

Monthly Climate Bulletin

October 2019



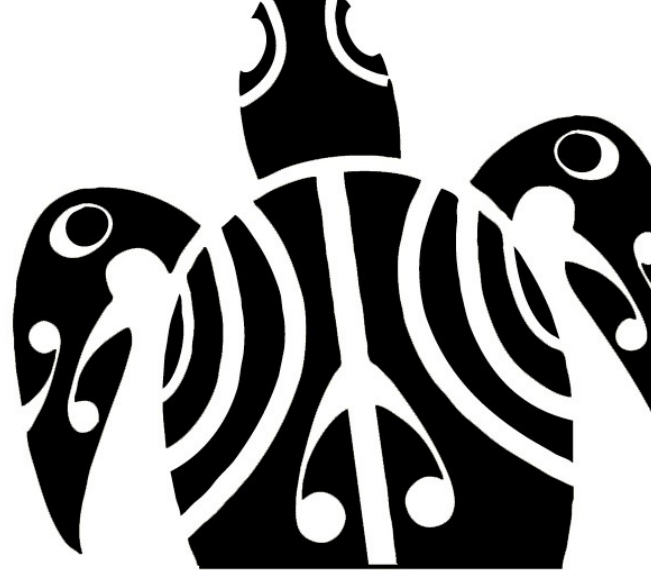
Australian Government
Department of Foreign Affairs and Trade
Bureau of Meteorology



Climate and Oceans Support
program in the Pacific



Pacific
Community
Communauté
du Pacifique



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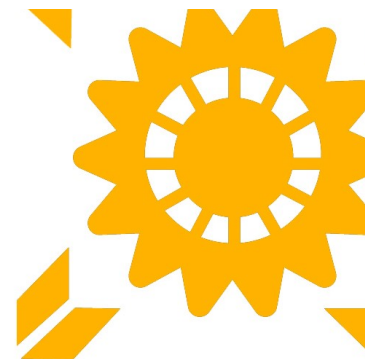
Issued 08 November 2019

- In the tropical Pacific Ocean, the El Niño Southern Oscillation (ENSO) remains neutral. The positive Indian Ocean Dipole (IOD) events continues.
- A pulse of the Madden-Julian Oscillation (MJO) re-strengthened over the eastern Maritime Continent during the past week. As it moved out of this environment, the MJO pulse rapidly redeveloped and is forecast to track further east as a moderate to strong pulse in the coming fortnight. At this time of the year, an MJO pulse over the eastern Maritime Continent and the western Pacific Ocean may help to enhance cloudiness and rainfall across parts of the Pacific during the next week or two.
- The Intertropical Convergence Zone (ITCZ) was weaker than normal. The South Pacific Convergence Zone (SPCZ) was more active over the PNG Islands, Solomon Islands, and from Fiji to Niue. There was below normal cloud cover over the Marshall Islands, Nauru, Tuvalu, Vanuatu and Cook Islands.
- Sea level in October was higher than normal in the equatorial and the south Pacific. All COSPPac countries experienced positive sea level anomalies. The main region of the positive anomalies was along the equator to 5° N, which saw the largest positive anomalies of 250-300mm in the east of Marshall Islands. Similarly, Nauru, Kiribati, Samoa, Niue and the Cook Islands observed anomalies of +100-150mm.
- For November 2019 to January 2020, the SCOPIC and the APEC Climate Centre multi-model favour below-normal rainfall over southeastern Papua New Guinea, Central Solomon Islands and southern Tuvalu. The models disagrees elsewhere.
- Tropical cyclone outlook for the Pacific for 2019/20 season favours tropical cyclone (TC) activity in the western North Pacific to increase through November and possibly into December 2019. In the Southwest Pacific, regional-scale tropical cyclone outlooks for the upcoming November 2019 to April 2020 season favour a near normal season for most islands or 9-12 tropical cyclones for the whole region.

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EL NIÑO–SOUTHERN OSCILLATION



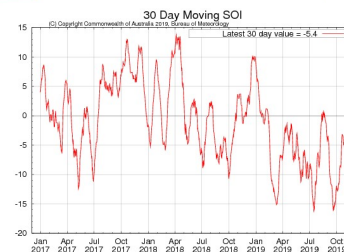
Strong Indian Ocean Dipole persist as ENSO remains neutral

ENSO Wrap-Up issued on 05 November 2019

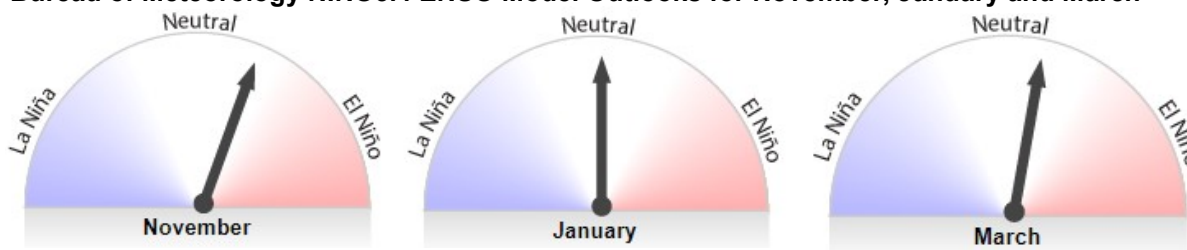
The positive Indian Ocean Dipole (IOD) event continues, while the El Niño Southern Oscillation (ENSO) remains neutral. The Indian Ocean Dipole (IOD) index remains strongly positive, with the latest weekly value at of +2.06°C, well above the positive IOD threshold of +0.4 °C. Forecasts show an easing in the easterly trade winds in the coming weeks, suggesting the positive IOD may be near its peak. However, international climate models surveyed by the Bureau indicate the positive IOD is so strong that it is likely to take several weeks to decline and could persist into mid-summer (January). The slow decline is also due to the strong IOD slowing the movement of the monsoon into the southern hemisphere. A positive IOD typically brings below average spring rainfall to western Pacific region especially over Papua New Guinea.

In the tropical Pacific Ocean, waters have warmed over the past month but have caused little change in the atmosphere, and hence the El Niño Southern Oscillation (ENSO) remains neutral. The latest 30-day Southern Oscillation Index (SOI) is -5.2, returning it to more neutral levels. The majority of climate models forecast neutral ENSO for the remainder of 2019 and into the first quarter of 2020. When ENSO is neutral, it has little effect on Pacific climate, meaning other influences are more likely to dominate.

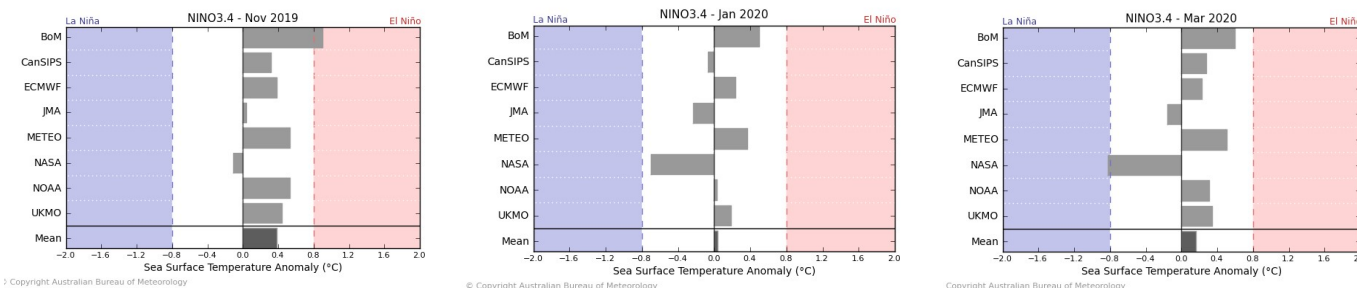
The approximate 30-day and 90-day Southern-Oscillation Index (SOI) values to 27 October were -5 and -8 respectively.



