

Northern Australia Climate Program

Centre for Applied Climate Sciences

Climate Outlook Review – Northern Australia

April 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 are forecast close to 'average to slightly above normal rainfall probabilities' for the April to June period (2020). Additionally, for the coming winter period some models are indicating high rainfall probability values. Note that these seasonal forecasts are for total rain over a three month period.

In terms of three-month total rainfall, the SOI phase system indicates average to slightly above normal rainfall probabilities for most of NE and northern Australia and average to slightly below average for most of the remainder (relative to this time of year).

The ECMWF model is currently indicating close to average rainfall probability values for the coming winter period (June -August) over most regions, but with some areas in NT showing 'slightly above average' for winter.

The latest UK Met Office forecast indicates close to normal rainfall probability of exceeding median rainfall values for eastern and northern Australia for the May to July period but with above normal values for the core winter June to August 2020 period (please see map page 7).

The Bureau of Meteorology ACCESS model is now indicating above normal rainfall probability values for most of NW and Western Australia plus parts of Northern Territory.

The next MJO event is due again across our longitudes mid to end of April.

The average Southern Oscillation Index (SOI) value for the month of March was close to minus 6.2 (-6.2).

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

April / June

Based on Consistently Near Zero phase during February / March

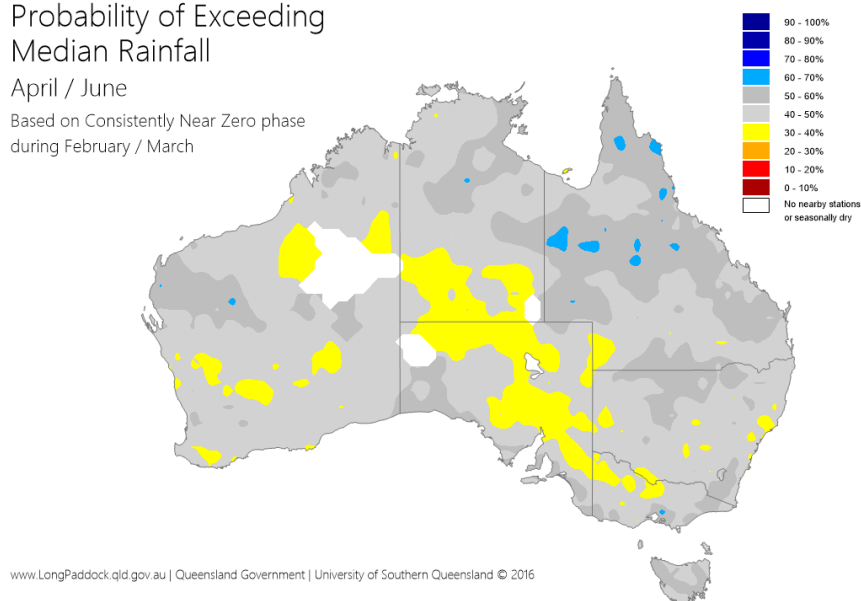


Figure 1: Using the SOI phase system in this example, the 'probability of exceeding median rainfall' values for Australia for the overall period April to June 2020 based on a 'Consistently Near Zero' phase SOI pattern during February/March. Regions shaded darker grey have 50-60% probability of exceeding 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.

