

Monthly Climate Bulletin

July 2024



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Photo Credit: Molly Powers (SPC) Samoa Tide Gauge





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Issued 14 August 2024

- The El Niño Southern Oscillation (ENSO) is currently neutral.
- The Madden-Julian Oscillation (MJO) is currently indiscernible.
- In July, the Intertropical Convergence Zone (ITCZ) was just north of the equator, and a well-defined South Pacific Convergence Zone (SPCZ) extended east-southeast from PNG to the northern Cook Islands in the southern hemisphere.
- Sea surface temperatures (SSTs) for July 2024 were warmer than average across much of the western tropical Pacific Ocean.
- The Coral bleaching Outlook to 08 September shows 'Alert Level 2' over southeast FSM, and northern PNG's EEZ.
- For August to October 2024 the models agree that above normal rainfall is likely or very likely for southern Palau, western FSM, central RMI, most of PNG mainland, northern Fiji, southern Tuvalu, American Samoa, northern Tonga, northwest Niue, and the northern Cook Islands. In addition, the models agree that below normal rainfall is likely or very likely for far southern RMI, Nauru, Kiribati (except far southern Line Is.), southeast French Polynesia, and Pitcairn Islands.
- The ACCESS-S weekly tropical cyclone outlook shows significantly increased risk over FSM, Guam, CNMI, Philippines and Japan for the fortnight from 18 to 31 August.

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EL NIÑO–SOUTHERN OSCILLATION

ENSO and IOD neutral, SAM strongly negative

Click link to access [Climate Driver Update issued on 06 August 2024](#)

The El Niño-Southern Oscillation (ENSO) is currently neutral.

Sea surface temperatures (SSTs) in the central equatorial Pacific Ocean are ENSO-neutral, following a steady cooling from El Niño levels since December 2023. This cooling is being sustained by deep waters surfacing in the central and eastern Pacific. However, the rate and extent of cooling both at and below the surface has decreased since May. Atmospheric patterns, including cloud and trade winds, are currently ENSO-neutral.

ENSO is likely to remain neutral until at least early spring. Three of 7 climate models suggest the possibility of SSTs reaching the La Niña threshold (below $-0.8\text{ }^{\circ}\text{C}$) by October. The remaining 4 models suggest a continuation of ENSO-neutral throughout the forecast period.

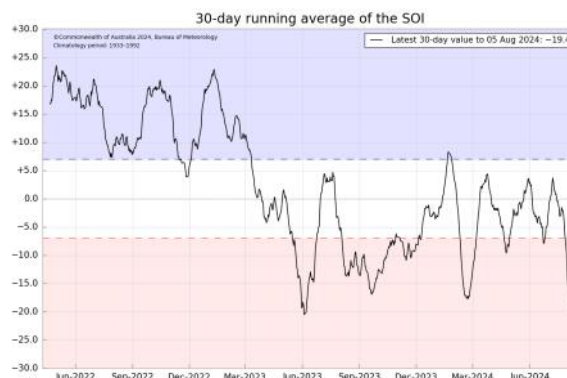
The ENSO Outlook remains at La Niña Watch. La Niña Watch does not guarantee La Niña development, only that there is about an equal chance of ENSO remaining neutral or La Niña developing during the remainder of 2024.

The Indian Ocean Dipole (IOD) is currently neutral. The latest model outlooks indicate that the IOD is likely to remain neutral until at least the end of winter. Three of 5 climate models suggest that during spring, negative IOD development is likely, while 2 forecast a neutral or positive state of the IOD.

Global sea surface temperatures (SSTs) have been the warmest on record for each month between April 2023 and June 2024. July 2024 global SSTs were the second-warmest July on record. The current global pattern of warmth differs to historical patterns of SSTs associated with ENSO and IOD. This means future predictions of ENSO and IOD based on SSTs during past events may not be reliable. Phenomena such as ENSO and the IOD are only broad indicators of the expected climate. The long-range forecast provides better guidance on local rainfall and temperature patterns.

The Southern Annular Mode (SAM) is strongly negative (as at 3 August). The index is forecast to remain negative for at least the coming fortnight, beyond which predictability is typically low. During winter, a negative SAM typically increases the likelihood of rain-bearing fronts across southern Australia and decreases rainfall influenced by onshore flow in parts of the east.

The 30-, 60- and 90-day Southern Oscillation Index (SOI) data is currently unavailable due to technical issues.



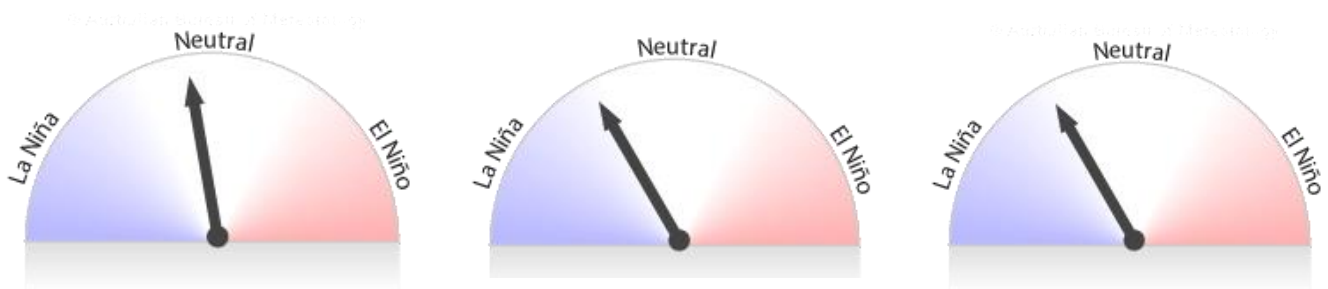


EL NIÑO–SOUTHERN OSCILLATION

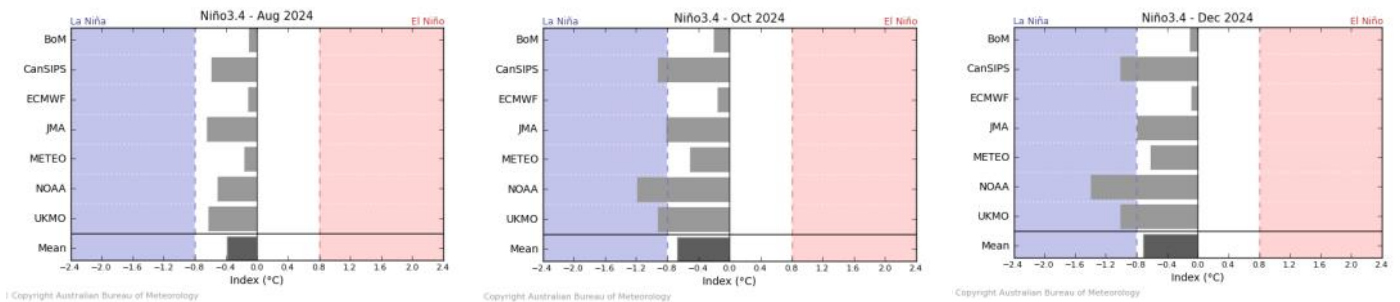
ENSO and IOD neutral, SAM strongly negative

Click link to access [Climate Driver Update issued on 06 August 2024](#)

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>

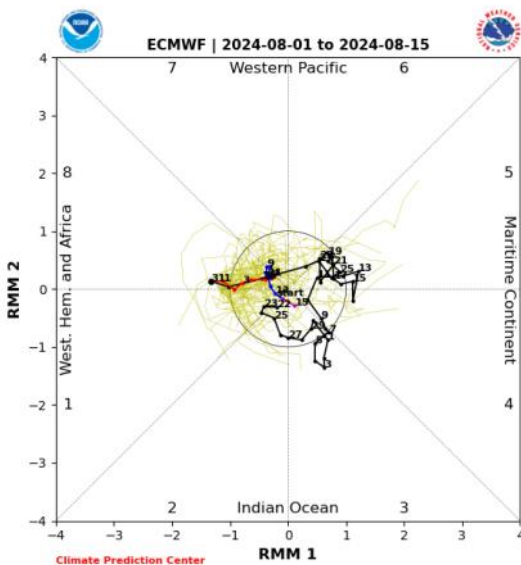
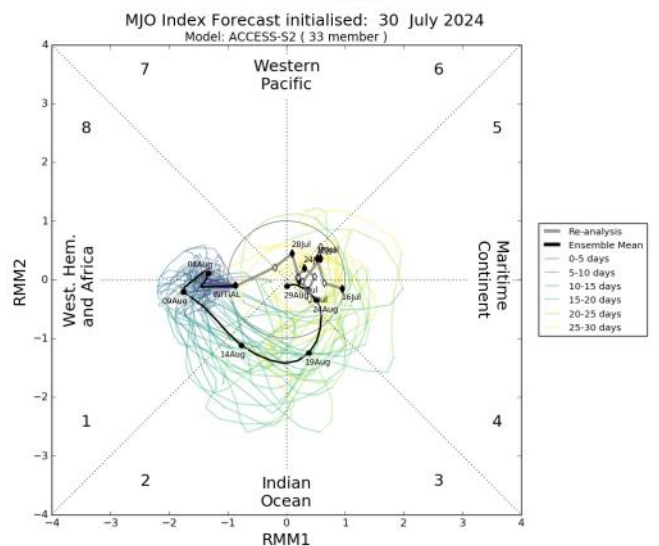
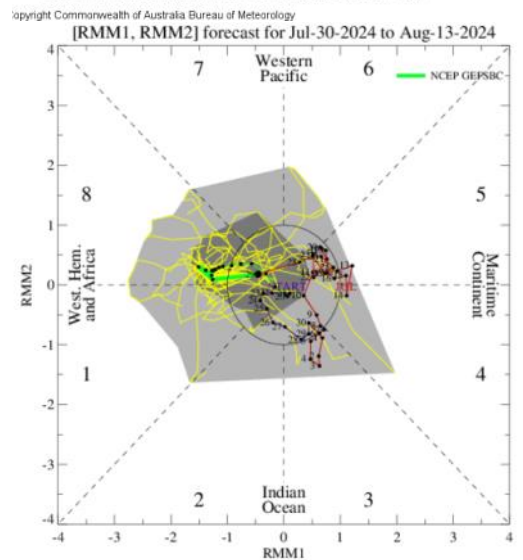
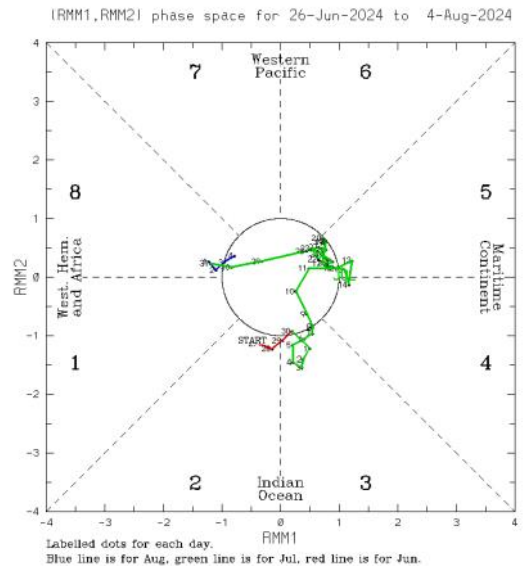
MADDEN–JULIAN OSCILLATION

