Monthly Climate Bulletin

May 2022

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Photo Credit: Molly Powers (SPC) Samoa Tide Gauge

SPREP
Secretariat of the Pacific Regional Environment Programme

Australian Government
Department of Foreign Affairs and Trade
Bureau of Meteorology

Australian Aid

Climate and Oceans Support Program in the Pacific

Pacific Community
Communauté du Pacifique

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- The 2021-2022 La Niña event is slowly weakening in the tropical Pacific. Most climate models surveyed by the Bureau indicate a return to neutral ENSO during the southern hemisphere winter (June-August).

- All climate model outlooks surveyed suggest a negative IOD is likely to form the coming months.

- The Madden-Julian Oscillation (MJO) is currently at moderate strength over the western hemisphere, and is expected to strengthen in the coming weeks.

- The Intertropical Convergence Zone (ITCZ) was active and shifted north over the western equatorial Pacific, while the South Pacific Convergence Zone (SPCZ) was not active.

- The SSTs for May 2022 show cool SST anomalies across the central to eastern equatorial Pacific and along the coastline of South America, and warm SST anomalies over parts of the Maritime Continent.

- Coral bleaching status for 06th June 2022 has warning 'Alert Level 2' and 'Alert Level 1' for parts of northern PNG mainland, with 'Warning' for CNMI while 'Watch or 'No Stress for the rest of COSPPac partner countries.

- For June-August 2022, the dynamical models (including SCOPIC) agree on above normal rainfall for southern 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 Palau, FSM, PNG Islands, northern Solomon Islands, Nauru, Kiribati, Tuvalu, Tokelau, Samoa, American Samoa, northern Cook Islands, northern French Polynesia and Pitcairn Island.

- The weekly tropical cyclone forecast from the ACCESS-S model shows reduced risk in the weeks beginning 08 June and ending 14 June 2022 for northwest Pacific. There is increased risk for northern Philippines and Japan for the week 15 to 21 June 2022.

EL NIÑO–SOUTHERN OSCILLATION

Negative Indian Ocean Dipole favoured for winter

Click link to access Climate Driver Update issued on 07 June 2022

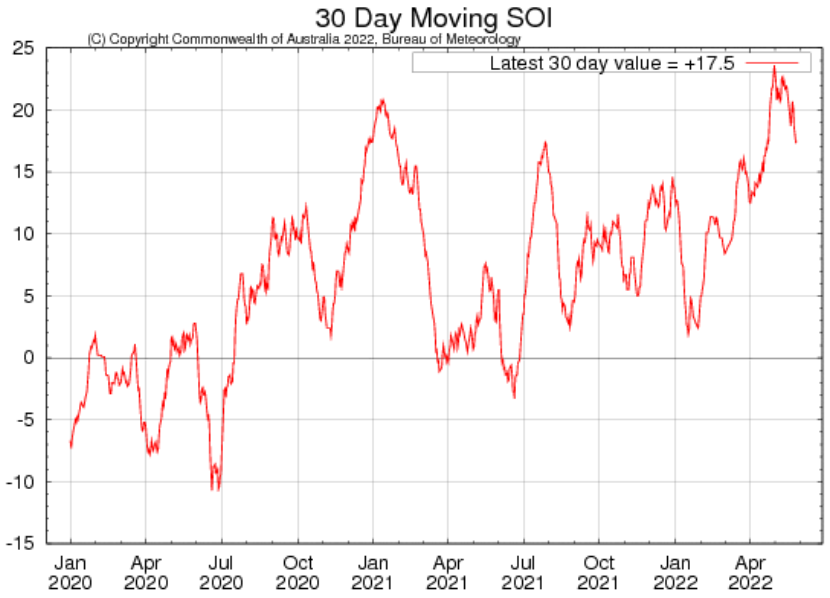
The 2021-2022 La Niña event is slowly weakening in the tropical Pacific. Compared to two weeks ago, tropical Pacific sea surface temperatures have warmed, particularly in the western half of the tropical Pacific, returning to near average values. However, some atmospheric indicators continue to show a La Niña signal, including cloudiness along the equator and the Southern Oscillation Index (SOI), while trade winds have shifted more firmly towards a more neutral ENSO pattern (neither La Niña nor El Niño).

The Indian Ocean Dipole (IOD) is currently neutral. The IOD index has been below zero over the past four weeks, with two of those weeks exceeding the negative IOD threshold value (-0.4 °C). All climate model outlooks surveyed suggest a negative IOD is likely to form the coming months. Outlook accuracy for IOD forecasts significantly improves from June, while model consistency over the coming weeks and months adds confidence to this outlook.

Most climate models surveyed by the Bureau indicate a return to neutral ENSO during the southern hemisphere winter (June-August). Two of the seven models maintain La Niña conditions through the southern winter.

The Southern Annular Mode (SAM) index is currently positive, but is expected to return to neutral and remain so for much of June. Neutral SAM has little influence on Australian rainfall. Longer-term SAM is tending towards positive which typically has a drying influence for parts of south-west and south-east Australia during winter.

The 30-day Southern Oscillation Index (SOI) for the 30 days ending 05 June was +18.6. The 90-day SOI value was +17.4. The 30-day SOI remains firmly at La Niña levels despite dropping several points compared to the middle of May. The 90-day value also continues to be typical of La Niña.



EL NIÑO–SOUTHERN OSCILLATION

Negative Indian Ocean Dipole favoured for winter

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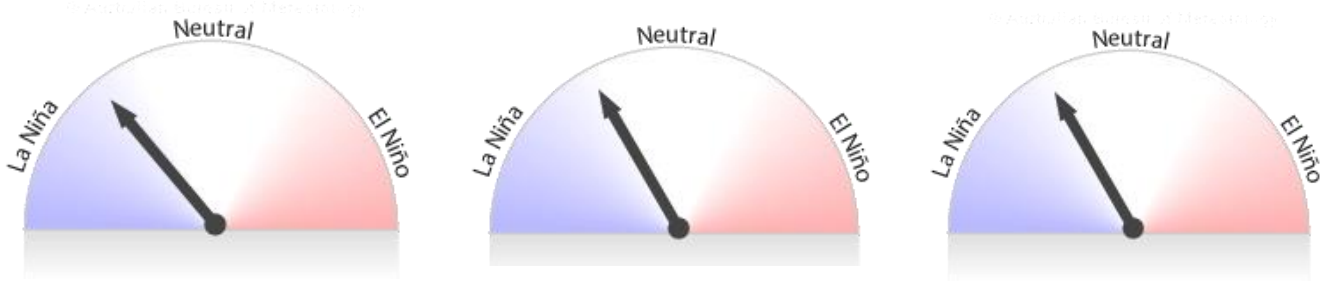
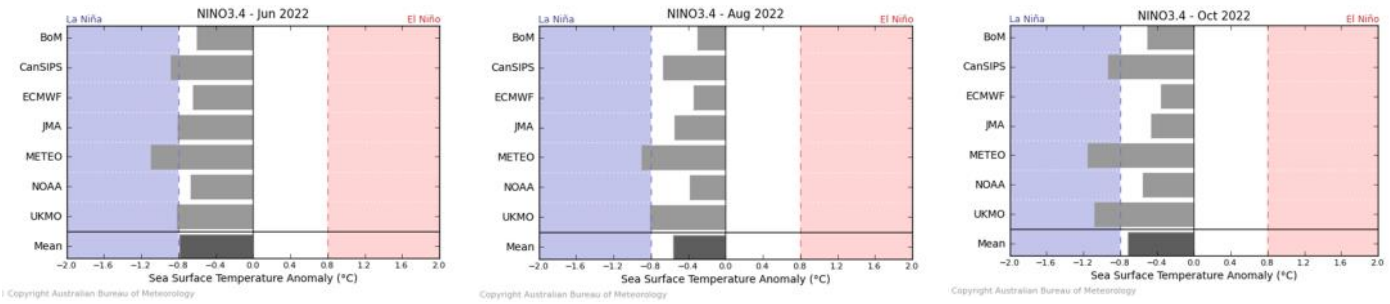
Bureau of Meteorology NINO3.4 ENSO Model Outlooks for June, August and October



Bureau of Meteorology NINO3.4 International Model Outlooks



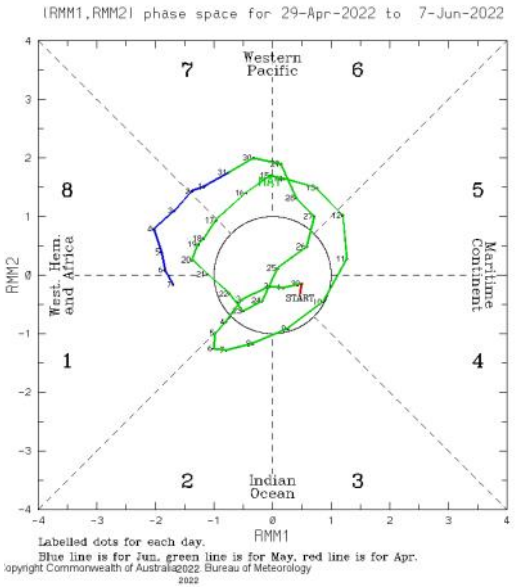
Bureau of Meteorology summary of international model outlooks for NINO3.4: http://www.bom.gov.au/climate/model-summary/#tabs=Pacific-Ocean

