Monthly Pacific Climate and Ocean Bulletin

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Photo Credit: Molly Powers (SPC) Samoa Tide Gauge

SPREP
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NEW ZEALAND
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Australian Aid

Climate and Oceans Support Program in the Pacific

Pacific Community
Communauté du Pacifique

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Issued 17 March 2025

- The El Niño Southern Oscillation (ENSO) remains neutral.
- A moderate pulse of Madden Julian Oscillation (MJO) is currently located close to the tropical African longitudes.
- In February, the Intertropical Convergence Zone (ITCZ) was active and north of the equator over Palau, central FSM, and central RMI north of the equator, and a well-defined SPCZ extending east-southeast from Coral Sea region, southeastern PNG to western Cook Islands in the southern hemisphere.
- Sea surface temperatures (SSTs) for February 2025 were warmer than average in the western Pacific while cooler than average waters in the eastern half of the equatorial Pacific.
- The Coral bleaching Outlook to 23 March shows 'Alert Level 2' over most of PNG, western and southern Solomon Islands, northwest Vanuatu, and southern French Polynesia.
- For March to May 2025, the models agree that above normal rainfall is likely or very likely for Palau, most of FSM, Guam, CNMI, most of RMI in the northern hemisphere. Another band stretches from southeastern PNG, southern Solomon Islands, New Caledonia, Vanuatu, southern Fiji, southern Tonga, Niue, southern Cook Islands, and southern French Polynesia. The models agree that below normal rainfall is likely or very likely for northern PNG, northern Solomon Islands, southern FSM, Nauru, Kiribati, and extending to northern Tuvalu.
- The weekly tropical cyclone forecasts from the ACCESS-S model shows some risk for northern Australia from 16 to 22 February. Normal to Reduced risk over northern Pacific for the same period.

EL NIÑO–SOUTHERN OSCILLATION

El Niño-Southern Oscillation (ENSO) remains neutral

Click link to access Climate Driver Update issued on 05 March 2025

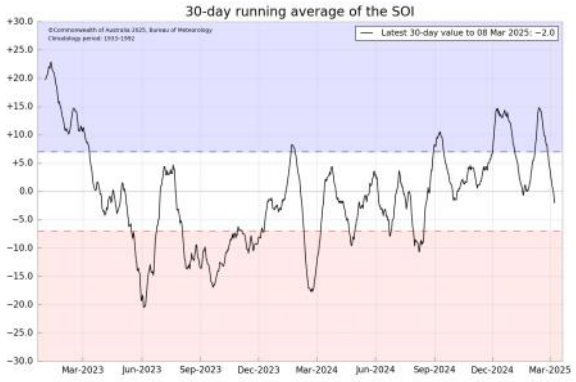
The El Niño-Southern Oscillation (ENSO) remains neutral despite a brief period from December to February when the tropical Pacific shifted towards a La Niña-like state. SSTs in the central tropical Pacific have risen over the past 4 weeks, with the most recent value of Niño3.4 (-0.30°C). The Bureau's model predicts neutral ENSO (neither El Niño nor La Niña) until at least July. This is consistent with all surveyed international models.

The Indian Ocean Dipole (IOD) is neutral.

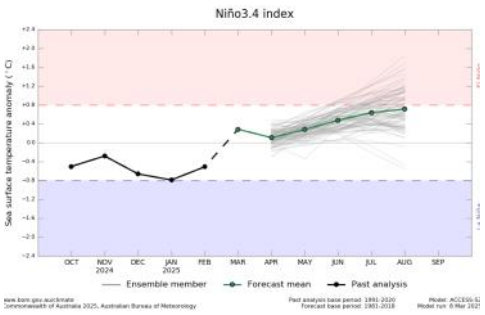
Global sea surface temperatures (SSTs) remain substantially above average. Daily SSTs so far in 2025 have been the second warmest on record for this time of year, only slightly cooler than in 2024.

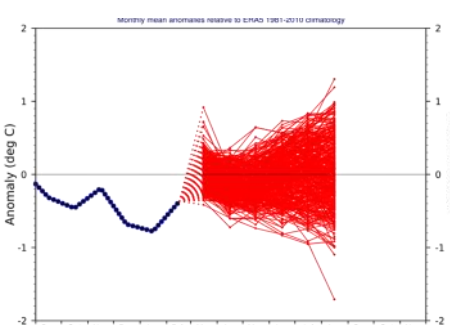
The Southern Annular Mode (SAM) is neutral as at 2 March. Forecasts show the SAM will likely remain neutral until at least mid-March.

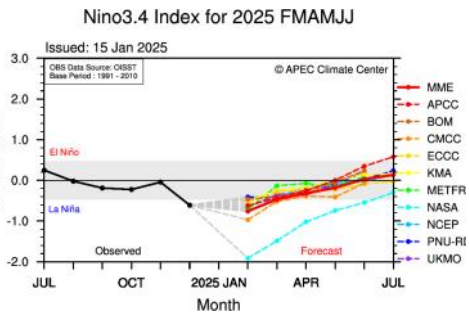
The 30 day average of the Southern Oscillation Index (SOI) for the period ending 08 March was -2.0.



International Model Outlooks







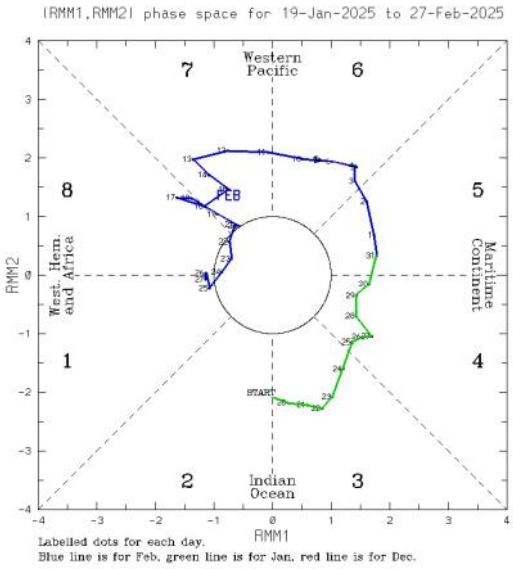
MADDEN–JULIAN OSCILLATION

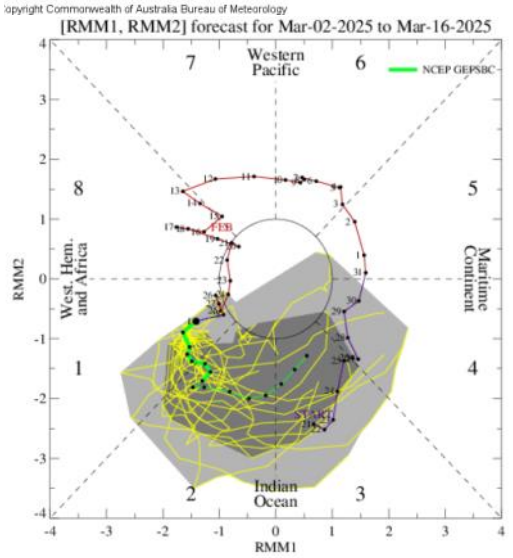
Click link to access *Tropical monitoring and outlook* [Issued on Tuesday 04 March 2025]

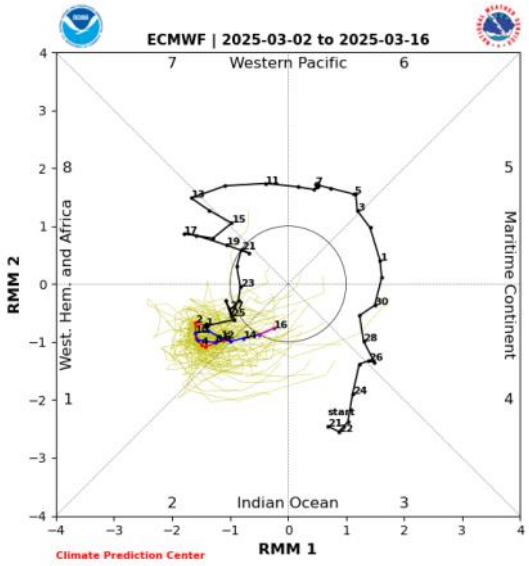
A A strong pulse of the Madden-Julian Oscillation (MJO) has progressed across the Maritime Continent and Western hemisphere during first three weeks of February before weakened in the last week of the month. .

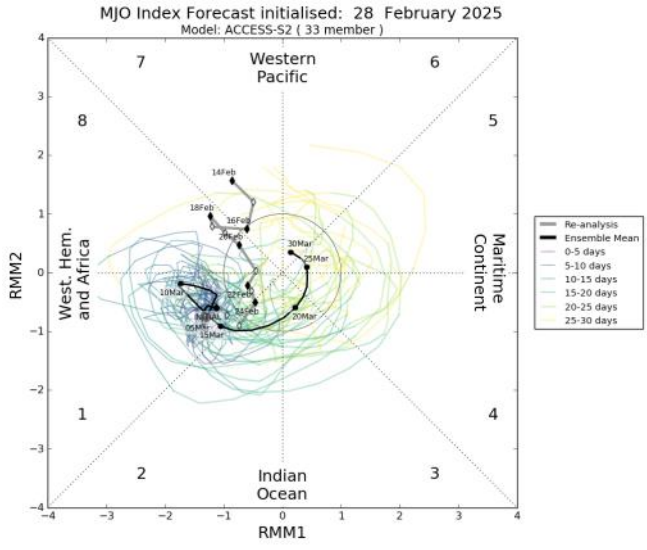
The MJO is at moderate strength and currently located close to the tropical African longitudes. Forecasts from surveyed international models suggest it will likely make a slow move into the western Indian Ocean over the coming fortnight. Its likely strength over the fortnight is uncertain, with a range of strengths forecast by the models surveyed.

