

# Monthly Climate Bulletin

April 2022

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Photo Credit: Vanuatu Meteorological and Geohazard Department - impacts of Tropical Cyclone Dovi 9 Feb 2022. Tropical Cyclones for South West Pacific ends in April





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- The 2021-2022 La Niña event continues in the tropical Pacific, with little change in strength in the past few weeks.
- The Madden-Julian Oscillation (MJO) has recently been weak and is expected to remain mostly weak for the coming fortnight.
- The Intertropical Convergence Zone (ITCZ) was active and shifted north over the central equatorial Pacific, while the South Pacific Convergence Zone (SPCZ) was active shifted southwest in the western Pacific.
- The SSTs for April 2022 show cool SST anomalies across the central to eastern equatorial Pacific and along the coastline of South America, and mostly weak warm SST anomalies over parts of the Maritime Continent.
- Coral bleaching status for 08th May 2022 has warning 'Alert Level 2' for southeast PNG, with 'Alert Level 1' for southwestern Solomon Islands, and 'No stress' or 'Watch' for rest of CO-SPPac partner countries.
- For May-July 2022, the dynamical models (including SCOPIC) agree on above normal rainfall for most countries in the south Pacific including CNMI and southern RMI in the north. The models also agree on below normal rainfall is very likely for PNG Islands, Nauru, Kiribati, Tuvalu, Tokelau, Wallis and Futuna, Samoa, American Samoa, northern and central Cook Islands, and the northern and central French Polynesia.
- The southwest Pacific 2021-22 tropical cyclone has ended on 30th April 2022 with seven TCs events of which two reached category three. The weekly tropical cyclone forecast from the ACCESS-S model shows reduced risk to 29 May 2022 for northwest Pacific.



# EL NIÑO–SOUTHERN OSCILLATION

## La Niña maintains strength

Click link to access [Climate Driver Update issued on 10 May 2022](#)

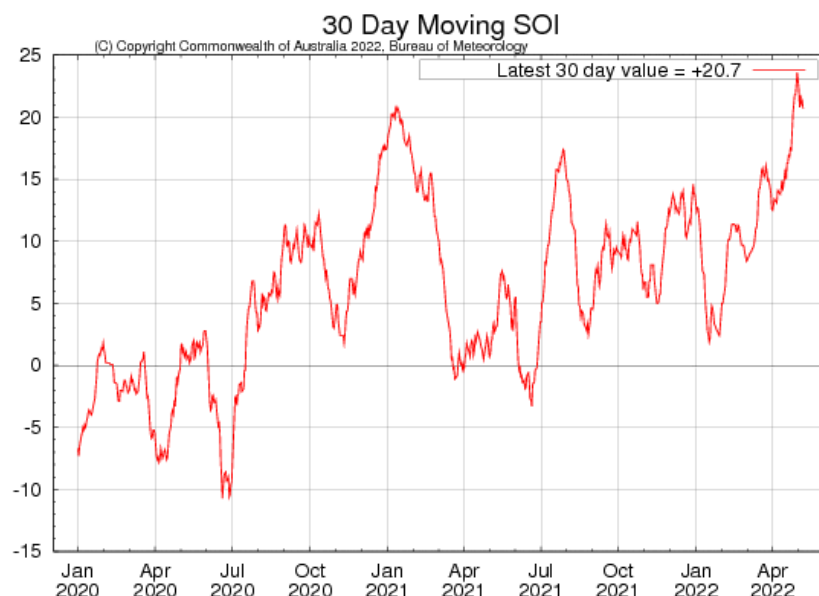
The 2021-2022 La Niña event continues in the tropical Pacific, with little change in strength in the past few weeks. Several indicators of La Niña, including tropical Pacific sea surface temperatures, cloudiness near the Date Line, and the Southern Oscillation Index (SOI), have maintained or slightly increased their strength over the past fortnight. However, beneath the surface of the tropical Pacific, waters have warmed closer to neutral El Niño-Southern Oscillation (ENSO) levels.

Most climate models surveyed by the Bureau indicate a return to neutral ENSO by the early southern hemisphere winter (June-July). Only one of seven models continues La Niña conditions through the southern winter. La Niña conditions increase the chances of above average rainfall for much of eastern Australia and the western Pacific, while neutral ENSO has little influence on rainfall patterns.

The Indian Ocean Dipole (IOD) is neutral. All climate model outlooks surveyed suggest a negative IOD may develop in the coming months. While model outlooks have low accuracy at this time of year and hence some caution should be taken with IOD outlooks beyond May, there is strong forecast consistency across international models. A negative IOD increases the chances of above average winter-spring rainfall for much of Australia. It also increases the chances of warmer days and nights for northern Australia.

The Southern Annular Mode (SAM) index is currently positive and is forecast to remain positive for the coming four weeks. During autumn SAM typically has a weaker influence on Australian rainfall, but as we approach winter, positive SAM often has a drying influence for parts of south-west and south-east Australia.

The 30-day Southern Oscillation Index (SOI) for the 30 days ending 08 May was +20.7. The 90-day SOI value was +14.2. The 30-day SOI was persistently strong during April and remains firmly at La Niña levels. The 90-day value also continues to be typical of La Niña. The 30-day Southern Oscillation Index (SOI) for the 30 days ending 27 February was +9.6. The 90-day SOI value was +8.6. The 30-day SOI has dropped slightly over the past week, but remains within La Niña thresholds. It is not uncommon during the northern Australian wet season for the SOI to experience fluctuations from transient tropical weather. The 90-day value also continues to be typical of La Niña.



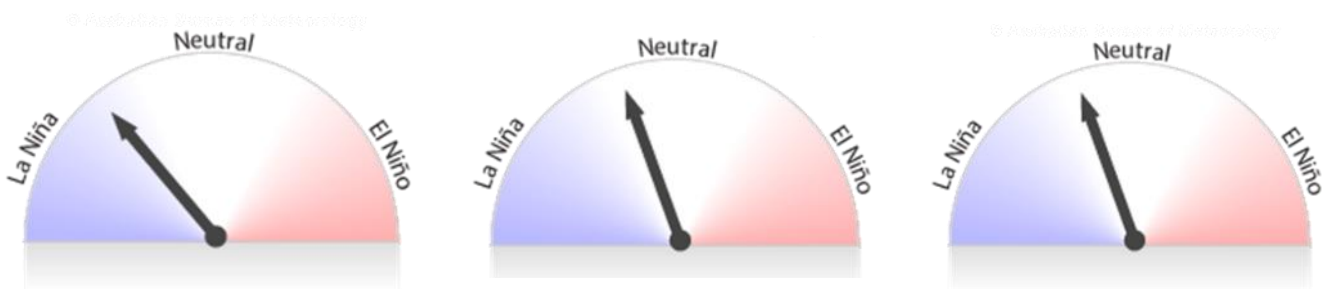


# EL NIÑO–SOUTHERN OSCILLATION

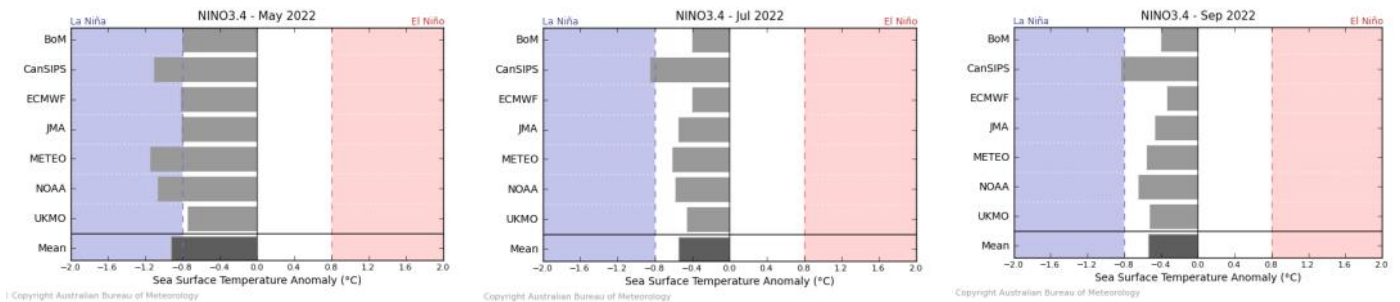
La Niña maintains strength

Click link to access [Climate Driver Update issued on 10 May 2022](#)

