

Monthly Climate Bulletin

July 2022



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Photo Credit: Molly Powers (SPC) Samoa Tide Gauge



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- A negative Indian Ocean Dipole (IOD) event is under way. A negative IOD event is associated with above average winter-spring rainfall for much of Australia.
- La Niña WATCH continues meaning there is around a 50% chance (double the normal likelihood) of La Niña forming later in 2022. This is a result of current observations and model outlooks.
- The Madden-Julian Oscillation (MJO) is currently weak. Most models suggest the MJO is likely to remain weak or indiscernible over the coming week. This means it is likely to exert little or no influence on Pacific tropical weather.
- The Intertropical Convergence Zone (ITCZ) was active and shifted north of the average July position in the central equatorial Pacific, while the South Pacific Convergence Zone (SPCZ) was largely suppressed in July.
- The SSTs for July 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 2 August 2022 shows 'Alert Level 1 and 2' in parts of PNG Islands. Patches of 'Warning' for western FSM while 'No Stress or Watch' for the rest of COSPPac partner countries.
- For August-October 2022, the models agree on above normal rainfall for central RMI, most of PNG mainland, southern Solomon Islands, New Caledonia, Vanuatu, Fiji, Tonga, Niue and southern Cook Islands. The models also agree below normal rainfall is very likely for Guam, northern FSM, PNG Islands, northern Solomon Islands, Nauru, Kiribati, Tuvalu, Tokelau, Samoa, northern Cook Islands, northern French Polynesia and Pitcairn Island.
- The ACCESS-S weekly tropical cyclone forecast model shows a significantly increased risk for the period 10 and 23 August 2022 for the northwest Pacific including the Philippines, South China Sea region and south Japan.



EL NIÑO–SOUTHERN OSCILLATION

Negative Indian Ocean Dipole under way; La Niña WATCH continues; negative Indian Ocean Dipole- likely

Click link to access [Climate Driver Update issued on 02 August 2022](#)

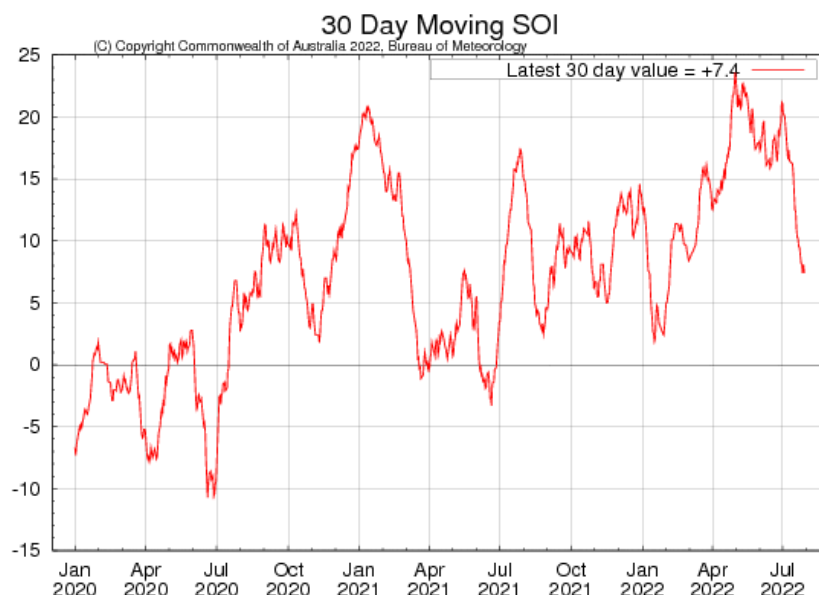
A negative Indian Ocean Dipole (IOD) event is under way. The IOD index has been very close to or exceeded negative IOD thresholds (i.e., at or below $-0.4\text{ }^{\circ}\text{C}$) over the past eight weeks. All climate model outlooks surveyed indicate that negative IOD conditions are likely to continue into late spring (October-November). A negative IOD event is associated with above average winter to spring rainfall for much of Australia.

The Bureau's ENSO Outlook remains at La Niña WATCH, meaning there is around a 50% chance (double the normal likelihood) of La Niña forming later in 2022. This is a result of current observations and model outlooks. La Niña events increase the chance of above average winter to spring rainfall across much of northern and eastern Australia. El Niño Southern Oscillation (ENSO) ocean indicators are currently at neutral levels. However, some atmospheric indicators, such as the Southern Oscillation Index, continue to show a residual La Niña like signal. Trade winds have also recently restrengthened in the western Pacific (more La Niña like).

Three of seven climate models surveyed by the Bureau suggest La Niña could return in early southern hemisphere spring (September), with a fourth in late spring (November). The remaining three models persist at neutral ENSO levels.

The Southern Annular Mode (SAM) index is currently neutral, with neutral to weakly positive values forecast for the rest of August. 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 31 July was $+8.7$. The 90-day SOI value was $+15.2$. The 30-day SOI has fallen over the past fortnight to values just above La Niña threshold. Much of the persistent positive SOI signal is due to high pressures over Tahiti; pressures near Darwin are near normal for the past fortnight.



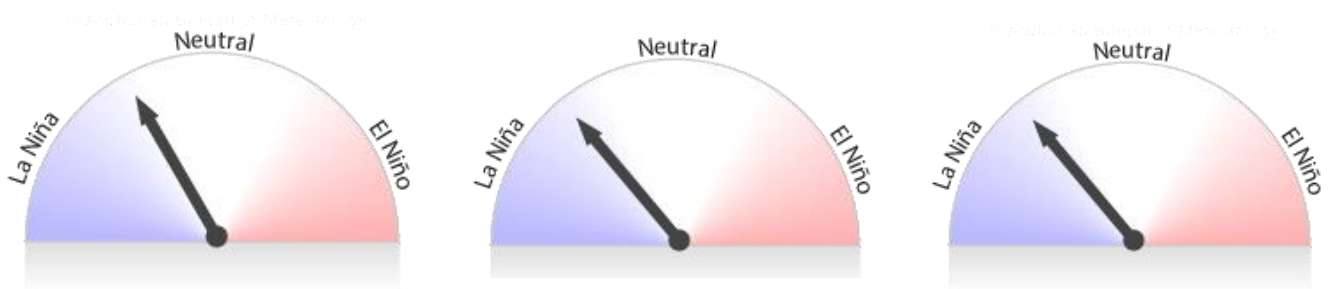


EL NIÑO–SOUTHERN OSCILLATION

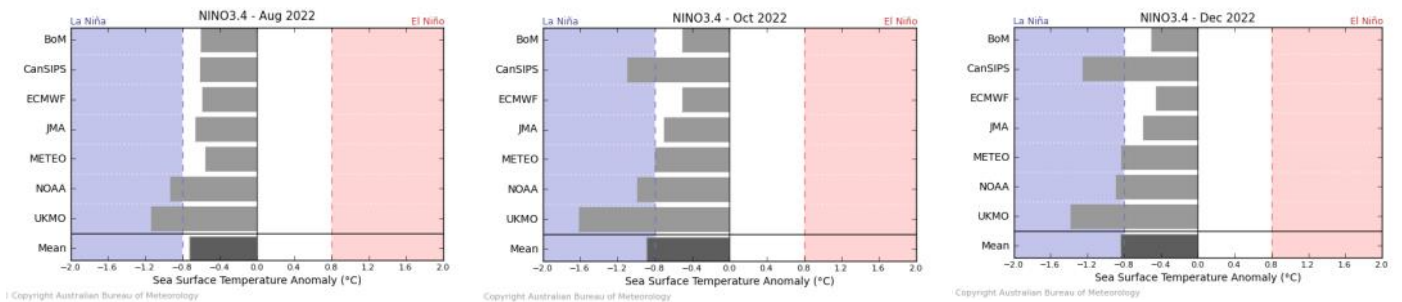
Negative Indian Ocean Dipole under way; La Niña WATCH continues; negative Indian Ocean Dipole likely

Click link to access [Climate Driver Update issued on 02 August 2022](#)

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



Bureau of Meteorology NINO3.4 International Model Outlooks



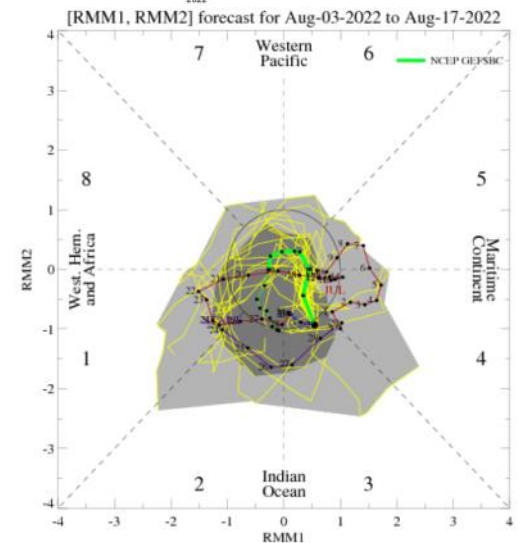
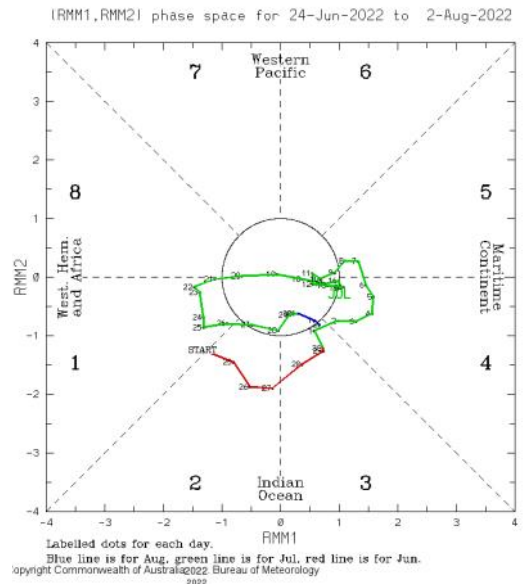
Bureau of Meteorology summary of international model outlooks for NINO3.4: <http://www.bom.gov.au/climate/model-summary/#tabs=Pacific-Ocean>

