

Monthly Climate Bulletin

June 2022



ISSN: 2617-3557

Photo Credit: Molly Powers (SPC) Samoa Tide Gauge



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 |

- The Indian Ocean Dipole (IOD) index has been very close to or exceeded negative IOD thresholds (i.e. at or below -0.4 °C) over the past four weeks, meaning a negative IOD event is increasingly likely in 2022. All climate model outlooks surveyed indicate a negative IOD event is likely for the coming months.
- The 2021-22 La Niña event has ended. However, observations and climate model outlooks suggest La Niña may reform later in 2022.
- The Madden-Julian Oscillation (MJO) is currently in the western Maritime Continent region. Models suggest this MJO signal is likely to weaken in the coming days.
- The Intertropical Convergence Zone (ITCZ) was active in the central equatorial Pacific, while the South Pacific Convergence Zone (SPCZ) was active and shifted southwest affecting southern PNG, southern Solomon Islands, Vanuatu, New Caledonia and towards New Zealand.
- The SSTs for June 2022 were generally close to average close to the equator across the Pacific, but SSTs were slightly cooler than average over much of the tropical central and eastern Pacific south of the equator, and in some scattered areas north of the equator.
- Coral bleaching status for 03rd July 2022 shows 'Alert Level 1 & 2' parts of northern PNG mainland. Patches of 'Warning' for Palau while 'No Stress or Watch' for the rest of COSPPac partner countries.
- For July-September 2022, the dynamical models agree on above normal rainfall for central RMI, most of PNG mainland, southern Solomon Islands, New Caledonia, Vanuatu, Fiji, Tonga, and Niue. The models also agree on below normal rainfall is very likely for FSM, PNG Islands, northern Solomon Islands, Nauru, Kiribati, Tuvalu, Tokelau, northern Cook Islands, northern French Polynesia and Pitcairn Island.
- The weekly tropical cyclone forecast from the ACCESS-S model shows significant increased risk in the weeks beginning 09 July and ending 22 July 2022 for northwest Pacific including northern Philippines, South China Sea region and south Japan.



EL NIÑO–SOUTHERN OSCILLATION

La Niña WATCH; negative Indian Ocean Dipole likely

Click link to access [Climate Driver Update issued on 05 July 2022](#)

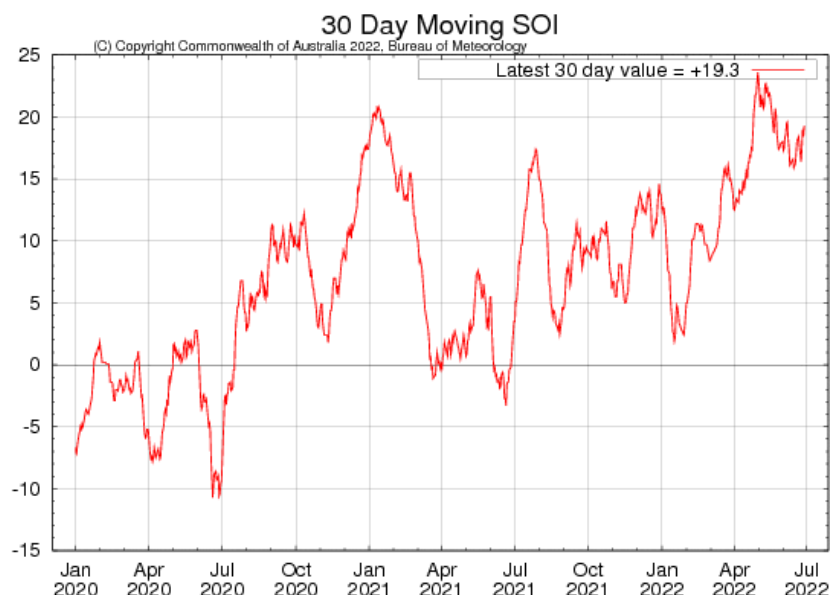
The Indian Ocean Dipole (IOD) index has been very close to or exceeded negative IOD thresholds (i.e. at or below -0.4 °C) over the past four weeks, meaning a negative IOD event is increasingly likely in 2022. All climate model outlooks surveyed indicate a negative IOD event is likely for the coming months.

The 2021-22 La Niña event has ended. However, observations and climate model outlooks suggest La Niña may reform later in 2022. As a result, the Bureau's ENSO Outlook status is at La Niña WATCH. La Niña WATCH means there is around a 50% chance of La Niña forming later in 2022. This is approximately double the normal likelihood. La Niña events increase the chance of above average winter-spring rainfall across much of northern and eastern Australia. El Niño-Southern Oscillation (ENSO) indicators are mostly at neutral levels. Tropical Pacific sea surface temperatures have continued to warm and are now mostly close to average levels. Similarly, beneath the surface, water temperatures are close to average, or slightly warmer than average in the east. Trade winds are also generally close to average strength. However, some atmospheric indicators continue to show a La Niña-like signal, including cloudiness near the Date Line and the Southern Oscillation Index (SOI).

Most climate models surveyed by the Bureau indicate ENSO is likely to remain neutral through the southern hemisphere winter. Four of the seven models surveyed by the Bureau suggest La Niña could return in spring, with the remaining three models persisting at neutral ENSO levels.

The Southern Annular Mode (SAM) index is currently positive, and while SAM values are expected to briefly return to neutral within the next week, neutral to positive values are generally anticipated for the remainder of July. Positive SAM has a drying influence for parts of south-west and south-east Australia, while neutral SAM has little influence on Australian rainfall.

The 30-day Southern Oscillation Index (SOI) for the 30 days ending 03 July was +20.2. The 90-day SOI value was +19.5. The 30-day SOI remains firmly elevated despite the return to a neutral ENSO phase. Much of the SOI signal is due to high pressures over Tahiti.



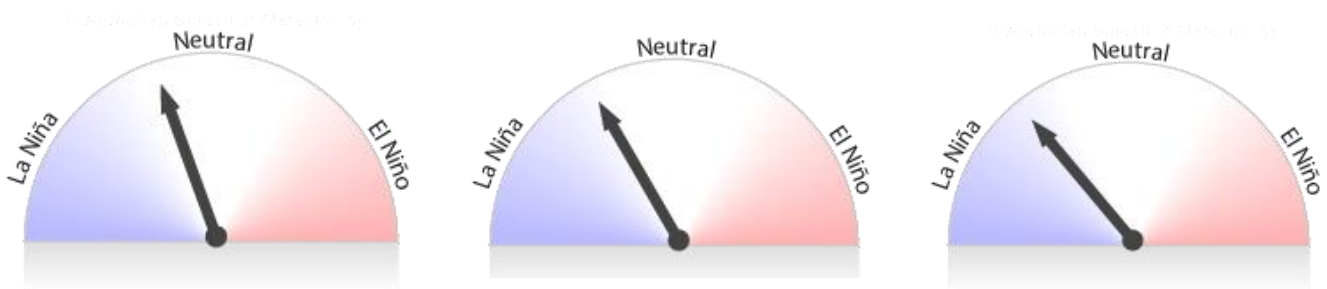


EL NIÑO–SOUTHERN OSCILLATION

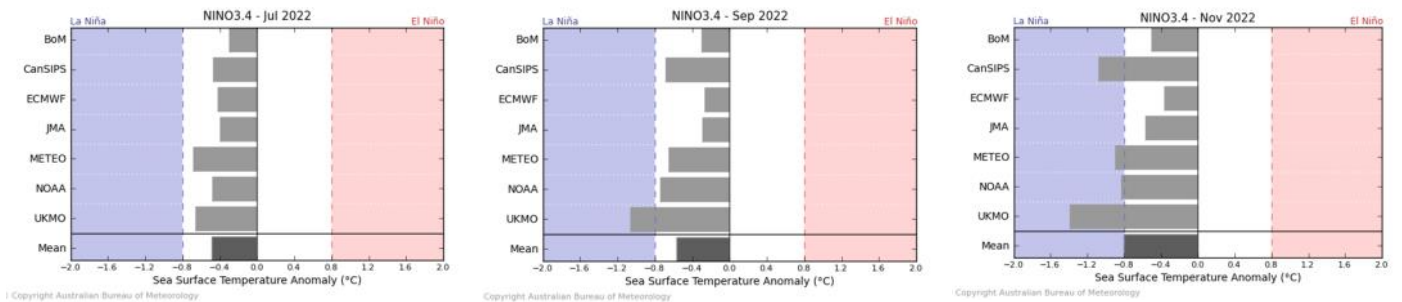
La Niña WATCH; negative Indian Ocean Dipole likely

Click link to access [Climate Driver Update issued on 05 July 2022](#)

