

Monthly Climate Bulletin

July 2021



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Photo Credit: SPREP Open Day Raising Awareness of Schools on Climate & Ocean Science



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 06 August 2021

- The negative Indian Ocean Dipole (IOD) event continues and likely to persist throughout spring (September-November).
- El Niño Southern Oscillation (ENSO) remains neutral. Climate models indicate the central tropical Pacific is likely to cool over the coming months.
- A moderately strong pulse of the Madden-Julian Oscillation moved into the Western Pacific region in recent days. International climate models predict the MJO pulse will weaken and possibly become indiscernible in the next few days as it tracks further eastwards across the Western Pacific.
- The Intertropical Convergence Zone (ITCZ) was active and shifted north over western Pacific, while the South Pacific Convergence Zone (SPCZ) was generally suppressed.
- The sea surface temperature anomaly pattern in July 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 western FSM.
- A notable sea level anomaly of +250mm observed in the southern and eastern Solomon Islands and northern Fiji.
- For August to October 2021, the dynamical models agree on above normal rainfall for Palau, southern Marshall Islands, most of PNG, southern Solomon Islands, New Caledonia, Vanuatu, Fiji, Tonga, Niue and southern Cook Islands. The models also agree on below normal rainfall for FSM, CNMI, Guam, central and northern RMI, northern Solomon Islands, Kiribati, Tuvalu, Tokelau, northern and central Cook Islands, and the northern half of French Polynesia.

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EL NIÑO–SOUTHERN OSCILLATION

Negative Indian Ocean Dipole continues

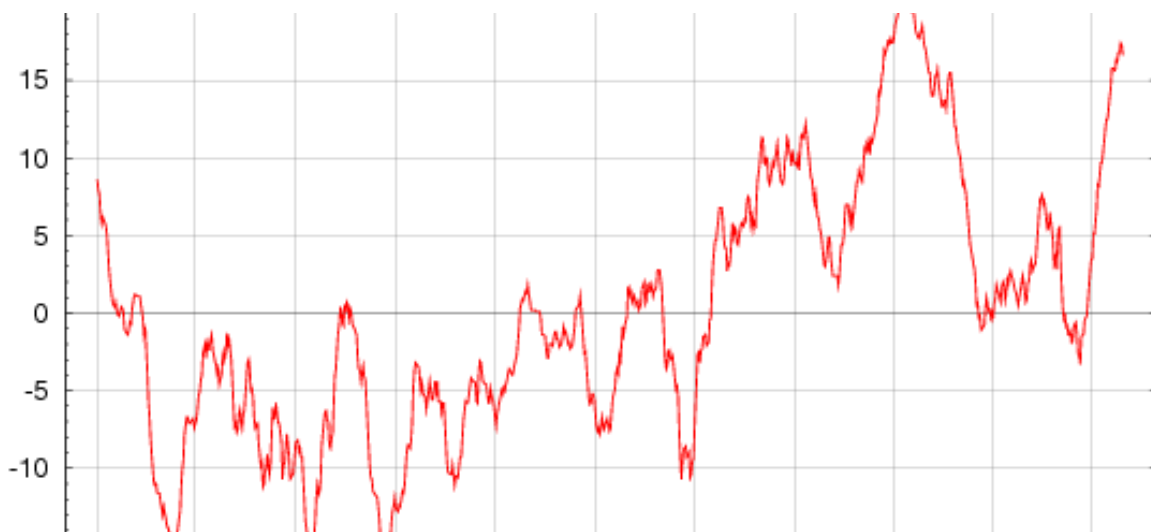
Click link to access [Climate Driver Update issued on 03 August 2021](#)

The negative Indian Ocean Dipole (IOD) event continues. A negative IOD increases the chances of above average winter-spring (August–November) rainfall for much of southern and eastern Australia. It also increases the chances of cooler than average days in southern Australia for winter-spring (August–November), and warmer than average nights across northern Australia.

The most recent weekly IOD value is $-0.76\text{ }^{\circ}\text{C}$, with warmer than average waters in the eastern tropical Indian Ocean, and average to cooler than average waters in the western tropical Indian Ocean. Most climate models surveyed by the Bureau predict negative IOD conditions are likely to persist throughout spring (September–November).

The El Niño Southern Oscillation (ENSO) remains neutral with most oceanic and atmospheric indicators within the neutral range. While pressure patterns show some La Niña characteristics, as indicated by the latest Southern Oscillation Index (SOI) 30-day value of $+15.1$, it is likely that some of this shift in pressure is driven from warm conditions in the eastern Indian Ocean. Most climate model outlooks indicate the central tropical Pacific is likely to cool over the coming months, with three of seven models surveyed by the Bureau indicating this cooling will be enough to reach La Niña thresholds in spring, with the remaining four models staying neutral. Along with the negative IOD, this may be contributing to the wetter than median climate outlooks in Australia.

The 30-day Southern Oscillation Index (SOI) for the 30 days ending 01 August was $+15.1$. The 90-day SOI value was $+8.5$. The 30-day value has remained similar over the past few weeks, with some pressure patterns showing La Niña-like characteristics, although it is possible some of this pressure influence may be coming from the Indian Ocean.



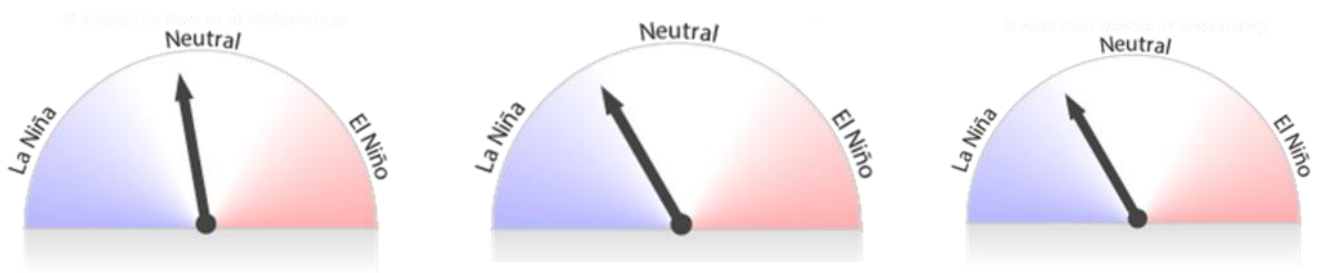


EL NIÑO–SOUTHERN OSCILLATION

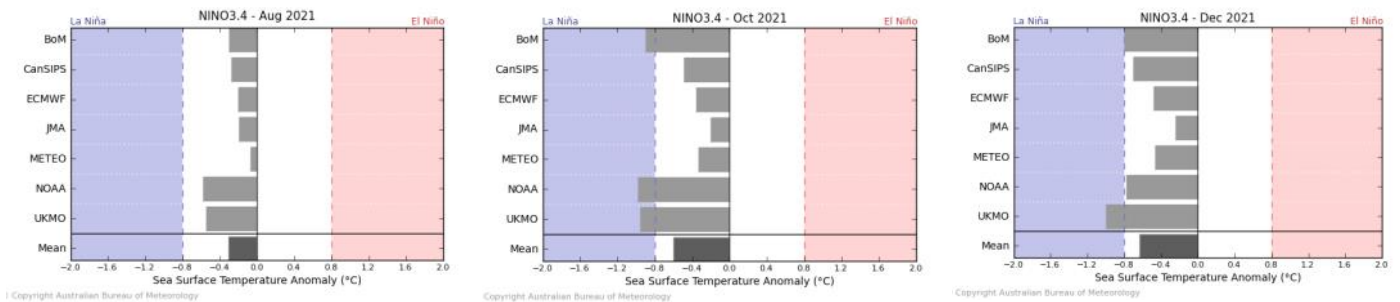
Negative Indian Ocean Dipole continues

Click link to access [Climate Driver Update issued on 03 August 2021](#)

