Northern Australia Climate Program

Centre for Applied Climate Sciences

Climate Outlook Review – Granite Belt

October 2019

Author: Dr Chelsea Jarvis

mla MEAT & LIVESTOCK AUSTRALIA
UNIVERSITY OF SOUTHERN QUEENSLAND
Queensland Government

Overview

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

Rainfall – The majority of rainfall forecasts for the period of October through December are for below average rainfall, with likely rainfall values in the bottom tercile (or lowest third of all years on record). For Stanthorpe, this means that there is a low chance of getting more than 197mm total rainfall before January.

The ECMWF seasonal forecast indicates low rainfall probability values (likely in the bottom tercile) for the October to December period but predicts a higher likelihood of average to below average rainfall for January and February.

The Bureau of Meteorology ACCESS model is indicating very low rainfall probability values, with a ~70-80% chance of being in the bottom tercile for October to December, and likely through January as well.

The UK Met Office forecast output indicates a 60-80% chance of being in the lowest rainfall tercile for October to December and into January.

Rainfall Terciles for Stanthorpe are as follows:

	Oct/Nov/Dec	Nov/Dec/Jan
bottom tercile	0-197mm	0-221mm
middle tercile	197-266mm	221-302mm
top tercile	266-448+mm	302-483+mm

Temperatures, both minimum and maximum, are predicted by all models to be in the top/upper tercile through January.

Wind speeds are predicted to be stronger than usual (this information sourced only from the BOM).

Note that warm temperatures and strong winds increase evaporation/PeT.

These warm/dry conditions that have been present for the past 24 months are likely due to warm water near the dateline/equator in the central Pacific Ocean, though there are also other forces at play.

