

# Monthly Climate Bulletin

August 2020

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# SUMMARY

Issued 07 September 2020

- The Bureau's ENSO Outlook remains at La Niña ALERT, meaning the chances of La Niña forming in 2020 is around 70% - roughly three times the average likelihood.
- The Intertropical Convergence Zone (ITCZ) was suppressed in the western Pacific and displaced northwards in the central and eastern Pacific. The South Pacific Convergence Zone (SPCZ) was also suppressed and displaced south over the Solomon Islands.
- The Madden-Julian Oscillation (MJO) is currently in the Indian Ocean and is expected to become weak or discernible.
- Sea level in August was higher than normal for most of countries in the region with positive anomalies situated around western Palau, north western FSM and Solomon Islands. Parts of southern PNG, Fiji, Vanuatu, Tonga and Cook Islands experienced below normal conditions.
- Coral bleaching is on Alert Level 1 in northern PNG and parts of FSM. The Coral Bleaching Outlook shows chances of Coral Bleaching to intensify to alert level 2 in western FSM, with Alert Level 1 in remainder of FSM and central Palau. Bleaching outlooks for other countries in the region favours warning, watch or no stress.
- For September to November, the dynamical models agree on below normal rainfall for central FSM, the northern and eastern New Guinea Islands, Nauru, Kiribati and the northern Tuvalu, Cook Islands and French Polynesia. The models also agree on above normal rainfall for Palau, most parts of PNG, southern Solomon Islands, New Caledonia, Vanuatu, Fiji, Tonga, Samoa, Niue and central and southern Cook Islands.

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# EL NIÑO–SOUTHERN OSCILLATION

La Niña and negative Indian Dipole likely to remain during spring (September-December)

[Climate Driver Update issued on 01 September 2020](#)

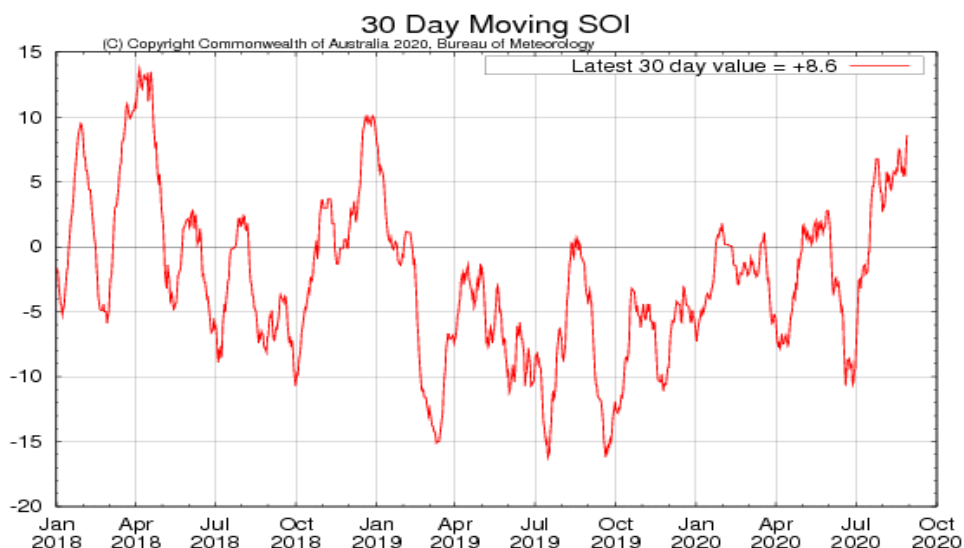
Recent cooling of the surface of the tropical Pacific Ocean, changes in tropical weather patterns, and continued ocean cooling forecast by climate models suggest La Niña could become established in spring 2020. The Bureau's ENSO Outlook remains at La Niña ALERT. This means the chance of La Niña forming in 2020 is around 70% - roughly three times the average likelihood.

While most key indicators remain within ENSO-neutral range, there have been further signs of La Niña development in the past fortnight. The central tropical Pacific Ocean has continued to cool and trade winds remain stronger than average, while the Southern Oscillation Index (SOI) has exceeded La Niña thresholds in recent days. Equatorial cloudiness near the Date Line also remains below average.

All surveyed international climate models anticipate further cooling of the tropical Pacific Ocean. Five of the eight models reach or exceed La Niña thresholds during October, with six models indicating that if La Niña forms it is likely to persist into December.

Large parts of the Indian Ocean are warmer than average, with some weak cool anomalies in the west of the basin. The Indian Ocean Dipole (IOD) index has now been at negative IOD levels for three consecutive weeks. More than half of the surveyed models indicate a negative IOD is likely for spring. To be considered a negative IOD event, these values would need to be sustained for at least eight weeks.

The 30-day Southern-Oscillation Index (SOI) for the 30 days ending 30 August was +9.1, having tipped just over the threshold into La Niña values in recent days. The 90-day value remains within the ENSO-neutral range at +2.3.



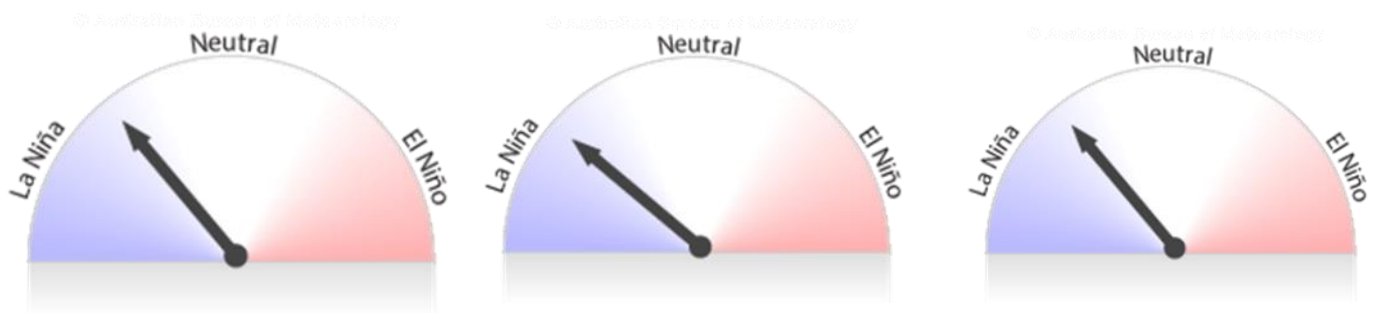
# EL NIÑO–SOUTHERN OSCILLATION

El Niño-Southern Oscillation neutral but La Niña indicators continue to develop

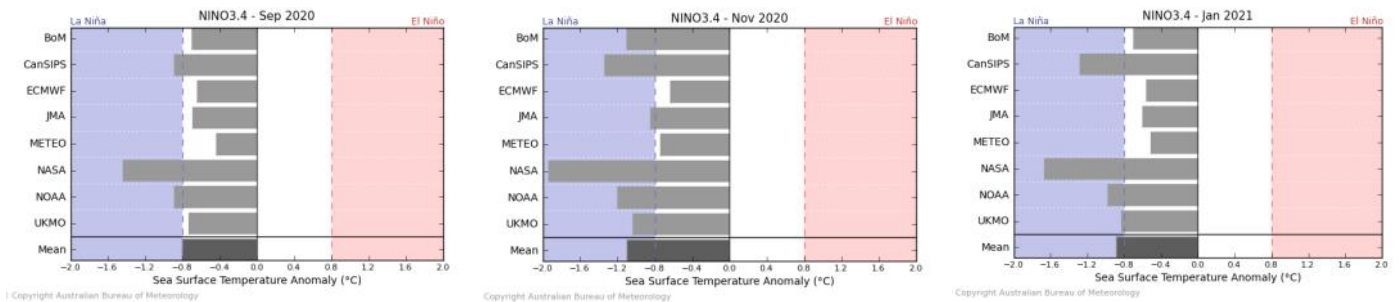
[Climate Driver Update issued on 01 September 2020](#)



## 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/model-summary/#tabs=Pacific-Ocean>

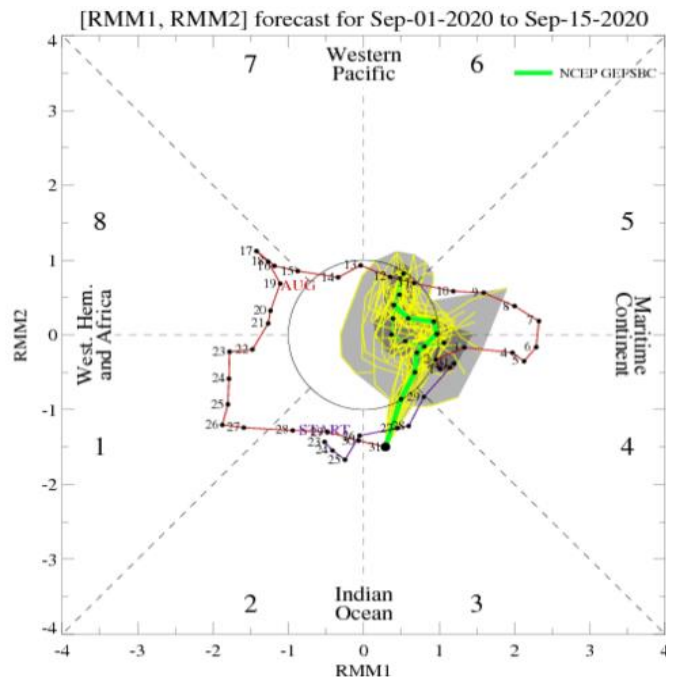
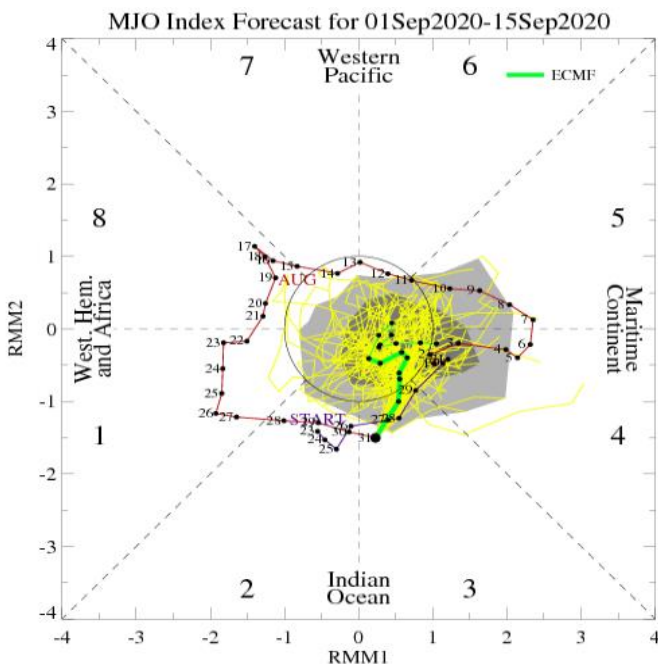
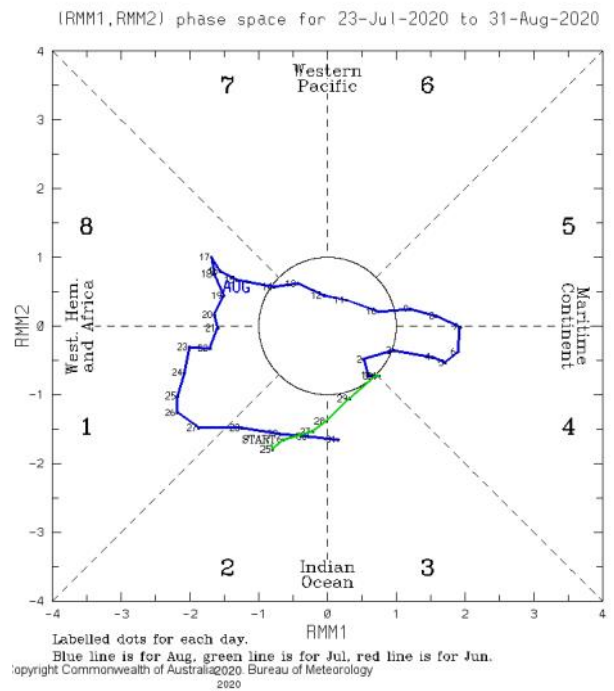