MADDEN–JULIAN OSCILLATION

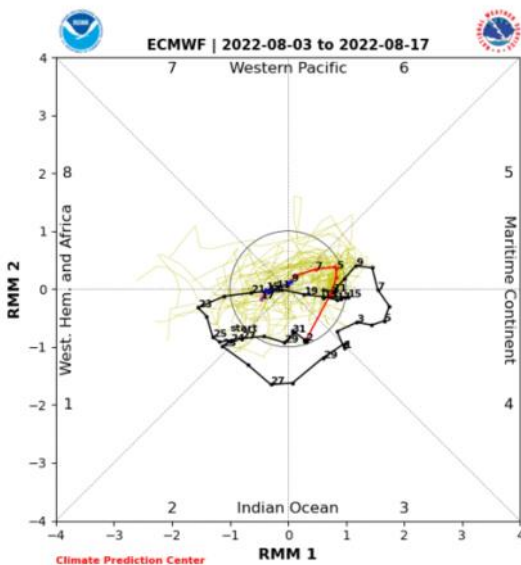
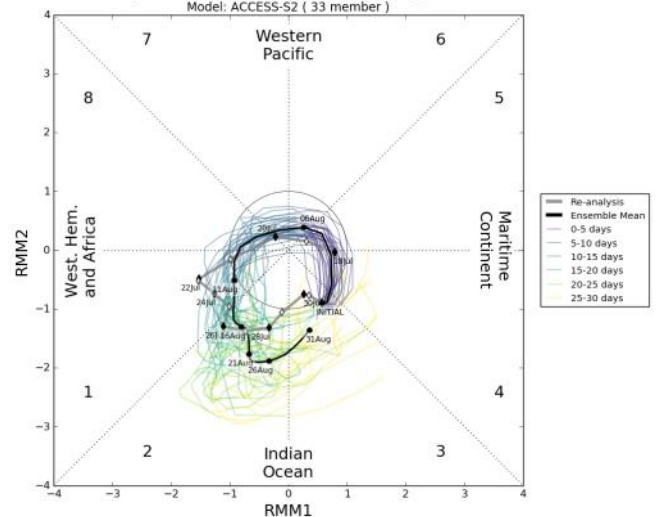
Click link to access [Tropical Climate Update](#) [Issued on Tuesday 02 August 2022]

During the month of July, a moderate pulse of Madden-Julian Oscillation (MJO) occurred and affected the Western Pacific during the first week and another moderate pulse affected the Western Hemisphere and Africa towards the end of the month. The MJO was generally not active during the second to the third week of July. The Madden-Julian Oscillation (MJO) is currently weak. Most models suggest the MJO is likely to remain weak or indiscernible over the coming week. The means it is likely to exert little or no influence on global tropical weather.

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



MJO Index Forecast initialised: 1 August 2022
Model: ACCESS-S2 (33 member)



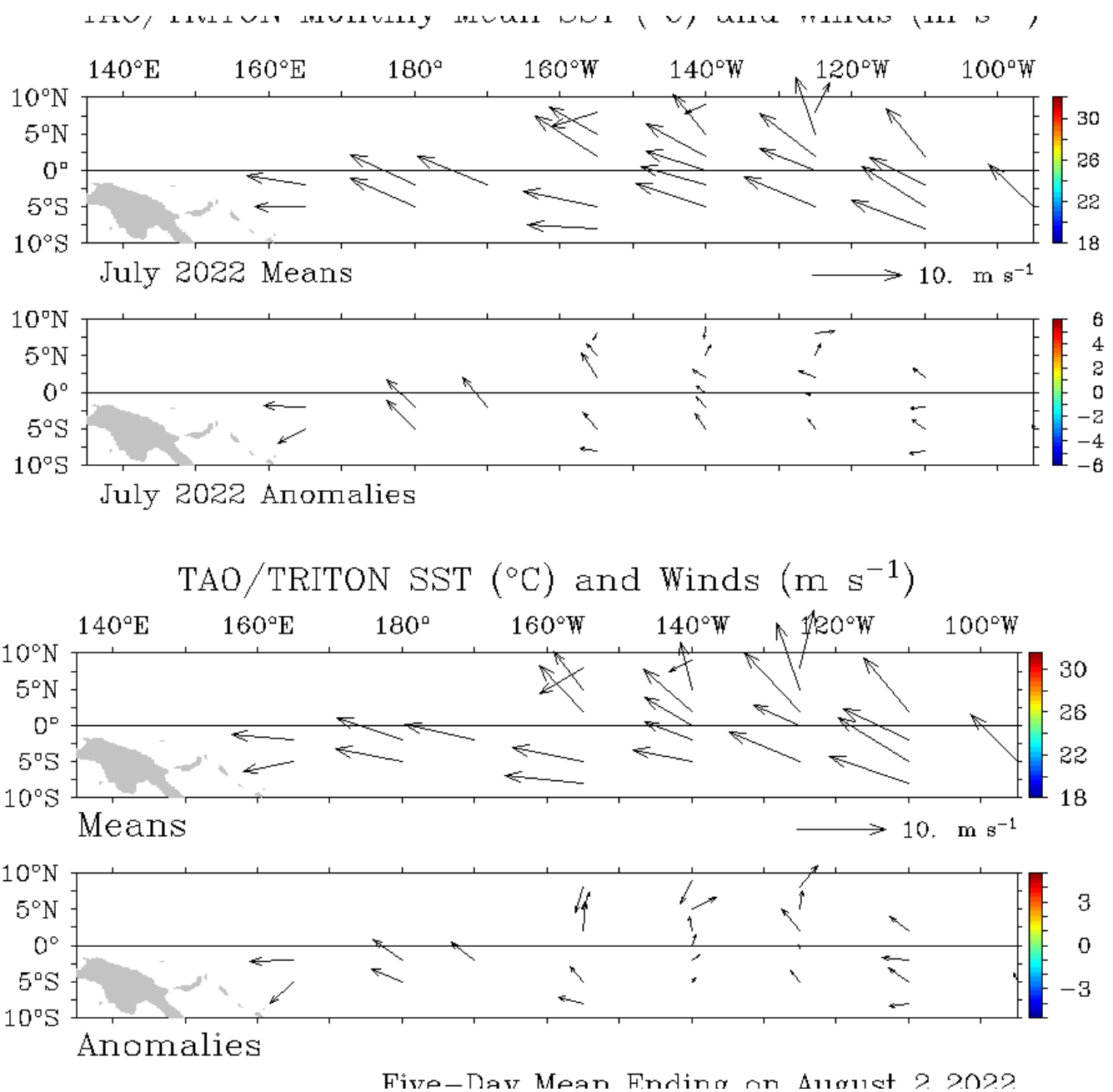


WIND

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

The trade winds in July were stronger over the equatorial Pacific, especially west of the Date Line.

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



CLOUD AND RAINFALL

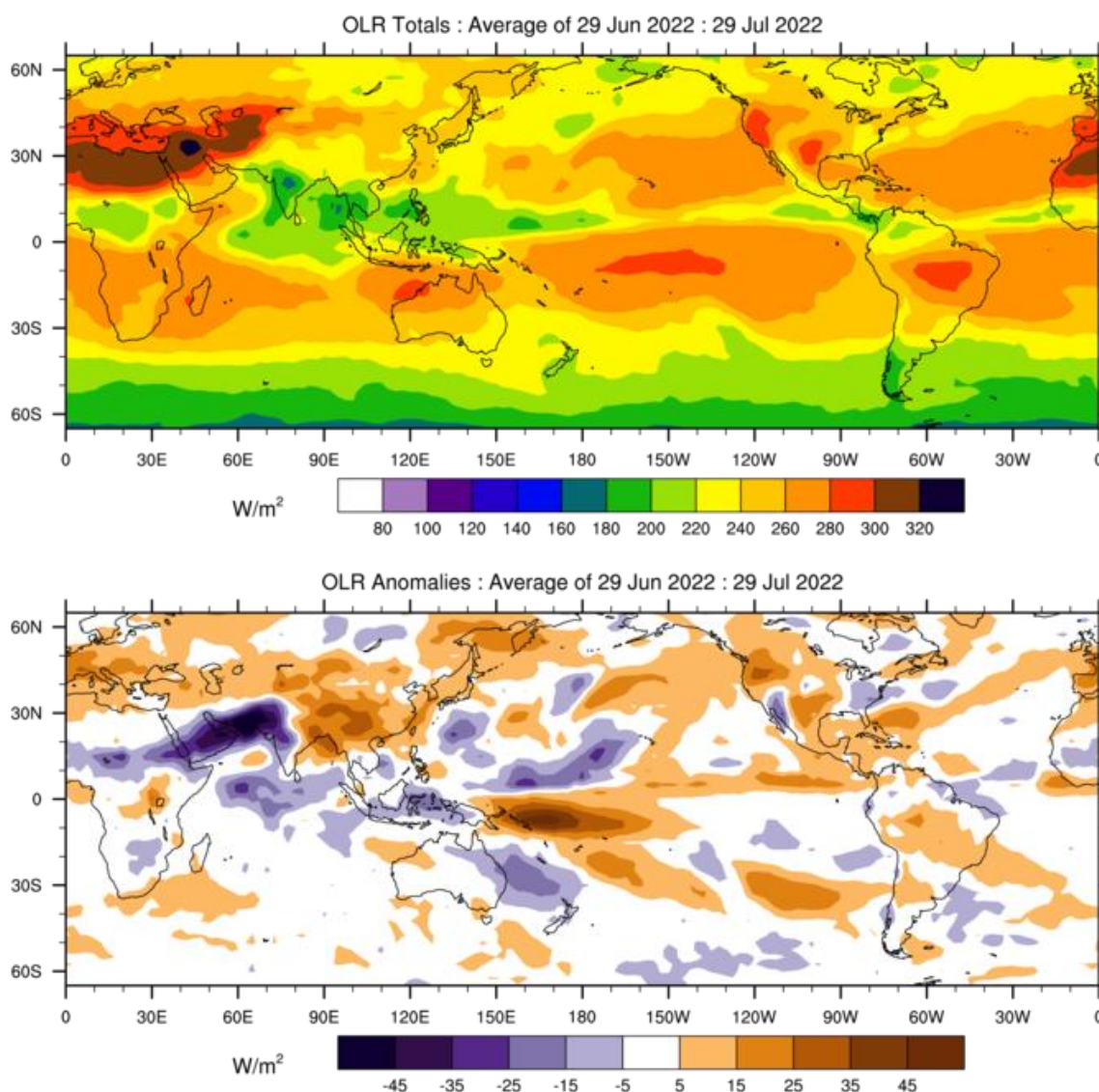
Click link to access [OLR](#)