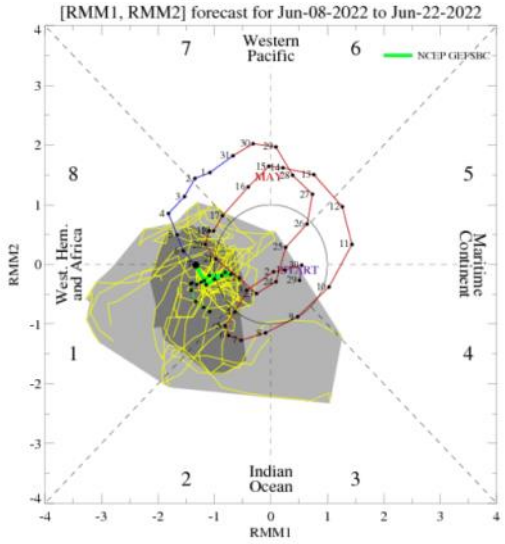
MADDEN–JULIAN OSCILLATION

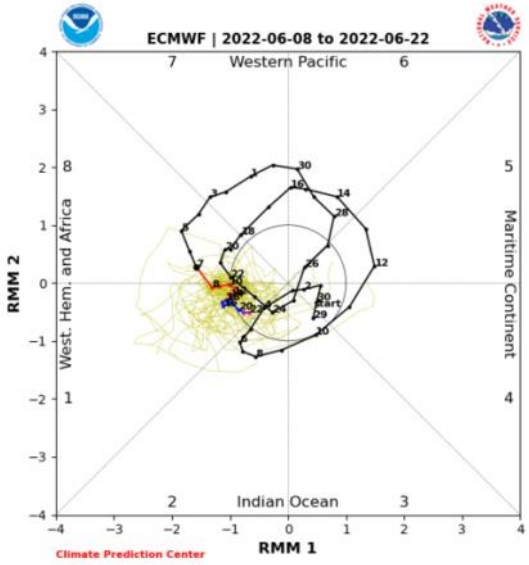
Click link to access *Tropical Climate Update* [Issued on Tuesday 07 June 2022]

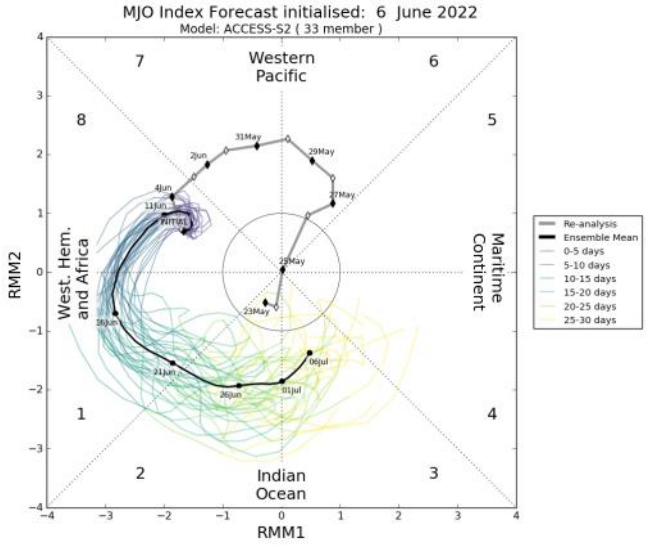
During the month of May, a moderate to strong pulse of Madden-Julian Oscillation (MJO) occurred during the 11-21 and 27-29 day of the month affecting the Maritime continent towards the Western Hemisphere and Africa. There was a period during the first and last week of May when the MJO was not active. The Madden-Julian Oscillation (MJO) is currently at moderate strength over the western hemisphere, and is expected to strengthen in the coming weeks. The MJO is contributing to the enhanced westerly wind anomalies currently observed in the western Pacific, which typically act to weaken La Niña events. .

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







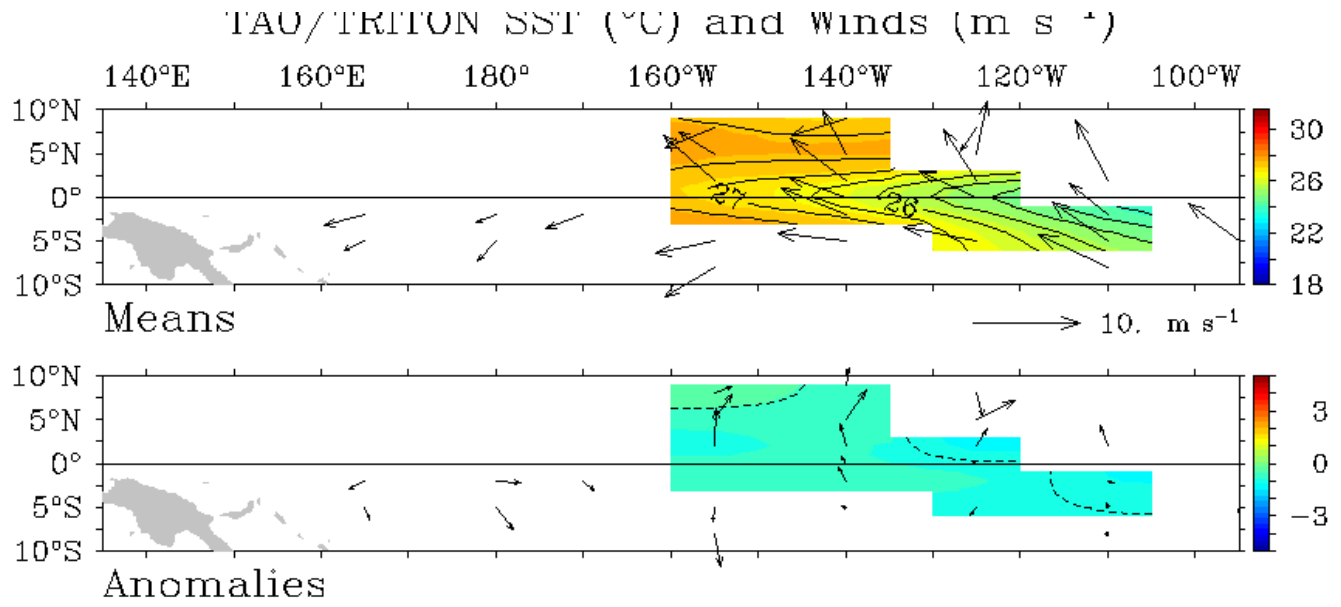


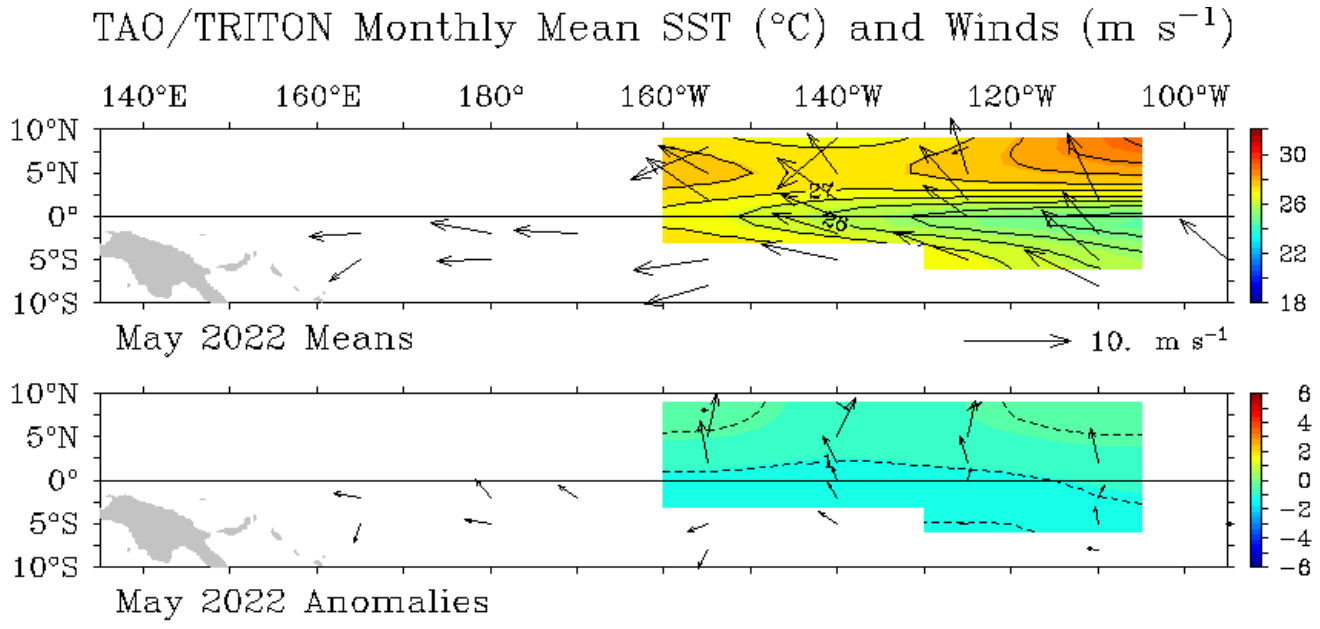
WIND

Click link to access Wind plots link

The trade winds in May were stronger over the equatorial Pacific especially over the central and western equatorial Pacific.