Chance of Exceeding Median Growth

April to June 2020

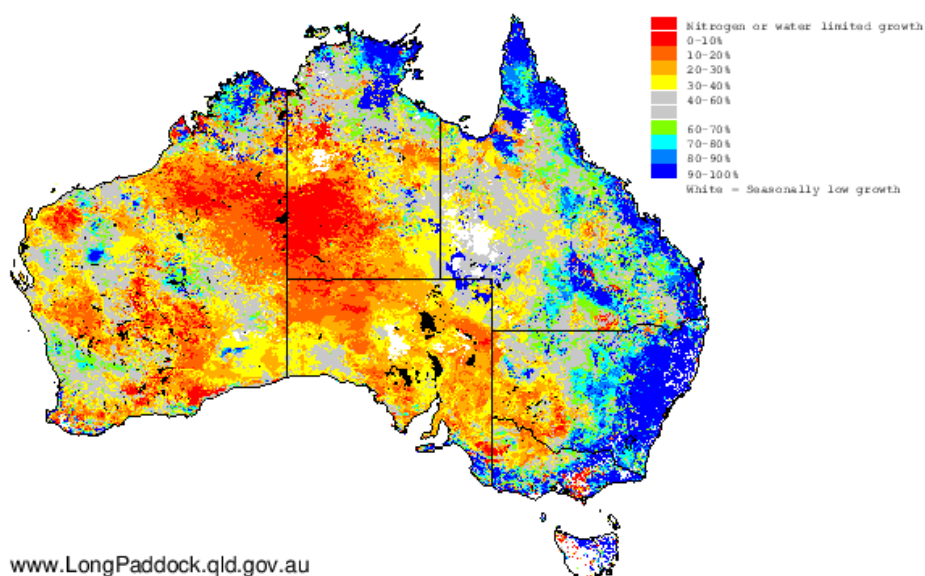


Figure 2: Chances of exceeding median pasture growth for Australia for the April to June 2020 period (relevant to this period of the year). This output integrates antecedent moisture and forecast rainfall, temperature, within a pasture growth model and the SOI phase forecast system.

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.

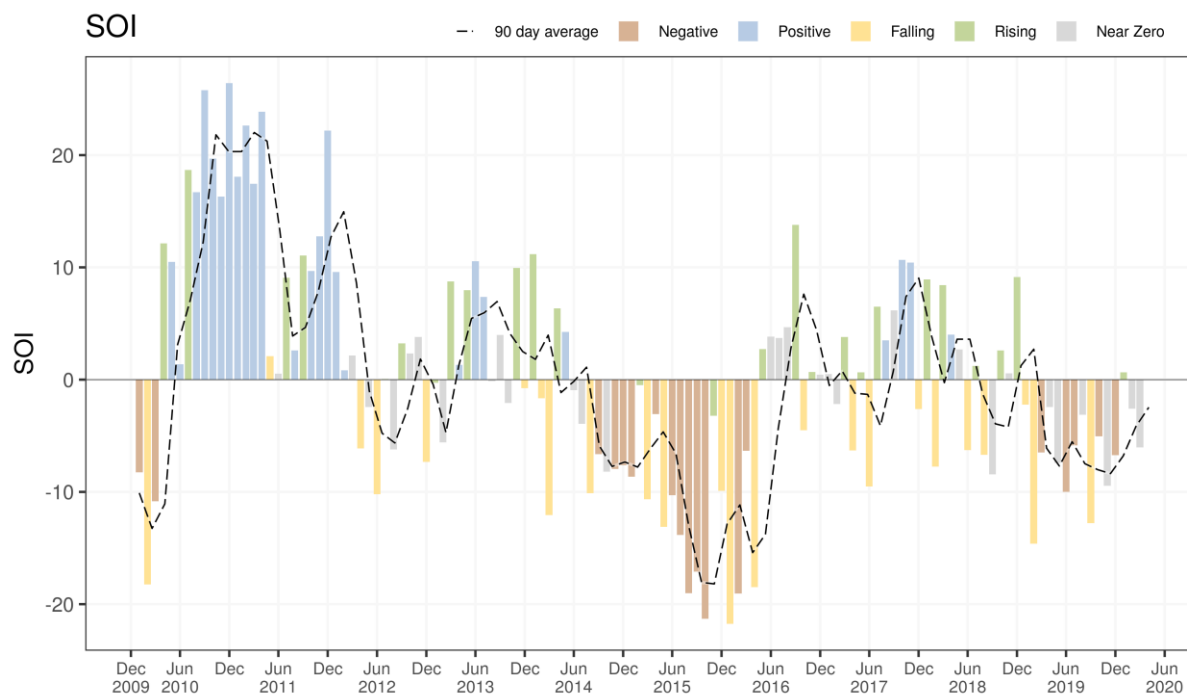


Figure 3: Monthly SOI values since December 2009 – the most recent phase was 'Consistently Near Zero phase'. The most recent 30-day average value to 31 March 2020, was close to minus 6.2 (-6.2).