## Bureau of Meteorology NINO3.4 ENSO Model Outlooks for May, July and September



## Bureau of Meteorology NINO3.4 International Model Outlooks



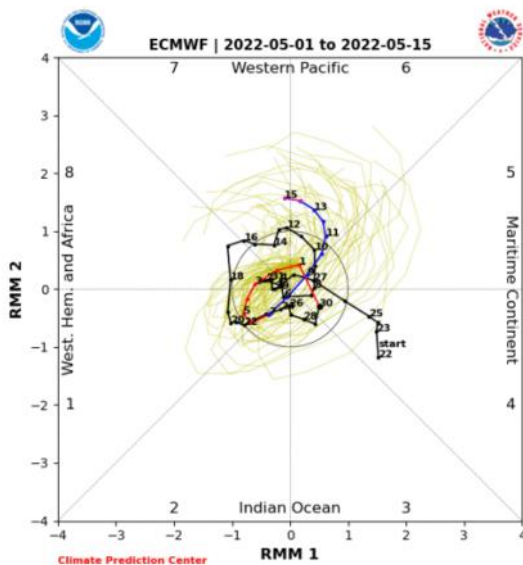
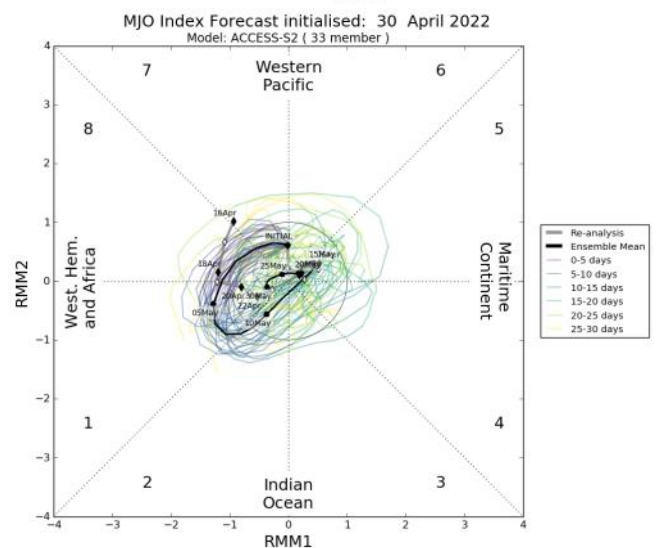
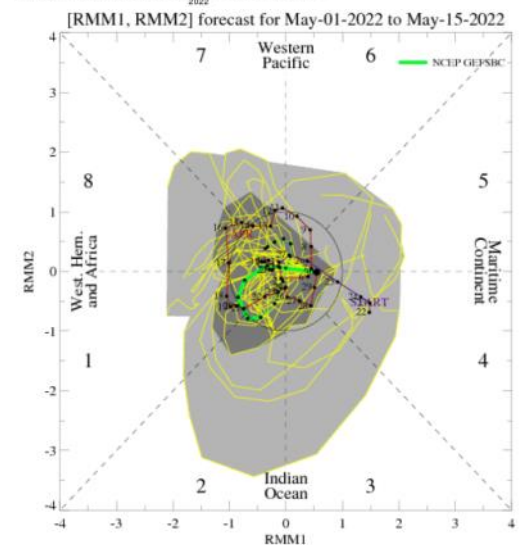
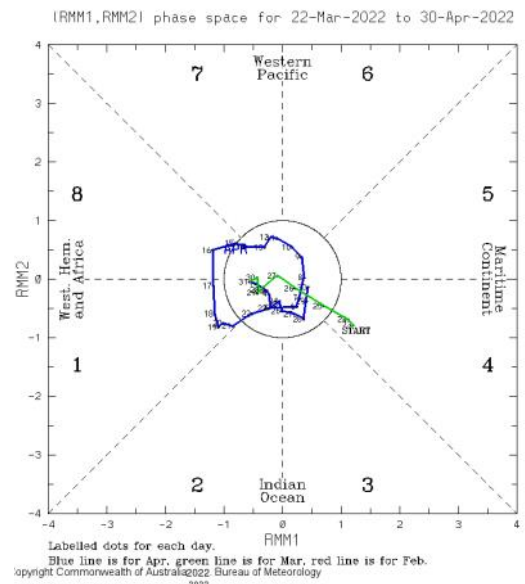
Bureau of Meteorology summary of international model outlooks for NINO3.4: <http://www.bom.gov.au/climate/model-summary/#tabs=Pacific-Ocean>

# MADDEN–JULIAN OSCILLATION

Click link to access [Tropical Climate Update](#) [Issued on Tuesday 03 May 2022]

During the month of April, a weak pulse of Madden-Julian Oscillation (MJO) occurred during the first two and last week of the month. There was a period when the MJO was active during the third week of April over Africa region. The Madden-Julian Oscillation (MJO) has recently been weak and is expected to remain mostly weak for the coming fortnight. Some climate model outlooks show the MJO could develop over the Western Pacific next week, but this scenario would not typically cause strong impacts on northern Australia at this time of year. As such, the MJO is unlikely to exert a significant influence on rainfall patterns across northern Australia this coming fortnight.

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



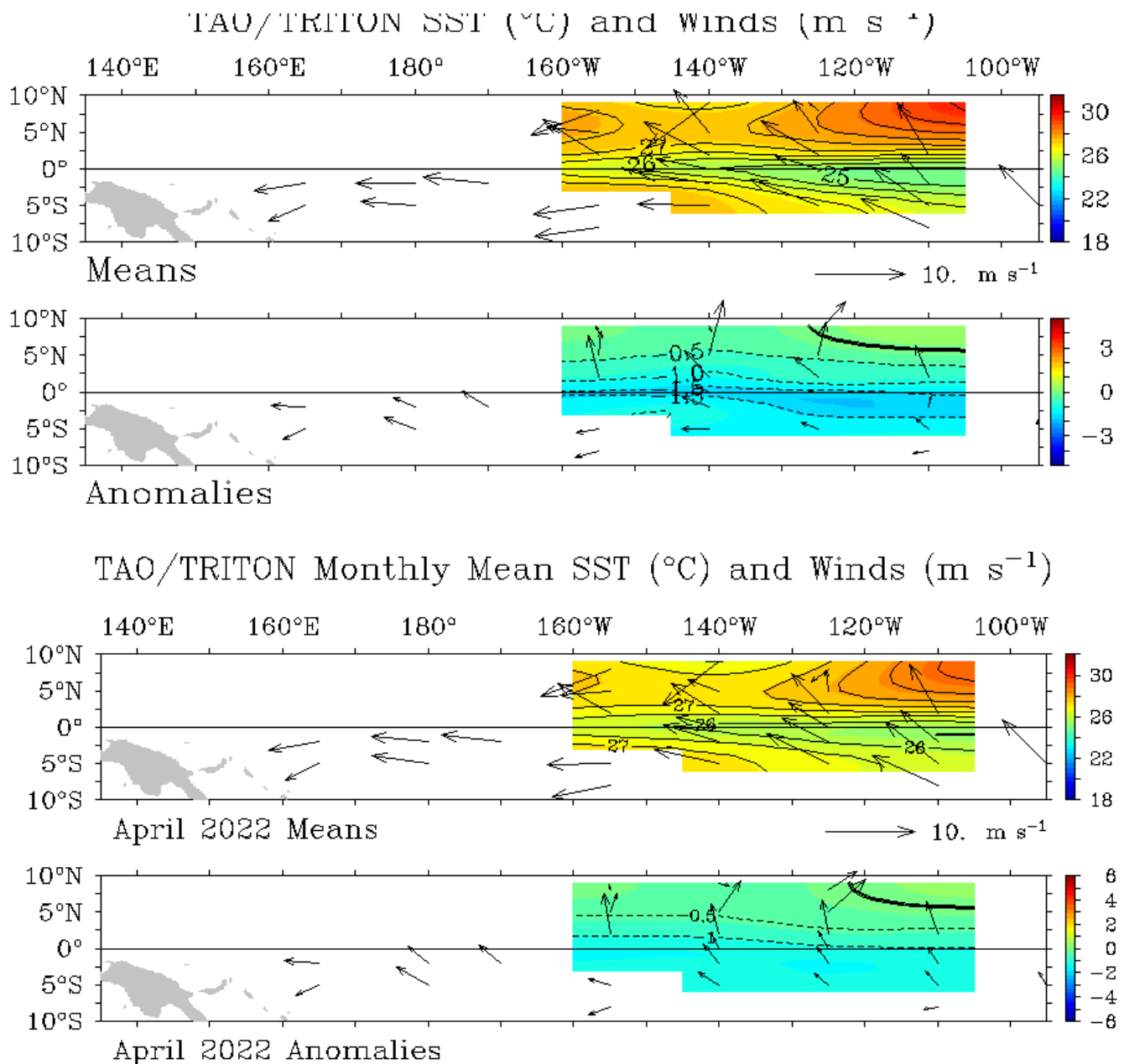


# WIND

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

The trade winds in April were stronger over the equatorial Pacific especially over the central and western equatorial Pacific.

During La Niña events, there is a sustained strengthening of the trade winds across much of the tropical Pacific, while during El Niño events there is a sustained weakening, or even reversal, of the trade winds.



# CLOUD AND RAINFALL

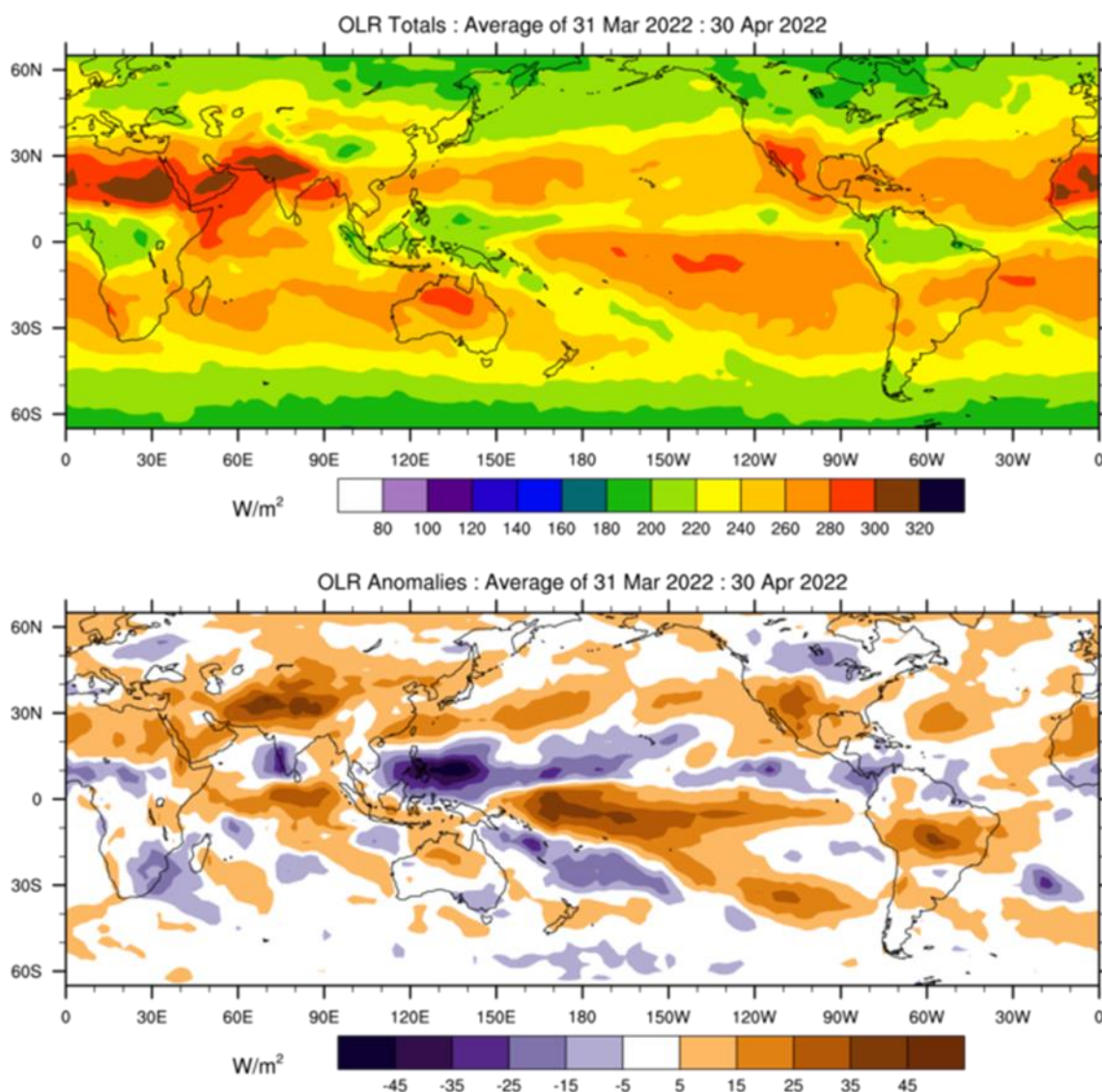
Click link to access [OLR](#)



The April 30-day OLR total and anomaly maps suggest the Intertropical Convergence Zone (ITCZ) was active and shifted north over the central equatorial Pacific, while the South Pacific Convergence Zone (SPCZ) was active shifted southwest in the western Pacific around New Caledonia, Vanuatu, Fiji and Tonga.