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



Bureau of Meteorology NINO3.4 International Model Outlooks



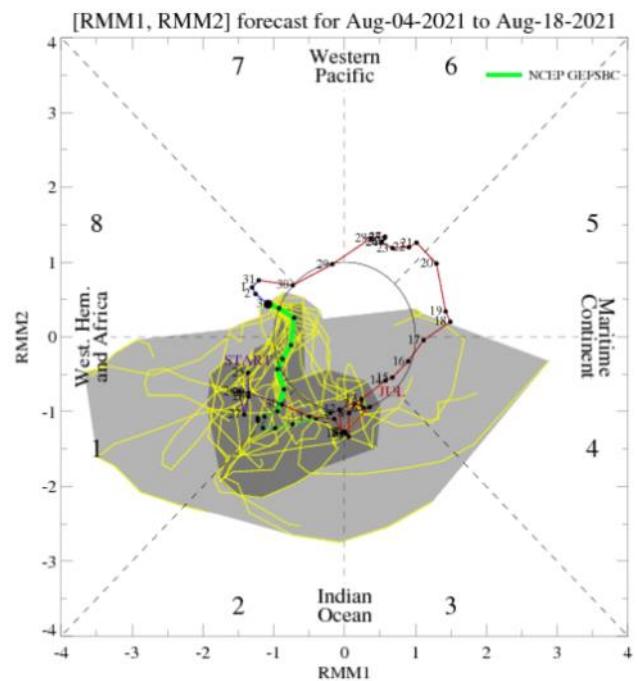
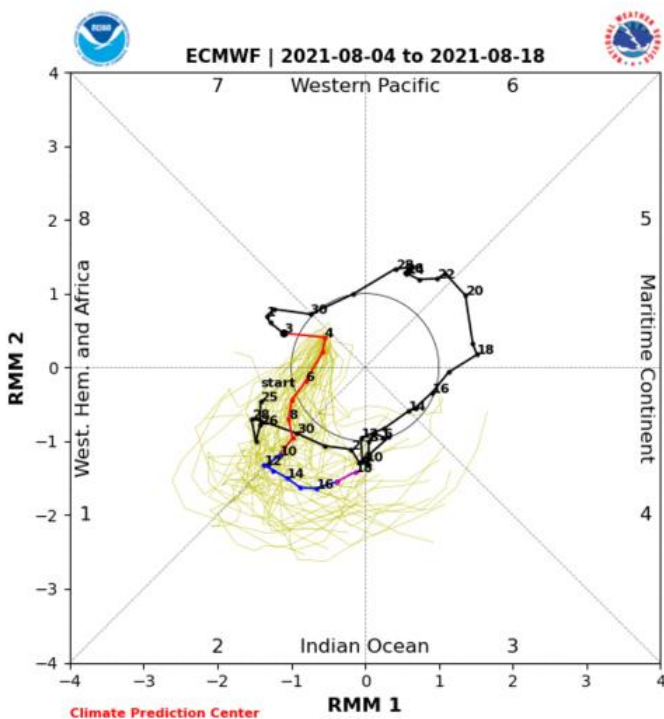
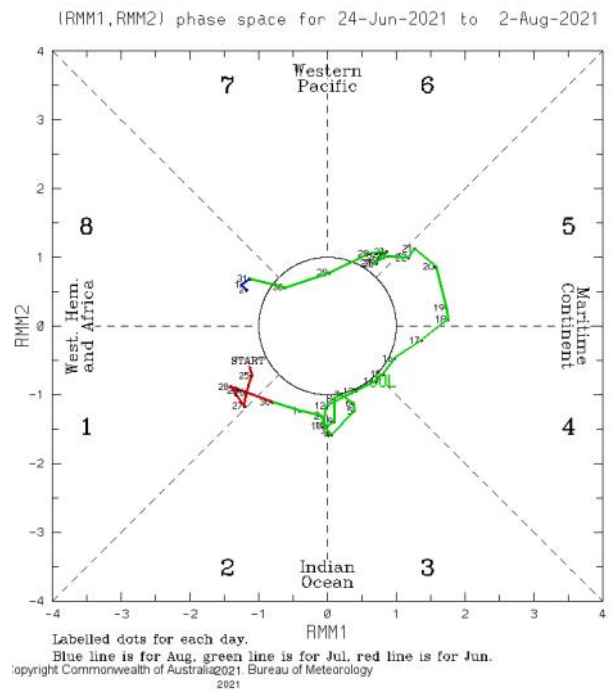
Bureau of Meteorology summary of international model outlooks for NINO3.4: <http://www.bom.gov.au/climate/model-summary/#tabs=Pacific-Ocean>

MADDEN–JULIAN OSCILLATION

Click link to access [Tropical Climate Update](#) [Issued on Tuesday 27 July 2021]

During mid-July, a moderately strong pulse of Madden-Julian Oscillation (MJO) tracked across the Maritime continent and weakened towards the end of the month. A moderately strong pulse of the Madden-Julian Oscillation moved into the Western Pacific region in recent days, after tracking eastwards across Maritime Continent longitudes at similar strength during the previous week. This pulse of the MJO, along with other tropical atmospheric wave activity in the region, has contributed to the active monsoon and tropical weather across Asia and the Maritime Continent. International climate models predict the MJO pulse will weaken and possibly become indiscernible in the next few days as it tracks further eastwards across the Western Pacific. Whilst in the Western Pacific region, the influence of an MJO pulse on northern Australia is relatively small at this time of the year, typically favouring below-average rainfall across parts of tropical Queensland.

