

Monthly Climate Bulletin

August 2019



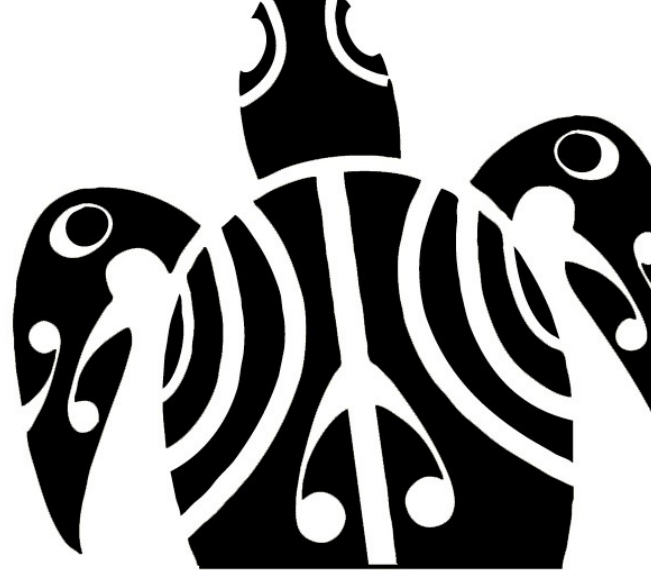
Australian Government
Department of Foreign Affairs and Trade
Bureau of Meteorology



Climate and Oceans Support
program in the Pacific



Pacific
Community
Communauté
du Pacifique



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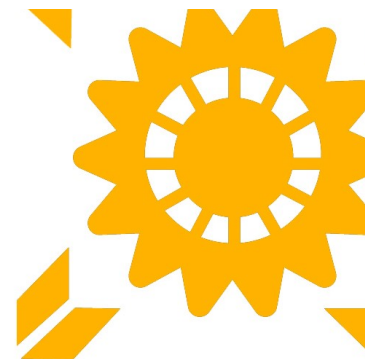
Issued 05 September 2019

- The El Niño Southern Oscillation (ENSO) remains neutral.
- The Madden-Julian Oscillation (MJO) has remained mostly weak during the past three weeks. International models generally agree the MJO will remain weak or indiscernible this coming week.
- The Intertropical Convergence Zone (ITCZ) was evident north of the equator and enhanced in the tropical western Pacific in August. Extending south-southeast from PNG was the South Pacific Convergence Zone (SPCZ) which was enhanced over southern PNG and the northern Solomon Islands.
- Sea level in August was higher than normal in the equatorial and most of the south Pacific. Most COSPPac countries experienced positive sea level anomalies. PNG however experienced sea level within about 50mm of normal. The main region of the positive anomalies was 10°N, which saw the largest positive anomalies of 150-200mm in FSM and the Marshall Island. Similarly, Nauru, Kiribati, Tuvalu, Samoa, Niue and the Cook Islands observed anomalies of +100-150mm.
- For September to November 2019, SCOPIC favours below-normal rainfall for Palau, western and central Micronesia, Marshall Islands, most of northern mainland Papua New Guinea, Solomon Islands, Vanuatu, Fiji, Tonga, Samoa and Niue. Above-normal rainfall totals are most likely for Kiribati, northern and central Tuvalu and the Cook Islands.

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EL NIÑO–SOUTHERN OSCILLATION



Positive Indian Ocean Dipole persist as ENSO remains neutral

ENSO Wrap-Up issued on 03 September 2019

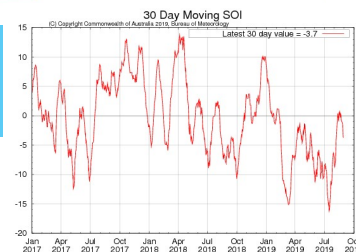
The El Niño Southern Oscillation (ENSO) remains neutral.

The Indian Ocean Dipole (IOD) index has generally been above the positive IOD threshold since mid-July. The broader Indian Ocean patterns of sea surface temperature, cloud, and wind have been positive IOD-like since late May, contributing to dry conditions affecting most of Australia with lesser impact on the rainfall distribution in the Pacific region.

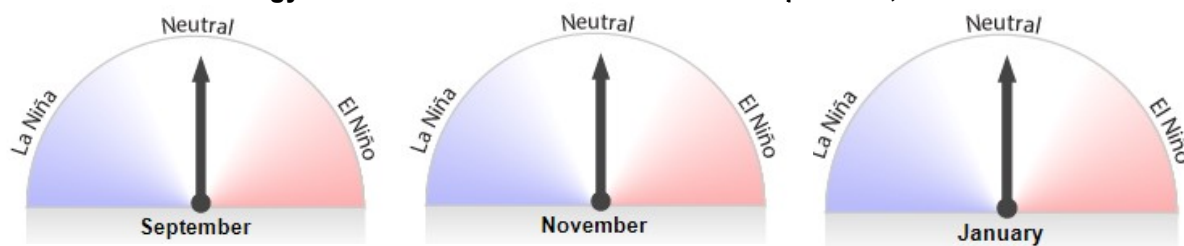
The tropical Pacific Ocean remains neutral with respect to the ENSO. Atmospheric and oceanic indicators of ENSO are generally close to average, reflecting neutral tropical Pacific cloud and rainfall patterns.

Most climate models indicate the tropical Pacific is likely to remain ENSO-neutral for the rest of 2019 and into early 2020, meaning other climate drivers, like the IOD, are likely to remain as the primary influences on Pacific region and global weather.

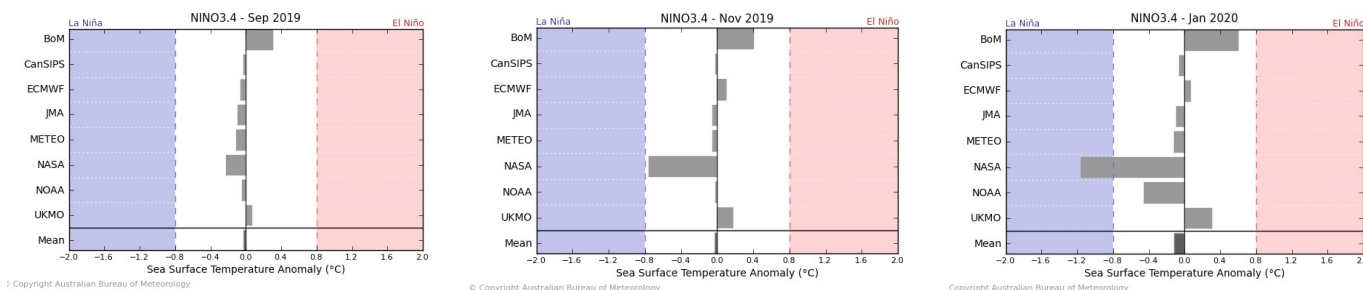
The approximate 30-day and 90-day Southern-Oscillation Index (SOI) values to 01 September were -4 and -6 respectively



