

# Monthly Climate Bulletin

May 2021



ISSN: 2617-3565

Photo Credit: Anetone Sagaga & Samoa Met (December 2020 Samoa Flooding)



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# SUMMARY

Issued 11 June 2021

- El Niño Southern Oscillation (ENSO) remains neutral. Climate model outlooks indicate this neutral phase will last at least until September.
- A moderate to strong Madden-Julian Oscillation (MJO) pulse weakened prior moving into western Pacific.
- The Intertropical Convergence Zone (ITCZ) was active and shifted north, while the South Pacific Convergence Zone (SPCZ) was shifted to the southwest.
- The sea surface temperature anomaly pattern in May 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 north of PNG.
- A notable sea level anomalies of +250mm-300mm observed in the Solomon Islands.
- For June to August 2021, the dynamical models (as well as SCOPIC) agree on above normal rainfall for the Highlands and, Southern regions of PNG, New Caledonia, Vanuatu, Fiji, Tonga, Niue and southern Cook Islands. The models also agree on below normal rainfall for Rotuma, Kiribati (in southern hemisphere), Tuvalu, northern Cook Islands, the northern half of French Polynesia, and Pitcairn Island.

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# EL NIÑO–SOUTHERN OSCILLATION

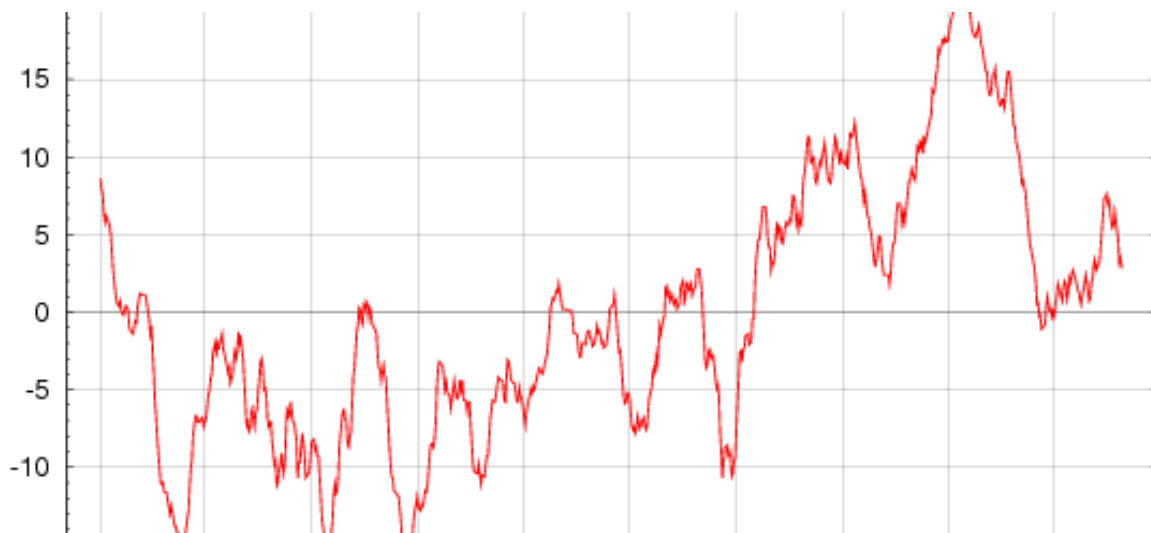
Climate drivers currently neutral

Click link to access [Climate Driver Update issued on 08 June 2021](#)

The El Niño Southern Oscillation (ENSO) remains neutral with all oceanic and atmospheric indicators within the neutral range. Climate model outlooks show this neutral ENSO state is likely to continue until at least September.

The Indian Ocean Dipole (IOD) is currently neutral, although the index has been below the negative IOD threshold for three consecutive weeks. Large parts of the eastern Indian Ocean are warmer than average, with some cooler than average water near the Horn of Africa. The consensus of international climate model outlooks suggest the IOD is most likely to remain neutral during the first part of the southern winter, although three of the five models suggest negative IOD conditions could develop over southern winter or spring. The accuracy of IOD forecasts is still low in early June but will increase significantly by the end of the month.

The 30-day Southern Oscillation Index (SOI) for the 30 days ending 06 June was -0.4. The 90-day SOI value was +1.9. Both are within ENSO neutral thresholds.



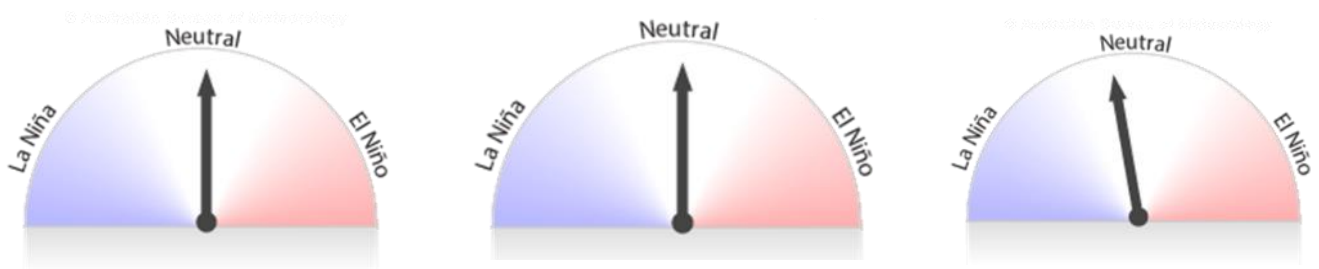


# EL NIÑO–SOUTHERN OSCILLATION

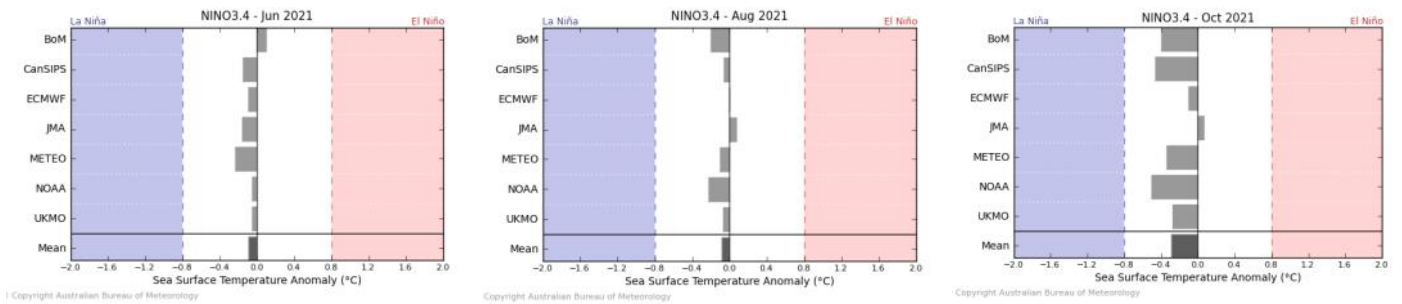
Climate drivers currently neutral

Click link to access [Climate Driver Update issued on 08 June 2021](#)

## Bureau of Meteorology NINO3.4 ENSO Model Outlooks for June, August and October



## Bureau of Meteorology NINO3.4 International Model Outlooks



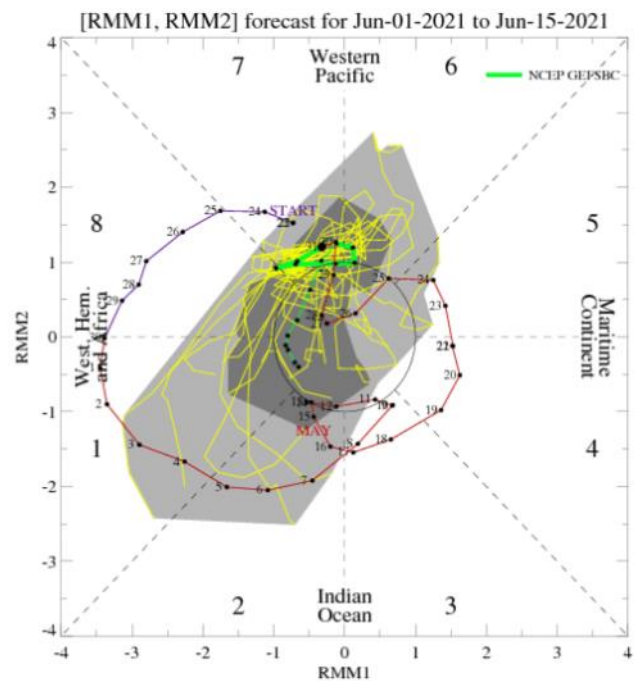
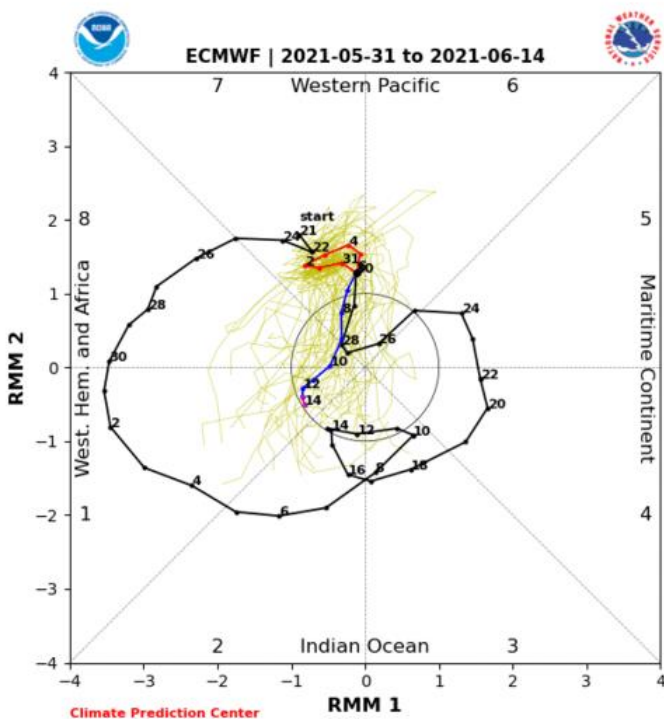
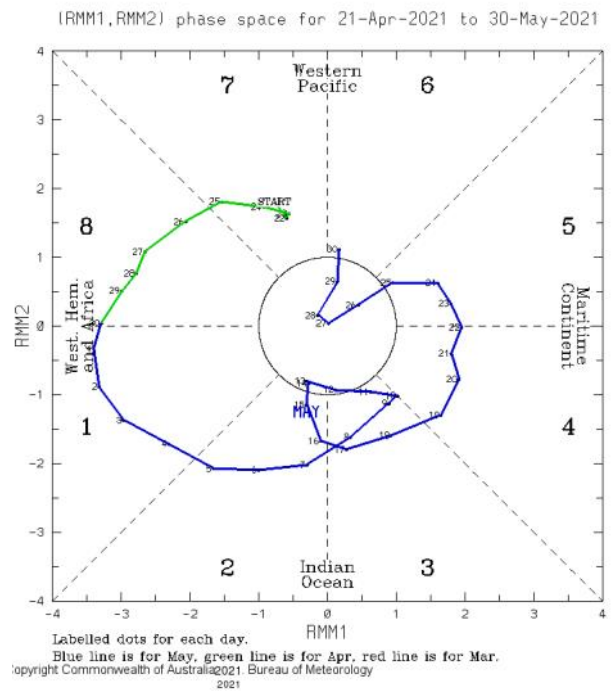
Bureau of Meteorology summary of international model outlooks for NINO3.4: <http://www.bom.gov.au/climate/model-summary/#tabs=Pacific-Ocean>