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



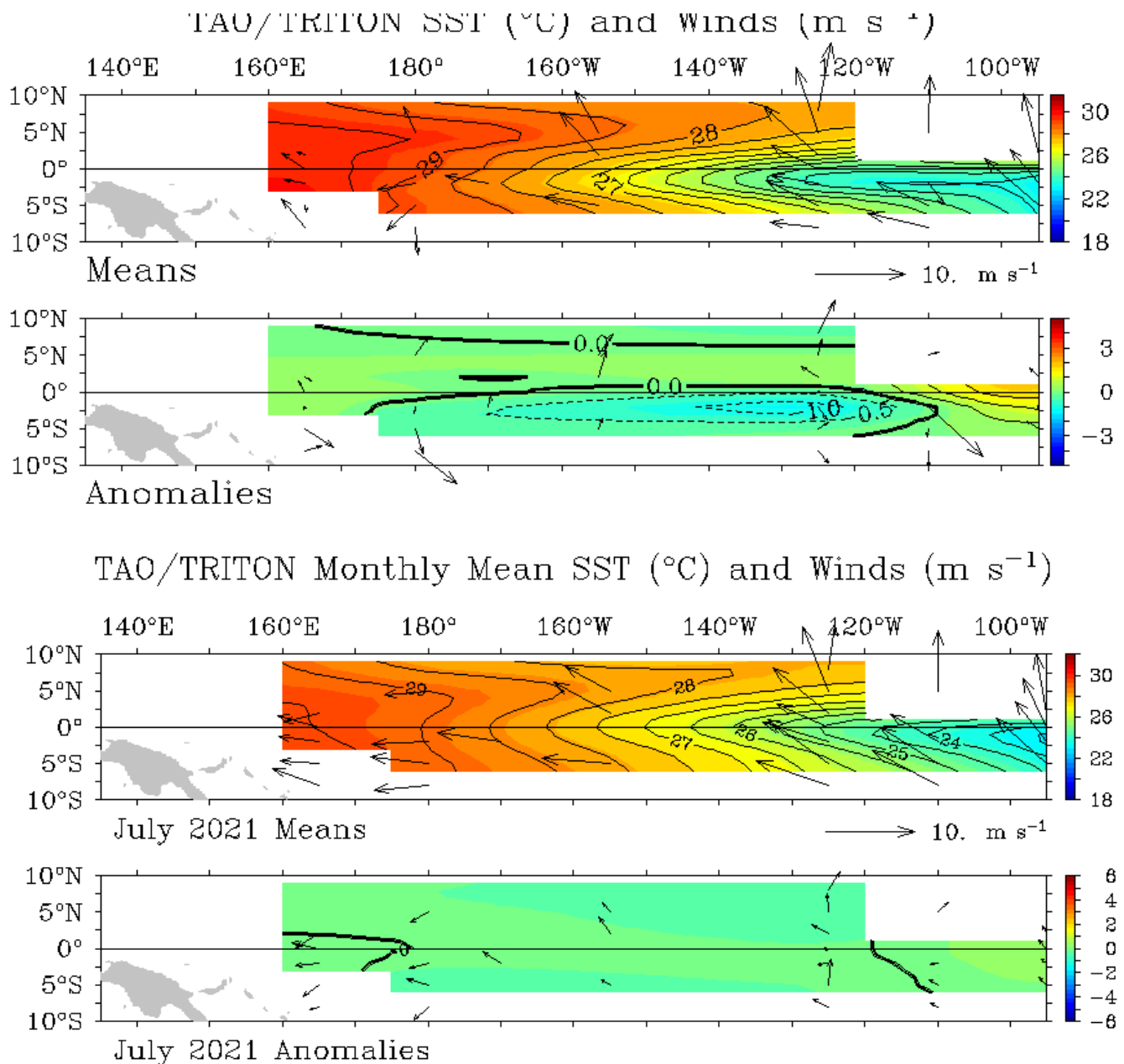


WIND

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

The trade winds in July 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

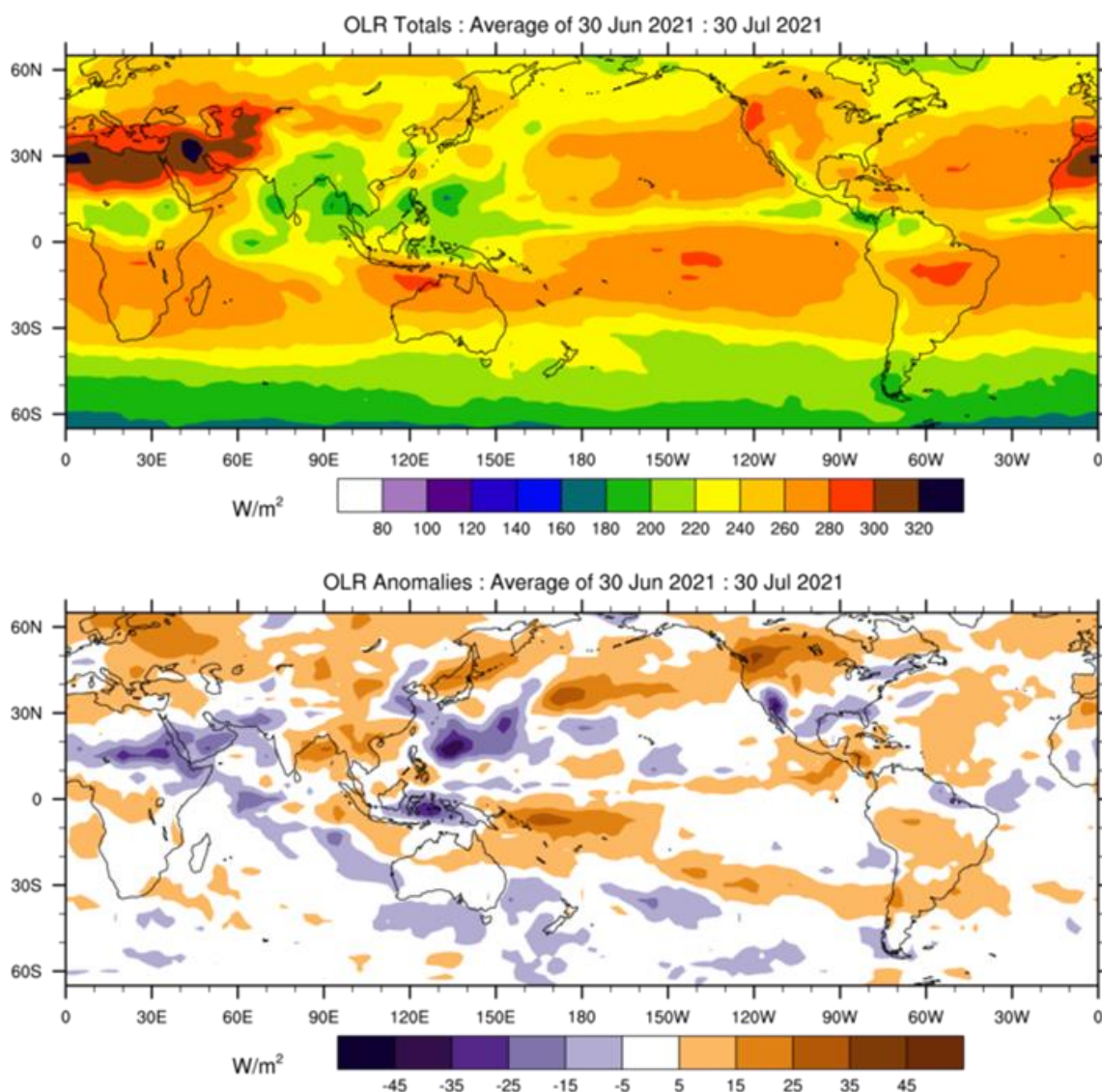
Click link to access [OLR](#)



The July 30-day OLR total and anomaly maps suggest the Intertropical Convergence Zone (ITCZ) was active and shifted a little north of its normal position over the western Pacific, while the South Pacific Convergence Zone (SPCZ) was generally suppressed.

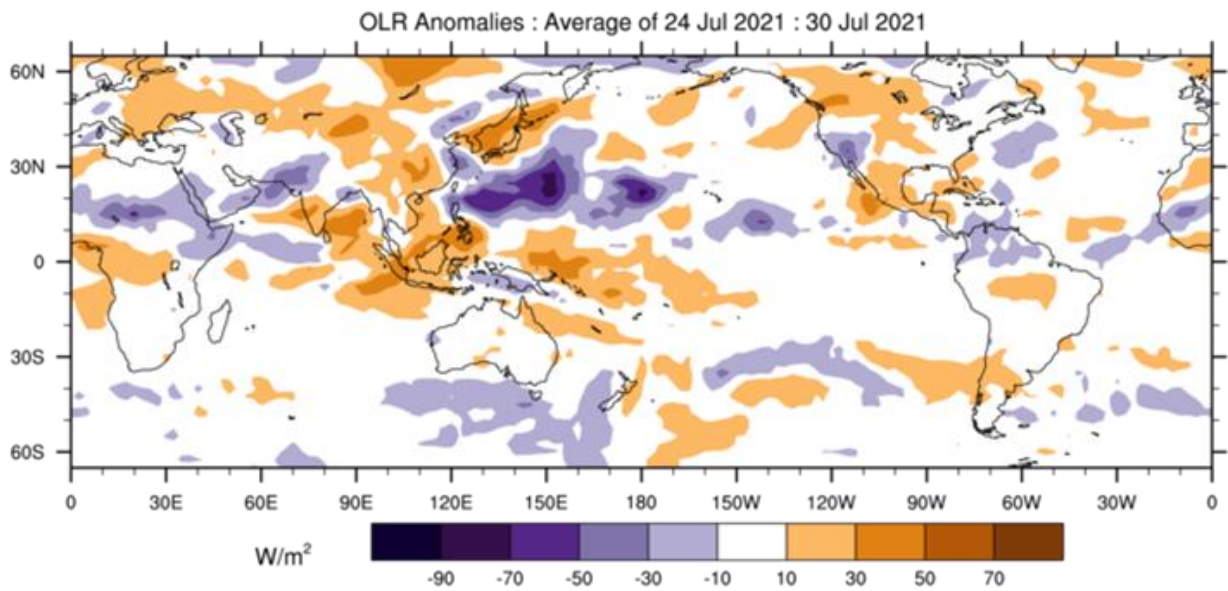
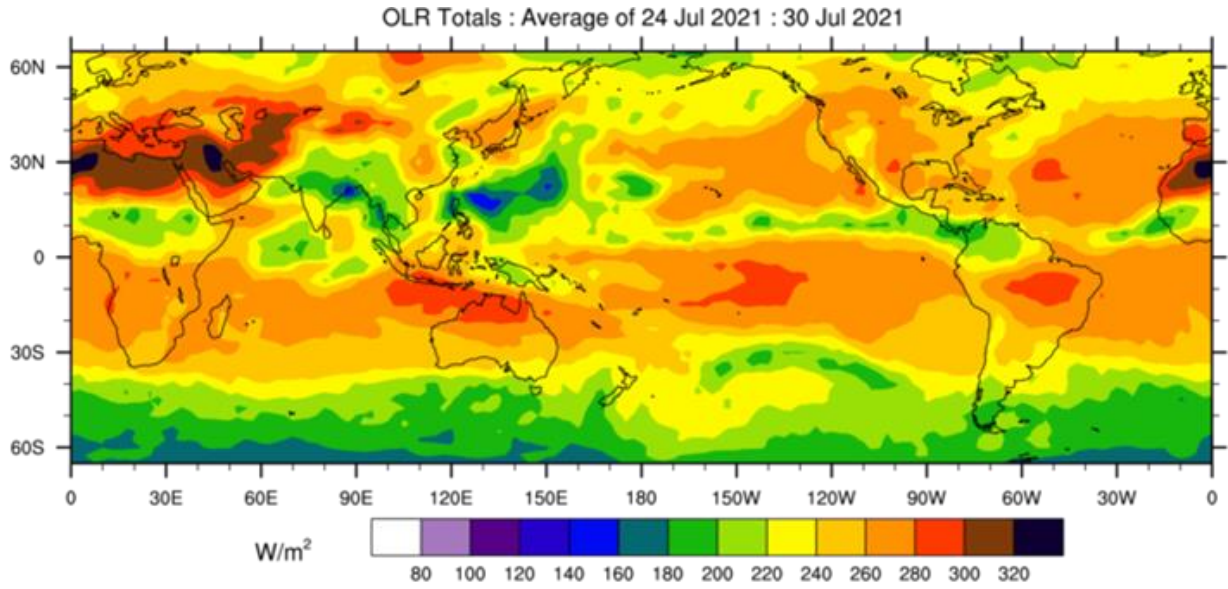
Note: Global maps of OLR below highlight regions experiencing increased or decreased cloudiness. The top panel is the total OLR in Watts per square metre (W/m^2) and the bottom panel is the anomaly (current minus the 1979-1998 climate average), in W/m^2 . In the bottom panel, negative values (blue shading)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