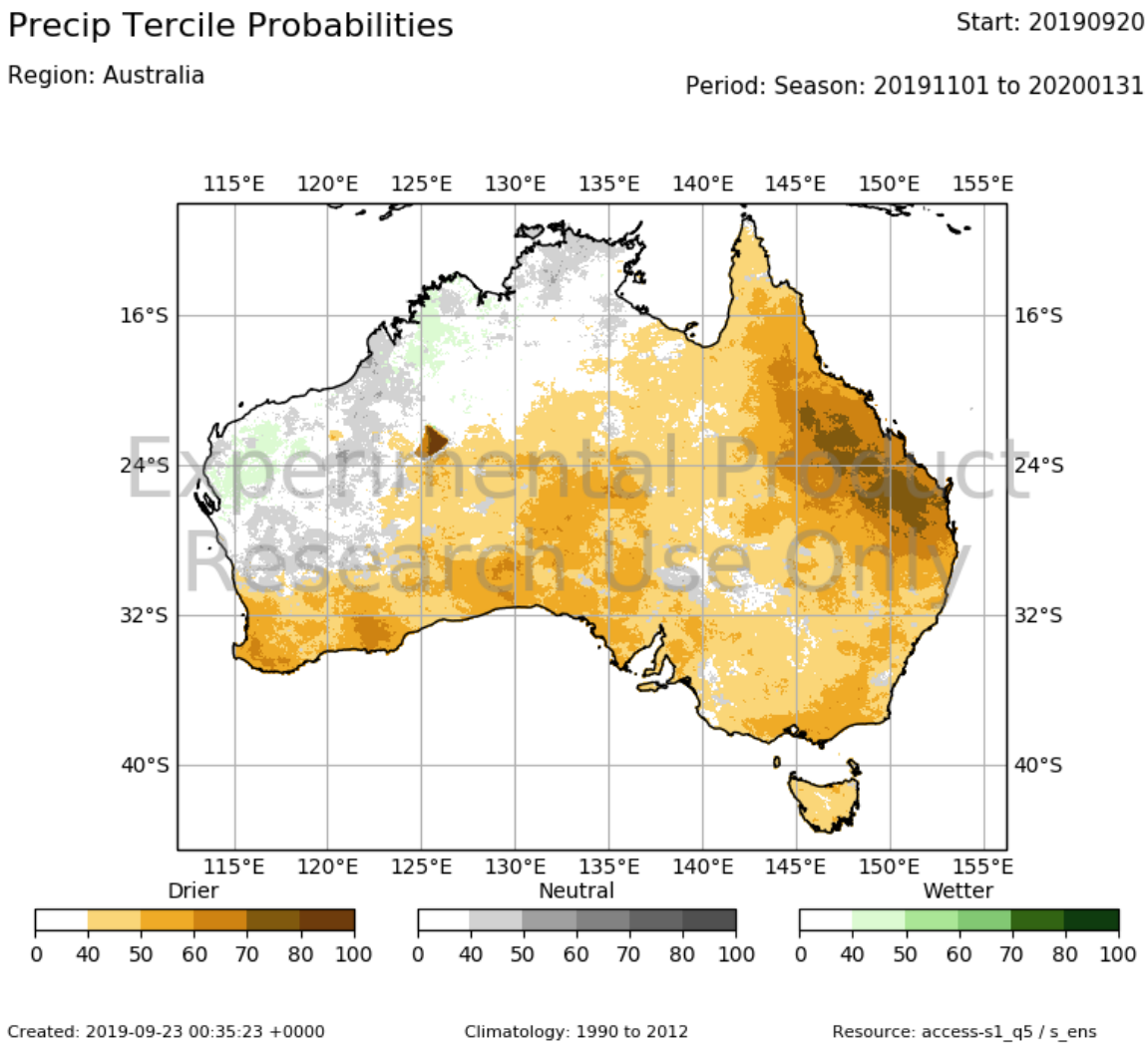

Figure 1: BOM rainfall forecast for November through January. 'Drier' indicates rainfall values are likely to be in the lowest tercile. This product indicates that the Granite Belt has a 60-70% chance of rainfall being in the lowest tercile. Please note this is an experimental product that is not yet available publicly.

