

Monthly Climate Bulletin

October 2022



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Photo Credit: Molly Powers (SPC) Samoa Tide Gauge



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- La Niña continues with models indicating a return to ENSO-neutral conditions (neither La Niña nor El Niño) early in 2023.
- The negative Indian Ocean Dipole (IOD) event continues.
- The Madden-Julian Oscillation (MJO) stalled while over the western to central Pacific region. This moderately strong pulse of the MJO is forecast to resume its eastwards track and weaken in the coming week.
- The Intertropical Convergence Zone (ITCZ) was displaced north of its average October position, while the South Pacific Convergence Zone (SPCZ) was displaced south-west over New Caledonia, southern Vanuatu, Fiji, and Tonga.
- Sea surface temperatures (SSTs) in September 2022 were slightly cooler than average along the equator between 157°E and the South American coast, with SSTs generally cooler than average along the rest of the equator across the Pacific.
- The Coral bleaching status for 1 November shows 'Alert Level 1' over parts of northern PNG and Palau. The four weeks Coral Bleaching Outlook to 27th November shows 'Alert Level 2' for northern PNG. 'Alert Level 1' for Palau, parts of FSM, parts of northern and southeastern PNG and western Solomon Islands.
- For November 2022-January 2023, models agree on above normal rainfall favoured for much of Palau, most of FSM, central RMI, western and southeastern PNG, most of Solomon Islands, New Caledonia, Vanuatu, Fiji, Tonga, Niue, southern Cook Islands, and southern French Polynesia. The models also agree on below normal rainfall for northern PNG and PNG Islands, southeastern FSM, northern most Solomon Islands, Nauru, Kiribati, Tuvalu, Tokelau, American Samoa, northern Cook Islands, northern French Polynesia and the Pitcairn Islands.
- The tropical cyclone season for southwest Pacific began on November 2022. The ACCESS-S weekly tropical cyclone forecast model shows marginally increased risk between 16 and 22 November for the northwest Pacific including the Philippines. There is no cyclone risk for the southwest Pacific for the period 8 to 21 November.



EL NIÑO–SOUTHERN OSCILLATION

La Niña and negative Indian Ocean Dipole continue

Click link to access [Climate Driver Update issued on 25 October 2022](#)

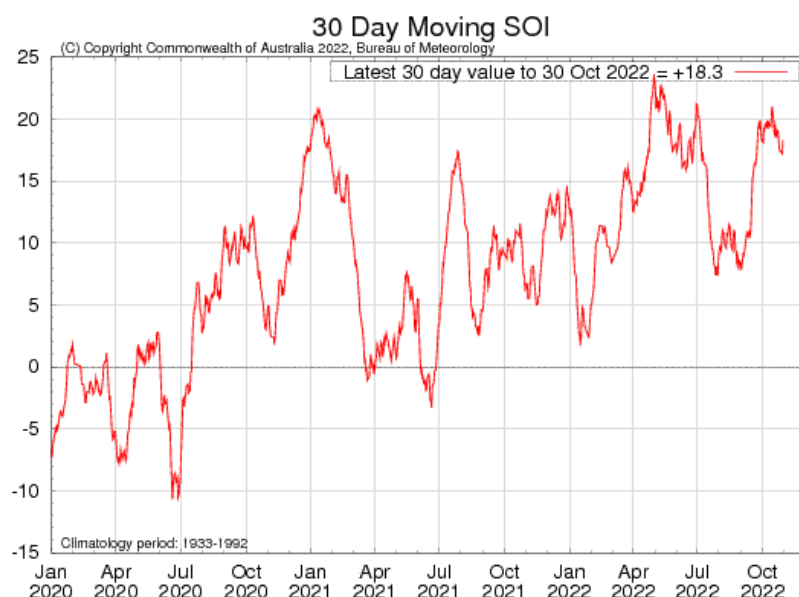
La Niña continues. In the tropical Pacific Ocean both atmospheric and oceanic indicators of the El Niño–Southern Oscillation (ENSO) are consistent with an established La Niña, including tropical Pacific sea surface temperatures, the Southern Oscillation Index (SOI), trade wind strength, and equatorial cloudiness.

Models indicate a return to ENSO-neutral conditions (neither La Niña nor El Niño) early in 2023.

The negative Indian Ocean Dipole (IOD) event also continues. The IOD index has satisfied negative IOD thresholds (i.e. at or below -0.4 °C) since June. Models indicate that the negative IOD is likely to persist into late spring before rapidly decaying.

The Southern Annular Mode (SAM) is currently in a neutral phase. However, SAM is likely to return to a positive phase during November and remain generally positive into early summer. During the spring and summer months, a positive SAM increases the chance of above average rainfall for parts of eastern New South Wales, eastern Victoria, and south-eastern Queensland, and increases the chance of below average rainfall for western Tasmania.

The 30-day Southern Oscillation Index (SOI) for the 30 days ending 30 October was +17.7. The 90-day SOI value was +14.6.



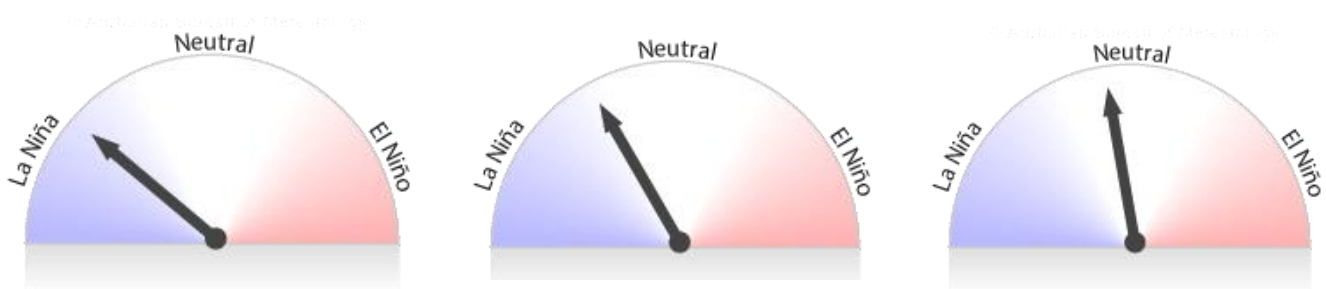


EL NIÑO–SOUTHERN OSCILLATION

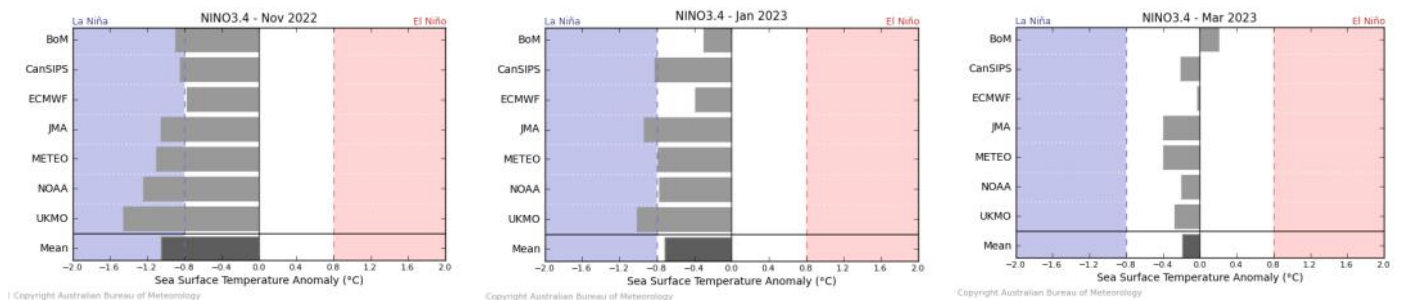
La Niña and negative Indian Ocean Dipole continue

Click link to access [Climate Driver Update issued on 25 October 2022](#)

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



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>

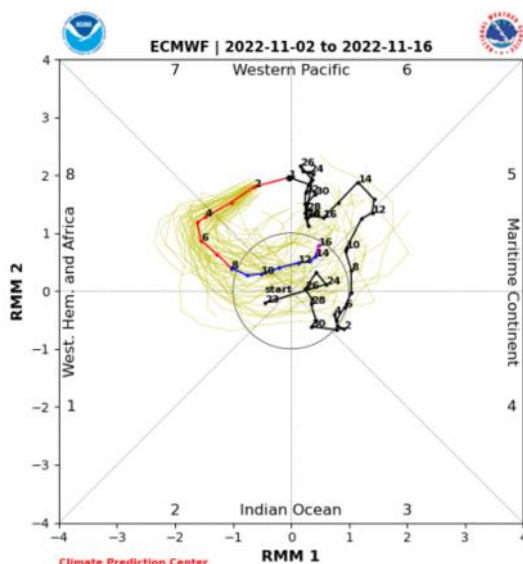
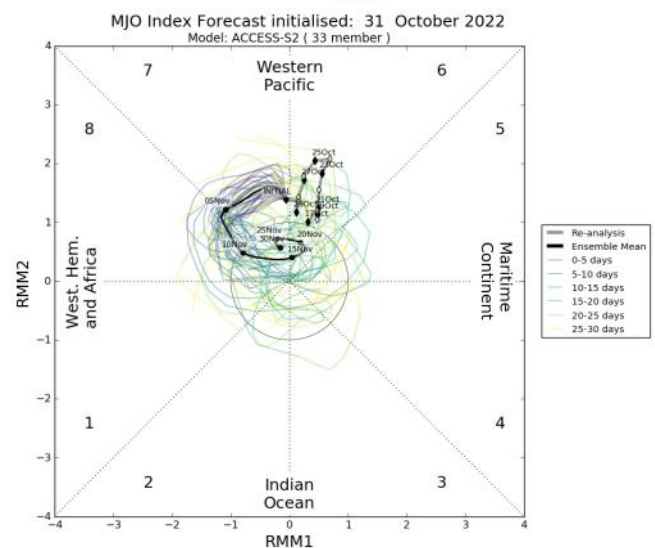
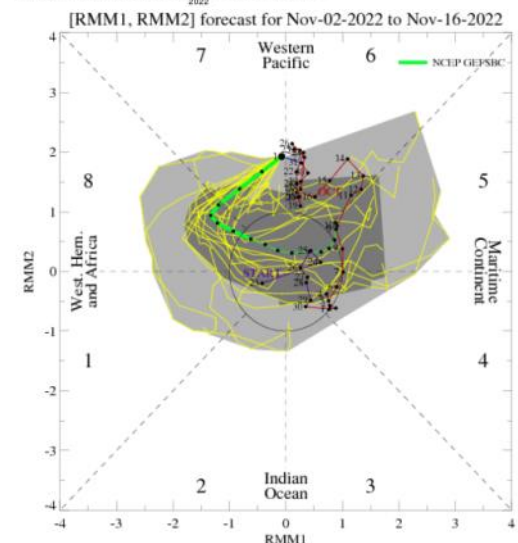
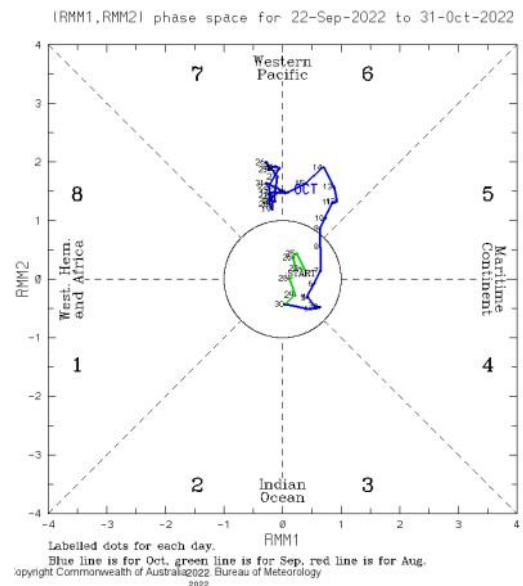
MADDEN–JULIAN OSCILLATION

