Northern Australia Climate Program

Centre for Applied Climate Sciences

Climate Outlook Review – Northern Australia

June 2020

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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.

For most of Northern Australia, rainfall probability values from the various models (statistical and GCM) are indicating a relatively high probability of exceeding the winter long-term median (June to August). Due to 'phase-locking' of the Pacific Ocean and atmospheric system, it would normally be expected that this somewhat improved pattern would persist through the coming summer. However, as always, we recommend fairly frequent checking of the situation (from month to month) to make sure this particular pattern is following this process.

In terms of three-month total rainfall, the SOI phase system indicates relatively high probability values of exceeding the long-term median for this winter time of year, especially across central Queensland and into the Northern Territory and NW Western Australia. Most remaining regions have rainfall forecast close to climatology (50% probability of exceeding the median), although some areas in southern Australia have 30% probability of exceeding median rainfall.

The latest UK Met Office forecast indicates above normal rainfall probability values for the July to September and August to October periods, 2020, for most of Australia.

The ECMWF model is currently indicating above average rainfall values for the June to August period for all regions and extending into Spring and through to summer (map page 8).

The Bureau of Meteorology ACCESS model is indicating 'above average' rainfall values for most of Australia.

The next MJO event is due again to across our longitudes towards the end of June.

The average Southern Oscillation Index (SOI) value for the month of May was close to plus 2.5 (+2.5).

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

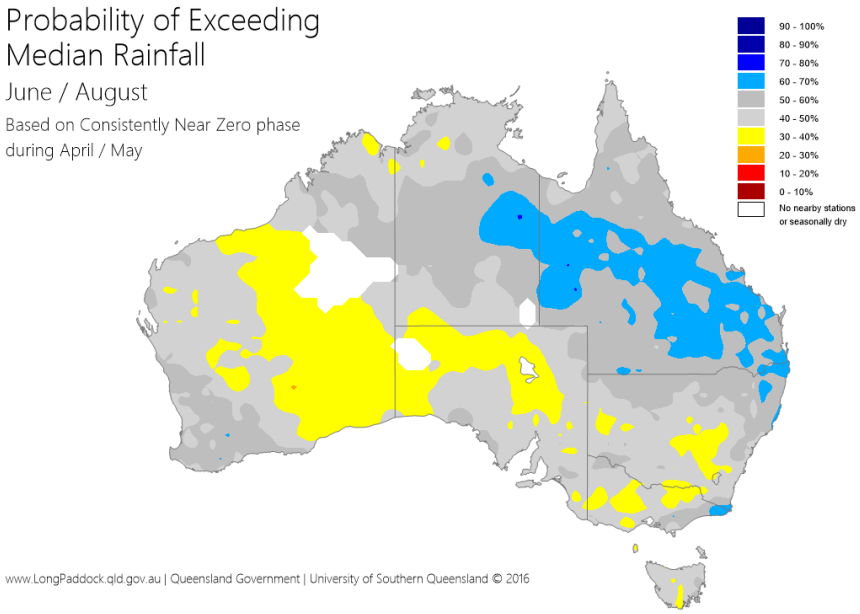


Figure 1: Using the SOI phase system in this example, the 'probability of exceeding median rainfall' values for Australia for the overall period June to August 2020 based on a 'Consistently Near Zero' phase SOI pattern during April/May. Regions shaded blue have a 60%-70% probability of exceeding median rainfall, relative to this time of the year. Regions shaded darker grey have 50-60% probability of exceeding median rainfall. Regions shaded grey have a 40-50% probability of exceeding median rainfall values relative to this period. Regions shaded yellow have 30-40% probability of exceeding median rainfall.