The July 30-day OLR total and anomaly maps suggest the Intertropical Convergence Zone (ITCZ) was active and shifted north of its average July position in the central equatorial Pacific, while the South Pacific Convergence Zone (SPCZ) was largely suppressed in July.

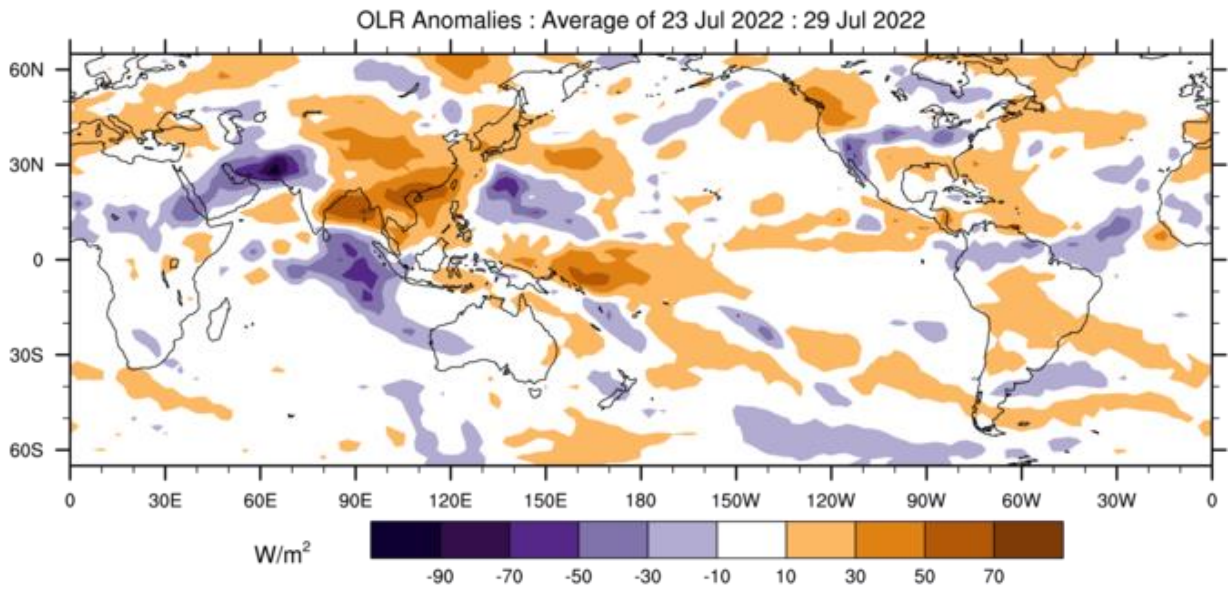
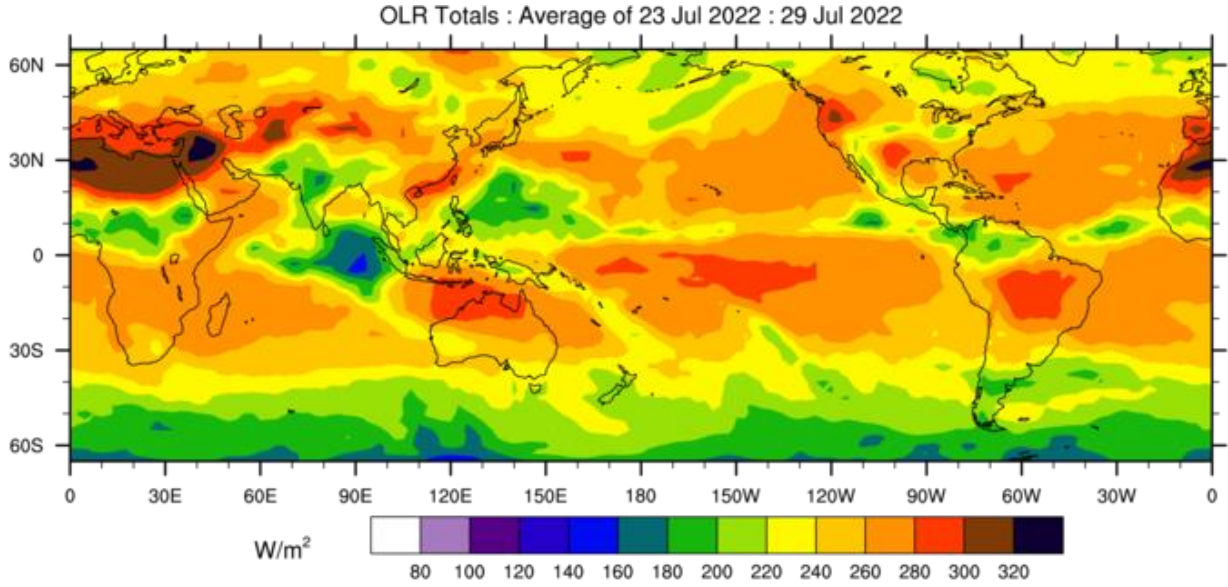
Note: Global maps of OLR below highlight regions experiencing increased or decreased cloudiness. The top panel is the total OLR in Watts per square metre (W/m^2) and the bottom panel is the anomaly (current minus the 1979-1998 climate average), in W/m^2 . In the bottom panel, negative values (blue shading)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

OLR Total and Anomalies, 30 Day OLR

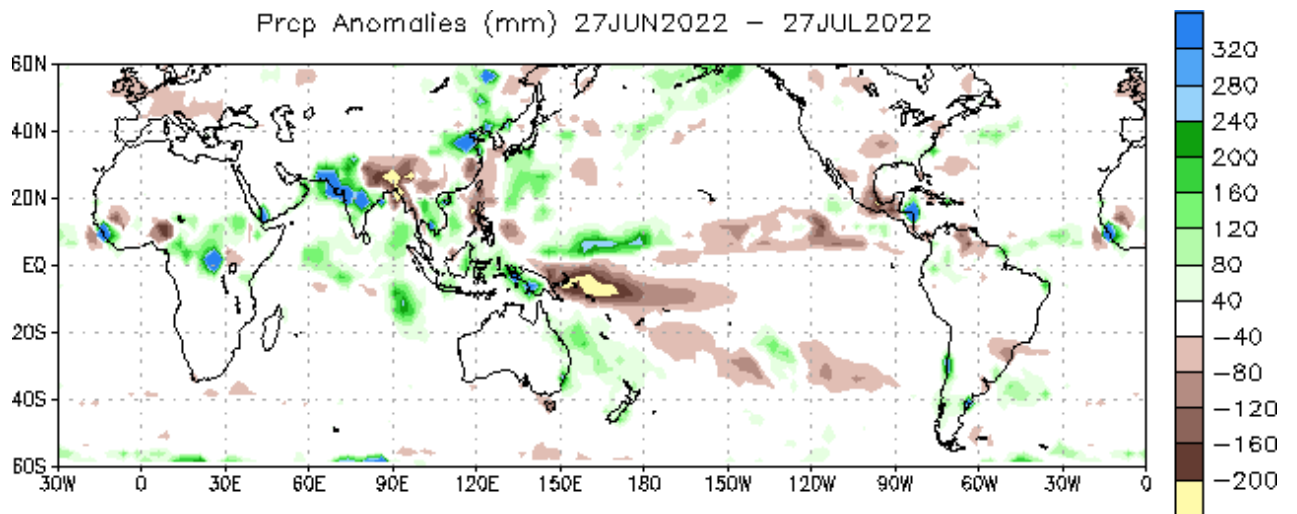


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OLR Total and Anomalies, 7 Day OLR

