Climate Risk Management

With Melissa Rebbeck

Climate & Agricultural Support PTY LTD

We specialise in training for rural people and communities

CERTIFICATE IV

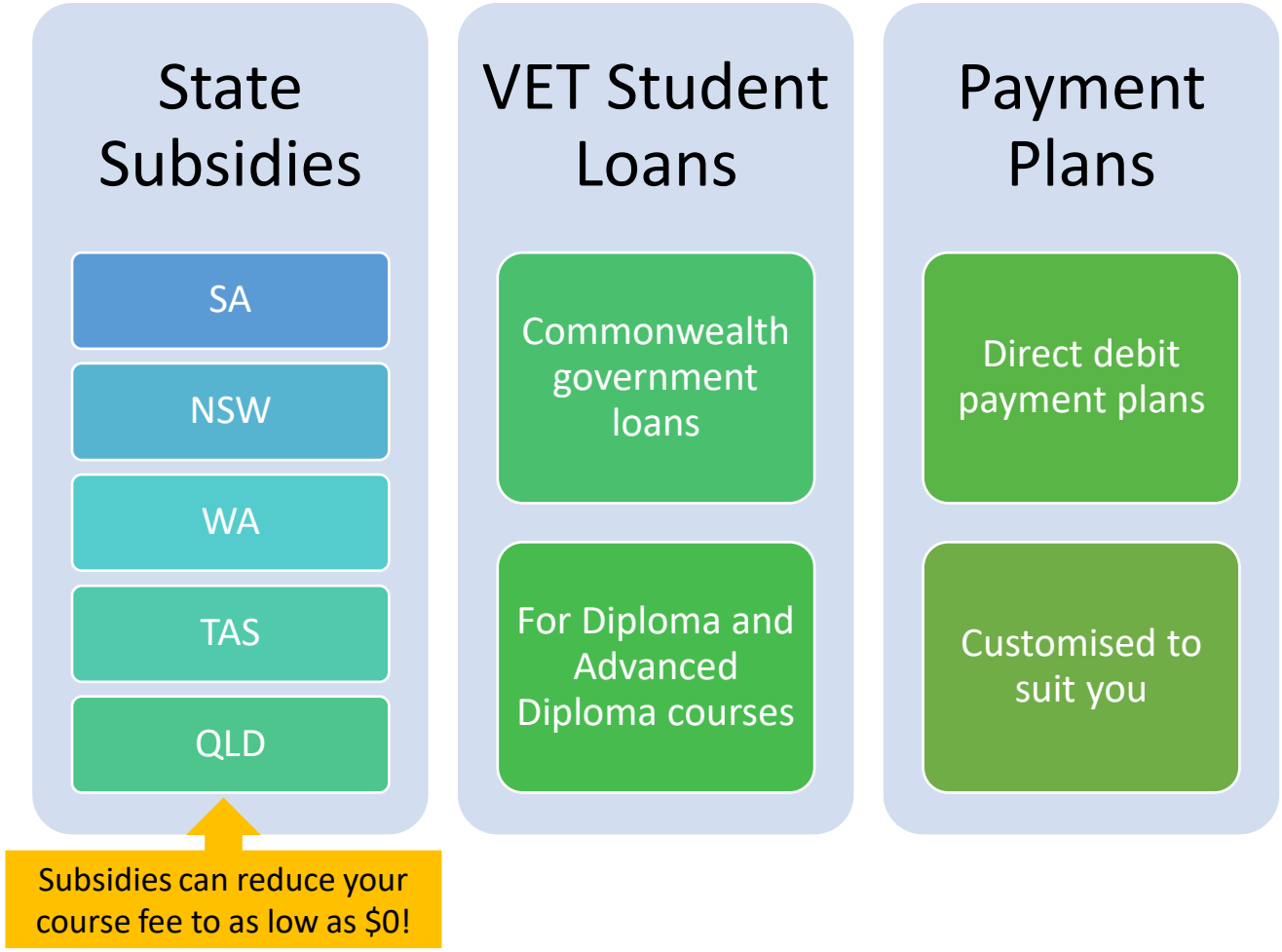
DIPLOMA

ADVANCED DIPLOMA

- Agriculture
- Agronomy
- Agribusiness
- Horticulture
- Community Coordination and Facilitation
- Chemical Card Plus

RuralBiz Training

Funding & payment options to make studying easier

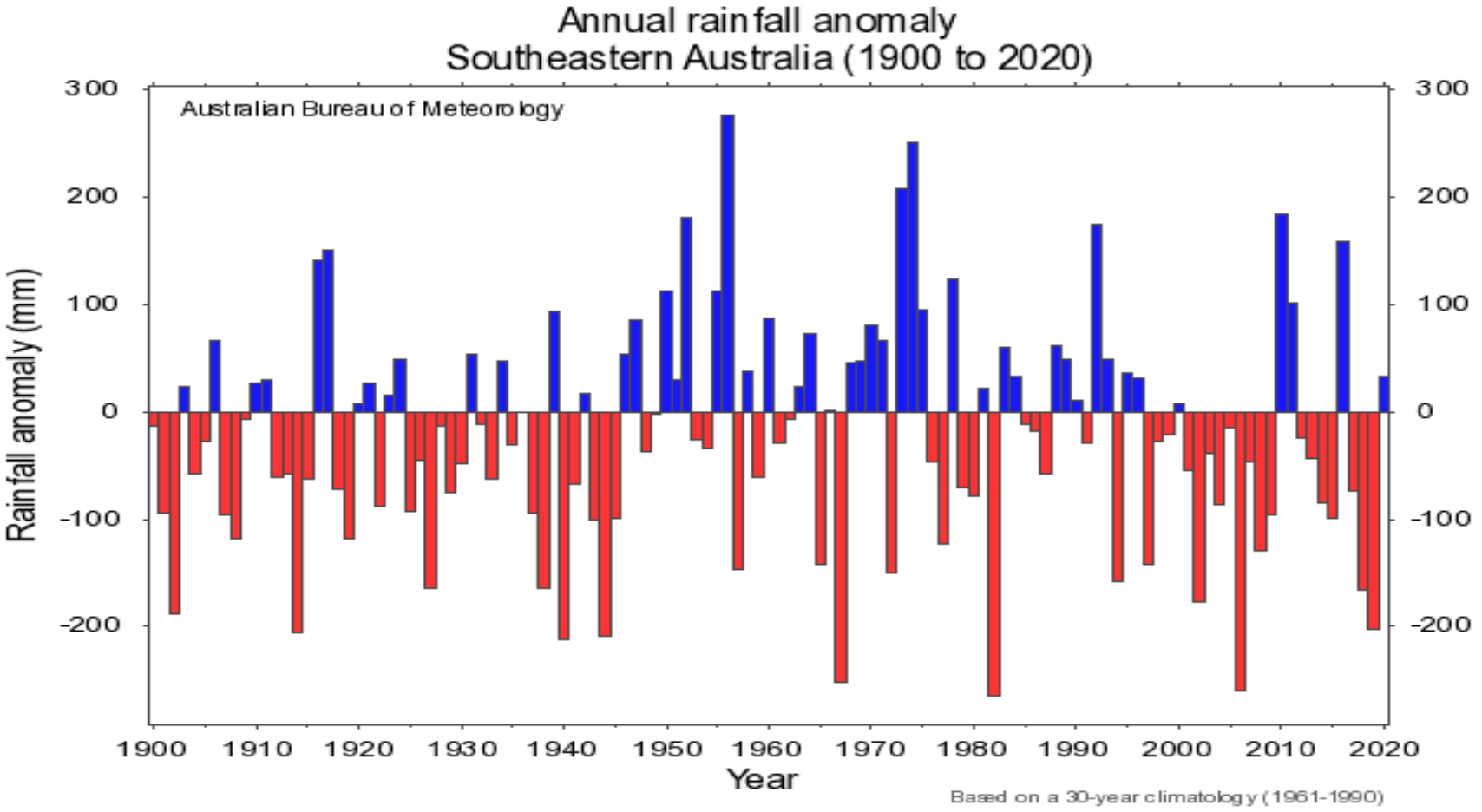


RuralBiz Training

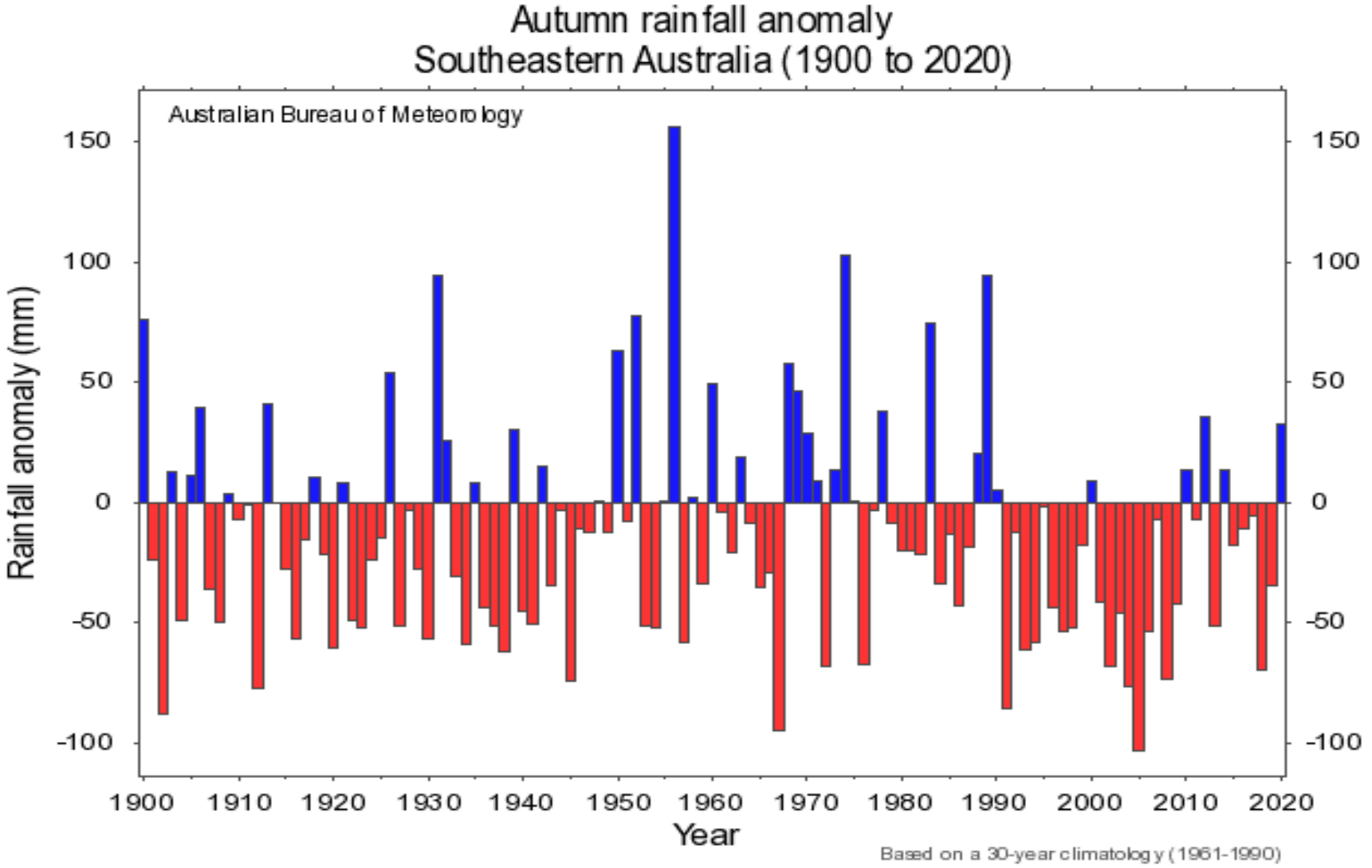
What we will cover

- The various climate and weather risks that affect a farm system.
- Weather and climate drivers and interpretation and accuracy of outlooks for your region
- The actual risks of an event occurring using tools (e.g. Australian Rainman)
- How to find this information on internet including weather and climate drivers – see links throughout presentation
- Discuss and prepare for these risks in a farming system

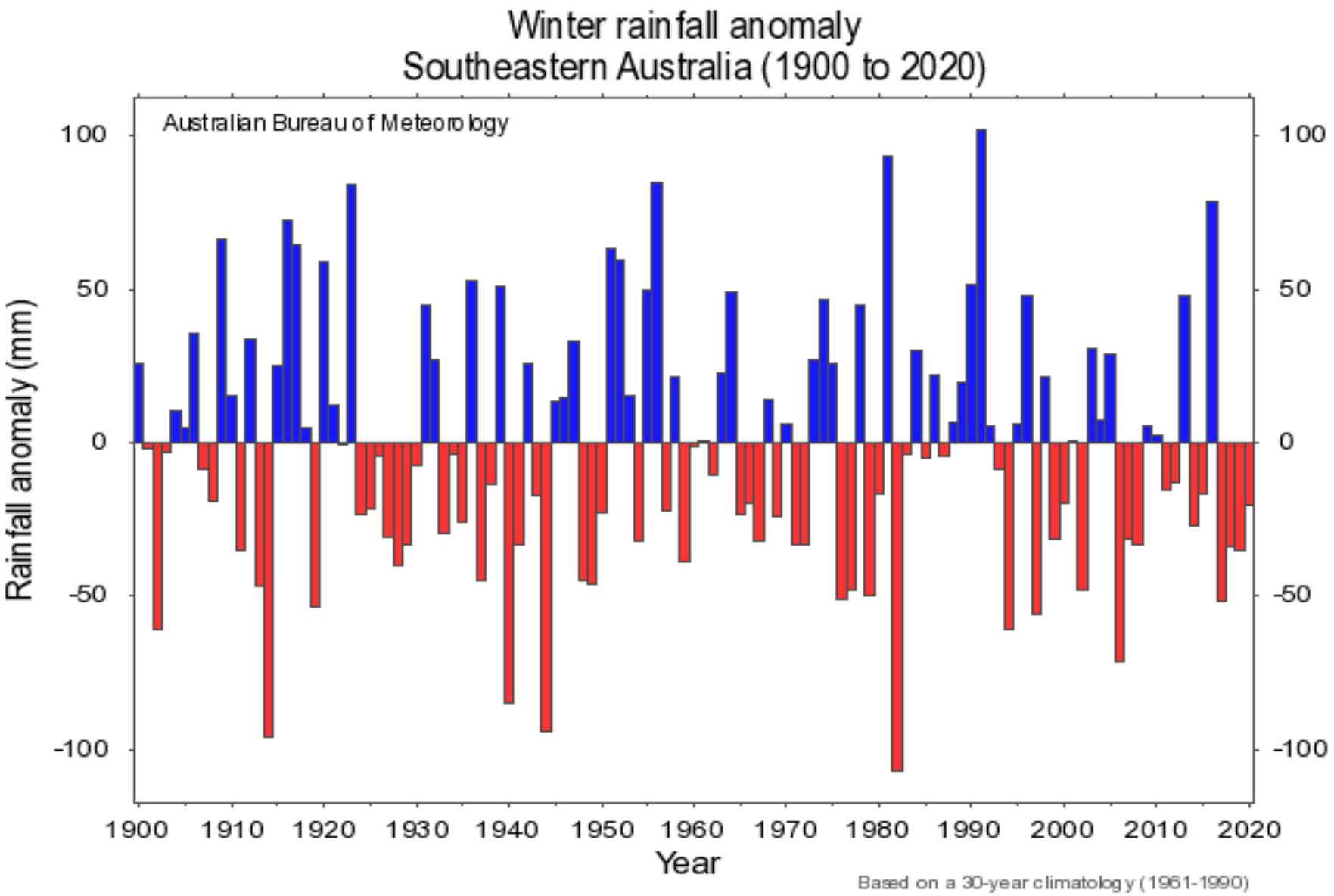
Annual rainfall trend south-eastern Australia



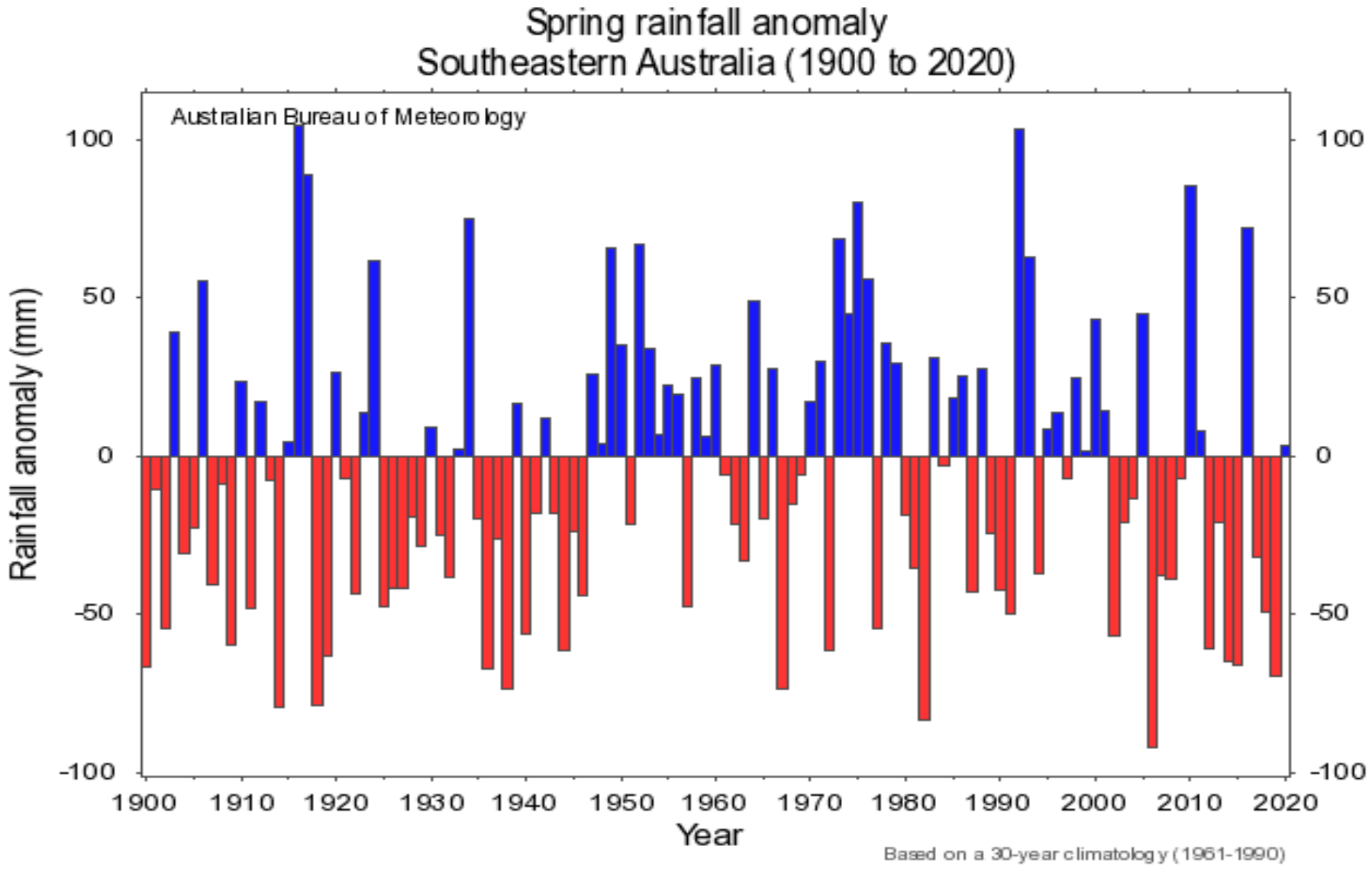
Autumn rainfall variations southeastern Australia



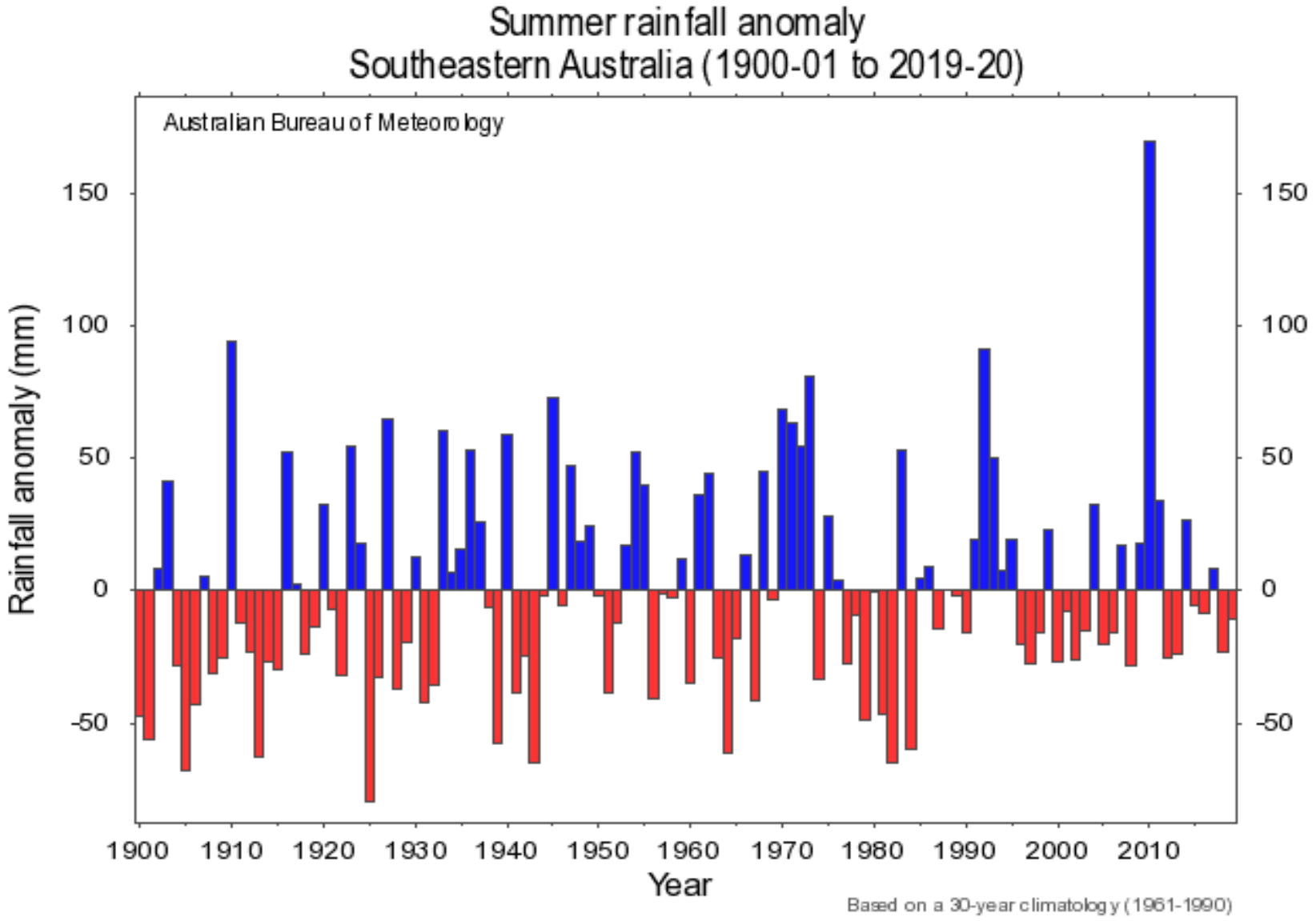
Winter rainfall variation South-eastern Australia



