

Northern Australia Climate Program

Centre for Applied Climate Sciences

Climate Outlook Review – Northern Australia

November 2019

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Overview

This is a review and opinion of various seasonal and other forecast systems currently available from a range of sources, from Australia and internationally.

Low rainfall probability values remain for central and the east coast regions of Queensland, but with higher values for parts of western Queensland and the Northern Territory.

In terms of three-month total rainfall, the SOI phase system indicates 20%-40% probability of exceeding the long-term median over most regions of eastern and northern Australia, with some regions having lower percentages (Please see map below). (Note also that the forecast issued for the total period October to December, still remains valid for that particular period).

The latest UK Met Office forecast output indicates low probability of exceeding median rainfall values for eastern and northern Australia for the November 2019 to January 2020 and December to February periods.

The ECMWF seasonal forecast indicates low rainfall probability values for the November 2019 to January 2020 and December to January periods. However, this model is indicating higher rainfall probability values across most of northern and eastern Australia for the February to April 2020 period.

The Bureau of Meteorology ACCESS model is indicating very low probability values of exceeding median rainfall (approx. 20% over almost all of eastern Australia, especially for the November 2019 to January 2020 period - with the exception of NW WA where probabilities are closer to 'normal' (climatology)).

Some of the longer-term dynamic climate models, that focus on forecasting central Pacific sea surface temperatures and El Niño, are hinting at a break to this drought pattern from late autumn 2020 onwards. We will update this advice as new information comes to hand.

The next MJO event is due again across our longitudes around mid-December.

The average Southern Oscillation Index (SOI) value for the month of October was close to Minus 5 (-5).

Please also note the forecast pasture growth map (courtesy Queensland Government) that utilises the integrated SOI phase system and a pasture growth model.

Probability of Exceeding Median Rainfall

November / January

Based on Consistently Negative phase
during September / October

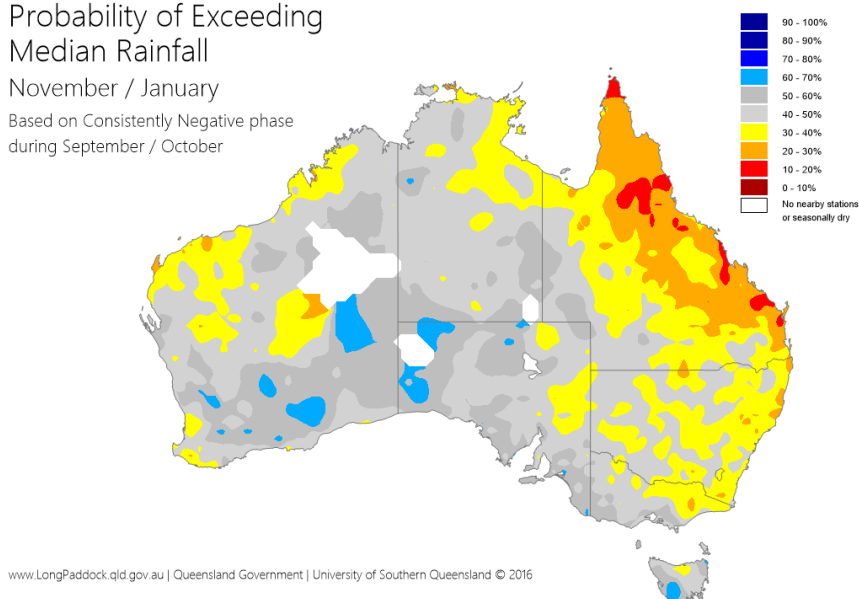


Figure 1: Using the SOI phase system in this example, the 'probability of exceeding median rainfall' values for Australia for the overall period November 2019 to January 2020 based on 'consistently negative phase' SOI pattern during September/October. Regions shaded grey have 40-50% probability of exceeding median rainfall. Regions shaded yellow have a 30-40% probability of exceeding median rainfall values relative to this period, whereas, regions shaded orange have a 20-30% probability of exceeding median rainfall.