Australian Bureau of Meteorology forecasts:

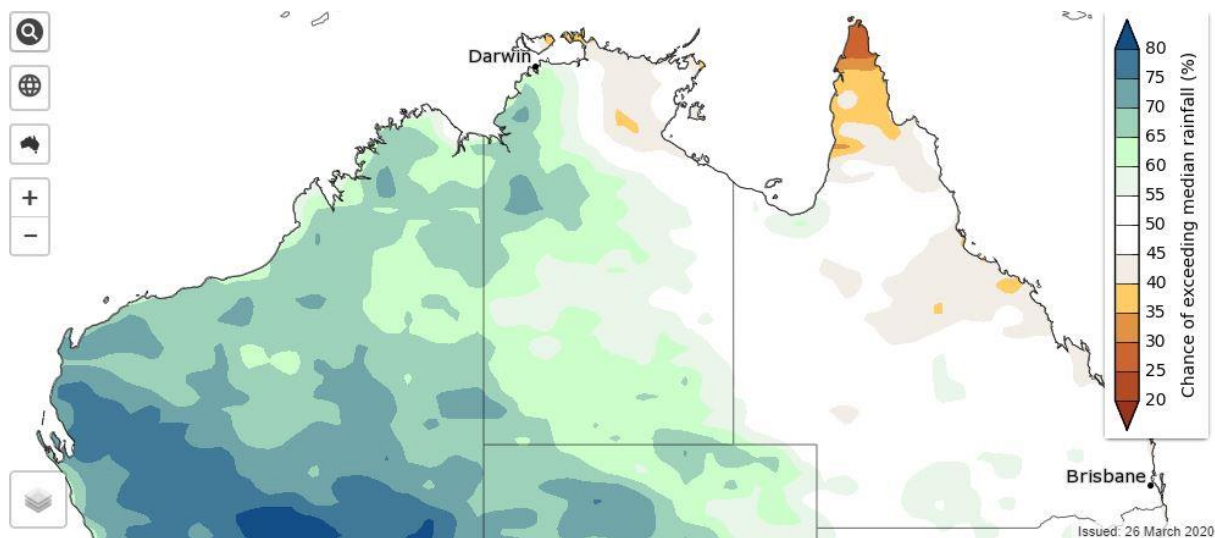


Figure 4: Bureau of Meteorology Forecast 'Chance of exceeding median rainfall' probability values for northern Australia for the overall total period April to June 2020.