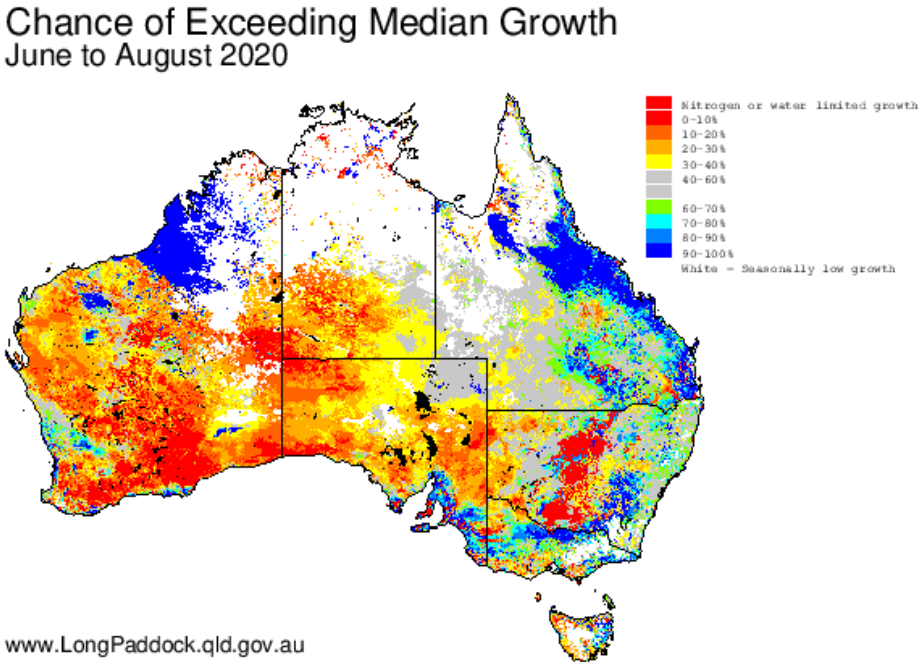


Figure 2: Chances of exceeding median pasture growth for Australia for the June to August 2020 period (relevant to this period of the year). This output integrates antecedent moisture and forecast rainfall, temperature, within a pasture growth model and the SOI phase forecast system.

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.

