Monthly Climate Bulletin

July 2020

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

CONTENTS

SUMMARY

Issued 06 August 2020

- The El Niño Southern Oscillation (ENSO) remains neutral but ENSO indicators show signs consistent with a developing La Niña. The Bureau's ENSO outlook remains La Niña WATCH, indicating La Niña forming in 2020 is around 50%-roughly twice the average likelihood.
- The Intertropical Convergence Zone (ITCZ) was suppressed in the central and western Pacific. The South Pacific Convergence Zone (SPCZ) was displaced south of its normal position towards Vanuatu, Fiji, Samoa, Cook Islands and French Polynesia.
- The Madden-Julian Oscillation (MJO) is currently over the Maritime Continent but is forecast to weaken over the coming week.
- Sea level in July was higher than normal for most of countries in the region with positive anomalies situated around western Palau and Solomon Islands. Parts of southern PNG, New Caledonia, Vanuatu, Tonga, Cook Islands and French Polynesia experienced below normal sea level.
- Coral Bleaching Alerts are in place for a region just to the north of PNG. The Coral Bleaching Outlook favours Coral Bleaching alerts continuing to the north of PNG and developing to the north of Palau, western FSM and New Guinea Islands.
- For August to October, the dynamical models agree on below normal rainfall for western and eastern FSM, northern RMI, Nauru, Kiribati and northern Tuvalu. The models also agree on above normal rainfall for Palau, most parts of PNG, Solomon Islands, Vanuatu, Fiji, Tonga, Wallis and Futuna, Samoa and Niue.

EL NIÑO–SOUTHERN OSCILLATION

El Niño-Southern Oscillation neutral but La Niña indicators continue to develop

Climate Driver Update issued on 04 August 2020

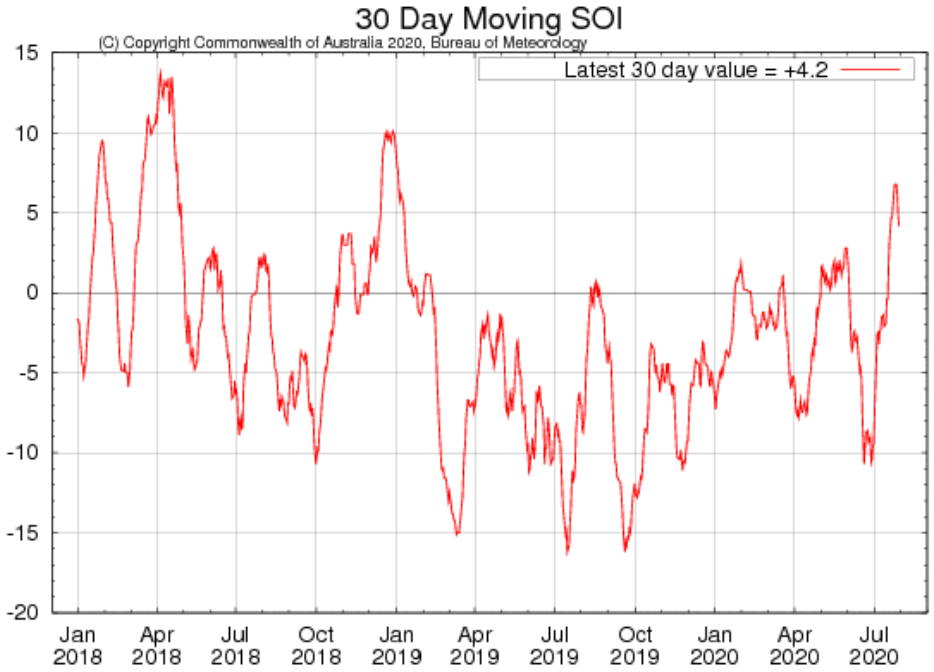
The El Niño Southern Oscillation (ENSO) and Indian Ocean Dipole (IOD) remain neutral. The Bureau's ENSO Outlook remains La Niña WATCH, indicating La Niña forming in 2020 is around 50%-roughly twice the average likelihood.

In the tropical Pacific Ocean, surface and sub-surface waters have cooled since April 2020. The latest weekly values have continued this trend. All surveyed international climate models anticipate further cooling is likely in the coming months with most models exceeding the La Niña threshold during spring (September - December).

Other ENSO indicators, such as the Southern Oscillation Index (SOI), trade winds, and cloudiness near the Date Line are ENSO neutral but show signs consistent with a developing La Niña. The latest trade winds have been stronger than average while the SOI has increased since the beginning of July. Equatorial cloudiness near the Date Line is below average.

Large parts of the eastern Indian Ocean are warmer than average. The Indian Ocean Dipole (IOD) is currently neutral. Half of the six surveyed models indicate negative IOD thresholds could be met or exceeded during spring.

The approximate 30-day and 90-day Southern-Oscillation Index (SOI) values to 02 August were +3.2 and -0.4 respectively. Both are within the ENSO-neutral range..



EL NIÑO–SOUTHERN OSCILLATION

El Niño-Southern Oscillation neutral but La Niña indicators continue to develop

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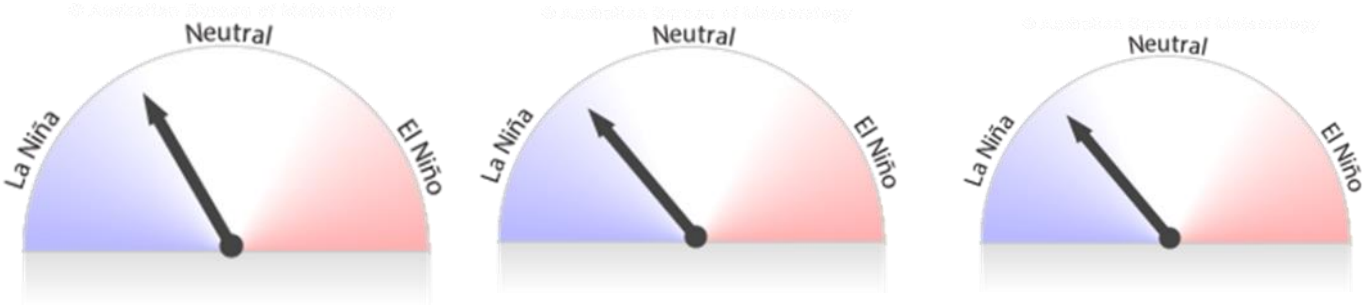
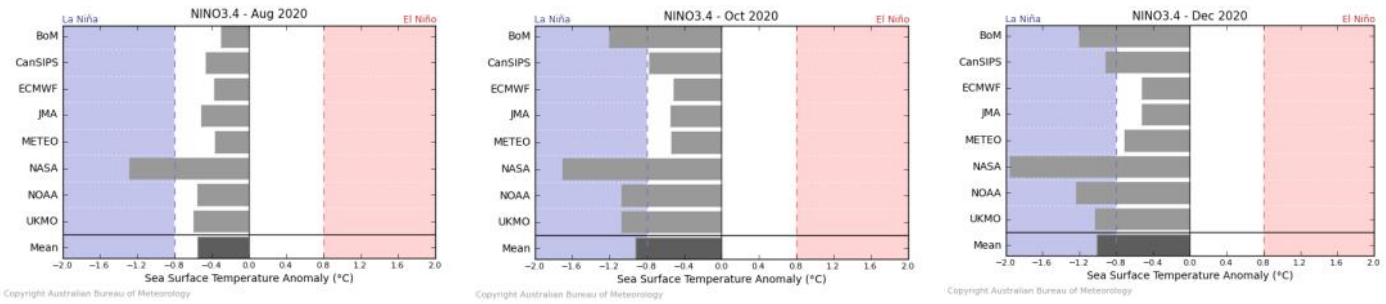
Bureau of Meteorology NINO3.4 ENSO Model Outlooks for August, October and December



