

Monthly Climate Bulletin

April 2021



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Photo Credit: Anetone Sagaga & Samoa Met (December 2020 Samoa Flooding)



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SUMMARY

Issued 10 May 2021

- El Niño Southern Oscillation (ENSO) remains neutral. Climate model outlooks indicate this neutral phase will last at least until September.
- A moderate to strong Madden-Julian Oscillation (MJO) pulse is expected to move eastwards from American longitudes towards tropical Africa.
- The Intertropical Convergence Zone (ITCZ) was active and shifted north of its normal position while the South Pacific Convergence Zone (SPCZ) was active and shifted to the southwest of normal.
- The sea surface temperature anomaly pattern in April shows the classic shape of a decaying La Niña with warm conditions in majority of the countries and distinct cooling along the equator, east of Nauru.
- Coral bleaching was on watch for almost all countries with patches of warning in PNG and Cook Islands.
- For sea level, a noticeable higher than normal in Solomon Islands, by 350mm.
- For May to July 2021, the dynamical models (as well as SCOPIC) agree on above normal rainfall for FSM, Marshall Islands, the southern and Momase regions of PNG, New Caledonia, Vanuatu, Fiji, Tonga, Niue, southern Cook Islands and southern French Polynesia. The models also agree on below normal rainfall for Nauru, Kiribati, Tuvalu, northern Cook Islands and central and northern French Polynesia.

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EL NIÑO–SOUTHERN OSCILLATION

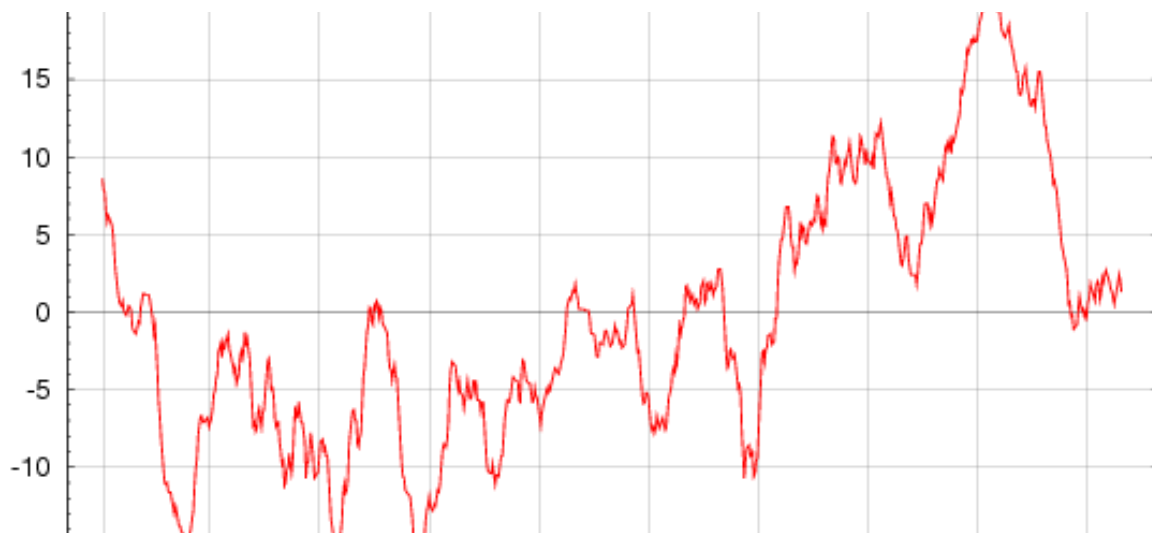
El Niño Southern Oscillation likely to remain neutral for southern Hemisphere Winter

Click link to access [Climate Driver Update issued on 27 April 2021](#)

The El Niño Southern Oscillation (ENSO) remains neutral. Climate model outlooks indicate this neutral phase will last at least until September. With little sign of El Niño or La Niña developing, the Bureau's ENSO Outlook status is INACTIVE.

Oceanic indicators of ENSO persist at neutral levels, with Pacific sea surface temperatures close to average across most of the equatorial region. Beneath the surface, temperatures are also near -average. The Southern Oscillation Index (SOI), an atmospheric indicator of ENSO, has now seen both the 30-day and 90-day SOI return to neutral levels. Similarly, winds and cloudiness near the Date Line persist at levels consistent with a neutral ENSO state.

The 30-day Southern Oscillation Index (SOI) for the 30 days ending 25 April was +0.5. The 90-day SOI value was +6.0. Both are within ENSO neutral thresholds.



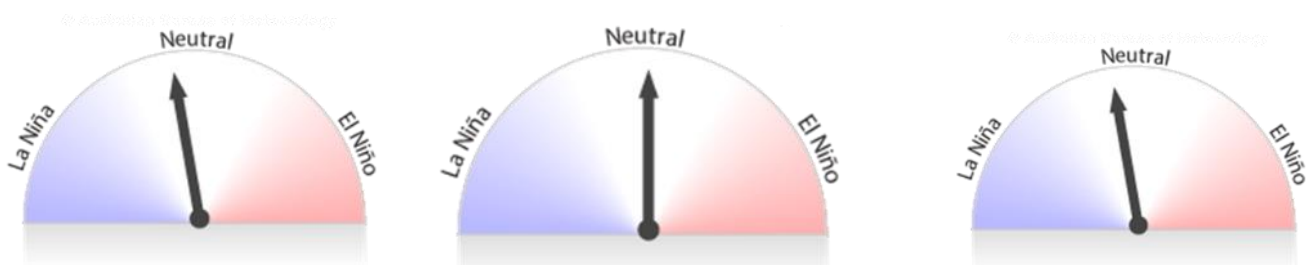


EL NIÑO–SOUTHERN OSCILLATION

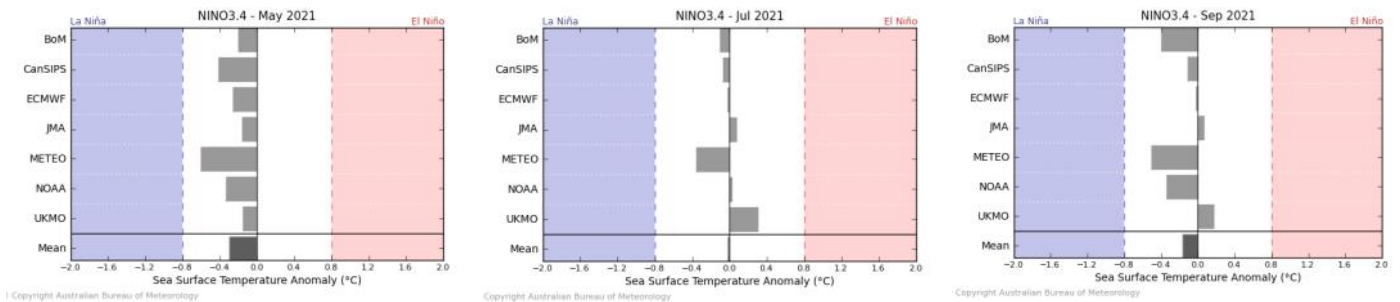
El Niño Southern Oscillation likely to remain neutral for southern Hemisphere Winter

Click link to access [Climate Driver Update issued on 27 April 2021](#)

Bureau of Meteorology NINO3.4 ENSO Model Outlooks for May, July and September



Bureau of Meteorology NINO3.4 International Model Outlooks



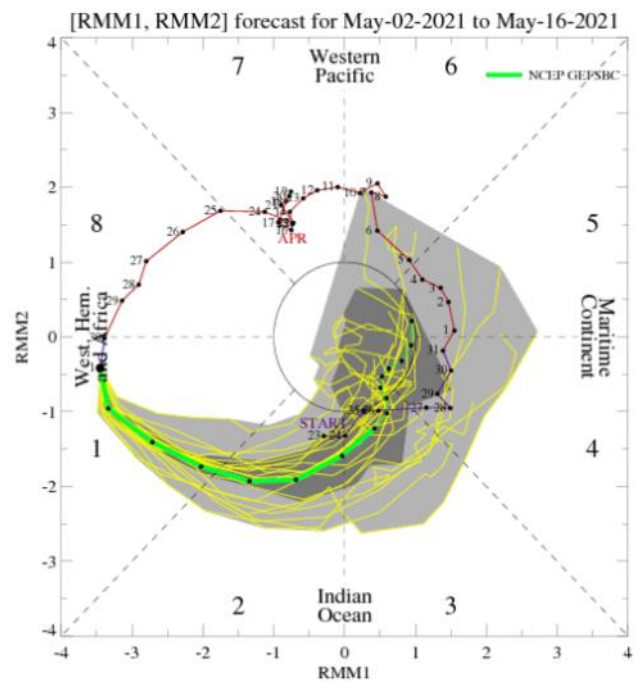
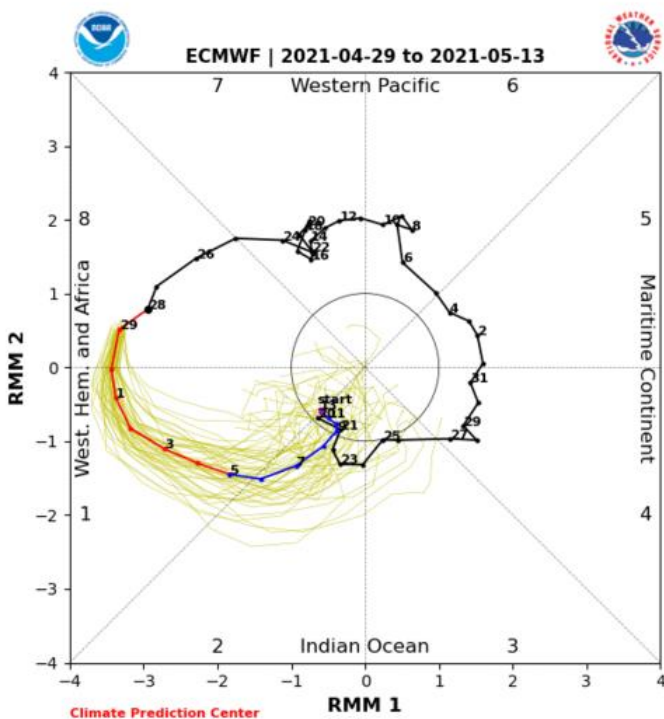
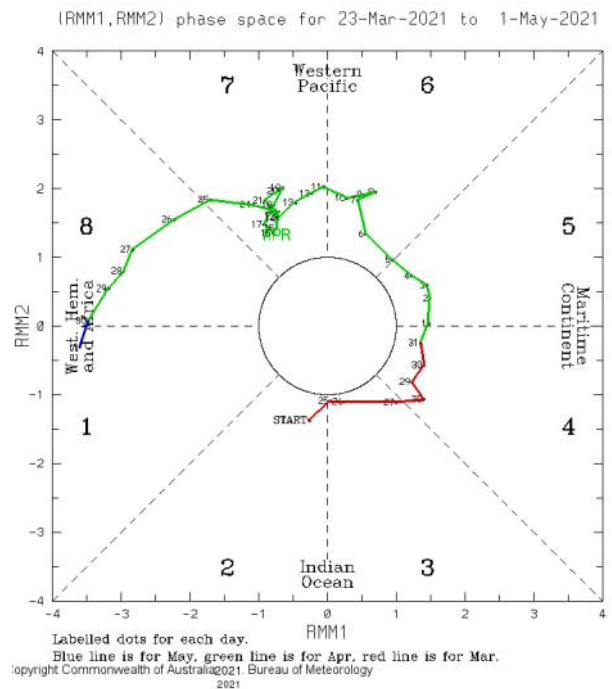
Bureau of Meteorology summary of international model outlooks for NINO3.4: <http://www.bom.gov.au/climate/model-summary/#tabs=Pacific-Ocean>