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



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

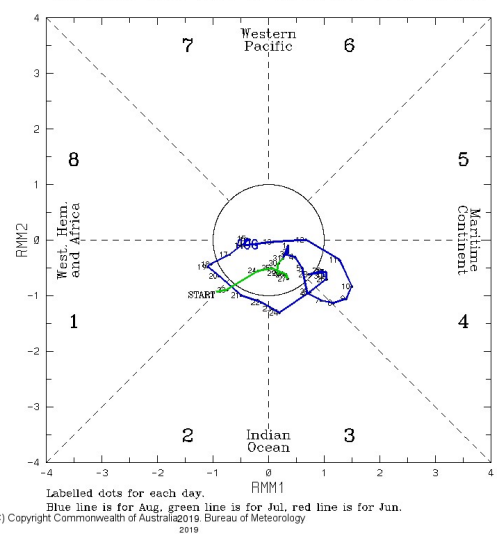


Weekly Tropical Note [Issued on Tuesday 03 September

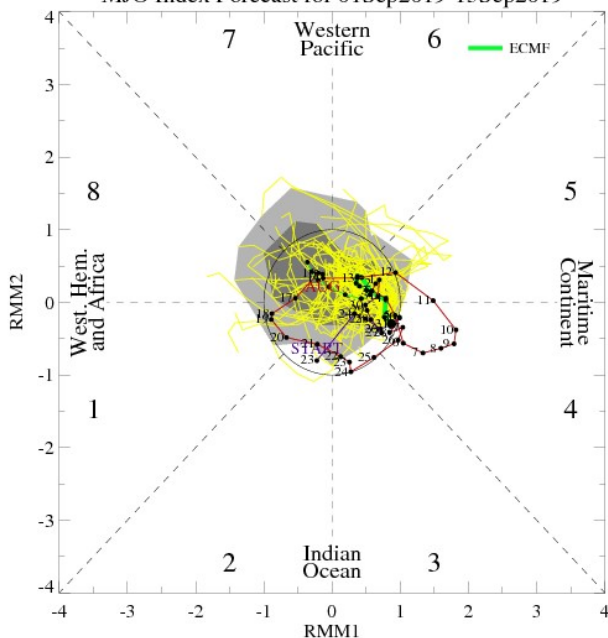
The Madden-Julian Oscillation (MJO) has remained mostly weak during the past three weeks. International models generally agree the MJO will remain weak or indiscernible this coming week. As such the MJO is not expected to strongly influence tropical rainfall patterns during this time. There is no consensus between the models as to where the MJO signal might emerge after next week.

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

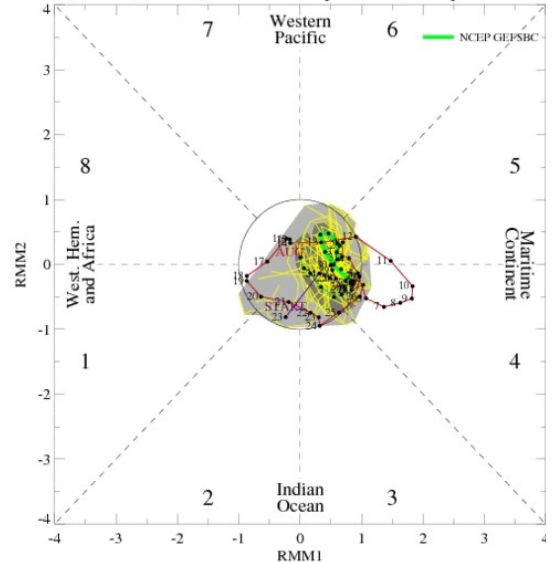
(RMM1, RMM2) phase space for 22-Jul-2019 to 30-Aug-2019



MJO Index Forecast for 01Sep2019-15Sep2019



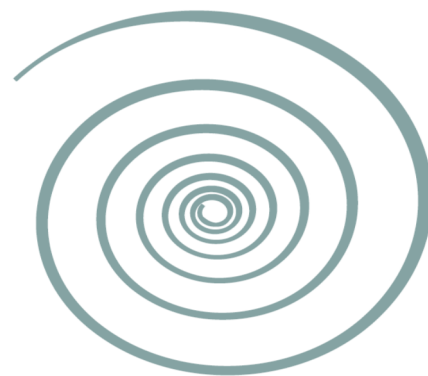
[RMM1, RMM2] forecast for Sep-01-2019 to Sep-15-2019



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

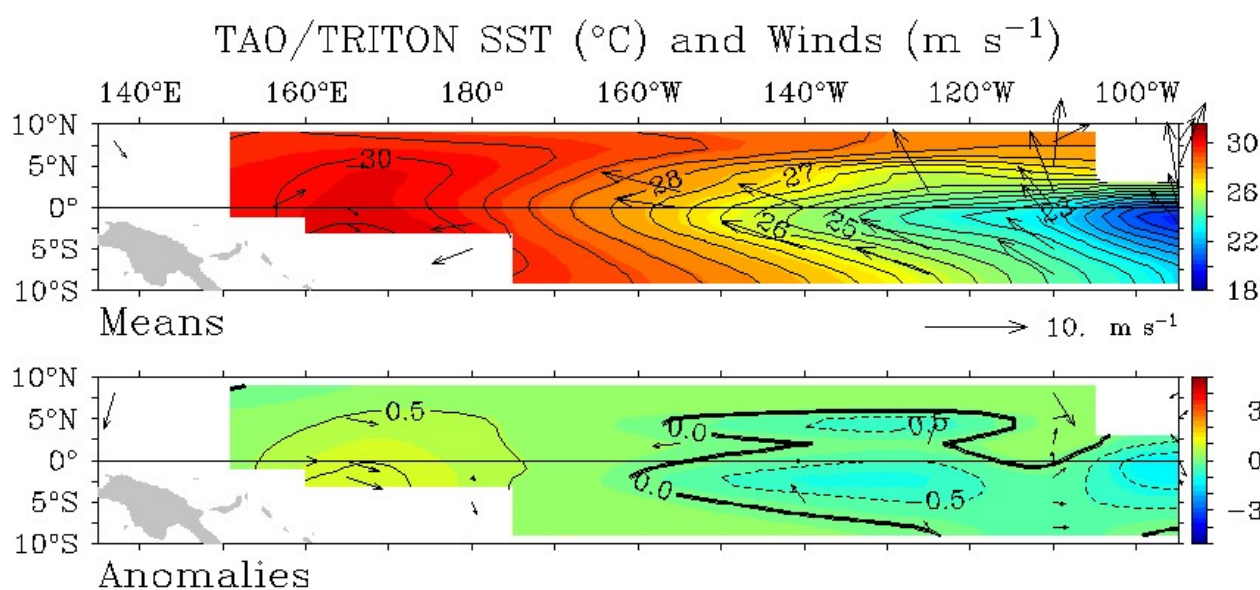
Bureau of Meteorology Weekly Tropical Climate
Note Page: <http://www.bom.gov.au/climate/tropical-note/>

