

# Monthly Climate Bulletin

August 2021

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Photo Credit: IPCC 6th Assessment Report (AR6) recently released reconfirms the grave risks facing us in a warming world





# CONTENTS

Summary	2
El Niño–Southern Oscillation	3
Madden–Julian Oscillation	4
Wind	5
Cloud and Rainfall	6
Oceanic Conditions	9
Mean Sea Level Pressure	13
Model Outlooks	14
Cyclones	17
Further Information	18

# SUMMARY

Issued 09 September 2021

- The El Niño Southern Oscillation (ENSO) is currently neutral and is likely to stay neutral in the coming months.
- A weak pulse of the Madden-Julian Oscillation was in the Indian Ocean in past fortnight. International climate models agree that this pulse of the MJO will strengthen marginally and approach Australian longitudes in the coming fortnight.
- The Intertropical Convergence Zone (ITCZ) was active around the central and eastern Pacific, while the South Pacific Convergence Zone (SPCZ) was generally suppressed except for some activity between around PNG's Gulf region and Tuvalu.
- The sea surface temperature anomaly pattern in August shows SSTs were close to average across most of the equatorial Pacific Ocean.
- Coral bleaching status is 'no stress' or 'watch' for almost all countries with patches of warning for Palau and FSM.
- A notable sea level anomaly of +200mm observed in the Palau, western FSM, southern PNG, southern and eastern Solomon Islands, northern Vanuatu and western Fiji.
- For September to November 2021, the dynamical models agree on above normal rainfall for Palau, FSM, southern Marshall Islands, most of PNG, southern Solomon Islands, New Caledonia, Vanuatu, Fiji, Tonga, Niue, southern Cook Islands and southern French Polynesia. The models also agree on below normal rainfall for CNMI, Guam, central and northern Marshall Islands, northern Solomon Islands, Nauru, Kiribati, Tuvalu, Tokelau, northern and central Cook Islands, and the northern half of French Polynesia.

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# EL NIÑO–SOUTHERN OSCILLATION

Tropical Pacific Ocean likely to cool, but remain ENSO-neutral

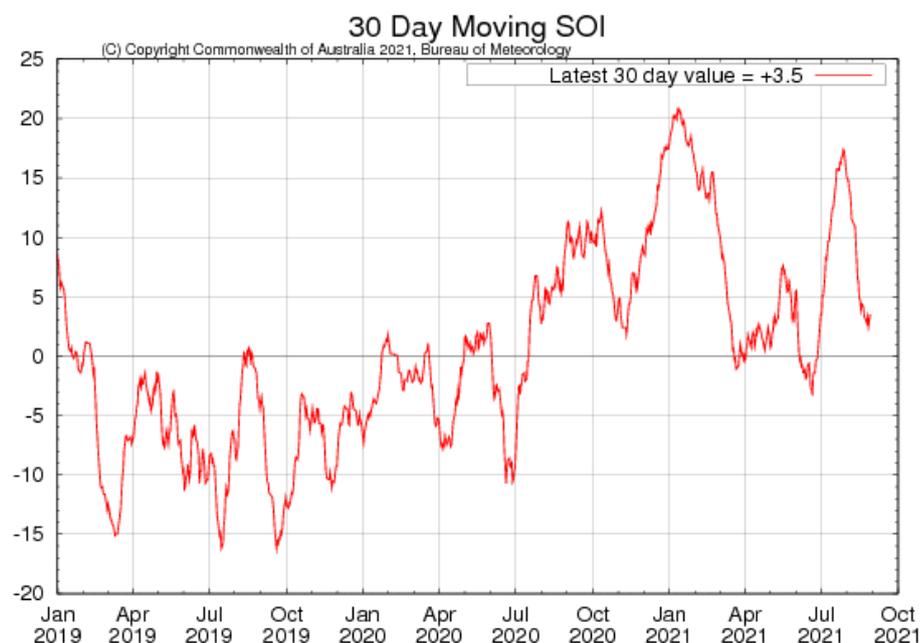
Click link to access [Climate Driver Update issued on 31 August 2021](#)

The El Niño Southern Oscillation (ENSO) is neutral. Sea surface temperatures (SSTs) in the central tropical Pacific Ocean are near average, despite slowly cooling over the past two months. Waters beneath the surface are slightly cooler than average.

While most models indicate SSTs in the central tropical Pacific are likely to continue cooling over the coming months, ENSO-neutral is favoured to persist. Only two of the seven models surveyed suggest SSTs will remain cool for long enough to be considered a La Niña event. This cooling of the tropical Pacific may be contributing to the wetter than median climate outlooks in Australia.

Most climate models predict the negative Indian Ocean Dipole (IOD) event will persist through the southern hemisphere spring (September–November), despite current values rising marginally above the  $-0.4\text{ °C}$  threshold. Stronger-than-usual easterly winds across the tropical eastern Indian Ocean over the last three weeks have weakened the IOD event, however, this is most likely to be temporary. A majority of the five climate models surveyed by the Bureau predict the negative IOD will persist into November. A negative IOD increases the chance of above average winter–spring rainfall for much of southern and eastern Australia.

The 30-day Southern Oscillation Index (SOI) for the 30 days ending 29 August was +3.5. The 90-day SOI value was +7.9. The 30-day value has been relatively flat over the past two weeks, remaining within neutral values.



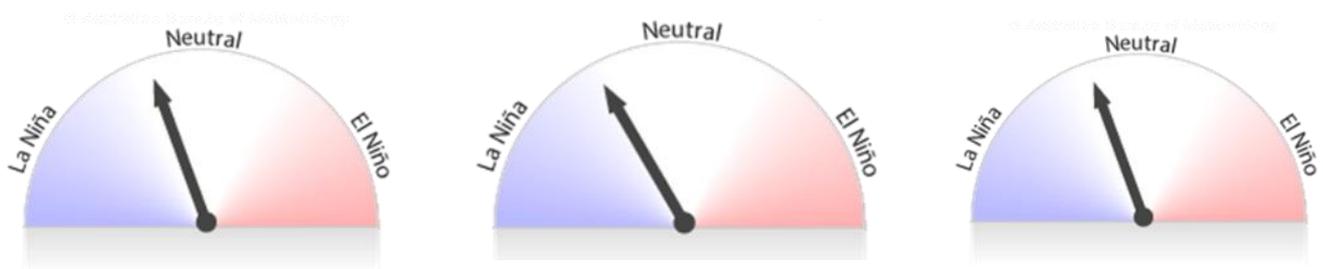


# EL NIÑO–SOUTHERN OSCILLATION

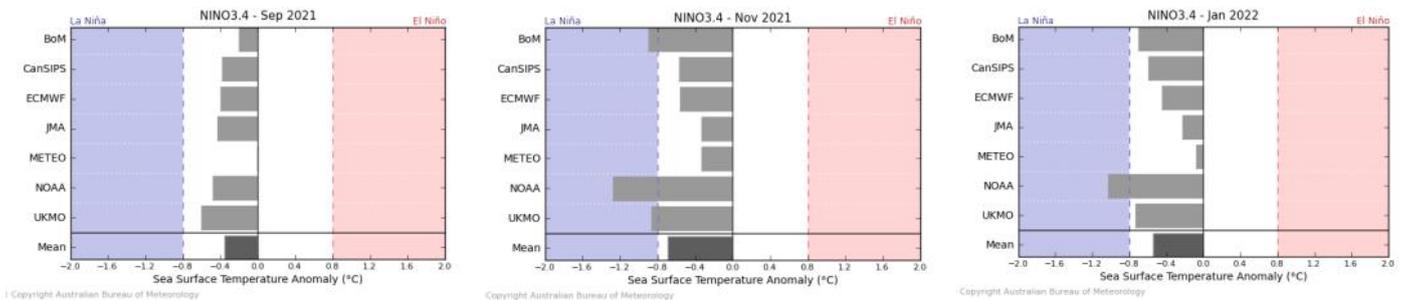
Tropical Pacific Ocean likely to cool, but remain ENSO-neutral

Click link to access [Climate Driver Update issued on 31 August 2021](#)