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.

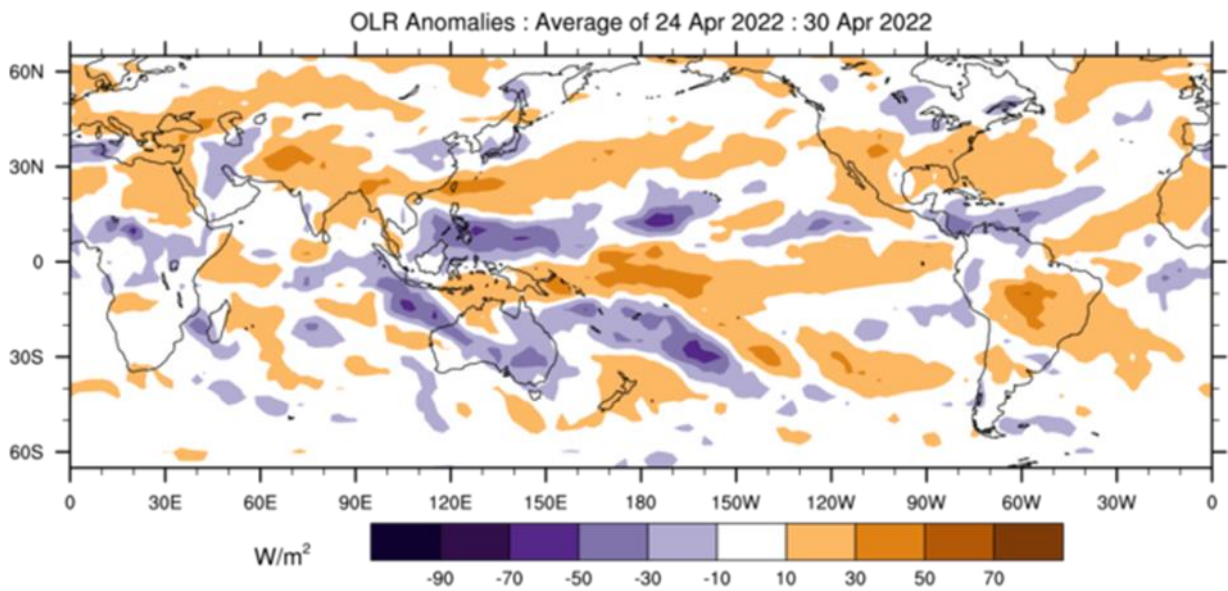
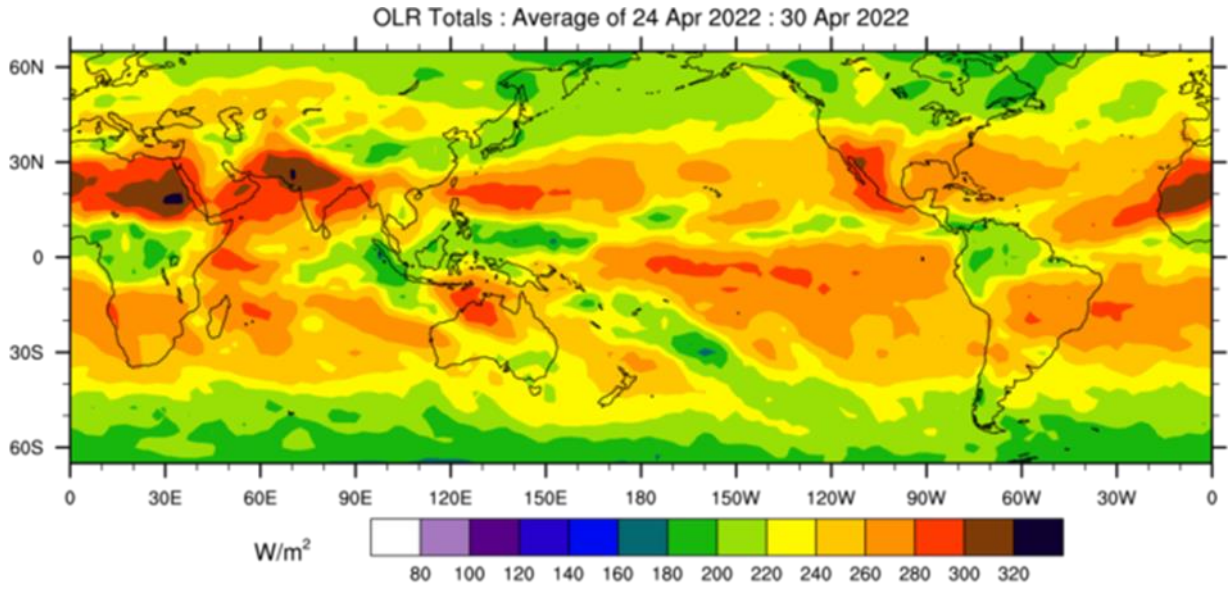
## OLR Total and Anomalies, 30 Day OLR



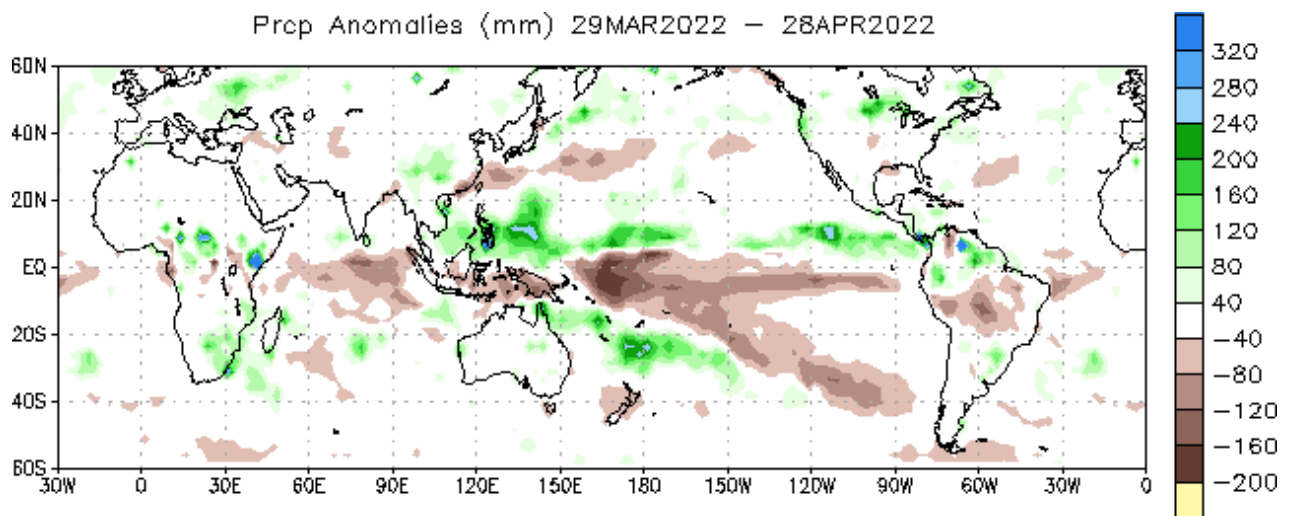
(C) Copyright Commonwealth of Australia 2022. Bureau of Meteorology