# MADDEN–JULIAN OSCILLATION

Weekly Tropical Note [Issued on Tuesday 01 September 2020]

The Madden-Julian Oscillation (MJO) is currently in the Indian Ocean and is expected to become weak or discernible in the coming weeks.

This is an abbreviated version of the Weekly Tropical Note. Click on the *Weekly Tropical* for more information



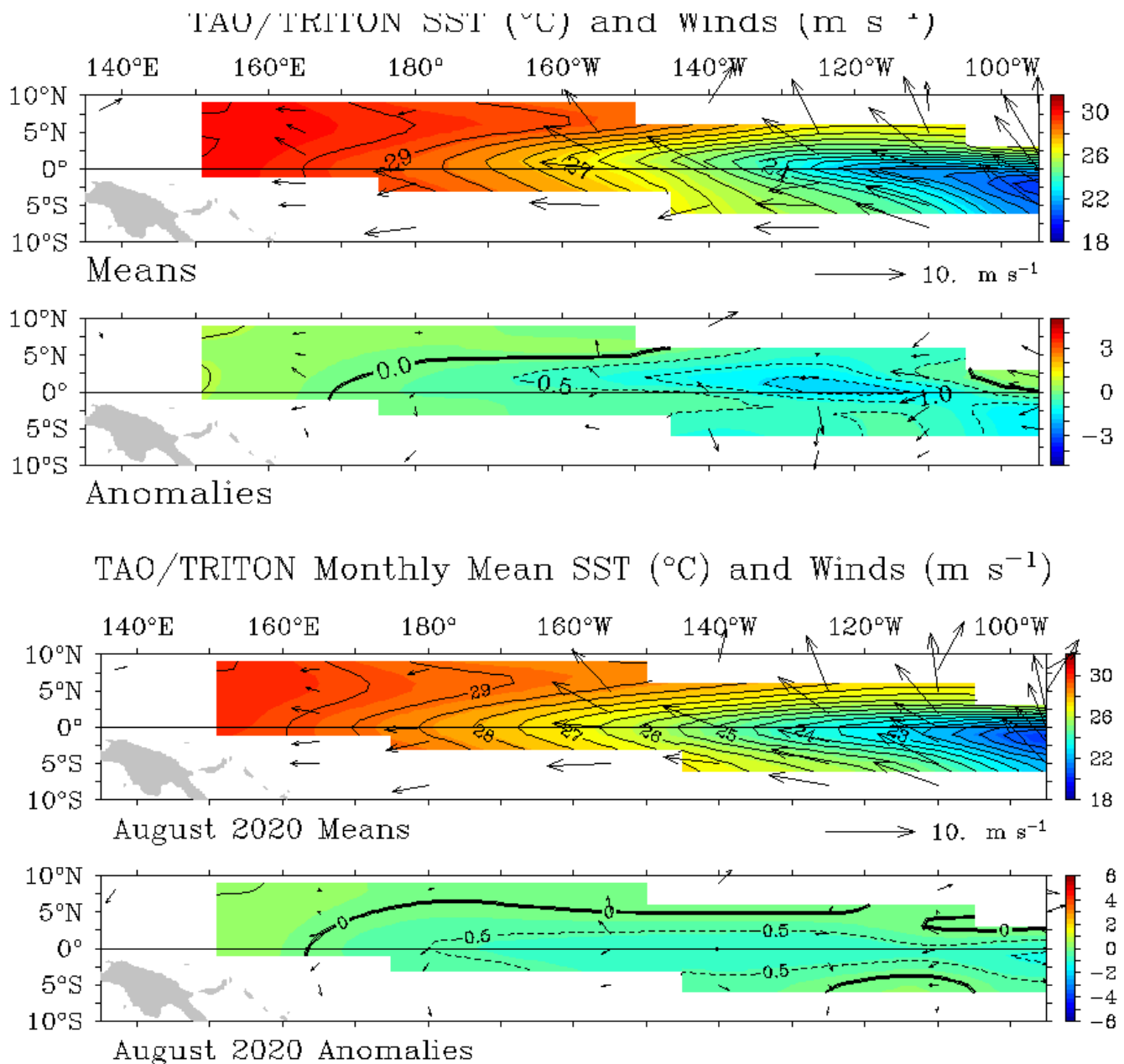


# WIND

[Display link](#)

The equatorial trade winds in the 5-day snapshot ending 31 August and for the month of August show near normal trade winds across most of the equatorial tropical 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.



# CLOUD AND RAINFALL

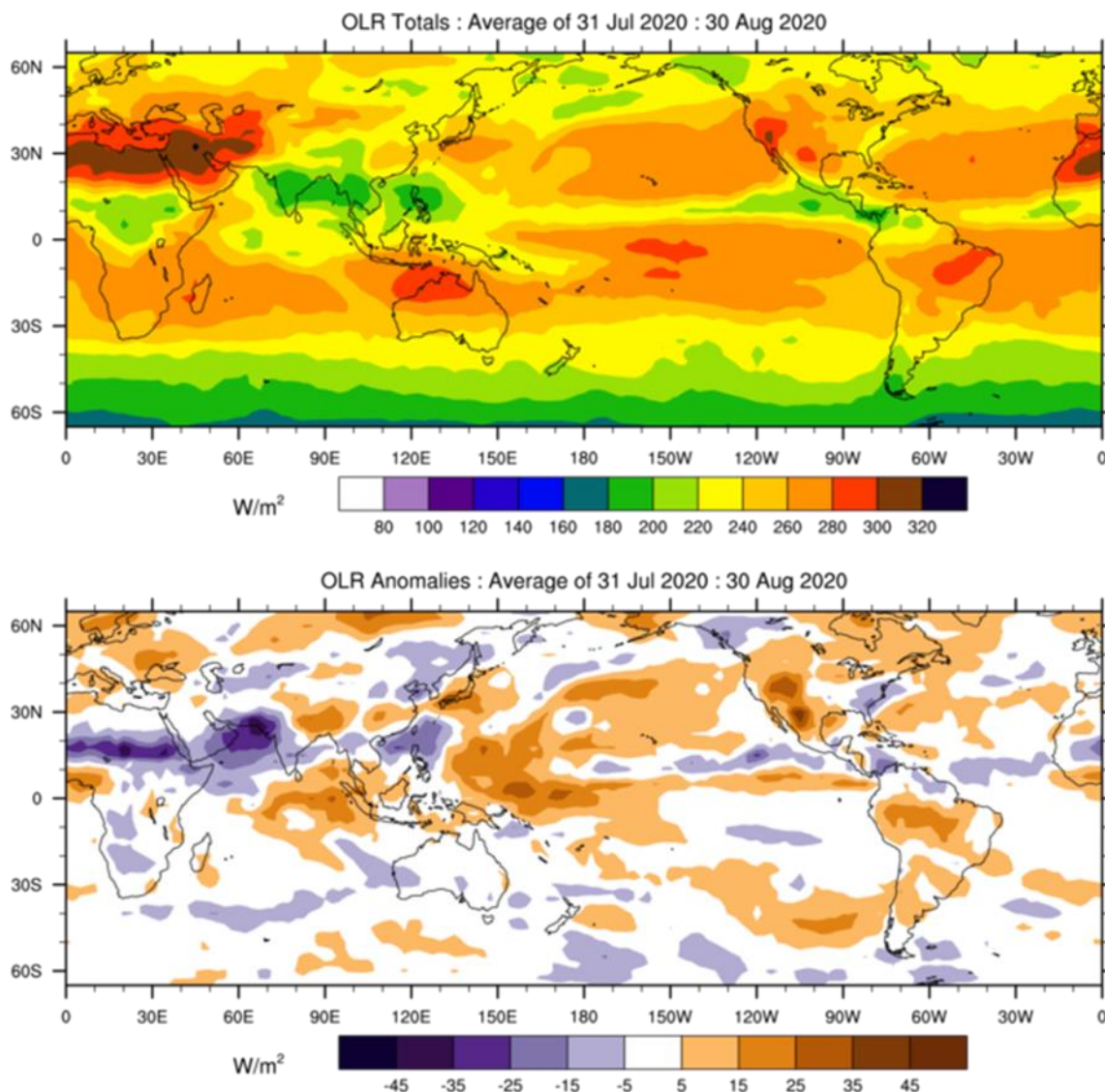
[OLR link](#)



The August 30-day OLR total and anomaly maps suggest the Intertropical Convergence Zone (ITCZ) was suppressed in the western Pacific and displaced northwards in the central and eastern Pacific. The South Pacific Convergence Zone (SPCZ) was also suppressed and displaced south over the over Solomon Islands. This pattern resulted in drier than normal conditions for most COSPPac countries.