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



## Bureau of Meteorology NINO3.4 International Model Outlooks



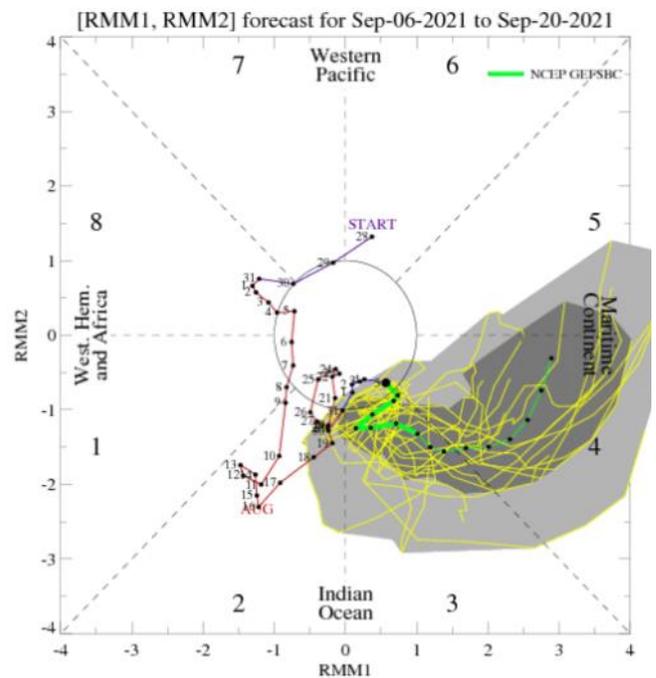
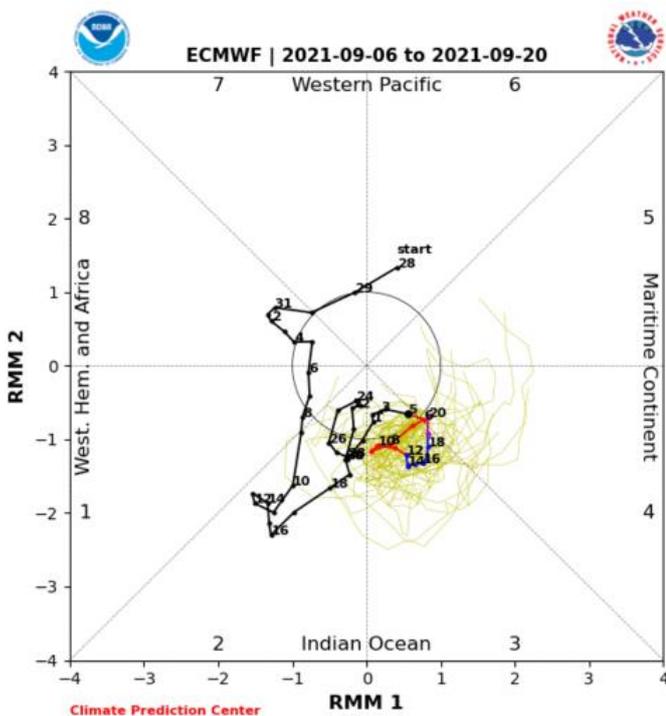
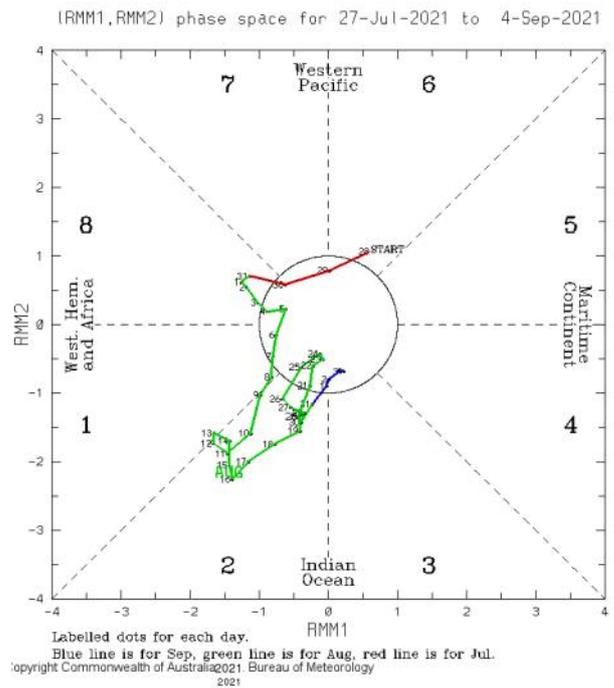
Bureau of Meteorology summary of international model outlooks for NINO3.4: <http://www.bom.gov.au/climate/model-summary/#tabs=Pacific-Ocean>

# MADDEN–JULIAN OSCILLATION

Click link to access [Tropical Climate Update](#) [Issued on Tuesday 07 September 2021]

During mid-August, a moderately strong pulse of Madden-Julian Oscillation (MJO) tracked across the Indian Ocean and weakened towards the end of the month. The past fortnight has seen the Madden-Julian Oscillation (MJO) mostly at weak or indiscernible levels in the western Indian Ocean region. A majority of international climate models agree that this pulse of the MJO will strengthen marginally and approach Australian longitudes in the coming fortnight. When an MJO moves over the Maritime Continent at this time of the year, its influence on rainfall patterns is usually confined to the tropics to the north of Australia. Typically, much of the Maritime Continent region along with South-East Asia has an increased likelihood of observing above-average cloudiness and rainfall in this scenario.

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



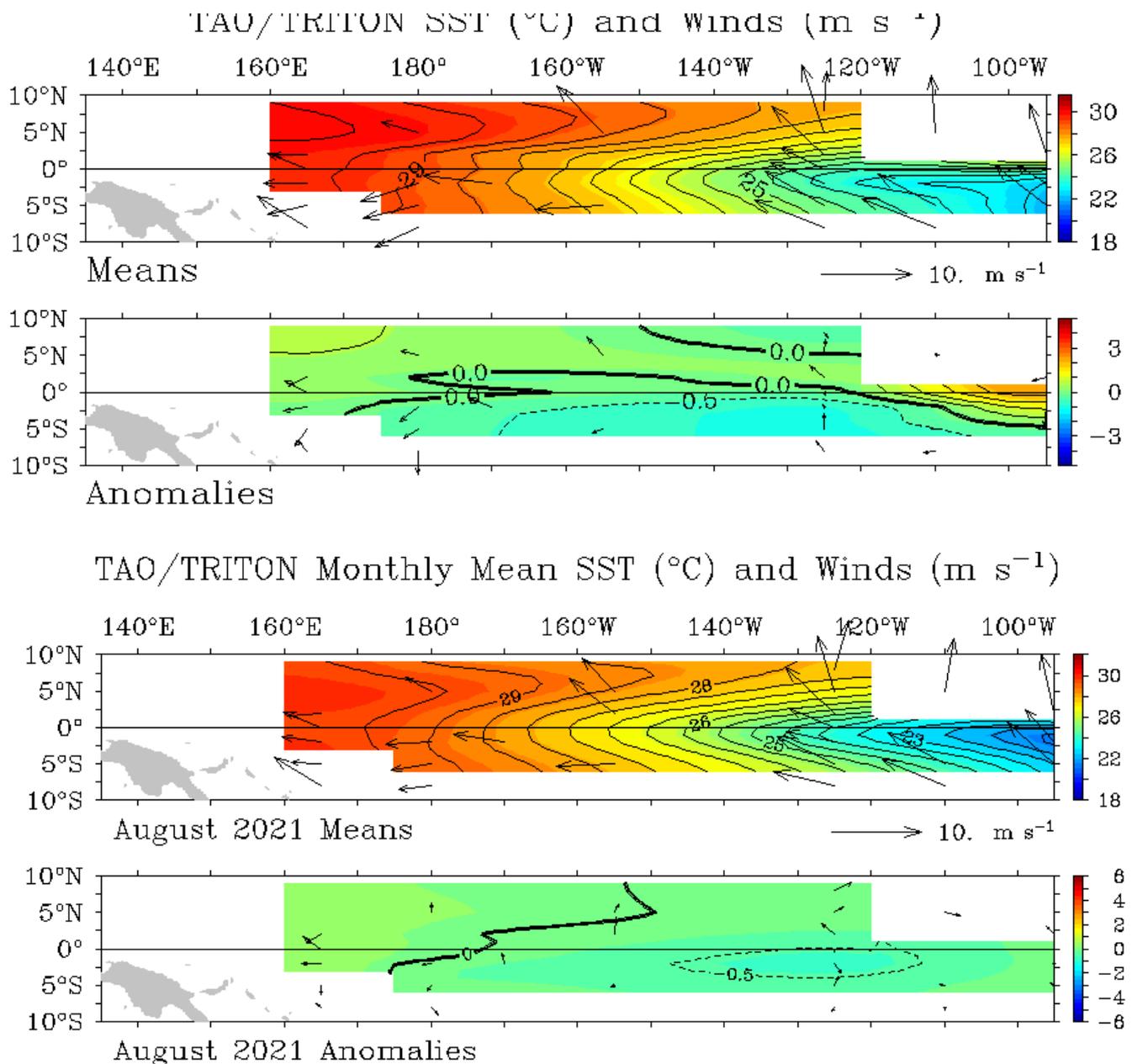


# WIND

Click link to access [Wind plots link](#)

The trade winds in August were stronger over the west and close to average over the central and eastern equatorial Pacific for most of the month.

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

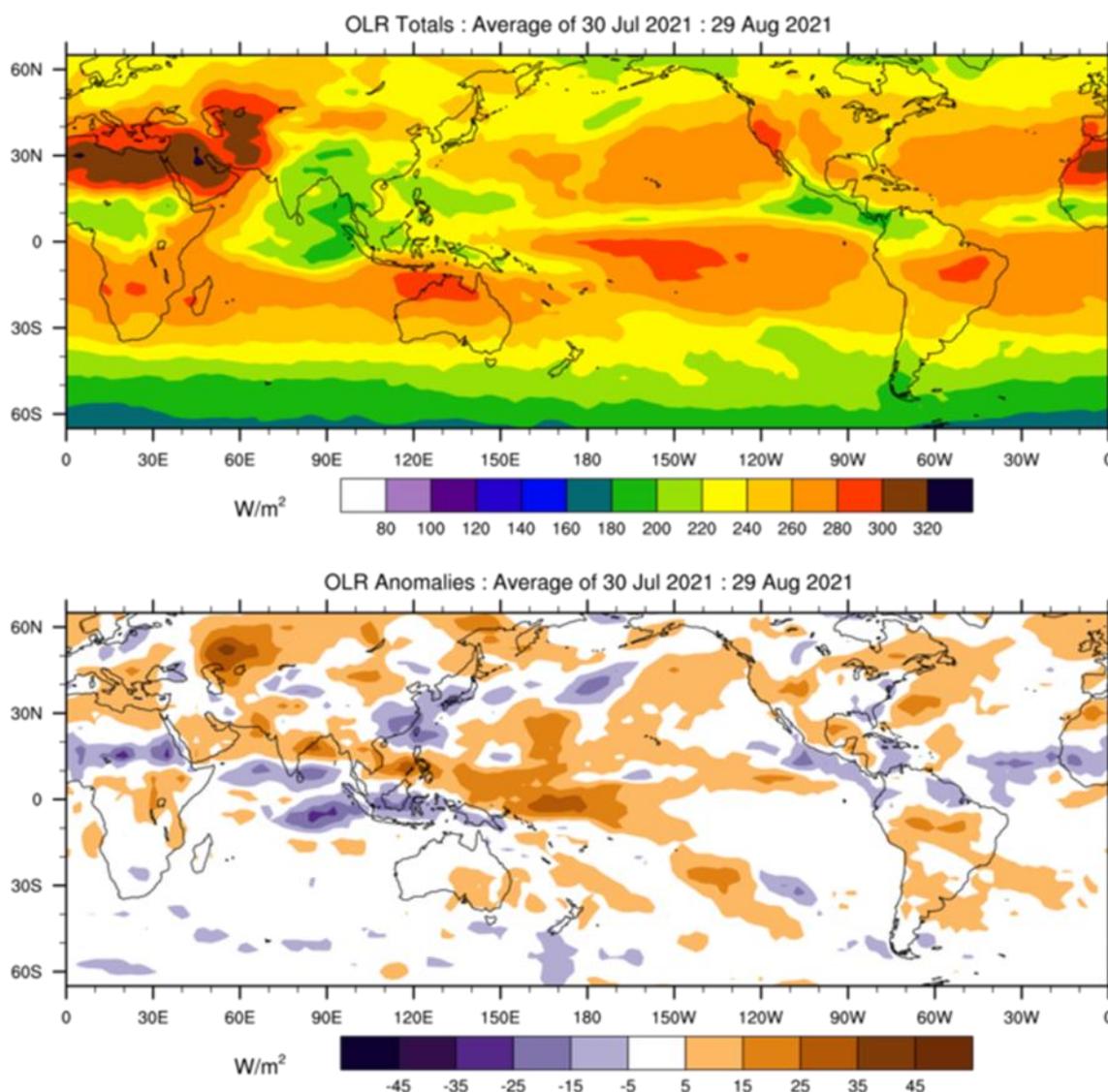
Click link to access [OLR](#)