Click link to access [Tropical Climate Update](#) [Issued on Tuesday 02 November 2022]

The Madden-Julian Oscillation (MJO) was weak or indiscernible during the first week of October but later became moderately strong over the last three weeks of the month over the western Pacific.

In the past week the Madden-Julian Oscillation (MJO) stalled while over the western to central Pacific region. This moderately strong pulse of the MJO is forecast to resume its eastwards track and weaken in the coming week. While some climate models indicate the MJO will track towards the eastern Pacific, most models predict it will weaken and become indiscernible next week. While remaining in the central Pacific, this MJO pulse may contribute to above-average rainfall for northern Queensland in the coming week. An indiscernible MJO signal, likely during the second week of the forecast period, means the MJO is not expected to exert a significant influence on tropical cloudiness or rainfall patterns.

This is an abbreviated version of the Tropical Climate Update. Click on the [Weekly Tropical Update](#) for more information .



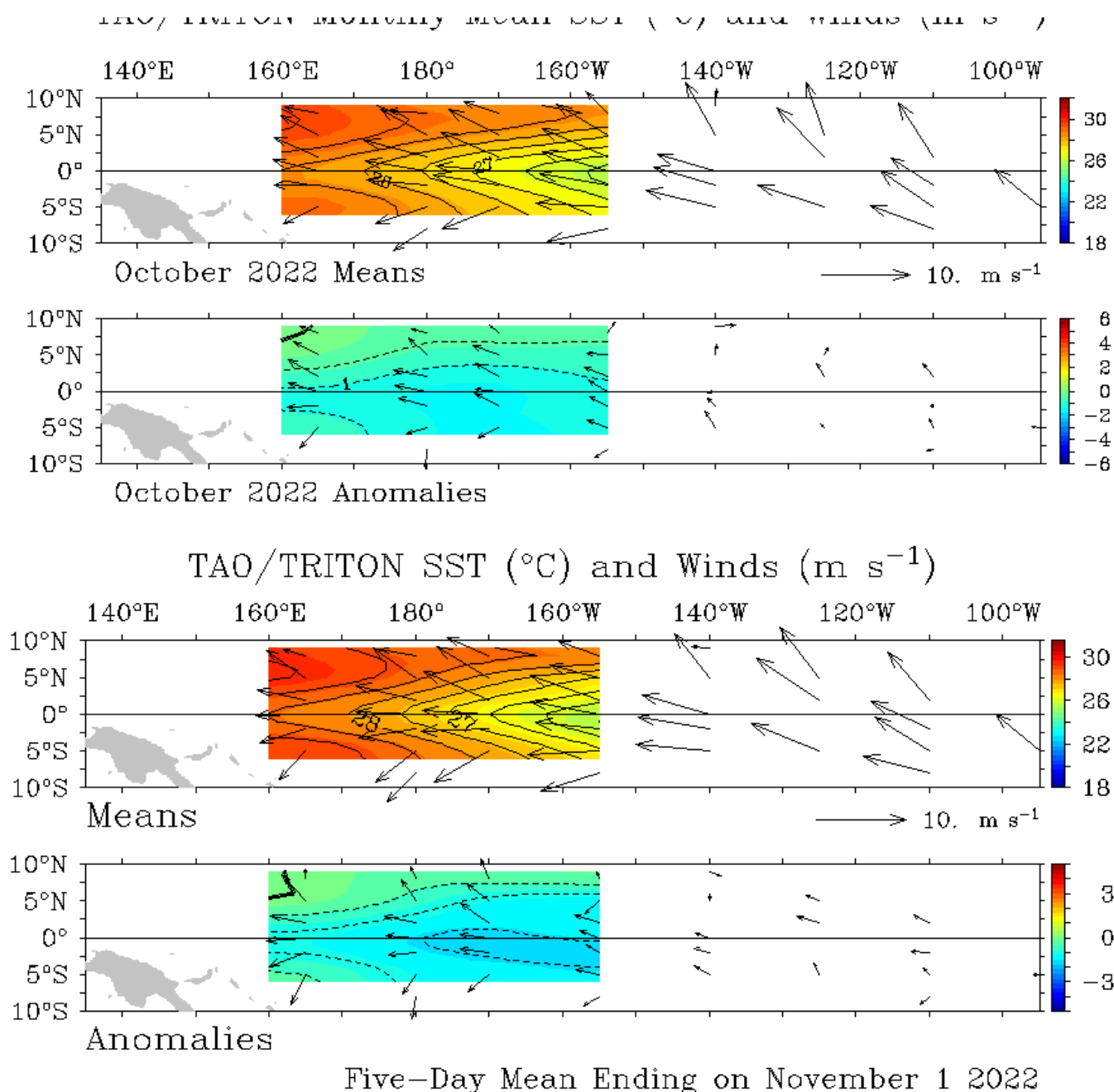
WIND



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

The trade winds were stronger than normal in the western and central equatorial Pacific over the five days ending 1 November. Similarly, they were stronger than normal in the western and central equatorial Pacific in October.

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

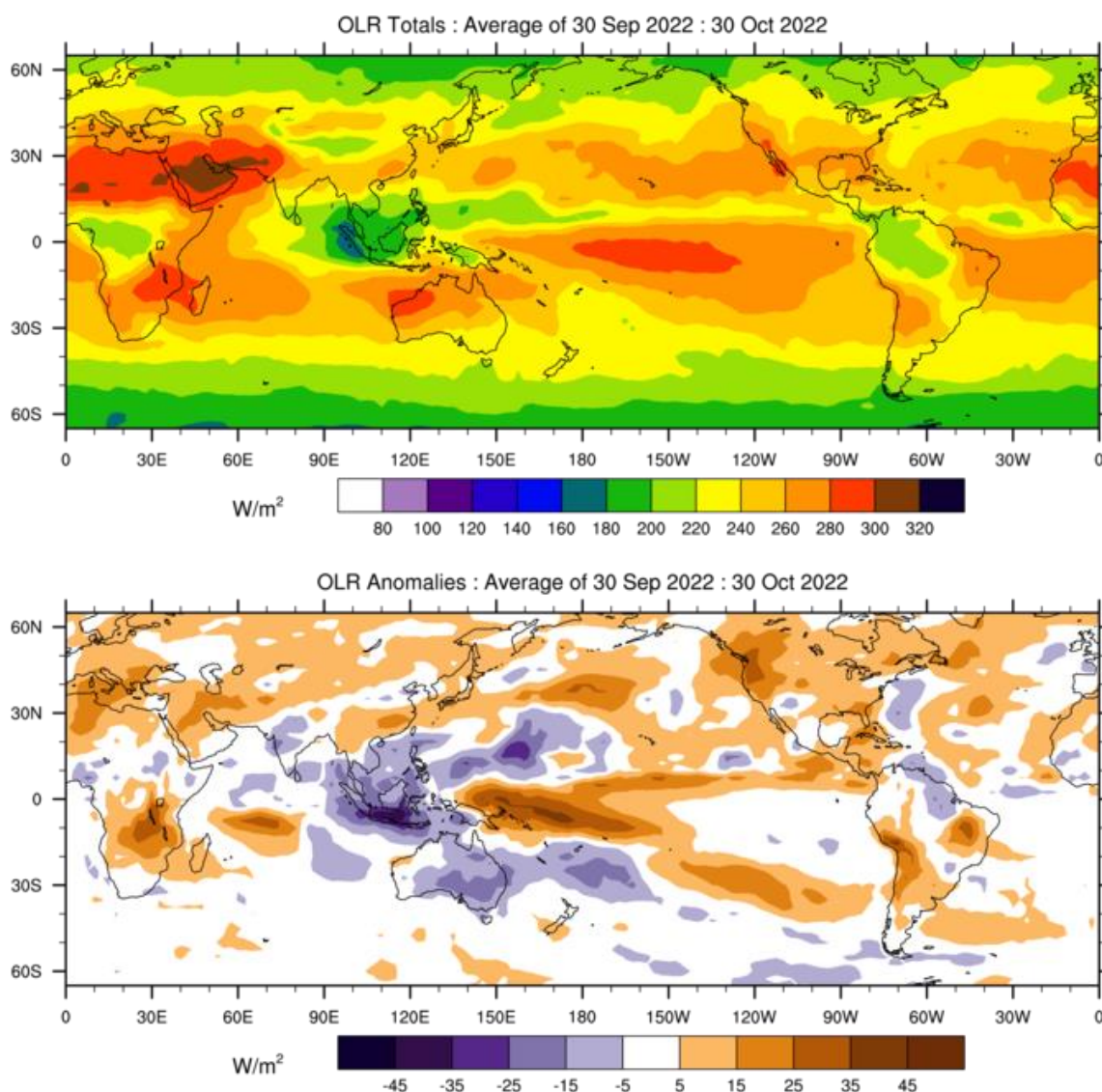
Click link to access [OLR](#)



The October 30-day OLR total and anomaly maps suggest the Intertropical Convergence Zone (ITCZ) was displaced north of its average October position especially in the western Pacific. The South Pacific Convergence Zone (SPCZ) was displaced south-west over New Caledonia, southern Vanuatu, Fiji and Tonga.

