

The background image is a wide-angle landscape photograph. The sky is filled with large, dark, and textured clouds, with some lighter patches where sunlight is breaking through. The ground is a flat, open field with dry, brownish-yellow grass. In the distance, there are a few small, dark silhouettes of buildings or structures on the horizon.

2020 Seasonal Outlook

Barossa Improved Grazing Group

7th April webinar

Darren Ray

Consulting Climatologist

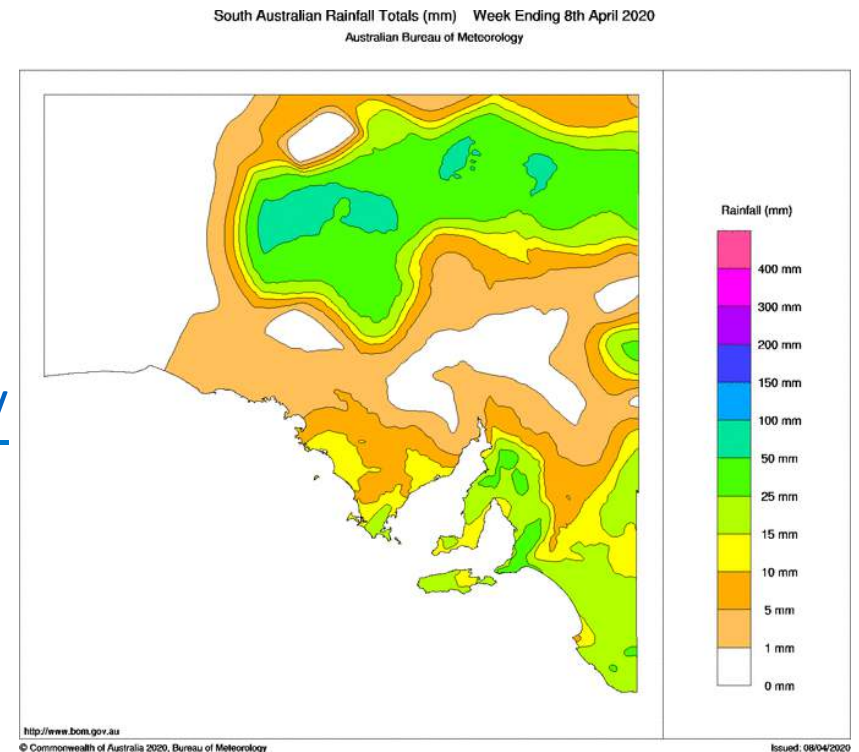
Recent conditions

Maps of recent conditions

- <http://www.bom.gov.au/climate/maps/>

Nuriootpa recent conditions

- <http://www.bom.gov.au/climate/dwo/IDCJDW5049.latest.shtml>



7-10 days ahead

Broadscale out to 10 days ahead

- https://www.pivotalweather.com/model.php?m=gfs&p=prateptype_cat_mm&fh=loop&r=au&dpdt=&mc=

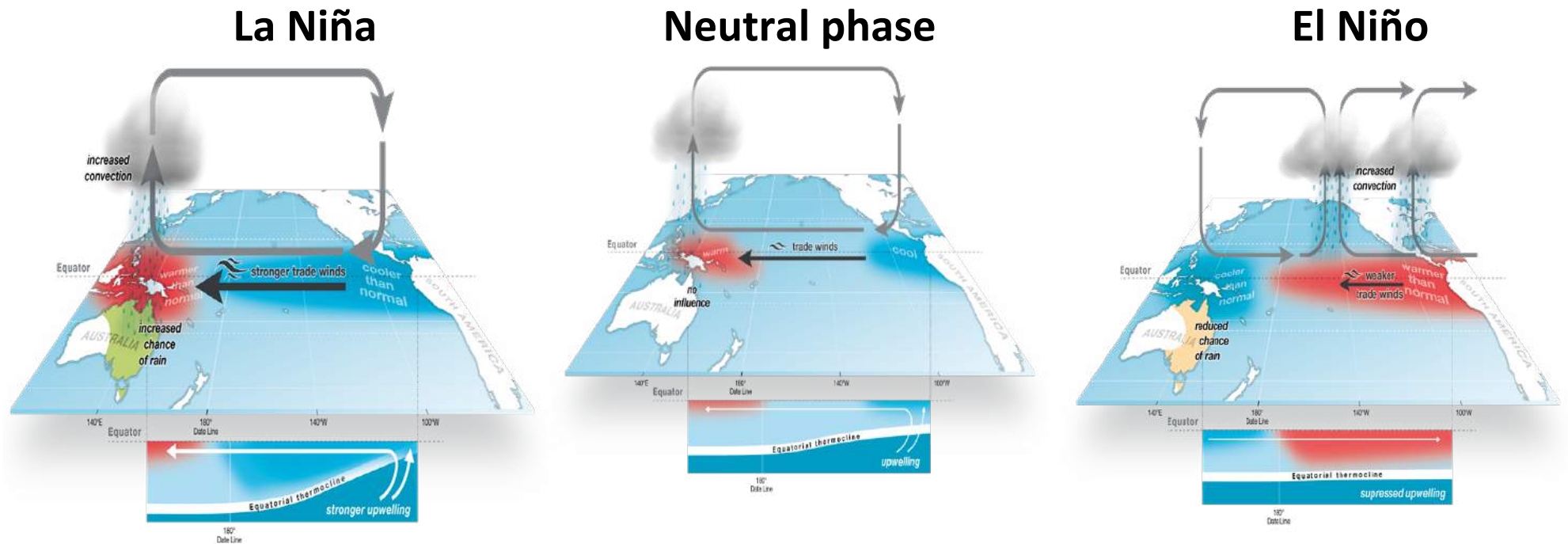
Location multi-model weather for Nuriootpa

- <https://meteologix.com/au/weather/2064340-nuriootpa>

Climate influences for 2020

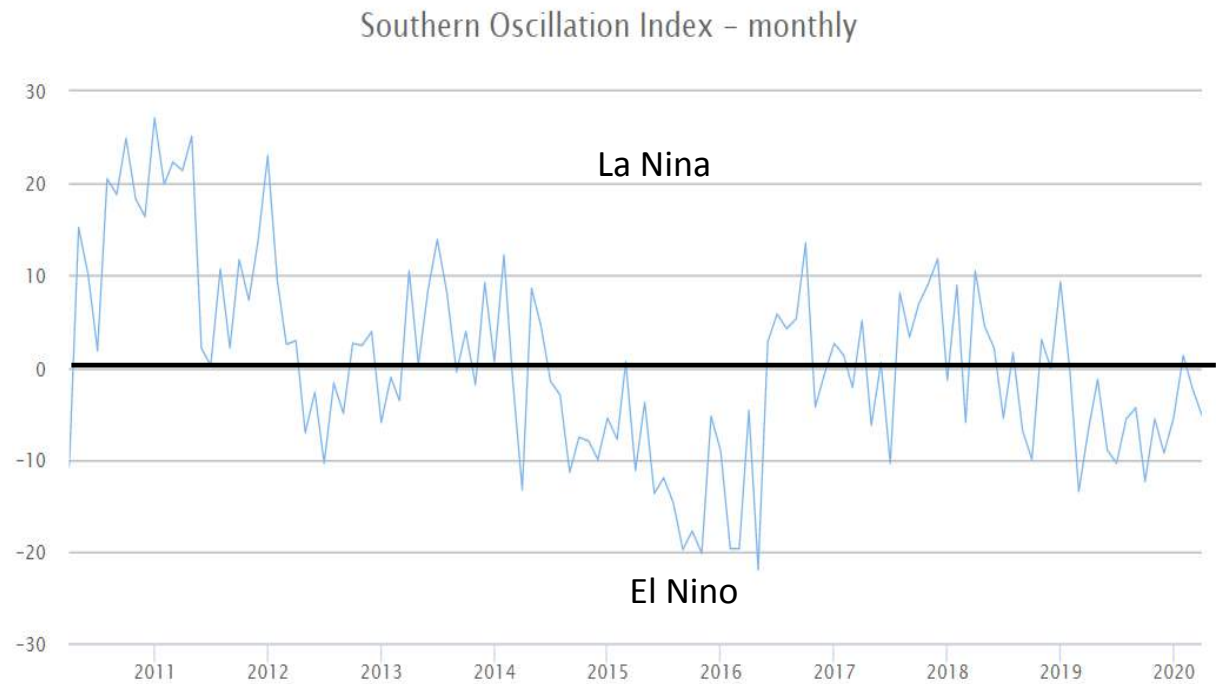
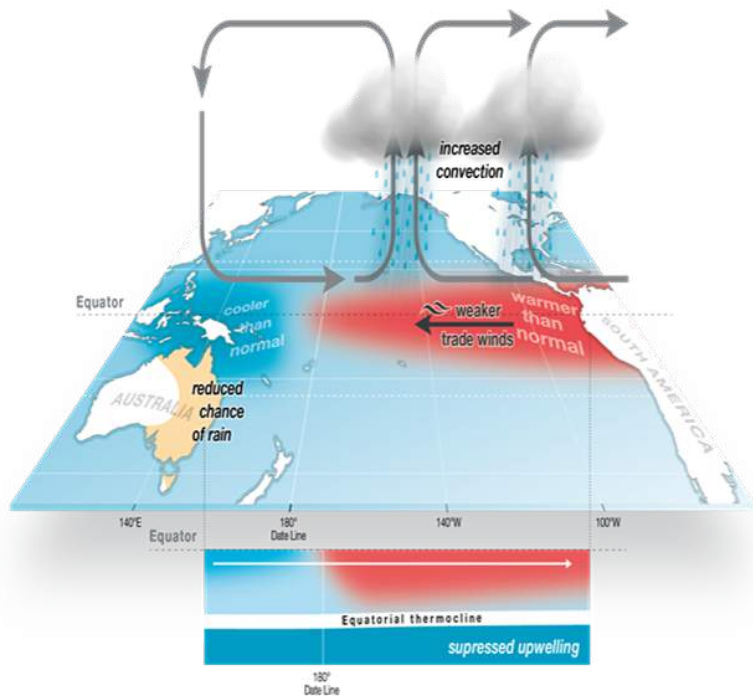


Tropical variability is a big feature of Australian climate



El Niño and La Niña both occur on average every 4-7 years. Start in winter/spring and extend over summer

Southern Oscillation Index (SOI)



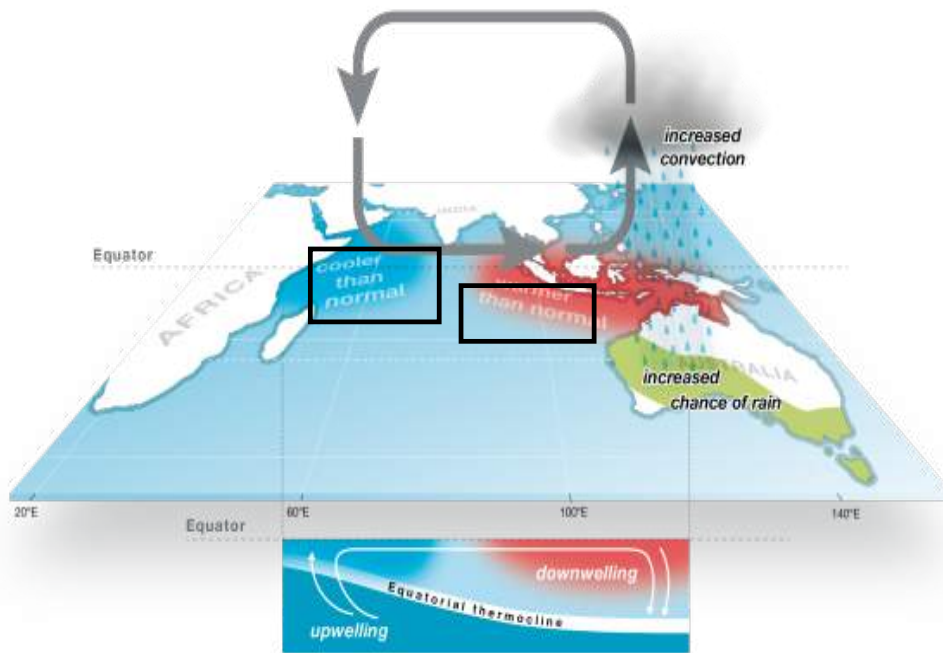
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Latest SOI:

<http://www.bom.gov.au/climate/enso/#tabs=SOI>

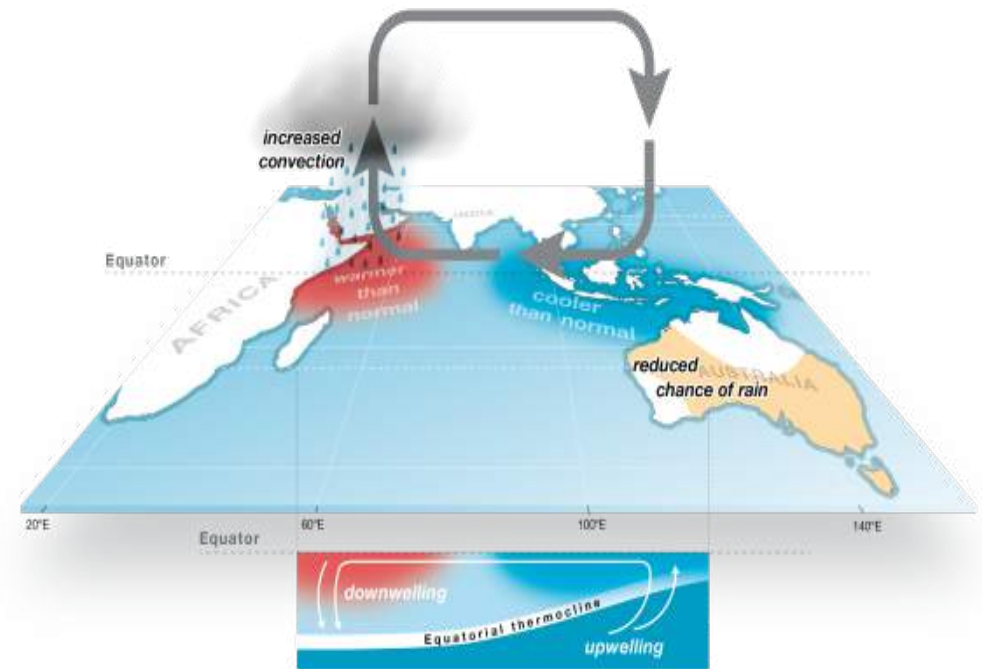
-ve SOI is El Niño, +ve is La Niña

Indian Ocean Dipole (IOD)