The August 30-day OLR total and anomaly maps suggest the Intertropical Convergence Zone (ITCZ) was active around the central and eastern Pacific and shifted north of its normal position, while the South Pacific Convergence Zone (SPCZ) was generally suppressed.

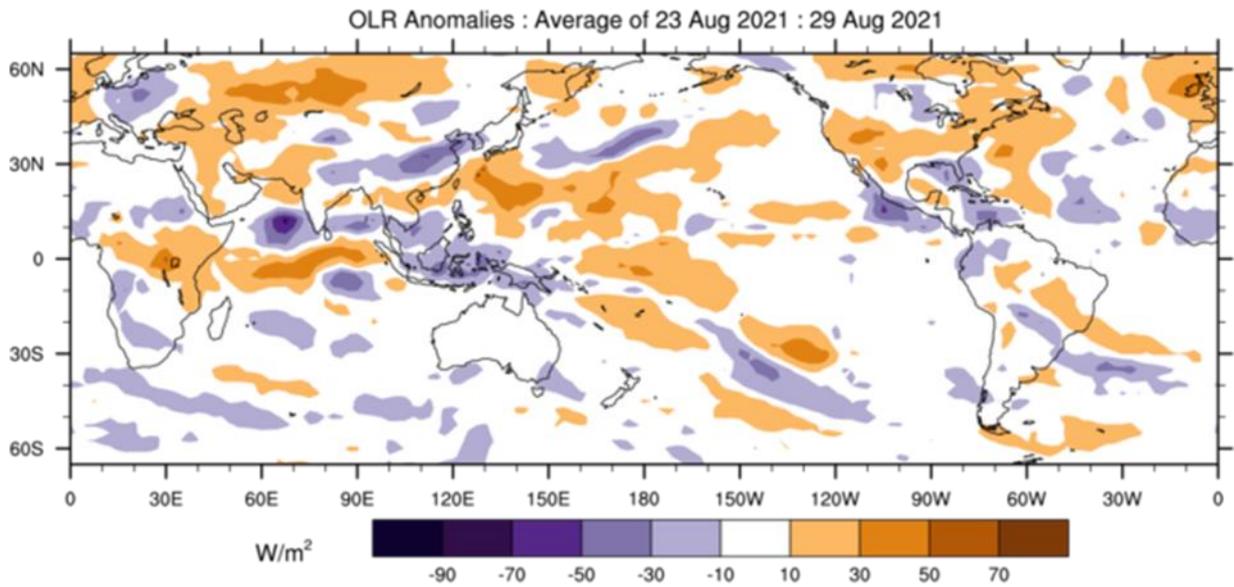
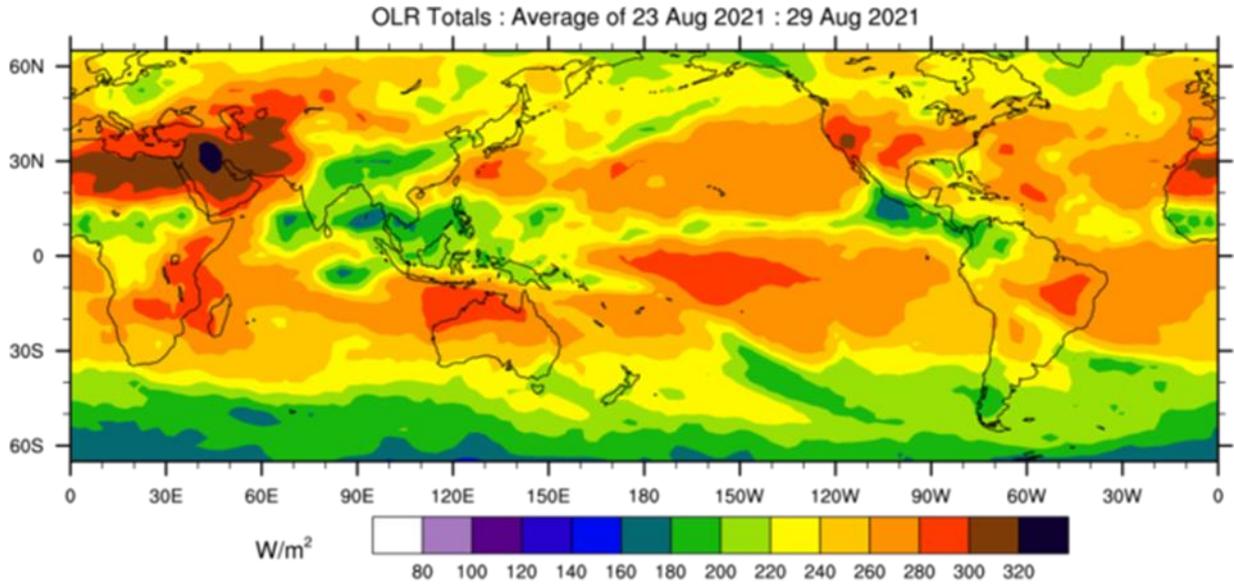
Note: Global maps of OLR below highlight regions experiencing increased or decreased cloudiness. The top panel is the total OLR in Watts per square metre ( $W/m^2$ ) and the bottom panel is the anomaly (current minus the 1979-1998 climate average), in  $W/m^2$ . In the bottom panel, negative values (blue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

