

# Monthly Pacific Climate and Ocean Bulletin

March 2025



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Photo Credit: Molly Powers (SPC) Samoa Tide Gauge





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- The El Niño Southern Oscillation (ENSO) is neutral.
- The Madden Julian Oscillation (MJO) is weak or indiscernible strength.
- In March, the Intertropical Convergence Zone (ITCZ) was active and along the equator over Palau, southern FSM, and central RMI north of the equator. The South Pacific Convergence Zone (SPCZ) was displaced south stretching southeastwards over eastern Australia, New Caledonia, Vanuatu, Fiji, and Tonga.
- Sea surface temperatures (SSTs) for March 2025 were cooler than average waters eastwards from 155 °E along the equatorial Pacific.
- The Coral bleaching Outlook to 18 May shows 'Alert Level 2' over part of Papua New Guinea and the western Solomon Islands. A patch of "Alert Level 1" in areas such as Samoa, central American Samoa, Palau, and the Cook Islands.
- For April to June 2025 the models agree that above normal rainfall is likely or very likely for Palau, CNMI, northern RMI in the northern hemisphere. Another band stretches from southeastern PNG, Solomon Islands, New Caledonia, Vanuatu, northern Fiji, northern Tonga, Niue, southern American Samoa, southern Cook Islands, and southern French Polynesia. The models agree that below normal rainfall is likely or very likely for PNG Islands, southern FSM, Nauru, most of Kiribati, and northeast French Polynesia.
- The weekly tropical cyclone forecasts from the ACCESS-S model shows some risk for PNG Islands, Solomon Islands, Vanuatu, and New Caledonia from 05 to 08 May.





# EL NIÑO–SOUTHERN OSCILLATION

El Niño-Southern Oscillation (ENSO) and Indian Dipole are neutral

Click link to access [Climate Driver Update issued on 15 April 2025](#)

The El Niño-Southern Oscillation (ENSO) is neutral. Sea surface temperatures (SSTs) in the Australian region during March 2025 were the second warmest for March on record since observations began in 1900. SSTs for the previous 5 consecutive months were the warmest on record for each respective month. The Bureau's model predicts neutral ENSO (neither El Niño nor La Niña) until at least September. This is consistent with forecasts from a range of international models. However, skill for ENSO forecasts at this time of the year has historically been low beyond winter.

The Indian Ocean Dipole (IOD) is neutral. The Bureau's model predicts a neutral IOD until at least August.

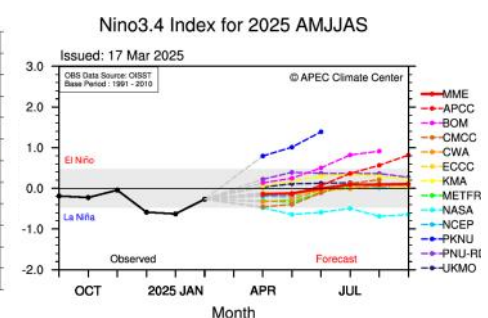
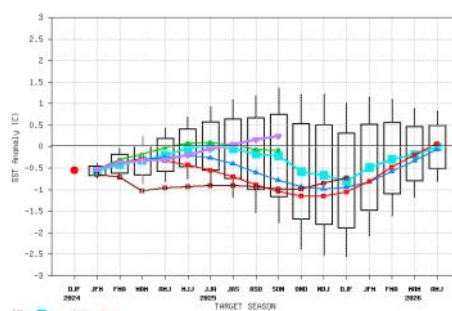
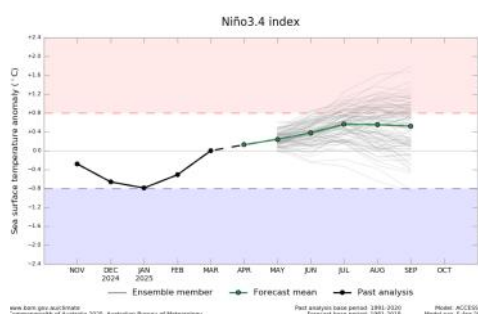
Global sea surface temperatures (SSTs) remain substantially above average. Each month in 2025 has been the second warmest recorded for its respective month, only slightly cooler than 2024.

The Southern Annular Mode (SAM) is positive as of 12 April, following a period of strongly positive values since early April. Forecasts show the SAM will likely become neutral next week and remain neutral until at least early May.

The 30 day average of the Southern Oscillation Index (SOI) for the period ending 09 April was +16.5.



## International Model Outlooks





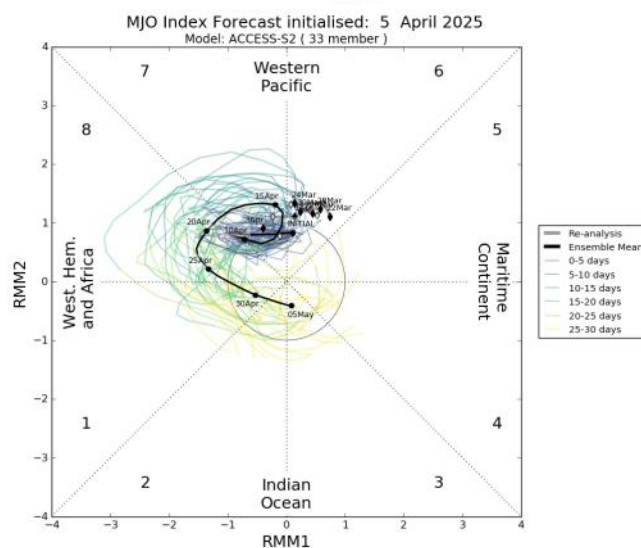
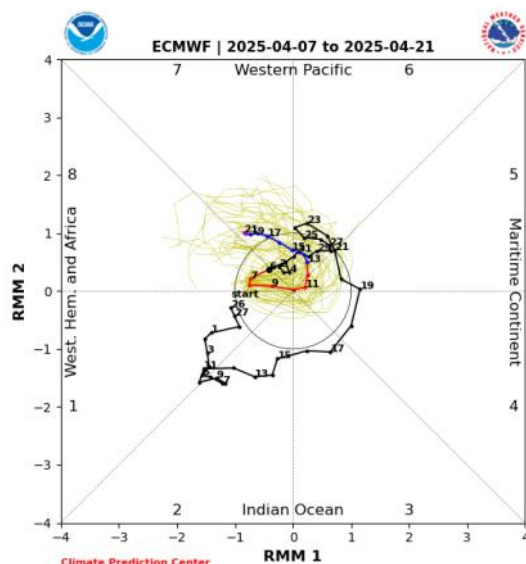
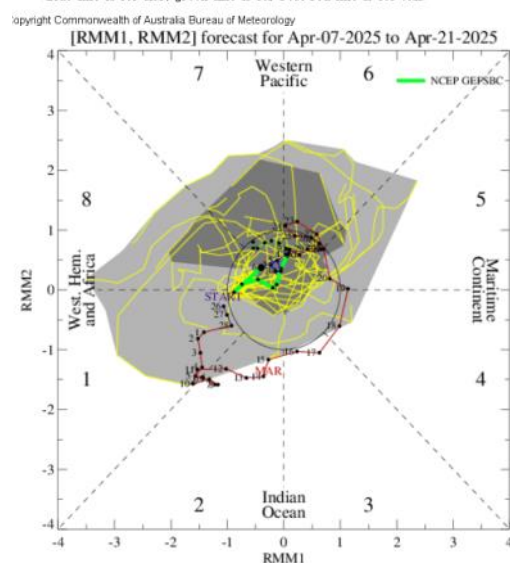
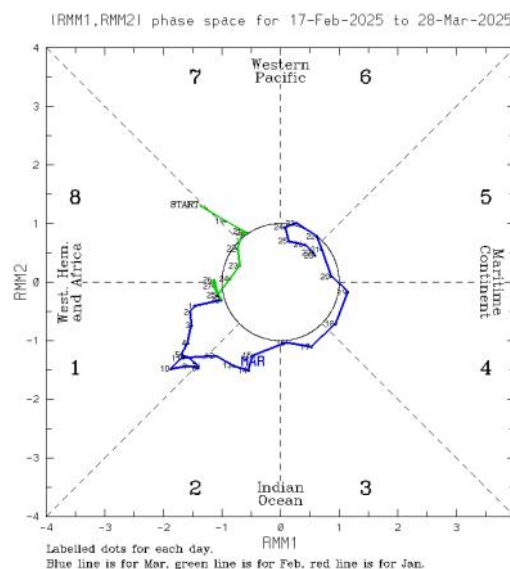
# MADDEN–JULIAN OSCILLATION

Click link to access [Tropical monitoring and outlook](#) [Issued on Tuesday 22 April 2025]

A weak to moderate pulse of the Madden-Julian Oscillation (MJO) has progressed across the Indian Ocean and Maritime Continent during first three weeks of March before weakened in the last week of the month in the Western Pacific.

The past week has seen the Madden-Julian Oscillation (MJO) persist at weak or indiscernible strength, as has been observed for much of April. Most models indicate that it will strengthen and re-appear in the Western Pacific region during the last week of April. However, this strengthening is forecast to be weak and relatively short-lived. The remaining models maintain a weak or indiscernible MJO. When the MJO is in the Western Pacific region, it is typically associated with suppressed cloudiness to the western Pacific.