WIND

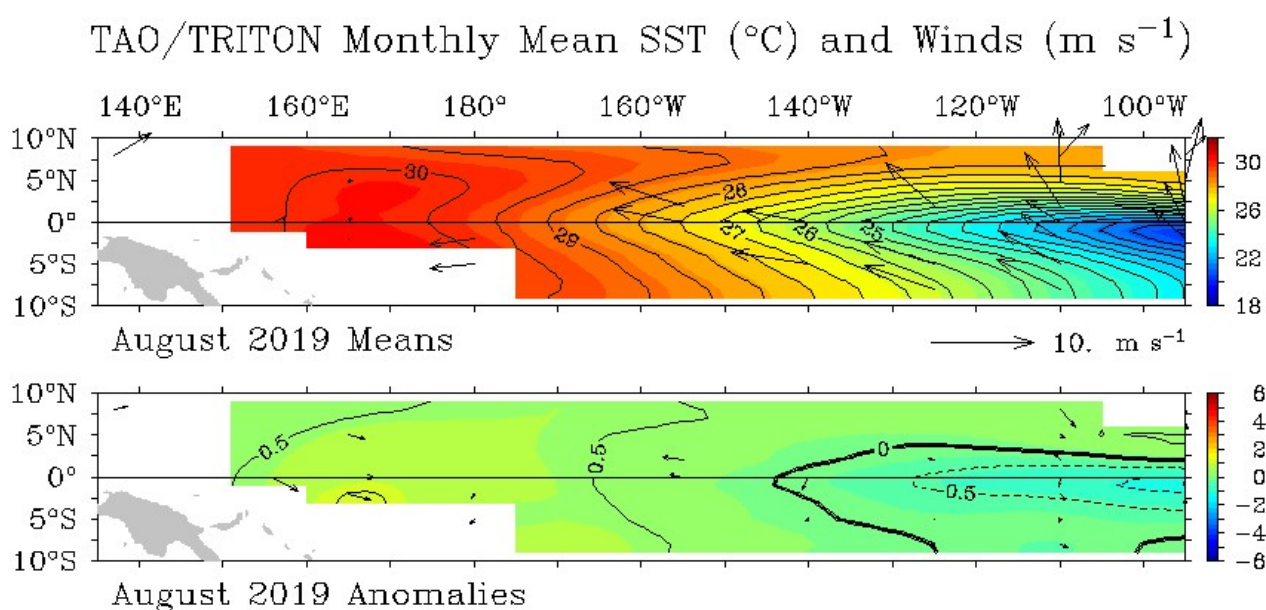


The equatorial trade winds for the month of August were weaker than normal across most of the equatorial Pacific with westerlies anomalies in the far western Pacific. The 5-day snapshot ending 31 August shows the trade winds were generally weaker than average near and east of the Date Line with westerly anomalies in the western 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 August 31 2019



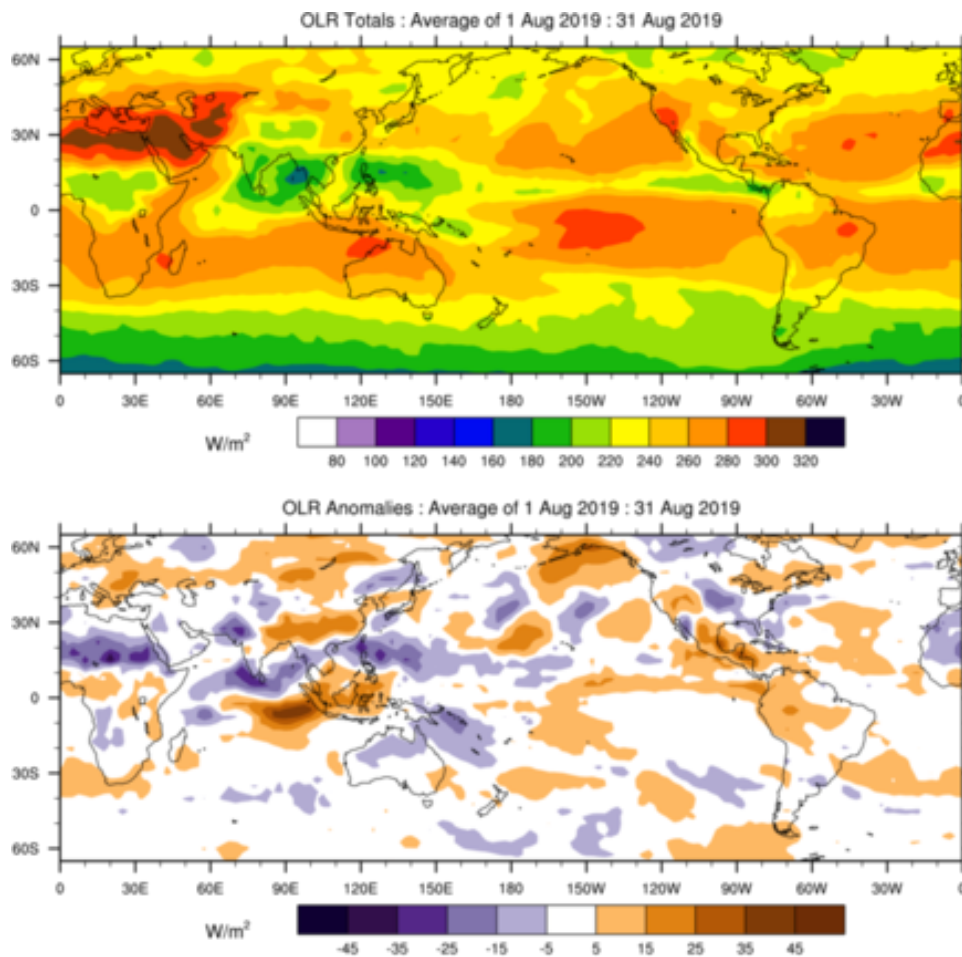
CLOUD AND RAINFALL



The August 30-day OLR and NOAA NCEP CAMP total and anomaly maps suggest the Intertropical Convergence Zone (ITCZ) was evident north of the equator and enhanced in the tropical western Pacific. Extending south-southeast from PNG was the South Pacific Convergence Zone (SPCZ) which was enhanced over the southern PNG and the northern Solomon Islands. There was below normal cloud cover over parts of Tuvalu, Kiribati, Samoa, and the 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.