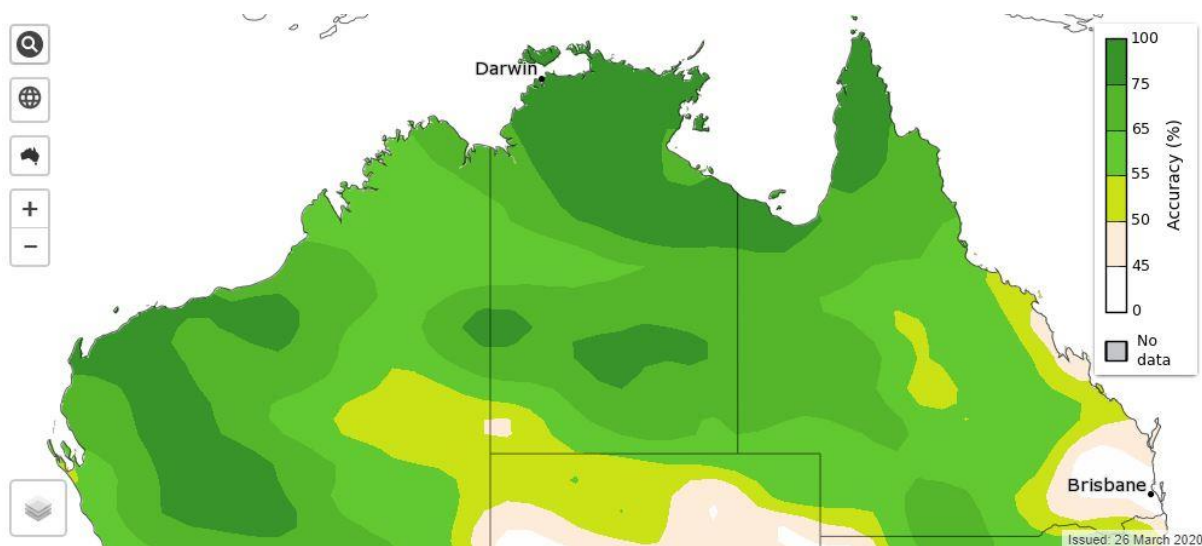


Figure 5: Bureau of Meteorology Past accuracy of rainfall from April to June 2020, indicating how accurate past rainfall forecasts have been for these months.

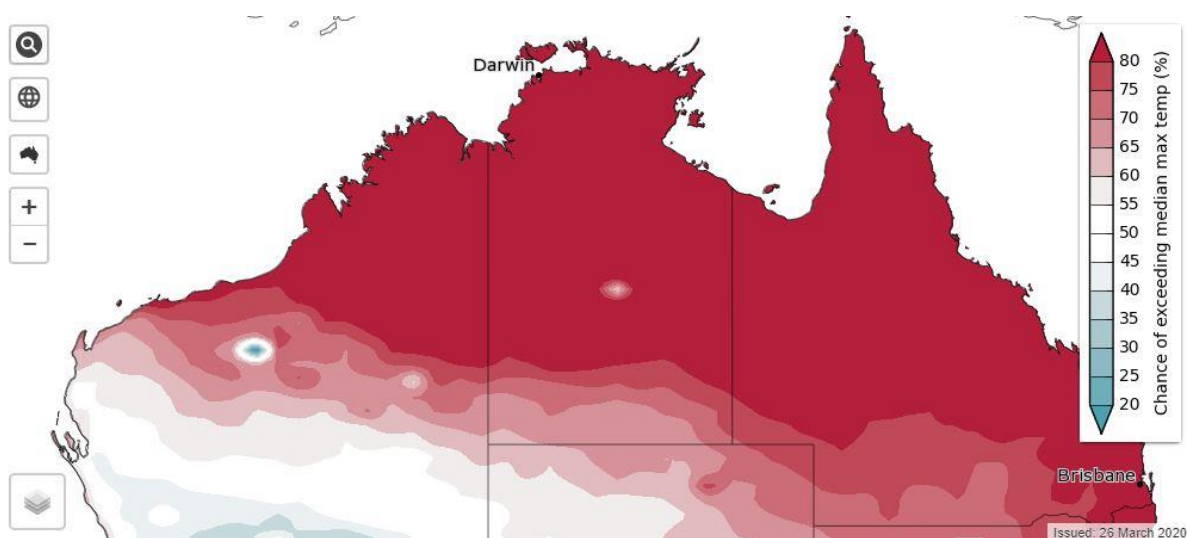


Figure 6: Bureau of Meteorology Forecast 'Chance of exceeding median maximum temperatures' for northern Australia for the overall April to June 2020. Many regions of northern Queensland are showing at least 75% chance of exceeding median maximum temperatures. Some regions of Western Australia are a little lower and showing 50-60% chance of exceeding median maximum temperatures over this overall period.