Bureau of Meteorology NINO3.4 International Model Outlooks



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

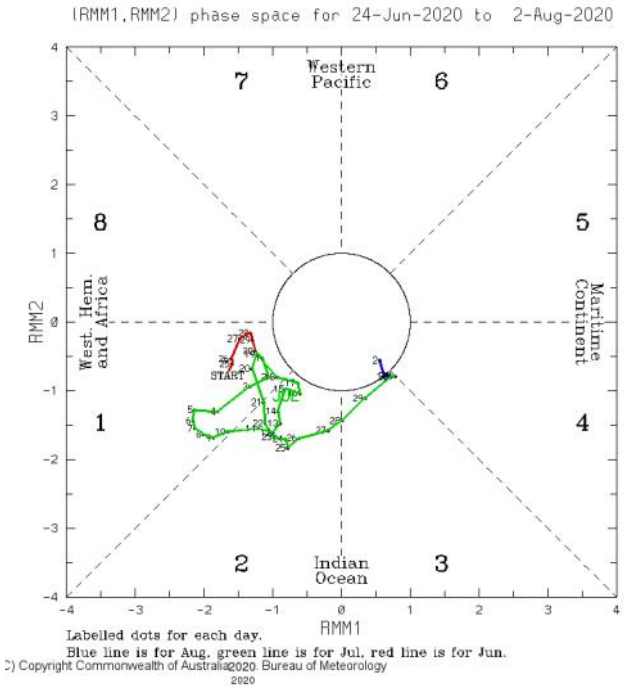
MADDEN–JULIAN OSCILLATION

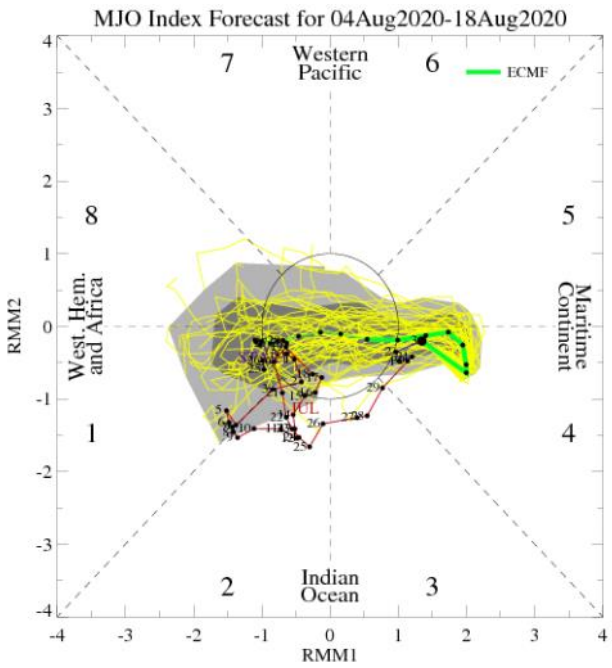
Weekly Tropical Note [Issued on Tuesday 04 August 2020

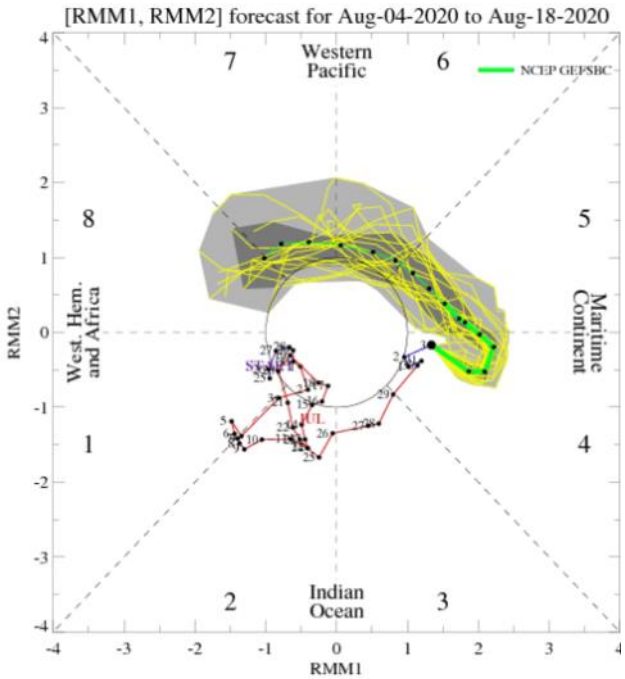
A pulse of the Madden-Julian Oscillation (MJO) has continued to track eastwards during the past week and is now located to Australia's north, in the western Maritime Continent. Most climate models indicate the pulse will slow down in the coming days before weakening, although some indicate it will strengthen further and remain discernible for at least another week.

At this time of the year, an MJO pulse over the Maritime Continent has only a small influence on rainfall patterns across northern Australia. Further north, parts of the Maritime Continent, including (Palau), Papua New Guinea, (northern Solomon Islands), and South-East Asia typically observe above-average rainfall. This prediction is consistent with the ACCESS-S outlook http://access-s.clide.cloud/regional/pacific/weekly/ for the coming week.

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





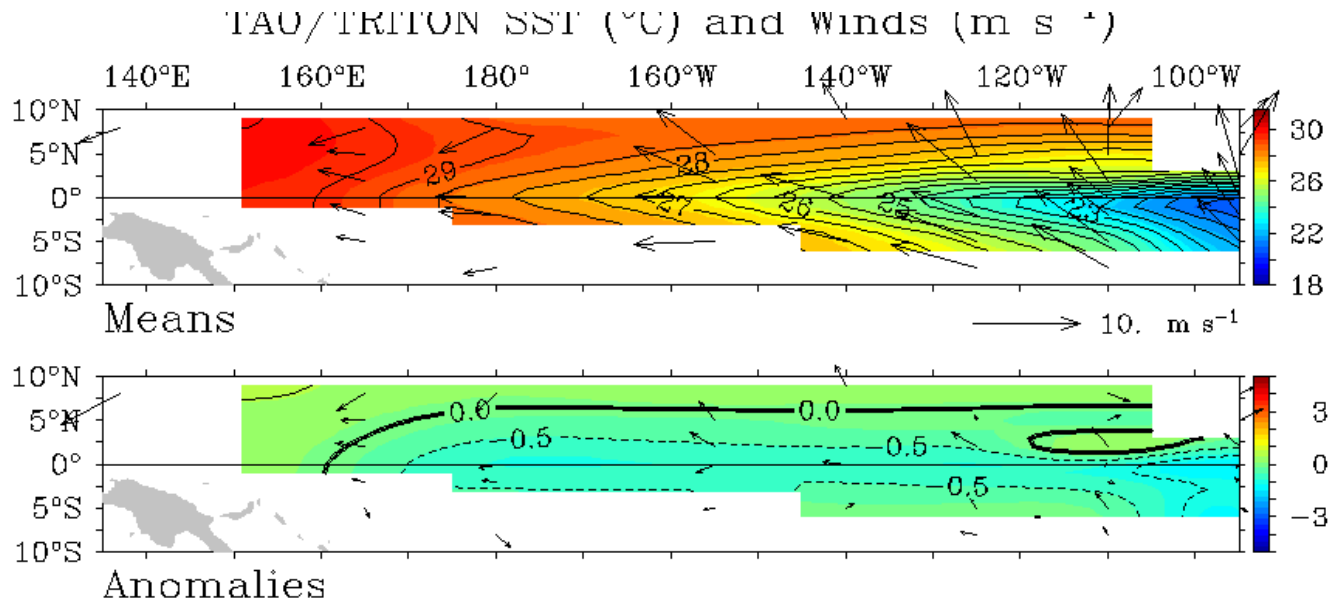


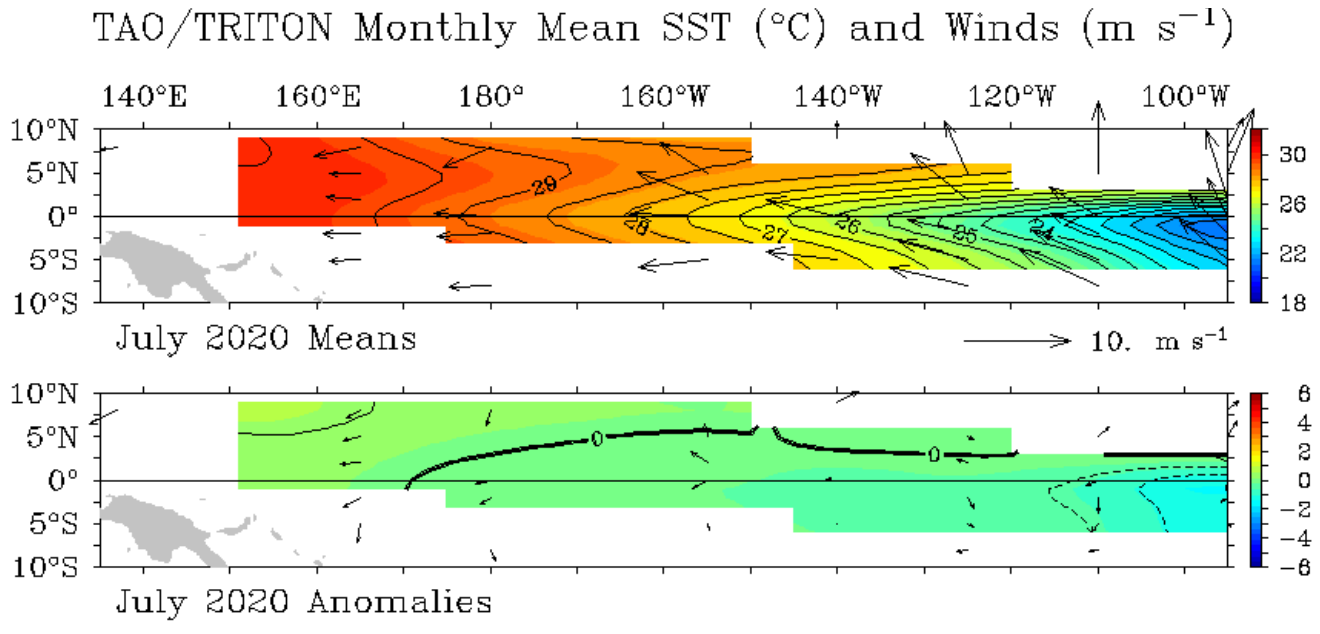
WIND

Display link

The equatorial trade winds in the 5-day snapshot ending 01 August and for the month of July show near normal trade winds across the equatorial tropical 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.