Bureau of Meteorology NINO3.4 ENSO Model Outlooks for November, January and March



Bureau of Meteorology NINO3.4 International Model Outlooks



Bureau of Meteorology summary of international model outlooks for NINO3.4: <http://www.bom.gov.au/climate/>

Bureau of Meteorology ENSO Wrap-Up
<http://www.bom.gov.au/climate/enso/>

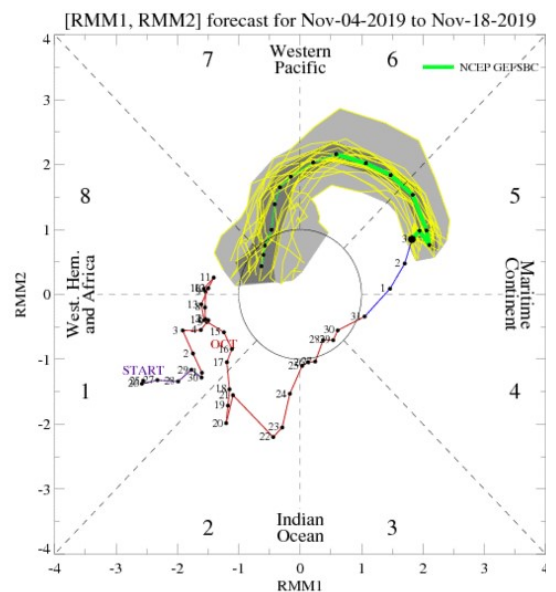
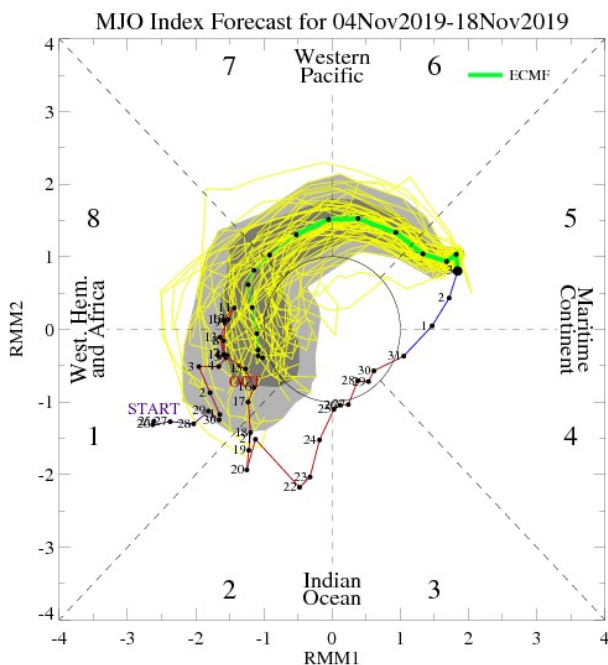
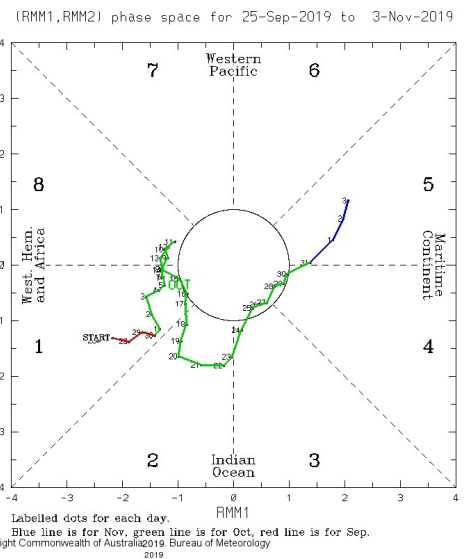
MADDEN–JULIAN OSCILLATION



Weekly Tropical Note [Issued on Tuesday 06 November 2019]

A pulse of the Madden-Julian Oscillation (MJO) re-strengthened over the eastern Maritime Continent during the past week. This pulse had previously weakened rapidly as it encountered the unfavourable environment of the eastern Indian Ocean, a result of the 'blocking' effect of the positive IOD. As it moved out of this environment, the MJO pulse rapidly redeveloped and is forecast to track further east as a moderate to strong pulse in the coming fortnight. At this time of the year, an MJO pulse over the eastern Maritime Continent and the western Pacific Ocean may help to enhance cloudiness and rainfall across parts of the Pacific during the next week or two. The MJO is likely to increase the risk of tropical cyclone formation over the western South Pacific oceans in the coming week or two.

This is an abbreviated version of the Weekly Tropical Note. Click on the link below for the full version.

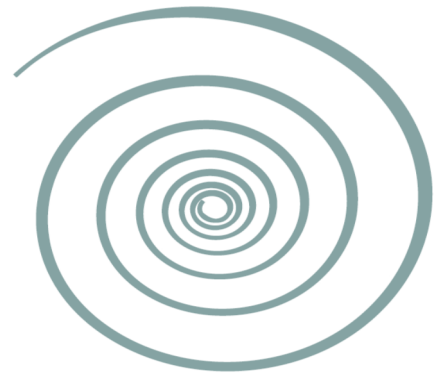


This is an abbreviated version of the Weekly Tropical Note. Click on the link below for the full version.

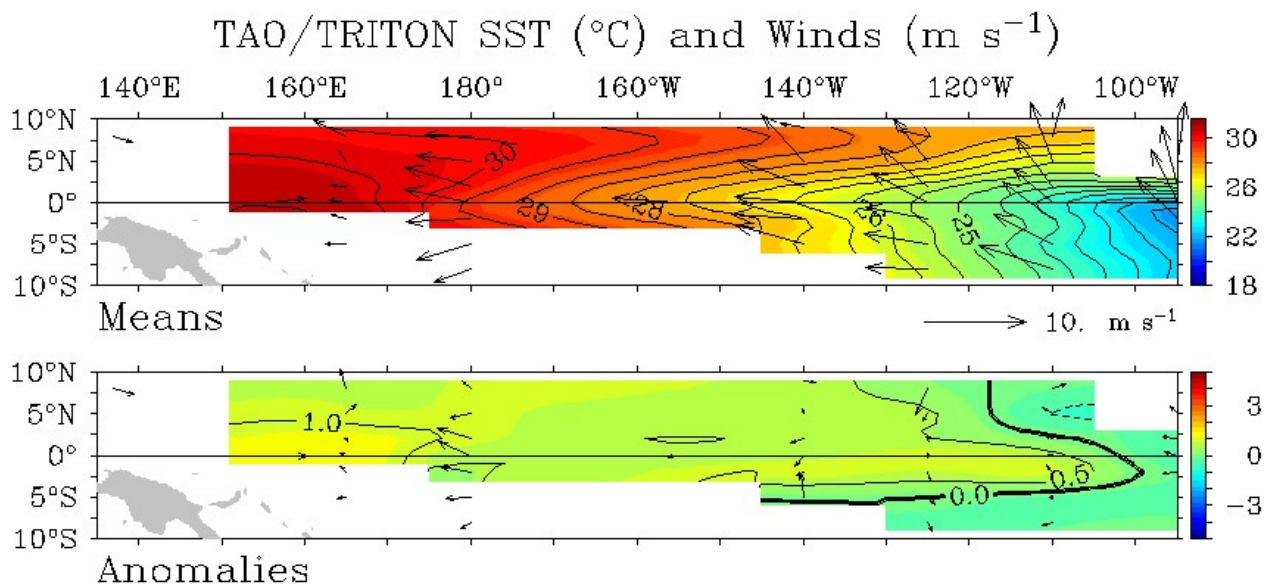
Bureau of Meteorology Weekly Tropical Climate
Note Page: <http://www.bom.gov.au/climate/tropical-note/>