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





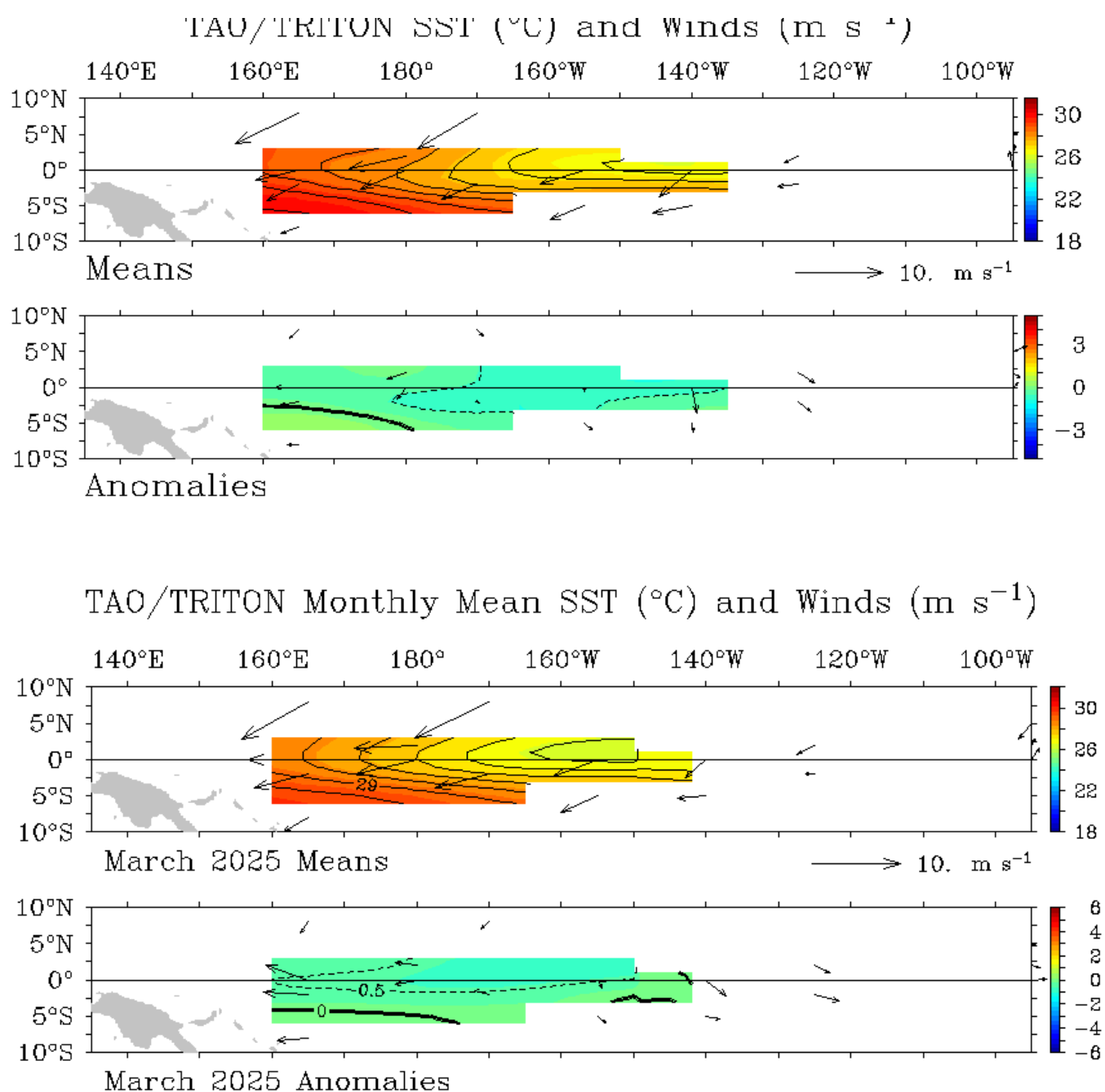
# WIND



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

During March, the trade winds were generally stronger than average over the western equatorial Pacific especially west of Dateline. For the five days ending 06 April 2025, the trades were average in the equatorial Pacific.

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

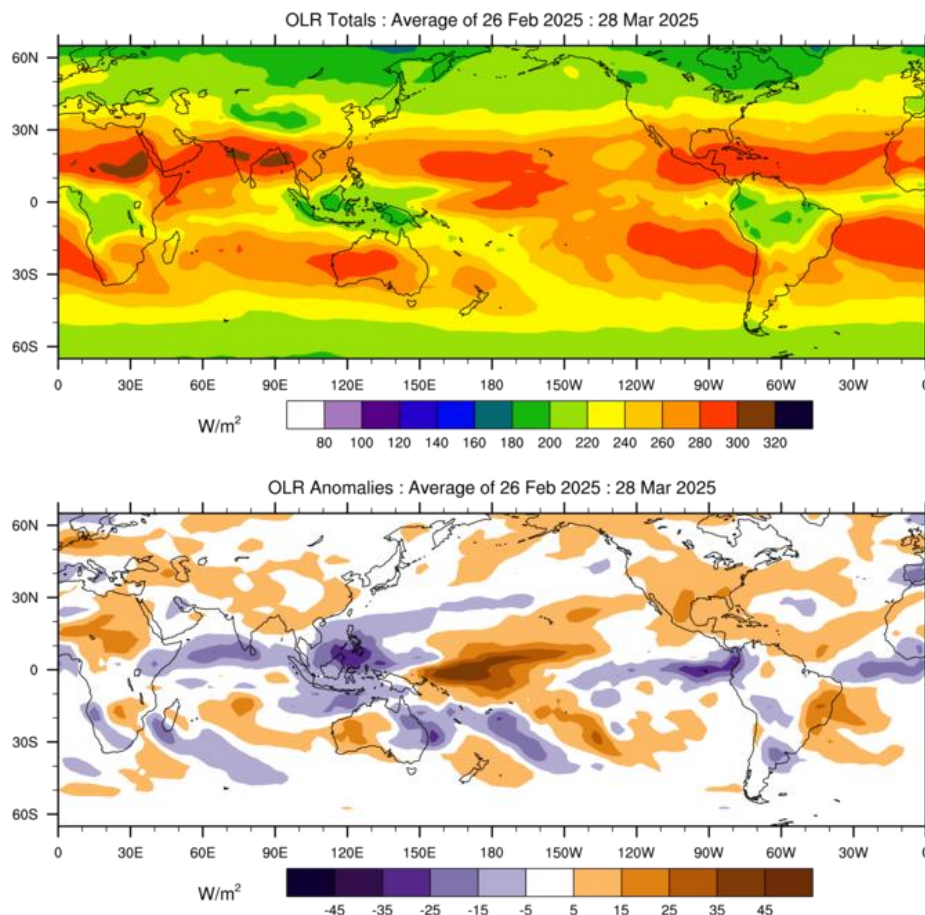
Click link to access [OLR](#)



The March 30-day OLR anomaly map shows a region of negative OLR (increased convection) in a band stretching eastwards from Palau to northern FSM along the Intertropical Convergence Zone (ITCZ) region. The South Pacific Convergence Zone (SPCZ) was displaced south stretching southeastwards over eastern Australia, New Caledonia, Vanuatu, Fiji, and Tonga. Areas of anomalously high OLR (decreased convection) were evident over PNG Islands, eastern FSM, southern RMI, Solomon Islands, Nauru, Kiribati, Tuvalu, Wallis and Futuna, Samoa, Tokelau, American Samoa, Niue, southern Cook Islands, and southern French Polynesia.