Chance of Exceeding Median Growth November 2019 to January 2020

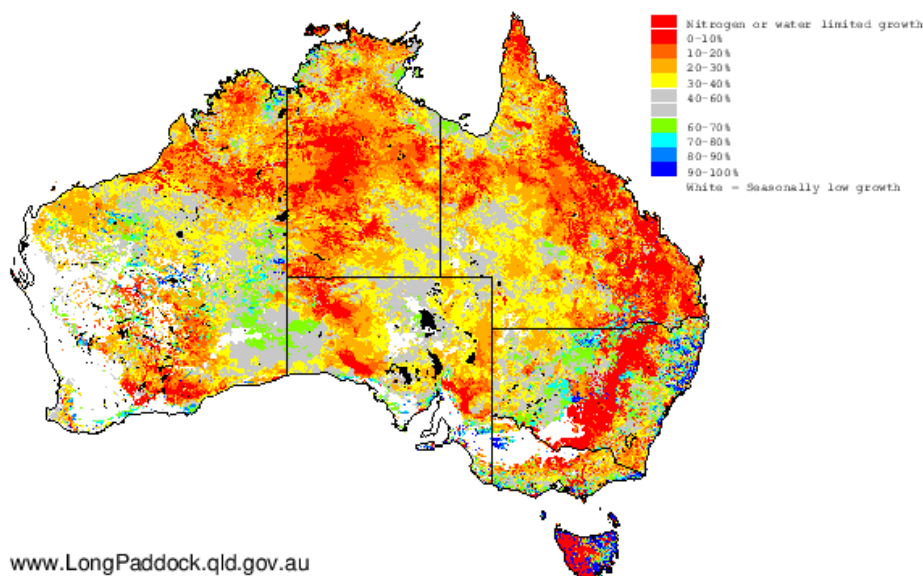


Figure 2: Chances of exceeding median pasture growth for Australia for November 2019 to January 2020 period (relevant to this period of the year). This output integrates antecedent moisture and forecast rainfall, temperature, within a pasture growth model and the SOI phase forecast system.

The Southern Oscillation Index:

The Southern Oscillation Index (SOI) is an index based on the difference between surface pressure anomalies between Tahiti and Darwin.

The SOI phases (constructed using principal components and cluster analysis) consists of five different categories that take into account both rate of change and consistency in the SOI.

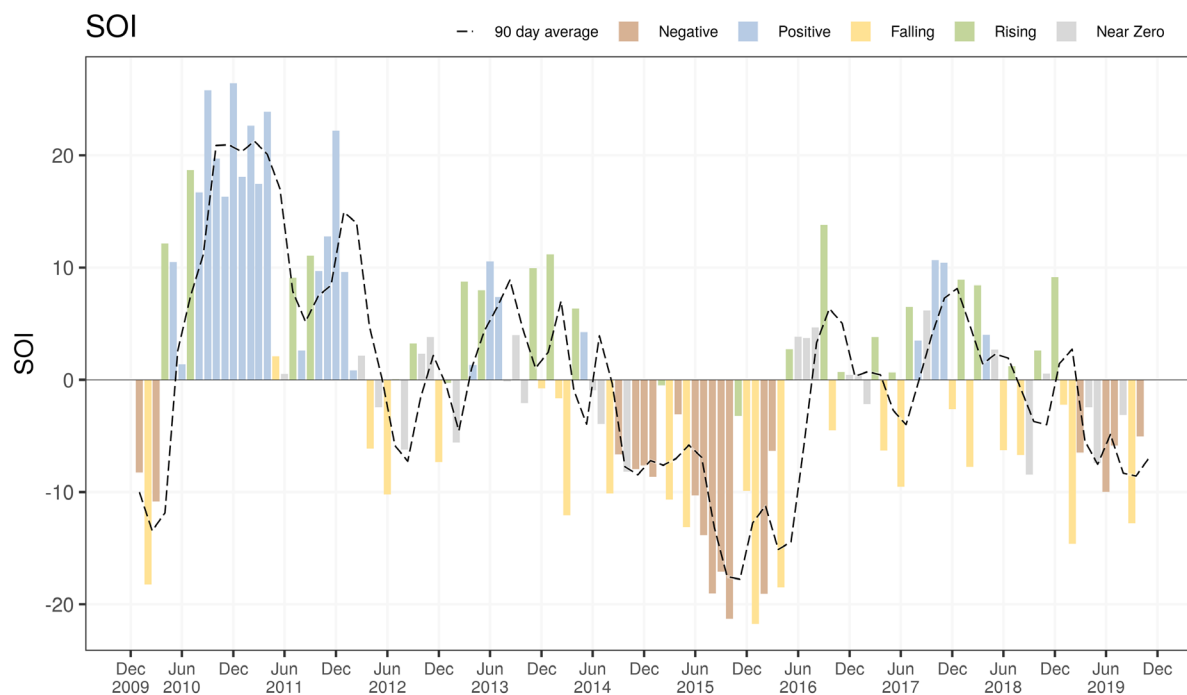


Figure 3: Monthly SOI values since January 2010 – the most recent phase was 'Consistently Negative' phase. The most recent 30-day average value to 31 October, was close to minus 5 (-5).