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



Bureau of Meteorology NINO3.4 International Model Outlooks



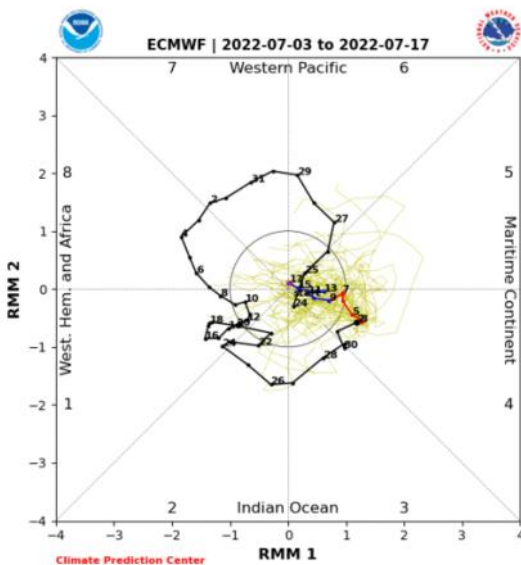
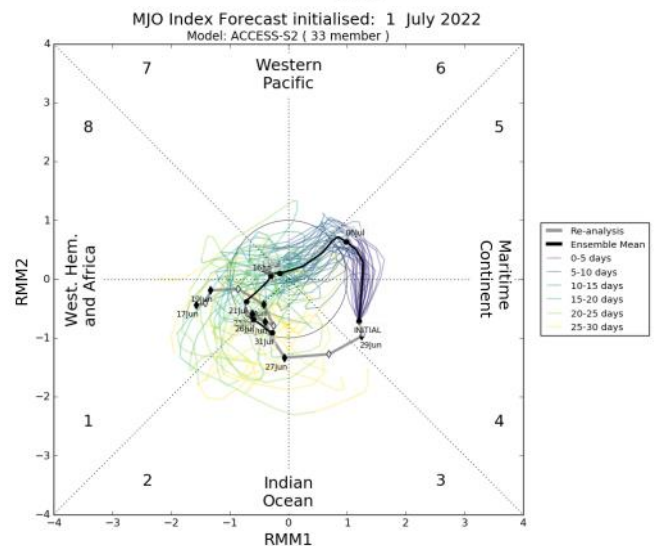
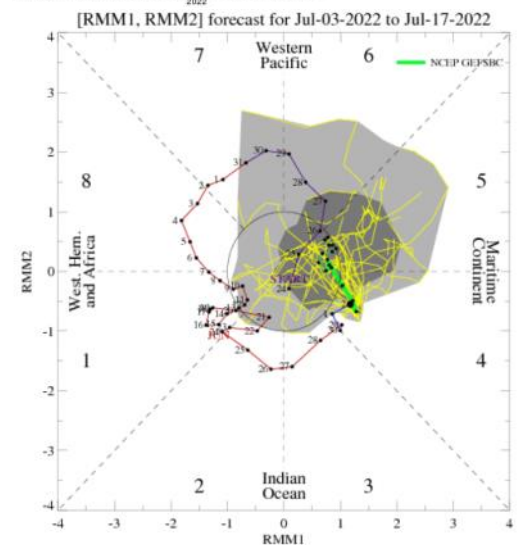
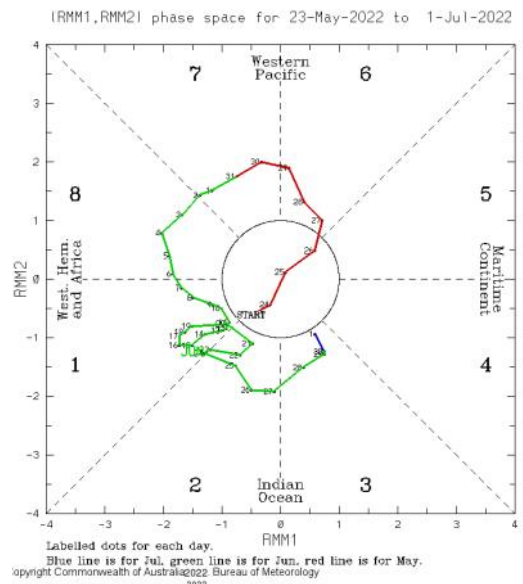
Bureau of Meteorology summary of international model outlooks for NINO3.4: <http://www.bom.gov.au/climate/model-summary/#tabs=Pacific-Ocean>

MADDEN–JULIAN OSCILLATION

Click link to access [Tropical Climate Update](#) [Issued on Tuesday 28 June 2022]

During the month of June, a moderate to strong pulse of Madden-Julian Oscillation (MJO) occurred and affected the Western Pacific, West Hemisphere and Africa, and Indian Ocean. The Madden-Julian Oscillation (MJO) is currently in the western Maritime Continent region. Models suggest this MJO signal is likely to weaken in the coming days. The MJO in this region typically enhances rainfall over parts of north-east Australia and the northern Maritime Continent and can also strengthen trade winds over the tropical Pacific. If the MJO pulse weakens as forecast, its influence on rainfall and wind patterns is expected to diminish.

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



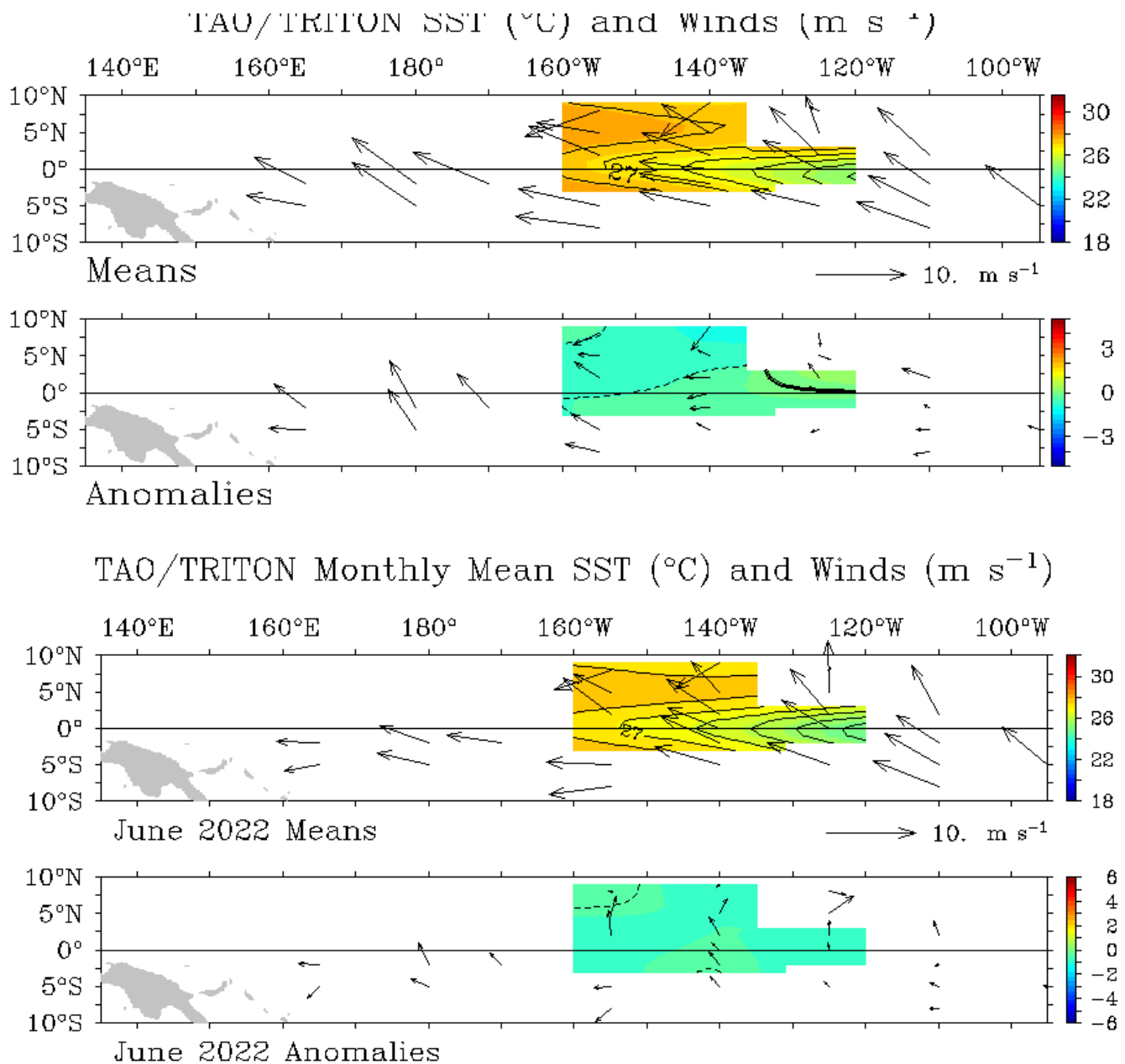


WIND

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

The trade winds in June were stronger over the 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

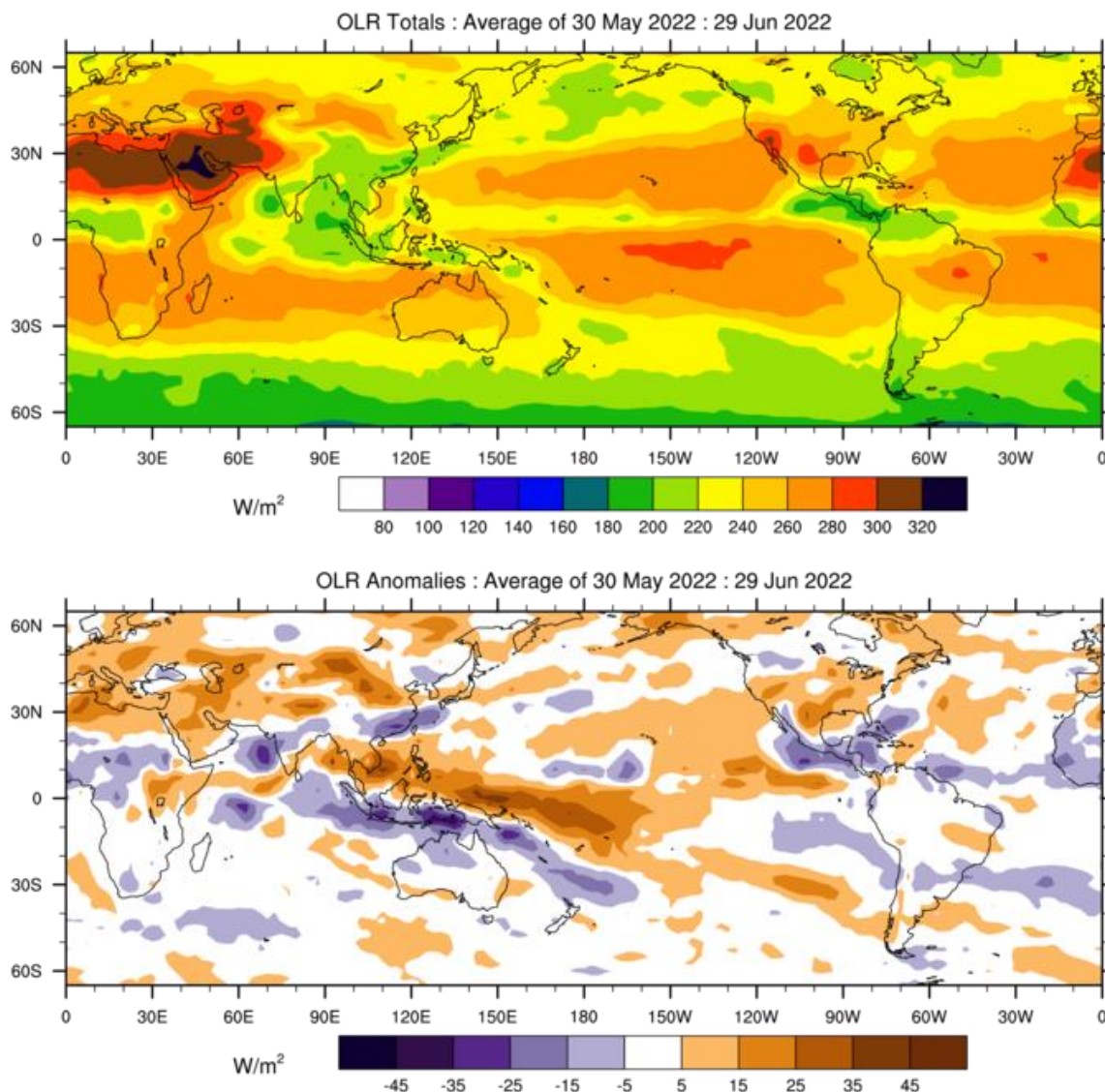
Click link to access [→ OLR](#)