## OLR Total and Anomalies, 30 Day OLR

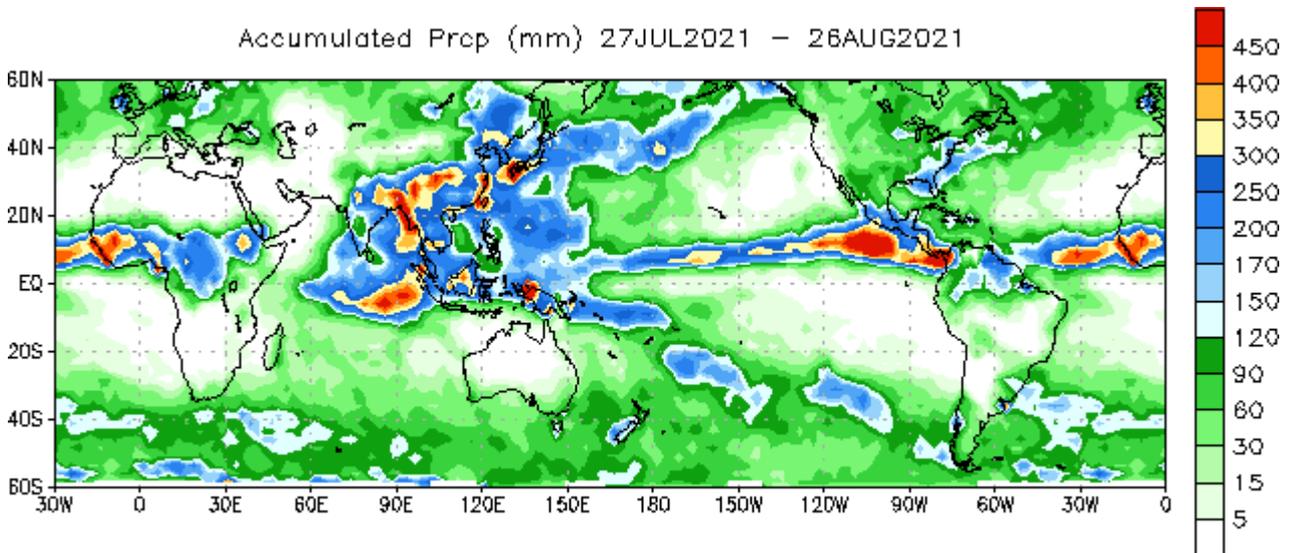


(C) Copyright Commonwealth of Australia 2021. Bureau of Meteorology

# OLR Total and Anomalies, 7 Day OLR

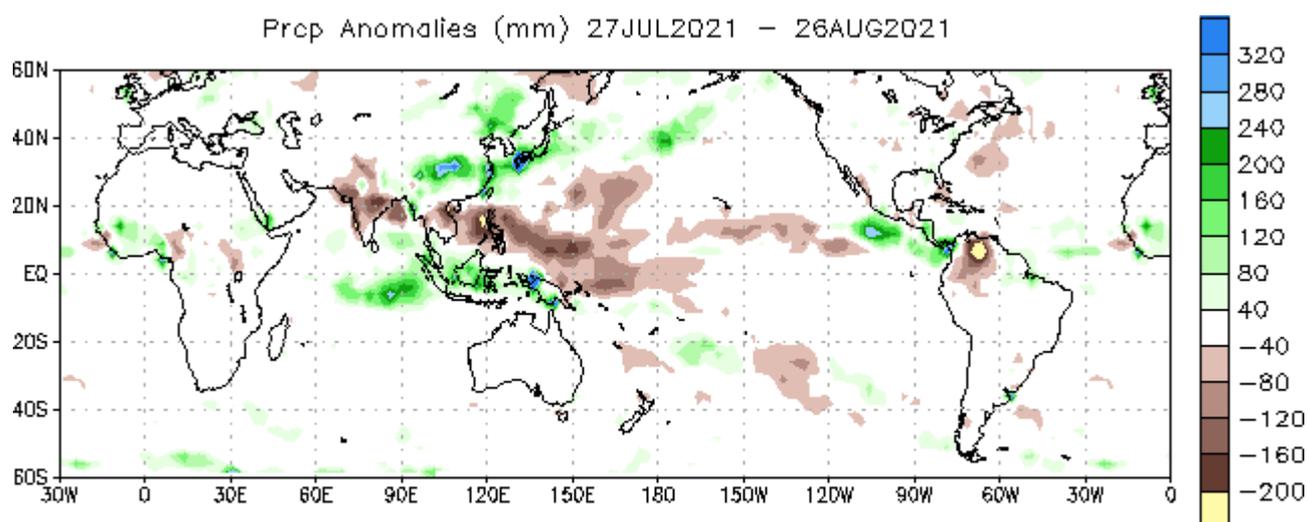


(C) Copyright Commonwealth of Australia 2021. Bureau of Meteorology

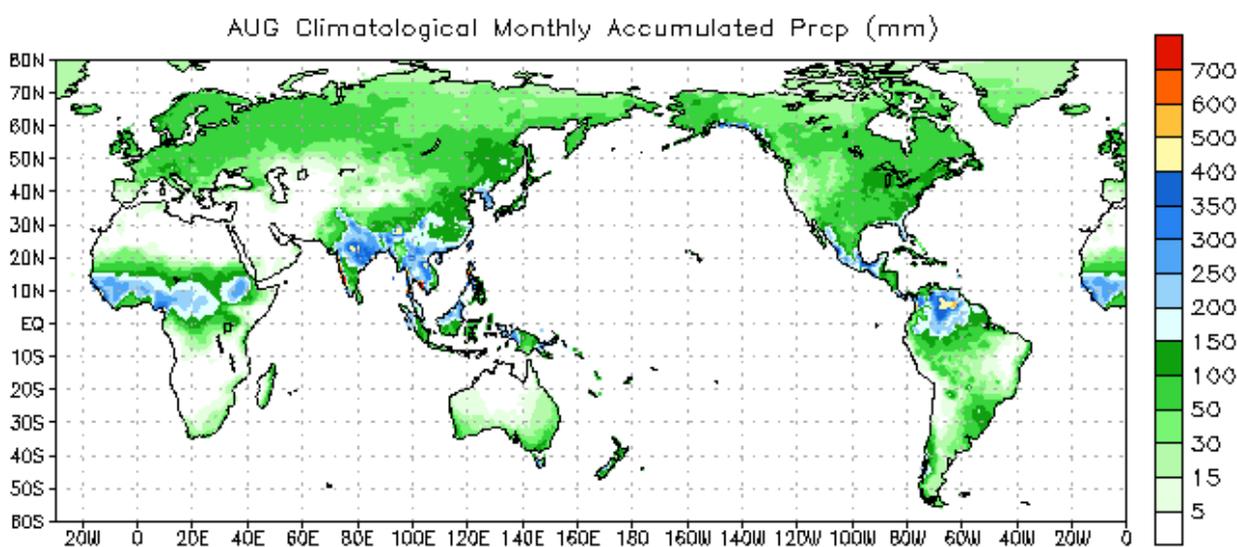


Data Source: NCEP CMAP Precipitation

## 30-Day Rainfall Anomalies



Data Source: NCEP CMAP Precipitation  
Climatology (1991–2020)



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

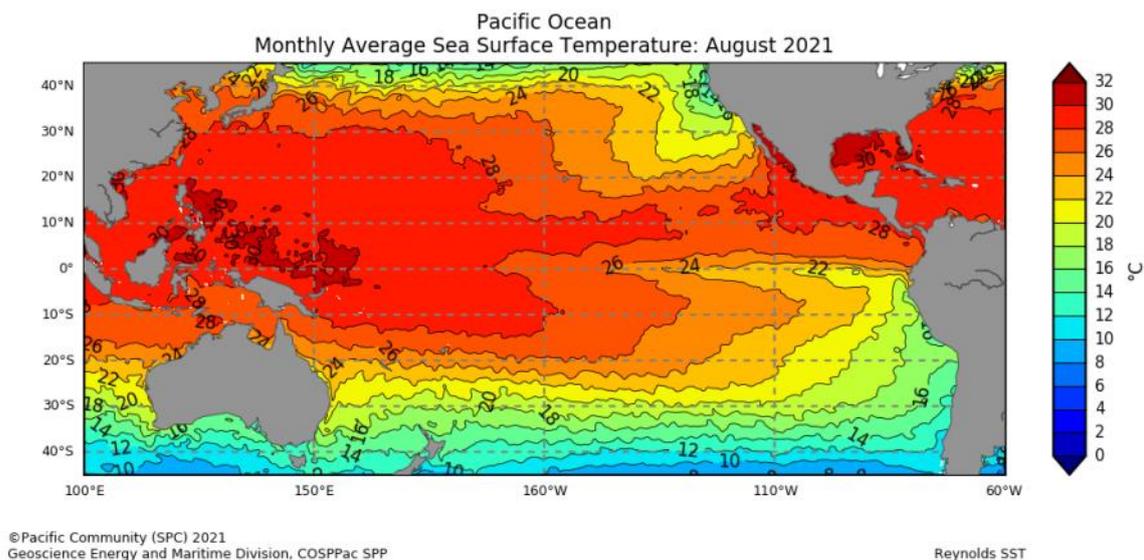


Click link to access [Pacific Community COSPPac Ocean Portal](#)

The SST map for August 2021 shows SSTs were close to average across most of the equatorial Pacific Ocean, although warmer than average SSTs continued in the far western and eastern Pacific Ocean close to South America. SSTs were warmer than average in waters around the west, much of the east of Australia and the COSPPac countries.

In terms of the deciles, regions of above average (deciles 8-9) for August occurred across majority of the COSPPac countries from Palau to French Polynesia. Regions of very much above average (deciles 10) SSTs spanned across Palau, FSM, PNG, parts of Solomon Islands, Vanuatu, Fiji, Tonga, Niue, central and southern Cook Islands, and southern French Polynesia. Regions of highest on record deciles occurred in southern PNG, parts of southern Cook Islands and French Polynesia. In contrast, below average (deciles 2-3) SSTs were observed central and eastern Kiribati.

### Mean Sea Surface Temperature

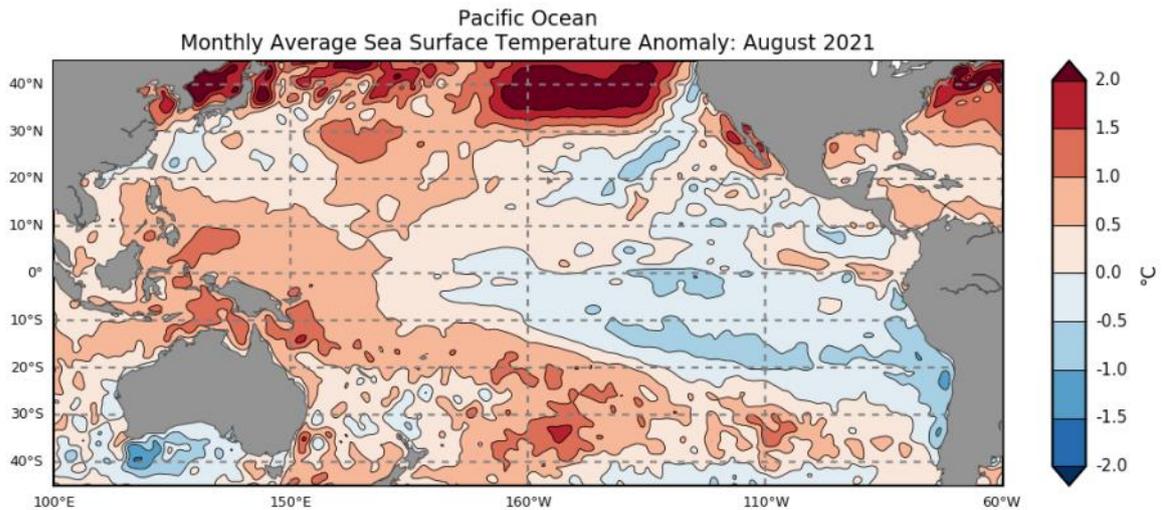


# OCEAN CONDITIONS

Click link to access [SEA SURFACE TEMPERATURE](#)



