Northern Australia Climate Program

CLIMATE SAVVY FOR GRAZING MANAGEMENT

Far North Queensland

MEAT & LIVESTOCK AUSTRALIA

UNIVERSITY OF SOUTHERN QUEENSLAND

Queensland Government

El Niño – Southern Oscillation

What: ENSO has two active phases, El Niño and La Niña, and an inactive or neutral phase.

When: Any time between June (start) to April (end). Main impacts of ENSO are usually from December to March. Events can span multiple years, which is more common with La Niña events.

Where: All of far north Queensland.

How: El Niño tends to cause warmer days and less rainfall, fewer cyclones, and increase risk of spring frosts due to clear nights. La Niña tends to cause wetter weather, increased humidity and an increased risk of cyclones and flooding.

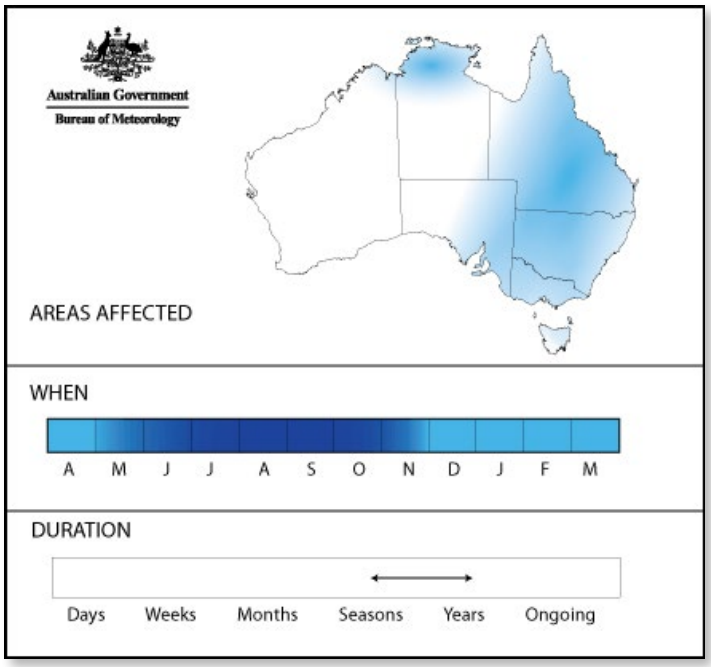
Prediction lead time:

About 2-3 months for a more reliable forecast, up to 6 months in advance for an indication of a possible ENSO event. We start looking for a possible ENSO event in April/May, but become more confident in the forecast in June/July.

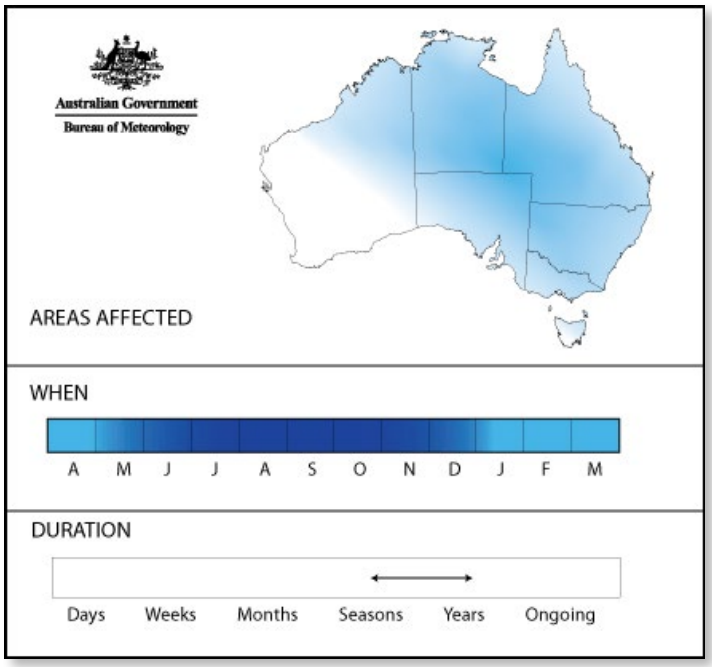
> ***Note:*** *There is a 'prediction gap' from about January to April when it's very difficult to tell whether or not an ENSO will develop in the coming winter. The Southern Oscillation Index, a measure of ENSO, can be a poor indicator from January to April due to the monsoon trough creating low pressure (unrelated to ENSO) over Darwin.*

Other Information:

During an El Niño Modoki, there is a warm pool of water in the central Pacific Ocean near the dateline (180°) and the equator (0°), which is different to a 'traditional' El Niño where the warm water is closer to South America (eastern Pacific). Recent research shows that Modoki events may have more dry/warm impacts on northern Australia than a 'traditional' El Niño event and may occur more regularly in the future.