The June 30-day OLR total and anomaly maps suggest the Intertropical Convergence Zone (ITCZ) was active in the central equatorial Pacific, while the South Pacific Convergence Zone (SPCZ) was active and shifted southwest affecting southern PNG, southern Solomon Islands, Vanuatu, New Caledonia and towards New Zealand.

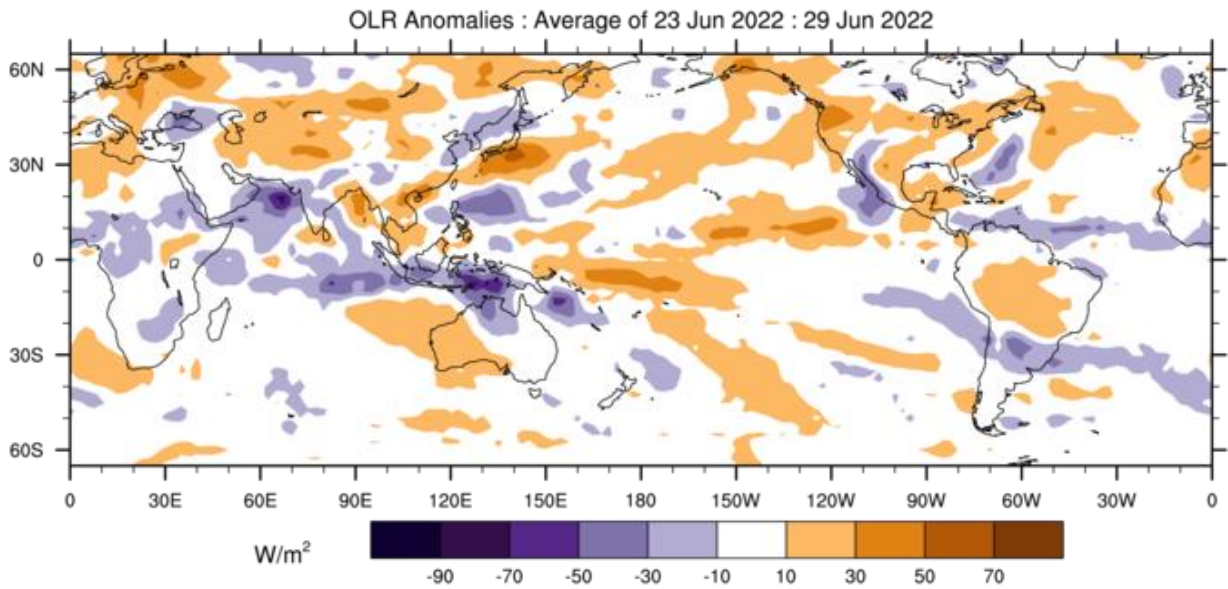
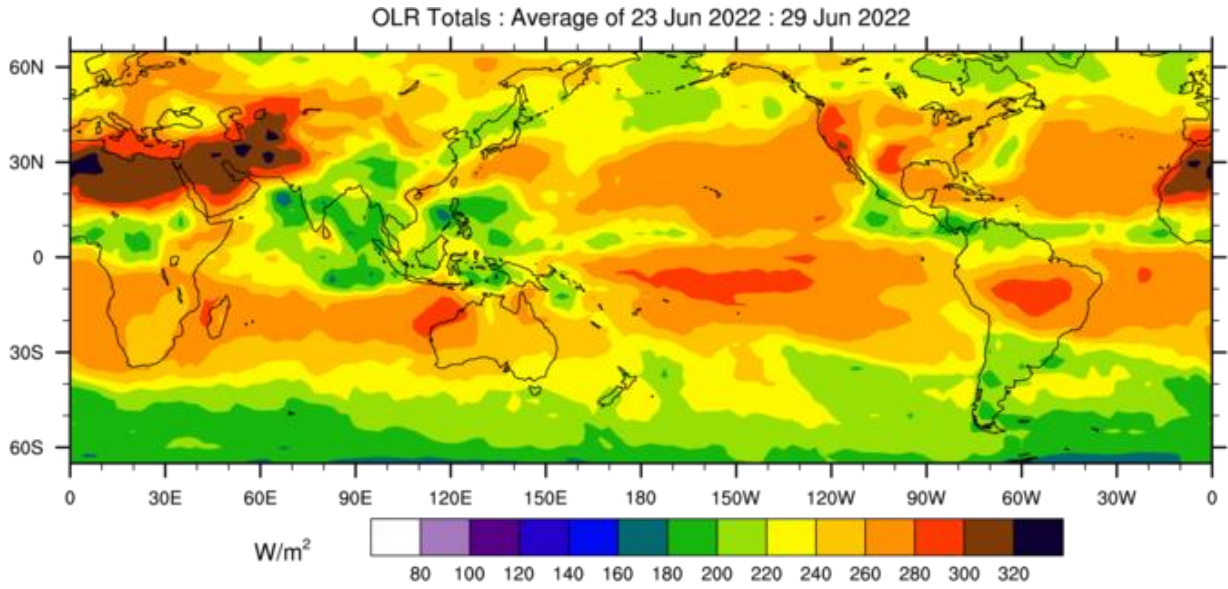
Note: Global maps of OLR below highlight regions experiencing increased or decreased cloudiness. The top panel is the total OLR in Watts per square metre (W/m^2) and the bottom panel is the anomaly (current minus the 1979-1998 climate average), in W/m^2 . In the bottom panel, negative values (blue shading)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