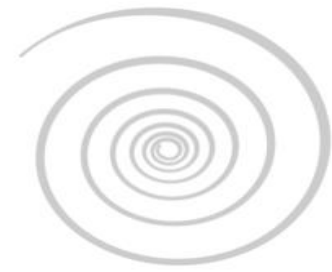
Click link to access [Tropical Climate Update](#) [Issued on Tuesday 06 August 2024]

The Madden-Julian Oscillation (MJO) has been generally weak in July.

The MJO is currently indiscernible (as of 3 August). The majority of models suggest a weak pulse of the MJO may briefly emerge in the Western Hemisphere and Africa in early August, with the remainder forecasting a weak or indiscernible signal to continue. A weak MJO has little impact on Pacific and Australian rainfall. .

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



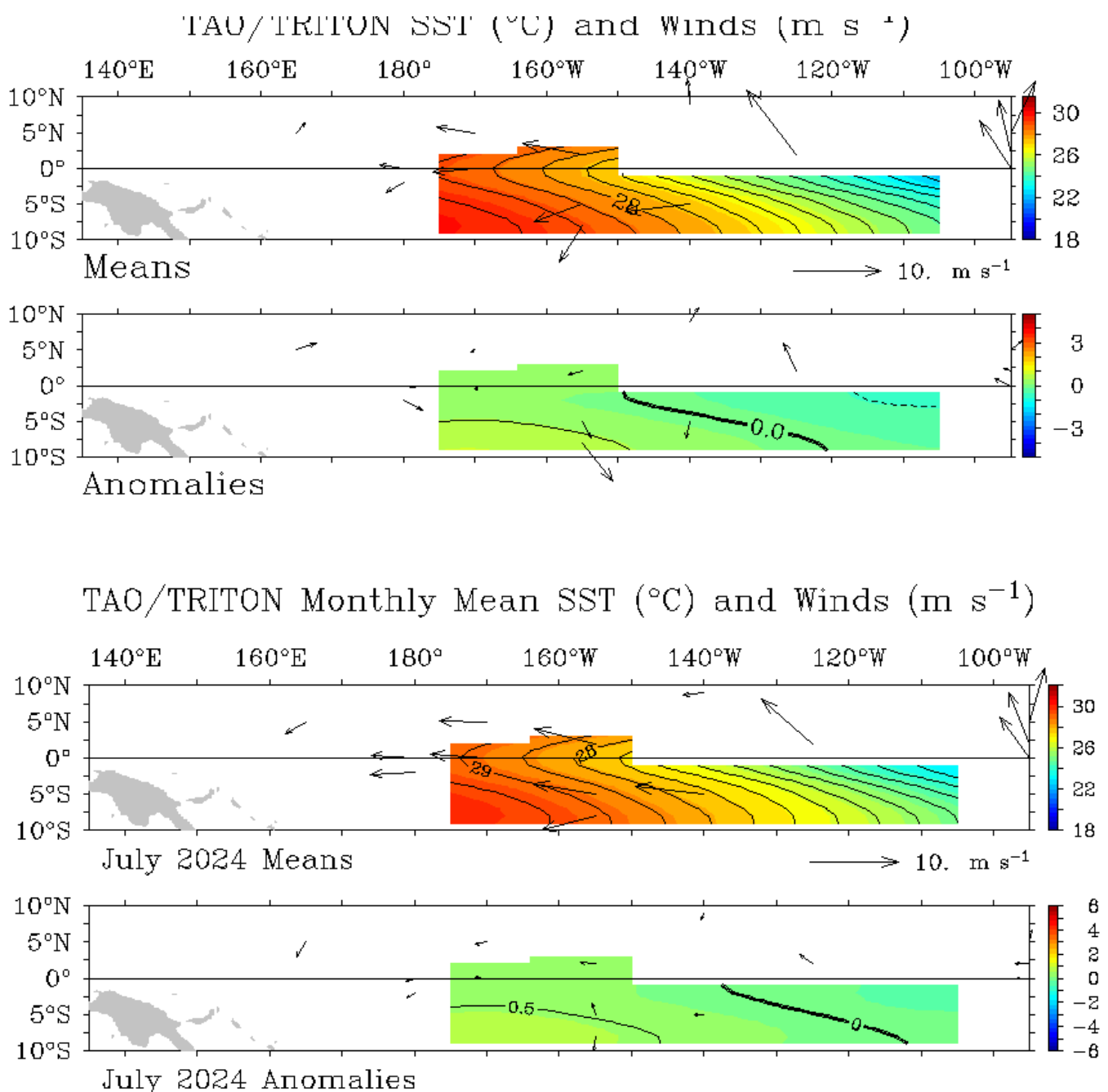


WIND

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

During July, the trade winds were generally slightly stronger than normal over the equatorial Pacific east of the Date Line. For the five days ending 30 July 2024, the trades were weaker than average in the southern hemisphere between the Date Line and 160°W.

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



CLOUD AND RAINFALL

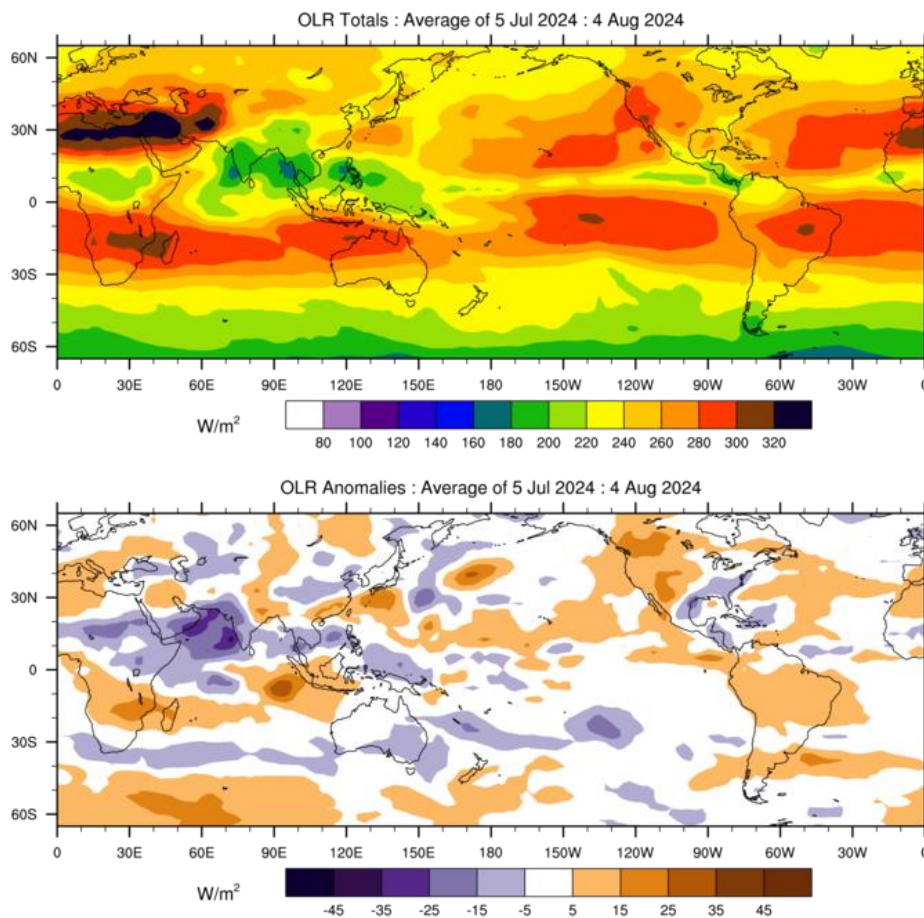
Click link to access [OLR](#)



The July 30-day OLR anomaly map shows a region of negative OLR (increased convection) over northern PNG and the warm pool area, with another band stretching east-southeastwards from New Caledonia, and southern Vanuatu. Areas of anomalously high OLR (decreased convection) were evident over FSM, Guam, CNMI, RMI, and Kiribati in the northern hemisphere.