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.

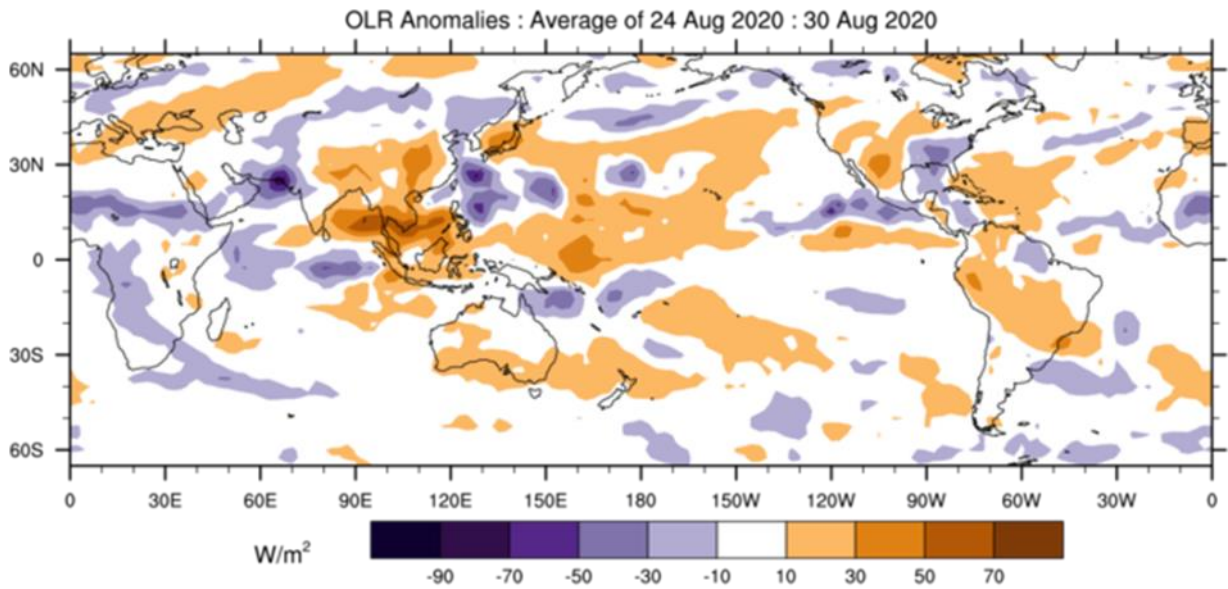
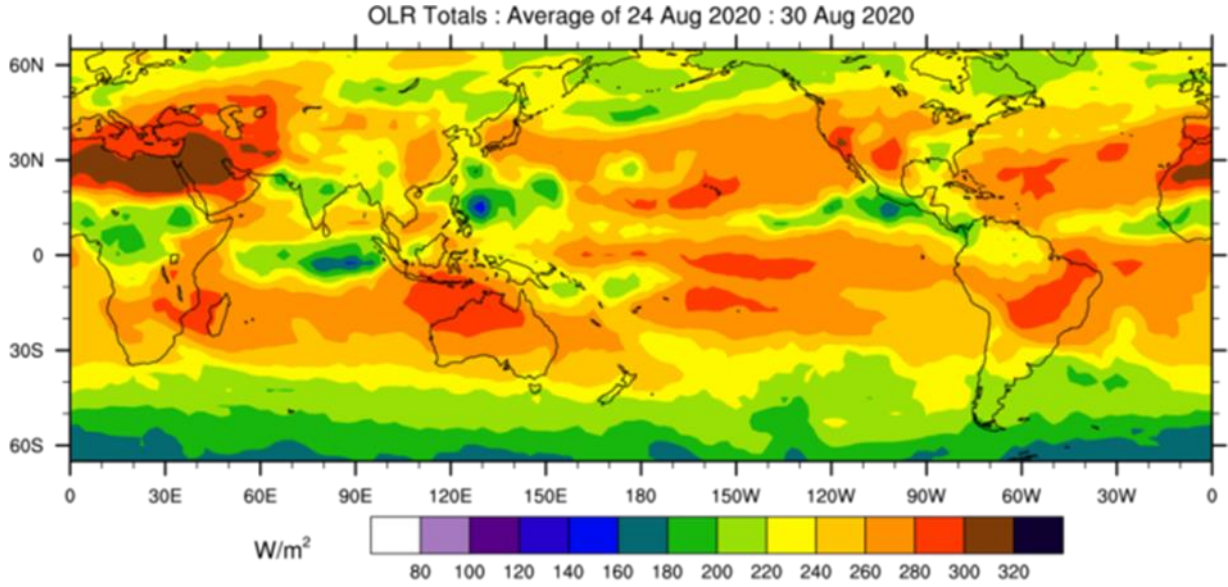
## OLR Total and Anomalies, 30 Day OLR



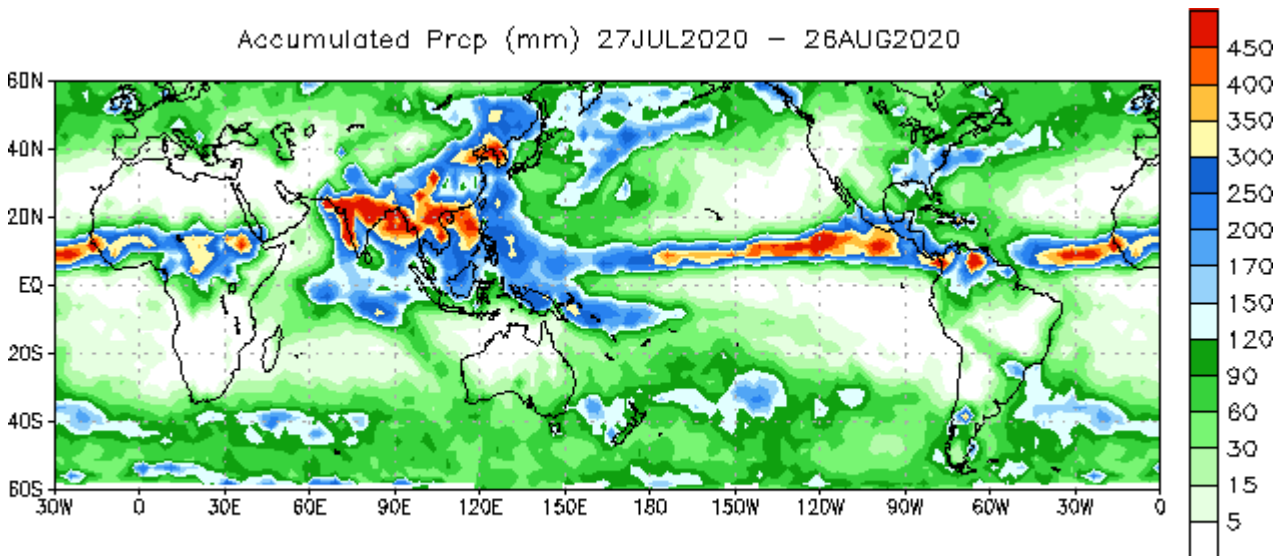
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# OLR Total and Anomalies, 7 Day OLR

