

# Monthly Climate Bulletin

February 2022



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Photo Credit: Flooding in Port Vila, Vanuatu (Source: Tans Photography)





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- The 2021-2022 La Niña is past its peak, with outlooks indicating a return to neutral El Niño-Southern Oscillation (ENSO) levels neither La Niña nor El Niño during the southern hemisphere autumn (March to May 2022). As La Niña weakens, it will continue to influence global weather and climate
- The Madden-Julian Oscillation (MJO) recently weakened while in the Australian region and is now indiscernible with most climate models suggest the MJO is likely to remain weak for the coming fortnight.
- The Intertropical Convergence Zone (ITCZ) was active over the western warm pool region and eastern Pacific with a shift to the north from its normal position, while the South Pacific Convergence Zone (SPCZ) was active and shifted southwest around Vanuatu, Fiji and Tonga.
- The SSTs for February 2022 show weak cool SST anomalies were present from 180°W towards the south American coast, while weak warm SST anomalies were largely present across the remainder of the basin west of 180°W.
- Coral bleaching status for 01st March 2022 has warning 'Alert Level 2' for parts of south Fiji and Tonga. 'Alert 1' for parts of southeast PNG, southern Solomon Islands, parts of New Caledonia, Vanuatu and southern French Polynesia. The coral bleaching outlook remains 'Alert Level 2' for southern Solomon Islands, central and western Vanuatu, southern Fiji, southern Tonga and southern French Polynesia.
- For March-May 2022, the dynamical models (including SCOPIC) agree on above normal rainfall for RMI, 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 Nauru, Kiribati, Tuvalu, Tokelau, Wallis and Futuna, Samoa, American Samoa, northern and central Cook Islands, and the northern and central French Polynesia.
- The weekly tropical cyclone forecast from the ACCESS-S model shows increased risk in the weeks beginning 16 March and ending 22 March 2022 for the southwest Pacific. There is reduce cyclone risk for the northwest Pacific region during the same period.



# EL NIÑO–SOUTHERN OSCILLATION

La Niña likely to persist until mid-autumn

Click link to access [Climate Driver Update issued on 01 March 2022](#)

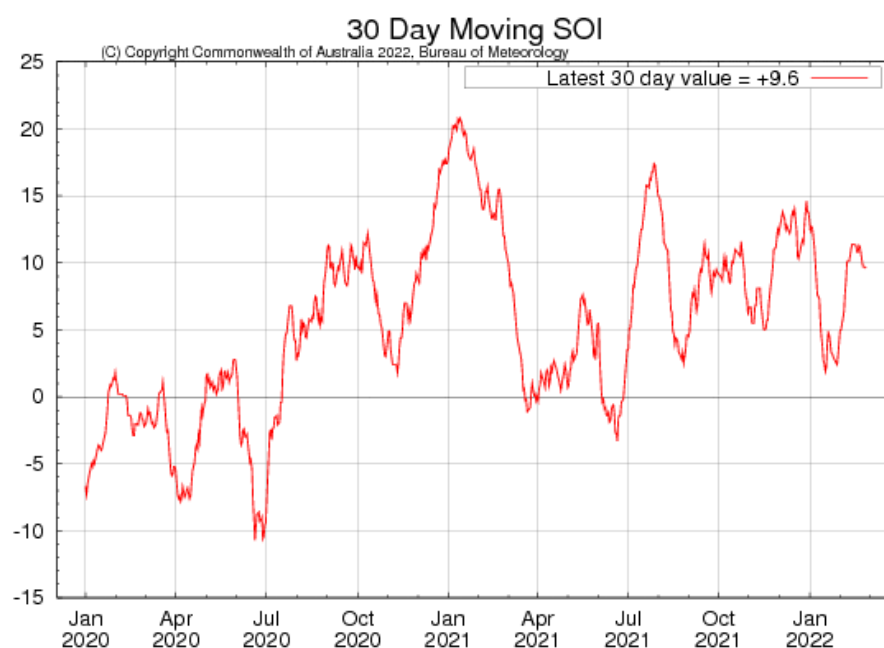
The 2021-2022 La Niña is past its peak, with outlooks indicating a return to neutral El Niño-Southern Oscillation (ENSO) levels neither La Niña nor El Niño during the southern hemisphere autumn (March to May 2022). As La Niña weakens, it will continue to influence global weather and climate.

Atmospheric and oceanic indicators over the Pacific remain at La Niña levels. Eastern tropical Pacific sea surface temperatures remain cooler than average despite a slow warming of deeper waters. Warming below the surface of the Pacific Ocean typically foreshadows a breakdown in La Niña, and typically occurs in the southern autumn. In the atmosphere, several indicators remain at La Niña levels, including decreased cloudiness along the Date Line, strengthened trade winds in the western Pacific, and a positive Southern Oscillation Index (SOI).

La Niña increases the likelihood of tropical cyclones within the Australian and southwest Pacific region, as well as increasing the chances of above average rainfall across large parts of eastern Australia and southwest Pacific countries during autumn.

The Indian Ocean Dipole (IOD) is neutral. It typically has little influence on global climate from December to April due to the influence of the monsoon.

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.



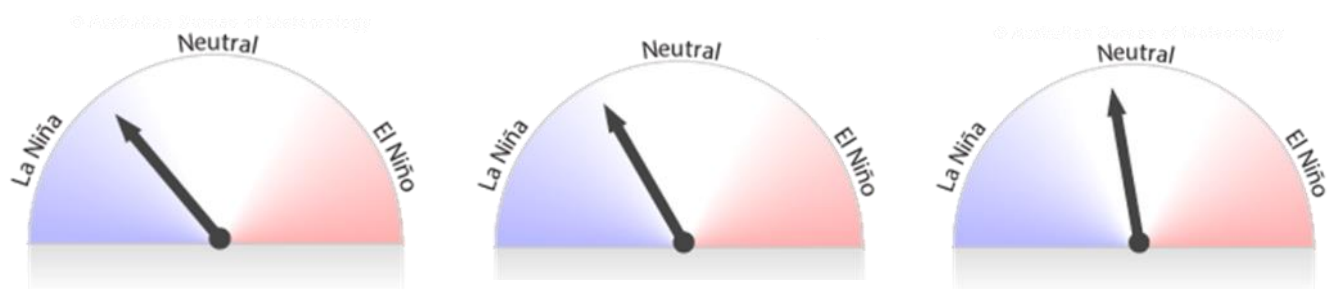


# EL NIÑO–SOUTHERN OSCILLATION

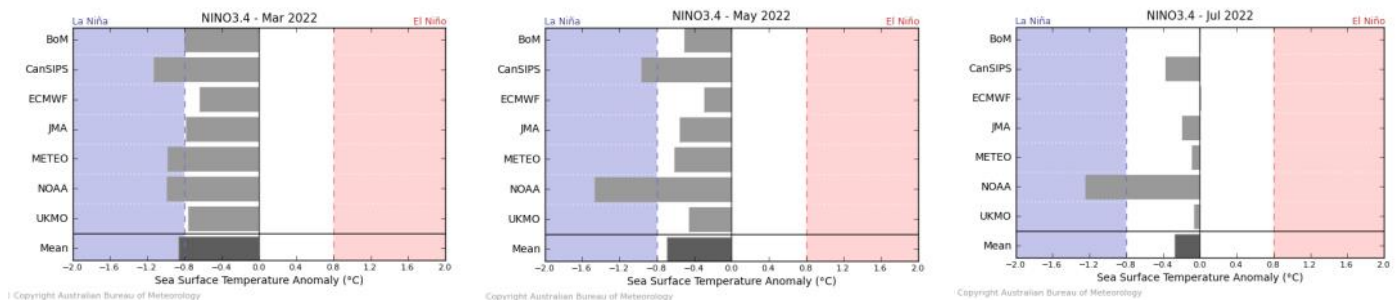
La Niña likely to persist until mid-autumn

Click link to access [Climate Driver Update issued on 01 March 2022](#)