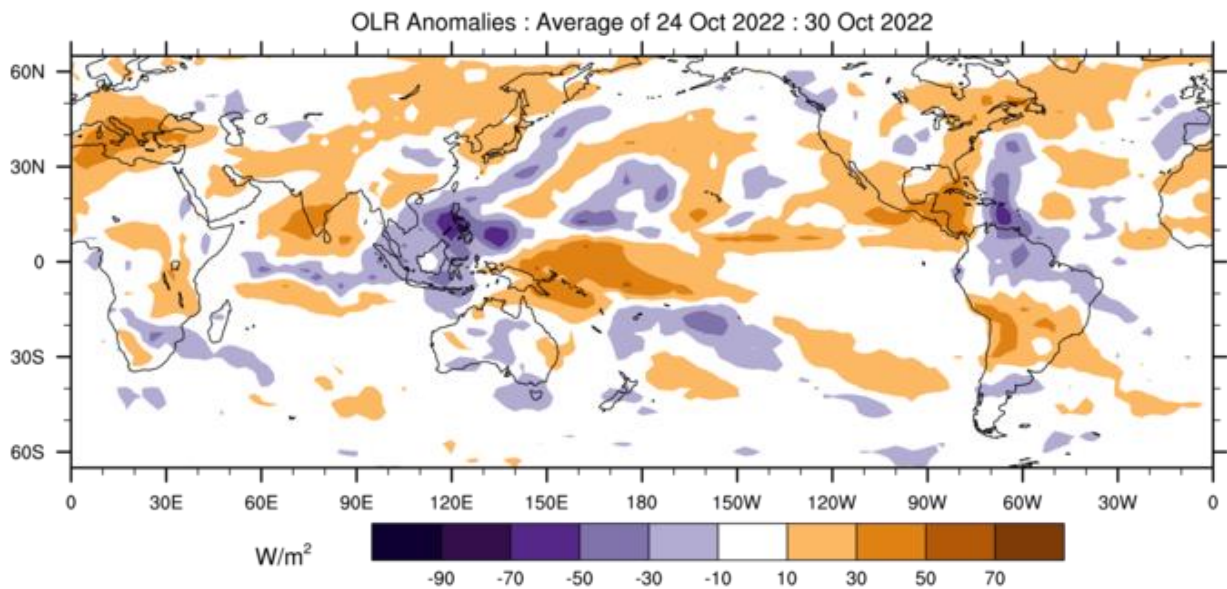
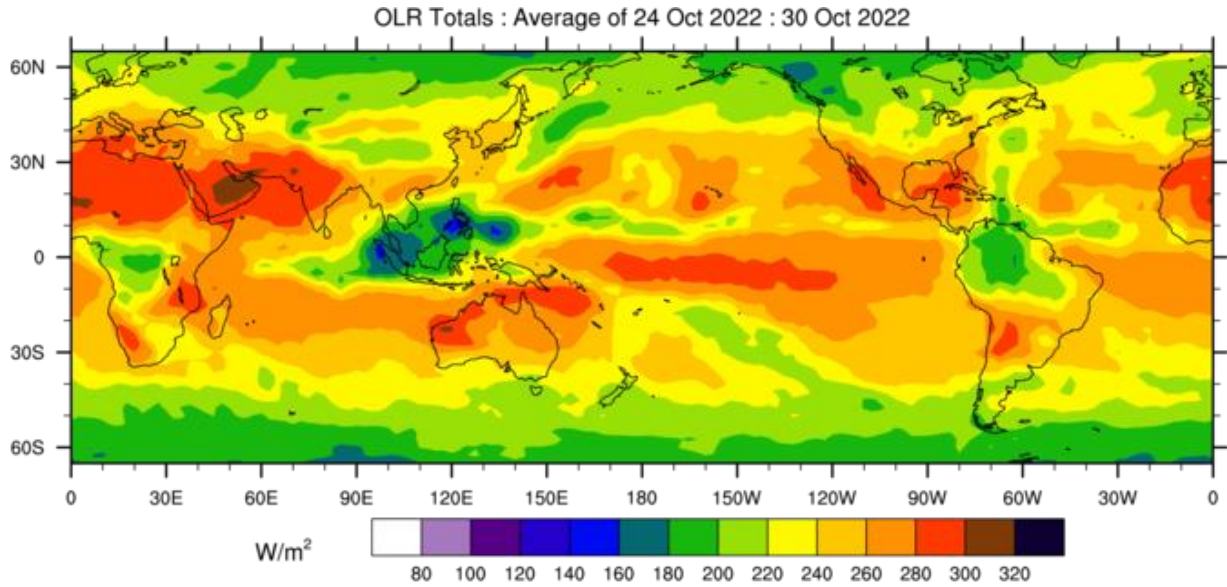
Note: Global maps of OLR below highlight regions experiencing increased or decreased cloudiness. The top panel is the total OLR in Watts per square metre (W/m^2) and the bottom panel is the anomaly (current minus the 1979-1998 climate average), in W/m^2 . In the bottom panel, negative values (blue shading)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