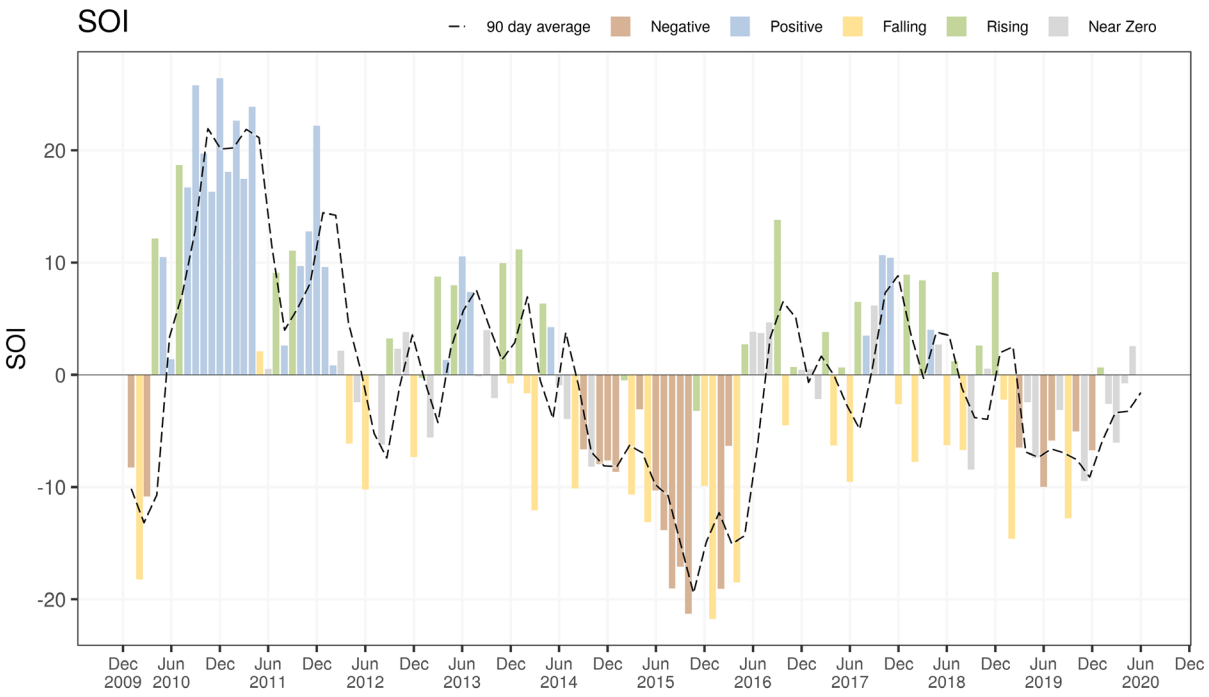


Figure 3: Monthly SOI values since December 2009 – the most recent phase was 'Consistently Near Zero phase'. The most recent 30-day average value to 31 May 2020, was close to plus 2.5 (+2.5).

Australian Bureau of Meteorology forecasts:

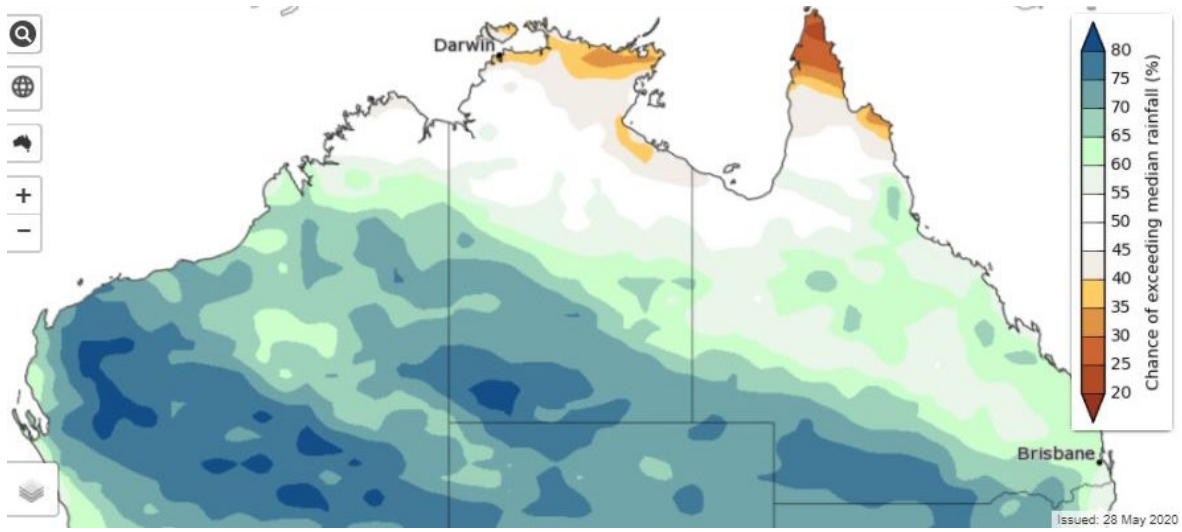


Figure 4: Bureau of Meteorology Forecast 'Chance of exceeding median rainfall' probability values for northern Australia for the overall total period June to August 2020.