Negative phase

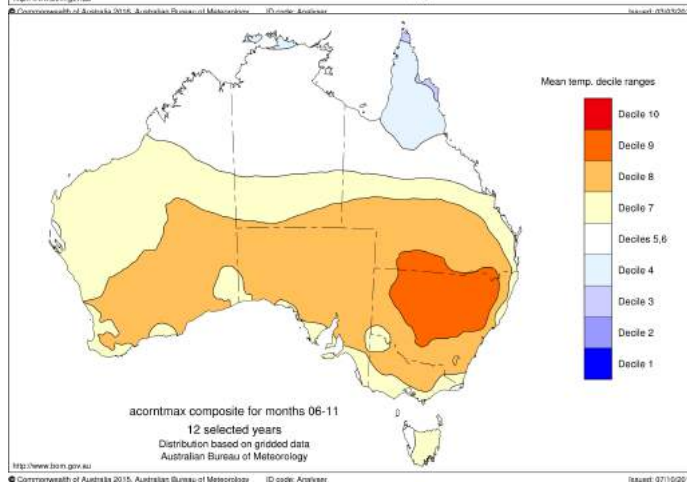
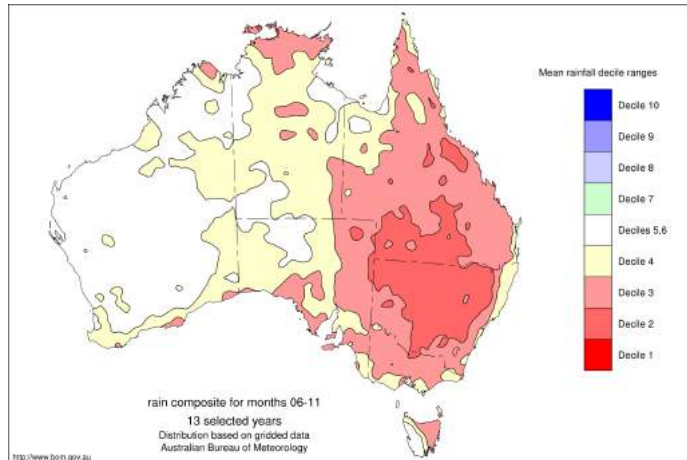
Positive phase in 2015
Negative phase in 2016



Positive phase

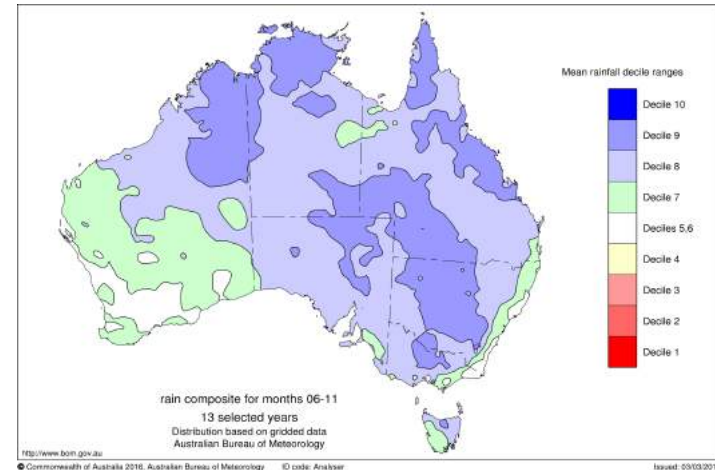
El Niño / La Niña impacts

El Niño

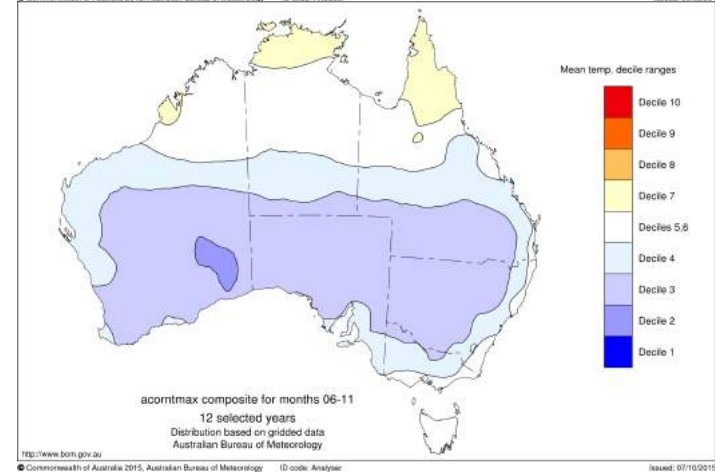


La Niña

Rainfall

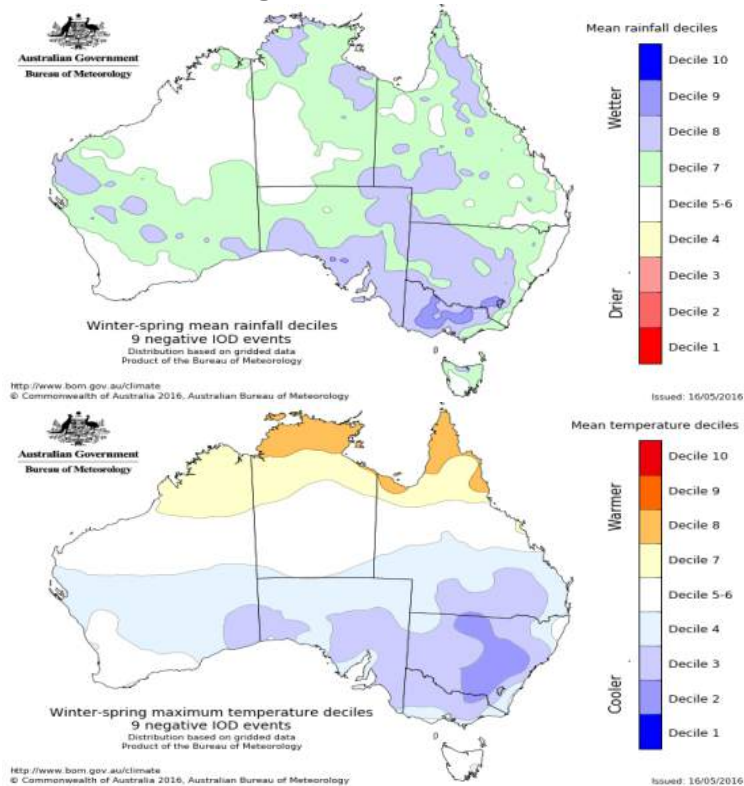


Maximum temperature

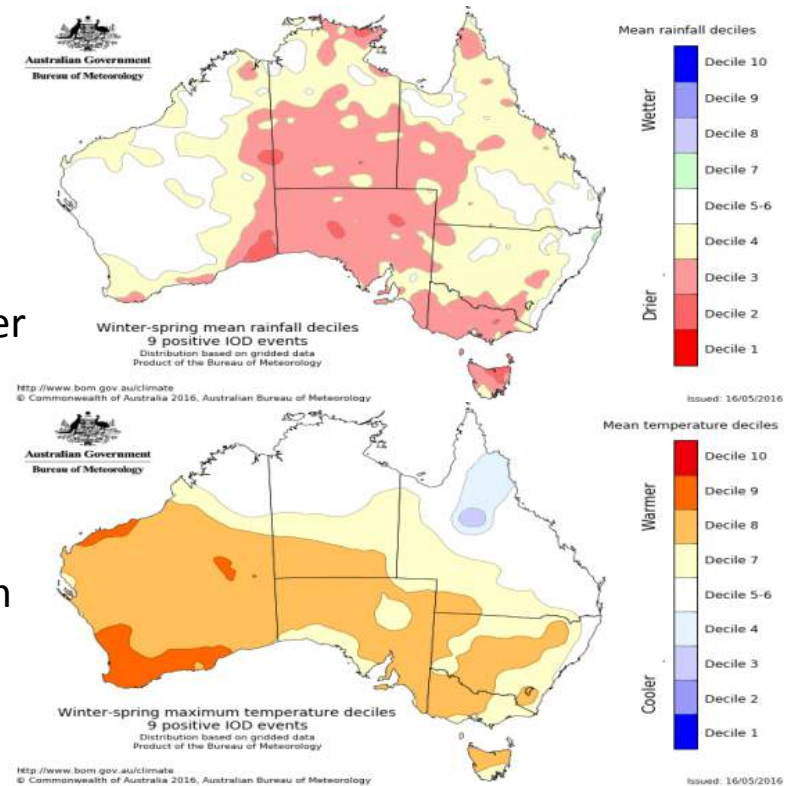


Indian Ocean Dipole impacts

Negative IOD



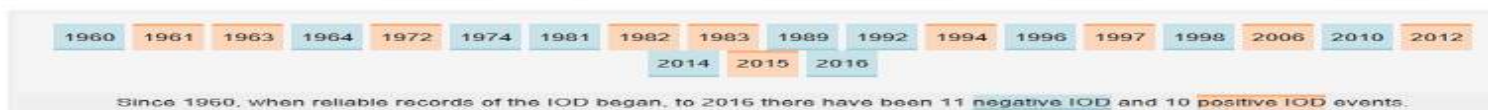
Positive IOD



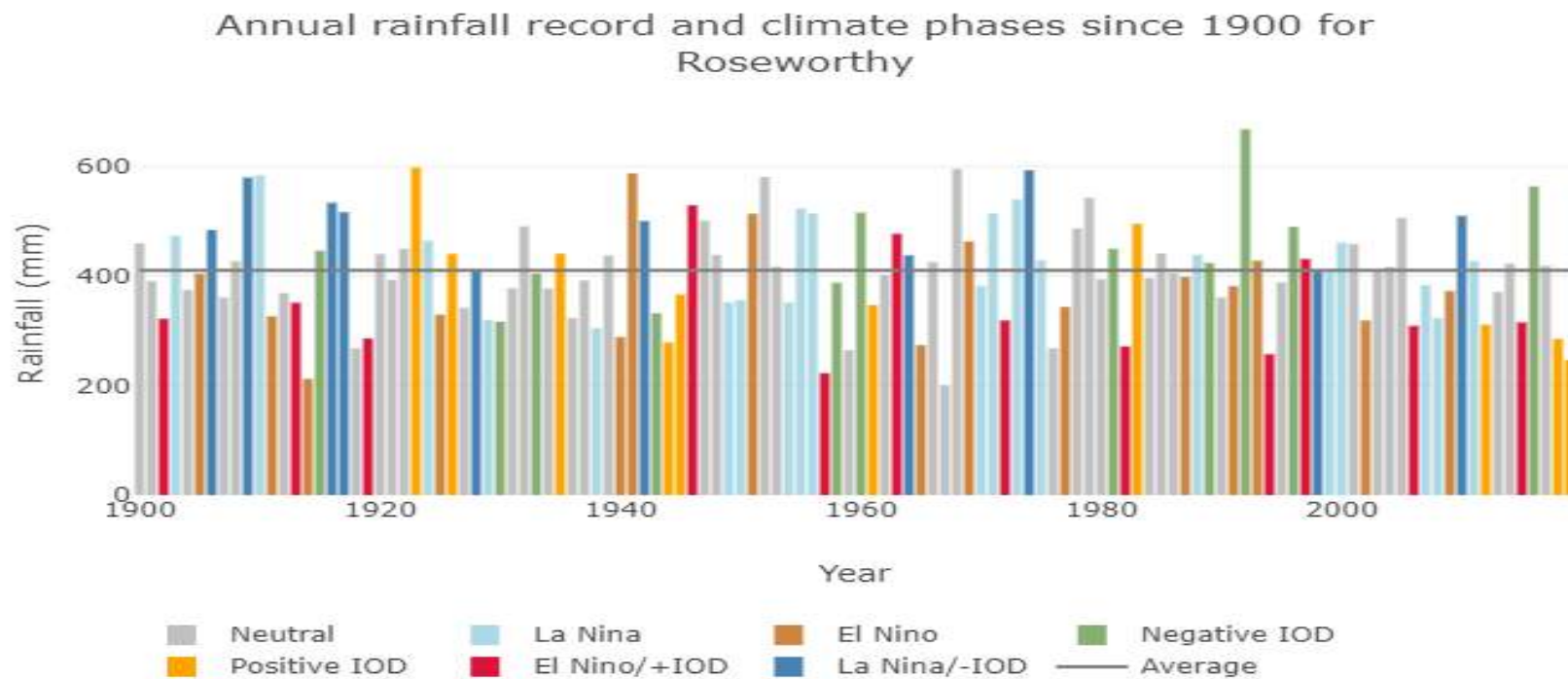
Also occurs every 4-7 years on average, starting during winter and ending in November