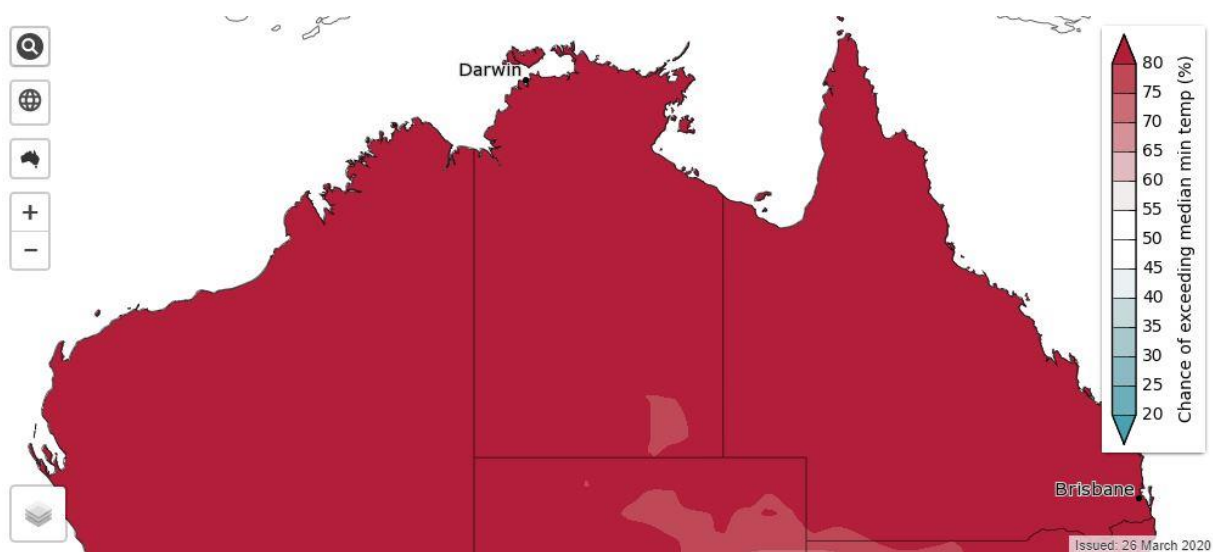


Figure 7: Bureau of Meteorology Forecast 'Chance of exceeding median minimum temperatures' for northern Australia for the overall period April to June 2020. Regions of northern Australia show at least 80% chance of exceeding median minimum temperatures.

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 June to August 2020 for those regions shaded blue.

Probability of above median precipitation Jun/Jul/Aug
Issued March 2020

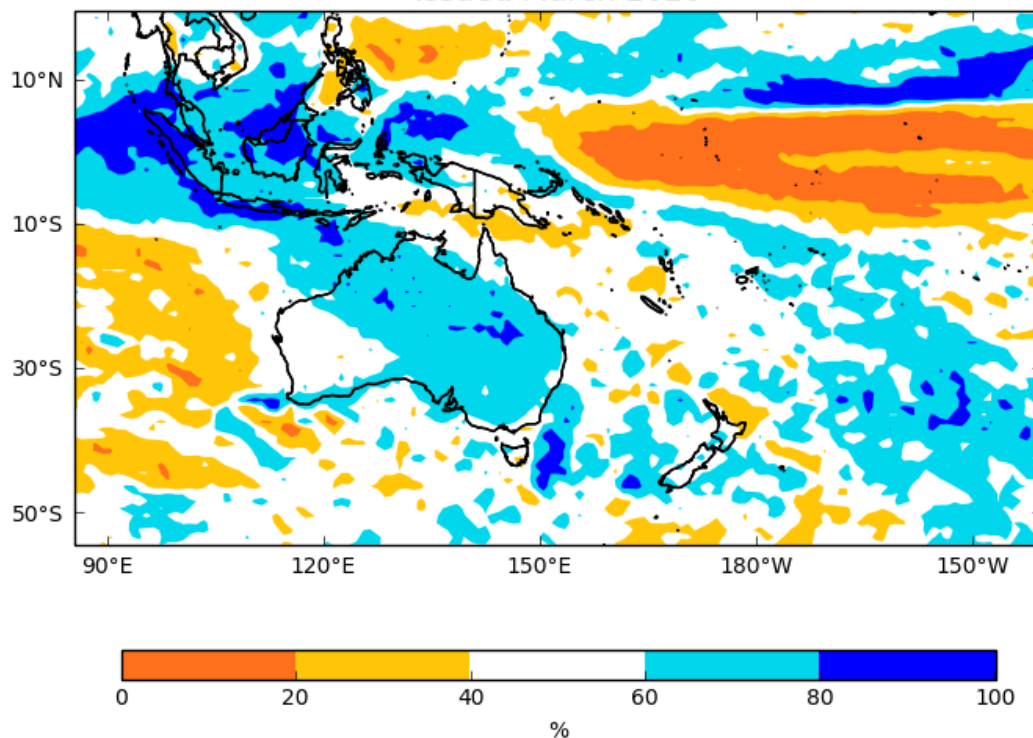


Figure 8: UKMO forecast map: Probability of getting above median precipitation for the total period June to August 2020. Regions shaded blue have a 60-80% probability of above median precipitation.