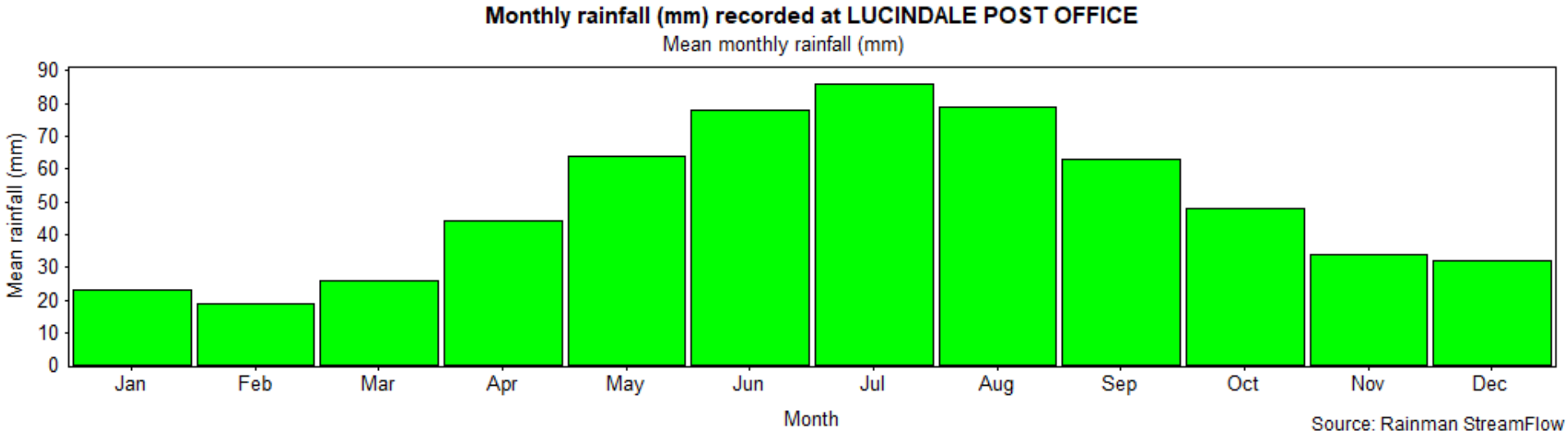
Spring rainfall variation South-eastern Australia



Summer rainfall variation South-eastern Australia



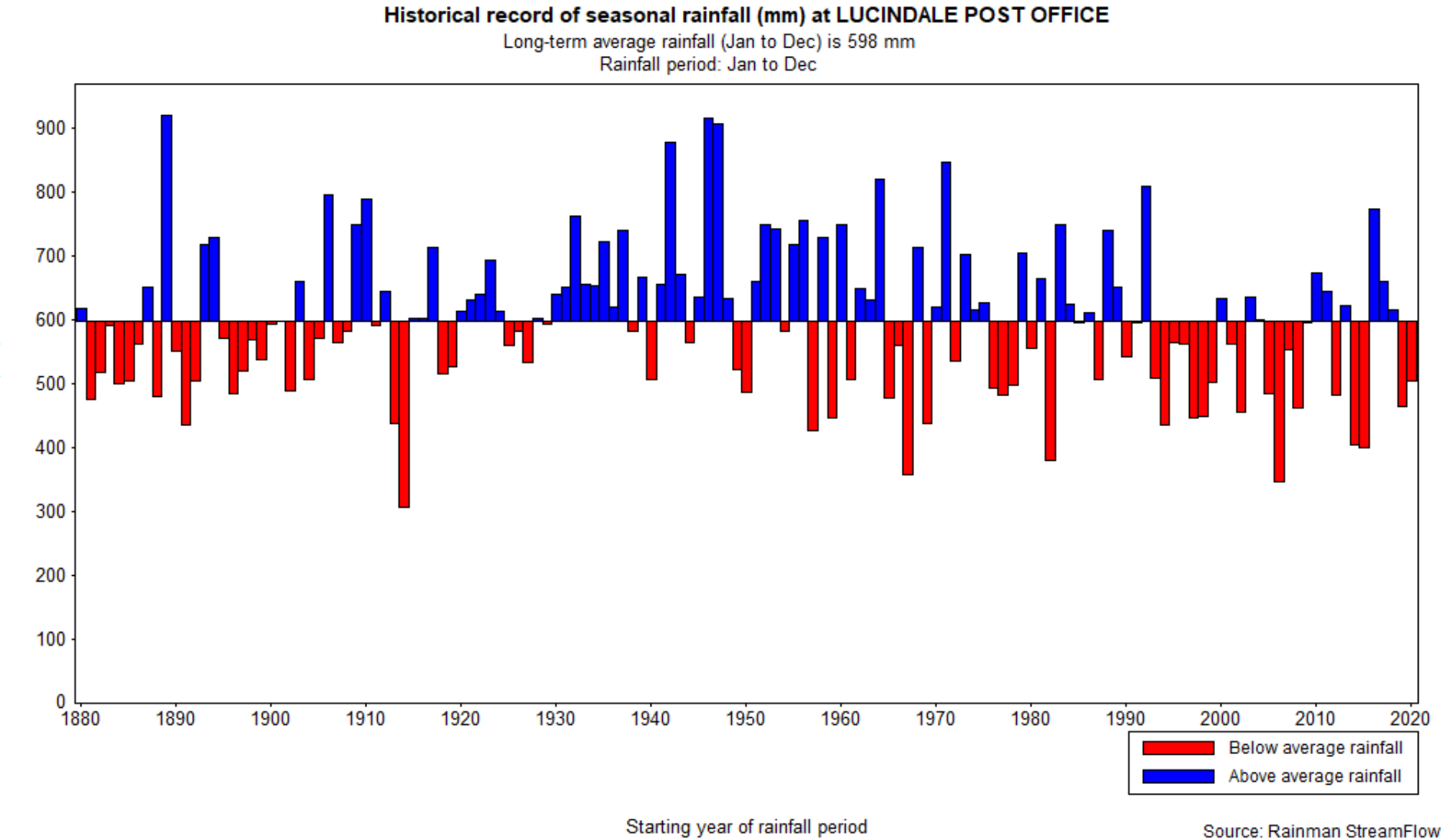
Monthly Rainfall at Lucindale



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Mean	23	19	26	44	64	78	86	79	63	48	34	32	598
Median	17	11	19	37	61	75	82	75	60	43	29	27	596
Standard deviation	21	22	27	30	33	37	36	35	29	27	22	27	118
Highest on record	114	117	151	151	162	180	206	176	188	126	100	176	920
Lowest on record	0	0	0	0	6	11	24	9	12	1	1	0	305
Mean raindays	5	4	6	10	14	15	17	17	14	11	8	7	128
No. of years	142	141	141	141	141	141	141	141	141	141	141	141	141

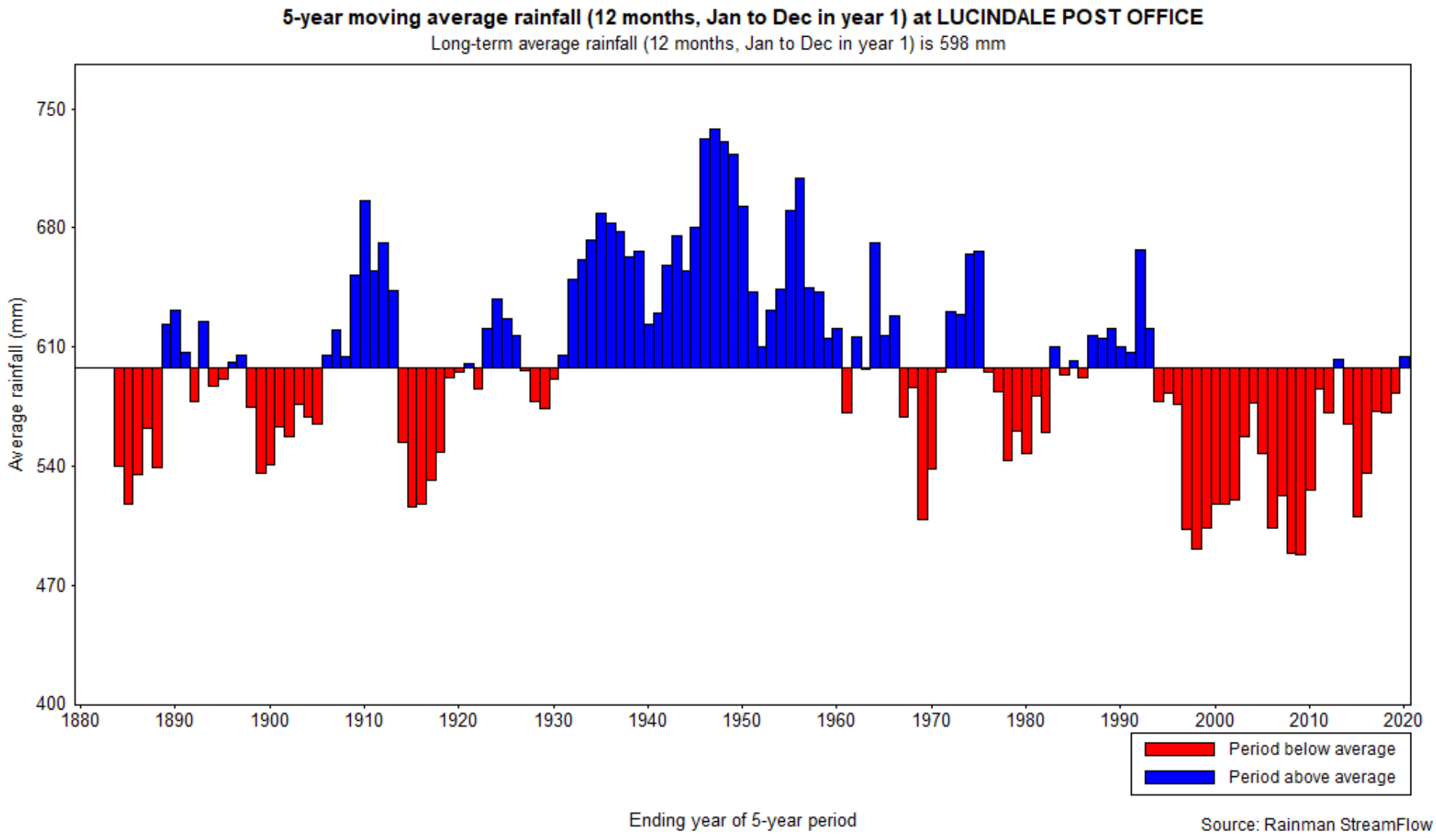
Annual Average Rainfall – Lucindale

Rainman StreamFlow analysis tool | Department of Agriculture and Fisheries, Queensland (daf.qld.gov.au)