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





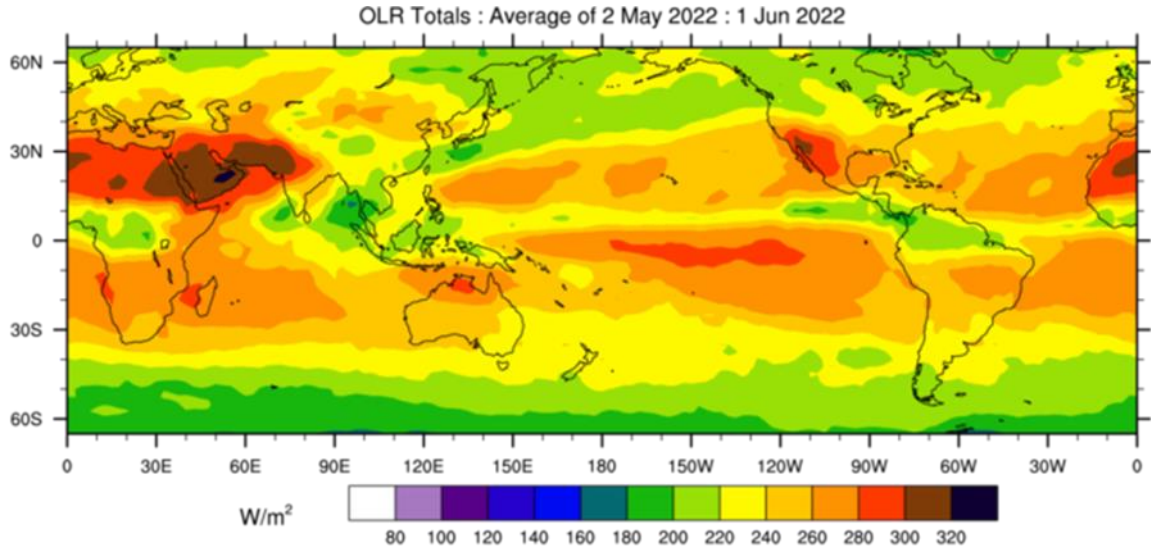
CLOUD AND RAINFALL

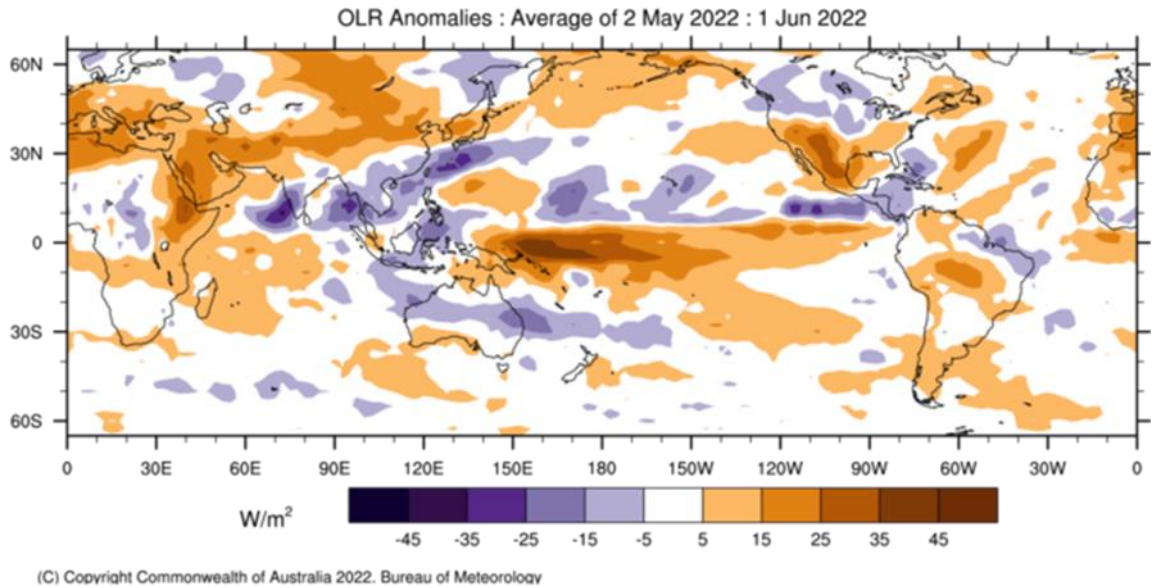
Click link to access OLR

The May 30-day OLR total and anomaly maps suggest the Intertropical Convergence Zone (ITCZ) was active and shifted north over the central and eastern equatorial Pacific, while the South Pacific Convergence Zone (SPCZ) was not active.

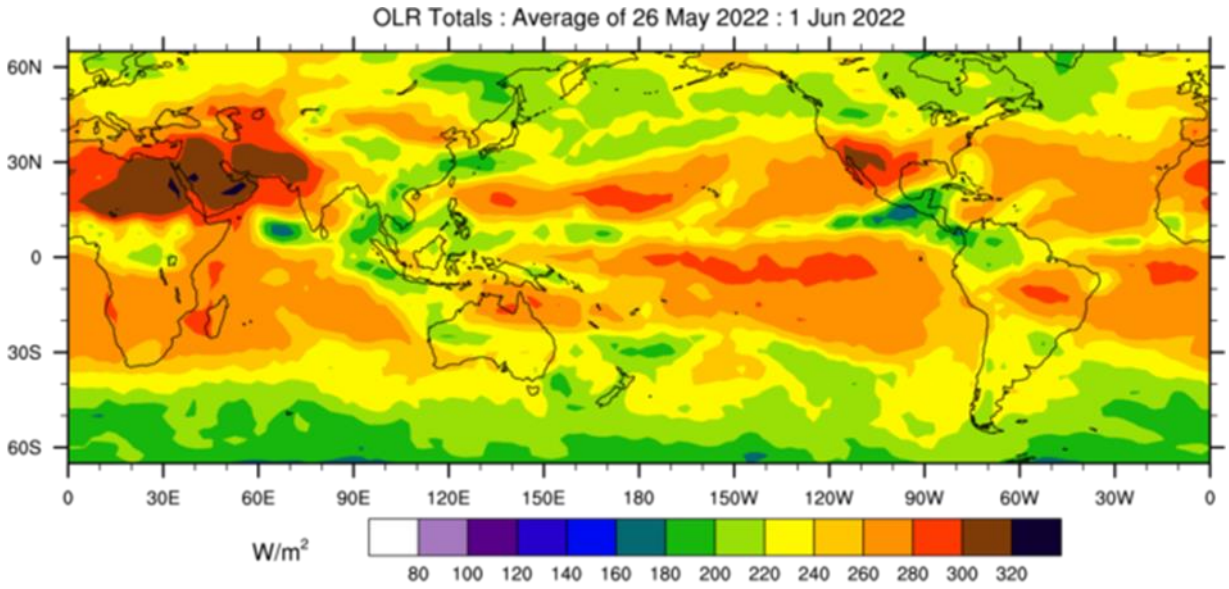
Note: Global maps of OLR below highlight regions experiencing increased or decreased cloudiness. The top panel is the total OLR in Watts per square metre (W/m^2) and the bottom panel is the anomaly (current minus the 1979-1998 climate average), in W/m^2. In the bottom panel, negative values (blue shading)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

