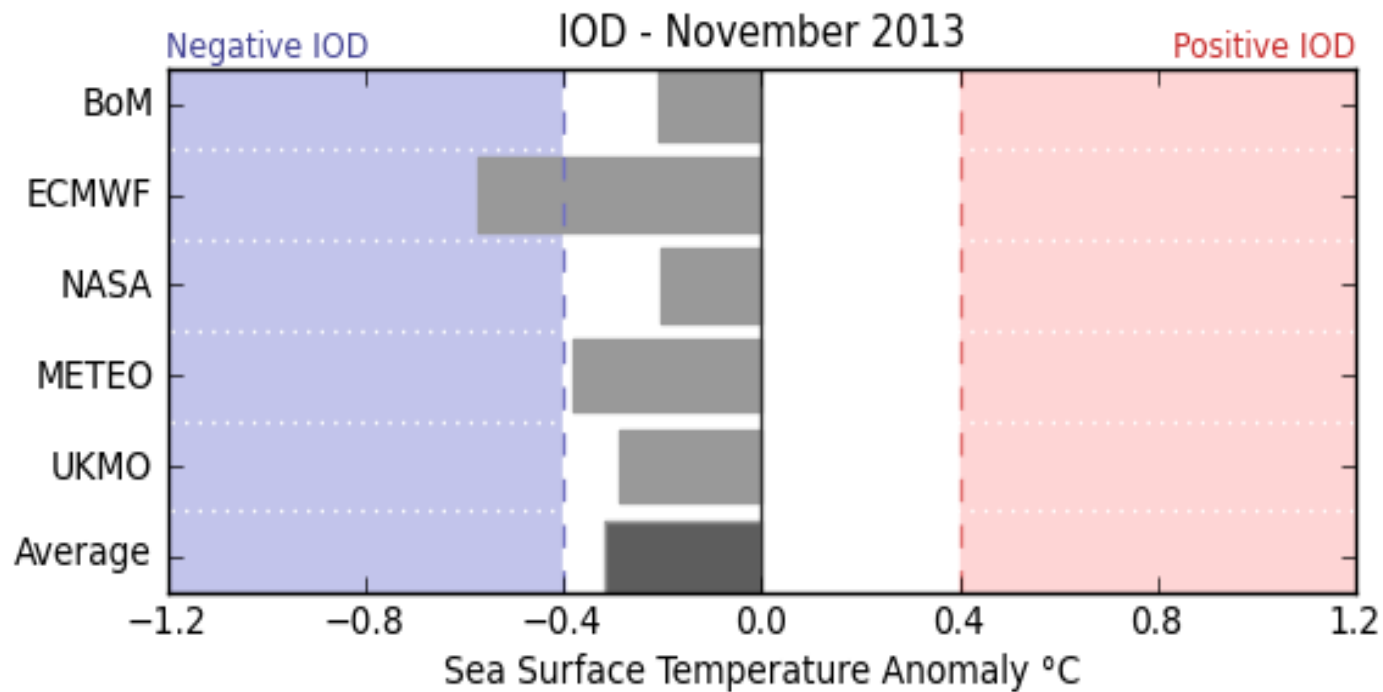
SPOTA-1 (Seasonal Pacific Ocean Temperature Analysis version 1) monitors Pacific Ocean sea surface temperatures (SSTs) from March to October each year and, on this basis, provides long-lead 'outlooks' for Queensland summer (November to March) rainfall.