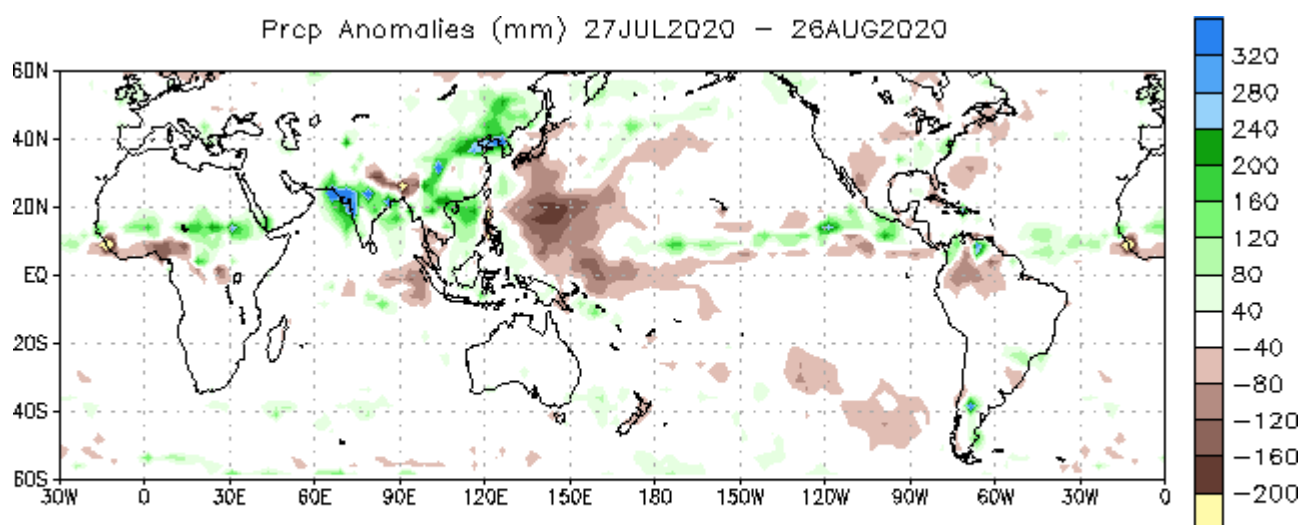


(C) Copyright Commonwealth of Australia 2020. Bureau of Meteorology

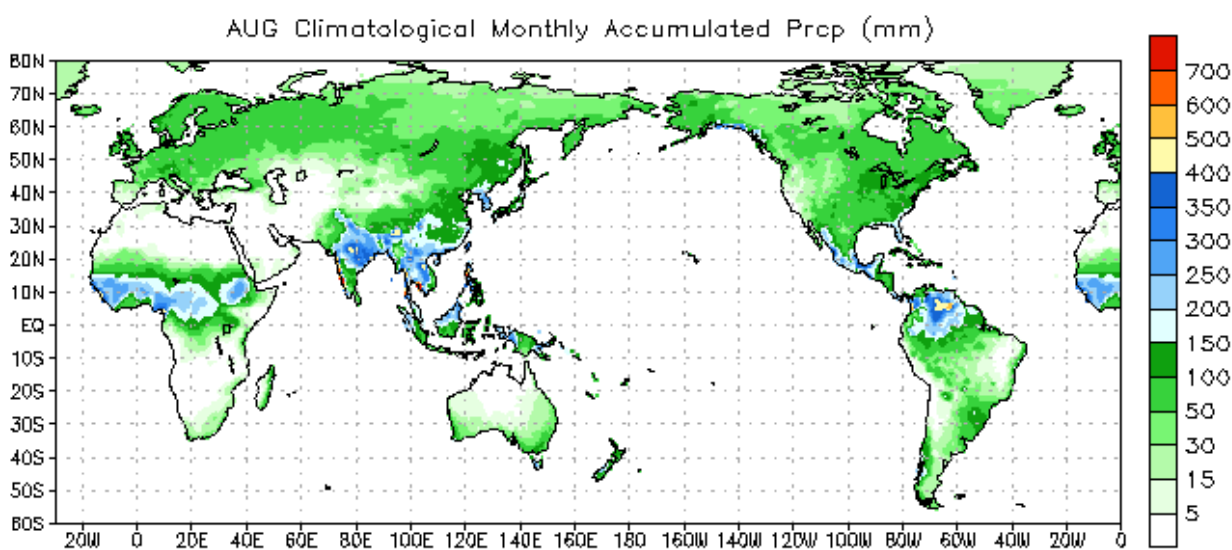


Data Source: NCEP CMAP Precipitation

## 30-Day Rainfall Anomalies



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



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

NOAA Climate Prediction Centre - NCEP CMAP precipitation:

[https://ww.cpc.ncep.noaa.gov/products/Global\\_Monsoons/Global-Monsoon.shtml](https://ww.cpc.ncep.noaa.gov/products/Global_Monsoons/Global-Monsoon.shtml)

# OCEAN CONDITIONS

## SEA SURFACE TEMPERATURE

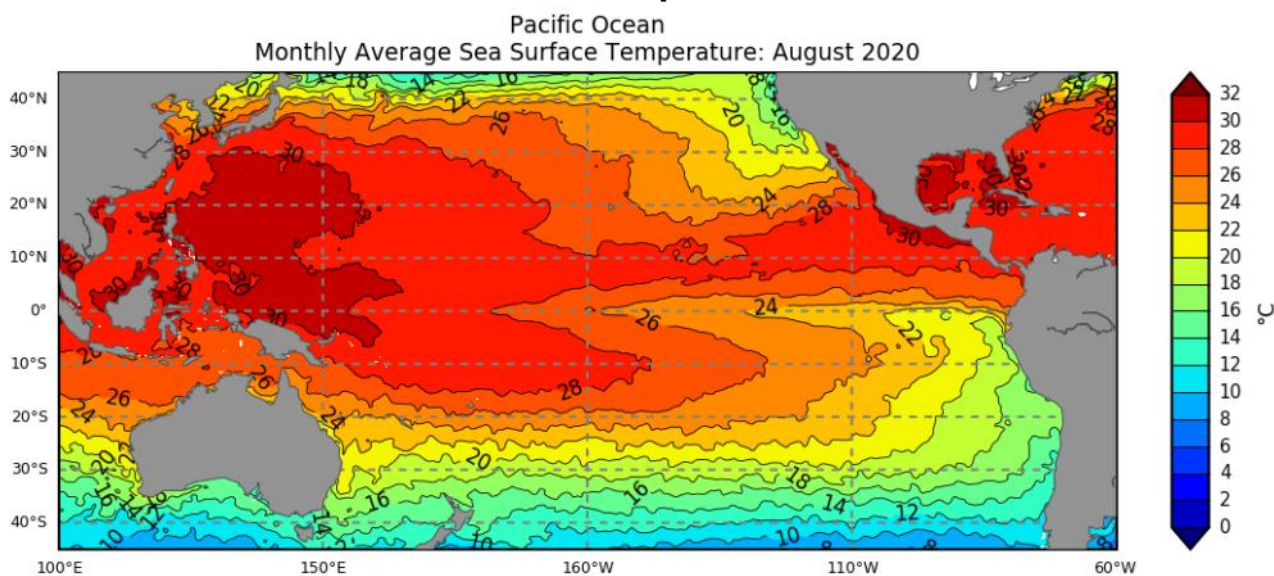


[Pacific Community COSPPac Ocean Portal](#)

Sea surface temperatures (SSTs) for August shows a profound cooling in the central and eastern tropical Pacific Ocean compared to July. A very typical La Niña like condition. Cool SST anomalies in the central and eastern equatorial Pacific extend across the tropics and to the south of the equator in the eastern Pacific. Line Islands of the Kiribati group experienced the coolest condition with a temperature drop by more than 1.5 degrees. Nauru and parts of Cook Islands also experienced cooler than normal conditions.

Above normal SST conditions prevailed in the north western Pacific including countries east of 160°W. SST in some of these countries have increased in intensity and extent compared to July. SSTs ranged from 0.5 to 1.0 degree warmer than normal around most countries in the region and 1.5 degrees warmer than normal around PNG, Solomon Islands, Vanuatu, Fiji and Tonga. In terms of the deciles, regions of Highest on Record for August spanned across north of Palau, parts of FSM, PNG, Solomon Islands, Vanuatu, Tuvalu, Fiji, Samoa, Tonga and Cook Islands EEZs. Regions of very much and above average (decile 8-10) SSTs also spanned across the same countries with inclusion of RMI and Niue. Average to very much below average (decile 1-7) SSTs spanned across Kiribati, New Caledonia, Nauru, Vanuatu, Fiji, Tonga, Cook Islands and French Polynesia EEZ.

### Mean Sea Surface Temperature



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Geoscience Energy and Maritime Division, COSPPac SPP

Reynolds SST

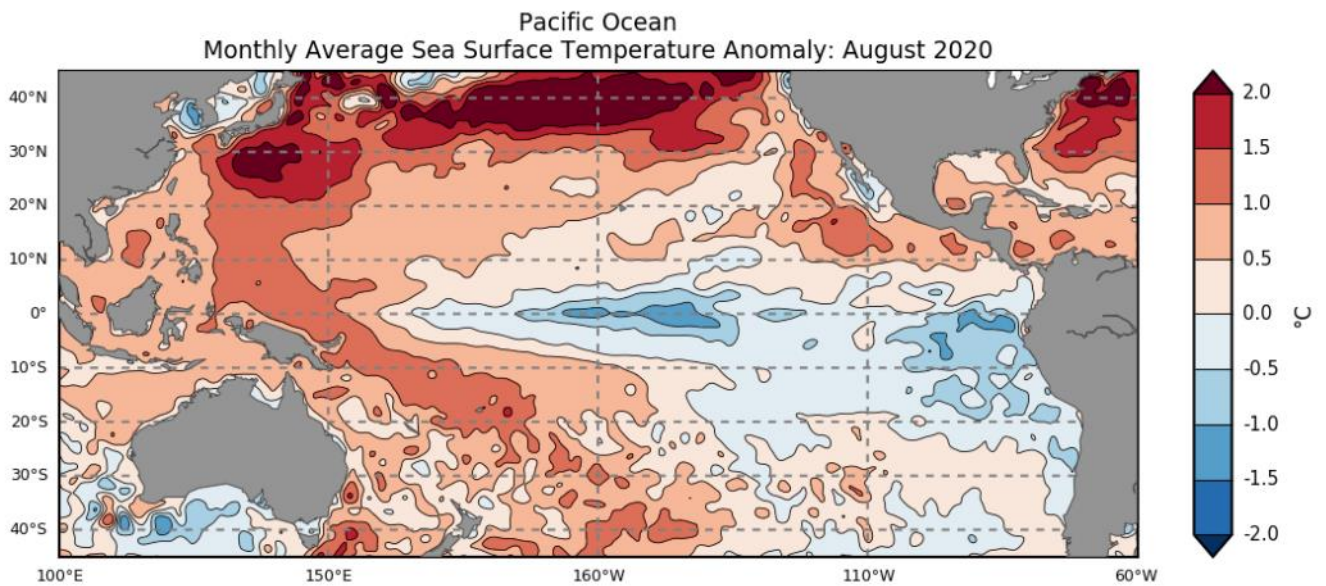


# OCEAN CONDITIONS

## SEA SURFACE TEMPERATURE



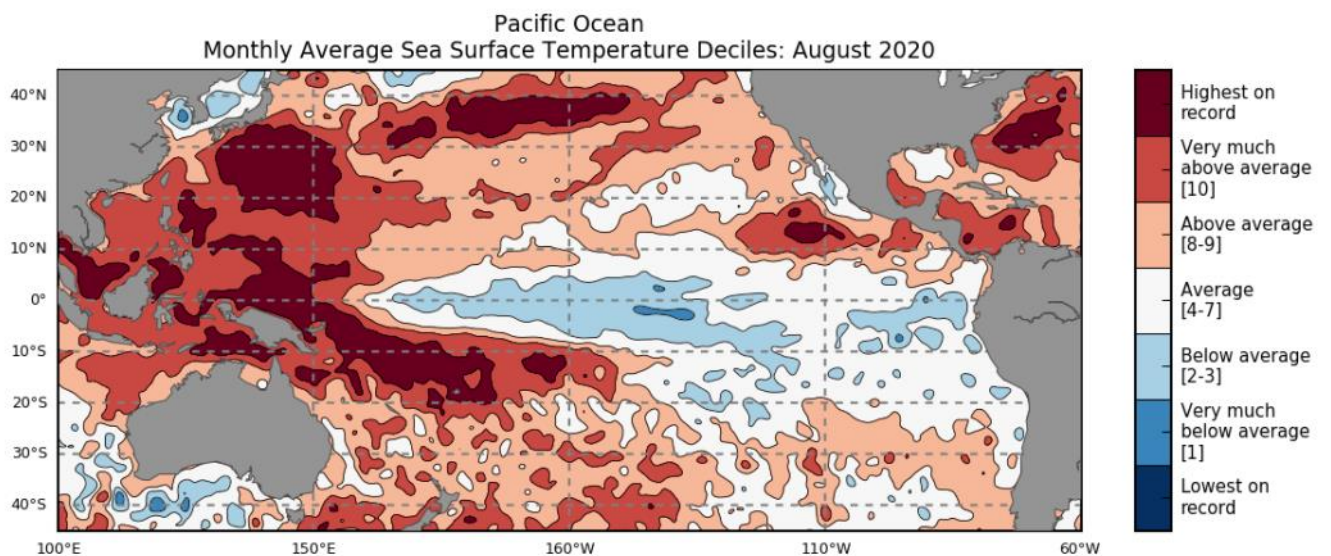
### Anomalous Sea Surface Temperature



©Pacific Community (SPC) 2020  
Geoscience Energy and Maritime Division, COSPPac SPP