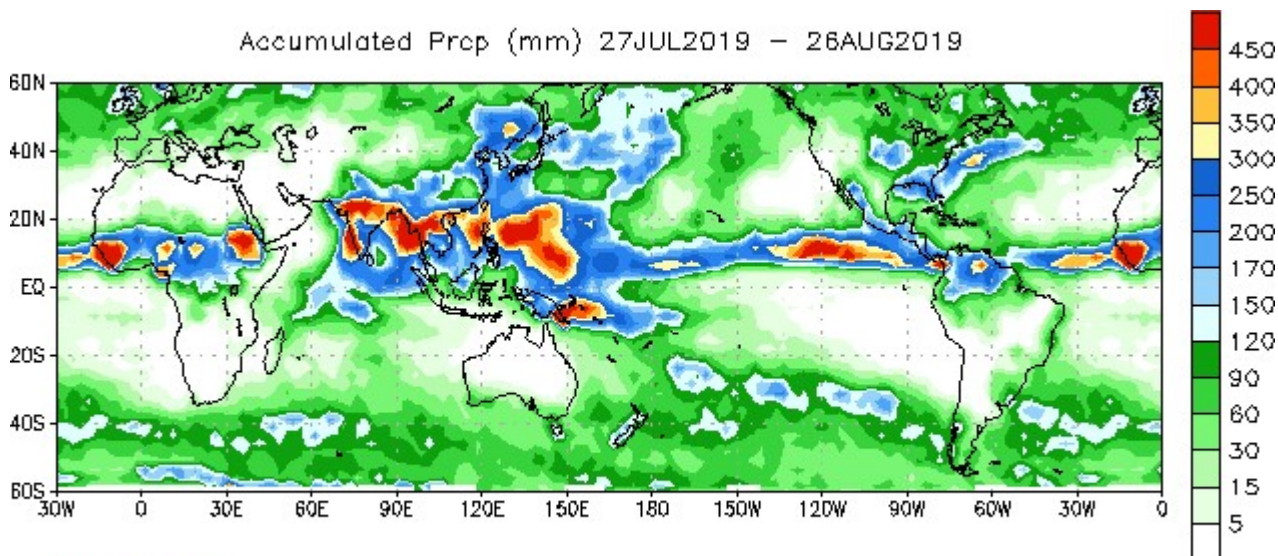
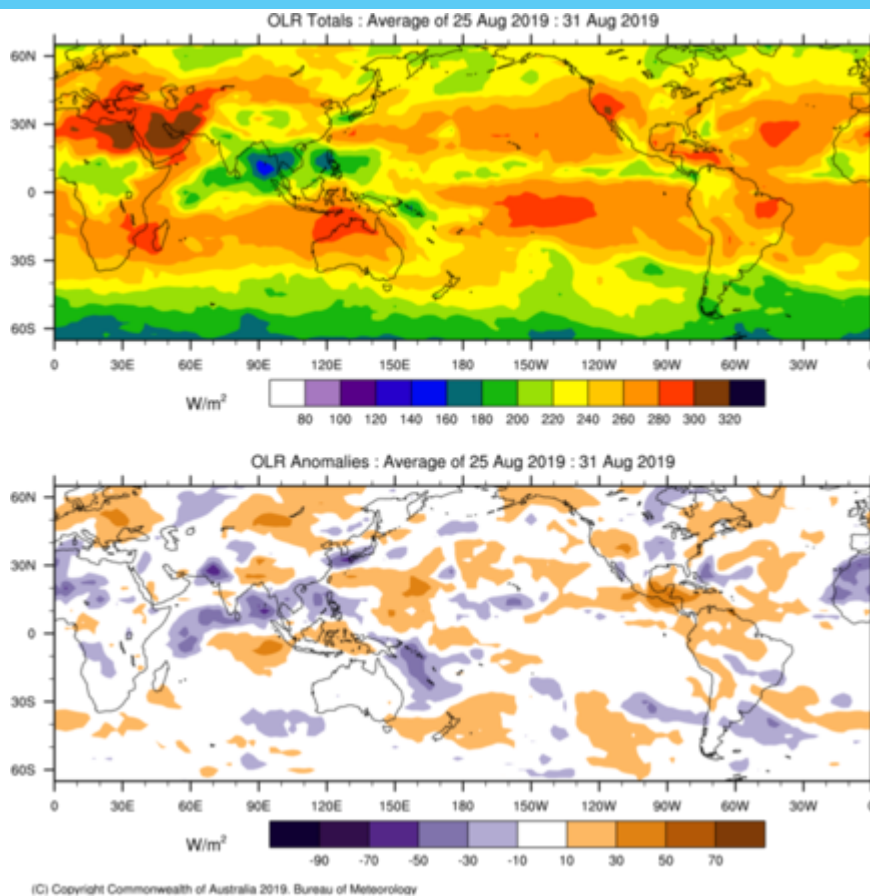
OLR Total and Anomalies, 30 Day OLR