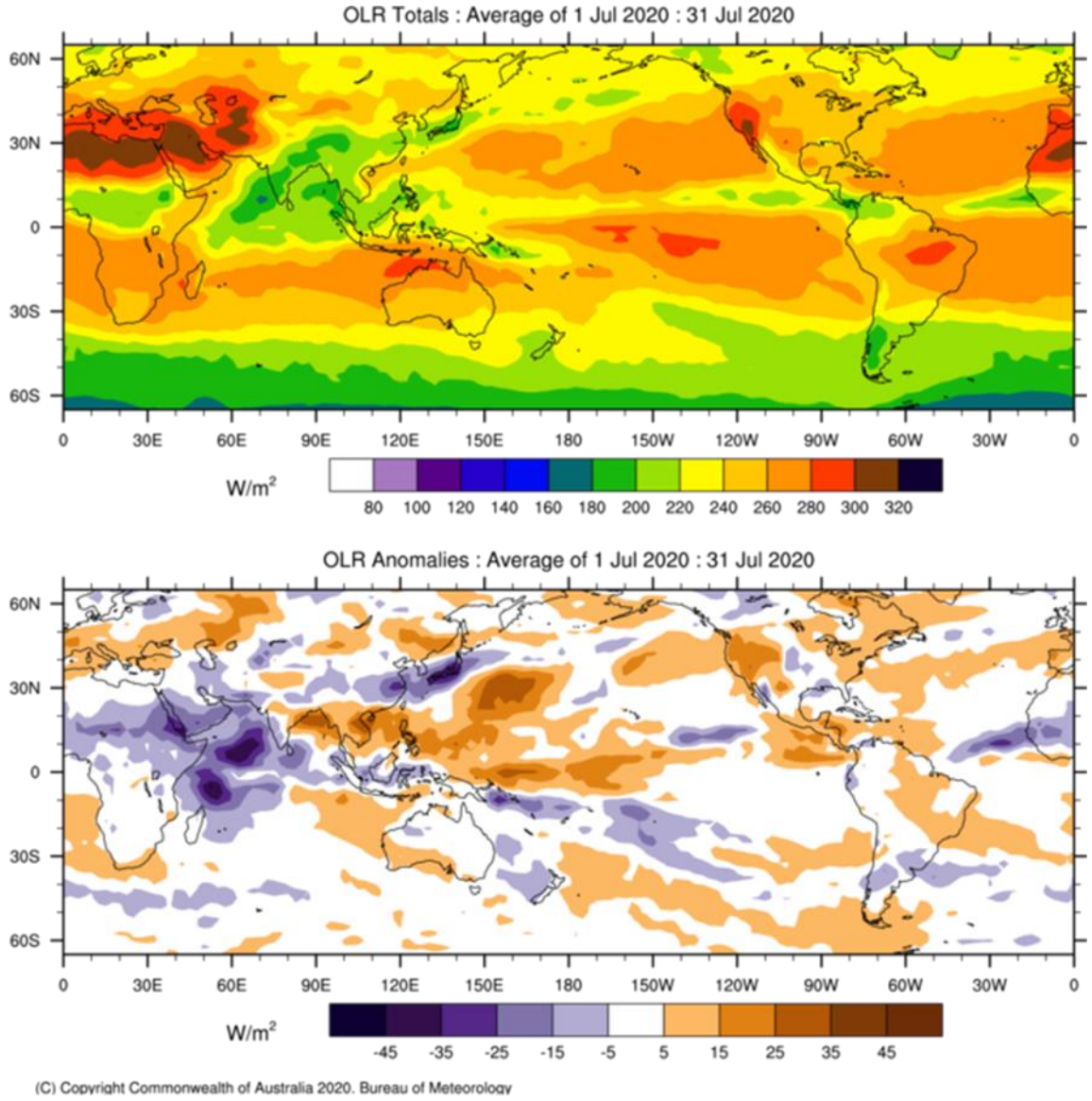
CLOUD AND RAINFALL

OLR link

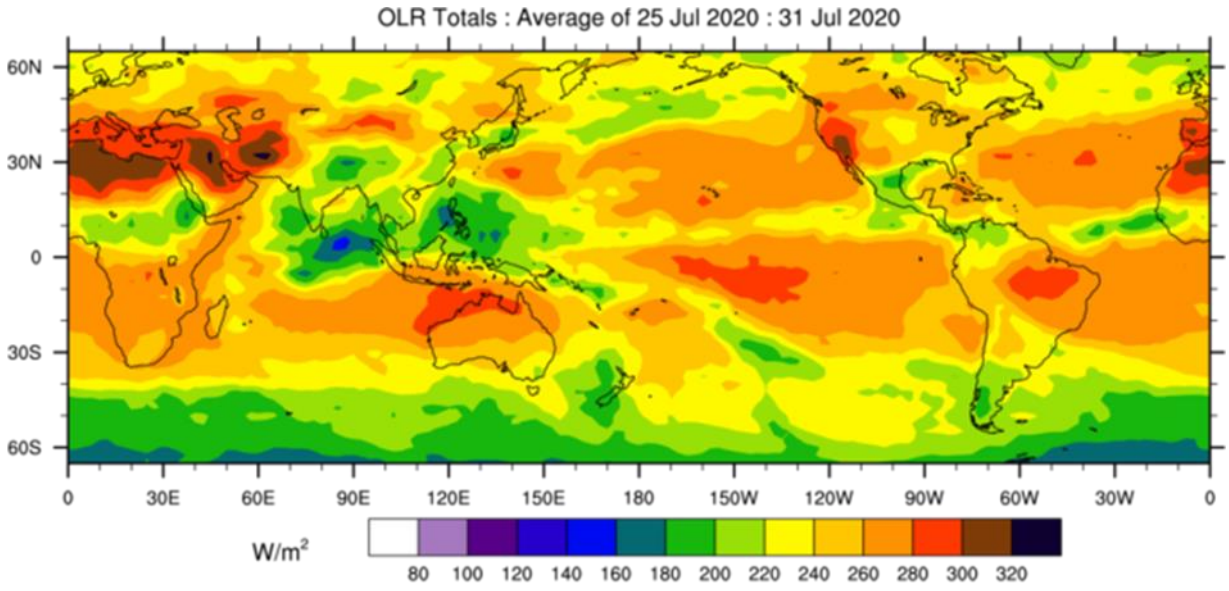
The July 30-day OLR total and anomaly maps suggest the Intertropical Convergence Zone (ITCZ) was suppressed in the central and western Pacific while more active in the far eastern Pacific. The South Pacific Convergence Zone (SPCZ) was displaced south of its normal position over the eastern Solomon Islands and towards Vanuatu, Fiji, Samoa, Cook Islands and French Polynesia resulting in higher than normal rainfall for these countries. The southward displacement resulted in drier than normal conditions south of the equator.

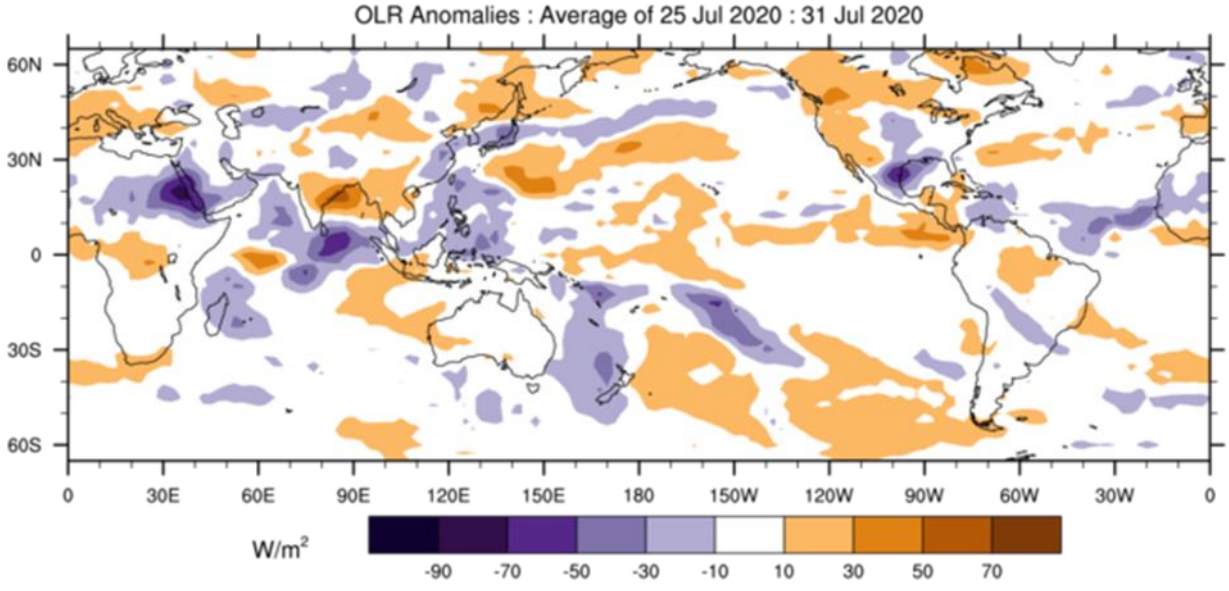
Note: Global maps of OLR below highlight regions experiencing more or less cloudiness. The top panel is the total OLR in Watts per square metre (W/m^2) and the bottom panel is the anomaly (current minus the 1979-1998 climate average), in W/m^2. In the bottom panel, negative values (blue shading) represent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