# MADDEN–JULIAN OSCILLATION

Click link to access [Weekly Tropical Note](#) [Issued on Tuesday 01 June 2021]

During early May, Madden-Julian Oscillation (MJO) was generally weak until a moderately strong pulse of the Madden-Julian Oscillation (MJO), which tracked across Maritime Continent longitudes (north of Australia) during the past fortnight, recently weakened prior to moving into the western Pacific region. The pulse has since re-strengthened but international climate models generally agree that the MJO pulse will again weaken. In the next fortnight, the MJO is predicted to remain weak over the central to eastern Pacific Ocean. At this time of the year, an MJO pulse over the western to central Pacific typically increases the likelihood of above-average cloudiness and rainfall across the tropical western Pacific Ocean, while leading to below-average rainfall across Australia's northeast.

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



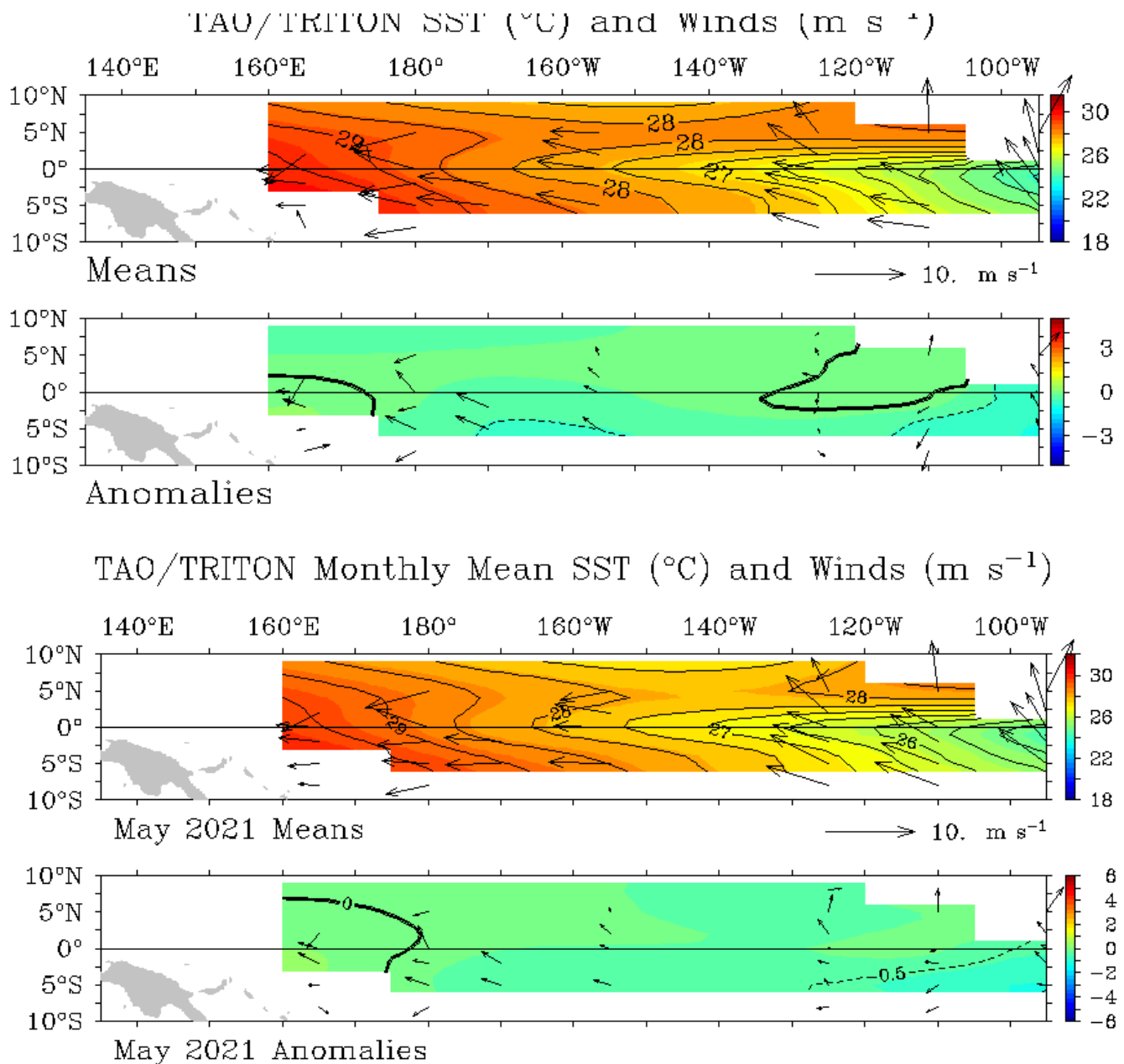


# WIND

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

The trade winds in May were stronger than average over most of the equatorial Pacific for most of the month. The main exception was in the western Pacific where they were a little weaker than normal late in 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

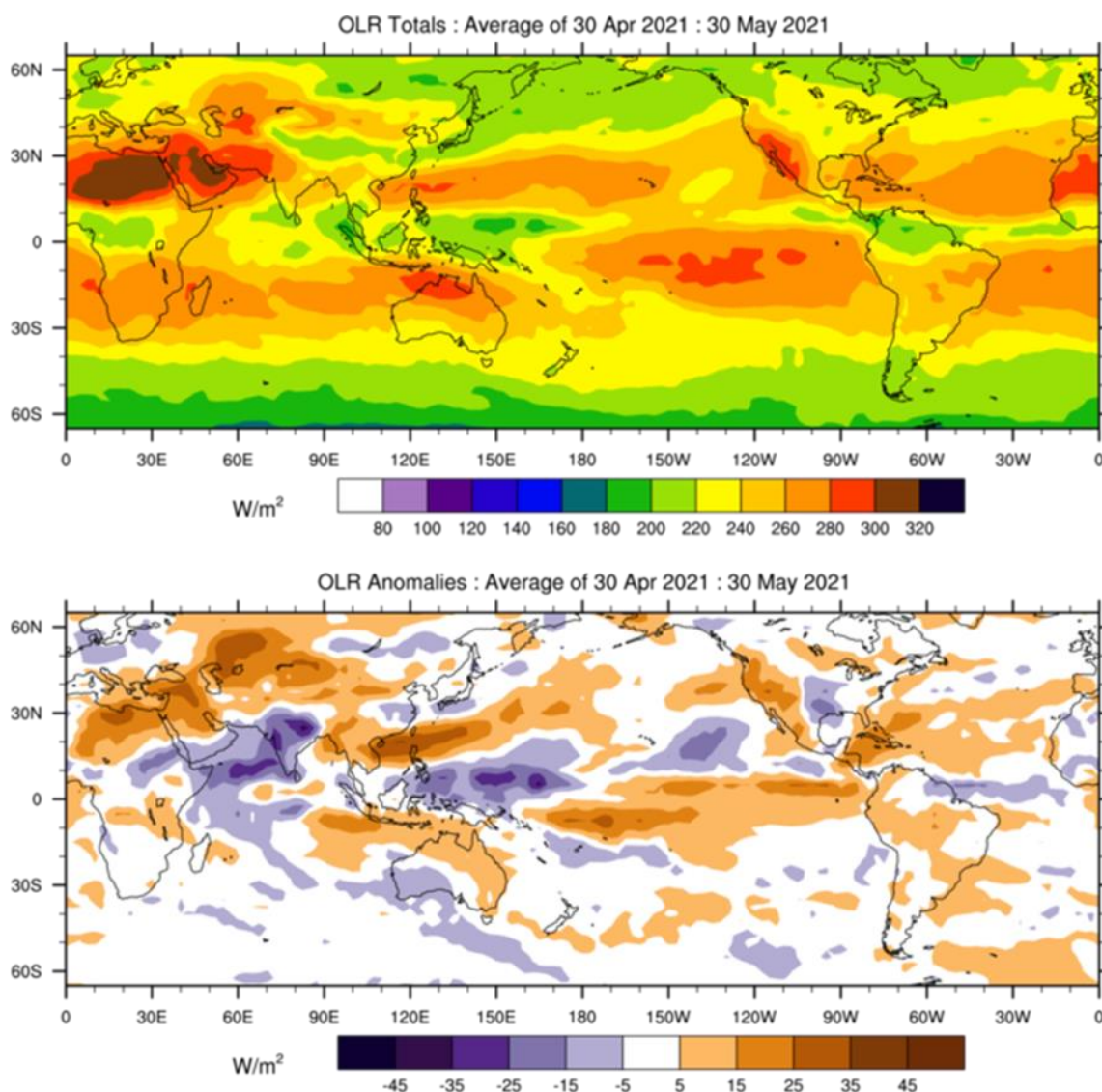
Click link to access [OLR](#)



The May 30-day OLR total and anomaly maps suggest the Intertropical Convergence Zone (ITCZ) was active and shifted a little north of its normal position. The South Pacific Convergence Zone (SPCZ) was also active and shifted to the southwest, affecting Vanuatu, Fiji, Tonga, Niue, and the southern Cook Islands.