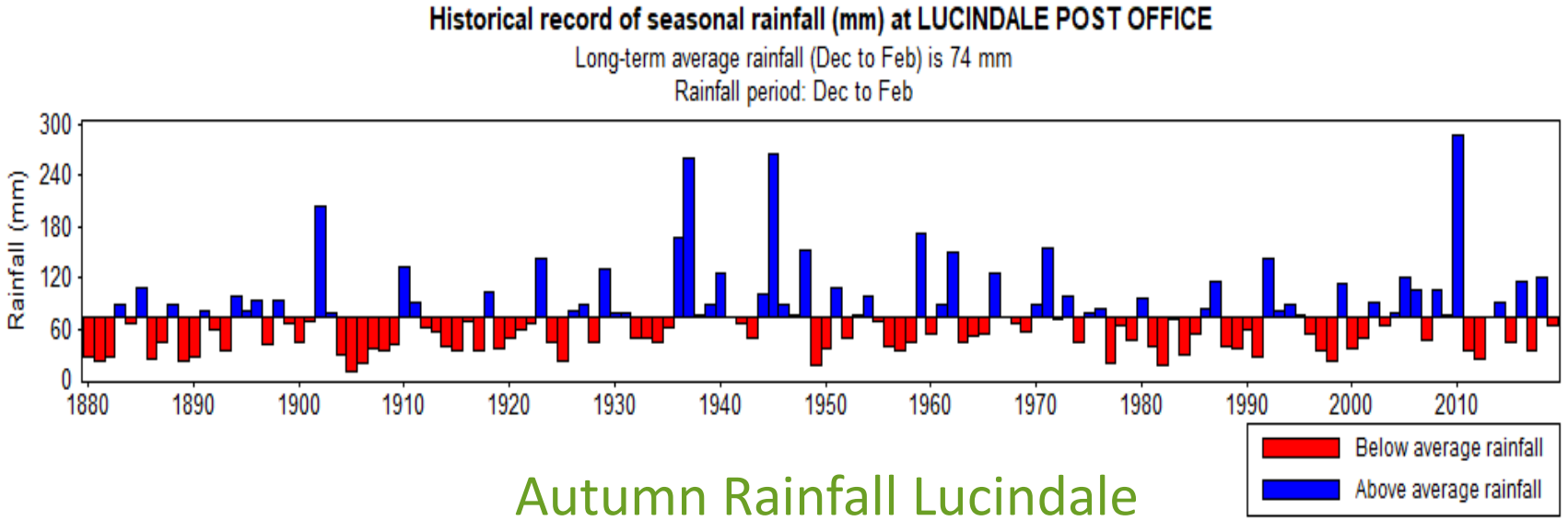
Source: Rainman StreamFlow

5 - Year Moving Average Lucindale

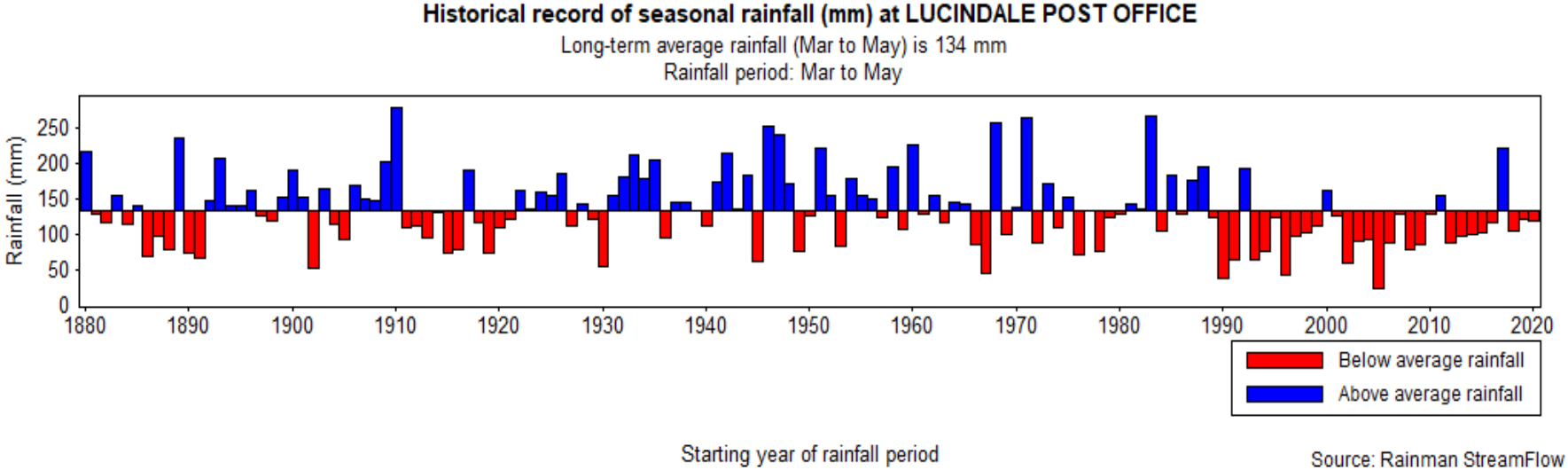


Source: Rainman StreamFlow

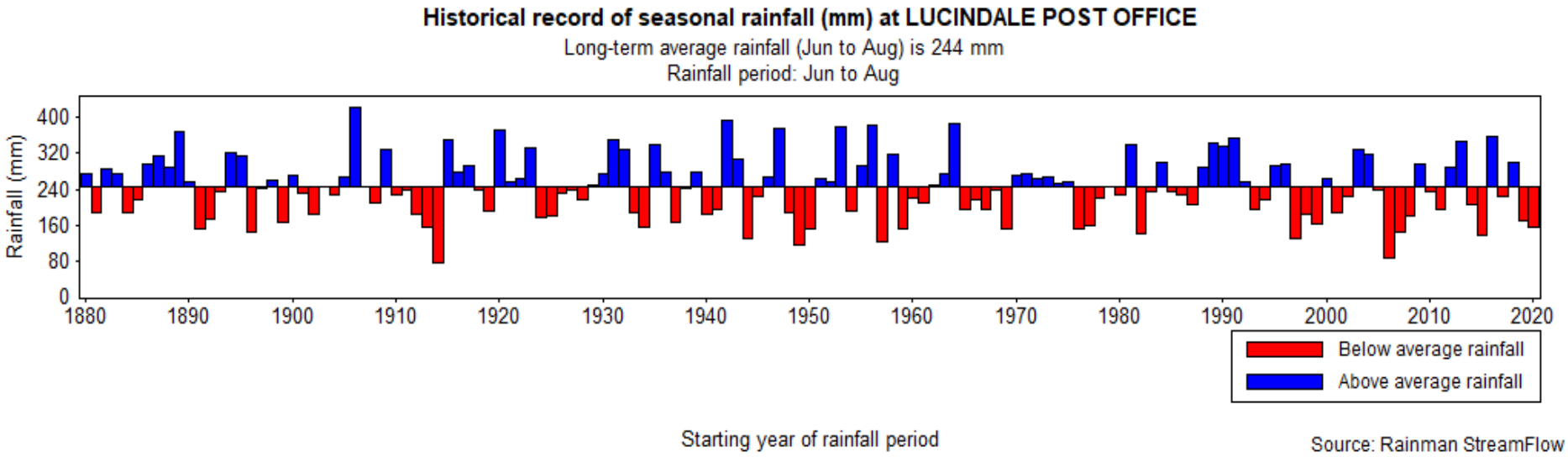
Summer Rainfall Lucindale



Autumn Rainfall Lucindale

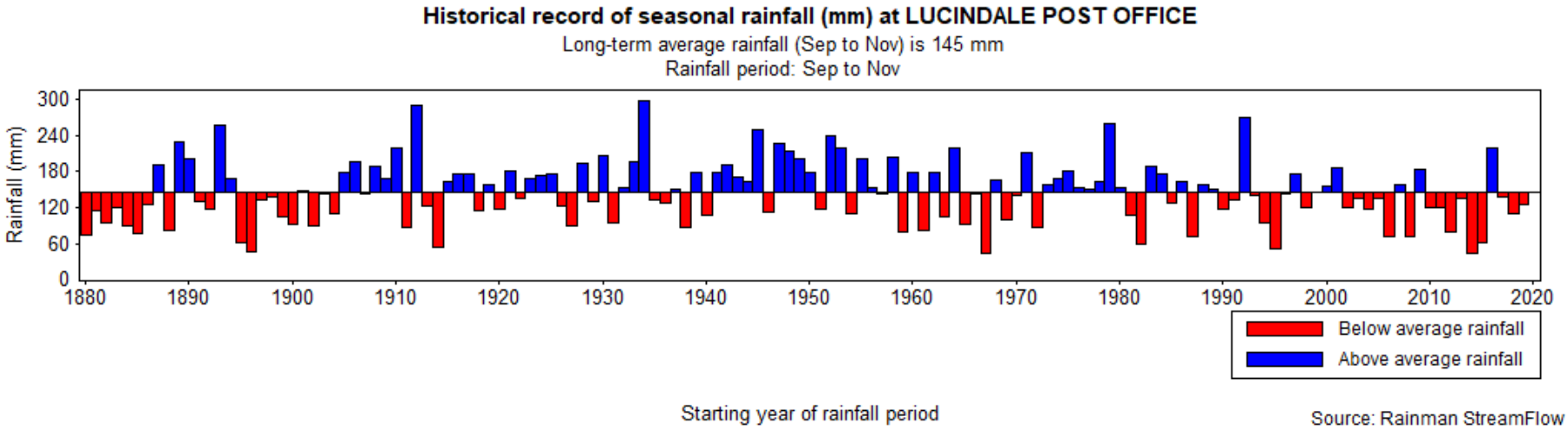


Winter Rainfall Lucindale



Source: Rainman StreamFlow

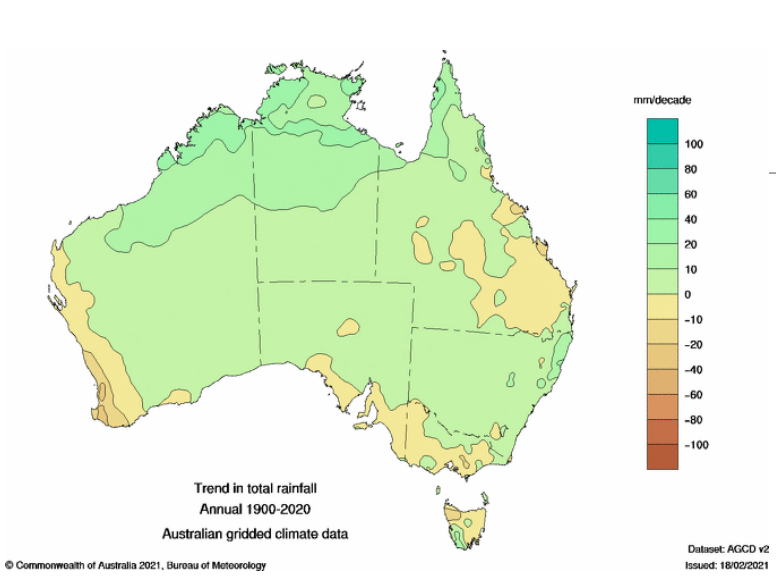
Spring Rainfall Lucindale



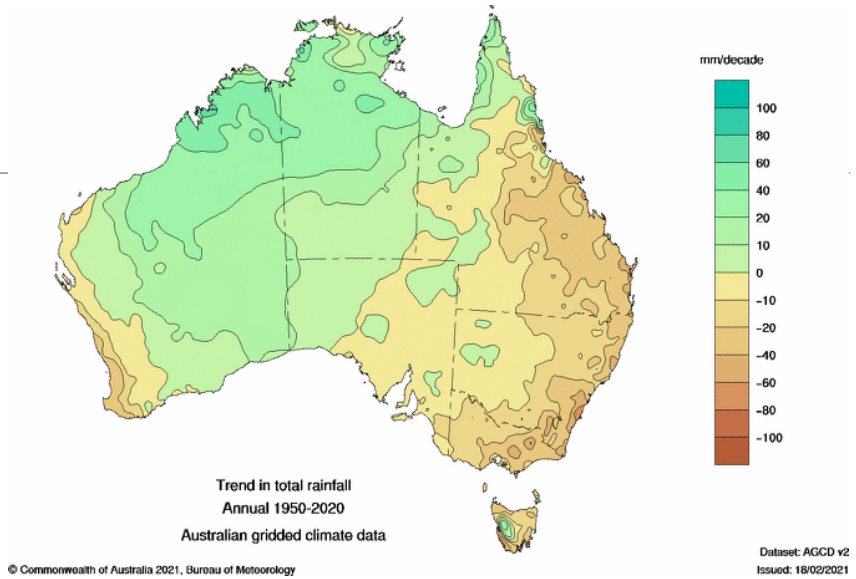
Source: Rainman StreamFlow

Australian Rainfall Trends

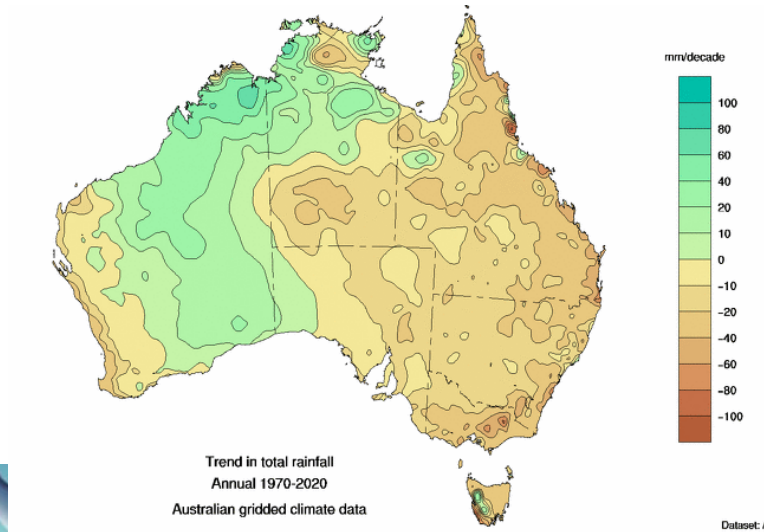
1900-Present



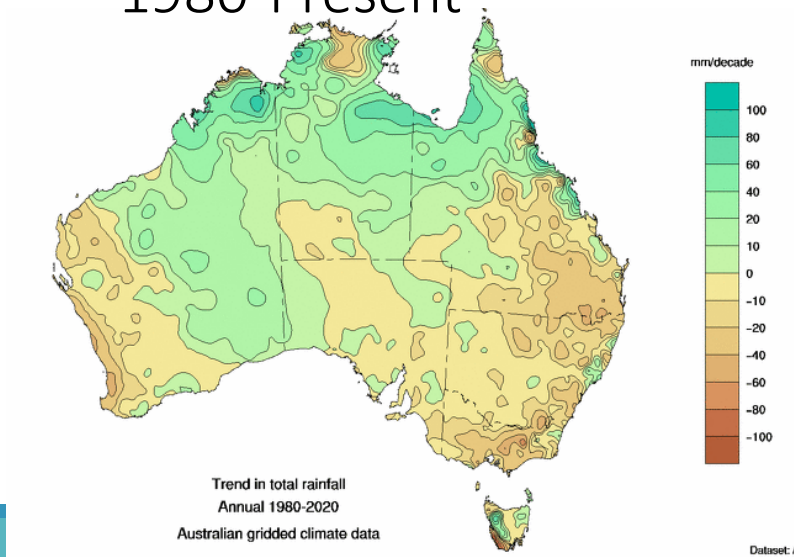
1950-Present



1970-Present

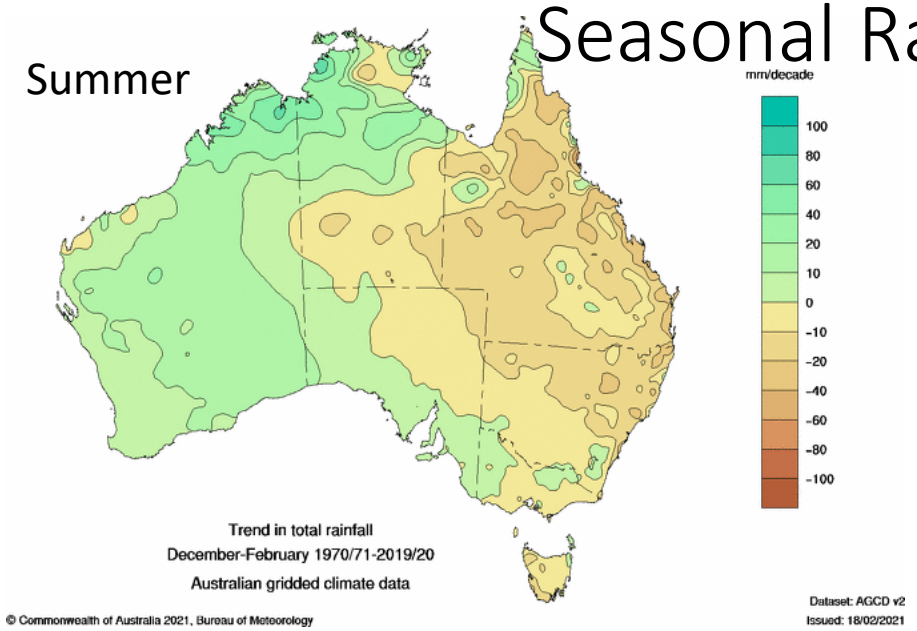


1980-Present

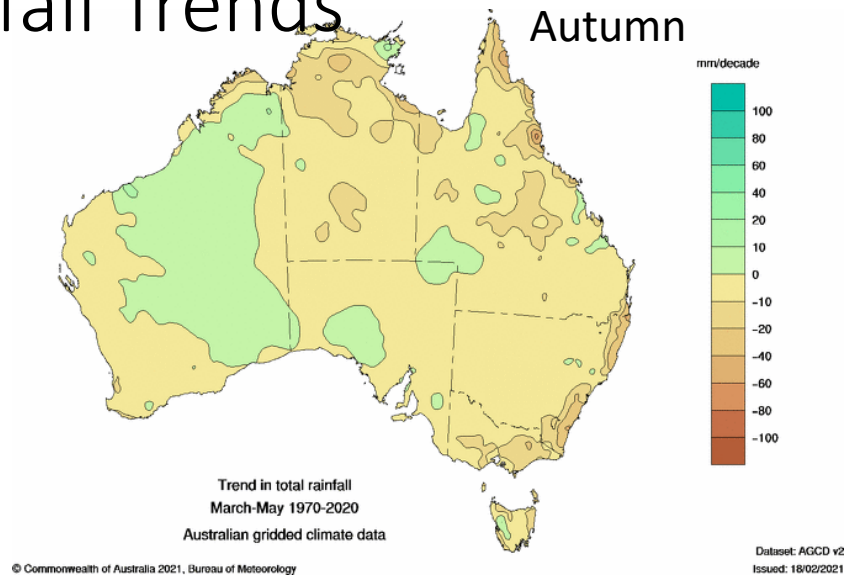


Seasonal Rainfall Trends

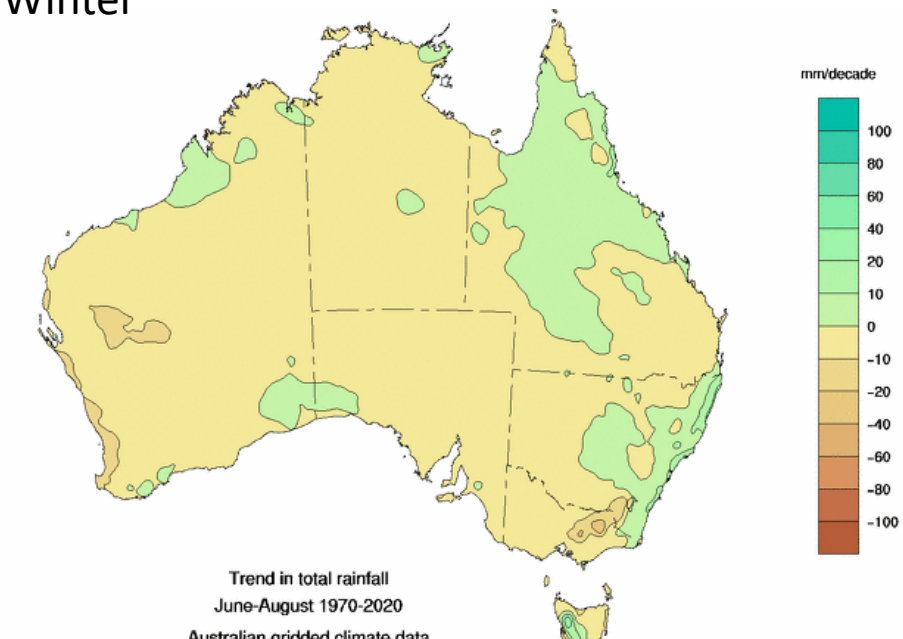
Summer



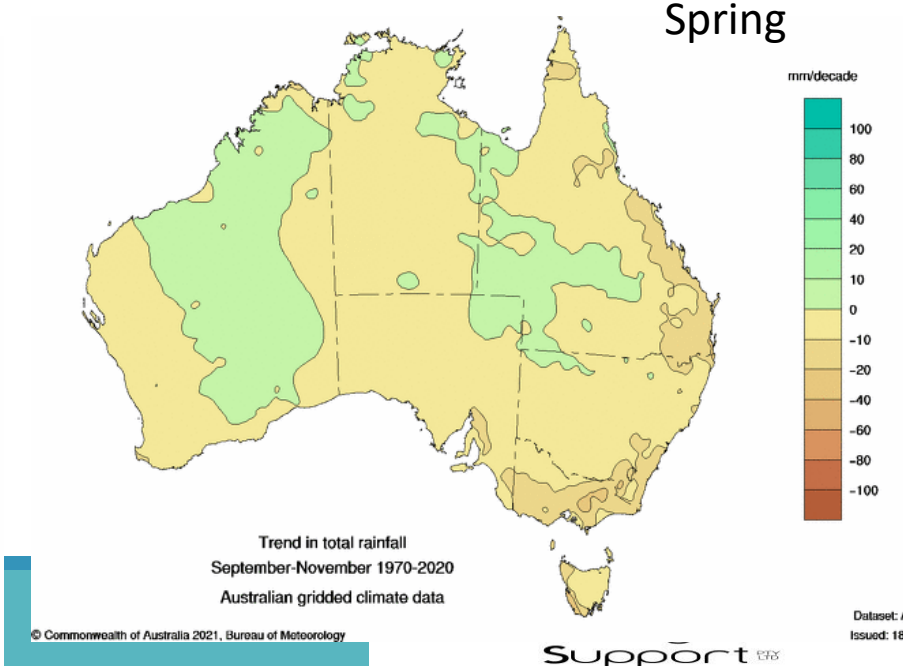
Autumn



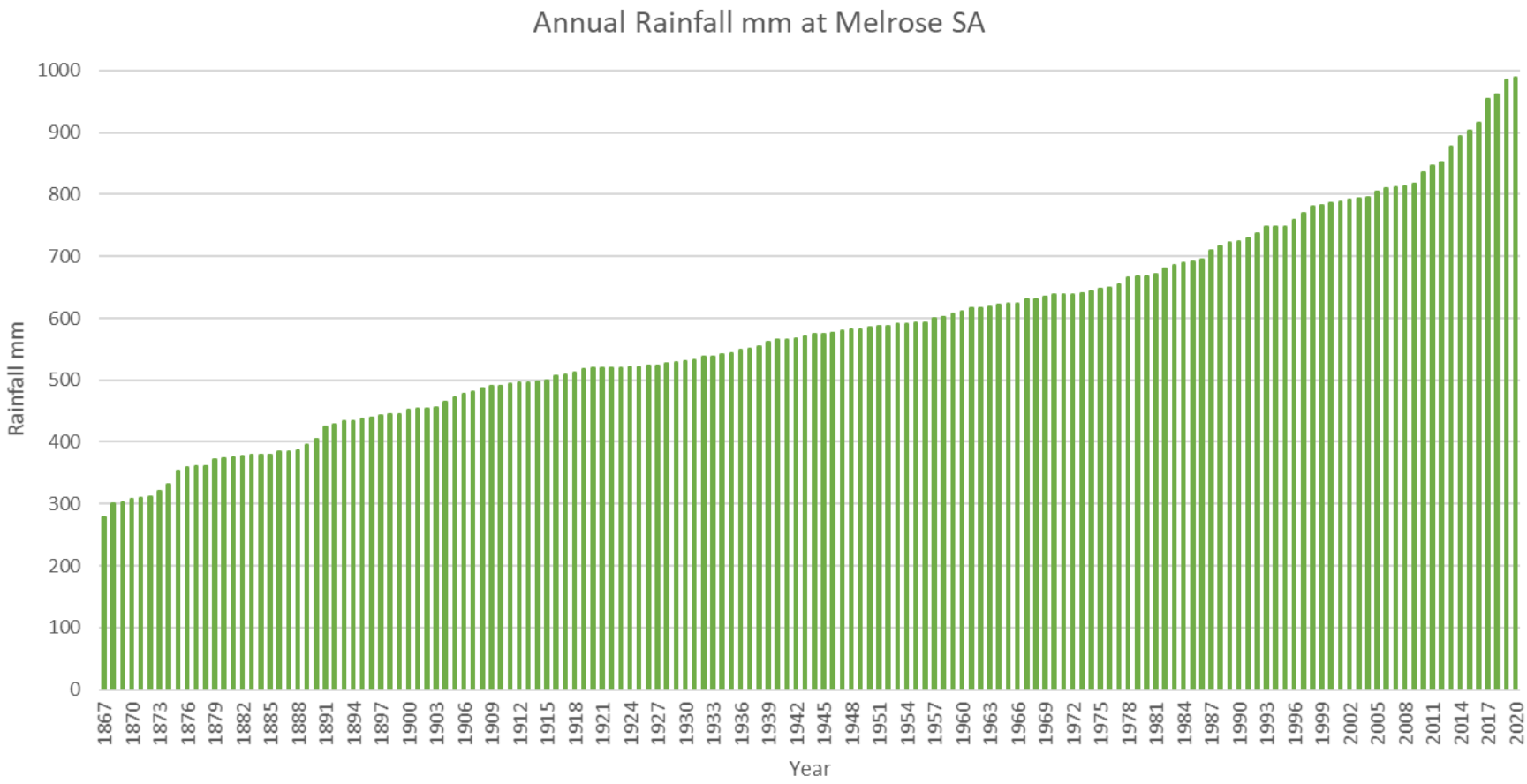
Winter



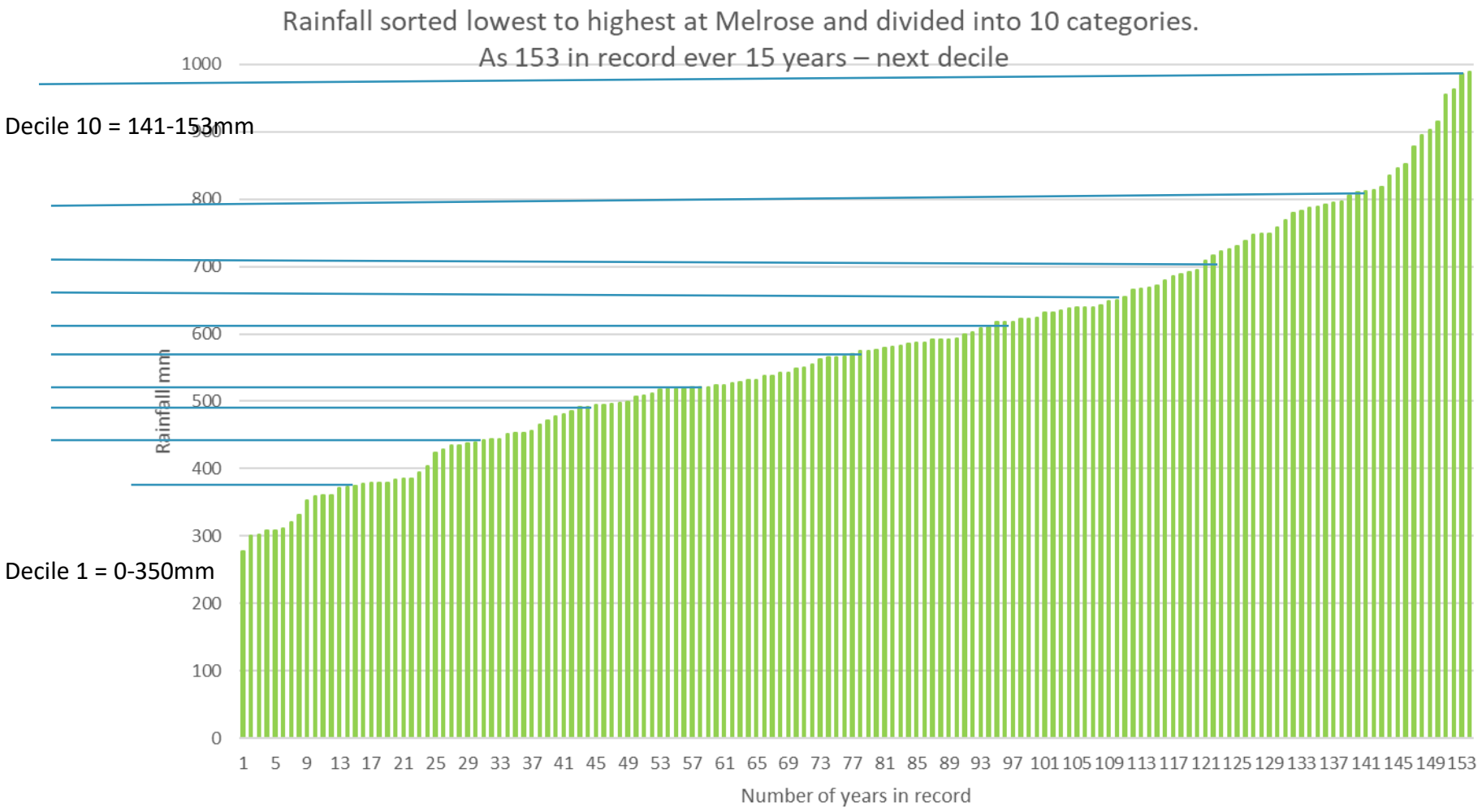
Spring



Calculating rainfall deciles



Example of calculating rainfall deciles



Decile 10 = 141-153mm

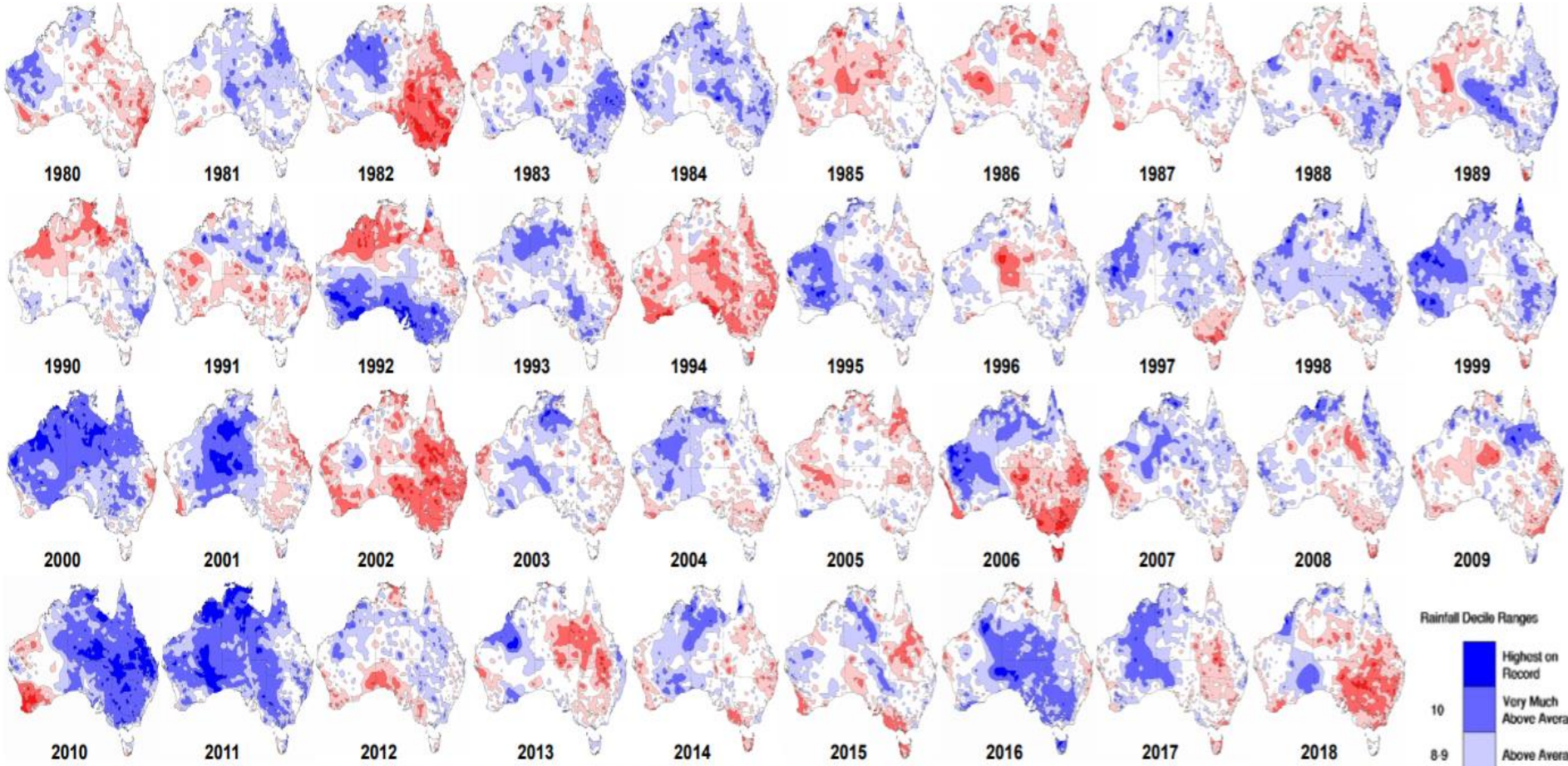
Decile 1 = 0-350mm

Monthly Probabilities of Rainfall

Probabilities of monthly rainfall recorded at MELROSE POST OFFICE
Amounts of rain (mm) received or exceeded in 100%, 90% ... 0% of years.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Lowest on record	0	0	0	0	3	0	4	3	5	1	0	0	278
90% yrs at least	1	0	1	4	14	14	26	26	17	9	5	4	378
80% yrs at least	3	2	3	8	24	38	38	37	28	19	10	8	443
70% yrs at least	7	4	6	15	32	49	45	53	35	27	18	12	496
60% yrs at least	12	8	9	24	41	58	59	60	46	34	23	16	527
median, 50% yrs	18	12	14	32	51	64	68	67	54	42	30	22	572
40% yrs at least	22	21	19	41	60	78	77	77	61	50	37	30	607
30% yrs at least	33	29	28	49	75	96	91	89	77	64	44	36	644
20% yrs at least	46	41	36	63	96	114	106	104	92	91	61	43	723
10% yrs at least	62	62	65	91	132	138	127	116	129	105	79	52	802
Highest on record	193	206	217	167	264	242	241	175	207	223	136	150	988
Mean	28	25	25	38	63	75	74	71	64	52	37	29	582
Standard deviation	34	34	33	33	50	47	43	38	43	40	30	27	160