WIND

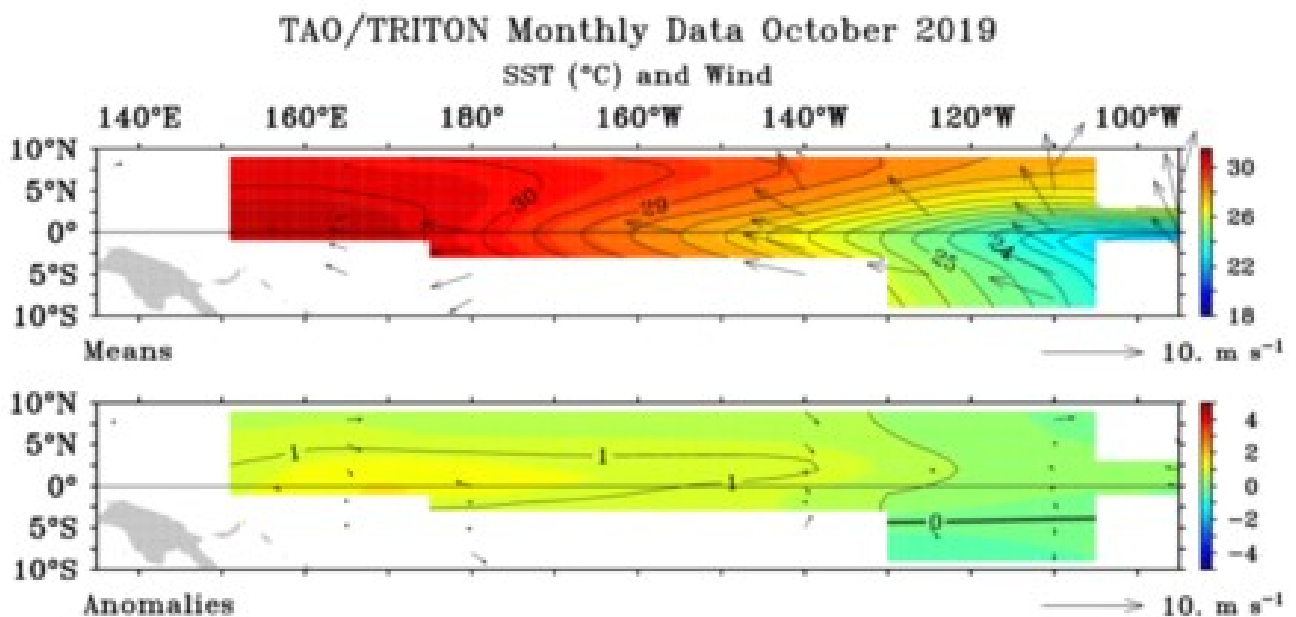
The equatorial trade winds for the month of October were above normal across most of the equatorial Pacific. The 5-day snapshot ending 03 November shows the trade winds were above normal just east of the Dateline while near normal in the central and eastern equatorial Pacific.



During La Niña events, there is a sustained strengthening of the trade winds across much of the tropical Pacific, while during El Niño events there is a sustained weakening, or even reversal, of the trade winds.



Five-Day Mean Ending on November 3 2019



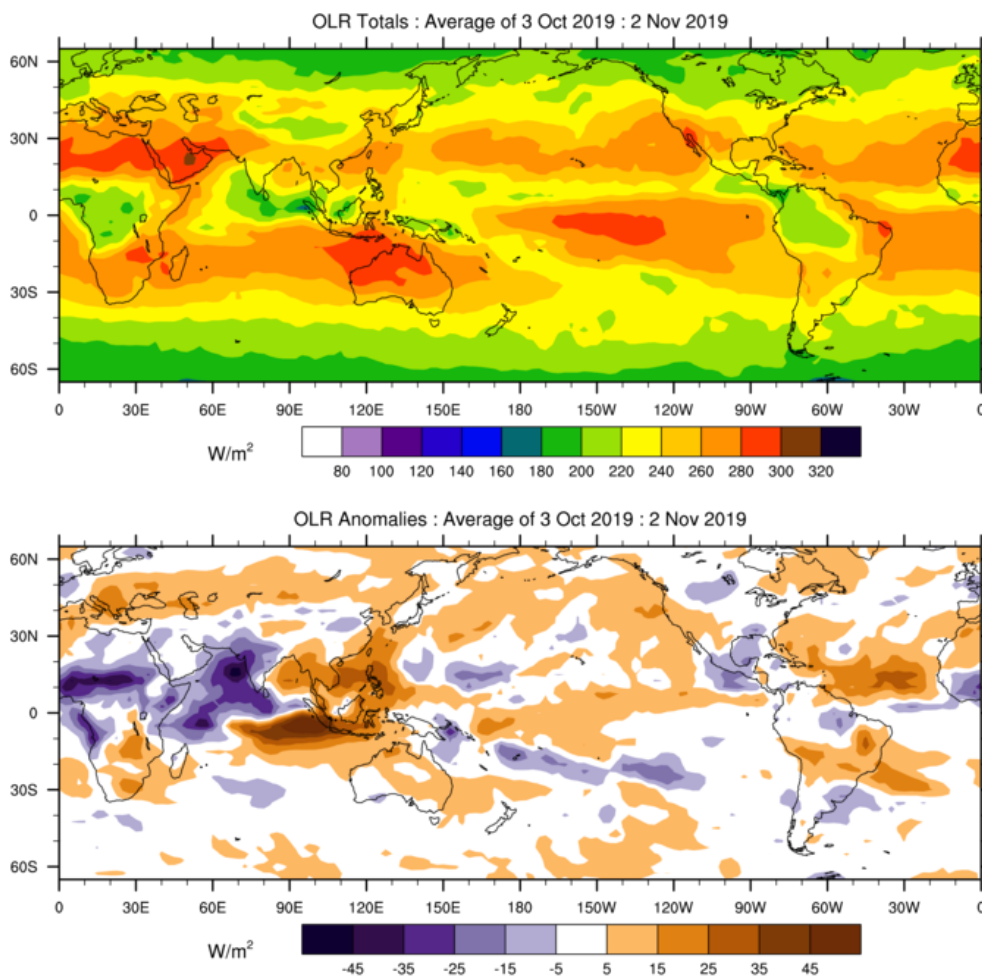
CLOUD AND RAINFALL



The October 30-day OLR and NOAA NCEP CAMP total and anomaly maps suggest the Intertropical Convergence Zone (ITCZ) was weaker than normal. The South Pacific Convergence Zone (SPCZ) was more active than normal over the Papua New Guinea Islands, Solomon Islands and from Fiji to Niue. There was below normal cloud cover over Marshall Islands, Nauru, Tuvalu, Vanuatu and Cook Islands.

Note: Global maps of OLR below highlight regions experiencing more or less cloudiness. The top panel is the total OLR in Watts per square metre (W/m^2) and the bottom panel is the anomaly (current minus the 1979-1998 climate average), in W/m^2 . In the bottom panel, negative values (blue shading) represent above normal cloudiness while positive values (brown shading) represent below normal cloudiness.

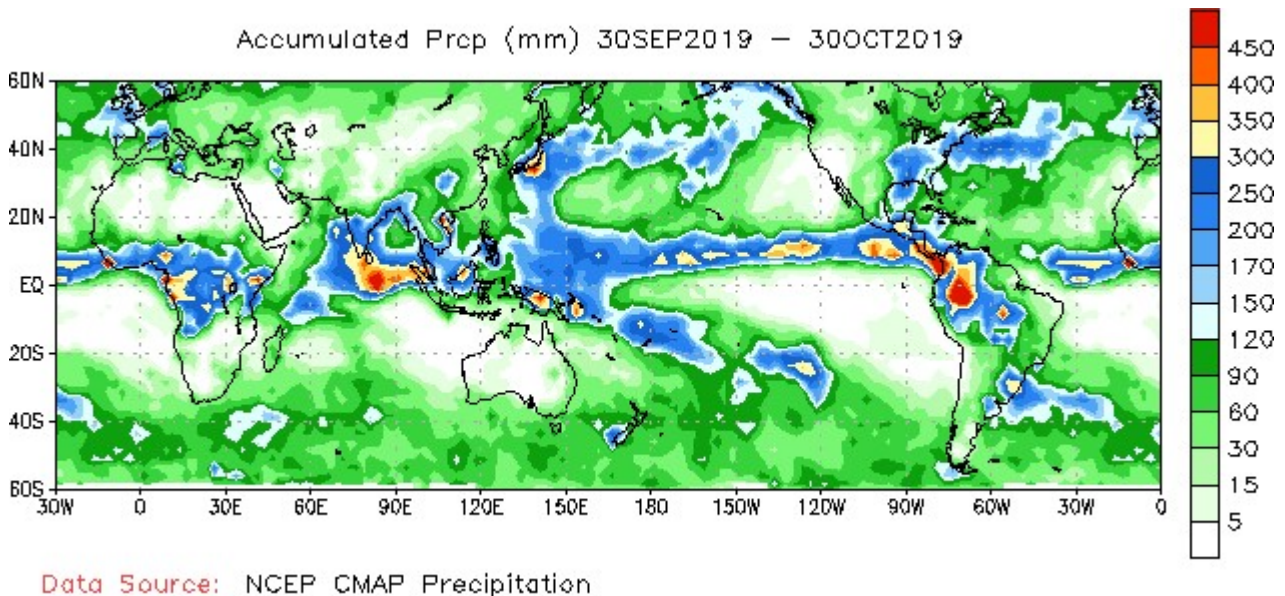
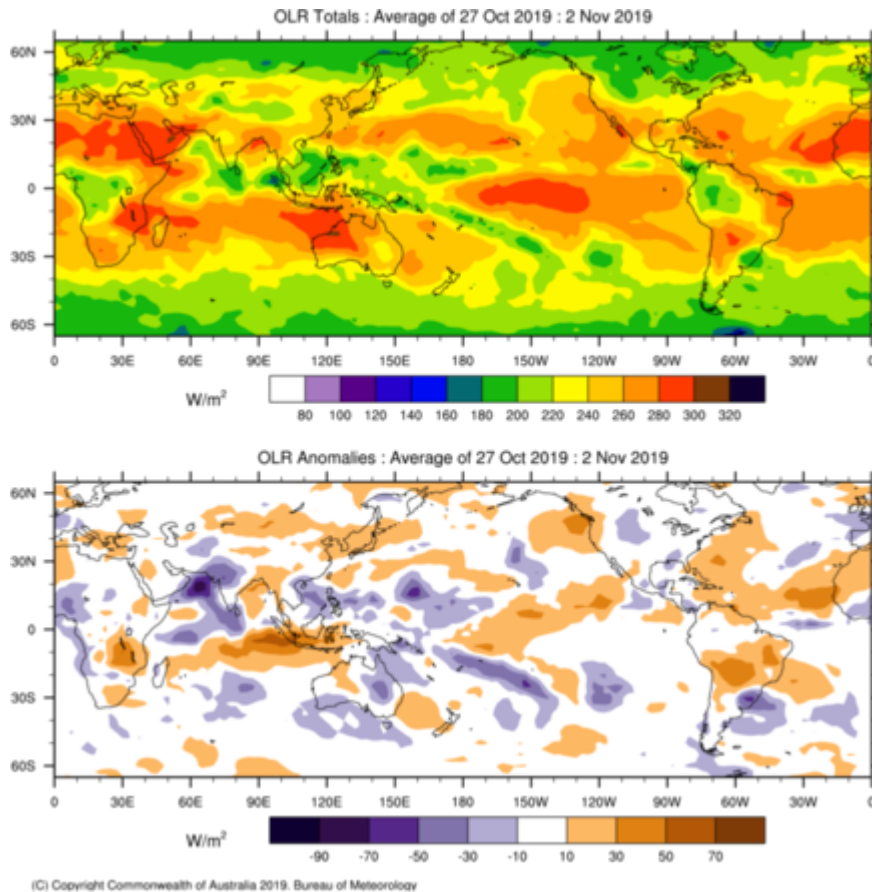
OLR Total and Anomalies, 30 Day OLR