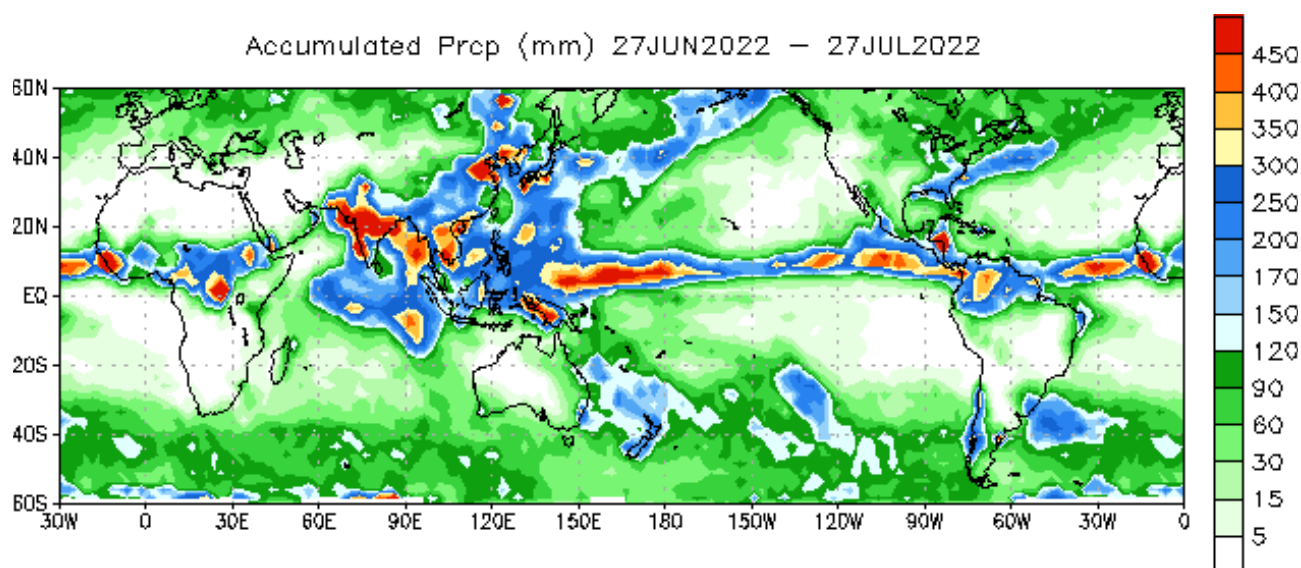


(C) Copyright Commonwealth of Australia 2022. Bureau of Meteorology

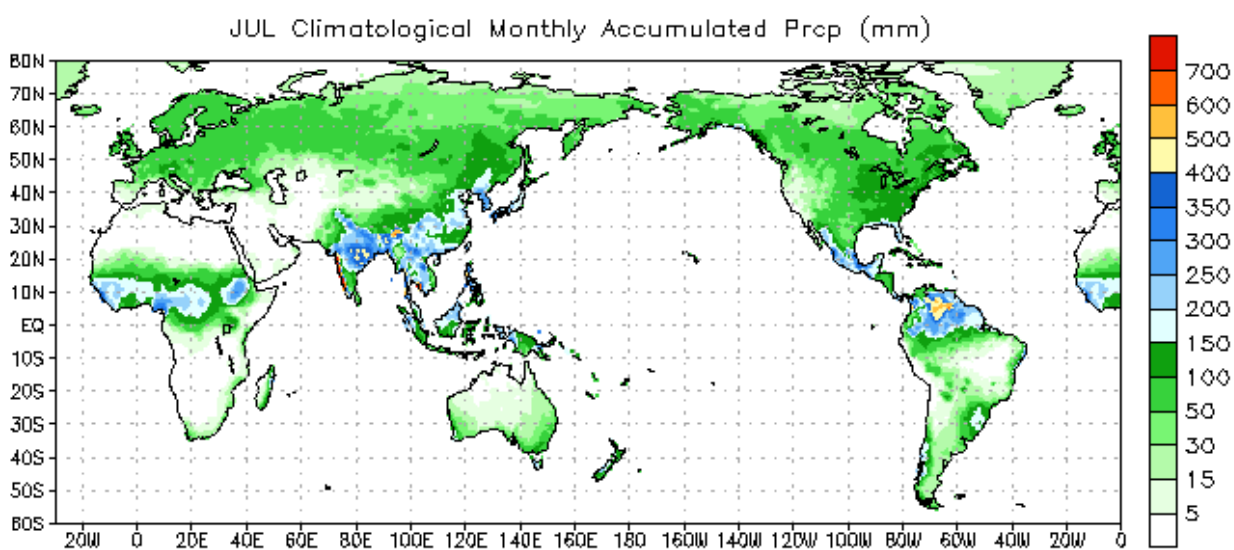


Data Source: NCEP CMAP Precipitation Climatology (1991–2020)

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

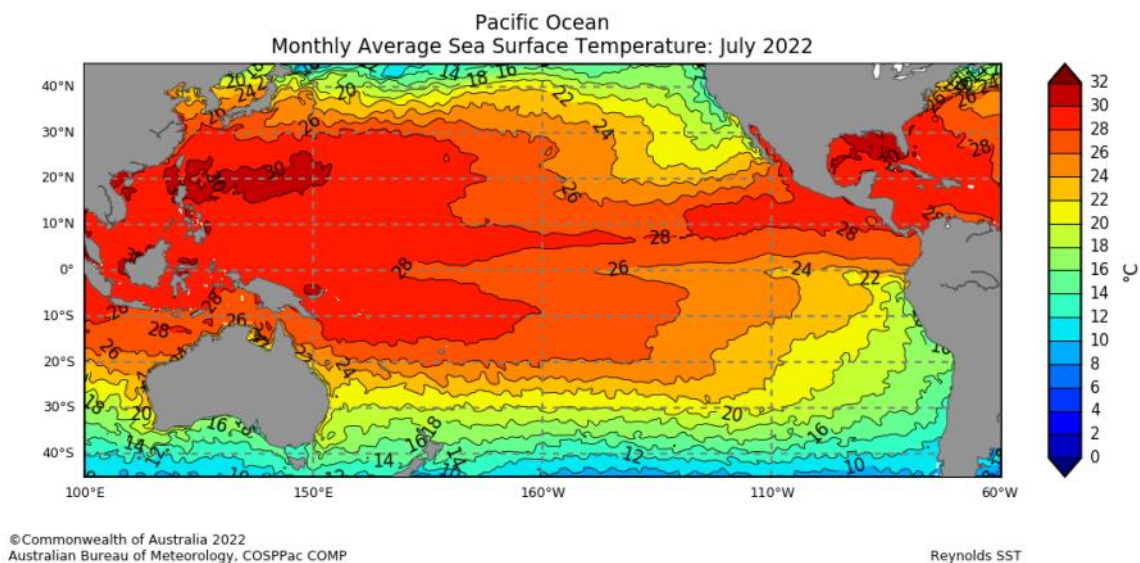


Click link to access [Pacific Community COSPPac Ocean Portal](#)

The SSTs for July 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 June, cool anomalies have strengthened towards PNG, while warm anomalies around northern Australia weakened but strengthened to Australia's north-east.

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

Mean Sea Surface Temperature

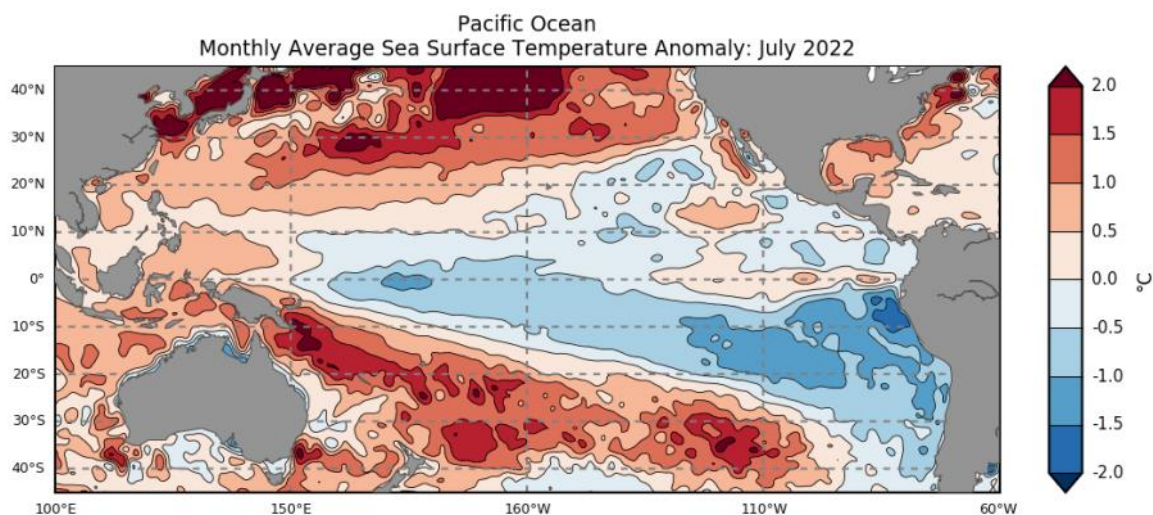


OCEAN CONDITIONS

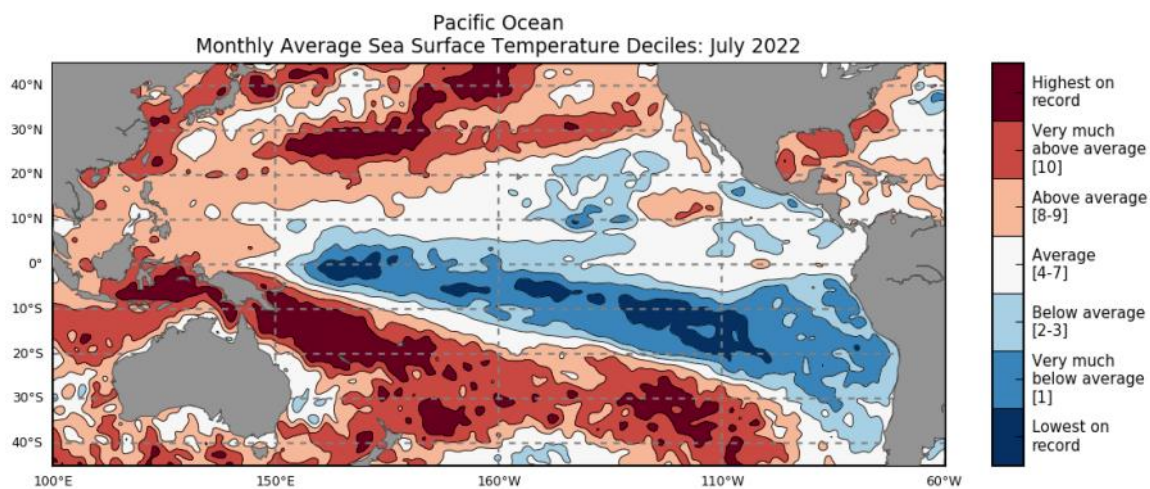
Click link to access [SEA SURFACE TEMPERATURE](#)