CLOUD AND RAINFALL



OLR Total and Anomalies, 7 Day OLR

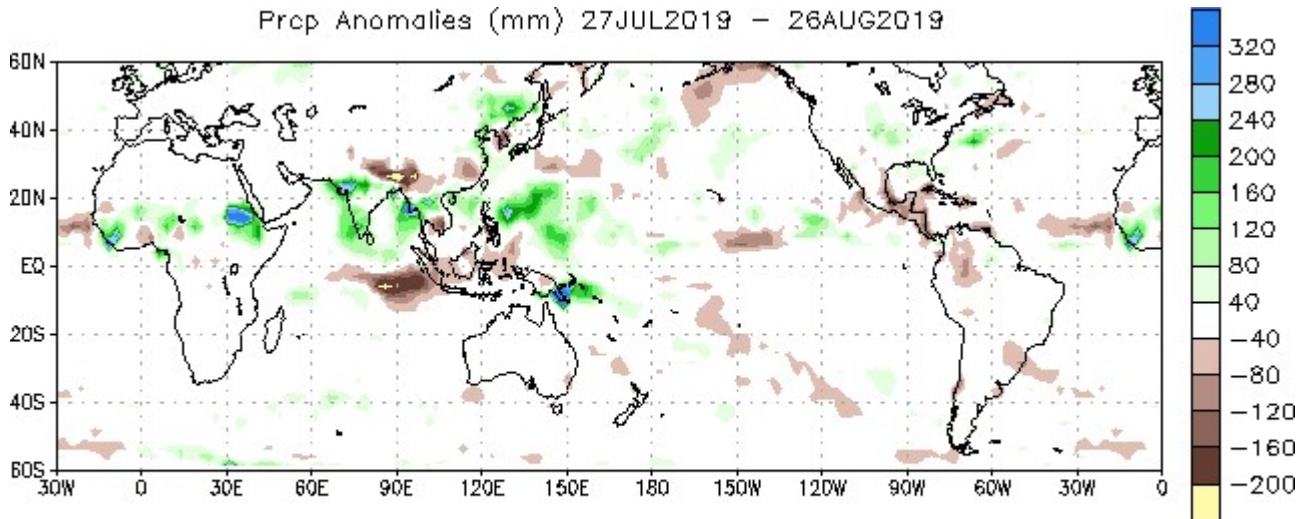


Data Source: NCEP CMAP Precipitation

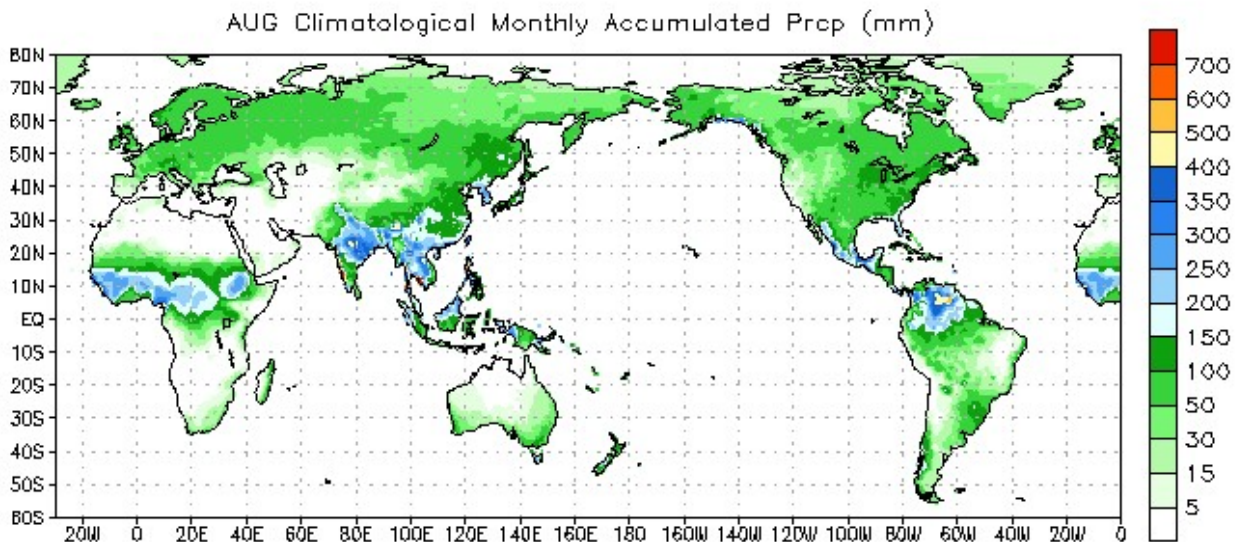
CLOUD AND RAINFALL



30-Day Rainfall Anomalies



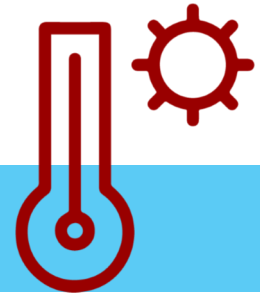
Data Source: NCEP CMAP Precipitation
Climatology (1979–1995)



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

https://www.cpc.ncep.noaa.gov/products/Global_Monsoons/Global-Monsoon.shtml

OCEAN CONDITIONS



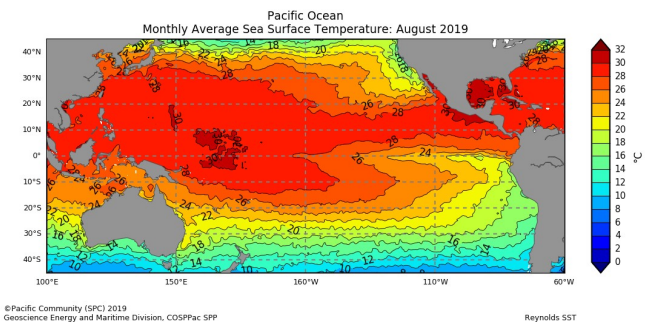
SEA SURFACE TEMPERATURE

Sea surface temperatures (SSTs) for August were warmer than average across the western tropical Pacific Ocean, near-average for the central tropical Pacific, and cooler than average in some parts of the eastern equatorial Pacific, extending into the south Pacific close to South America.

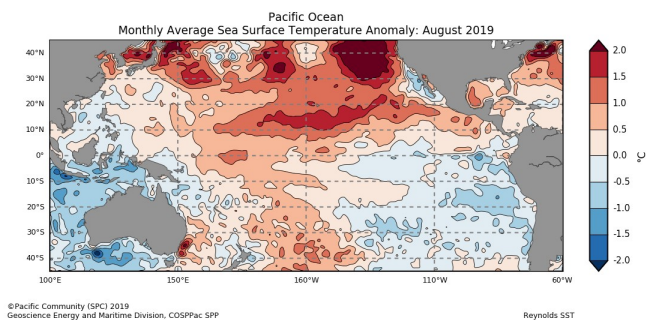
SSTs were warmer than average across most COSPPac countries including Australia's east, with this warmth extending across the Tasman Sea and well to the east of New Zealand, although anomalies were smaller than during July. Kiribati and Marshall Islands experienced positive anomalies of up to 1.5°C while weak negative anomalies affected parts of Palau, PNG, the southern Cook Islands and the eastern tropical Pacific. SSTs for the three NINO regions have cooled in August, and are in the ENSO neutral range for all NINO regions. The August SST anomalies for the NINO3, NINO3.4 and NINO4 regions were 0.0 °C, +0.2 °C and +0.7 °C, respectively.

The SST decile map for August shows a large region of deciles 8 to 9 in the central equatorial Pacific extending to north and south Pacific, surrounding a large area of 10 and highest on record affecting Marshall Islands, parts of Federated States of Micronesia, Kiribati and Tuvalu. Most of the COSPPac countries are in regions of deciles 4-7, 8-9 or 10.