# OLR Total and Anomalies, 7 Day OLR

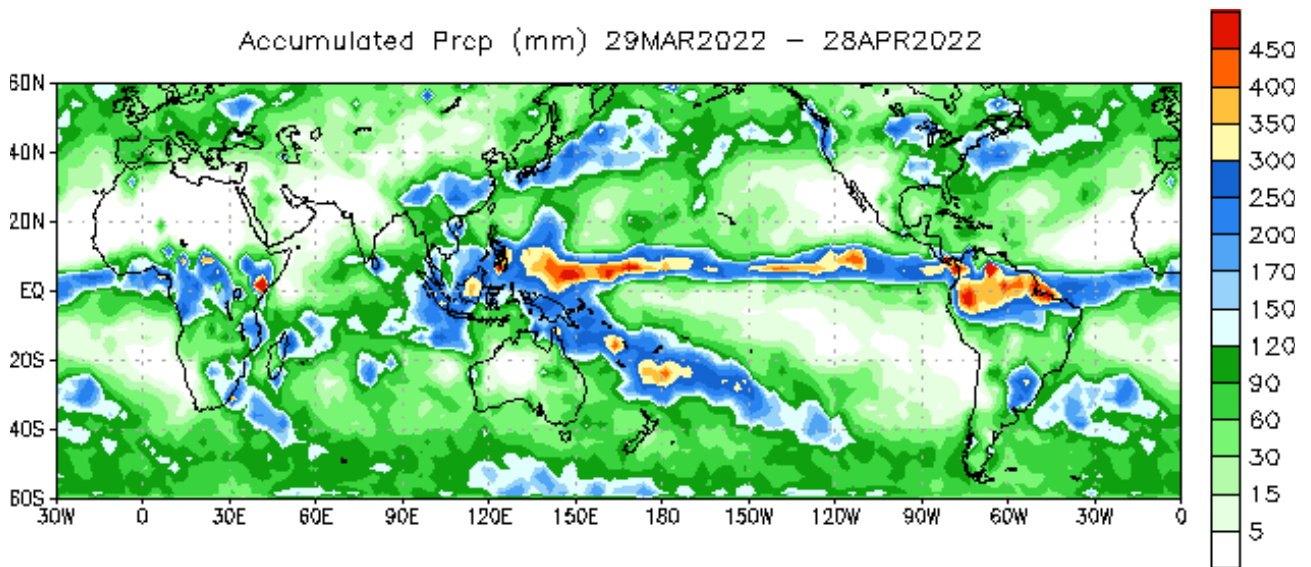


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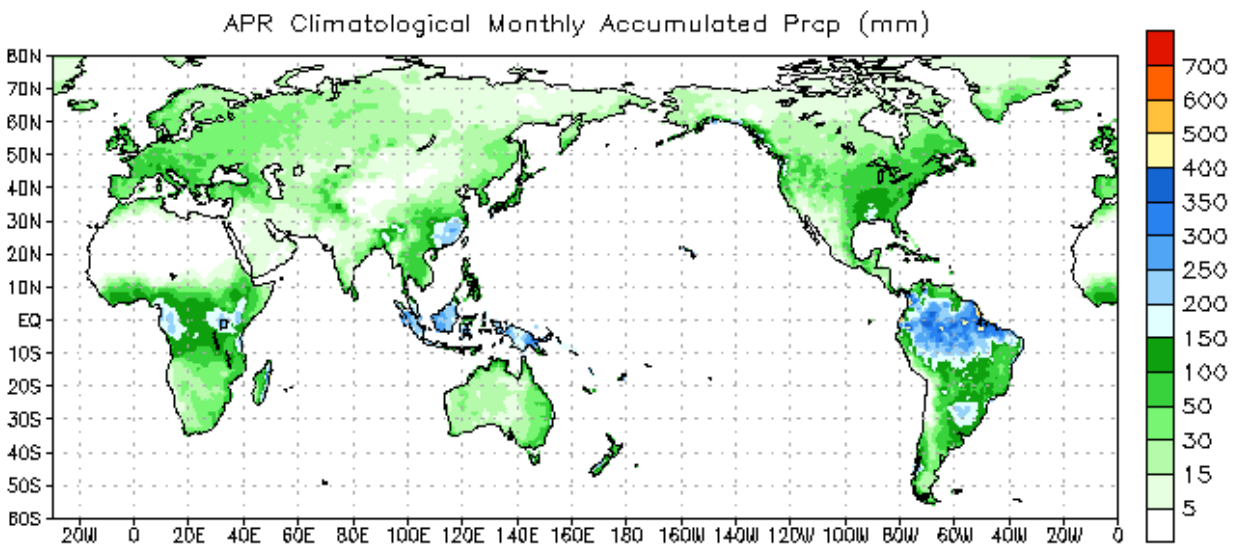


Data Source: NCEP CMAP Precipitation Climatology (1991–2020)

## 30-Day Rainfall Anomalies



Data Source: NCEP CMAP Precipitation



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

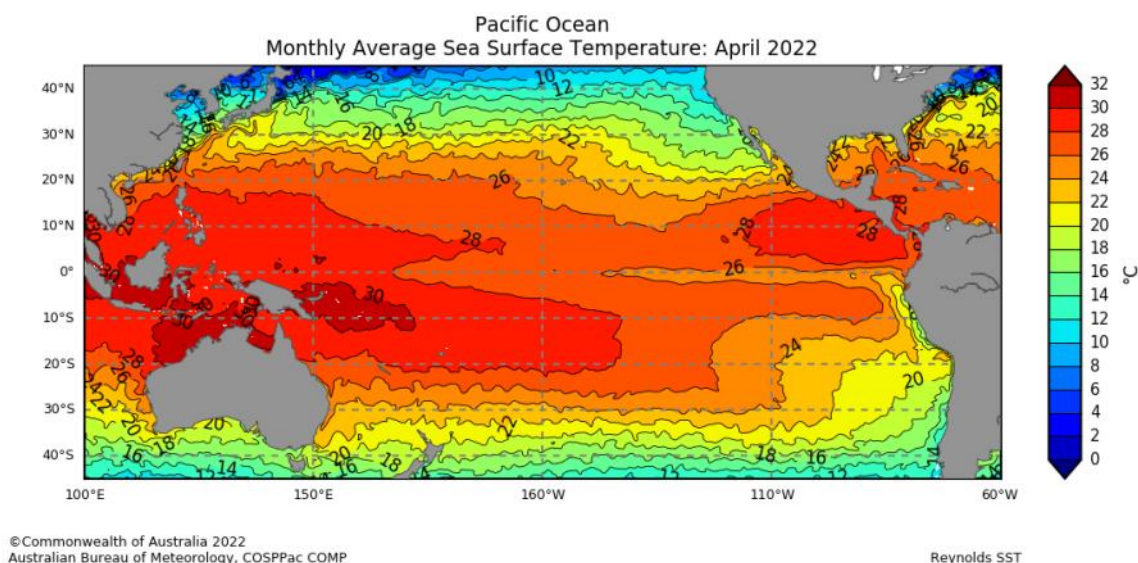


Click link to access [Pacific Community COSPPac Ocean Portal](#)

The SSTs for April 2022 show cool SST anomalies across the central to eastern equatorial Pacific and along the coastline of South America, and mostly weak warm SST anomalies over parts of the Maritime Continent. Compared to March, cool anomalies in the central to eastern tropical Pacific have strengthened, while in the west SST anomalies are closer to average than they were during March.

The highest on record deciles for April, occurred in southeastern Papua New Guinea, Coral Sea region, western Solomon Islands, parts of New Caledonia, Vanuatu, Fiji, Tonga, Niue and southern Cook Islands. Regions of very much above average (deciles 10) SSTs spanned across southeast PNG and extend southeastward towards southern Cook Islands. The regions of above average (deciles 8-9) for April occurred across majority of the COSPPac countries from Palau to southern Cook Islands. In contrast, average (4-7) SSTs were observed in eastern FSM, RMI, Tuvalu, northern Samoa, central Cook Islands and southern French Polynesia. Below average (deciles 2-3) to very much below average (decile 1) occurred over Nauru, Kiribati, northern Cook Islands and central and northern French Polynesia.

### Mean Sea Surface Temperature

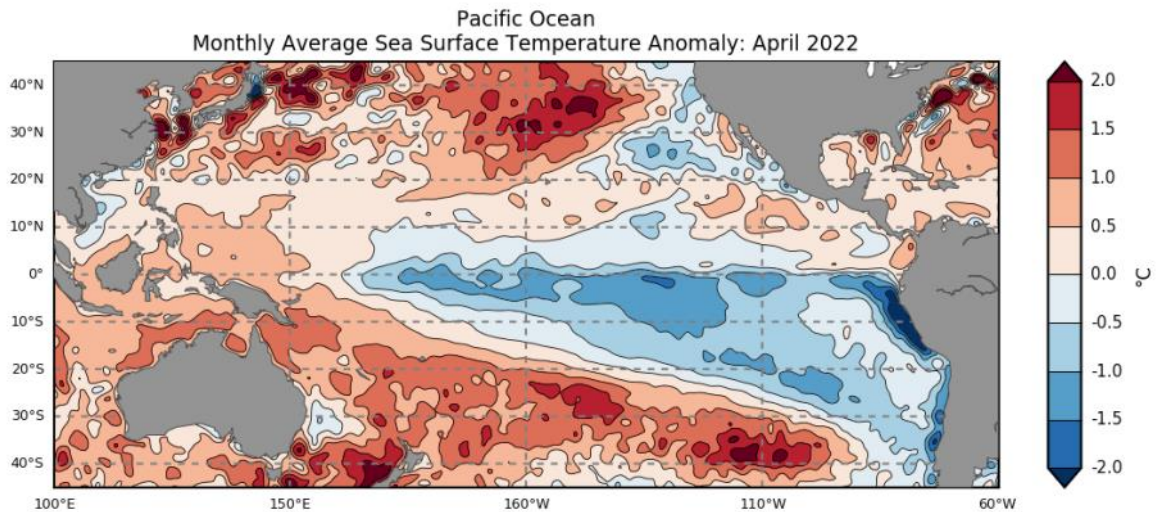


# OCEAN CONDITIONS

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



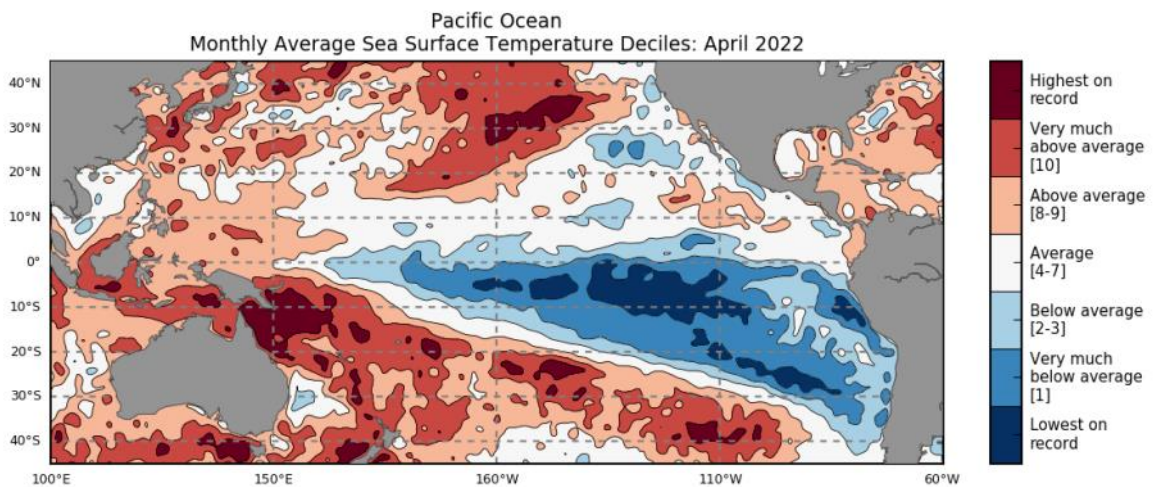
## Anomalous Sea Surface Temperature



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Australian Bureau of Meteorology, COSPPac COMP