OLR Total and Anomalies, 30 Day OLR

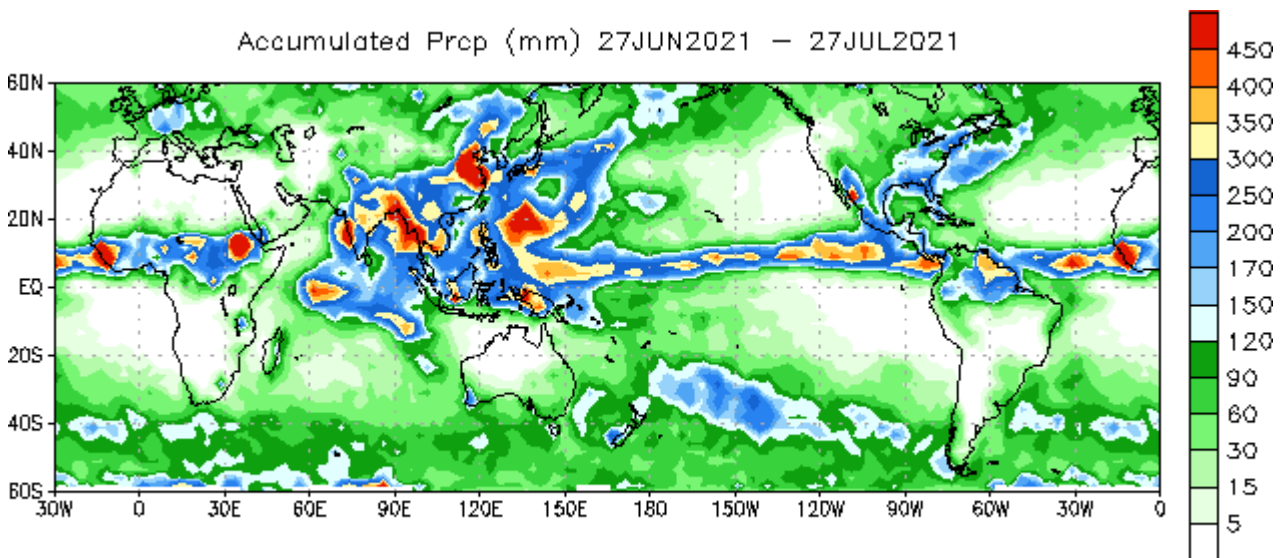


(C) Copyright Commonwealth of Australia 2021. Bureau of Meteorology

OLR Total and Anomalies, 7 Day OLR

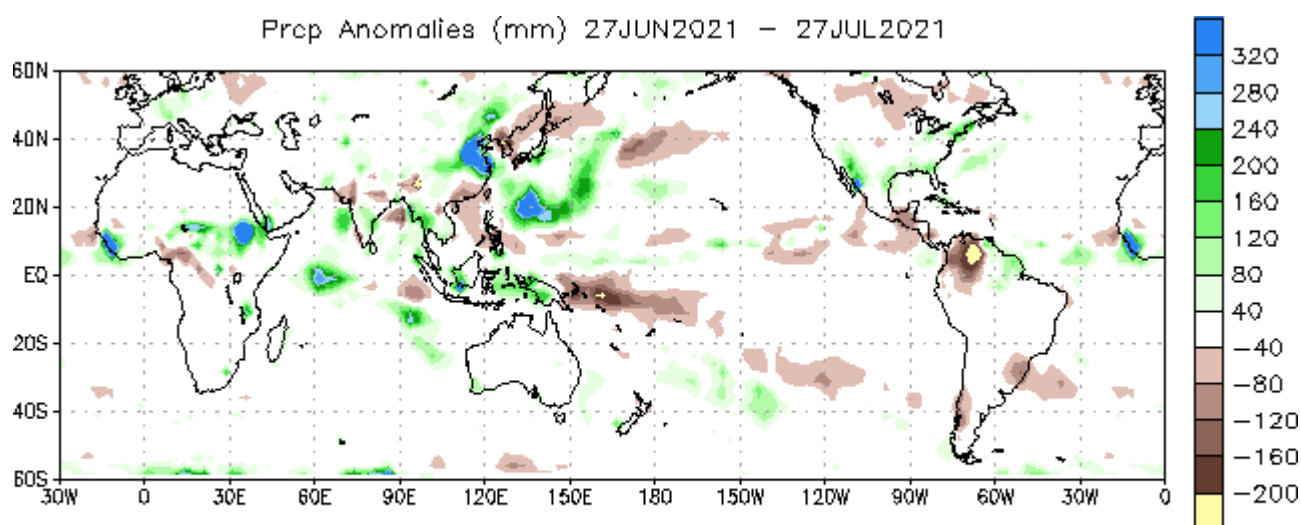


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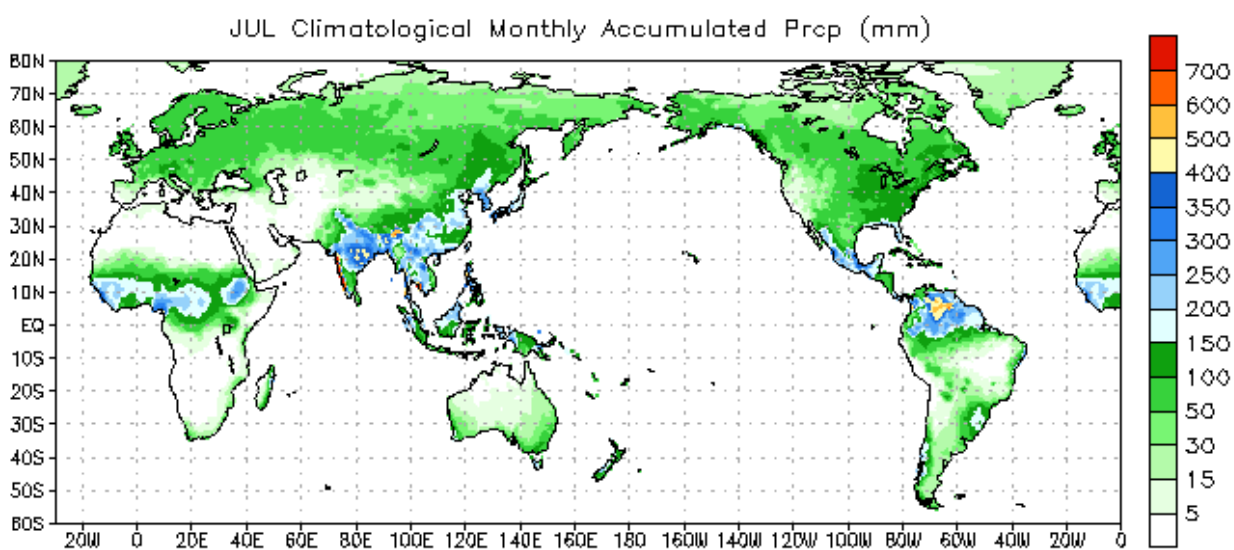


Data Source: NCEP CMAP Precipitation

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

OCEAN CONDITIONS

SEA SURFACE TEMPERATURE

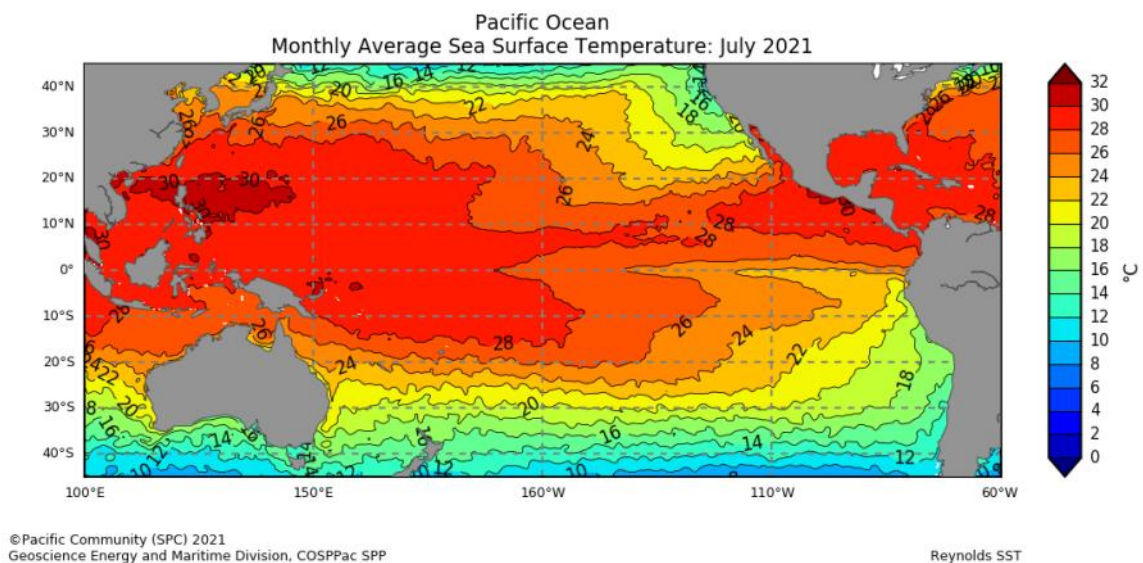


Click link to access [Pacific Community COSPPac Ocean Portal](#)