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

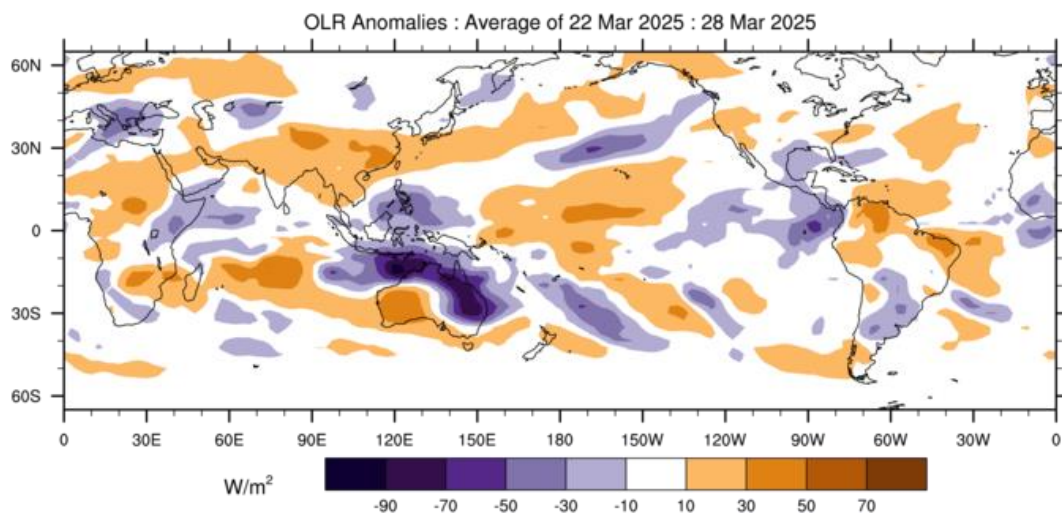
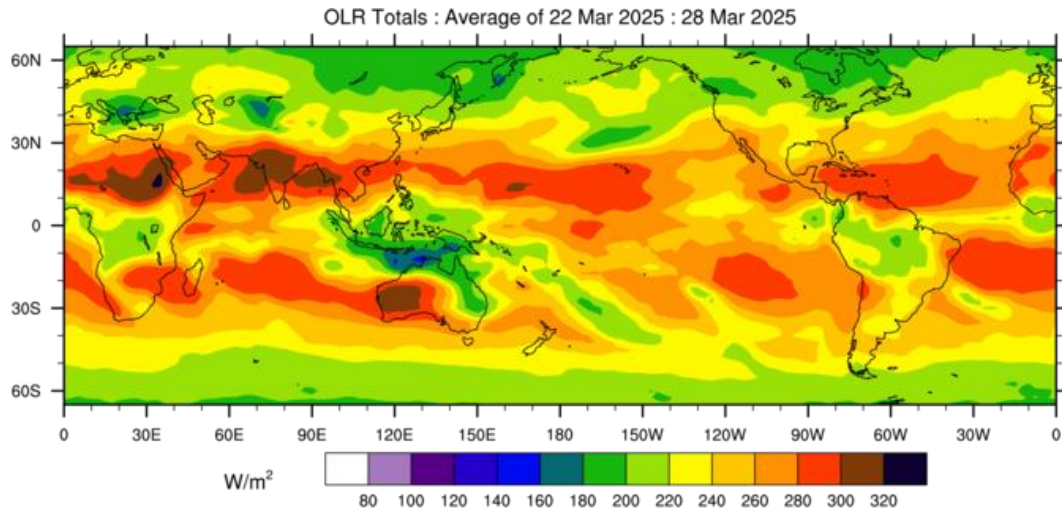
## OLR Total and Anomalies, 30 Day OLR



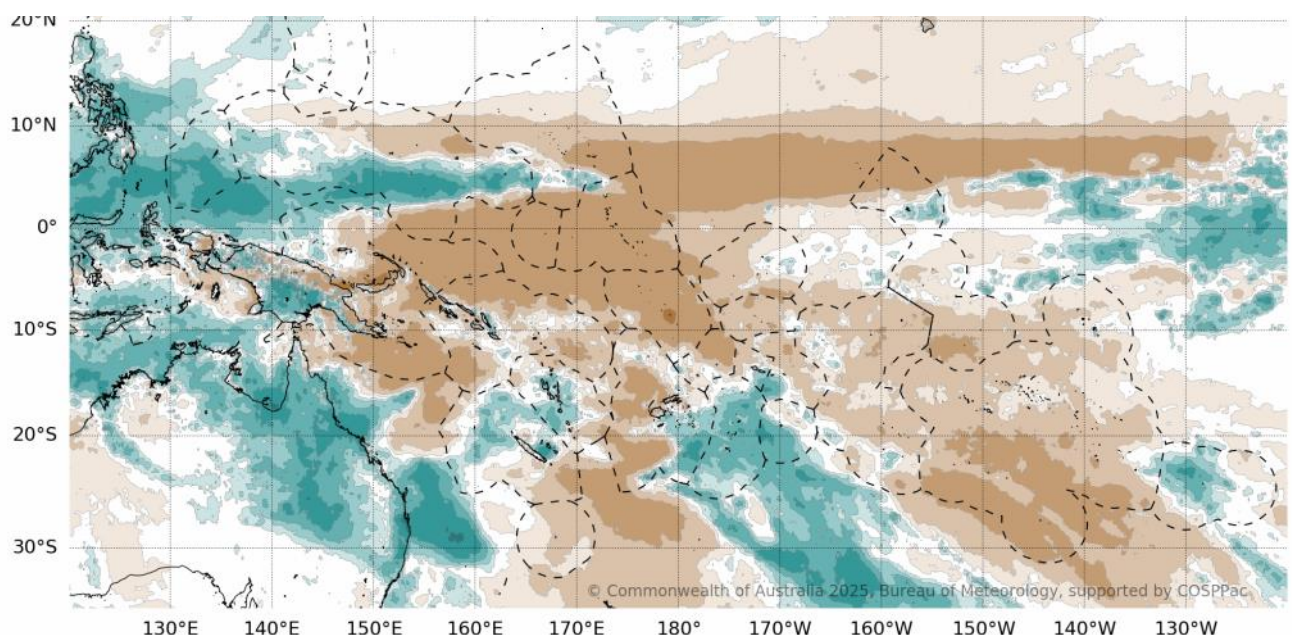
(C) Copyright Commonwealth of Australia 2025. Bureau of Meteorology



## OLR Total and Anomalies, 7 Day OLR

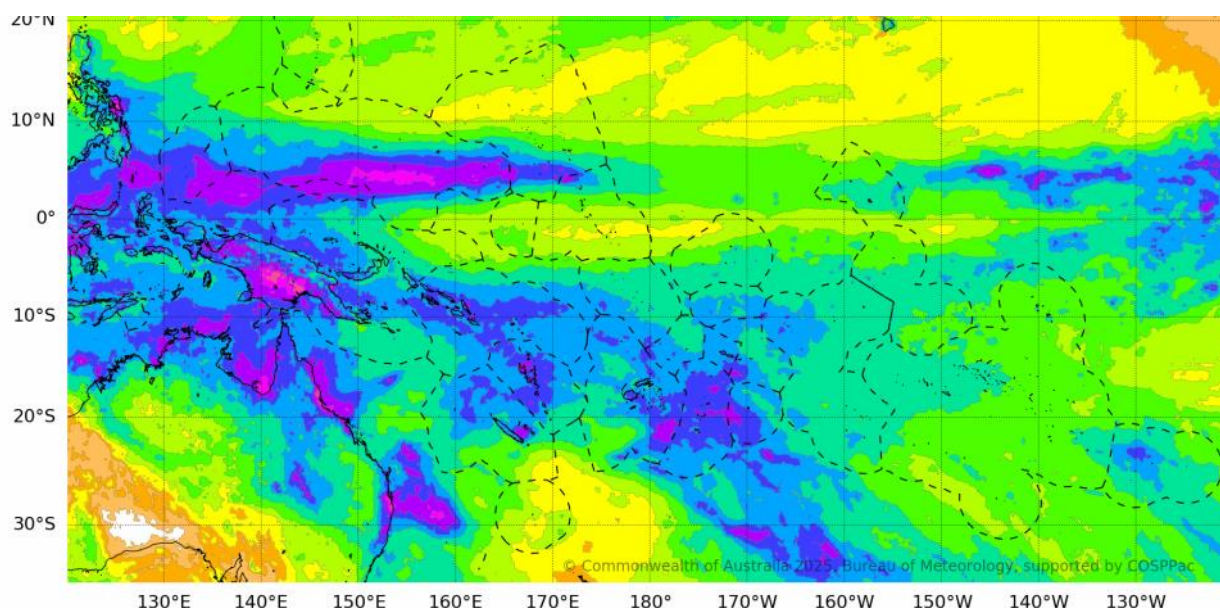


(C) Copyright Commonwealth of Australia 2025. Bureau of Meteorology





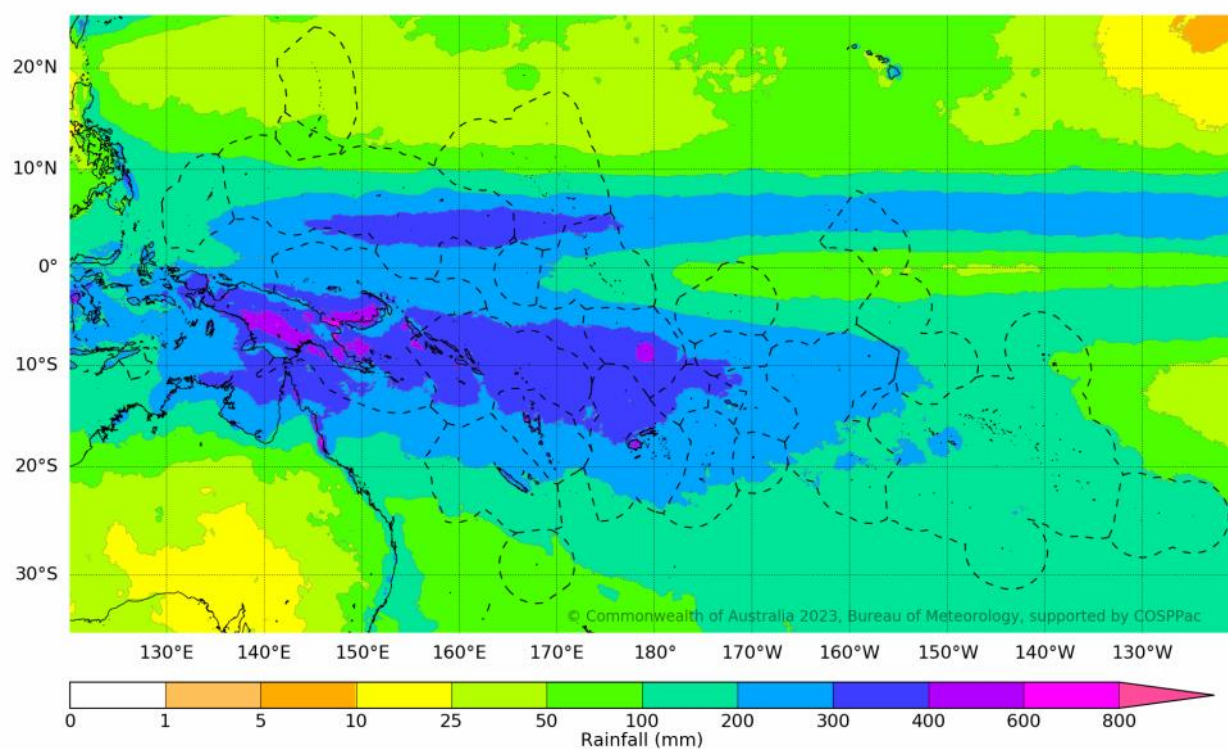
## 30-Day Rainfall Accumulated



Base period: 1980-2021  
Data source: MSWEP

### Monthly climatology for March

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.marineregions.org/>.