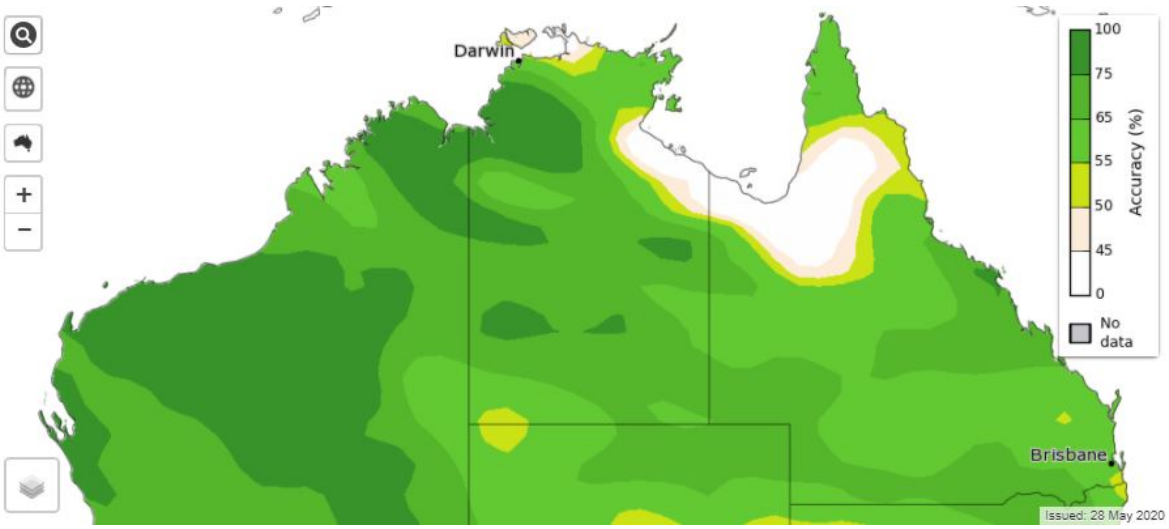


Figure 5: Bureau of Meteorology Past accuracy of rainfall from June to August 2020, indicating how accurate past rainfall forecasts have been for these months.

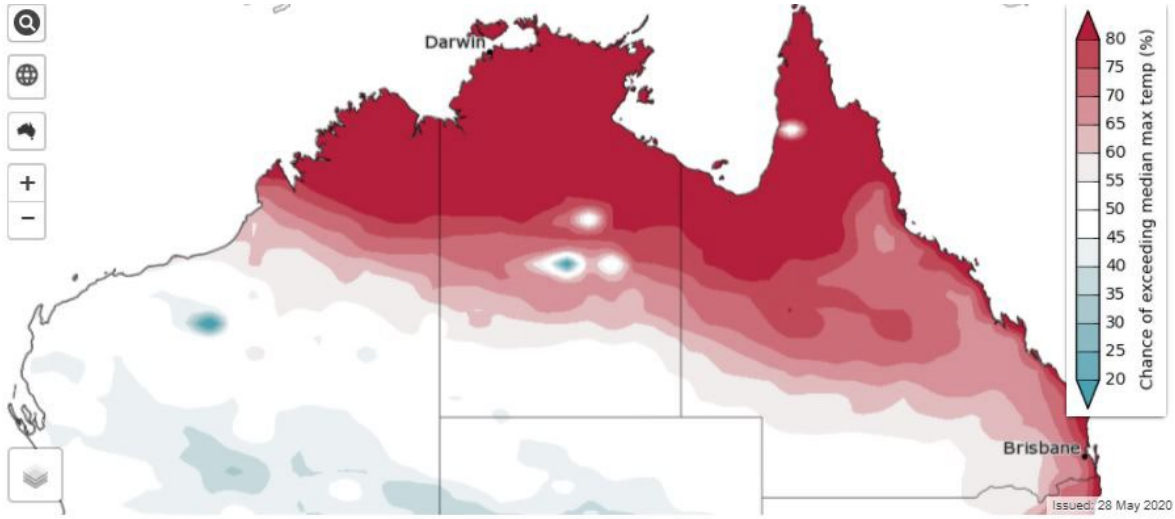


Figure 6: Bureau of Meteorology Forecast 'Chance of exceeding median maximum temperatures' for northern Australia for the overall June to August 2020. Regions of far northern Queensland and Northern Territory are showing at least 75% chance of exceeding median maximum temperatures. Other regions of Western Australia are a much lower and showing 40-50% 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 June to August 2020. Regions of northern Australia show at least 80% chance of exceeding median minimum 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 60-80% chance of above Median rainfall for August to October 2020 for those regions shaded lighter blue.