OLR Total and Anomalies, 30 Day OLR

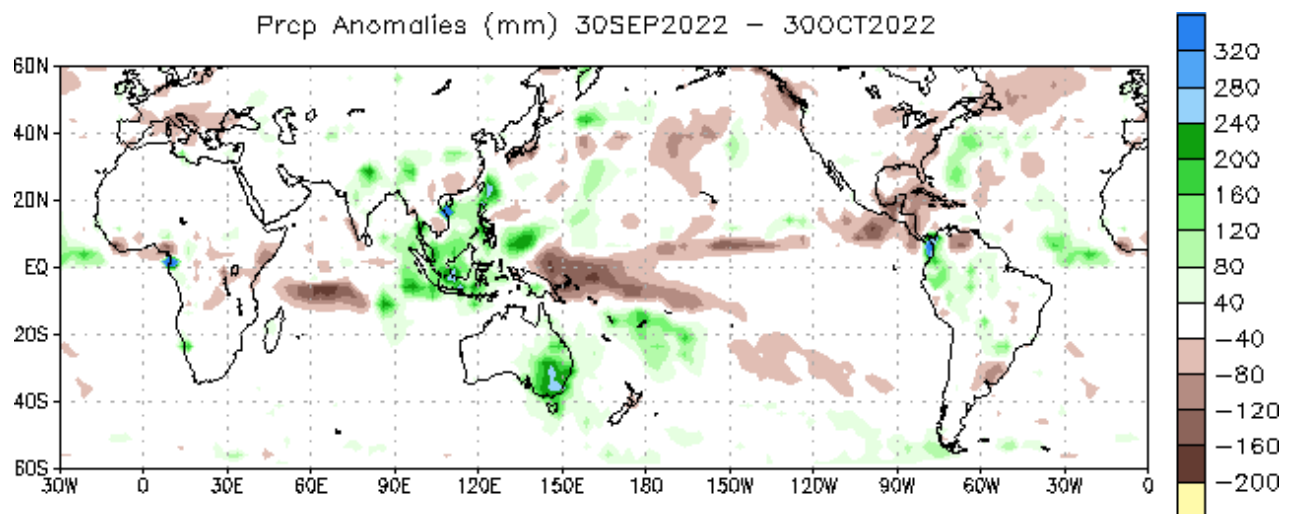


(C) Copyright Commonwealth of Australia 2022. Bureau of Meteorology

OLR Total and Anomalies, 7 Day OLR

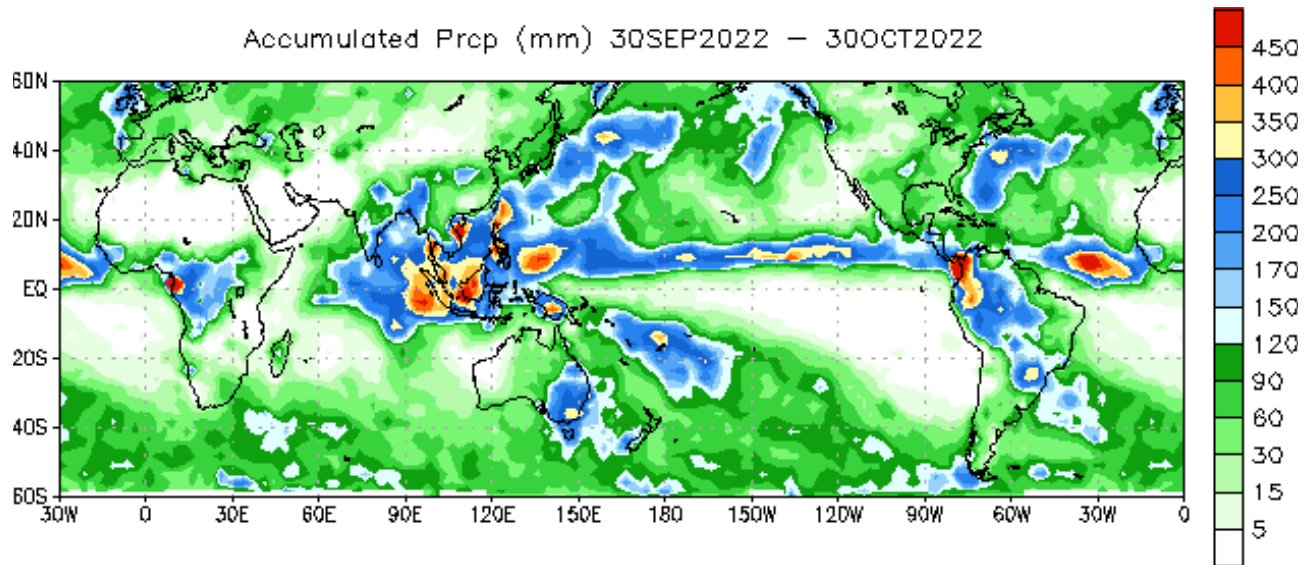


(C) Copyright Commonwealth of Australia 2022. Bureau of Meteorology

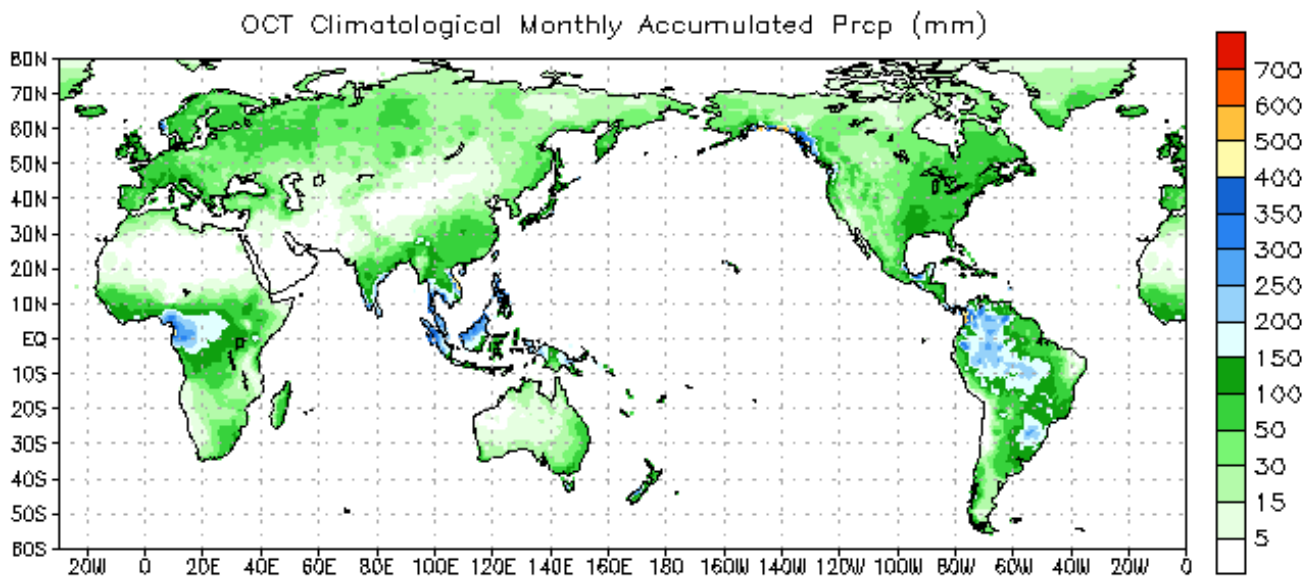


Data Source: NCEP CMAP Precipitation
Climatology (1991–2020)

30-Day Rainfall Accumulated



Data Source: NCEP CMAP Precipitation



Data Source: CPC Unified (gauge-based) Precipitation
Climatology (1979–1995)

NOAA Climate Prediction Centre - NCEP CMAP precipitation:

https://www.cpc.ncep.noaa.gov/products/Global_Monsoons/Global-Monsoon.shtml

OCEAN CONDITIONS

SEA SURFACE TEMPERATURE

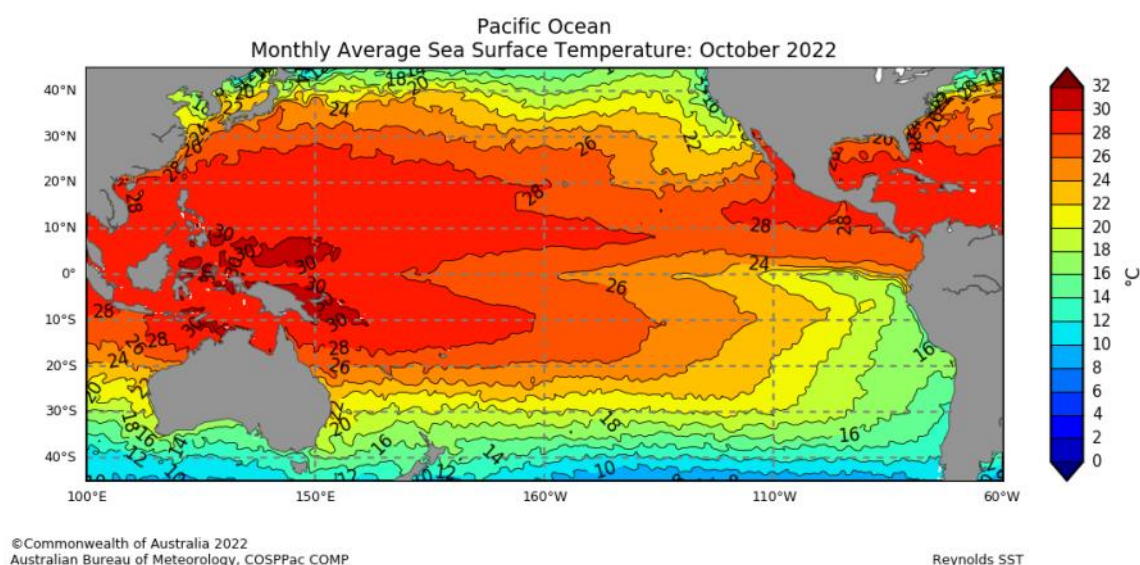


Click link to access [Pacific Community COSPPac Ocean Portal](#)

Sea surface temperatures (SST) in October 2022 was cooler than average along the equator between 157°E and the South American coast. SSTs were also slightly cooler than average south of the equator in the tropical central and eastern Pacific. Warm SST anomalies were present over much of the Maritime Continent and across most COSPPac countries, with the exception for Nauru, southern RMI, Tuvalu, Tokelau, northern Cook Islands and French Polynesia where cooler than normal SSTs were experienced. Compared to September, cool anomalies have strengthened over the eastern and western equatorial Pacific.

Record high SSTs for the month of October were observed in southern and southeastern Papua New Guinea, southern Solomon Islands, northern New Caledonia, majority of Vanuatu, southern Fiji, and parts of Tonga. Regions of very much above average (deciles 10) SST were present in parts of Palau's EEZ, western and southern FSM, northern PNG, northern Solomon Islands, southern New Caledonia, northern Fiji, parts of southern Tonga, and in patches around Niue and the southern Cook Islands. Regions of above average (deciles 8-9) SST for October were observed across most of the COSPPac countries from central FSM to the Pitcairn Islands. Below average (deciles 2-3) to very much below average (decile 1) SSTs were observed over far southeastern FSM, southern RMI, Nauru, Kiribati, northern Tuvalu, Tokelau, northern Cook Islands and central and northern French Polynesia. The lowest on record SSTs were observed over southern Gilbert Islands, most of Phoenix Islands and southern Line Islands of Kiribati and central French Polynesia.