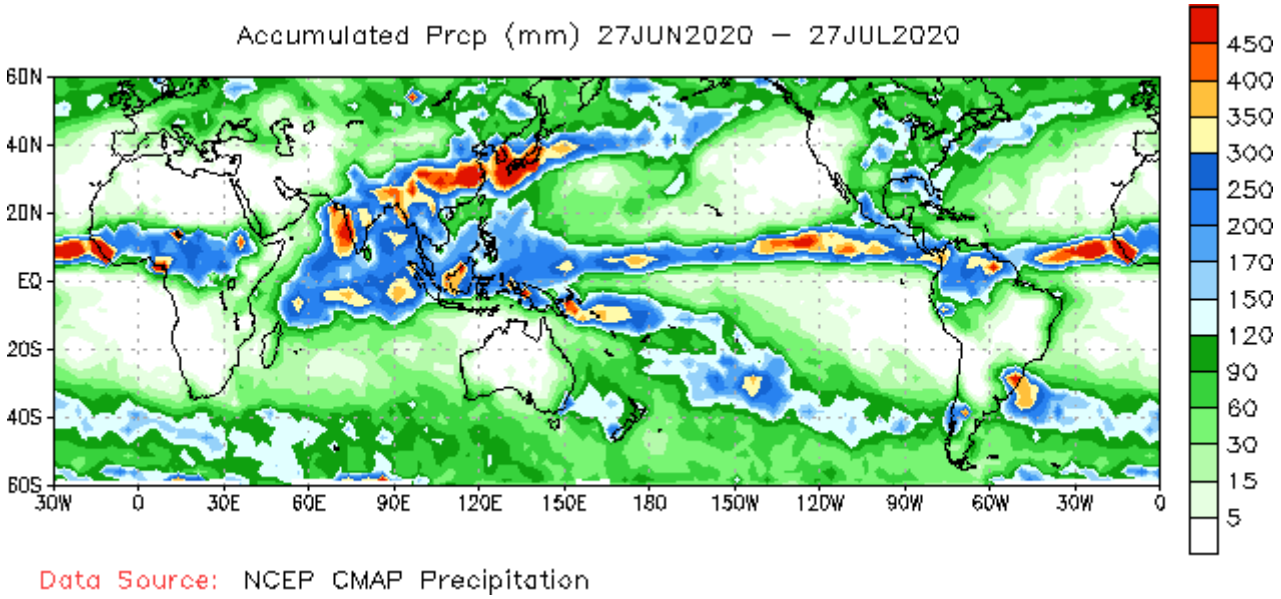
OLR Total and Anomalies, 30 Day OLR



OLR Total and Anomalies, 7 Day OLR

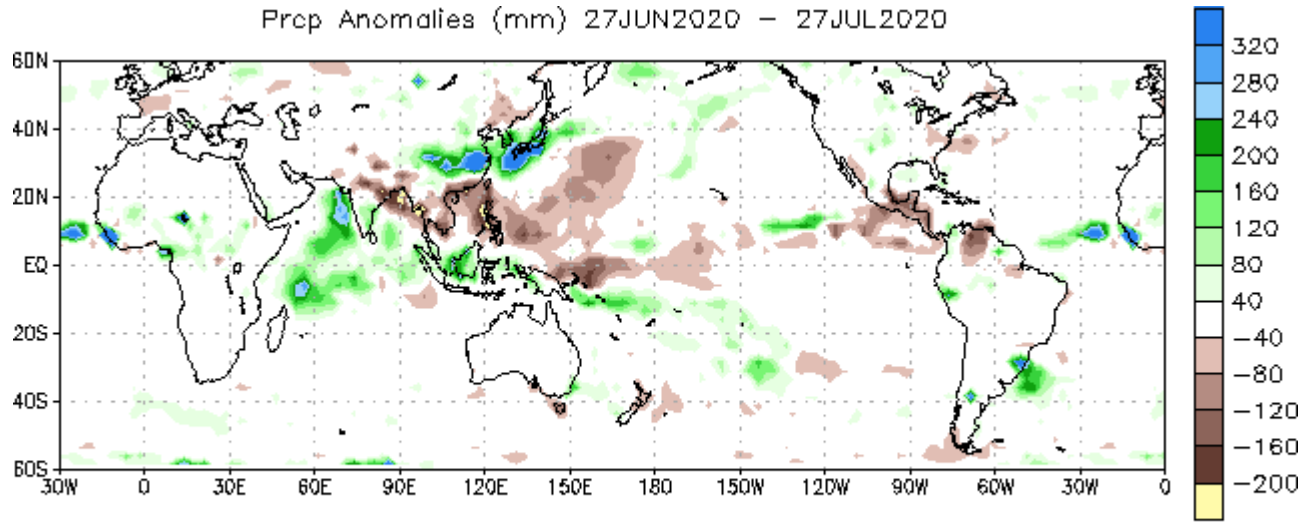




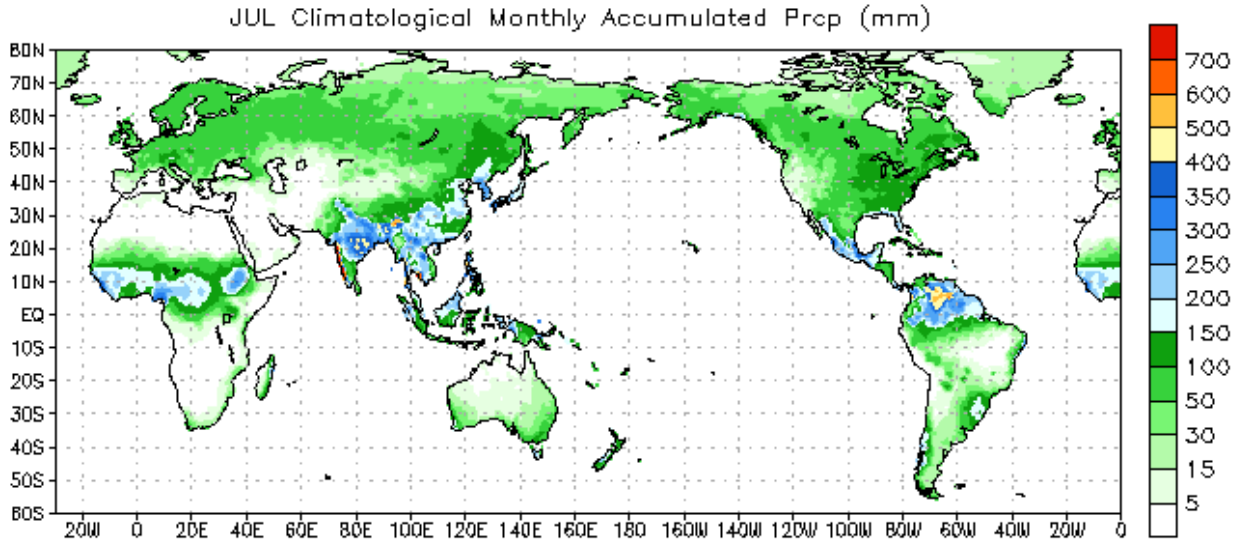


Data Source: NCEP CMAP Precipitation

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

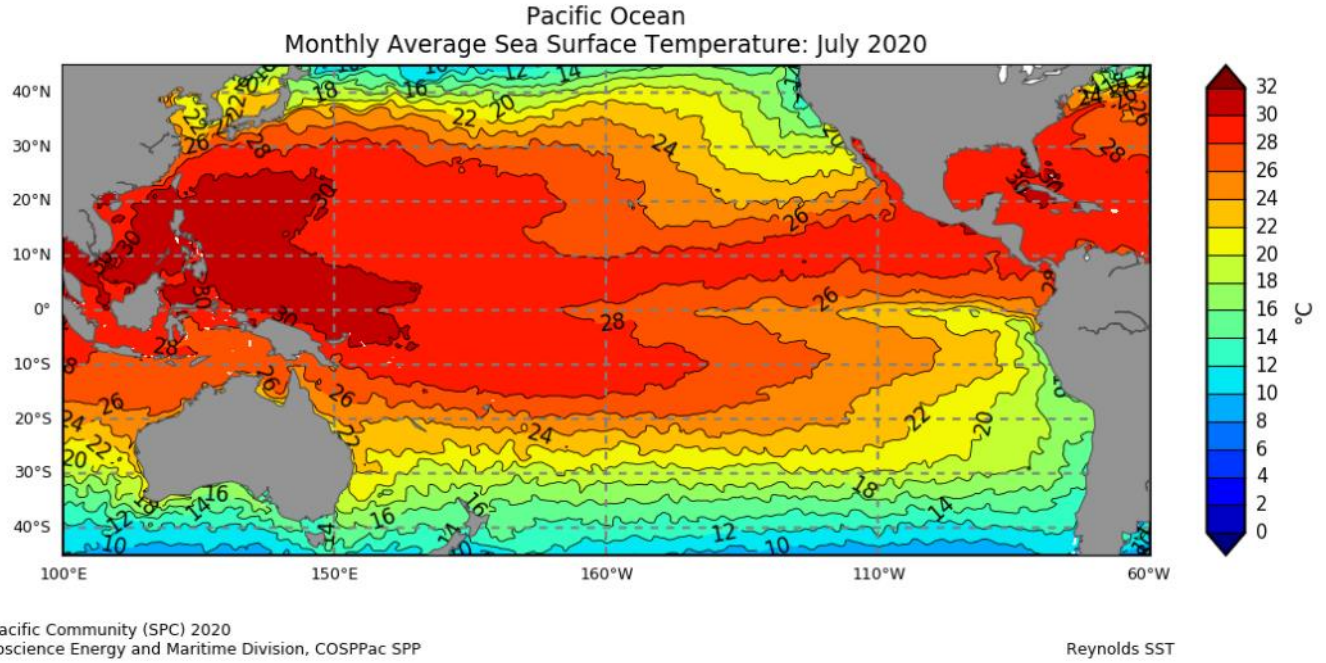
SEA SURFACE TEMPERATURE

Pacific Community COSPPac Ocean Portal

Sea surface temperatures (SSTs) for July shows a decrease in the extent and intensity of cooler than average SSTs in the eastern tropical Pacific Ocean, compared to June, in some of the equatorial Pacific, while cooler conditions have strengthened closer to the South American coast. Below normal SSTs persisted along the equator extending from the South American coast to 150° W. Above normal SSTs persist in the western equatorial Pacific and in the Tasman Sea generally weakened compared to June.

SSTs were also remain warmer than normal around most of the COSPPac partner countries. SSTs ranged from 0.5 to 1.0 degree warmer than normal around most countries in the region