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



## Bureau of Meteorology NINO3.4 International Model Outlooks



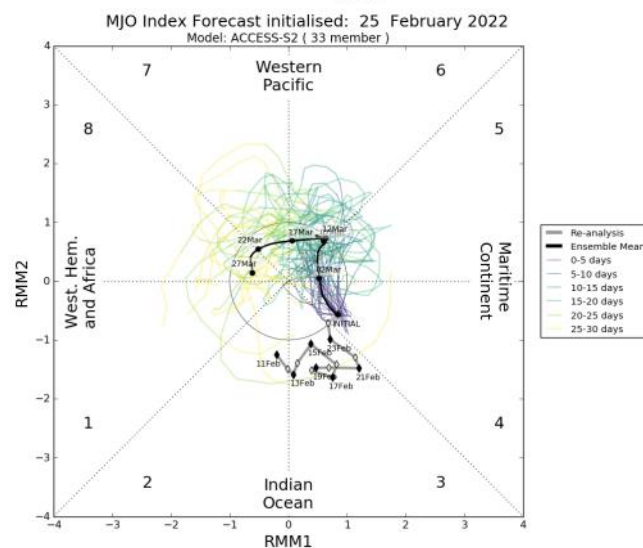
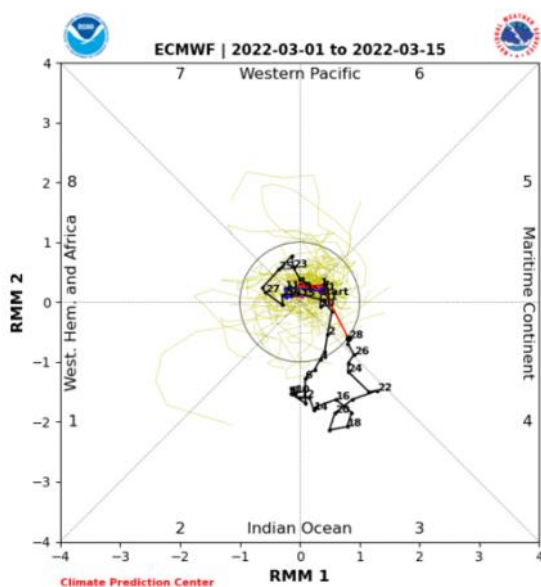
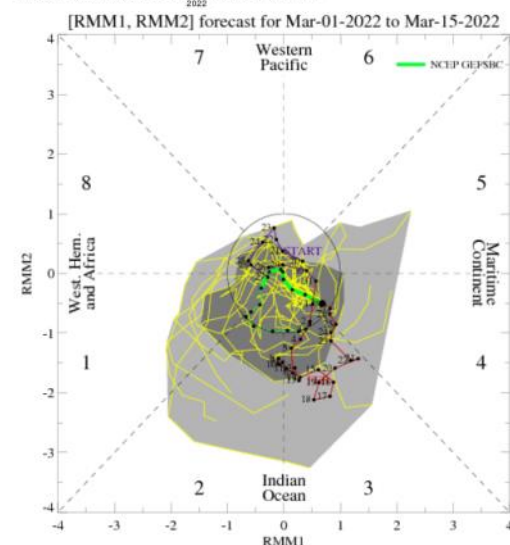
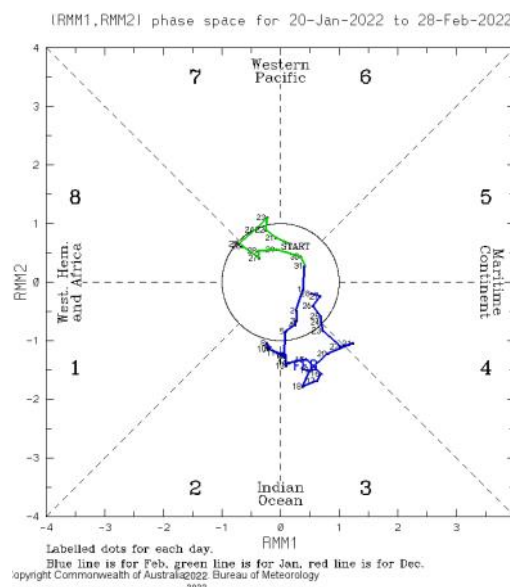
Bureau of Meteorology summary of international model outlooks for NINO3.4: <http://www.bom.gov.au/climate/model-summary/#tabs=Pacific-Ocean>

# MADDEN–JULIAN OSCILLATION

Click link to access [Tropical Climate Update](#) [Issued on Tuesday 22 February 2022]

During the month of February, a strong pulse of Madden-Julian Oscillation (MJO) occurred during the second and third week tracked across the Indian Ocean towards the maritime Continent before becoming weak towards the last week. The Madden-Julian Oscillation (MJO) recently weakened while in the Australian region and is now indiscernible. Most climate models suggest the MJO is likely to remain weak for the coming fortnight, meaning it is unlikely to influence tropical climate during this time.

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



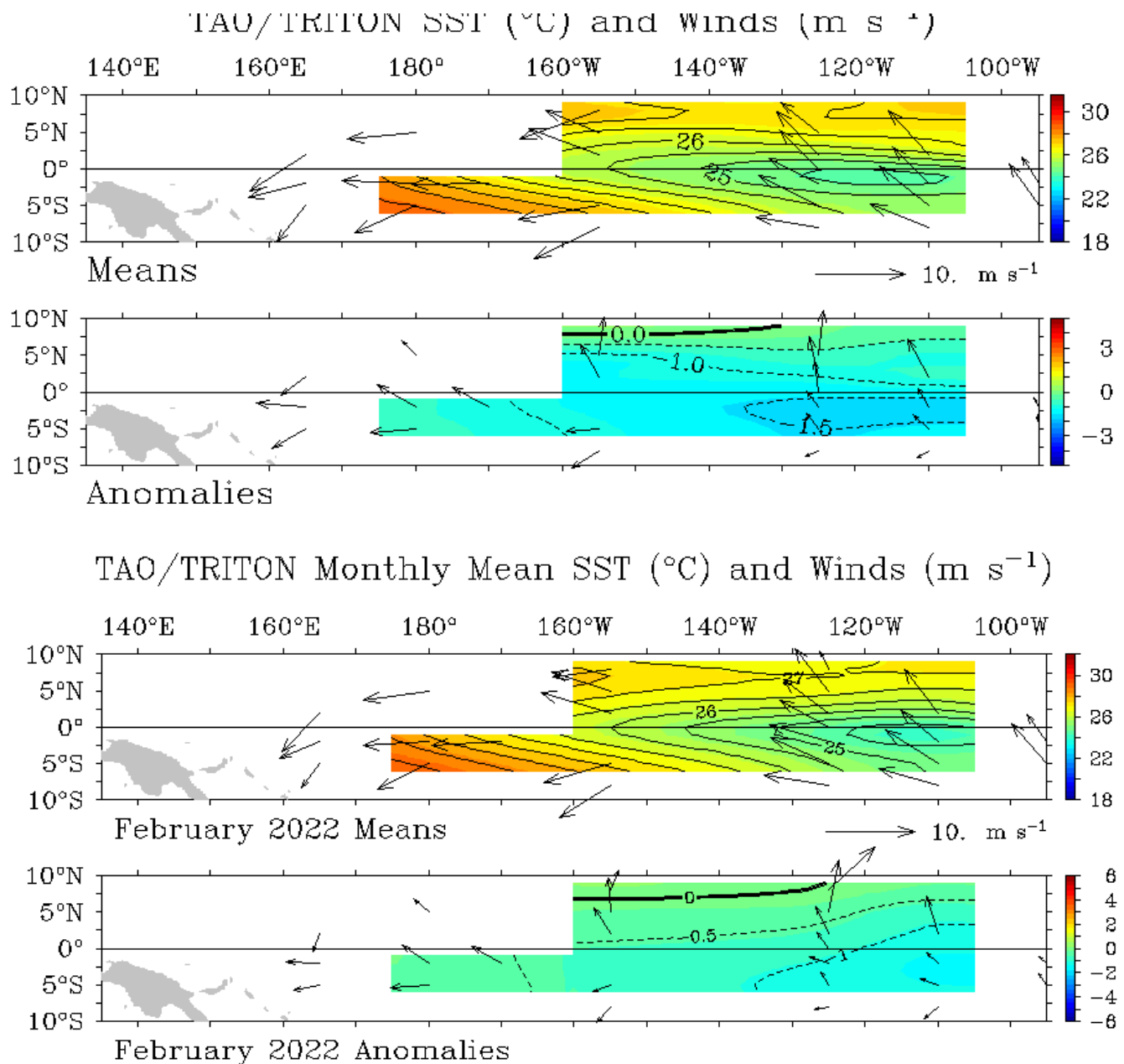
# WIND



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

The trade winds in February were stronger over the equatorial Pacific compared to January 2022.

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

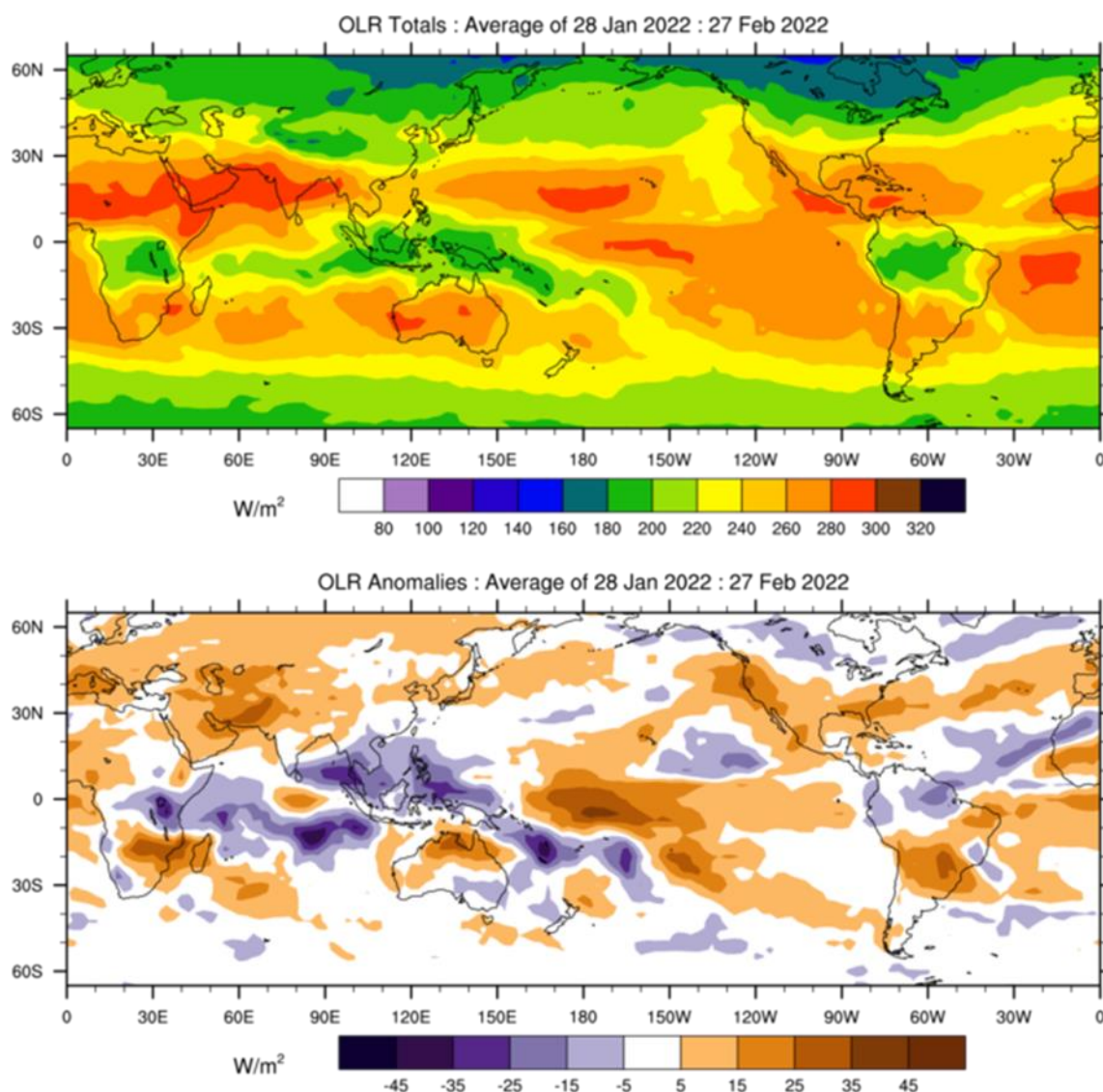
Click link to access [OLR](#)



The February 30-day OLR total and anomaly maps suggest the Intertropical Convergence Zone (ITCZ) was active over the western warm pool region and eastern Pacific with a shift to the north from its normal position, while the South Pacific Convergence Zone (SPCZ) was active and shifted southwest in the western Pacific around Vanuatu, Fiji and Tonga.