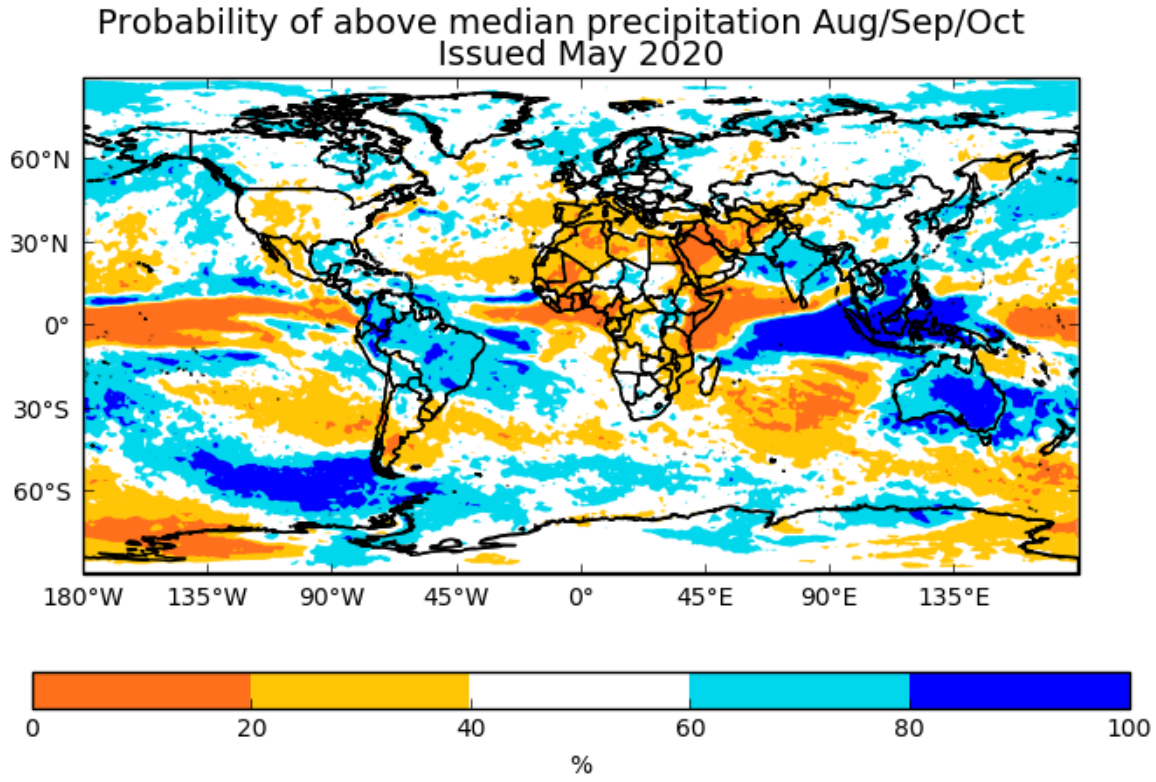


Figure 8: UKMO forecast map: Probability of getting above median precipitation for the total period August to October 2020. Regions shaded lighter blue have a 60-80% probability of above median precipitation. Regions shaded dark blue have a 80- 100% probability of above median precipitation.