This is an abbreviated version of the Tropical monitoring and outlook. Click on the *Tropical Update* for more information .







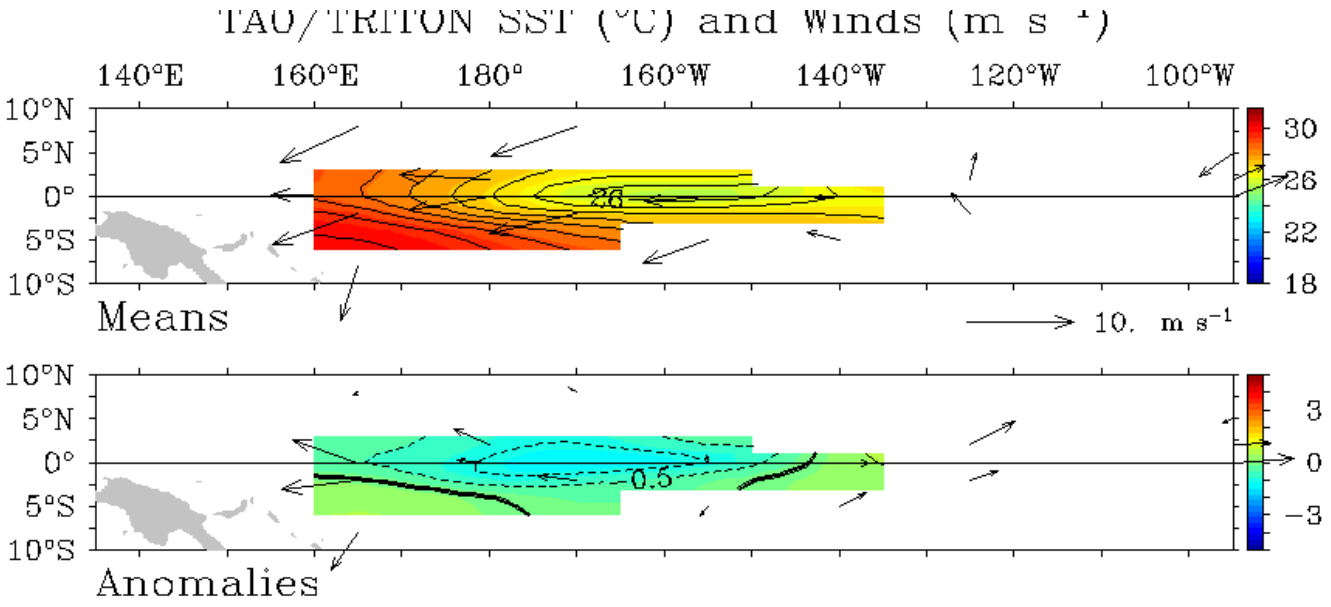


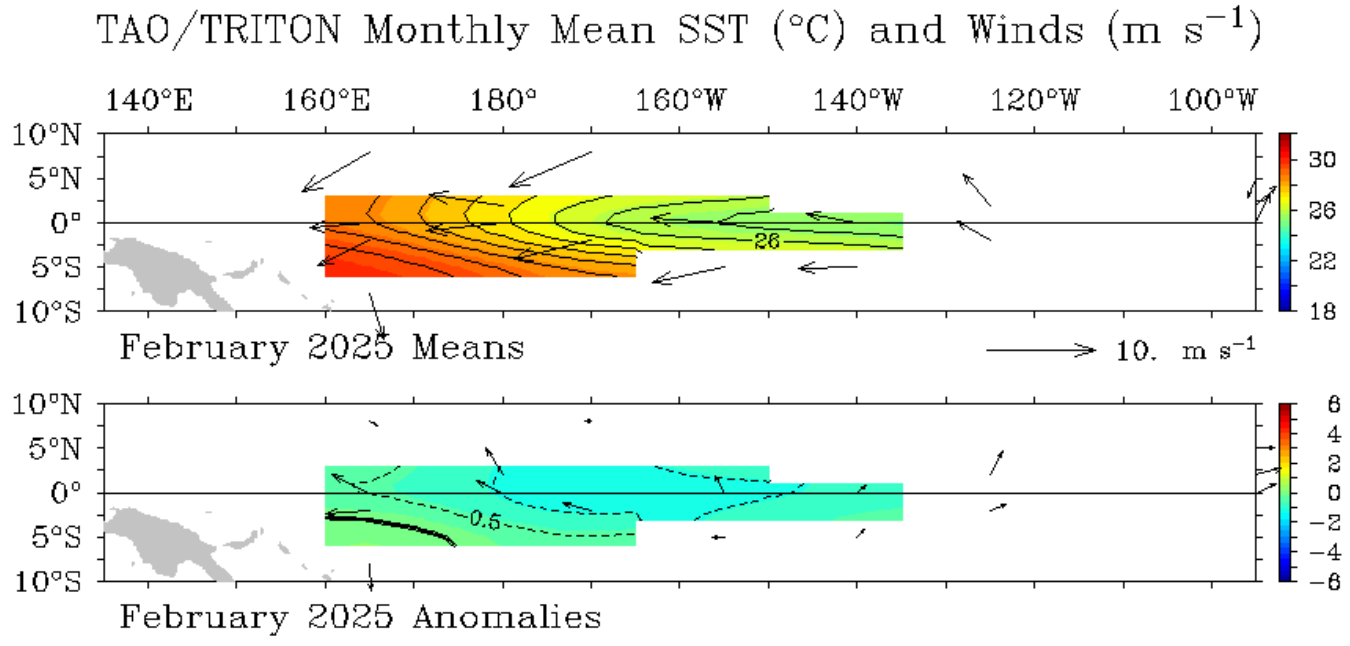
WIND

Click link to access Wind plots link

During February, the trade winds were generally stronger than average over the equatorial Pacific especially west of Dateline. For the five days ending 01 March 2025, the trades were also stronger than 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.