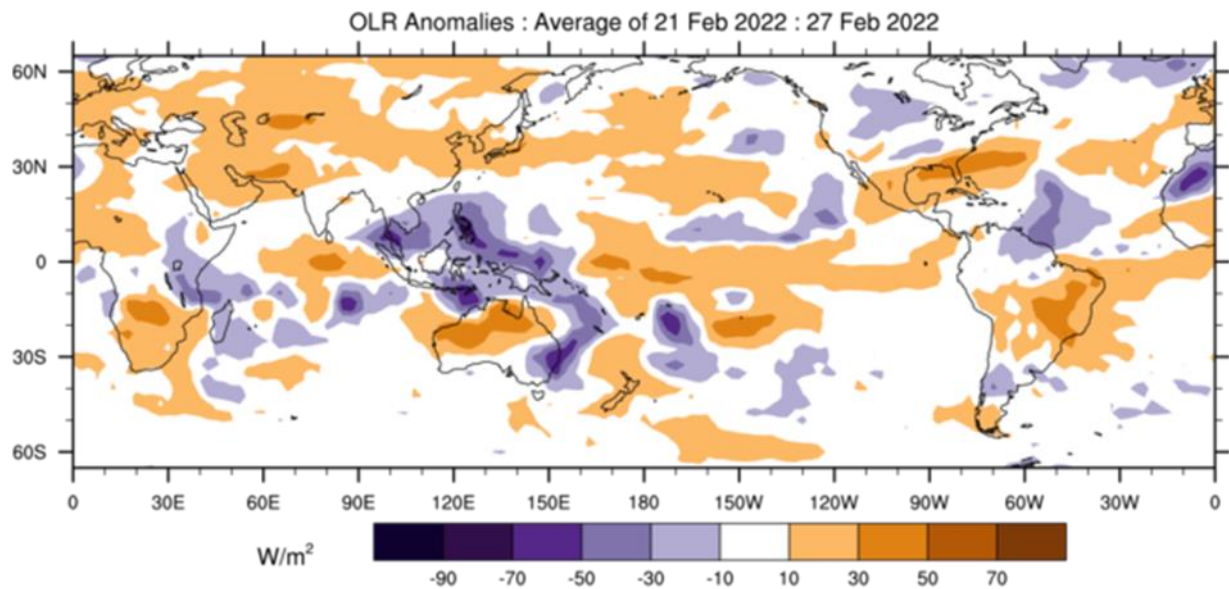
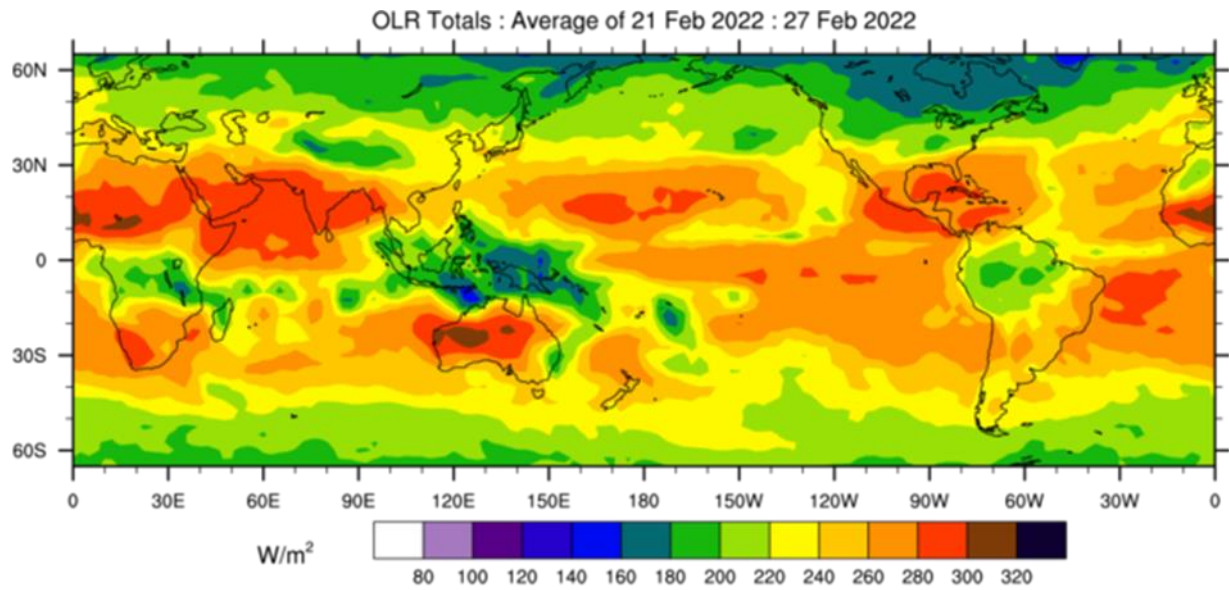
Note: Global maps of OLR below highlight regions experiencing increased or decreased cloudiness. The top panel is the total OLR in Watts per square metre ( $\text{W/m}^2$ ) and the bottom panel is the anomaly (current minus the 1979-1998 climate average), in  $\text{W/m}^2$ . In the bottom panel, negative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