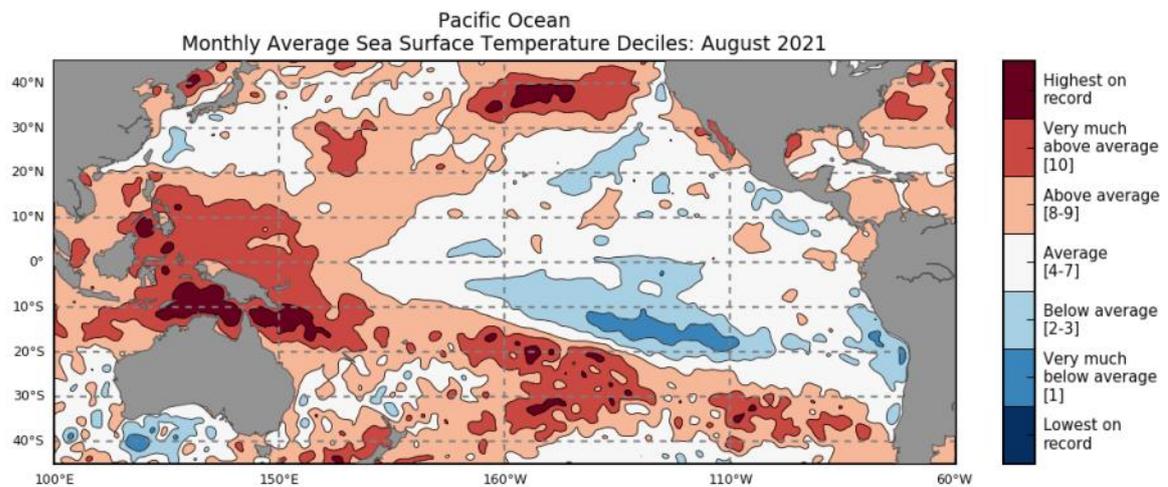
## Anomalous Sea Surface Temperature



©Pacific Community (SPC) 2021  
Geoscience Energy and Maritime Division, COSPPac SPP

Reynolds SST

## Sea Surface Temperatures Deciles



©Pacific Community (SPC) 2021  
Geoscience Energy and Maritime Division, COSPPac SPP

Reynolds SST

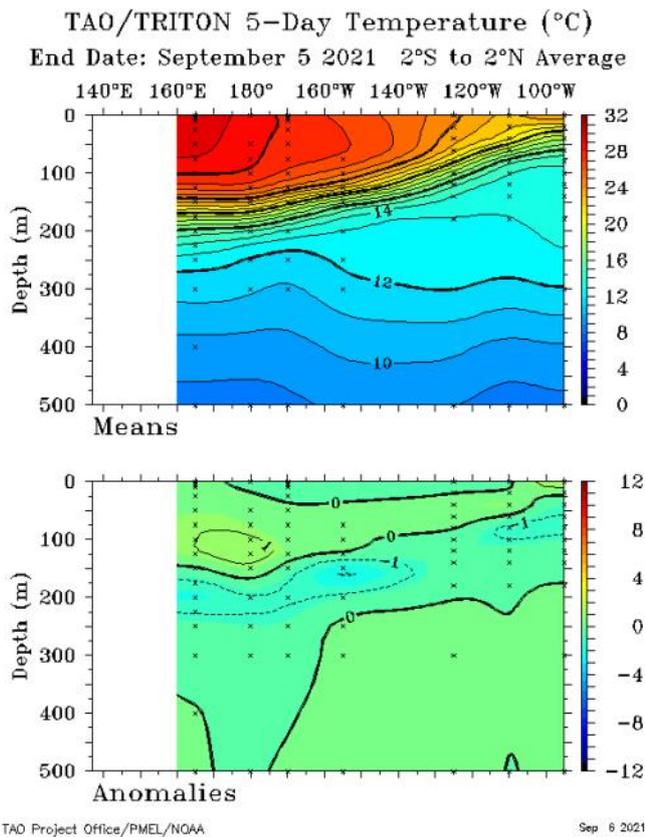
# OCEAN CONDITIONS

## SUB SURFACE

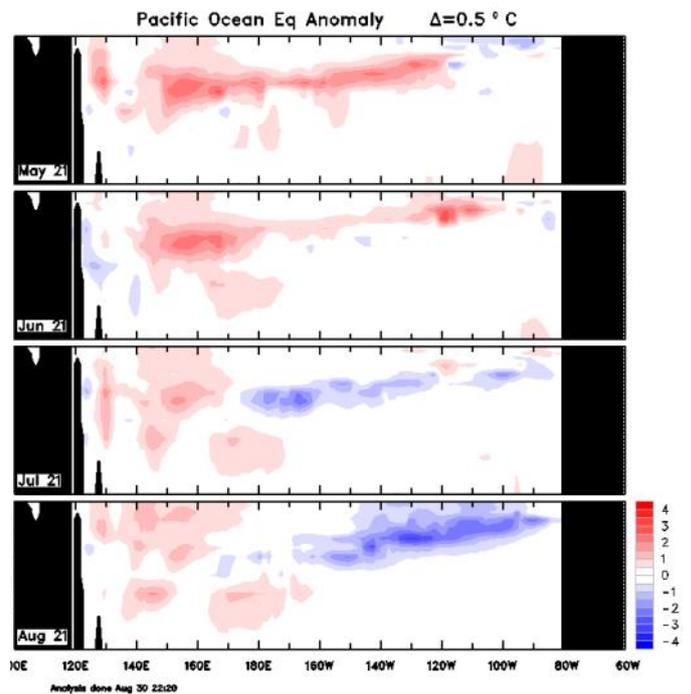


The four-month sequence of equatorial Pacific sub-surface temperature anomalies (to 26 August) shows a pattern consistent with a neutral ENSO state, despite the emergence of cool anomalies in the sub-surface of the central to eastern equatorial Pacific during August to date. Water in part of this region is more than three degrees cooler than average for August.

**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

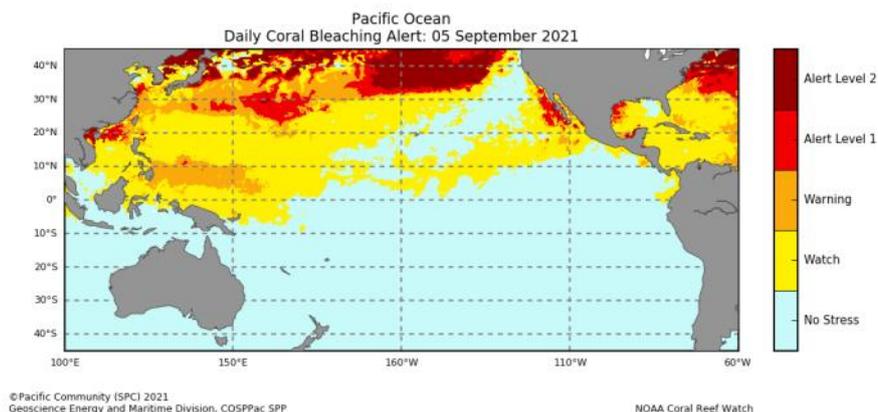
## CORAL BLEACHING



The daily Coral Bleaching Alert for 05th September 2021 shows 'Warning' for Palau and most of FSM. 'No Stress or Watch' for the rest of COSPPac partner countries. The four weeks Coral Bleaching Outlook to 26th September shows 'No Stress' for most of the countries with a 'Watch' and 'Warning' for northern PNG, western Solomon Islands, and RMI. 'Alert level 1' for western FSM and Palau.

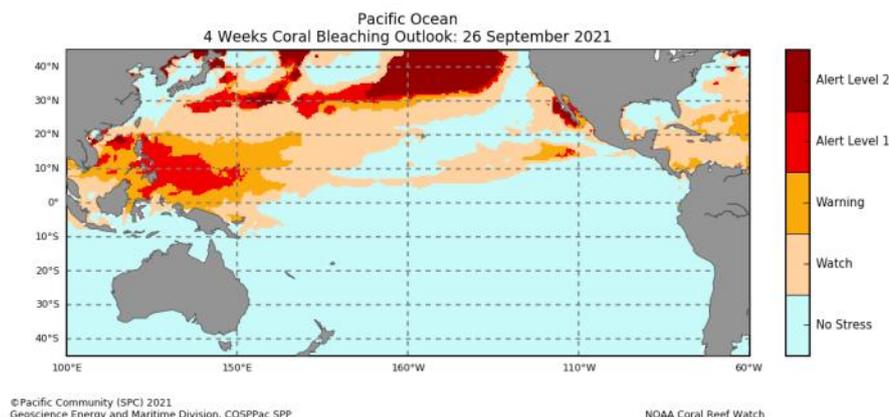
### Daily Coral Bleaching Alert

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



### 4-Weeks Coral Bleaching Outlook

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



# OCEAN CONDITIONS

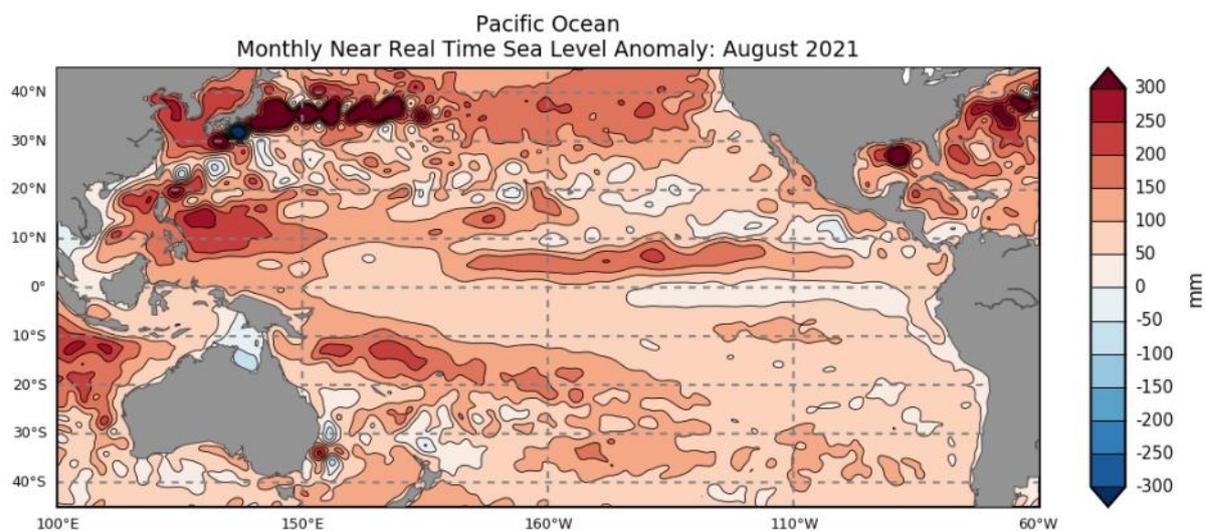
## OCEAN SURFACE CURRENTS AND SEA LEVEL



Sea level was above normal for most of the COSPPac countries. The highest anomalies above +200mm were in the Palau, western FSM, southern PNG, southern and eastern Solomon Islands, northern Vanuatu and western Fiji. Patches of near normal to below normal Sea levels were observed further north and south of the COSPPac countries.