Reynolds SST

## Sea Surface Temperatures Deciles



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Australian Bureau of Meteorology, COSPPac COMP

Reynolds SST

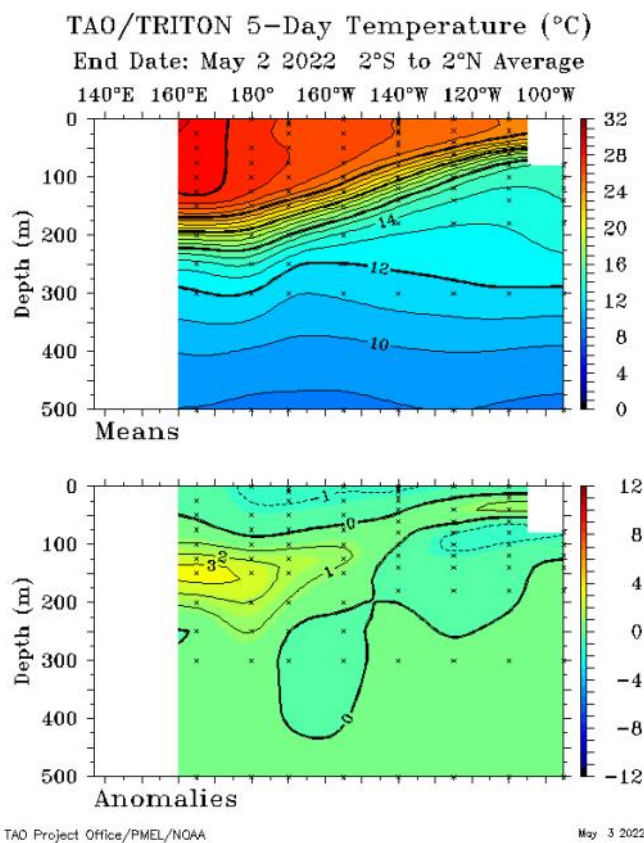
# OCEAN CONDITIONS

## SUB SURFACE

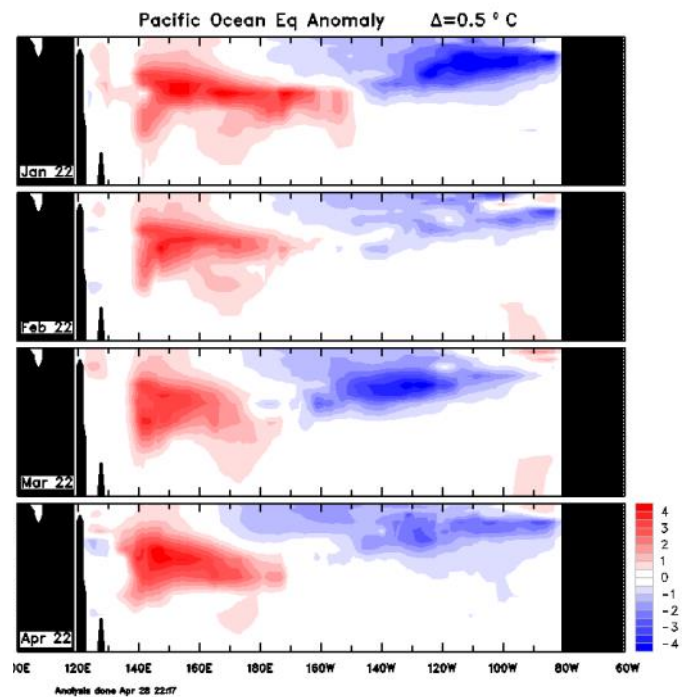


The four-month sequence of equatorial Pacific sub-surface temperature anomalies (to April 2022) shows cool anomalies in the central and eastern tropical Pacific for April were generally weaker than those for March, despite an increase in spatial extent. For April, cool anomalies were present across most of the top 150 m of water from the International Date Line eastwards, reaching 2.5 °C to 3 °C cooler than average in some areas east of 140°W. Warm anomalies continue west of the International Date Line, reaching 3.5 °C warmer than between around 100 m and 200 m below the surface. The distribution of warm anomalies in the western Pacific is similar to that during March, but the strength of anomalies has increased slightly.

**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

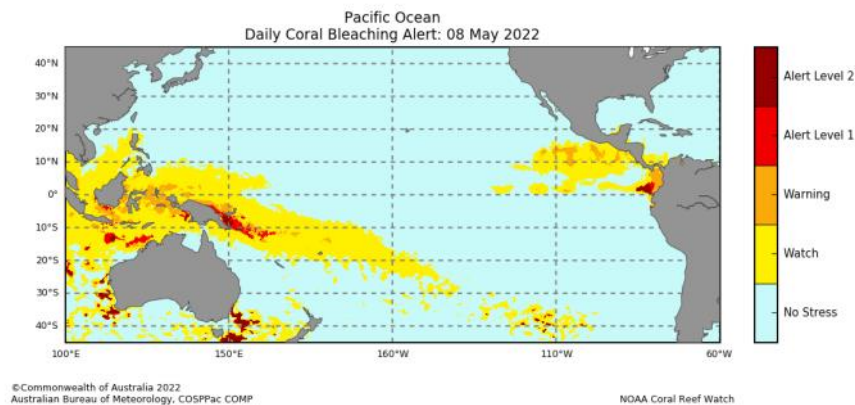
## CORAL BLEACHING



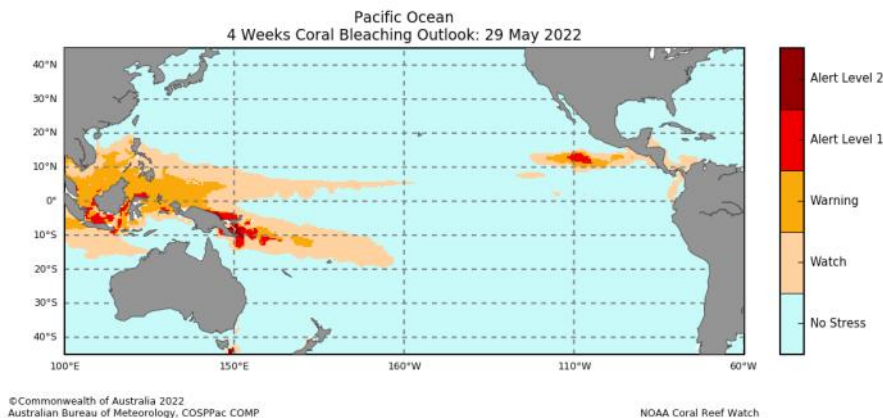
The daily Coral Bleaching Alert for 08th April 2022 shows 'Alert Level 2' for parts of southeast PNG mainland. 'Alert 1' for parts of southeast PNG and southwestern Solomon Islands. 'No Stress or Watch' for the rest of COSPPac partner countries. The four weeks Coral Bleaching Outlook to 29th May 2022 shows 'Alert Level 2' for southeastern PNG mainland. 'Alert Level 1' for parts of southeastern PNG and western Solomon Islands. 'Warning' alert for Palau and southern FSM. 'No Stress or Watch' for the rest of COSPPac partner countries.

### Daily Coral Bleaching Alert

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



### 4 Weeks Coral Bleaching Outlook



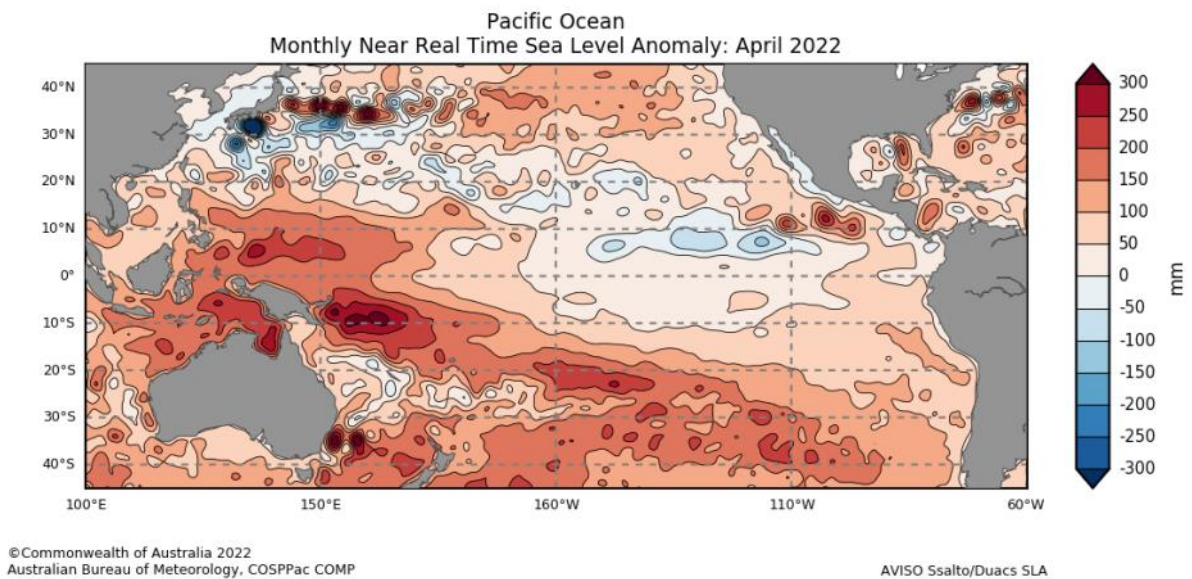
# OCEAN CONDITIONS

## OCEAN SURFACE CURRENTS AND SEA LEVEL

Sea level was above normal for most of the COSPPac countries. The highest anomalies above 300mm were observed in central Solomon Islands and southeast PNG, 200mm and 250mm in Palau, FSM and northern Vanuatu and southern Cook Islands. Sea level of 150mm to 200mm were observed for rest of FSM, RMI, PNG, Vanuatu, Fiji, Tonga, Samoa while between 100mm and 150mm for Nauru, Tuvalu, Kiribati and northern Cook Islands and French Polynesia. Patches of near normal to below normal sea levels were observed over parts of eastern Kiribati.