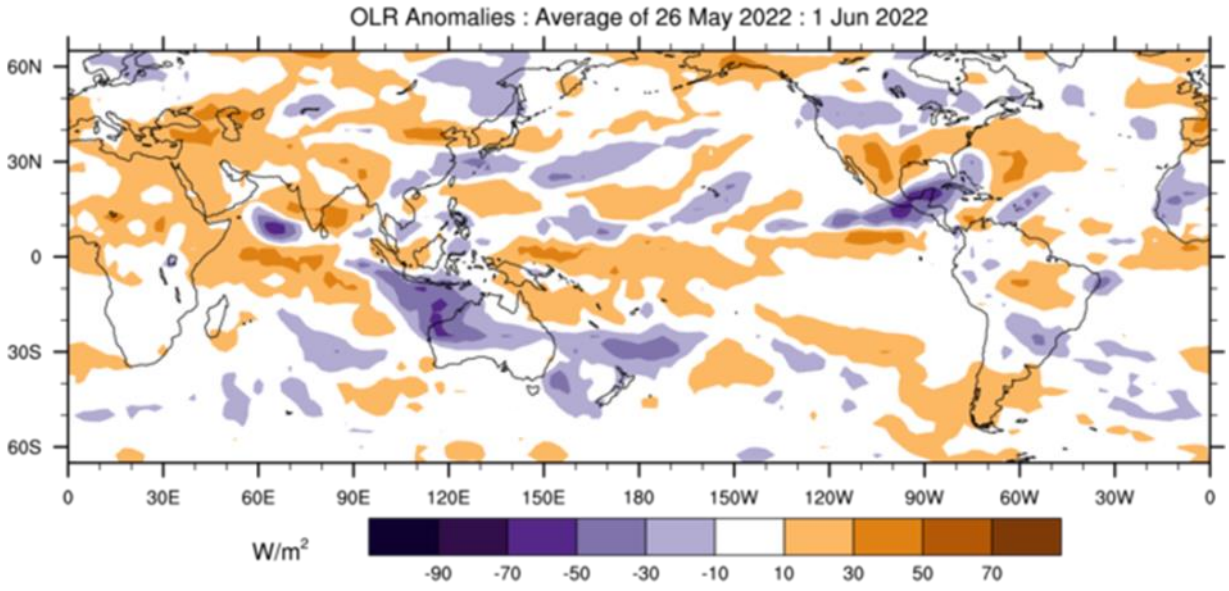
OLR Total and Anomalies, 30 Day OLR

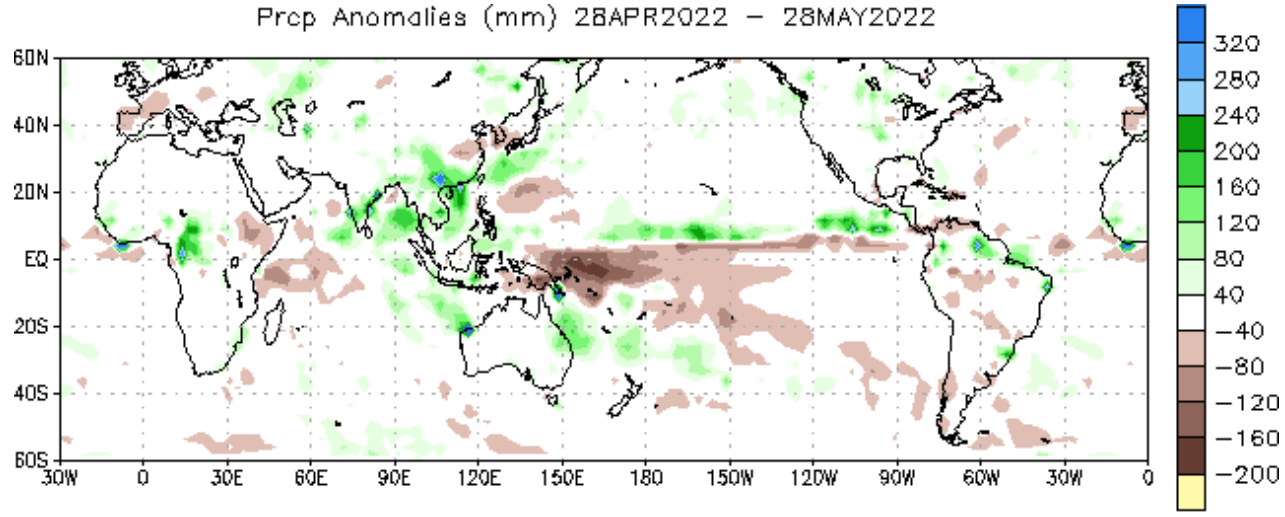




OLR Total and Anomalies, 7 Day OLR

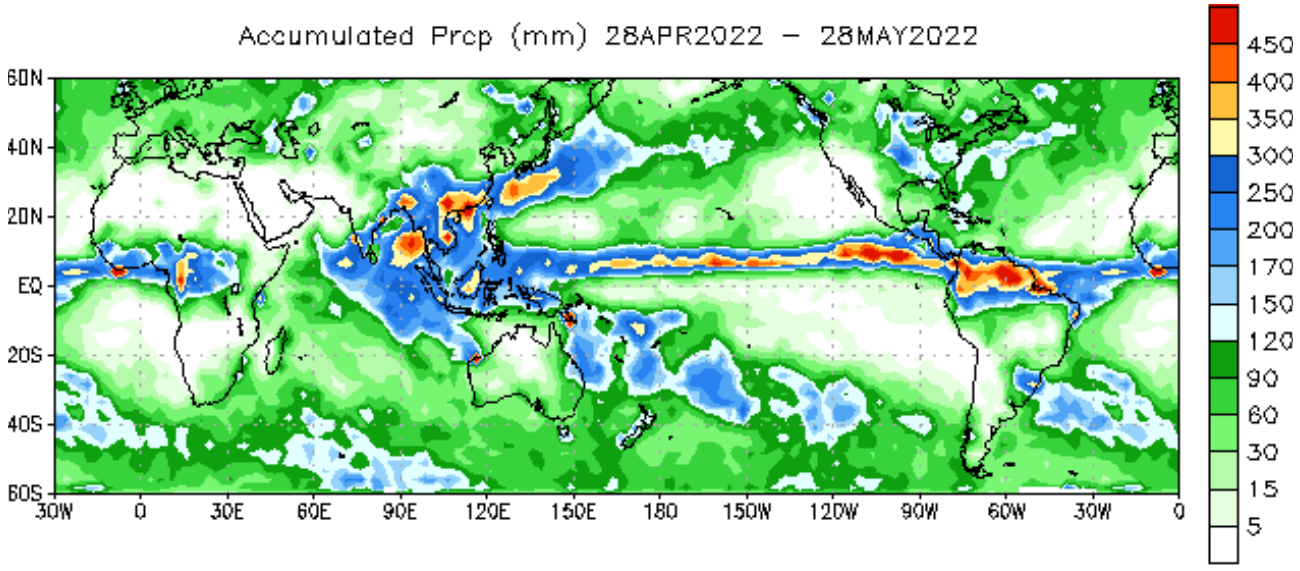




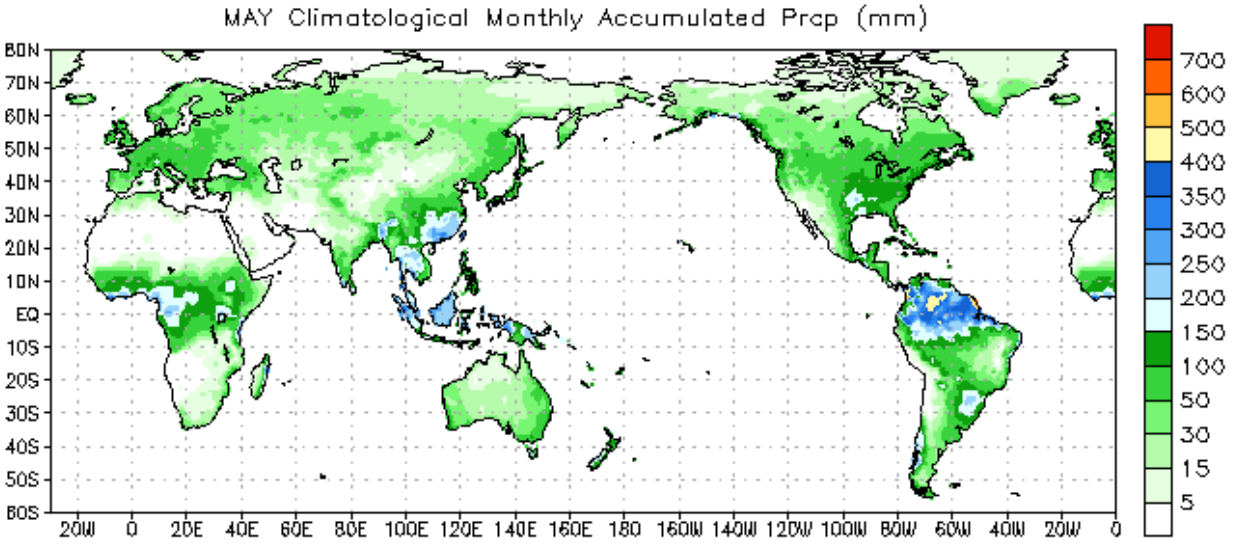


Data Source: NCEP CMAP Precipitation Climatology (1991–2020)

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

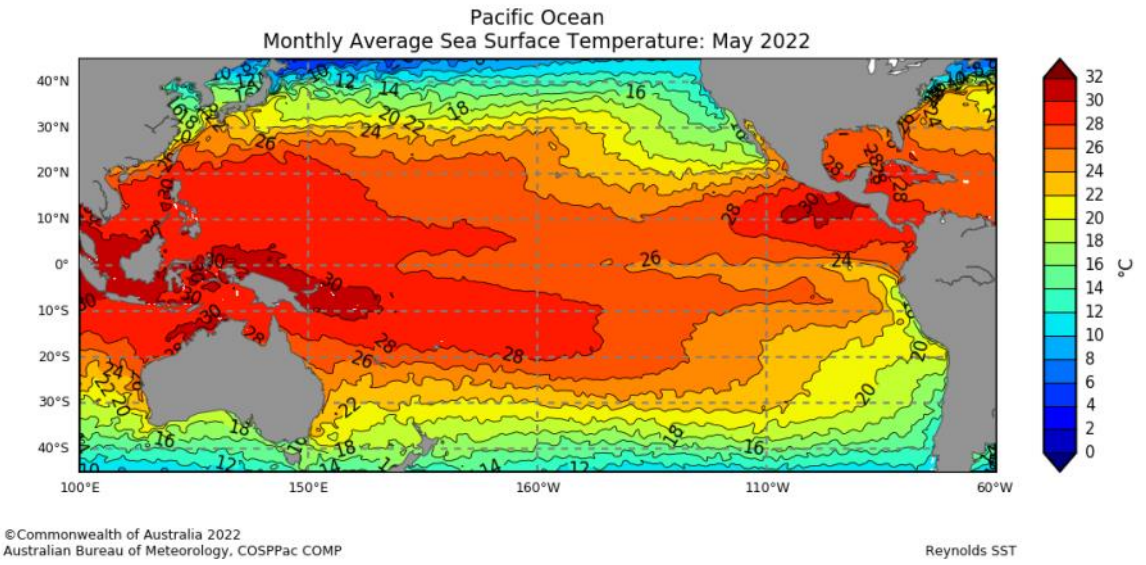
SEA SURFACE TEMPERATURE

Click link to access Pacific Community COSPPac Ocean Portal

The SSTs for May 2022 show cool SST anomalies across the central to eastern equatorial Pacific (eastwards of about 165 °E) and along the coastline of South America, and warm SST anomalies over parts of the Maritime Continent. Compared to March, cool anomalies in the central to eastern tropical Pacific have strengthened, while in the west SST anomalies are closer to average than they were during March.