Mean Sea Surface Temperature

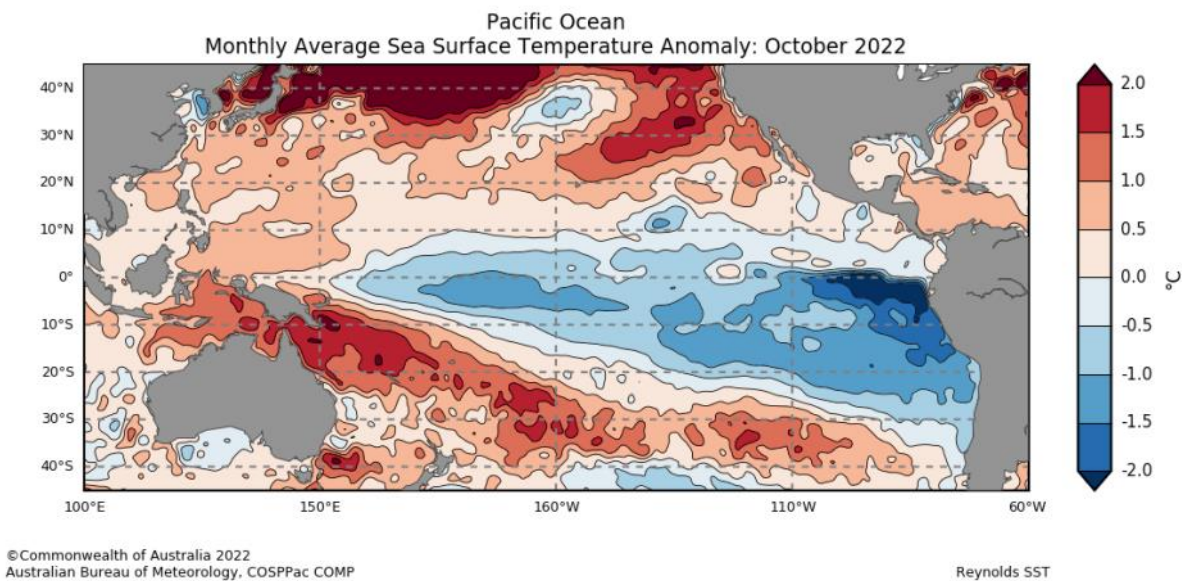


OCEAN CONDITIONS

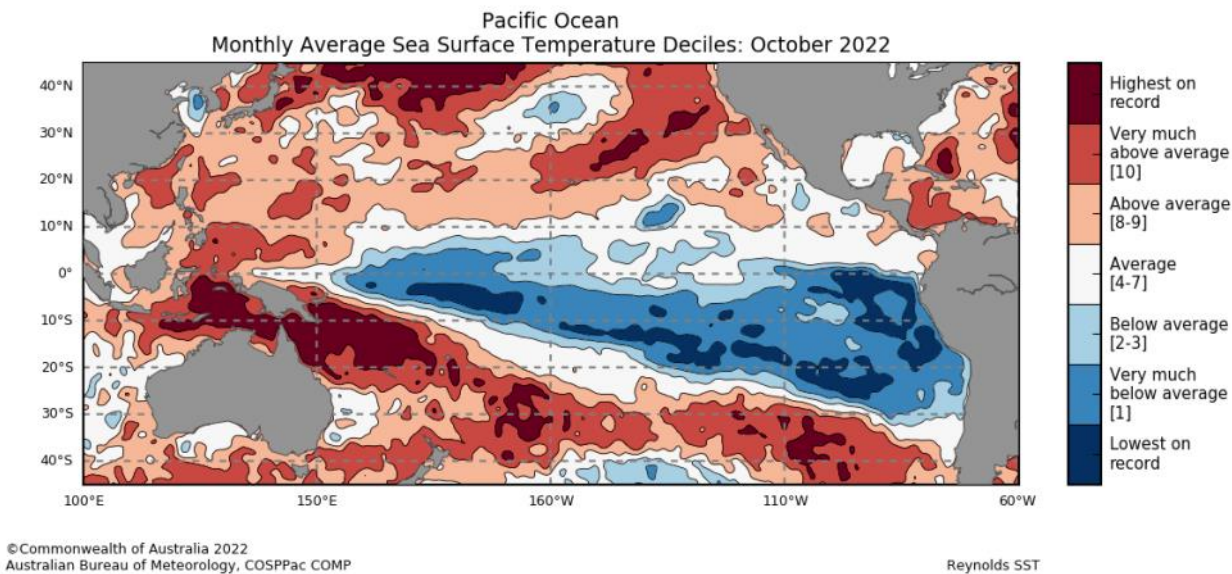
Click link to access [→SEA SURFACE TEMPERATURE](#)



Anomalous Sea Surface Temperature



Sea Surface Temperatures Deciles



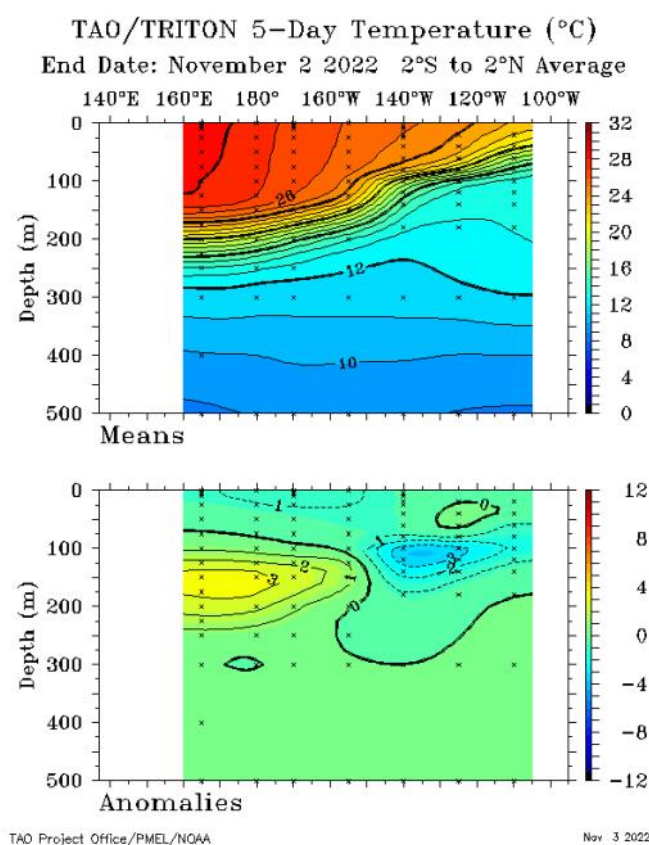
OCEAN CONDITIONS

SUB SURFACE

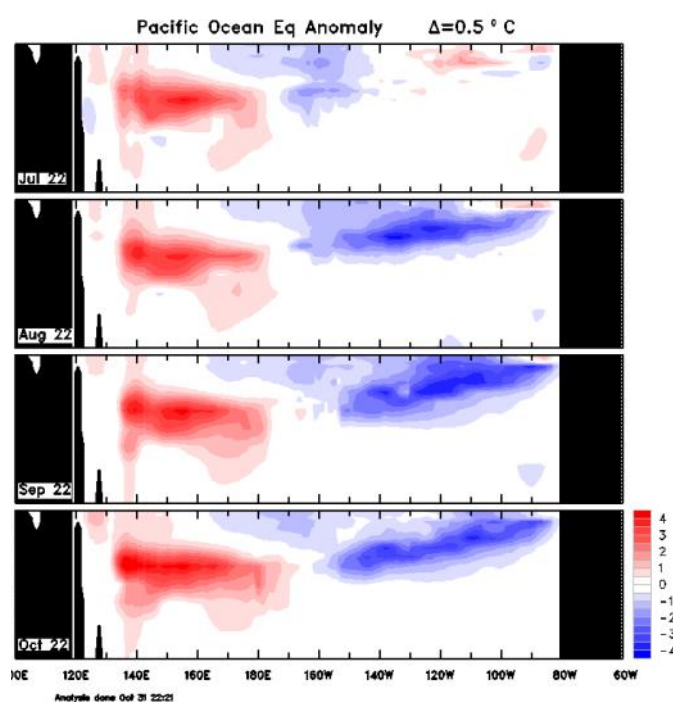


The four-month sequence of equatorial Pacific sub-surface temperature anomalies (to 20 October 2022) shows cool anomalies from the surface to around 150 m depth in the central to eastern equatorial Pacific. Anomalies reached more than 2.5 degrees cooler than average across much of this region. Warm anomalies persist between around 100 and 250 m depth west of the International Date Line. In parts of this region anomalies reached more than 2.5 degrees warmer than average west of 160°E. The pattern and strength of anomalies in has been fairly similar during October and September.

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

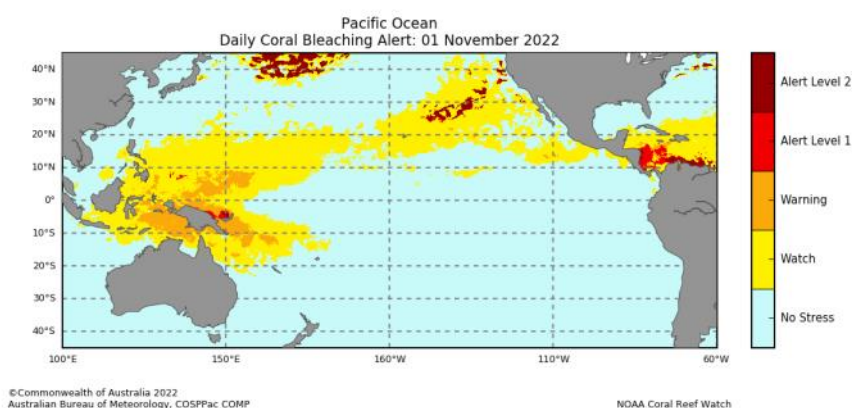
CORAL BLEACHING



The daily Coral Bleaching Alert status for 1 November 2022 shows 'Alert Level 1' in parts of the northern PNG and Palau's EEZ. Patches of 'Warning' were present in central FSM, most of PNG and southern Solomon Islands. The four weeks Coral Bleaching Outlook to 27 November shows 'Alert Level 2' for northern PNG. 'Alert Level 1' for Palau, parts of FSM, parts of northern and southeastern PNG and western Solomon Islands. The 'Warning' alert is present for most of FSM, southern Palau, northeastern PNG, most of Solomon Islands and western Vanuatu.