## OLR Total and Anomalies, 30 Day OLR

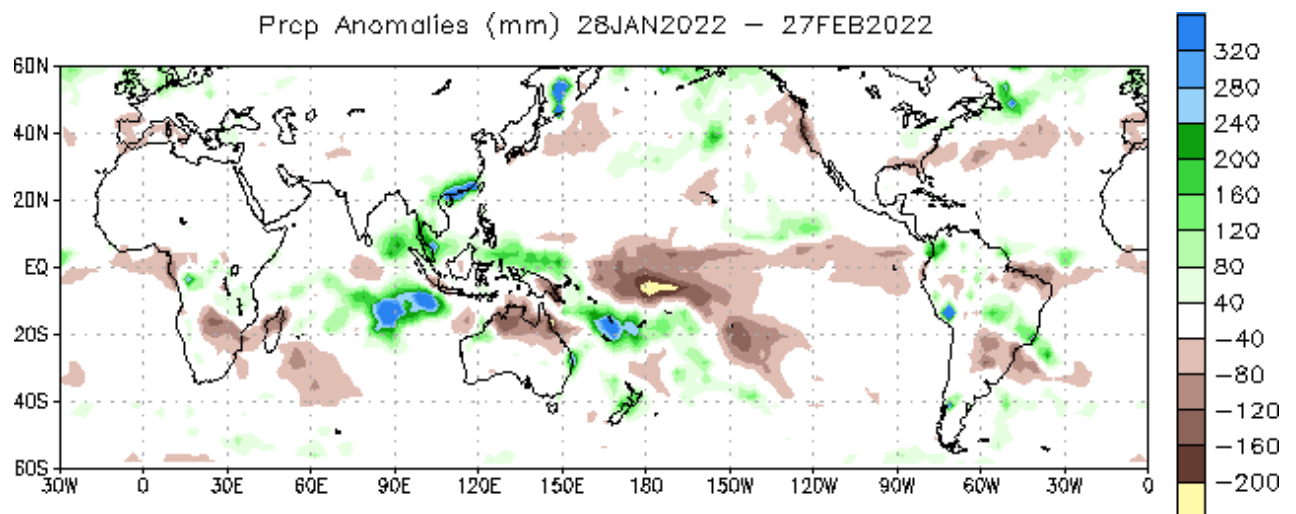


(C) Copyright Commonwealth of Australia 2022. Bureau of Meteorology

## OLR Total and Anomalies, 7 Day OLR

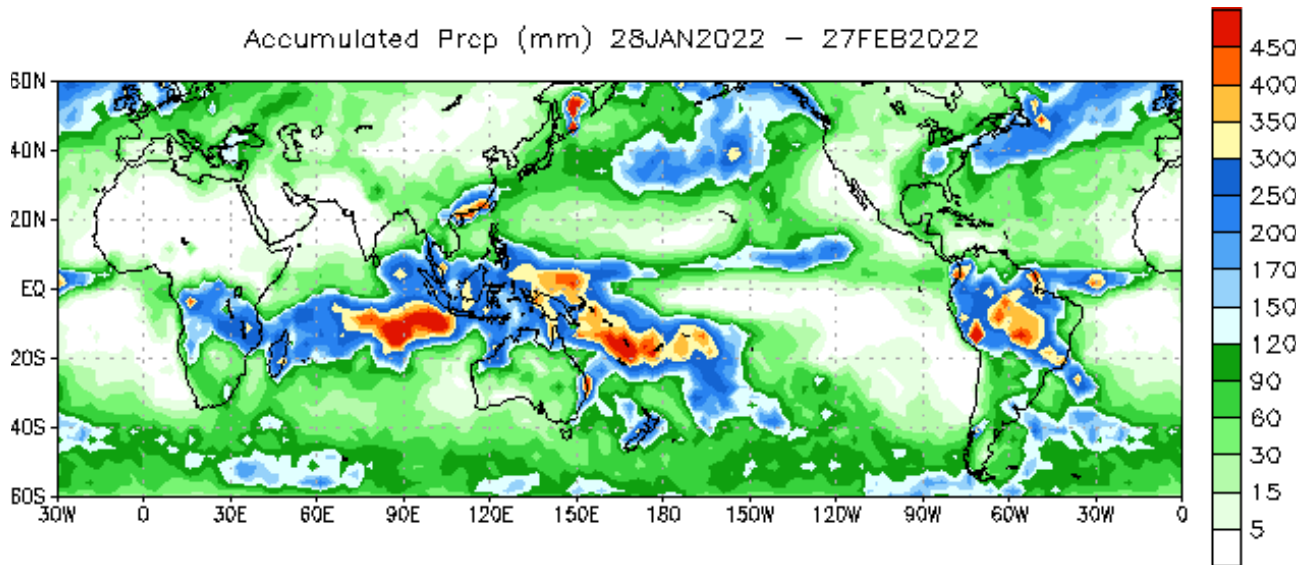


(C) Copyright Commonwealth of Australia 2022. Bureau of Meteorology

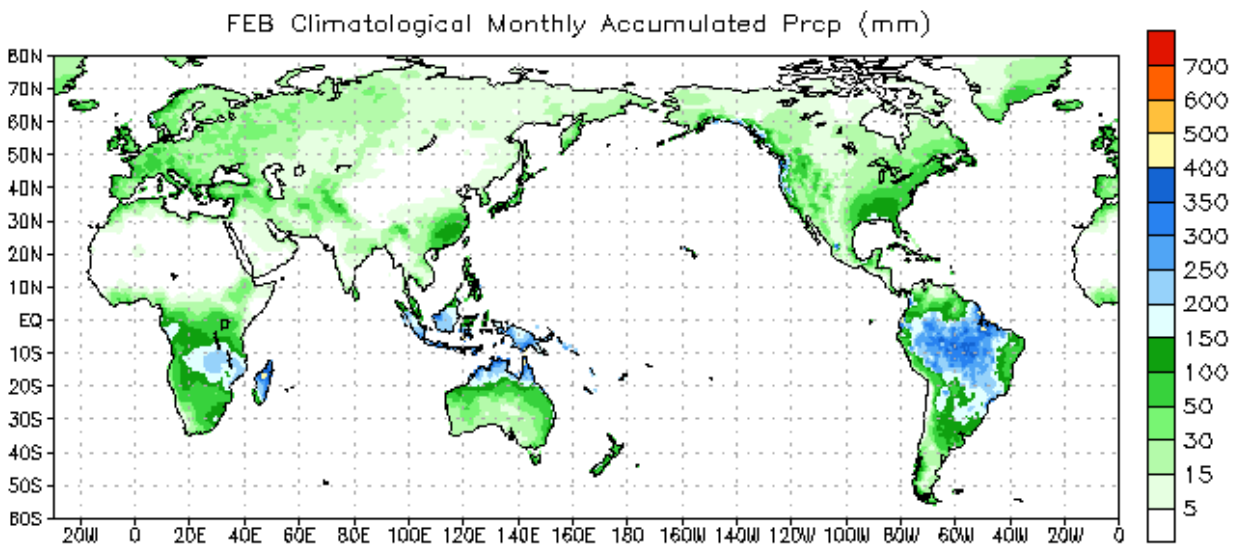


Data Source: NCEP CMAP Precipitation  
Climatology (1991–2020)

## 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

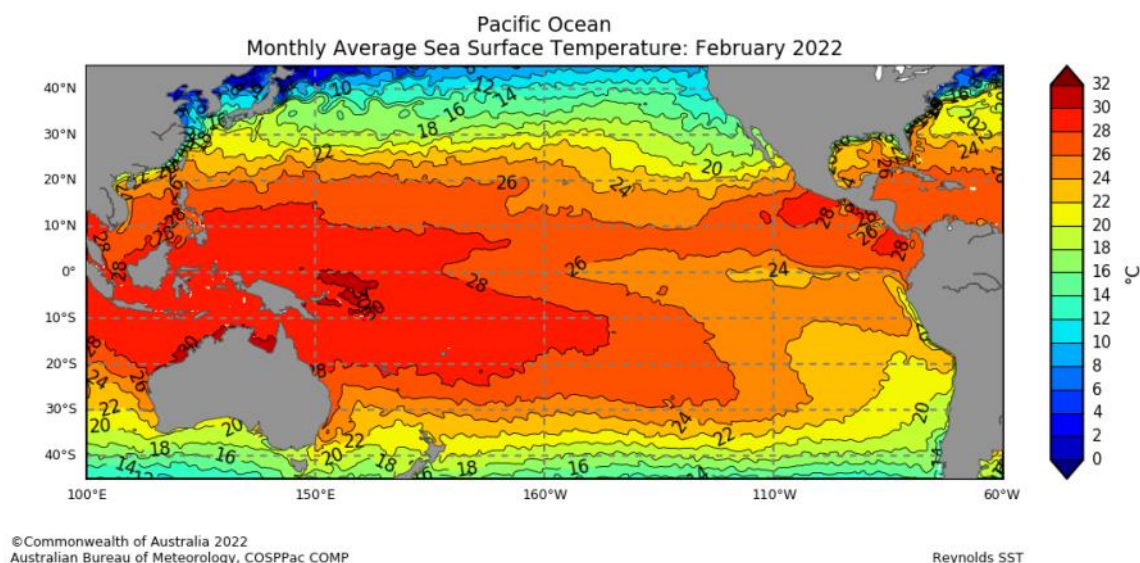


Click link to access [Pacific Community COSPPac Ocean Portal](#)

The SSTs for February 2022 show weak cool SST anomalies were present from 180°W towards the south American coast, while weak warm SST anomalies were largely present across the remainder of the basin west of 180° W. Warmer conditions were prevalent, south of Fiji, Tonga and regions south of 20°S

In terms of the deciles, highest on record occurred in central Marshall Islands, southern Fiji and southern Tonga. Regions of very much above average (deciles 10) SSTs spanned across Palau, northern FSM, northern RMI, northeastern PNG, northern Solomon Islands, New Caledonia, Fiji, Tonga and Niue. The regions of above average (deciles 8-9) for February occurred across majority of the COSPPac countries from Palau to southern Cook Islands. In contrast, average (4-7) to below average (deciles 2-3) SSTs were observed in southern PNG, southern Solomon Islands, Vanuatu, Nauru, Tuvalu, Kiribati with patches of very much below average (decile 1) over parts of eastern Kiribati and northern Cook Islands.