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

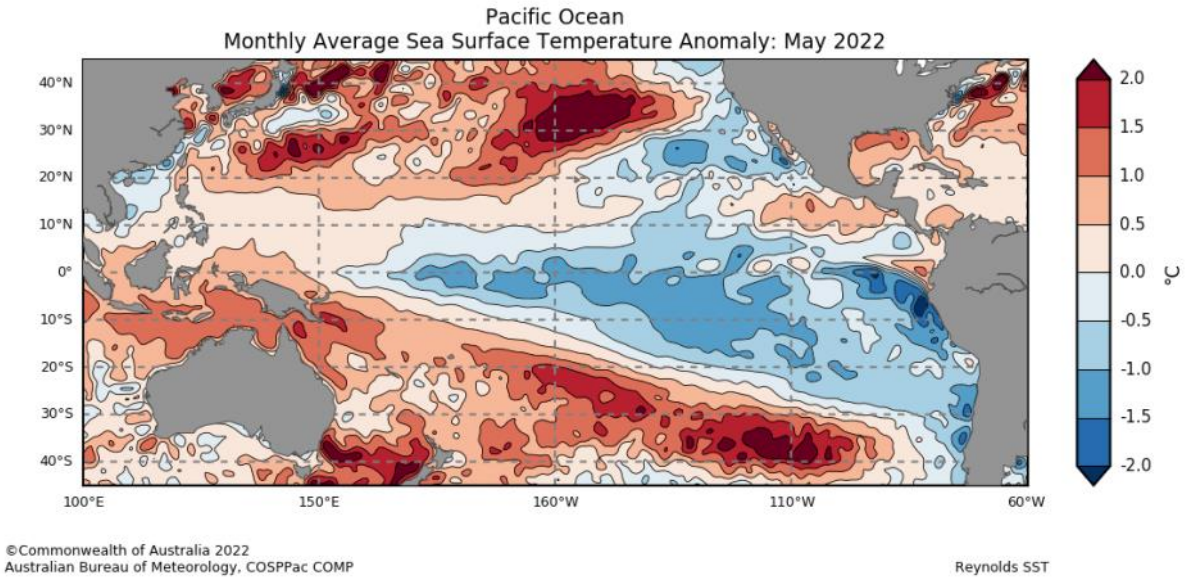
Mean Sea Surface Temperature



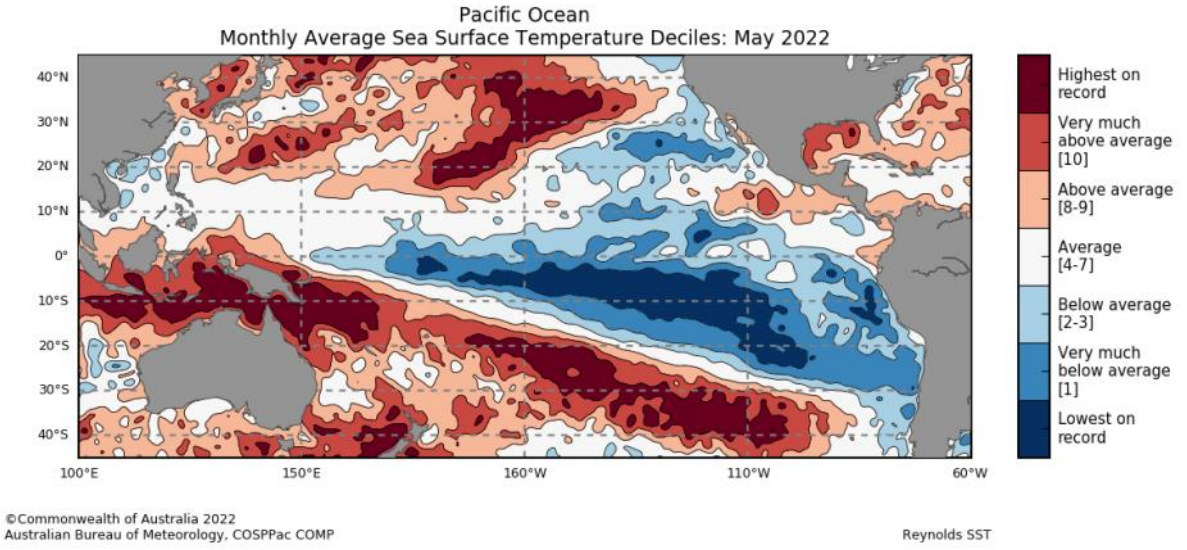
OCEAN CONDITIONS

Click link to access SEA SURFACE TEMPERATURE

Anomalous Sea Surface Temperature



Sea Surface Temperatures Deciles

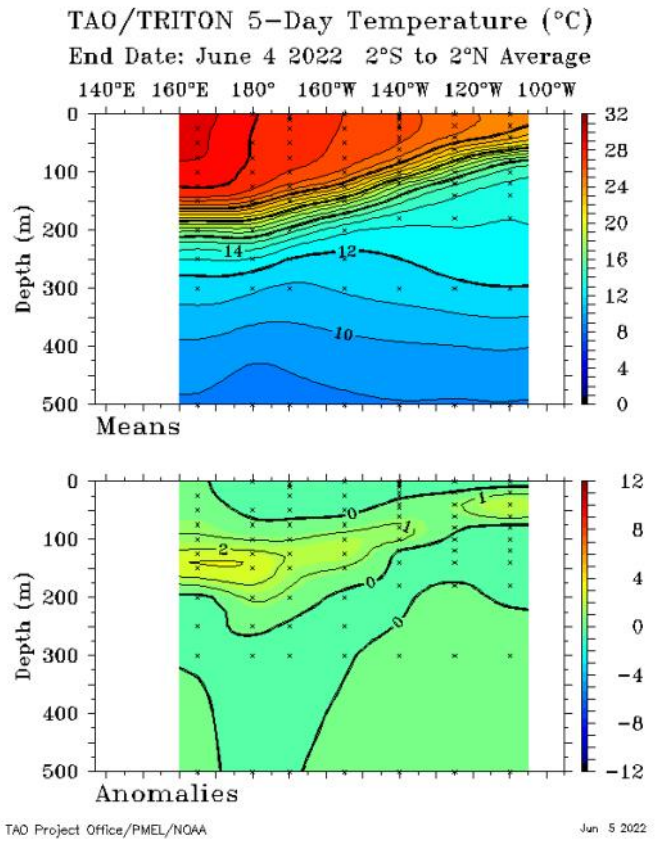


OCEAN CONDITIONS

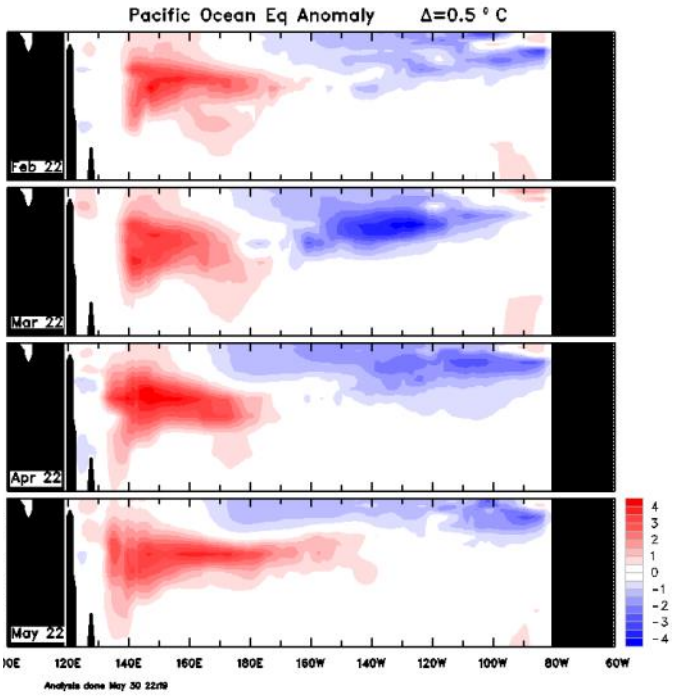
SUB SURFACE

The four-month sequence of equatorial Pacific sub-surface temperature anomalies (to May 2022) shows weak cool anomalies in the central Pacific tending to moderate in the far eastern tropical Pacific. Cool anomalies were present across most of the top 100 m of water from 165 ° E eastwards, but exceed 1.5 °C to 2 °C cooler than average in some areas east of 120 °W. The strength of sub-surface cool anomalies has declined month-on-month since March. Warm anomalies continue in the western to central equatorial Pacific, spanning nearly the full column depth west of 140 °E, and underlying the weak cool anomalies east of the 165 °E to around 135 °W, extending down to around 200 m depth. Warm anomalies remain similar in strength to April and March, but extend much farther eastward than in either month.

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/

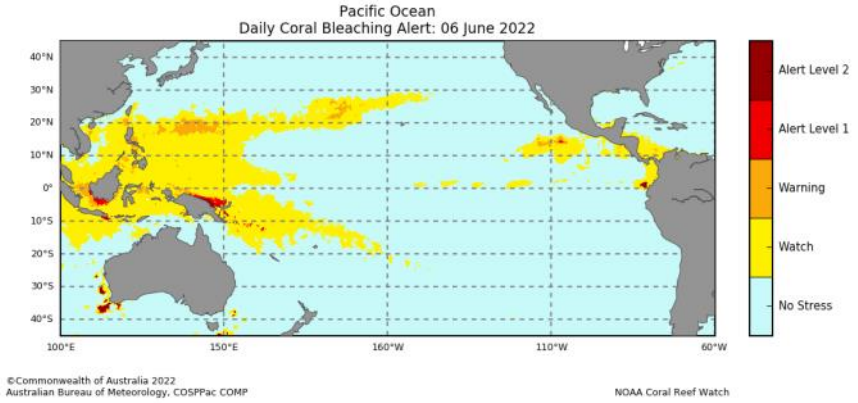
OCEAN CONDITIONS

CORAL BLEACHING

The daily Coral Bleaching Alert for 06th June 2022 shows 'Alert Level 2' and 'Alert 1' for parts of northern PNG mainland. 'Warning' for CNMI while 'No Stress or Watch' for the rest of COSPPac partner countries. The four weeks Coral Bleaching Outlook to 26th June 2022 shows 'Alert Level 2' and 'Alert Level 1' for northern and southeastern PNG mainland. 'Warning' alert for Palau and western and southern FSM and part of western Solomon Islands. 'No Stress or Watch' for the rest of COSPPac partner countries.

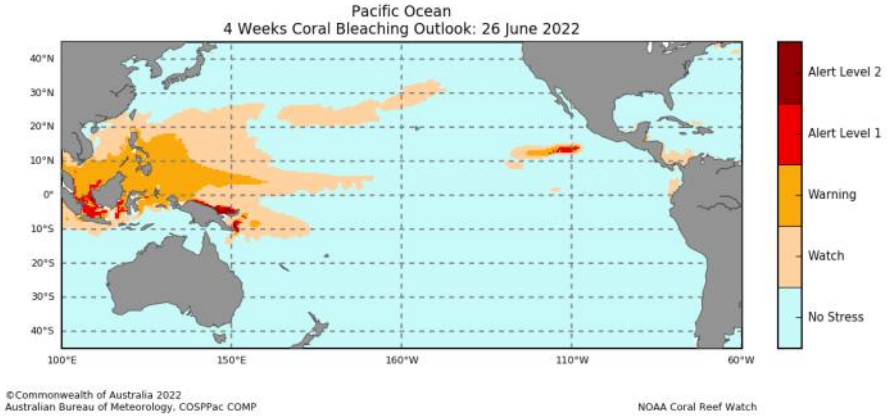
Daily Coral Bleaching Alert

(Source: Pacific Community COSPPac Ocean Porta Coral Bleaching)



4 Weeks Coral Bleaching Outlook

(Source: Pacific Community COSPPac Ocean Portal)



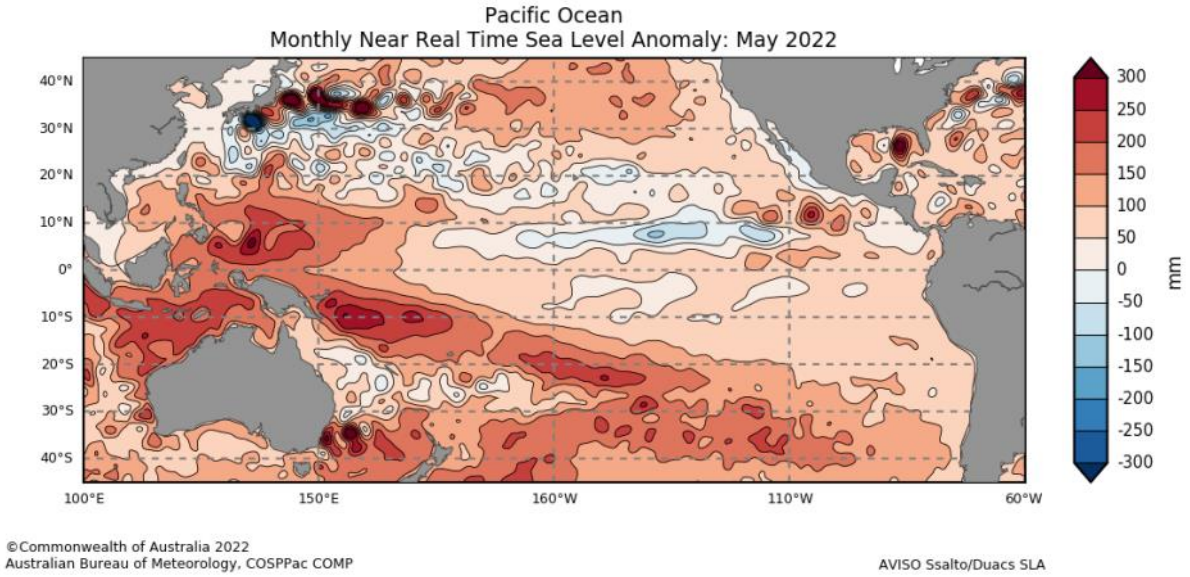
OCEAN CONDITIONS

OCEAN SURFACE CURRENTS AND SEA LEVEL

Sea level was above normal for most of the COSPPac countries. The highest anomalies above 300mm were observed in eastern Palau, parts of southeastern PNG and western Solomon Islands. Sea level of 200mm and 250mm were observed in Palau, western FSM, southeastern PNG, most of Solomon Islands, northern Vanuatu, Niue, southern Cook Islands and southern French Polynesia. Sea level of 100mm to 200mm were observed for rest of FSM, RMI, PNG, Nauru, Vanuatu, southern Tuvalu, Fiji, Tonga, Samoa, and central Cook Islands while 50mm observed at southeastern RMI, northern Tuvalu, Kiribati and northern Cook Islands and French Polynesia. Patches of near normal to below normal sea levels were observed over parts of eastern Kiribati and western New Caledonia.