Anomalous Sea Surface Temperature



Sea Surface Temperatures Deciles



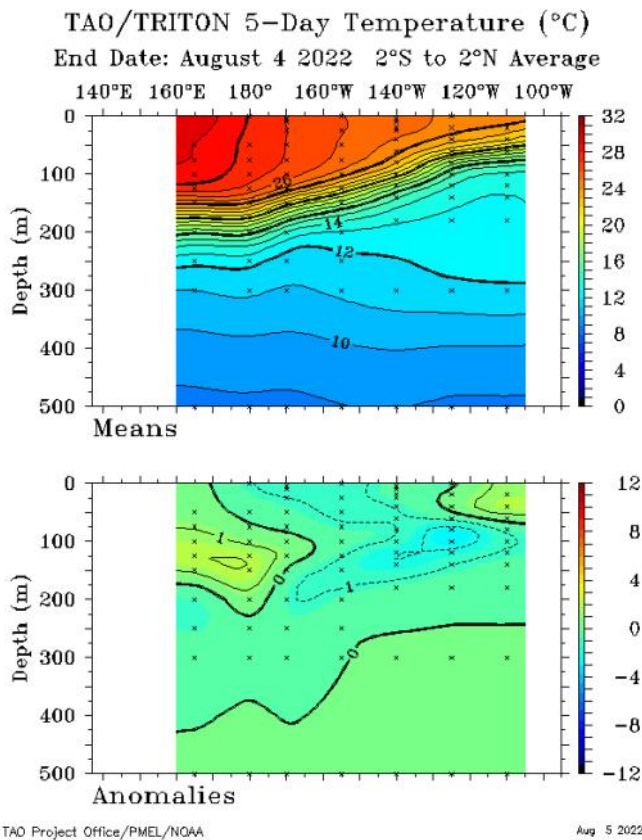
OCEAN CONDITIONS

SUB SURFACE

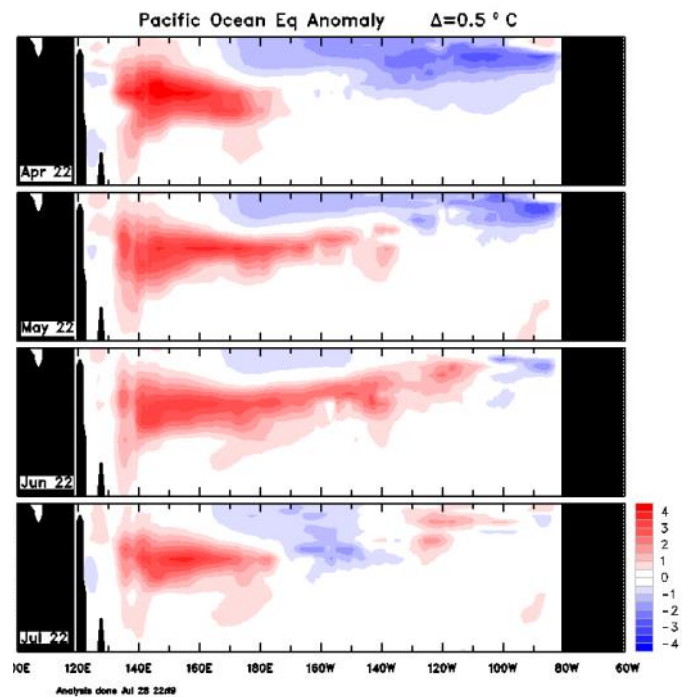


The four-month sequence of equatorial Pacific sub-surface temperature anomalies (to July 2022) shows a small area of weak cool anomalies has appeared in the central equatorial Pacific up to 200 m in depth, with weak warm anomalies persisting but decreasing in extent in the western and eastern tropical Pacific subsurface, as compared to June. This breaks the month-on-month trends of warm anomalies increasing their eastward extent during autumn and into June.

Weekly Temperatures Mean and Anomalies



Monthly Temperatures Anomalies



Bureau of Meteorology Sea Temperature Analysis: <http://www.bom.gov.au/marine/sst.shtml>

TAO/TRITON Data Display: <http://www.pmel.noaa.gov/tao/jsdisplay/>

OCEAN CONDITIONS

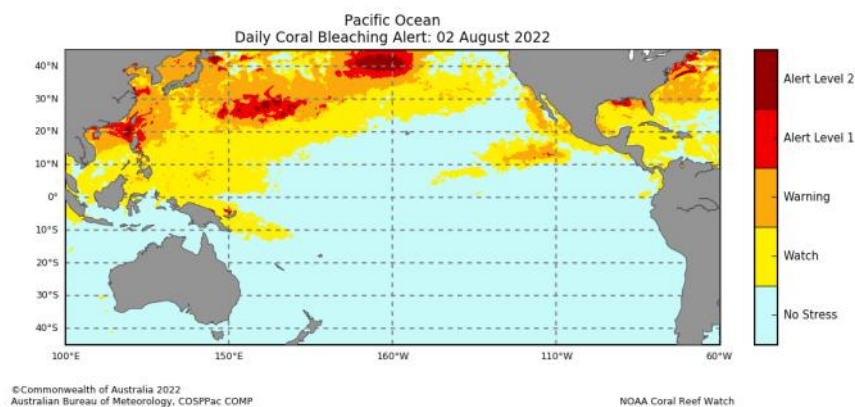
CORAL BLEACHING



The daily Coral Bleaching Alert for 02nd August 2022 shows 'Alert Level 1 and 2' parts of PNG island. Patches of 'Warning' for western FSM while 'No Stress or Watch' for the rest of COSPPac partner countries. The four weeks Coral Bleaching Outlook to 28th August shows 'Alert Level 1' for parts of Palau and northern PNG. 'Warning' alert for Palau, western FSM and northern PNG. 'No Stress or Watch' for the rest of COSPPac partner countries.

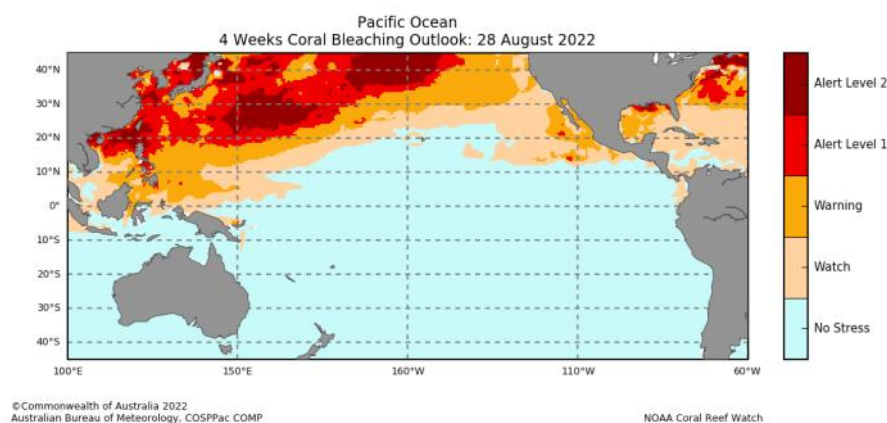
Daily Coral Bleaching Alert

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



4 Weeks Coral Bleaching Outlook

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



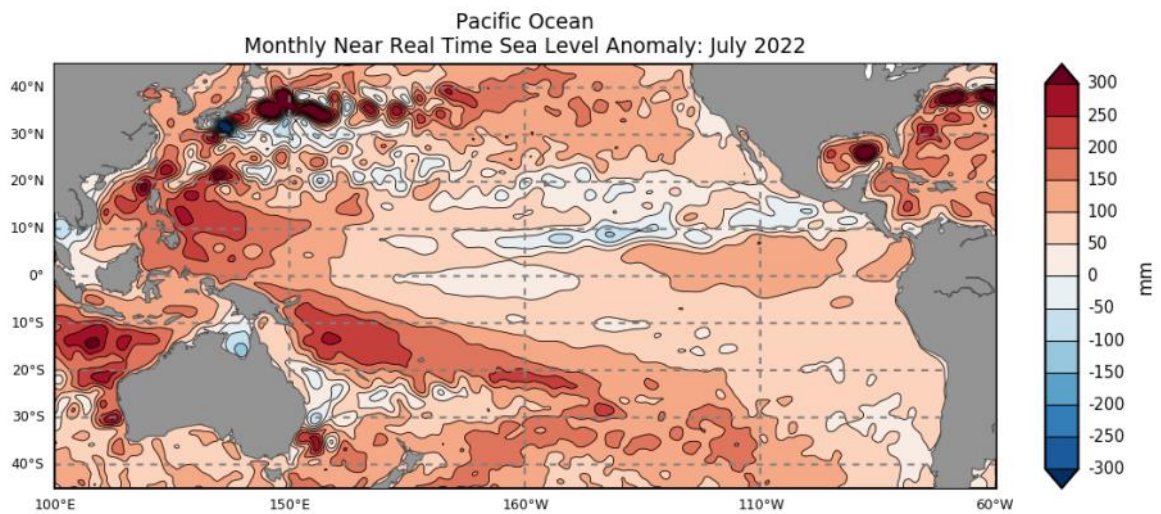
OCEAN CONDITIONS

OCEAN SURFACE CURRENTS AND SEA LEVEL

Sea level was above normal for most of the COSPPac countries. Patches of the highest anomalies above 200-300mm were observed in southeastern PNG, southern Solomon Islands, and western Vanuatu. Sea level of 150mm to 200mm were also observed for Palau, western FSM, most of PNG, Solomon Islands, patches of New Caledonia, Vanuatu, Fiji, Tonga, Samoa, Niue, and southern Cook Islands and French Polynesia. Anomalies of 100mm observed at most of COSPPac countries except for central RMI and Kiribati with 50mm. Near normal to below normal sea levels were observed over parts of Line Islands of Kiribati, southern New Caledonia and southern Tonga.