and 1.5 degrees warmer than normal around Palau, FSM, northern PNG, Solomon Islands, northern Fiji, southern Tuvalu, northern Tonga, Samoa and Niue. Cooler than average SST were around the Kiribati, New Caledonia, southern Vanuatu, Fiji, Tonga and French Polynesia EEZ. In terms of the deciles, regions of Highest on Record for July spanned across Palau, parts of FSM, PNG, Solomon Islands, Vanuatu, Tuvalu, Fiji, Samoa and Cook Islands EEZs. Regions of above average (decile 8-9) SSTs also spanned across the same countries with inclusion of RMI and Nauru. Average to below normal (decile 2-7) SSTs spanned across Kiribati, New Caledonia, Vanuatu, Fiji, Tonga, Cook Islands and French Polynesia EEZ.

Mean Sea Surface Temperature



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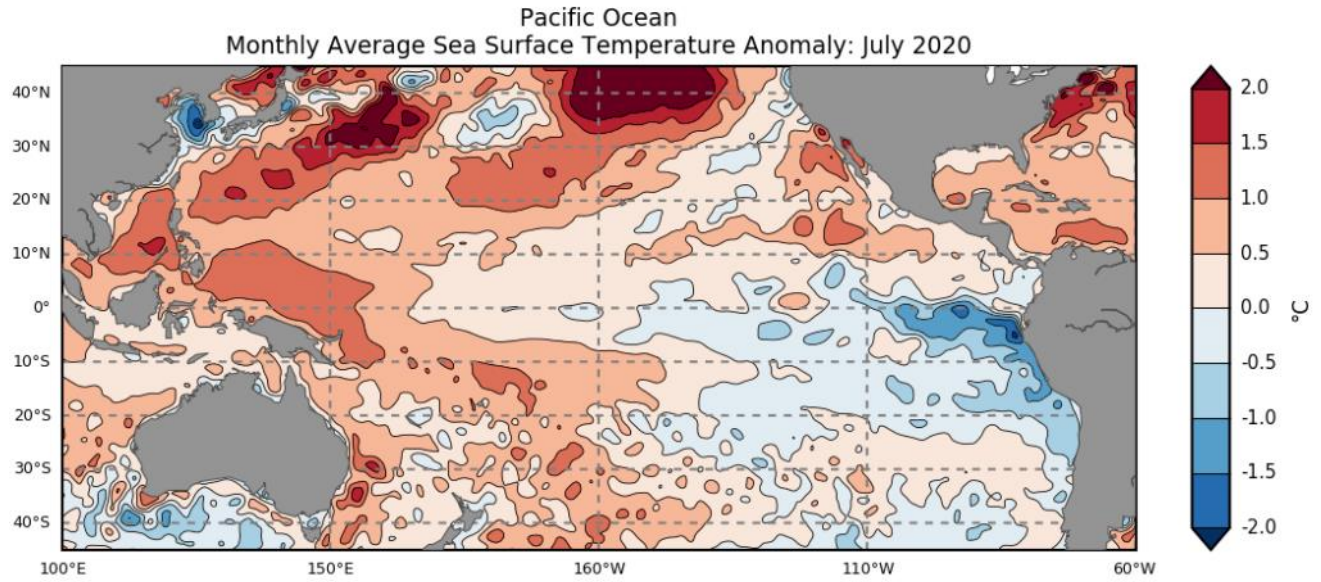
Geoscience Energy and Maritime Division, COSPPac SPP

Reynolds SST

OCEAN CONDITIONS

SEA SURFACE TEMPERATURE

Anomalous Sea Surface Temperature



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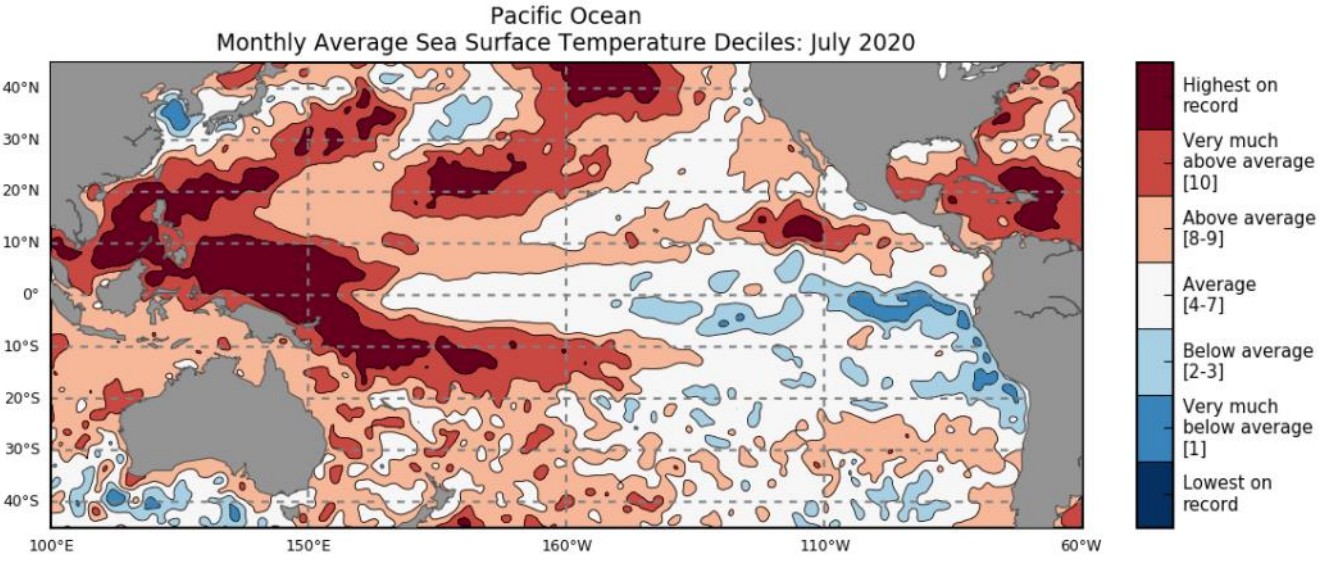
Reynolds SST