MADDEN–JULIAN OSCILLATION

Click link to access [Weekly Tropical Note](#) [Issued on Tuesday 27 April 2021]

The Madden-Julian Oscillation (MJO) remains moderate to strong and is currently located over American longitudes. The consensus amongst international climate models is for further eastwards movement of this MJO pulse towards tropical Africa, at a similar strength. At this time of the year, the influence of the MJO tends to affect the northern hemisphere tropics more than the southern hemisphere. As a result, an MJO pulse near tropical America or Africa has only a small influence on far northern Australia and typically acts to suppress rainfall across that region as well as the broader Maritime Continent.

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



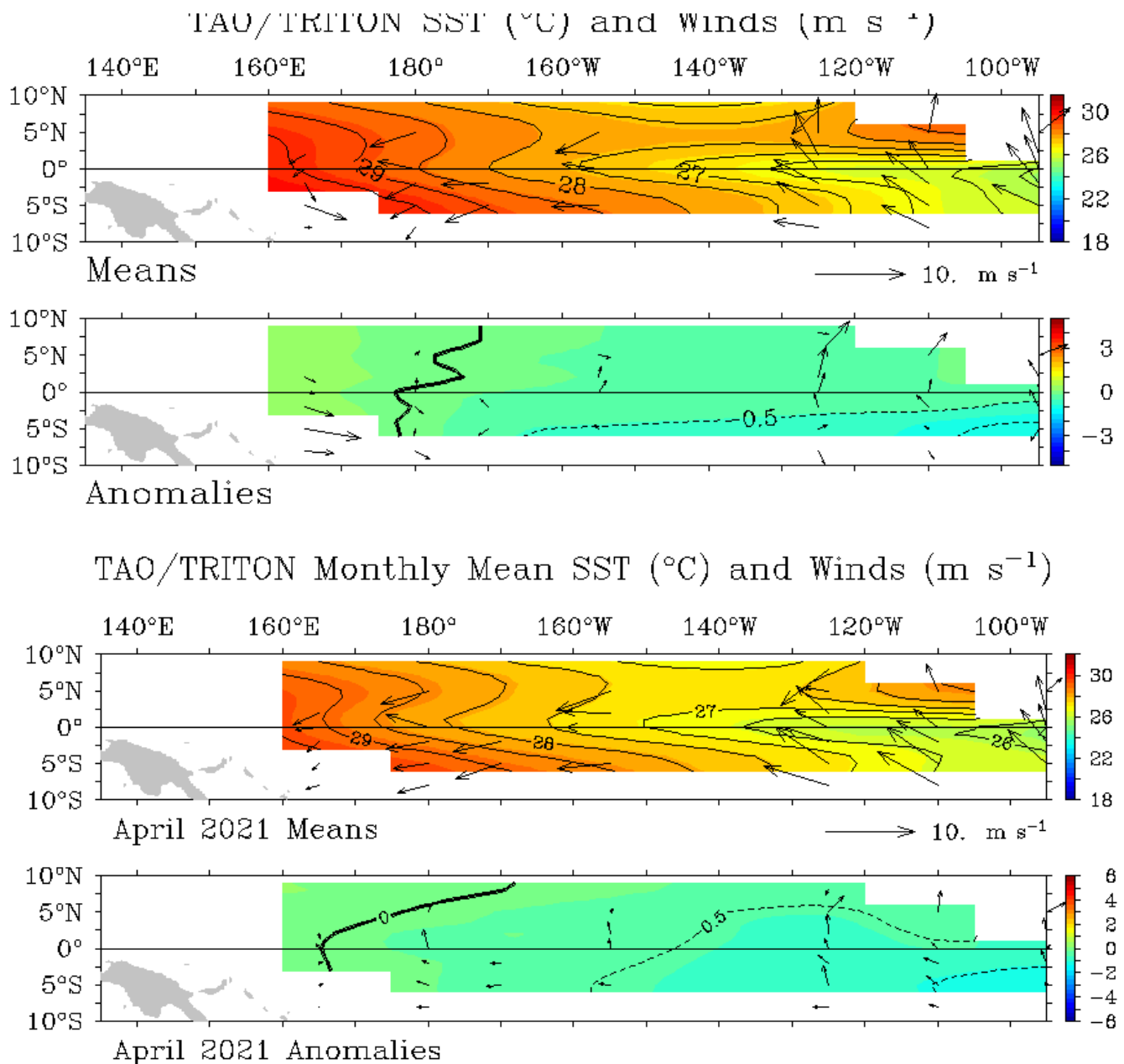


WIND

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

The trade winds in April were close to average over the 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

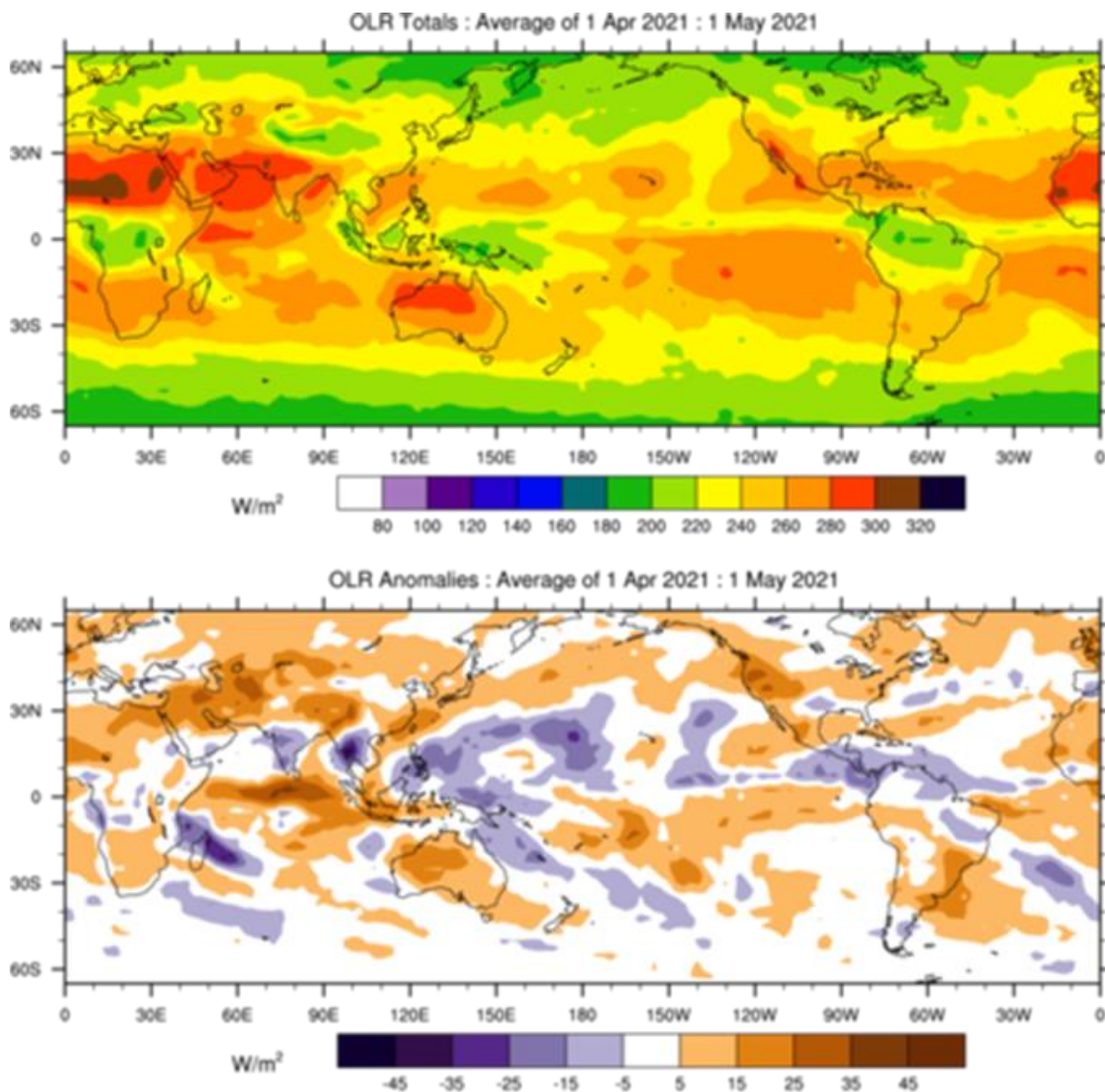
Click link to access [OLR](#)



The April 30-day OLR total and anomaly maps suggest the Intertropical Convergence Zone (ITCZ) was active and shifted north of its normal position. The South Pacific Convergence Zone (SPCZ) was also active. It was shifted substantially to the southwest, such that it affected New Caledonia.