<http://www.longpaddock.qld.gov.au/spota1-getpassword>



# Indian Ocean Dipole

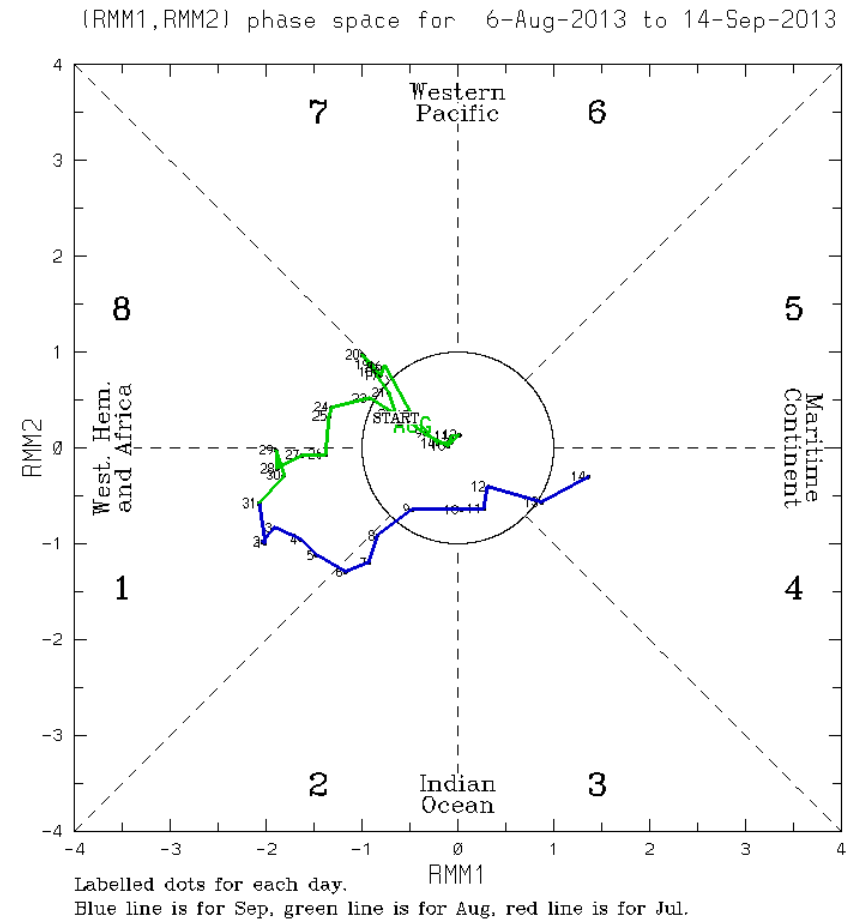
- Currently neutral
- <http://www.bom.gov.au/climate/enso/>