Australian Bureau of Meteorology forecasts:

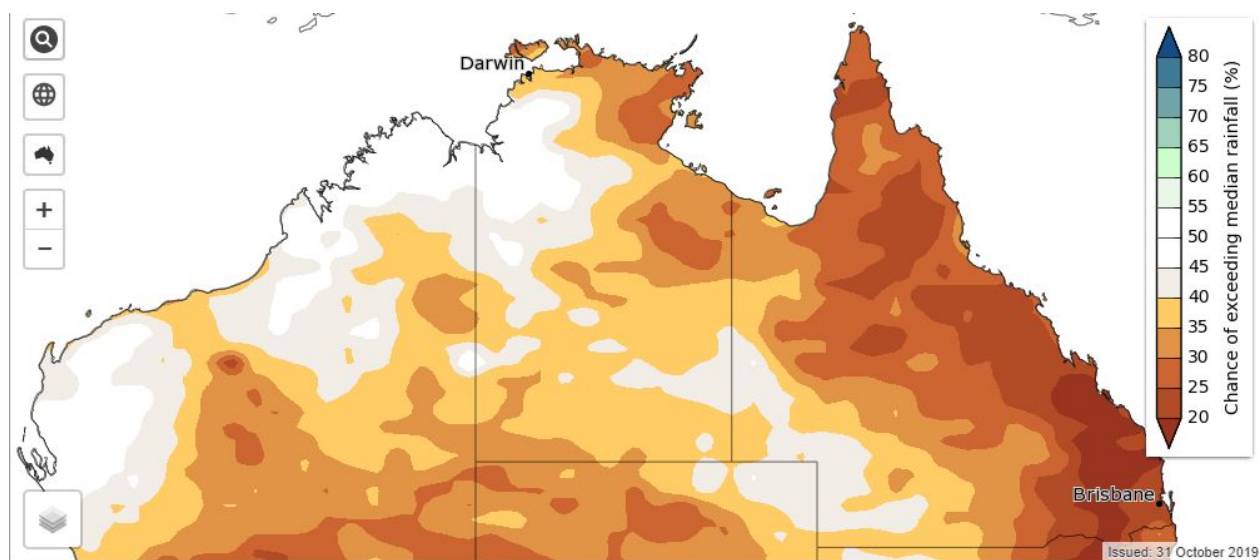


Figure 4: Bureau of Meteorology Forecast 'Chance of exceeding median rainfall' probability values for northern Australia for the overall total period November 2019 to January 2020.

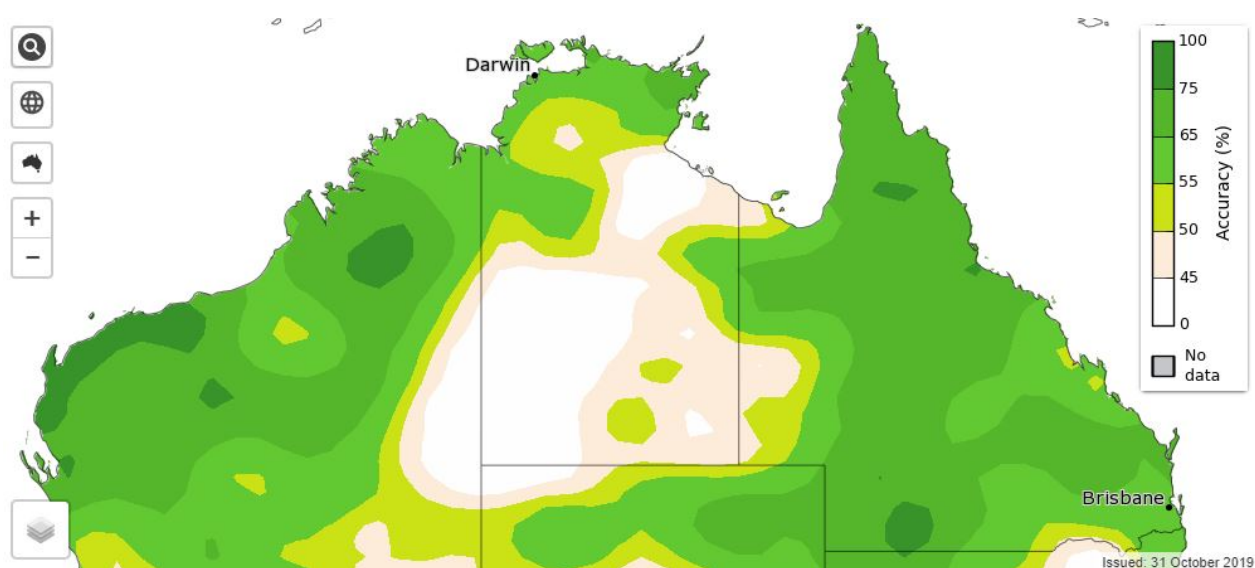


Figure 5: Bureau of Meteorology Past accuracy of rainfall from November 2019 to January 2020, indicating how accurate past rainfall forecasts have been for these months.