Sea Surface Temperatures Deciles



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Geoscience Energy and Maritime Division, COSPPac SPP

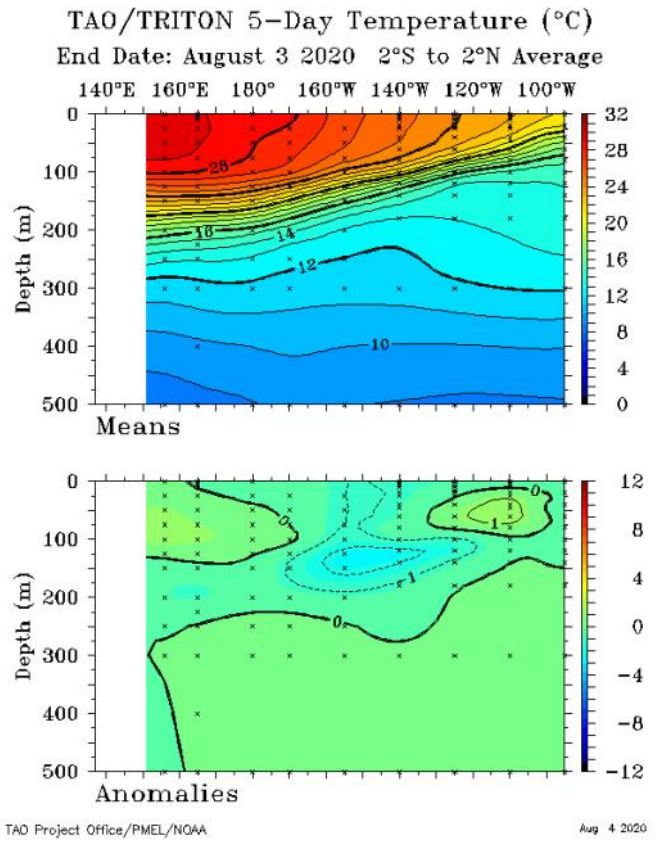
Reynolds SST

OCEAN CONDITIONS

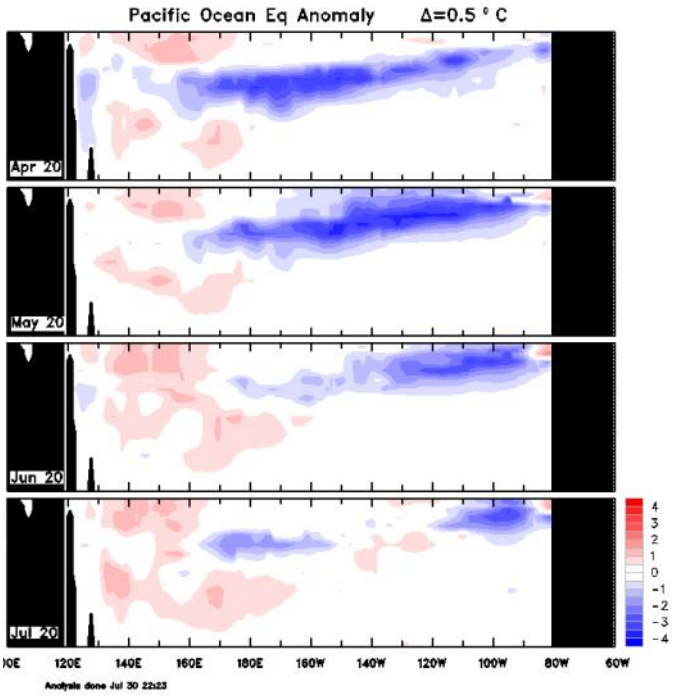
SUB SURFACE

The Bureau of Meteorology's four- month sequence of equatorial sub-surface temperature anomalies (to July) shows areas of cooler than average water in both the central and eastern equatorial Pacific, between about 100 and 200 m in the central equatorial Pacific and in the top 100 m in the east. Compared to June, the strength and extent of cooler than average water has decreased. Weak warm anomalies persist across much of the column depth west of the Date Line. Since January, the pattern of cooler anomalies at depth has persisted, providing conditions favourable for potential La Niña development, although July has seen some weakening of these patterns.

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/

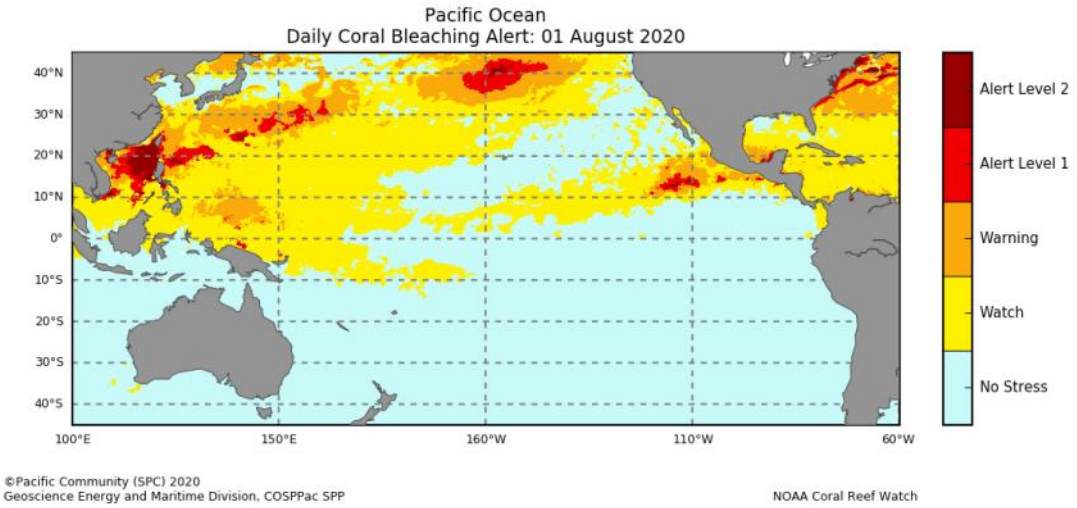
OCEAN CONDITIONS

CORAL BLEACHING

The daily Coral Bleaching Alert for 02 August 2020 shows Alert Level 1 just to the north of PNG. Areas of Warming exist around eastern Palau and western FSM. The remainder of south west Pacific Island countries are on Watch and no stress. The four weeks Coral Bleaching Outlook to 23 August shows the region of Alert Level 1 persisting over north Palau, western FSM, northern PNG and New Guinea Islands. The remainder of the south west Pacific countries are on warning, Watch or no stress.

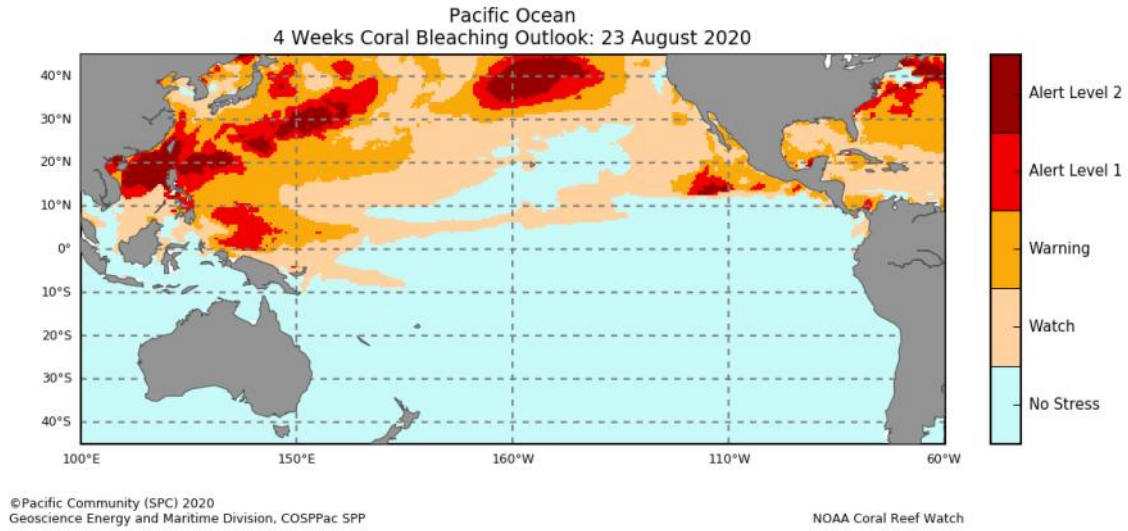
Daily Coral Bleaching Alert

(Source: Pacific Community COSPPac Ocean Porta Coral Bleaching)



4-Weeks Coral Bleaching Outlook

(Source: Pacific Community COSPPac Ocean Portal)