TAO Project Office/PMEL/NOAA

Mar 2 2025

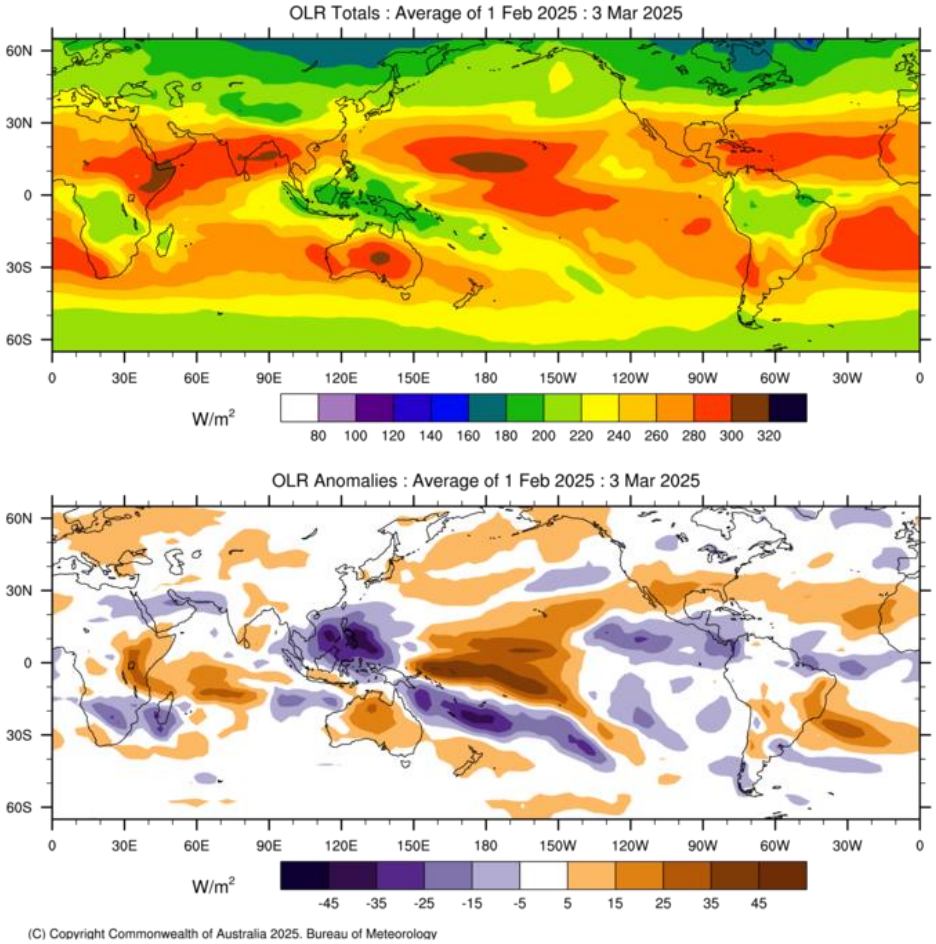
CLOUD AND RAINFALL

Click link to access OLR

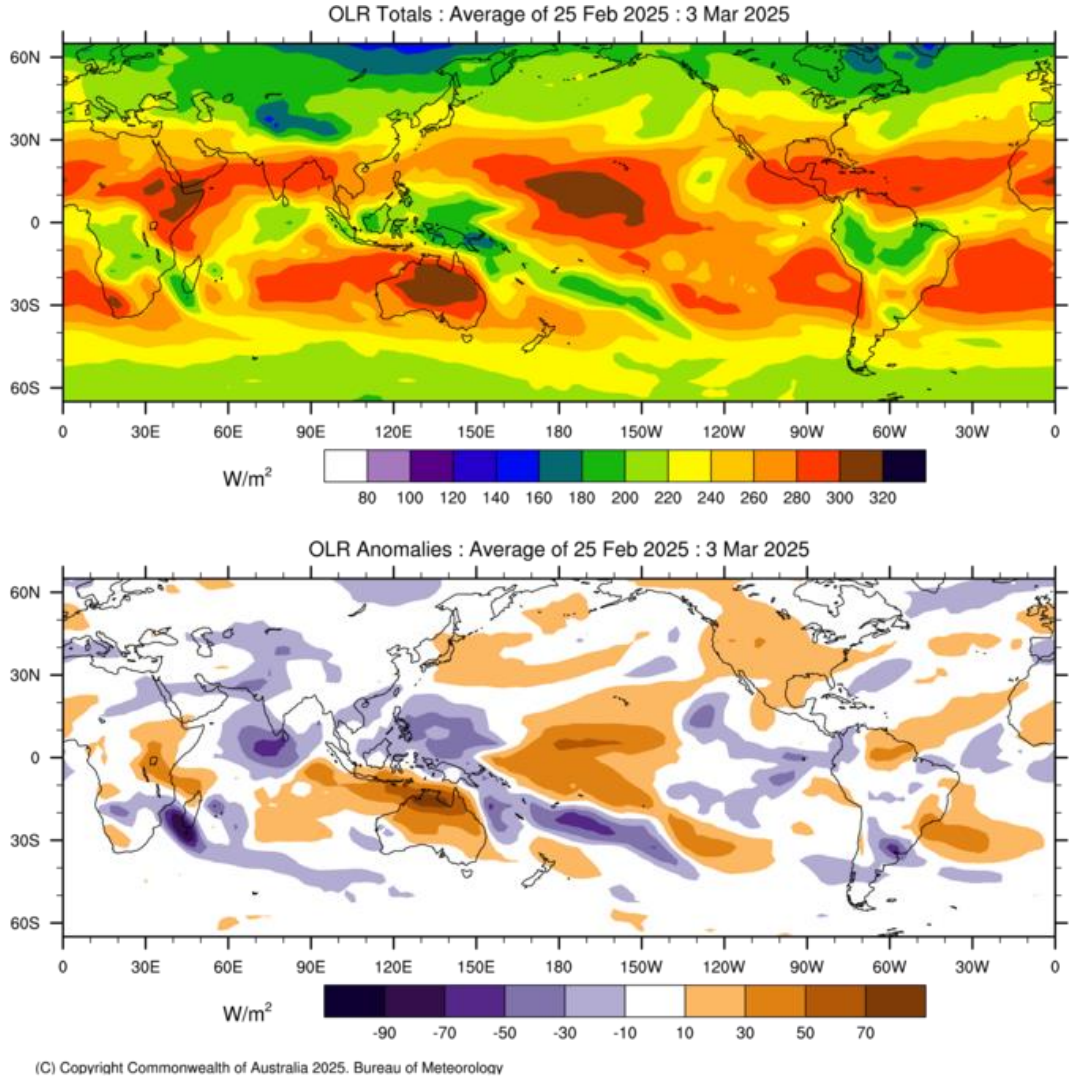
The February 30-day OLR anomaly map shows a region of negative OLR (increased convection) in a band stretching southeastwards over eastern Australia, southern PNG, southern Solomon Islands, New Caledonia, Vanuatu, Fiji, Tonga, and Niue to southern Cook Islands. Another band of negative OLR (increased convection) over Palau, Guam, and CNMI. Areas of anomalously high OLR (decreased convection) were evident over PNG Islands, eastern FSM, southern RMI, Nauru, and Kiribati. Areas of anomalously high OLR (decreased convection) were also evident over Tuvalu, Tokelau, Samoa, American Samoa, northern Cook Islands, northern French Polynesia, and Pitcairn.

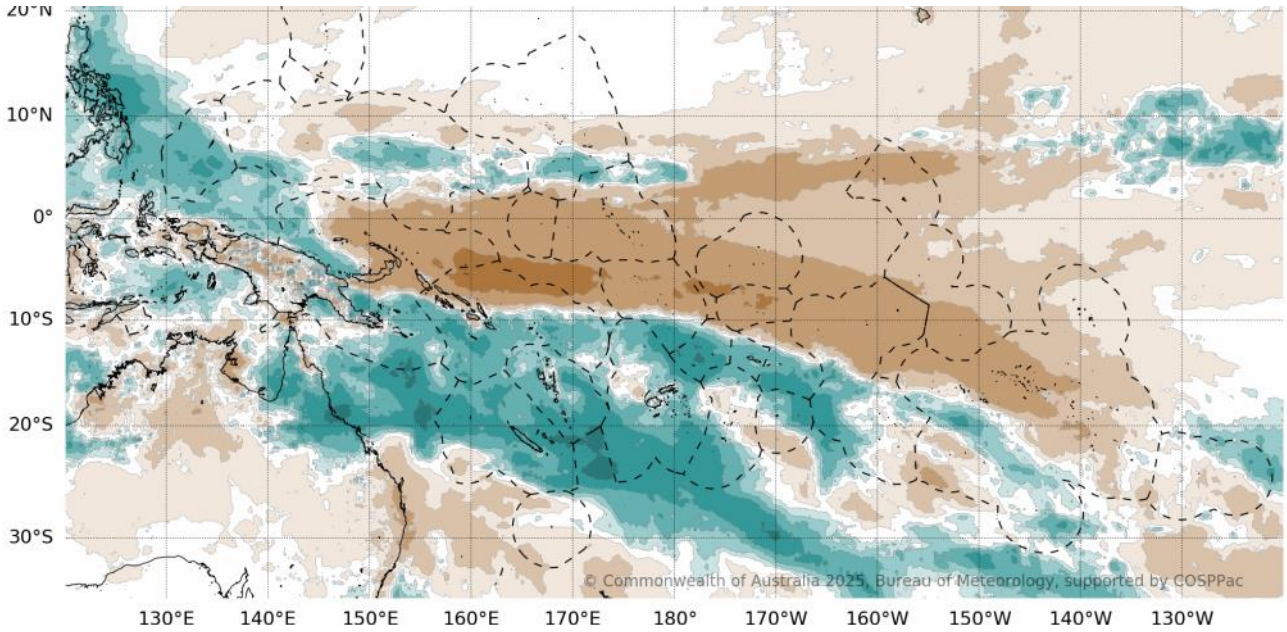
Note: Global maps of OLR below highlight regions experiencing increased or decreased cloudiness. The top panel is the total OLR in Watts per square metre (W/m^2) and the bottom panel is the anomaly (current minus the 1979-1998 climate average), in W/m^2. In the bottom panel, negative values (blue shading)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

OLR Total and Anomalies, 30 Day OLR

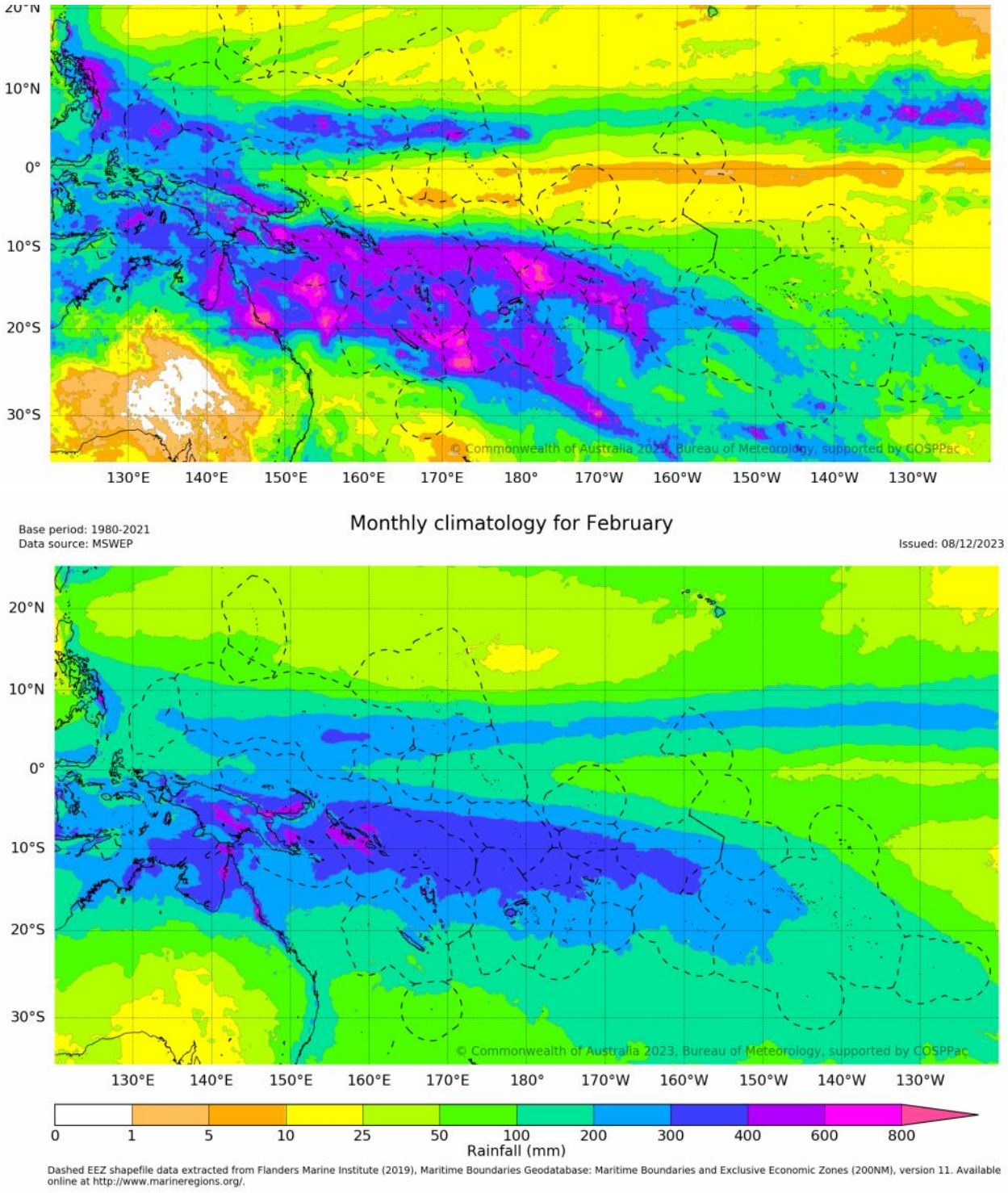


OLR Total and Anomalies, 7 Day OLR





30-Day Rainfall Accumulated



Global and Pacific ACCESS-S outlook and Pacific Climate Monitoring - ACCESS-S precipitation:
http://access-s.clide.cloud/