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 ( $\text{W/m}^2$ ) and the bottom panel is the anomaly (current minus the 1979-1998 climate average), in  $\text{W/m}^2$ . In the bottom panel, negative values (blue shading) represent above normal cloudiness while positive values (brown shading) represent below normal cloudiness.

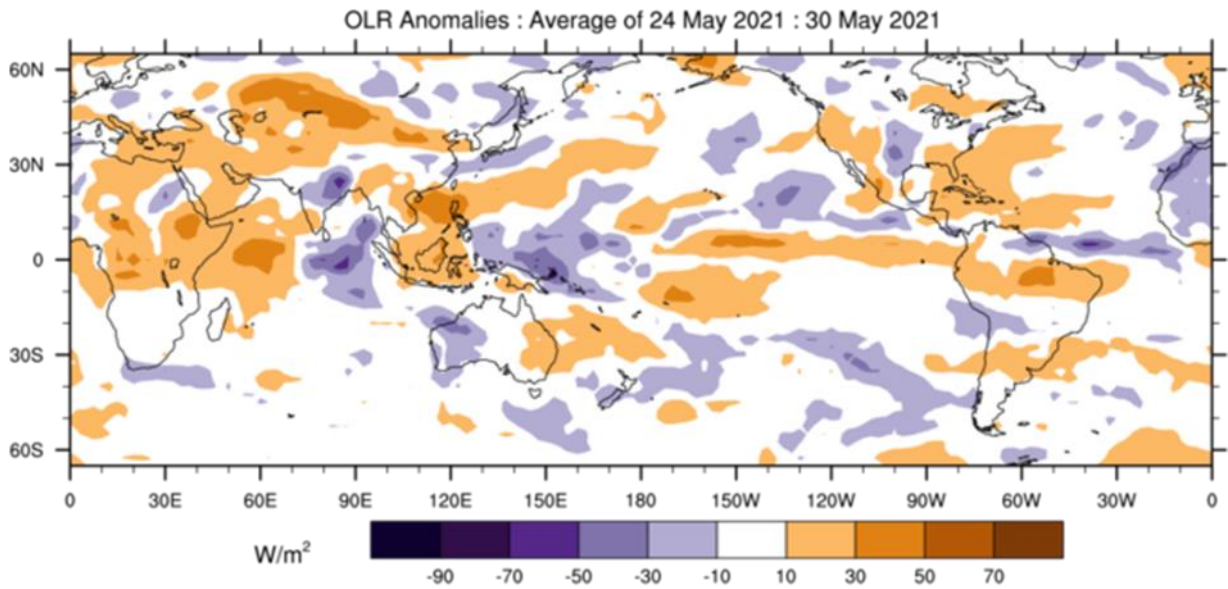
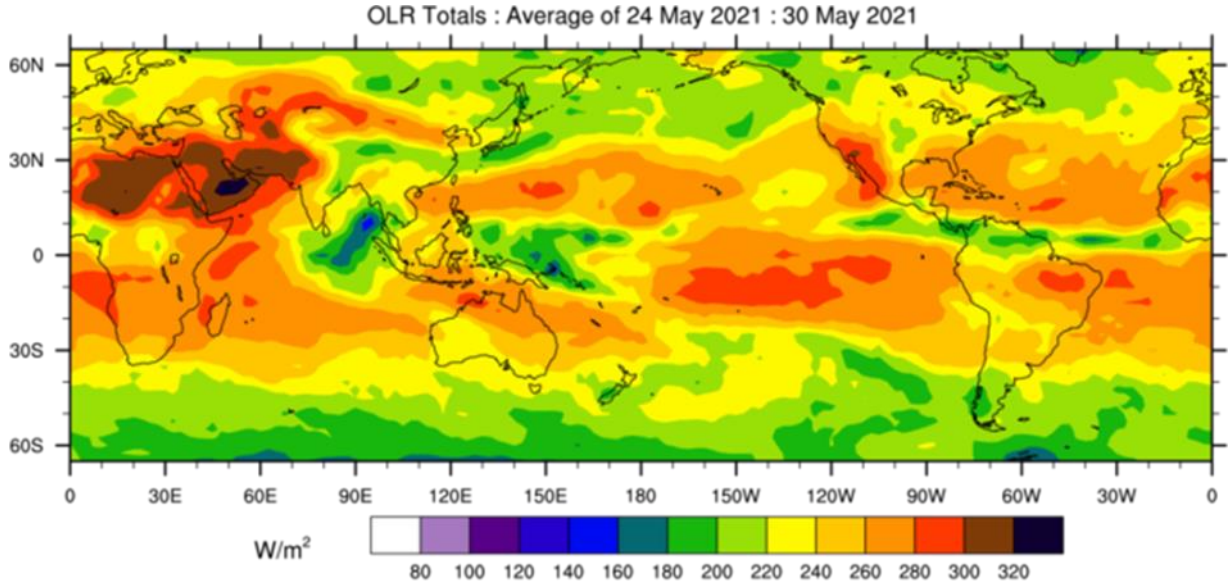
## OLR Total and Anomalies, 30 Day OLR



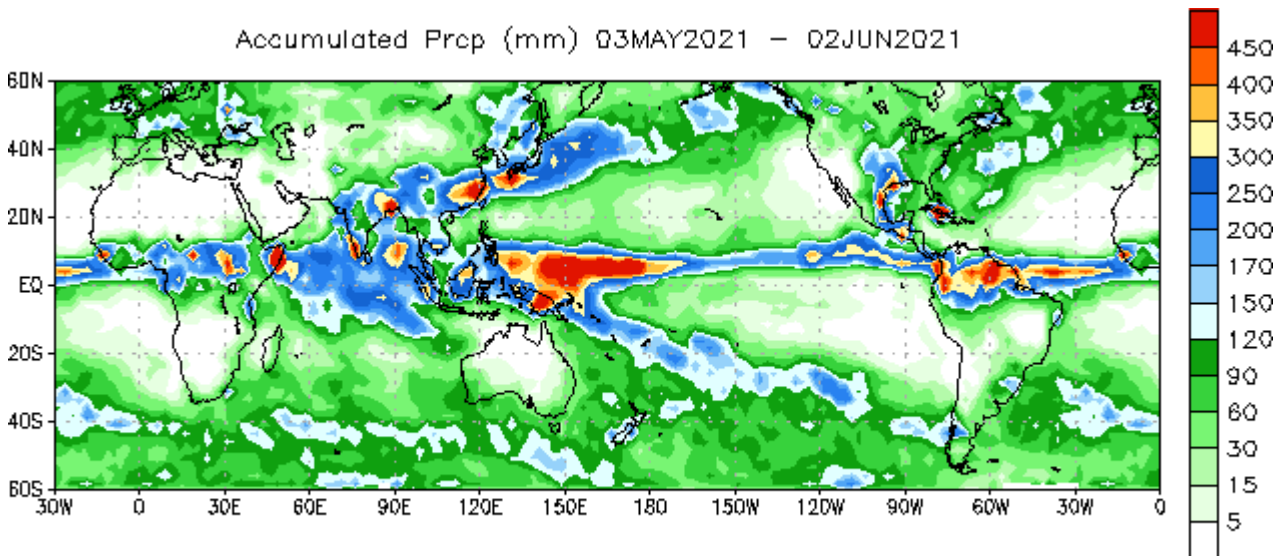
(C) Copyright Commonwealth of Australia 2021. Bureau of Meteorology