*The diagram above shows the area affected by **El Niño**, when it occurs and how long it may last.*



*The diagram above shows the area affected by **La Niña**, when it occurs and how long it may last.*

Where to find information:

BOM: **http://www.bom.gov.au/climate/enso/**
NOAA: **https://www.cpc.ncep.noaa.gov/products/precip/CWlink/MJO/enso.shtml**
ESRL: **https://www.esrl.noaa.gov/psd/enso/**
SOI: **https://www.longpaddock.qld.gov.au/soi/**

Madden-Julian Oscillation

What: A large band of clouds that influence alternating wet/dry conditions during the wet/summer season. The MJO can increase the availability of moisture in the area during an MJO 'wet' phase, leading to an increased chance of rain.

When: Year-round, but mainly during wet season (December to April). An active 'wet' phase in late November or December can bring on the start of the summer monsoon.

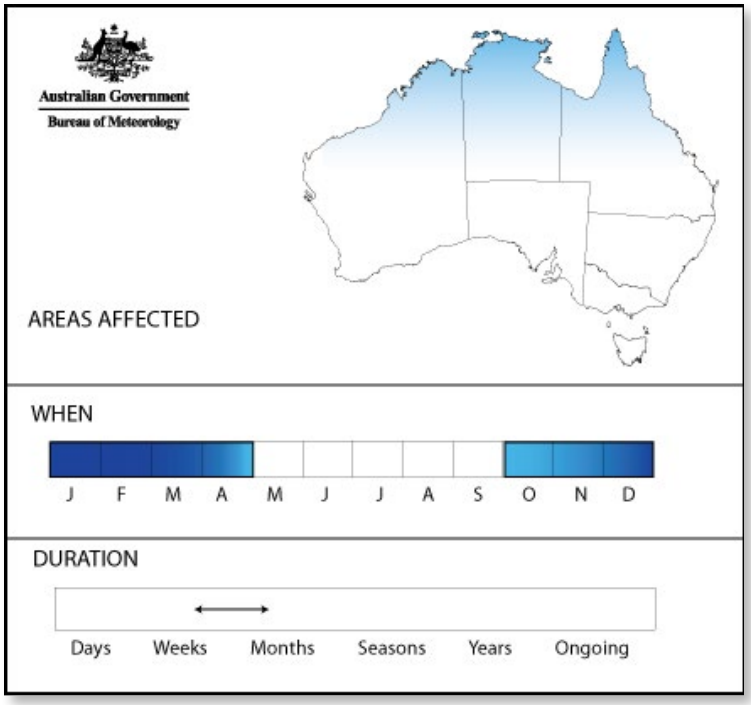
Where: All of far north Queensland.

How: Impact varies by season and location.

Period	Wet Phases	Dry Phases
June, July, August (minimal impact)	1, 2, 4	6 &7
September, October, November (minimal impact)	6 & 7	1 & 2
December, January, February	5, 6, 7	2 & 3
March, April, May	4, 5, 6	8, 1, 2

Prediction lead time:

The publicly issued CPC/NOAA MJO forecast is issued 14-days in advance. The MJO forecast on the BOM website is for 21-days in advance.



The diagram above shows the general area most affected by the Madden-Julian Oscillation (MJO), the seasons during which the MJO's influence on Australia is greatest, and for how long each active phase of the MJO typically lasts.

Where to find information:

BOM: **http://www.bom.gov.au/climate/enso/#tabs=Tropics**

NOAA: **https://www.cpc.ncep.noaa.gov/products/precip/CWlink/MJO/mjo.shtml**

Monsoon

What: An annual change in the direction of the prevailing winds to be from west to east.