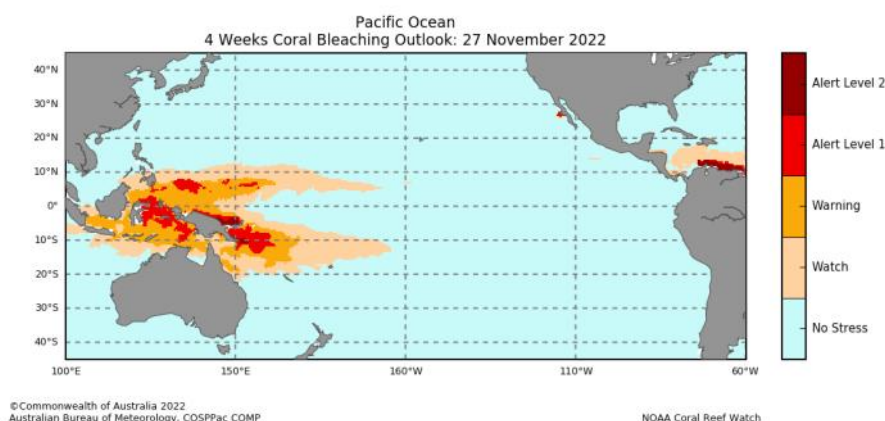
Daily Coral Bleaching Alert

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



4 Weeks Coral Bleaching Outlook

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



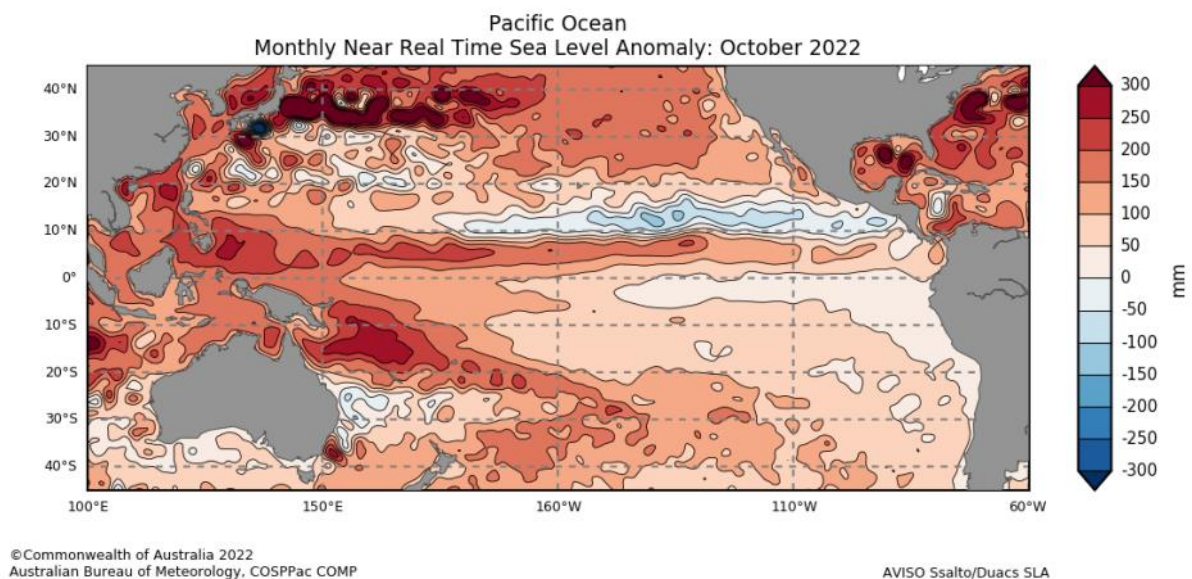
OCEAN CONDITIONS

OCEAN SURFACE CURRENTS AND SEA LEVEL

Sea level was above normal for most of the COSPPac countries. Anomalies above 250mm were observed in northern New Caledonia, western Vanuatu, southern Tonga and southern Solomon Islands. Patches of anomalies 150-200mm were observed in parts of Palau, southern FSM, southern RMI, southeastern PNG, most of Solomon Islands, rest of Vanuatu, most of Fiji, southern Tonga, Niue and southern Cook Islands.

Monthly Sea Level Anomalies

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

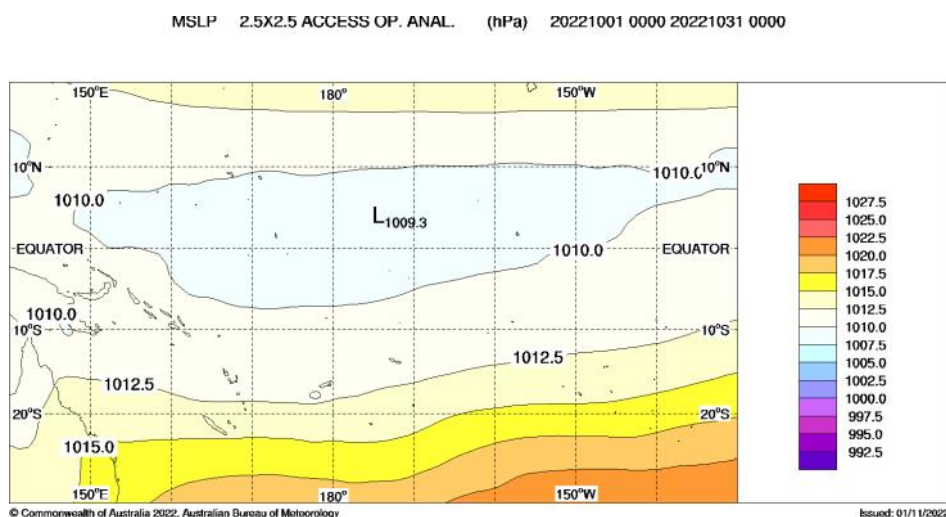


MEAN SEA LEVEL PRESSURE

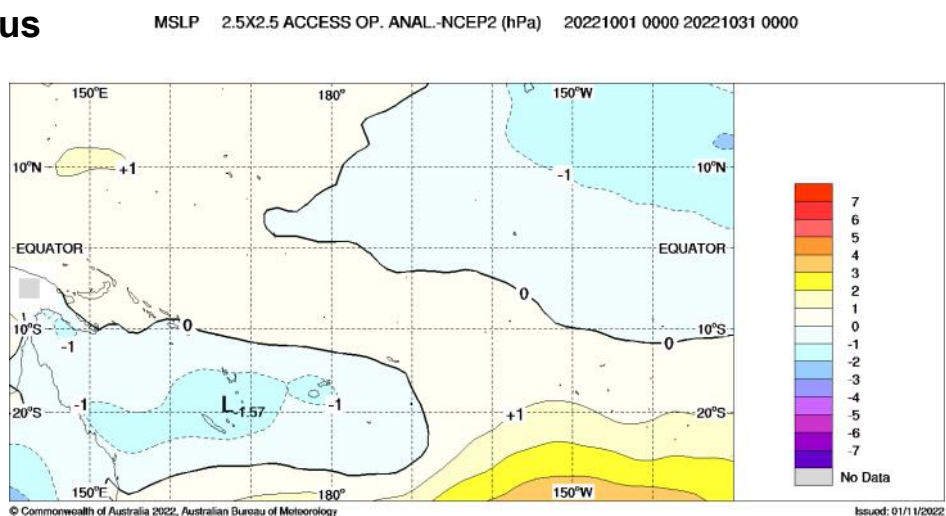
The October mean sea level pressure (MSLP) anomaly map shows mostly negative anomalies of -1 or greater over Fiji, Vanuatu, and towards the Coral Sea region. Positive anomalies of +1 or greater over southern French Polynesia and central FSM.

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

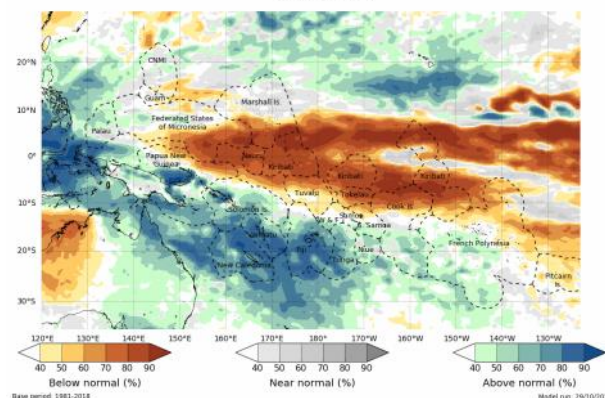
November 2022—January 2023



The ACCESS-S model forecast for November 2022, favours below normal rainfall for southern and eastern FSM, north-eastern PNG, southern RMI, Nauru, Kiribati, Tuvalu, Tokelau, American Samoa, northern Cook Islands, northern French Polynesia and Pitcairn. Above normal rainfall is likely or very likely for Palau, most of PNG, most of Solomon Islands, New Caledonia, Vanuatu, Fiji, Tonga, Niue, southern Cook Islands and patches of French Polynesia.

The three-month rainfall outlook (November 2022-January 2023) favours below normal rainfall for northern PNG, Momase region and the PNG Islands, southeastern FSM, southern RMI, northern most Solomon Islands, Nauru, most of Kiribati, Tuvalu, Wallis and Futuna, Tokelau, Samoa, American Samoa, northern Cook Islands, northern French Polynesia and Pitcairn. Above normal rainfall is likely or very likely for Palau, CNMI, Guam, most of FSM, northern and central RMI, southeast PNG, most of Solomon Islands, New Caledonia, Vanuatu, Fiji, Tonga, Niue and southern Cook Islands and French Polynesia.

Monthly [ACCESS-S](#) Maps



The Copernicus multi-model outlook for November 2022-January 2023 favours below normal rainfall for Momase region and PNG Islands, southern RMI, western and northern Solomon Islands, Nauru, most of Kiribati, Tuvalu, Tokelau, Wallis and Futuna, American Samoa, northern and central Cook Islands, French Polynesia and Pitcairn Island. Above normal rainfall is likely or very likely for Palau, Guam, CNMI, most of FSM, northern Marshall Islands, western and southern PNG, southern Solomon Islands, New Caledonia, Vanuatu, Fiji, Tonga, Niue and southern Cook Islands and French Polynesia.

The APEC Climate Centre multi-model for November 2022-January 2023 favours below normal rainfall for southern RMI, PNG Islands, western and northern Solomon Islands, Nauru, most of Kiribati, Tuvalu, Tokelau, American Samoa, northern Cook Islands, northern French Polynesia and Pitcairn Island. Above normal rainfall is likely or very likely for Palau, western and central FSM, central RMI, PNG mainland and Milne Bay region, southern Solomon Islands, New Caledonia, Vanuatu, Fiji, Tonga, Niue, southern Cook Islands and southwest French Polynesia.