OLR Total and Anomalies, 30 Day OLR

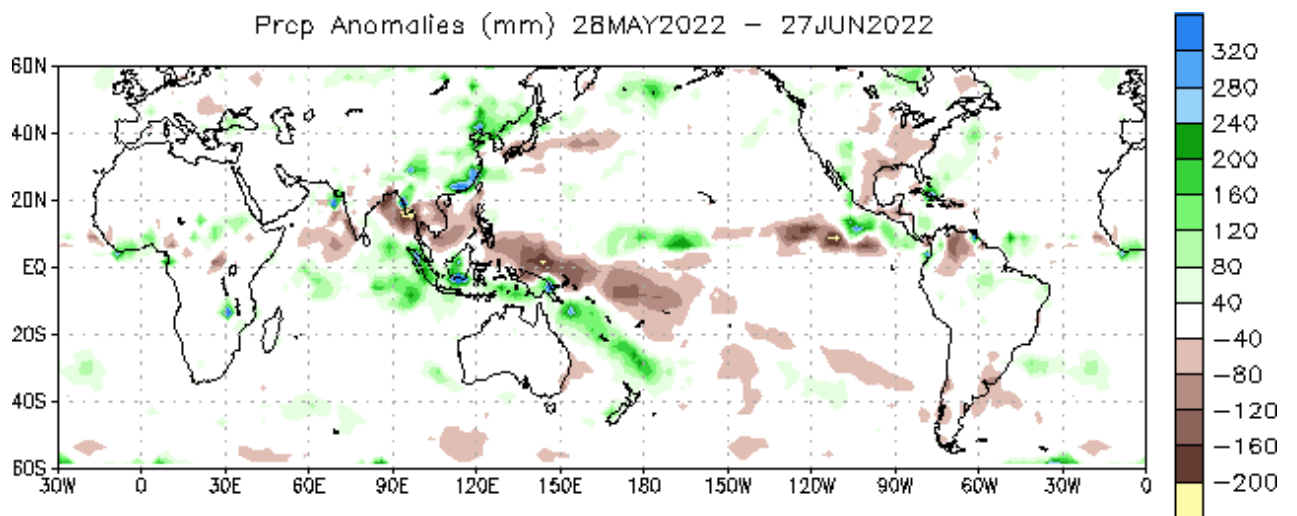


(C) Copyright Commonwealth of Australia 2022. Bureau of Meteorology

OLR Total and Anomalies, 7 Day OLR

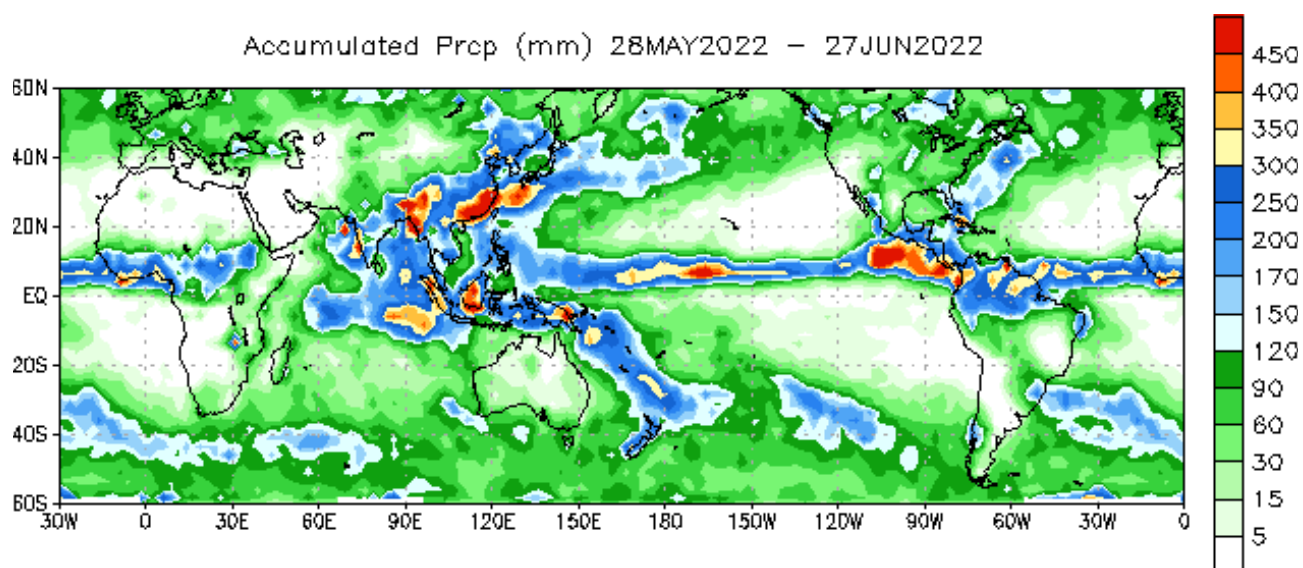


(C) Copyright Commonwealth of Australia 2022. Bureau of Meteorology

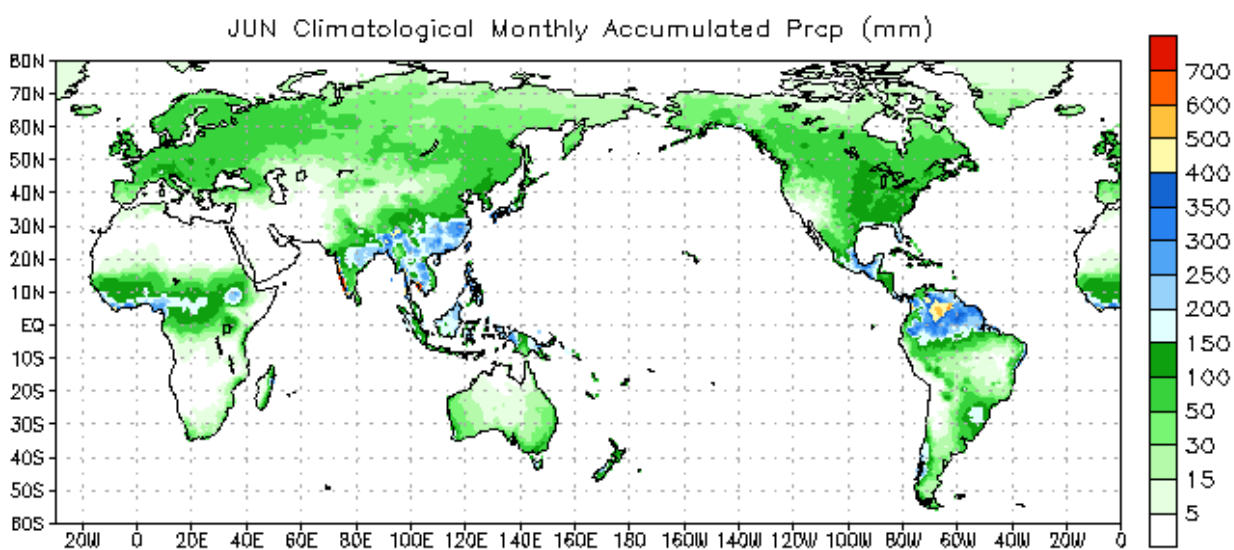


Data Source: NCEP CMAP Precipitation
Climatology (1991-2020)

30-Day Rainfall 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

OCEAN CONDITIONS

SEA SURFACE TEMPERATURE

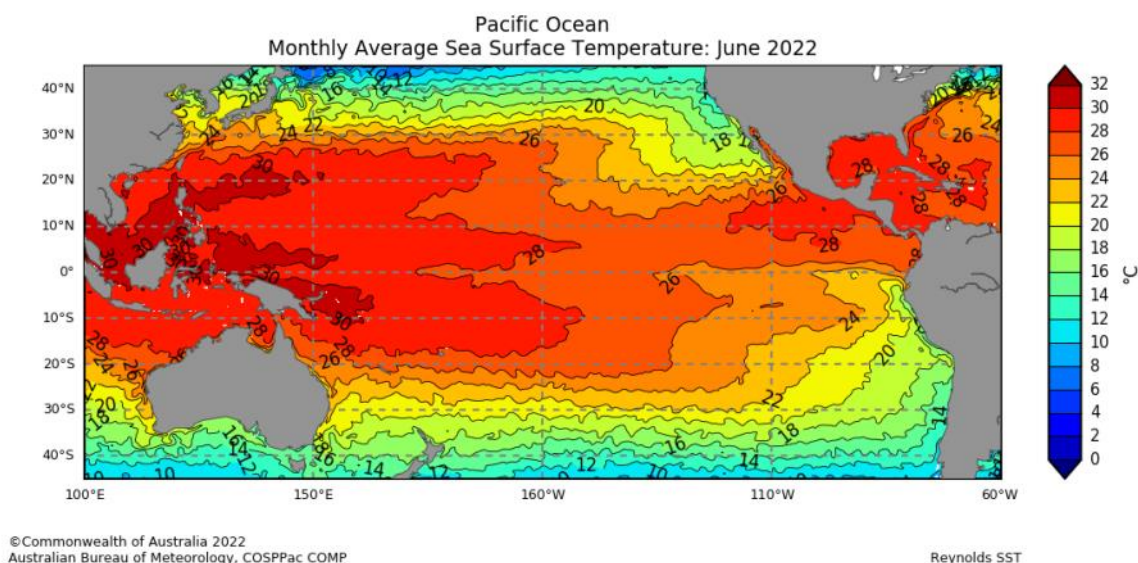


Click link to access [Pacific Community COSPPac Ocean Portal](#)

The SSTs for June 2022 were generally close to average close to the equator across the Pacific, but SSTs were slightly cooler than average over much of the tropical central and eastern Pacific south of the equator, and in some scattered areas north of the equator. Cool anomalies were strongest close to South America. Warm SST anomalies were present over much of the Maritime Continent. Compared to May, cool anomalies have weakened, while warm anomalies around northern Australia and to Australia's north-east have strengthened.

The highest on record deciles for June, occurred in most of Papua New Guinea, most of Solomon Islands, New Caledonia, most of Vanuatu, southern Fiji, southern and central Tonga, parts of Niue, southern Cook Islands and southern French Polynesia. Regions of very much above average (deciles 10) SSTs spanned across parts of Palau, parts of southern FSM, northern Solomon Islands, northeast Vanuatu, most of Fiji mains islands, and patches in Tonga, Niue, Cook Islands, French Polynesia and Pitcairn Island. Regions of above average (deciles 8-9) SST for June occurred across majority of the COSPPac countries from Palau to Pitcairn Island. In contrast, average (4-7) SSTs were observed in eastern FSM, most of RMI, northern PNG, Tuvalu, Tokelau, central Cook Islands and central French Polynesia. Below average (deciles 2-3) to very much below average (decile 1) occurred over Nauru, Kiribati, northern Tuvalu, northern Cook Islands and central and northern French Polynesia. The lowest on record SSTs were observed over central Line Islands, Kiribati.