When: November/December to March/April

Where: All of far north Queensland.

How: Areas in northern Australia are subject to influence from the monsoon trough, which moves south with the Intertropical Convergence Zone during Austral summer.

Note: *The Monsoon can be delayed by El Niño and brought forward by La Niña.*

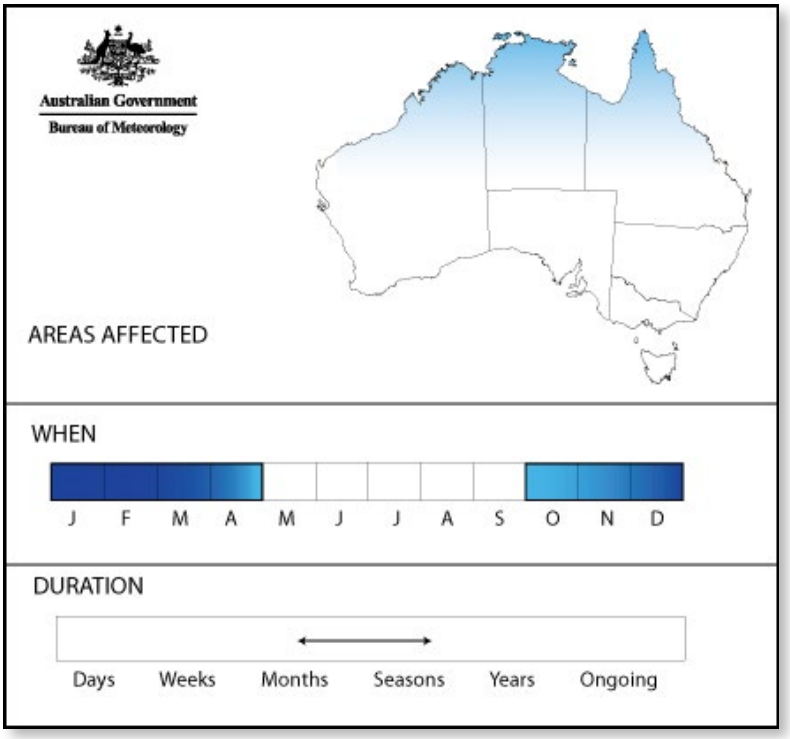
Prediction lead time:

The BOM currently issues a 'Northern Rainfall Onset' forecast and also has information about timing of monsoon onset during El Niño and La Niña events, but there is not specific 'Monsoon Onset' forecast.

Different definitions:

Monsoon: Seasonal reversal of winds over the tropics, from mostly easterly winds to westerly winds; has 'active' (rain) and 'inactive' (dry) phases. Active and inactive phases can be associated with the MJO.

Northern Rainfall Onset: The day after 1 September that an area receives an accumulated total of 50mm of rain.



The diagram above shows the area affected by the monsoon, when it occurs and how long it may last.

Where to find information:

BOM Monsoon: **http://www.bom.gov.au/climate/about/?bookmark=monsoon**
BOM Northern Rainfall Onset Forecast: **http://www.bom.gov.au/climate/rainfall-onset/**
BOM Weekly Tropical Climate Note: **http://www.bom.gov.au/climate/tropical-note/**

Indian Ocean Dipole

What: The IOD has two active phases, Positive and Negative, and an inactive/neutral phase.

When: It can only occur between June/July and the end of December.