# OLR Total and Anomalies, 7 Day OLR

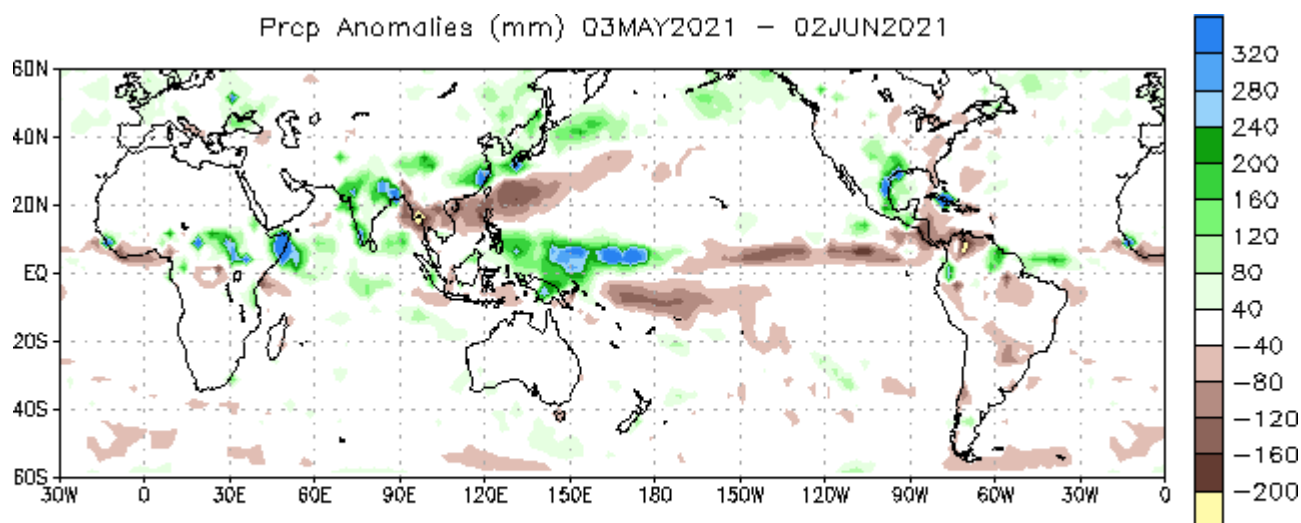


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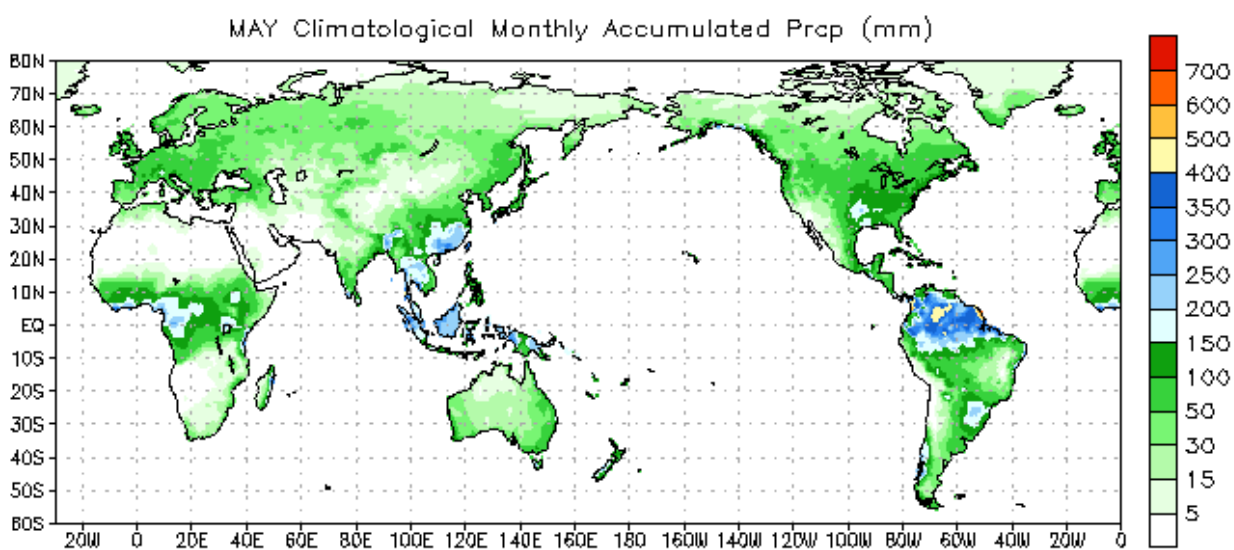


Data Source: NCEP CMAP Precipitation

## 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

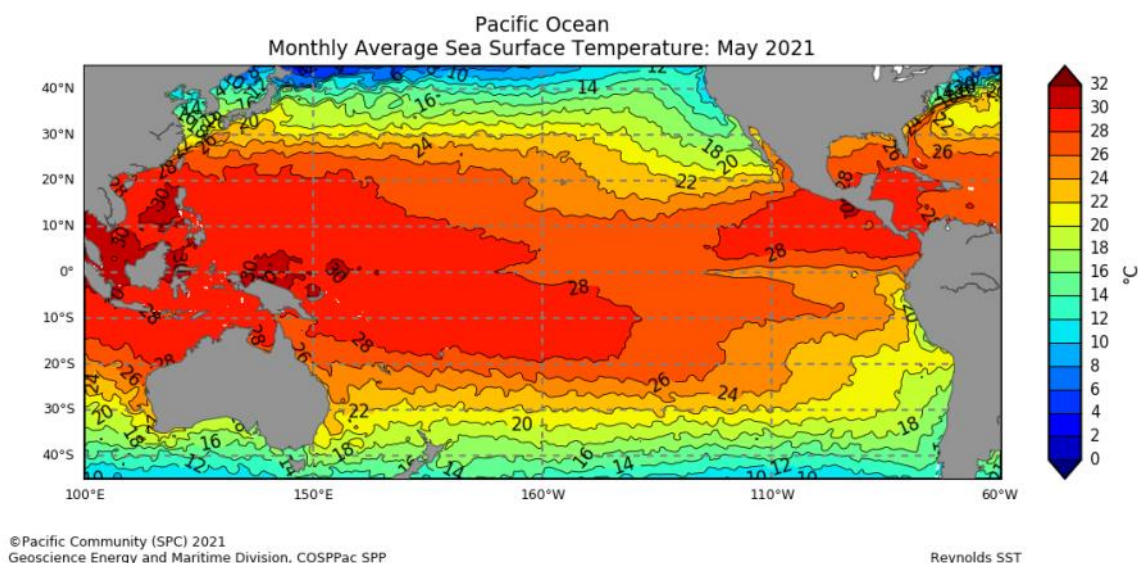


Click link to access [Pacific Community COSPPac Ocean Portal](#)

The SST map for May shows SSTs were close to average across most of the equatorial Pacific Ocean, although cool anomalies remained in some small areas of the tropics in the east of the Basin, extending along the coastline of South America. These cool anomalies were noted in Niue, Cook Islands and Fiji. SSTs were warmer than average in waters around the west and much of the south of Australia.

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

### Mean Sea Surface Temperature

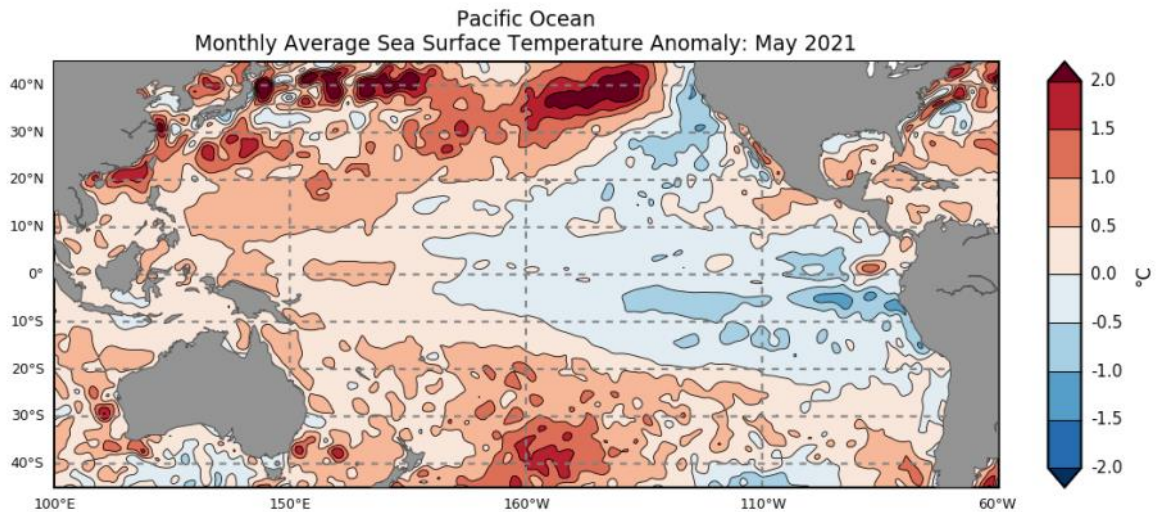


# OCEAN CONDITIONS

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



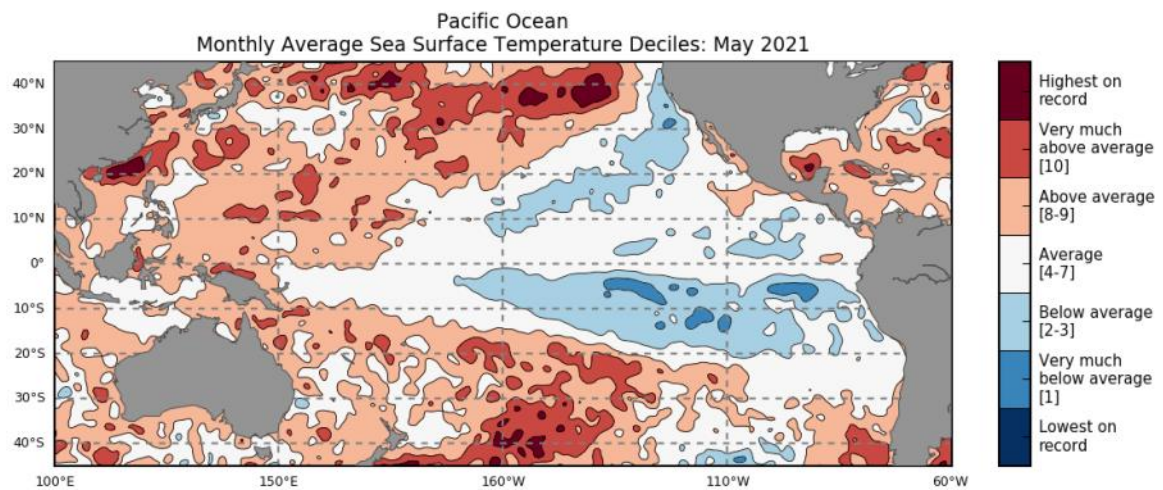
## Anomalous Sea Surface Temperature



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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