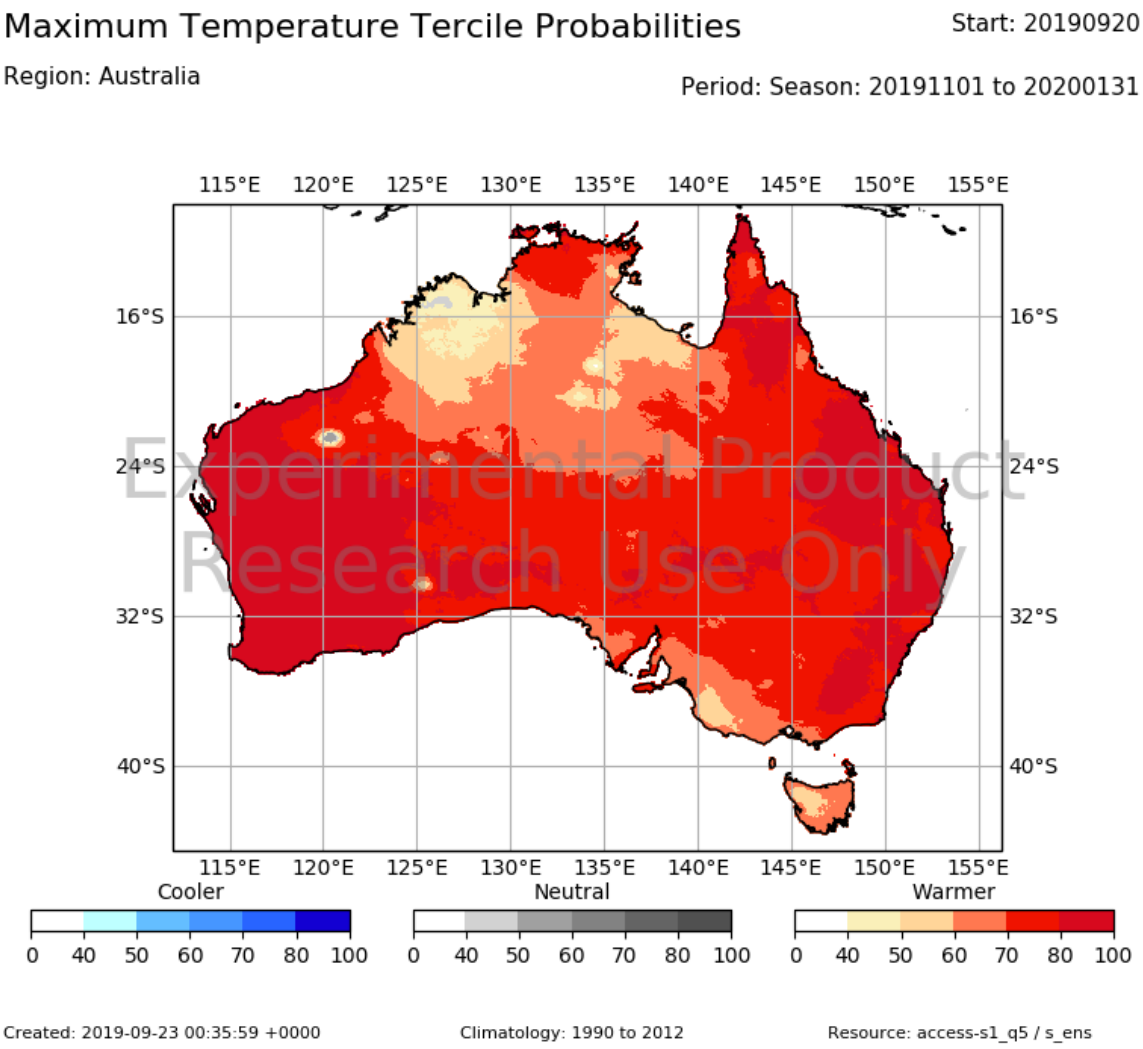

Figure 2: BOM maximum temperature forecast for November through January. 'Warmer' indicates that values are likely to be in the highest tercile. This product indicates that maximum temperatures in the Granite Belt in Nov/Dec/Jan are 70-80% likely to be in the highest tercile. Please note this is an experimental product that is not yet available publicly.