### Mean Sea Surface Temperature

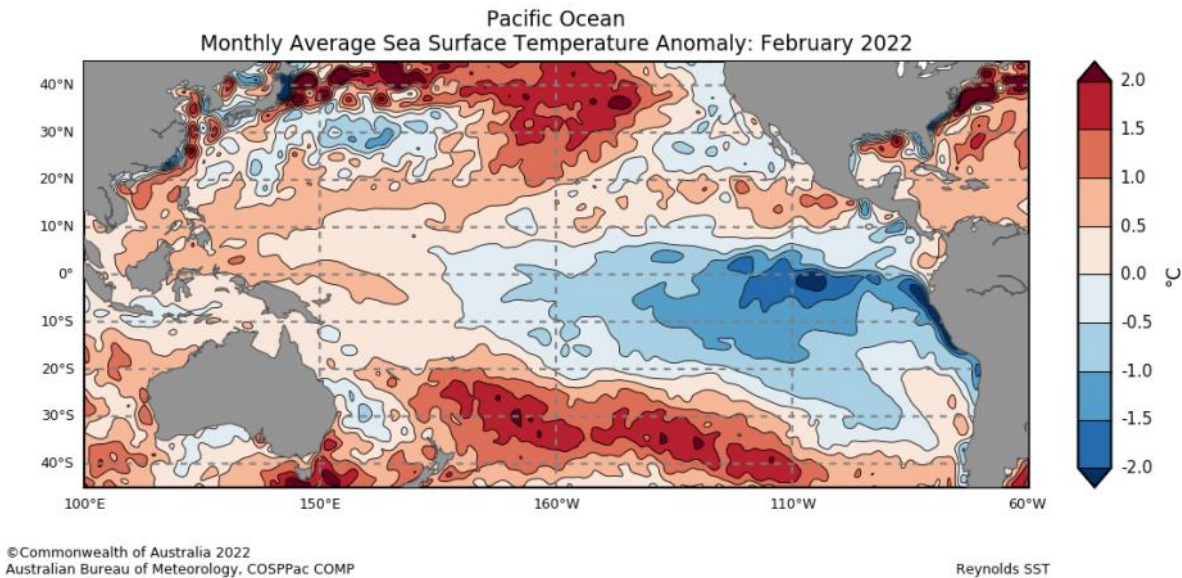


# OCEAN CONDITIONS

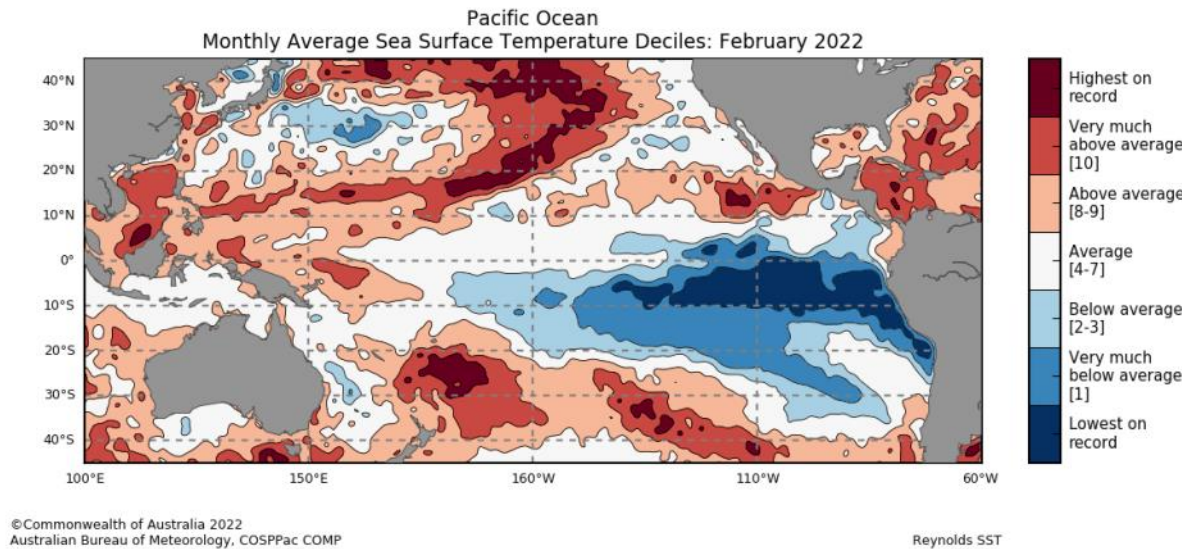
Click link to access [→SEA SURFACE TEMPERATURE](#)



## Anomalous Sea Surface Temperature



## Sea Surface Temperatures Deciles



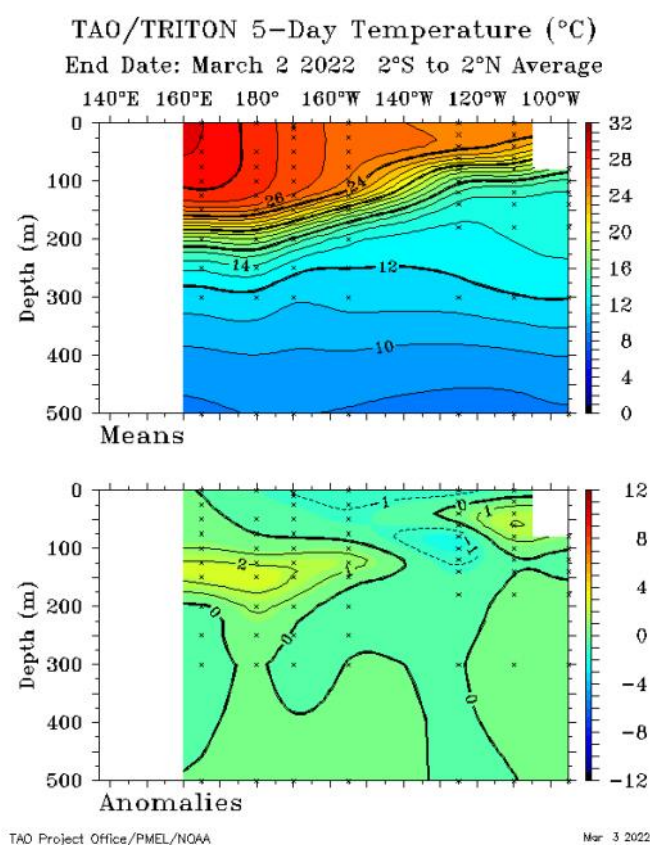
# OCEAN CONDITIONS

## SUB SURFACE

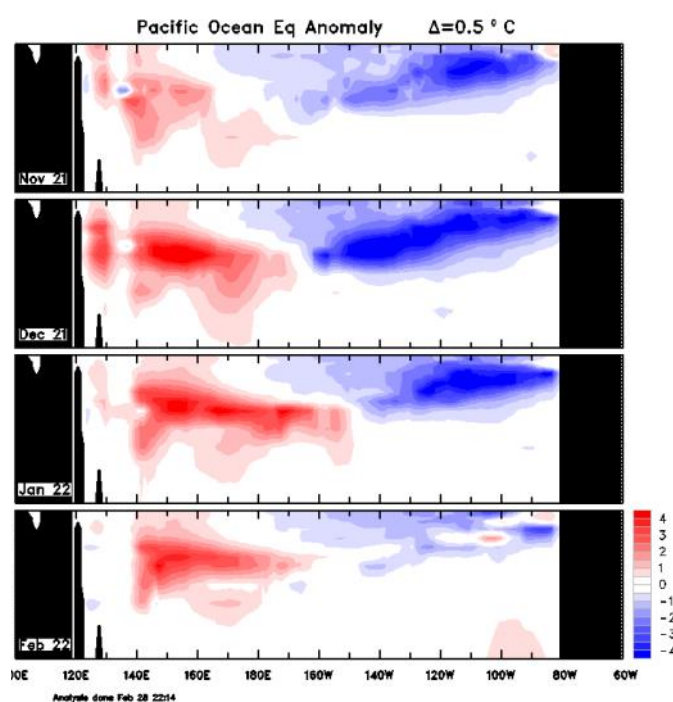


The four-month sequence of equatorial Pacific sub-surface temperature anomalies (to 28 February 2022) shows cool anomalies persist across the sub-surface of the eastern half of the equatorial Pacific, although anomalies were much weaker during February than during January. For February, waters were one-and-a-half to three degrees cooler than average across the top 100 m of the equatorial Pacific east of 110°W. Warm anomalies continue across parts of the central to western equatorial Pacific. These warm anomalies reached more than three degrees above average between 140°E and the Date Line (180°E) between 100 m and 175 m depth. Compared to January, warm anomalies have also weakened during February.

### 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

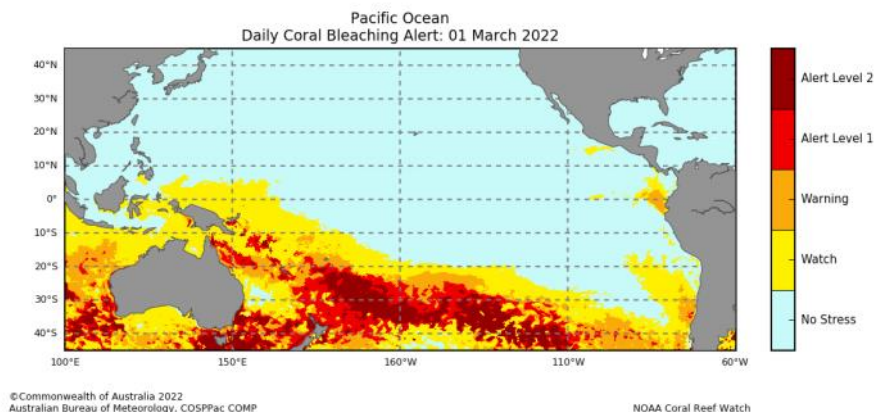
## CORAL BLEACHING



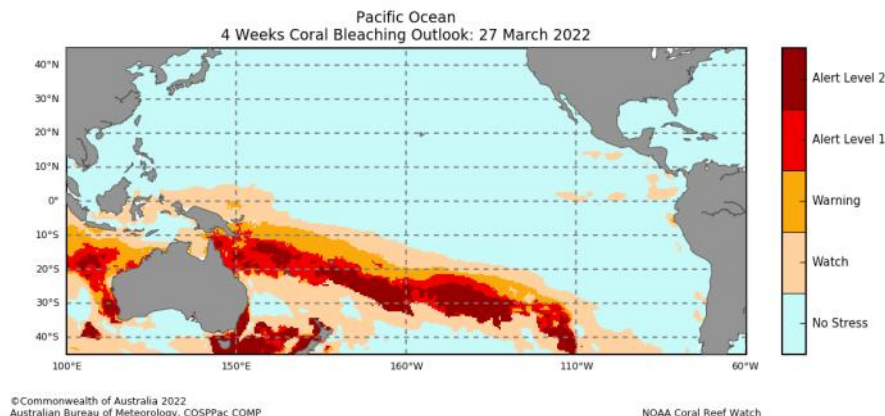
The daily Coral Bleaching Alert for 01st March 2022 shows 'Alert Level 2' for parts of south Fiji and Tonga. 'Alert 1' for parts of southeast PNG, southern Solomon Islands, parts of New Caledonia, Vanuatu and southern French Polynesia. 'No Stress or Watch' for the rest of COSPPac partner countries. The four weeks Coral Bleaching Outlook to 27th March 2022 shows 'Alert Level 2' for southern Solomon Islands, central and western Vanuatu, southern Fiji, southern Tonga and southern French Polynesia while 'Alert Level 1' for other parts of southern and southeast PNG, southern Solomon Islands, most parts of Vanuatu, northern New Caledonia, southern Fiji and southern Tonga. 'Warning' for eastern PNG, Solomon Islands, northern Fiji, northern Tonga, Niue, and southern Cook Islands. 'No Stress or Watch' for the rest of COSPPac partner countries.