Monthly Sea Level Anomalies

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



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Australian Bureau of Meteorology, COSPPac COMP

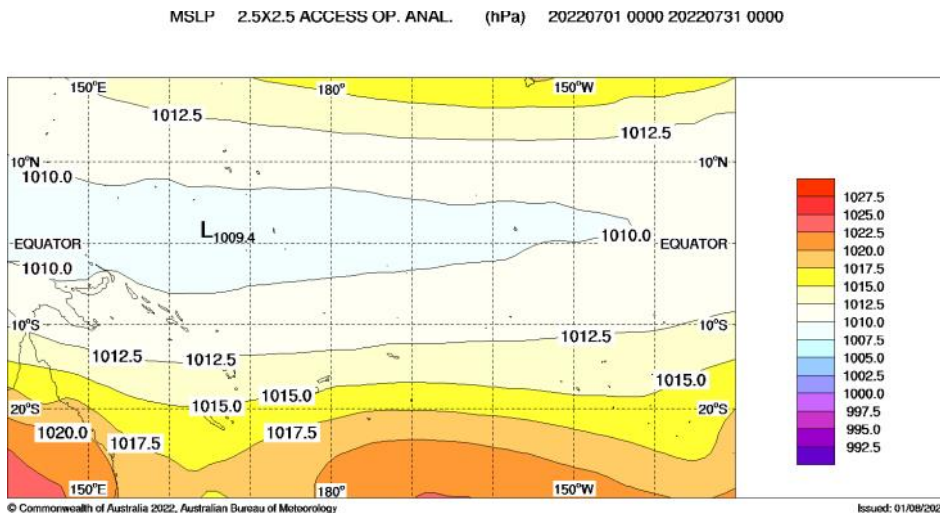
AVISO Ssalto/Duacs SLA

MEAN SEA LEVEL PRESSURE

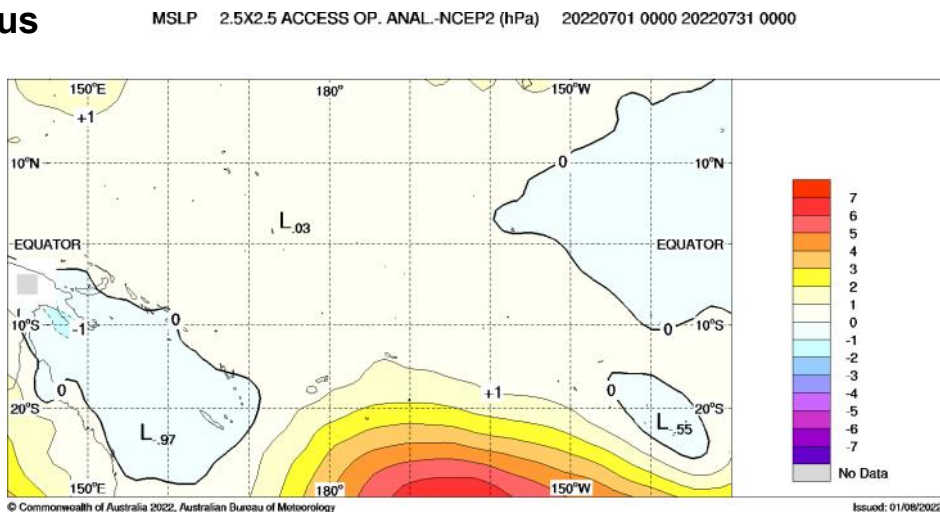
The July mean sea level pressure (MSLP) anomaly map shows mostly positive anomalies of +1 or greater over south Fiji and Tonga and further south. A small area of negative anomalies of -1 were observed in southern PNG.

Areas of above (below) average MSLP usually coincide with areas of suppressed (enhanced) convection and rain throughout the month.

Mean



Anomalous



Bureau of Meteorology South Pacific Circulation Patterns: <http://www.bom.gov.au/cgi-bin/climate/cmb.cgi?variable=mslp&area=spac&map=anomaly&time=latest>

SEASONAL RAINFALL OUTLOOK

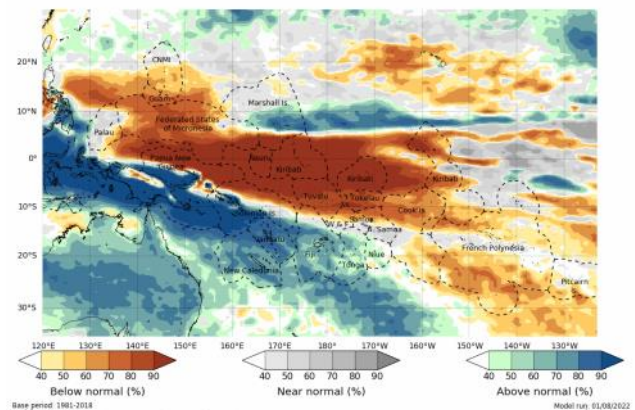
August—October 2022



The ACCESS-S model forecast for August 2022, favours below normal rainfall for CNMI, Guam, FSM, northern PNG, northern Solomon Islands, Nauru, Kiribati, Tuvalu, Tokelau, northern and southern Cook Islands, and northern and southern French Polynesia. Above normal rainfall is very likely for central RMI, most of PNG, most of Solomon Islands, New Caledonia, Vanuatu, Fiji, Tonga and Niue.

The three-month rainfall outlook (August-October 2022) favours below normal rainfall for most of 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 above normal rainfall 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 157°E, namely eastern FSM, northeast PNG, 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 August-October 2022 favours below normal rainfall for Palau, 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 southern PNG, New Caledonia, Vanuatu, Fiji, and Tonga.

The APEC Climate Centre multi-model for August-October 2022 favours below normal rainfall for Guam, northern FSM, southern RMI, PNG Islands, western and northern Solomon Islands, Nauru, Kiribati, Tuvalu, Tokelau, Samoa, 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, Niue and southern Cook Islands.