Figure 6: Bureau of Meteorology Forecast 'Chance of exceeding median maximum temperatures' for northern Australia for the overall period November 2019 to January 2020. Northern Australia is showing at least a 80% chance of exceeding median maximum temperatures over this overall period.

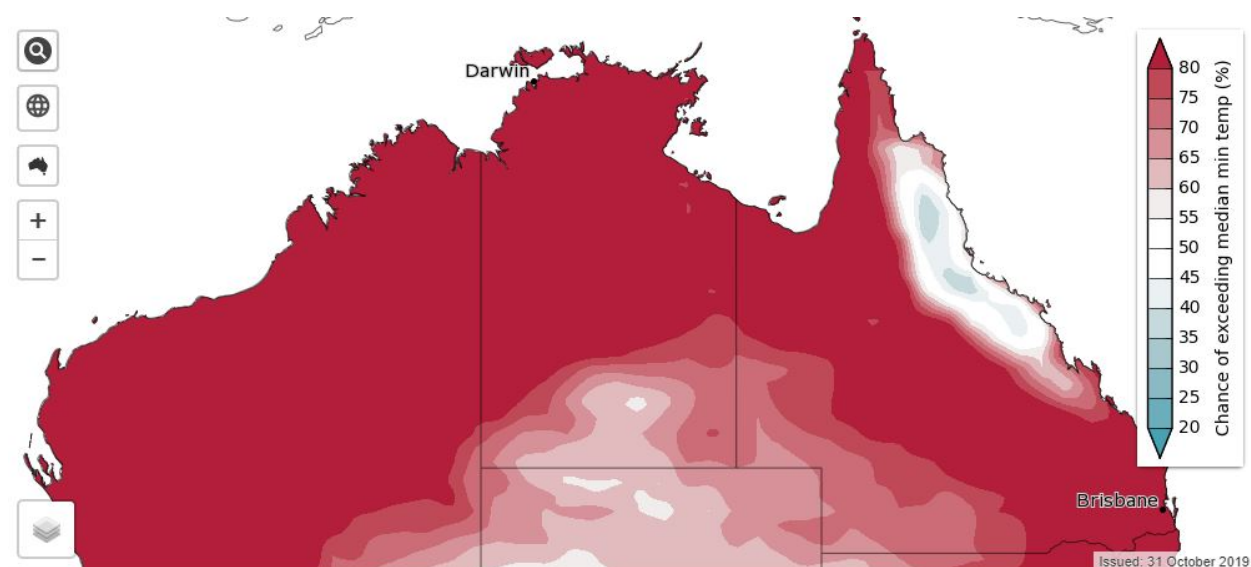


Figure 7: Bureau of Meteorology Forecast 'Chance of exceeding median minimum temperatures' for northern Australia for the overall period November 2019 to January 2020. Most regions of northern Australia show at least 80% chance of exceeding median minimum temperatures, whilst north-eastern Queensland and southern parts of the Northern Territory are showing between 40–60% chance of exceeding median maximum temperatures.

Longer-term forecasts:

The UKMO and ECMWF models provide useful assessments of longer-term rainfall probability values for northern Australia. The UKMO example below suggests about a 20-40% probability of above median rainfall for November 2019 to January 2020 for much of northern Australia.