### Monthly Sea Level Anomalies

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

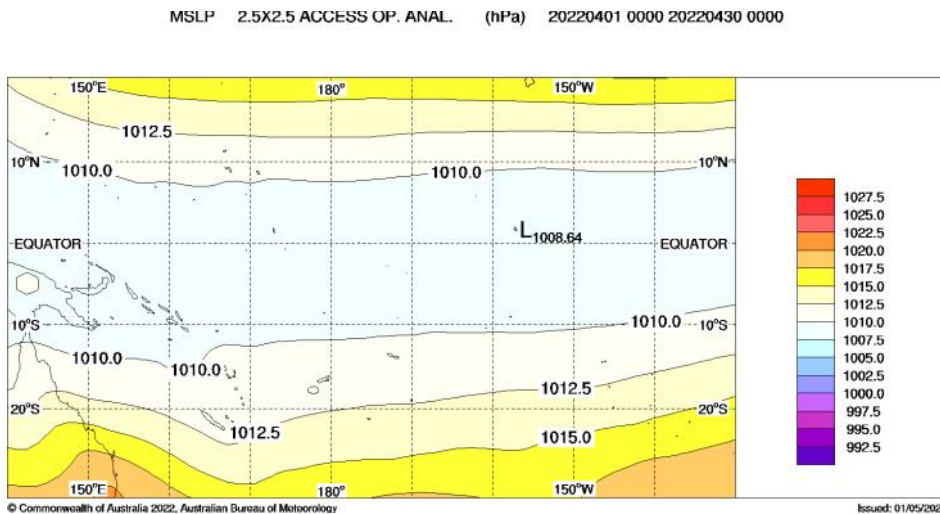


# MEAN SEA LEVEL PRESSURE

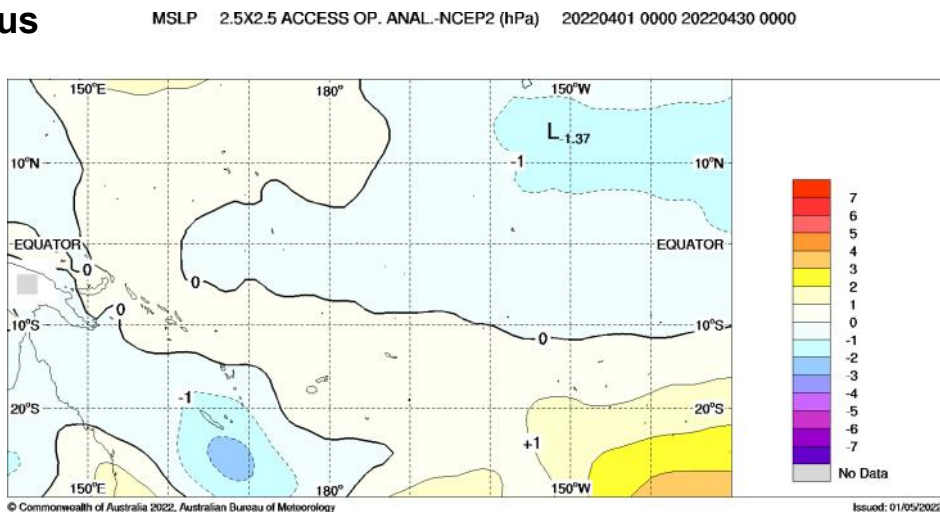
The April mean sea level pressure (MSLP) anomaly map shows mostly positive anomalies of -1 or greater over southern Cook Islands and French Polynesia. Negative anomalies of +1 were observed in New Caledonia.

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

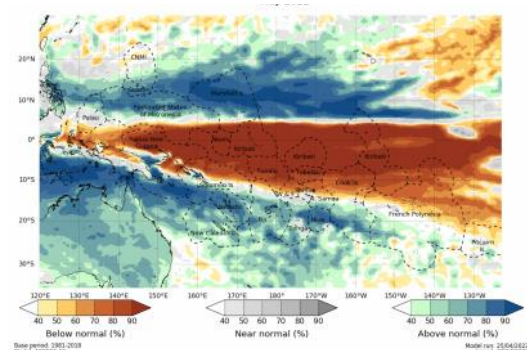
May—July 2022



The ACCESS-S model forecast for May 2022, the dry signal is stronger compared to last month's forecast but extend further west and is very likely to be below normal rainfall for southern Palau, southern FSM, southern RMI, northern PNG, most of Solomon Islands, Nauru, Kiribati, Tuvalu, Wallis and Futuna, Tokelau, the northern and central Cook Islands and northern French Polynesia. The wetter than normal signal is also stronger compared to last month's forecast especially for the southern Pacific Islands with above normal rainfall is very likely for southern CNMI, Guam, northern Palau, most of FSM, central and northern RMI, southeast PNG, southern Solomon Islands, New Caledonia, Vanuatu, Fiji, Tonga, Niue, southern Cook Islands and southern French Polynesia.

The three-month rainfall outlook (May-July 2022) shows a larger region of dry signal than the forecast issued last month very likely to affect Palau, southern FSM, PNG Islands, southern RMI, northern Solomon Islands, Nauru, Kiribati, Tuvalu, Tokelau, American Samoa, northern and central Cook Islands, northern and central French Polynesia and Pitcairn Island. The models show an increased chance of wetter very likely for northern CNMI, central and northern RMI, eastern PNG, southern Solomon Islands, New Caledonia, Vanuatu, Fiji, Tonga, Niue, southern Cook Islands and parts of southern French Polynesia. Above normal maximum and minimum temperatures are very likely for most COSPPac countries, except for countries east of 155°E, namely Nauru, central and southern RMI, Kiribati, northern Tuvalu, Tokelau, northern Cook Islands, northern and central French Polynesia, where near-normal to below normal temperatures are favoured.

Monthly [ACCESS-S](#) Maps



The Copernicus multi-model outlook for May-July 2022 is very likely to be below normal rainfall for PNG Islands, western and northern Solomon Islands, Nauru, Kiribati, Tuvalu, Tokelau, Wallis and Futuna, Samoa, American Samoa, northern and central Cook Islands, and French Polynesia. Above normal rainfall is very likely for CNMI, Guam, Marshall Islands, southeastern PNG, New Caledonia, Vanuatu, Fiji, Tonga, Niue and southern Cook Islands.

The SCOPIC statistical model forecast for May-July 2022 is very likely to be above normal rainfall for most of the COSPPac countries except for PNG Islands, Kiribati, Tuvalu, and northern Cook Islands very likely to have below normal rainfall.

The APEC Climate Centre multi-model for May-July 2022 forecast is very likely to be below normal rainfall for northern PNG, northern Solomon Islands, Nauru, Kiribati, Tuvalu, Samoa, American Samoa, Tokelau, Wallis and Futuna, northern Cook Islands, and northern French Polynesia. Above normal rainfall is very likely for northern and southern RMI, southeast PNG, southern Solomon Islands, New Caledonia, Vanuatu, Fiji, Tonga, Niue, southern Cook Islands and part of southern French Polynesia.