### Daily Coral Bleaching Alert

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



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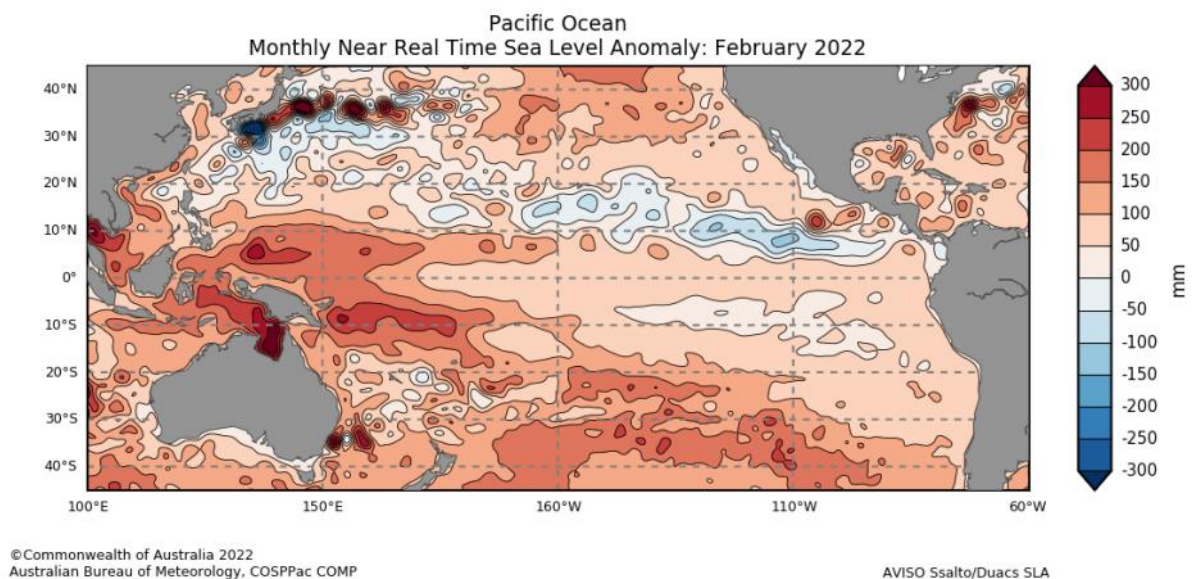
# OCEAN CONDITIONS

## 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 northern Australia, +250mm for eastern Palau and eastern PNG while between +100mm and +150mm in remaining COSPPac countries which includes FSM, RMI, rest of PNG, Solomon Islands, New Caledonia, Vanuatu, Nauru, Kiribati, Fiji, Tonga, Tuvalu, Wallis and Futuna, Tokelau, Samoa, Niue, Cook Islands, French Polynesia and Pitcairn Island. Patches of near normal to below normal sea levels were observed east of 180°W north of 10°.

### Monthly Sea Level Anomalies

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

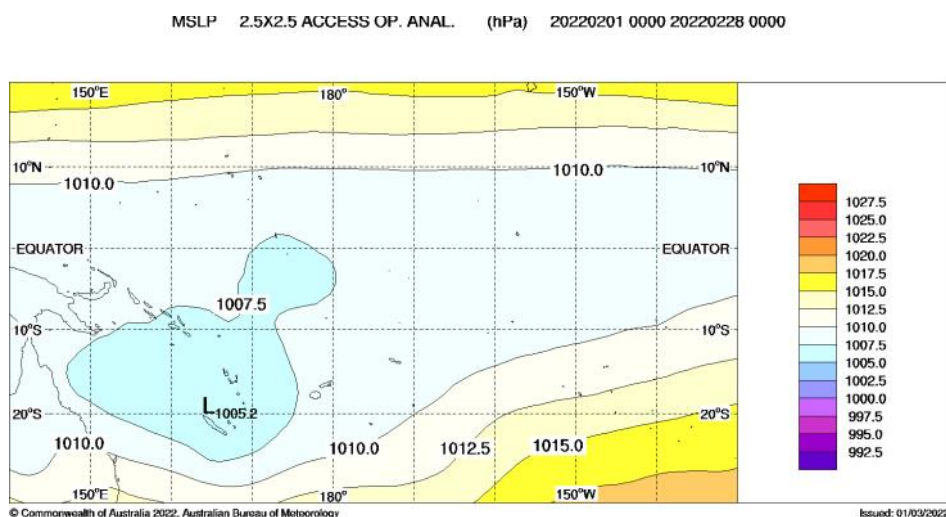


# MEAN SEA LEVEL PRESSURE

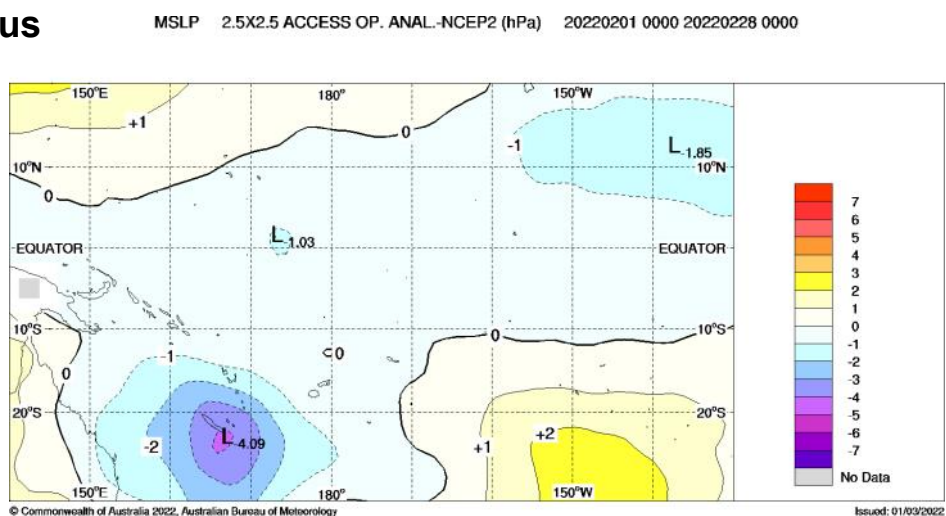
The February mean sea level pressure (MSLP) anomaly map shows negative anomalies of -1 or greater over New Caledonia, Vanuatu and southern Fiji. Positive anomalies of +1 or more were present over CNMI, and southern French Polynesia.

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

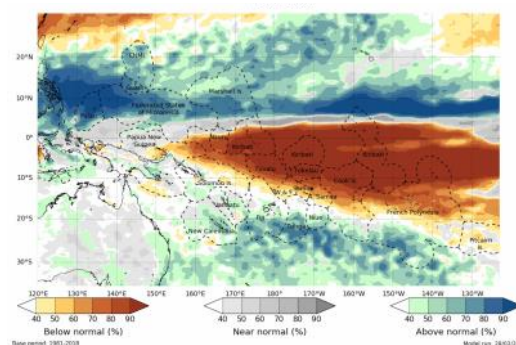
## March—May 2022



The ACCESS-S model forecast for March 2022, the dry signal is stronger compared to last month's forecast and is very likely to be below normal rainfall for Nauru, Kiribati, Tuvalu, Tokelau, the northern and central Cook Islands and northern and central French Polynesia. The wetter than normal signal is also stronger compared to last month's forecast with above normal rainfall is very likely for Palau, FSM, Guam, CNMI, Central RMI and southern Tonga.

The three-month rainfall outlook (March-May 2022) shows a stronger dry signal than the forecast issued last month very likely to affect PNG Islands, southern RMI, northern Solomon Islands, Nauru, Kiribati, Tuvalu, Tokelau, Wallis and Futuna, Samoa, American Samoa, northern and central Cook Islands, northern and central French Polynesia and northern Pitcairn Island. In contrast, the models show an increased chance of wetter very likely in Palau, FSM, CNMI, Guam, central and northern RMI, southeast PNG, southern Solomon Islands, New Caledonia, northern and central Vanuatu, Fiji, Tonga, Niue, southern Cook Islands and southern French Polynesia. Above normal maximum and minimum temperatures are very likely for most COSPPac countries, except for northern CNMI, countries east of 162°E, namely Nauru, Kiribati, northern Tuvalu, Tokelau, northern Cook Islands, northern and central French Polynesia and northern Pitcairn, where near-normal to below normal temperatures are favoured.

Monthly [ACCESS-S](#) Maps



The Copernicus multi-model outlook for March-May 2022 is very likely to be below normal rainfall for 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 Guam, Marshall Islands, Milne Bay Islands (PNG), New Caledonia, central and southern Vanuatu, southern Fiji, Tonga, Niue and southern Cook Islands.