CLOUD AND RAINFALL



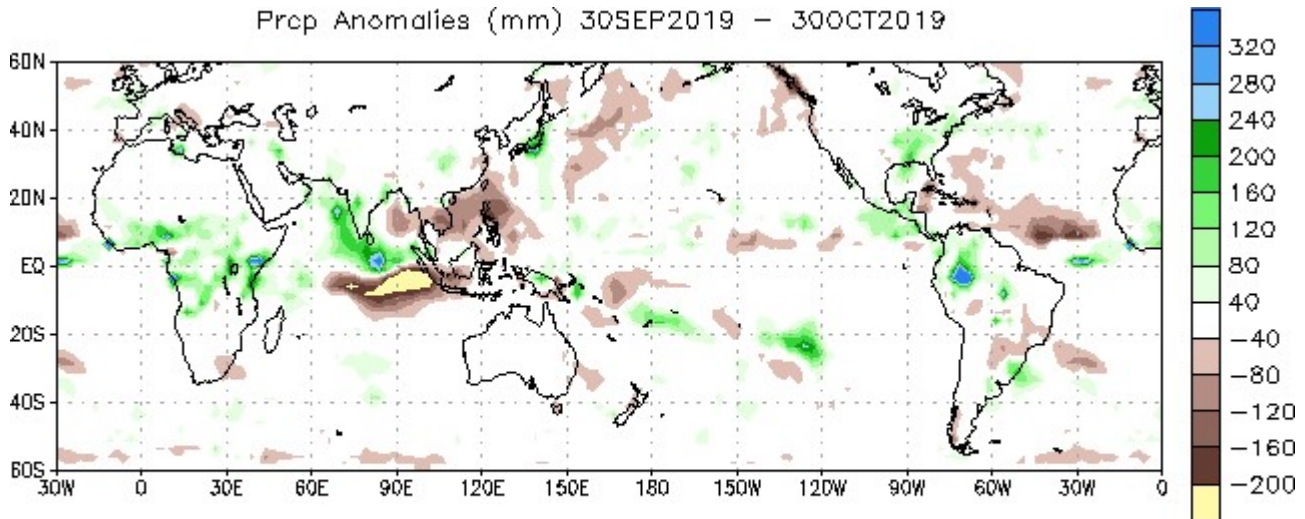
OLR Total and Anomalies, 7 Day OLR



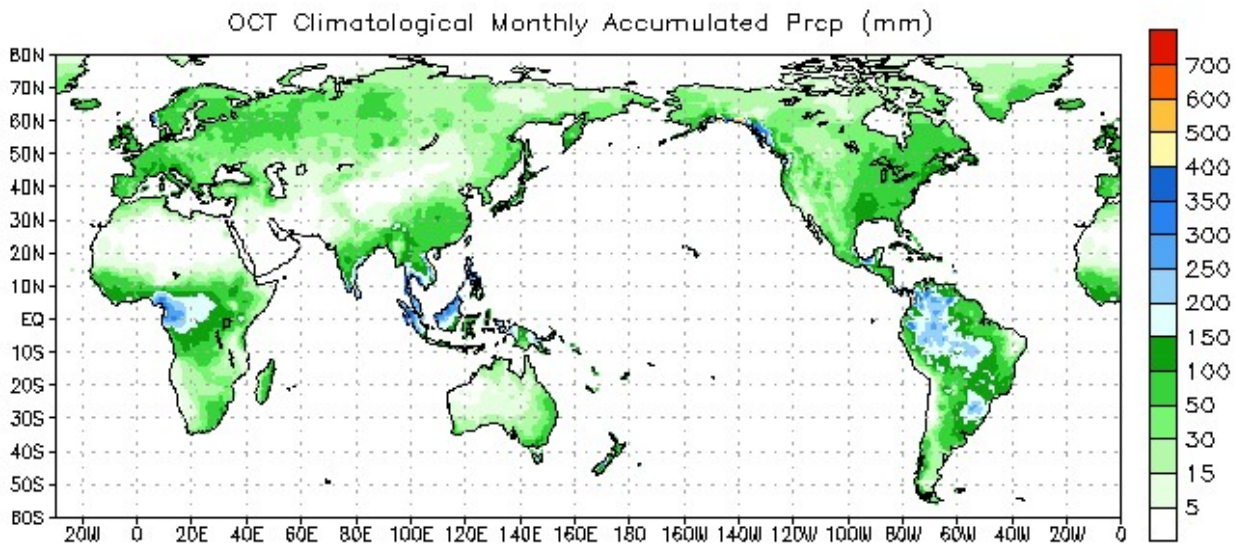
CLOUD AND RAINFALL



30-Day Rainfall Anomalies



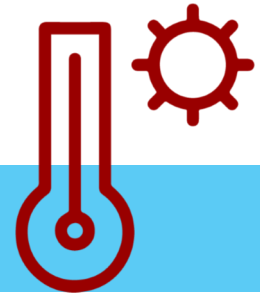
Data Source: NCEP CMAP Precipitation
Climatology (1979–1995)



Data Source: CPC Unified (gauge-based) Precipitation
Climatology (1979–1995)

https://www.cpc.ncep.noaa.gov/products/Global_Monsoons/Figures/curr.p.30day.figb.gif

OCEAN CONDITIONS



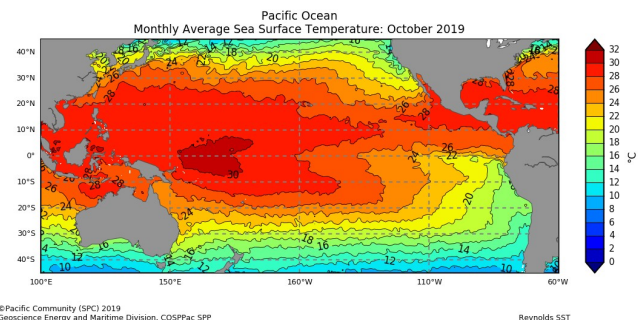
SEA SURFACE TEMPERATURE

Sea surface temperatures (SSTs) for October were warmer than average in the western to central tropical Pacific Ocean, with patches of anomalies in the 1.5 °C range and greater in the north and south Pacific. Cooler than average in some parts of the eastern and western equatorial Pacific, extending into the south Pacific close to South America and New Caledonia.