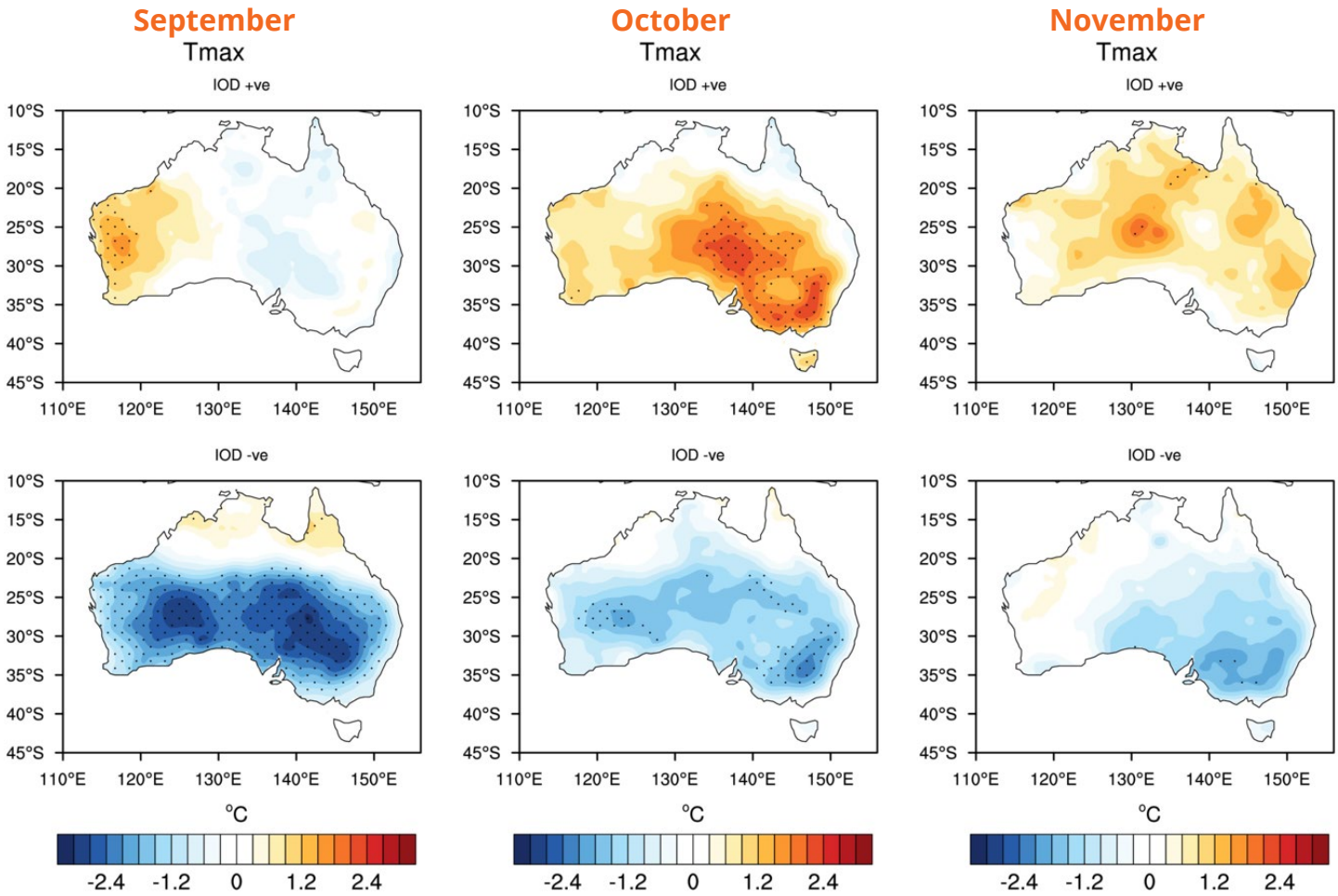
Where: IOD Positive events mainly impact western and southeast Australia, with a minor impact on most of Queensland; IOD negative events mainly impact southeast Australia, extending up into Queensland.

How: IOD Positive events tend to bring warmer temperatures and drier conditions. IOD negative events are the opposite, with cooler temperatures and an increased chance for rain.

Note: *Because IOD is active during the dry season in Queensland, it won't have much of an impact either way in regard to rainfall, but it can impact temperatures (Refer to maps below – These maps show changes – warmer or cooler – to usual maximum temperature).*

Prediction lead time:
The IOD can be predicted about 2-3 months in advance. Forecasters start looking for signs of an IOD event around May/June. The forecast will be more accurate from July onwards.

Other:
Very strong IOD Positive events, like what was observed in 2019, can indirectly delay the start of the monsoon.



Deviation of Maximum Temperatures from the mean during September (left), October (middle), and November (right) for IOD Positive (top row) and IOD Negative (bottom row) phases.

Where to find information:
BOM IOD information and forecast: **http://www.bom.gov.au/climate/enso/#tabs=Indian-Ocean**

Cyclones

When: November/December to April/May

Where: All of far north Queensland.

How: Moderate to heavy rain and strong winds, often associated with flooding or infrastructure damage.