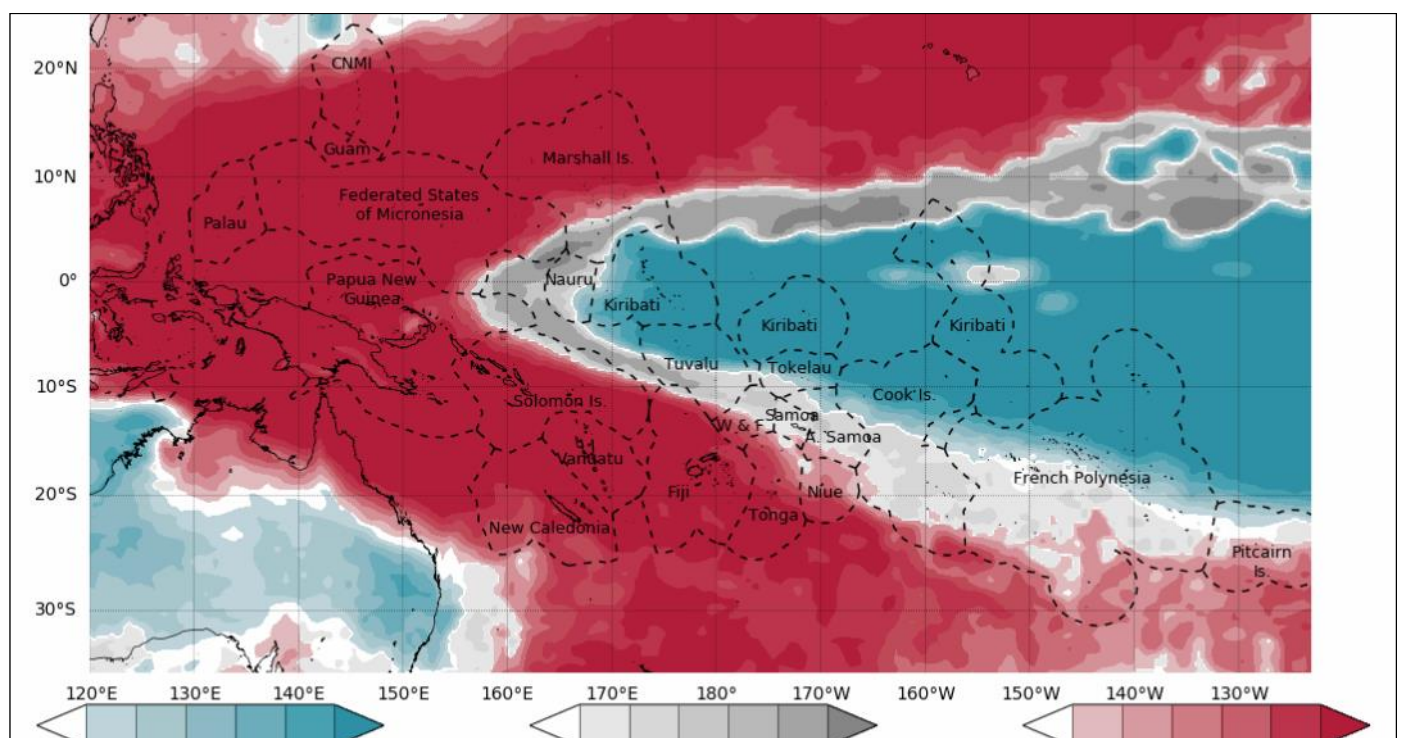
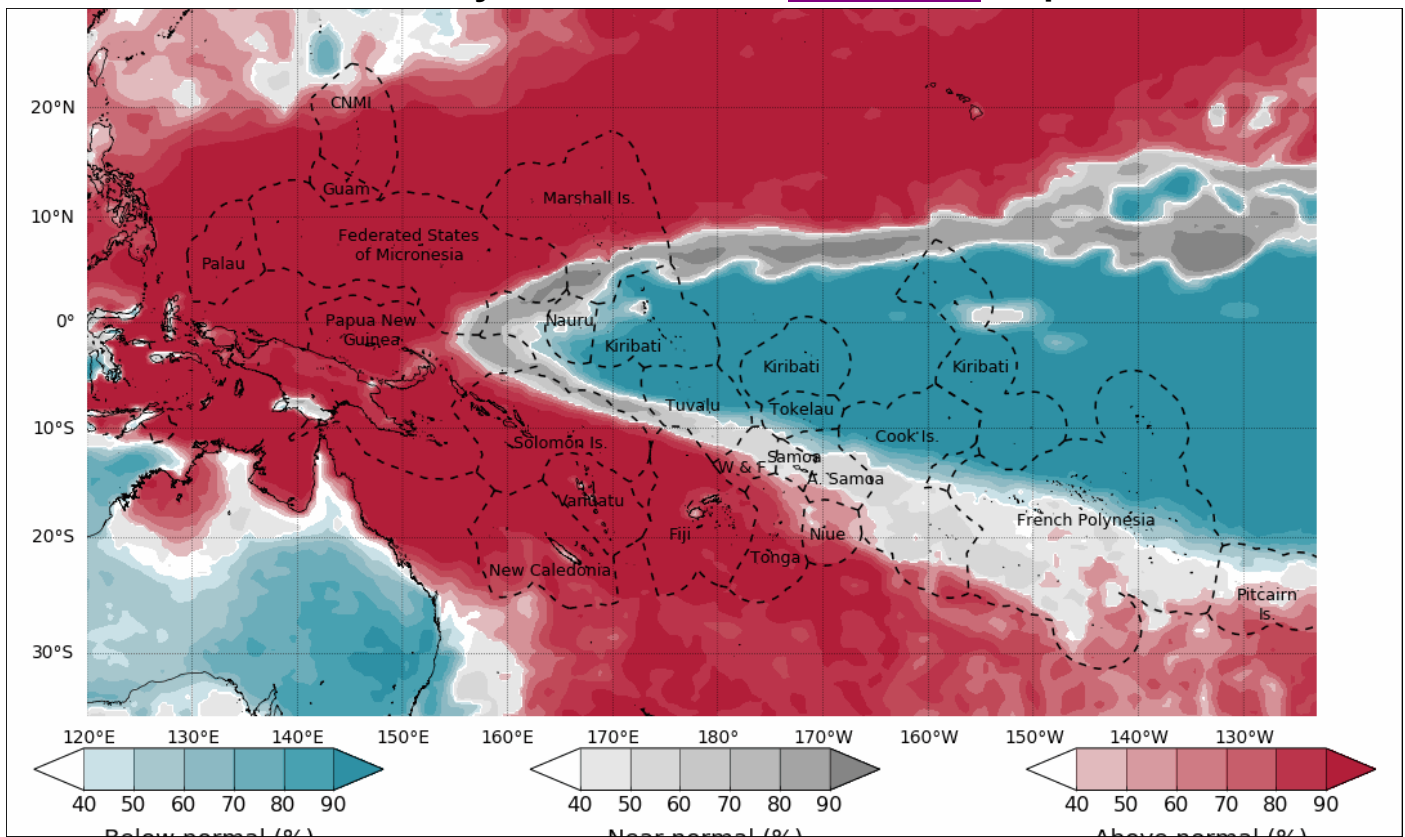
For November 2022-January 2023, the models agree on above normal rainfall for much of Palau, most of FSM, central RMI, western and southeastern PNG, most of Solomon Islands, New Caledonia, Vanuatu, Fiji, Tonga, Niue, southern Cook Islands, and southern French Polynesia. The models also agree that below normal rainfall is likely or very likely for northern PNG and PNG Islands, southeastern FSM, northern most Solomon Islands, Nauru, Kiribati, Tuvalu, Tokelau, American Samoa, northern Cook Islands, northern French Polynesia and Pitcairn Island.

SEASONAL TEMPERATURE OUTLOOK

November 2022—January 2023



Monthly Tmax and Tmin ACCESS-S Maps



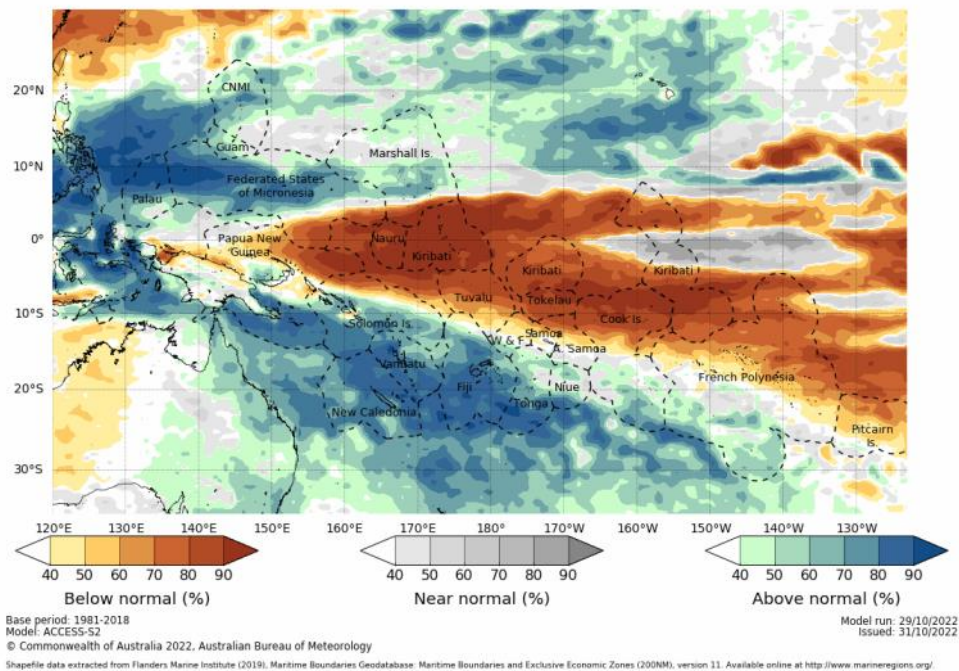
SEASONAL RAINFALL OUTLOOK

November 2022—January 2023

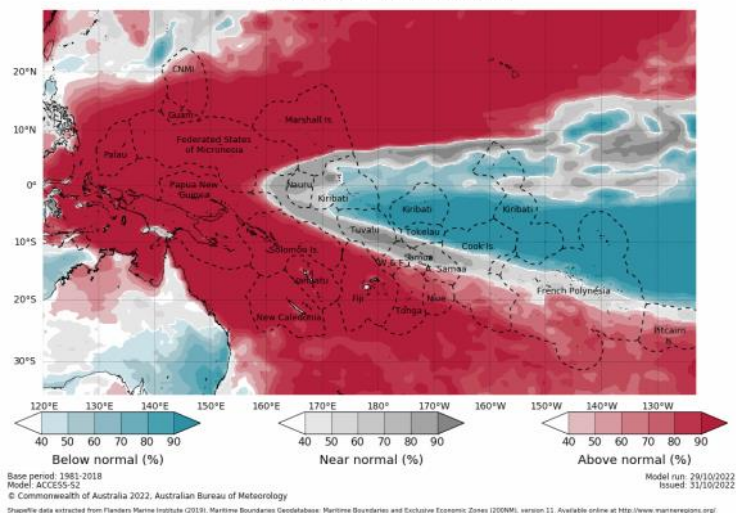


Seasonal ACCESS-S maps

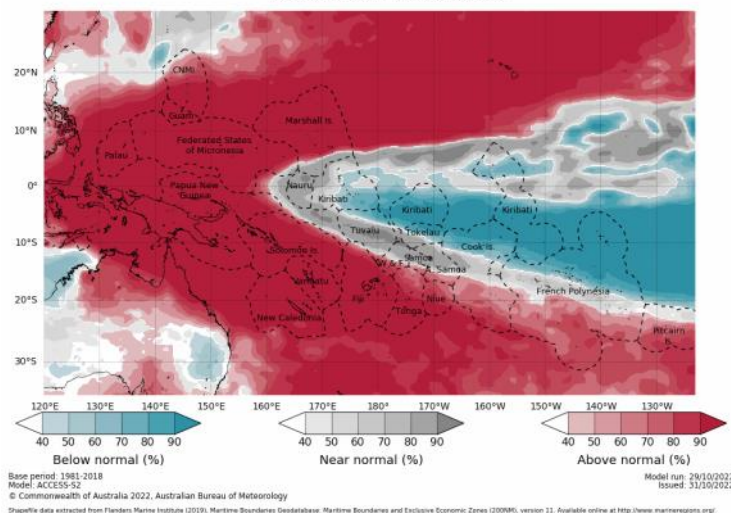
Tercile rainfall probabilities for
November 2022 to January 2023