Can be predicted 3-4 months ahead by ocean modelling

Indian Ocean Dipole years



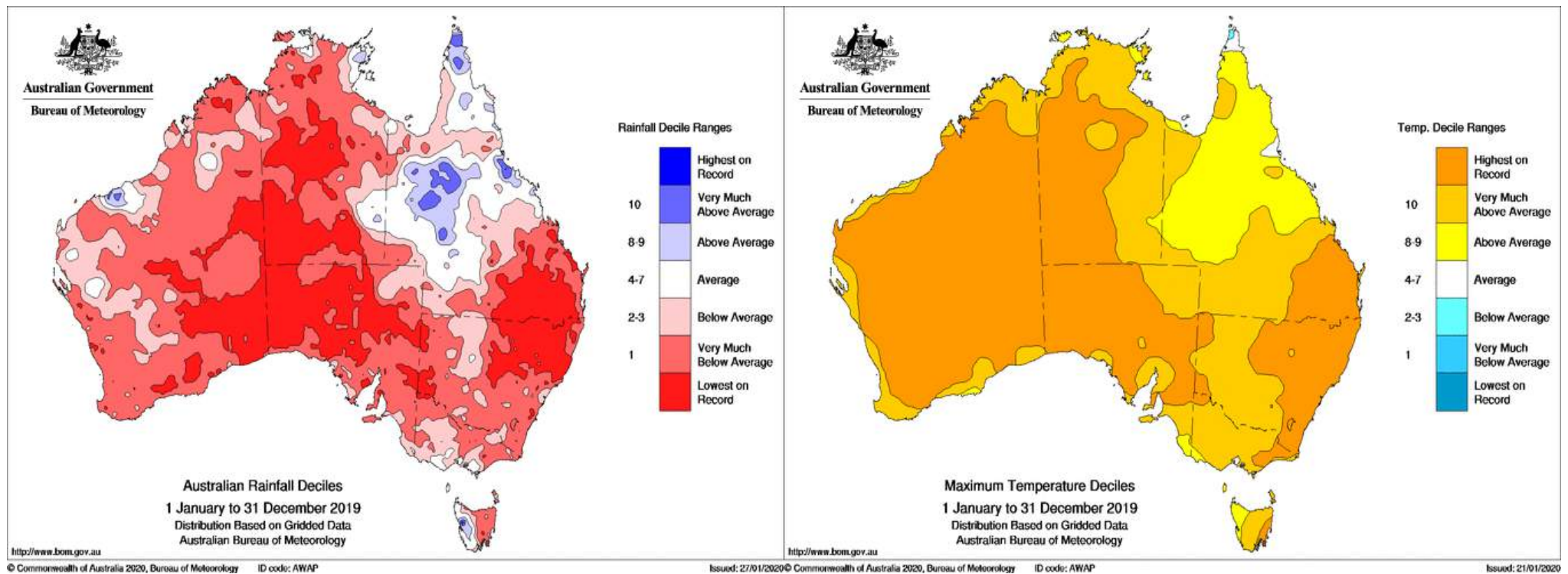
Local impacts of El Nino/La Nina/IOD



- <https://forecasts4profit.com.au/Local-Climate-Tool>

2019

Very strong Positive IOD was the dominant influence



IOD Index Time Series

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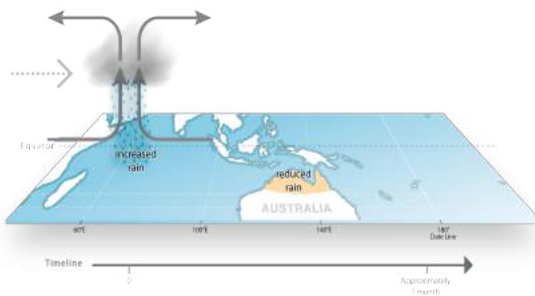


Madden Julian Oscillation (MJO)

- Pulses of tropical activity along the equator on a 4-6 week cycle
- Impacts tropical moisture feeds for rain events through Nov to Mar
- Phases 4/5 see increased rain, phases 1/ 2 hot conditions

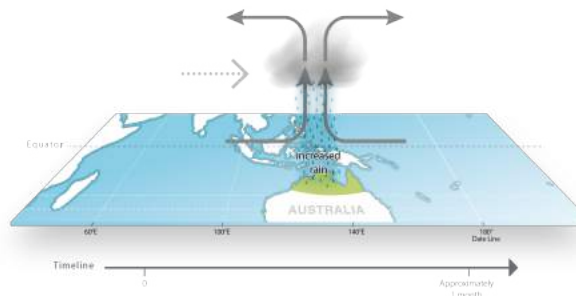
Madden-Julian Oscillation (MJO)

Example cycle: Week 1



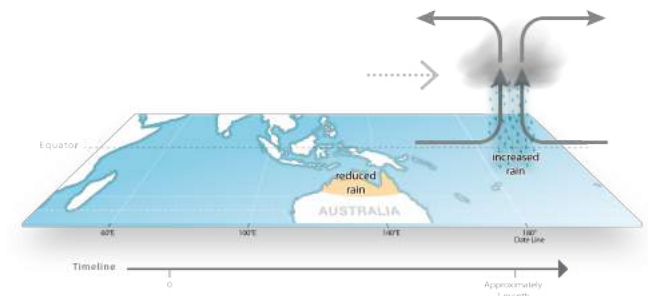
Madden-Julian Oscillation (MJO)

Example cycle: Week 2-3



Madden-Julian Oscillation (MJO)

Example cycle: Week 4-5

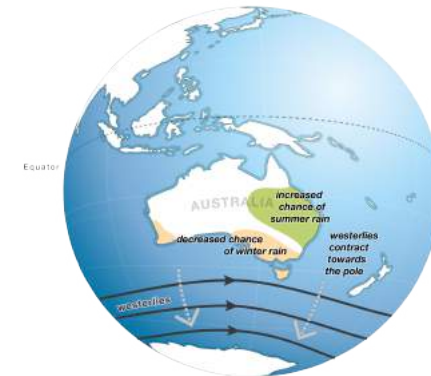


Southern Annular Mode (SAM)

- Measures how contracted cold fronts are moving around the South Pole – tighter is more positive SAM, more relaxed is negative SAM
- Negative SAM good for rainfall in winter, means drier conditions for spring and summer
- Positive SAM values drier in winter, a bit wetter in spring/summer
- Variations in SAM values from volcanoes, SSW, El Nino/IOD

Southern Annular Mode (SAM)

Positive phase



Australian Government
Bureau of Meteorology

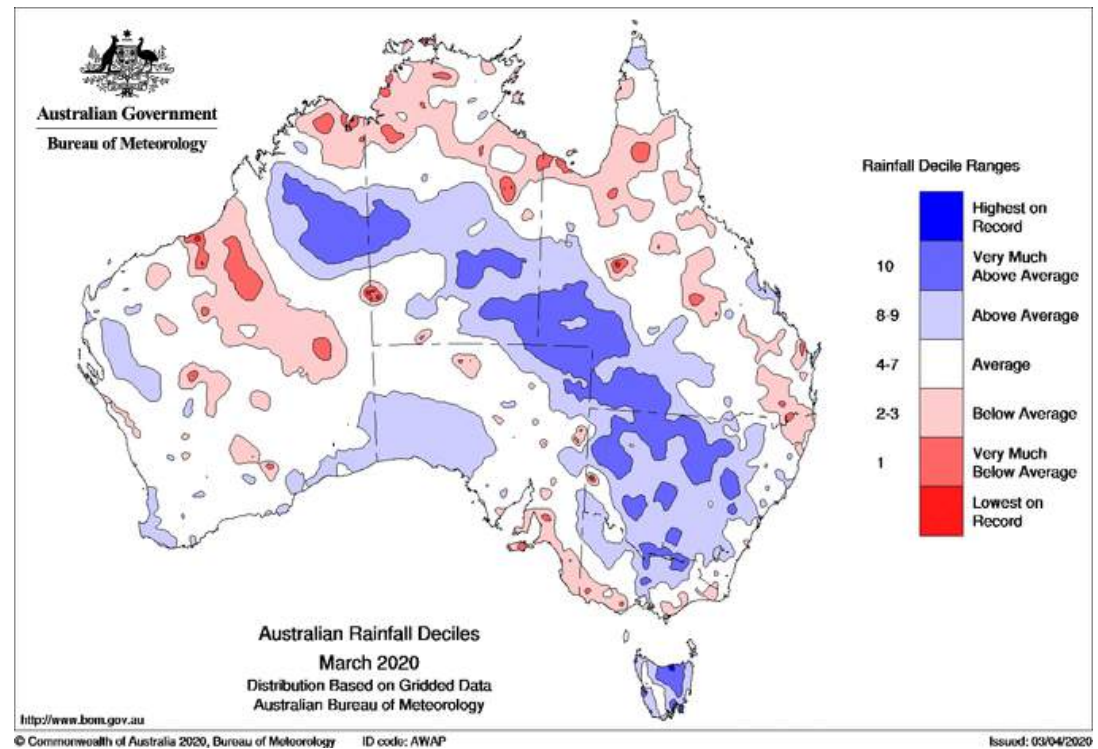
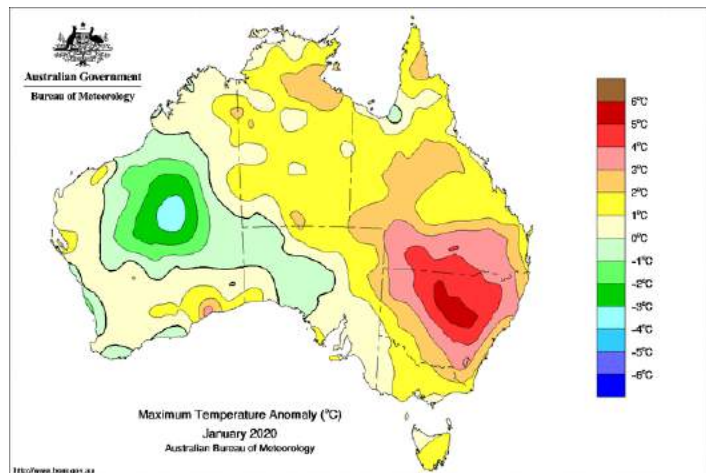
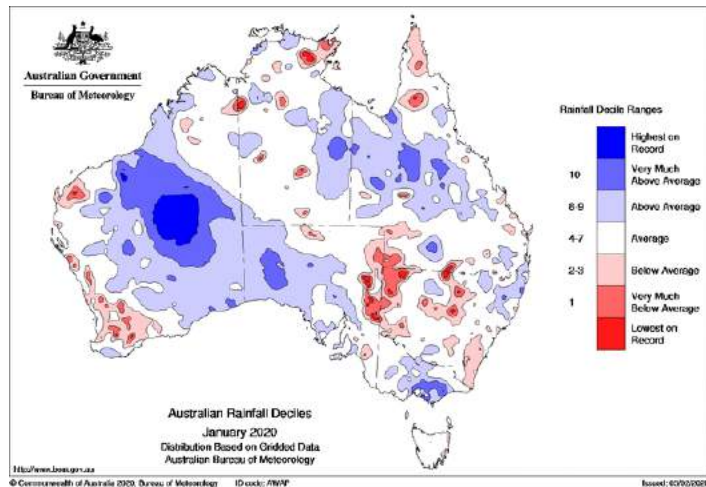
Southern Annular Mode (SAM)