OCEAN CONDITIONS

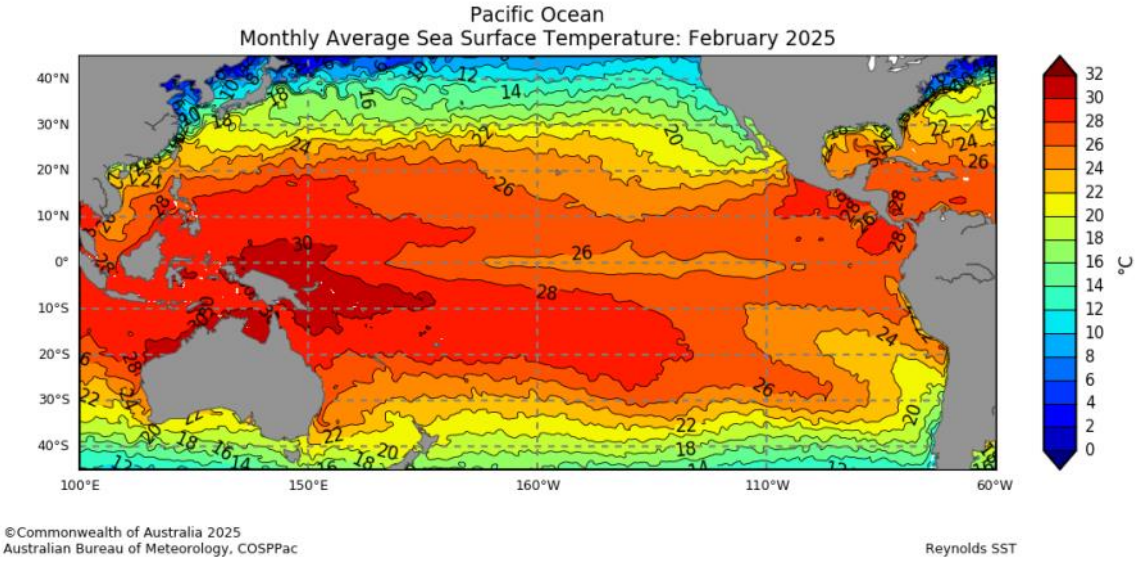
SEA SURFACE TEMPERATURE

Click link to access Pacific Community COSPPac Ocean Portal

Sea surface temperatures (SSTs) for February 2025 were cooler than average waters eastwards from 160 °E along the equatorial Pacific. Warmer than average waters in the western half of the equatorial Pacific.