Reynolds SST

### Sea Surface Temperatures Deciles



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Geoscience Energy and Maritime Division, COSPPac SPP

Reynolds SST

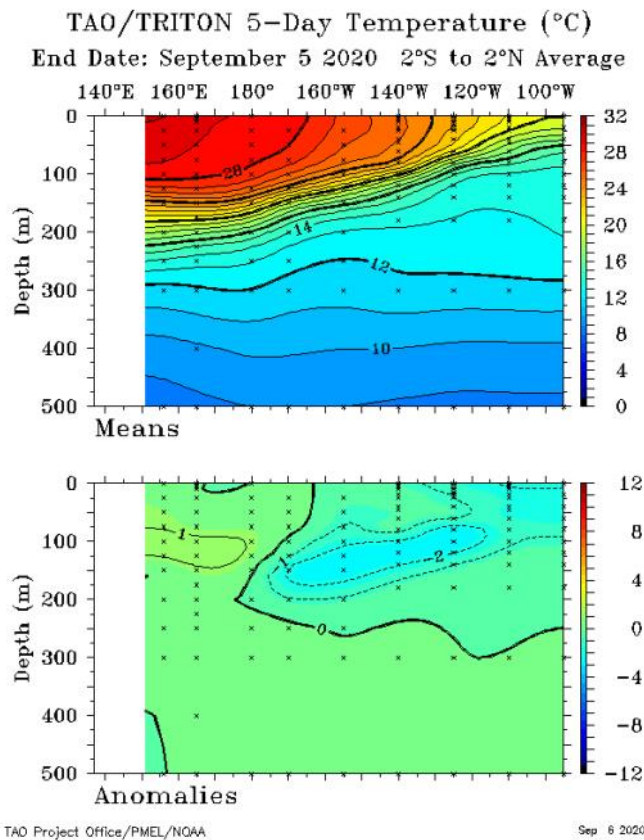
# OCEAN CONDITIONS

## SUB SURFACE

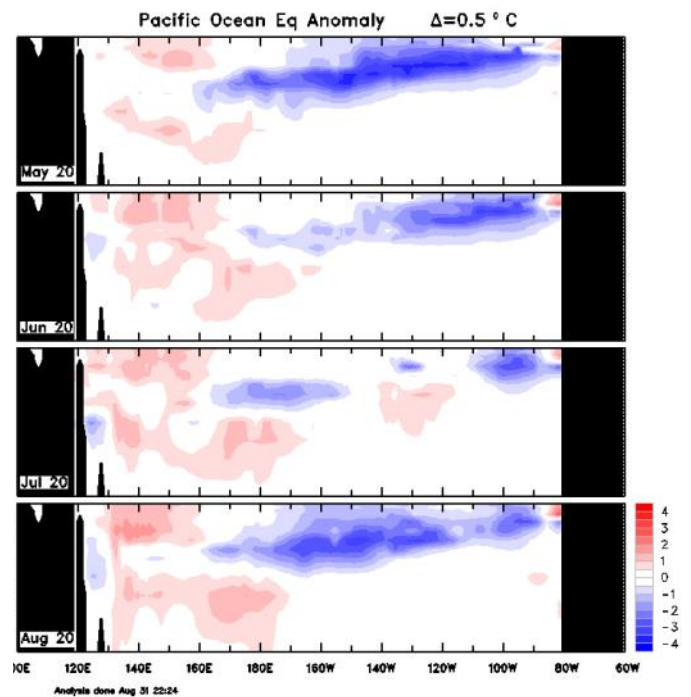


The Bureau of Meteorology's four-month sequence of equatorial sub-surface temperature anomalies to (27 August) shows cooler than average water extending across the top 150 m of the sub-surface of most of the equatorial Pacific, extending eastward from around 160°E. Compared to July, the strength and extent of cooler than average water has increased. Weak warm anomalies persist across large parts of the column depth west of the Date Line. Since January, the pattern of cooler anomalies at depth has persisted, providing conditions favourable for potential La Niña development. Renewed cooling in August has reinforced these patterns.

### 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

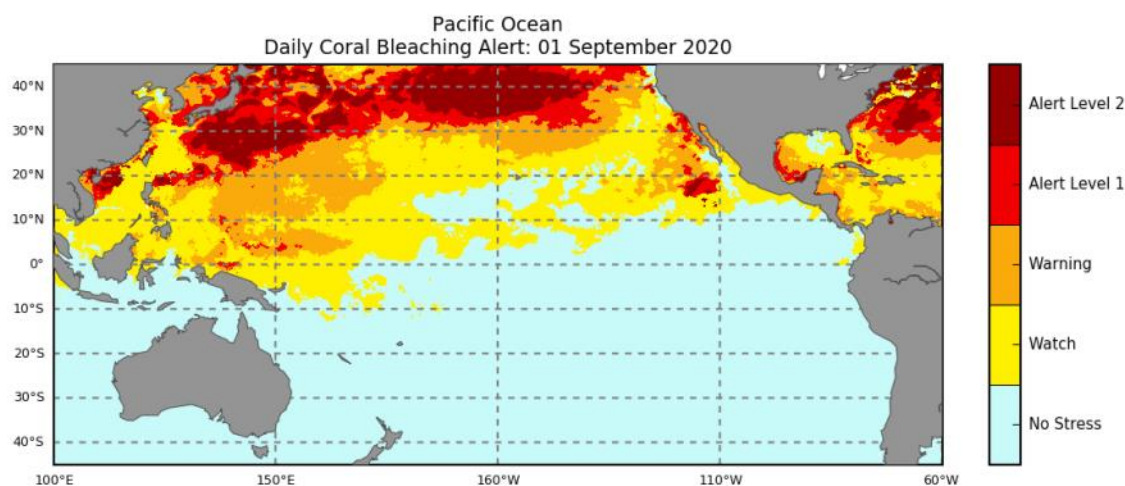
## CORAL BLEACHING



The daily Coral Bleaching Alert for 01 September 2020 shows Alert Level 1 just to the north of PNG and most parts of FSM. Areas of Warming exist around southern Palau and most of FSM. Parts of Marshall Islands, Tuvalu, Kiribati, Nauru and Solomon Island are on Watch while remainder of south west Pacific Island countries are no stress. The four weeks Coral Bleaching Outlook to 27 September shows the region of Alert Level 2 persisting over Palau, western FSM, with Alert 1 in remainder of FSM and central Palau. PNG, northern Solomon Islands and Marshall Islands are on Warning and Watch alert while remainder of the south west Pacific countries are no stress.

### Daily Coral Bleaching Alert

(Source: [Pacific Community COSPPac Ocean Portal Coral Bleaching](#))

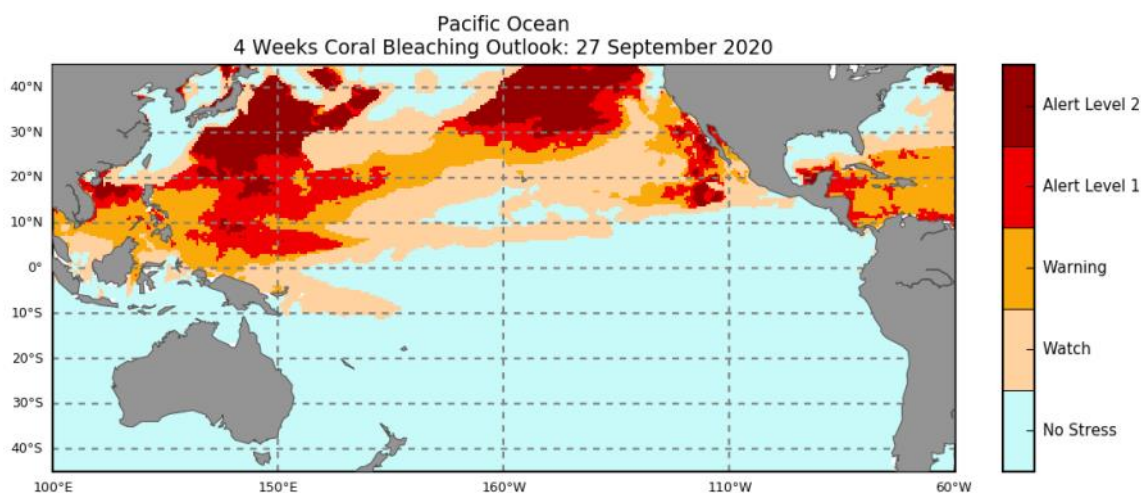


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NOAA Coral Reef Watch

### 4-Weeks Coral Bleaching Outlook

(Source: [Pacific Community COSPPac Ocean Portal](#))