Mean Sea Surface Temperature

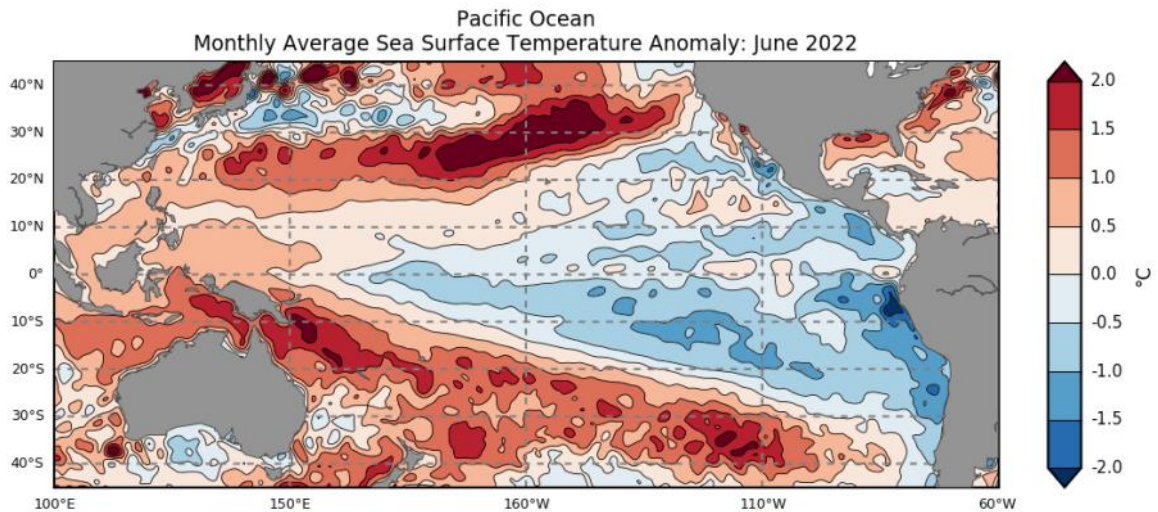


OCEAN CONDITIONS

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



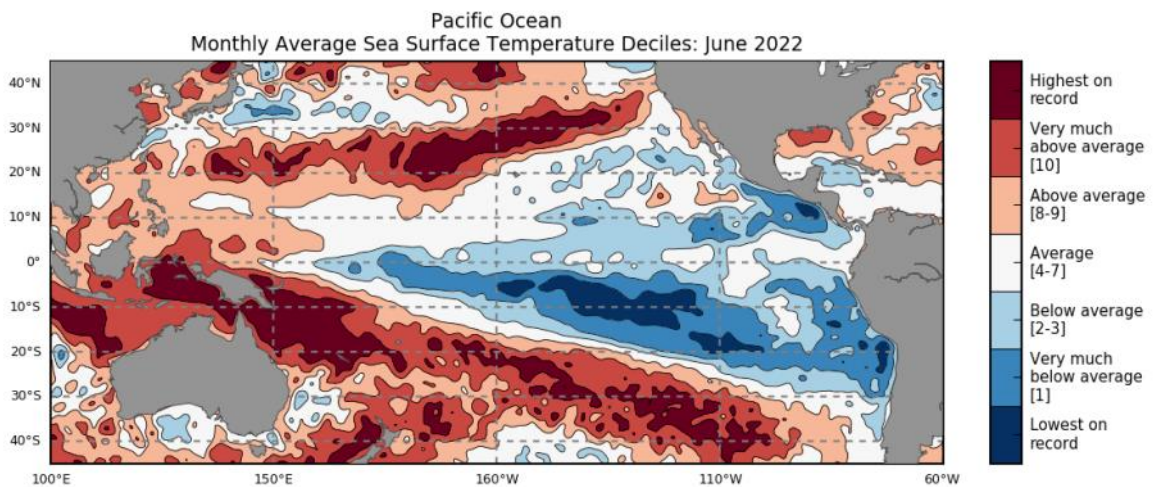
Anomalous Sea Surface Temperature



©Commonwealth of Australia 2022
Australian Bureau of Meteorology, COSPPac COMP

Reynolds SST

Sea Surface Temperatures Deciles



©Commonwealth of Australia 2022
Australian Bureau of Meteorology, COSPPac COMP

Reynolds SST

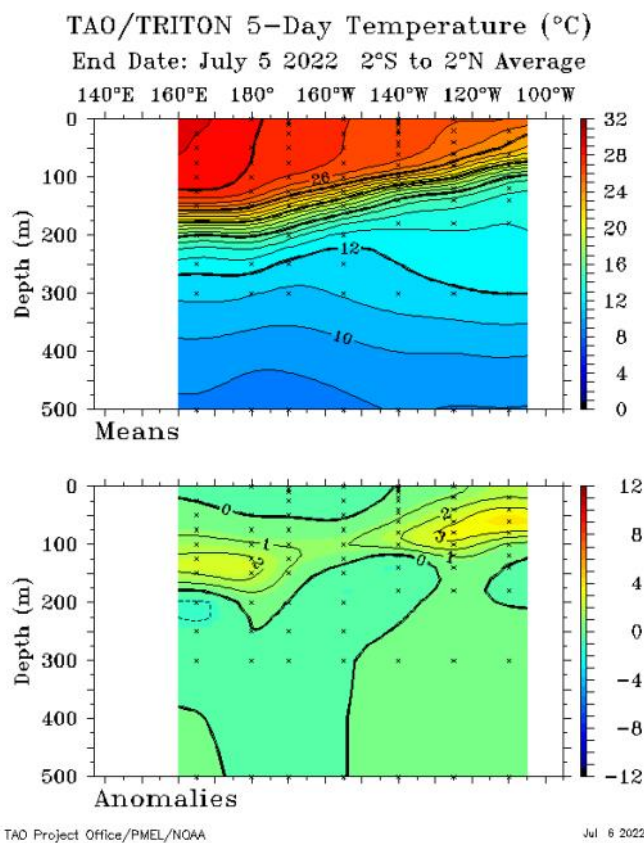
OCEAN CONDITIONS

SUB SURFACE

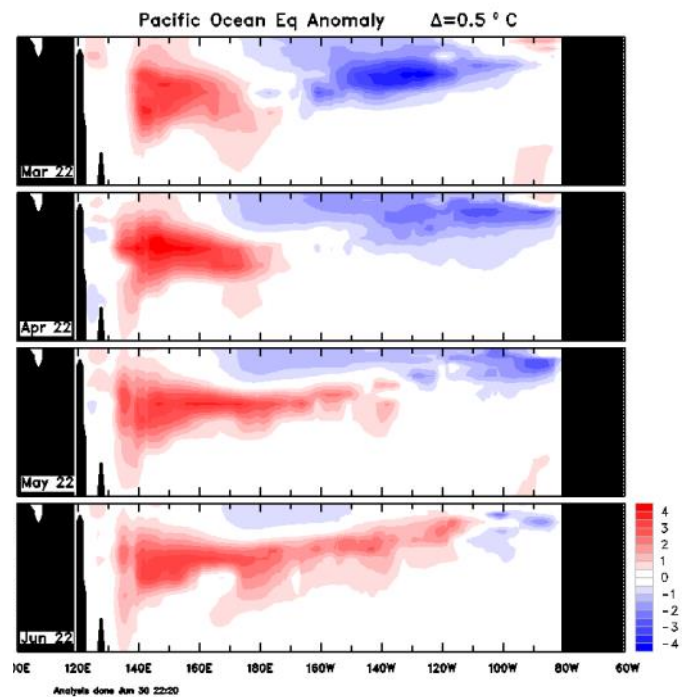


The four-month sequence of equatorial Pacific sub-surface temperature anomalies (to June 2022) shows a small area of weak cool anomalies persist in the far eastern equatorial Pacific for June, but warm anomalies dominate across the majority of the tropical subsurface. Warm anomalies have increased their eastward extent month-on-month across autumn and the first month of winter. For June, warm anomalies spanned nearly the full column depth west of 140° E, rising to 50 to 150 m depth around 120°W.

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

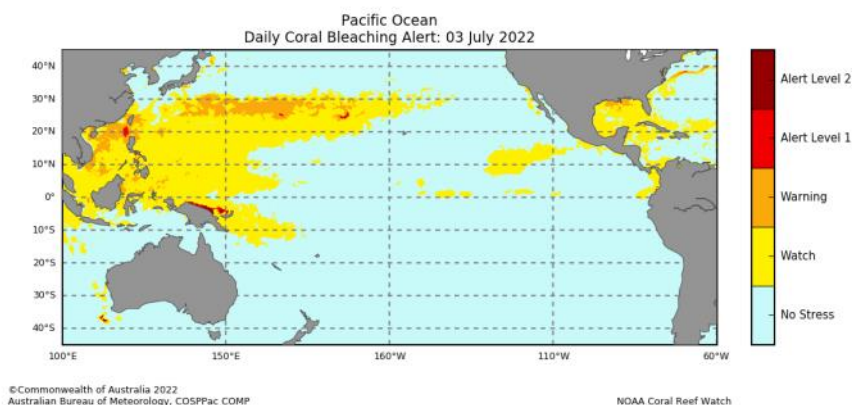
CORAL BLEACHING



The daily Coral Bleaching Alert for 03rd July 2022 shows 'Alert Level 1 & 2' parts of northern PNG mainland. Patches of 'Warning' for Palau while 'No Stress or Watch' for the rest of COSPPac partner countries. The four weeks Coral Bleaching Outlook to 31st July shows 'Alert Level 1 & 2' for parts of northern PNG. 'Warning' alert for Palau and western FSM. 'No Stress or Watch' for the rest of COSPPac partner countries.