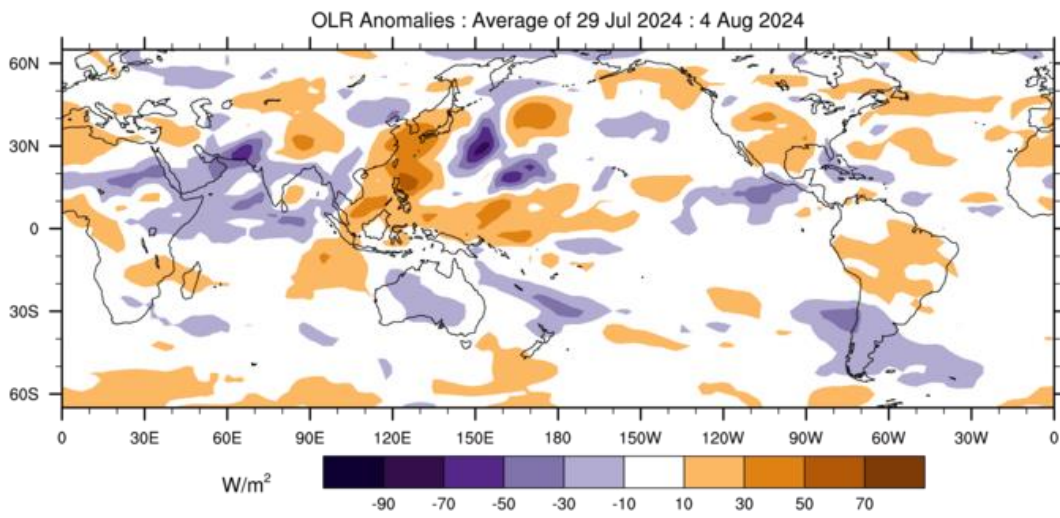
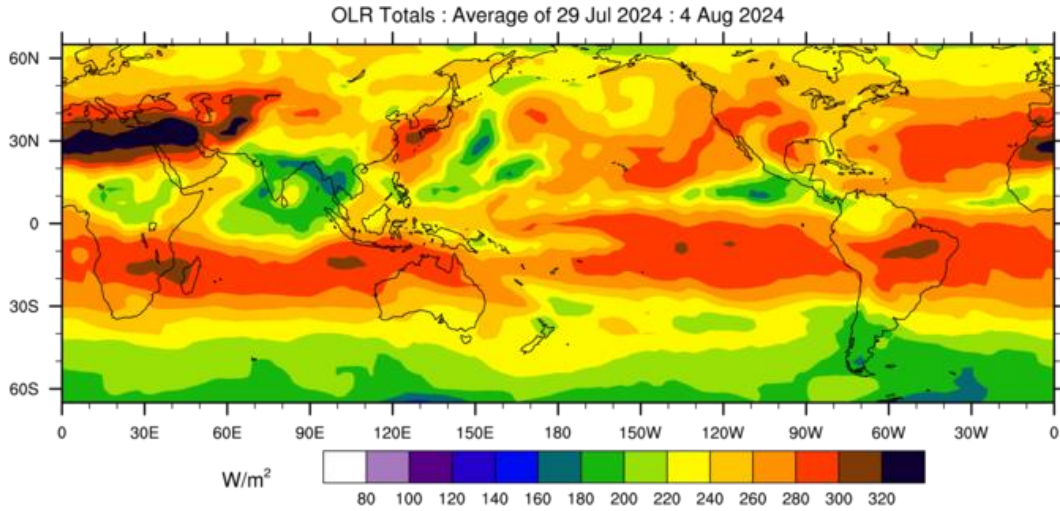
Note: Global maps of OLR below highlight regions experiencing increased or decreased cloudiness. The top panel is the total OLR in Watts per square metre (W/m^2) and the bottom panel is the anomaly (current minus the 1979-1998 climate average), in W/m^2 . In the bottom panel, negative values (blue shading)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

OLR Total and Anomalies, 30 Day OLR

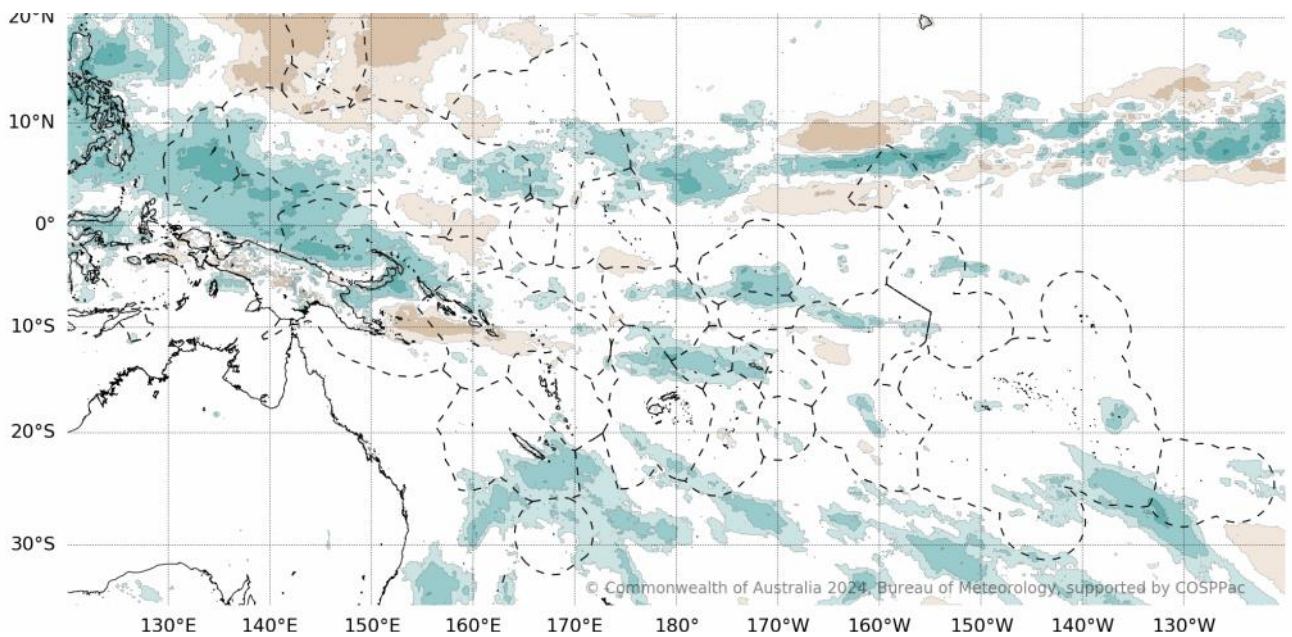


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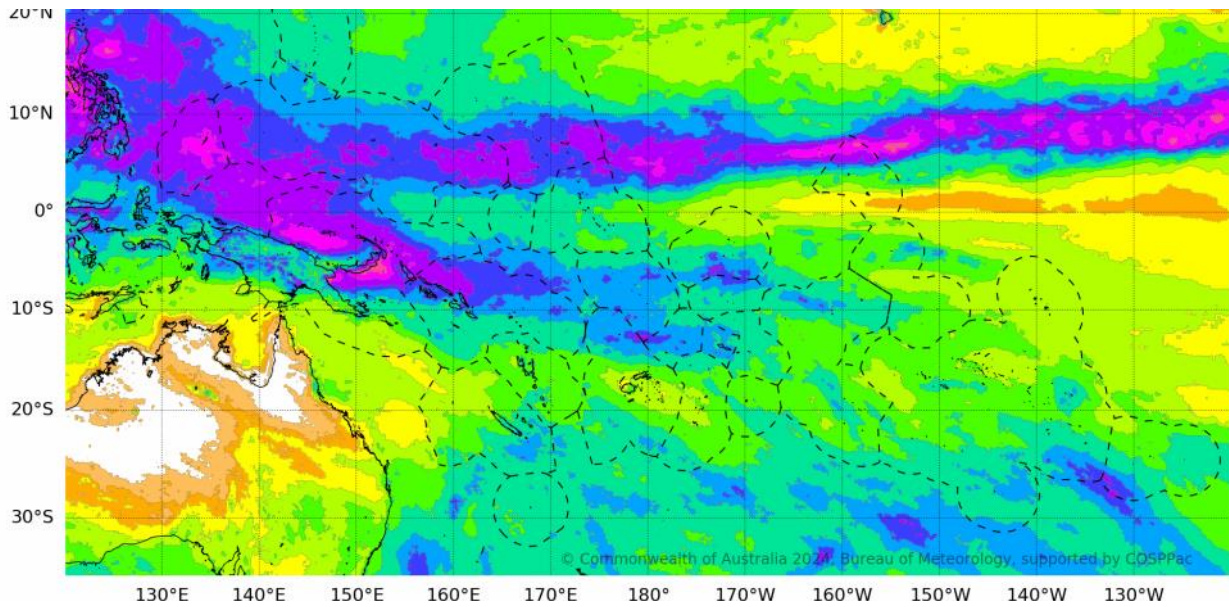
OLR Total and Anomalies, 7 Day OLR