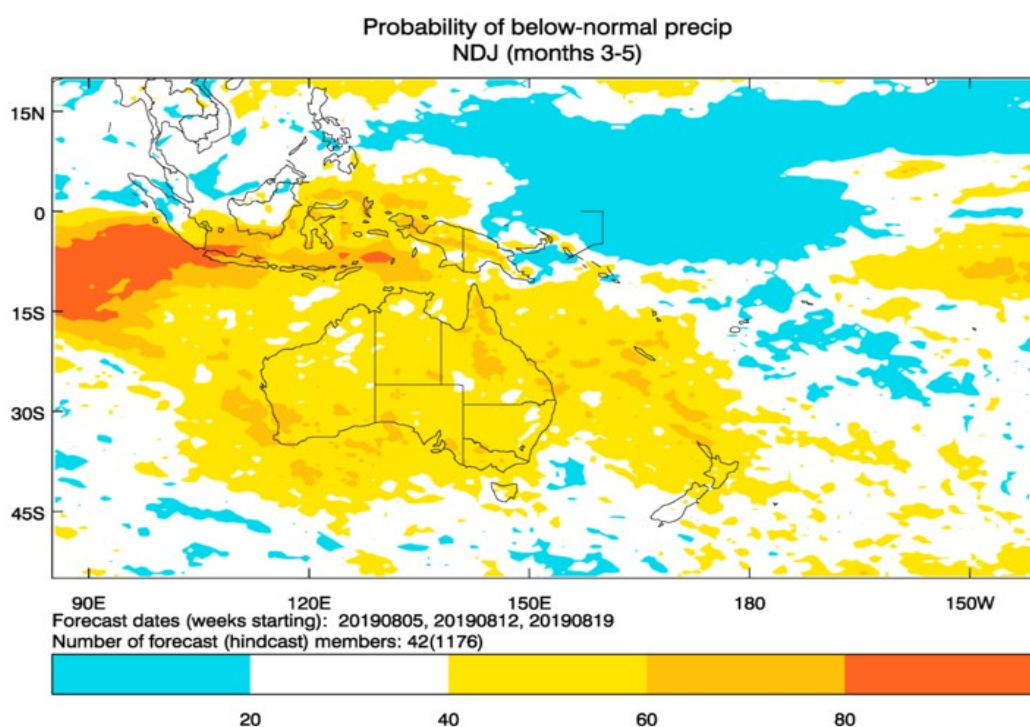


Figure 8: UKMO forecast map: Probability of getting below normal precipitation for the total period November (2019) to January (2020). In this different type of presentation, regions shaded yellow or orange have a greatly increased risk of **below normal rainfall**.

ECMWF Seasonal Forecast
 Prob(precipitation > median)
 Forecast start is 01/10/19, climate period is 1993-2016
 Ensemble size = 51, climate size = 600

System 5
 NDJ 2019/20
 Solid contour at 1% significance level

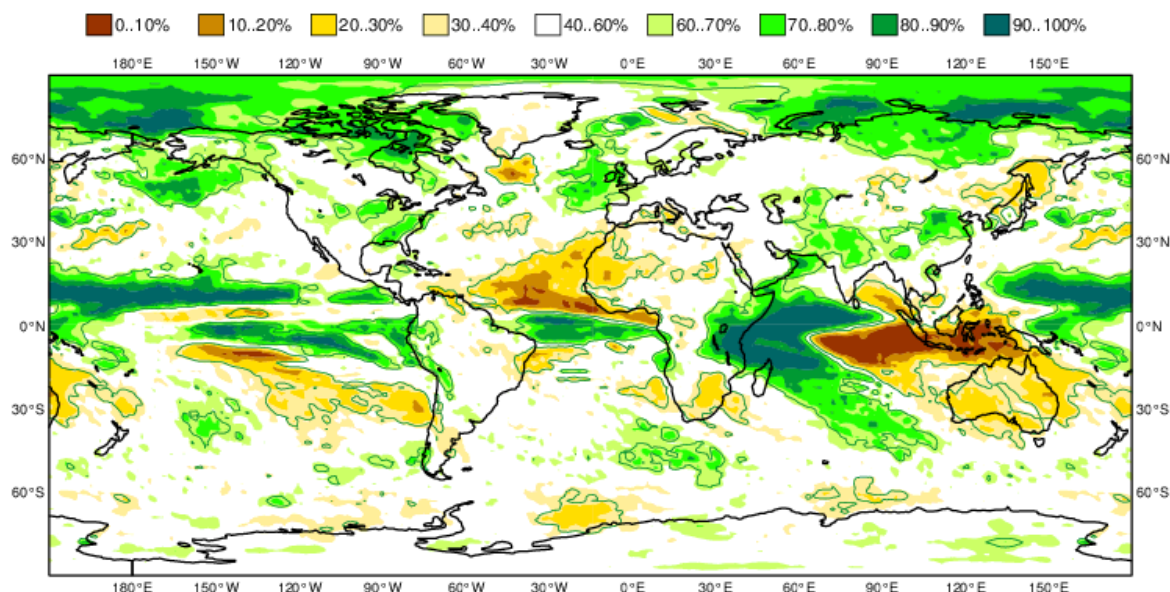


Figure 9: ECMWF forecast rainfall probability values for northern Australia – and the region generally for the period November 2019 to January 2020 (Courtesy ECMWF). Most regions of Australia show about a 20-30% probability of above median rainfall for this seasonal period for northern Australia for this period.