Prediction lead time:

Minimal. General storm tracks can be predicted up to 7 days in advance, but actual path is hard to determine more than a day in advance.

Where to find information:

BOM, Current Cyclones: **http://www.bom.gov.au/cyclone/index.shtml**
BOM, General Info: **http://www.bom.gov.au/climate/about/?bookmark=tc**
ECMWF: **https://www.ecmwf.int/en/forecasts/charts/latest-tropical-cyclones-forecast**
Links to other cyclone websites: **https://www.cawcr.gov.au/research/cyclone-exchange/**

Local Convection/Thunderstorms

When: Late spring, summer, autumn

Where: All of far north Queensland, though impact can be very patchy, with one area getting rain and another area 1km away not getting rain.

How: The land heats up faster than surrounding air, causing warming of the air near the surface. Warm air always wants to rise and is considered to be an unstable airmass. As the air rises, any water vapor condenses and cools. If there is sufficient moisture and condensation nuclei (such as dust particles), it will rain.

Prediction lead time:

Minimal. Sometimes a few days (general prediction), but only a few hours for a more precise prediction.

Other:

Currently, convection is extremely hard to model in general circulation models due to the spatial resolution required, which limits forecasting ability/lead time.

Where to find information:

BOM MetEye: **http://www.bom.gov.au/australia/meteye/**

DETERMINING A 'GREEN DATE' AND 'PRODUCTION DATE'

The Green Date is the date after 1 September that you can expect to get 50mm of rainfall within 3 consecutive days in 7 out of 10 years (or 70% of the time). This is generally considered to be the amount of rain required to start pasture growth. Note that the Green Date will vary by soils (type and current moisture), land cover and type, and other climatic considerations (like high temperatures and high winds). A Production Date is when there is enough pasture growth to translate into kg gains and occurs about 2-6 weeks after the Green Date.

Timing of decision:

Has the Green Date changed? Is it coming later than in previous years? It is often a lot later than managers think! Looking at the Green Date will give an indication as to the best time to aim for returning stock to particular paddocks and when you want calves hitting the ground to ensure there is sufficient feed available to last the dry season.

Climate drivers to watch for this decision:

Historical Climate Records; ENSO, IOD

El Niño Year and/or Strong Positive IOD – Green Date likely to be later than usual.

La Niña Year and/or Strong Negative IOD – Green Date likely to be earlier than usual.

Issues associated with decision:

Is there enough feed to carry cattle through to the Green Date or, even better, the Production Date? Are cows at peak lactation around the Production Date?

Information needed for decision:

Data to determine when the Green Date is and if it has changed over time. There is concern around the change/later pasture response due to the later onset of rainfall occurring more often.

Information sources:

CliMate App:**https://climateapp.net.au/**
Climate data on-line: **http://www.bom.gov.au/climate/data/**
Climate change: **https://www.climatechangeinaustralia.gov.au/en/**

DESTOCK EARLY – PENDING PREDICTED WET SEASON ONSET

Climate drivers to watch for this decision:

ENSO, IOD, MJO

Timing of decision:

El Niño Year and/or Strong Positive IOD – There is an increased likelihood of a late start to the wet season. If this is the case, depending on stock numbers and feed available, it may be opportunistic to reduce stock numbers.

La Niña Year and/or Strong Negative IOD – Increased possibility of some winter rain and/or an early start to the summer rains. If feed supplies are good, some cull cows could be kept to improve weight because late in the winter season there is less supply of well finished cull cows so market prices could be more favourable.

MJO – Watching the MJO in late November/December will give an idea of when the first rains will arrive.

Information needed for decision:

Reliable Northern Rainfall Onset forecast, reliable seasonal rainfall predictions.

Information sources:

Rainfall outlook: **http://www.bom.gov.au/climate/outlooks/#/rainfall/summary**
Northern Rainfall: **http://www.bom.gov.au/climate/rainfall-onset/**

DESTOCK EARLY PRE-DRY SEASON – FAILED WET SEASON/PASTURE GROWTH RESPONSE DRASTICALLY REDUCED

Failed wet seasons can lead to cattle in poor condition and limited options. Decisions need to be made in the early dry Season (April–May) and will depend on what has occurred during the wet season in terms of rainfall, and also pasture growth response to the season or a failed season. To be in the best position, it is imperative to have a destocking plan, decision dates, and the upcoming seasonal climate forecast.