© Copyright Australian Bureau of Meteorology

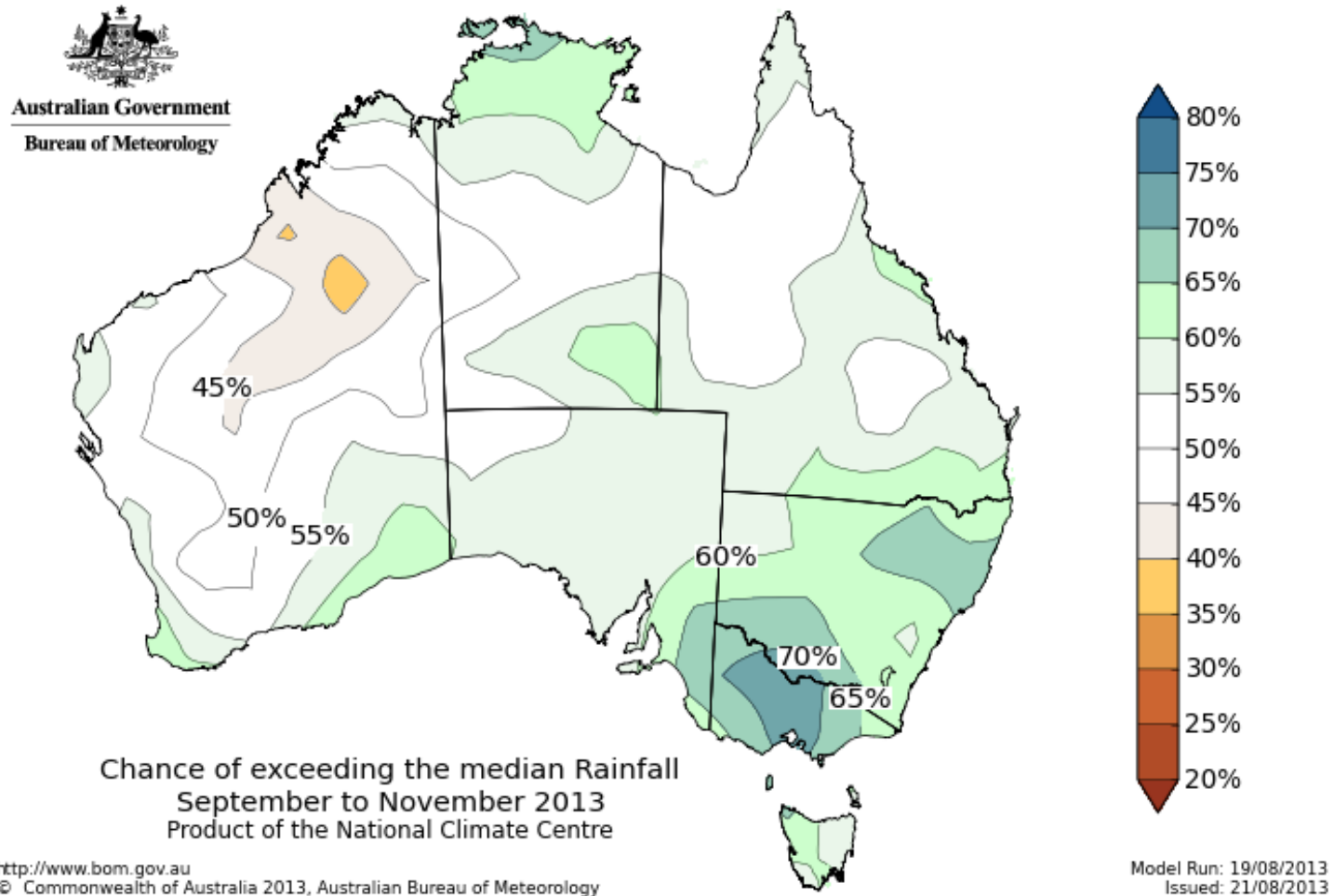
# MJO – 14/09/13

- The MJO is a band of low air pressure which originates off the east coast of central Africa.
- For information and updates on its current location try [www.bom.gov.au/climate/mjo/](http://www.bom.gov.au/climate/mjo/)



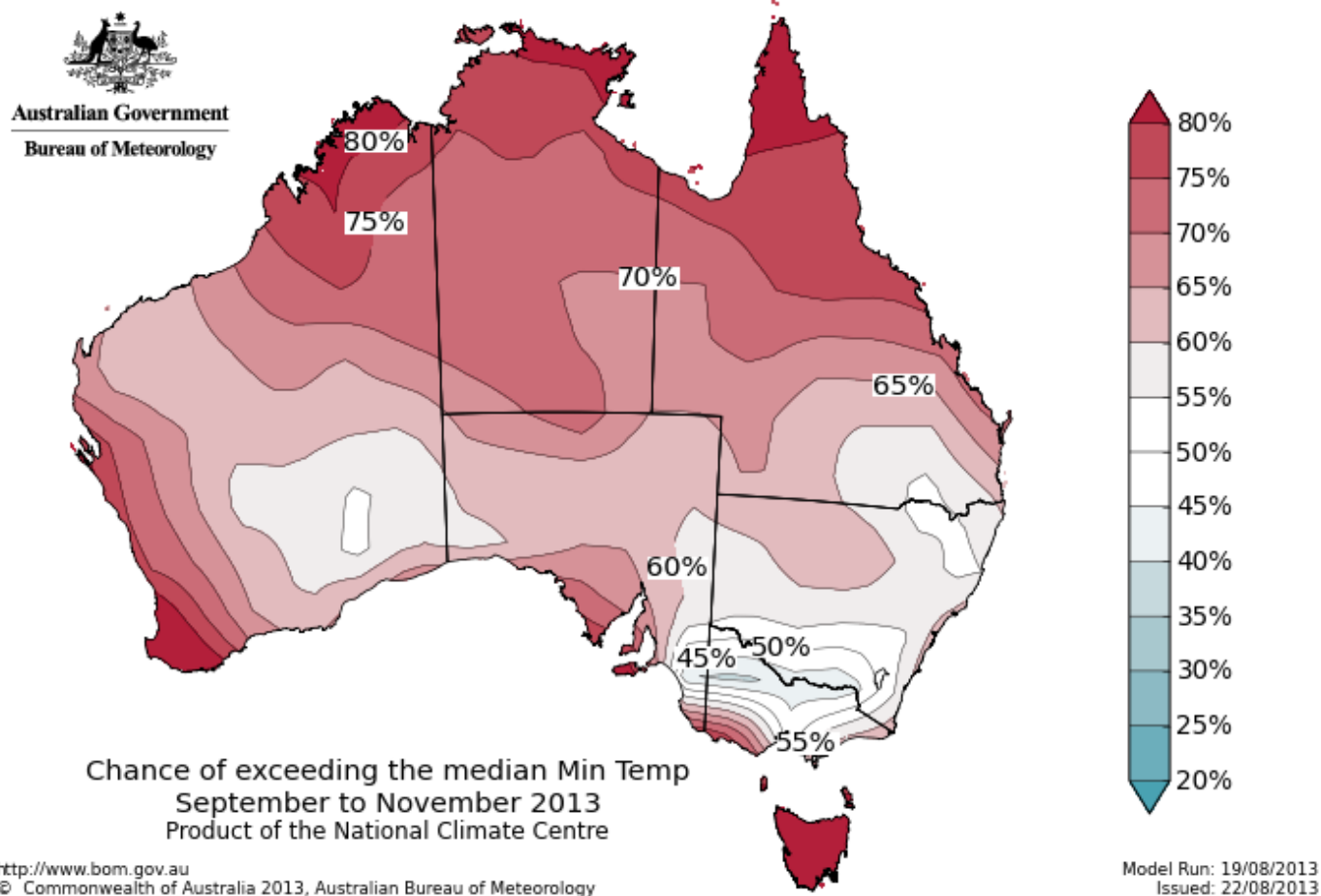
(C) Copyright Commonwealth of Australia 2013. Bureau of Meteorology