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

Mean Sea Surface Temperature

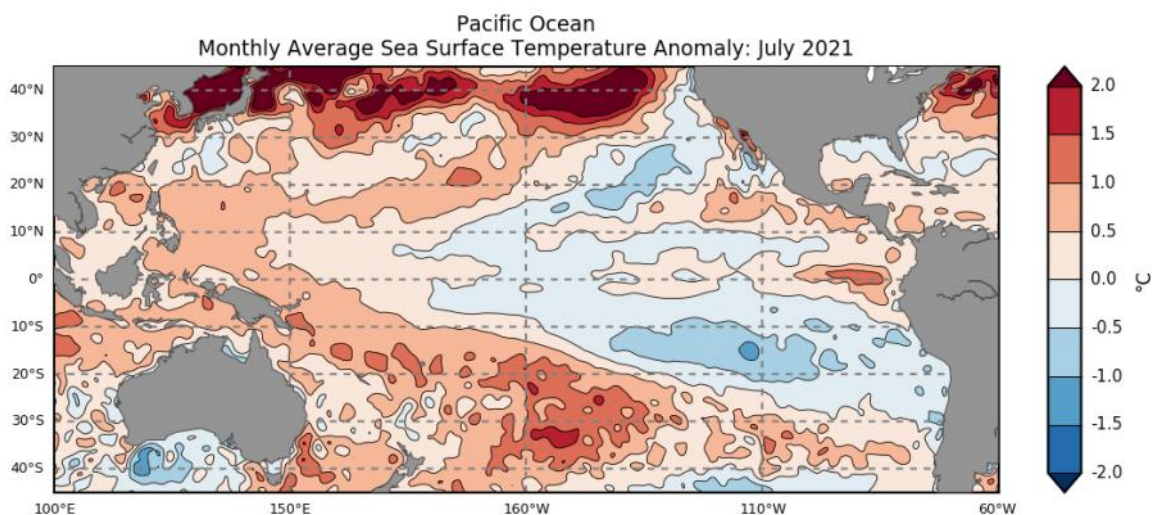


OCEAN CONDITIONS

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



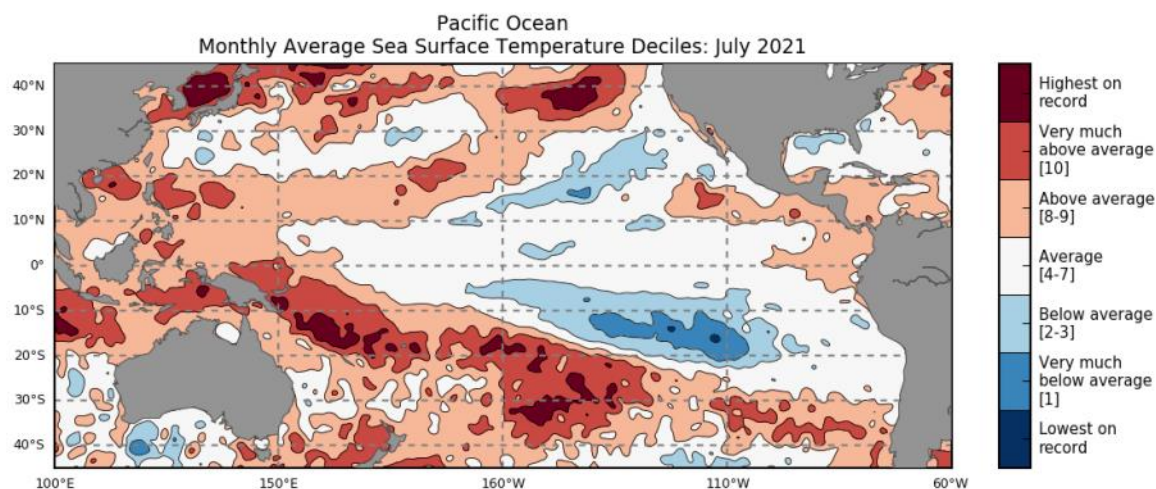
Anomalous Sea Surface Temperature



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Geoscience Energy and Maritime Division, COSPPac SPP

Reynolds SST

Sea Surface Temperatures Deciles



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Reynolds SST

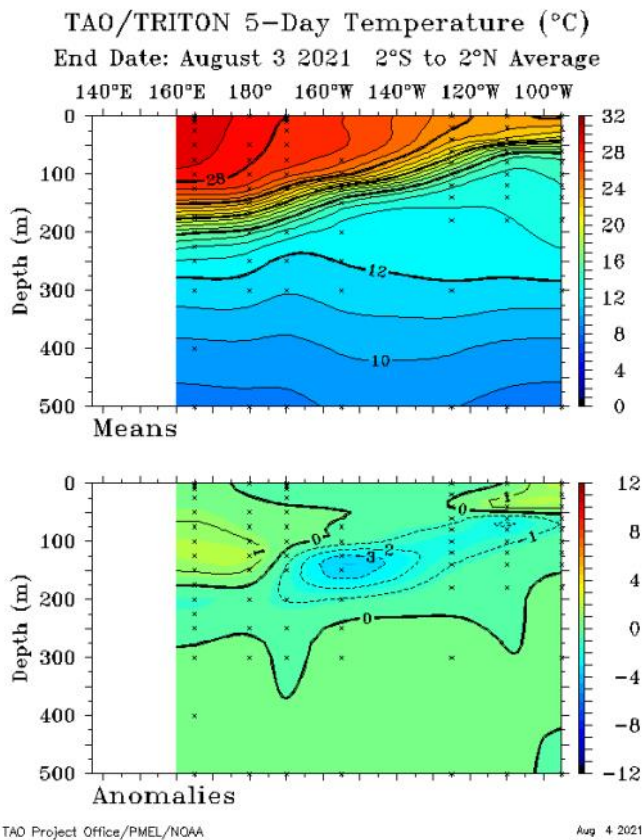
OCEAN CONDITIONS

SUB SURFACE

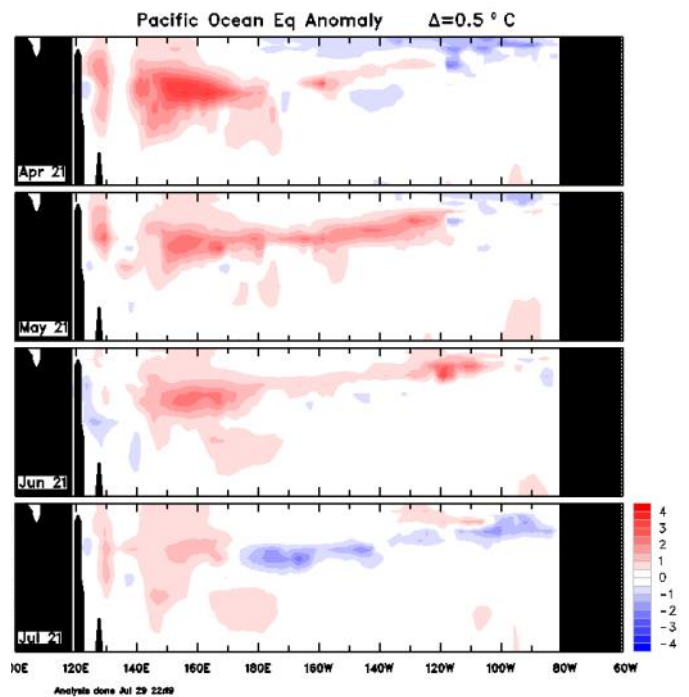


The four-month sequence of equatorial Pacific sub-surface temperature anomalies (to July) shows a pattern consistent with a neutral ENSO state. Weak warm anomalies were present across much of the column depth west of the Date Line, while weak cool anomalies were present across the central and eastern equatorial Pacific between around 175 m depth and 75 m depth. These cool anomalies developed during July.

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

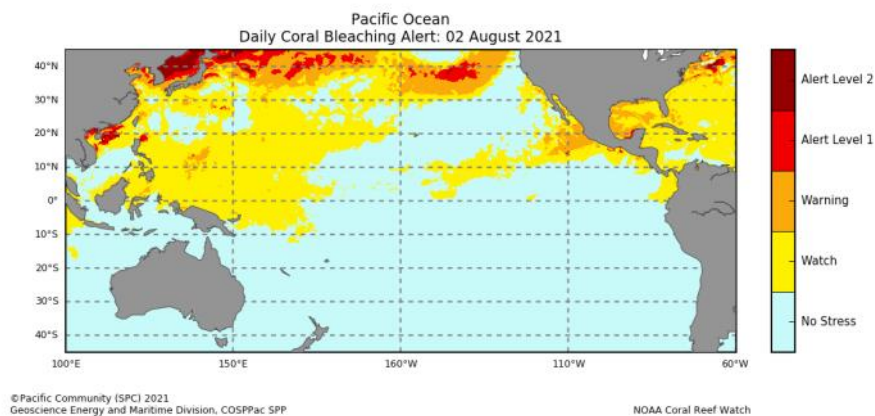
CORAL BLEACHING



The daily Coral Bleaching Alert for 02nd August 2021 shows 'No Stress or Watch' for much of the CO-SPPac partner countries, peaking at 'Warning' for western FSM. The four weeks Coral Bleaching Outlook to 29th August shows 'No Stress' for most of the countries with a 'Watch' and 'Alert level 1' for western FSM, northern PNG, western Solomon Islands, Nauru, RMI and Kiribati.