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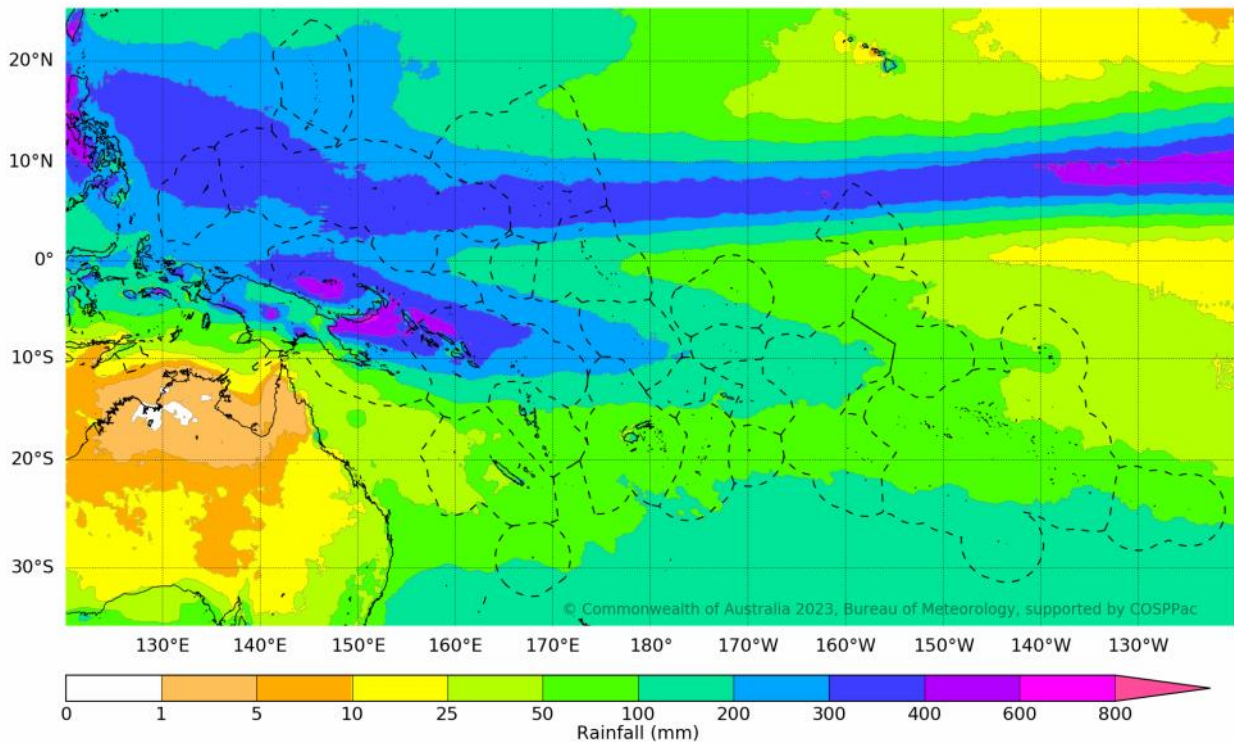
30-Day Rainfall Accumulated



Base period: 1980-2021
Data source: MSWEP

Monthly climatology for July

Issued: 08/12/2023



Dashed EEZ shapefile data extracted from Flanders Marine Institute (2019), Maritime Boundaries Geodatabase: Maritime Boundaries and Exclusive Economic Zones (200NM), version 11. Available online at <http://www.marinerregions.org/>.

Global and Pacific ACCESS-S outlook and Pacific Climate Monitoring - ACCESS-S precipitation:

<http://access-s.clide.cloud/>

OCEAN CONDITIONS

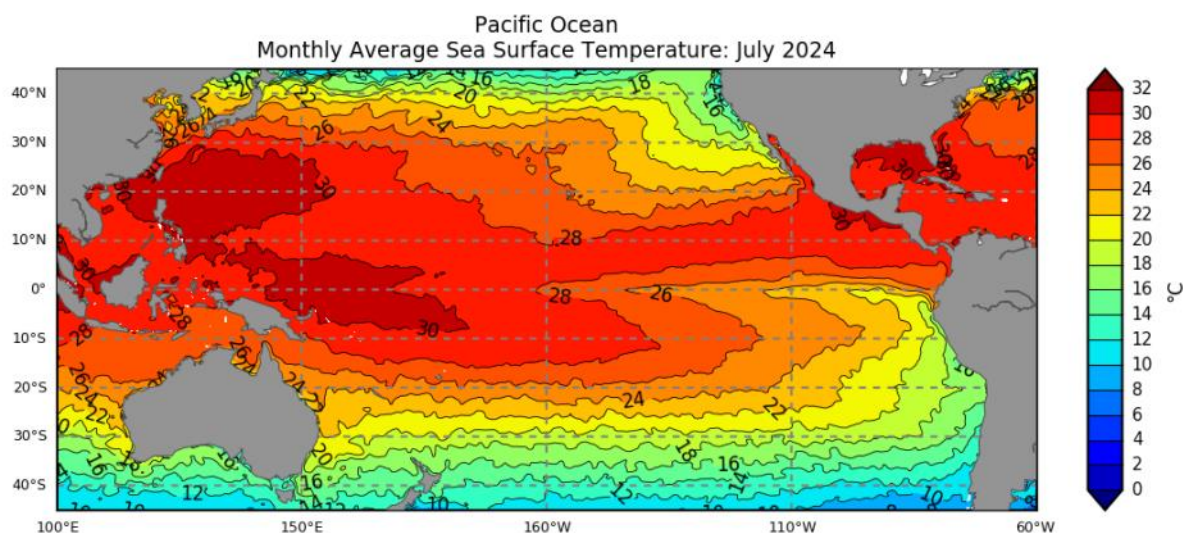
SEA SURFACE TEMPERATURE



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

Sea surface temperatures (SSTs) for July 2024 were up to 1.5 °C warmer than average across much of the western tropical Pacific Ocean, reaching up to 2 °C warmer than average for far east. SSTs were up to 2.0 °C cooler than average in patches of the equatorial Pacific east of 140°W and along parts of the South American coast.

Highest-on-record July SSTs occurred in southeastern FSM extending northeastwards to southern RMI. Another extension east southeast over northeast PNG, southern Nauru, central Tuvalu and northern Cook Islands. The SSTs in decile 10 (very much above average) stretched east-northeastwards from Palau, FSM to Marshall Islands. Another band stretched from east-southeastwards from PNG to northern French Polynesia. Above average (8-9) decile were observed for majority of the Pacific Island Countries, spanning east-south-eastward from southern PNG, New Caledonia, Fiji, Tonga, Samoa, southern American Samoa, Niue, and southern Cook Islands. Another band of above average (8-9) decile occurred over part of northern FSM, Kiribati (central Gilbert, northern Phoenix and most parts of Line Islands). Average SSTs (4-7) for July were observed in New Caledonia, southern Fiji, southern Tonga, southern Niue, central and southern Cook Islands, Kiribati (northern Line Islands) and southern French Polynesia. Patches of decile 2-3 (below average) were observed in southern French Polynesia, and Pitcairn Islands.



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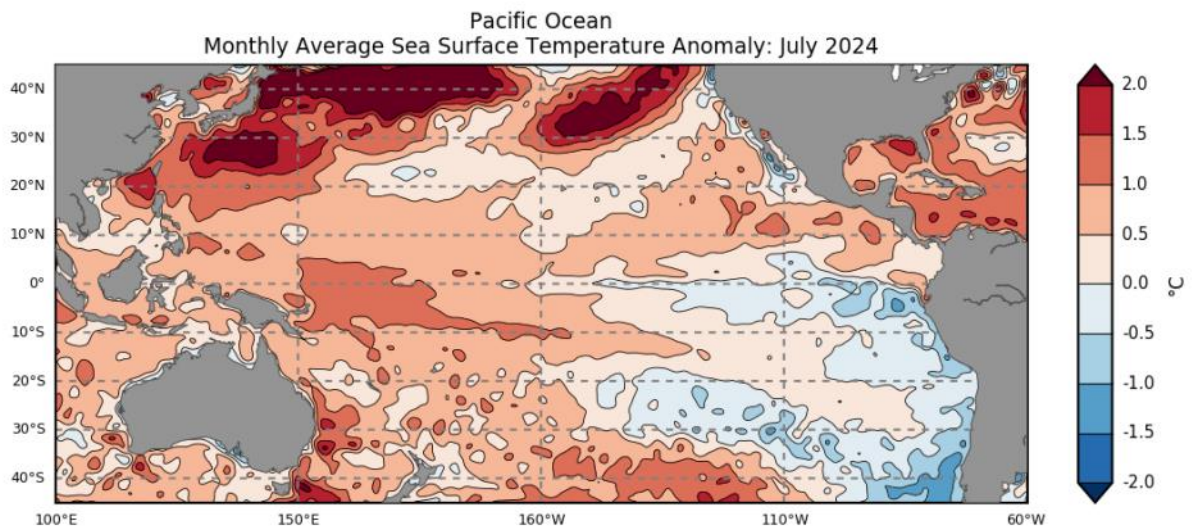
Reynolds SST