Negative phase



Australian Government
Bureau of Meteorology

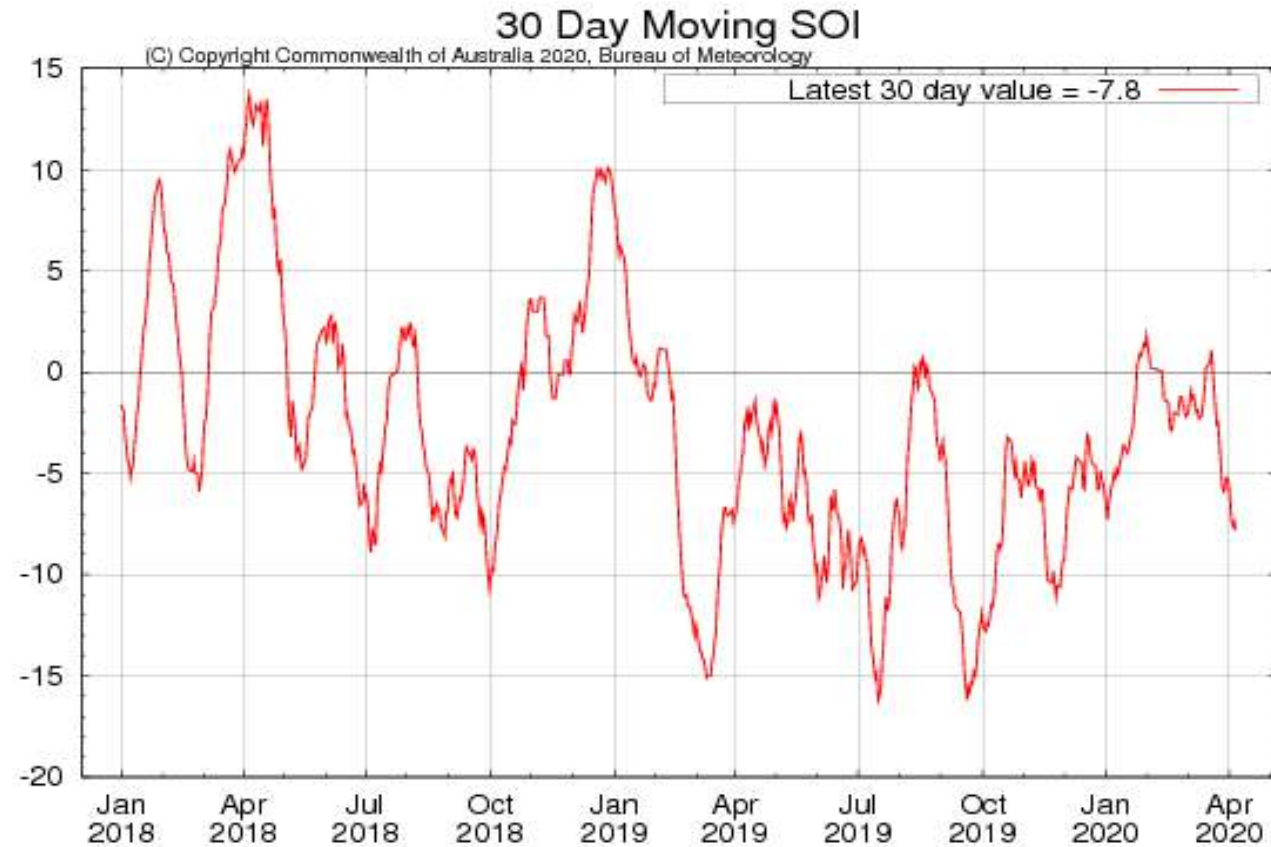
Current conditions and influences



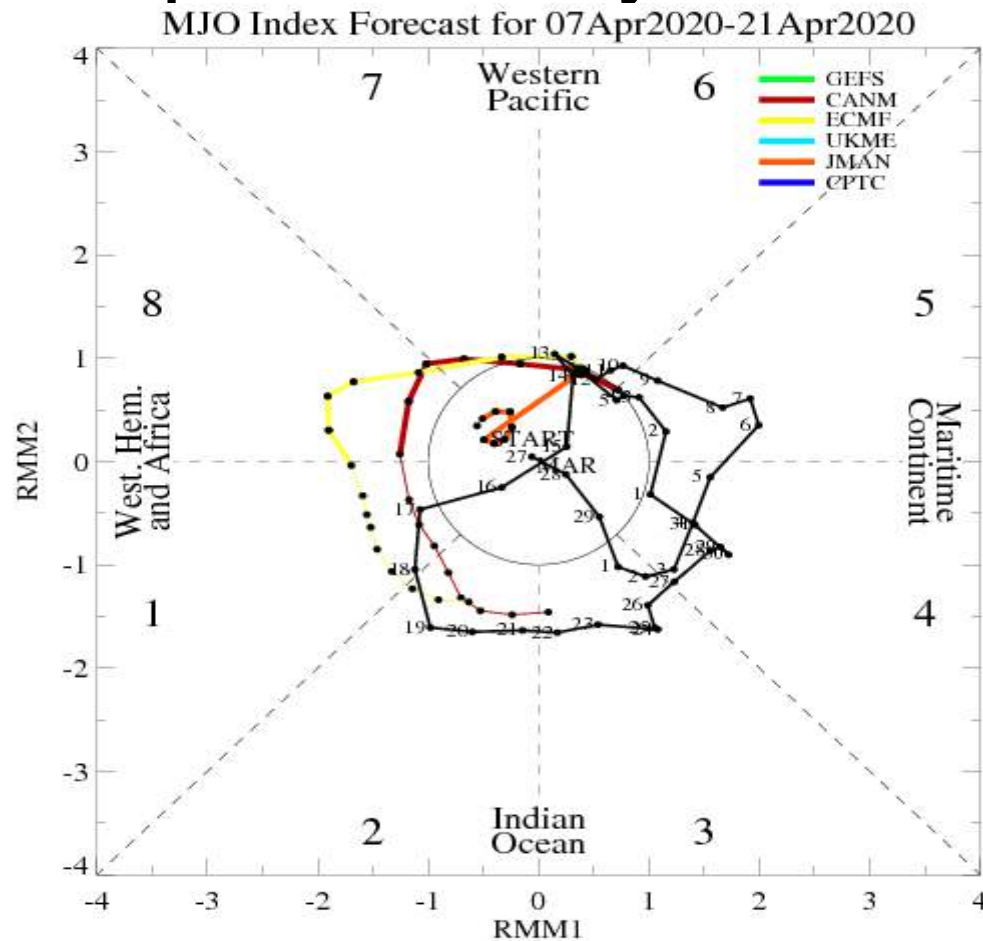
Strongly positive SAM was good for rain inland not for southern SA

Tropical activity - SOI

- -ve SOI indicates rainfall is suppressed



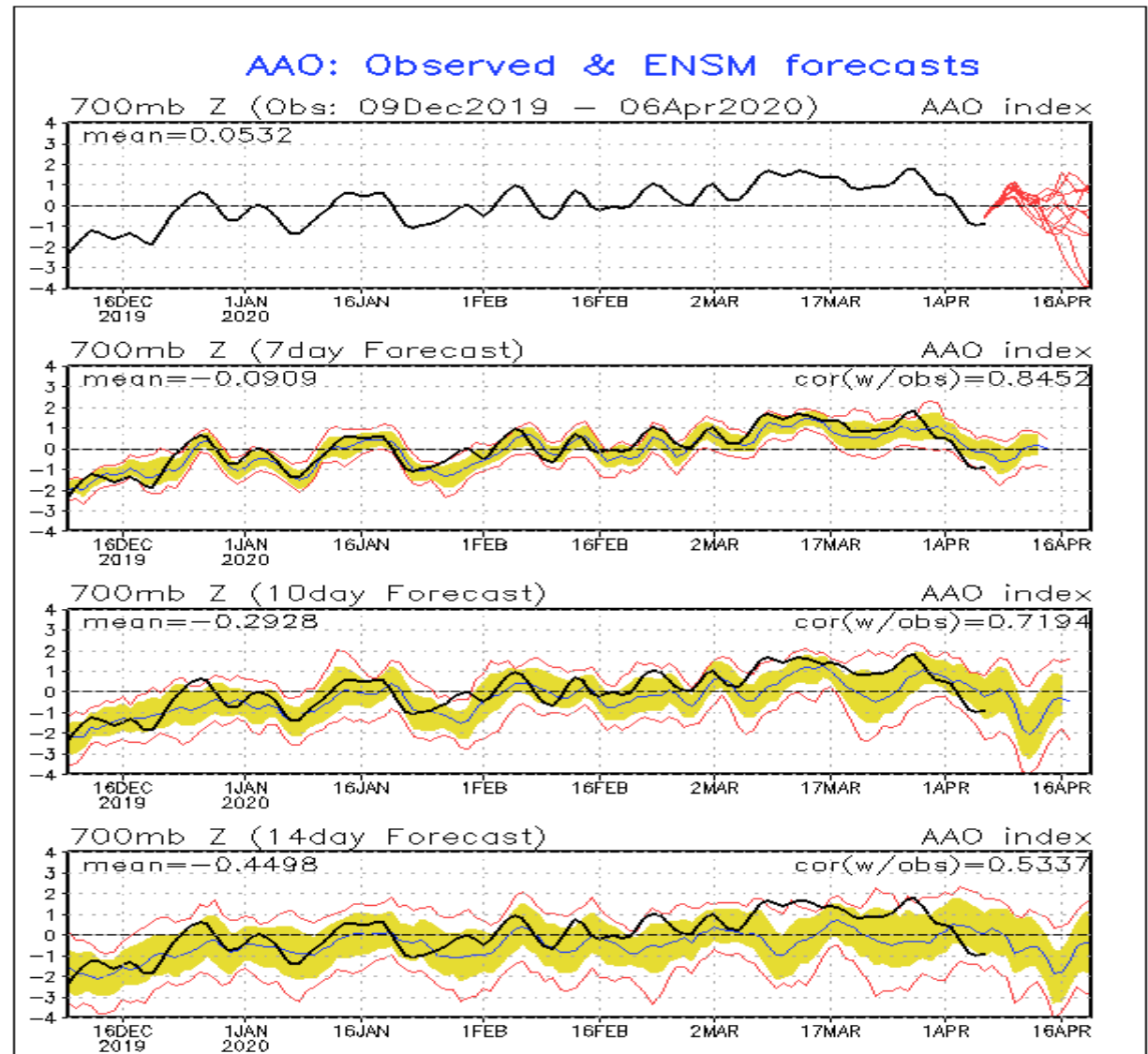
Tropical activity- MJO



- Phase 4/5 good for rain events – weak pulse just been through
- Currently moving into 6/7/8 where rain events are suppressed
- Not much support for decent rain events for a few weeks

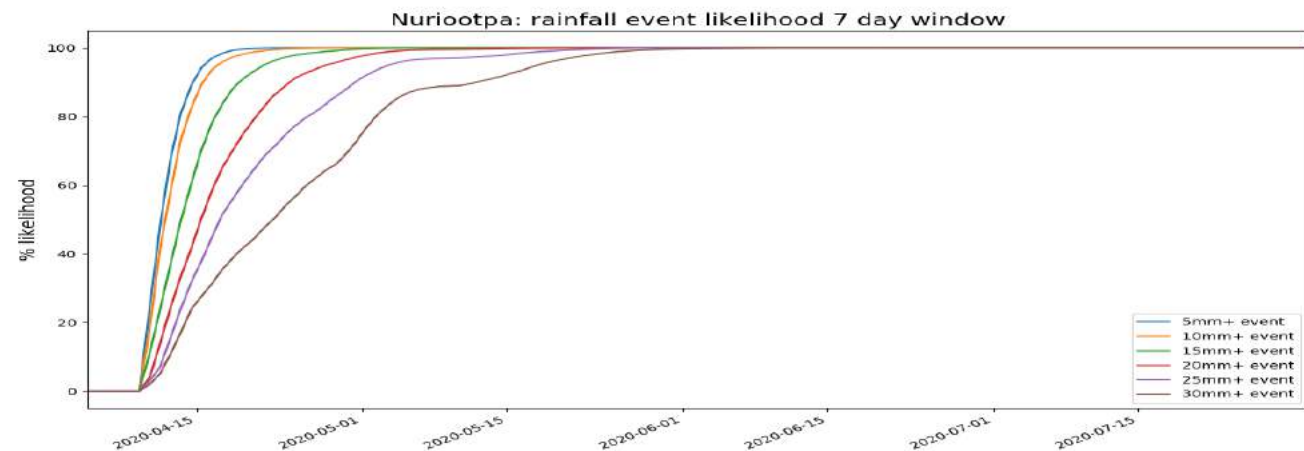
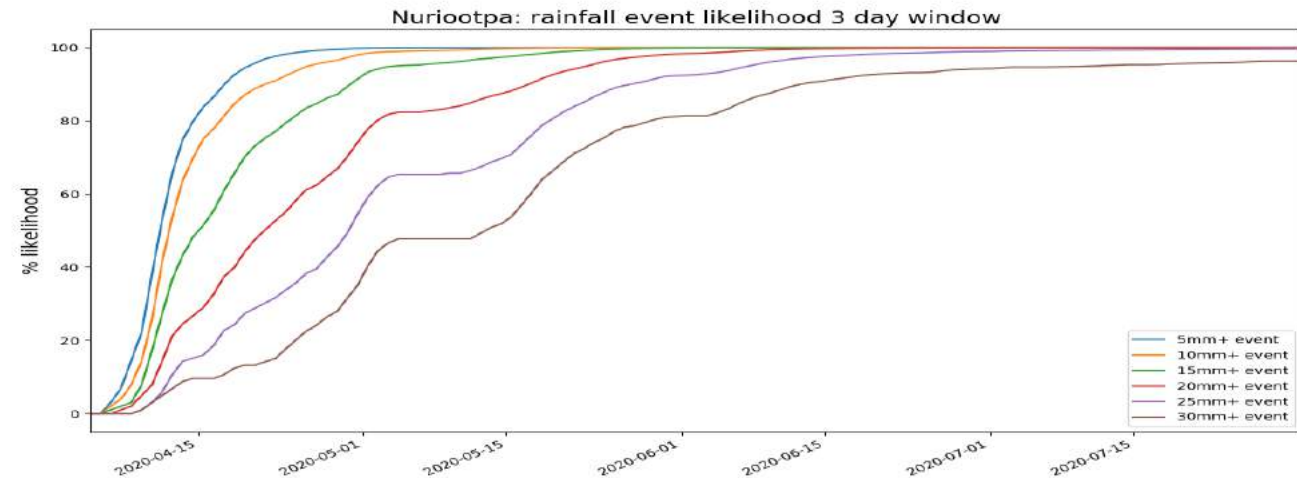
SAM/AAO outlook

- Looking for negative SAM at this time of the year
- Heading negative for mid-April meaning more frequent cold fronts