Global and Pacific ACCESS-S outlook and Pacific Climate Monitoring - ACCESS-S precipitation:  
<http://access-s.climatecloud/>



# OCEAN CONDITIONS

## SEA SURFACE TEMPERATURE

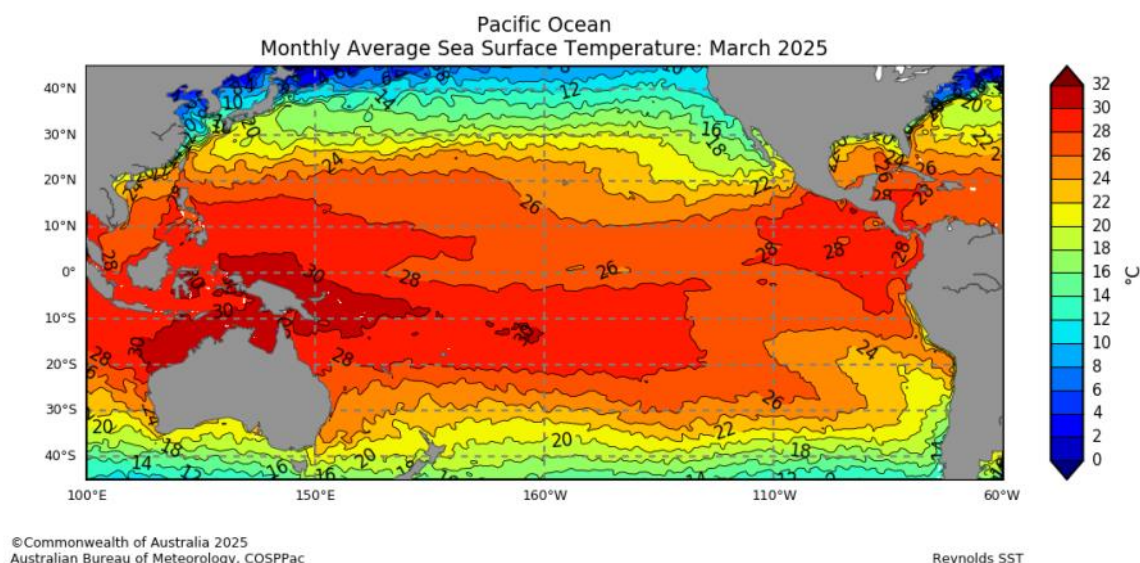


Click link to access [Pacific Community COSPPac Ocean Portal](#)

Sea surface temperatures (SSTs) for March 2025 were cooler than average waters in waters between 155 °E and 150 °W along the equatorial Pacific, which was surrounded by average waters. Surrounding the cool and average waters were the warmer than average waters in the western, north and south Pacific.

Highest-on-record March SSTs occurred over southern Palau, northern PNG, and western Solomon Islands. The SSTs in decile 10 (very much above average) stretched northeastwards from Palau, northern FSM, to northern RMI. Another band stretched southeastwards from PNG Islands, central Solomon Islands, and Vanuatu to western Fiji. Patches of SSTs in decile 10 (very much above average) were observed in Niue, American Samoa, central Cook Islands, and southern French Polynesia. Above average (8-9) deciles were observed for the majority of the Pacific Island Countries, spanning east-southeastwards from eastern Solomon Is., New Caledonia, eastern Vanuatu, northern Fiji, most of Tonga, Tuvalu, Tokelau, Wallis and Futuna, Samoa, American Samoa, most of Niue, most of Cook Islands, French Polynesia, and Pitcairn Islands. Average SSTs (4-7) were observed in southeast FSM, southern RMI, Kiribati (Phoenix and central Line Is.), parts of eastern Australia, southern New Caledonia, southern Vanuatu, southern Fiji, southern Tonga, southern Niue, and southern Cook. Decile 2-3 (below average) patches were observed in Nauru, and Kiribati (Gilbert Is, northern Phoenix, and northern Line Is.).

### Mean Sea Surface Temperature



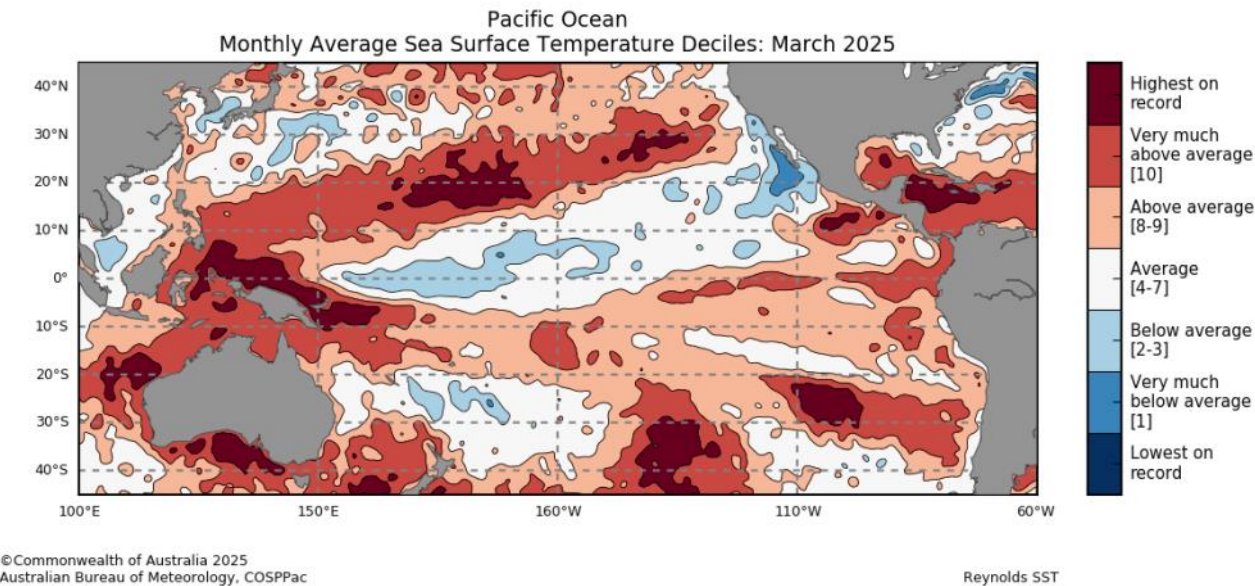
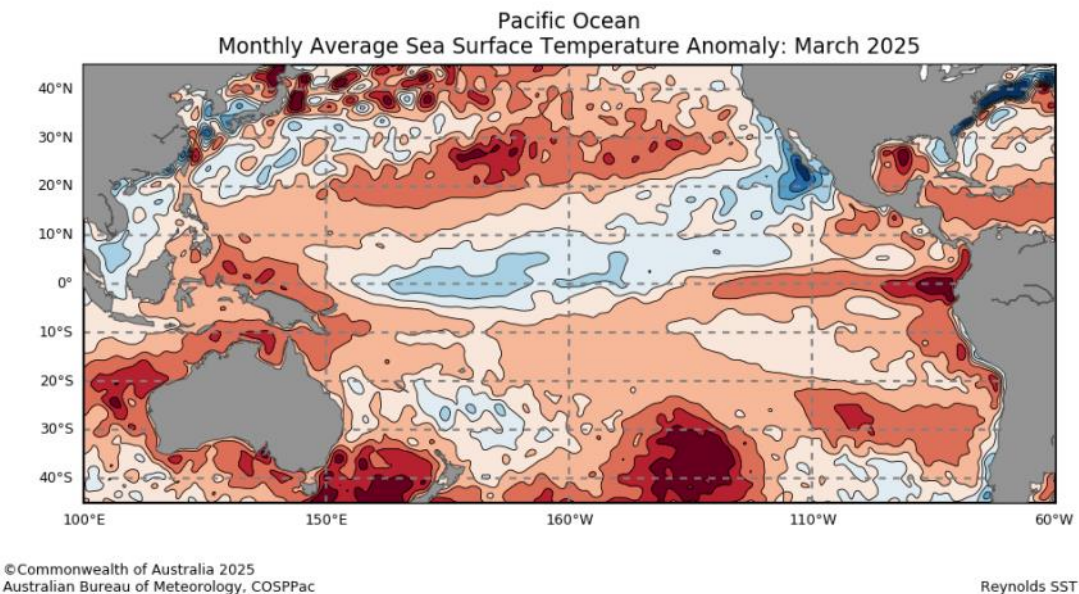