Monthly Sea Level Anomalies

Source: Pacific Community COSPPac Ocean Portal

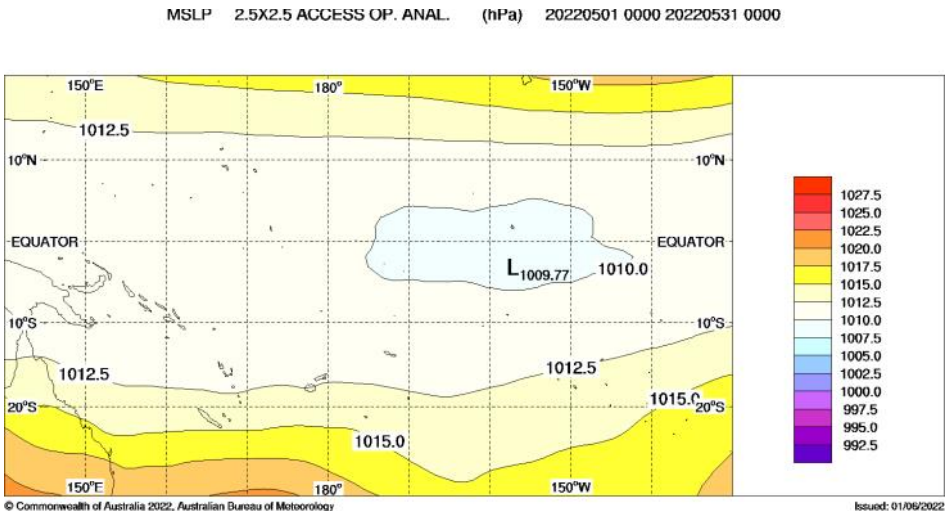


MEAN SEA LEVEL PRESSURE

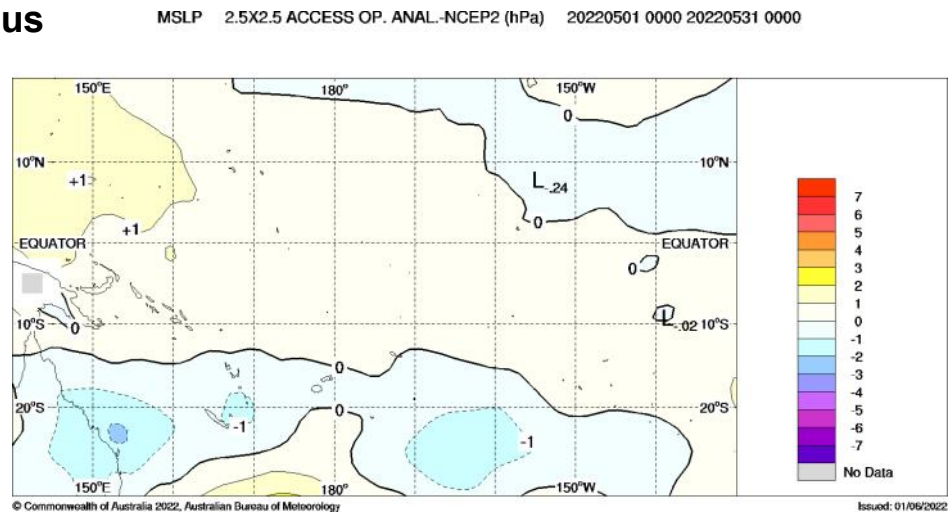
The May mean sea level pressure (MSLP) anomaly map shows mostly positive anomalies of -1 or greater over northern PNG, FSM, Guam and CNMI. Negative anomalies of +1 were observed in New Caledonia, southern Vanuatu and the Coral Sea region.

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

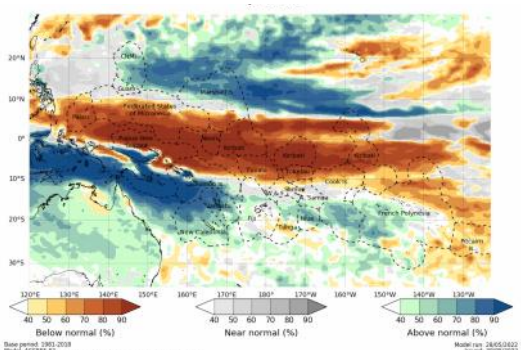
SEASONAL RAINFALL OUTLOOK

June—August 2022

The ACCESS-S model forecast for June 2022, the dry signal is weaker compared to last month's forecast but extend further west and is very likely to cause below normal rainfall for Palau, FSM, southern RMI, northern PNG, northern Solomon Islands, Nauru, Kiribati, Tuvalu, Tokelau, the northern Cook Islands, northern French Polynesia and Pitcairn Island. The wetter than normal signal is also stronger compared to last month's forecast especially for the southwest Pacific Islands with above normal rainfall is very likely for southern CNMI, northern RMI, western and southeast PNG, most of Solomon Islands, New Caledonia, Vanuatu, central Tonga, Niue, southern Cook Islands and central French Polynesia.

The three-month rainfall outlook (June-August 2022) shows a larger region of dry signal than the forecast issued last month very likely to affect eastern Palau, FSM, northern PNG, southern RMI, northern Solomon Islands, Nauru, Kiribati, Tuvalu, Tokelau, northern Cook Islands, northern French Polynesia and Pitcairn Island. The models show an increased chance of wetter very likely for northern CNMI, central RMI, most PNG, southern Solomon Islands, New Caledonia, Vanuatu, Tonga, Niue, central Cook Islands and parts of central French Polynesia. Above normal maximum and minimum temperatures are very likely for most COSPPac countries, except for countries east of 155°E, namely Nauru, central and southern RMI, Kiribati, 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 June-August 2022 is very likely to be below normal rainfall for Palau, western FSM, PNG Islands, western and northern Solomon Islands, Nauru, 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 Marshall Islands, western and southeastern PNG, New Caledonia, Vanuatu, Fiji, Tonga, Niue and southern Cook Islands.

The SCOPIC statistical model forecast for June-August 2022 is very likely to be above normal rainfall for PNG Momase and southern region, Vanuatu, most of Fiji, Samoa, Niue and southern Cook Islands. Below normal rainfall is very likely for PNG Islands, western Solomon Islands, Rotuma, Kiribati, Tuvalu, southern Tonga and northern Cook Islands.

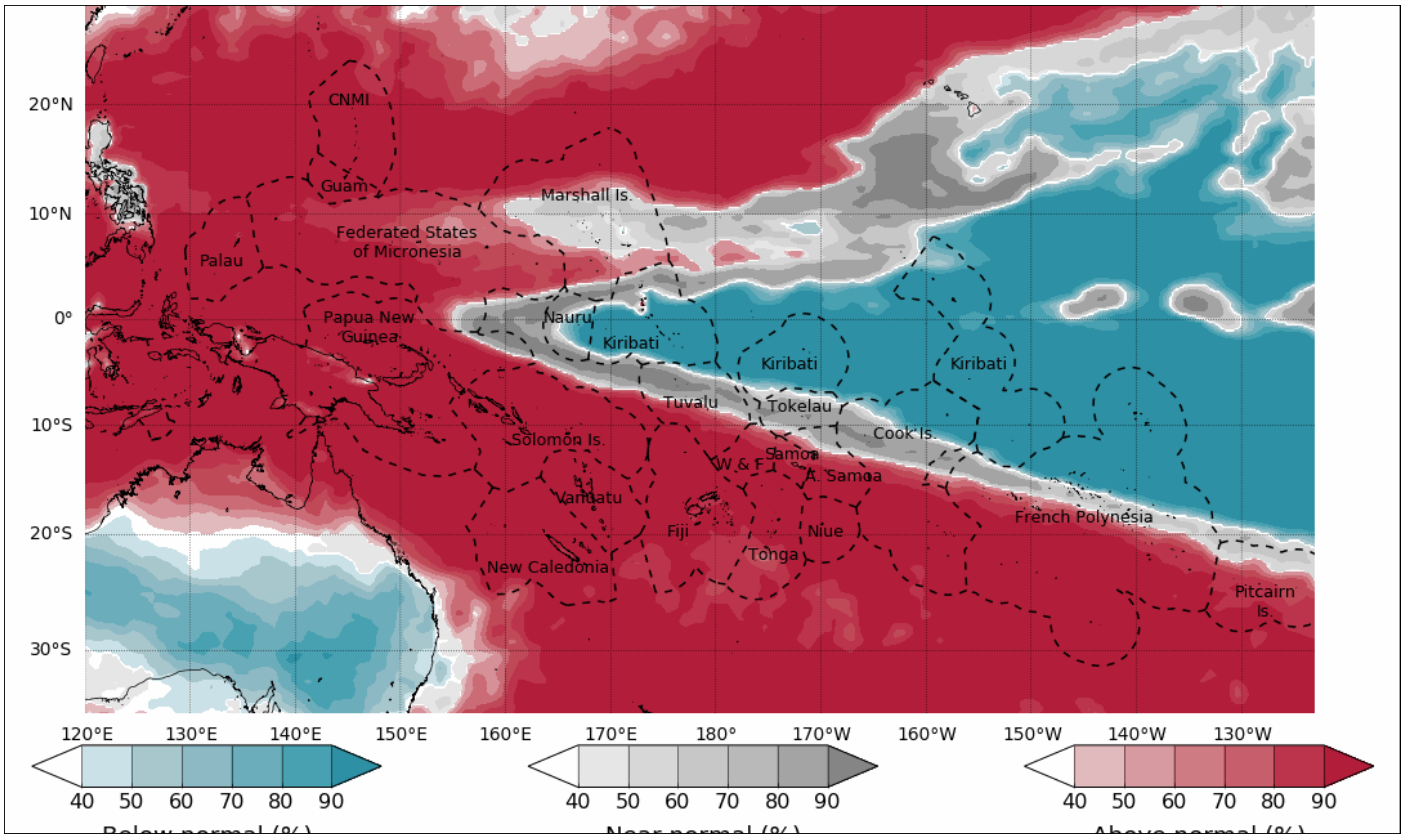
The APEC Climate Centre multi-model for June-August 2022 forecast is very likely to be below normal rainfall for Palau, northern FSM, northern PNG, western and northern Solomon Islands, Nauru, Kiribati, Tuvalu, Samoa, American Samoa, Tokelau, northern Cook Islands, northern French Polynesia and Pitcairn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