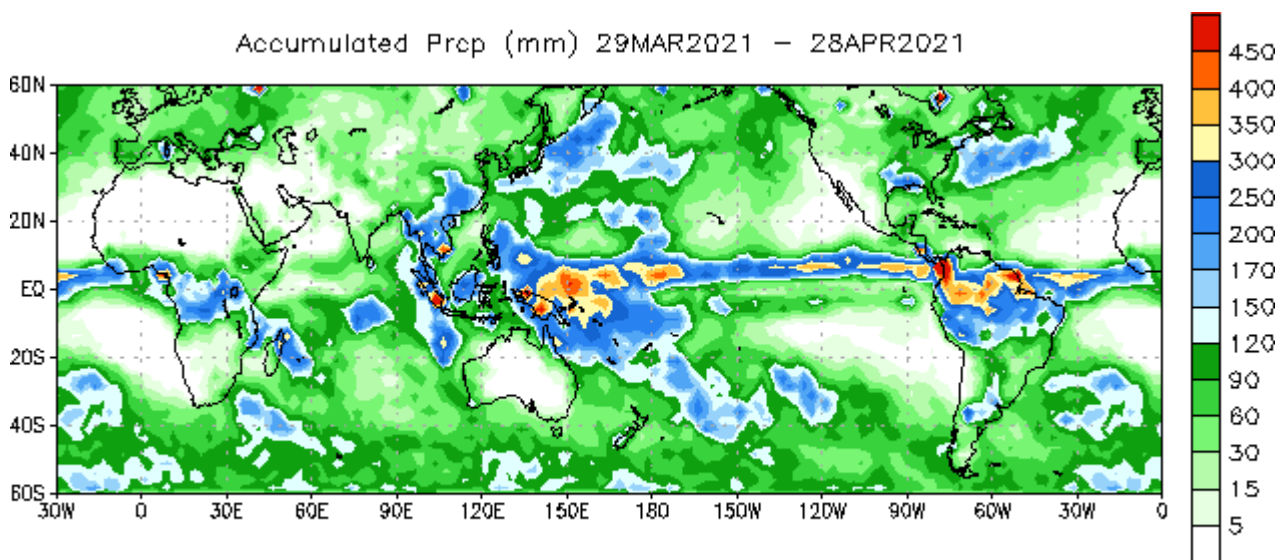
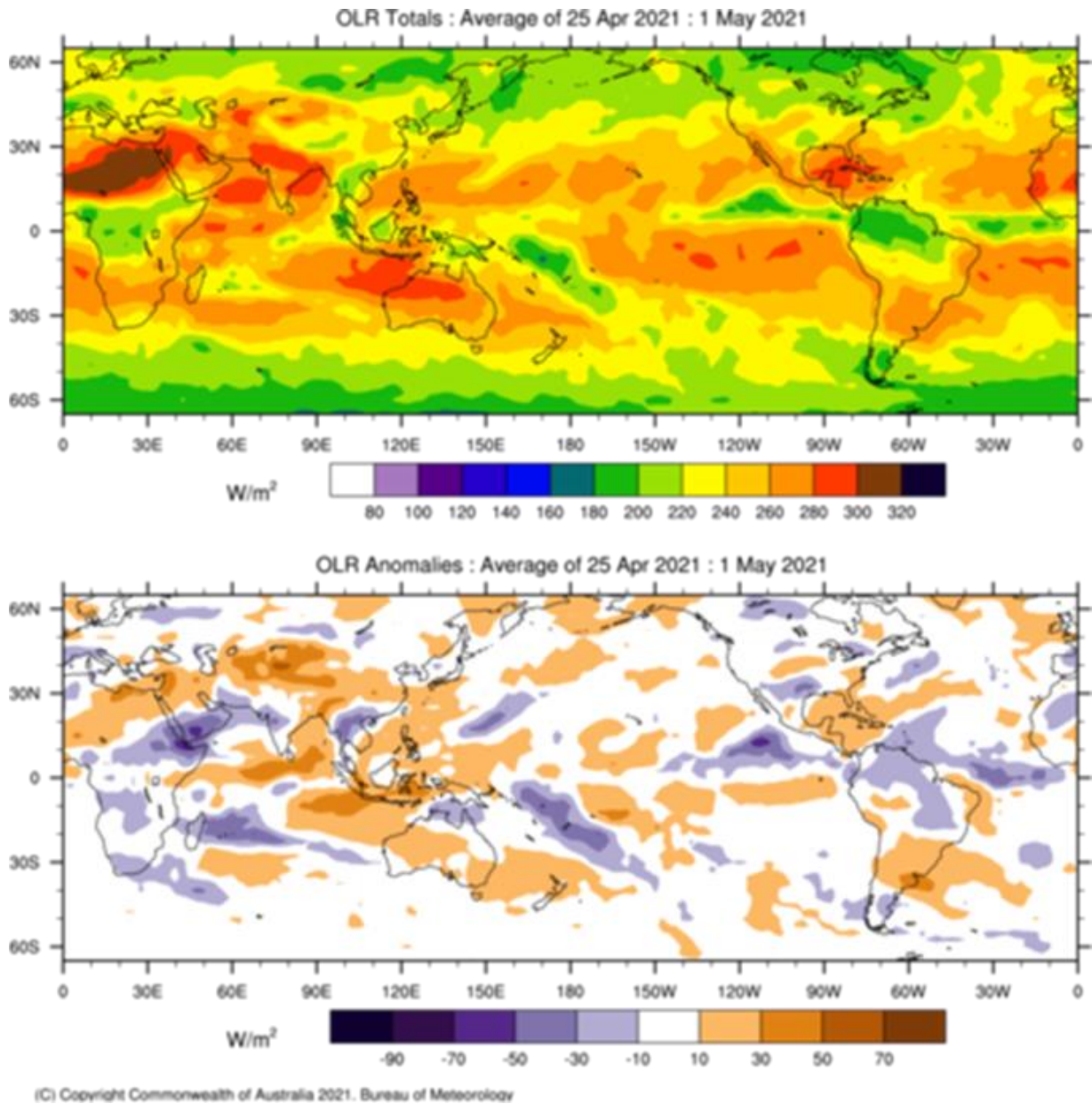
Note: Global maps of OLR below highlight regions experiencing increased or decreased cloudiness. The top panel is the total OLR in Watts per square metre (W/m^2) and the bottom panel is the anomaly (current minus the 1979-1998 climate average), in W/m^2 . In the bottom panel, negative values (blue shading)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

OLR Total and Anomalies, 30 Day OLR



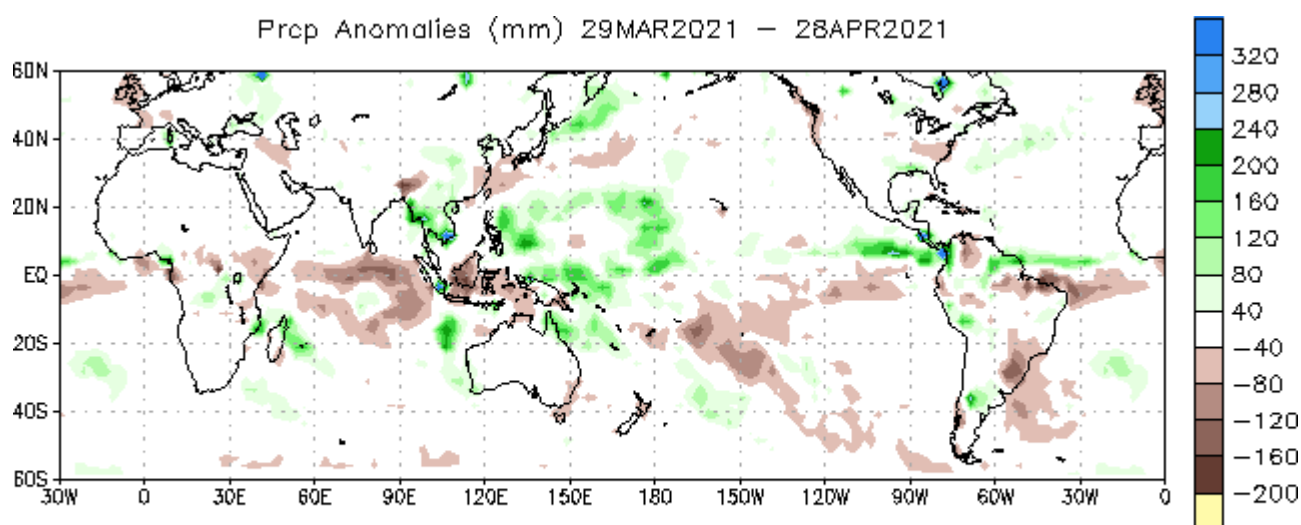
(C) Copyright Commonwealth of Australia 2021. Bureau of Meteorology