Australian Rainfall Decile Maps



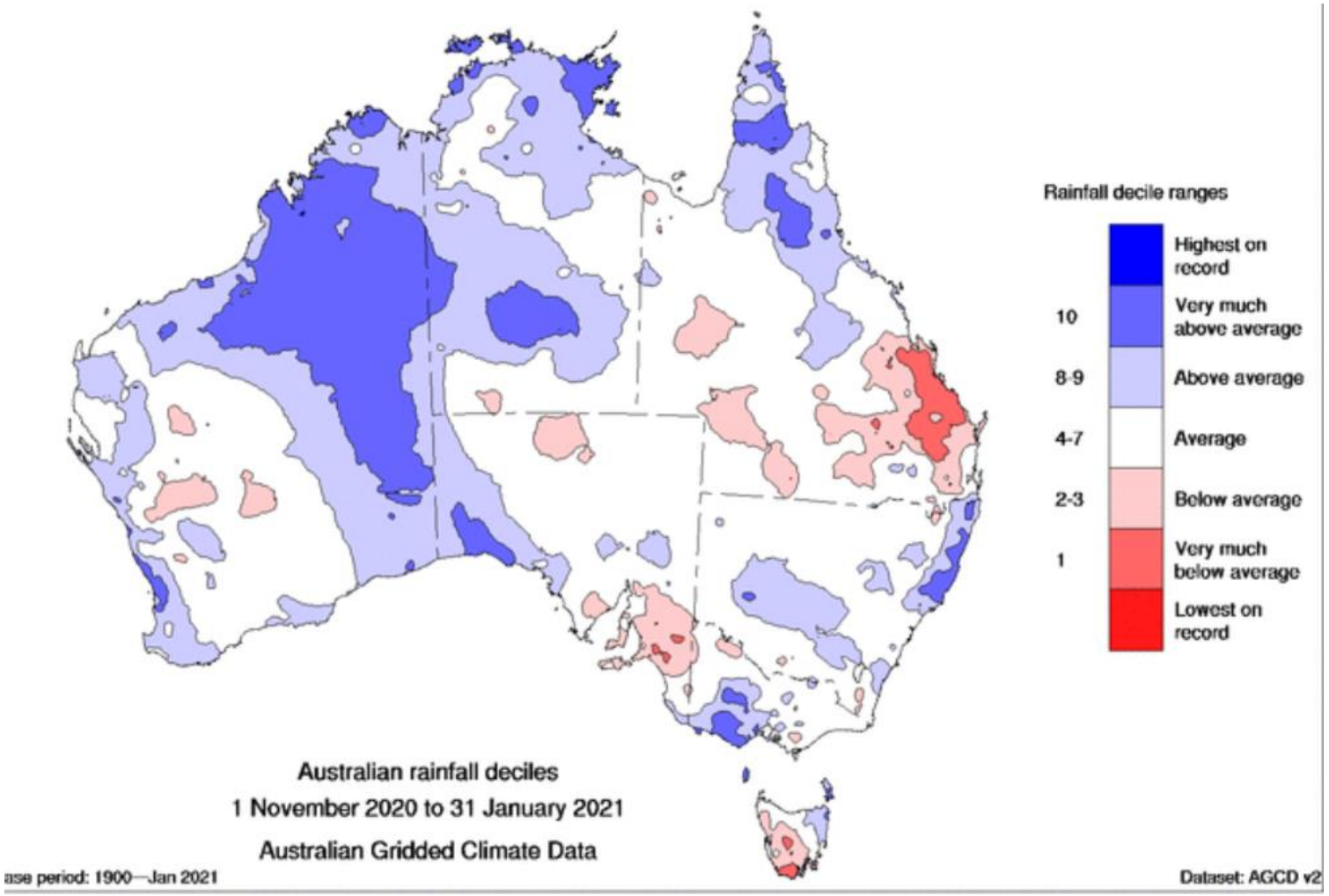
Data provided by the Bureau of Meteorology. Maps show the annual (1 January to 31 December) rainfall deciles.

The grids show the rainfall values across Australia in the form of two-dimensional array data.

The analyses (grids) are computer generated using a sophisticated analysis technique. It incorporates an optimised Barnes successive correction technique that applies a weighted averaging process to the station data. Topographical information is included by the use of rainfall ratio (actual rainfall divided by monthly average) in the analysis process.
On the maps each grid-point represents an approximately square area with sides of about five kilometres (0.05 degrees). The size of the grids is limited by the data density across Australia.
This grid-point analysis technique provides an objective average for each grid square and enables useful estimates in data-sparse areas such as central Australia. However, in data-rich areas such as southeast Australia or in regions with strong gradients, 'data smoothing' will occur resulting in grid-point values that may differ slightly from the exact rainfall amount measured at the contributing stations.

The observational (station) data on which the analyses were based have an associated accuracy of the order of 0.01 degrees (approximately 1km) or better.

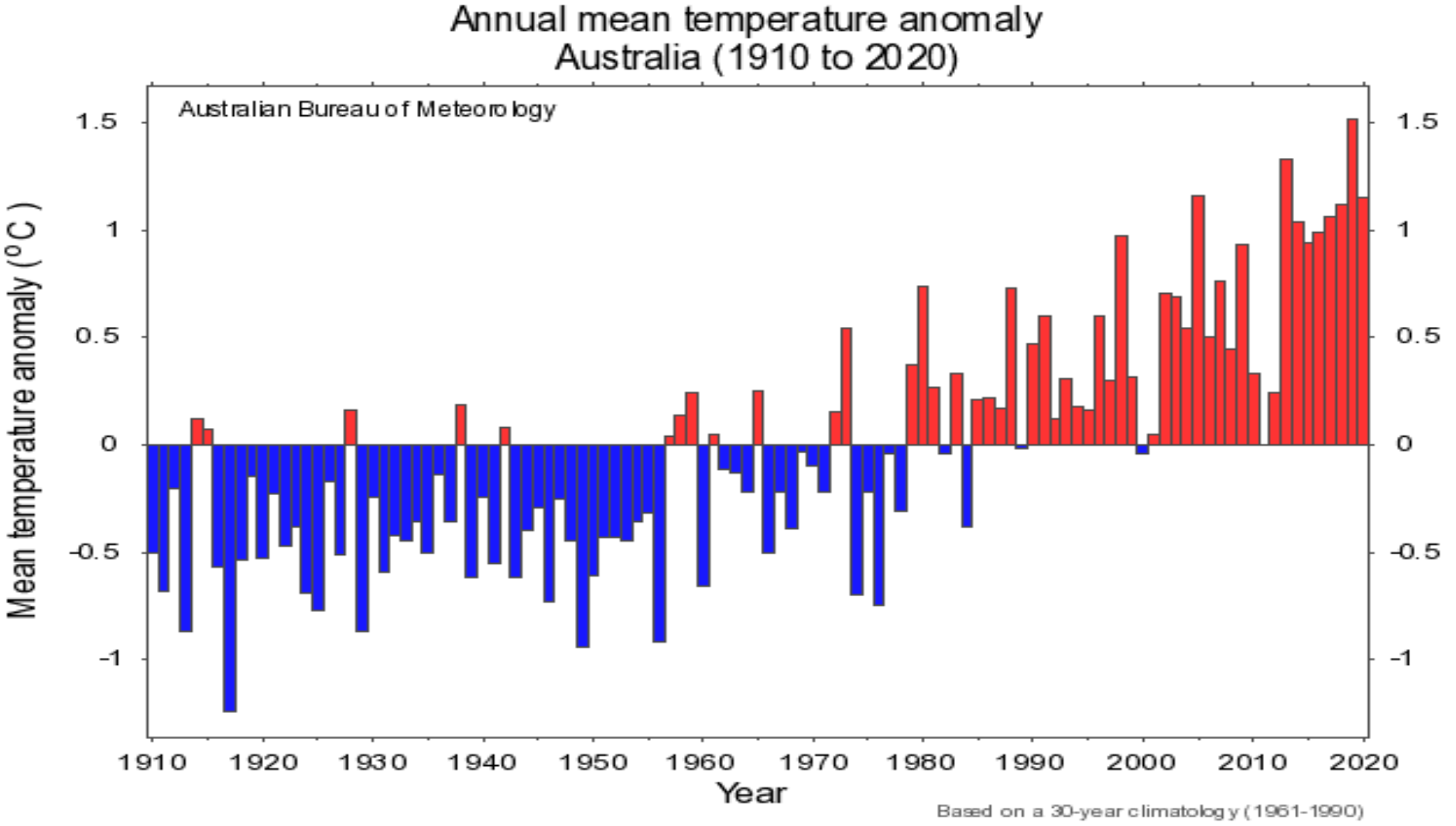
Recent and historical rainfall maps, Australian Bureau of Meteorology (bom.gov.au)



Rainfall variability in Millicent SA

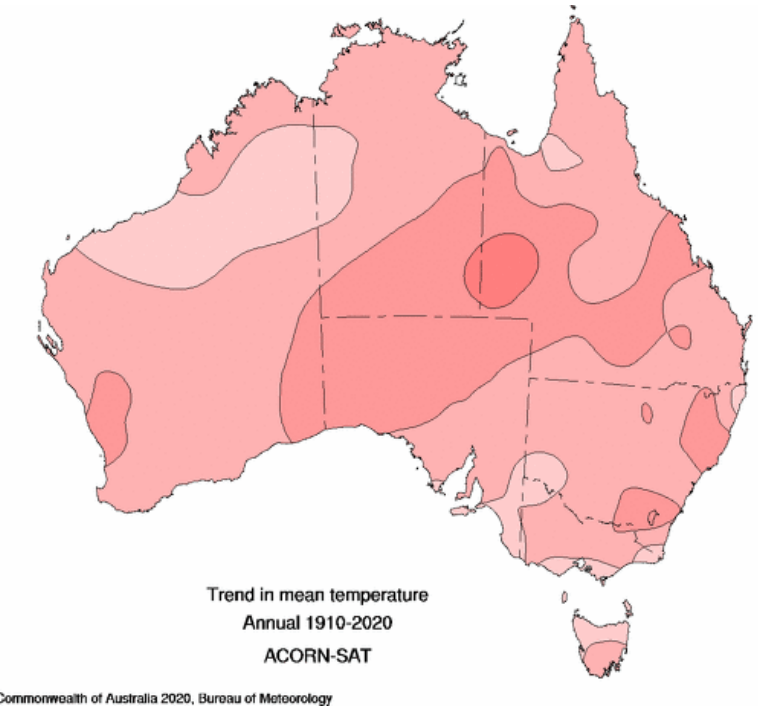
Lowest			Middle			Highest
360-442	443-524	525-606	607-688	689-770	771-852	853-934
360	444		635	694	772	964
	480		647	708	781	
			657	733	791	
			688	748	795	
				763	824	
					846	
					850	
5%	10%		20%	25%	35%	5%

Temperature Trends

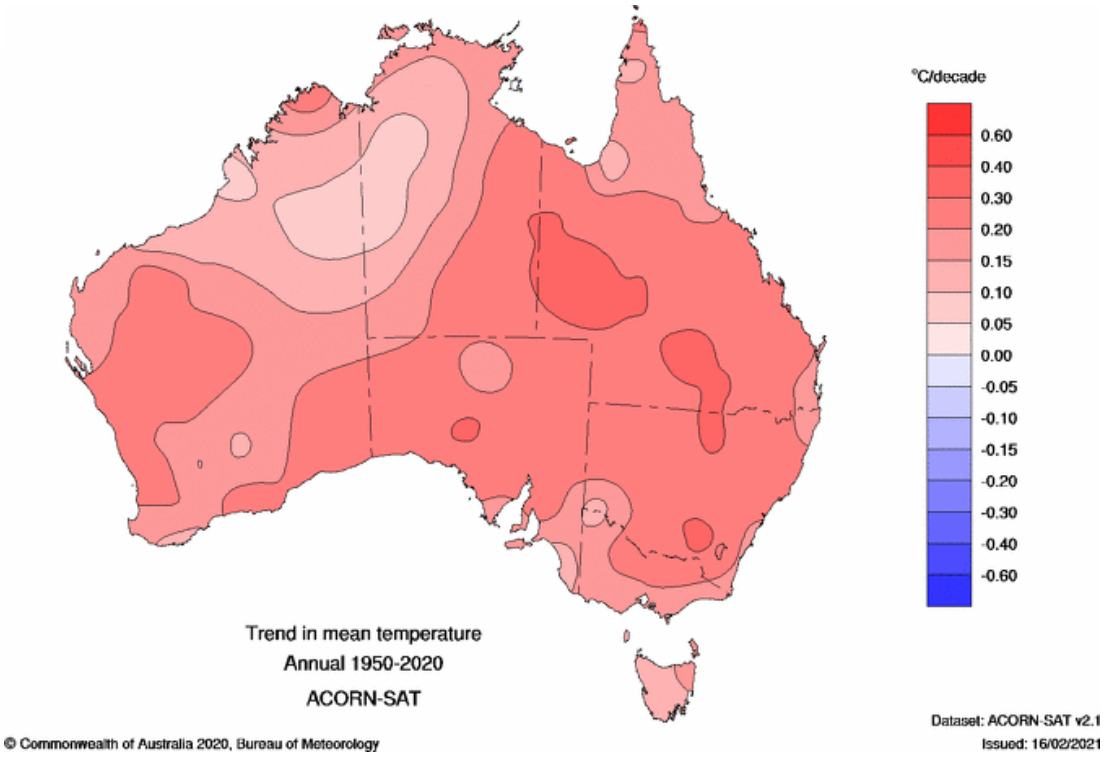


Annual Temperature Trends

1910-2020

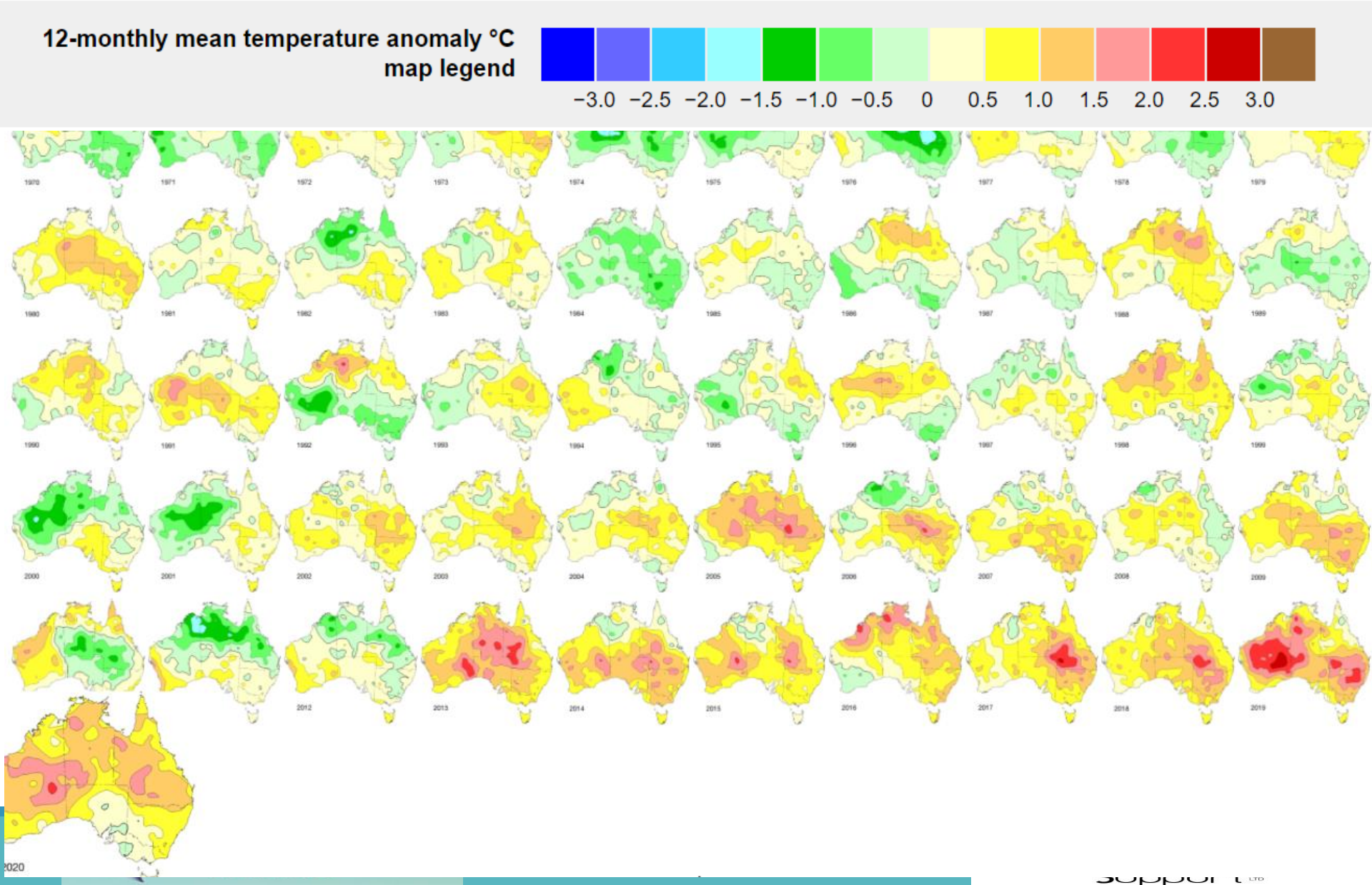


1950-2020



Warmed by 0.3degrees/decade since 1950

Temperature Trends Poster



What we will cover

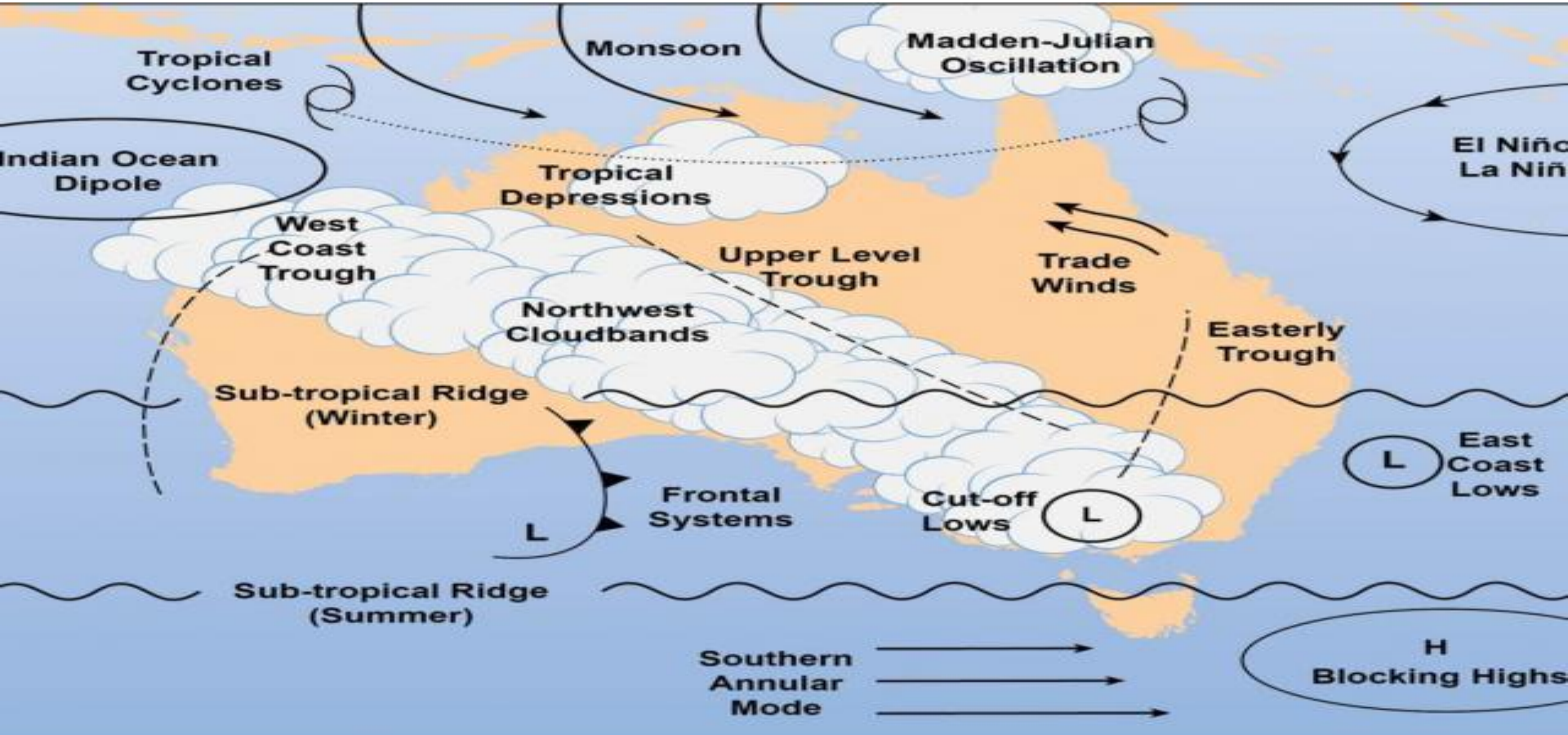
- The various climate and weather risks that affect a farm system.
- Weather and climate drivers and interpretation and accuracy of outlooks for your region
- The actual risks of an event occurring using tools (e.g. Australian Rainman)
- How to find this information on internet including weather and climate drivers
- Discuss and prepare for these risks in a farming system

The Weather and climate drivers

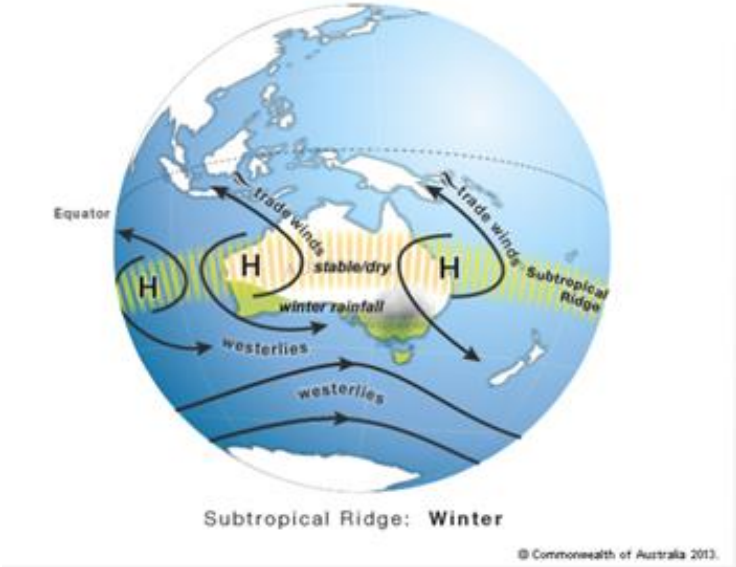
The weather is a description of the current state of the atmosphere including wind, cloudiness, temperature, humidity, precipitation etc.