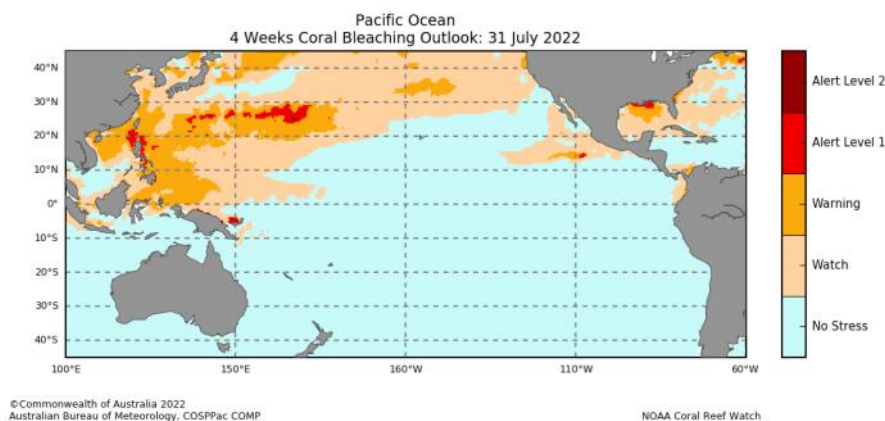
Daily Coral Bleaching Alert

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



4 Weeks Coral Bleaching Outlook

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



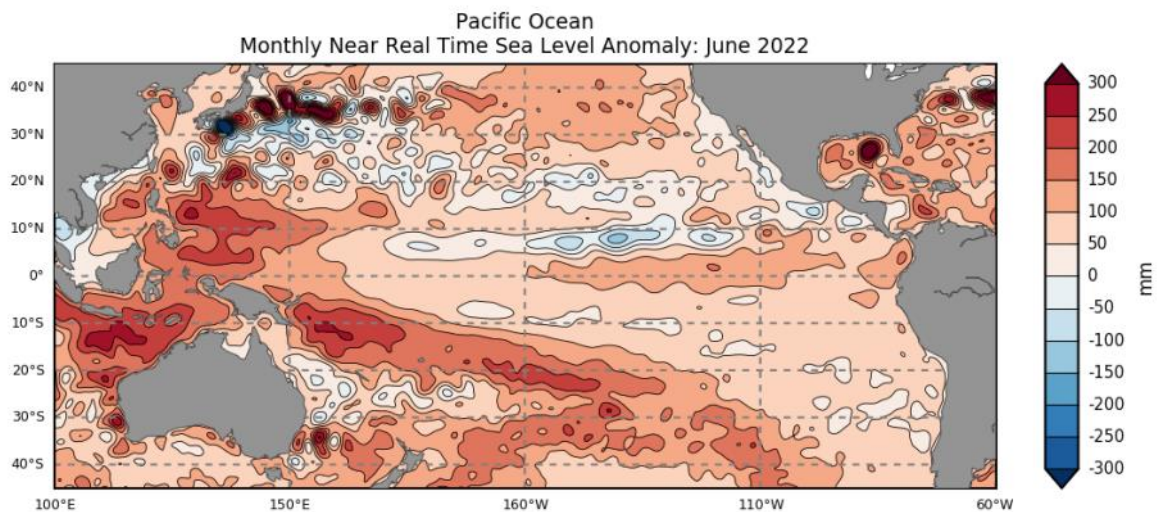
OCEAN CONDITIONS

OCEAN SURFACE CURRENTS AND SEA LEVEL

Sea level was above normal for most of the COSPPac countries. The highest anomalies above 200-300mm were observed in southeast Palau, southeastern PNG, southern Solomon Islands, southern Cook Islands and central French Polynesia. Sea level of 150mm to 200mm were also observed for Palau, western FSM, parts of Solomon Islands, majority of PNG, patches of New Caledonia, Vanuatu, Fiji, Tonga, and central Cook Islands and French Polynesia. Anomalies of 100mm observed at most of COSPPac countries except for southern RMI, Nauru, northern Tuvalu, Kiribati, Tokelau that have patches of 50mm. Near normal to below normal sea levels were observed over parts of eastern RMI, Phoenix and Line Islands of Kiribati, southern New Caledonia and southern Tonga.

Monthly Sea Level Anomalies

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



©Commonwealth of Australia 2022
Australian Bureau of Meteorology, COSPPac COMP

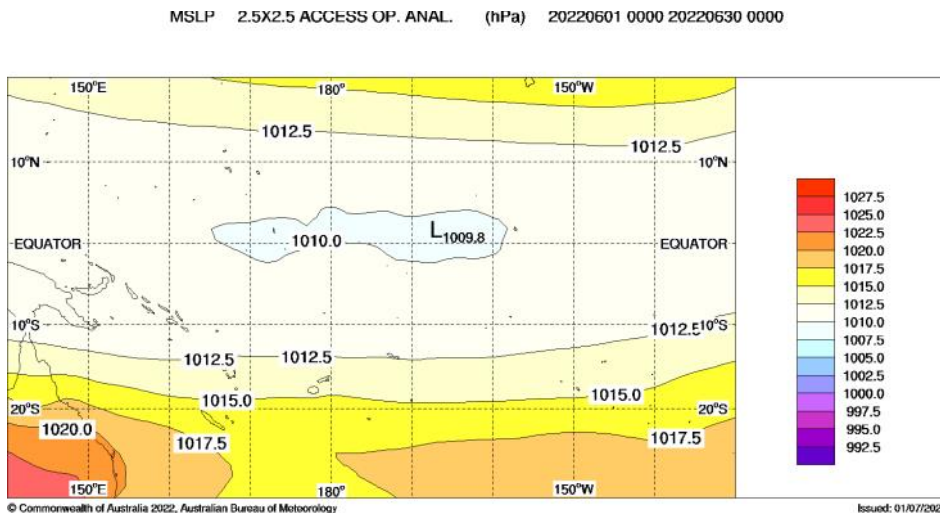
AVISO Ssalto/Duacs SLA

MEAN SEA LEVEL PRESSURE

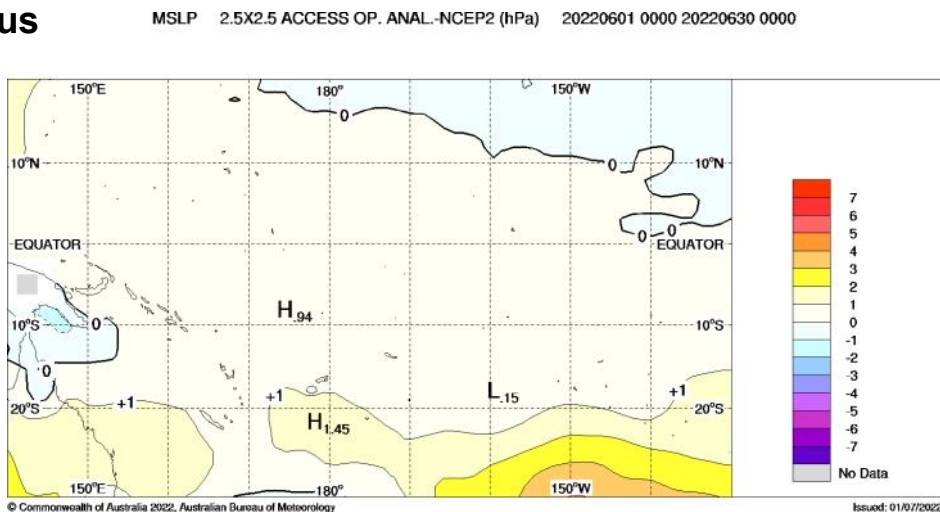
The June mean sea level pressure (MSLP) anomaly map shows mostly positive anomalies of -1 or greater over Coral Sea region, southern Fiji and southern Tonga. Negative anomalies of +1 were not observed during this month in the COSPPac countries.

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

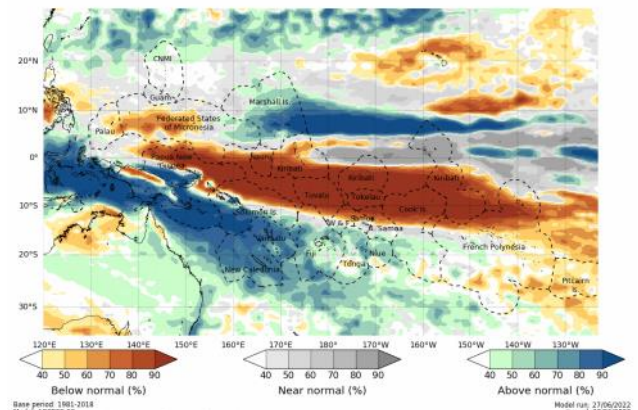
July—September 2022



The ACCESS-S model forecast for July 2022, the dry signal is weaker compared to last month's forecast and is very likely to cause below normal rainfall for central FSM, northern PNG, northern Solomon Islands, Nauru, Kiribati, Tuvalu, Tokelau, northern Cook Islands, and northern French Polynesia. The wetter than normal signal is stronger compared to last month's forecast especially for the southwest Pacific Islands with above normal rainfall is very likely for central and southern RMI, western and southeast PNG, southern Solomon Islands, New Caledonia, Vanuatu, northern and southern Fiji, and parts of northern Tonga.

The three-month rainfall outlook (July-September 2022) shows a similar pattern to last month's forecast with a region of dry signal very likely to affect central FSM, northern PNG, northern Solomon Islands, Nauru, Kiribati, Tuvalu, Tokelau, northern Cook Islands, northern French Polynesia and Pitcairn Island. The models show an increased chance of wetter very likely for central RMI, most of PNG, most of Solomon Islands, New Caledonia, Vanuatu, Fiji, Tonga and Niue. 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, central and 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 July-September 2022 is very likely to be below normal rainfall for Palau, western FSM, Guam, PNG Islands, most of Solomon Islands, Nauru, eastern and central Kiribati, Tuvalu, Tokelau, Wallis and Futuna, Samoa, American Samoa, northern and central Cook Islands, French Polynesia and Pitcairn Island. Above normal rainfall is very likely for central Marshall Islands, western and southeastern PNG, New Caledonia, Vanuatu, Fiji, and southern Tonga.

The APEC Climate Centre multi-model for July-September 2022 forecast is very likely to be below normal rainfall for northern FSM, PNG Islands, western and northern Solomon Islands, Nauru, Kiribati, Tuvalu, Tokelau, northern Cook Islands, northern French Polynesia and Pitcairn Island. Above normal rainfall is very likely for southern RMI, PNG mainland and Milne bay region, southern Solomon Islands, New Caledonia, Vanuatu, Fiji, Tonga, and Niue.