OLR Total and Anomalies, 7 Day OLR

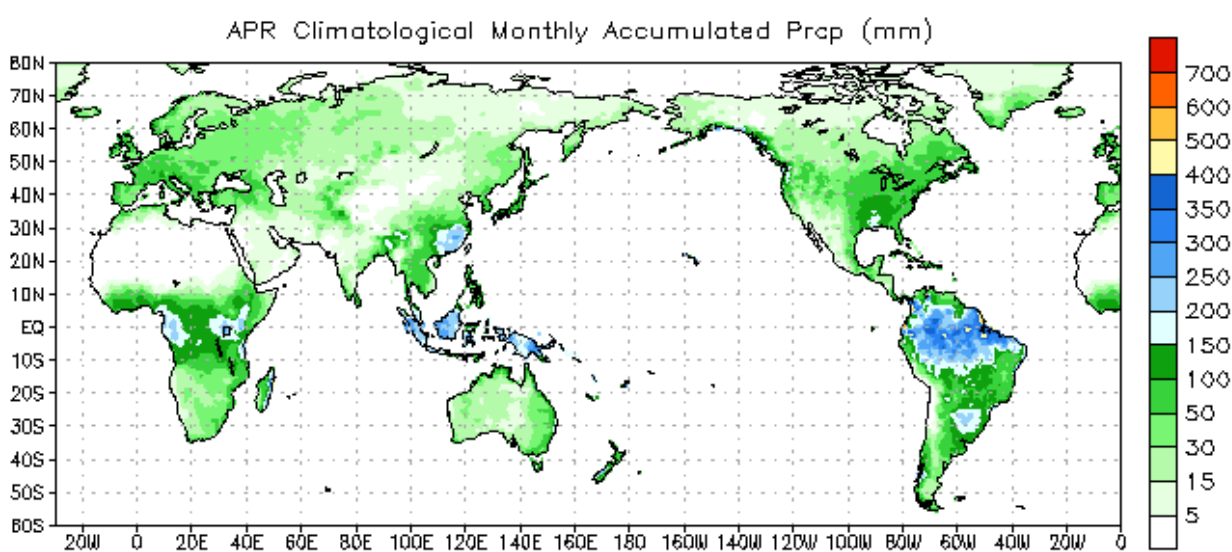


Data Source: NCEP CMAP Precipitation

30-Day Rainfall Anomalies



Data Source: NCEP CMAP Precipitation
Climatology (1979–1995)



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

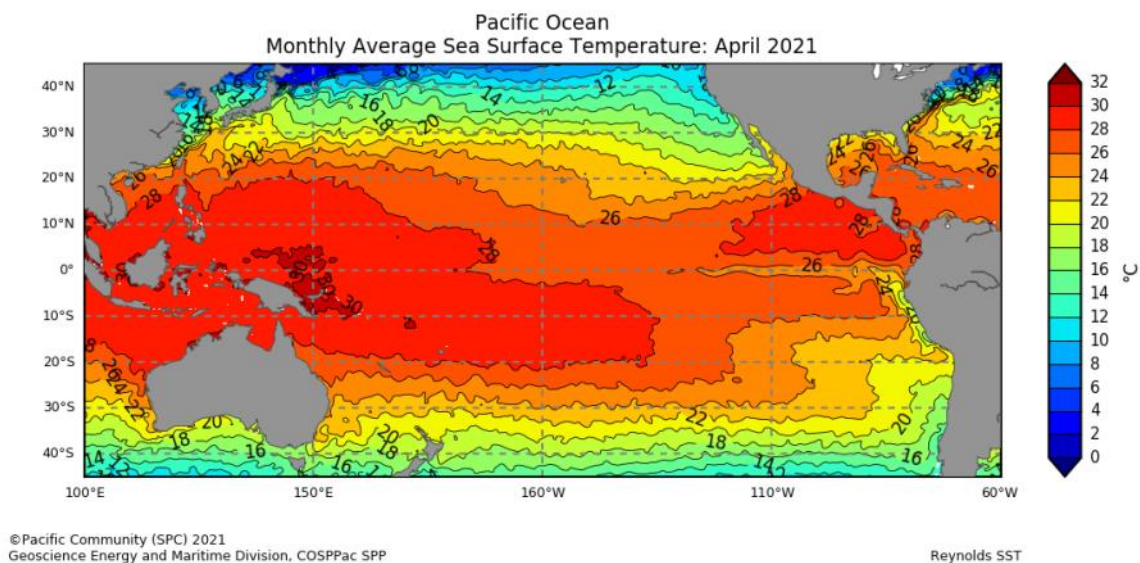


Click link to access [Pacific Community COSPPac Ocean Portal](#)

The SST anomaly pattern in April show the classic shape of a decaying La Niña, with below average temperatures prevailing along the equator up to Gilbert Islands of Kiribati. The usual boomerang shape of above average temperatures surrounding the cool equatorial anomalies present in the region with patches of cool anomalies in the southern subtropics. Highest anomalies were experienced by northern FSM and southern Cook Islands where ocean temperatures were 1.0 to 1.5 degrees above average. The Kiribati group continued to experience cool anomalies of 0.5 to 1.0 degrees.

In terms of the deciles, regions of Highest-on-Record for April occurred in much of Palau, parts of FSM, PNG, and Cook Islands. Regions of above average to very much above average (deciles 8-10) SSTs spanned RMI, Solomon Islands, Vanuatu, Fiji, Tonga, Samoa, Niue and central Cook Islands. In contrast, below average to very much below average (deciles 1-3) SSTs were observed in Kiribati.

Mean Sea Surface Temperature

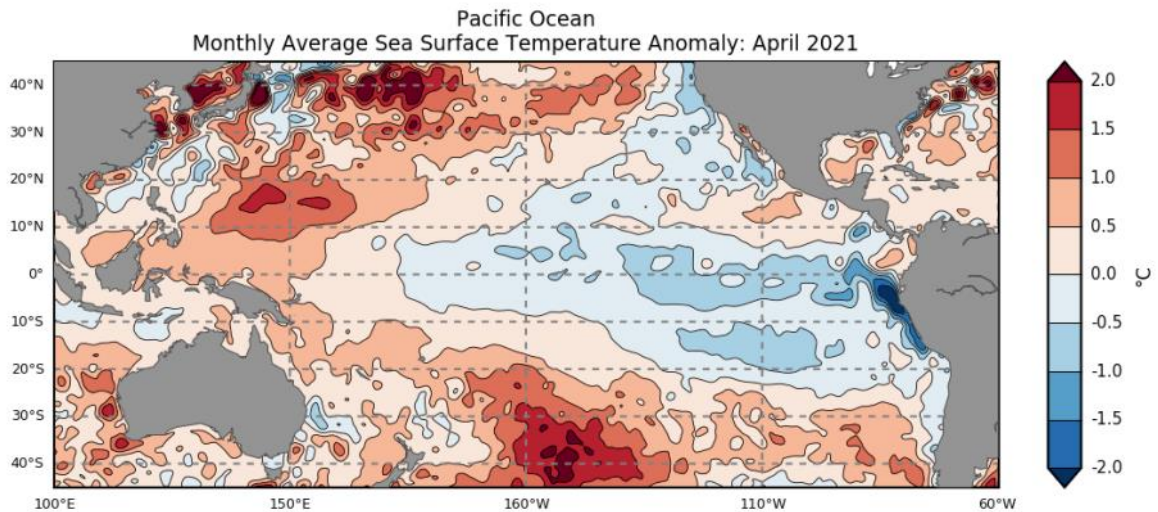


OCEAN CONDITIONS

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



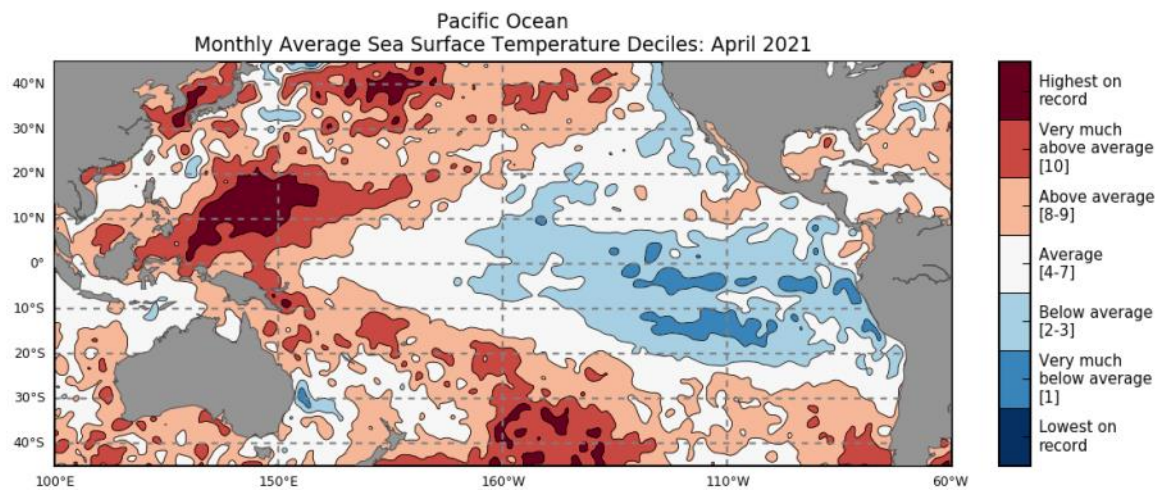
Anomalous Sea Surface Temperature



©Pacific Community (SPC) 2021
Geoscience Energy and Maritime Division, COSPPac SPP

Reynolds SST

Sea Surface Temperatures Deciles



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Geoscience Energy and Maritime Division, COSPPac SPP