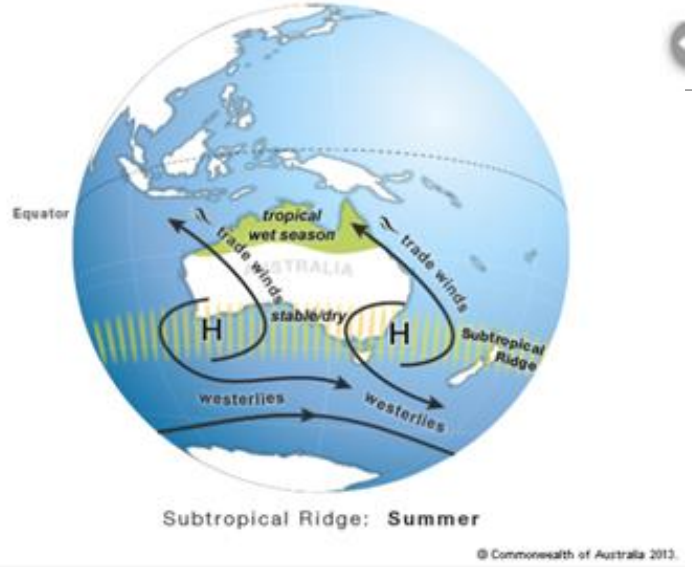
Climate drivers influence the weather.

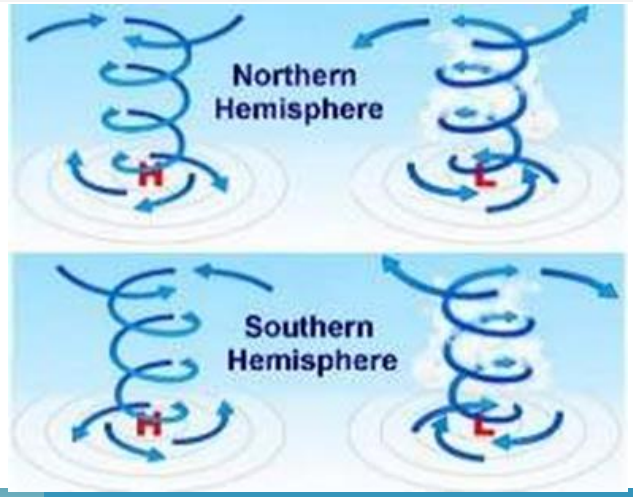
Eg: Indian Ocean Dipole, Southern Oscillation Index, Southern Annular Mode



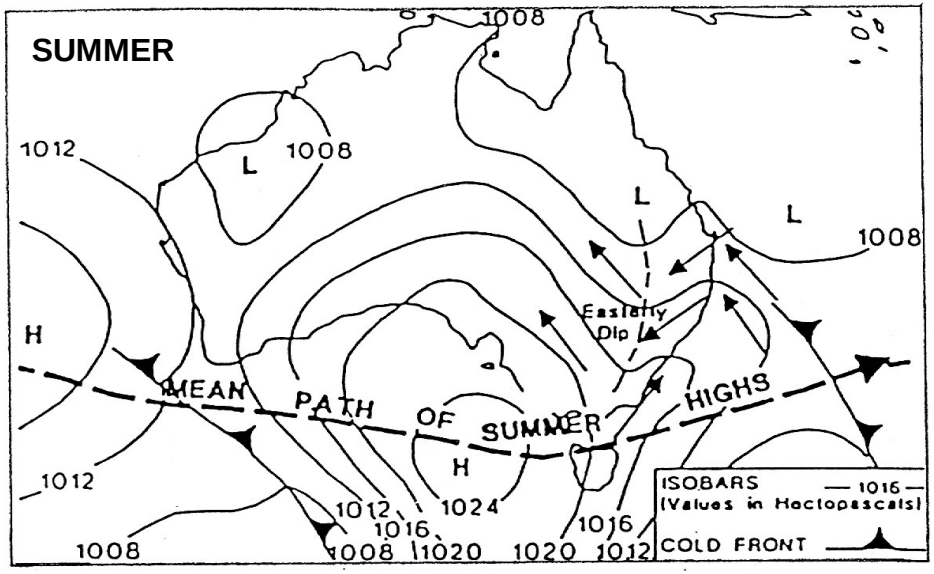
Low and High Pressure Systems

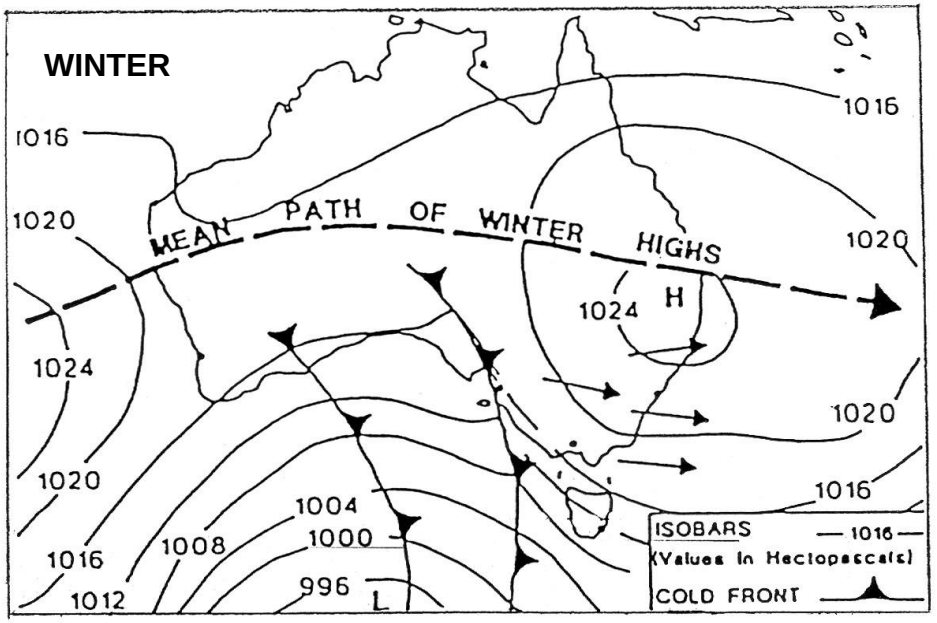




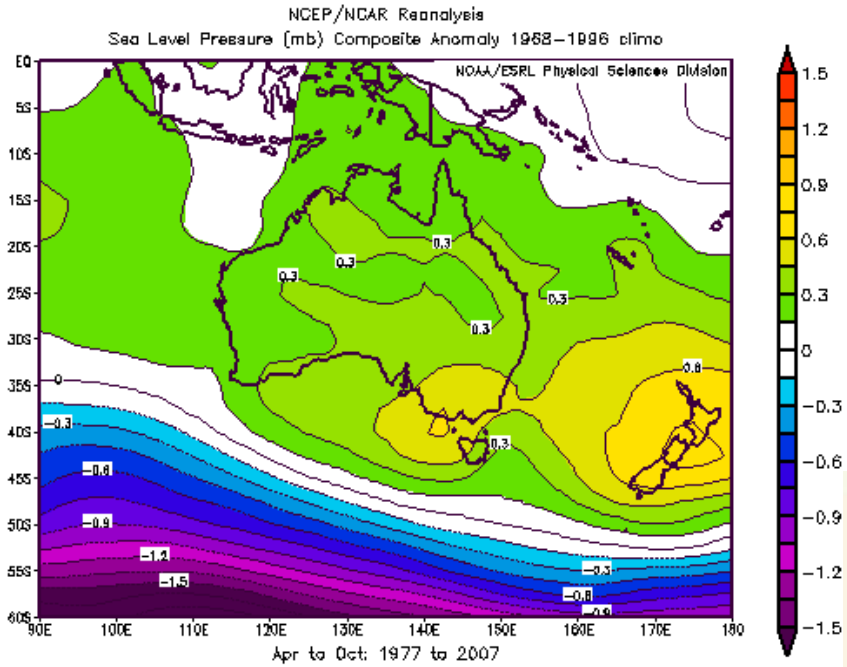


Understanding weather

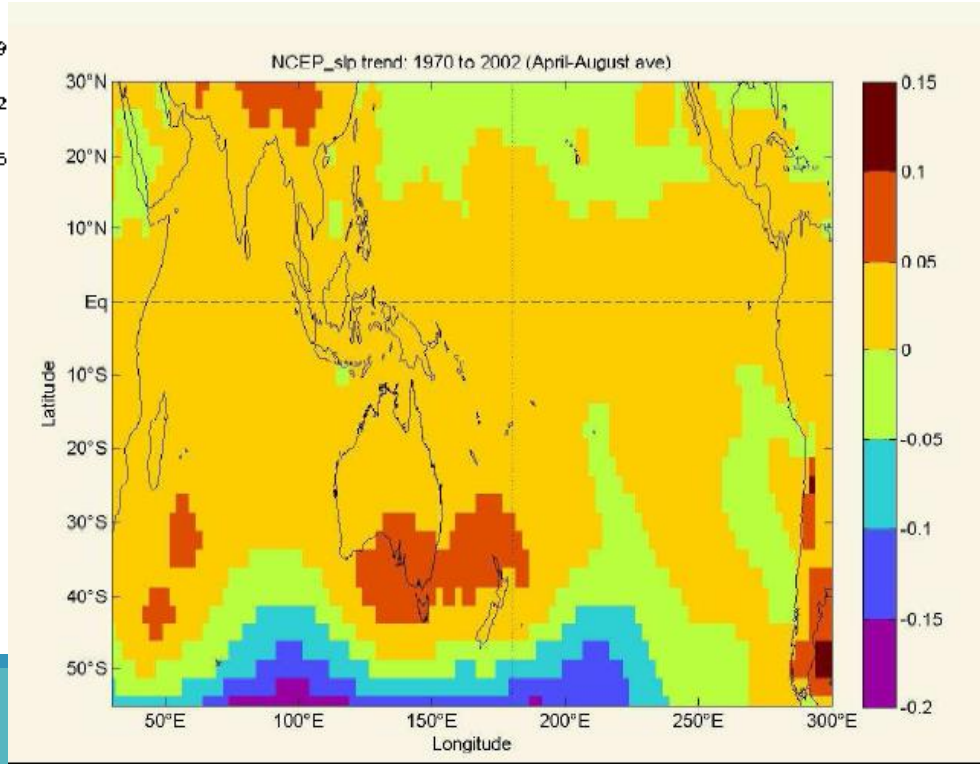




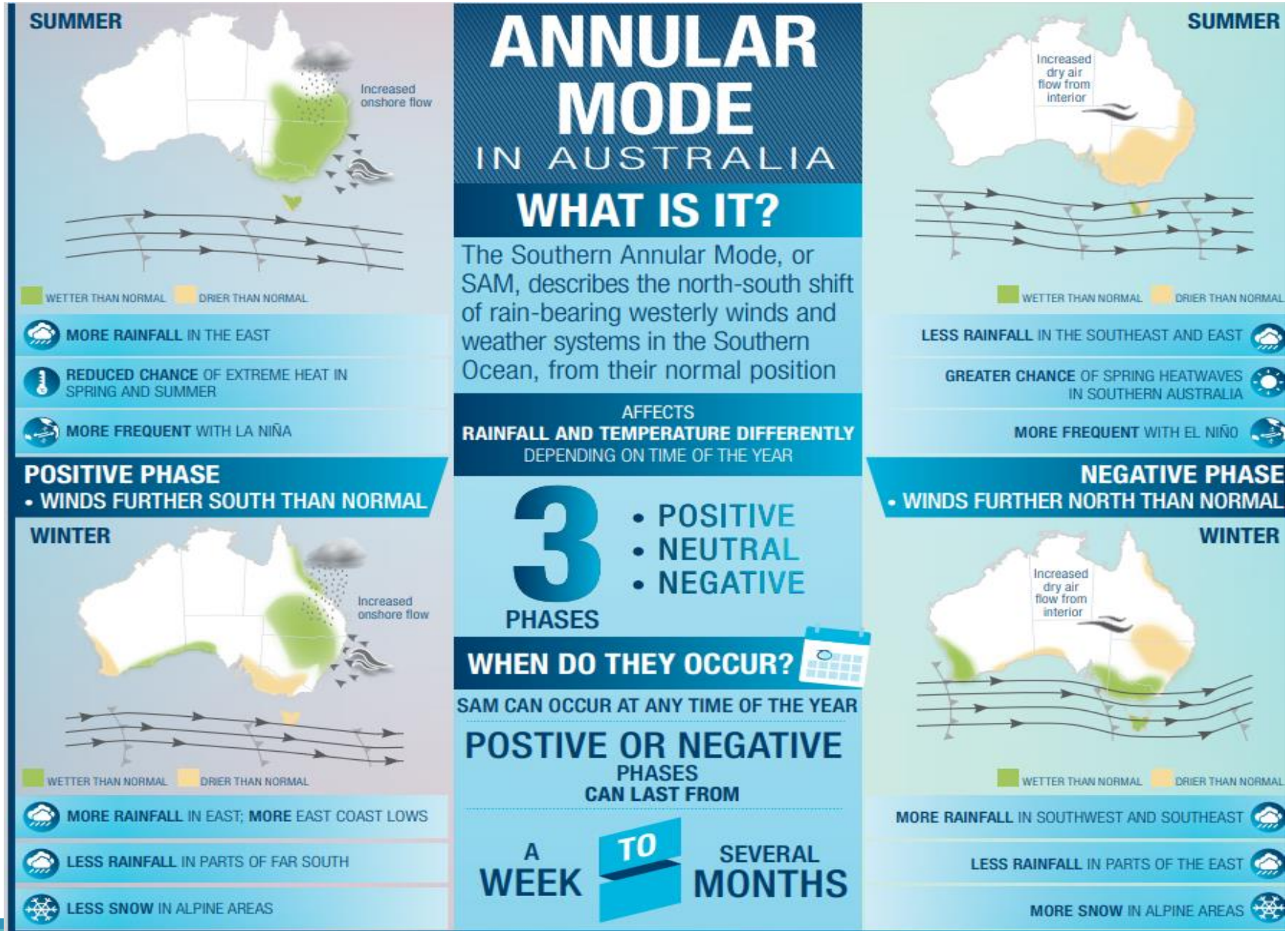
High Pressure



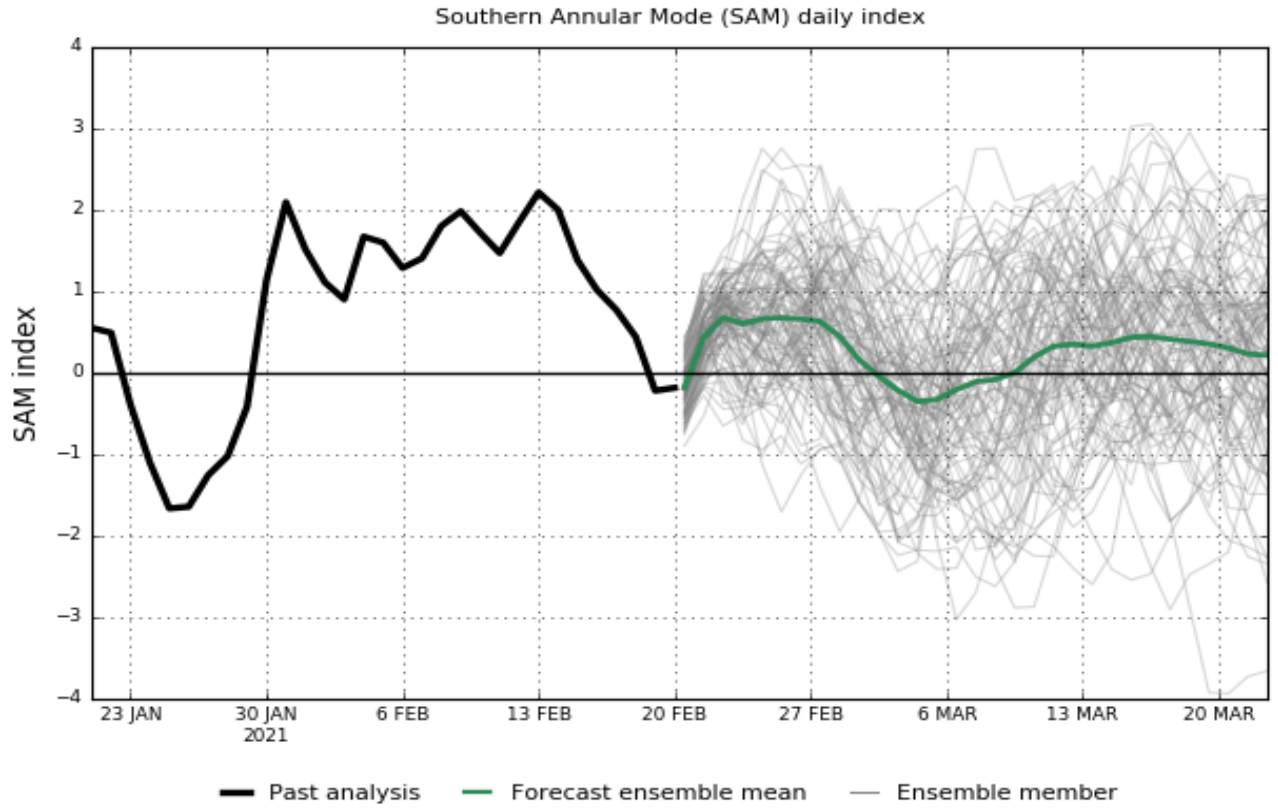
- High pressure systems larger
- Pressure at centre of high larger
- High pressure systems not moving further north as often giving cold fronts



Southern Annular Mode – SAM



Southern Annular Mode (SAM) outlook



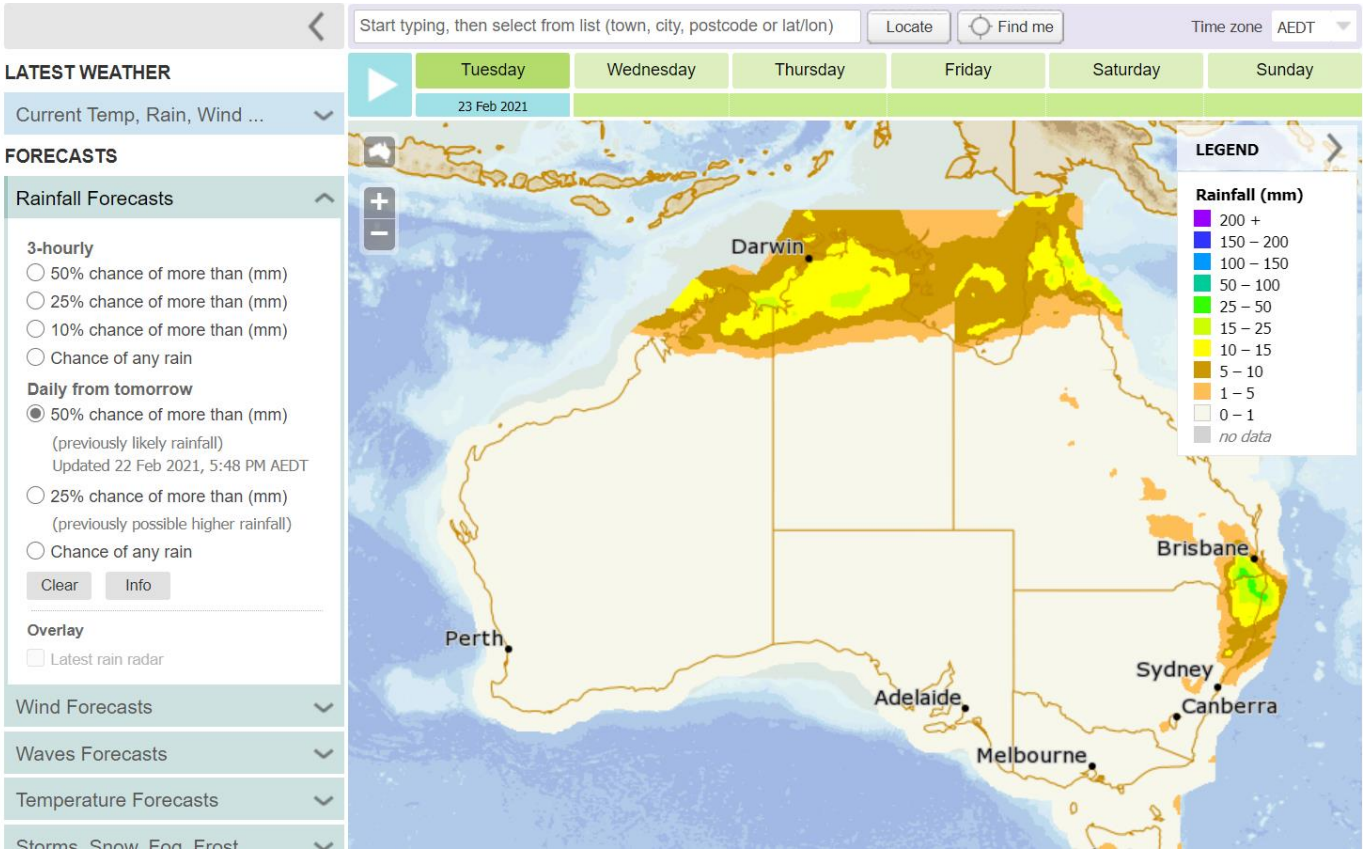
www.bom.gov.au/climate
Commonwealth of Australia 2021, Australian Bureau of Meteorology