ECMWF Seasonal Forecast
 Prob(precipitation > median)
 Forecast start is 01/10/19, climate period is 1993-2016
 Ensemble size = 51, climate size = 600

System 5
 FMA 2020
 Solid contour at 1% significance level

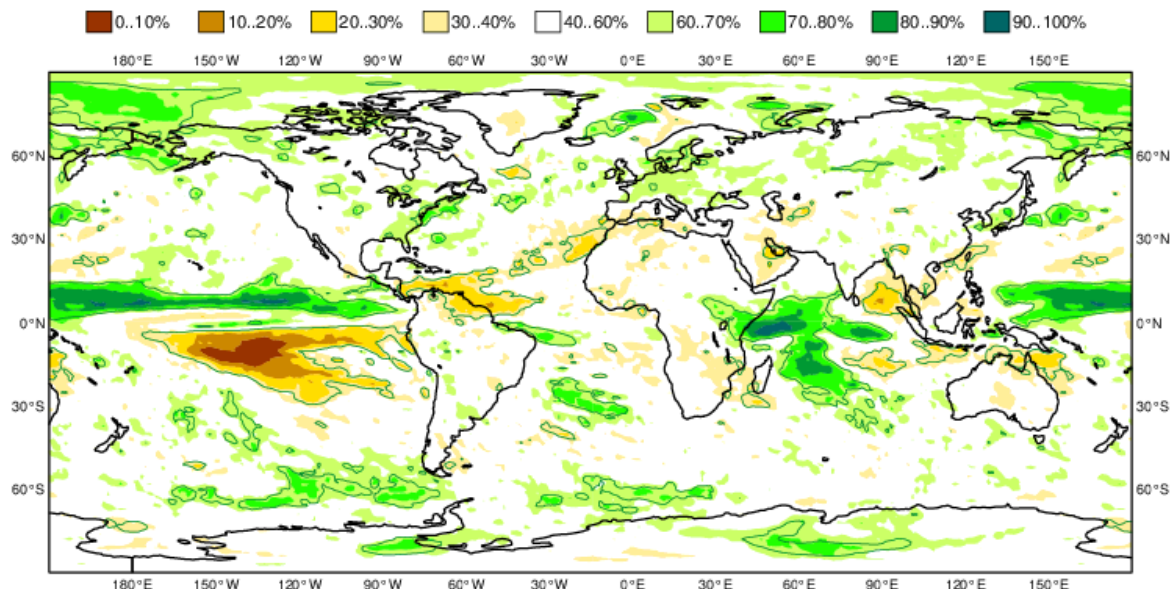


Figure 10: ECMWF forecast rainfall probability values for northern and eastern Australia – and the region generally for February to April 2020. (Courtesy ECMWF). At this stage, most regions of northern Australia indicate about a (normal) 40%-60% probability of above median rainfall for this seasonal period, late Summer/Autumn 2020.

Explaining the differences between models:

Dynamical models use the current state of the oceans and atmospheres combined with our understanding of the physical processes behind weather and climate to forecast the likelihood of future rainfall. Each dynamical model is based on certain model calibrations, which differ from model to model, providing slightly different outcomes. Statistical models use historical climate data to determine when conditions were similar in the past and what rainfall resulted from those past conditions.

While all of the models may be slightly different, it is important to focus on the overall predicted outcomes. All three of the models presented here show that there is an average to below average likelihood of receiving median rainfall when assessed over a three month period.

El Niño-Southern Oscillation (ENSO)

ENSO events generally begin in the Southern Hemisphere winter, peak during summer, and then usually end during autumn. The El Niño phase is *often* associated with warmer and drier conditions while La Niña phases are *often* associated with cooler and wetter conditions. The main areas of Australia impacted by ENSO phases are the eastern seaboard, north-eastern Australia and south-eastern Australia.

Madden Julian Oscillation (MJO)

MJO impacts weather in tropical Australia (and occasionally in higher latitude areas) on a weekly to monthly timescale. According to BoM's and NOAA's forecasting system and USQ's analysis. The Madden Julian Oscillation (MJO) may next be due in longitudes relevant to northern Australia around mid-December. Please also refer to the interesting NOAA website (last page of this review) for updated information on the MJO. During the dry season, the MJO has minimal impact on northern Australia.