# OCEAN CONDITIONS

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



## Anomalous Sea Surface Temperature





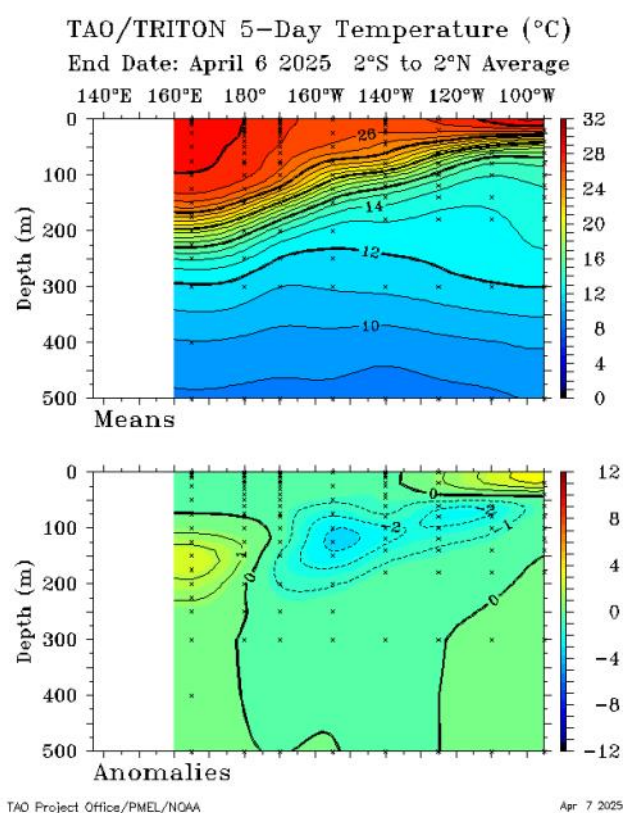
# OCEAN CONDITIONS

## SUB SURFACE

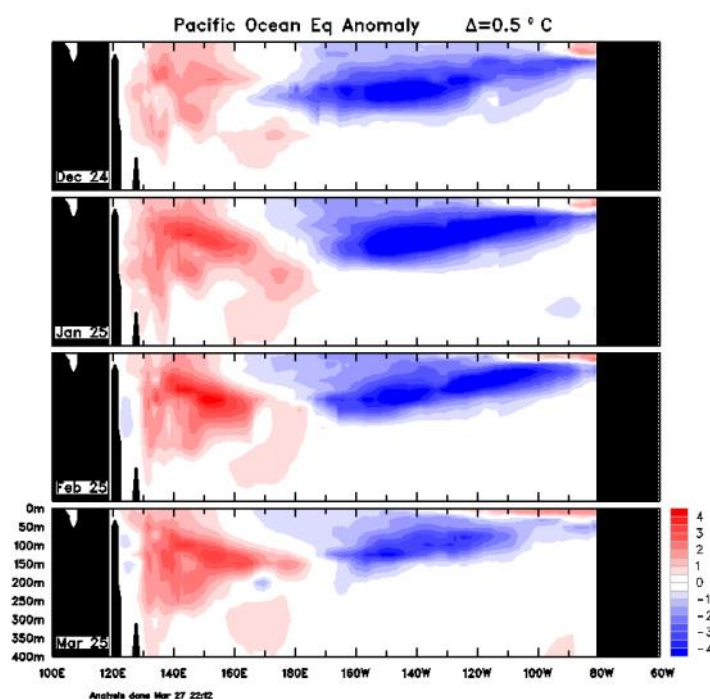


The March equatorial Pacific sub-surface temperature anomalies for the 30 days ending 27 March 2025 show cooler than average waters in the eastern half of the equatorial Pacific down to about 200 m depth; cooler waters peak around 100 to 150 m depth in the eastern Pacific where they are more than 4 °C cooler than average. Warmer than average waters in the western half of the equatorial Pacific down to about 400 m depth in the far western Pacific. Waters are 2 to 3 °C warmer than average in the far western Pacific between 100 m and 200 m depth.

### 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

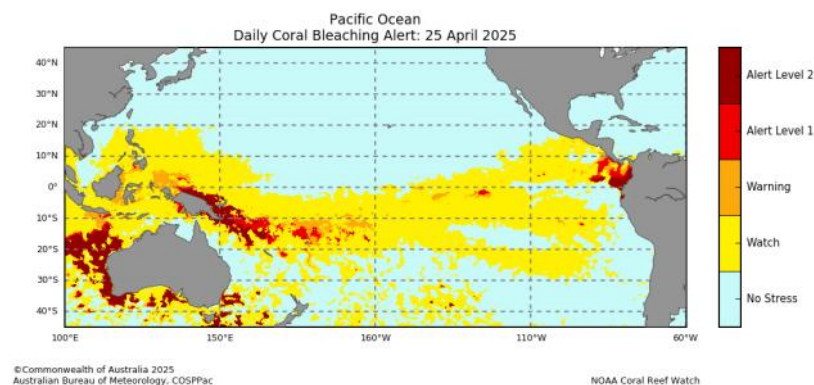
## CORAL BLEACHING



The daily Coral Bleaching Alert status for 25 April 2025 shows an area of 'Alert Level 2' over northern and southern PNG. 'Alert Level 1 and 2' over Solomon Islands, New Caledonia and Vanuatu. 'Alert Level 1' patches over part of central Fiji, northern Tonga, Samoa, American Samoa and Cook Islands. 'Warning' over southern Palau, eastern Solomon Islands, Samoa, Wallis and Futuna, central and northern Fiji, Samoa, American Samoa, southern Tuvalu, Tokelau, and northern Cook Islands. Watch or 'No stress' for the rest of the countries. The four-week Coral Bleaching Outlook to 18 May shows 'Alert Level 2' over PNG, western Solomon Islands. A patch of 'Alert Level 1' in areas such as Samoa, central American Samoa, Palau, and the Cook Islands. 'Warning' covers most of Palau, the southern part of FSM, the Solomon Islands, northern edge of Fiji, southern Tuvalu, Samoa, American Samoa, Wallis and Futuna, the northern Cook Islands, and Kiribati (Phoenix and Line Islands). 'Watch' or 'No Stress' over the rest of the countries.

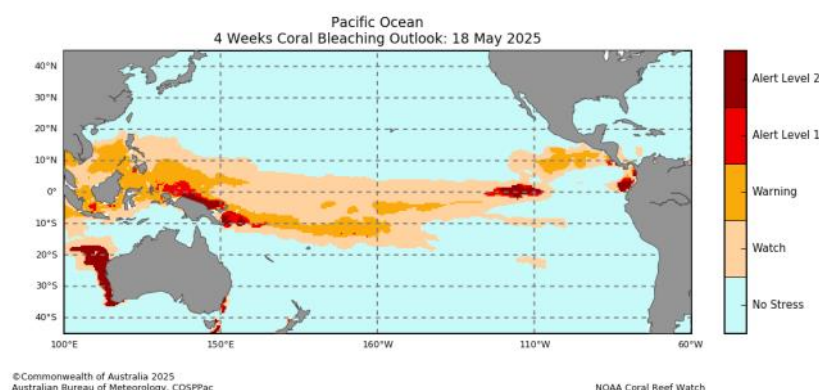
### Daily Coral Bleaching Alert

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



### 4 Weeks Coral Bleaching Outlook

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





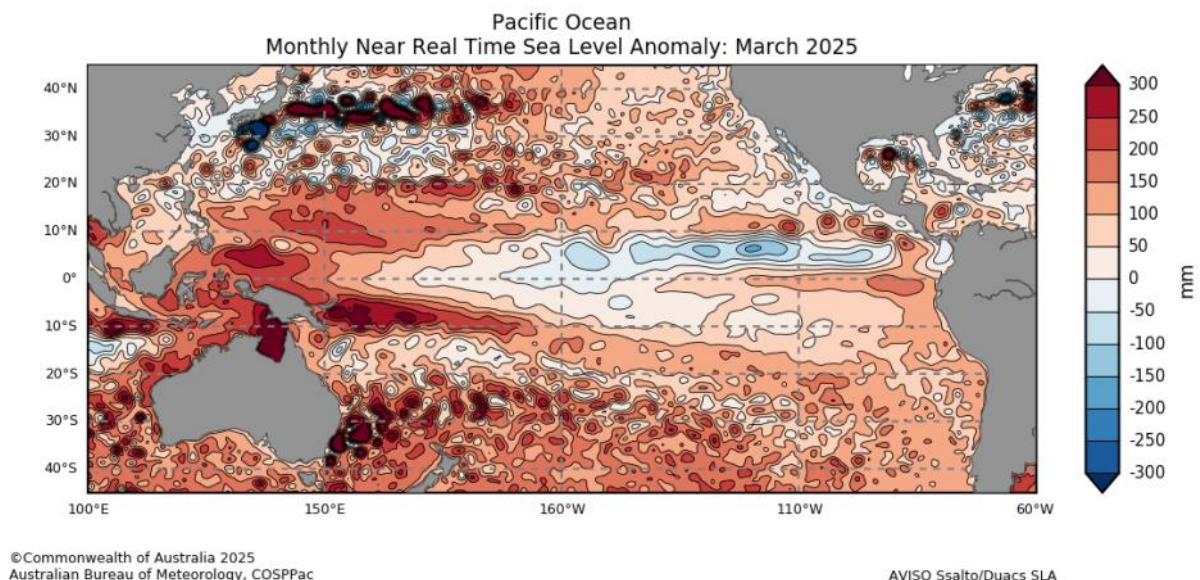
# OCEAN CONDITIONS

## OCEAN SURFACE CURRENTS AND SEA LEVEL

Sea levels observed in March were above normal over most COSPPac countries. Patches of anomalies from +250mm were observed over eastern PNG and western Solomon Islands. Anomalies of 200-250 mm were observed in Palau, northern FSM, northern RMI, and in a band stretched from northern PNG, Solomon Islands, central Tuvalu, and southern Tokelau. Anomalies of 150-200 mm were observed over eastern FSM, southern RMI, most of Tuvalu, and Tokelau. The rest of the region were observed with Anomalies of +50mm to 150 mm, apart from some patches of below normal sea level anomalies observed over Kiribati (central and northern Line Is.), southeast PNG, New Caledonia, Vanuatu, Fiji, and Tonga.