Tercile maximum temperature probabilities for
November 2022 to January 2023



Tercile minimum temperature probabilities for
November 2022 to January 2023



'About ACCESS-S <http://access-s.climatecloud/>

SEASONAL RAINFALL OUTLOOK

November 2022—January 2023



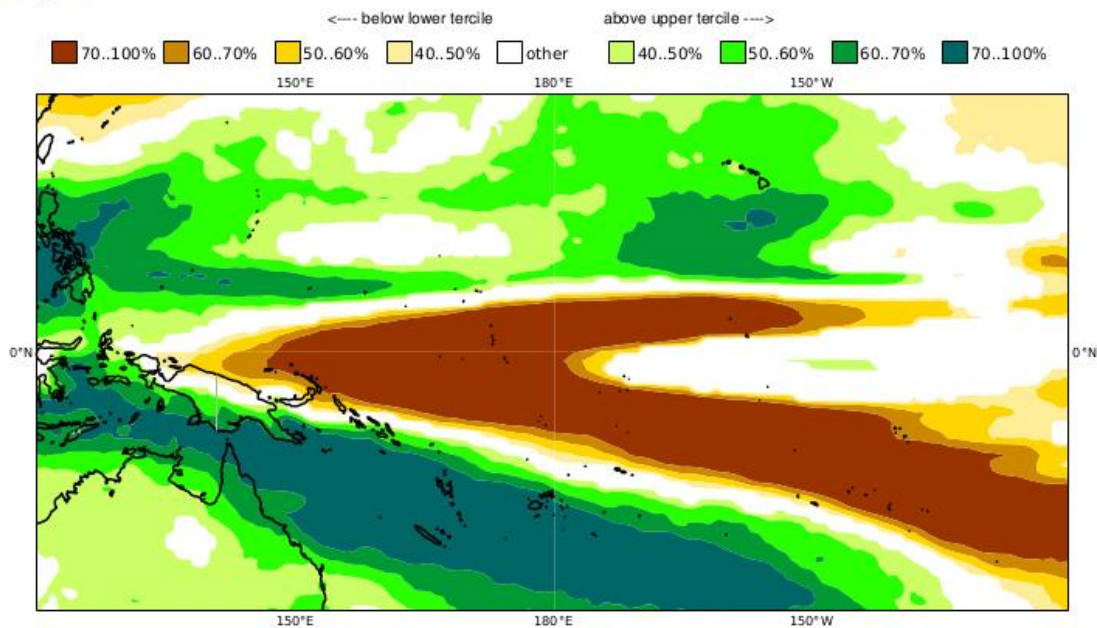
Copernicus (C3S multi-system)-Rainfall

Prob(most likely category of precipitation)

Nominal forecast start: 01/10/22

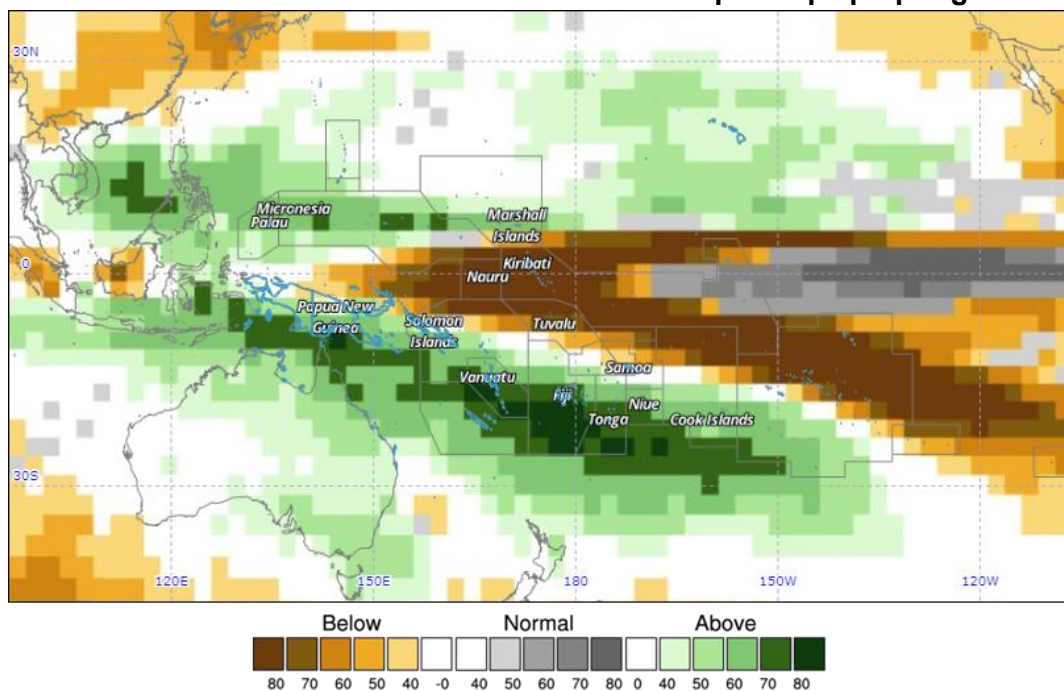
Unweighted mean

NDJ 2022/23



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

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



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

Model: APCC, BOM, CMCC, CWB, MSC, NASA, NCEP

Generated using CLIK® (2022-11-4)

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TROPICAL CYCLONE

2022/2023 Season



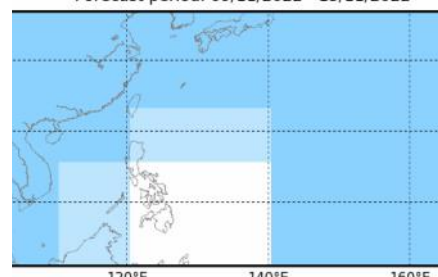
The northwest Pacific, 2021-22 tropical cyclone season is year around, with most cyclones occurring between May and October. Twenty-four named TCs have occurred as of 31 October with four reaching super typhoon intensity. Most TCs in the southwest Pacific occur between November to April. Associated with the existing La Niña conditions, models favour enhanced TC risk in the western Pacific. In the central part of south Pacific, TC risks are generally near normal to below normal.

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 marginally increased risk between 16 and 22 November for the northwest Pacific including the Philippines. There is no cyclone risk for the southwest Pacific for the period 8 to 21 November.

ACCESS-S Weekly Forecasts –Northwest Pacific

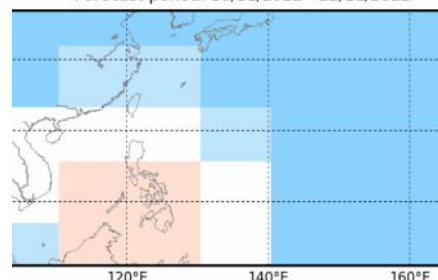
a from normal chance of Tropical Cyclone's in the Nor
Forecast period: 09/11/2022 - 15/11/2022



d Risk Significantly Increased Ris
Percentage (%)

robability in overlapping 15 x 20 degree boxes
122, Australian Bureau of Meteorology Model: ACCESS_S2 Model Run: 1

a from normal chance of Tropical Cyclone's in the Nor
Forecast period: 16/11/2022 - 22/11/2022

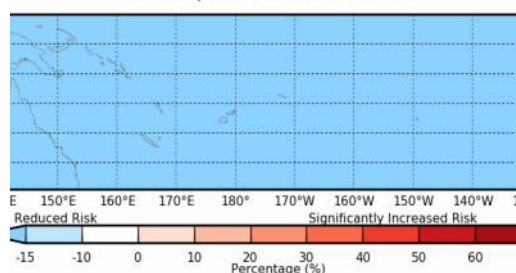


d Risk Significantly Increased Ris
Percentage (%)

robability in overlapping 15 x 20 degree boxes
122, Australian Bureau of Meteorology Model: ACCESS_S2 Model Run: 1

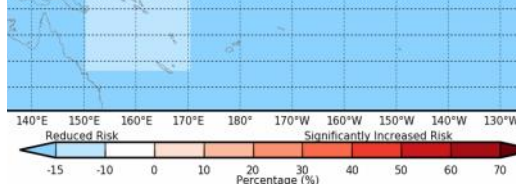
ACCESS-S Weekly Forecasts –Southwest Pacific

Difference from normal chance of Tropical Cyclone's in the South Pacific
Forecast period: 09/11/2022 - 15/11/2022



robability in overlapping 15 x 20 degree boxes
122, Australian Bureau of Meteorology Model: ACCESS_S2 Model Run: 01/11/2022

Difference from normal chance of Tropical Cyclone's in the South Pacific
Forecast period: 16/11/2022 - 22/11/2022



Model anomaly probability in overlapping 15 x 20 degree boxes
south of Australia 2022, Australian Bureau of Meteorology Model: ACCESS_S2 Model Run: 01/11/2022 Issued

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.

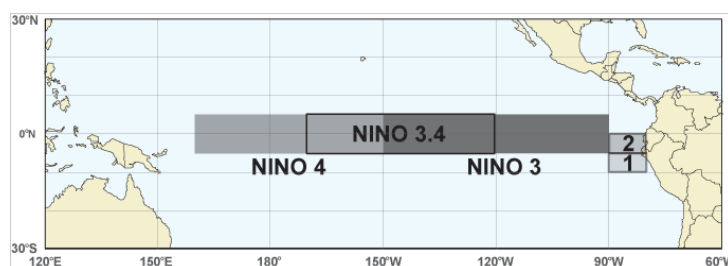
20 degrees Celsius Isotherm Depth

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