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NOAA Coral Reef Watch

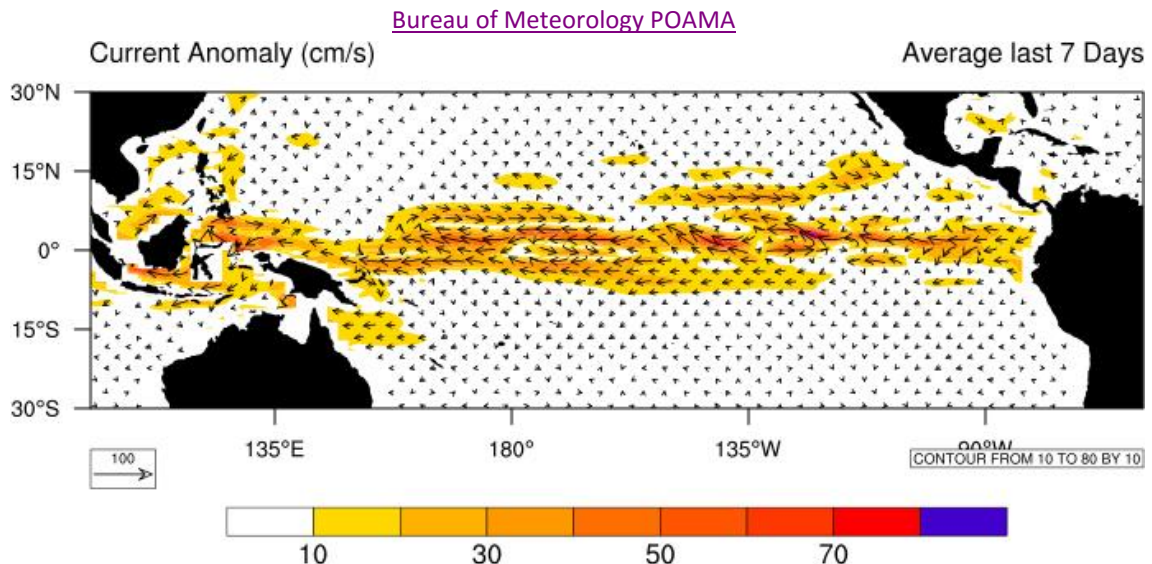
# OCEAN CONDITIONS

## OCEAN SURFACE CURRENTS AND SEA LEVEL



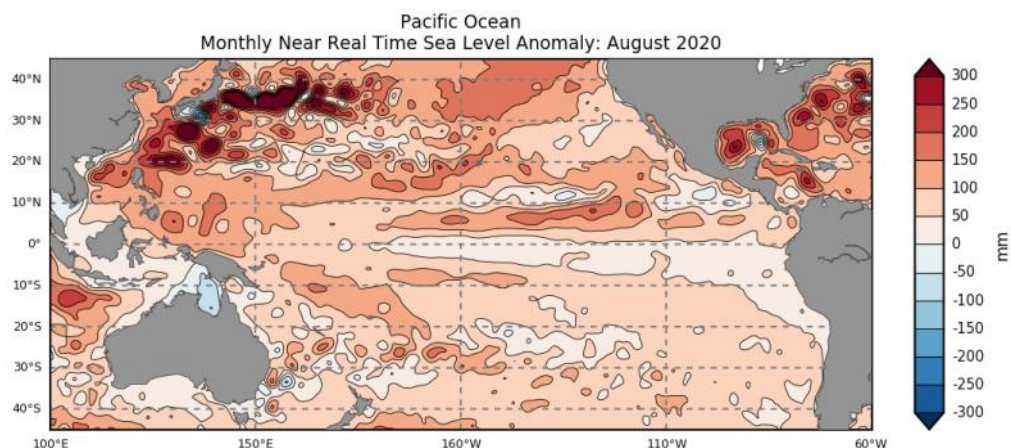
The most recent 7-day ocean surface currents plot shows a stronger than normal westward flowing Equatorial Current in the equatorial Pacific with clear divergence along the equator, especially east of about 160° W. The plot also shows a stronger than normal eastward flowing Equatorial Current east of 160°E. Sea level in August was higher than normal for most of countries in the region with positive anomalies (15-20cm) situated around western Palau, north western FSM and Solomon Islands. Parts of southern PNG, Fiji, Vanuatu, Tonga and Cook Islands experienced below normal conditions. From the east towards central equator, sea level was lower in August when compared to July. This is typical of a La Niña like condition.

### Ocean Surface Current (Last 7-Days)



### Monthly Sea Level Anomalies

Source: [Pacific Community COSPPac Ocean Portal](#)

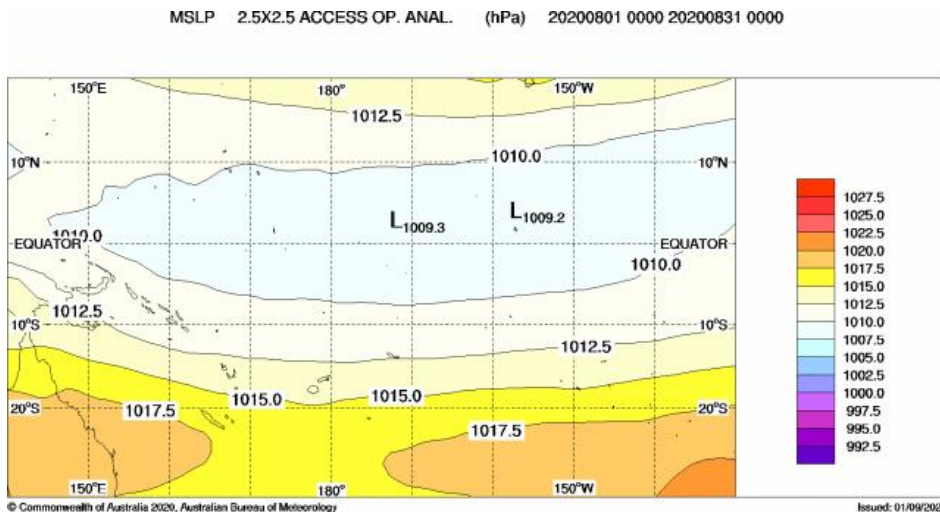


# MEAN SEA LEVEL PRESSURE

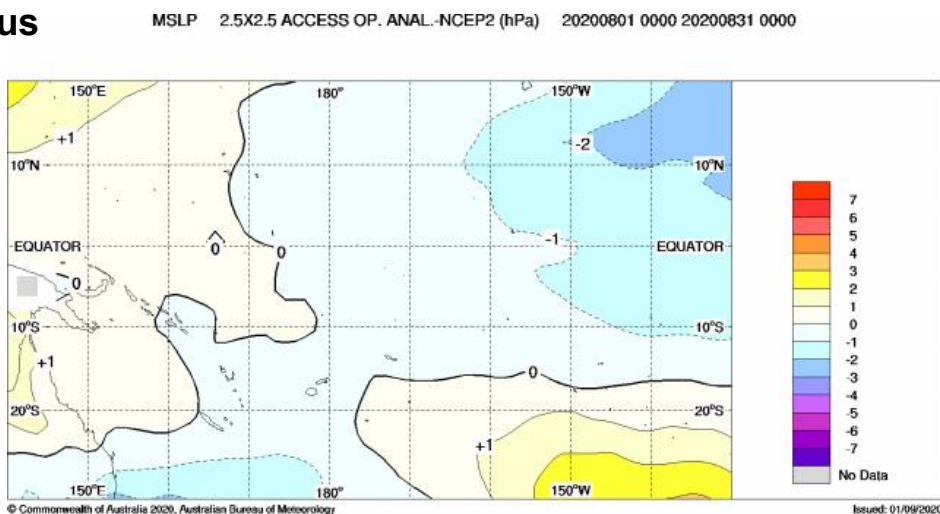
The August mean sea level pressure (MSLP) anomaly map shows negative anomalies east of about 160°W in the tropical Pacific. Positive anomalies were present in the tropical north Pacific west of 150°E.

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

## Mean



## Anomalous



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>

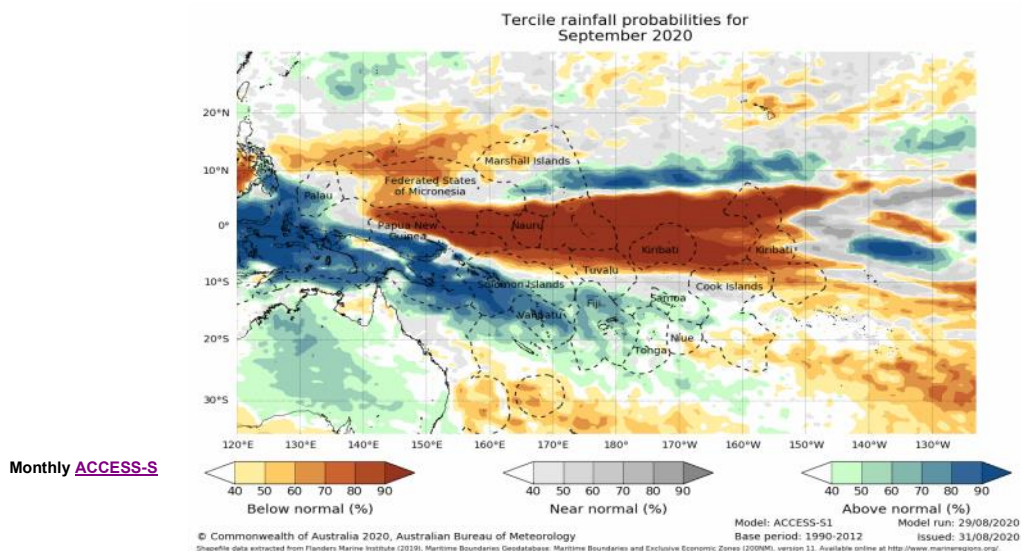


# SEASONAL RAINFALL OUTLOOK

September—November 2020



For September, the ACCESS-S model favours below normal rainfall for central and northern FSM, north-western Marshall Islands, Nauru, most of Kiribati, northern Tuvalu, Tokelau, southern and northern Cook Islands and parts of central and southern French Polynesia. Wetter than normal conditions are favoured for southern Palau, southern Marshall Islands, most parts of PNG, Solomon Islands, New Caledonia, Vanuatu, Fiji, Tonga and Samoa. The three months outlook (September-November) favours a similar outlook to that for September with below normal rainfall extending to the northern and easternmost New Guinea Islands, southernmost Marshall Islands and northern French Polynesia and above normal rainfall extending to western FSM, Niue, central Cook Islands and parts of central French Polynesia. This is a typical La Niña rainfall pattern. Warmer than average maximum and minimum temperature are favoured for all COSPPac countries except for Kiribati, Nauru, northern Tuvalu and northern Cook Islands where near normal to below normal temperature is favoured.



The Copernicus multi-model outlook favours below normal rainfall for the northern most New Guinea Islands, Nauru, Kiribati, northern Tuvalu, northern Cook Islands and northern French Polynesia. Above normal rainfall for Palau, highlands region, eastern and southern region of PNG, southern Solomon Islands, New Caledonia, Vanuatu, Fiji, Tonga, Samoa, Niue and central Cook Islands.

The SCOPIC statistical model favours normal or climatology for most countries in the COSPPac region. Above normal rainfall is favoured for part of central and eastern Solomon Islands and northern and southern Vanuatu.