OCEAN CONDITIONS

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

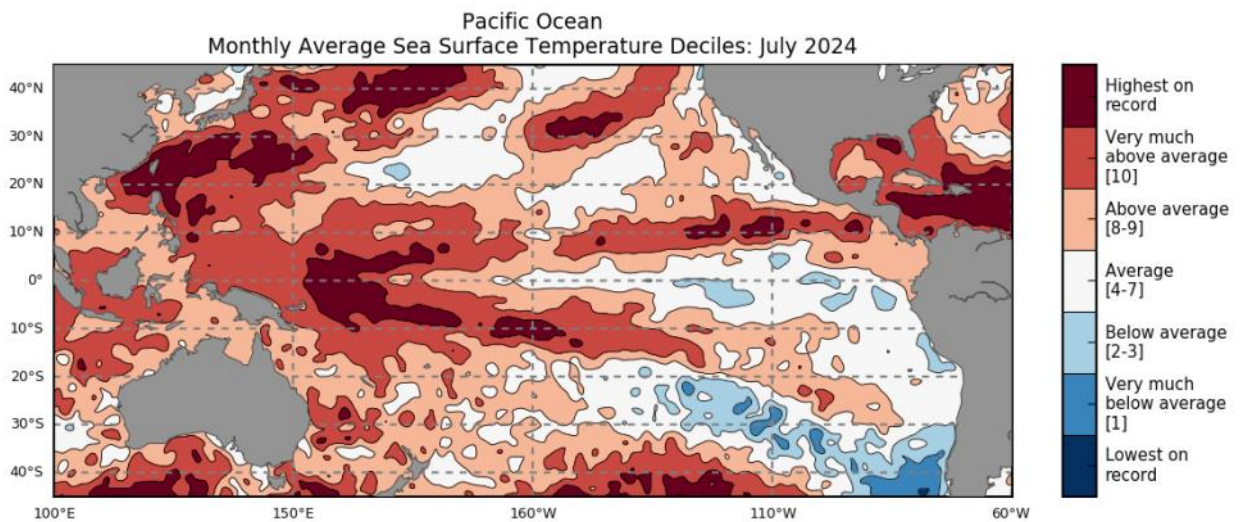


Anomalous Sea Surface Temperature



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Australian Bureau of Meteorology, COSPPac

Reynolds SST



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Reynolds SST

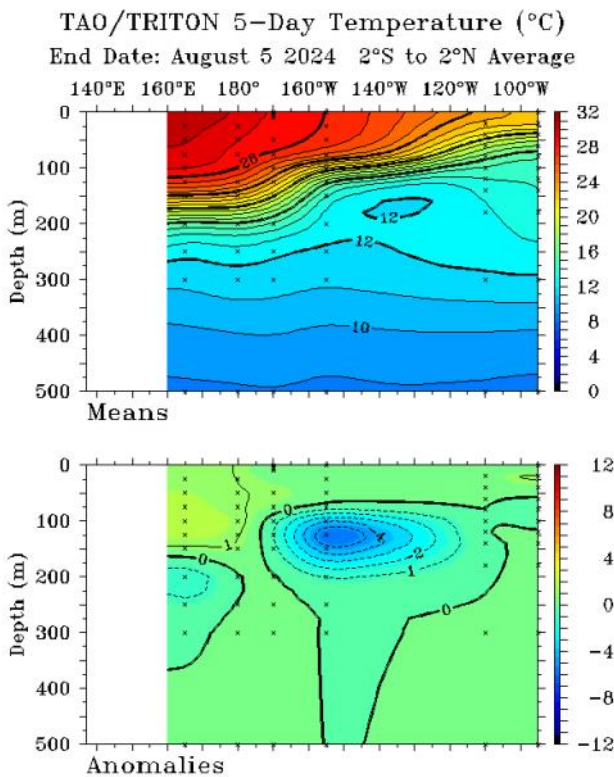
OCEAN CONDITIONS

SUB SURFACE

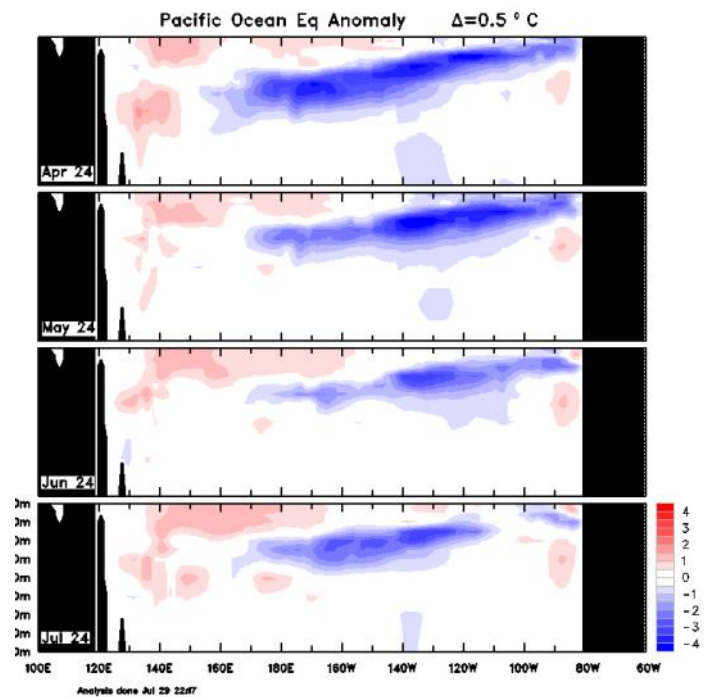


The four-month sequence of equatorial Pacific sub-surface temperature anomalies (to 29 July 2024) shows persistent cool anomalies in the eastern Pacific which reduced in magnitude and spatial extent from April to July. Warm anomalies in the top 100 m of the central and western equatorial Pacific (between 130°E and 165°W) reaching up to 1.5°C warmer than average, strengthening slightly during July.

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

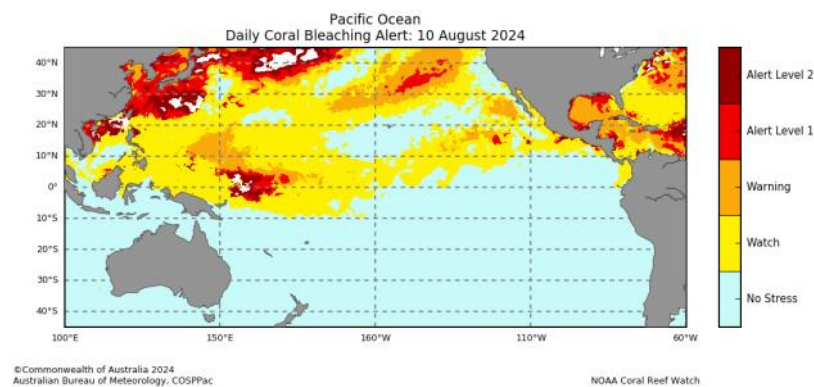
CORAL BLEACHING



The daily Coral Bleaching Alert status for 10 August 2024 shows an area of 'Alert Level 2' over parts of southeastern FSM, Nauru, and northeastern PNG's EEZ. 'Alert Level 1' over parts of western and southeast FSM, southern RMI, Nauru, and Kiribati (northern Gilbert islands). 'Warning' status over central FSM, CNMI, Guam, northern Nauru, and patches in Kiribati (northern Gilbert Is.). 'Watch' or 'No stress' for the rest of the countries. The four-week Coral Bleaching Outlook to 08 September shows 'Alert Level 2' over southeast FSM. 'Alert Level 1' rating over southern FSM, and northern PNG's EEZ. 'Warning' covers northern PNG, and parts of FSM. 'Watch' or 'No Stress' over the rest of the countries.

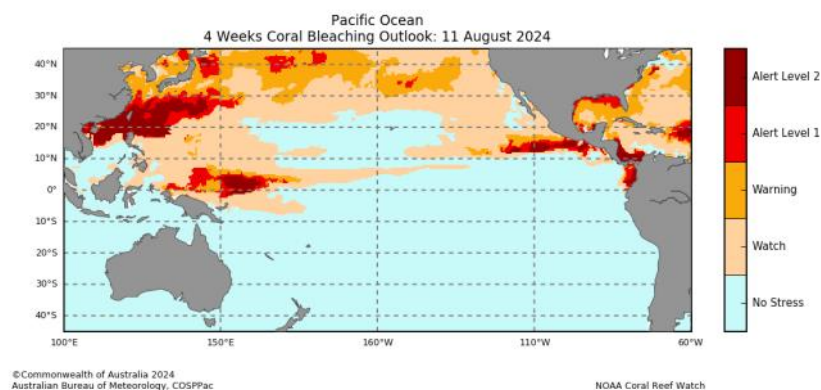
Daily Coral Bleaching Alert

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



4 Weeks Coral Bleaching Outlook

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



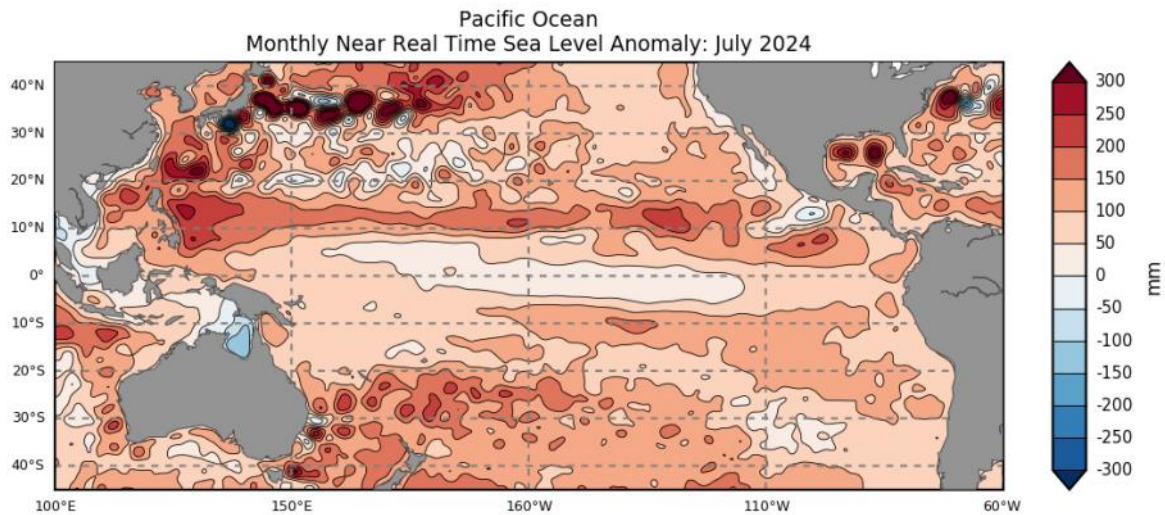
OCEAN CONDITIONS

OCEAN SURFACE CURRENTS AND SEA LEVEL

Sea levels observed in July were above normal over most COSPPac countries. Patches of anomalies from +200 to +300 mm were observed over central Palau, southern Fiji, and southern Tonga. Anomalies of +100mm to +200mm were observed over most of Palau, northern FSM, northern RMI, with patches over parts of southern New Caledonia, southern Vanuatu, southern Fiji, Tonga, Niue, Samoa, Cook Islands, and southern French Polynesia. However, near-normal anomalies were observed in southern part of Marshall Islands, and Kiribati Islands (eastern Gilbert Islands, northern Phoenix Islands, and central Line Islands). The rest of the region were observed with anomalies between +50 and +100mm.