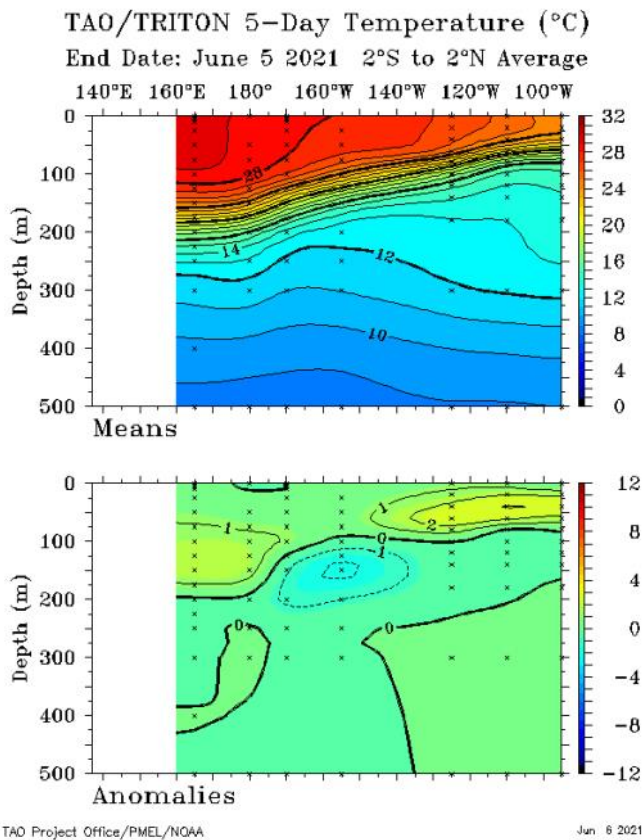
# OCEAN CONDITIONS

## SUB SURFACE

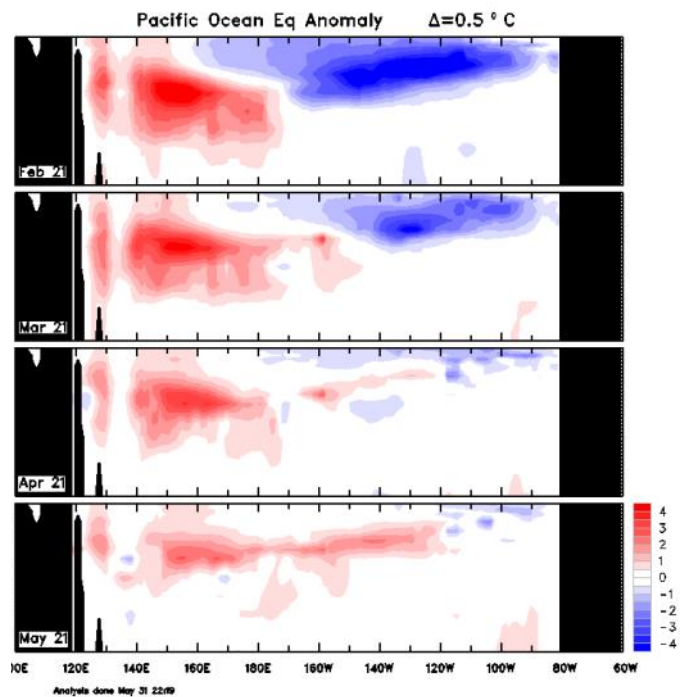


The four-month sequence of equatorial Pacific sub-surface temperature anomalies (to May) shows a pattern consistent with the return to a neutral ENSO state. For May, the weak warm anomalies were present across much of the central and western equatorial Pacific, mostly between 75m and 150m depth. These warm anomalies also weakened in May.

**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

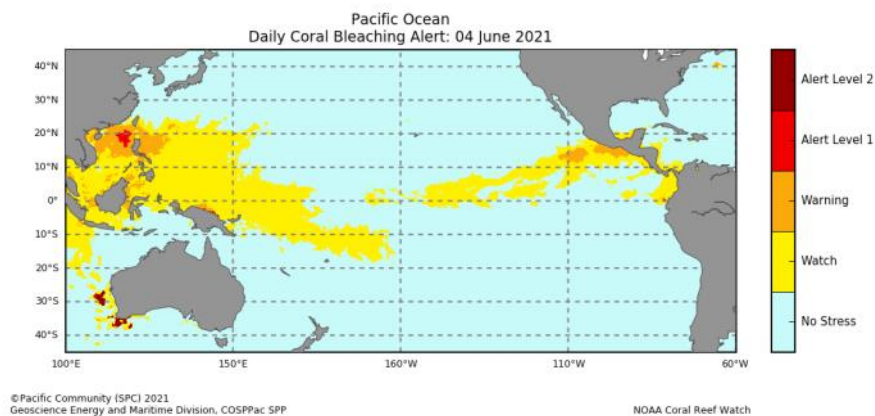
## CORAL BLEACHING



The daily Coral Bleaching Alert for 04th June 2021 shows 'No Stress or Watch' for much of the COSPPac partner countries, peaking at 'Warning' and Alert Level 1 for north PNG. The four weeks Coral Bleaching Outlook to 27th June shows 'No Stress' for most of the countries with a 'Watch' alert for countries west of the dateline.

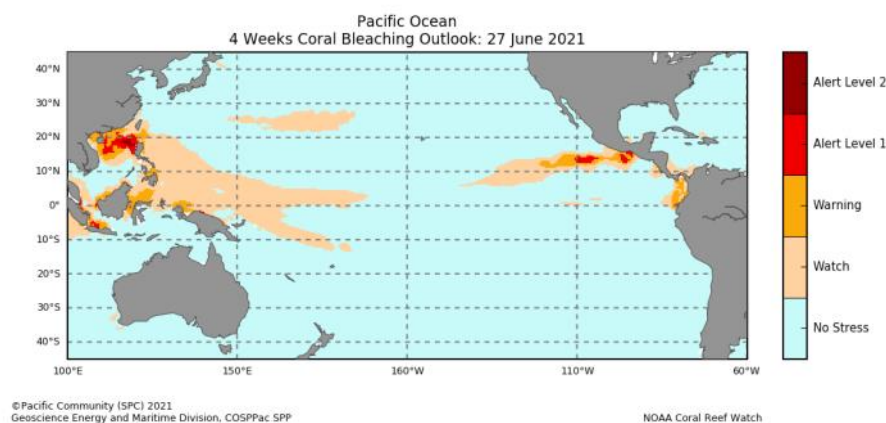
### Daily Coral Bleaching Alert

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



### 4-Weeks Coral Bleaching Outlook

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



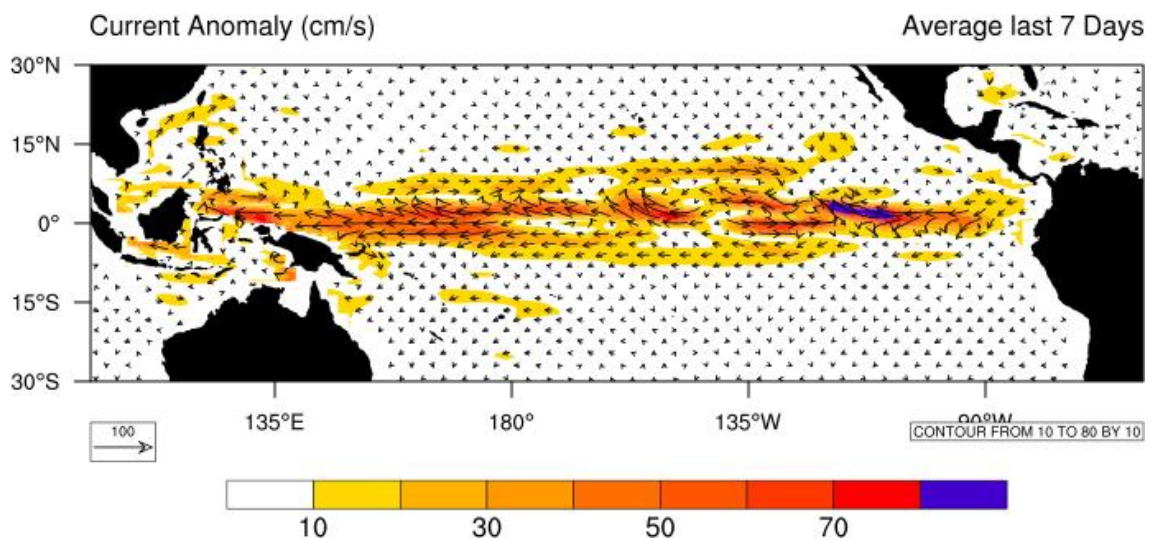
# OCEAN CONDITIONS

## OCEAN SURFACE CURRENTS AND SEA LEVEL



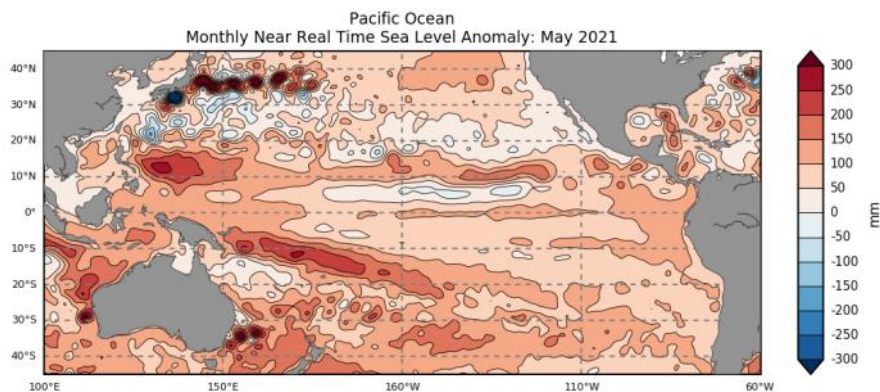
Sea level was above normal for most of the western Pacific region. The highest anomalies above +250mm were in the Solomon Islands. Sea levels were above normal (+100mm to +200mm) in Palau, FSM, RMI, PNG to southern Cook Island. Parts of PNG, Vanuatu, Tonga and Kiribati EEZ continued with near normal to below normal conditions.