### Monthly Sea Level Anomalies

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



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Geoscience Energy and Maritime Division, COSPPac SPP

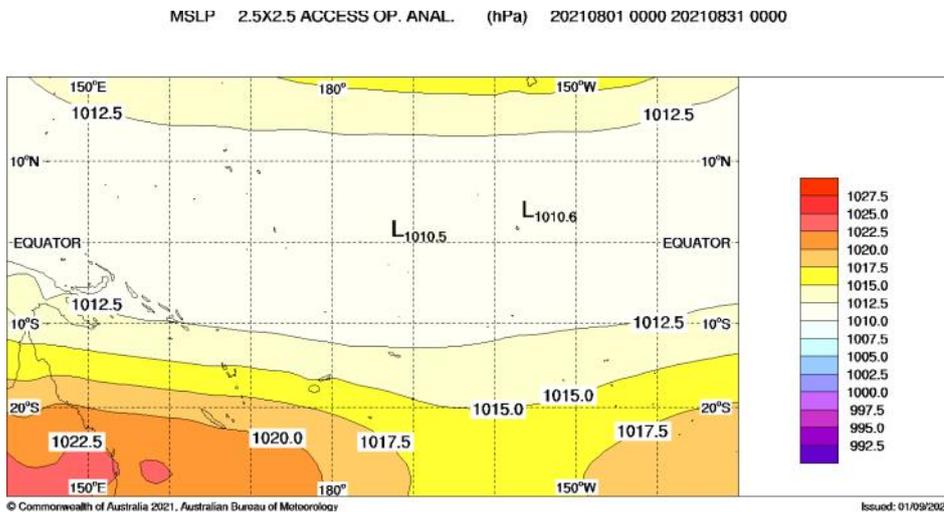
AVISO Ssalto/Duacs SLA

# MEAN SEA LEVEL PRESSURE

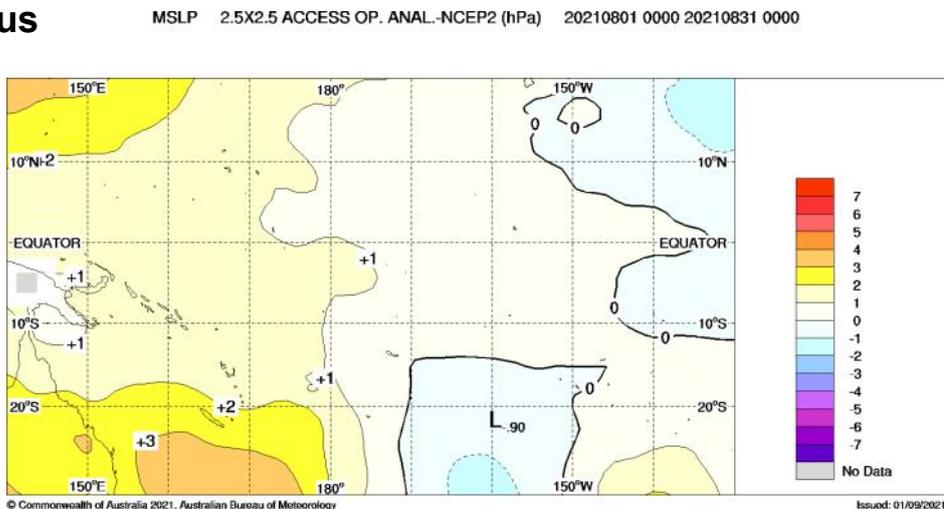
The August mean sea level pressure (MSLP) anomaly map shows positive anomalies west of 180°W over most COSPPac countries and Australia. Negative anomalies were present over French Polynesia.

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

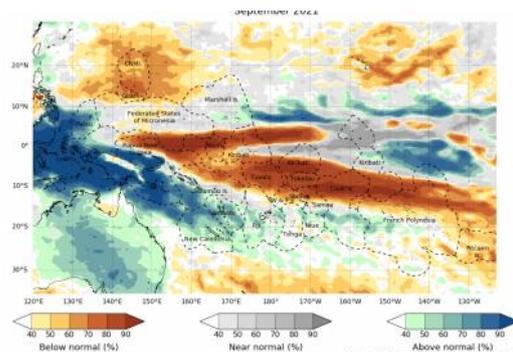
## September—November 2021



The ACCESS-S model forecast for September 2021 strongly favours below normal rainfall for CNMI, Guam, central and southern FSM, northern and southern Marshall Islands, northern PNG, northern Solomon Islands, Nauru, Kiribati, Tuvalu, Tokelau, Samoa, the northern Cook Islands, northern French Polynesia and Pitcairn Island. Above normal rainfall is favoured for Palau, most of PNG, western and southern Solomon Islands, Vanuatu, most of Fiji, Niue and southern Cook Islands.

The three-month rainfall outlook (September-November) shows a strong dry signal affecting northern PNG, northern Marshall Islands, Nauru, Kiribati, Tuvalu, Tokelau, northern Cook Islands, northern French Polynesia and Pitcairn Island. In contrast, the models show an increased chance of wetter in Palau, western FSM, most of PNG, Solomon Islands, New Caledonia, Vanuatu, Fiji, Tonga, Samoa, Niue, southern Cook Islands and French Polynesia. Above normal maximum and minimum temperatures are favoured for most COSPPac countries, except for some areas east of 160°E, namely Nauru, Kiribati, northern Tuvalu, Tokelau, northeastern Cook Islands, plus northern and central French Polynesia, where near-normal to below normal temperatures are favoured.

Monthly [ACCESS-S](#) Maps



The Copernicus multi-model outlook for September to November favours below normal rainfall for Guam, CNMI, central and northern Marshall Islands, the northeastern PNG Islands, northern Solomon Islands, Nauru, western Kiribati, Tuvalu, Tokelau, northern and central Cook Islands, northern and central French Polynesia, and Pitcairn Island. Above normal rainfall is favoured for Palau, western FSM, southern Marshall Islands, most of PNG, southern Solomon Islands, New Caledonia, Vanuatu, Fiji, Tonga, Niue and southern Cook Islands.

The SCOPIC statistical model for September to November favours normal rainfall or climatology for most of the COSPPac countries. Above normal rainfall is favoured for parts of eastern Solomon Islands and southern Vanuatu.

The APEC Climate Centre multi-model for September to November favours below normal rainfall for CNMI, Guam, northern Marshall Islands, northeastern PNG, western and northern Solomon Islands, Nauru, Kiribati, Tuvalu, Tokelau, Samoa, northern Cook Islands, and central to northern French Polynesia. Above normal rainfall is favoured for Palau, most of FSM, the southern Marshall Islands, most of PNG, southern Solomon Islands, New Caledonia, Vanuatu, Fiji, Tonga, Niue, southern Cook Islands and southern French Polynesia.