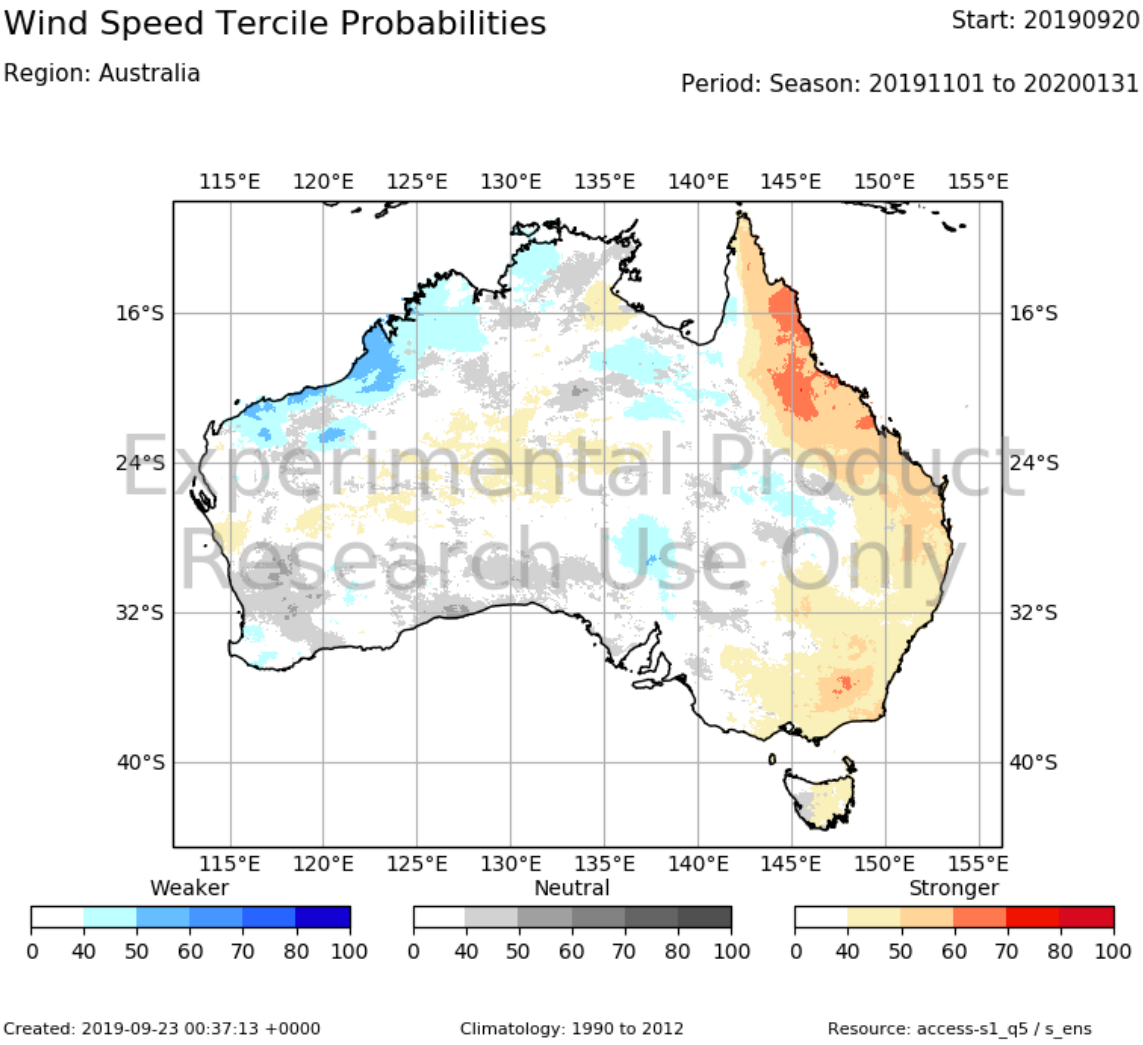

Figure 3: BOM wind speed forecast for November through January. This product indicates that wind speeds are 50-60% likely to be in the upper tercile ('Stronger'). Please note this is an experimental product that is not yet available publicly.

ECMWF Forecasts can be found at:
https://climate.copernicus.eu/charts/c3s_seasonal/

Under the "Parameter" menu on the left, T2m is daily temperature or you can select precipitation. This brings up a number of different models, one of which is ECMWF. When you click on ECMWF, you can then select the type of forecast you want (terciles, median, etc) and also the Area (select Australasia)

UKMO Forecasts can be found at:
https://www.metoffice.gov.uk/research/climate/seasonal-to-decadal/gpc-outlooks/glob-seas-prob

Why is it so dry?

The past 24 months have been the driest on record for the Stanthorpe area since records started in 1900. However, there is no El Niño event, which is what generally causes sustained dry conditions in the Granite Belt area. So, what may be causing this drought?

Because there is no clear signal from the Pacific Ocean (ie El Niño), it is a bit hard to determine exactly what is causing the dryness and it is more likely due to a number of conditions.

First and foremost, there have been warmer-than-normal sea surface temperatures in the central Pacific Ocean near the intersection of the dateline and equator (indicated in map below by white circle) that have been there for quite some time (since at least last September). When there is warm water in this location it causes it to be dry over eastern and northern Australia due to the location of the Walker Cell. Please feel free to email me if you would like more information on the Walker Cell.

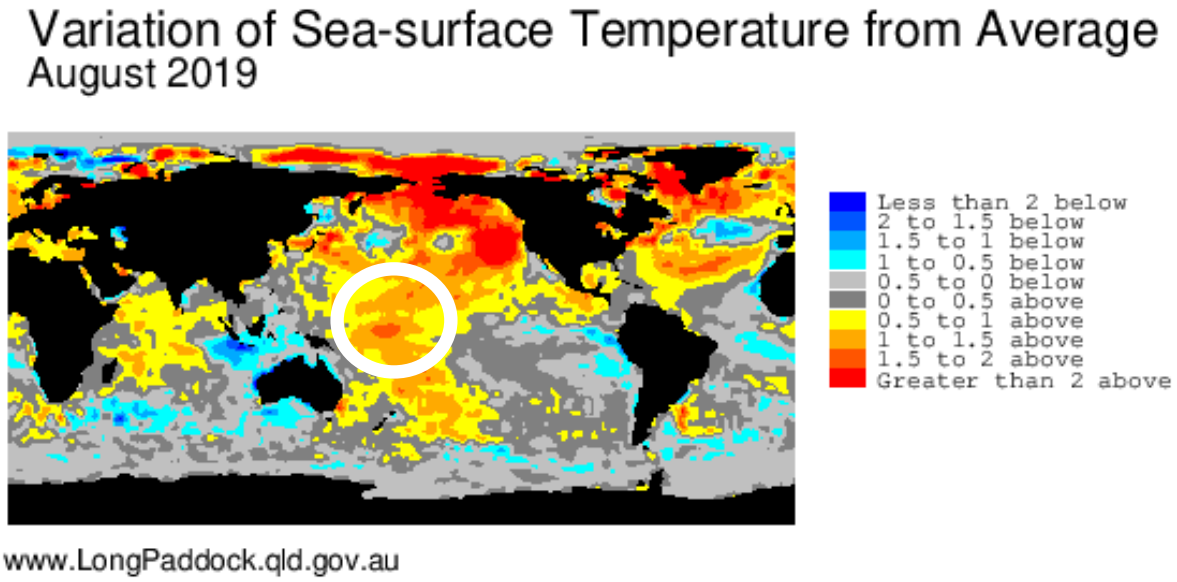

Figure 4: Sea surface temperature anomalies (ie difference of current temperature from the average) for August 2019, showing warming in the central Pacific.