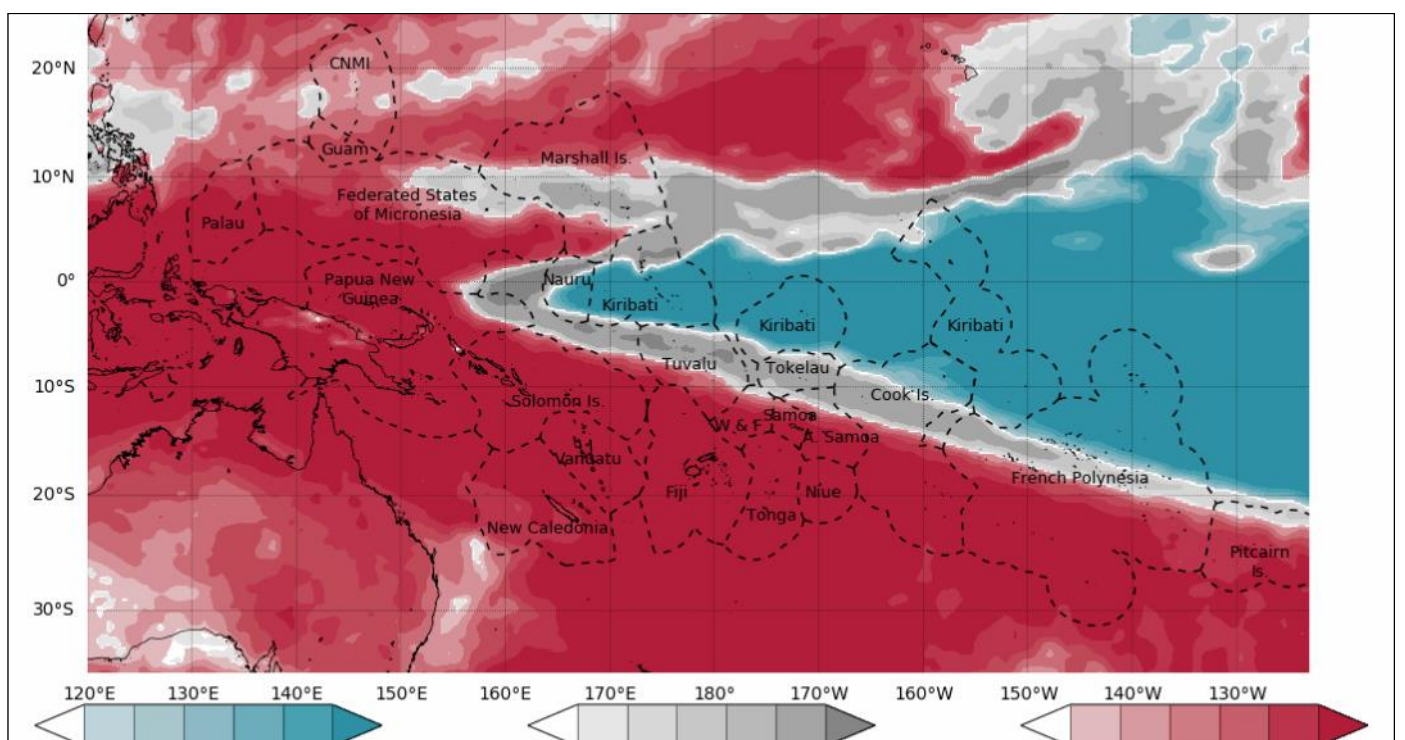
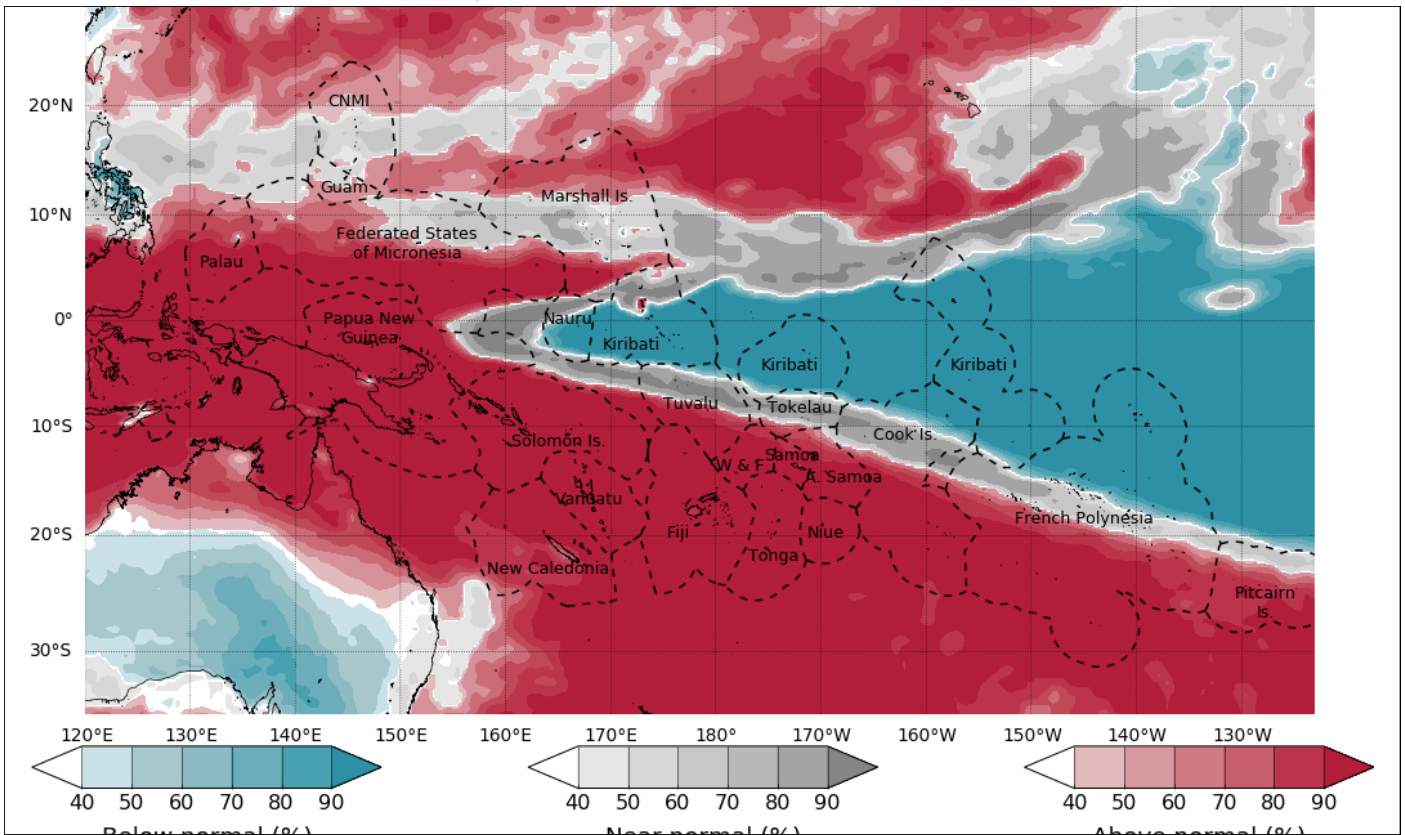
For May-July 2022, the dynamical models (including SCOPIC) agree on above normal rainfall for CNMI, southern RMI, southeast PNG, southern Solomon Islands, New Caledonia, Vanuatu, Fiji, Tonga, Niue, southern Cook Islands and southern French Polynesia. The models also agree on below normal rainfall is very likely for PNG Islands, western Solomon Islands, Nauru, Kiribati, Tuvalu, Tokelau, Wallis and Futuna, Samoa, American Samoa, northern and central Cook Islands, and the northern and central French Polynesia. French Polynesia.

# SEASONAL TEMPERATURE OUTLOOK

May—July 2022



## Monthly Tmax and Tmin ACCESS-S Maps



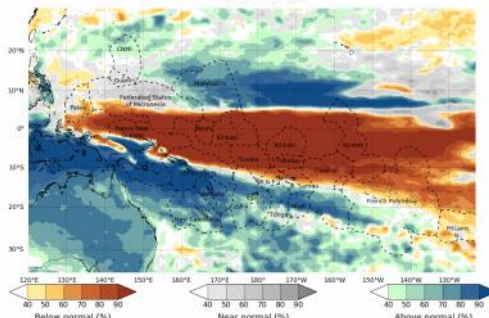
# SEASONAL RAINFALL OUTLOOK

May—July 2022

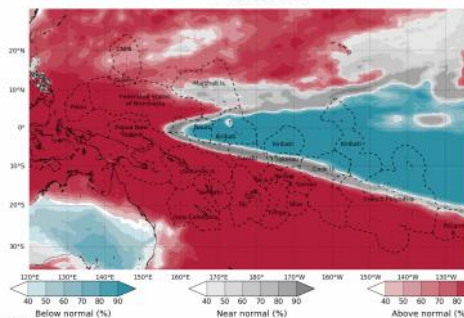


## Seasonal ACCESS-S maps

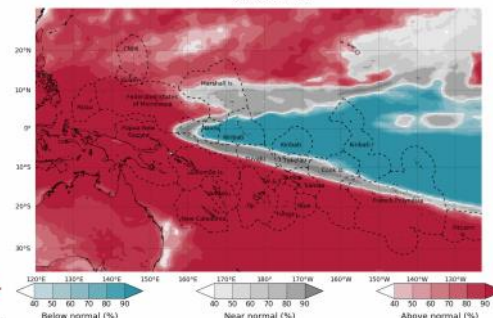
Tercile rainfall probabilities for May to July 2022



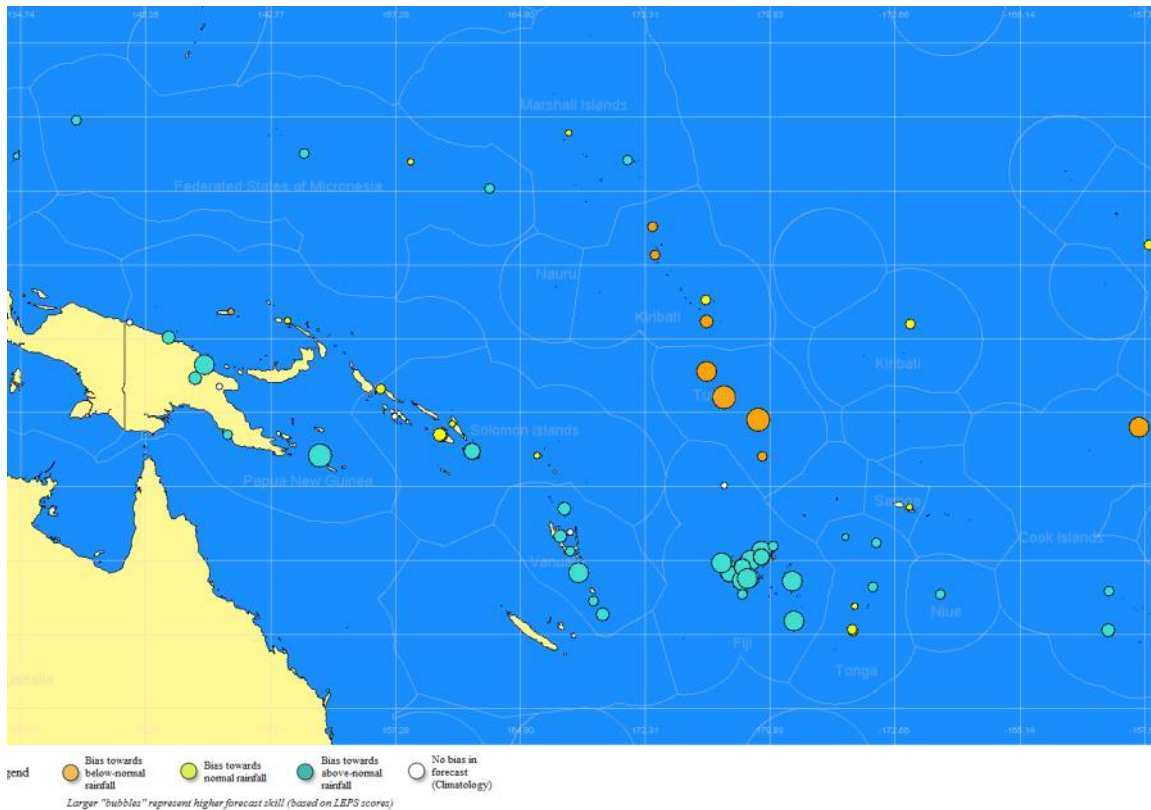
Tercile maximum temperature probabilities for May to July 2022