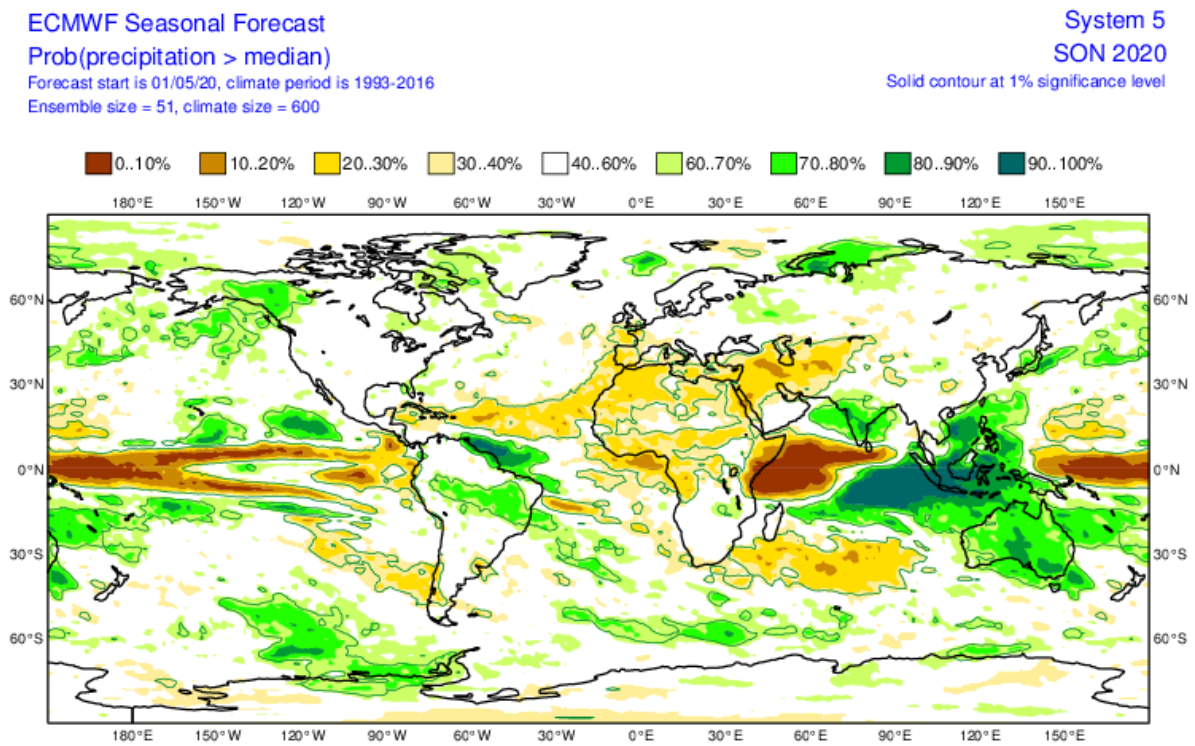


Figure 9: ECMWF forecast rainfall probability values for northern and eastern Australia – and the region generally for September to November 2020. (Courtesy ECMWF). At this stage, many regions of Australia indicate 70%-80% probability of above median rainfall for this seasonal period, Spring 2020.

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 end of June. Please also refer to the interesting NOAA website (last page of this review) for updated information on the MJO.