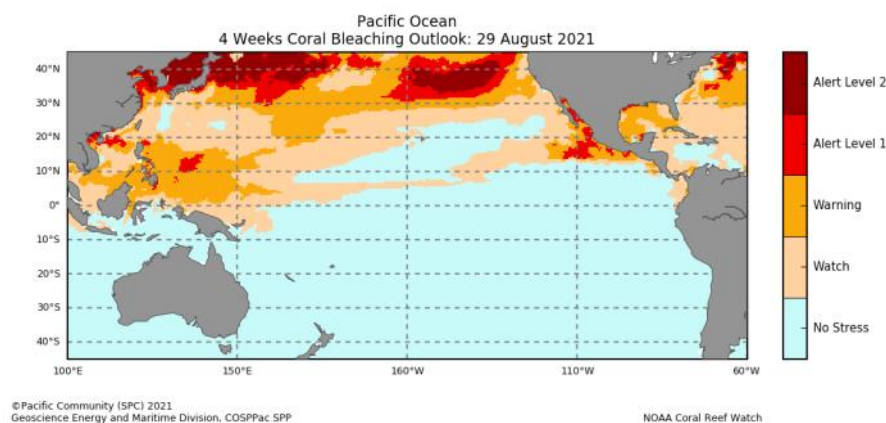
Daily Coral Bleaching Alert

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



4-Weeks Coral Bleaching Outlook

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



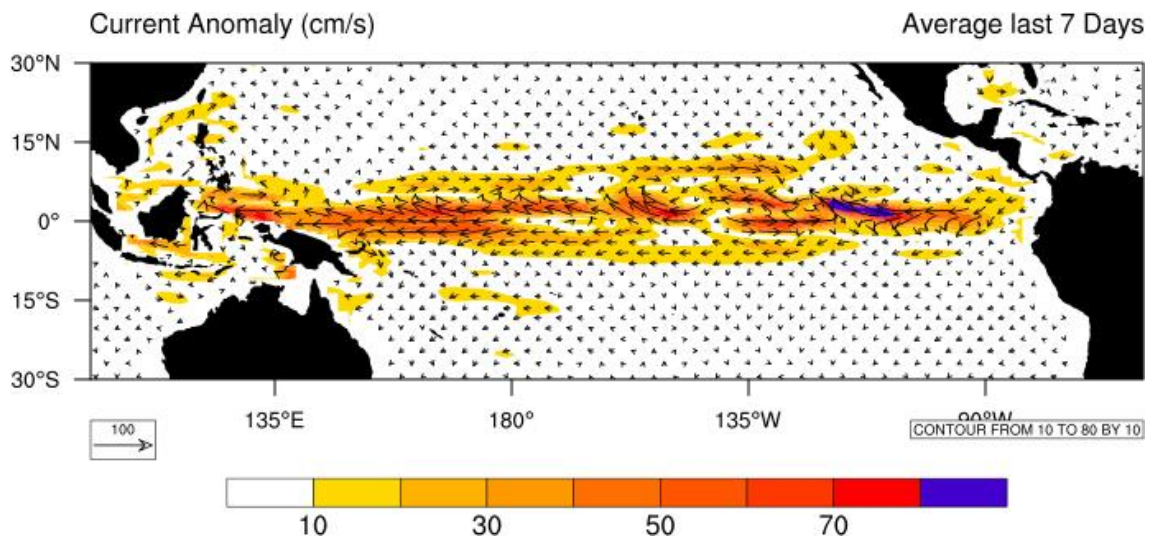
OCEAN CONDITIONS

OCEAN SURFACE CURRENTS AND SEA LEVEL



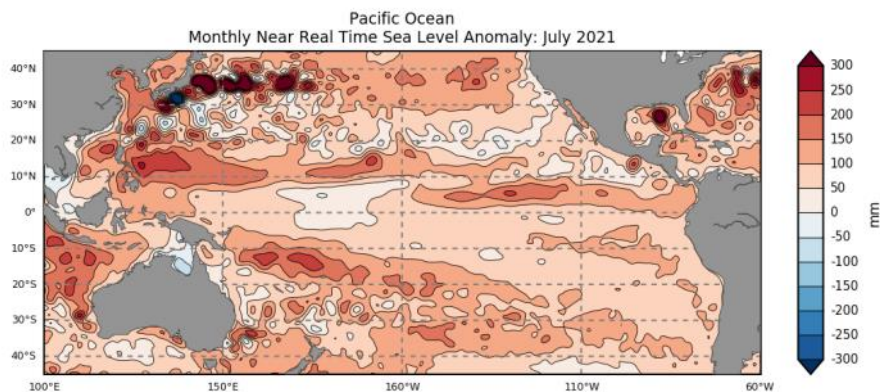
Sea level was above normal for most of the COSPPac countries. The highest anomalies above +250mm were in the southern and eastern Solomon Islands and northern Fiji. Patches of near normal to below normal Sea levels were observed further north and south of the COSPPac countries.

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

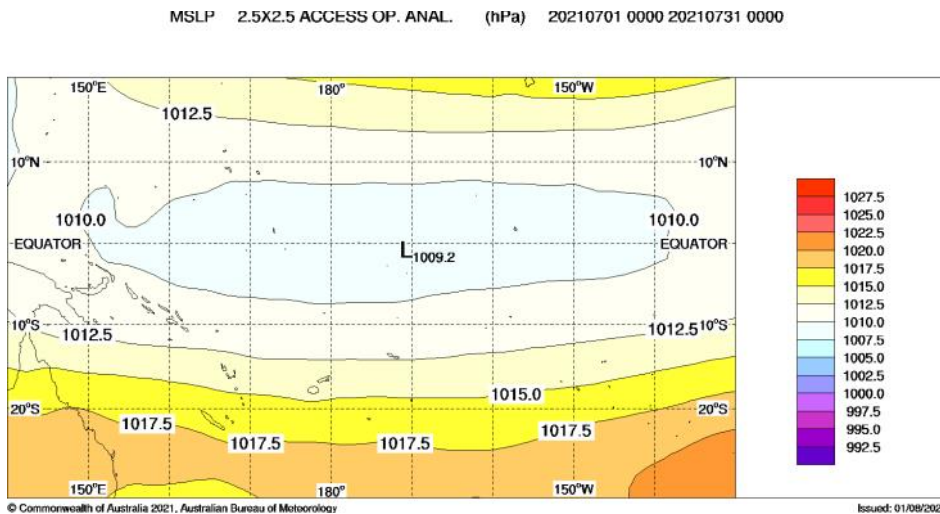
AVISO Ssalto/Duacs SLA

MEAN SEA LEVEL PRESSURE

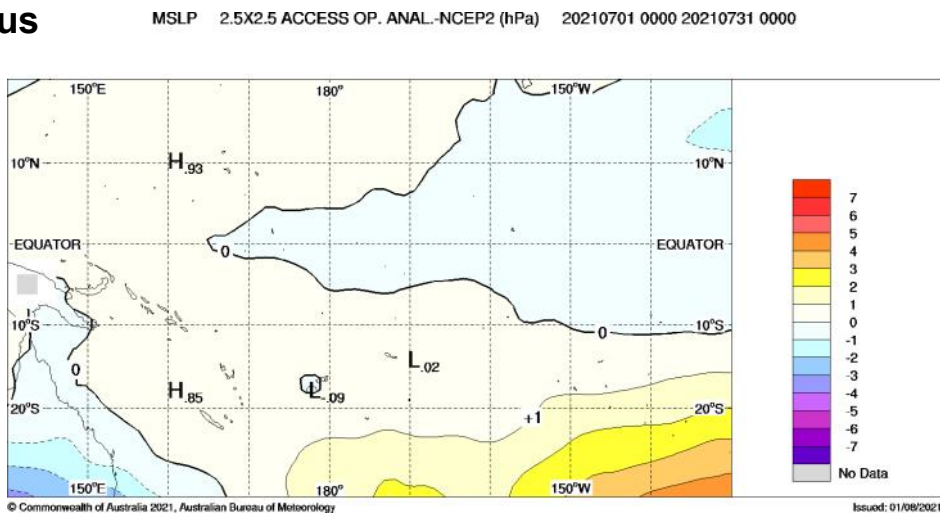
The July mean sea level pressure (MSLP) anomaly map shows negative anomalies over Australia and northwest of 10°N and 135°W. Positive anomalies were present over French Polynesia and New Zealand.

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

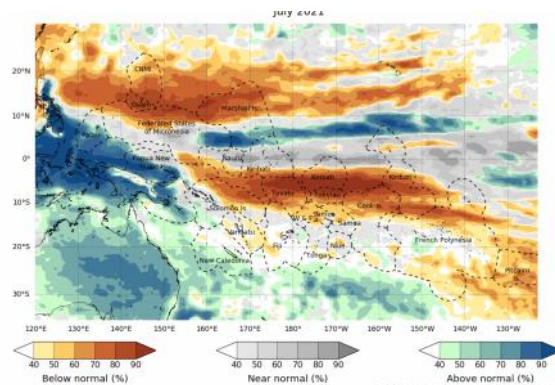
August—October 2021



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

The three-month rainfall outlook (August-October) shows a strong dry signal affecting southern CNMI, Guam, FSM, most of 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, PNG, most of Solomon Islands, New Caledonia, Vanuatu, Fiji, and southern Cook Islands. Above normal maximum and minimum temperatures are favoured for many 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 August to October favours below normal rainfall for FSM, Guam, CNMI, central and northern Marshall Islands, the northeastern PNG Islands, western and 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 southern Marshall Islands, Highlands, Western, Southern and parts of Momase regions of PNG, southern Solomon Islands, New Caledonia, Vanuatu, Fiji, Tonga, and Niue.

The SCOPIC statistical model for August to October favours normal rainfall or climatology for most of the COSPPac countries. Above normal rainfall is favoured for parts of central Solomon Islands and, northern and southern Vanuatu.