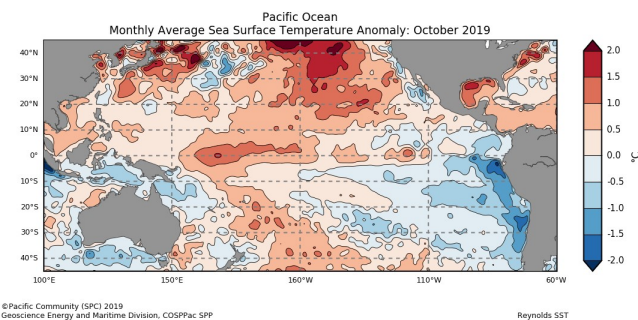
SSTs were warmer than average across most COSPPac countries, with this warmth extending across Palau to central Kiribati in the northern Pacific and from northern PNG to Niue in the south Pacific. Weak negative anomalies affected southern parts of PNG to northern New Caledonia, Coral Sea region and from southern Cook Islands and eastwards. SSTs for the three NINO regions has warmed in October, and are in the ENSO neutral range for all NINO regions. The October SST anomalies for the NINO3, NINO3.4 and NINO4 regions were +0.4 °C, +0.7 °C and +1.0 °C, respectively.

The SST decile map for October shows a small region of deciles 8 to 9 in the western equatorial Pacific extending to north and south Pacific, surrounding a large area of decile 10 affecting Nauru and central Kiribati. Most of the COSPPac countries are in regions of deciles 4-7, 8-9 or 10 with exception of PNG and parts of Solomon Islands with temperature record in deciles 2-3.

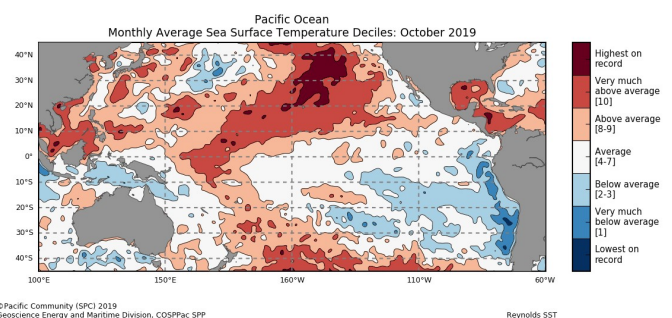
Mean SST



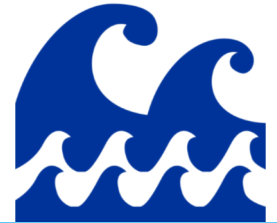
Anomalous SST



SST Deciles



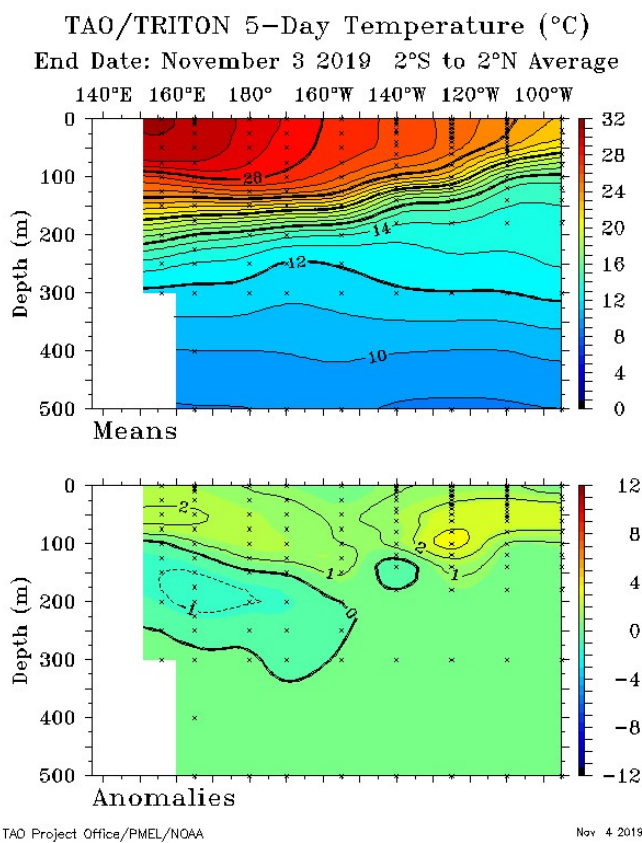
OCEAN CONDITIONS



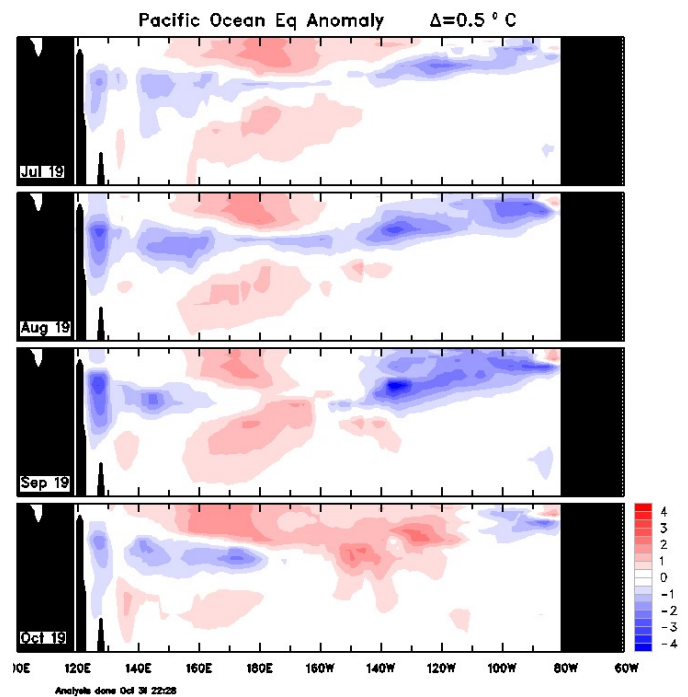
SUB SURFACE

The Bureau of Meteorology's four-month sequence of equatorial sub-surface temperature anomalies (to 24 October) shows cool anomalies in the western equatorial Pacific, at a depth of around 100 to 200 m, and in the shallow sub-surface east of 110° between 0 to 100 m depth. Weak warm anomalies extend across most of the top 200 m in most of the remainder of the equatorial Pacific. Warm anomalies in the central Pacific have intensified in October, compared to September and August, while cool anomalies in the east and west have weakened. Warm anomalies reach up to 2.5 degrees warmer than average in small regions.

Weekly Temperatures Mean and Anomalies



Monthly Temperatures Anomalies

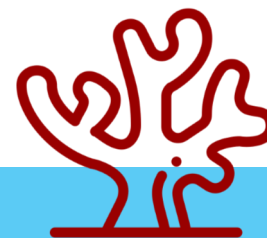


Bureau of Meteorology Sea Temperature Analysis: <http://www.bom.gov.au/marine/sst.shtml>

TAO/TRITON Data Display: <http://www.pmel.noaa.gov/tao/jsdisplay/>



OCEAN CONDITIONS



CORAL BLEACHING

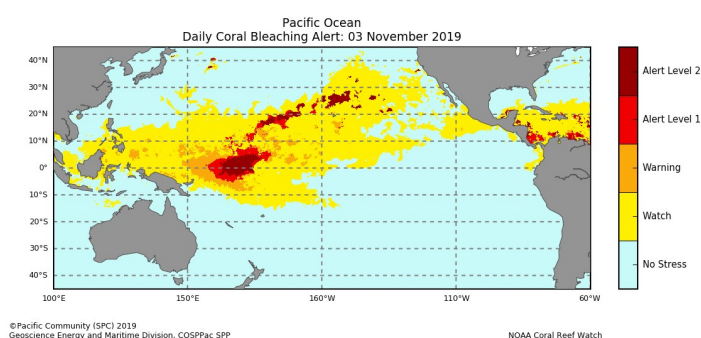
The daily Coral Bleaching Alert for 03 November 2019 shows warning areas affecting parts of Palau, eastern Federated States of Micronesia, Papua New Guinea and Solomon Islands. Marshall Islands, Nauru and Kiribati are on Alert level 1 and 2. The remainder of the COSPPac region is on watch alert with regions south of 15° on no stress. The Coral Bleaching Outlook for 03 November shows warning area expected in eastern Federated State of Micronesia, Marshall Islands, New Guinea Islands, northern Solomon Islands, Tuvalu, Nauru and Kiribati, with a small Alert level 1 and 2 affecting the latter two and Marshall Islands.