Monthly Sea Level Anomalies

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



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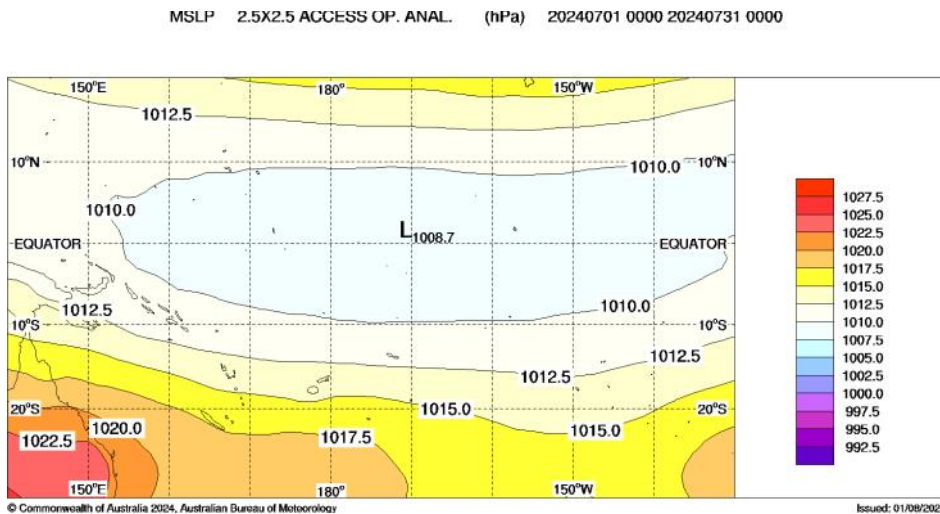
AVISO Ssalto/Duacs SLA

MEAN SEA LEVEL PRESSURE

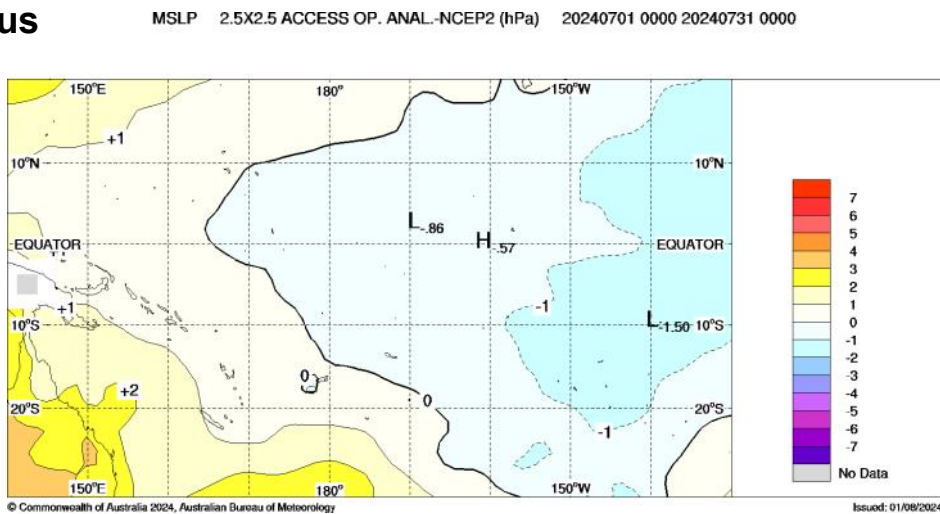
The July mean sea level pressure (MSLP) anomaly map displays positive anomalies of 1 hPa or greater over Palau, PNG, western New Caledonia, and areas further south towards New Zealand. Negative anomalies of -1 hPa or greater were observed over French Polynesia.

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

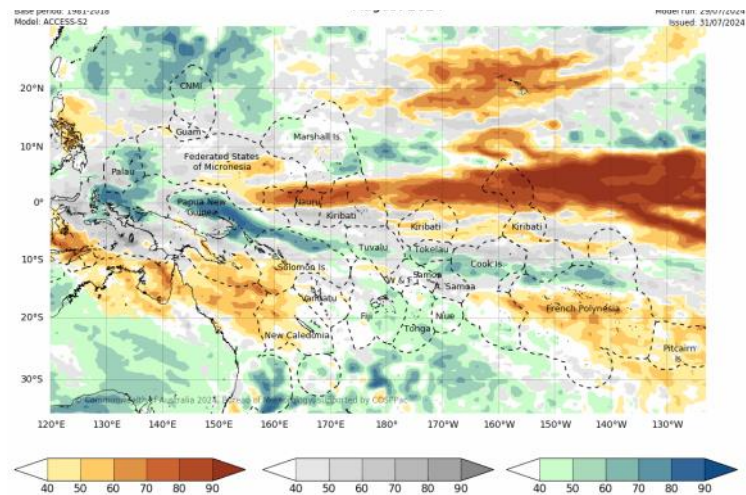
August—October 2024



The ACCESS-S model forecast for August 2024, shows above normal rainfall is likely or very likely for most of Palau, far western FSM, CNMI, southeast RMI, and in a narrow band stretching east-southeast from the PNG Islands to northern French Polynesia. A separate area where above normal rainfall is likely covers much of Fiji, Tonga, Niue, and patches of the southern Cook Islands. Below normal rainfall is likely or very likely for central to eastern FSM, northern Nauru, Kiribati (northern Gilbert Is., parts of Phoenix Is., and central and northern Line Is.), central Cook Islands, central French Polynesia, and Pitcairn Islands. In addition, below normal rainfall is likely over an area covering southeast PNG, southwest Solomon Islands, western New Caledonia, and the western Coral Sea.

The ACCESS-S three-month rainfall outlook (August to October 2024) is very similar to the August outlook, but with a stronger equatorial dry signal over Kiribati extending to central FSM, and Tuvalu. The above normal rainfall region in the southern hemisphere is also more pronounced, extending over most of Palau and PNG, plus Fiji, Wallis and Futuna, Samoa and American Samoa.

Monthly [ACCESS-S](#) Maps



The Copernicus multi-model outlook for August to October 2024 is very similar to the ACCESS-S outlook, but with a stronger dry signal from northern RMI to CNMI, Guam, and northern FSM. The above normal rainfall signal extending southeast from Palau is located a little further south in Copernicus compared with ACCESS-S.

The APEC Climate Centre multi-model outlook (August to October 2024) is similar to the other two models, but with a slightly weaker wet signal in the southern hemisphere.