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

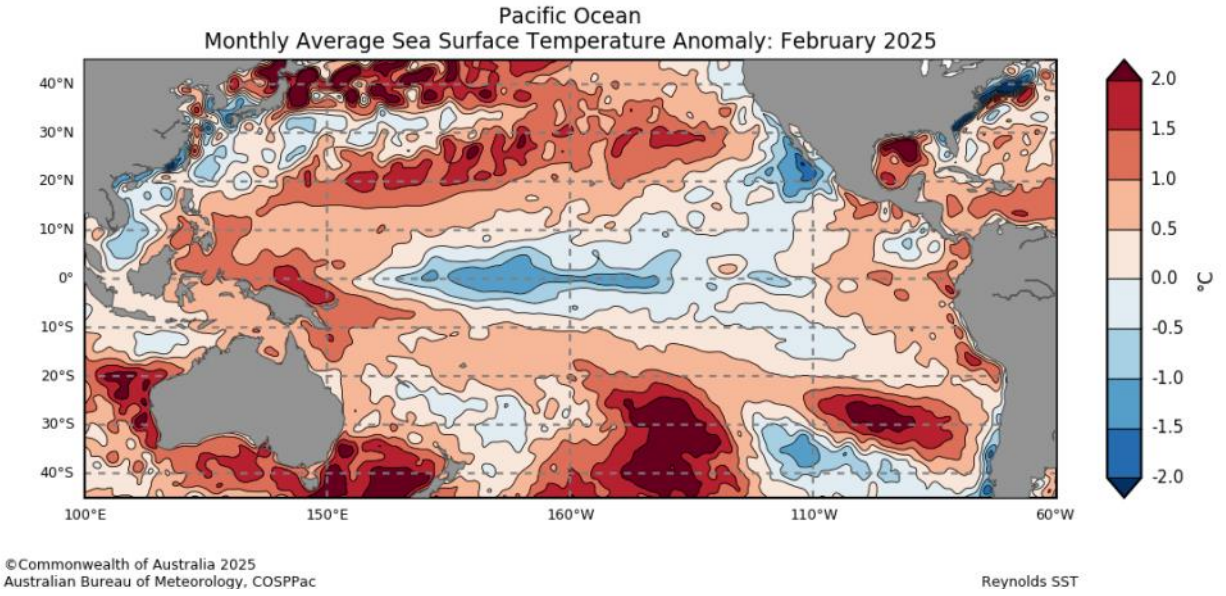
Mean Sea Surface Temperature

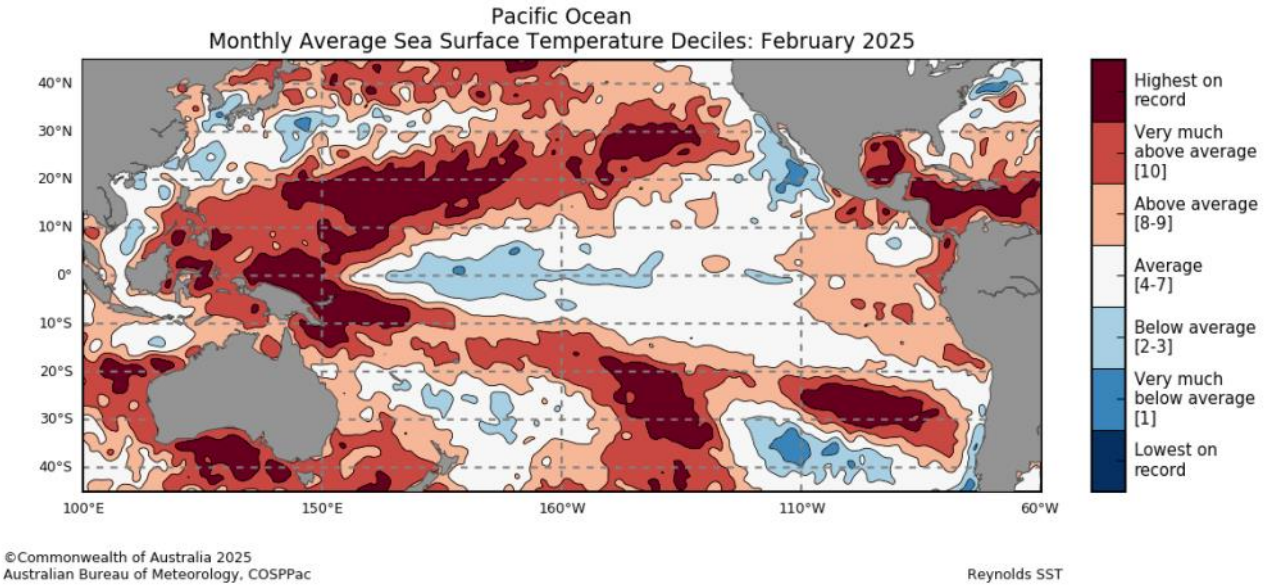


OCEAN CONDITIONS

Click link to access SEA SURFACE TEMPERATURE

Anomalous Sea Surface Temperature



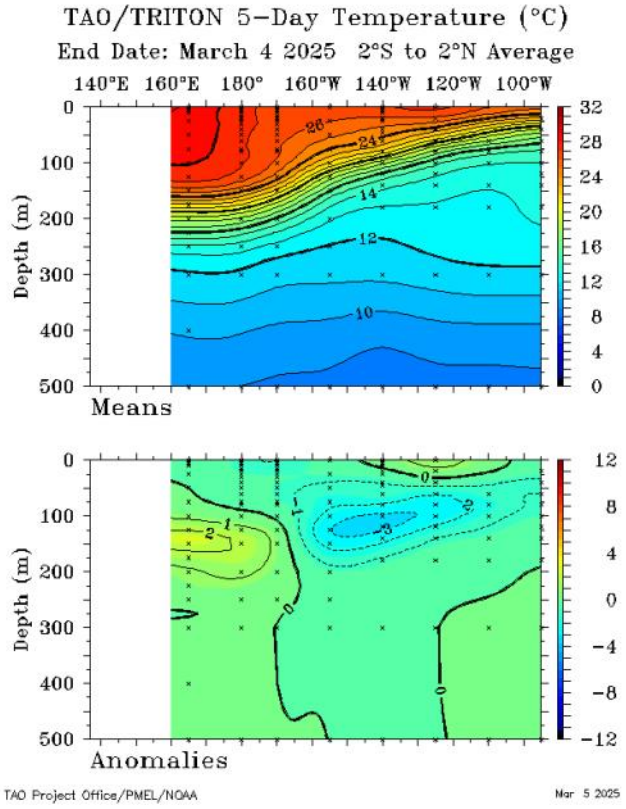


OCEAN CONDITIONS

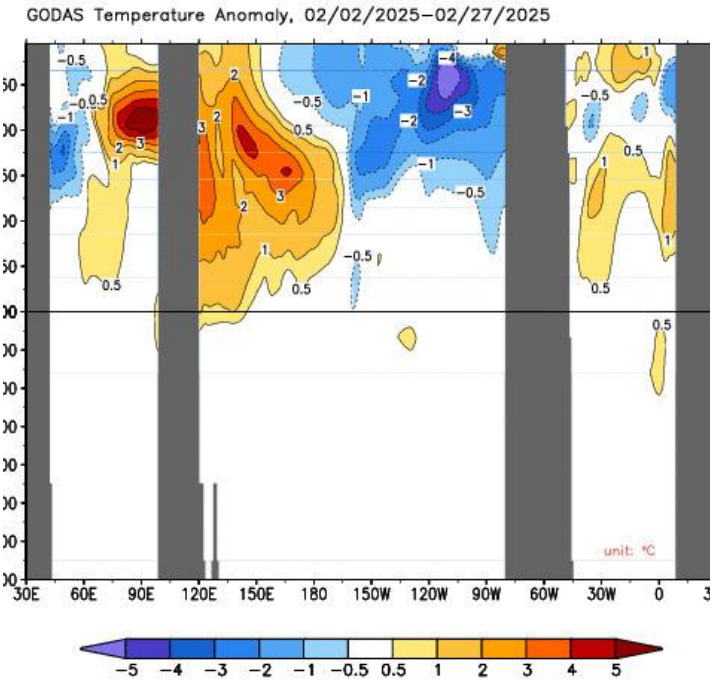
SUB SURFACE

The February equatorial Pacific sub-surface temperature anomalies for the 30 days ending 27 February 2025 show cooler than average waters in the eastern half of the equatorial Pacific down to about 225 m depth; cooler waters peak around 50 to 100 m depth in the eastern Pacific where they are more than 5 °C cooler than average. Warmer than average waters in the western half of the equatorial Pacific down to about 350 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 150 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/

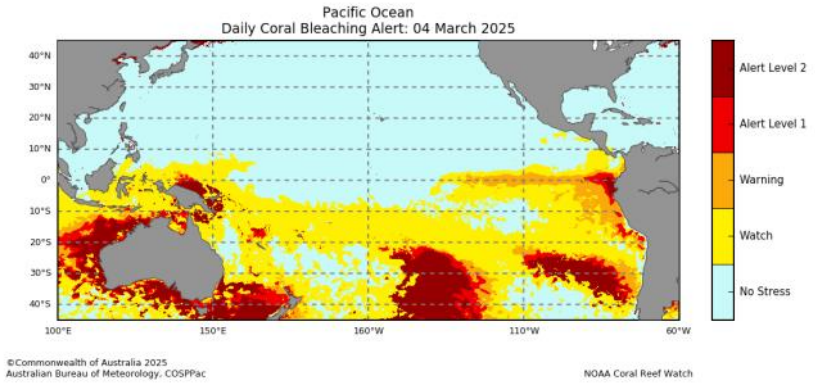
OCEAN CONDITIONS

CORAL BLEACHING

The daily Coral Bleaching Alert status for 4 March 2025 shows an area of 'Alert Level 2' over northern and southern PNG. 'Alert Level 1' over northern New Caledonia, western Vanuatu, and southern French Polynesia. 'Watch' or 'No stress' for the rest of the countries. The four-week Coral Bleaching Outlook to 23 March shows 'Alert Level 2' over most of PNG, western and southern Solomon Islands, northwest Vanuatu, and southern French Polynesia. 'Alert Level 1' rating over central Solomon Islands, northern Vanuatu, central Fiji, southern Tonga, central American Samoa, and central French Polynesia. 'Warning' covers eastern Solomon Islands, most of Vanuatu, most of Fiji, northern Tonga, Wallis and Futuna, central and southern Cook Islands and northern French Polynesia. 'Watch' or ' No Stress' over the rest of the countries.

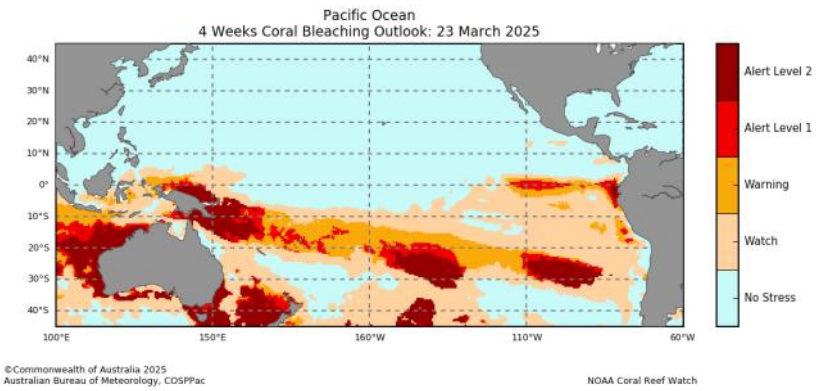
Daily Coral Bleaching Alert

(Source: Pacific Community COSPPac Ocean Porta Coral Bleaching)



4 Weeks Coral Bleaching Outlook

(Source: Pacific Community COSPPac Ocean Portal)



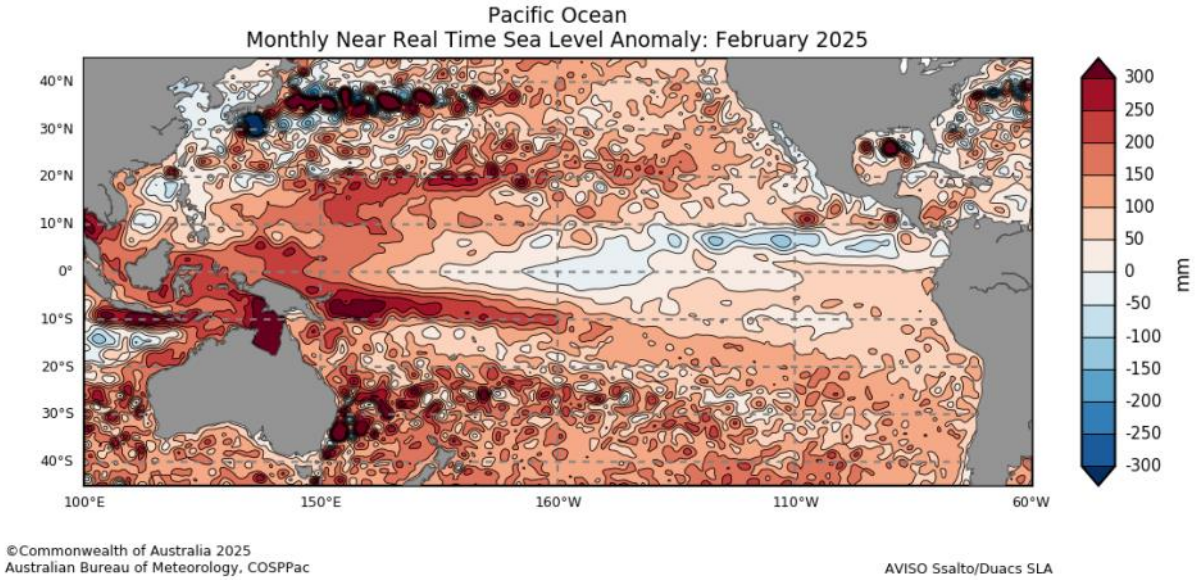
OCEAN CONDITIONS

OCEAN SURFACE CURRENTS AND SEA LEVEL

Sea levels observed in February were above normal over most COSPPac countries. Patches of anomalies from +200mm were observed over Palau, FSM, eastern PNG, northern and western Solomon Islands, central Tuvalu, Tokelau, Fiji, Tonga, and northern Cook Islands. Anomalies of +100mm to +200mm were observed over FSM, RMI, Guam, CNMI, Nauru, Kiribati (excludng central Line Islands), most of New Caledonia, rest of Solomon Islands, Vanuatu, rest of Fiji, rest of Tonga, Wallis and Futuna, Samoa, American Samoa, rest of Niue, rest of Cook Is., French Polynesia, and Pitcairn Islands. The rest of the region were observed with anomalies between +50 and +100mm.