### Monthly Sea Level Anomalies

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



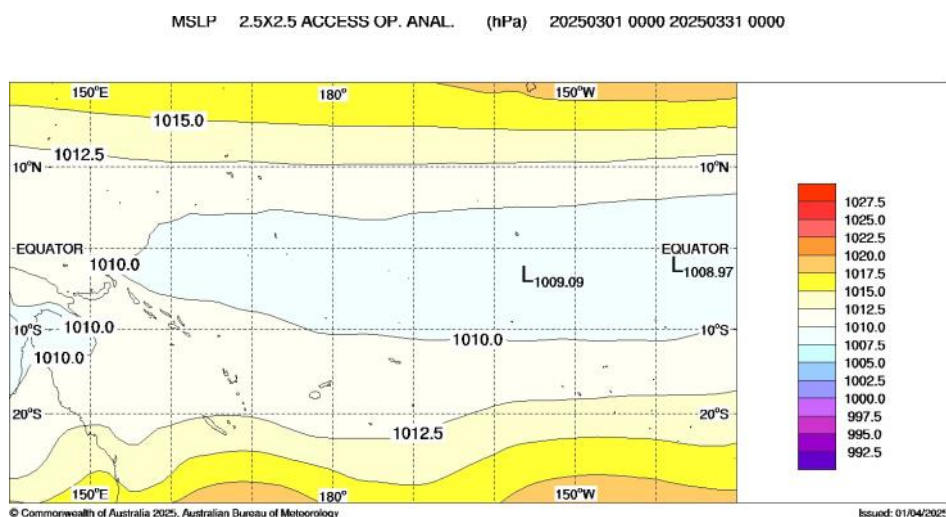


# MEAN SEA LEVEL PRESSURE

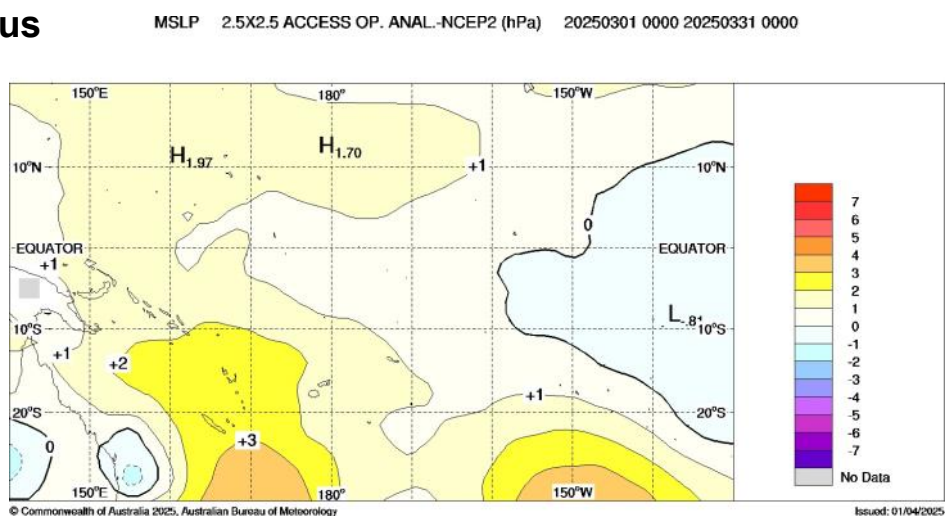
The March mean sea level pressure (MSLP) anomaly map displays positive anomalies of 1 hPa or greater over CNMI, FSM, RMI, PNG Islands, Solomon Islands, Vanuatu, Fiji, Tonga, Tuvalu, Wallis and Futuna, Samoa, Niue, southern Cook Islands, and southern French Polynesia. A small patches of negative anomalies of 1 hPa or greater was observed over eastern Australia.

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

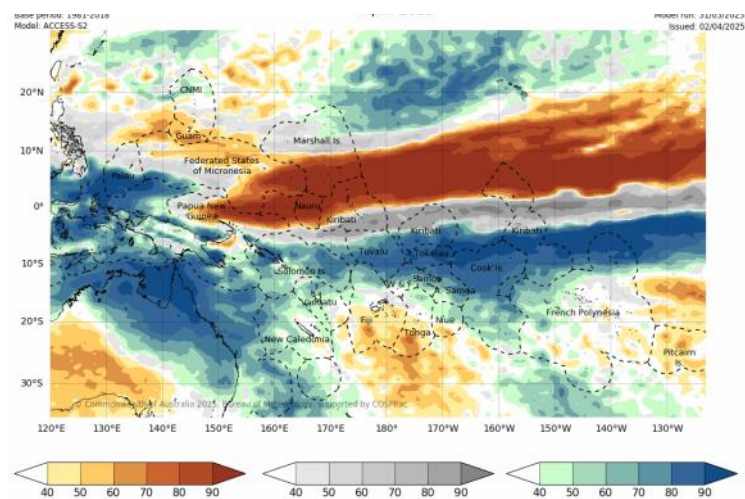
April—June 2025



The ACCESS-S model forecast for April 2025, shows above normal rainfall is likely or very likely for southern Palau, northern CNMI, and northern RMI, in the northern Pacific. Above normal rainfall is likely or very likely for most of PNG mainland, Solomon Islands, New Caledonia, Vanuatu, northern Fiji (Rotuma), northern Tonga, Tuvalu, Wallis and Futuna, Tokelau, Samoa, American Samoa, northern Niue, Cook Islands, and northern and western French Polynesia. Below normal rainfall is likely or very likely in a band stretching northeast from PNG Islands, southern CNMI, Guam, northern and eastern FSM, southern RMI, Nauru, and Kiribati (northern Gilbert and northern Line Is.). Below normal rainfall is also likely or very likely for southern Fiji, southern Tonga, southern Niue, parts of eastern French Polynesia, and Pitcairn Islands.

The ACCESS-S three-month rainfall outlook (April to June 2025) is very similar to the April outlook, but the dry patches coverage over Fiji and Tonga is less. The dry area over RMI extend further north compare to model forecast for April. The above normal rainfall region has a more stronger signal extending southeastwards over Palau, PNG, eastern Australia, Solomon Islands, New Caledonia, Vanuatu, northern Fiji, southern Tuvalu, Tokelau, Wallis and Futuna, northern Tonga, Samoa, American Samoa, Niue, Cook Is., and northern-most and western French Polynesia.

Monthly **ACCESS-S** Maps



The Copernicus multi-model outlook for April to June 2025 is very similar to the ACCESS-S outlook, but the above normal rainfall region extending from Palau to Guam, CNMI, and northern RMI. The dry signal region extend to most of Kiribati.

The APEC Climate Centre multi-model outlook (April to June 2025) is similar to the other two models.

For April to June 2025 the models agree that above normal rainfall is likely or very likely for Palau, CNMI, northern RMI in the northern hemisphere. Another band stretches from southeastern PNG, Solomon Islands, New Caledonia, Vanuatu, northern Fiji, northern Tonga, Niue, southern American Samoa, southern Cook Islands, and southern French Polynesia. The models agree that below normal rainfall is likely or very likely for PNG Islands, southern FSM, Nauru, most of Kiribati, and northeast French Polynesia.