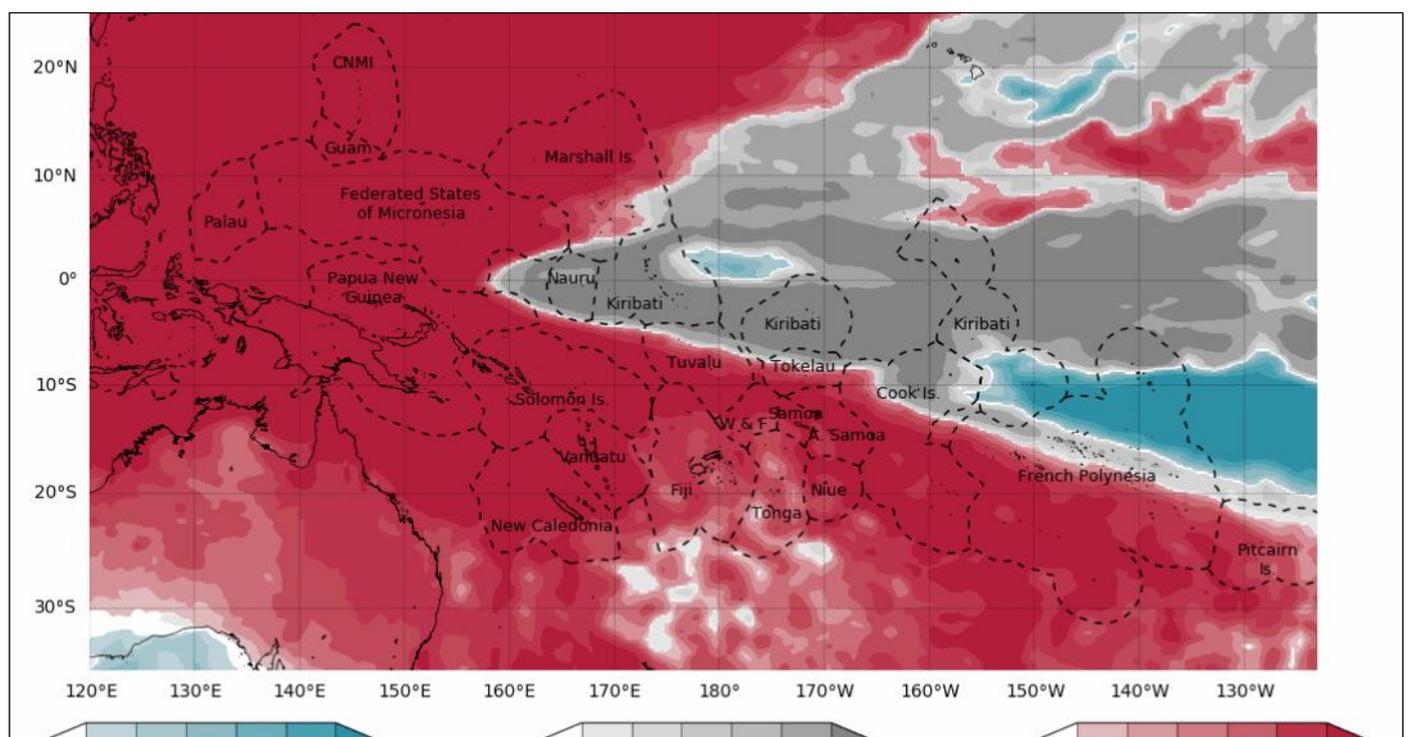
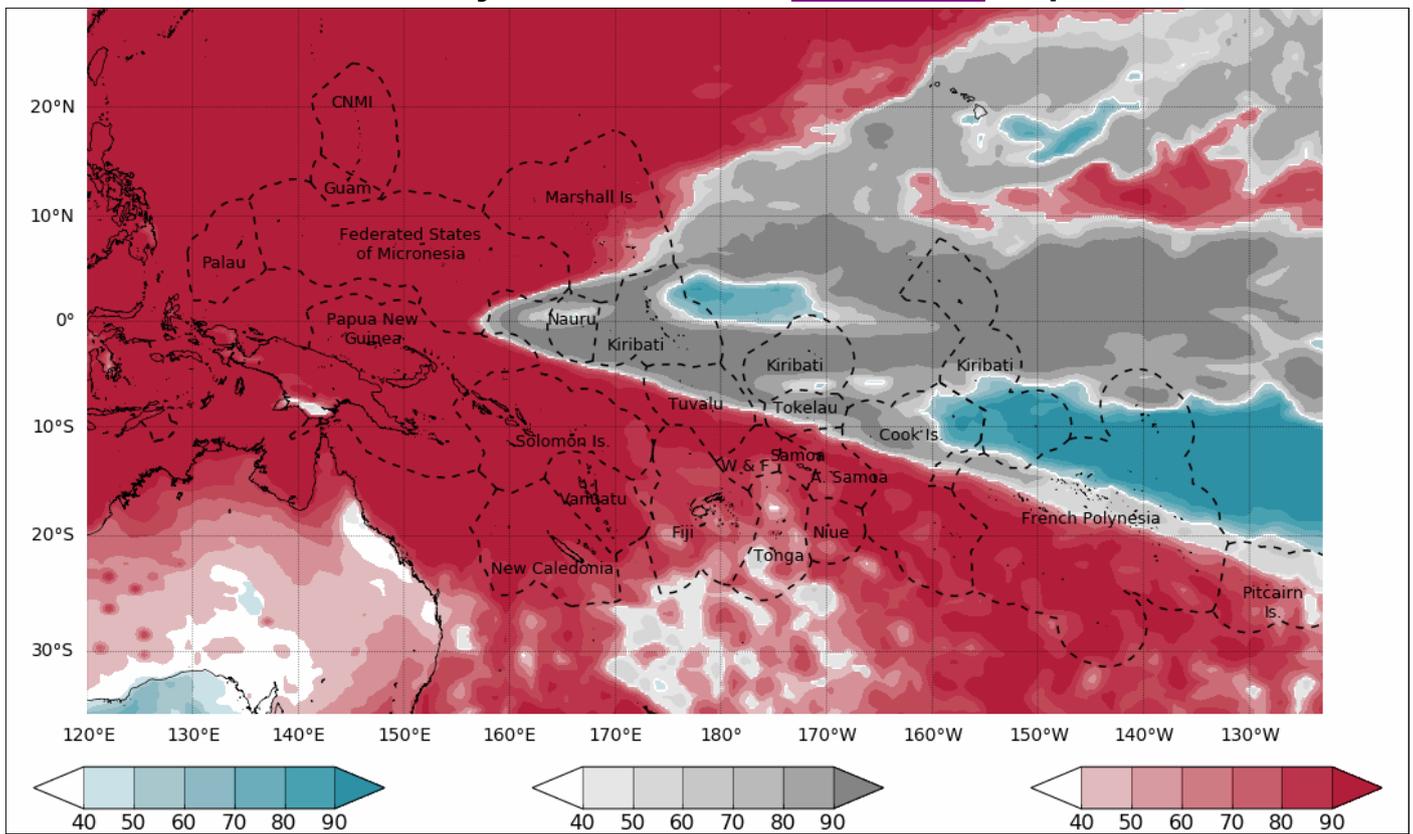
For September to November 2021, the dynamical models agree on above normal rainfall for Palau, FSM, southern Marshall Islands, most of PNG, southern Solomon Islands, New Caledonia, Vanuatu, Fiji, Tonga, Niue, southern Cook Islands and southern French Polynesia. The models also agree on below normal rainfall for CNMI, Guam, central and northern Marshall Islands, northern Solomon Islands, Nauru, Kiribati, Tuvalu, Tokelau, northern and central Cook Islands, and the northern half of French Polynesia.

# SEASONAL TEMPERATURE OUTLOOK

September—November 2021



Monthly Tmax and Tmin **ACCESS-S** Maps



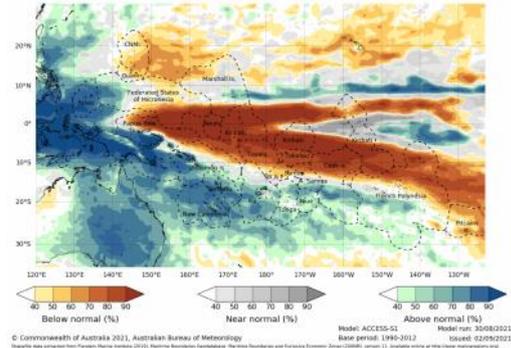
# SEASONAL RAINFALL OUTLOOK

September—November 2021

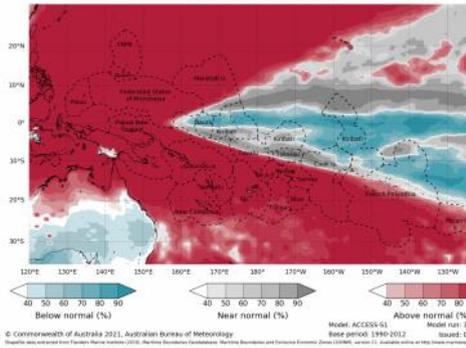


## Seasonal ACCESS-S maps

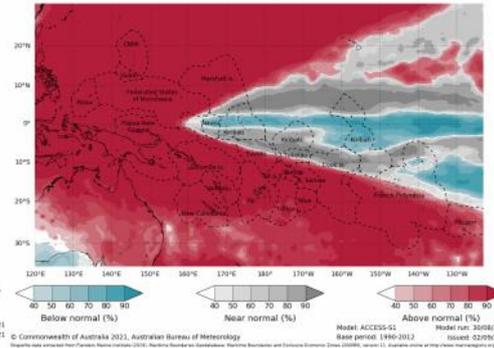
Tercile rainfall probabilities for September to November 2021



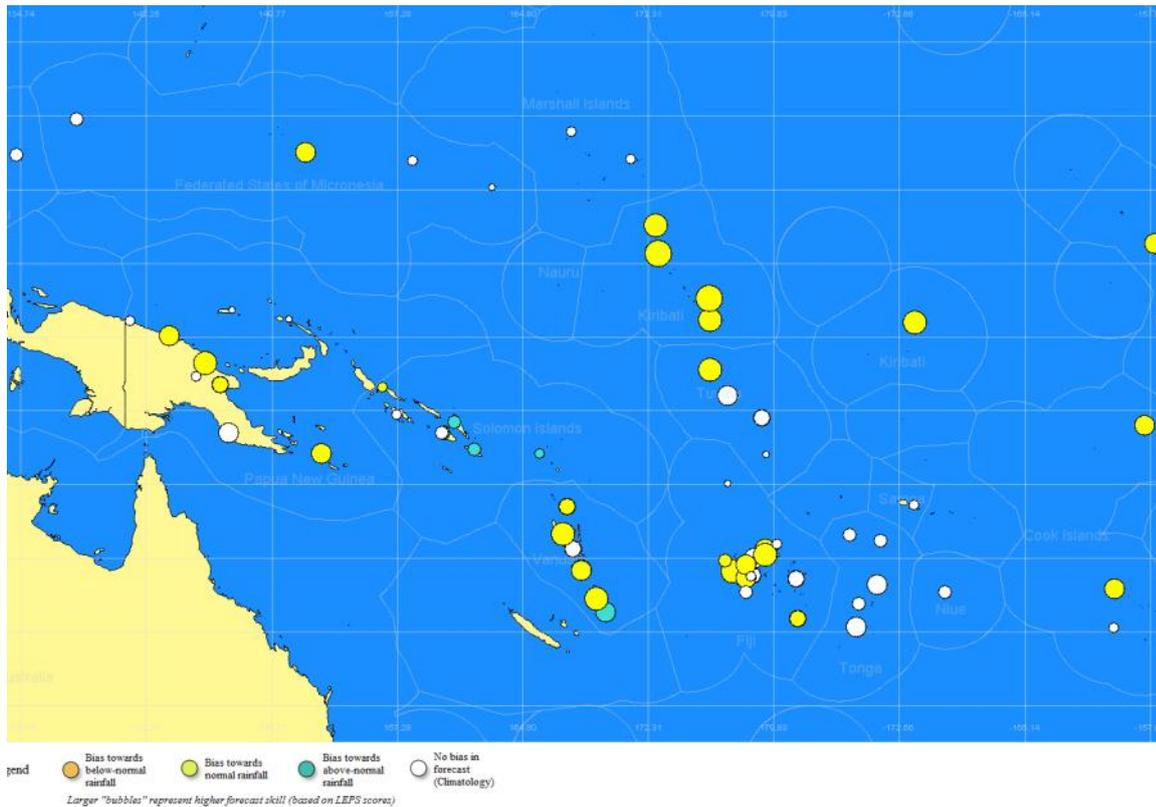
Tercile maximum temperature probabilities for September to November 2021