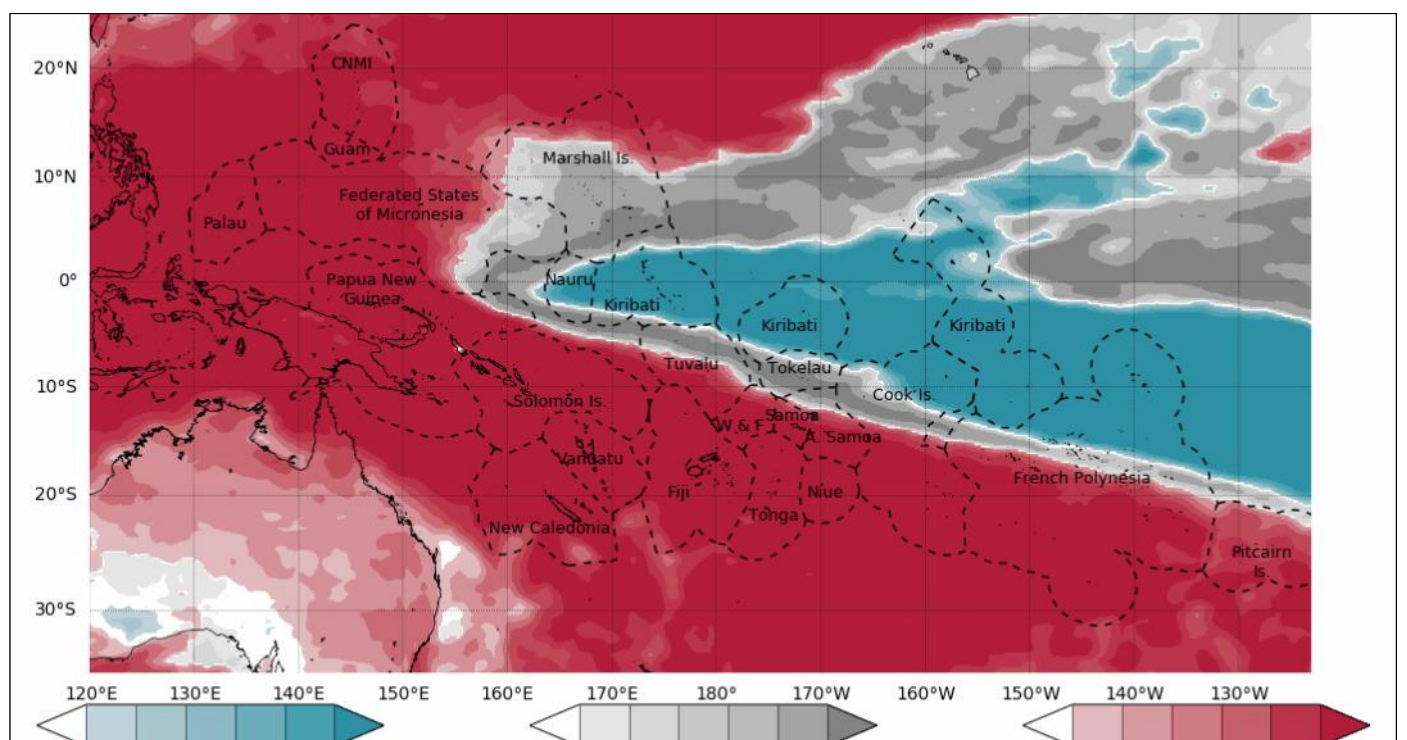
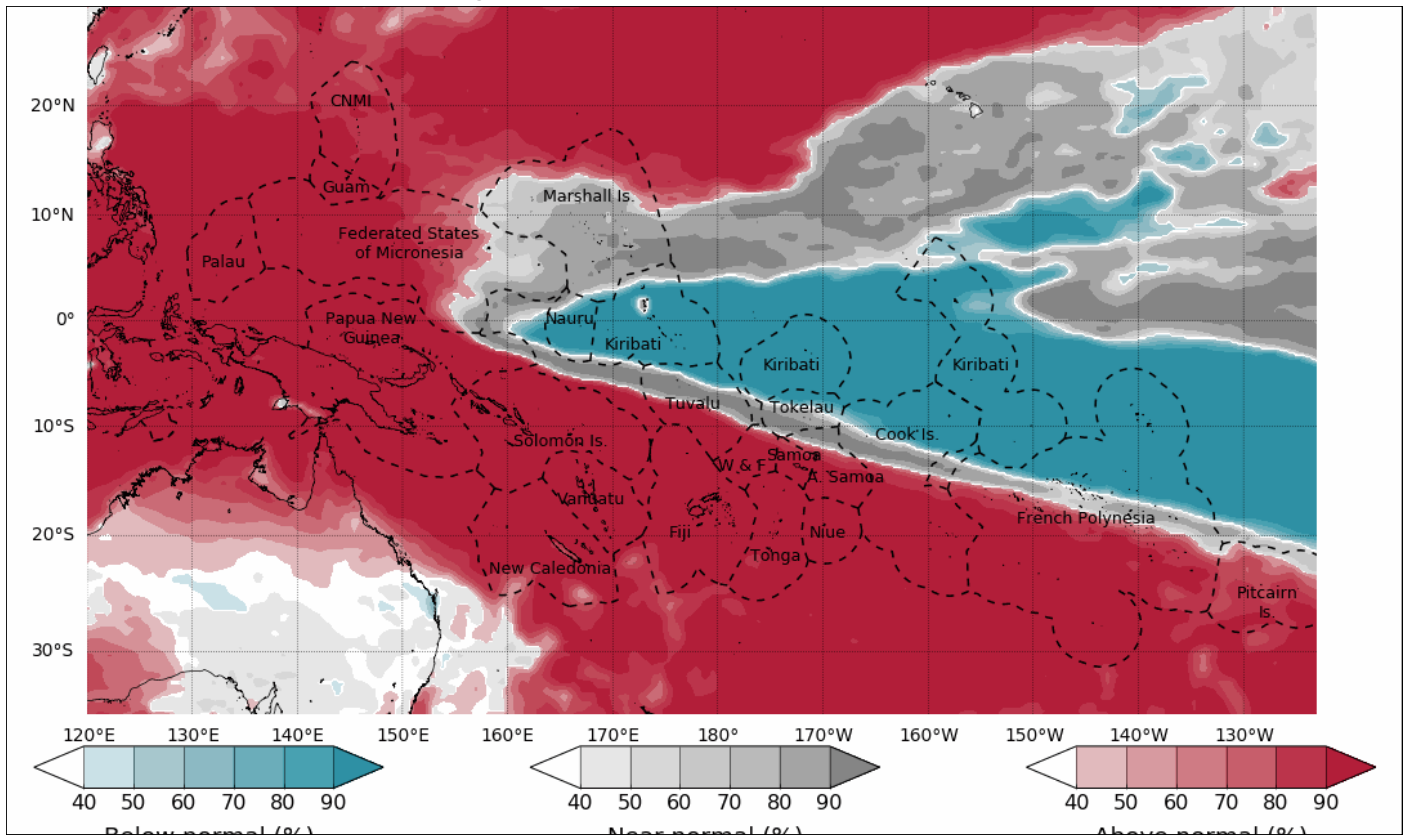
For July-September 2022, the models agree on above normal rainfall for central RMI, most of PNG mainland, southern Solomon Islands, New Caledonia, Vanuatu, Fiji, Tonga, and Niue. The models also agree on below normal rainfall is very likely for FSM, PNG Islands, northern Solomon Islands, Nauru, Kiribati, Tuvalu, Tokelau, northern Cook Islands, northern French Polynesia and Pitcairn Island.

SEASONAL TEMPERATURE OUTLOOK

July—September 2022



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



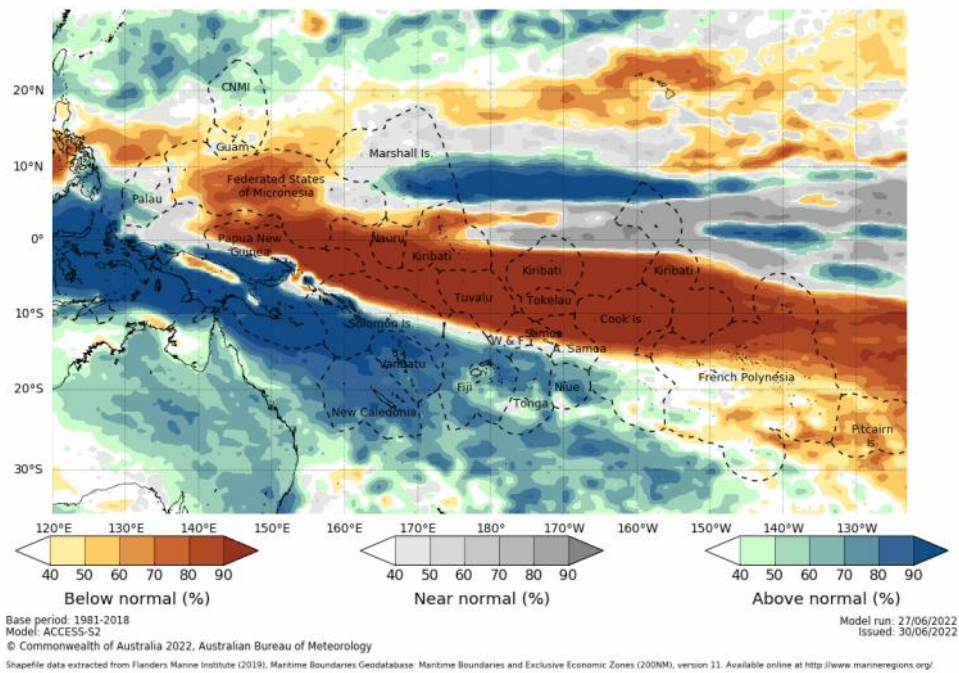
SEASONAL RAINFALL OUTLOOK

July—September 2022

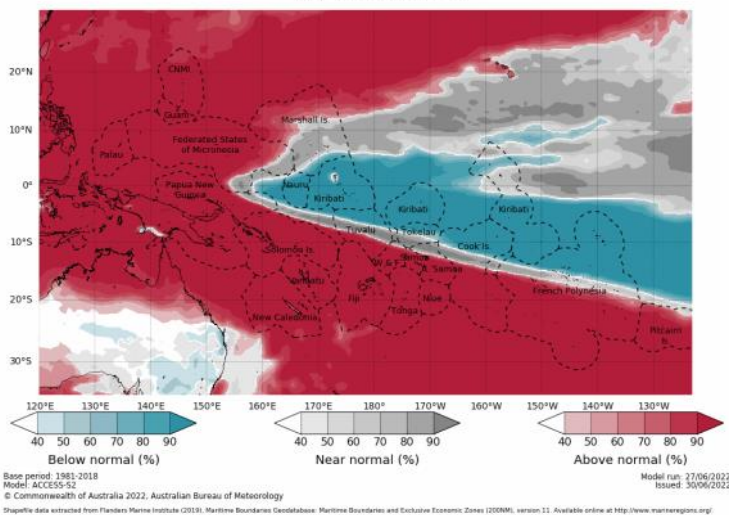


Seasonal ACCESS-S maps

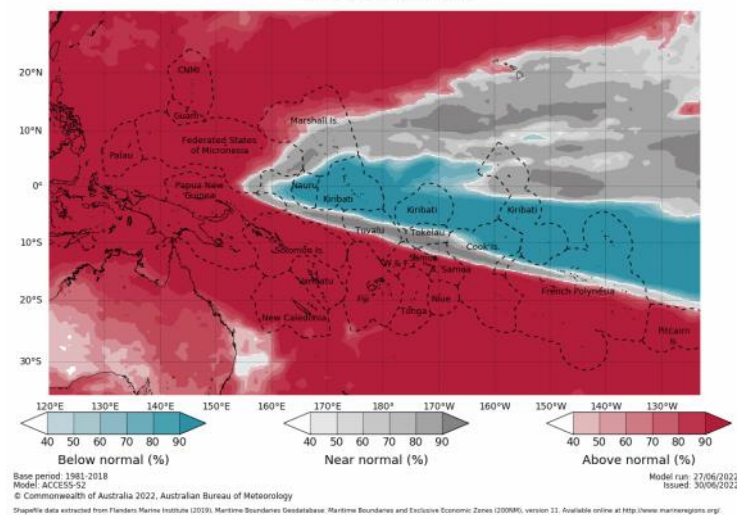
Tercile rainfall probabilities for July to September 2022