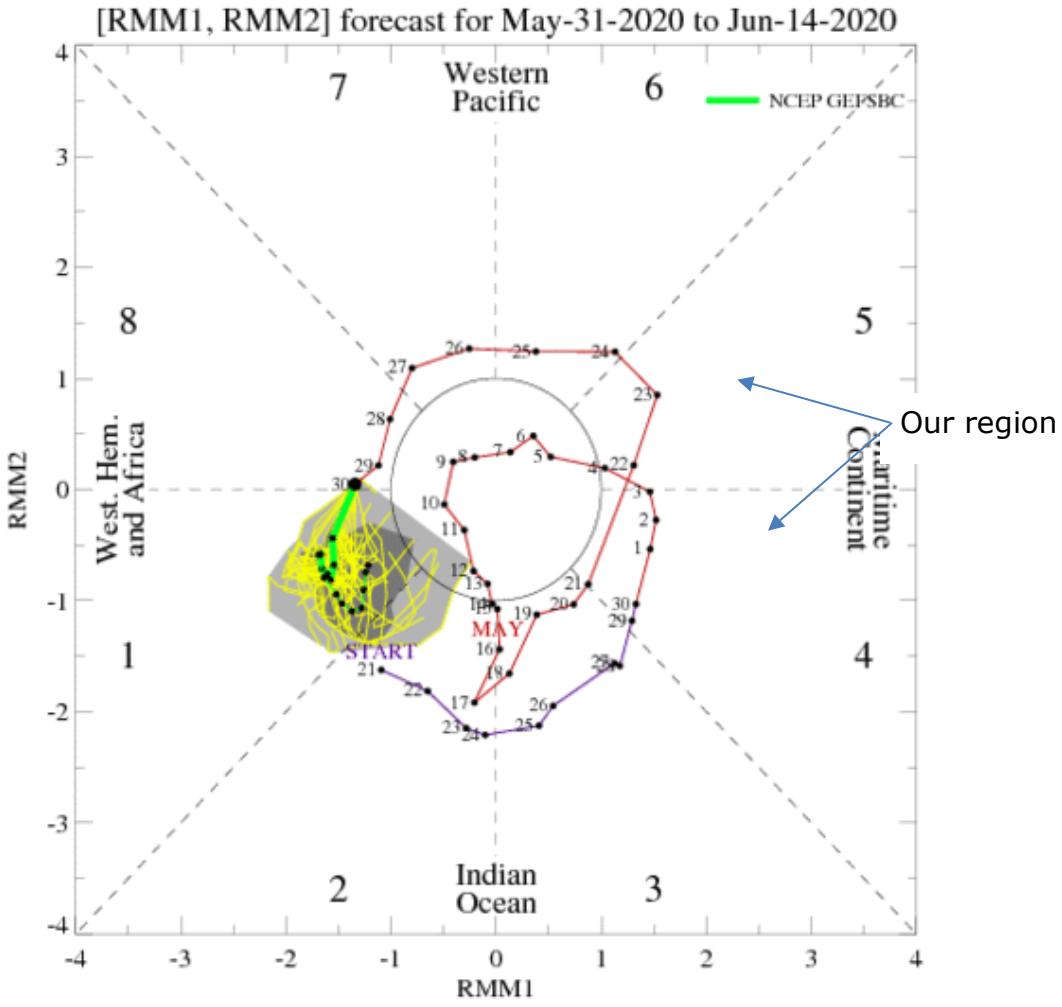
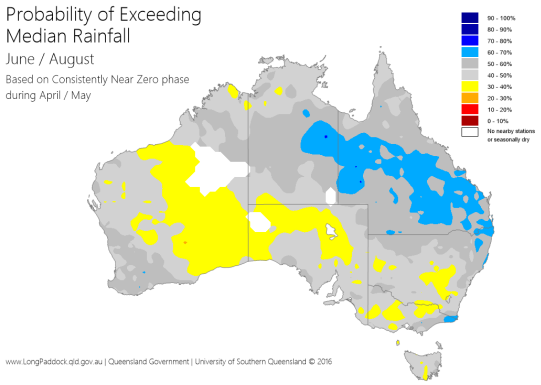


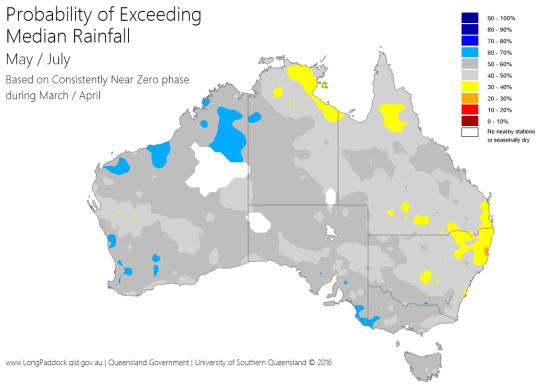
Figure 10: MJO phase diagram for 31 May to 14 June 2020. The purple line for April, the red line for May. The numbers indicate the day of the month. When the line is in the circle, it indicates a weak/inactive MJO phase and when the line is outside of the circle, the MJO is active with strength indicated by distance from circle. The area shaded in grey containing yellow lines indicates the ensemble plume prediction for 31 May to 14 June 2020 with the green line showing the (ensemble) mean.