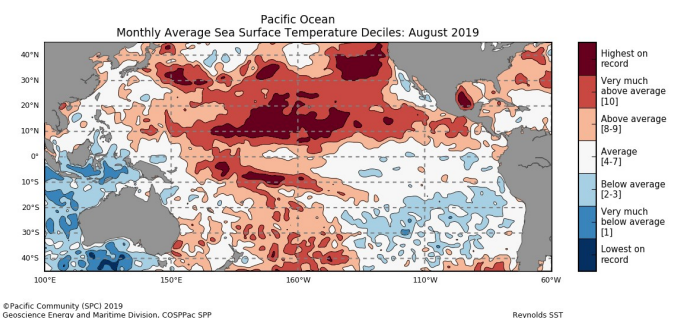
Mean SST



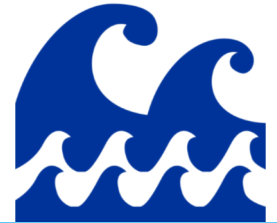
Anomalous SST



SST Deciles



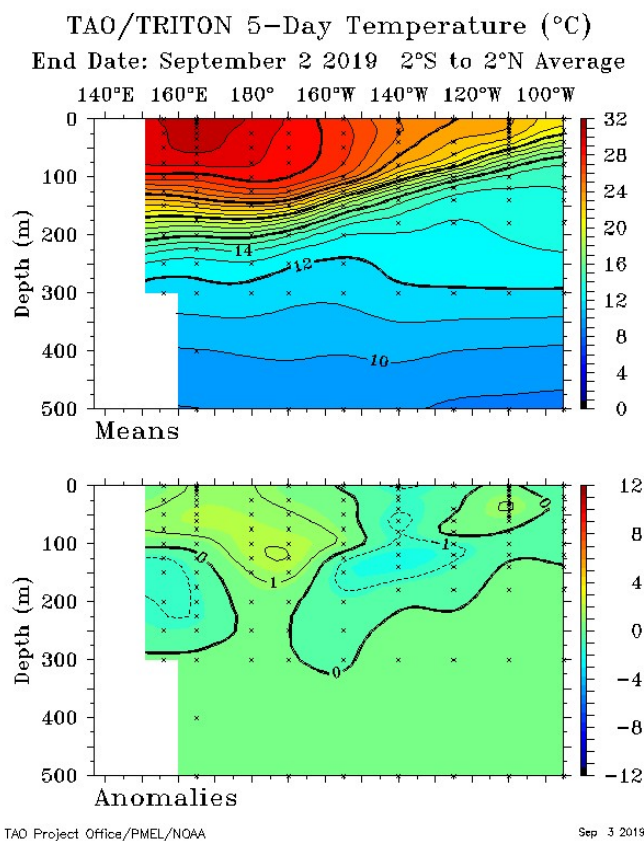
OCEAN CONDITIONS



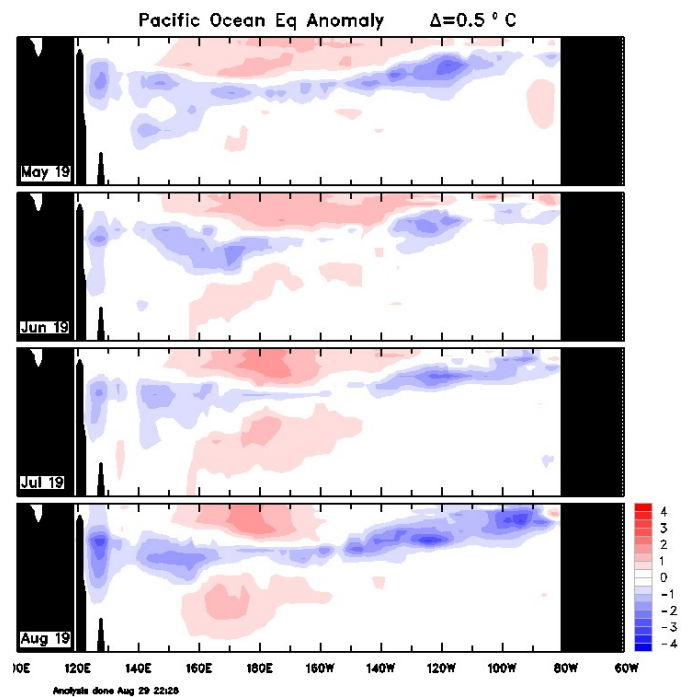
SUB SURFACE

The Bureau of Meteorology's four-month sequence of equatorial sub-surface temperature anomalies (to August) shows a pattern of weak cool anomalies extending across the equatorial Pacific, at a depth of around 100 to 200 m in the west of the Basin, rising to 0 to 100 m depth in the east. Weak warm anomalies extend across most of the column depth in the central to western equatorial Pacific above and below this band of cool anomalies. This general pattern has been in place since May. Anomalies, both warm and cool, are mostly within 2 degrees of average, though some areas of cool anomalies more than 2 degrees cooler than average exist in the east of the Pacific sub-surface.

Weekly Temperatures Mean and Anomalies



Monthly Temperatures Anomalies

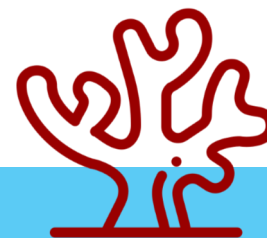


Bureau of Meteorology Sea Temperature Analysis: <http://www.bom.gov.au/marine/sst.shtml>

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



OCEAN CONDITIONS



CORAL BLEACHING

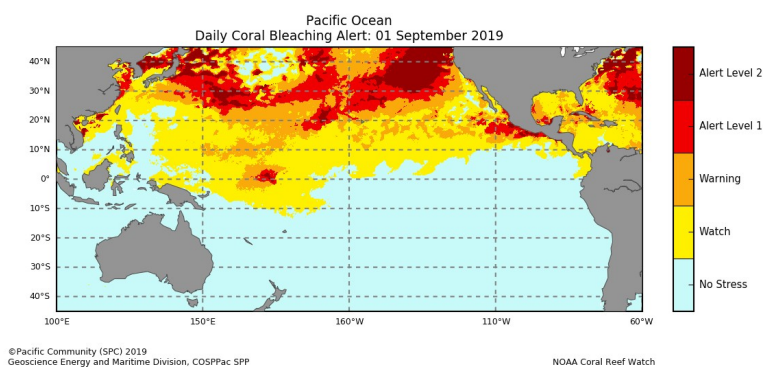
The daily Coral Bleaching Alert for 01 September 2019 shows warning areas mostly affecting Federated States of Micronesia, Marshall Islands, Nauru and Kiribati, with Alert level 2 in Gilbert islands of the Kiribati group. The remainder of the region is on watch alert or no stress. The Coral Bleaching Outlook for 01 September shows warning area expected in Federated States of Micronesia, Marshall Islands, Nauru and western and central Kiribati, with a small Alert level 2 affecting the latter two.

Daily Coral Bleaching Alert

About Coral Bleaching:

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

[about_coralbleaching.pdf](#)

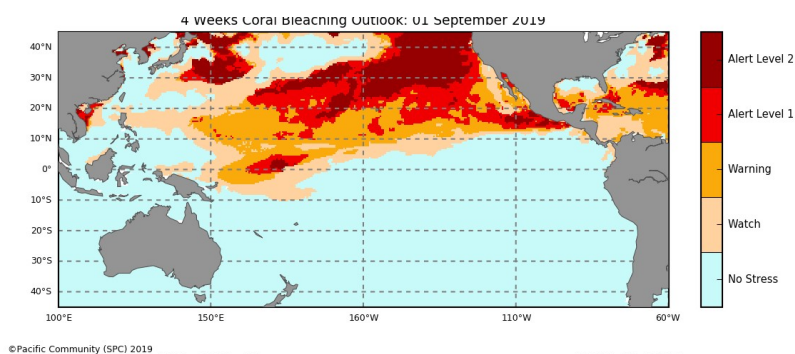


4-Weeks Coral Bleaching Outlook

Pacific Community COSPPac

Ocean Portal:

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



OCEAN CONDITIONS



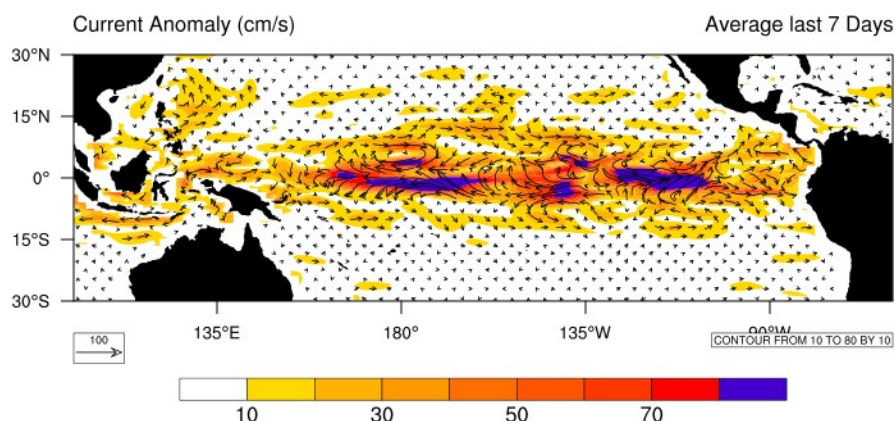
OCEAN SURFACE CURRENTS AND SEA LEVEL

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

Sea level in August was higher than normal in the equatorial and most of the south Pacific. Most COSPPac countries experienced positive sea level anomalies. PNG however experienced sea level within about 50mm of normal. The main region of the positive anomalies was 10°N, which saw the largest positive anomalies of 150-200mm in FSM and the Marshall Islands. Similarly, Nauru, Kiribati, Tuvalu, Samoa, Niue and the Cook Islands observed anomalies of +100-150mm.