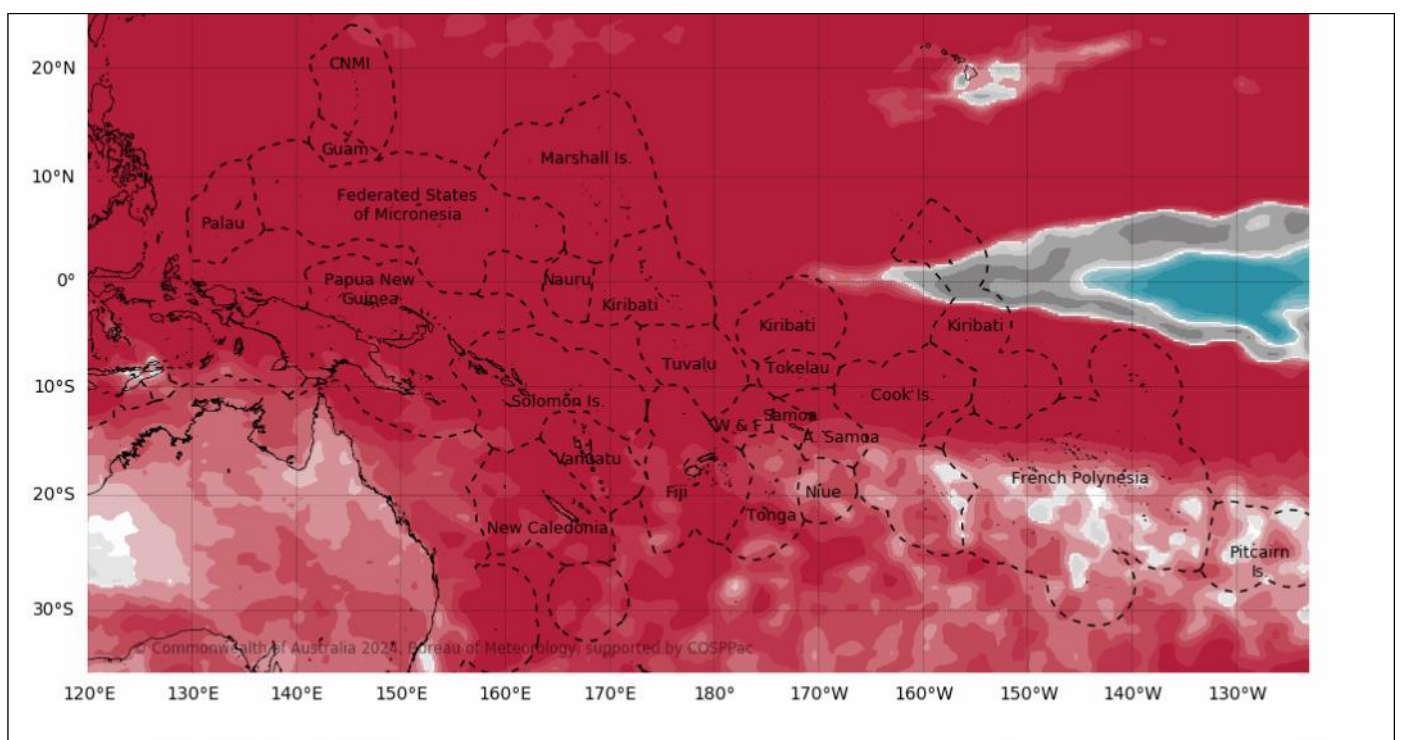
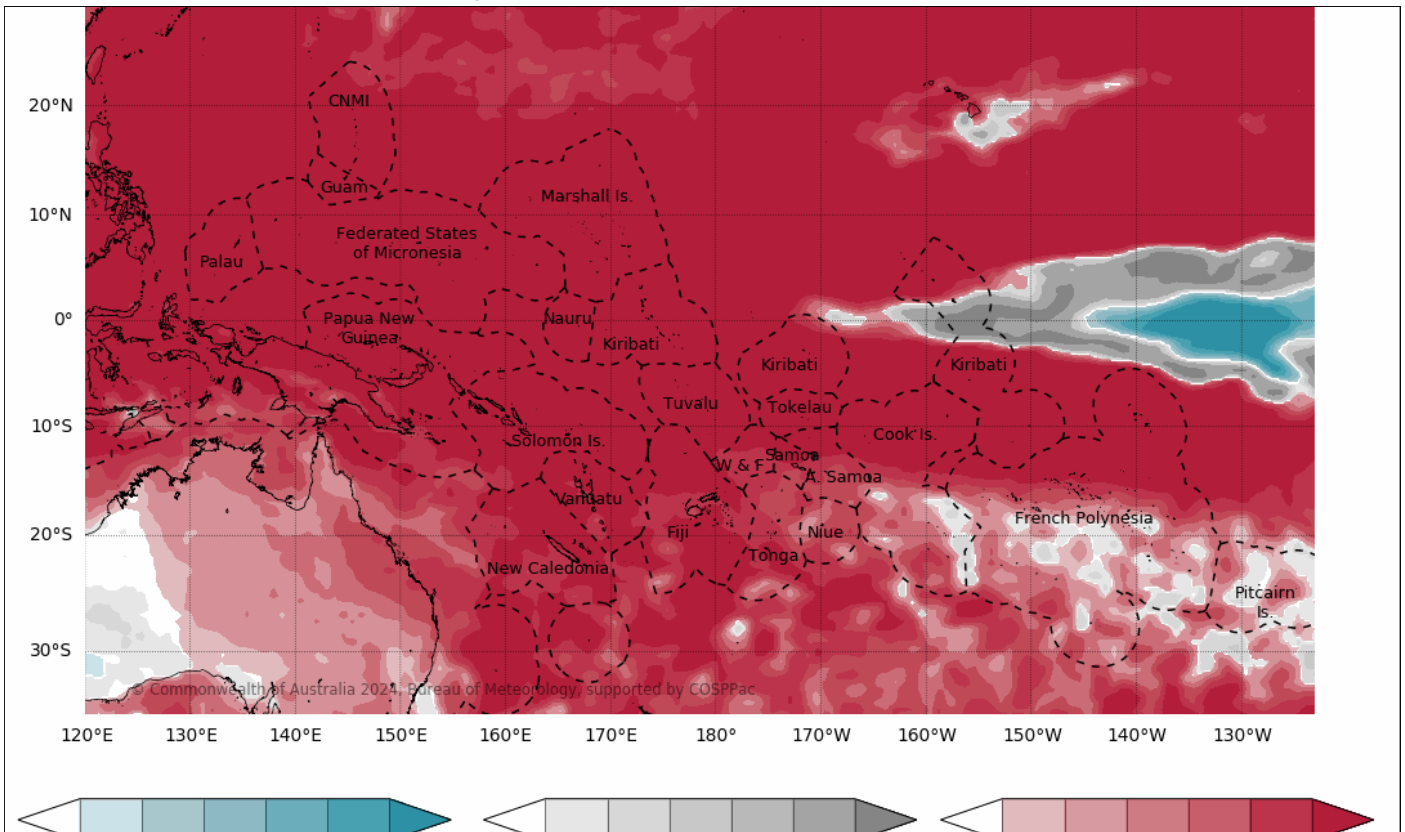
For August to October 2024 the models agree that above normal rainfall is likely or very likely for southern Palau, southwest FSM, central RMI, most of the PNG mainland, northern Fiji, southern Tuvalu, American Samoa, northern Tonga, northwest Niue, and the northern Cook Islands. In addition, the models agree that below normal rainfall is likely or very likely for far southern RMI, Nauru, Kiribati (except the far southern Line Is.), southeast French Polynesia, and Pitcairn Islands.

SEASONAL TEMPERATURE OUTLOOK

August—October 2024



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

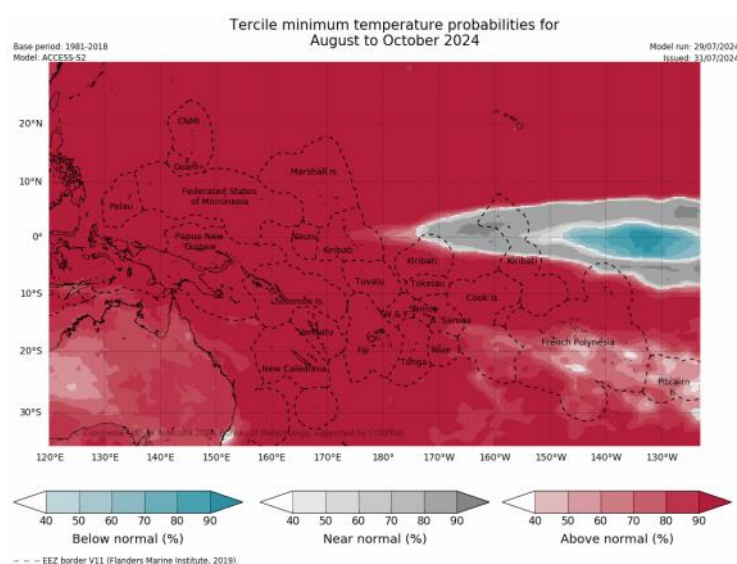
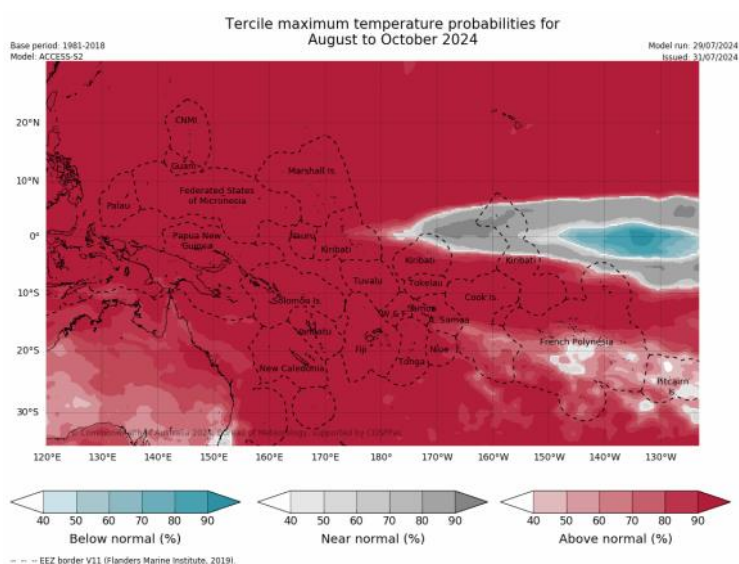
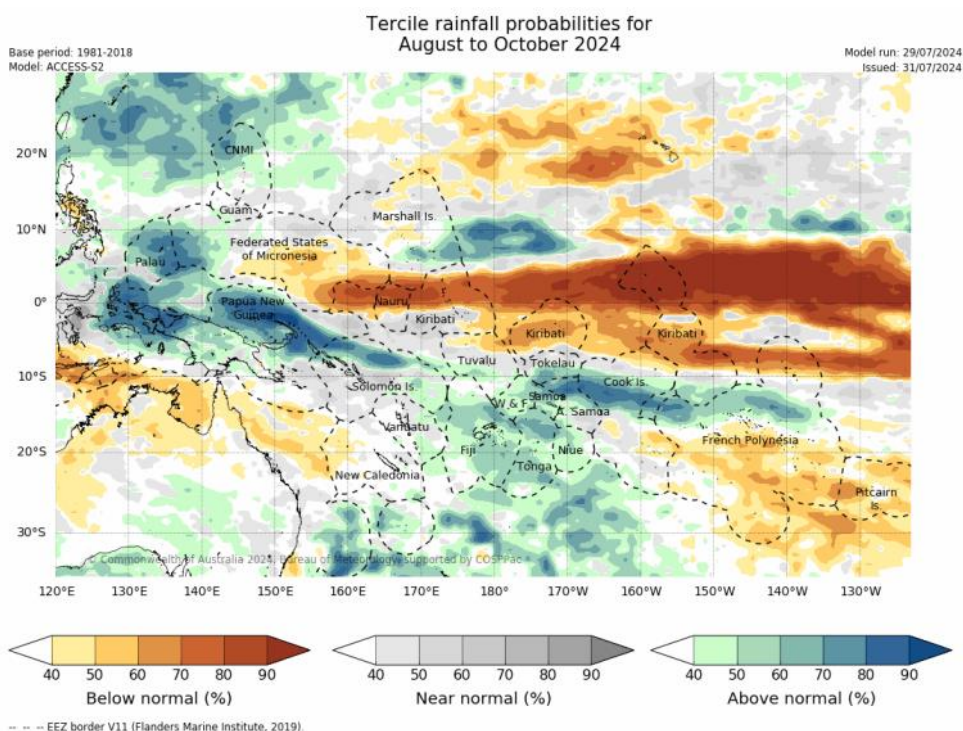