ECMWF Seasonal Forecast
 Prob(precipitation > median)
 Forecast start is 01/03/20, climate period is 1993-2016
 Ensemble size = 51, climate size = 600

System 5
 JAS 2020
 Solid contour at 1% significance level

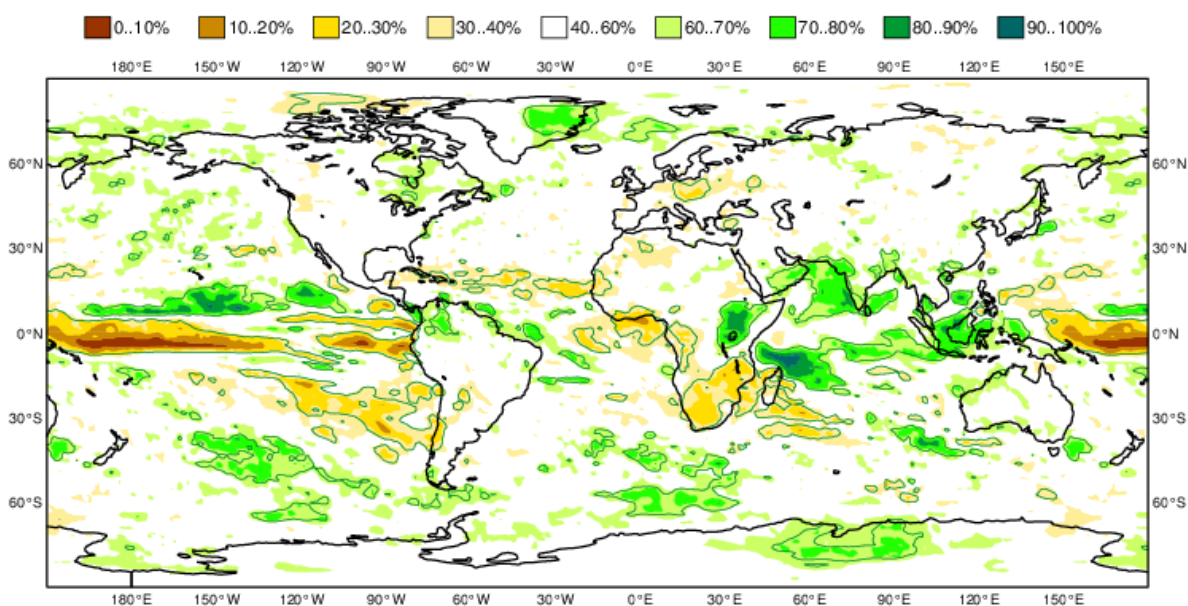


Figure 9: ECMWF forecast rainfall probability values for northern and eastern Australia – and the region generally for July to September 2020. (Courtesy ECMWF). At this stage, many regions of Australia indicate 40%-60% probability of above median rainfall for this seasonal period, some areas in NT and WA showing 'slightly above average' for winter Winter/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 mid-end of April. Please also refer to the interesting NOAA website (last page of this review) for updated information on the MJO.