OCEAN CONDITIONS

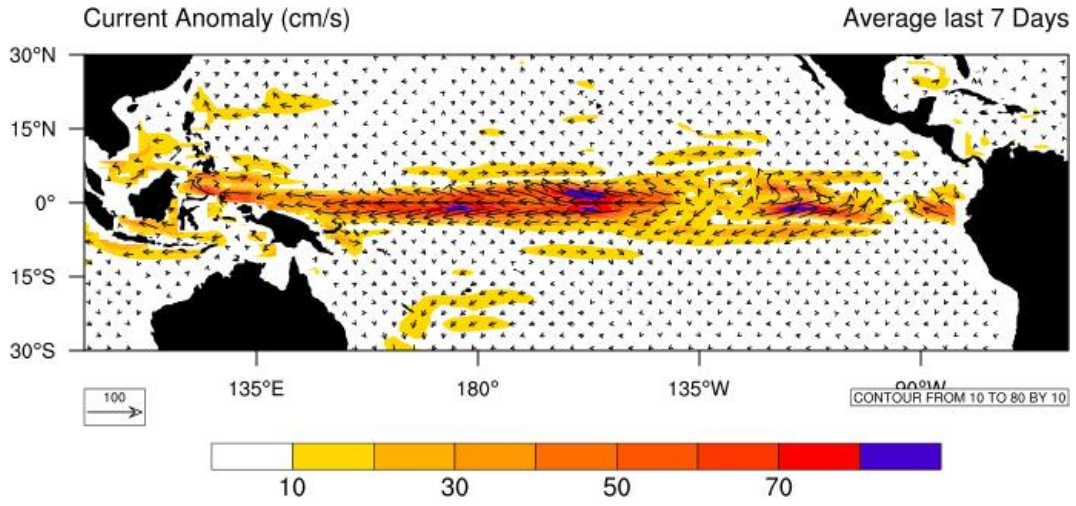
OCEAN SURFACE CURRENTS AND SEA LEVEL

The most recent 7-day ocean surface currents plot shows a stronger than normal westward flowing Equatorial Current in the central and western equatorial Pacific with clear divergence along the equator, especially east of about 135°W. The plot also shows a stronger than normal eastward flowing Equatorial Current east of 125°W.

Sea level in July was higher than normal for most of countries in the region with positive anomalies (15-20cm) situated around western Palau and Solomon Islands. Parts of southern PNG, New Caledonia, Vanuatu, Tonga, Cook Islands and French Polynesia experienced below normal conditions.

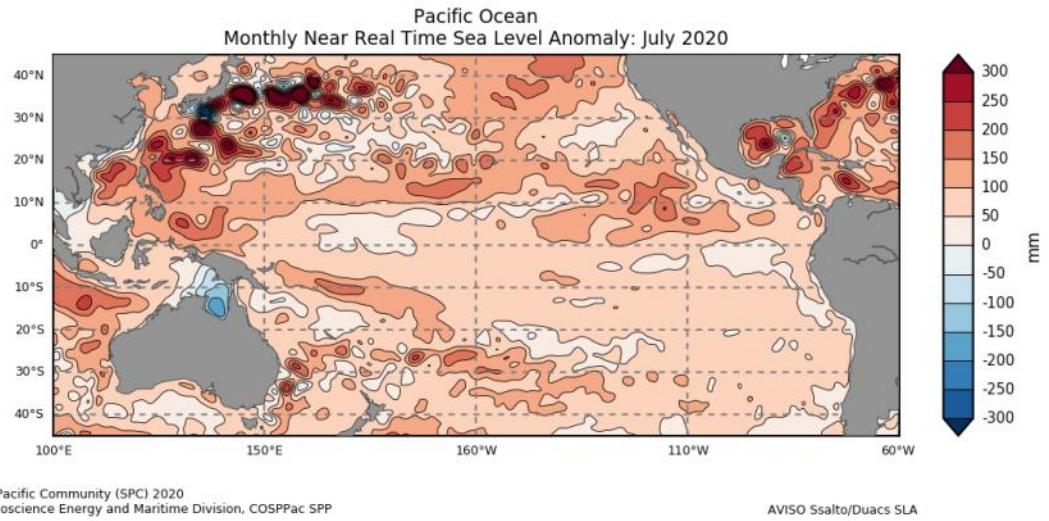
Ocean Surface Current (Last 7-Days)

Bureau of Meteorology POAMA



Monthly Sea Level Anomalies

Source: Pacific Community COSPPac Ocean Portal

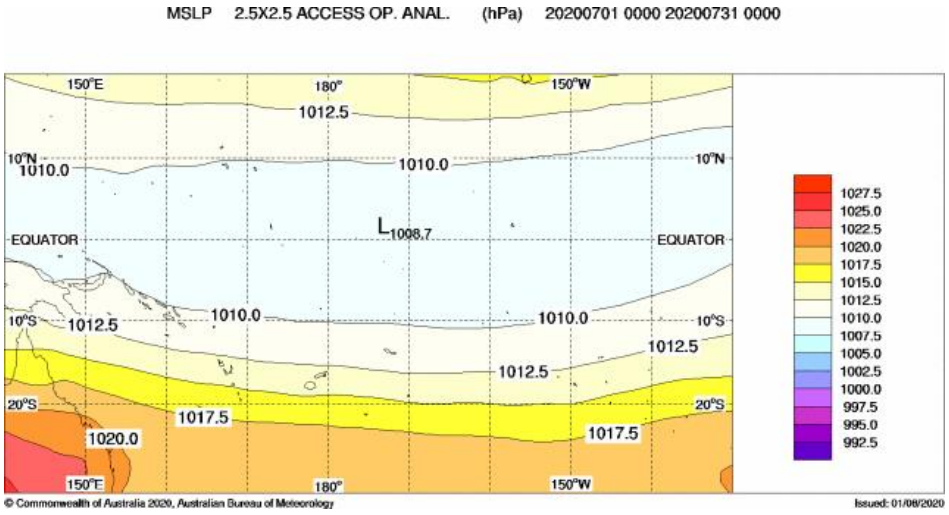


MEAN SEA LEVEL PRESSURE

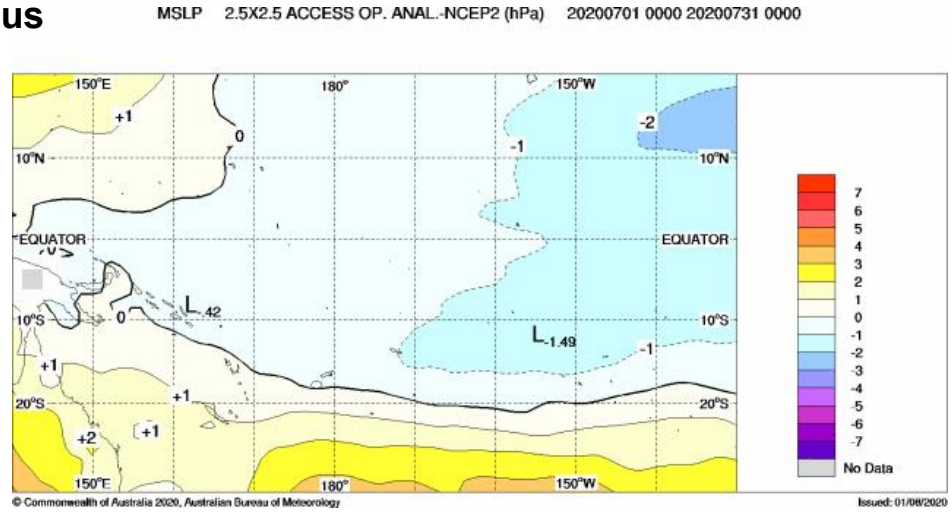
The July mean sea level pressure (MSLP) anomaly map shows negative anomalies east of 170°W in the tropical south Pacific and east of about 160°W in the northern tropical Pacific. Positive anomalies were present in the tropical north Pacific west of 160°E (over FSM) and tropical and subtropical south Pacific (over northeast Australia and New Caledonia).

Areas of above (below) average MSLP usually coincide with areas of suppressed (enhanced) convection and rain throughout the month.

Mean



Anomalous



Bureau of Meteorology South Pacific Circulation Patterns: http://www.bom.gov.au/cgi-bin/climate/cmb.cgi?variable=mslp&area=spac&map=anomaly&time=latest

SEASONAL RAINFALL OUTLOOK

August—October 2020

For August, the ACCESS-S model favours below normal rainfall for central and eastern FSM, northern, western and southern Marshall Islands, Nauru, New Caledonia, Kiribati, Niue, southern Cook Islands and parts of central and southern French Polynesia. Wetter than normal conditions is favoured for Palau, western FSM, eastern Marshall Islands, New Guinea Islands, highlands region and southern region of PNG, Solomon Islands, northern and central Vanuatu, northern and eastern Fiji, Tonga, Samoa, American Samoa and northern and central Cook Islands. The three months outlook (August-October) favours a similar outlook to that for August with below normal rainfall extending into northern Tuvalu, northern French Polynesia and above normal rainfall extending to western FSM, most parts of PNG, New Caledonia, southern Vanuatu and Niue. With the exception of FSM and the northern Marshall Islands, this is a typical La Niña rainfall pattern. Warmer than average maximum and minimum temperature are favoured for all COSPPac countries except for Kiribati and Nauru where near normal to below normal temperature is favoured.