Monthly Sea Level Anomalies

Source: Pacific Community COSPPac Ocean Portal

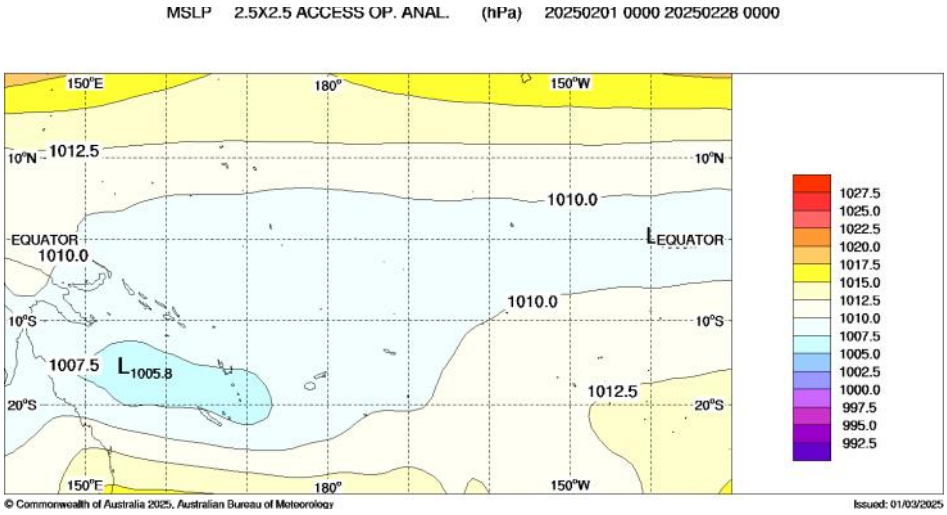


MEAN SEA LEVEL PRESSURE

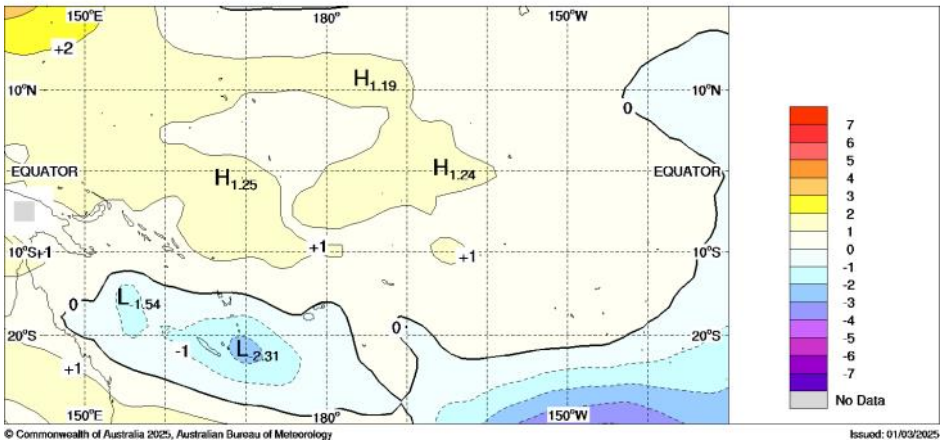
The February mean sea level pressure (MSLP) anomaly map displays positive anomalies of 1 hPa or greater over northern PNG Islands, FSM, RMI, and Guam. The negative anomalies of 1 hPa or greater were present over southern hemisphere from New Caledonia to southern Vanuatu.

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

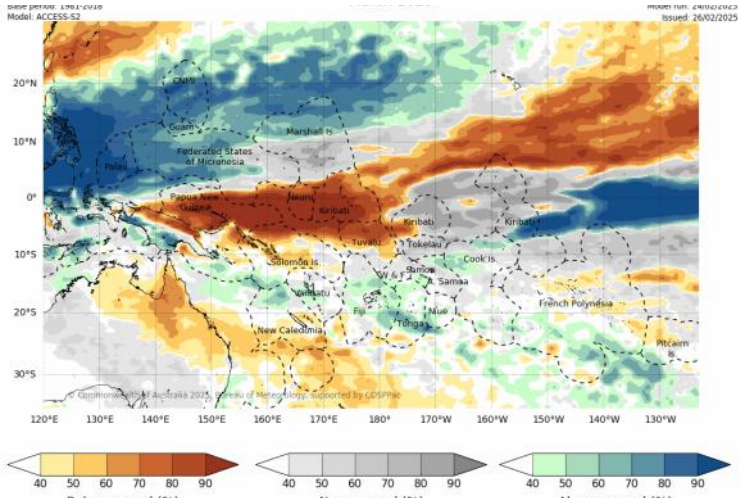
SEASONAL RAINFALL OUTLOOK

March—April 2025

The ACCESS-S model forecast for March 2025, shows above normal rainfall is likely or very likely for Palau, most of FSM, Guam, CNMI, and northern RMI. Patches of above normal rainfall is likely or very likely for southern PNG, southern Solomon Islands, central Vanuatu, most of Fiji, northern and southern Tonga, Samoa, northern American Samoa, southern Niue, northern Cook Islands, and southern French Polynesia. Below normal rainfall is likely or very likely in a band stretching eastwards from northern PNG, most of Solomon Islands, southern FSM, Nauru, Kiribati (Gilbert Is., western Phoenix Is., and northern Line Is.), and most of Tuvalu. Patches of below normal rainfall is likely or very likely for south New Caledonia, southern Tonga, central French Polynesia, and Pitcairn Islands.

The ACCESS-S three-month rainfall outlook (March to May 2025) is very similar to the February outlook, but with the southern hemisphere dry signal less extensive. The dry patches covers southern New Caledonia, southern Tonga, northern French Polynesia, and Pitcairn Islands. The above normal rainfall region has a more stronger signal extending eastwards and northwards over Palau, most of FSM, Guam, CNMI, and northern RMI. Another band stretches from southeastern PNG, southern Solomon Islands, northern New Caledonia, northern Vanuatu, Fiji, Tonga, Samoa, American Samoa, most of Cook Is., and southern French Polynesia.

Monthly ACCESS-S Maps



The Copernicus multi-model outlook for March to May 2025 is very similar to the ACCESS-S outlook.

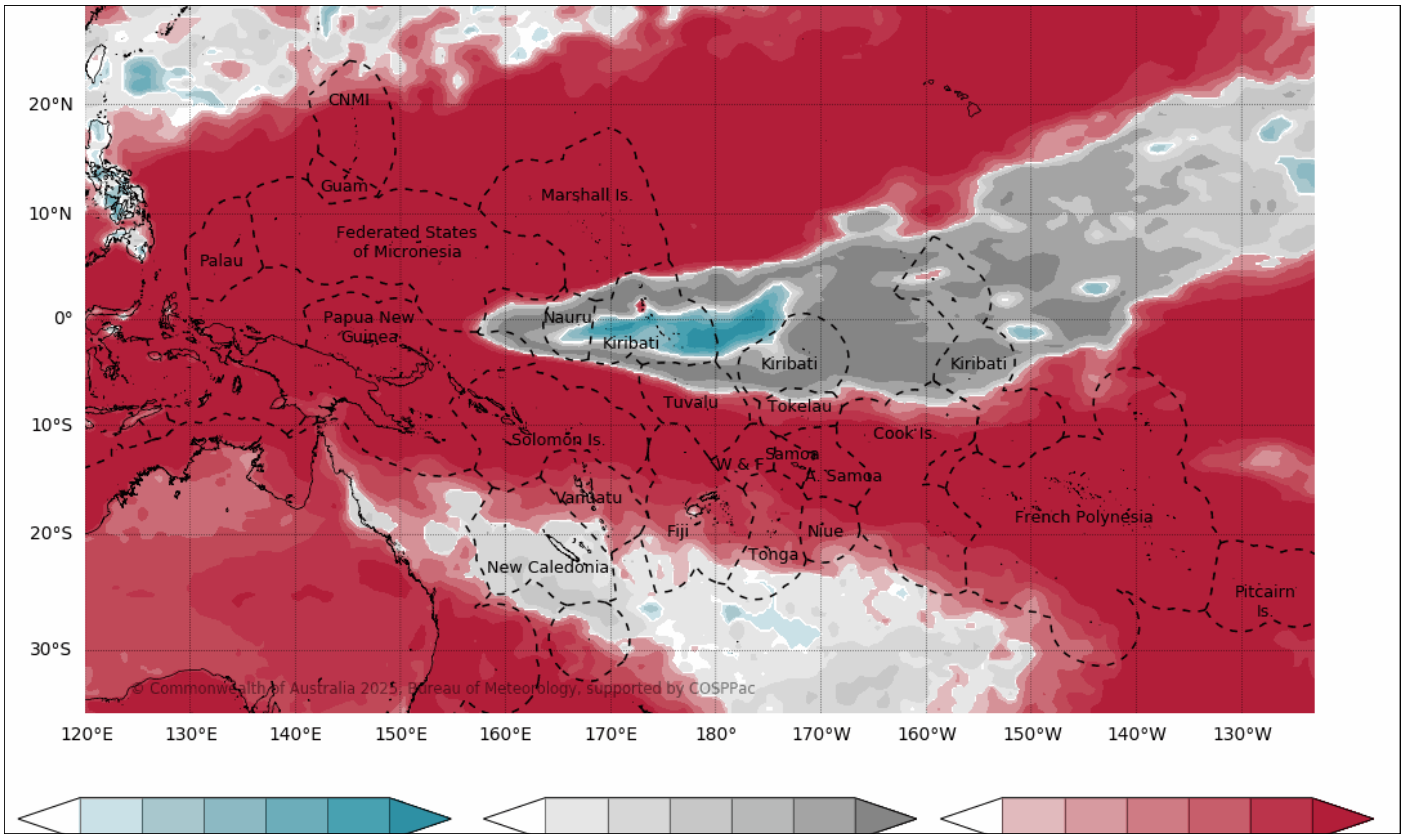
The APEC Climate Centre multi-model outlook (March to May 2025) is similar to the other two models.