Model run: 20 Feb 2021

Model: ACCESS-S1
Base period 1990-2012

http://www.bom.gov.au/climate/enso/#tabs=Southern-Ocean

MetEye (bom.gov.au)



ENSO = El Nino/Southern Oscillation

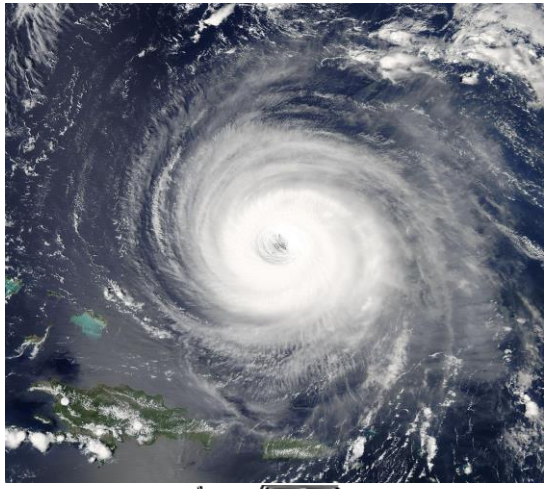
Walker Circulation – movement of warm and cold water

SST – Sea Surface Temperatures

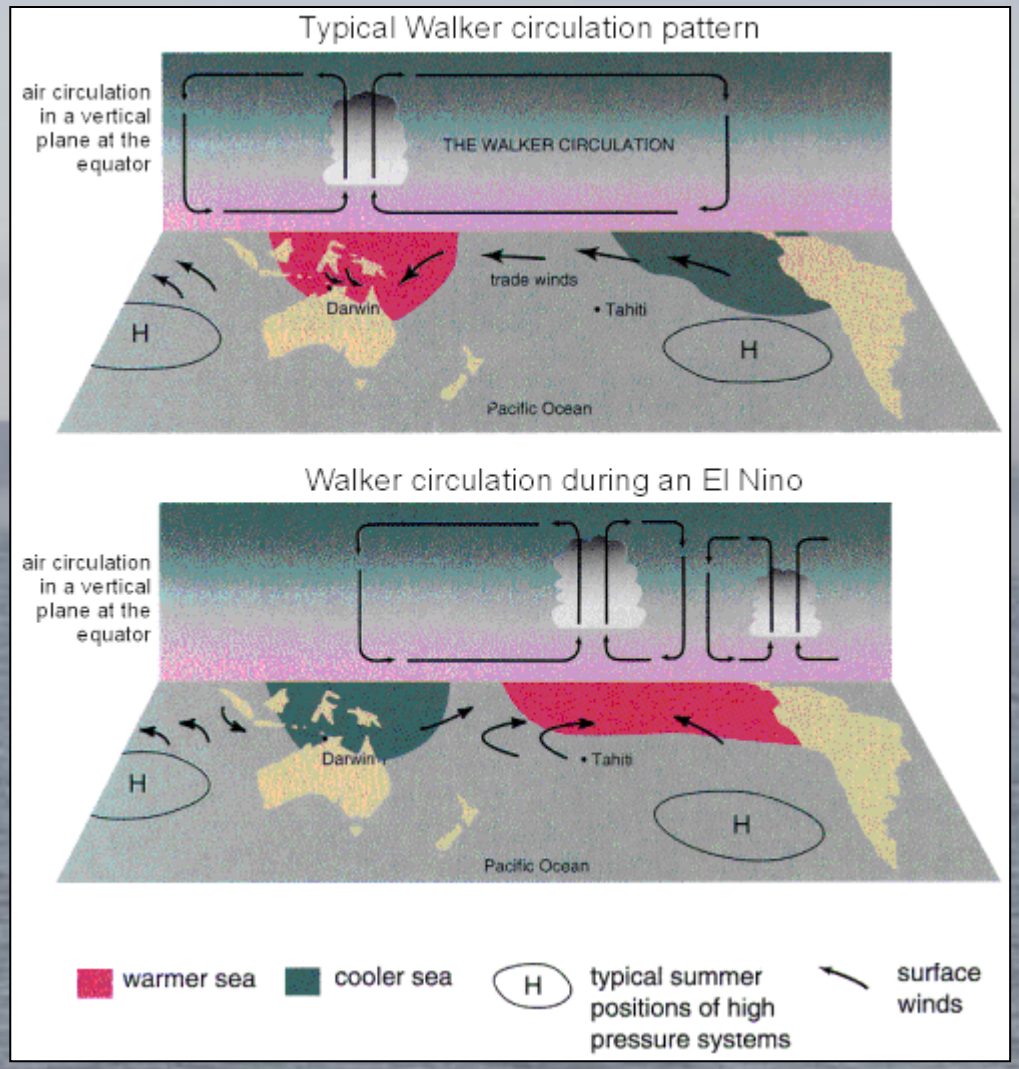
SOI – Measurement of air pressure difference between Tahiti and Darwin influences warm and cold water movement

El Nino – Cold water pacific above Aust

La Nina – Warm water pacific above Aust

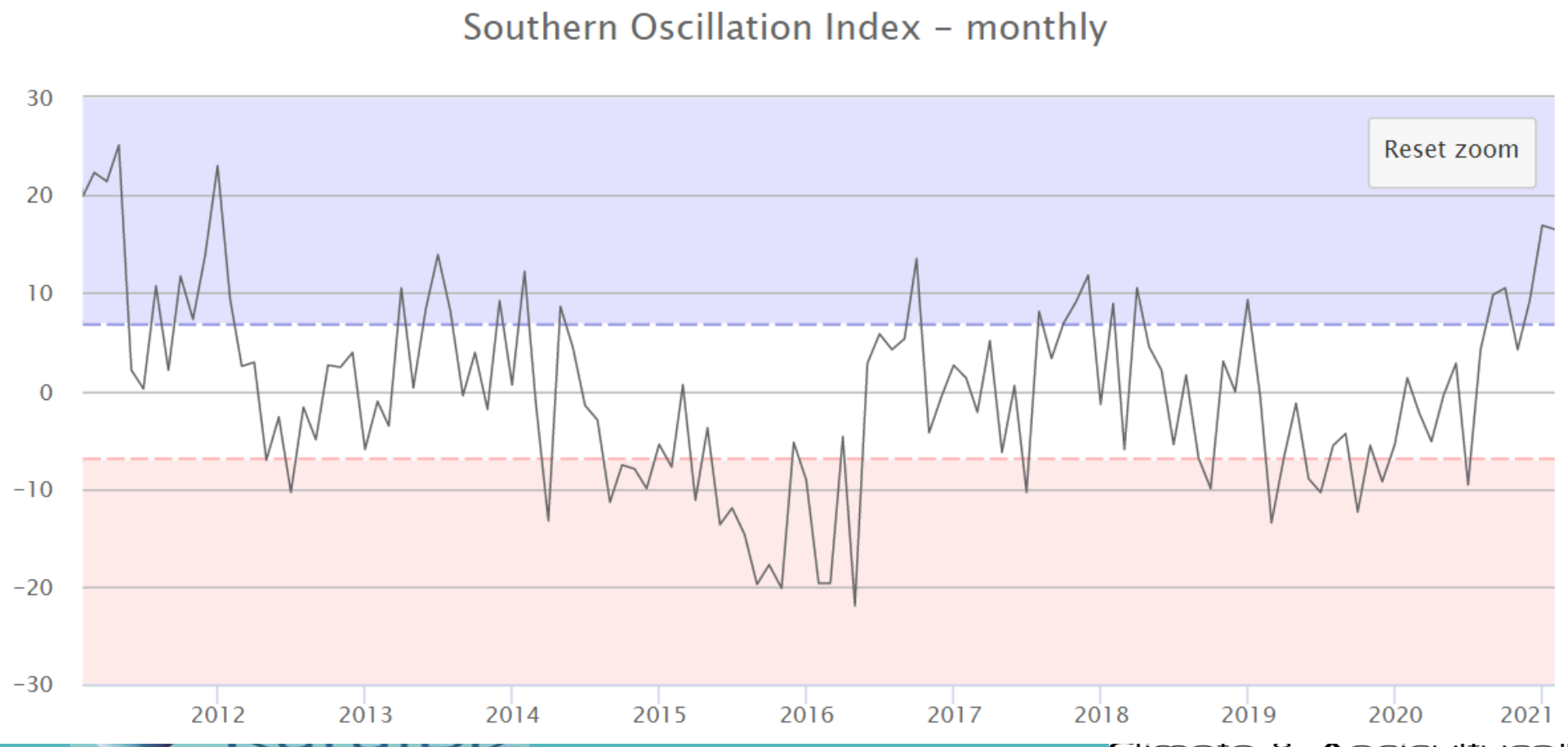


The pacific ocean – El Nino/La Nina



Southern Oscillation Index

A measure of the air pressure difference between Tahiti and Darwin.

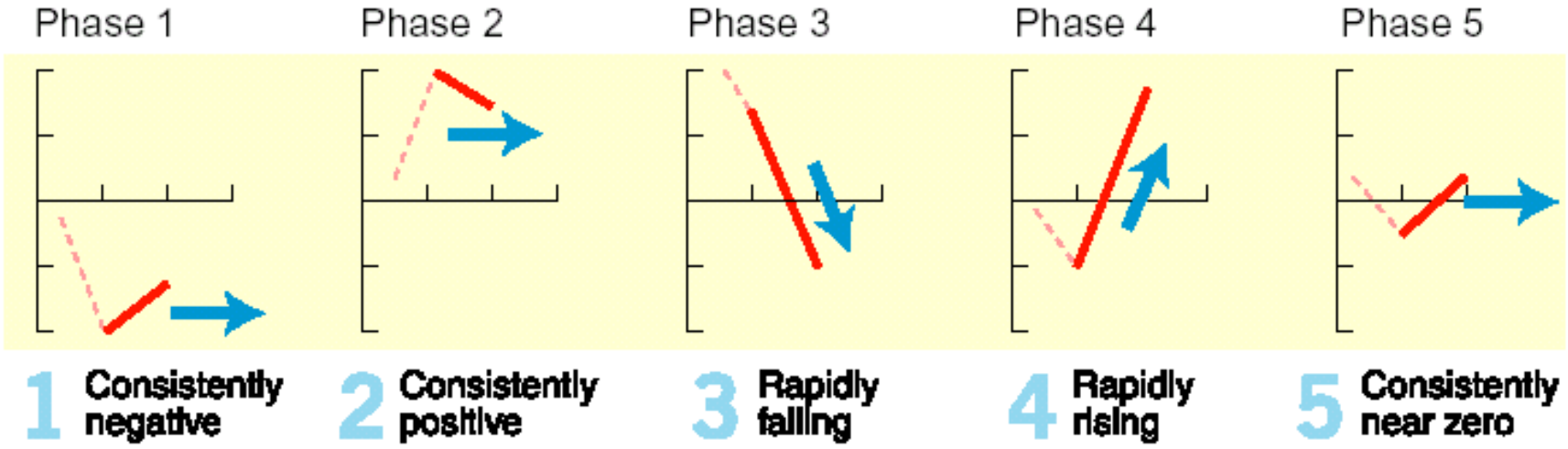


Southern oscillation index

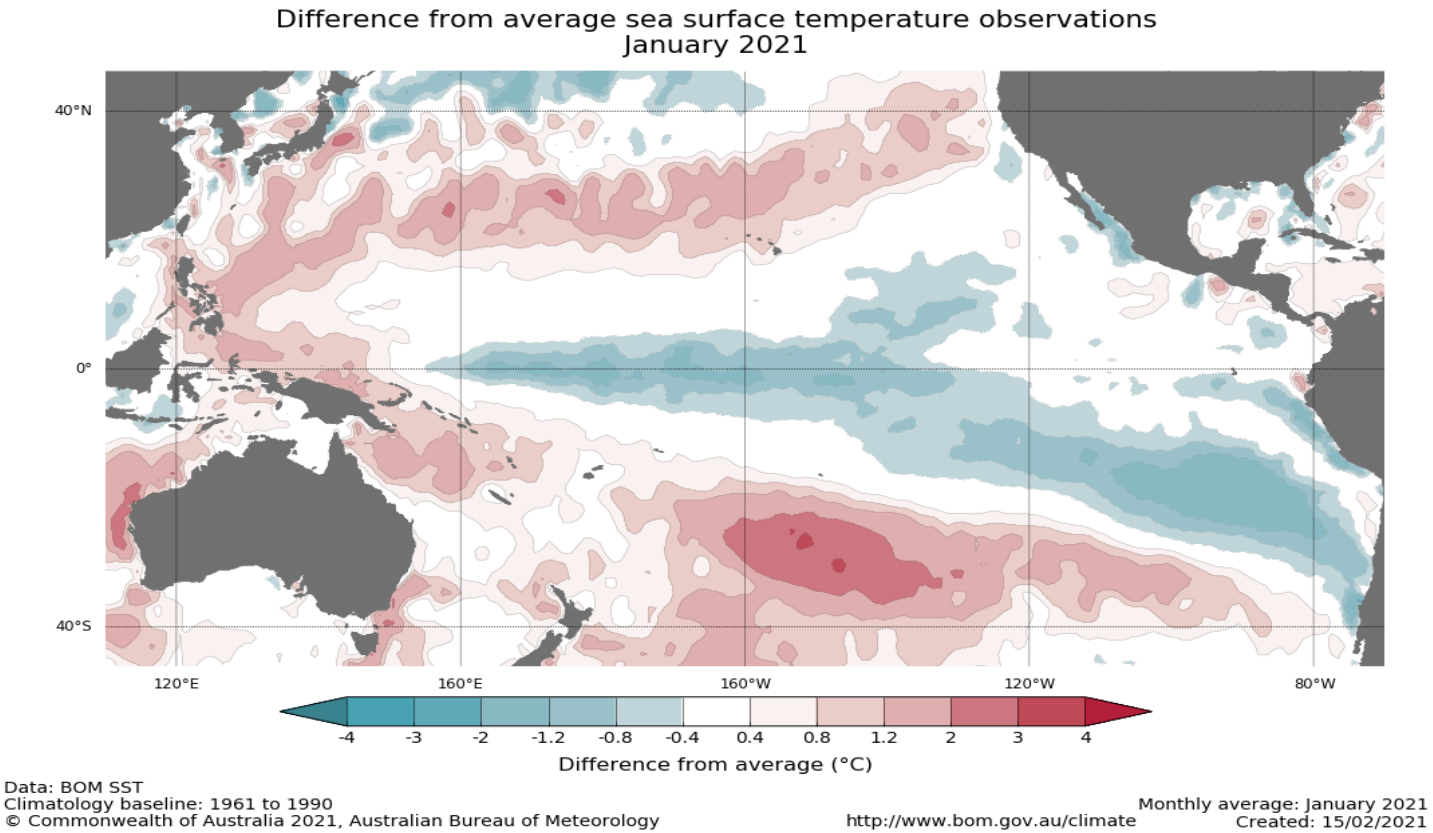
The SOI can be expressed as phases.

A strongly negative SOI (below -10) or rapidly falling phase is characteristic of El Niño.

A strongly positive SOI (above +10) or rapidly raising phase is characteristic of La Niña.

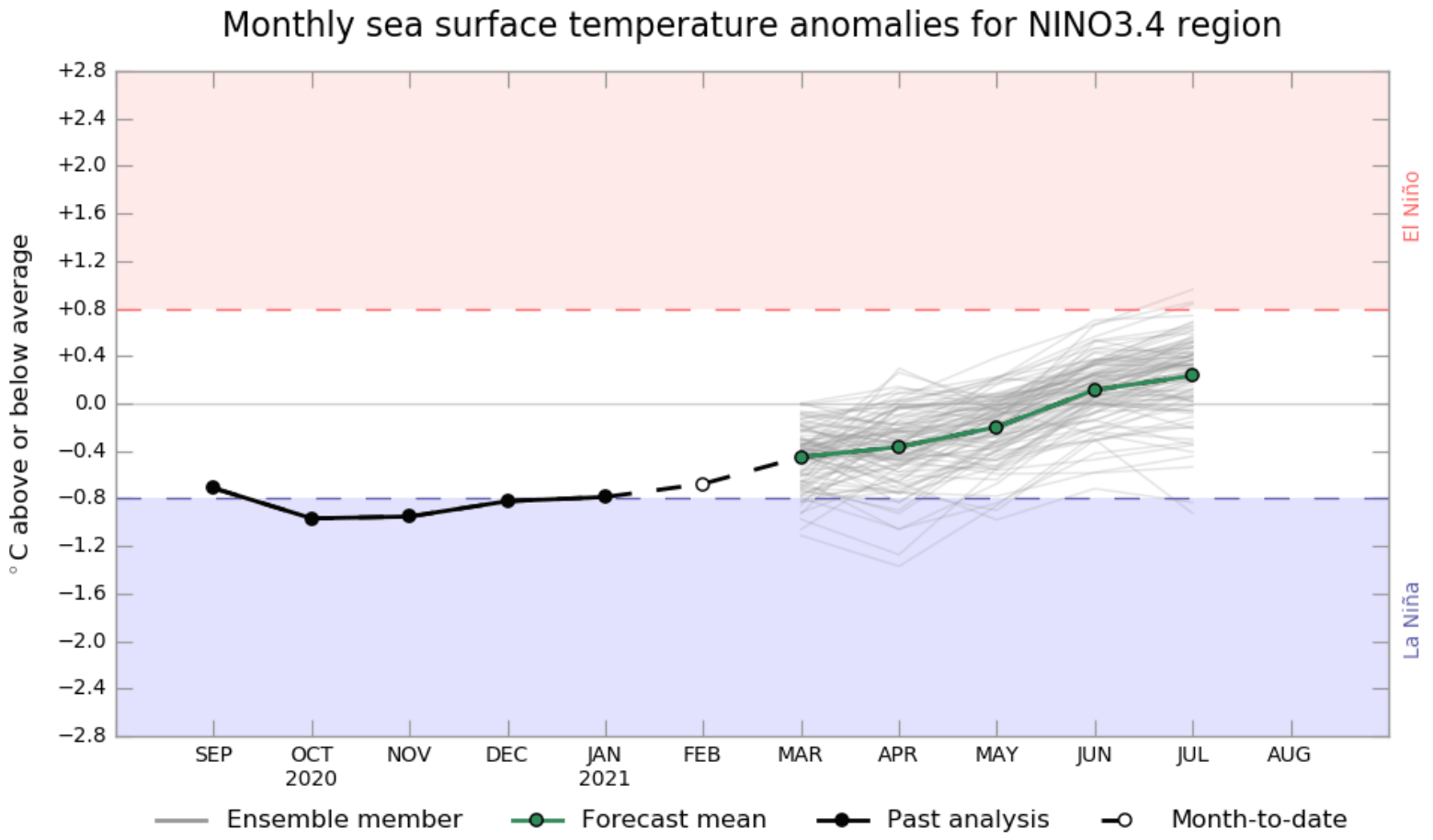


Sea surface temperatures



(286) La Niña in Australia - YouTube

Pacific ocean



www.bom.gov.au/climate
Commonwealth of Australia 2021, Australian Bureau of Meteorology

Model run: 13 Feb 2021

Model: ACCESS-S1
Base period 1990-2012

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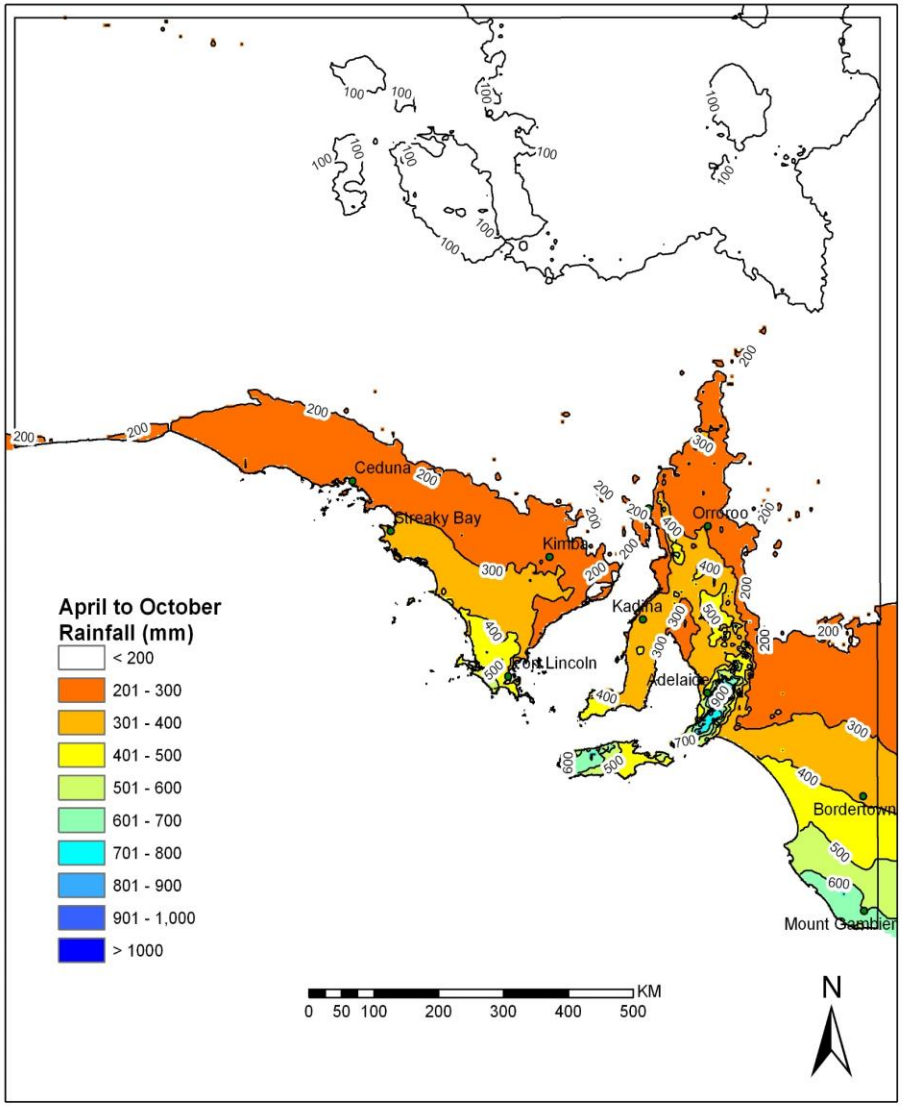
SST – Sea Surface Temperatures