Timing of decision:

April/May

Climate drivers to watch for this decision:

ENSO, IOD

El Niño Year and/or Strong Positive IOD in previous spring/summer – Feed is likely to be short due to a later start to summer rains and likely reduced rainfall. Therefore, stocking rates would need to be lower for the winter season.

> ***Note:*** *Sometimes in April, we have indications as to whether there will be an El Niño or La Niña in the coming winter/spring. Forecast skill is usually poor from March to June, but if there is going to be a strong ENSO event, we may have an indication in April. If it looks like an El Niño, there is a decreased chance for winter rain and an increased chance for a late start to the following growing season. The opposite would be true for a La Niña.*

Information needed for decision:

Realistic forage budget.

Information sources:

Rainfall outlook: **http://www.bom.gov.au/climate/outlooks/#/rainfall/summary**
Forage: **https://www.longpaddock.qld.gov.au/forage/**

LATE SEASON MUSTERING

Some properties are able to move at risk livestock from flood-prone or exposed areas with just a couple of weeks' notice. ENSO and IOD can create conditions that would make it beneficial to move stock in the spring.

Timing of decision:

November/December

Climate drivers to watch for this decision:

El Niño Year and/or Strong Positive IOD – There is an increased risk for hot and dry conditions, which can lead to calf loss and make it difficult to move stock.

La Niña Year and/or Strong Negative IOD – There is an increased risk for flooding and early cyclones; muddy ground can make it difficult to move stock.

MJO – If coming into an active wet phase (phases 6 & 7), the MJO can give an indication of coming rainfall events or the likelihood of a cyclone.

Issues associated with decision:

Are any temperature extremes predicted? Is calf loss likely? Are there workplace health and safety issues?

Information needed for decision:

Predictions and lead times for the likelihood of extreme weather events which could result in major impacts on business/ production system, livestock, due to flooding and extreme variations in temperatures.

Information sources:

BOM Rainfall outlook: **http://www.bom.gov.au/climate/outlooks/#/rainfall/summary**
Northern Rainfall onset: **http://www.bom.gov.au/climate/rainfall-onset/**
Temperature outlook: **http://www.bom.gov.au/climate/outlooks/#/temperature/summary**
MJO Forecast: **https://www.cpc.ncep.noaa.gov/products/precip/CWlink/MJO/mjo.shtml**

WHEN AND WHERE TO IMPLEMENT PRESCRIBED BURNS

Looking at short-term and longer-term weather and climate forecasts is key to effective burning. Fires to control woody thickening need to be hot fires late in the year, but when there is minimal wind and a good chance of follow-up rain. Fires to address patch grazing need to cool burns early in the wet season with good follow up rain. Wildfire mitigation burns need to be cool fires early in the dry season.

Climate drivers to watch for this decision:

El Niño Year and/or Strong Positive IOD – Producers will likely get a hot burn, but follow-up rain may be more variable, resulting in the possibility of less pasture response. If it has been a dry wet season, wildfire mitigation may need to be undertaken with extra caution.

La Niña Year and/or Strong Negative IOD – Hot fires may need to occur earlier in the spring due to an increased likelihood of the rains start early. During one of these events could be a good time to control woody thickening, as there is an increased chance for follow-up rains.

MJO – An active wet MJO (phases 5, 6 & 7) in the late spring/early summer may give an opportunity for cooler conditions to burn. The MJO forecast can also be useful when planning a mosaic/patch burn.

Information needed for decision:

Reliable wet season onset forecast; duration of the wet season; consistency of the wet (bursts and breaks etc.); heat wave forecasts and when the temperatures/winds change; and daily forecasts to plan optimum time for a fire.

Information sources:

Rainfall outlook: **http://www.bom.gov.au/climate/outlooks/#/rainfall/summary**
Northern Rainfall onset: **http://www.bom.gov.au/climate/rainfall-onset/**
7-day MetEye forecast: **http://www.bom.gov.au/australia/meteye/**
MJO Forecast: **https://www.cpc.ncep.noaa.gov/products/precip/CWlink/MJO/mjo.shtml**

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