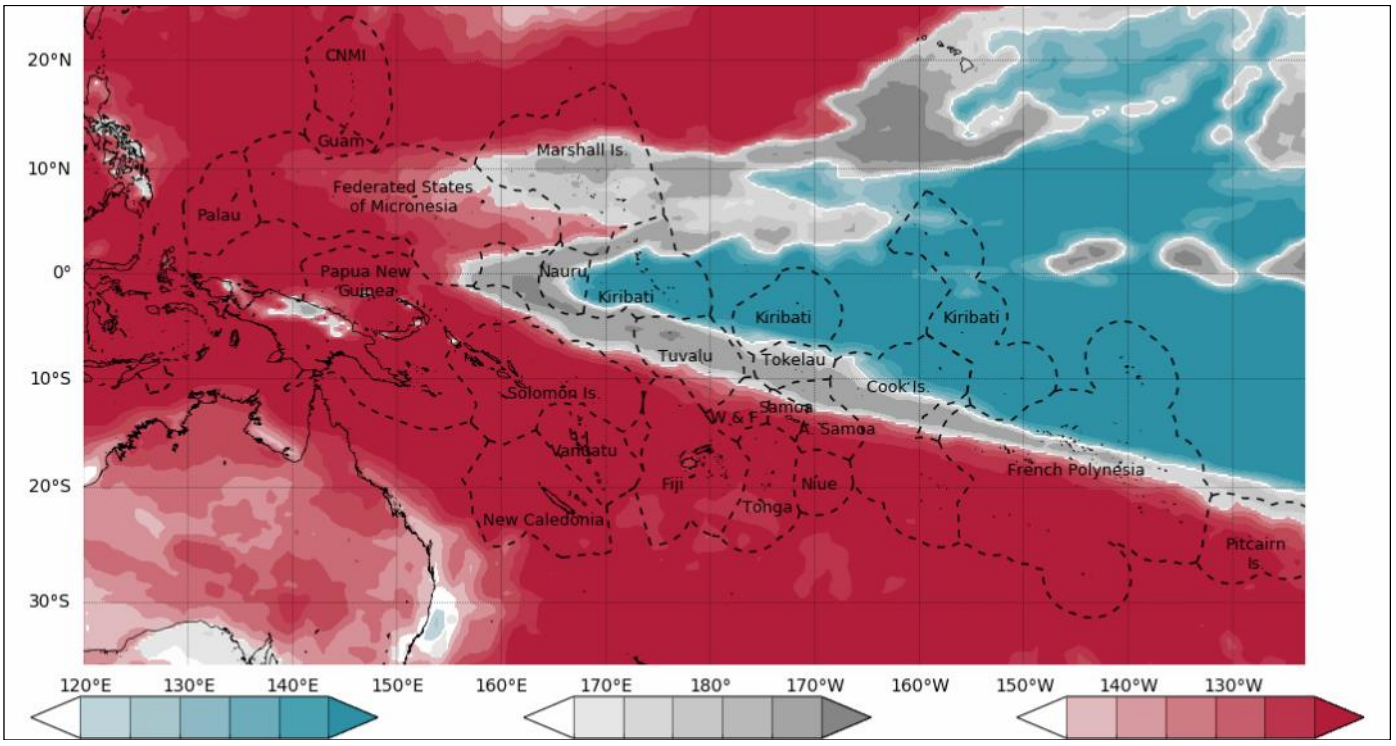
For June-August 2022, the dynamical models (including SCOPIC) agree on above normal rainfall for southern RMI, most of PNG mainland, southern Solomon Islands, New Caledonia, Vanuatu, Fiji, Tonga, Niue, and southern Cook Islands. The models also agree on below normal rainfall is very likely for Palau,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