Tercile minimum temperature probabilities for May to July 2022



## 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

May—July 2022



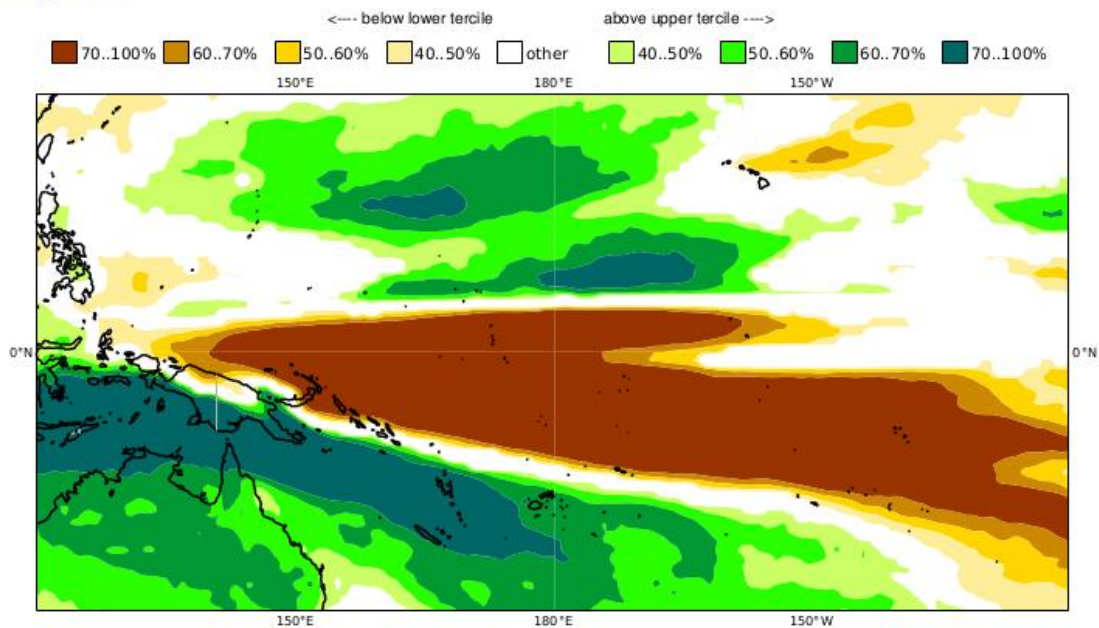
## Copernicus (C3S multi-system)-Rainfall

Prob(most likely category of precipitation)

MJJ 2022

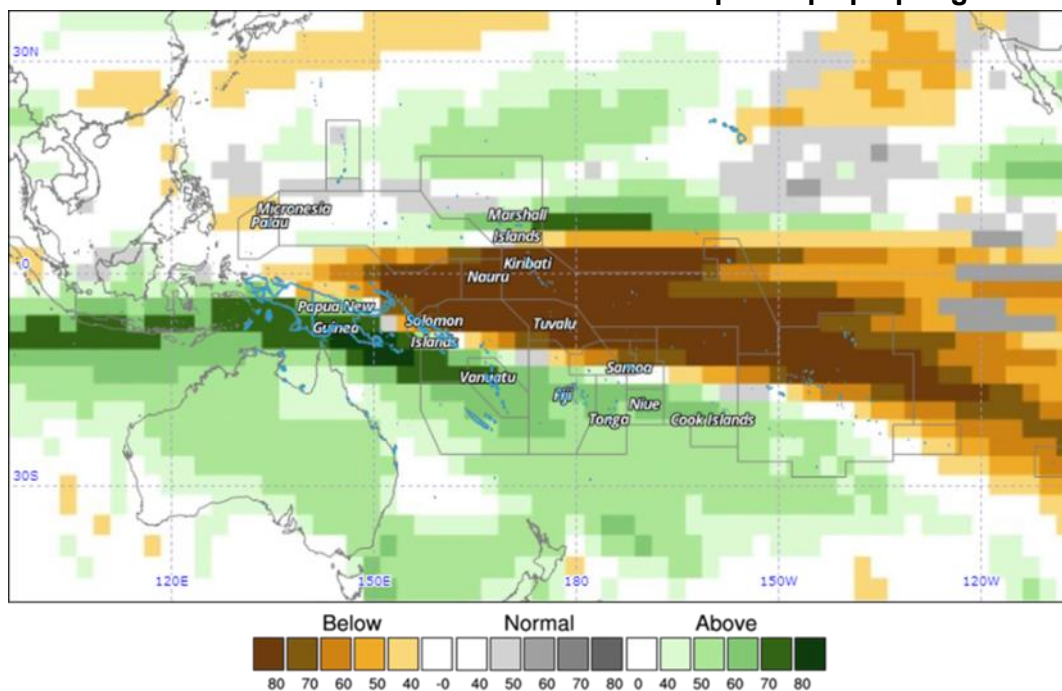
Nominal forecast start: 01/04/22

Unweighted mean



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

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



Year: 2022, Season: MJJ, Lead Month: 3, Method: GAUS

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

Generated using CLIK® (2022-5-4)

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# TROPICAL CYCLONE

## 2021/2022 Season

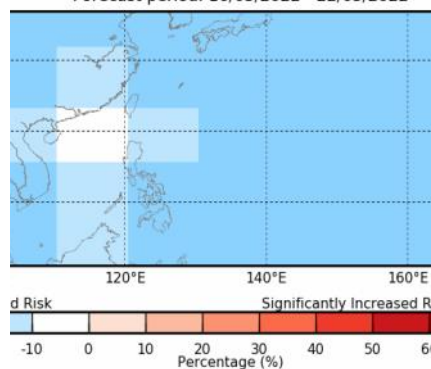


In the southwest Pacific, the 2021-22 tropical cyclone has ended on 30th April 2022. The outlook for the season was for enhanced risk for tropical cyclone activity in the western part of the basin over November to April. In the central part of the region, cyclone risks are generally near normal, with reduced chances farther east. Seven named TCs (Ruby, Seth, Cody, Dovi, Tiffany, Eva and Fili) formed from east of the longitude of the tip of Cape York, Australia. Two cyclones reached category three status, including Dovi and Coby. TC activity in the Western North Pacific occurs year around and with the weakening La Niña conditions, a preliminary cyclone outlook for the northwest Pacific is for near-average seasonal activity.

It's important to remember that it does not take a severe cyclone to produce severe impacts. Coastal and river flooding rainfall can occur with a distant, weak or former cyclone. Communities should remain vigilant, and follow forecast information provided by their National Meteorological and Hydrological Service (NMHS).

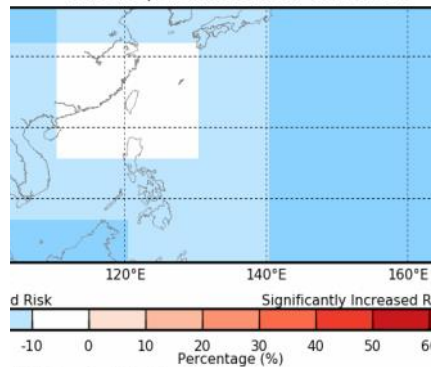
The weekly tropical cyclone forecast from the ACCESS-S model shows reduced risk in the weeks beginning 16 May and ending 29 May 2022 for northwest Pacific.

**ACCESS-S Weekly Forecasts –Northwest Pacific**  
 Difference from normal chance of Tropical Cyclone's in the North Pacific  
 Forecast period: 16/05/2022 - 22/05/2022



Model anomaly probability in overlapping 15 x 20 degree boxes  
 122, Australian Bureau of Meteorology Model: ACCESS\_S2 Model Run: 08/05/2022

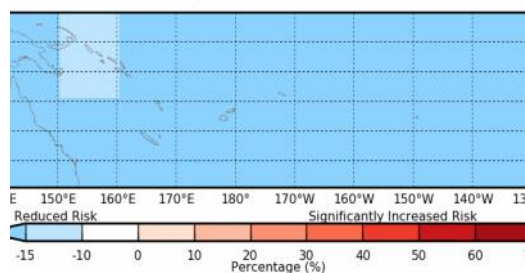
**ACCESS-S Weekly Forecasts –Northwest Pacific**  
 Difference from normal chance of Tropical Cyclone's in the North Pacific  
 Forecast period: 23/05/2022 - 29/05/2022



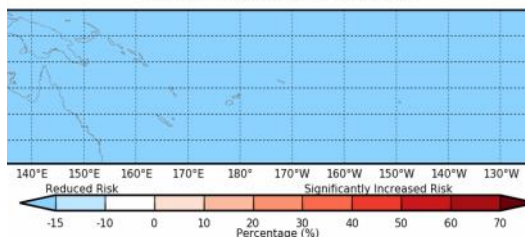
Model anomaly probability in overlapping 15 x 20 degree boxes  
 122, Australian Bureau of Meteorology Model: ACCESS\_S2 Model Run: 08/05/2022

**ACCESS-S Weekly Forecasts –Southwest Pacific**

Difference from normal chance of Tropical Cyclone's in the South Pacific  
 Forecast period: 16/05/2022 - 22/05/2022



Model anomaly probability in overlapping 15 x 20 degree boxes  
 122, Australian Bureau of Meteorology Model: ACCESS\_S2 Model Run: 08/05/2022



Model anomaly probability in overlapping 15 x 20 degree boxes  
 south of Australia 2022, Australian Bureau of Meteorology Model: ACCESS\_S2 Model Run: 08/05/2022 Issue: 1

### 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.

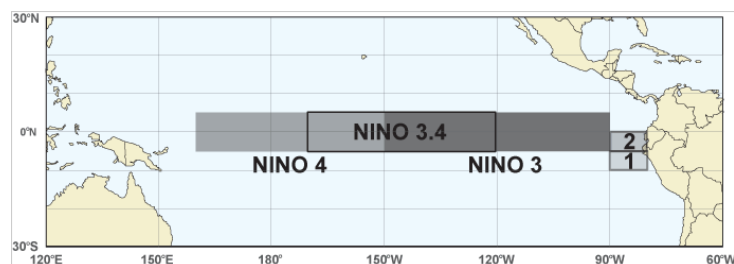
## 20 degrees Celsius Isotherm Depth

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