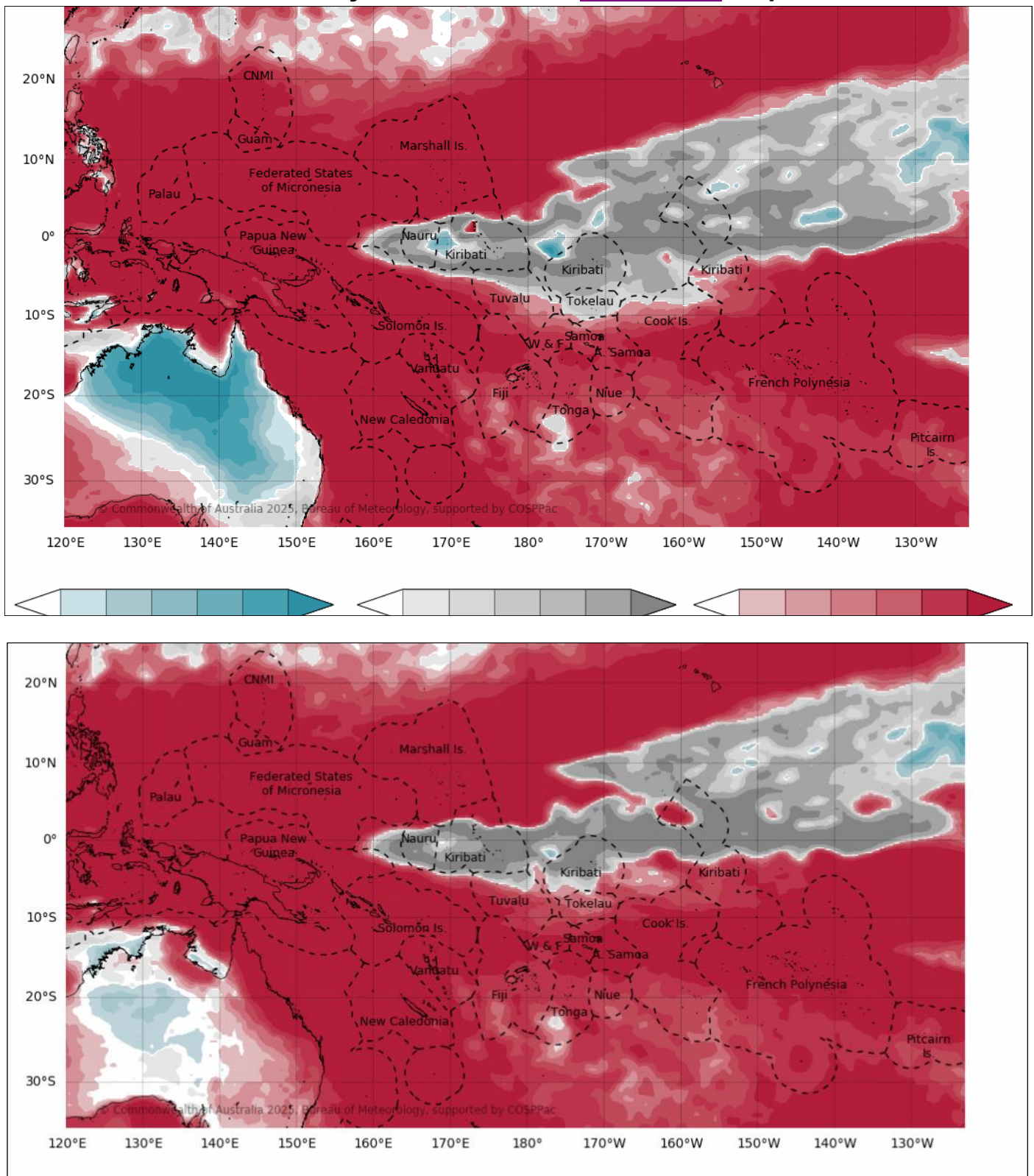


# SEASONAL TEMPERATURE OUTLOOK

April—June 2025



## Monthly Tmax and Tmin ACCESS-S Maps



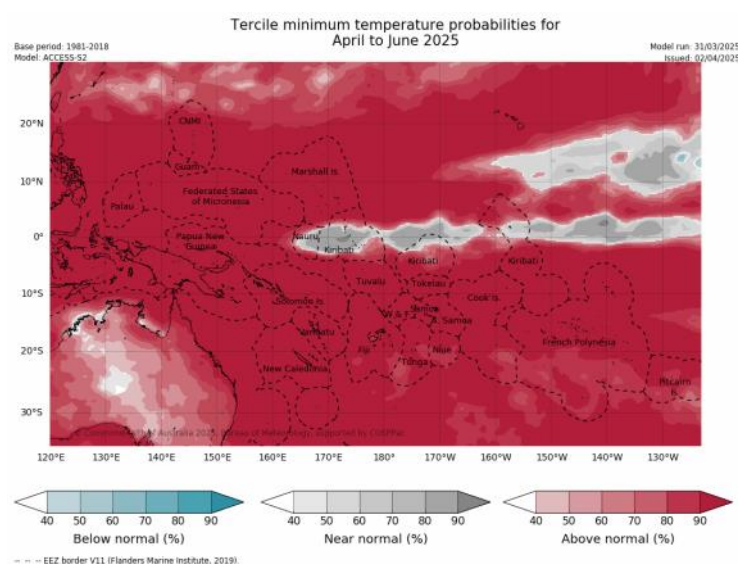
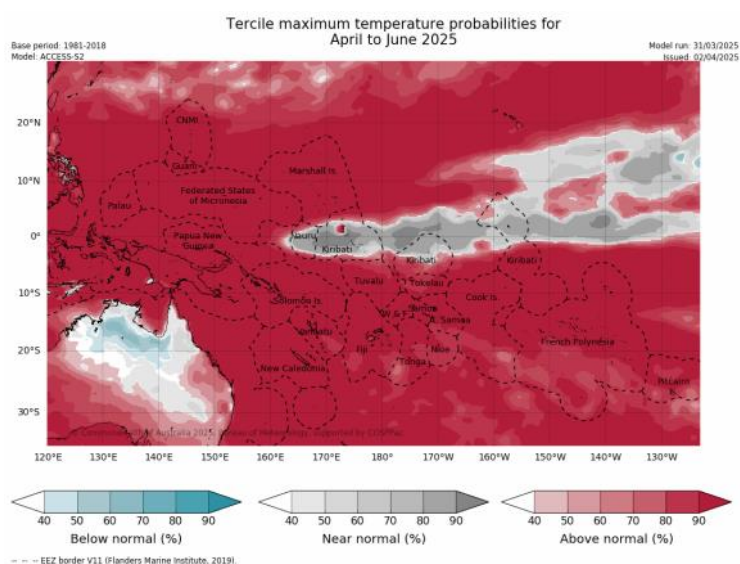
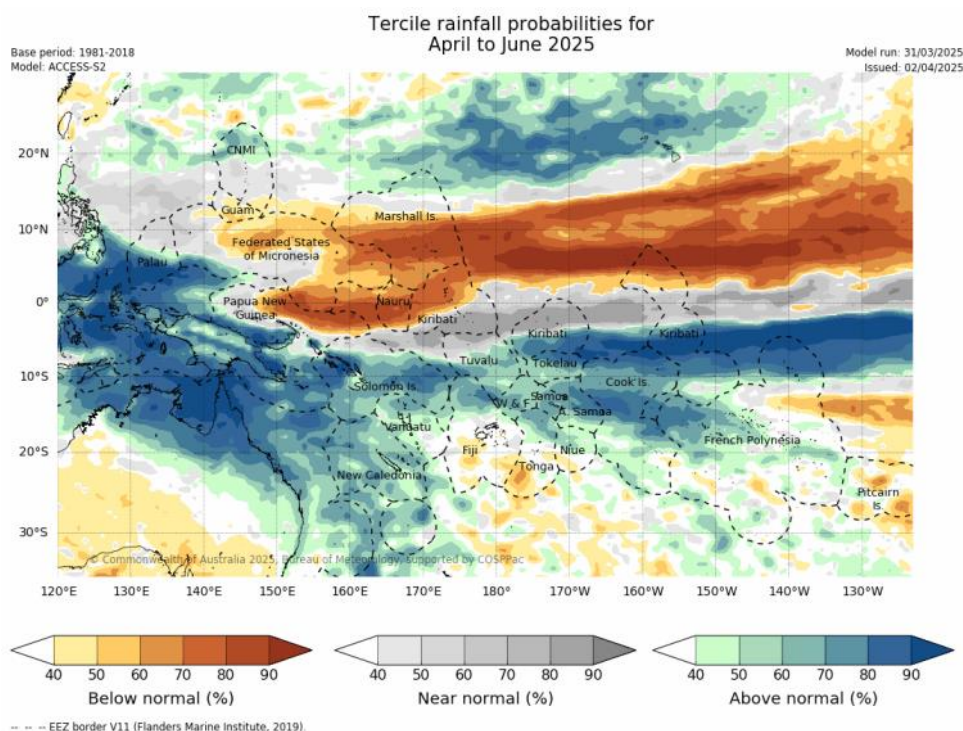