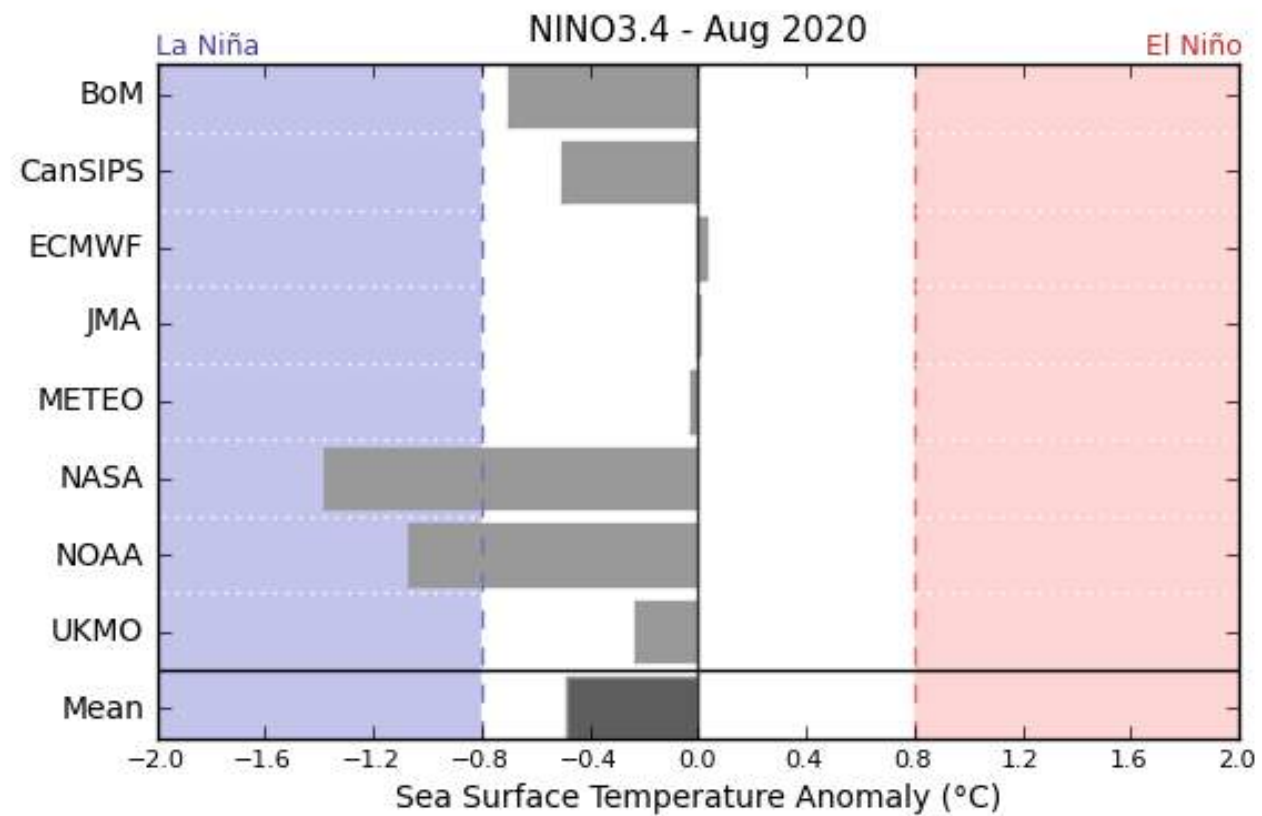


Likelihood of next significant rainfall event for Nuriootpa

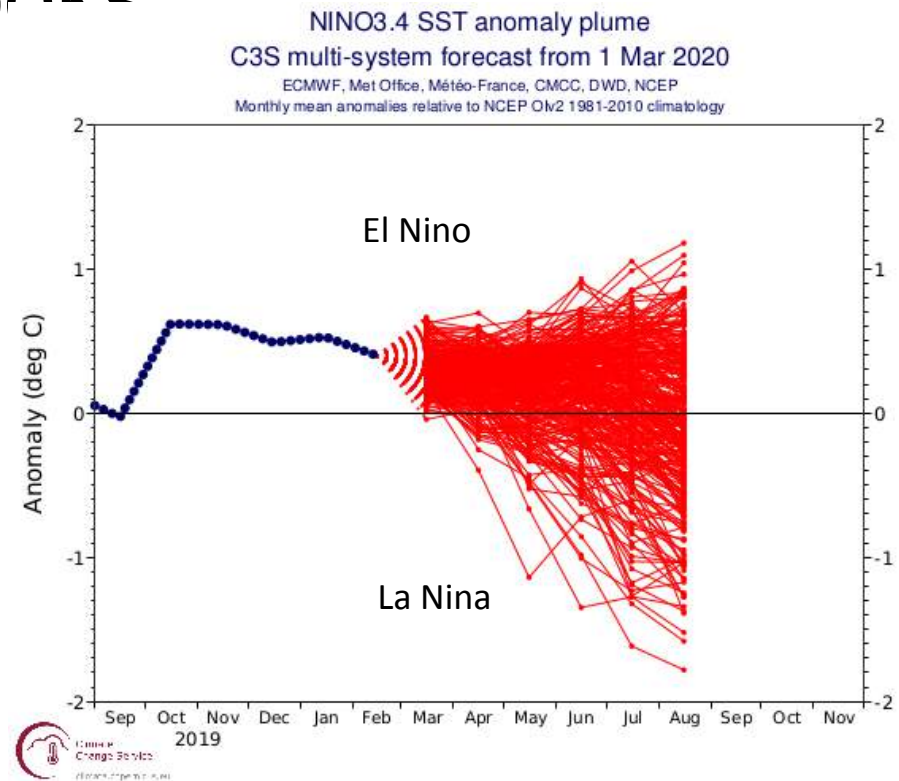
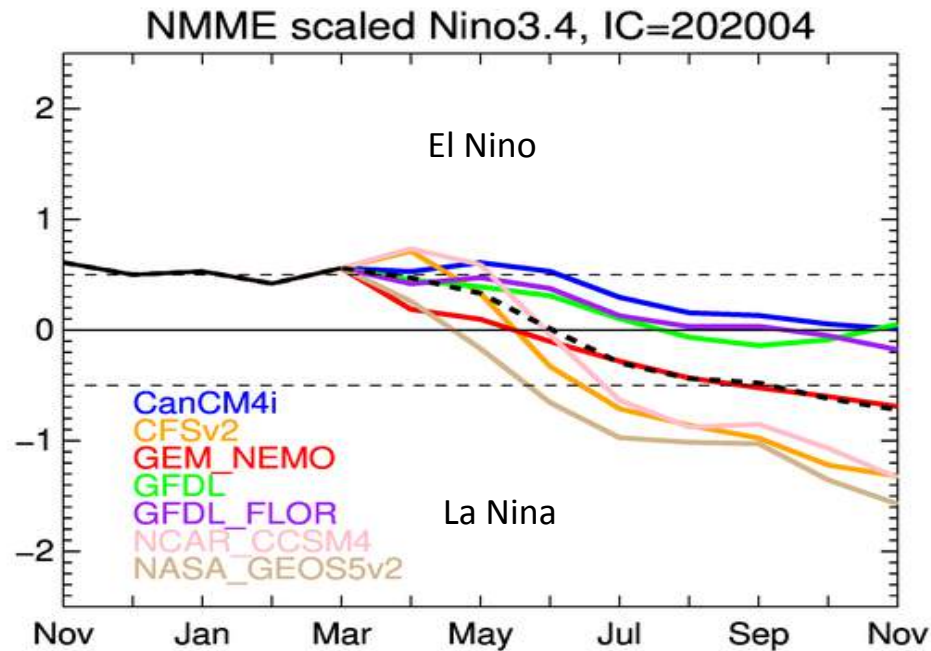
- Unlikely to get a 25mm + rain event in next few weeks but –ve SAM looks like bringing regular smaller rainfall through during late April and again mid-May



Pacific Ocean outlook



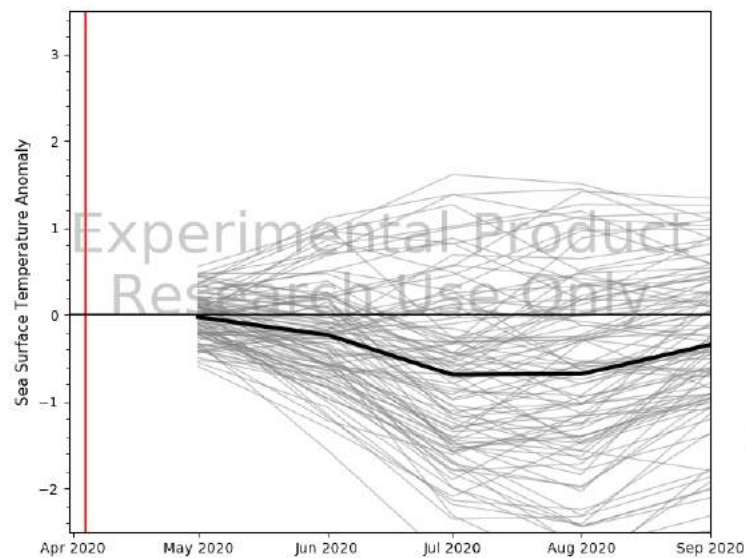
El Nino/La Nina Outlook



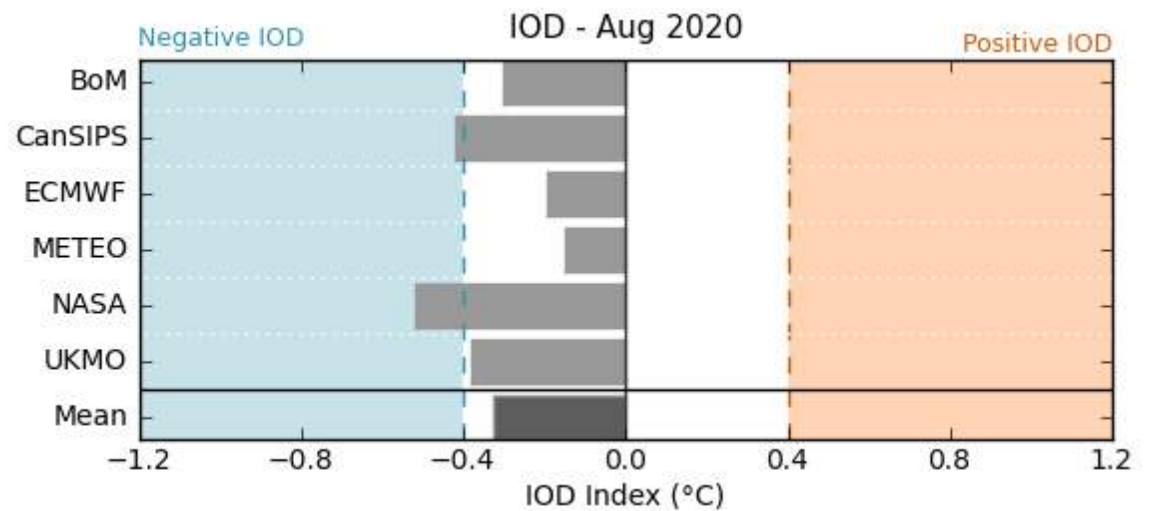
3 out of 13 models are going La Niña, but most are neutral to borderline La Nina

Indian Ocean outlook

ACCESS-S1 monthly IOD index
Region: Indian Ocean Dipole
Start: 202004
Period: 20200501 to 202011



Created: 2020-04-06 13:45:50 +0000 Climatology: 1990 to 2012 Resource: access-s1 / seasonal_dot_



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Neutral to borderline –ve IOD most likely

Longer term outlooks- temperature

C3S multi-system seasonal forecast

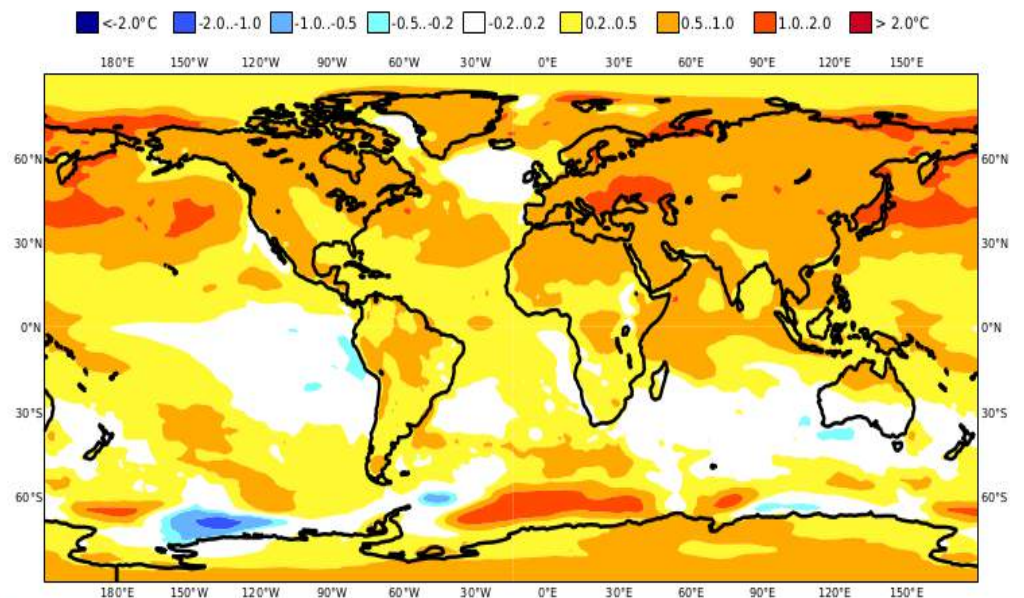
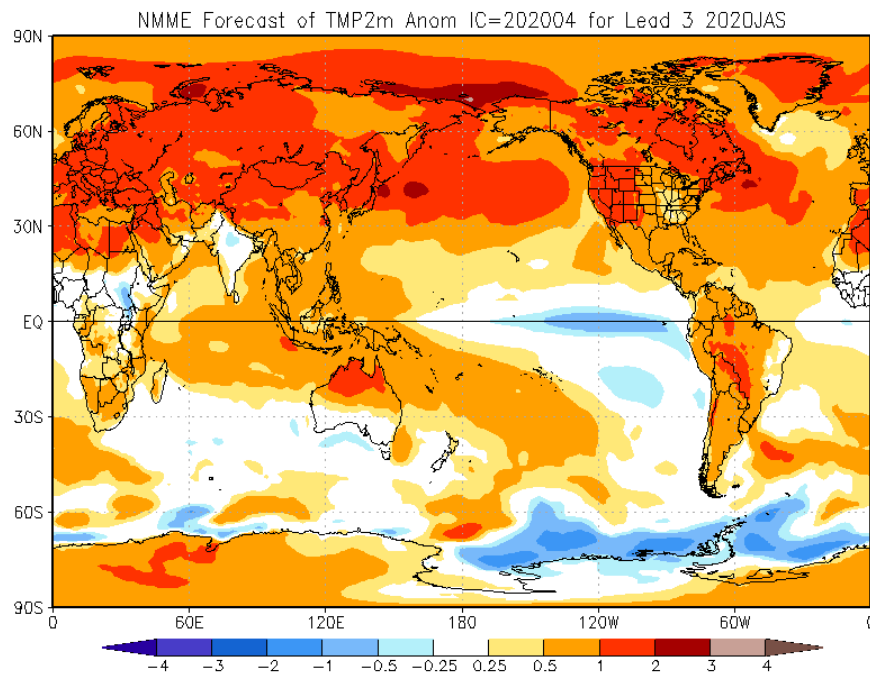
Mean 2m temperature anomaly