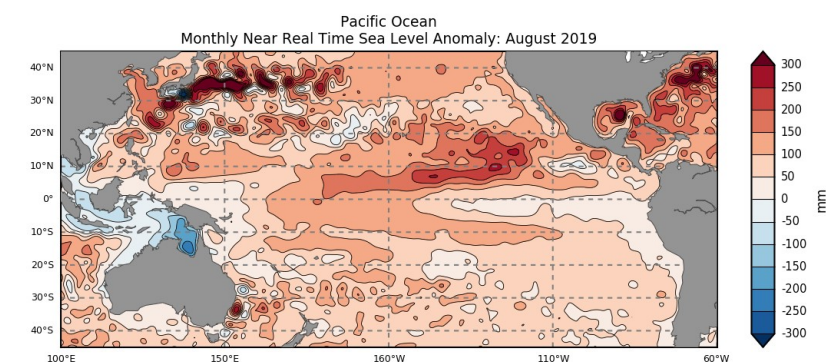
Ocean Surface Currents (Last 7-Days)

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)



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Geoscience Energy and Maritime Division, COSPPac SPP

AVISO Ssalto/Duacs SLA



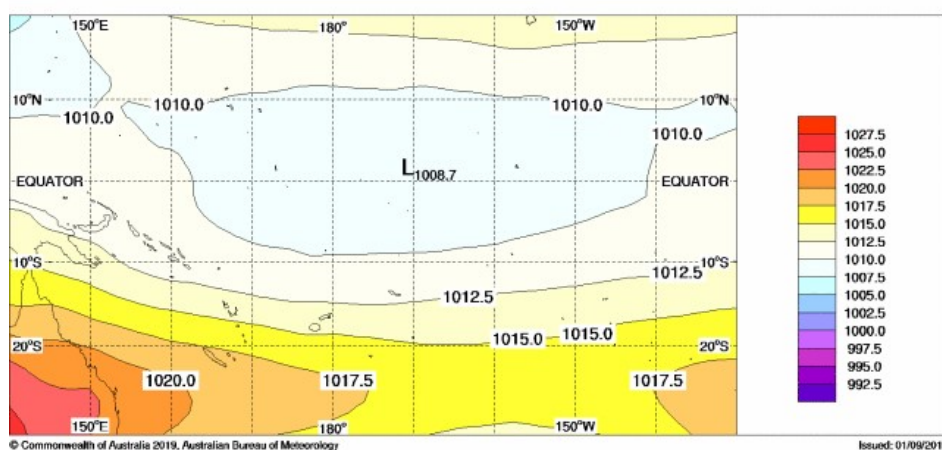
MEAN SEA LEVEL PRESSURE

The August mean sea level pressure (MSLP) anomaly map shows negative anomalies less than -1 hPa around and to the east of the Date Line not going below the 10° S. Positive anomalies greater than +1 hPa were present in the western Pacific to the west of New Caledonia, and over Papua New Guinea and Australia.

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

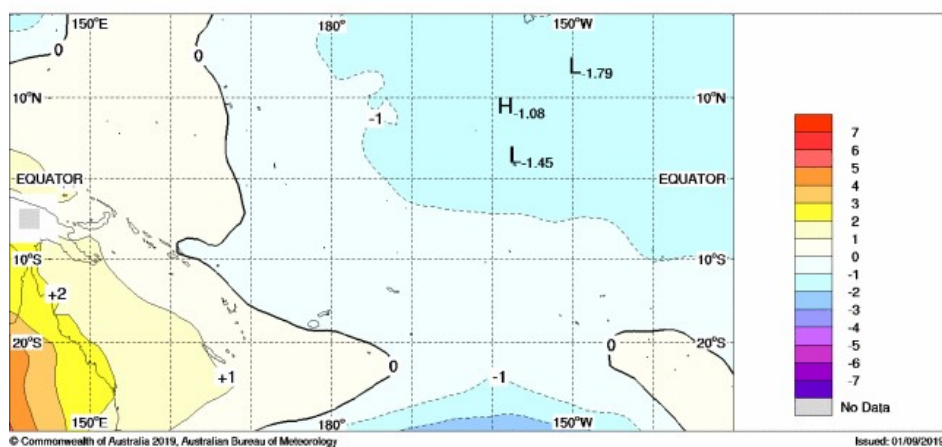
Mean

MSLP 2.5X2.5 ACCESS OP. ANAL. (hPa) 20190801 0000 20190831 0000

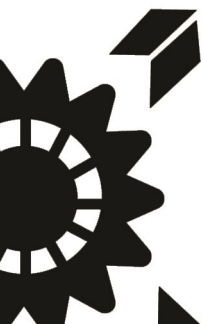


Anomalous

MSLP 2.5X2.5 ACCESS OP. ANAL.-NCEP2 (hPa) 20190801 0000 20190831 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>

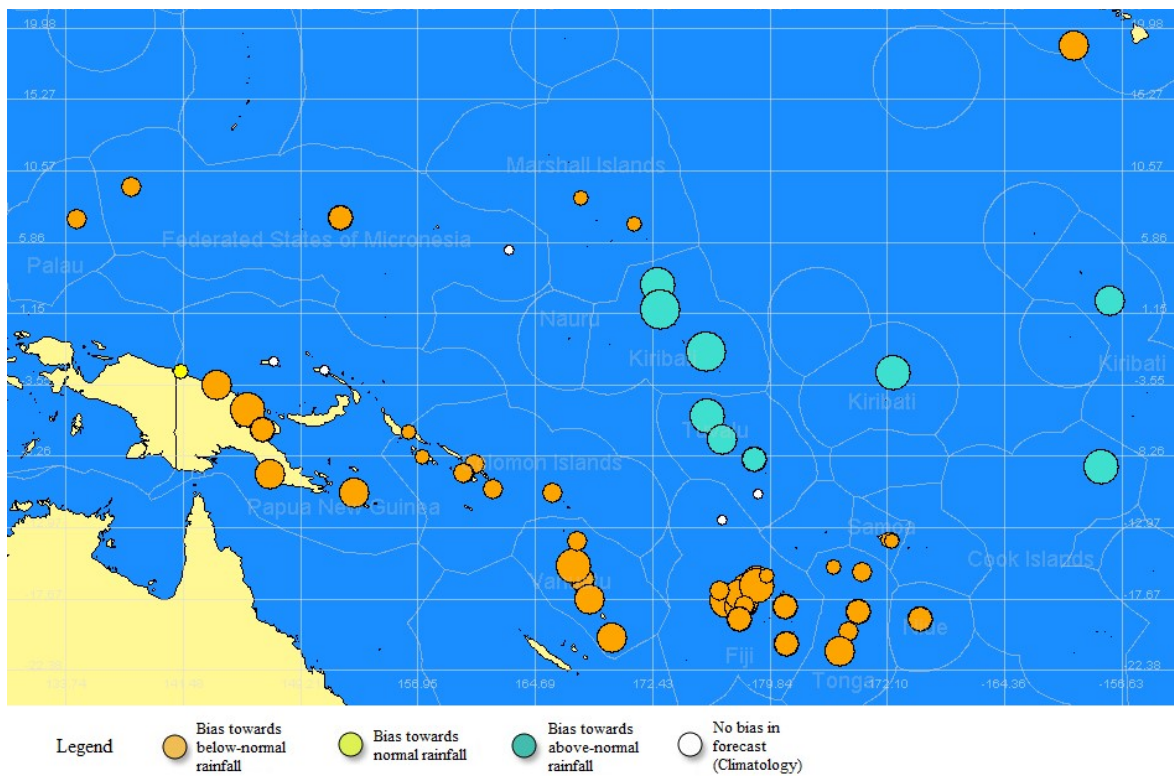


SEASONAL RAINFALL OUTLOOK



September—November 2019

SCOPIC favours below-normal rainfall for Palau, western and central Micronesia, Marshall Islands, most of mainland Papua New Guinea, Solomon Islands, Vanuatu, Fiji, Tonga, Samoa and Niue. Above-normal rainfall totals are most likely for Kiribati, northern and central Tuvalu and the Cook Islands. (Note APEC Climate Center multi-model is not available during the time of release).