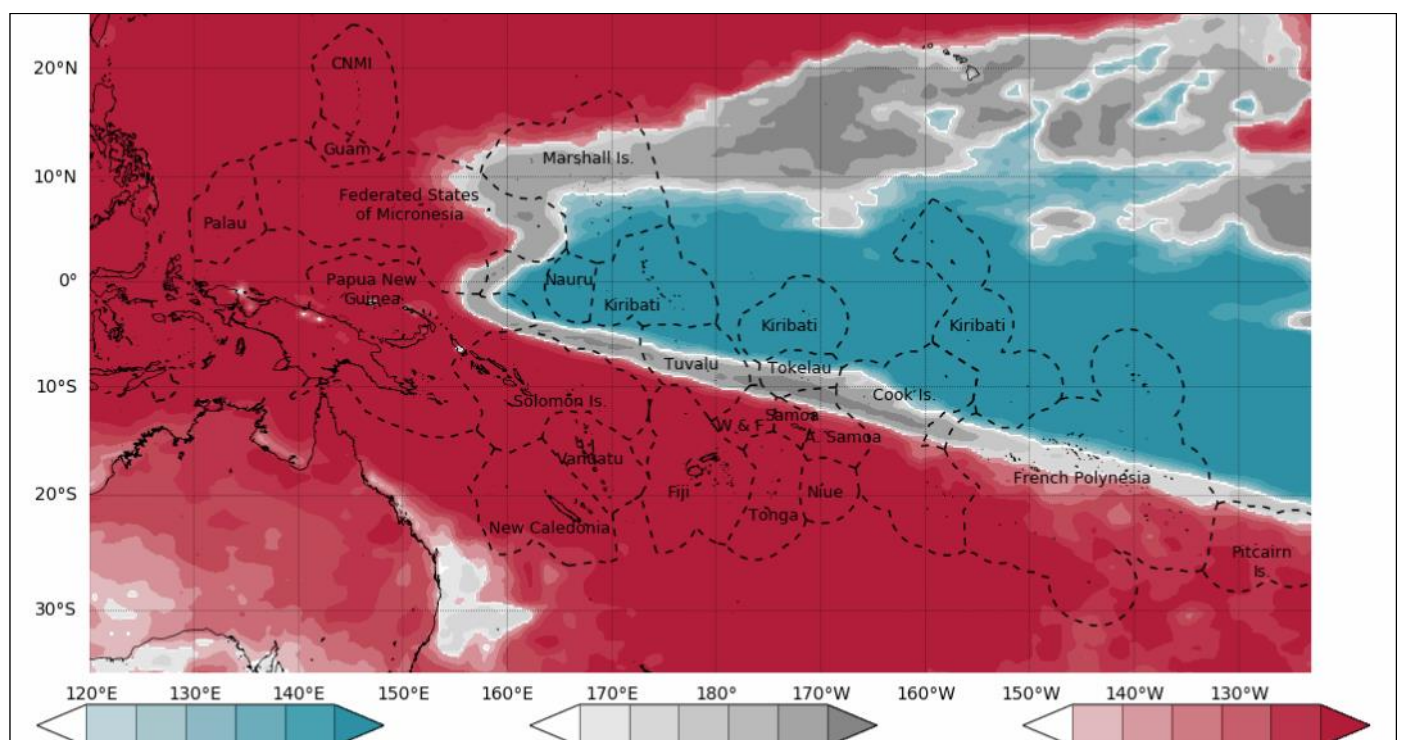
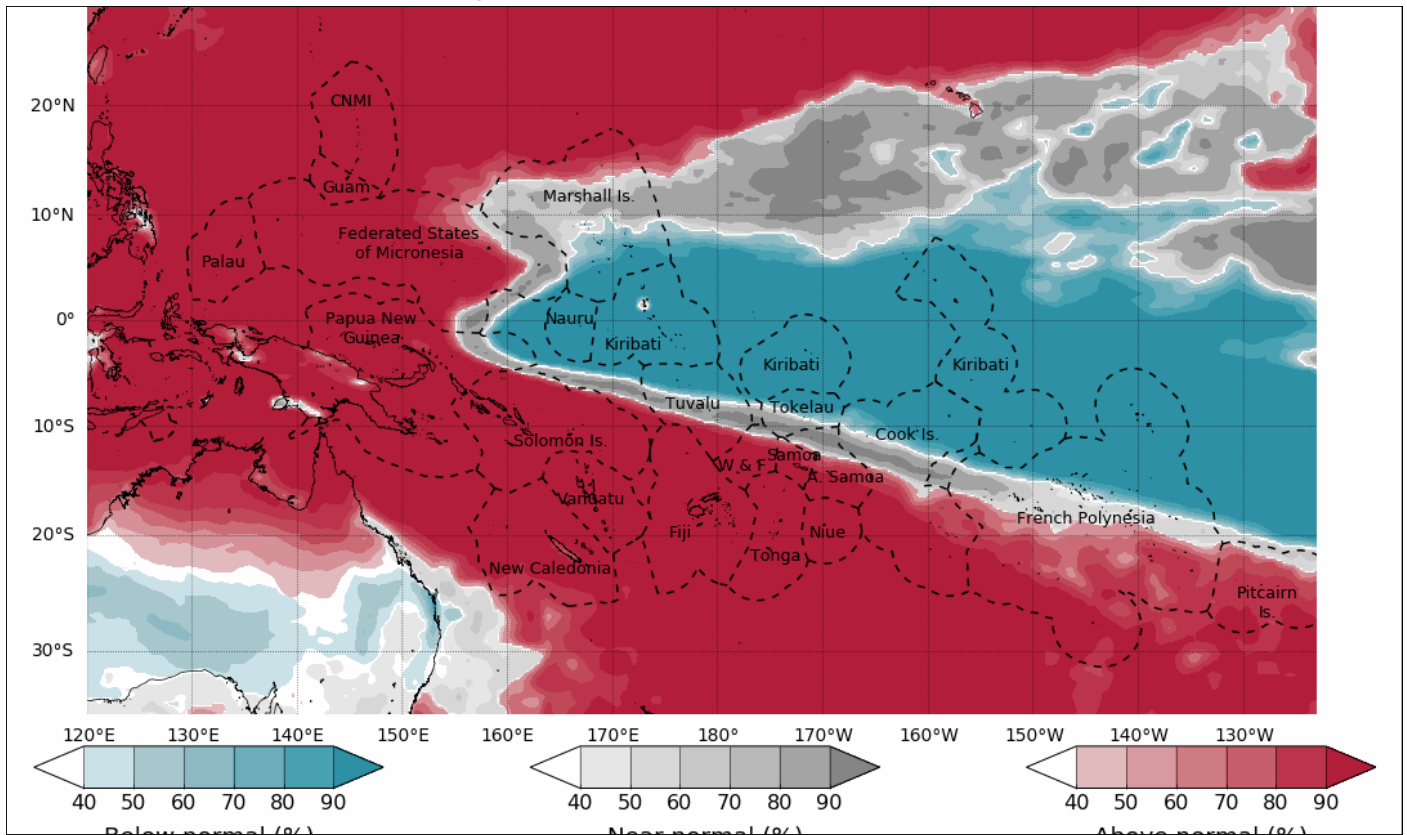
For August-October 2022, the models agree on above normal rainfall for central RMI, most of PNG mainland, southern Solomon Islands, New Caledonia, Vanuatu, Fiji, Tonga, Niue and southern Cook Islands. The models also agree on below normal rainfall is very likely for Guam, northern FSM, PNG Islands, northern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

SEASONAL TEMPERATURE OUTLOOK

August—October 2022



Monthly Tmax and Tmin ACCESS-S Maps



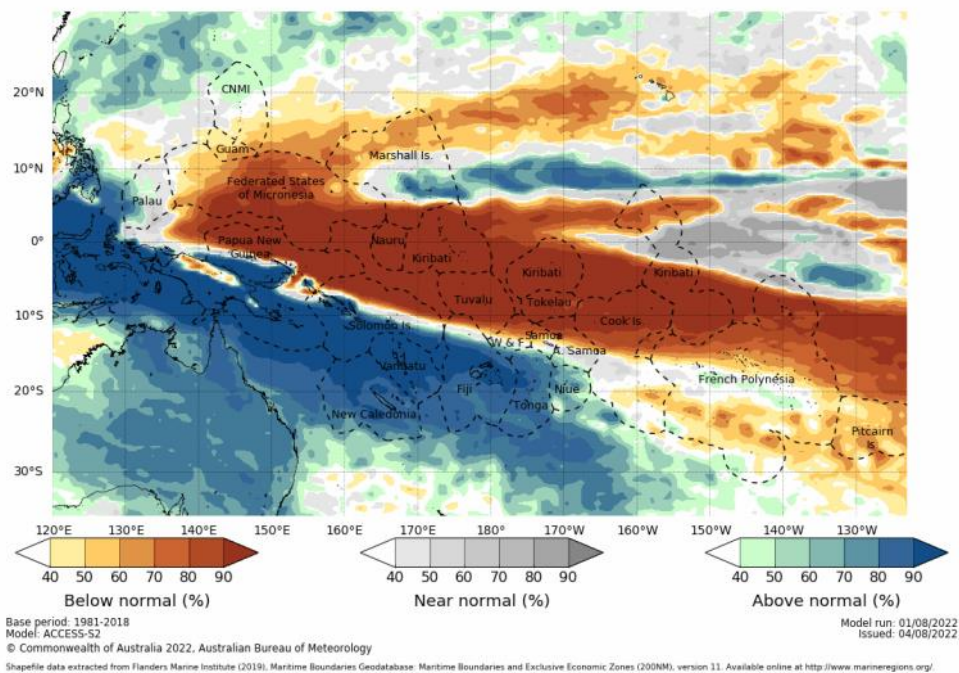
SEASONAL RAINFALL OUTLOOK

August—October 2022

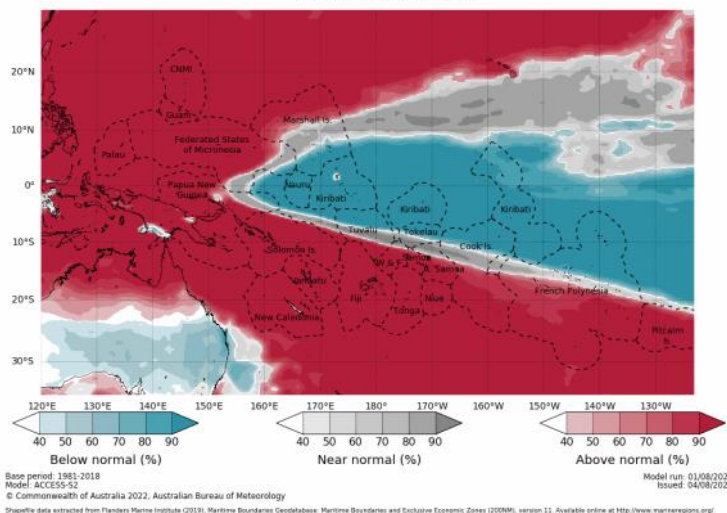


Seasonal ACCESS-S maps

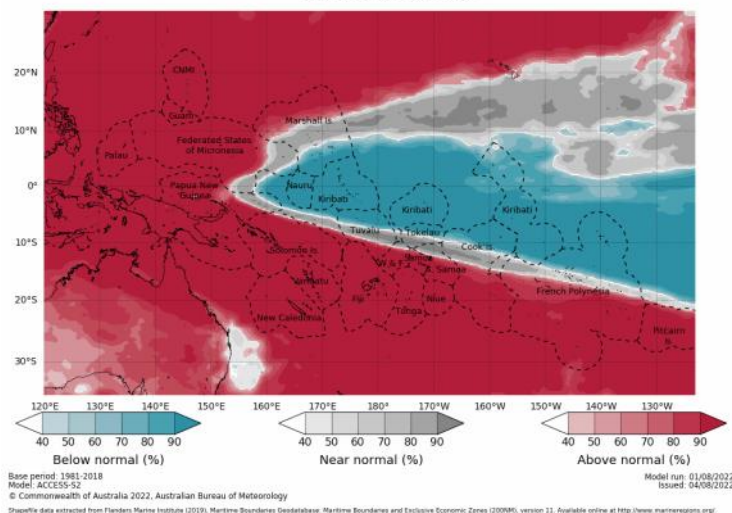
Tercile rainfall probabilities for August to October 2022