SOI – Measurement of air pressure difference between Tahiti and Darwin influences warm and cold water movement

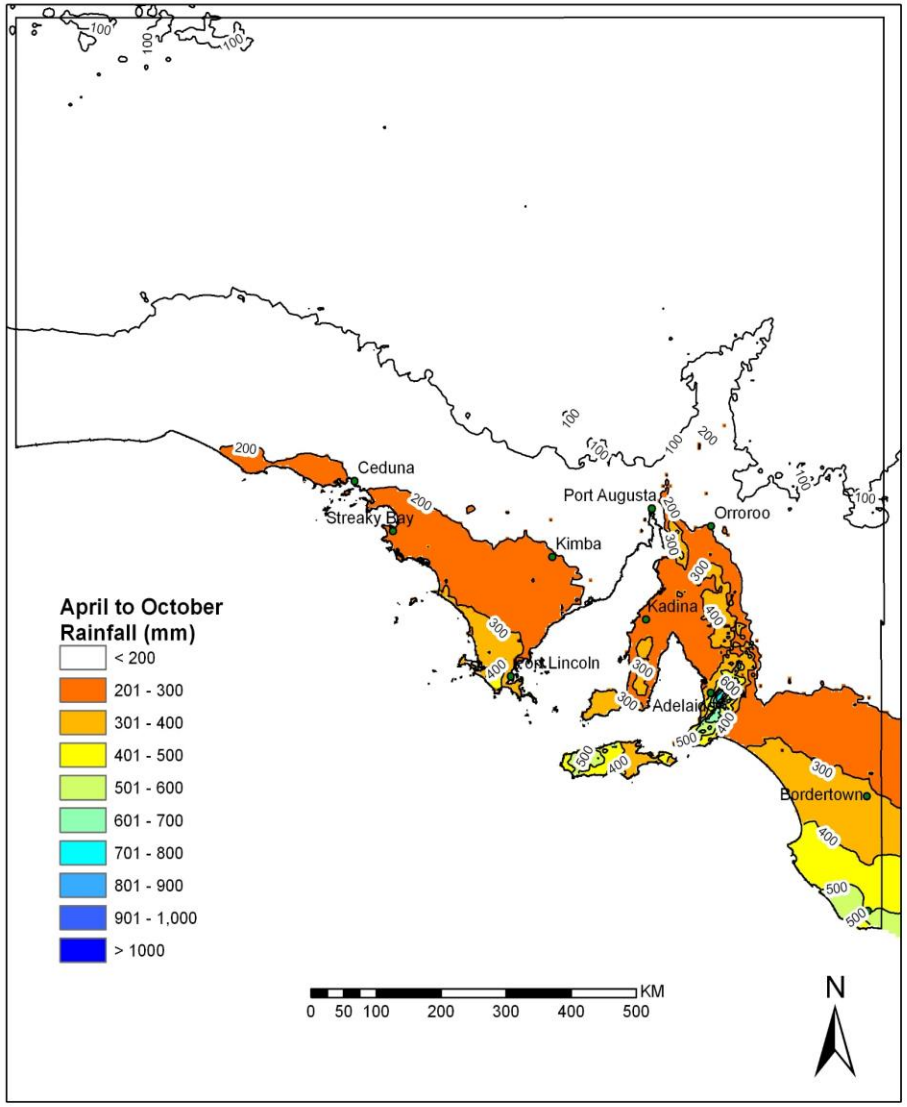
El Nino – Cold water pacific above Aust

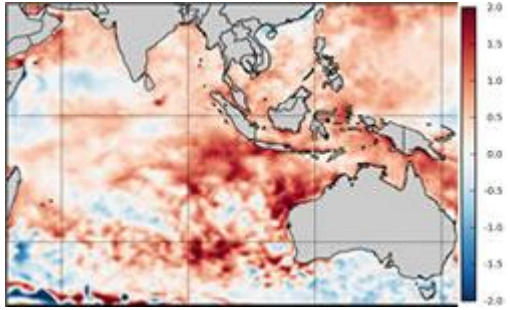
La Nina – Warm water pacific above Aust

Mean growing season rainfall (April to October) with SOI > 5

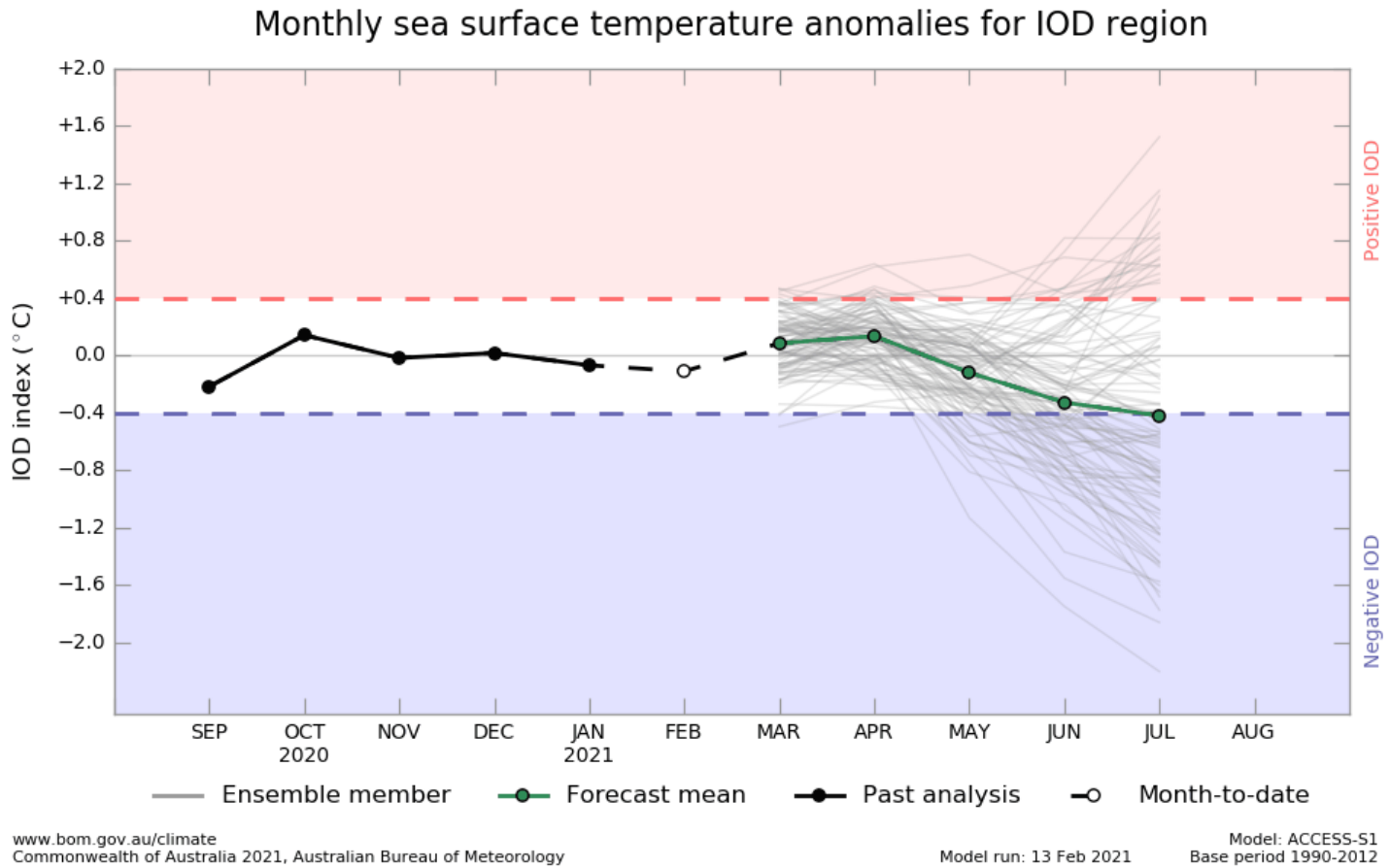


Mean growing season rainfall (April to October) with SOI < -5

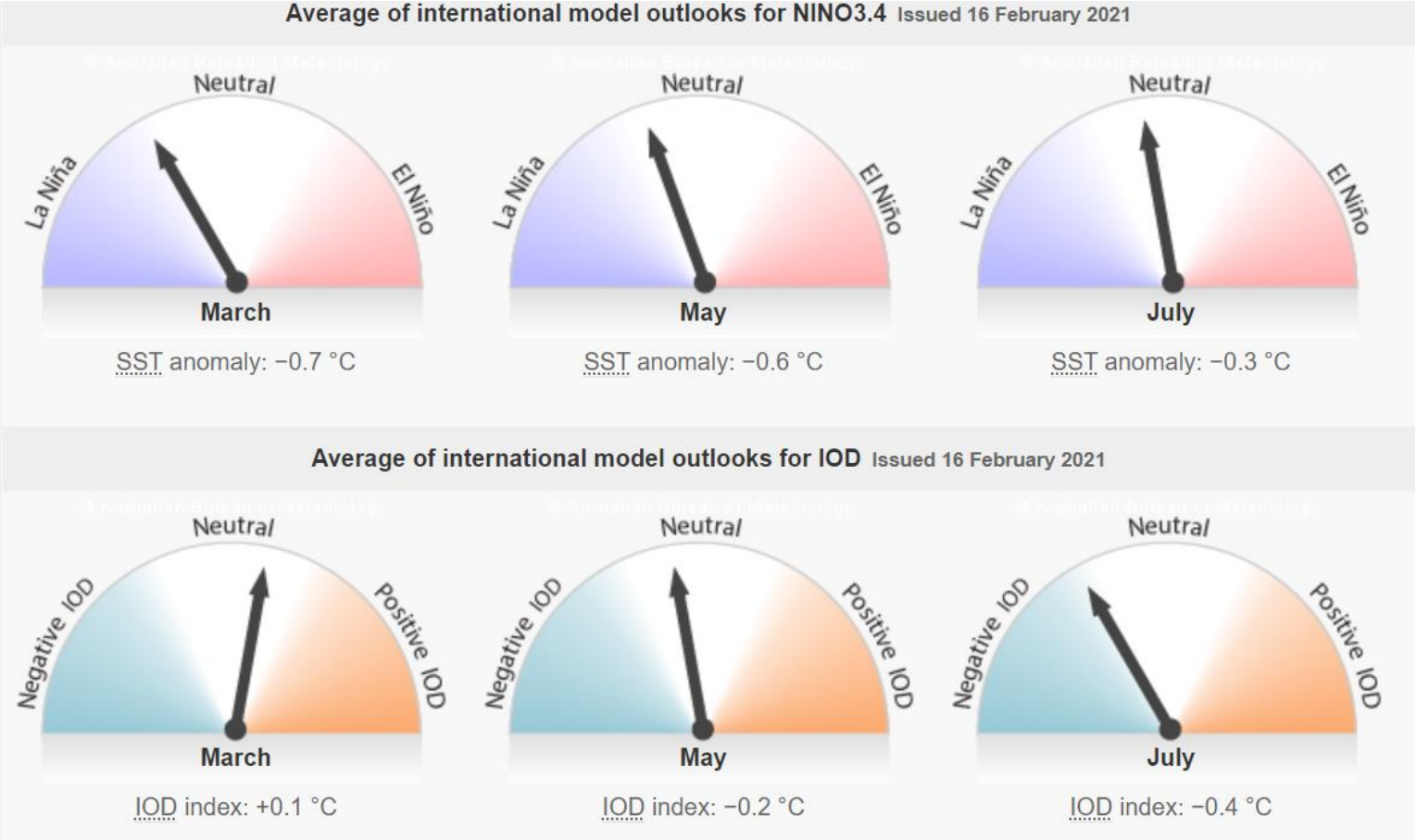




Indian Ocean Dipole



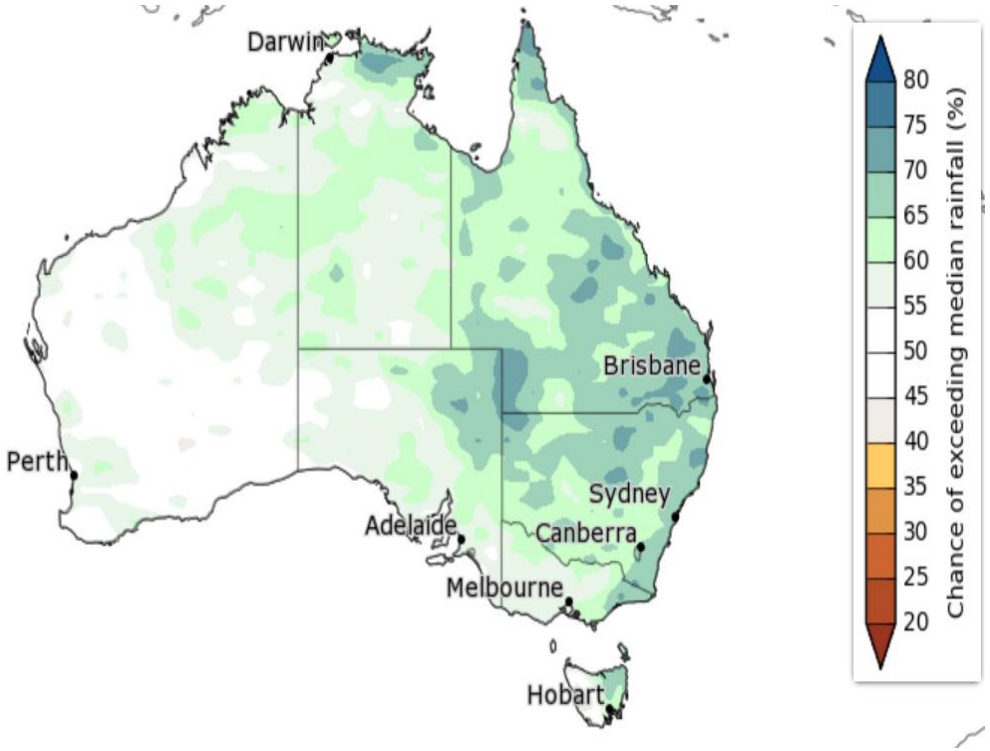
ENSO and IOD outlook

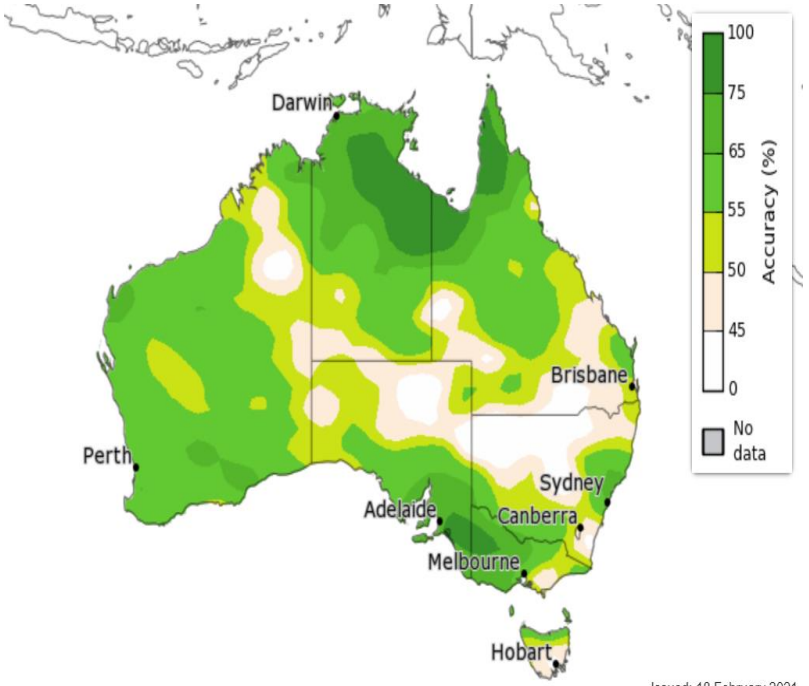


Outlook Feb – May 2021

ENSO (El Nino/Southern Oscillation)	La Niña active but reached its peak. Some influence for next month on upper Eastern Aust SST above normal around Aust
IOD	Neutral may trend negative (=good for rain)
SAM	Positive over next few weeks
BOM Outlook compiled	Wetter than normal conditions for Feb to May in many areas

Overview— - Climate Outlooks (bom.gov.au)





What we will cover

- Understand the various climate and weather risks that affect a farm system.
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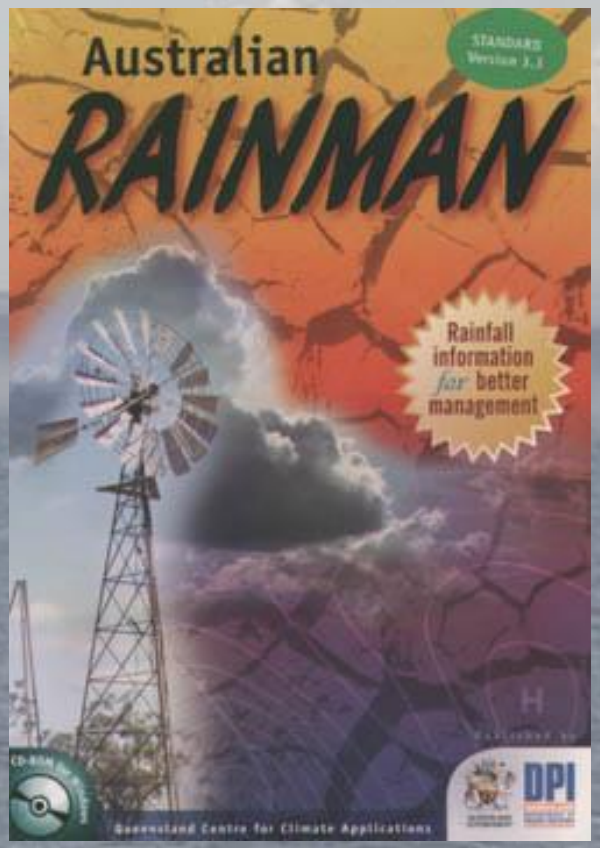
Rainman StreamFlow analysis tool | Department of Agriculture and Fisheries, Queensland (daf.qld.gov.au)



RuralBiz Training

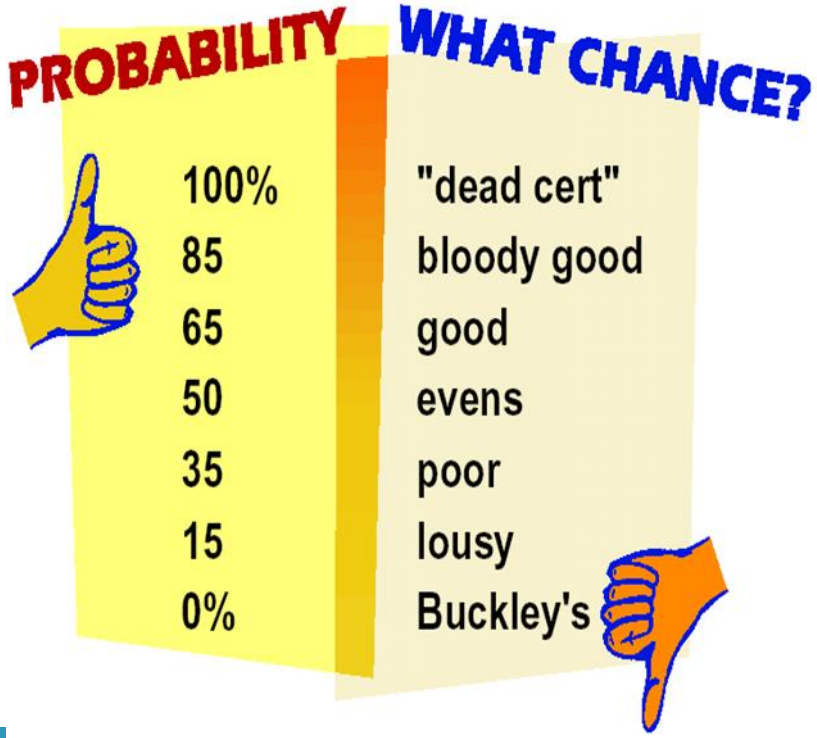
Climate & Agricultural Support

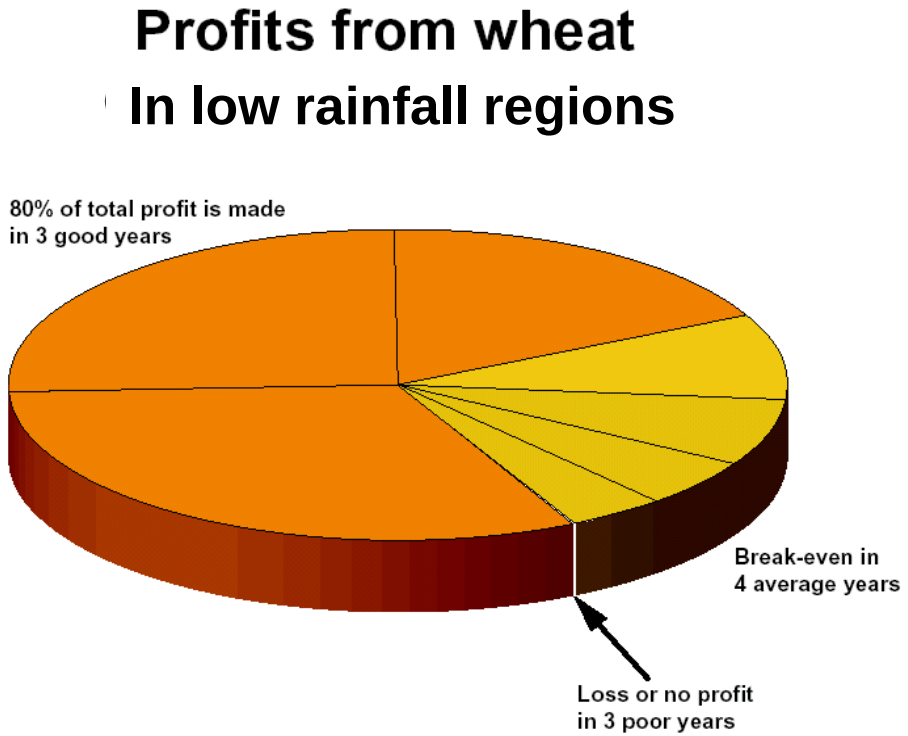
Actual Climate Risk

Rainfall outlooks and seasonal outlooks are also probabilities

Risk is often associated with uncertainty, a chance of failure or losing.