The APEC Climate Centre multi-model favours below normal rainfall for southern and eastern FSM, northern RMI, northern New Guinea Islands, Nauru, northern Tuvalu, Kiribati, northern Cook Islands and northern and eastern French Polynesia. Above normal rainfall is favour for Palau, western FSM, most parts of PNG, Solomon Islands, New Caledonia, Vanuatu, Fiji, southern Tuvalu, Tonga, Samoa, Niue and central and southern Cook Islands.

For September to November, the dynamical models (excluding SCOPIC) agree on below normal rainfall for central FSM, northern and eastern New Guinea Islands, Nauru, Kiribati, northern Tuvalu, northern Cook Islands and northern French Polynesia. The models also agree on above normal rainfall for Palau, most parts of PNG, southern Solomon Islands, New Caledonia, Vanuatu, Fiji, Tonga, Samoa, Niue and central and southern Cook Islands. The models disagree elsewhere.

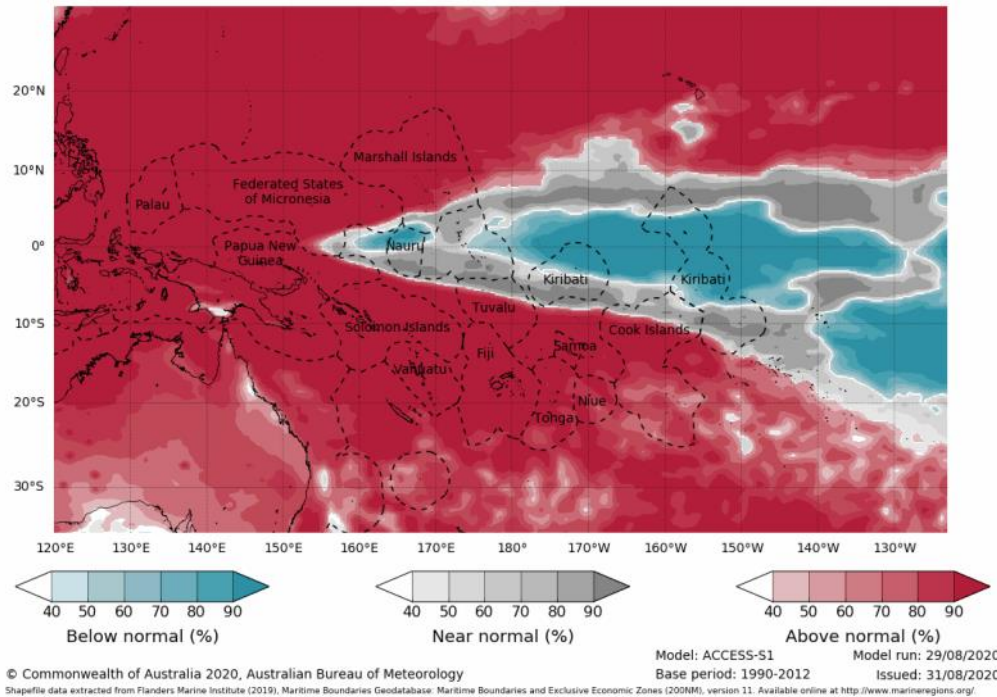
# SEASONAL RAINFALL OUTLOOK

September—November 2020



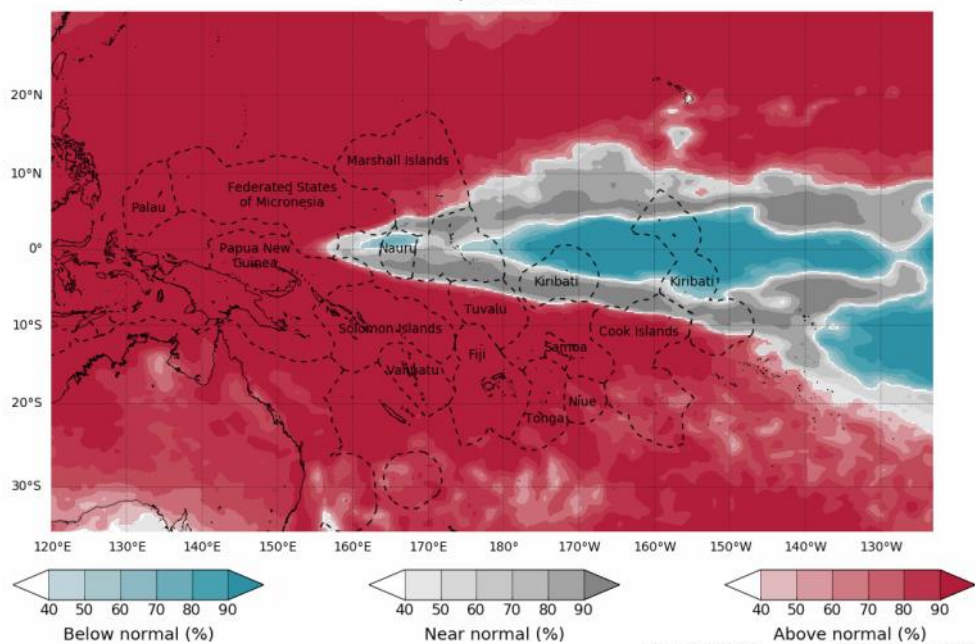
## Monthly **ACCESS-S** Maps

Tercile maximum temperature probabilities for September 2020



© Commonwealth of Australia 2020, Australian Bureau of Meteorology  
 Shapefile data extracted from Flanders Marine Institute (2019), Maritime Boundaries Geodatabase: Maritime Boundaries and Exclusive Economic Zones (200NM), version 11. Available online at <http://www.maritimerregions.org/>

Tercile minimum temperature probabilities for September 2020



© Commonwealth of Australia 2020, Australian Bureau of Meteorology  
 Shapefile data extracted from Flanders Marine Institute (2019), Maritime Boundaries Geodatabase: Maritime Boundaries and Exclusive Economic Zones (200NM), version 11. Available online at <http://www.maritimerregions.org/>



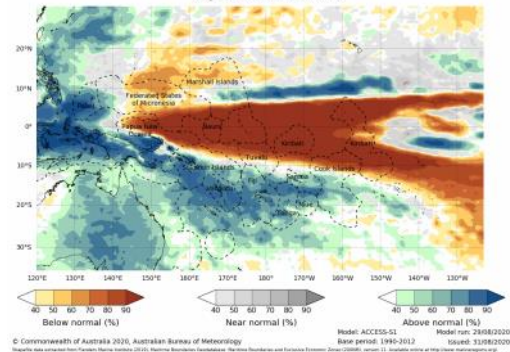
# SEASONAL RAINFALL OUTLOOK

September—November 2020

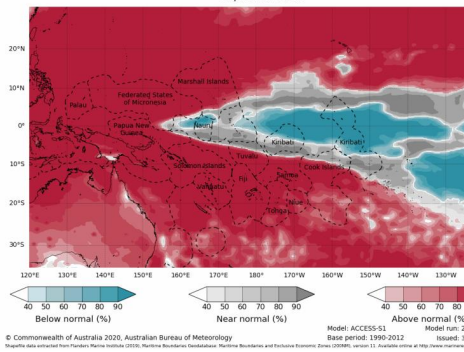


## Seasonal ACCESS-S maps

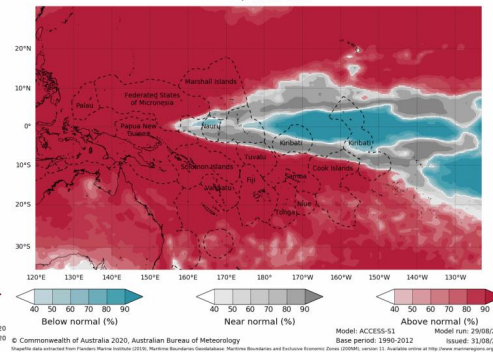
Tercile rainfall probabilities for September to November 2020



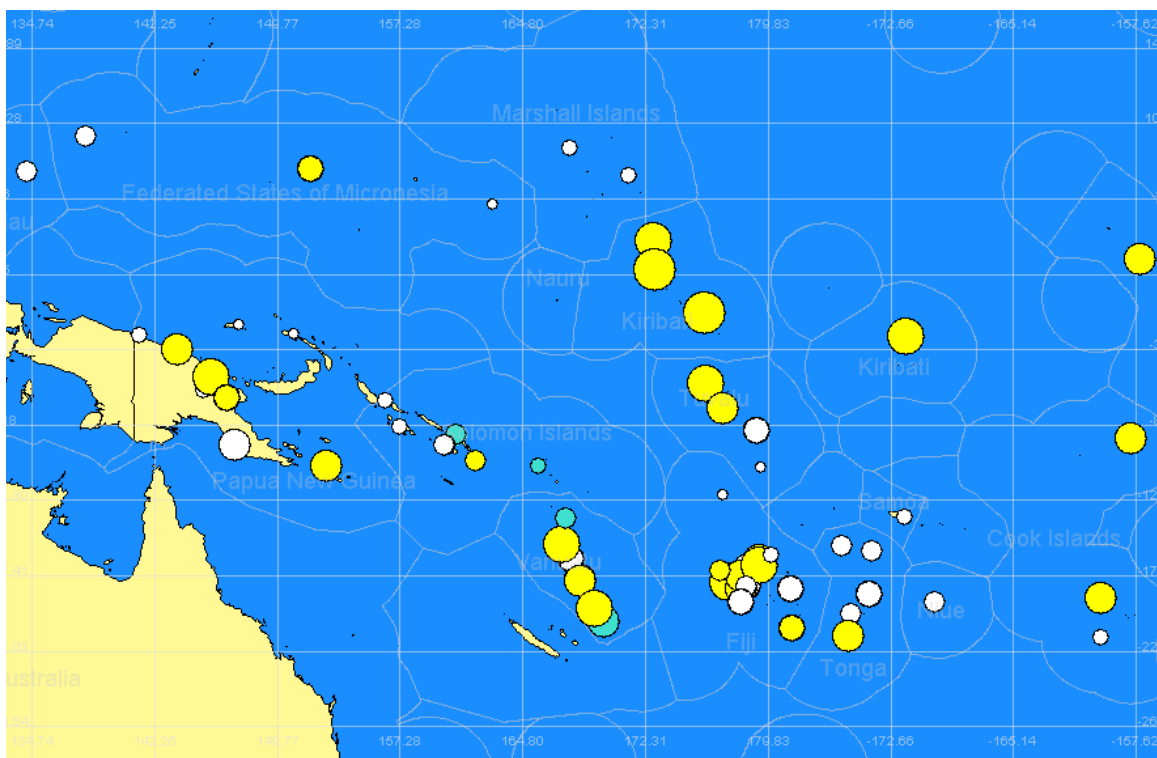
Tercile maximum temperature probabilities for September 2020