Reynolds SST

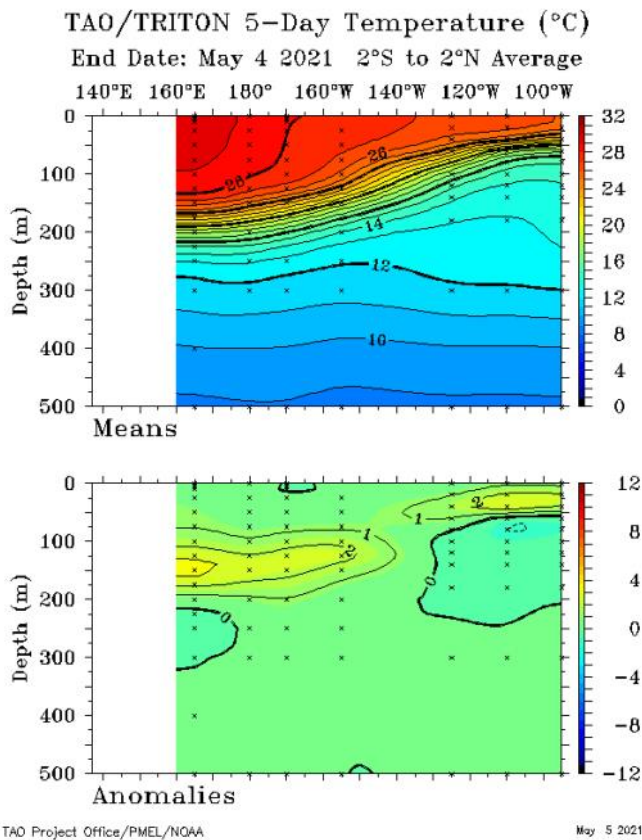
OCEAN CONDITIONS

SUB SURFACE

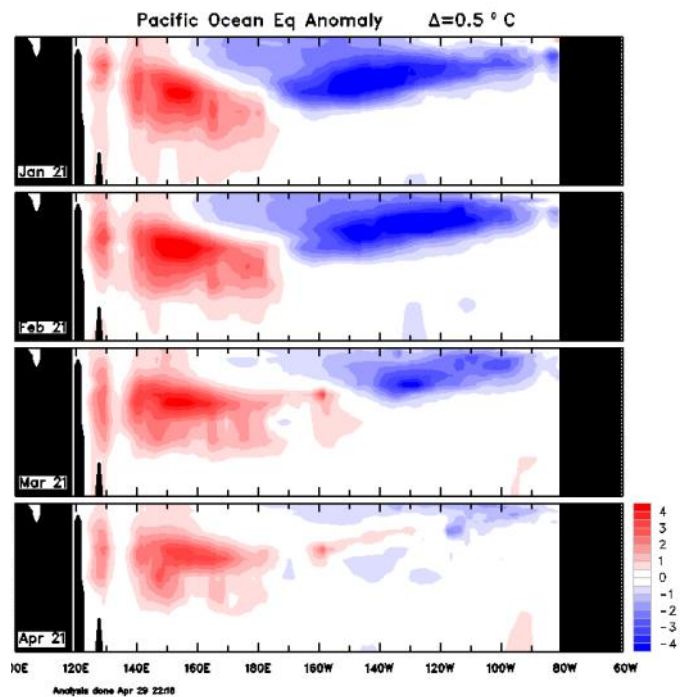


The four-month sequence of equatorial Pacific sub-surface temperature anomalies (to 22nd April) shows weak cool anomalies remain across the top 50 to 100 m of the central and eastern equatorial Pacific. The strength of these cool anomalies has decreased significantly compared to March, in line with the return to a neutral ENSO state. Warm anomalies persist across parts of the column depth west of the Date Line. These warm anomalies have decreased in strength and spatial extent compared to March.

Weekly Temperatures Mean and Anomalies



Monthly Temperatures Anomalies



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

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

OCEAN CONDITIONS

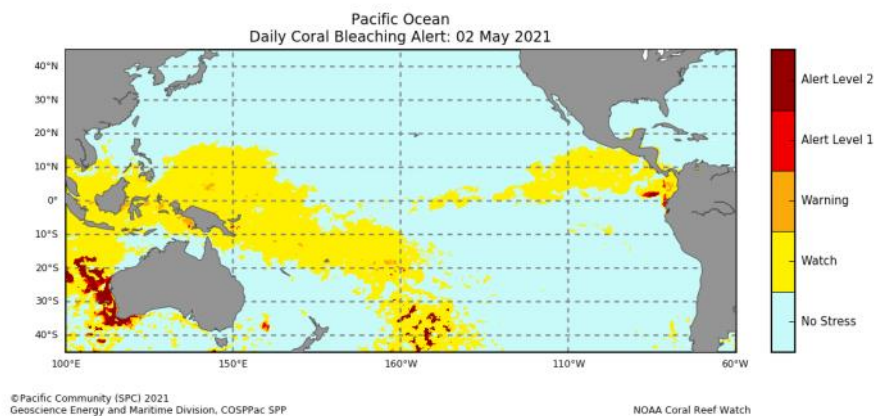
CORAL BLEACHING



The daily Coral Bleaching Alert for 02nd May 2021 shows 'Watch' for much of the COSPPac partner countries, peaking at 'Warning' just north and east of PNG and southern Cook Islands. The four weeks Coral Bleaching Outlook to 23rd May shows the 'Watch' alert continuing for most of the countries in the region with Palau, FSM, PNG, Nauru and parts of Kiribati on 'Warning'.

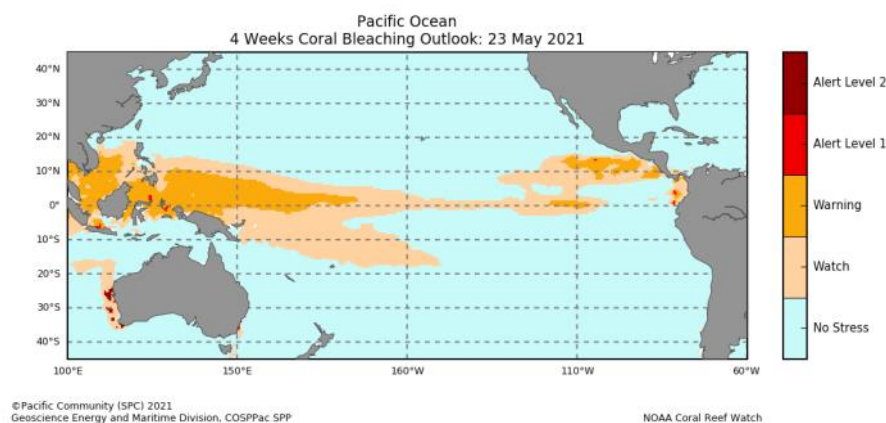
Daily Coral Bleaching Alert

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



4-Weeks Coral Bleaching Outlook

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



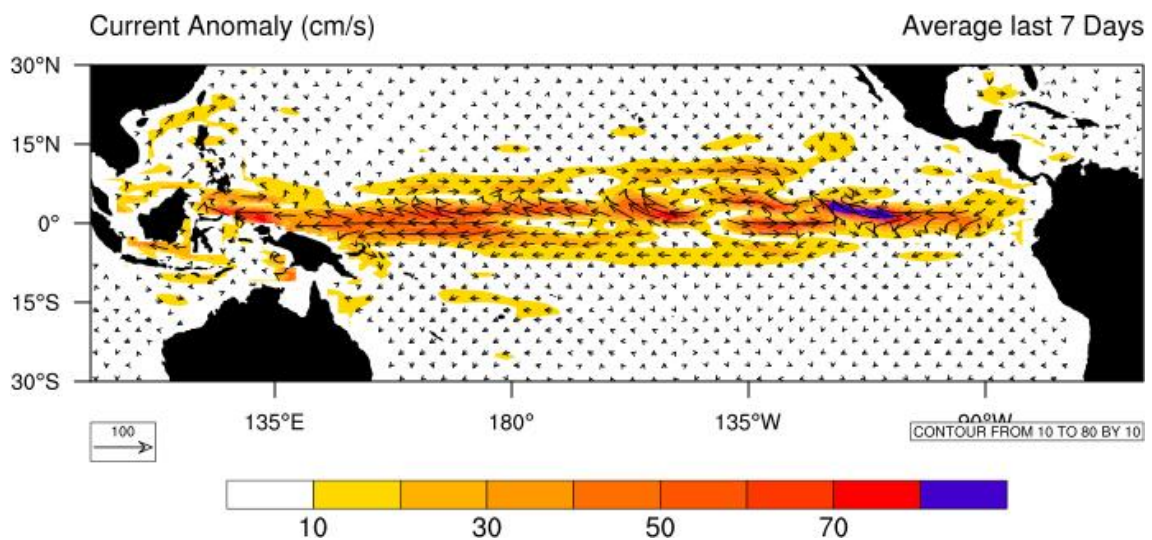
OCEAN CONDITIONS

OCEAN SURFACE CURRENTS AND SEA LEVEL



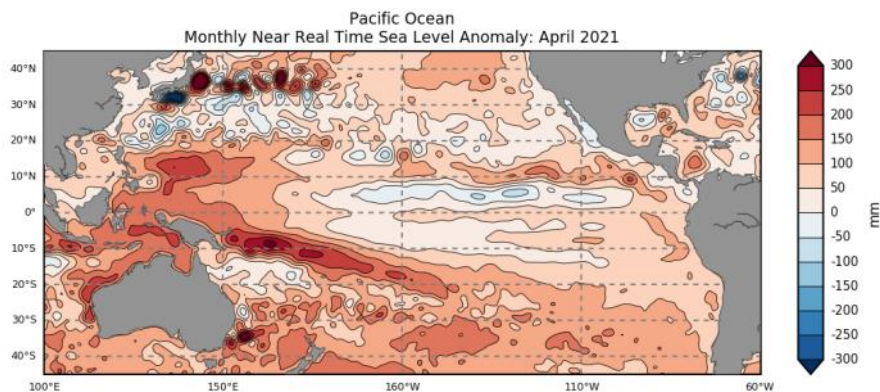
Sea level was above normal for most of the western Pacific region. The distinct boomerang shape was still present with highest anomalies above +300mm Solomon Islands. Sea Level above normal from 100mm to 150mm spanning from Palau, FSM, PNG to southern Cook Island. Kiribati and Vanuatu continued with near normal to below normal conditions.