# POAMA – rainfall outlook



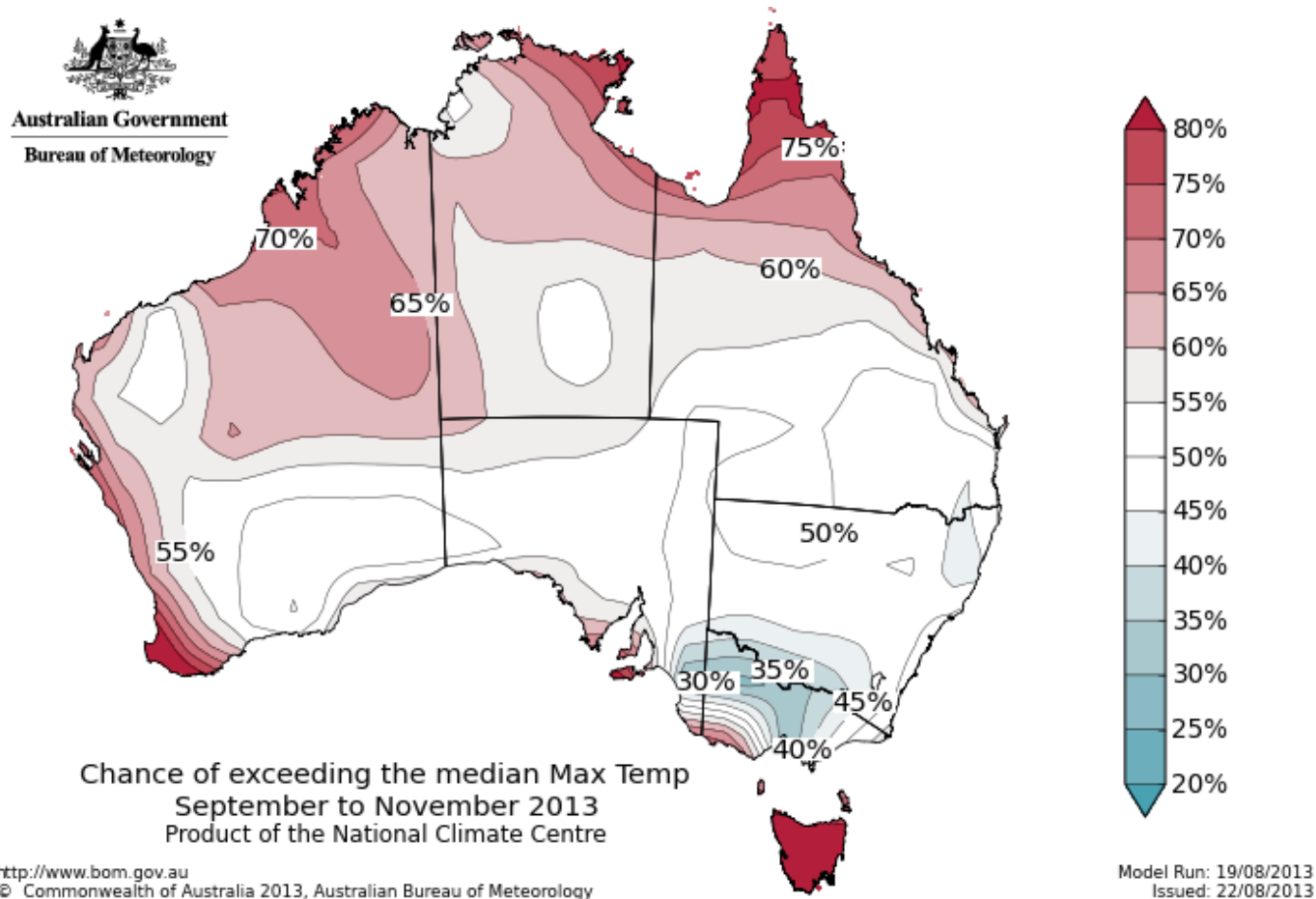
[http://www.bom.gov.au/climate/ahead/rain\\_ahead.shtml](http://www.bom.gov.au/climate/ahead/rain_ahead.shtml)