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



### Monthly Sea Level Anomalies

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



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Geoscience Energy and Maritime Division, COSPPac SPP

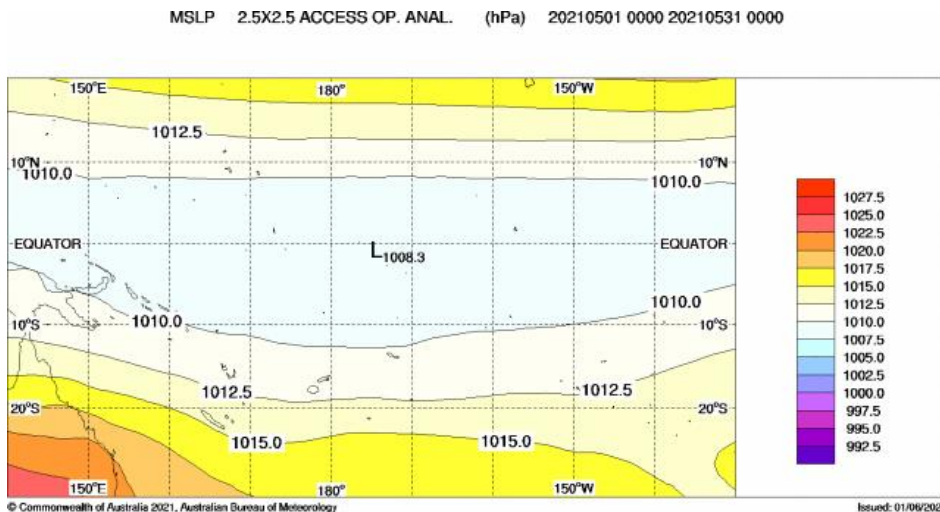
AVISO Ssalto/Duacs SLA

# MEAN SEA LEVEL PRESSURE

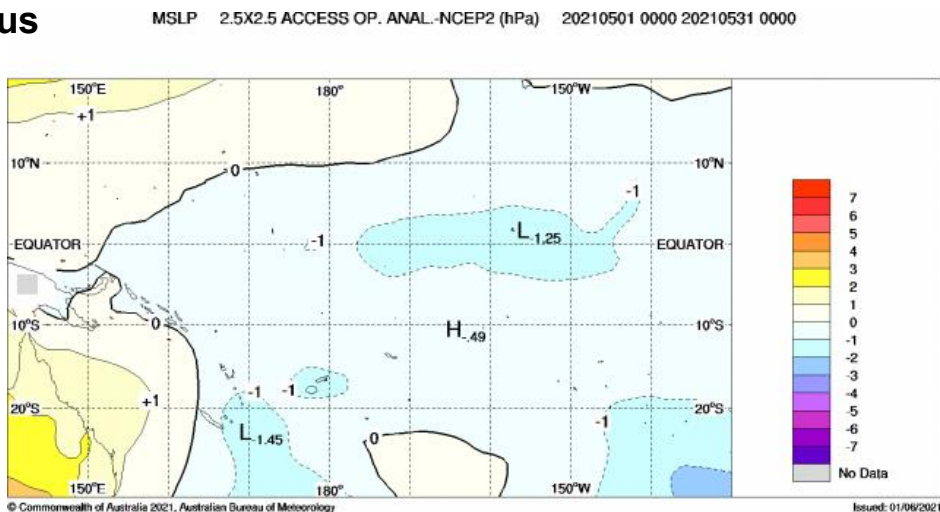
The May mean sea level pressure (MSLP) anomaly map shows negative anomalies over southern Vanuatu, Fiji and central and eastern Kiribati. Positive anomalies were present over the Coral Sea region.

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

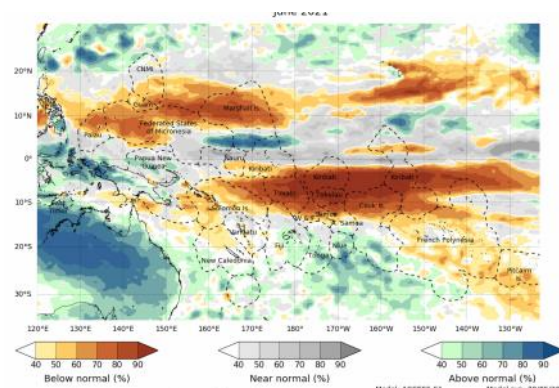
June—August 2021



The ACCESS-S model forecast for June 2021 strongly favours below normal rainfall for Palau, western and northern FSM, Guam, CNMI, central and northern Marshall Islands, Solomon Islands, Rotuma, Nauru, much of Kiribati (especially south of the equator), Tuvalu, Tokelau, Samoa, the northern Cook Islands, central and northern French Polynesia and Pitcairn Island. Above normal rainfall is favoured for the Highlands region of PNG, southern Marshall Islands, most parts of Fiji, Tonga, Niue and parts of southern Cook Islands and far southern French Polynesia.

The three-month rainfall outlook (June-August) shows a strong dry signal affecting CNMI, Guam, FSM, central and northern Marshall Islands, Rotuma, Nauru, much of Kiribati (especially in the southern hemisphere), Tuvalu, Samoa, Tokelau, northern Cook Islands, French Polynesia and Pitcairn Island. In contrast, the models show an increased chance of wetter in Palau, PNG, southern Marshall Islands, New Caledonia, Vanuatu, Fiji, Tonga, Niue and southern Cook Islands. Above normal maximum and minimum temperatures are favoured for many COSPPac countries, except for some areas east of 165°E, namely Nauru, Kiribati, northern Tuvalu, Tokelau, northern 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 June to August favours below normal rainfall for the northern PNG Islands, western Solomon Islands, central Kiribati, Tuvalu, Tokelau, northern and central Cook Islands, northern and central French Polynesia, and Pitcairn Island. Above normal rainfall is favoured for eastern FSM, southern Marshall Islands, Highlands, southern and Momase regions of PNG, New Caledonia, Vanuatu, Fiji, Tonga, Niue and southern Cook Islands.

The SCOPIC statistical model for June to August favours below normal rainfall for parts of New Guinea Islands, Kiribati, Tuvalu, Rotuma and northern Cook Islands. Above normal rainfall is favoured for parts of southern and Momase regions of PNG, Vanuatu, Fiji, and Samoa.

The APEC Climate Centre multi-model for June to August favours below normal rainfall for western and northern regions of the Solomon Islands, Nauru, Tuvalu, Kiribati, Rotuma, Samoa, Tokelau, northern Cook Islands, and central to northern French Polynesia. Above normal rainfall is favoured for Palau, most of FSM and the Marshall Islands, most of PNG, Vanuatu, Fiji, Tonga, Niue, southern Cook Islands and parts of southern French Polynesia.