Daily Coral Bleaching Alert

About Coral Bleaching:

<http://oceanportal.spc.int/portal/app.html#coral>

[about_coralbleaching.pdf](#)

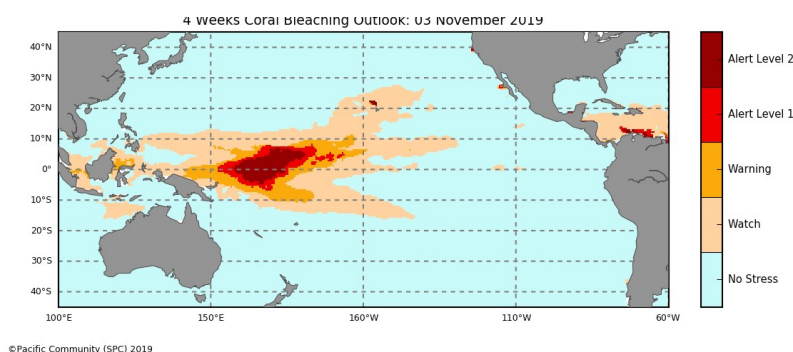


4-Weeks Coral Bleaching Outlook

Pacific Community COSPPac

Ocean Portal:

<http://oceanportal.spc.int/portal/app.html#coral>



OCEAN CONDITIONS



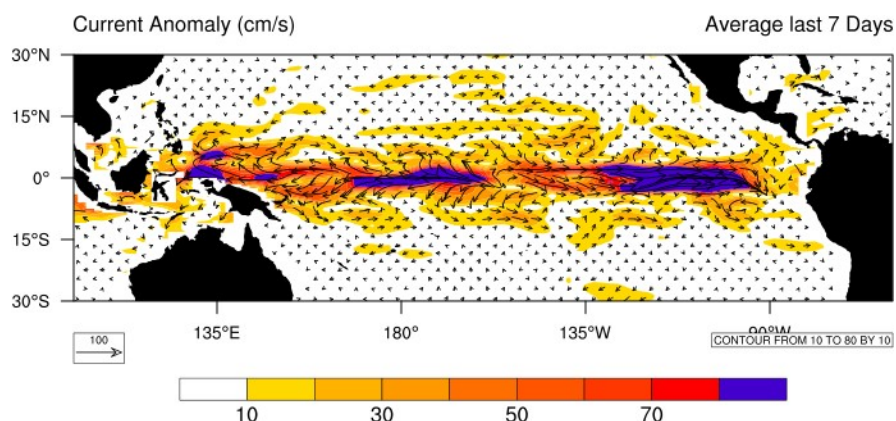
OCEAN SURFACE CURRENTS AND SEA LEVEL

The most recent seven-day ocean surface currents plot shows a stronger than normal eastward flowing Equatorial Counter Current in the central and eastern equatorial Pacific. Stronger than normal westward flowing Equatorial Counter current from the central and western Pacific.

Sea level in October was higher than normal in the equatorial and the south Pacific. All COSPPac countries experienced positive sea level anomalies. The main region of the positive anomalies was along the equator to 5°N, which saw the largest positive anomalies of 250-300mm in the east of Marshall Islands. Similarly, Nauru, Kiribati, Samoa, Niue and the Cook Islands observed anomalies of +100-150mm.

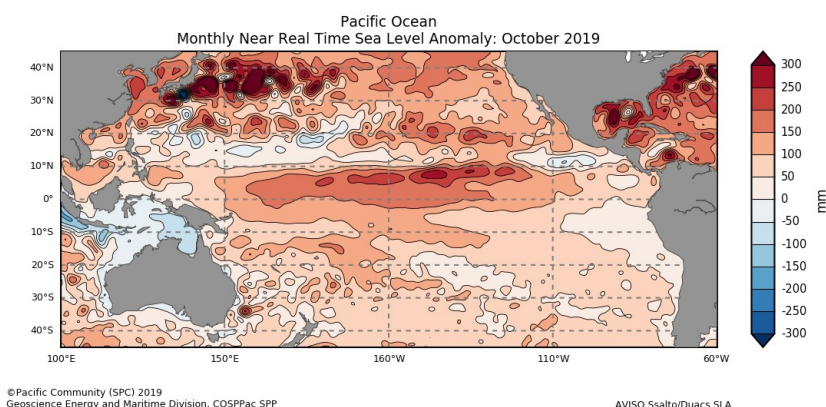
Ocean Surface Currents (Last 7-Days)

Bureau of Meteorology POAMA
[http://poama.bom.gov.au/
ocean_monitoring.shtml](http://poama.bom.gov.au/ocean_monitoring.shtml)



Monthly Sea Level Anomalies

Pacific Community COSPPac Ocean Portal:
[http://oceanportal.spc.int/portal/
app.html#sealevel](http://oceanportal.spc.int/portal/app.html#sealevel)



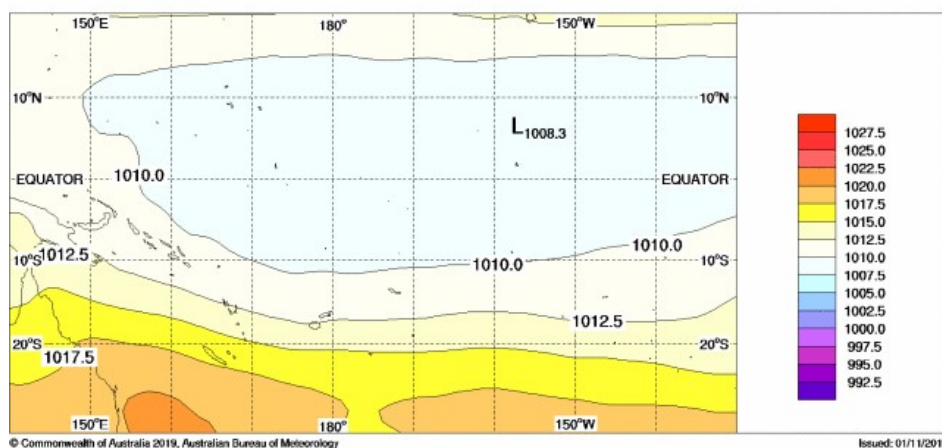
MEAN SEA LEVEL PRESSURE

The October mean sea level pressure (MSLP) anomaly map shows negative anomalies less than -2 hPa around 165° W and further east. Strong positive anomalies greater than $+2$ hPa were present in the far western Pacific over Coral Sea region, southern Papua New Guinea and northeast Australia.

Areas of above (below) average MSLP usually coincide with areas of suppressed (enhanced) convection and rain throughout the month.