Ocean Surface Current (Last 7-Days)



Monthly Sea Level Anomalies

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



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Geoscience Energy and Maritime Division, COSPPac SPP

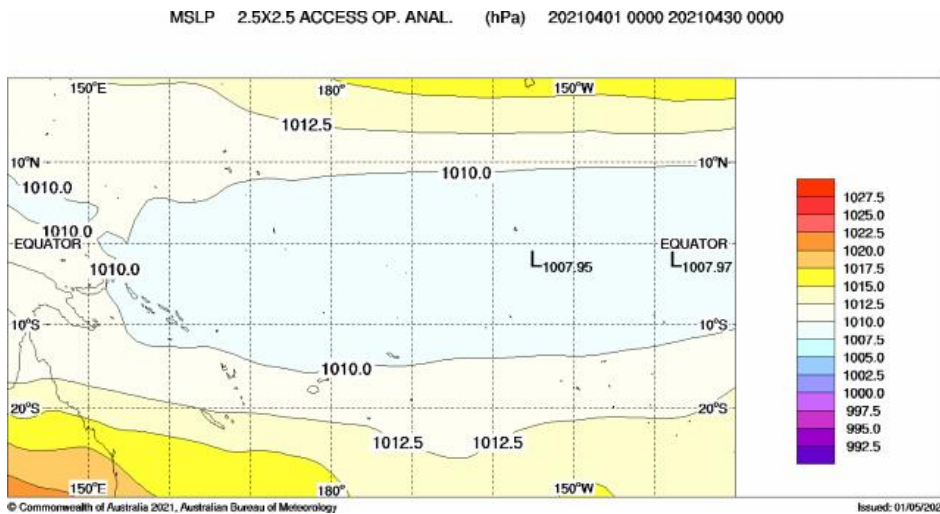
AVISO Ssalto/Duacs SLA

MEAN SEA LEVEL PRESSURE

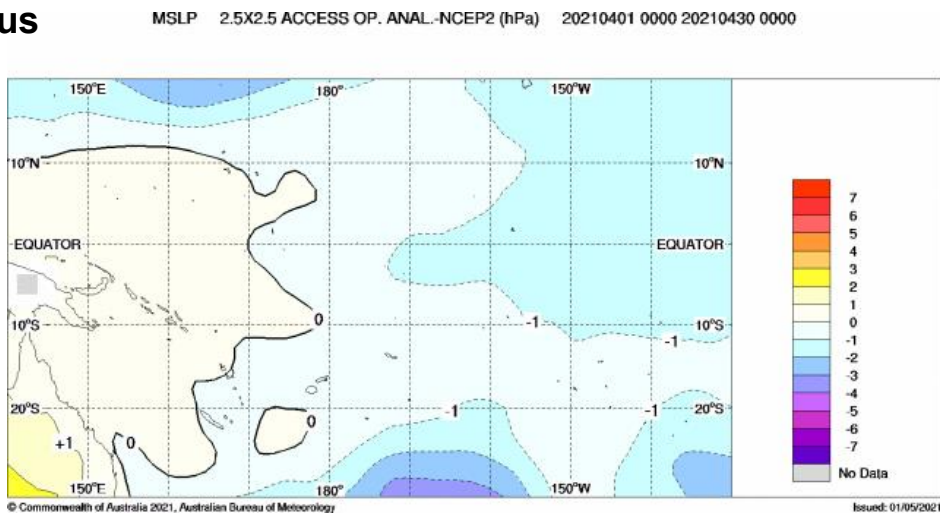
The April mean sea level pressure (MSLP) anomaly map shows negative anomalies over east of about 160° in the tropical Pacific. Positive anomalies were present over the Australian region

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

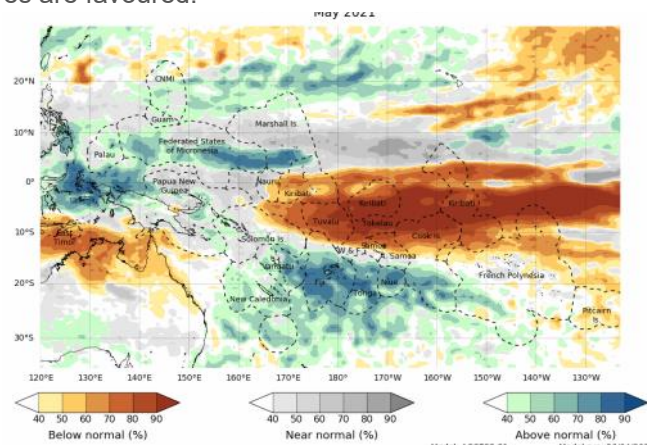
May—July 2021



The ACCESS-S model forecast for May 2021 strongly favours below normal rainfall for Kiribati, Tuvalu, Tokelau, the northern Cook Islands, and parts of northern French Polynesia. Above normal rainfall is favoured in most parts of Palau, FSM, northern and southern Marshall Islands, parts of the southern, Momase and New Guinea Islands regions of PNG, western Solomon Islands, New Caledonia, Vanuatu, Fiji, Tonga, Niue and parts of southern Cook Islands and far southeast French Polynesia.

The three-month rainfall outlook (May-July) is very similar to the May pattern: it shows a strong dry signal along the equator, surrounded by bands of increased chance wetter in both hemispheres. Above normal maximum and minimum temperatures are favoured for many COSPPac countries, except for some areas east of 165°E, namely eastern Nauru, Kiribati, northern Tuvalu, Tokelau, northern Cook Islands, plus northern and central French Polynesia where near-normal to below normal temperatures are favoured.

Monthly ACCESS-S Maps



The Copernicus multi-model outlook for May to July favours below normal rainfall for the northern PNG Islands, western and northern Solomon Islands, Nauru, Kiribati, Tuvalu, northern and central Cook Islands, and northern and central French Polynesia. Above normal rainfall is favoured for eastern FSM, central RMI, southern and Momase regions of PNG, New Caledonia, Vanuatu, Fiji, Tonga, Niue and southern Cook Islands.

The SCOPIC statistical model for May to July favours below normal rainfall for Kiribati, Tuvalu, and northern Cook Islands. Above normal rainfall is favoured for FSM, central Marshall Islands, parts of southern and Momase regions of PNG, eastern Solomon Islands, Vanuatu, Fiji, northern Tonga, Niue and southern Cook Islands.

The APEC Climate Centre multi-model for May to July favours below normal rainfall for New Guinea Islands, western and northern regions of the Solomon Islands, Nauru, Tuvalu, Kiribati, Samoa, northern Cook Islands, and central to northern French Polynesia. Above normal rainfall is favoured for eastern FSM, most of RMI, Highlands, southern and Momase regions of PNG, Vanuatu, Fiji, Tonga, Niue, southern Cook Islands and parts of southern French Polynesia.