Risk can also represent opportunity and potential for gain

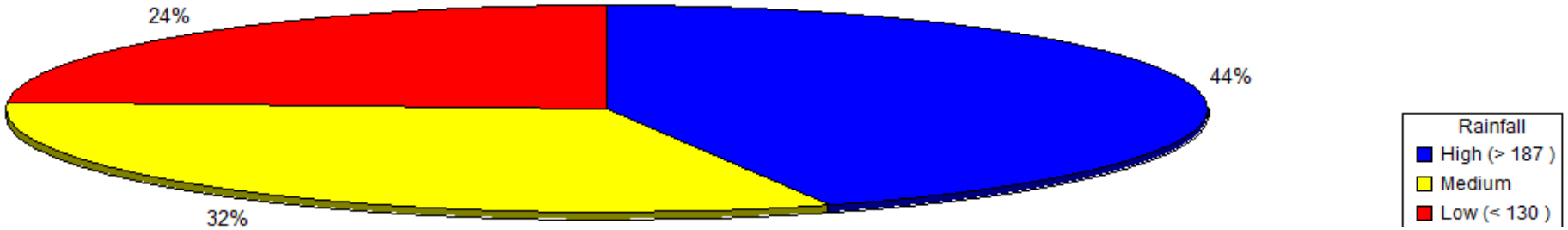




SOI Influence at Bundarra NSW

Chance of rainfall at BUNDARRA POST OFFICE

Analysis of historical data (1884 to 2021) using Average SOI: May to Jul Leadtime of 0 months Rainfall period: Aug to Oct
The average SOI/rainfall relationship for this season is statistically significant because KW test
is above 0.9, and Skill Score (19.8) is above 7.6 (p = 0.997).



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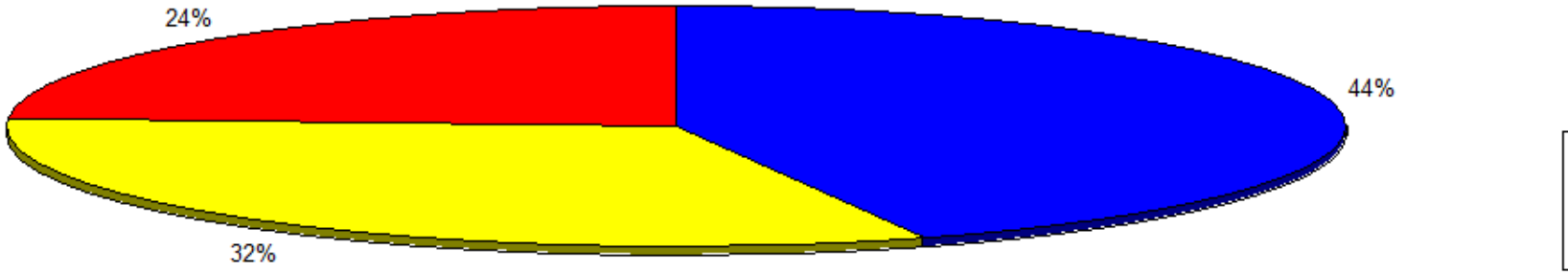

SOI above +5

Source: Rainman StreamFlow

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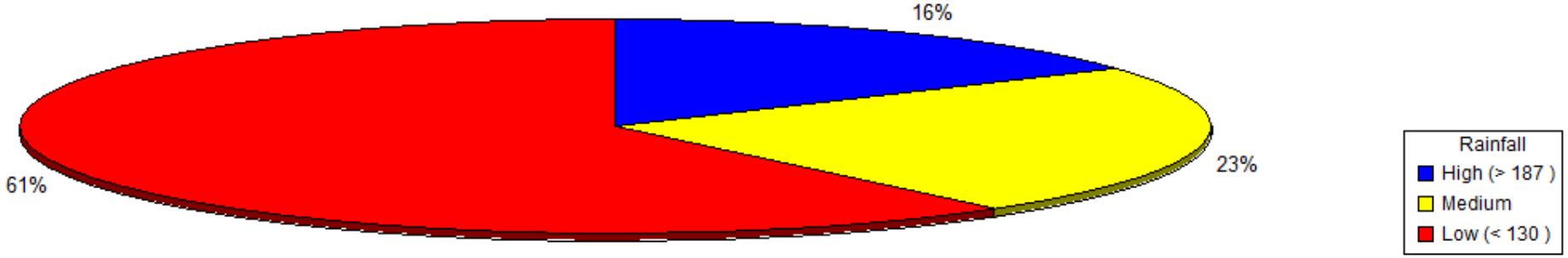
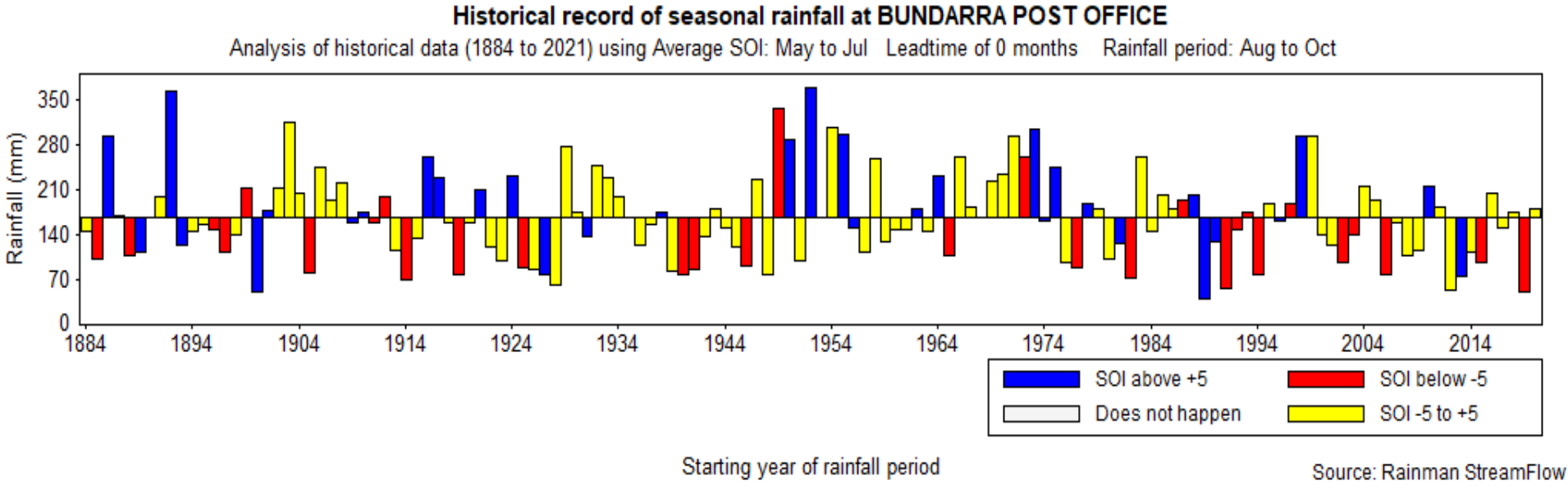
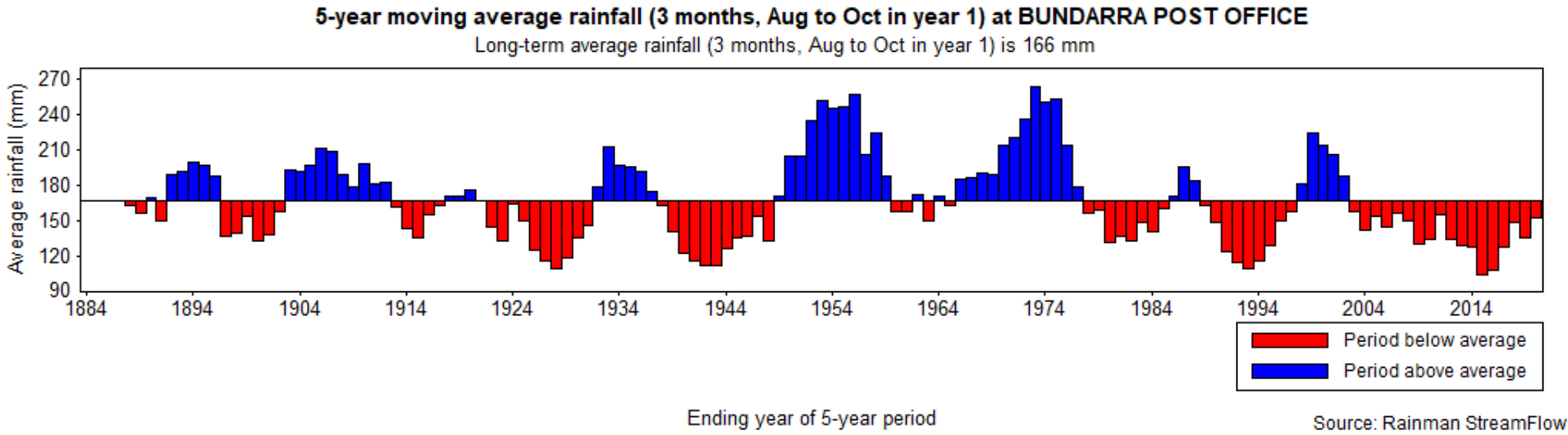
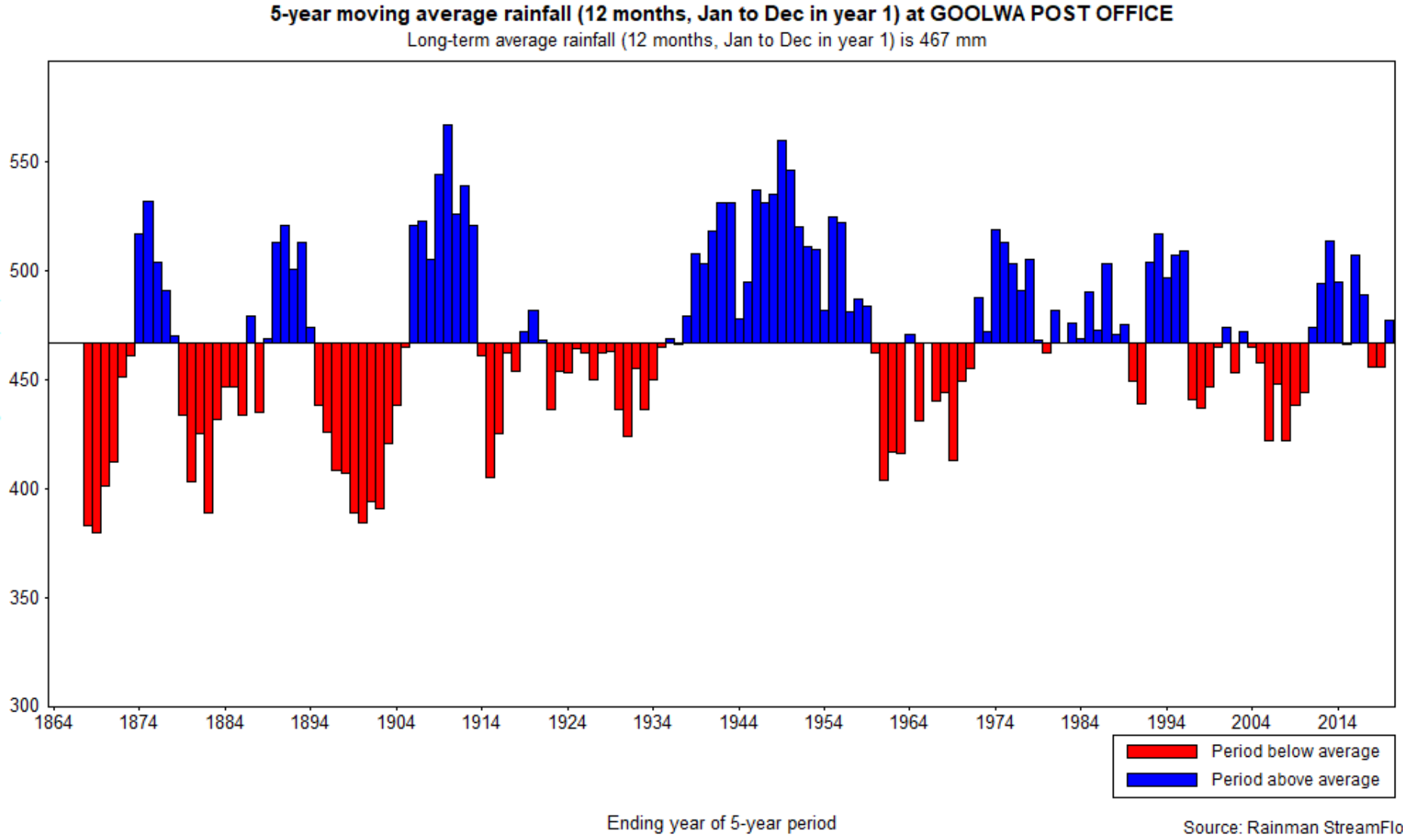


SOI phase influence on rainfall



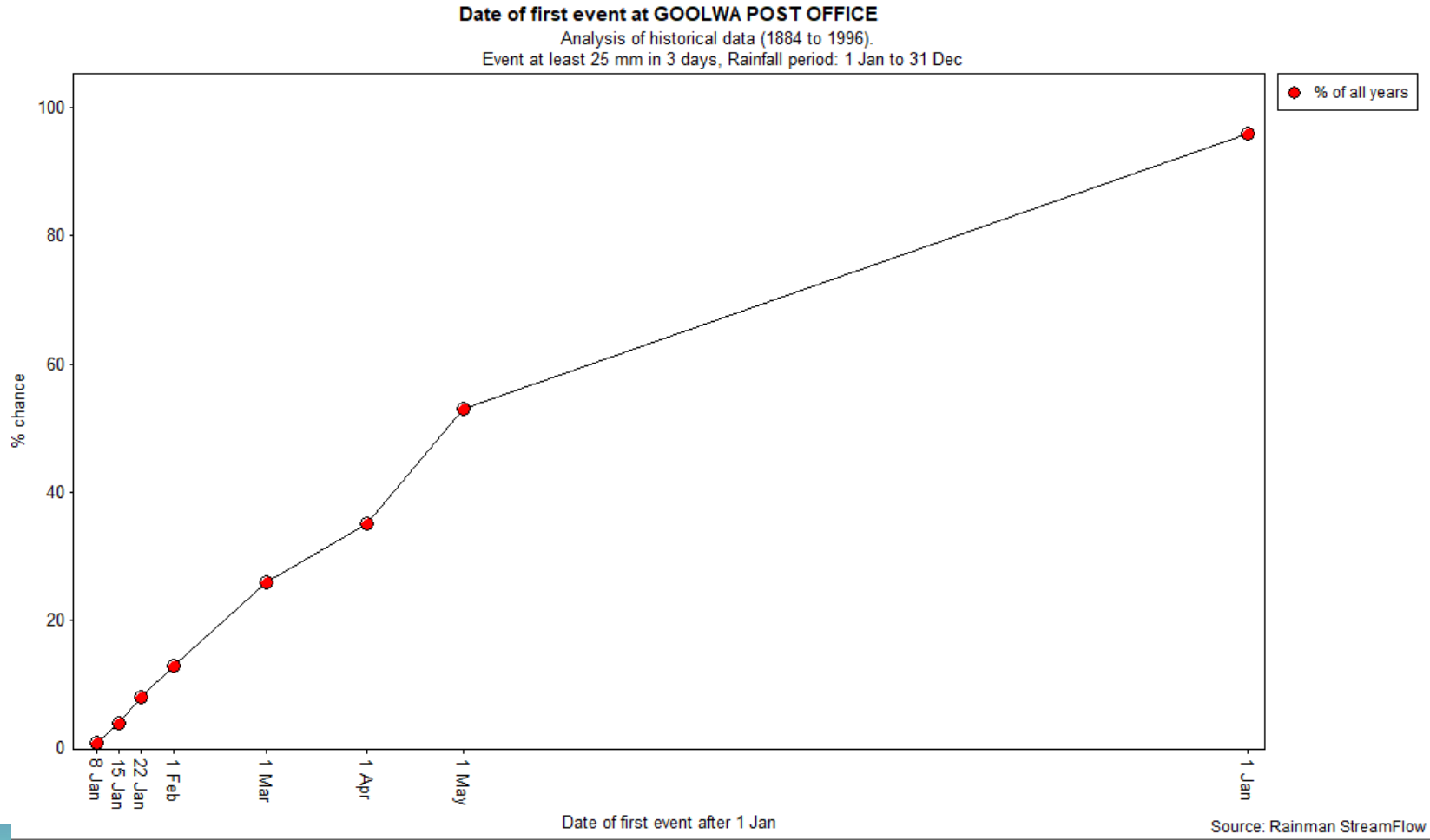


5 year moving average of rainfall at Goolwa



Source: Rainman StreamFlow

Chance of a rainfall break



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Links throughout presentation

Climate Driver Update (bom.gov.au)

Overview— - Climate Outlooks (bom.gov.au)

New BOM Weather App

Rainman StreamFlow analysis tool | Department of Agriculture and Fisheries, Queensland (daf.qld.gov.au)

The Southern Annular Mode (bom.gov.au)

Climate Kelpie

MetEye (bom.gov.au)

Recent and historical rainfall maps, Australian Bureau of Meteorology (bom.gov.au)

Climate change and variability: Tracker: Australian trend maps (bom.gov.au)

Climate Model Summary, Bureau of Meteorology (bom.gov.au)

Australian rainfall deciles since 1900 (bom.gov.au)

Australian 12-monthly mean temperature anomalies since 1911 (bom.gov.au)

Climate Driver Update (bom.gov.au)

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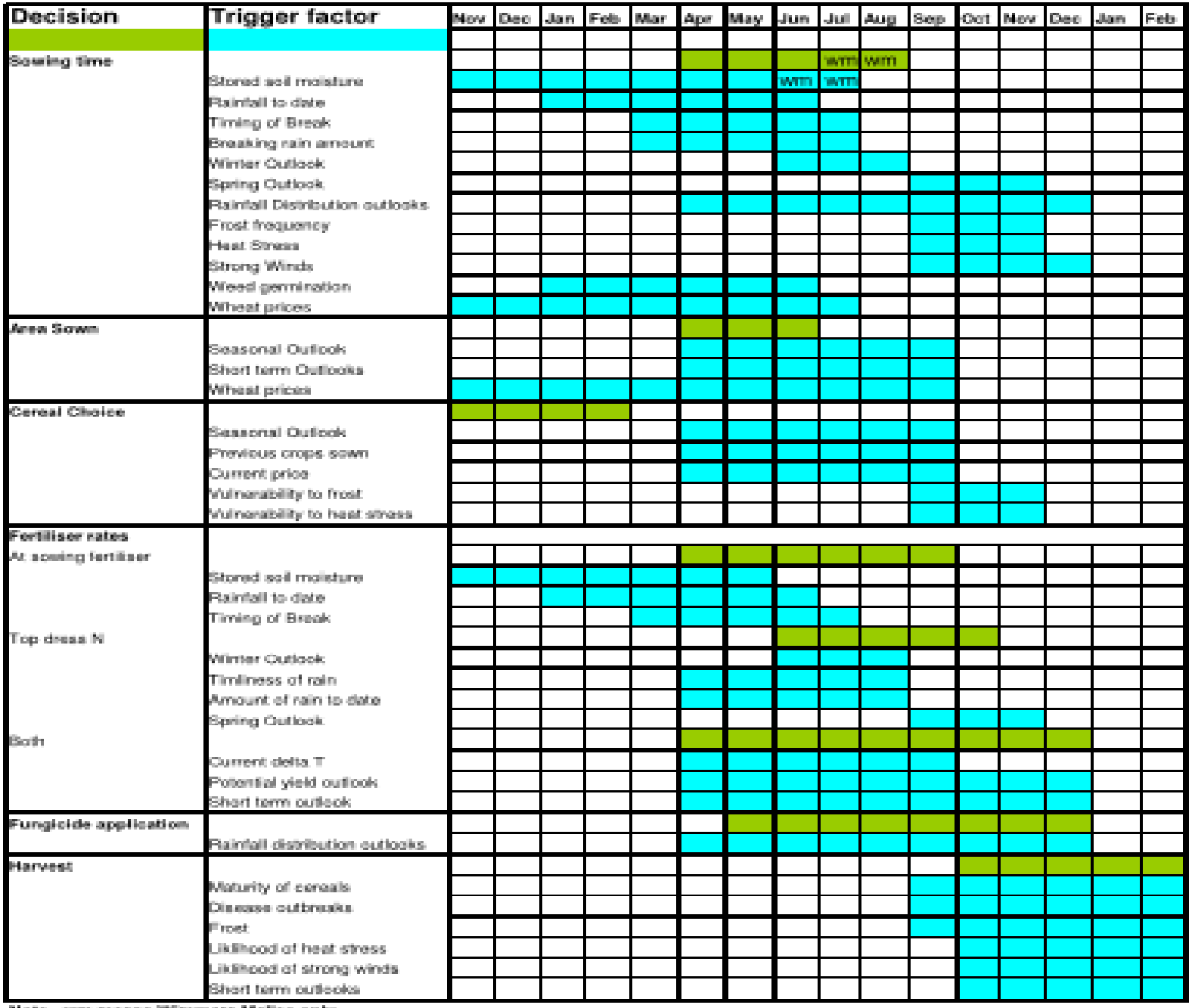

Note - wp means Wimmera Mallee only

Webinar 2 - Climate Change – 10th March

- Looking at climate change and agricultures contribution
- Look at climate change trends and projections in a region
- Look at climate change evidence
- Look at how farmers have adapted to change
- Opportunities to plan for climate change short, medium and longer term

Webinar 3 - Adaptation and mitigation of climate change (drought preparation and management) – 24th March

- The carbon cycle.
- Carbon sequestration and soil health management
- Water infiltration and water use efficiency
- Regenerative agriculture opportunities
- Other options to adapt and mitigate climate change in agriculture

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https://www.surveymonkey.com/r/climateriskandfarming

THANK YOU TO

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