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

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

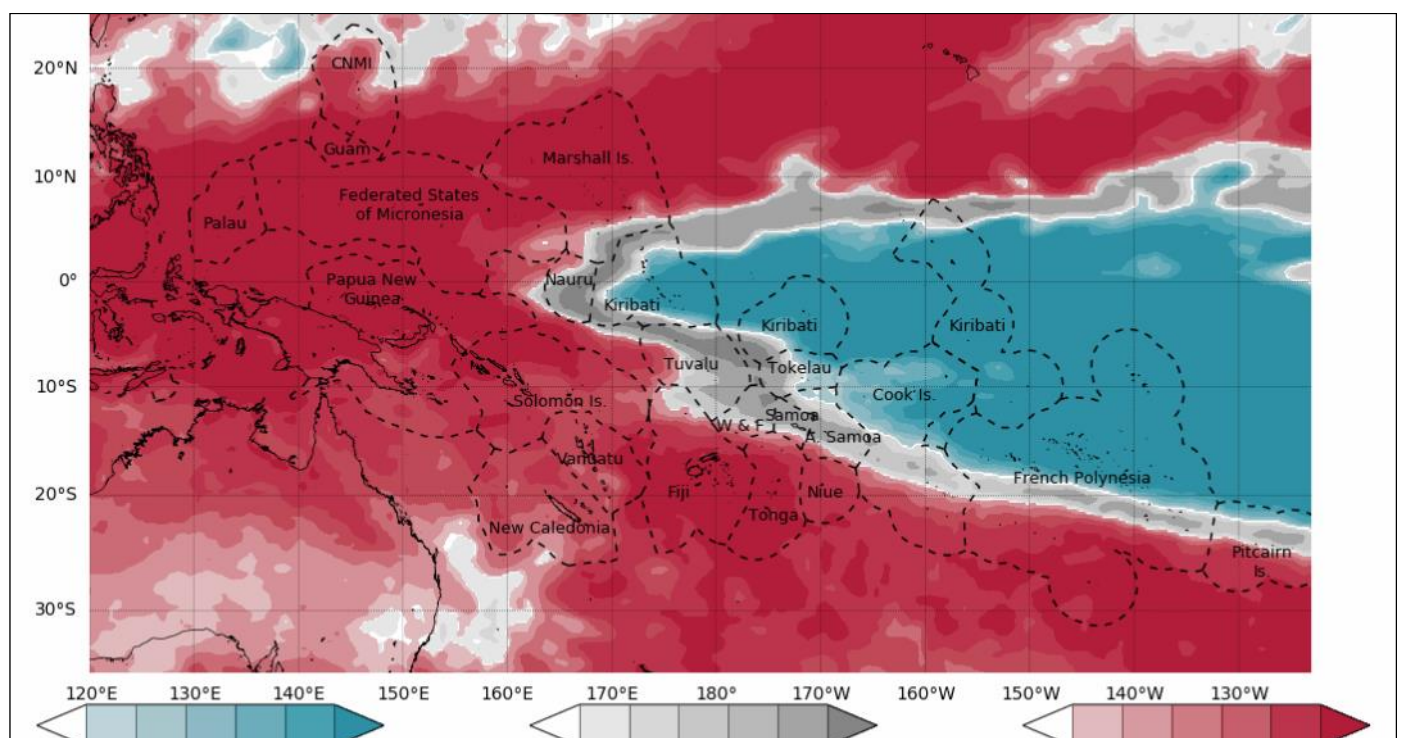
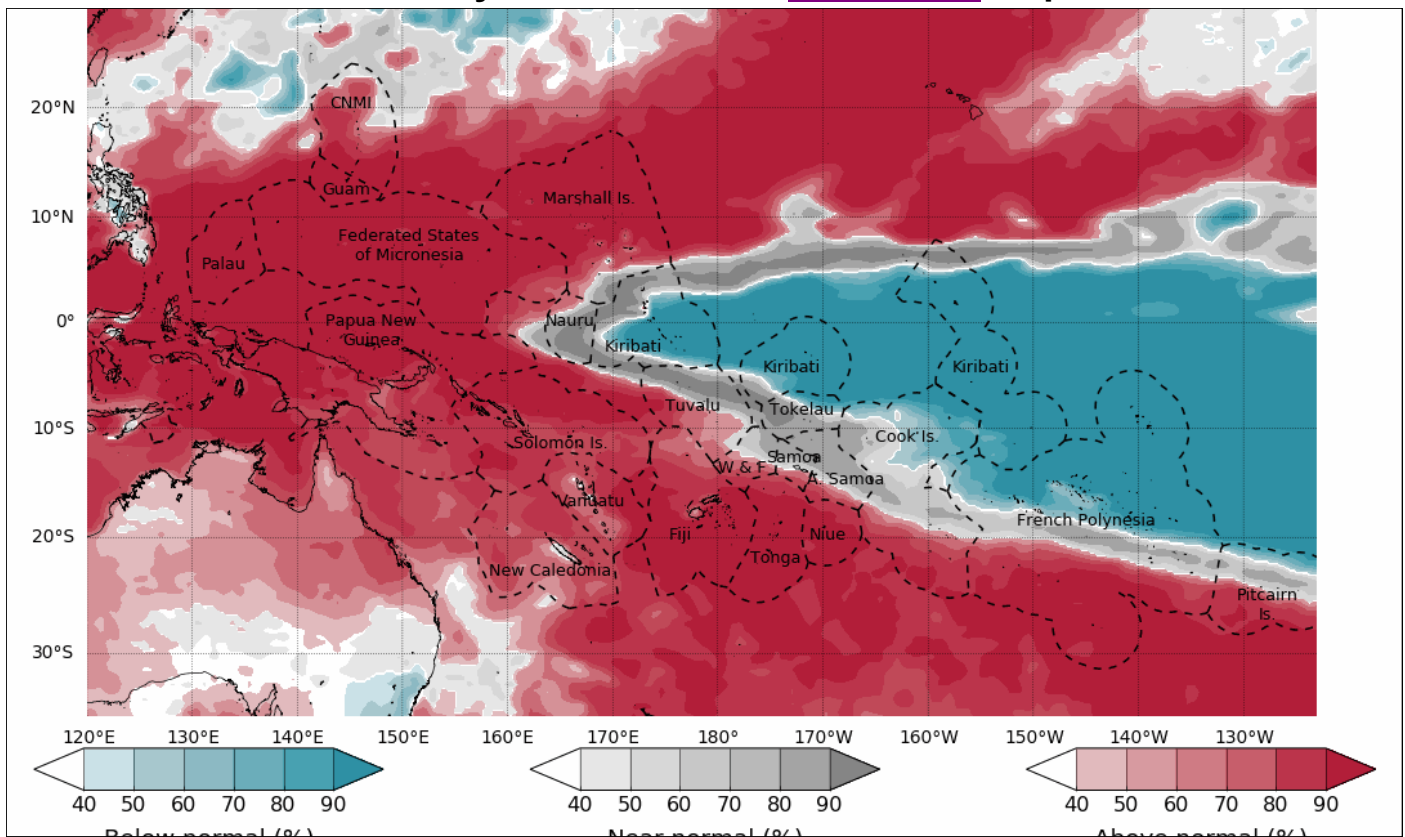
For March-May 2022, the dynamical models (including SCOPIC) agree on above normal rainfall for RMI, New Caledonia, Vanuatu, Fiji, Tonga, Niue, southern Cook Islands and southern French Polynesia. The models also agree on below normal rainfall is very likely for Nauru, Kiribati, Tuvalu, Tokelau, Wallis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

# SEASONAL TEMPERATURE OUTLOOK

March—May 2022



Monthly Tmax and Tmin [ACCESS-S](#) Maps



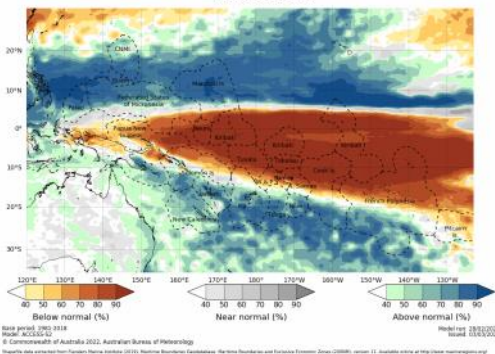
# SEASONAL RAINFALL OUTLOOK

March—May 2022

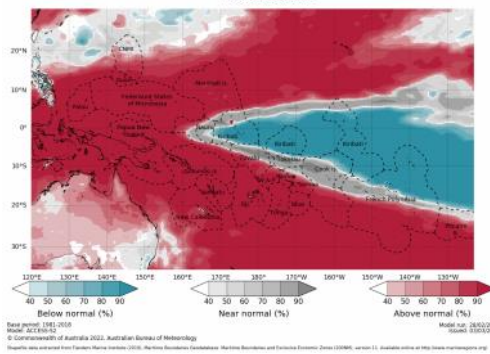


## Seasonal ACCESS-S maps

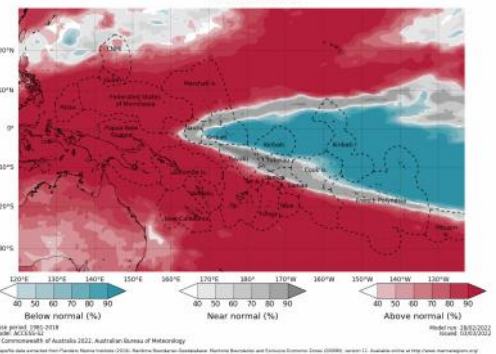
Tercile rainfall probabilities for March to May 2022



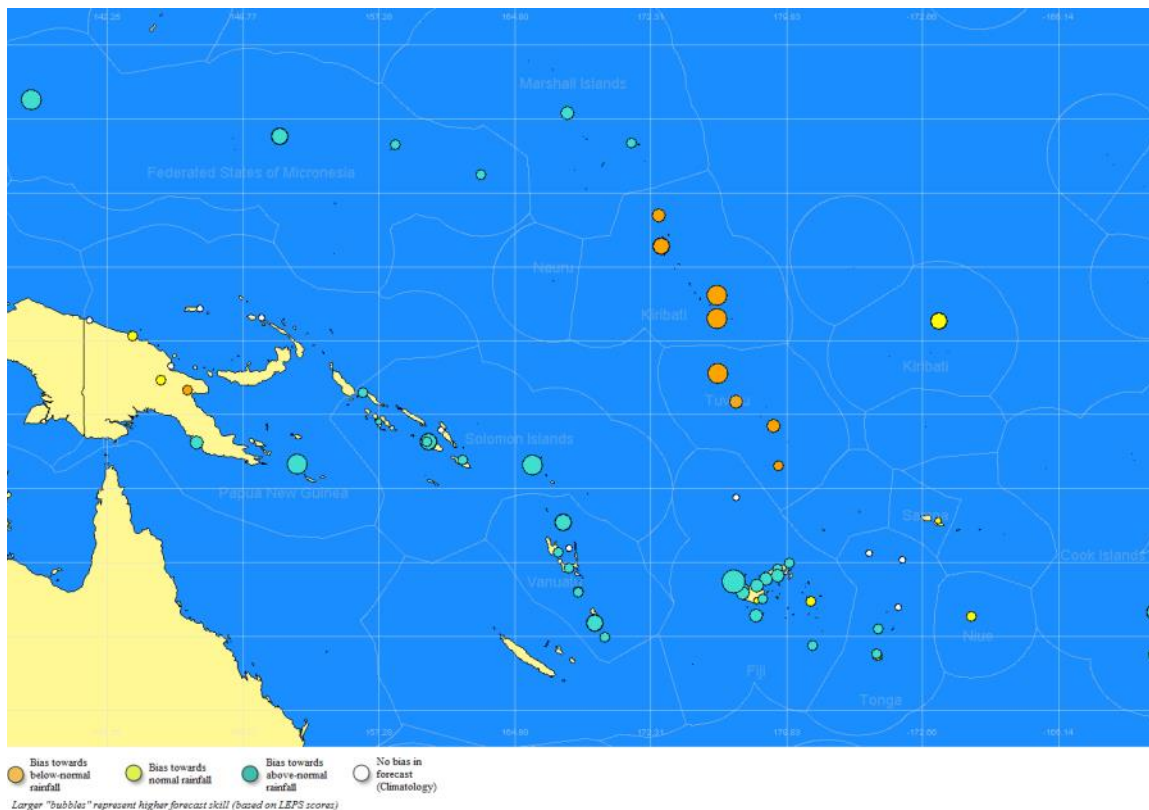
Tercile maximum temperature probabilities for March to May 2022