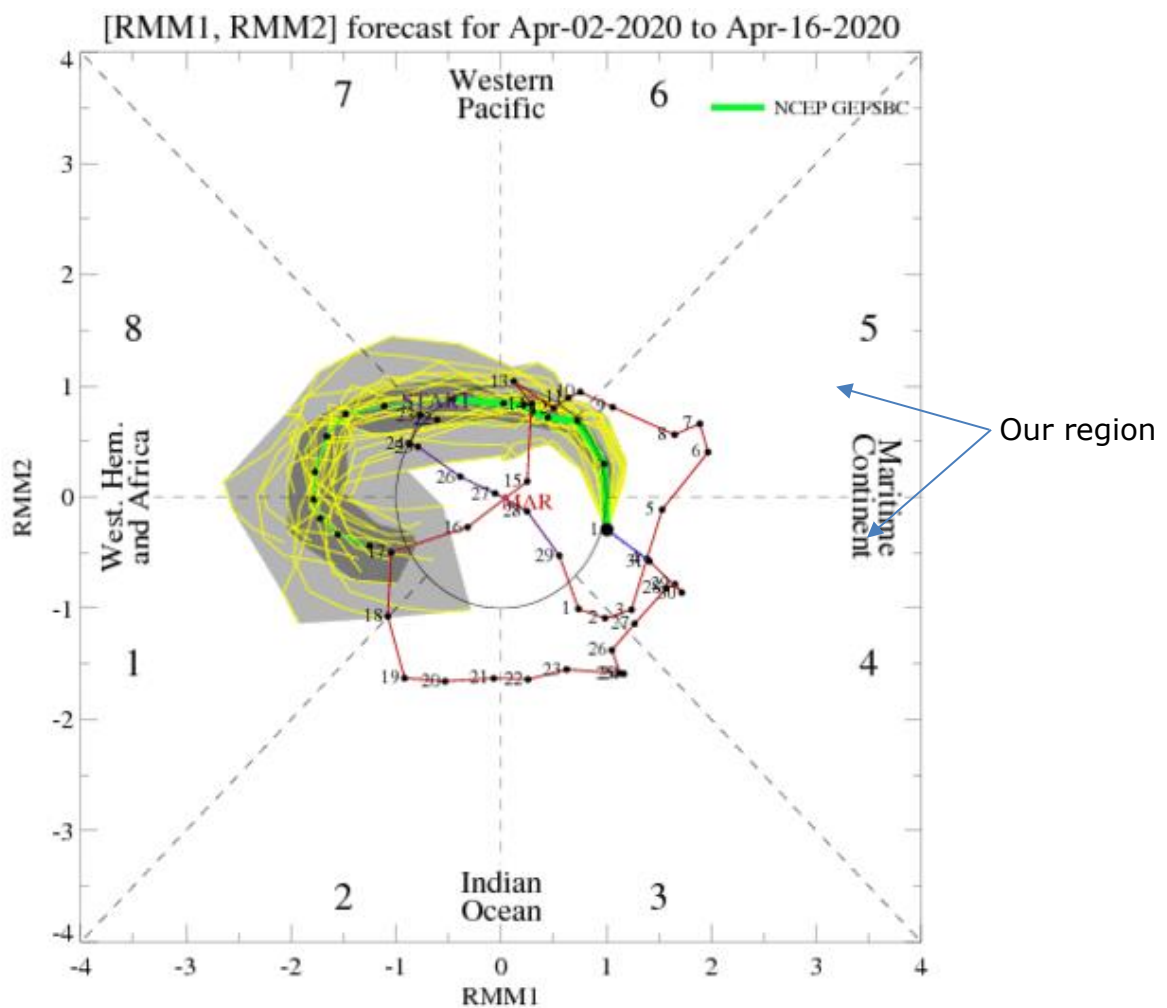
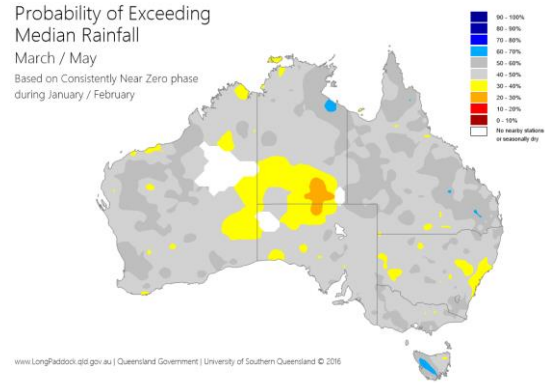
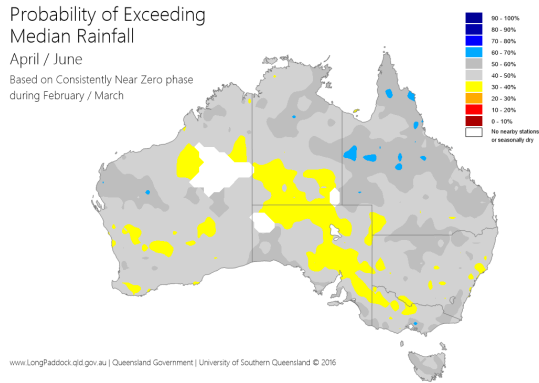