# SEASONAL RAINFALL OUTLOOK

April—June 2025



## Seasonal ACCESS-S maps



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



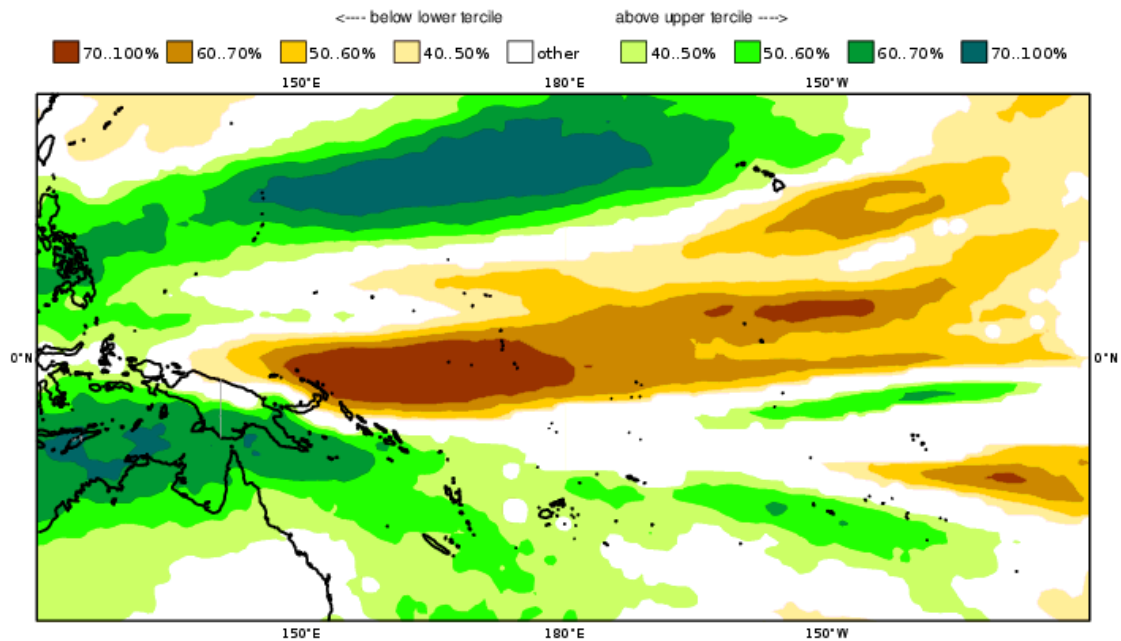
# SEASONAL RAINFALL OUTLOOK

April—June 2025



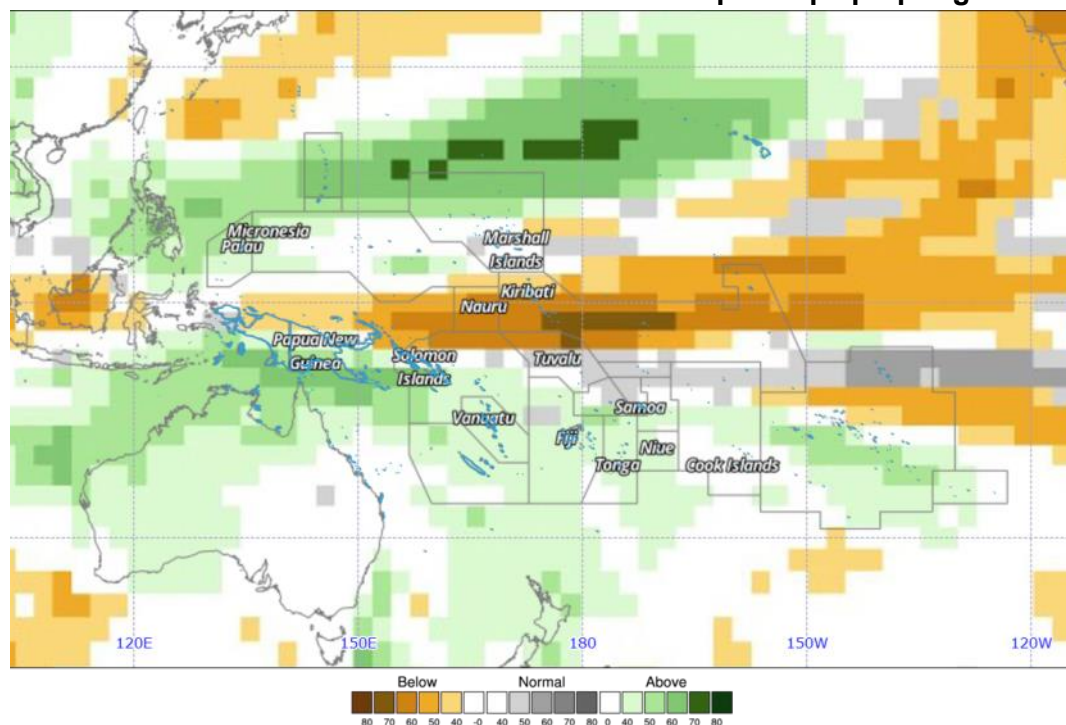
**Copernicus (C3S multi-system)-Rainfall**  
 Prob(most likely category of precipitation)  
 Nominal forecast start: 01/03/25  
 Unweighted mean

AMJ 2025



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

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



25, Season: AMJ, Lead Month: 3, Method: GAUS  
 ICC, BOM, CMCC, CMA, ECC, NASA, NCEP, PNU  
 ted using CLIK® (2025-4-1)

© APEC Climate



# TROPICAL CYCLONE

## 2024/2025 Season



The northwest Pacific (WNP) tropical cyclone season is year-round, with most cyclones occurring between May and December. The 2024 Tropical Cyclone (TC) outlook for the WNP, issued in May 2024, aged fairly well with below normal activity observed as a whole across Micronesia. Twenty four (24) TC of tropical storm strength or greater occurred within the WNP basin in 2024. This is 91 % of the long-term average (1959-2023 period). The distribution of TCs in 2024 was consistent with a transition to ENSO neutral and a La Niña-like pattern late in 2024 with activity shunted westward, closer to the Asian continent.

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. In the southwest Pacific, the 2024-25 tropical cyclone season started on 01st November 2024. The outlook for the season favoured normal or above normal TC activity is likely west of and including Vanuatu. East of Vanuatu, normal to below normal TC activity is likely.

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 some risks for PNG Islands, Solomon Islands, Vanuatu, and New Caledonia from 05 to 08 May. There are also some risk to Palau and the Philippines for the same period.

### 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>

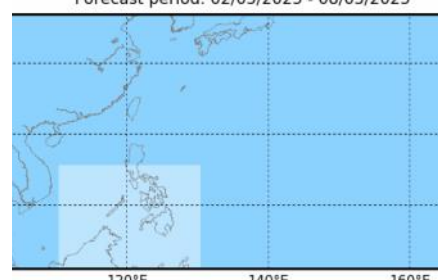
ECMWF Rain (Public charts) - Long range forecast: <http://www.ecmwf.int/en/forecasts/charts/seasonal/rain-public-charts-long-range-forecast>

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/>

### ACCESS-S Weekly Forecasts –Northwest Pacific

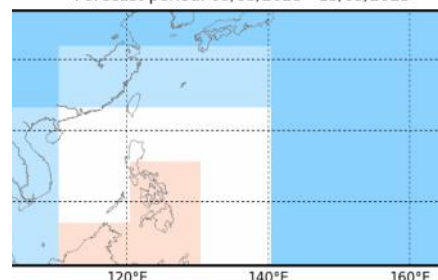
Difference from normal chance of Tropical Cyclone's in the North Pacific  
Forecast period: 02/05/2025 - 08/05/2025



Reduced Risk Significantly Increased Risk  
Percentage (%)

robability in overlapping 15 x 20 degree boxes  
125, Australian Bureau of Meteorology Model: ACCESS\_S2 Model Run: 1

Difference from normal chance of Tropical Cyclone's in the North Pacific  
Forecast period: 09/05/2025 - 15/05/2025

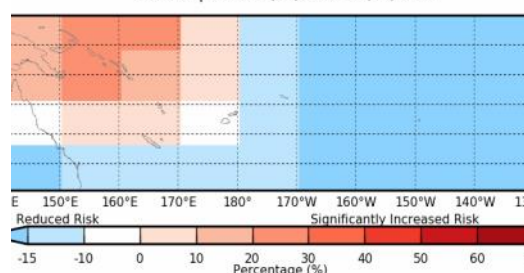


Reduced Risk Significantly Increased Risk  
Percentage (%)

robability in overlapping 15 x 20 degree boxes  
125, Australian Bureau of Meteorology Model: ACCESS\_S2 Model Run: 1

### ACCESS-S Weekly Forecasts –Southwest Pacific

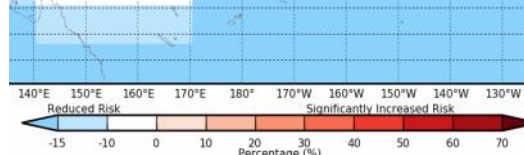
Difference from normal chance of Tropical Cyclone's in the South Pacific  
Forecast period: 02/05/2025 - 08/05/2025



Reduced Risk Significantly Increased Risk  
Percentage (%)

robability in overlapping 15 x 20 degree boxes  
125, Australian Bureau of Meteorology Model: ACCESS\_S2 Model Run: 24/04/2025

Difference from normal chance of Tropical Cyclone's in the South Pacific  
Forecast period: 09/05/2025 - 15/05/2025



robability in overlapping 15 x 20 degree boxes  
125, Australian Bureau of Meteorology Model: ACCESS\_S2 Model Run: 24/04/2025 Issued



# 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.

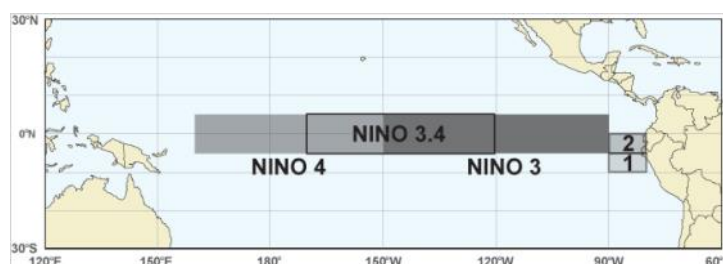
## 20 degrees Celsius Isotherm Depth

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