Second, we currently have a positive Indian Ocean Dipole (IOD+) event happening. These events tend to cause unusually warm and dry conditions, though their influence is more in southeast Australia, but can extend up into the Granite Belt area. Also, IOD events only last from about May/June to November/December, so they would not explain the prolonged drought we are seeing.

Third, there is currently a sudden stratospheric warming event underway. These events happen when the sun begins to reach the Antarctic and start warming the air in the stratosphere in that area. A major event, such as what we have now, is when the air warms very rapidly and causes significant changes to the polar jet stream. We had an event of a similar (though slightly less) magnitude in 2002. Sudden stratospheric warming can cause unusually hot and dry conditions in parts of Australia, especially the east coast area (including the Granite Belt), similar to a negative Southern Annular Mode event.

However, it's important to remember that this event has only recently started, which means that it is not responsible for the dryness experienced over the past 24 months.

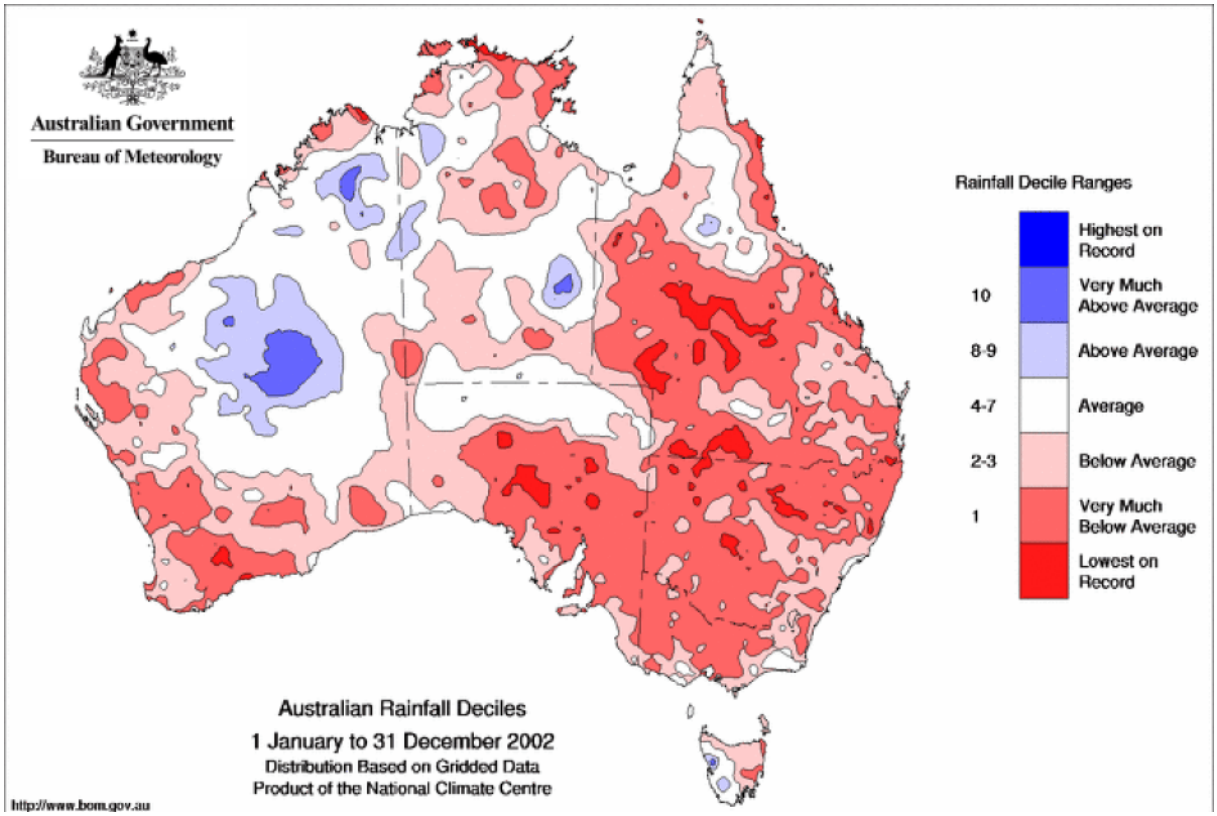

Figure 3: Rainfall deciles during the last sudden stratospheric warming event in 2002. This year's event may or may not be the same.

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

USQ Research
Centre for Applied Climate Sciences

Please email Prof Roger Stone at
roger.stone@usq.edu.au

This work is currently funded by Meat and Livestock Australia Donor Company, the Queensland State Government through the Drought and Climate Adaptation Program and the University of Southern Queensland