Tercile minimum temperature probabilities for March to May 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

March—May 2022



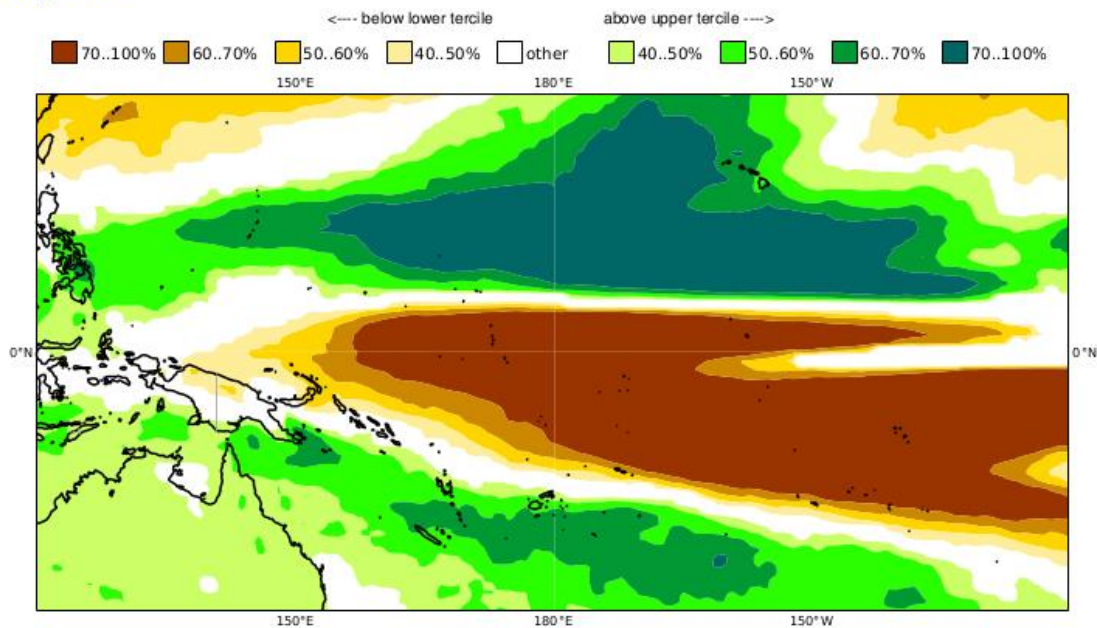
## Copernicus (C3S multi-system)-Rainfall

Prob(most likely category of precipitation)

Nominal forecast start: 01/02/22

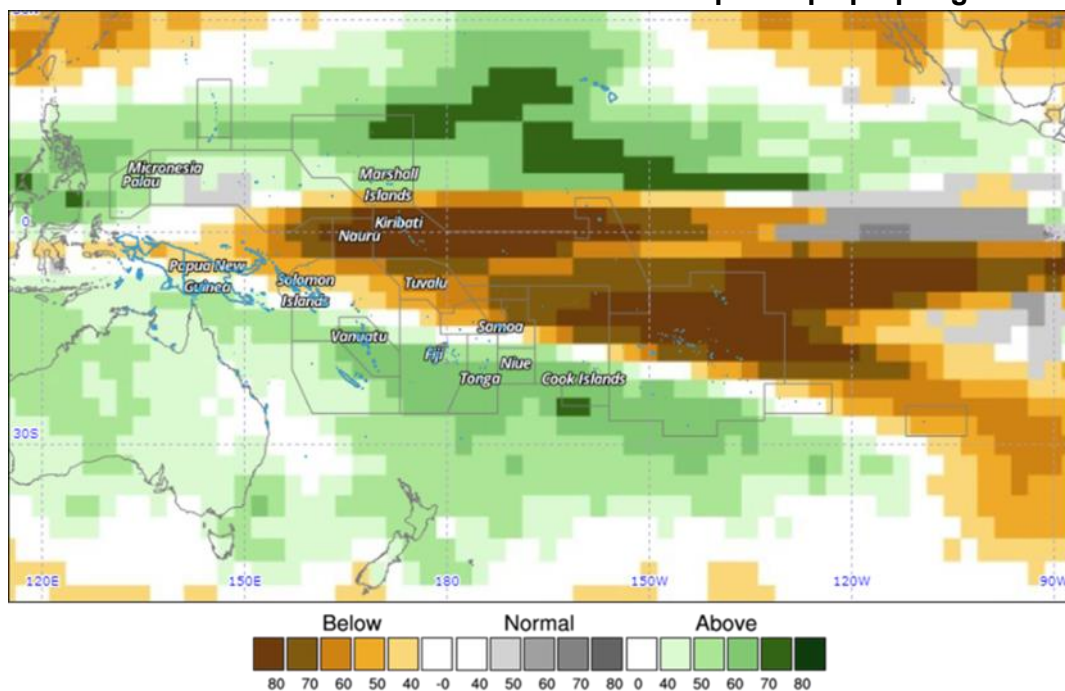
Unweighted mean

MAM 2022



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

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



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

Model: APCC, CMCC, CWB, NASA, NCER, PNU, POAMA

Generated using CLIK® (2022-3-3)

© APEC Climate Center

# TROPICAL CYCLONE

## 2021/2022 Season



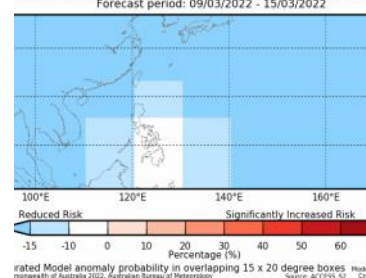
The cyclone activities in the western north Pacific occurs year around with near normal to below normal numbers of TCs anticipated. In the southwest Pacific, the tropical cyclone season 2021-22 started on the 01 November, 2021. The outlook for the season is enhanced risk for tropical cyclone activity 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. So far, there were six tropical cyclones (Ruby, Seth, Cody, Dovi and Eva,) for the southwest Pacific region.

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).

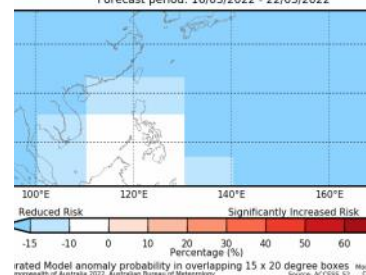
The weekly tropical cyclone forecast from the ACCESS-S model shows increased risk in the weeks beginning 16 March and ending 22 March 2022 for the southwest Pacific. There is reduce cyclone risk for the northwest Pacific region during the same period.

### ACCESS-S Weekly Forecasts –Northwest Pacific

Difference from normal chance of Tropical Cyclone's in the Northern  
Forecast period: 09/03/2022 - 15/03/2022

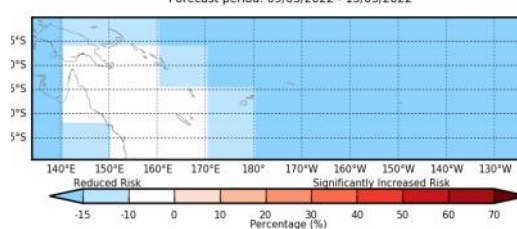


Difference from normal chance of Tropical Cyclone's in the Northern  
Forecast period: 16/03/2022 - 22/03/2022



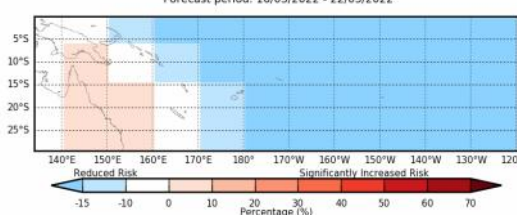
### ACCESS-S Weekly Forecasts –Southwest Pacific

Difference from normal chance of Tropical Cyclone's in the South Pacific  
Forecast period: 09/03/2022 - 15/03/2022



Calibrated Model anomaly probability in overlapping 15 x 20 degree boxes  
© Commonwealth of Australia 2022, Australian Bureau of Meteorology Source: ACCESS\_S2 Model run: 01/03/2022 Created: 03/03/2022

Difference from normal chance of Tropical Cyclone's in the South Pacific  
Forecast period: 16/03/2022 - 22/03/2022



Calibrated Model anomaly probability in overlapping 15 x 20 degree boxes  
© Commonwealth of Australia 2022, Australian Bureau of Meteorology Source: ACCESS\_S2 Model run: 01/03/2022 Created: 03/03/2022

### 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.

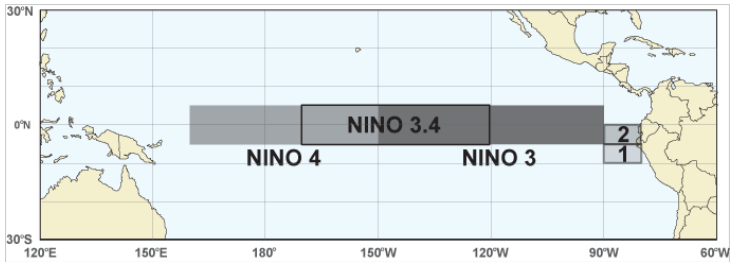
### 20 degrees Celsius Isotherm Depth

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