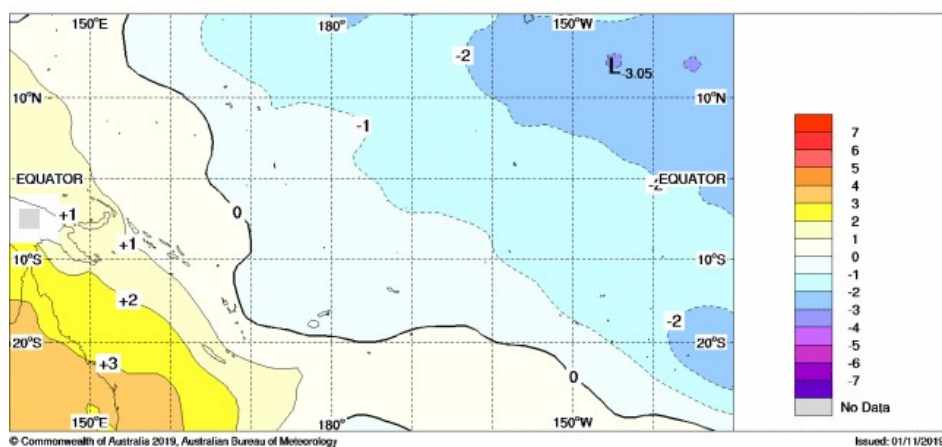
Mean

MSLP 2.5X2.5 ACCESS OP. ANAL. (hPa) 20191001 0000 20191031 0000



Anomalous

MSLP 2.5X2.5 ACCESS OP. ANAL.-NCEP2 (hPa) 20191001 0000 20191031 0000



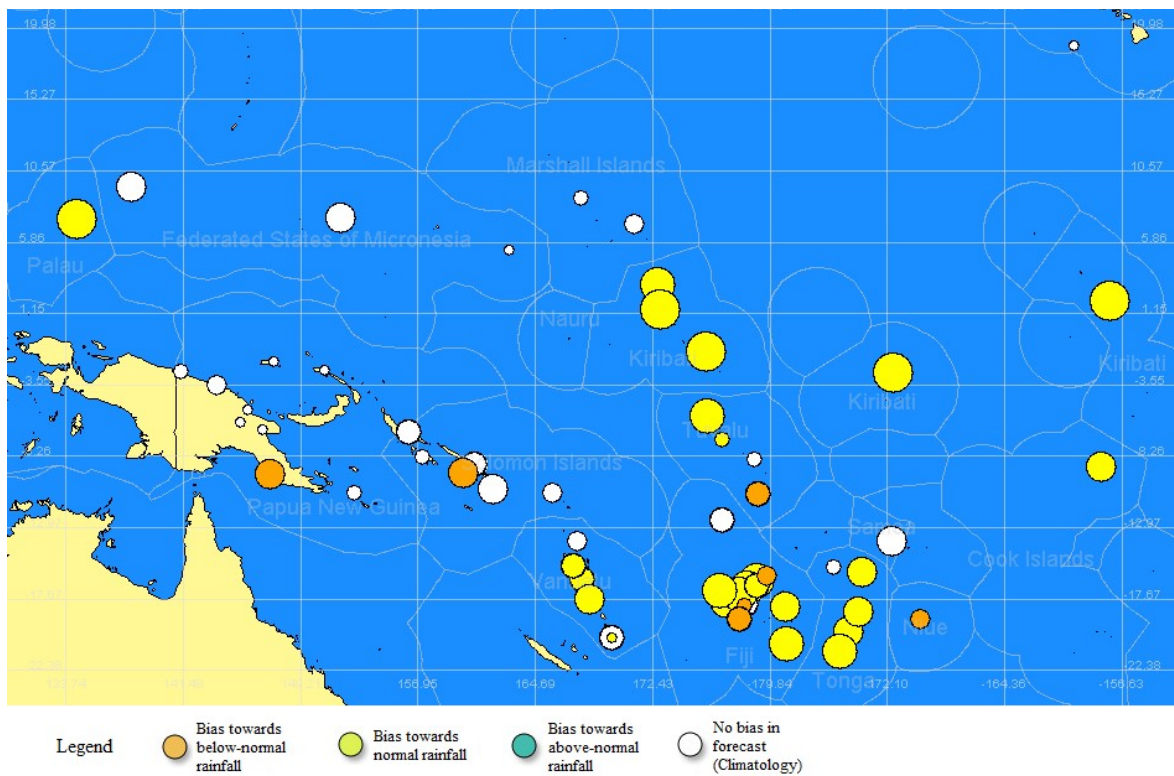
Bureau of Meteorology South Pacific Circulation Patterns: <http://www.bom.gov.au/cgi-bin/climate/cmb.cgi?variable=mslp&area=spac&map=anomaly&time=latest>

SEASONAL RAINFALL OUTLOOK



November 2019—January 2020

SCOPIC and the APEC Climate Centre multi-model favour below-normal rainfall over southeastern Papua New Guinea, central Solomon Islands and southern Tuvalu. The models disagree elsewhere.



'About SCOPIC' www.pacificmet.net/project/climate-and-ocean-support-program-pacific-cosppac

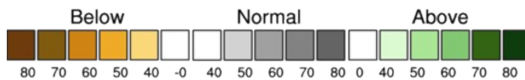
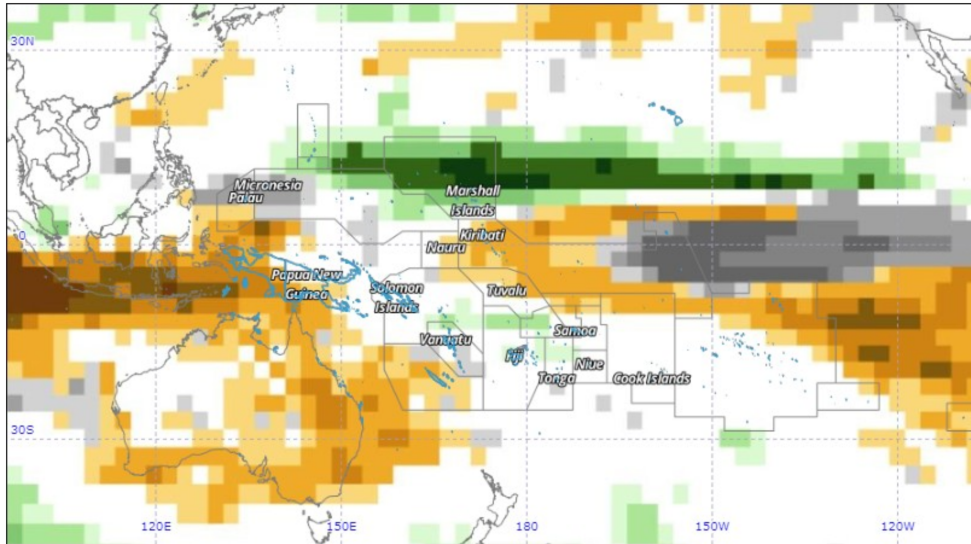
COSPPac Online Climate Outlook Forum: <https://www.pacificmet.net/products-and-services/online-climate-outlook-forum>



SEASONAL RAINFALL OUTLOOK



November 2019—January 2020



Year: 2019, Season: NDJ, Lead Month: 3, Method: GAUS
Model: APCC, NASA, NCEP, PNU, POAMA
Generated using CLIK® (2019-11-4)

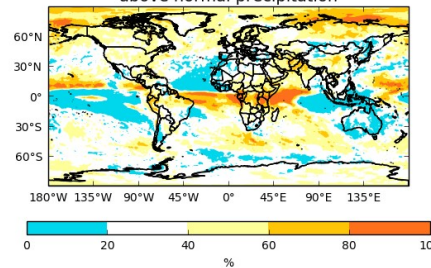
APEC Climate Information Toolkit for the Pacific: <http://clikp.sprep.org/>

© APEC Climate Center

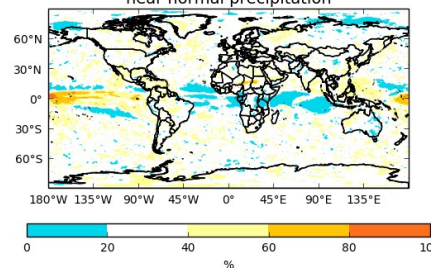
UKMO Pacific region tercile categories

<http://www.metoffice.gov.uk/research/climate/seasonal-to-decadal/gpc-outlooks/glob-seas-prob>

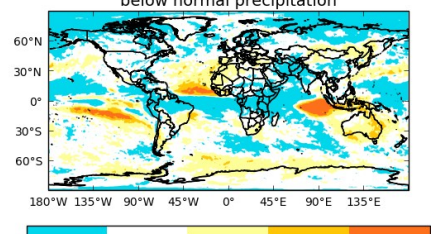
above normal precipitation



near normal precipitation



below normal precipitation

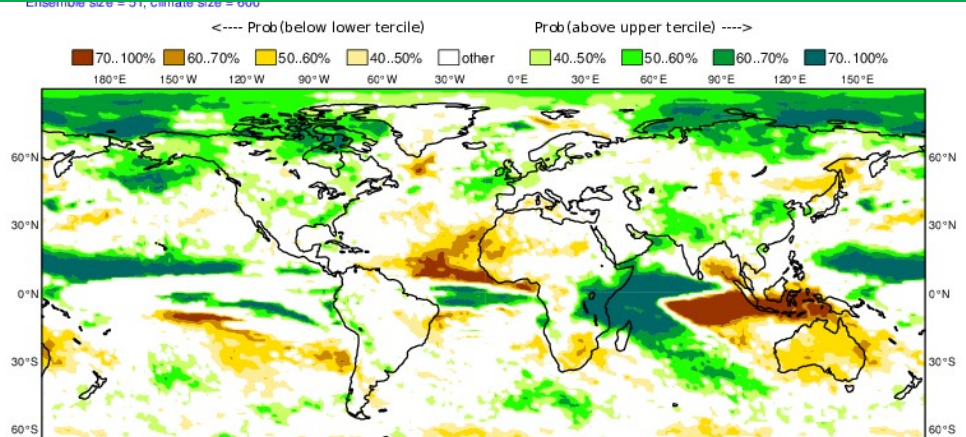


SEASONAL RAINFALL OUTLOOK



November 2019—January 2020

ECMWF Tropics tercile summary



<http://www.ecmwf.int/en/forecasts/charts/catalogue/>

Individual Model Links

UKMO Global long-range model probability maps: <http://www.metoffice.gov.uk/research/climate/seasonal-to-decadal/gpc-outlooks/glob-seas-prob>