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

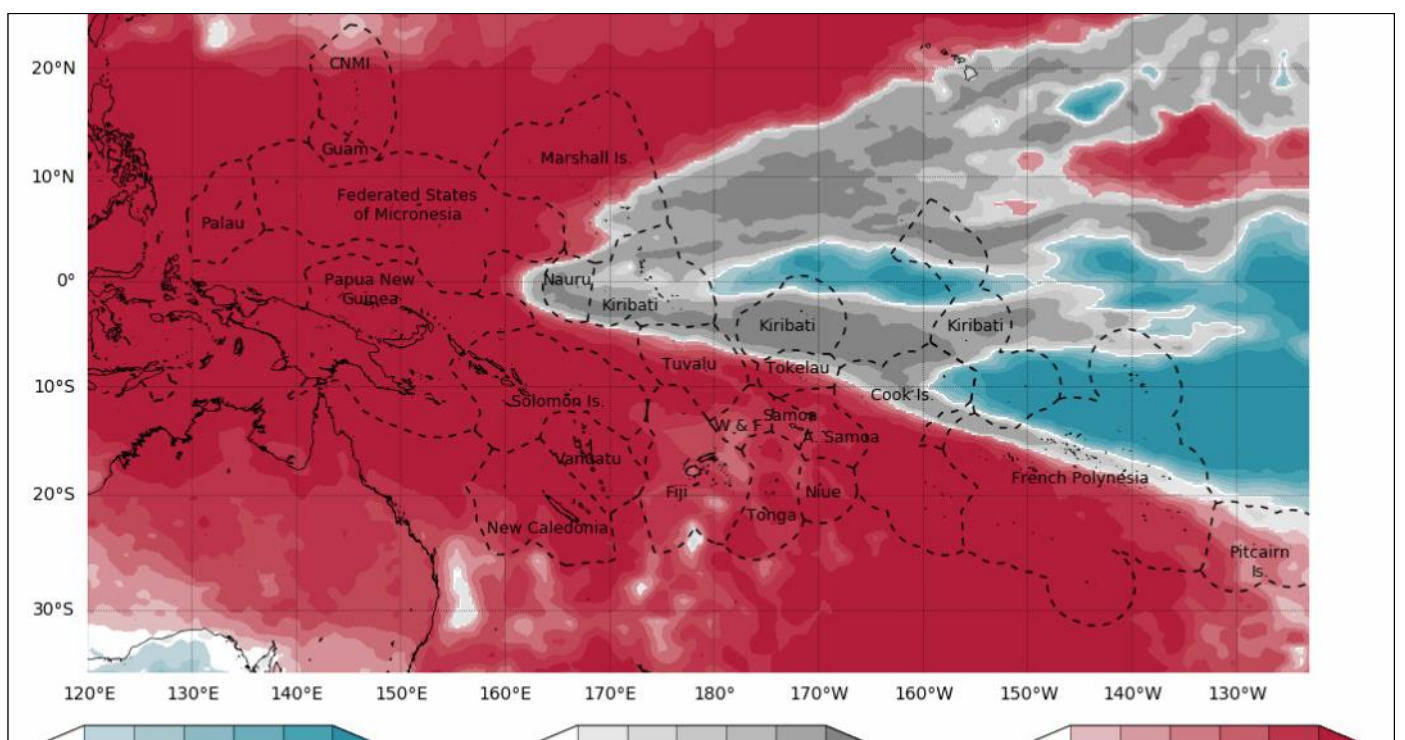
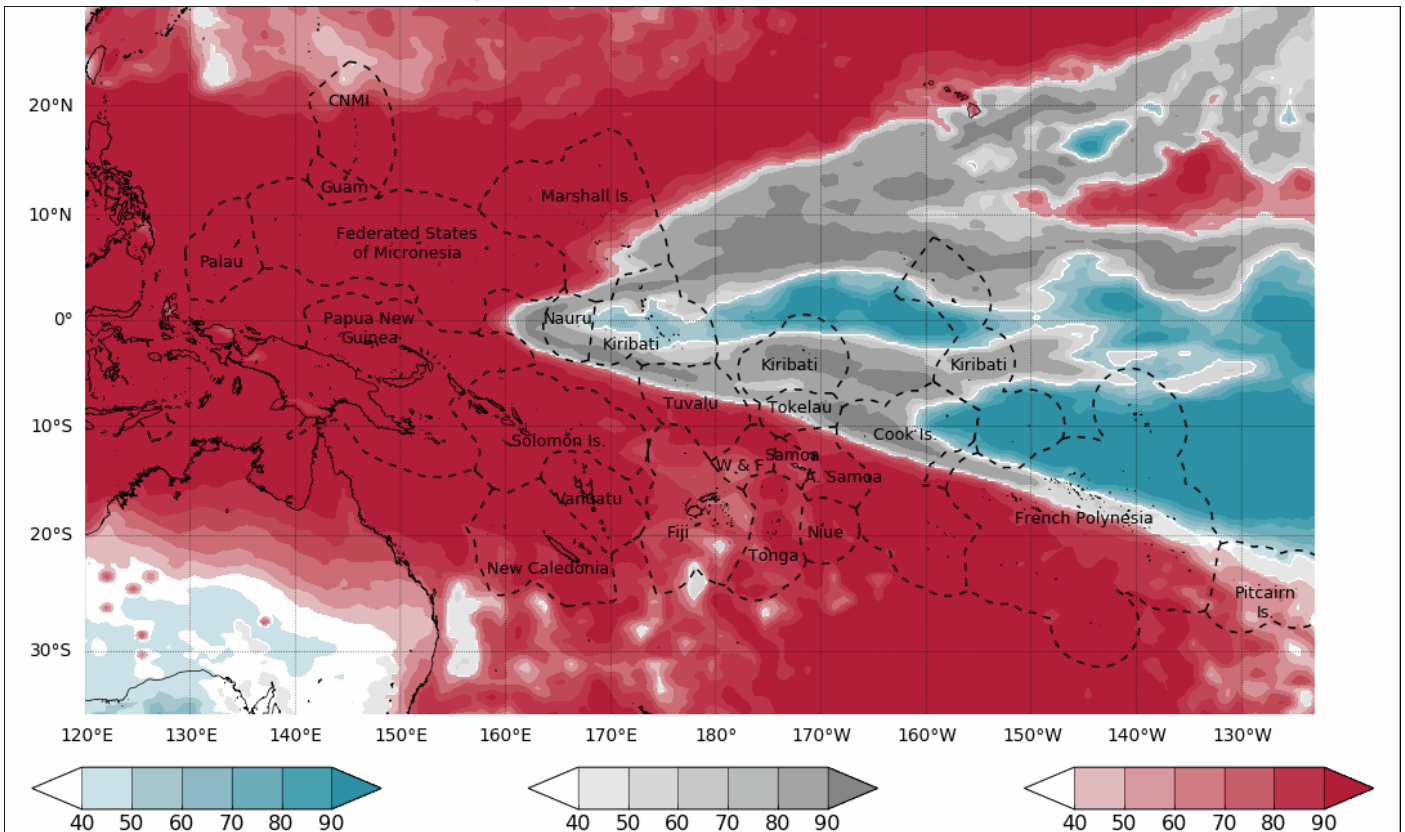
For August to October 2021, the dynamical models agree on above normal rainfall for Palau, southern Marshall Islands, most of PNG, southern Solomon Islands, New Caledonia, Vanuatu, Fiji, Tonga, Niue and southern Cook Islands. The models also agree on below normal rainfall for FSM, CNMI, Guam, central 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

August—October 2021



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



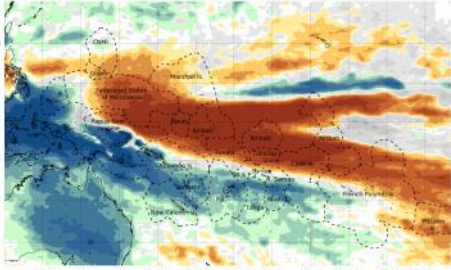
SEASONAL RAINFALL OUTLOOK

August—October 2021

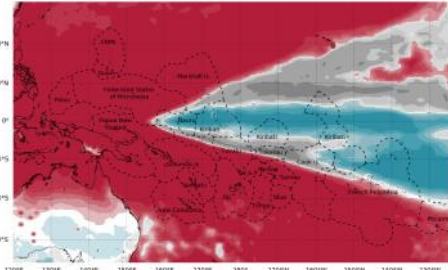


Seasonal ACCESS-S maps

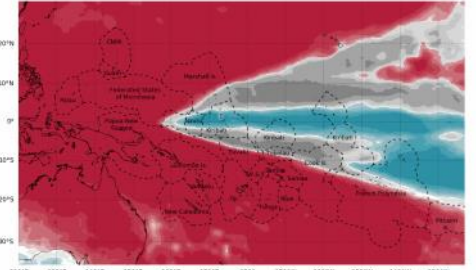
Tercile rainfall probabilities for August to October 2021



Tercile maximum temperature probabilities for August to October 2021

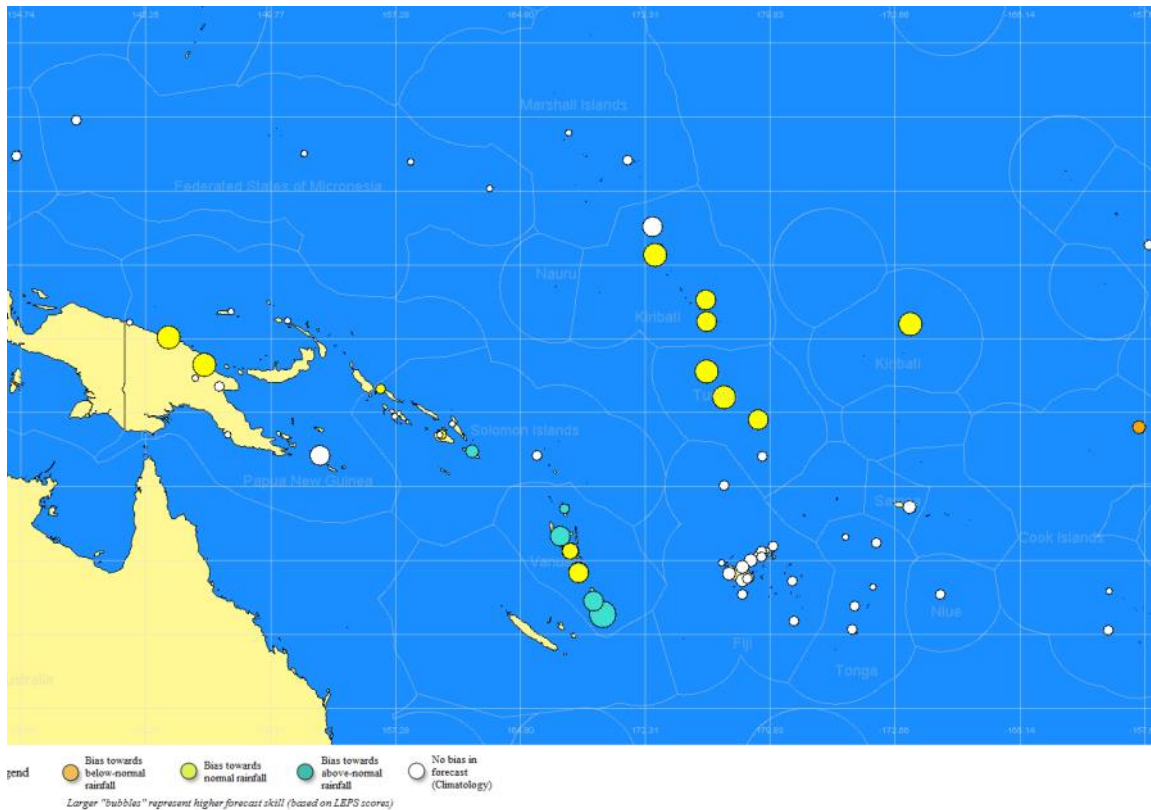


Tercile minimum temperature probabilities for August to October 2021



© Commonwealth of Australia 2021, Australian Bureau of Meteorology. Model: ACCESS-S1. Base period: 1990-2012. Issued: 29/07/2021. Model run: 26/07/2021. © Commonwealth of Australia 2021, Australian Bureau of Meteorology. Model: ACCESS-S1. Base period: 1990-2012. Issued: 29/07/2021. Model run: 26/07/2021. © Commonwealth of Australia 2021, Australian Bureau of Meteorology. Model: ACCESS-S1. Base period: 1990-2012. Issued: 29/07/2021. Model run: 26/07/2021.