'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



September—November 2019

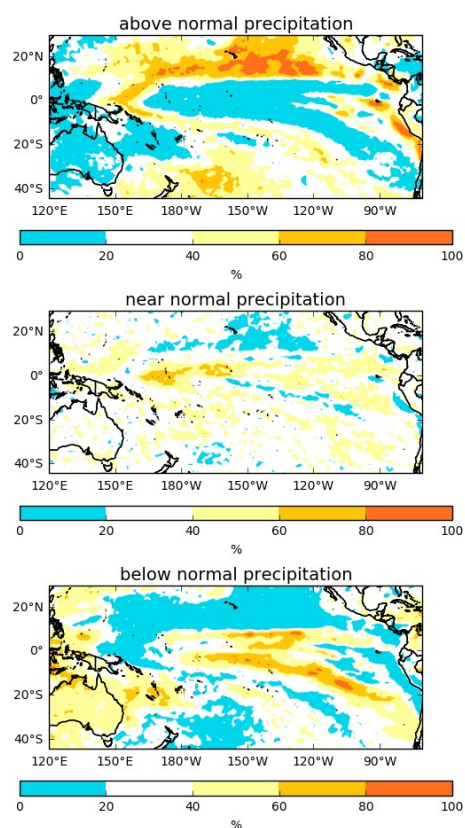
APEC Climate Information Toolkit for
the Pacific: <http://clikp.sprep.org/>

APEC models not available during time of release

UKMO Pacific region tercile categories

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

'robability of tercile categories Sep/Oct/Nov Issued August 201'

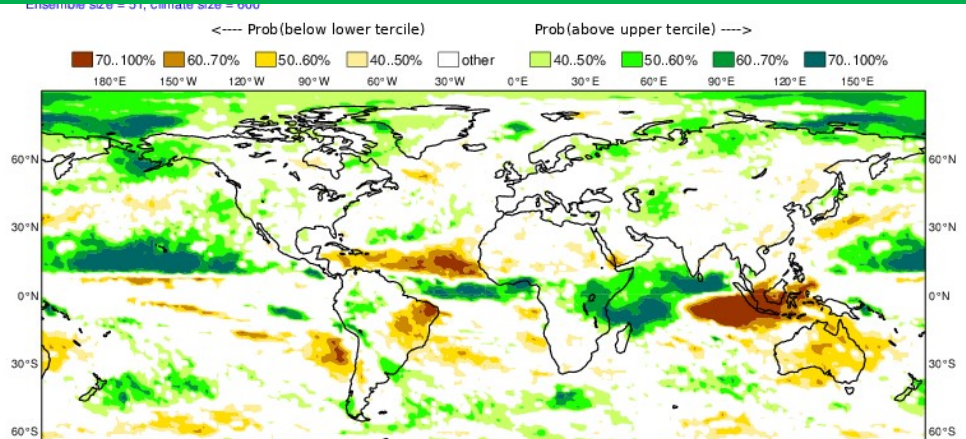


SEASONAL RAINFALL OUTLOOK



September—November 2019

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/>

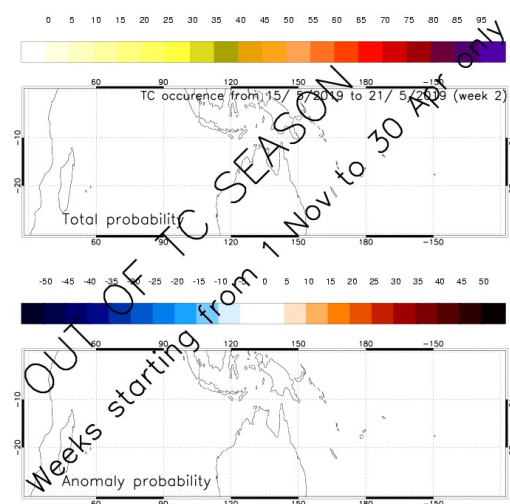
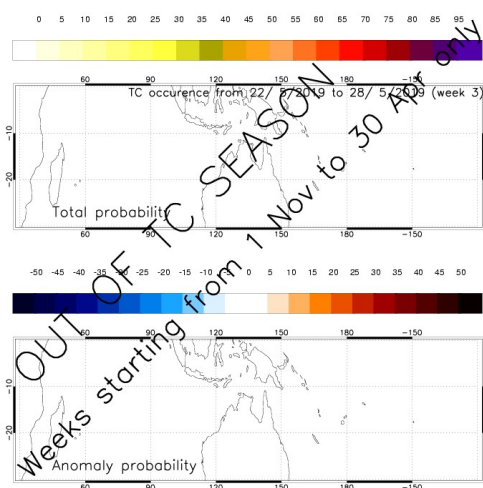
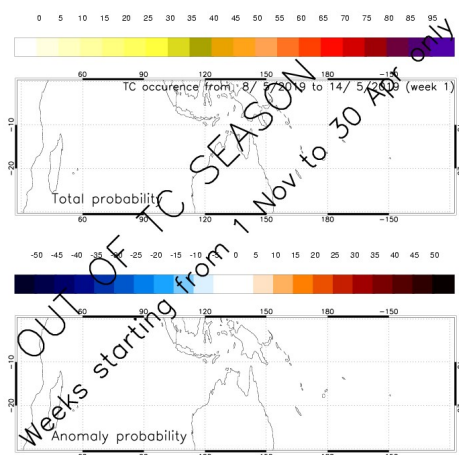
CYCLONES & OTHER INFORMATION



Nine tropical cyclones (Liaa, Owen, Penny, Mona, Neil, Oma, Pola and Trevor and Ann) formed in the 2018-19 south Pacific (east of the tip of Cape York, Queensland) cyclone season. These cyclones affected Australia, PNG, Solomon Islands, Nauru, New Caledonia, Vanuatu, Tuvalu, Fiji, Tonga, Samoa and Niue. The long-term average for the period 1969-70 to 2017-18 is nine cyclones. The official cyclone season ended on 30 April 2019. When out-of-season cyclones develop, they tend to do so when an El Niño event exist. Weekly tropical cyclone forecasts from the Meteo France will resume in October 2019.

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

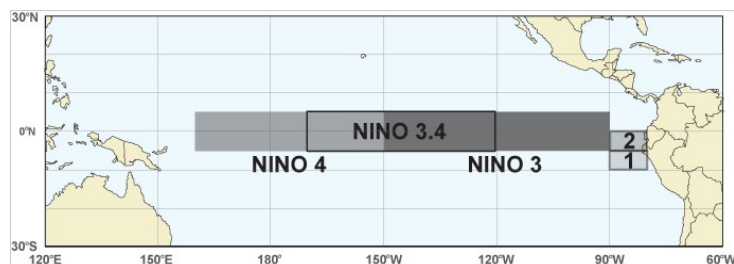
20 degrees Celsius Isotherm Depth

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