ECMWF Rain (Public charts) - Long range forecast: <http://www.ecmwf.int/en/forecasts/charts/seasonal/rain-public-charts-long-range-forecast>

POAMA Pacific Seasonal Prediction Portal: <http://poama.bom.gov.au/experimental/pasap/index.shtml>

APEC Climate Center (APCC): <http://www.apcc21.org/eng/service/6mon/ps/japcc030703.jsp>

NASA GMAO GEOS-5: <http://gmao.gsfc.nasa.gov/research/ocean/>

NOAA CFSv2: <http://www.cpc.ncep.noaa.gov/products/CFSv2/CFSv2seasonal.shtml>

IRI for Climate and Society: <http://iri.columbia.edu/our-expertise/climate/forecasts/seasonal-climate-forecasts/>

CYCLONES & OTHER INFORMATION

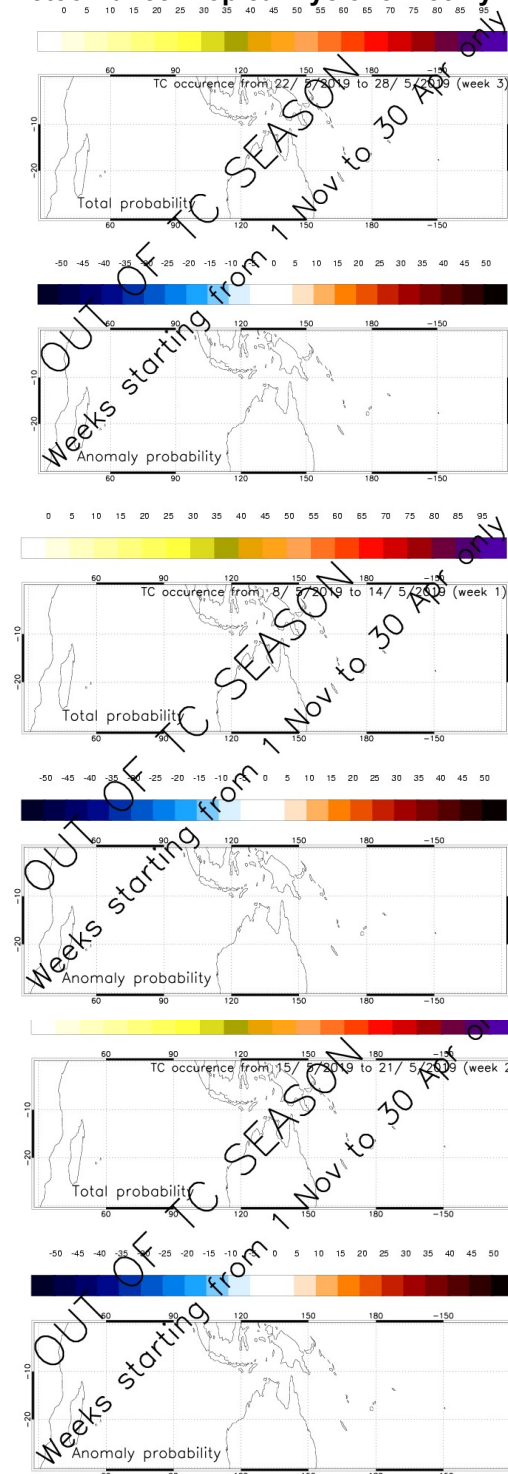


Tropical cyclone information 2019/2020 season

Tropical cyclone (TC) activity in the western North Pacific is expected to increase through November and possibly into December 2019. In the Southwest Pacific, regional-scale tropical cyclone outlooks for the upcoming November 2019 to April 2020 season favour a near normal season for most islands or 9-12 tropical cyclones for the whole region. The long term average for the basin is nine tropical cyclones east of the tip of Cape York in northern Australia. Tropical cyclone activity is expected to be near normal in the western and eastern South Pacific. In the Southwest Pacific, Vanuatu and New Caledonia typically experience the greatest activity, with an average of two or three named cyclones passing close to land each year. Forecast from MeteoFrance is not available for the next 4 weeks. The above statement comes from the 2019 Pacific Climate Outlook Forum (PICOF) regional statement.

The tropical cyclone season outlook for 2018-19 is available via: <http://www.bom.gov.au/climate/cyclones/south-pacific/>

MeteoFrance Tropical Cyclone Weekly Fore-



Individual Model Links

UKMO Global long-range model probability maps: <http://www.metoffice.gov.uk/research/climate/seasonal-to-decadal/gpc-outlooks/glob-seas-prob>

ECMWF Rain (Public charts) - Long range forecast: <http://www.ecmwf.int/en/forecasts/charts/seasonal/rain-public-charts-long-range-forecast>

POAMA Pacific Seasonal Prediction Portal: <http://poama.bom.gov.au/experimental/pasap/index.shtml>

APEC Climate Center (APCC): <http://www.apcc21.org/eng/service/6mon/ps/japcc030703.jsp>

NASA GMAO GEOS-5: <http://gmao.gsfc.nasa.gov/research/ocean/>

NOAA CFSv2: <http://www.cpc.ncep.noaa.gov/products/CFSv2/CFSv2seasonal.shtml>

IRI for Climate and Society: <http://iri.columbia.edu/our-expertise/climate/forecasts/seasonal-climate-forecasts/>

OTHER INFORMATION

Further Information:

Southern Oscillation Index

The Southern Oscillation Index, or SOI, gives an indication of the development and intensity of El Niño and La Niña events across the Pacific Basin. The SOI is calculated using the difference in air pressure between Tahiti and Darwin. Sustained negative values of the SOI below -7 often indicate El Niño episodes. These negative values are usually accompanied by sustained warming of the central and/or eastern tropical Pacific Ocean, and a decrease in the strength of the Pacific Trade Winds. Sustained positive values of the SOI greater than $+7$ are typical of La Niña episodes. They are associated with stronger Pacific Trade Winds and sustained cooling of the central and eastern tropical

Multivariate ENSO Index (MEI)

The Climate Diagnostics Center Multivariate ENSO Index (MEI) is derived from a number of parameters typically associated with El Niño and La Niña. Sustained negative values indicate La Niña, and

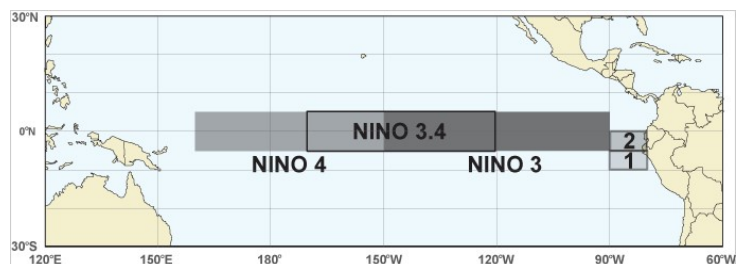
20 degrees Celsius Isotherm Depth

The 20°C Isotherm Depth is the depth at which the water temperature is 20°C. This measurement is important, as the 20°C isotherm usually occurs close to the thermocline, the region of most rapid change of temperature with depth, or the division between the mixed surface layer and deep ocean. A deeper than normal 20°C isotherm (positive anomaly) implies a greater heat content in the upper ocean, whilst a shallower 20°C isotherm (negative anomaly) implies a lower than normal heat con-

Regions

SST measurements may refer to the NINO1, 2, 1+2, 3, 3.4 or 4 regions. These descriptions simply refer to the spatially averaged SST for the region described. The NINO regions (shown in the figure

Region	Latitude	Longitude
NINO1	5-10°S	80-90°W
NINO2	0-5°S	80-90°W
NINO3	5°N to 5°S	150-90°W
NINO3.4	5°N to 5°S	120-170°W
NINO4	5°N to 5°S	160°E to 150°W



NOTE: NINO1+2 is the combined areas 1 and 2