Nominal forecast start: 01/03/20

Variance-standardized mean

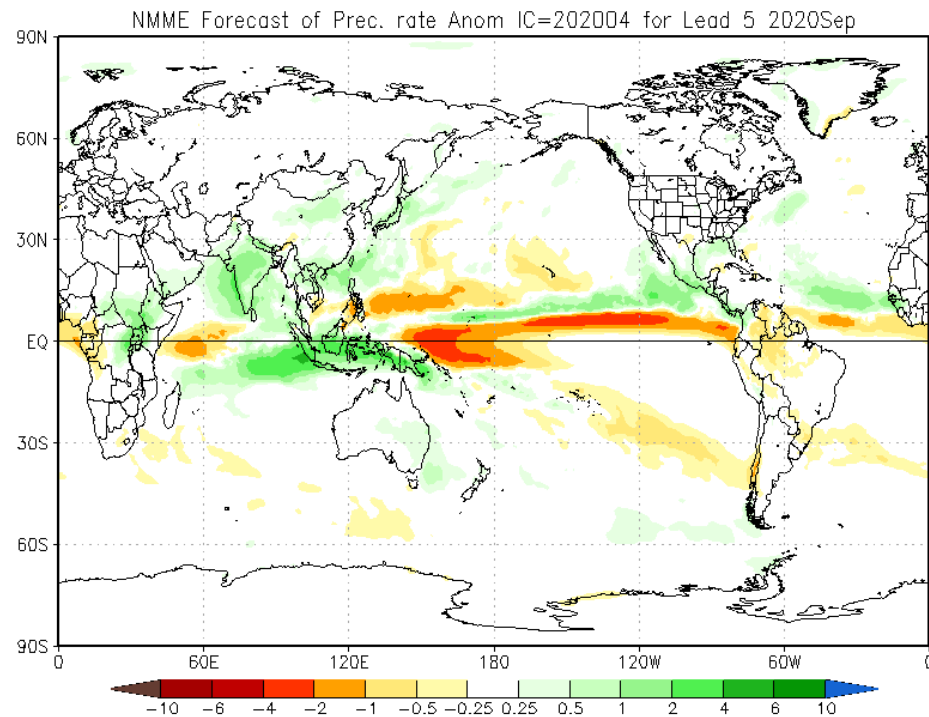
ECMWF/Met Office/Météo-France/CMCC/DWD/NCEP

JJA 2020



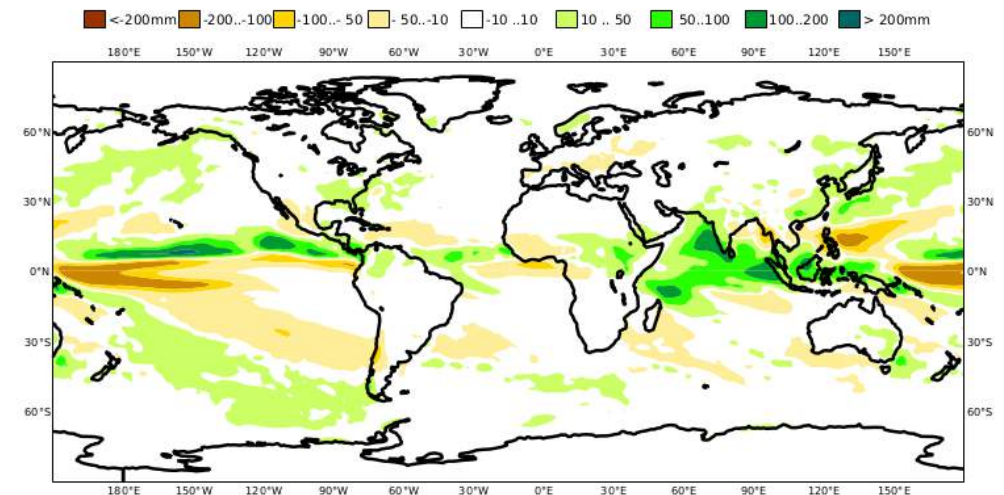
Near average to cooler conditions across southern SA

Longer term outlooks – rainfall

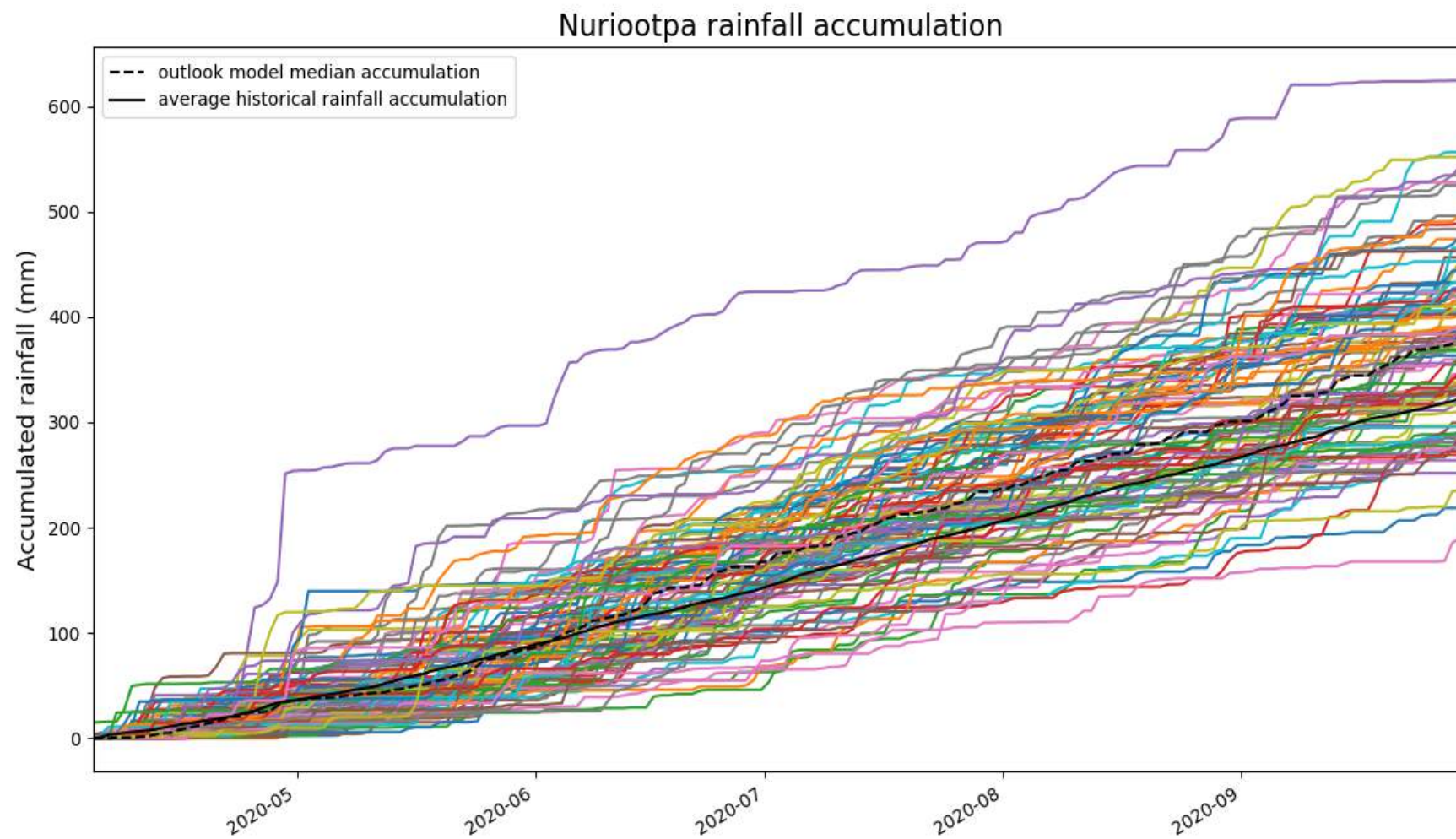


C3S multi-system seasonal forecast
Mean precipitation anomaly
Nominal forecast start: 01/03/20
Variance-standardized mean

ECMWF/Met Office/Météo-France/CMCC/DWD/NCEP
JJA 2020



Drier across top end, but moisture feeding across the west from the Indian Ocean through autumn and early winter



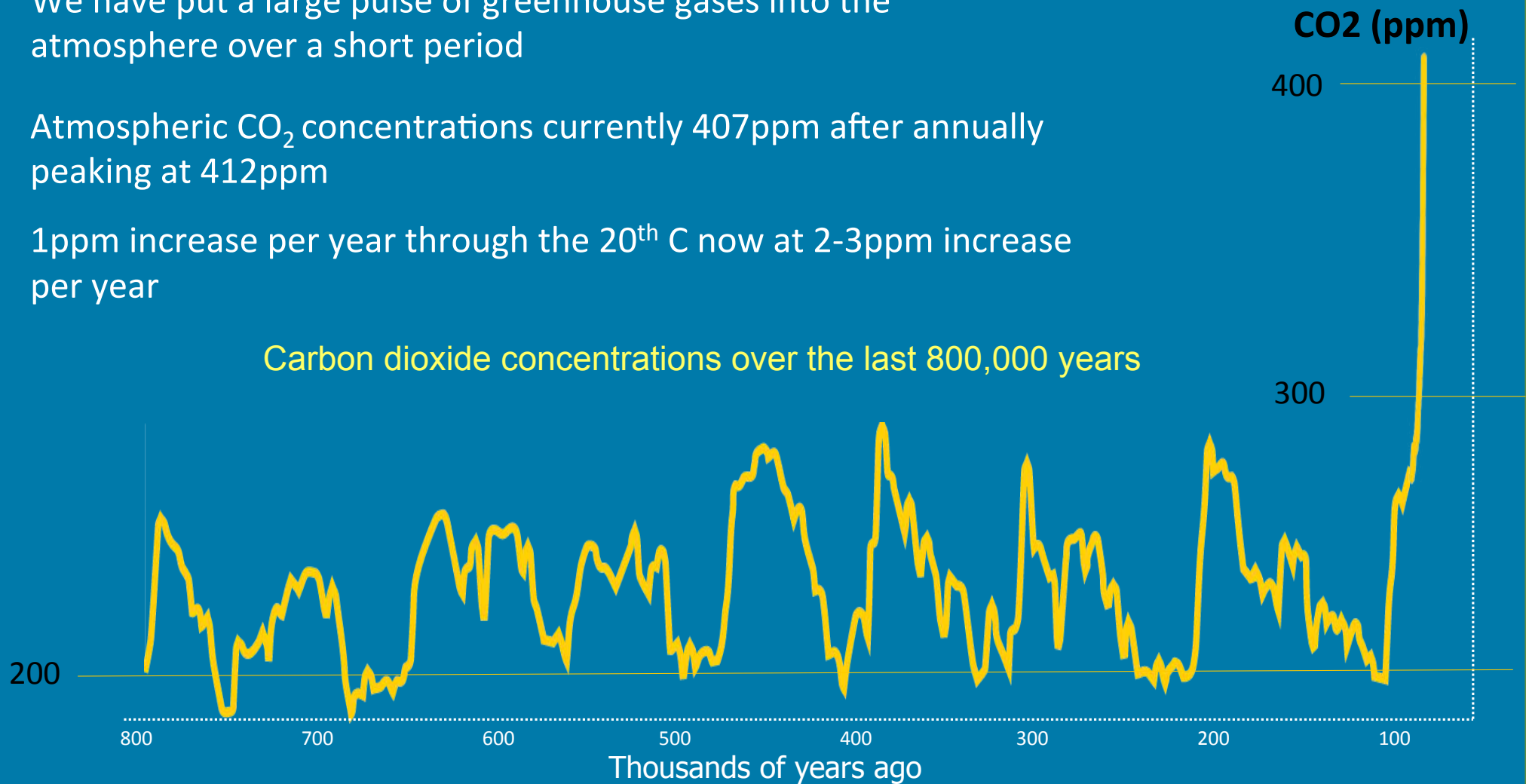
A little on the dry side until mid-May then slightly above average through the rest of the season