SCOPIC



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

SEASONAL RAINFALL OUTLOOK

August—October 2021



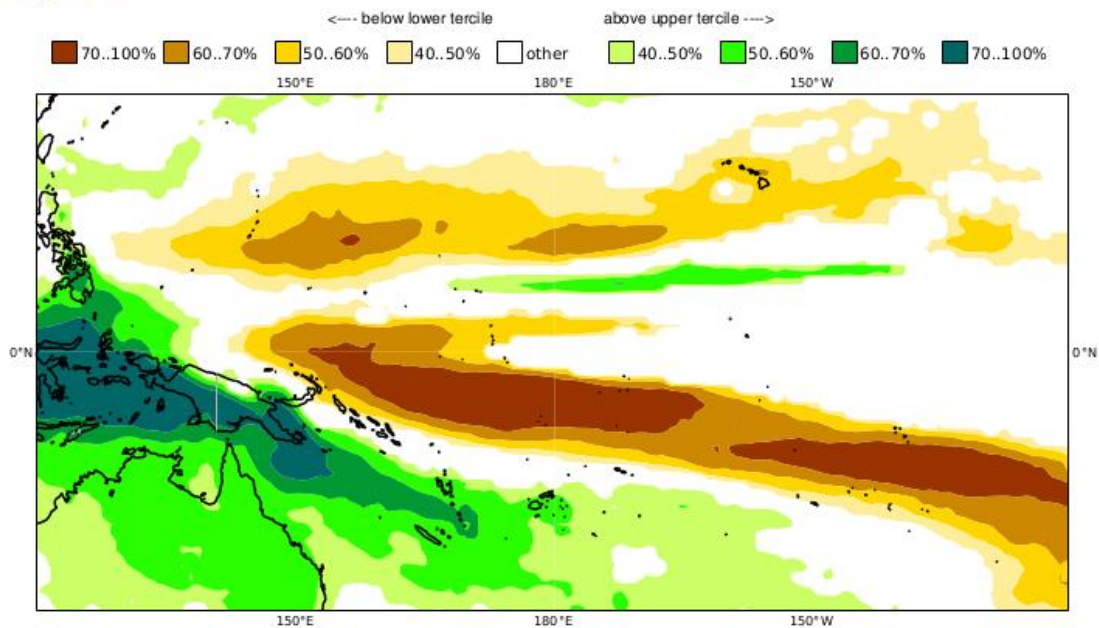
Copernicus (C3S multi-system)-Rainfall

Prob(most likely category of precipitation)

ASO 2021

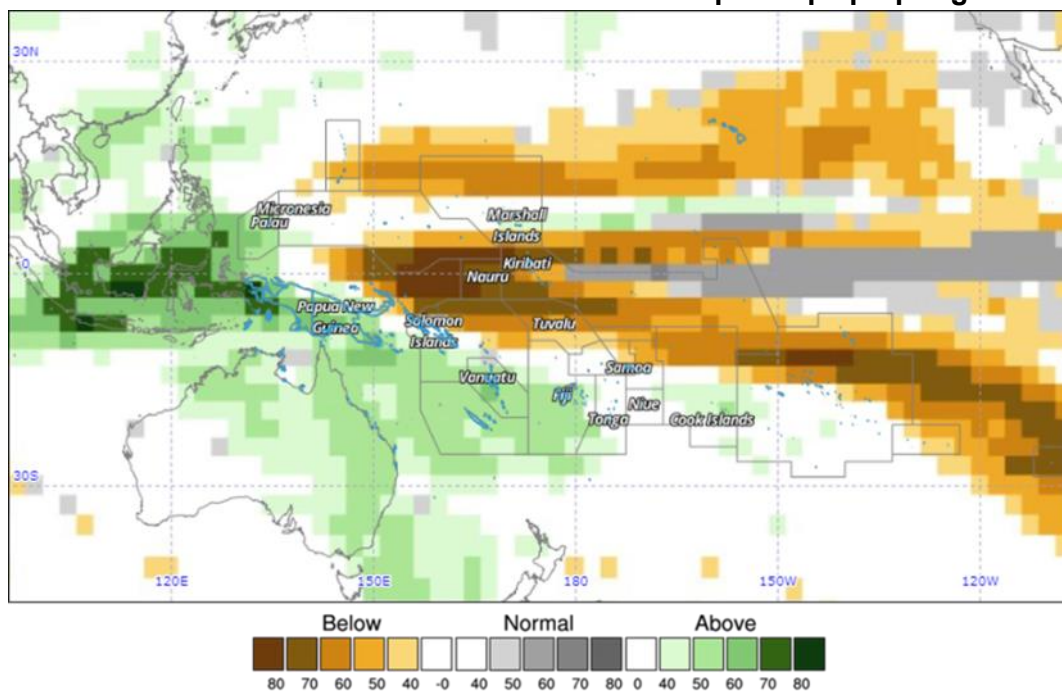
Nominal forecast start: 01/07/21

Unweighted mean



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

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



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

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

Generated using CLIK® (2021-8-4)

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TROPICAL CYCLONE

2020/2021 Season

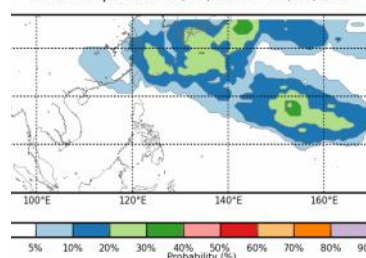


In the southwest Pacific, the tropical cyclone season 2020-21 ended on the 30th April, 2021. The outlook for the season was normal or slightly below normal Tropical Cyclone activity. Seven named TCs formed east of the longitude of the tip of Cape York, Australia. The long-term seasonal average for the 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.

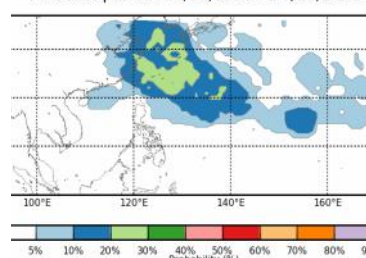
The weekly tropical cyclone forecast from the ACCESS-S model shows increased risk in the weeks beginning 07 August and ending 20 August 2021 for the northwest Pacific, especially in areas around southeast Japan and Marshall Islands.

ACCESS-S Weekly Forecasts –Northwest Pacific

Tropical Cyclone probabilities in the Northern Pac
Forecast period: 07/08/2021 - 13/08/2021

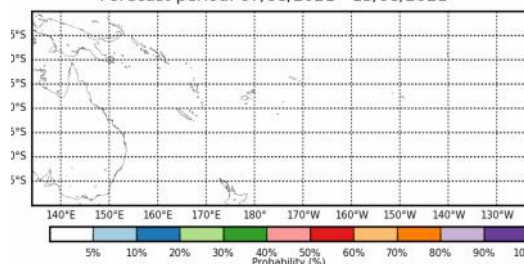


Tropical Cyclone probabilities in the Northern Pac
Forecast period: 14/08/2021 - 20/08/2021

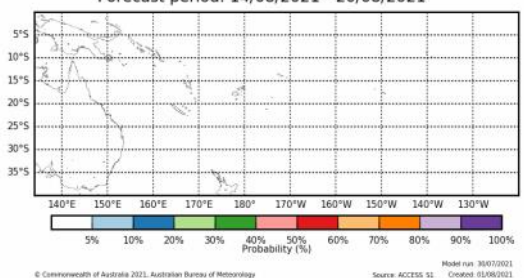


ACCESS-S Weekly Forecasts –Southwest Pacific

Tropical Cyclone probabilities in the South Pacific
Forecast period: 07/08/2021 - 13/08/2021



Tropical Cyclone probabilities in the South Pacific
Forecast period: 14/08/2021 - 20/08/2021



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.

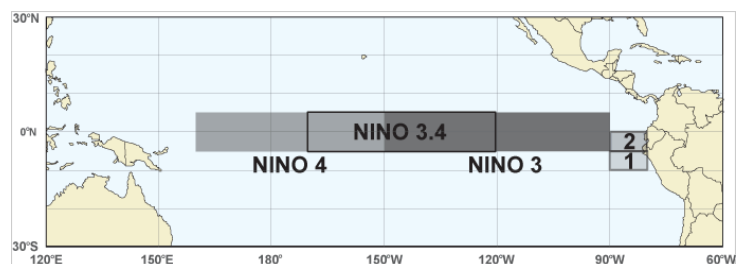
20 degrees Celsius Isotherm Depth

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