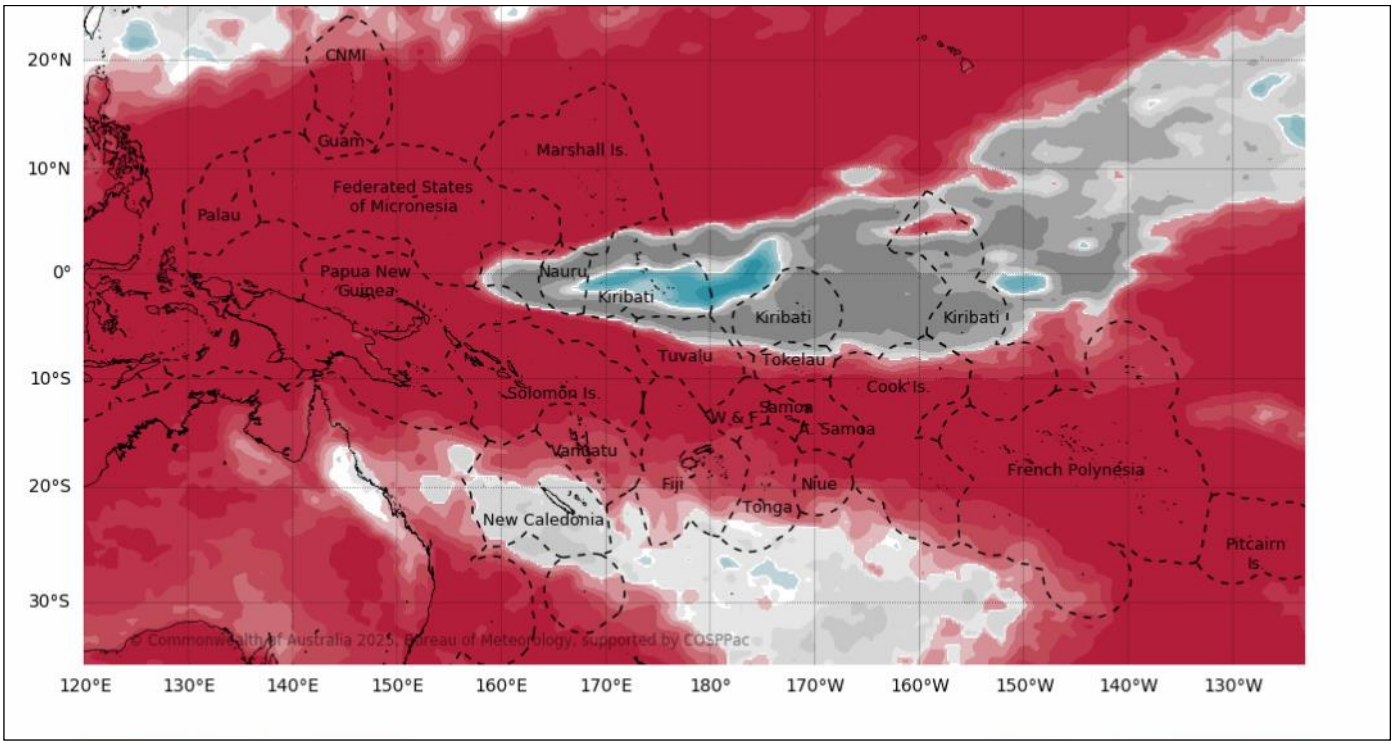
For March to May 2025 the models agree that above normal rainfall is likely or very likely for Palau, most of FSM, Guam, CNMI, most of RMI in the northern hemisphere. Another band stretches from southeastern PNG, southern Solomon Islands, New Caledonia, Vanuatu, southern Fiji, southern Tonga, Niue, southern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