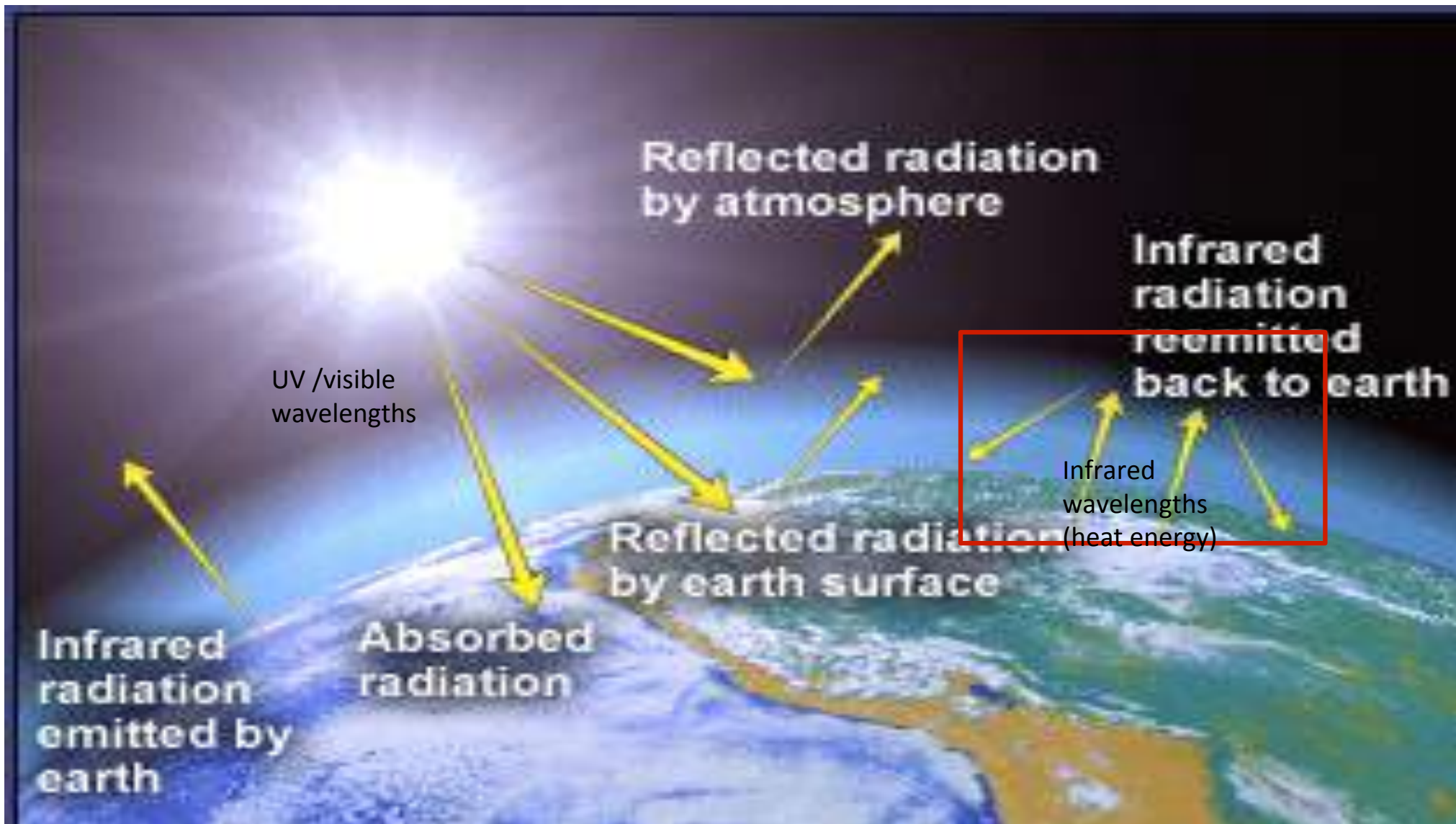
We have put a large pulse of greenhouse gases into the atmosphere over a short period

Atmospheric CO₂ concentrations currently 407ppm after annually peaking at 412ppm

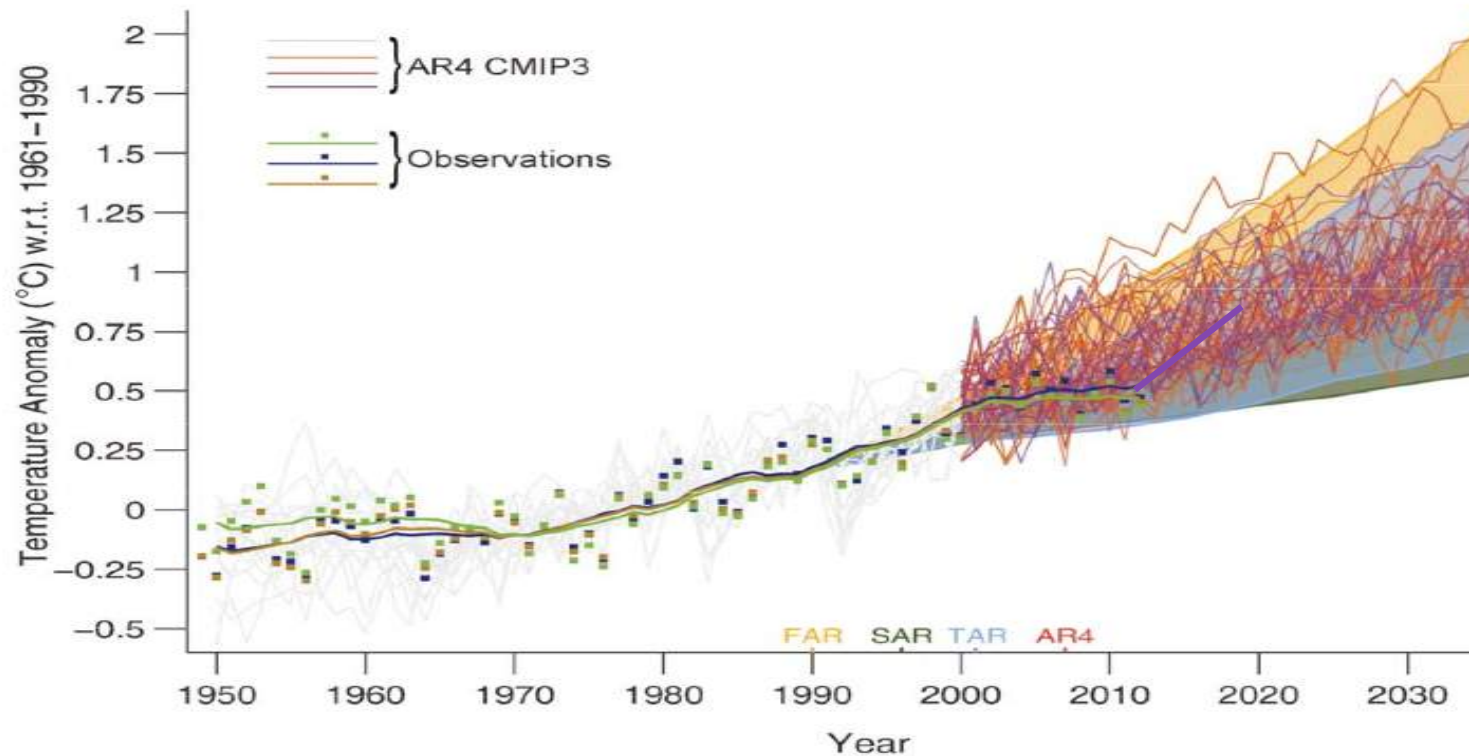
1ppm increase per year through the 20th C now at 2-3ppm increase per year

Carbon dioxide concentrations over the last 800,000 years

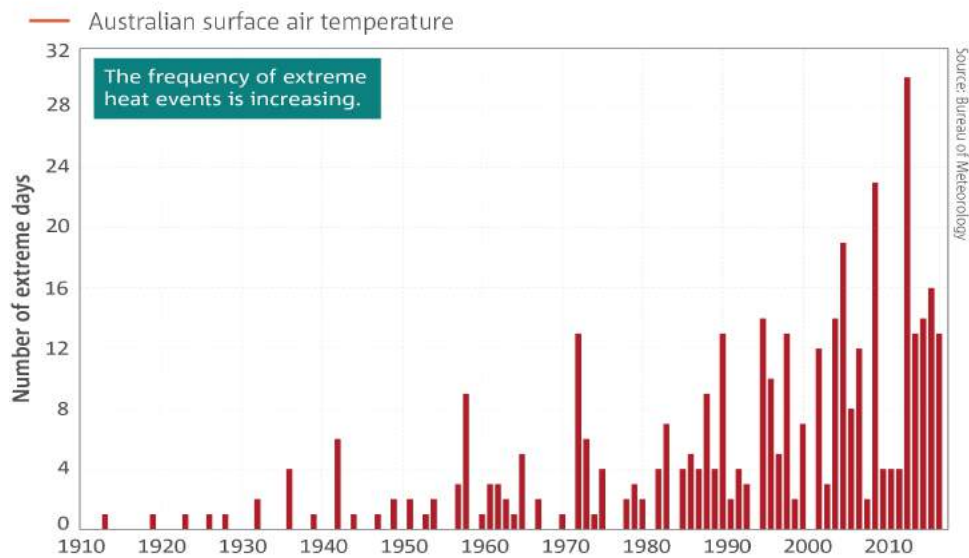
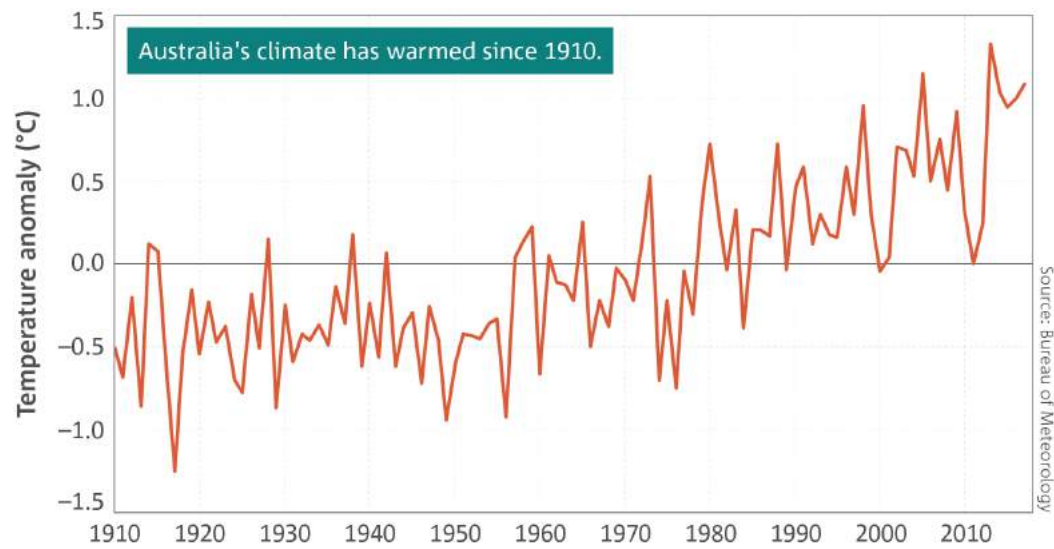




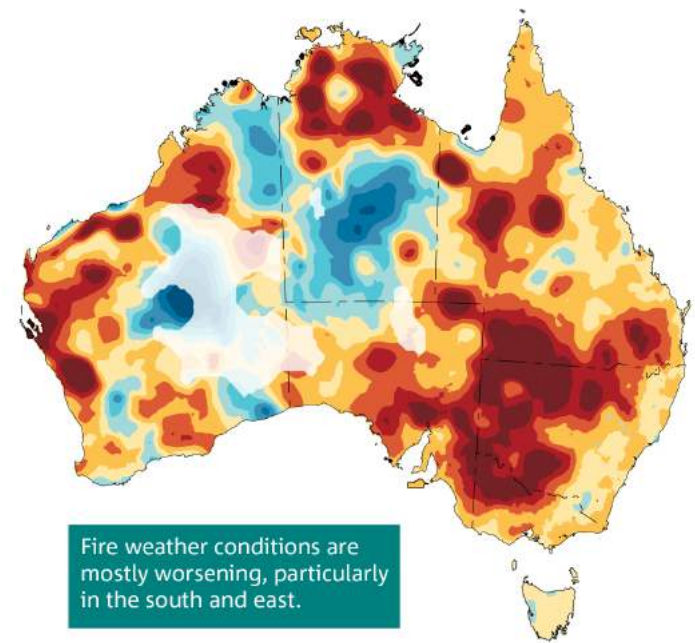
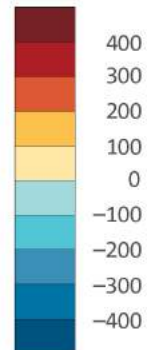
Climate change modelling



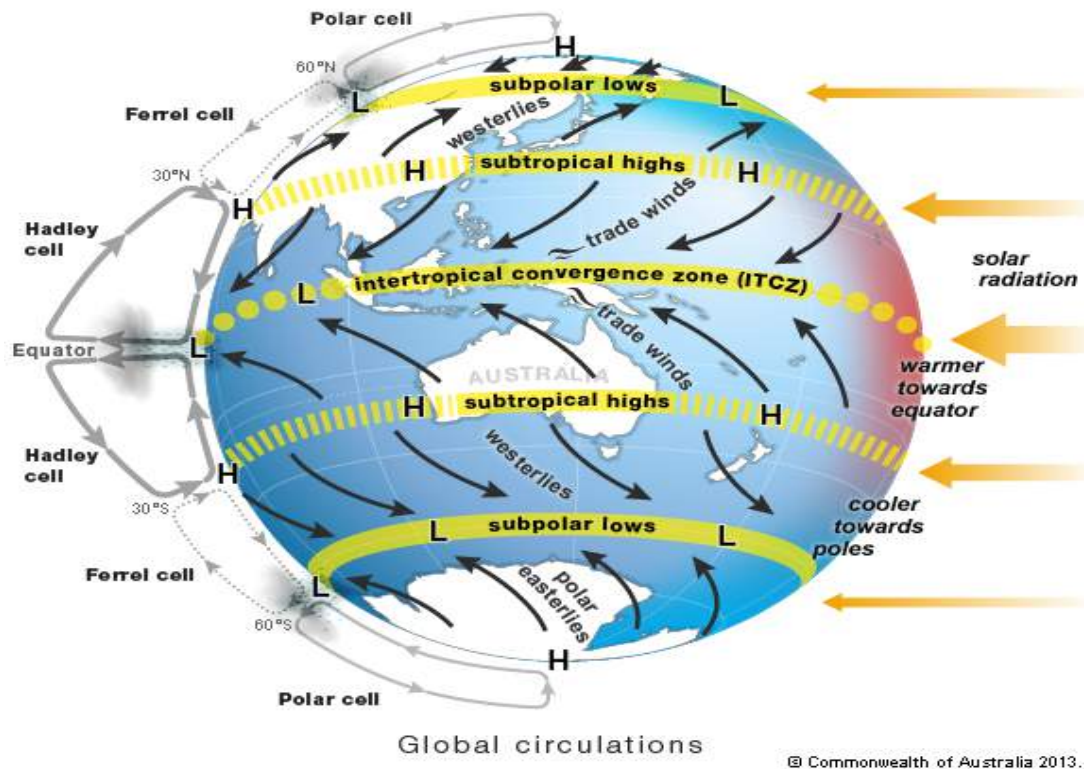
Earlier projections of warming from earlier IPCC reports (First Assessment Report – FAR and the Second and Third reports (SAR, TAR) are being seen in warming to date, after some slowdown in temperature rise through the period 2000-2013