SEASONAL RAINFALL OUTLOOK

August—October 2024



Seasonal ACCESS-S maps



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

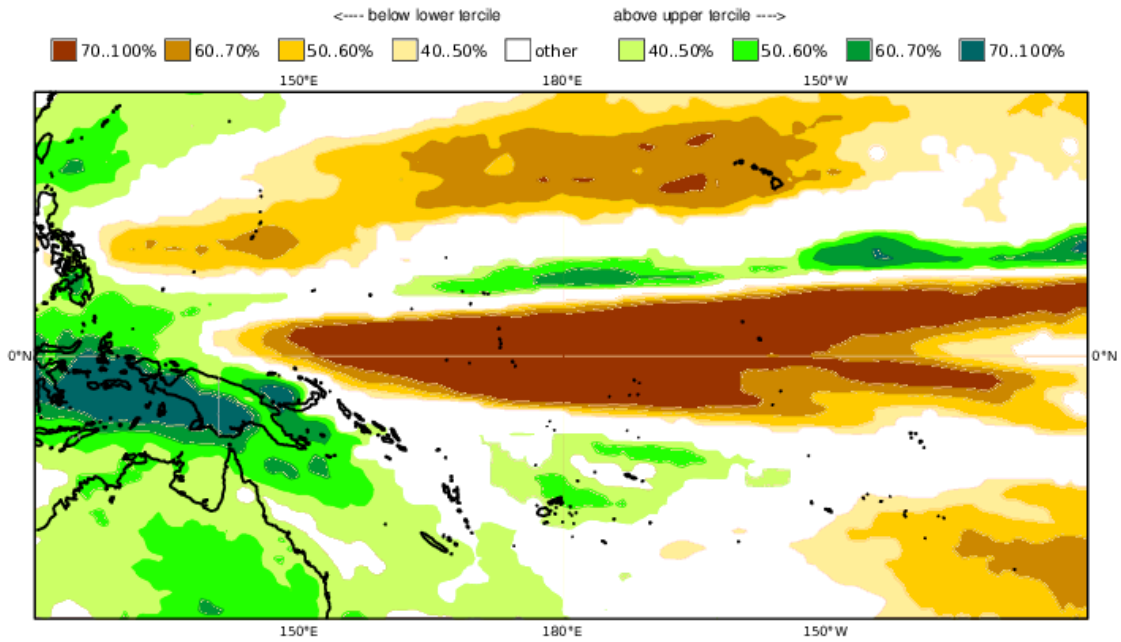
SEASONAL RAINFALL OUTLOOK

August—October 2024



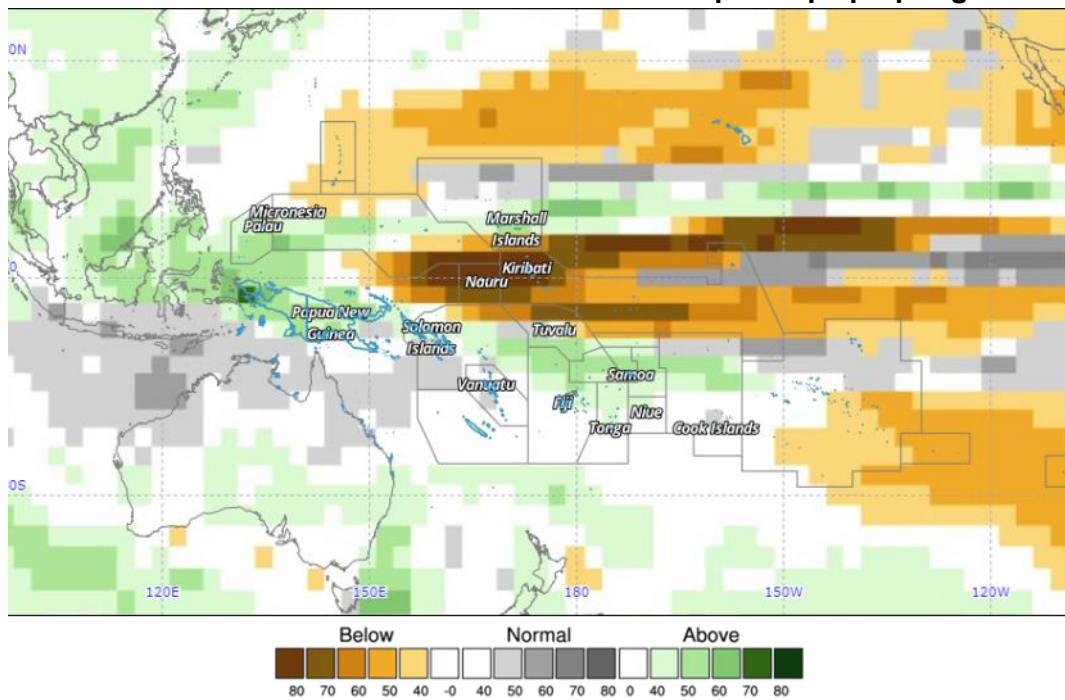
Copernicus (C3S multi-system)-Rainfall
 Prob(most likely category of precipitation)
 Nominal forecast start: 01/07/24
 Unweighted mean

ASU 2024



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

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



Year: 2024, Season: ASO, Lead Month: 3, Method: GAUS
 Model: APCC, BOM, CMCC, CWB, MSC, NASA, NCEP, PNU
 Generated using CLIKE® (2024-8-7)

© APEC Climate Center

TROPICAL CYCLONE

2023/2024 Season

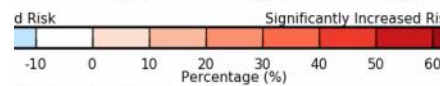
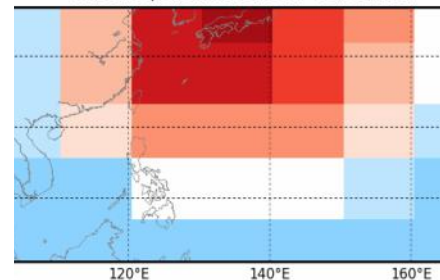


The northwest Pacific tropical cyclone season is year-round, with most cyclones occurring between May and December. In the WNP, the genesis and track of TCs show a relationship with the ENSO cycle: activity typically shifts eastward during El Niño and westward during La Niña.

It's important to remember that history shows that tropical cyclones can happen outside the normal cyclone season, and 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, especially if the system is slow-moving. Communities should remain vigilant, and follow forecast information provided by their National Meteorological and Hydrological Service (NMHS).

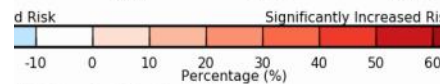
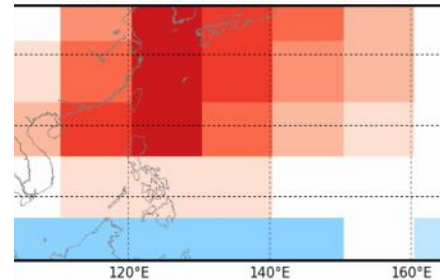
The weekly tropical cyclone forecasts from the ACCESS-S model shows significantly increased risk over FSM, Guam, CNMI, Philippines and Japan for the fortnight from 18 to 31 August.

ACCESS-S Weekly Forecasts –Northwest Pacific
 from normal chance of Tropical Cyclone's in the North Pacific
 Forecast period: 18/08/2024 - 24/08/2024



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

ACCESS-S Weekly Forecasts –Southwest Pacific
 from normal chance of Tropical Cyclone's in the North Pacific
 Forecast period: 25/08/2024 - 31/08/2024



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

ACCESS-S Weekly Forecasts –Southwest Pacific

OUT OF SEASON

Unseasonal Tropical Cyclone outlooks are for November to April

OUT OF SEASON

Unseasonal Tropical Cyclone outlooks are for November to April

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/>

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.

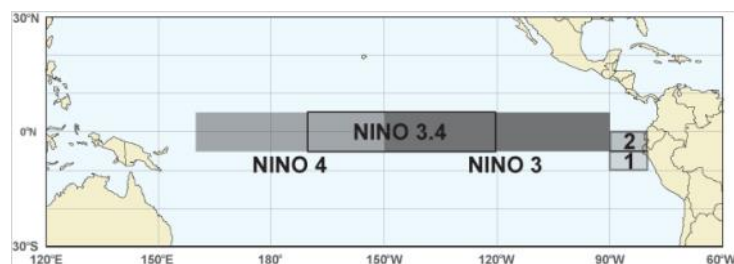
20 degrees Celsius Isotherm Depth

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