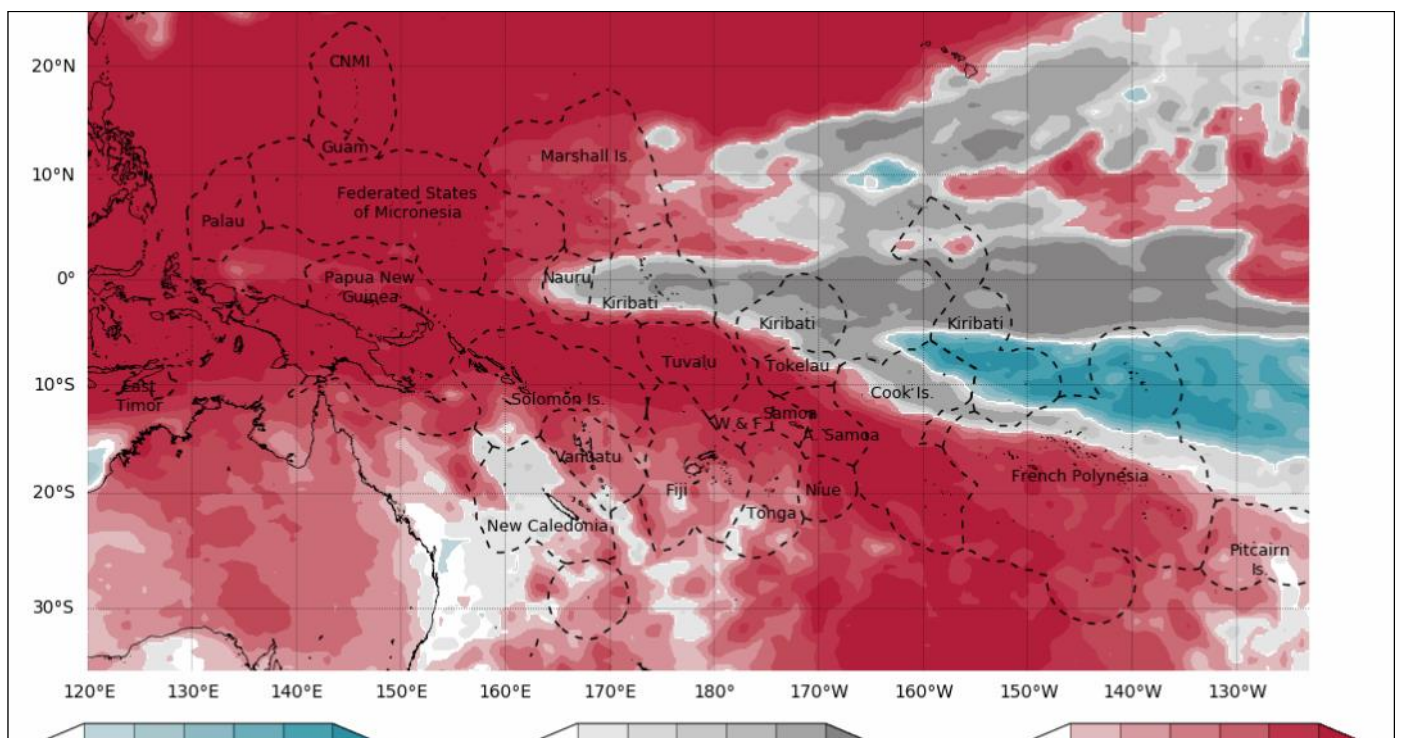
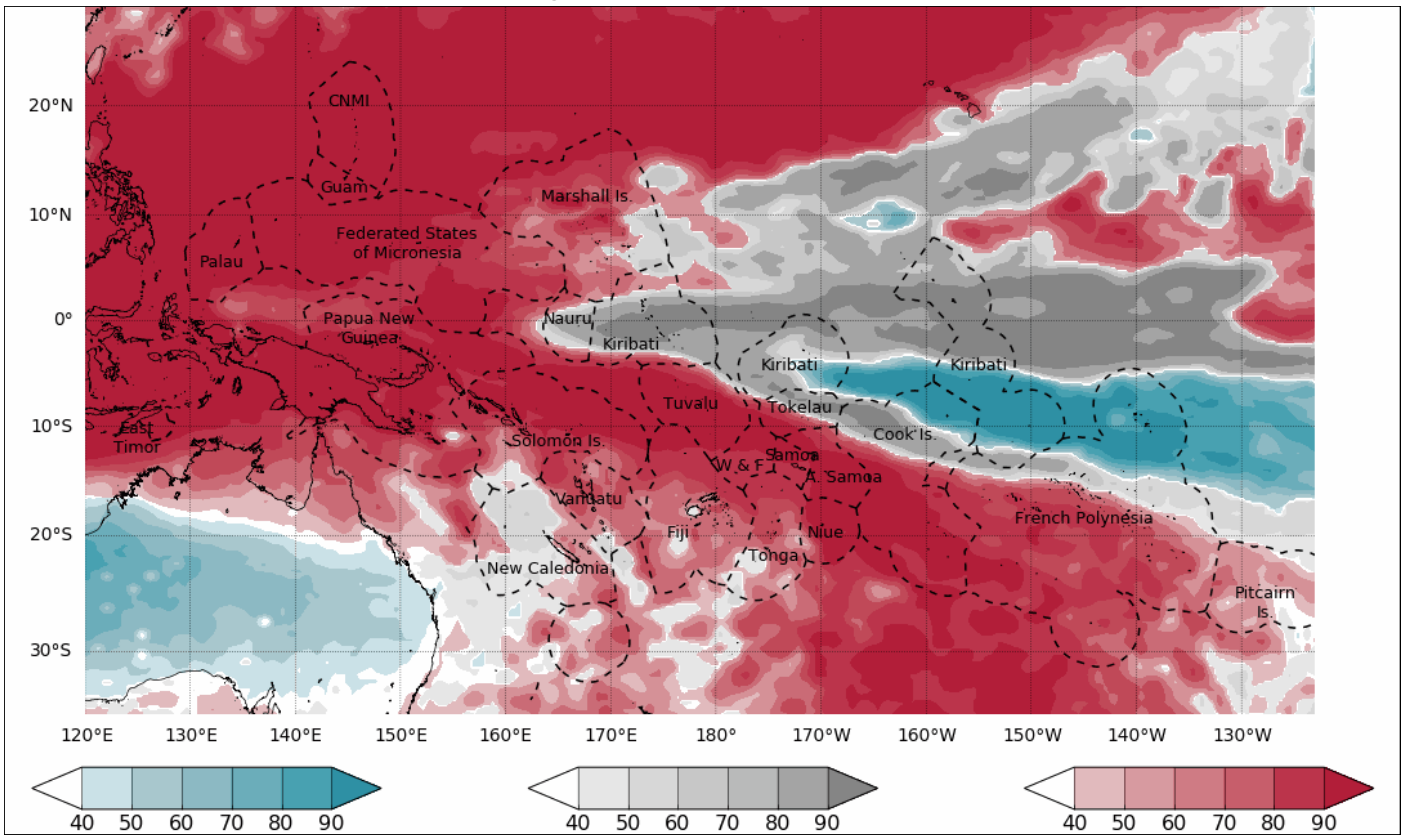
For June to August 2021, the dynamical models (as well as SCOPIC) agree on above normal rainfall for the Highlands and, Southern regions of PNG, New Caledonia, Vanuatu, Fiji, Tonga, Niue and southern Cook Islands. The models also agree on below normal rainfall for Rotuma, Kiribati (southern hemisphere), Tuvalu, northern Cook Islands, and the northern half of French Polynesia.

# SEASONAL TEMPERATURE OUTLOOK

June—August 2021



## Monthly ACCESS-S Maps



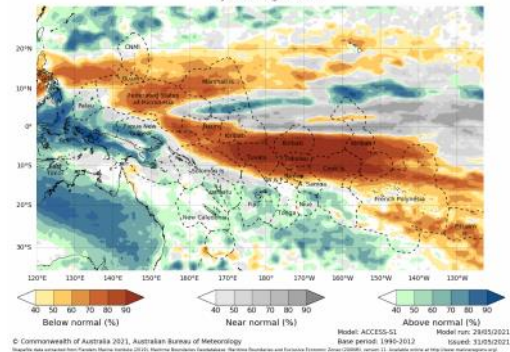
# SEASONAL RAINFALL OUTLOOK

June—August 2021

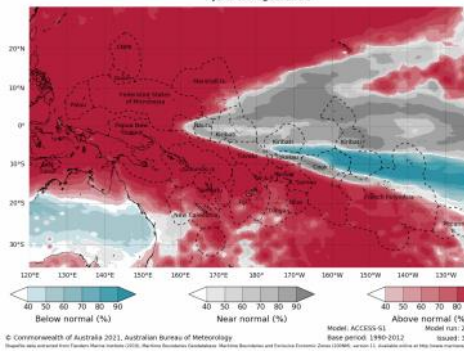


## Seasonal ACCESS-S maps

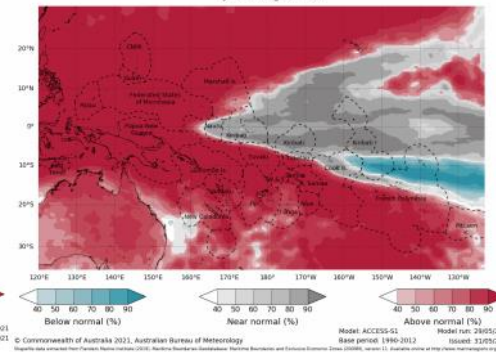
Tercile rainfall probabilities for June to August 2021



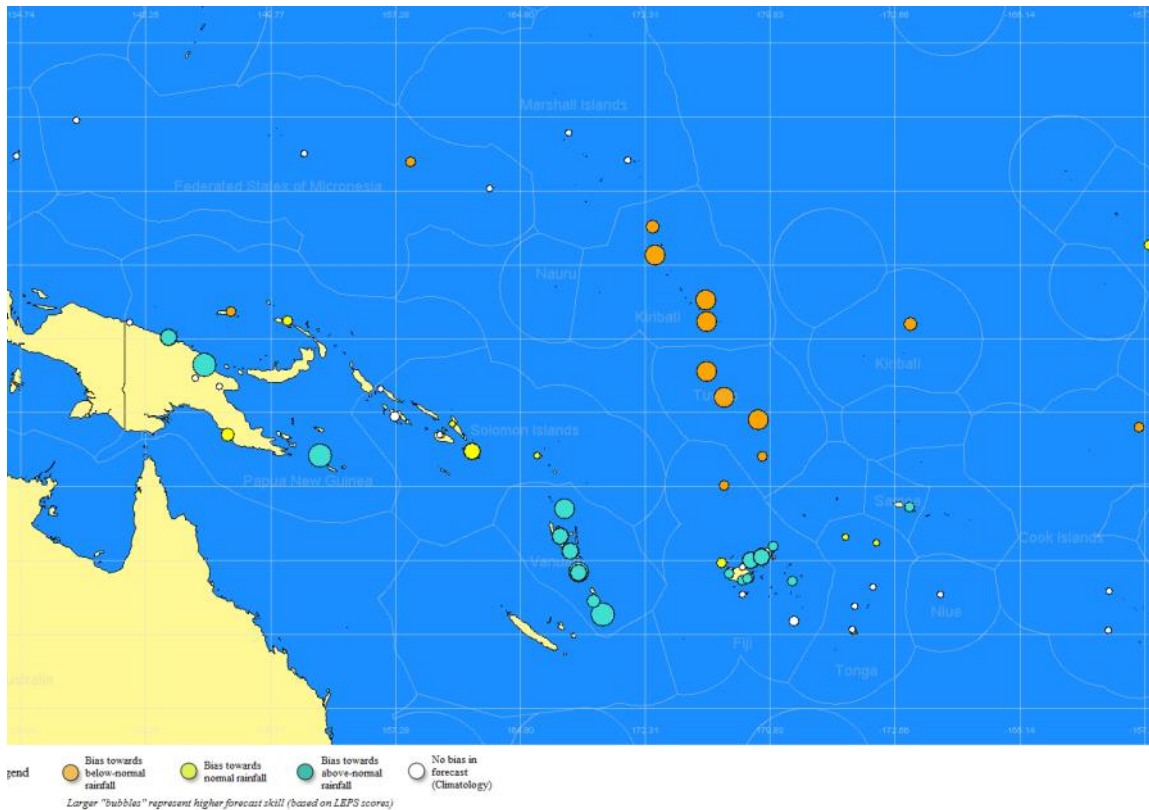
Tercile maximum temperature probabilities for June to August 2021