Tercile minimum temperature probabilities for September 2020



## SCOPIC



- Legend**
- Bias towards below-normal rainfall
  - Bias towards normal rainfall
  - Bias towards above-normal rainfall
  - No bias in forecast (Climatology)
- Larger "bubbles" represent higher forecast skill (based on LEPS scores)*

'About SCOPIC' [www.pacificmet.net/project/climate-and-ocean-support-program-pacific-cosppac](http://www.pacificmet.net/project/climate-and-ocean-support-program-pacific-cosppac)

# SEASONAL RAINFALL OUTLOOK

September—November 2020



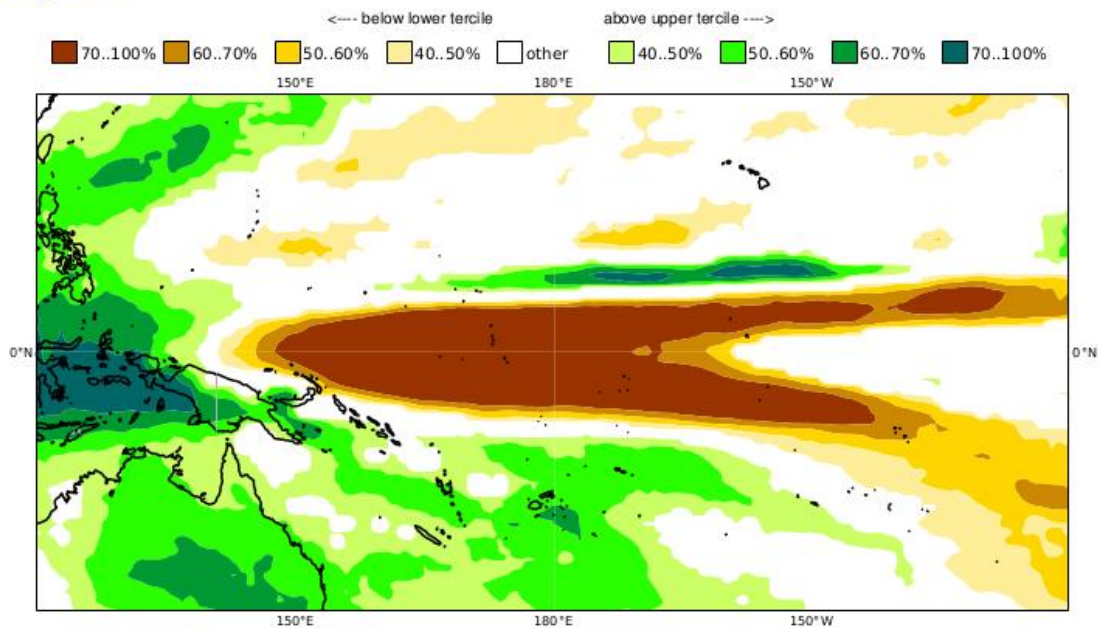
## Copernicus (C3S multi-system)-Rainfall

Prob(most likely category of precipitation)

SON 2020

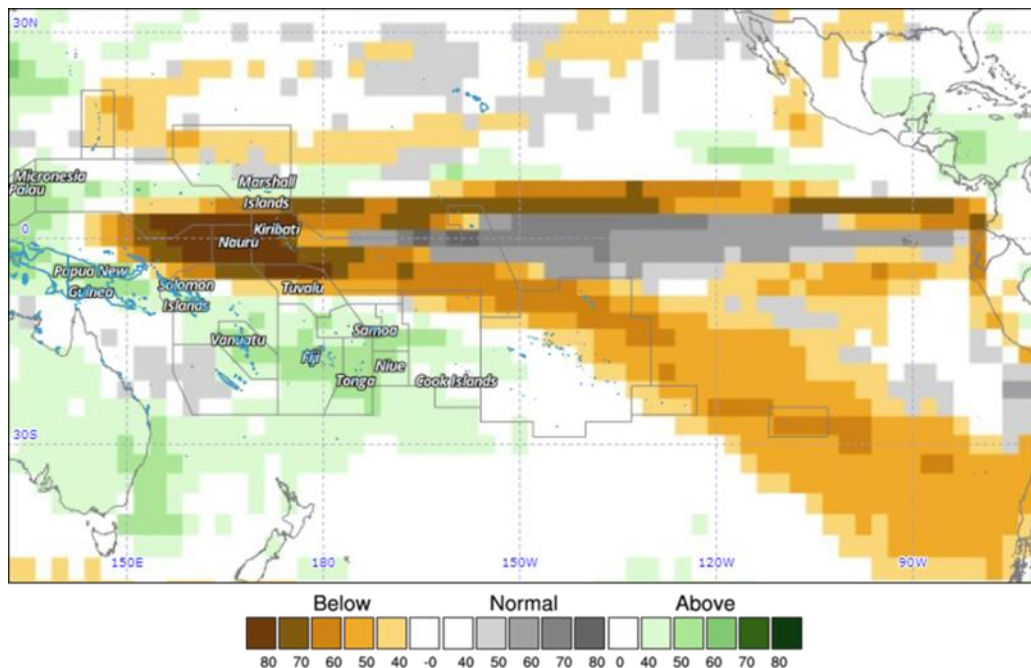
Nominal forecast start: 01/08/20

Unweighted mean



Copernicus Rainfall: <https://climate.copernicus.eu/charts/>

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



Year: 2020, Season: SON, Lead Month: 3, Method: GAUS

Model: APCC, CMCC, CWB, MSC, NASA, NCEP, PNU, POAMA

Generated using CLIK® (2020-9-1)

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# TROPICAL CYCLONE

## 2019/2020 Season

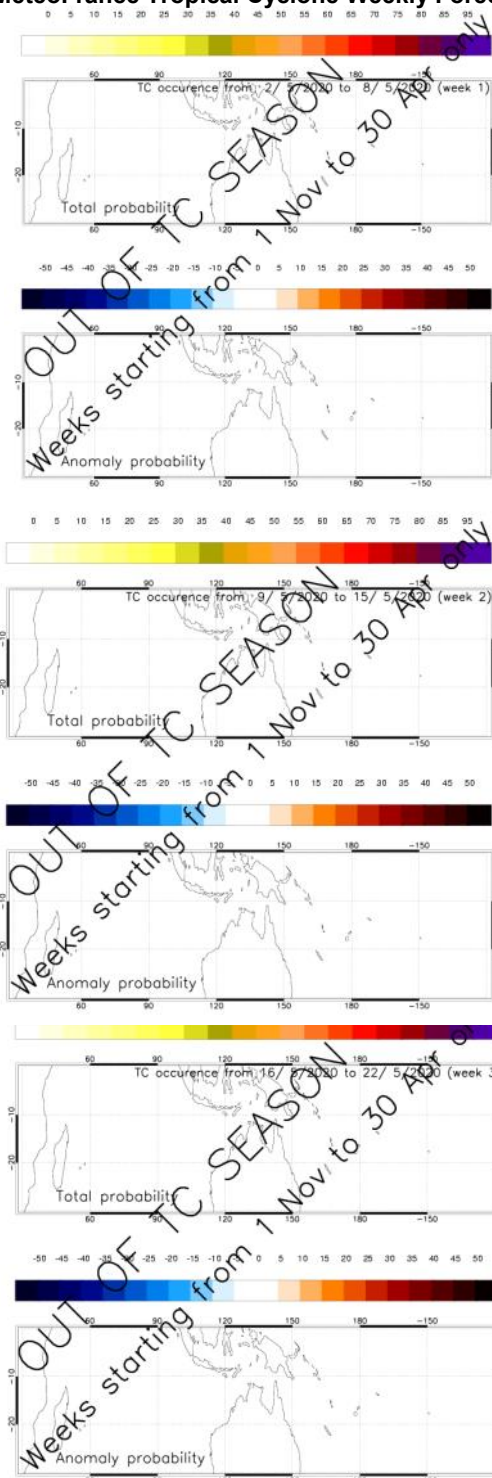


Eight tropical cyclones (Rita, Sarai, Tino, Uesi, Vicky, Wasi, Gretel and Harold) formed in the 2019-20 south Pacific (east of the tip of Cape York, Queensland) cyclone season. These cyclones affected Solomon Islands, New Caledonia, Vanuatu, Fiji, Wallis and Futuna, Tonga, American Samoa, Samoa and Niue. Out of the eight cyclones, four severe cyclones: Rita, Tino, Uesi, and Harold. Harold was one of the most intense cyclones to make landfall in the Pacific Islands during April on record (minimum mean sea level pressure 912 hPa). The long-term average for the period 1969-70 to 2017-18 is nine cyclones. Although the official cyclone season ended in April 2020, historical data has shown that cyclones can form outside the normal cyclone season. Updates on tropical cyclone forecast from the Meteo France weekly forecasts will resume in October 2020.

The tropical cyclone season outlook for 2019-20 is available via: <http://www.bom.gov.au/climate/cyclones/south-pacific/>

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

### MeteoFrance Tropical Cyclone Weekly Forecasts



### 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

## 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 Pacific Ocean. In contrast, ocean temperatures to the north of Australia usually become warmer than normal.

## 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 sustained positive values indicate El Niño.

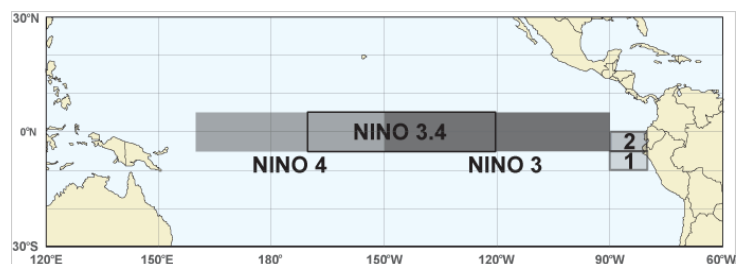
## 20 degrees Celsius Isotherm Depth

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 content in the upper ocean.

## 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 below) cover the following areas:

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