Tercile maximum temperature probabilities for July to September 2022



Tercile minimum temperature probabilities for July to September 2022



About ACCESS-S <http://access-s.clide.cloud/>

SEASONAL RAINFALL OUTLOOK

July—September 2022



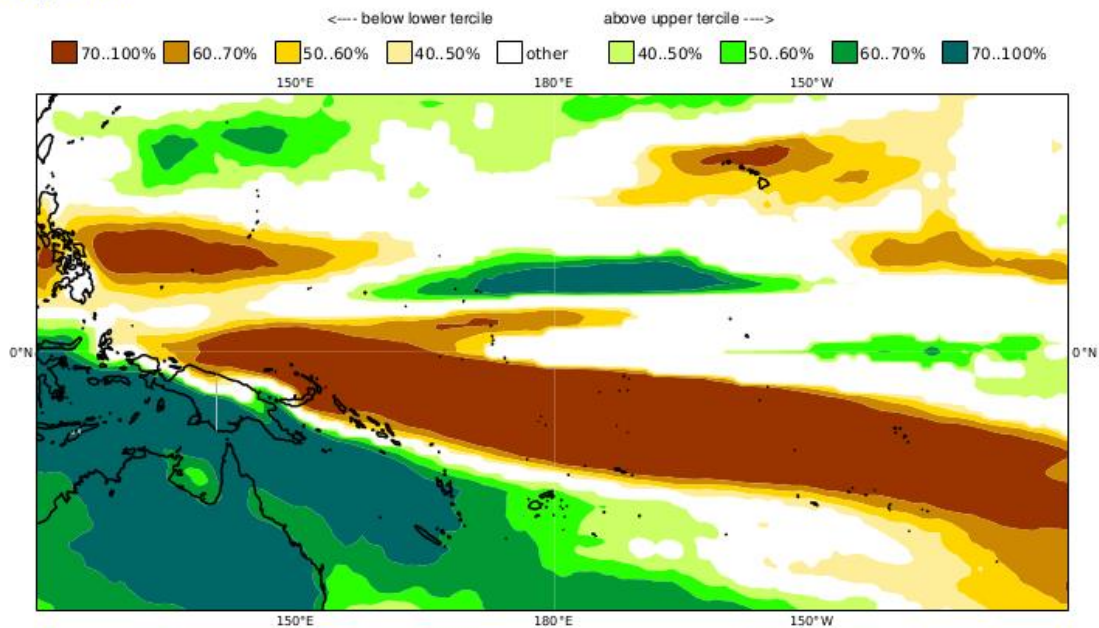
Copernicus (C3S multi-system)-Rainfall

Prob(most likely category of precipitation)

JAS 2022

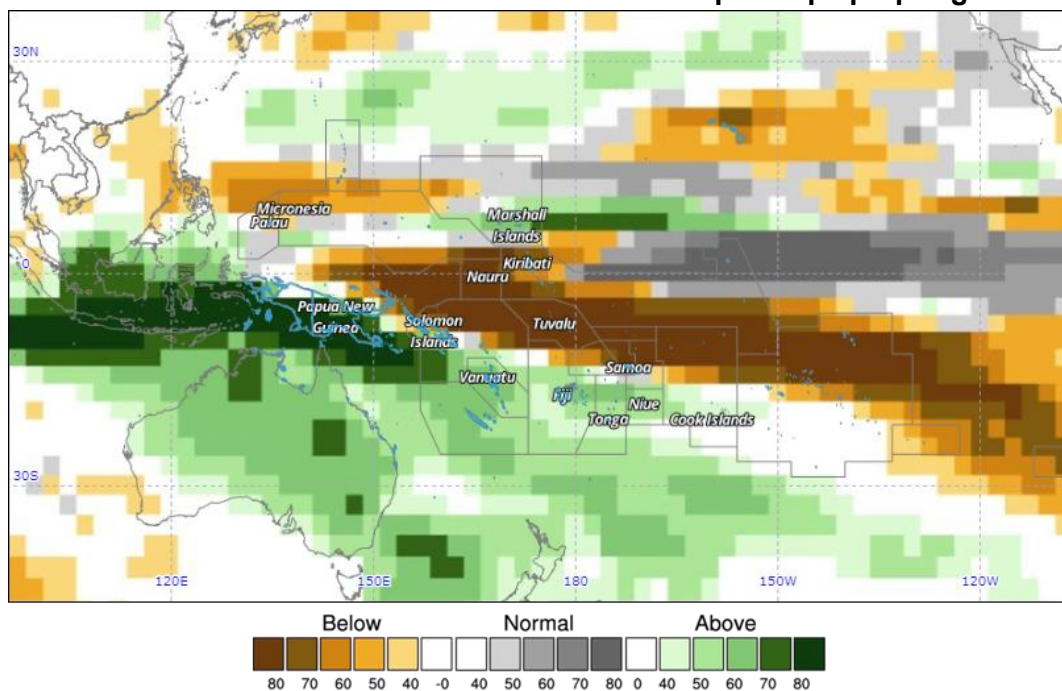
Nominal forecast start: 01/06/22

Unweighted mean



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

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



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

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

Generated using CLIK® (2022-7-6)

© APEC Climate Center

TROPICAL CYCLONE

2021/2022 Season

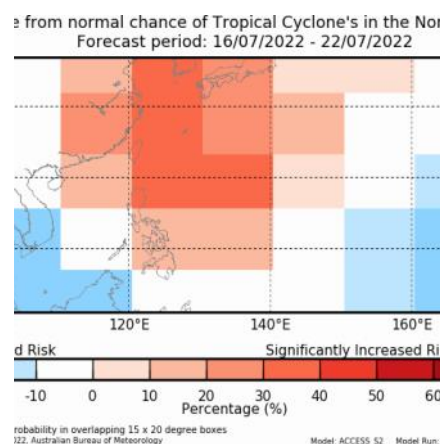
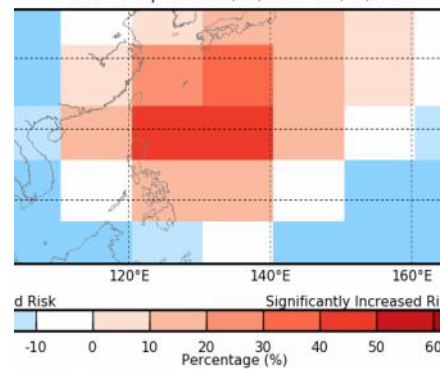


In the southwest Pacific, the 2021-22 tropical cyclone has ended on 30th April 2022. The outlook for the season was for enhanced risk for tropical cyclone activity in the western part of the basin over November to April. In the central part of the region, cyclone risks are generally near normal, with 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).

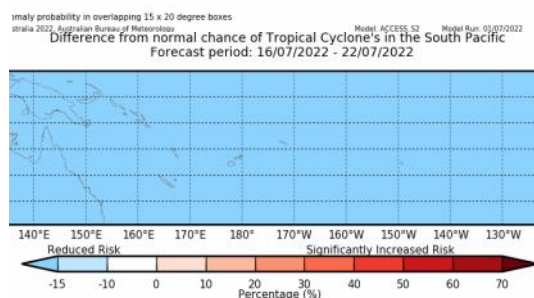
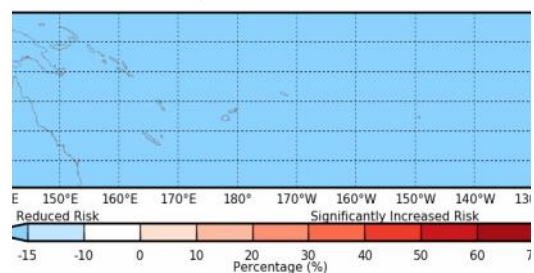
The weekly tropical cyclone forecast from the ACCESS-S model shows significant increased risk in the weeks beginning 09 Julye and ending 22 July 2022 for northwest Pacific including northern Philippines, South China Sea region and south Japan.

ACCESS-S Weekly Forecasts –Northwest Pacific
 Difference from normal chance of Tropical Cyclone's in the Northwest Pacific
 Forecast period: 09/07/2022 - 15/07/2022



ACCESS-S Weekly Forecasts –Southwest Pacific

Difference from normal chance of Tropical Cyclone's in the South Pacific
 Forecast period: 09/07/2022 - 15/07/2022



Model anomaly probability in overlapping 15 x 20 degree boxes south of Australia 2022. Australian Bureau of Meteorology. Model: ACCESS_S2. Model Run: 01/07/2022. Issue: 01/07/2022

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.

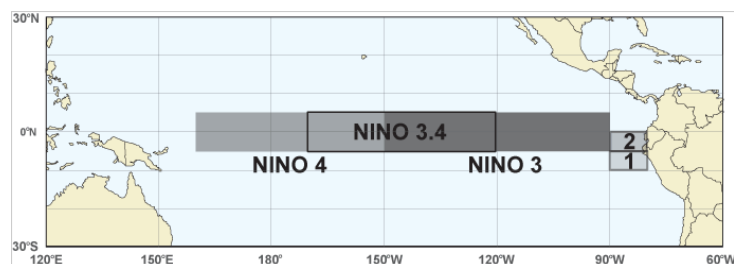
20 degrees Celsius Isotherm Depth

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