Tercile minimum temperature probabilities for June to August 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

June—August 2021



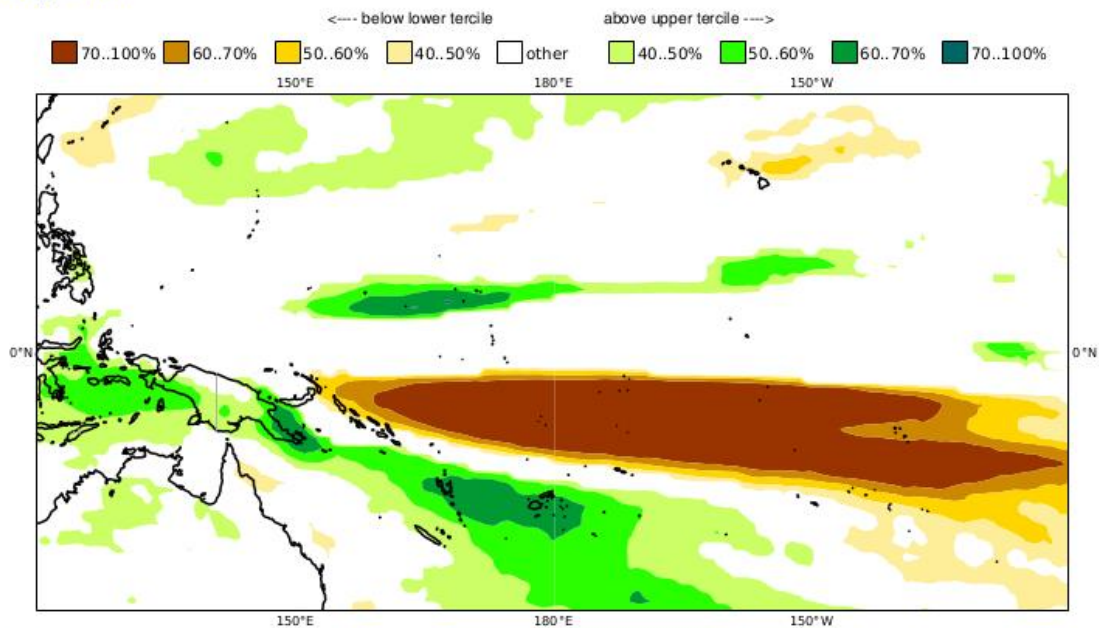
## Copernicus (C3S multi-system)-Rainfall

Prob(most likely category of precipitation)

JJA 2021

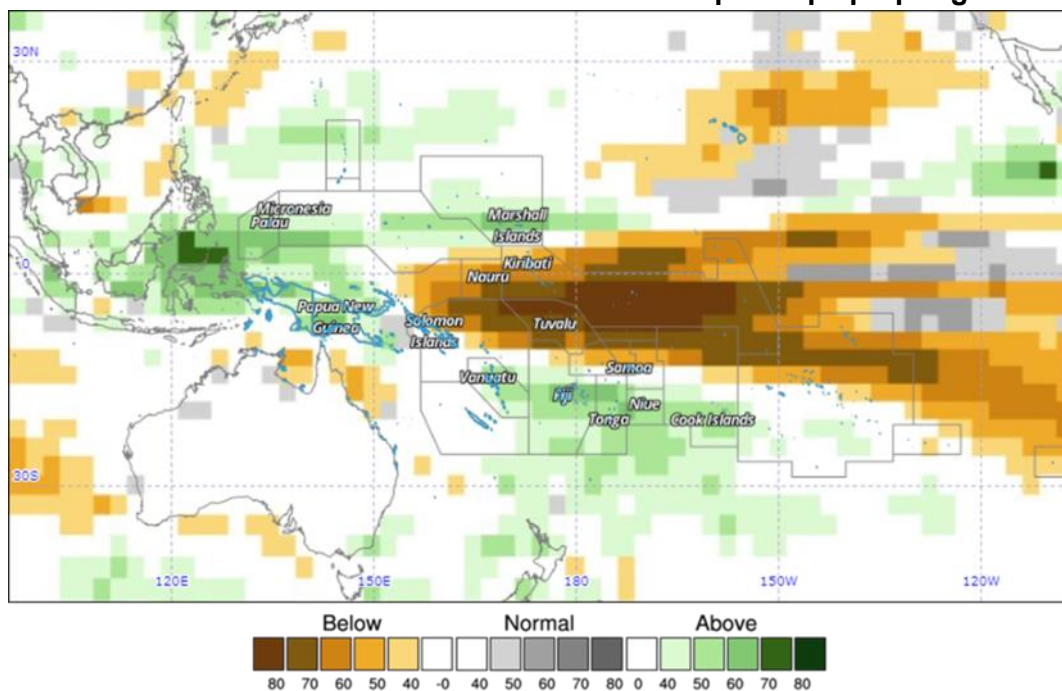
Nominal forecast start: 01/05/21

Unweighted mean



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

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



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

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

Generated using CLIK® (2021-6-7)

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# TROPICAL CYCLONE

## 2020/2021 Season

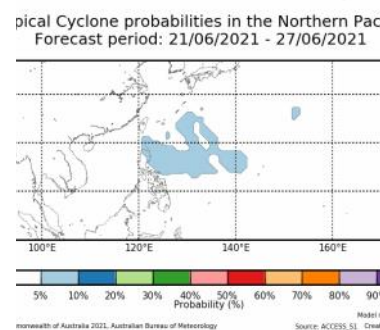
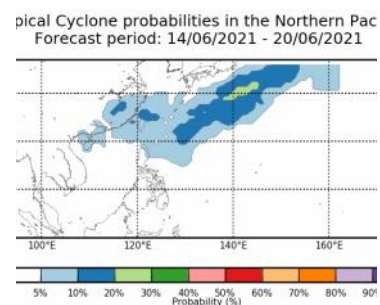


In the southwest Pacific, the tropical cyclone season 2020-21 ended on the 30th April, 2021. The outlook for the season was normal or slightly below normal Tropical Cyclone activity. Seven named TCs formed east of the longitude of the tip of Cape York, Australia. The long-term seasonal average for the 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 a likely transition from La Niña to EN-SO-Neutral in the next month or so, near-normal to below normal numbers of TCs are anticipated.

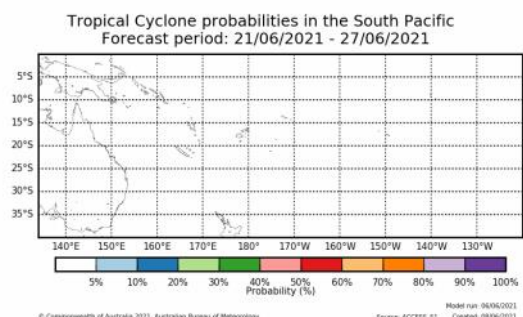
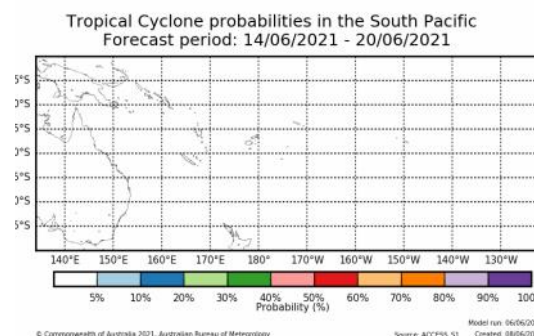
The weekly tropical cyclone forecast from the ACCESS-S model shows some high risk in the weeks beginning 12 June and ending 18 June 2021 for the northwest Pacific, especially in areas around the Philippines.

The tropical cyclone season outlook for 2020-21 is available via: <http://www.bom.gov.au/climate/cyclones/south-pacific/>

### ACCESS-S Weekly Forecasts –Northwest Pacific



### ACCESS-S Weekly Forecasts –Southwest Pacific



### 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.

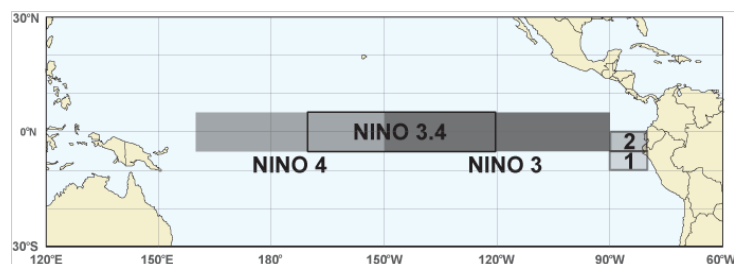
## 20 degrees Celsius Isotherm Depth

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