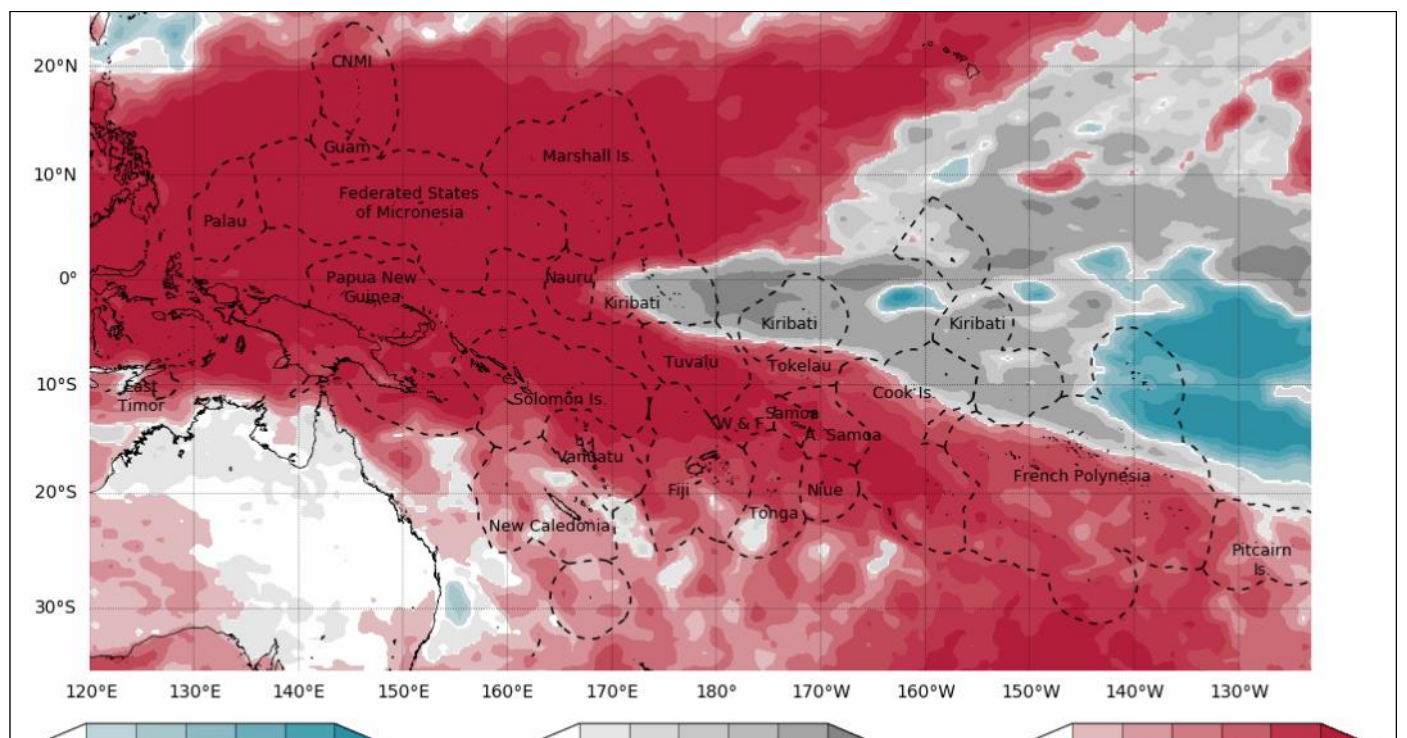
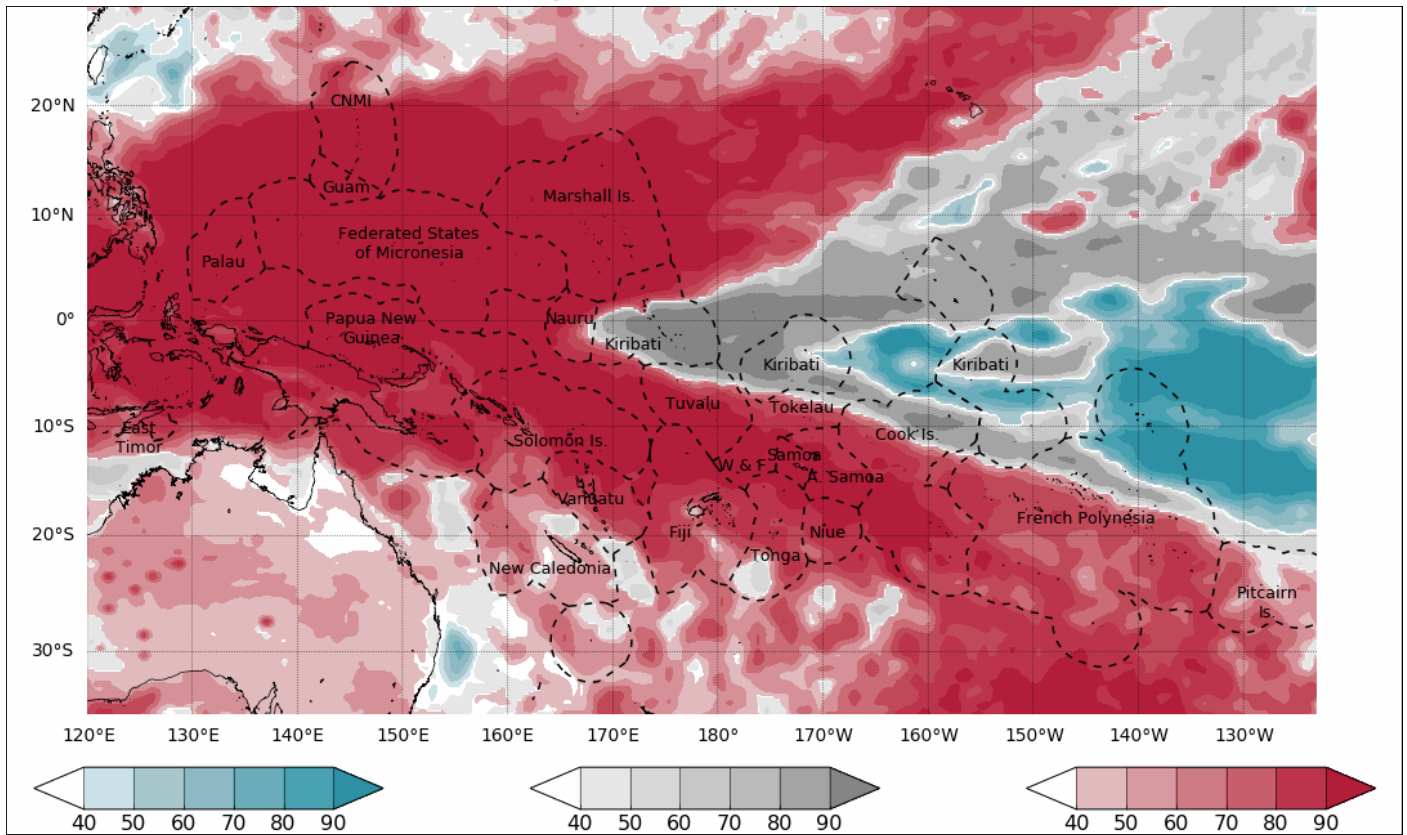
For May to July 2021, the dynamical models (as well as SCOPIC) agree on above normal rainfall for FSM, Marshall Islands, the southern and Momase regions of PNG, New Caledonia, Vanuatu, Fiji, Tonga, Niue, southern Cook Islands and southern French Polynesia. The models also agree on below normal rainfall for Nauru, Kiribati, Tuvalu, northern Cook Islands and central and northern French Polynesia.

SEASONAL TEMPERATURE OUTLOOK

May—July 2021



Monthly **ACCESS-S** Maps



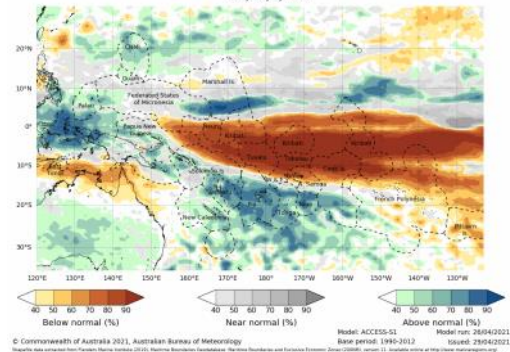
SEASONAL RAINFALL OUTLOOK

May—July 2021

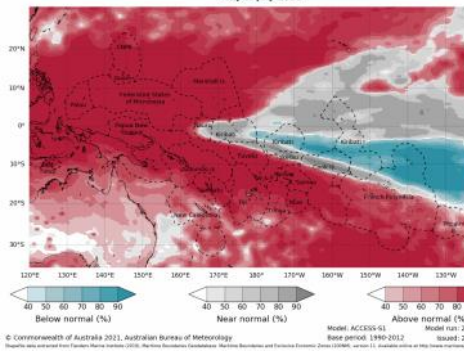


Seasonal ACCESS-S maps

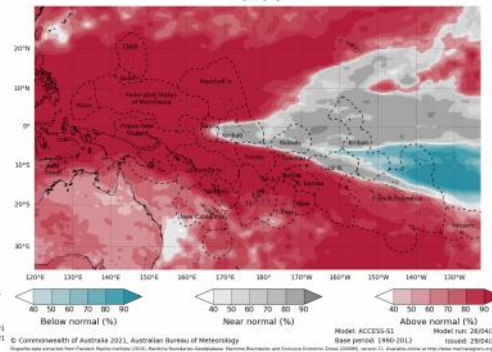
Tercile rainfall probabilities for May to July 2021



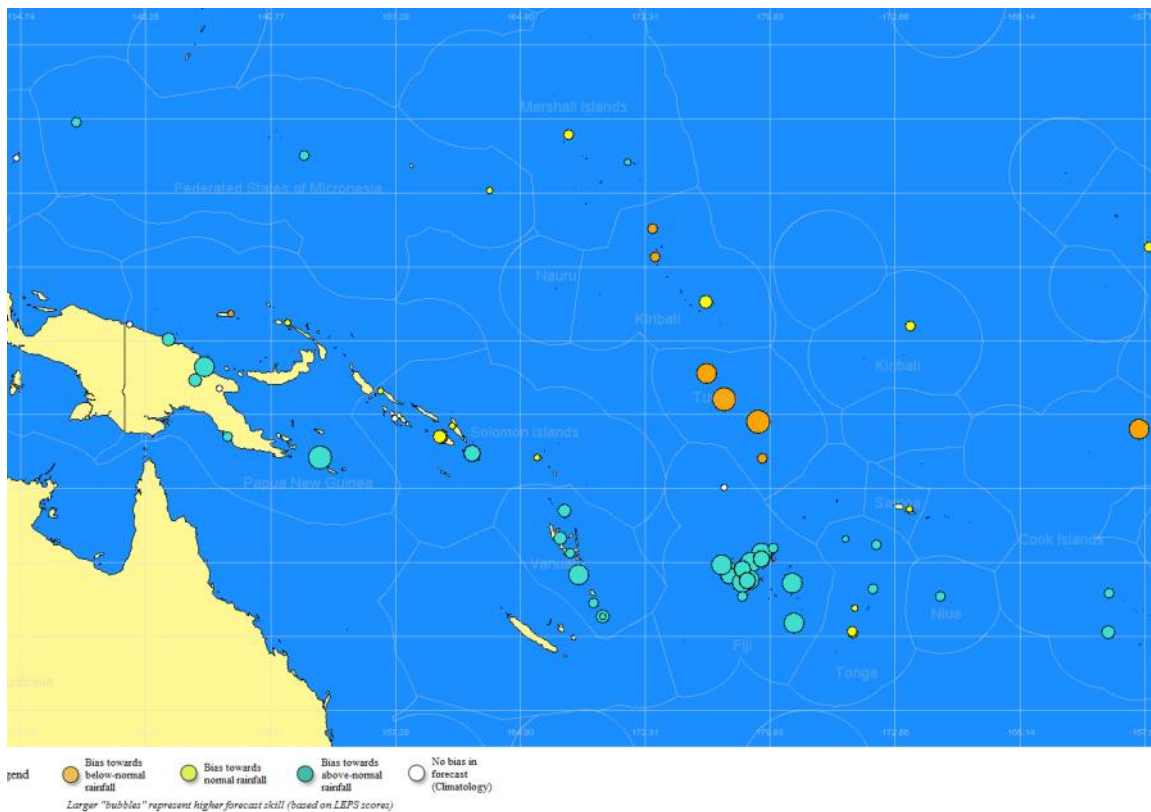
Tercile maximum temperature probabilities for May to July 2021