# POAMA - Min temp outlook



[http://www.bom.gov.au/climate/ahead/temps\\_ahead.shtml](http://www.bom.gov.au/climate/ahead/temps_ahead.shtml)

# POAMA - Max temp outlook



[http://www.bom.gov.au/climate/ahead/temps\\_ahead.shtml](http://www.bom.gov.au/climate/ahead/temps_ahead.shtml)



# Sources of information

- Climate information
  - [www.longpaddock.qld.gov.au](http://www.longpaddock.qld.gov.au)
  - [www.bom.gov.au/climate/enso](http://www.bom.gov.au/climate/enso)
  - [www.cpc.ncep.noaa.gov/](http://www.cpc.ncep.noaa.gov/)
- How farmers have used climate information
  - [www.climatekelpie.com.au/ask-a-farmer/climate-champion-program](http://www.climatekelpie.com.au/ask-a-farmer/climate-champion-program)
- Climate tools
  - Rainman Streamflow, HowWet?, Whopper Cropper [www.daff.qld.gov.au](http://www.daff.qld.gov.au)
  - MLA Rainfall to pasture growth outlook tool [www.mla.com.au/News-and-resources/Tools-and-calculators/Rainfall-to-pasture-growth-outlook-tool](http://www.mla.com.au/News-and-resources/Tools-and-calculators/Rainfall-to-pasture-growth-outlook-tool)
- Other drivers of our climate and weather
  - [www.bom.gov.au/watl/about/index.shtml](http://www.bom.gov.au/watl/about/index.shtml)

# Using climate information

- So how do I use this information?
  - Be sure of your source of information
  - Identify when key climate transition periods are
  - Identify when information has skill
  - Relate these to your production system
    - key decision making periods
    - seasonal conditions to date
    - period of climate risk approaching
    - potential cost or benefit of making a decision

# Decision making example

- Darling Downs winter stocking rate decision
  - Rainfall recorded during summer
  - Forage/pasture availability
  - Soil moisture profile level
  - Seasonal outlook
    - Major risks (ENSO)
    - Rainfall
    - Temperature
  - Other opportunities/risks (markets, seasonal conditions other areas etc)



# Thank you.

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