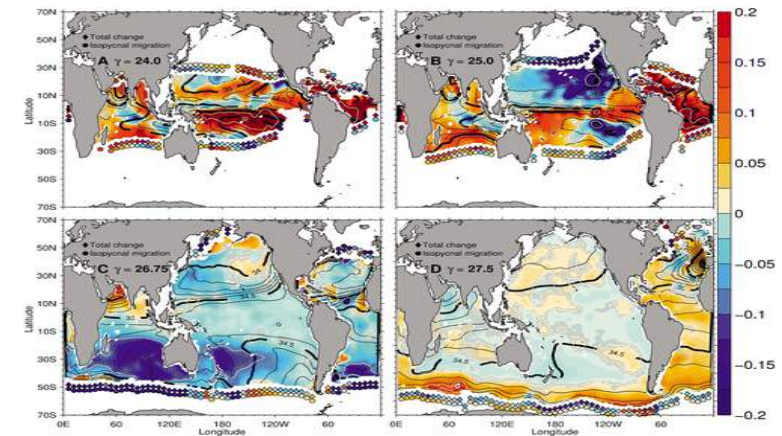
Forest Fire
Danger Index
points/decade



Influences on southern Australian rainfall

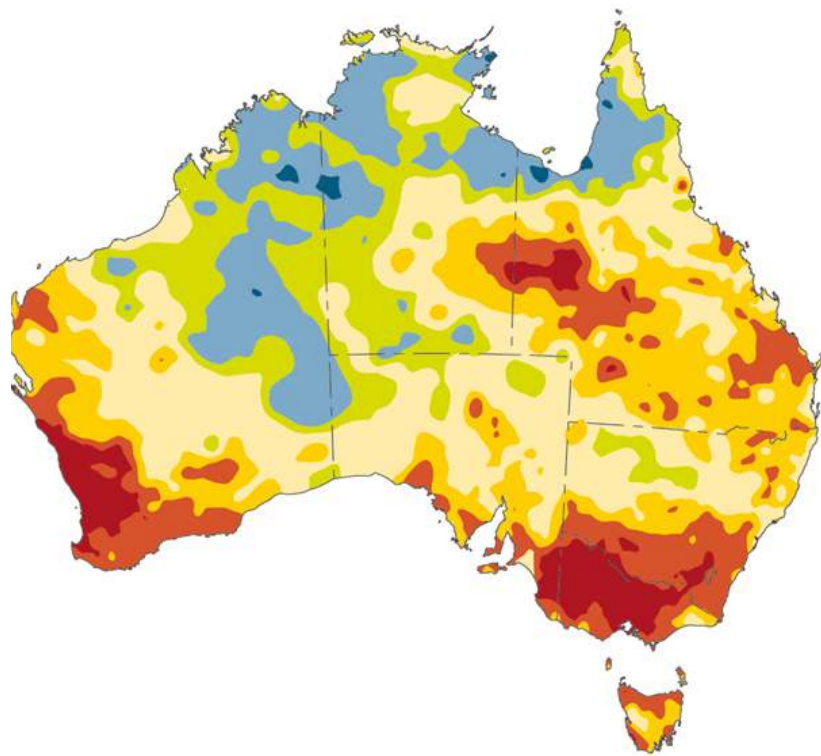


The Hadley Cell is expanding as the planet warms, meaning the tropics are widening and rain bearing cold frontal systems are staying further south in April to October

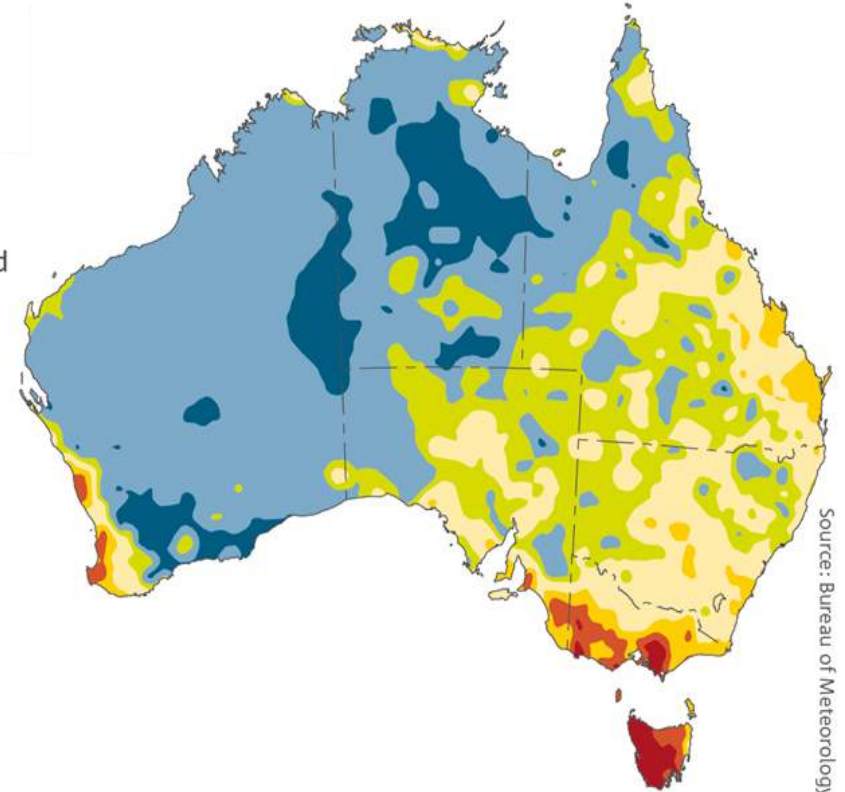
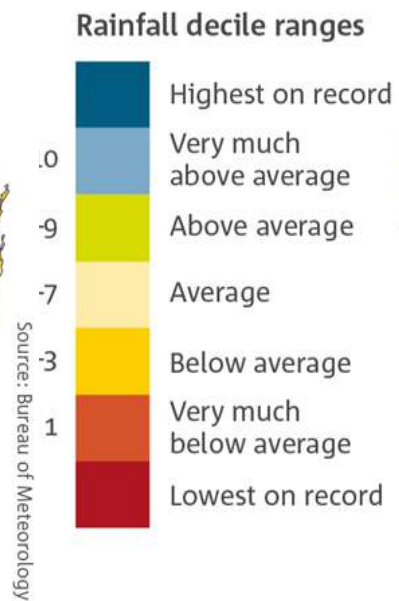


Trends in ocean surface salinity

Rainfall trends



April – October

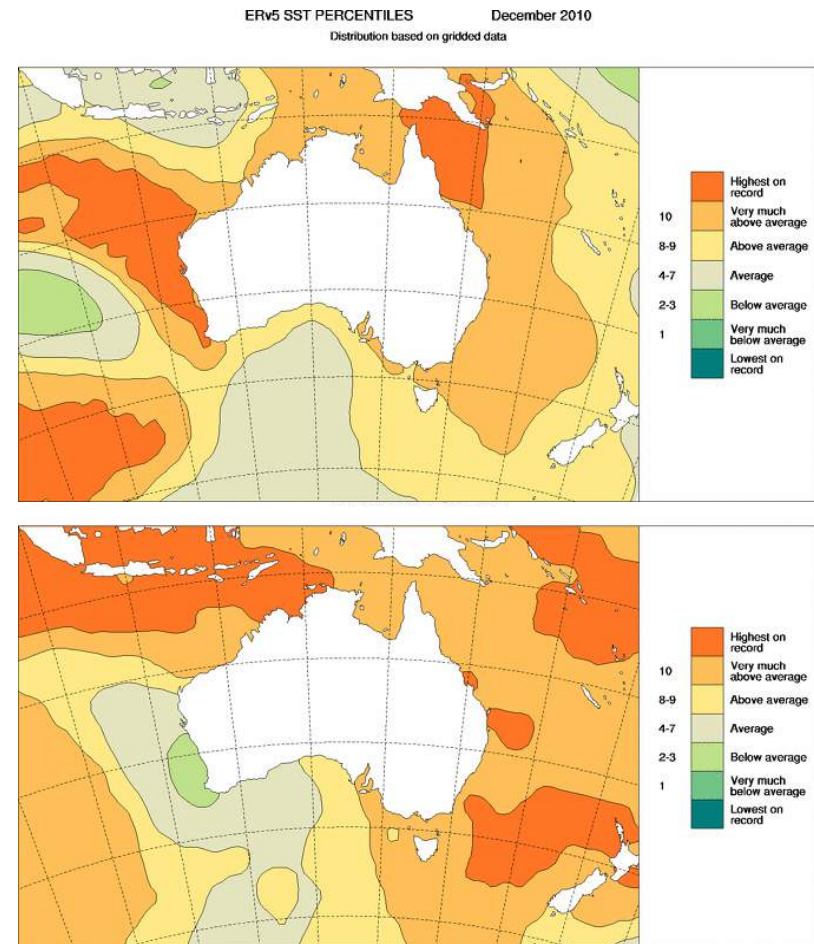


November-March

Source: Bureau of Meteorology

El Niño / La Niña under climate change

- Representation of El Niño/La Niña in climate change models is still not great
- In general more extreme events expected ie hotter/drier El Niño's and wetter La Niña's ie doubling under 1.5°C warming
- Area impacted expands
- 2010 La Niña was made worse by warmer oceans and increased humidity
- Record ocean temperatures supporting 2016 Negative IOD event

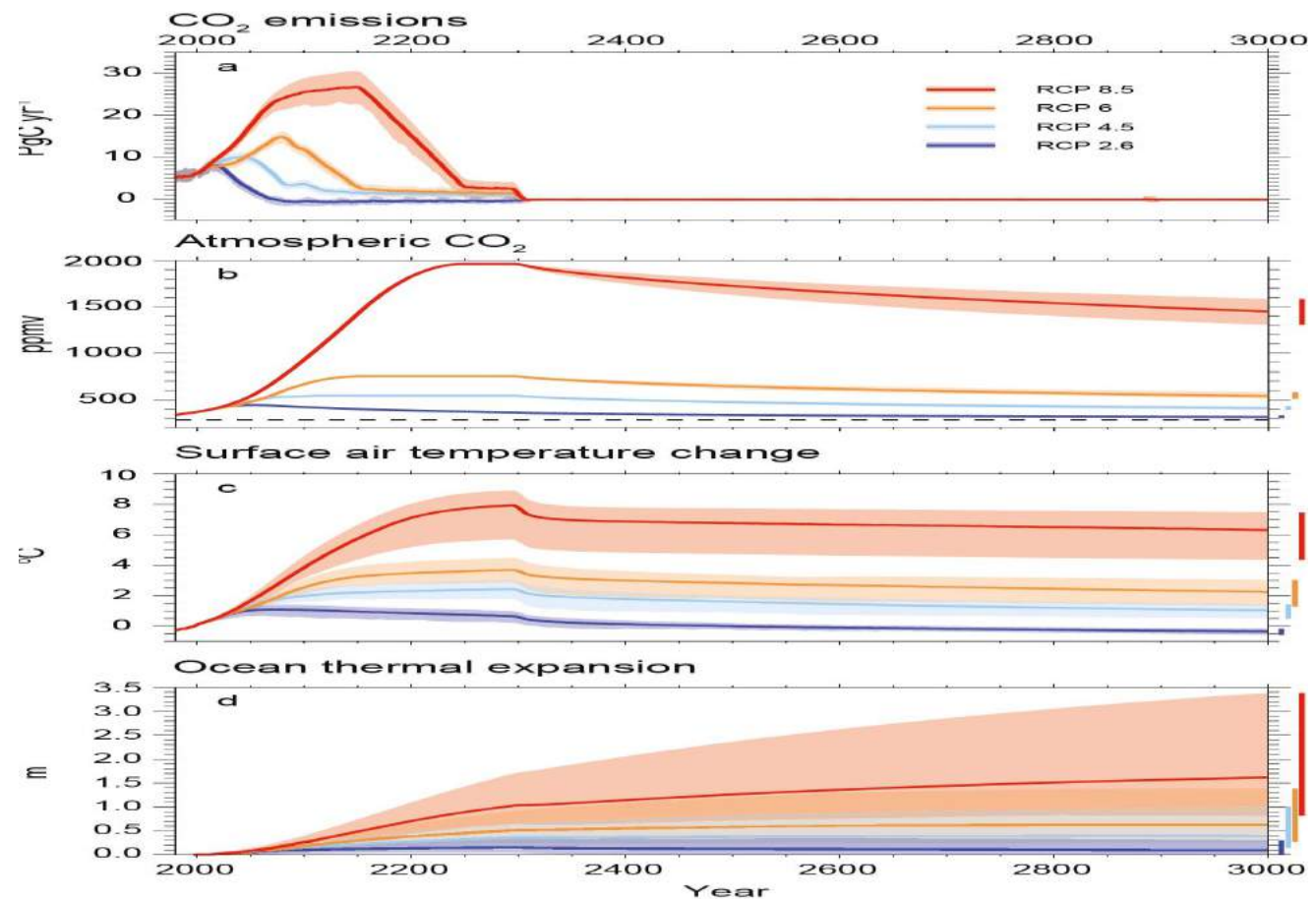


Both adaptation and mitigation are needed

2°C = Pliocene
(pre-2.6 million years ago)
around +12 to 25 metres

4°C = peak Miocene
(about 16 million years ago)
equilibrium sea levels of about
+40 metres

Climate change does
not stop at 2100



Summarising

- Dry and hot last year from a very strong Positive Indian Ocean Dipole
- Climate influences are now tending to borderline La Nina and tending slightly towards Negative Indian Ocean Dipole
- Remainder autumn looks average to cooler for temperature, warmer inland and across the north
- But tending a little drier to mid-May – less big events but more in frequent smaller events
- Rainfall tending a little above average through winter and spring – consistent with borderline La Nina
- Climate change is starting to impact. Finding ways to reduce and offset emissions will reduce the impacts

Thanks

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