Recent SOI-phase forecast maps

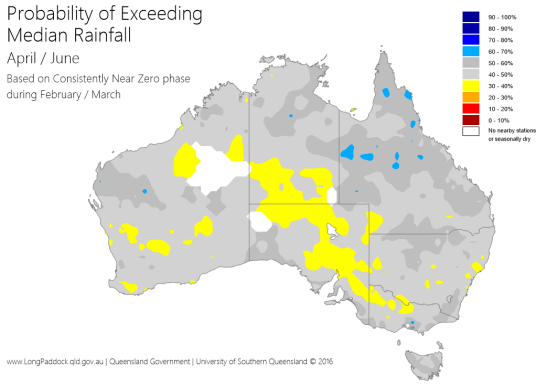
As these forecasts are issued for a three-month validity on a rolling monthly basis, it has been decided to provide a continuous reference to these forecasts, as below:



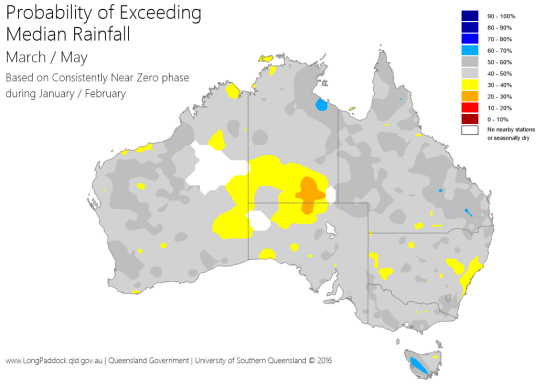
Seasonal climate forecast valid
1 June to 31 August 2020



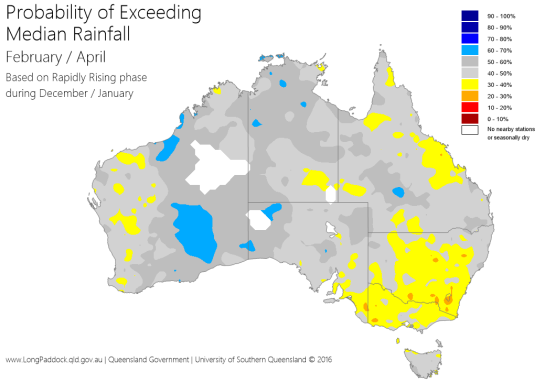
Seasonal climate forecast valid
1 May to 31 July 2020



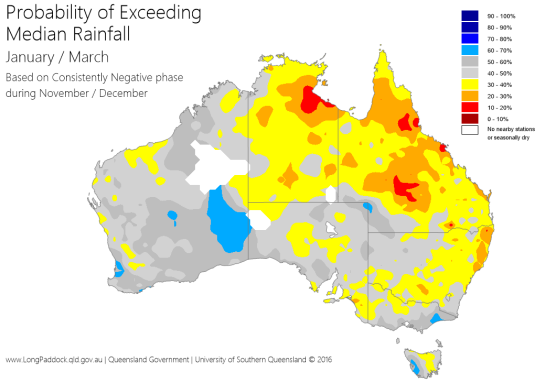
Seasonal climate forecast valid
1 April to 30 June 2020



Seasonal climate forecast valid
1 March to 31 May 2020



Seasonal climate forecast valid
1 February to 30 April 2020



Seasonal climate forecast valid
1 January to 31 March 2020

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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