Tercile maximum temperature probabilities for August to October 2022



Tercile minimum temperature probabilities for August to October 2022



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

SEASONAL RAINFALL OUTLOOK

August—October 2022



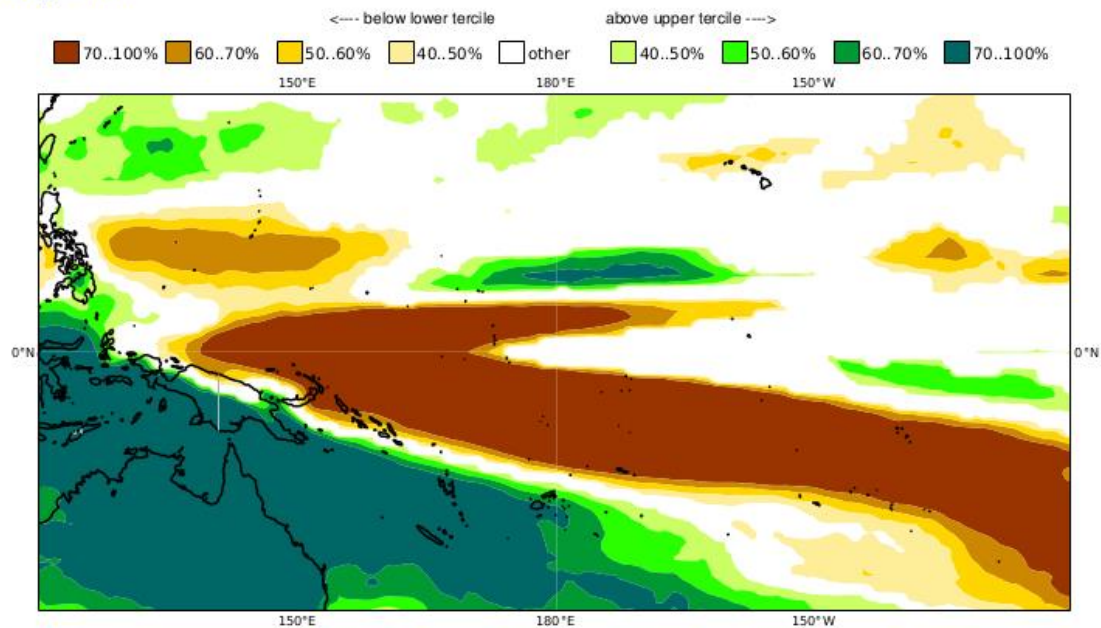
Copernicus (C3S multi-system)-Rainfall

Prob(most likely category of precipitation)

ASO 2022

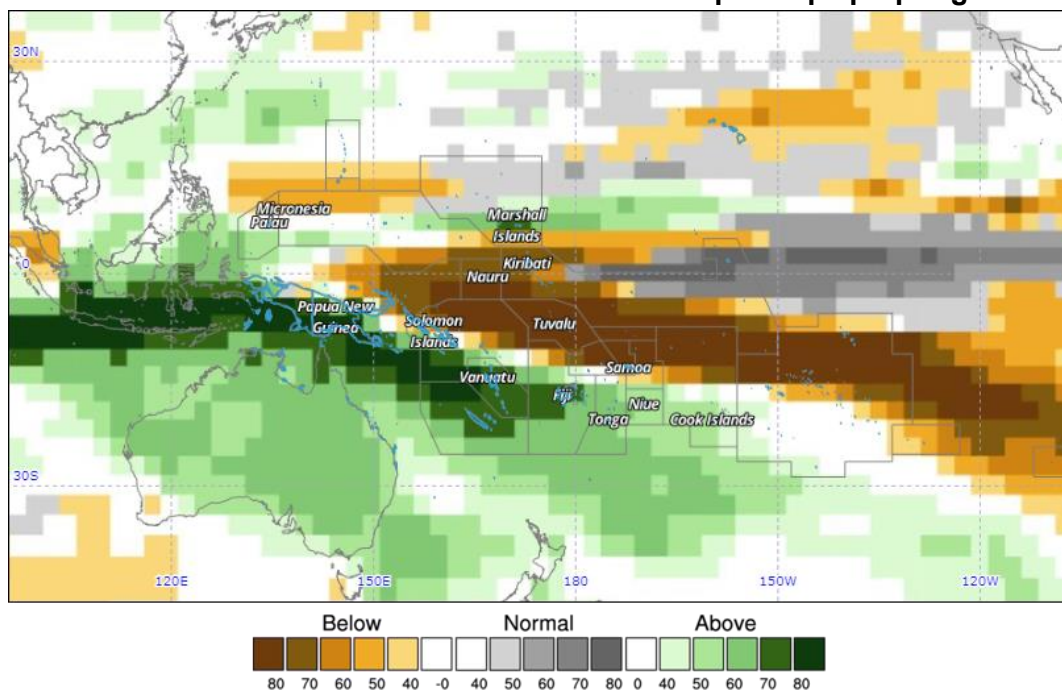
Nominal forecast start: 01/07/22

Unweighted mean



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

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



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

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

Generated using CLIK® (2022-8-4)

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TROPICAL CYCLONE

2021/2022 Season

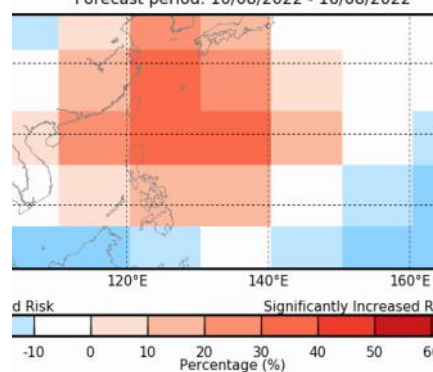


The southwest Pacific, 2021-22 tropical cyclone ended on 30th April 2022. The outlook for the season was for enhanced risk for tropical cyclone activity in the western part of the basin over November to April. In the central part of the region, cyclone risks are generally near normal, with reduced chances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

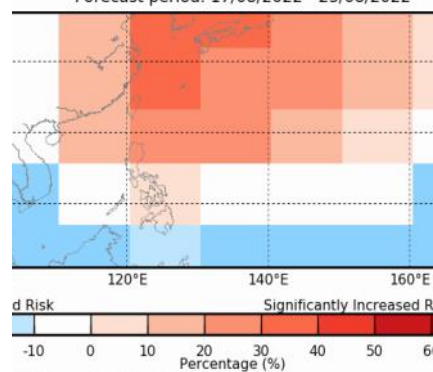
The weekly tropical cyclone forecast from the ACCESS-S model shows significant increased risk between 10 and 23 August for northwest Pacific including Philippines, South China Sea region and south Japan.

ACCESS-S Weekly Forecasts –Northwest Pacific
 Difference from normal chance of Tropical Cyclone's in the Northwest Pacific
 Forecast period: 10/08/2022 - 16/08/2022



Probability in overlapping 15 x 20 degree boxes
 122, Australian Bureau of Meteorology Model: ACCESS_S2 Model Run: 05/08/2022

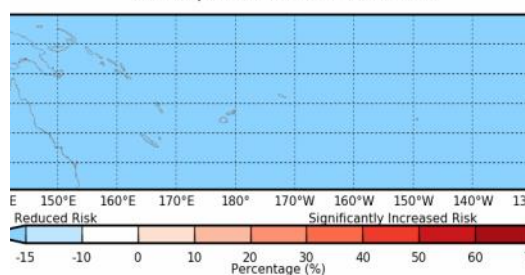
ACCESS-S Weekly Forecasts –Northwest Pacific
 Difference from normal chance of Tropical Cyclone's in the Northwest Pacific
 Forecast period: 17/08/2022 - 23/08/2022



Probability in overlapping 15 x 20 degree boxes
 122, Australian Bureau of Meteorology Model: ACCESS_S2 Model Run: 05/08/2022

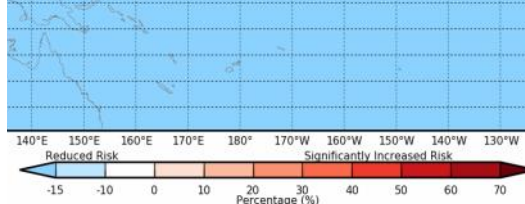
ACCESS-S Weekly Forecasts –Southwest Pacific

Difference from normal chance of Tropical Cyclone's in the Southwest Pacific
 Forecast period: 10/08/2022 - 16/08/2022



Probability in overlapping 15 x 20 degree boxes
 122, Australian Bureau of Meteorology Model: ACCESS_S2 Model Run: 05/08/2022

Difference from normal chance of Tropical Cyclone's in the Southwest Pacific
 Forecast period: 17/08/2022 - 23/08/2022



Probability in overlapping 15 x 20 degree boxes
 122, Australian Bureau of Meteorology Model: ACCESS_S2 Model Run: 02/08/2022 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.

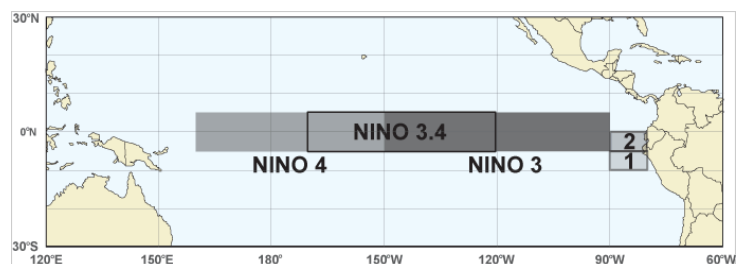
20 degrees Celsius Isotherm Depth

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