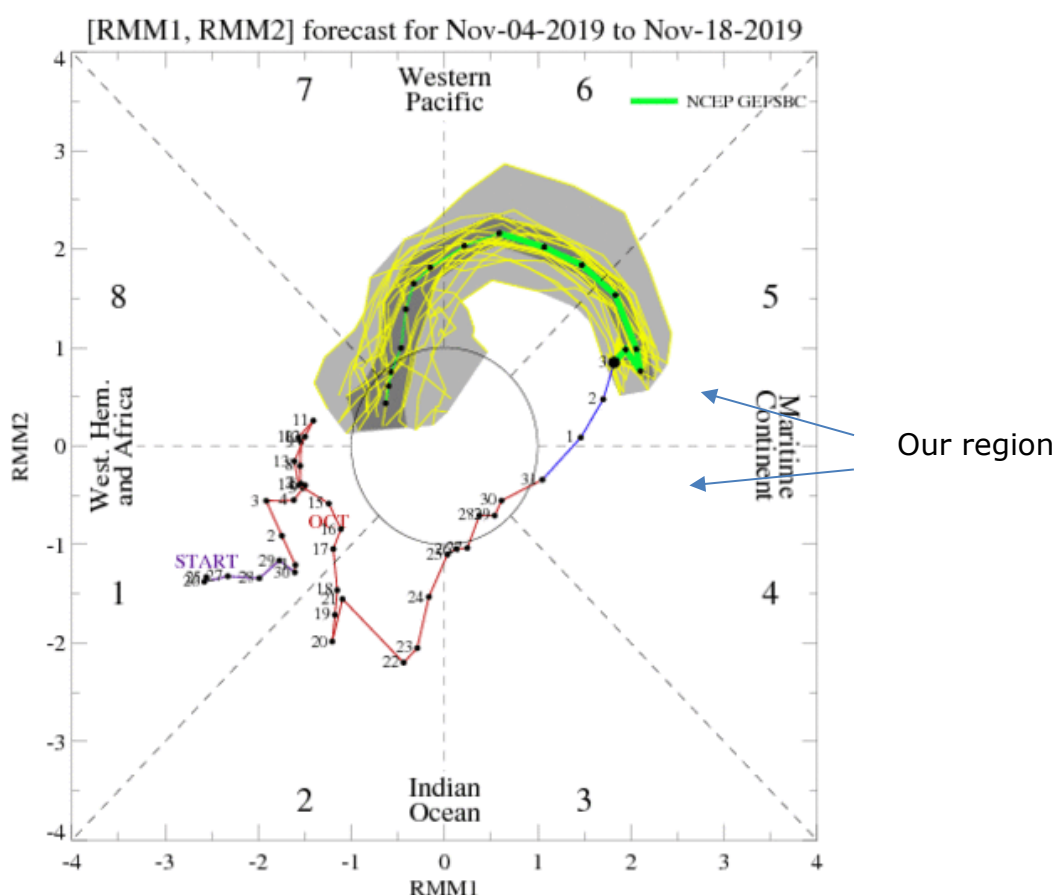
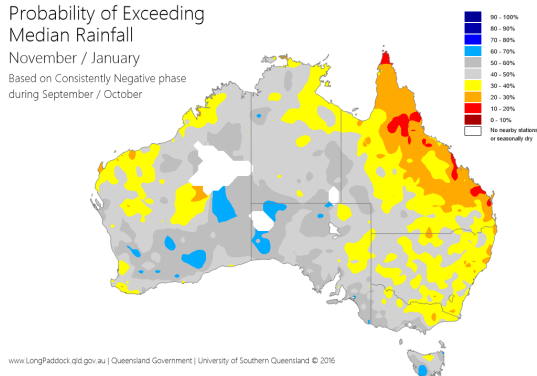


Figure 11: MJO phase diagram for 4 to 18 November 2019. The red line for October, the blue line for November. The numbers indicate the day of the month. When the line is in the circle, it indicates a weak/inactive MJO phase and when the line is outside of the circle, the MJO is active with strength indicated by distance from circle. The area shaded in grey containing yellow lines indicates the ensemble plume prediction for 4 to 18 November 2019 with the green line showing the (ensemble) mean.