Figure 10: MJO phase diagram for 2 to 16 April 2020. The purple line for February, the red line for March. The numbers indicate the day of the month. When the line is in the circle, it indicates a weak/inactive MJO phase and when the line is outside of the circle, the MJO is active with strength indicated by distance from circle. The area shaded in grey containing yellow lines indicates the ensemble plume prediction for 2 to 16 April 2020 with the green line showing the (ensemble) mean.

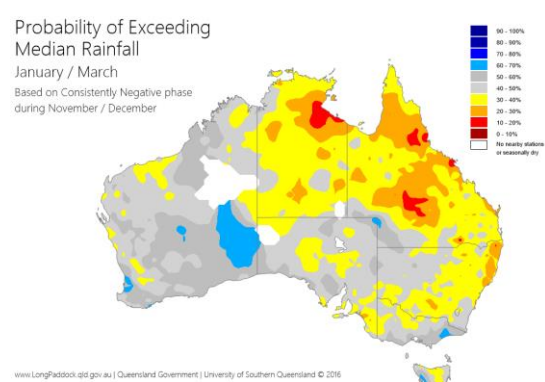
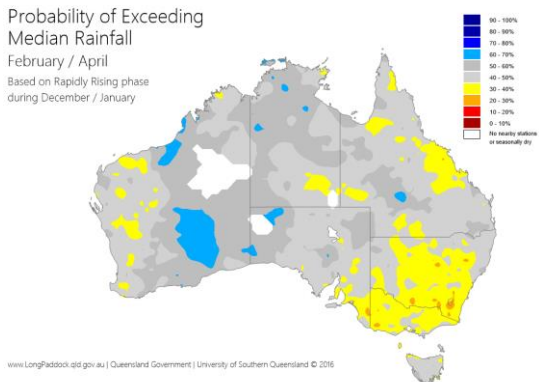
Recent SOI-phase forecast maps

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:



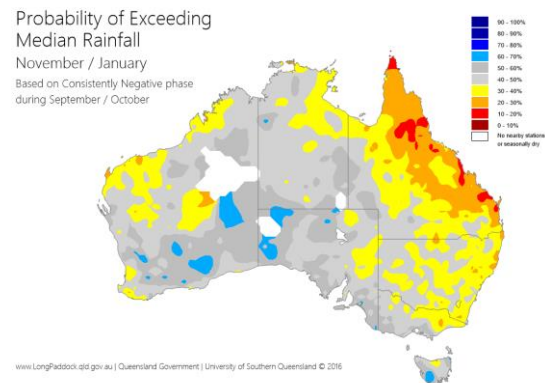
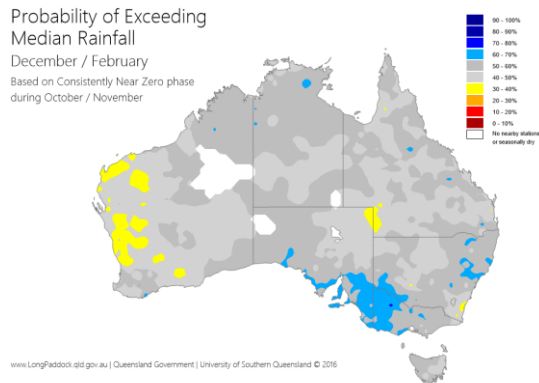
Seasonal climate forecast valid
1 April to 30 June 2020

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



Seasonal climate forecast valid
1 December 2019 to 29 February 2020

Seasonal climate forecast valid
1 November 2019 to 31 January 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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