Tercile minimum temperature probabilities for May to July 2021



SCOPIC



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

SEASONAL RAINFALL OUTLOOK

May—July 2021



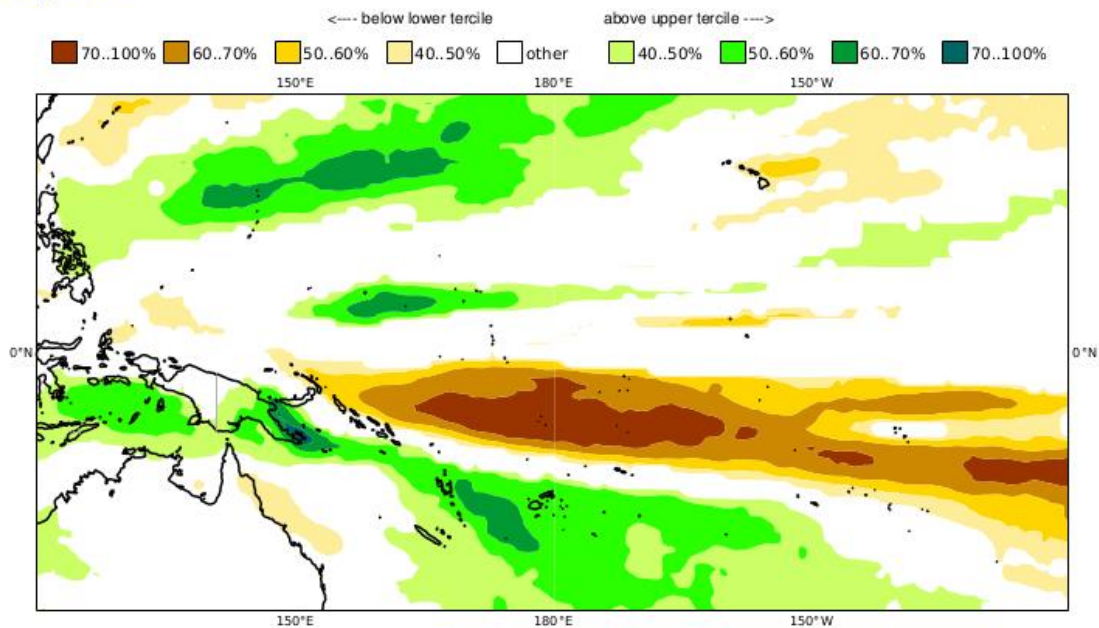
Copernicus (C3S multi-system)-Rainfall

Prob(most likely category of precipitation)

MJJ 2021

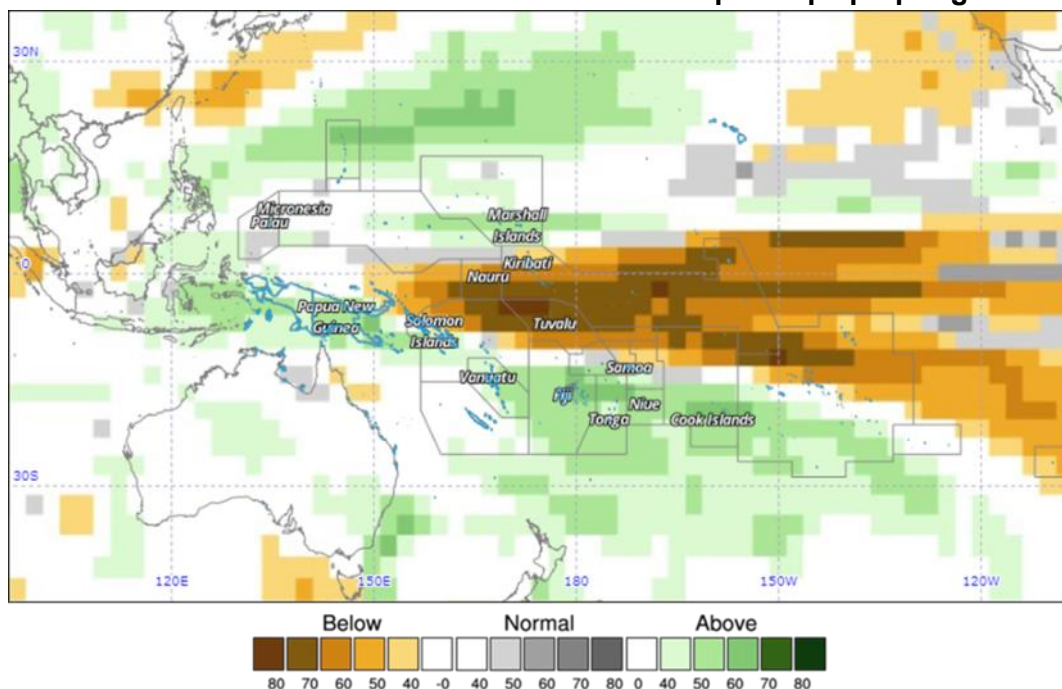
Nominal forecast start: 01/04/21

Unweighted mean



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

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



Year: 2021, Season: MJJ, Lead Month: 3, Method: GAUS

Model: APCC, CWB, MSC, NASA, NCEP, PNU, POAMA

Generated using CLIK® (2021-5-3)

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TROPICAL CYCLONE

2020/2021 Season



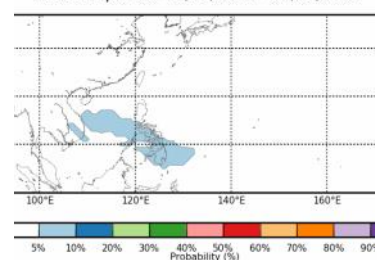
In the southwest Pacific, the tropical cyclone season 2020-21 has ended on the 30th April, 2021. The outlook for the season was normal or slightly below normal Tropical Cyclone activity. Seven named TCs formed east of the longitude of the tip of Cape York, Australia. The long-term seasonal average for the southwest Pacific is nine. Three cyclones reached severe Category 3-5 status, including Yasa, one of the most intense TCs on record in the basin. TC activity in the Western North Pacific occurs year around. With a likely transition from La Niña to ENSO-Neutral in the next month or so, near-normal to below normal numbers of TCs are anticipated.

The weekly tropical cyclone forecast from ACCESS-S model shows some high risk in the weeks beginning 8 May and ending 24 May 2021 for the northwest Pacific, especially in areas around Palau and the Philippines. There is also some tropical cyclone risk for the northwest Pacific in the week ending 24 May.

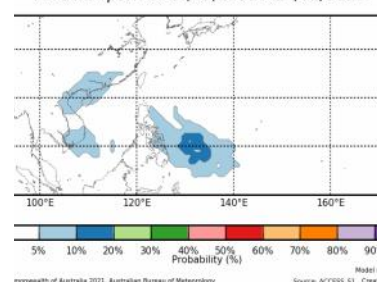
The tropical cyclone season outlook for 2020-21 is available via: <http://www.bom.gov.au/climate/cyclones/south-pacific/>

ACCESS-S Weekly Forecasts –Northwest Pacific

Tropical Cyclone probabilities in the Northern Pac
Forecast period: 11/05/2021 - 17/05/2021

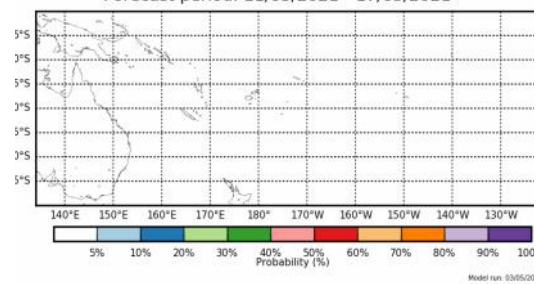


Tropical Cyclone probabilities in the Northern Pac
Forecast period: 18/05/2021 - 24/05/2021

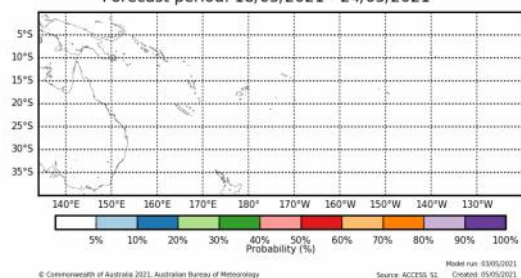


ACCESS-S Weekly Forecasts –Southwest Pacific

Tropical Cyclone probabilities in the South Pacific
Forecast period: 11/05/2021 - 17/05/2021



Tropical Cyclone probabilities in the South Pacific
Forecast period: 18/05/2021 - 24/05/2021



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.

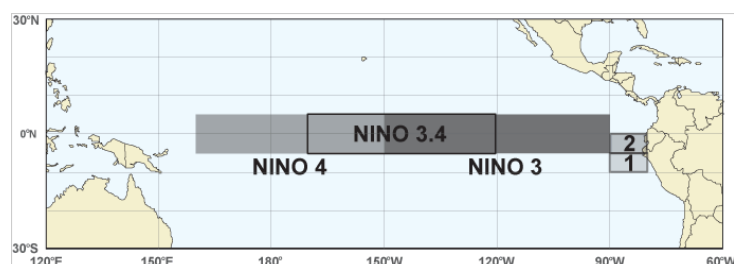
20 degrees Celsius Isotherm Depth

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