Recent SOI-phase forecast maps

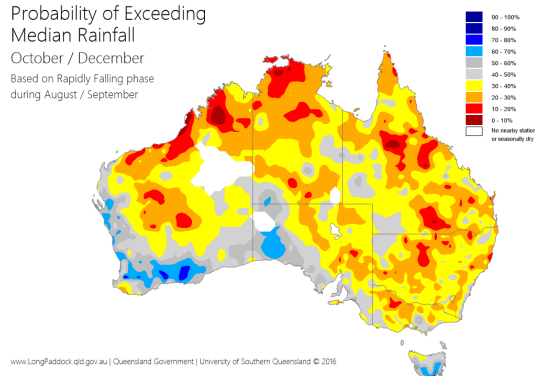
As these forecasts are issued for a three-month validity on a rolling monthly basis, it has been decided to provide a continuous reference to these forecasts, as below:

Probability of Exceeding
Median Rainfall
November / January
Based on Consistently Negative phase
during September / October



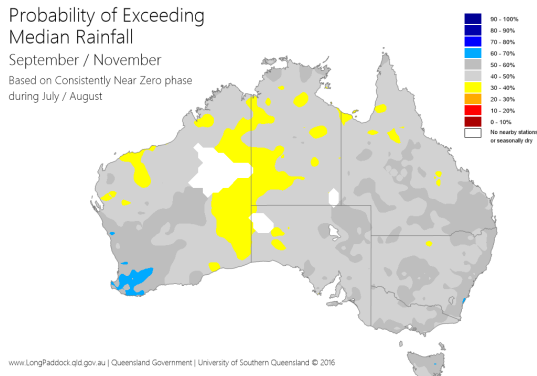
Seasonal climate forecast valid
1 November 2019 to 31 January 2020

Probability of Exceeding
Median Rainfall
October / December
Based on Rapidly Falling phase
during August / September



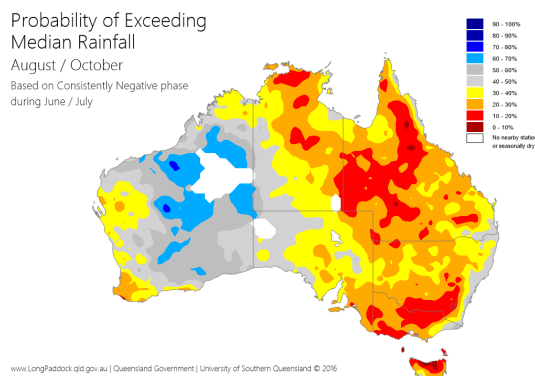
Seasonal climate forecast valid
1 October to 31 December 2019

Probability of Exceeding
Median Rainfall
September / November
Based on Consistently Near Zero phase
during July / August



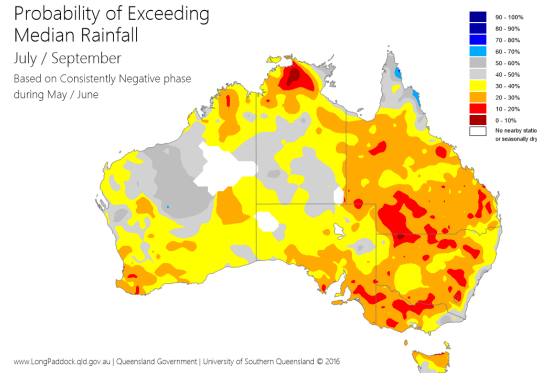
Seasonal climate forecast valid
1 September to 30 November 2019

Probability of Exceeding
Median Rainfall
August / October
Based on Consistently Negative phase
during June / July



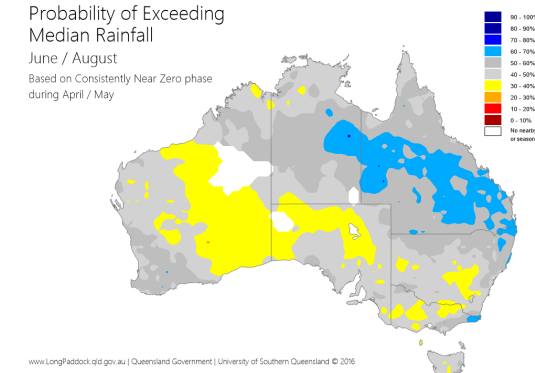
Seasonal climate forecast valid
1 August to 31 October 2019

Probability of Exceeding
Median Rainfall
July / September
Based on Consistently Negative phase
during May / June



Seasonal climate forecast valid
1 July to 30 September 2019

Probability of Exceeding
Median Rainfall
June / August
Based on Consistently Near Zero phase
during April / May



Seasonal climate forecast valid
1 June to 31 August 2019

Northern Australia Climate Program

For further information, click on the following links:

- For the MJO
- For weekly SSTs
- For easterly (and westerly) wind anomalies across the Pacific
- For sub-surface temperatures across the Pacific
- For ECMWF forecast products (note the web site for this output has changed)
- For 'plume' forecasts of SSTs in the central Pacific
- For a complete history of the SOI
- The Long Paddock
- Additional information on ENSO

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Centre for Applied Climate Sciences***

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