Tercile minimum temperature probabilities for September to November 2021



## SCOPIC



'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 2021



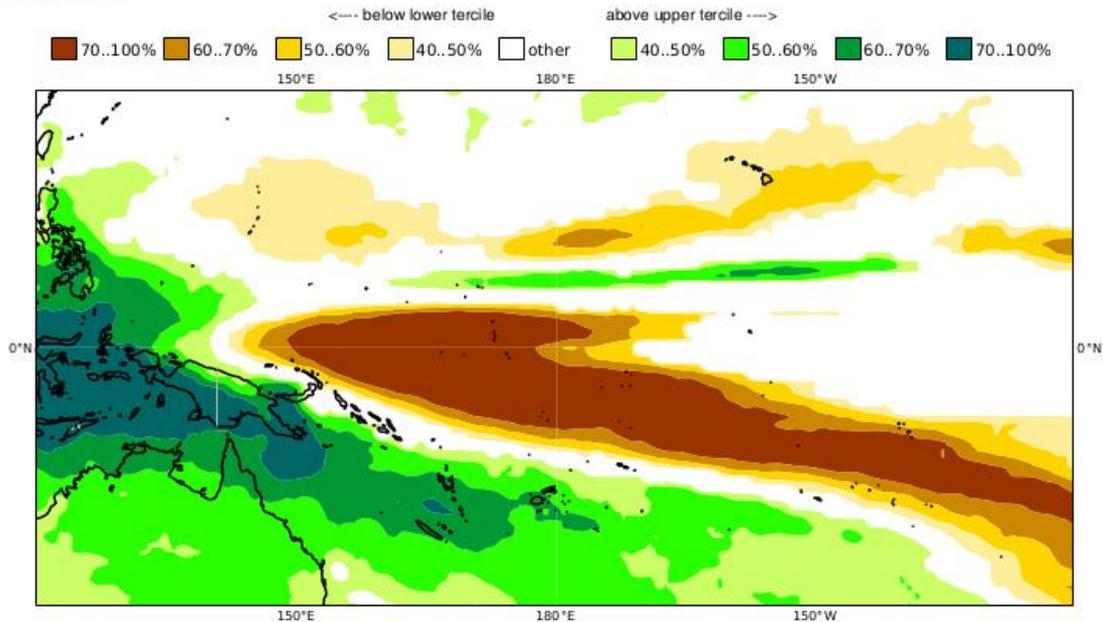
## Copernicus (C3S multi-system)-Rainfall

Prob(most likely category of precipitation)

SON 2021

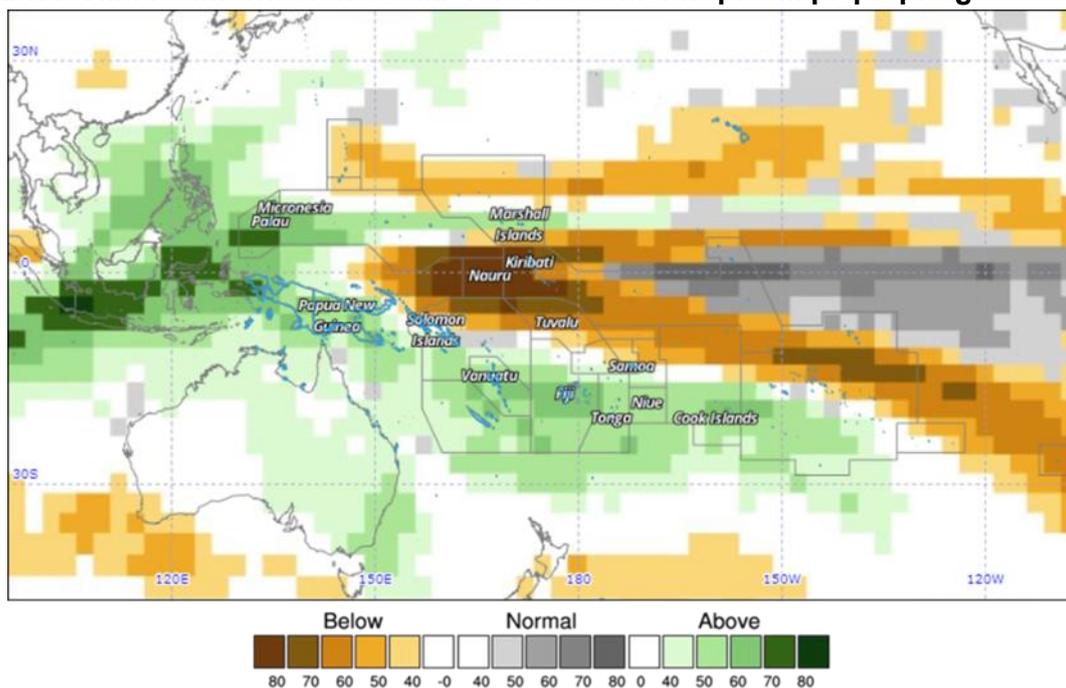
Nominal forecast start: 01/08/21

Unweighted mean



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

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



Year: 2021, Season: SON, Lead Month: 3, Method: GAUS

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

Generated using CLIK® (2021-9-3)

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# TROPICAL CYCLONE

## 2020/2021 Season

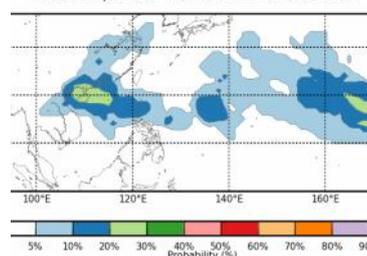


In the southwest Pacific, the tropical cyclone season 2020-21 ended on the 30th April, 2021. The outlook for the season was normal or slightly below normal Tropical Cyclone activity. Seven named TCs formed east of the longitude of the tip of Cape York, Australia. The long-term seasonal average for the southwest Pacific is nine. Three cyclones reached severe Category 3-5 status, including Yasa, one of the most intense TCs on record in the basin. TC activity in the Western North Pacific occurs year round. With ENSO-Neutral, near-normal to below normal numbers of TCs are anticipated.

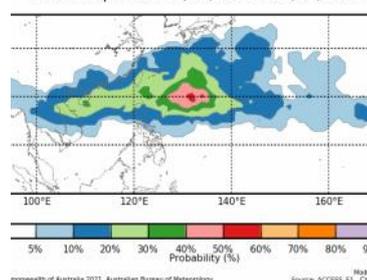
The weekly tropical cyclone forecast from the ACCESS-S model shows significant risk in the weeks beginning 06 September and ending 19 September 2021 for the northwest Pacific, especially in areas around southwest Japan and northern Philippines.

### ACCESS-S Weekly Forecasts –Northwest Pacific

Tropical Cyclone probabilities in the Northern Pac  
Forecast period: 13/09/2021 - 19/09/2021

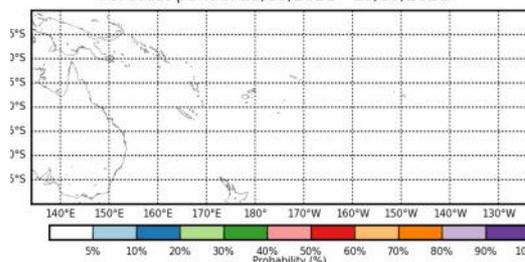


Tropical Cyclone probabilities in the Northern Pac  
Forecast period: 20/09/2021 - 26/09/2021

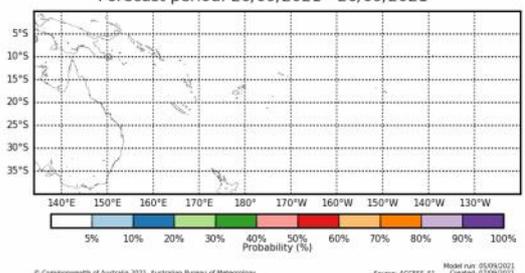


### ACCESS-S Weekly Forecasts –Southwest Pacific

Tropical Cyclone probabilities in the South Pacific  
Forecast period: 13/09/2021 - 19/09/2021



Tropical Cyclone probabilities in the South Pacific  
Forecast period: 20/09/2021 - 26/09/2021



### 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.

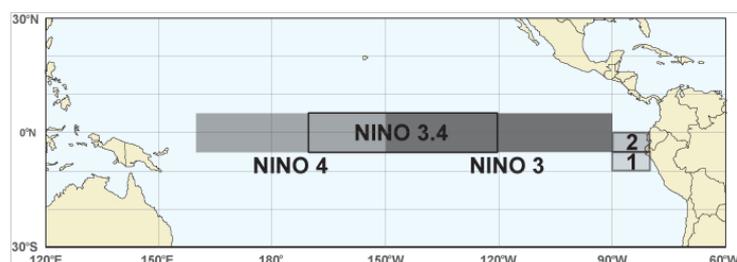
## 20 degrees Celsius Isotherm Depth

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 20°C isotherm that is deeper than normal (positive anomaly) implies a greater heat content in the upper ocean, while 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