SEASONAL TEMPERATURE OUTLOOK

June—August 2022

Monthly Tmax and Tmin ACCESS-S Maps

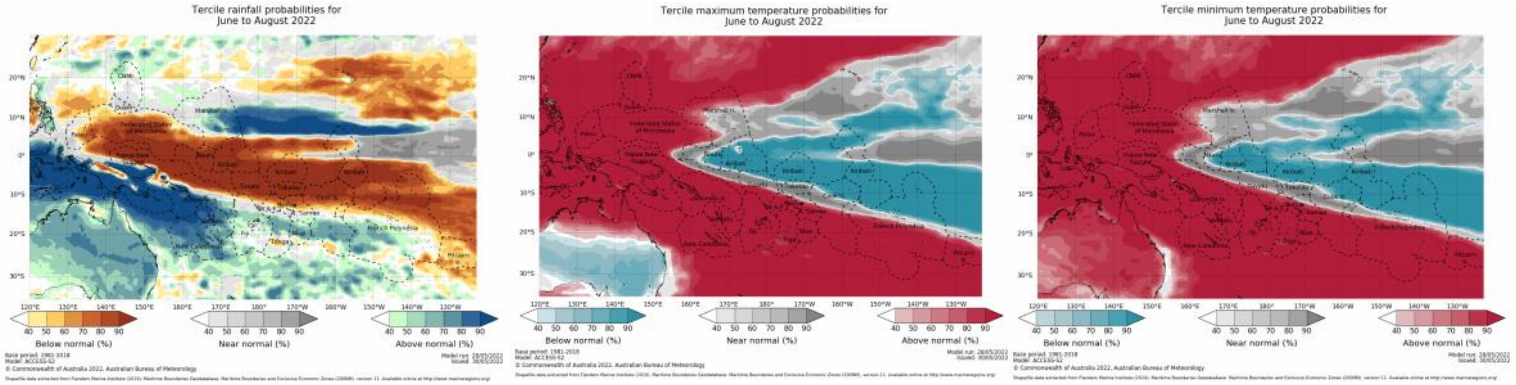




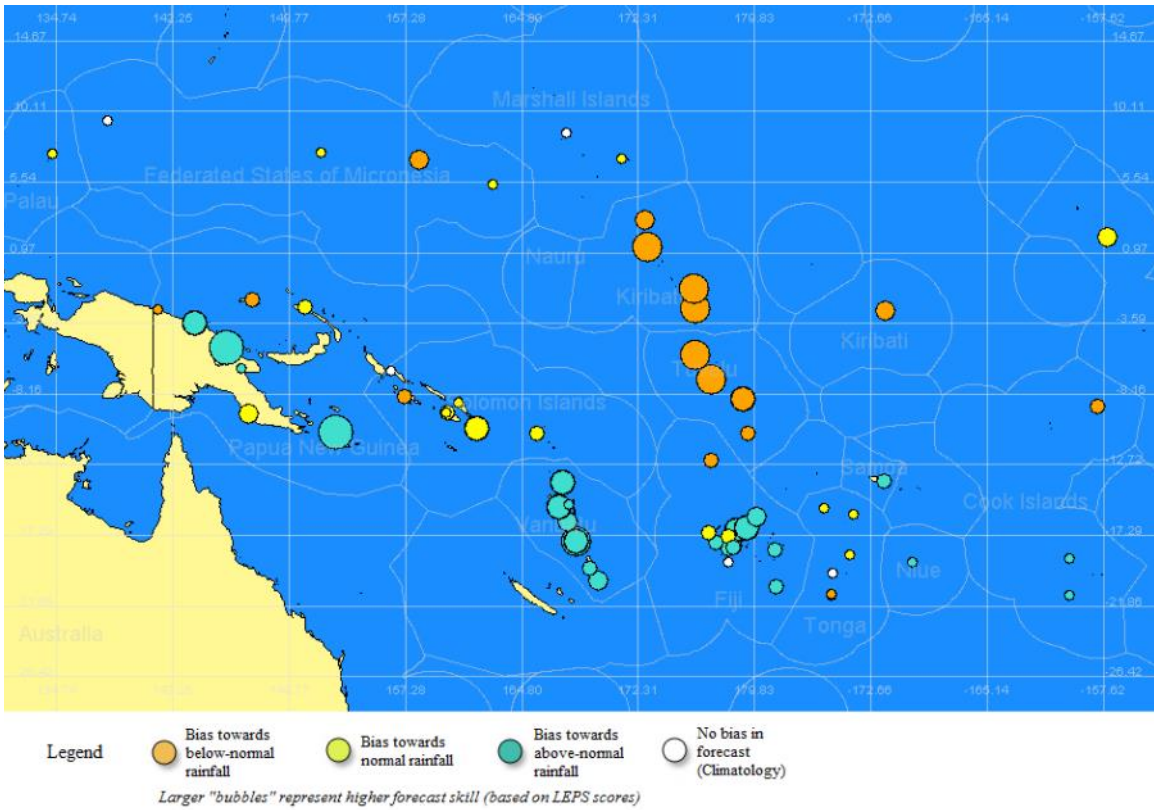
SEASONAL RAINFALL OUTLOOK

June—August 2022

Seasonal ACCESS-S maps



SCOPIC

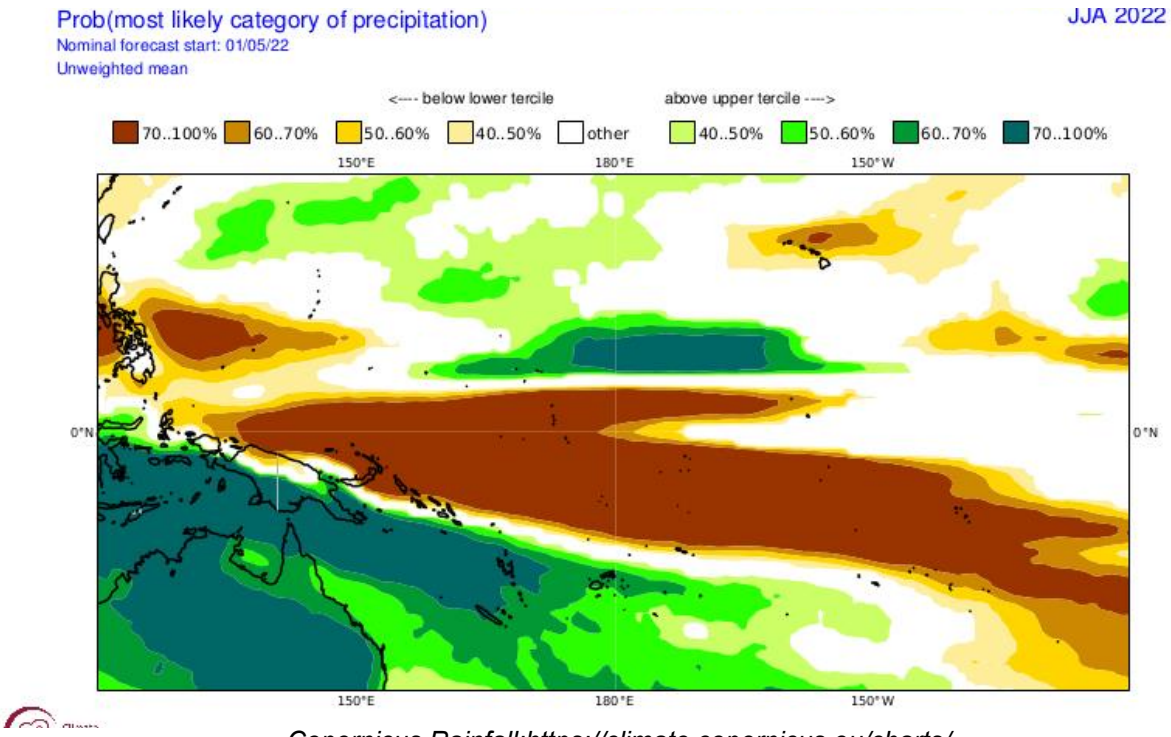


'About SCOPIC' www.pacificmet.net/project/climate-and-ocean-support-program-pacific-cosppac

SEASONAL RAINFALL OUTLOOK

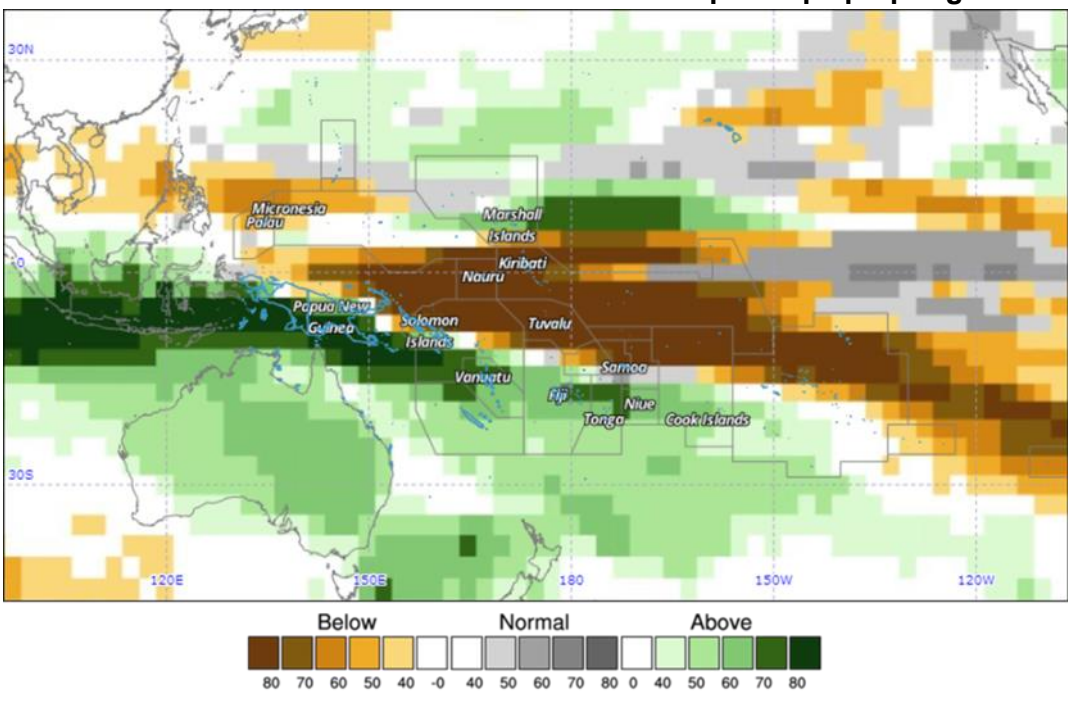
June—August 2022

Copernicus (C3S multi-system)-Rainfall



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

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



Year: 2022, Season: JJA, Lead Month: 3, Method: GAUS
Model: APCC, CMCC, CWB, MSC, NCEP, PNU, POAMA
Generated using CLIKP (2022-6-6)

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TROPICAL CYCLONE

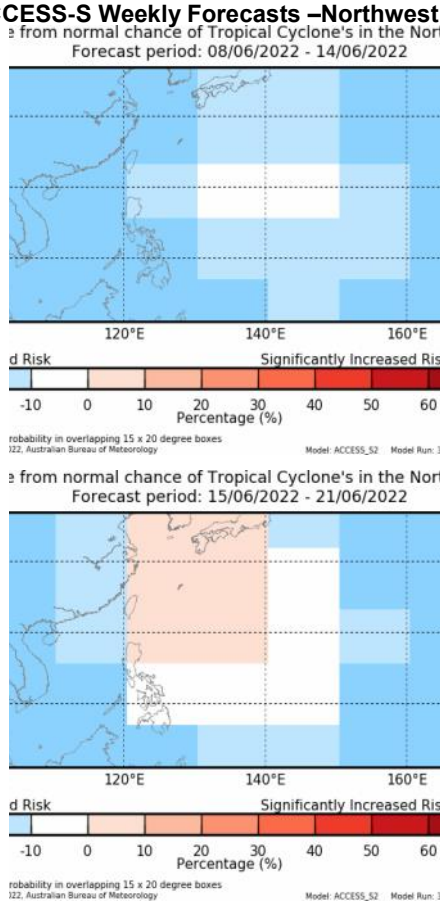
2021/2022 Season

In the southwest Pacific, the 2021-22 tropical cyclone has ended on 30th April 2022. The outlook for the season was for enhanced risk for tropical cyclone activity in the western part of the basin over November to April. In the central part of the region, cyclone risks are generally near normal, with reduced chances farther east. Seven named TCs (Ruby, Seth, Cody, Dovi, Tiffany, Eva and Fili) formed from east of the longitude of the tip of Cape York, Australia. Two cyclones reached category three status, including Dovi and Coby. TC activity in the Western North Pacific occurs year around and with the weakening La Niña conditions, a preliminary cyclone outlook for the northwest Pacific is for near-average seasonal activity.

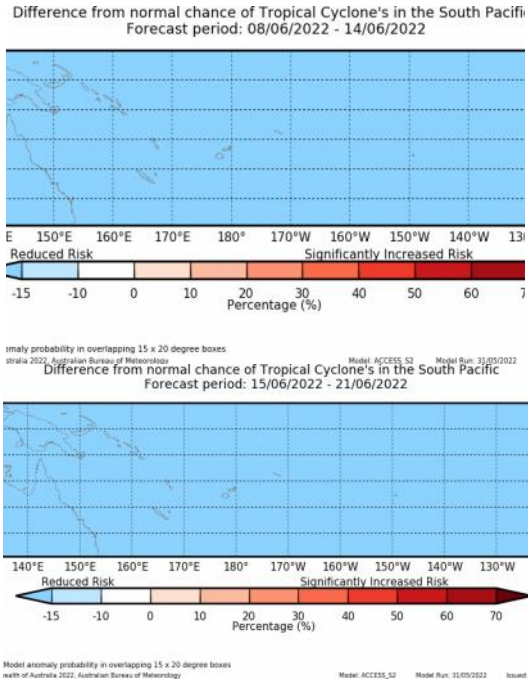
It's important to remember that it does not take a severe cyclone to produce severe impacts. Coastal and river flooding rainfall can occur with a distant, weak or former cyclone. Communities should remain vigilant, and follow forecast information provided by their National Meteorological and Hydrological Service (NMHS).

The weekly tropical cyclone forecast from the ACCESS-S model shows reduced risk in the weeks beginning 08 June and ending 14 June 2022 for northwest Pacific. There is increase risk for northern Philippines and Japan for the week 15 to 21 June 2022.

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/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.

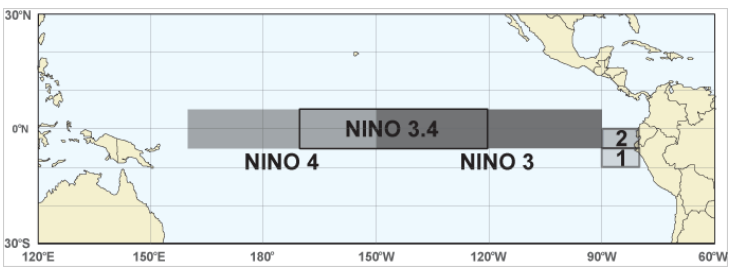
20 degrees Celsius Isotherm Depth

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