SEASONAL TEMPERATURE OUTLOOK

March—April 2025

Monthly Tmax and Tmin ACCESS-S Maps

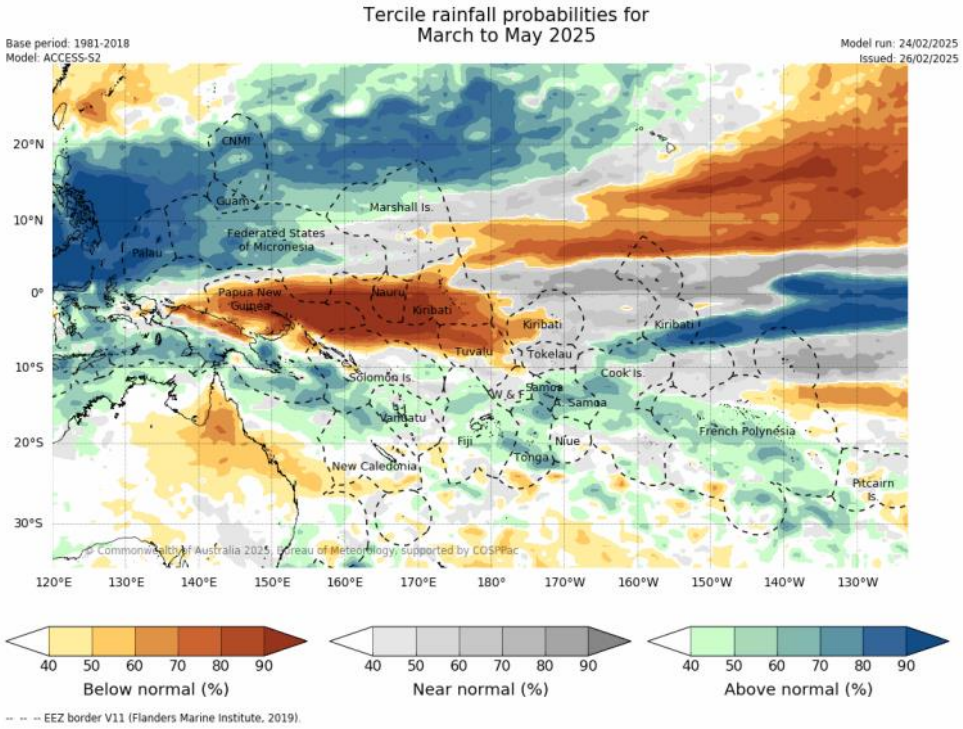


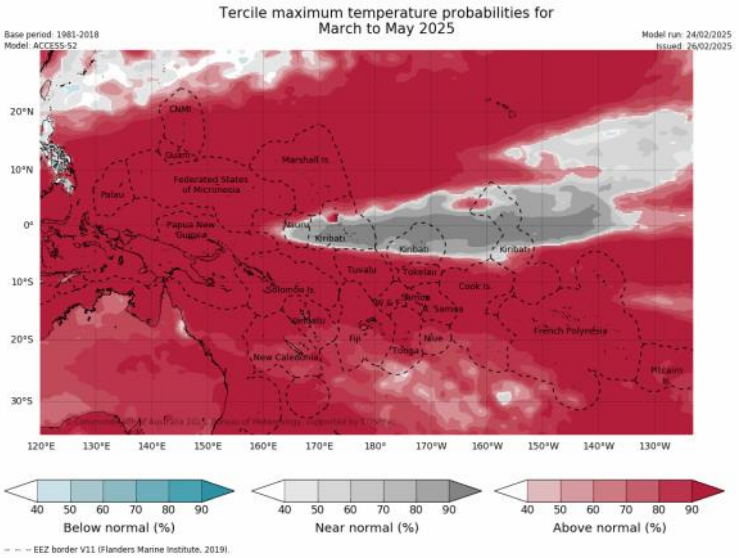


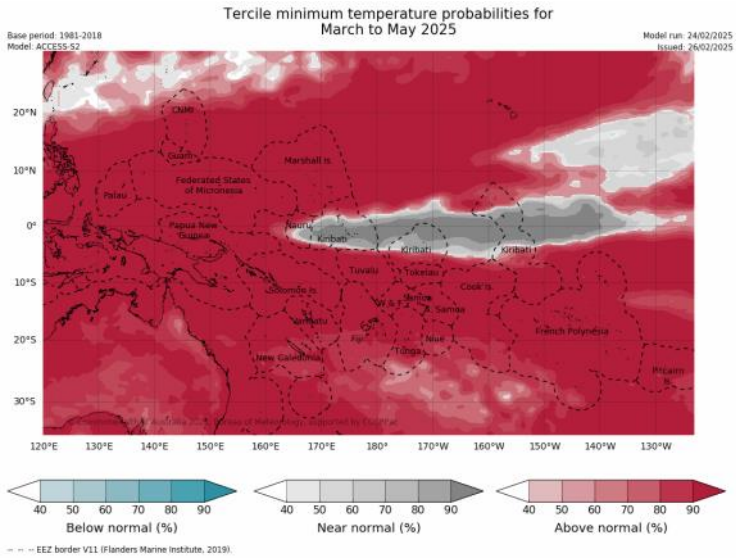
SEASONAL RAINFALL OUTLOOK

March—April 2025

Seasonal ACCESS-S maps



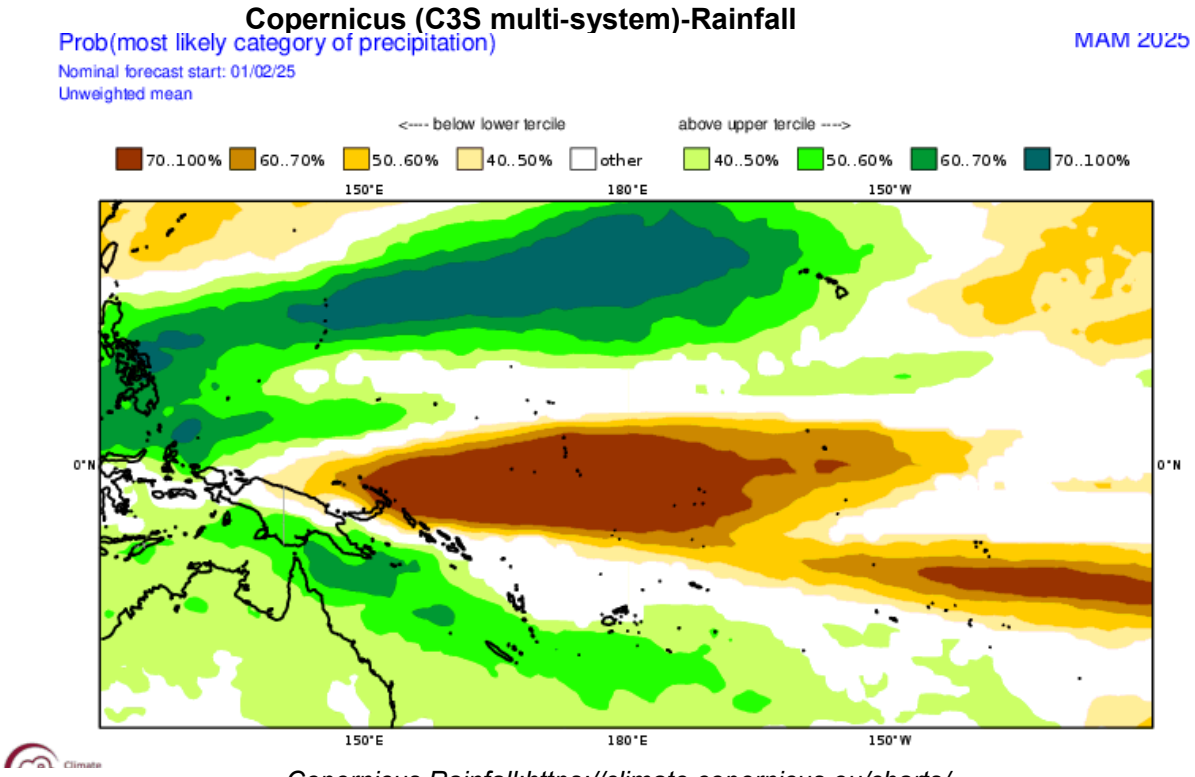




'About ACCESS-S http://access-s.clide.cloud/

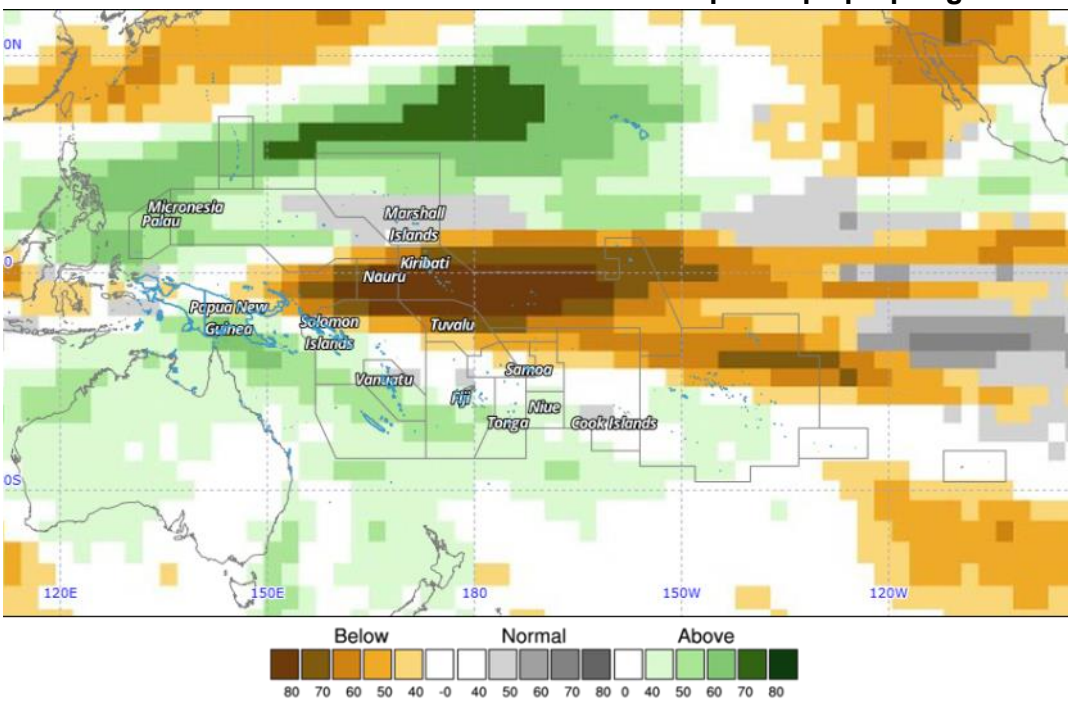
SEASONAL RAINFALL OUTLOOK

March—April 2025



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

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



Year: 2025, Season: MAM, Lead Month: 3, Method: GAUS
Model: APCC, BOM, CMCC, CWA, ECCC, NASA, NCEP, PNU
Generated using CLIKP (2025-3-3)

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TROPICAL CYCLONE

2024/2025 Season

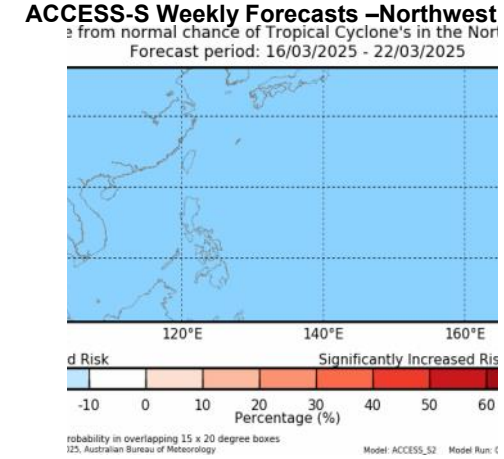
The northwest Pacific (WNP) tropical cyclone season is year-round, with most cyclones occurring between May and December. The 2024 Tropical Cyclone (TC) outlook for the NWP, issued in May 2024, aged fairly well with below normal activity observed as a whole across Micronesia. Twenty four (24) TC of tropical 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.

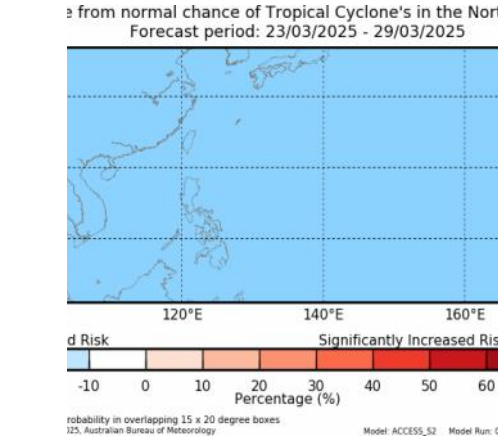
In the WNP, the genesis and track of TCs show a relationship with the ENSO cycle: activity typically shifts eastward during El Niño and westward during La Niña. In the southwest Pacific, the 2024-25 tropical cyclone season started on 01st November 2024. The outlook for the season favoured normal or above 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).

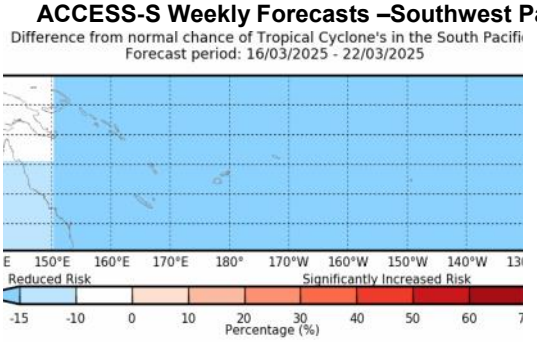
The weekly tropical cyclone forecasts from the ACCESS-S model shows some risk for northern Australia from 16 to 22 February. Normal to Reduced risk over northern Pacific for the same period.

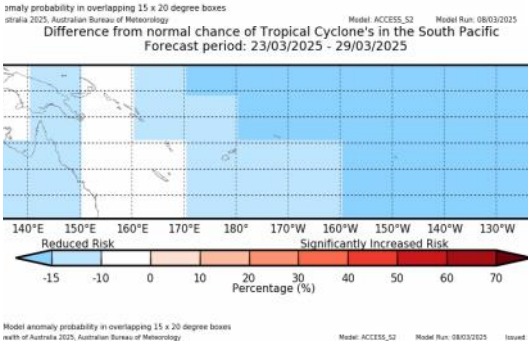
ACCESS-S Weekly Forecasts –Northwest Pacific





ACCESS-S Weekly Forecasts –Southwest Pacific





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.

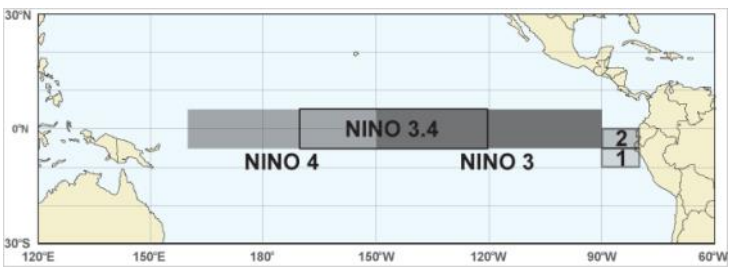
20 degrees Celsius Isotherm Depth

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