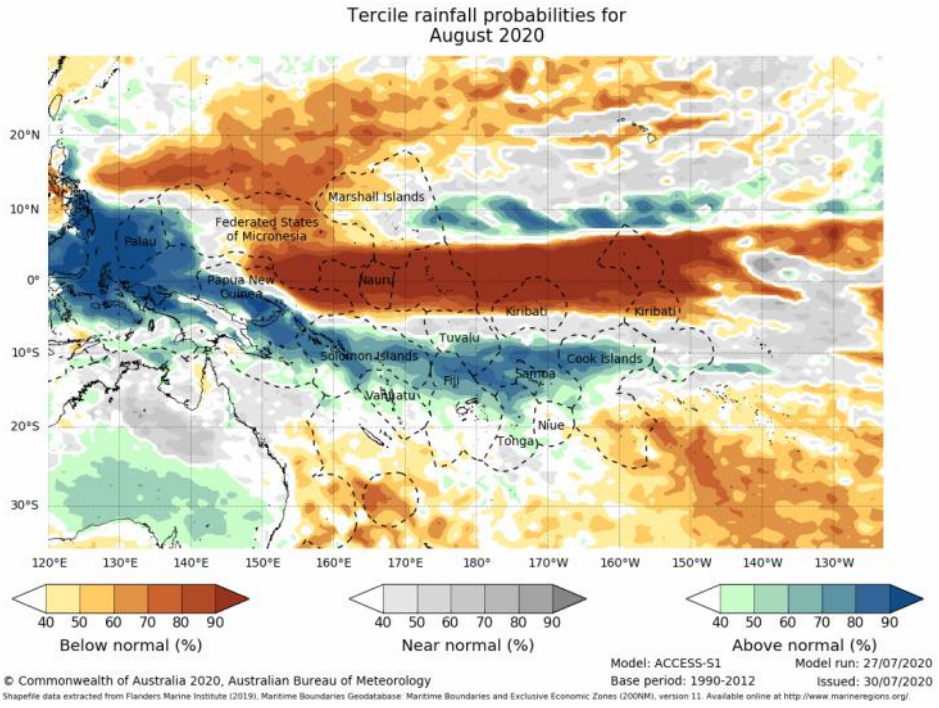
The Copernicus multi-model outlook favours below normal rainfall for the northernmost New Guinea Islands, FSM, RMI, Nauru, Kiribati and northern Tuvalu and above normal rainfall for Palau, Highlands region and eastern region of PNG, southern Solomon Islands, Vanuatu, Fiji, Tonga, Samoa and Niue.

The SCOPIC statistical model favours near normal or climatology for most countries in the COSPPac region. Above normal rainfall is favoured for part of central Solomon Islands and northern and southern Vanuatu.

The APEC Climate Centre multi-model favours below normal rainfall for FSM, northern RMI, northern New Guinea Islands, Nauru, northern Tuvalu, Kiribati and northern French Polynesia. Above normal rainfall is favour for most parts of PNG, Solomon Islands, northern Vanuatu, Fiji, southern Tuvalu, Wallis and Futuna, Samoa and central and southern Cook Islands.

For August to October, the dynamical models (excluding SCOPIC) agree on below normal rainfall for central and eastern FSM, northern RMI, Nauru, Kiribati and northern Tuvalu. The models also agree on above normal rainfall for Palau, most parts of PNG, Solomon Islands, Vanuatu, Fiji, Tonga, Wallis and Futuna, Samoa and Niue. The models disagree elsewhere.

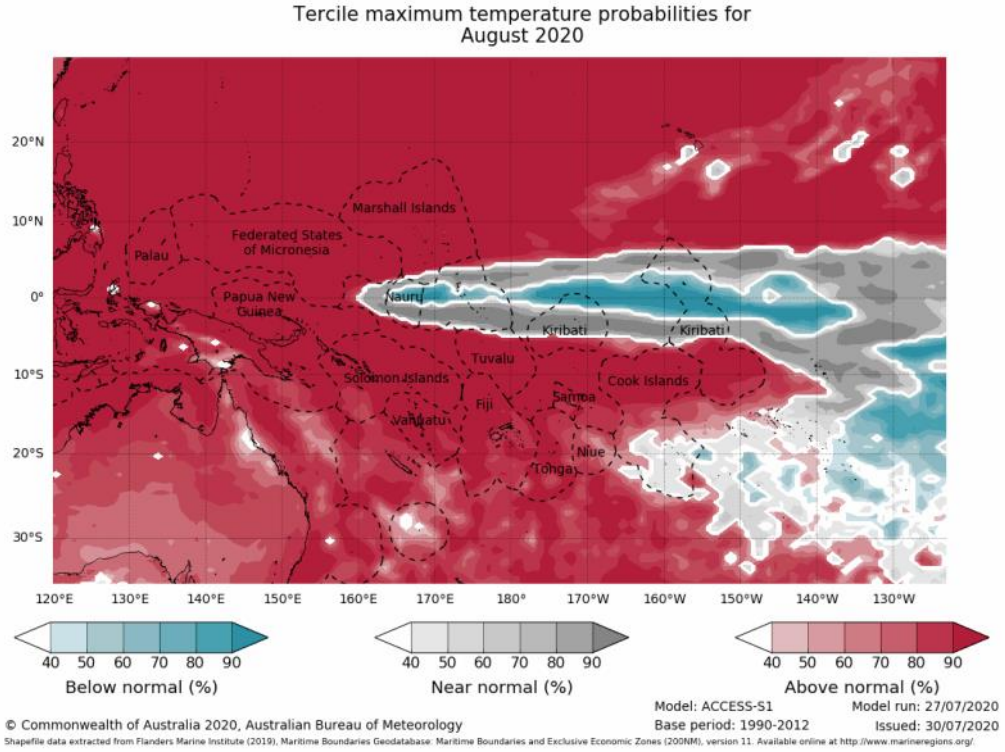
Monthly ACCESS-S Maps

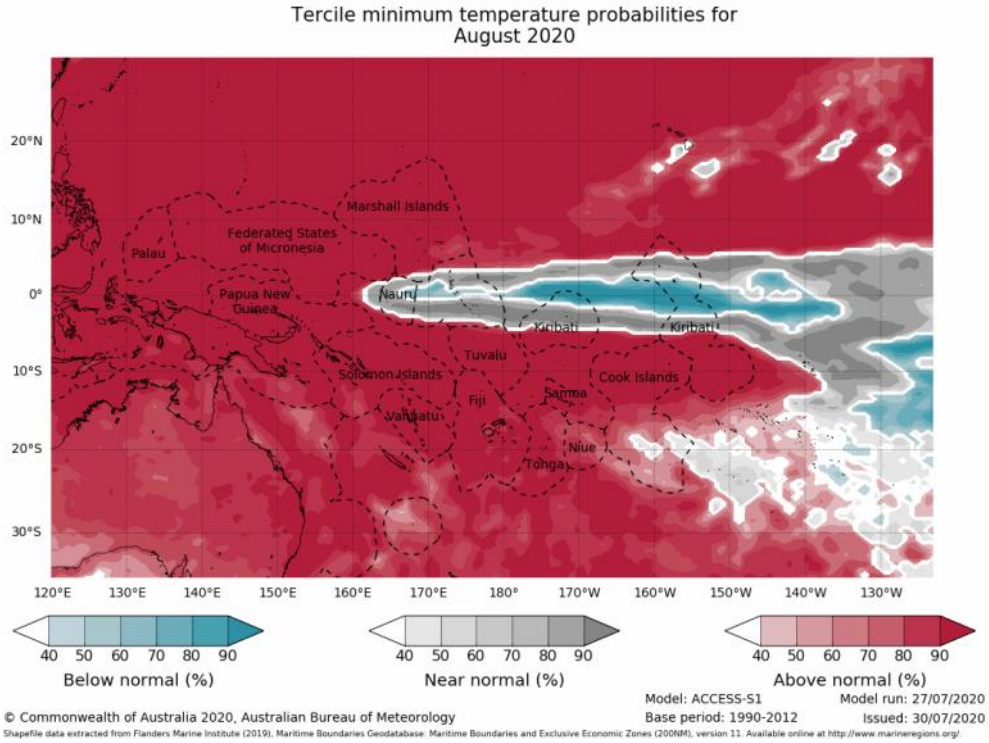


SEASONAL RAINFALL OUTLOOK

August—October 2020

Monthly ACCESS-S Maps

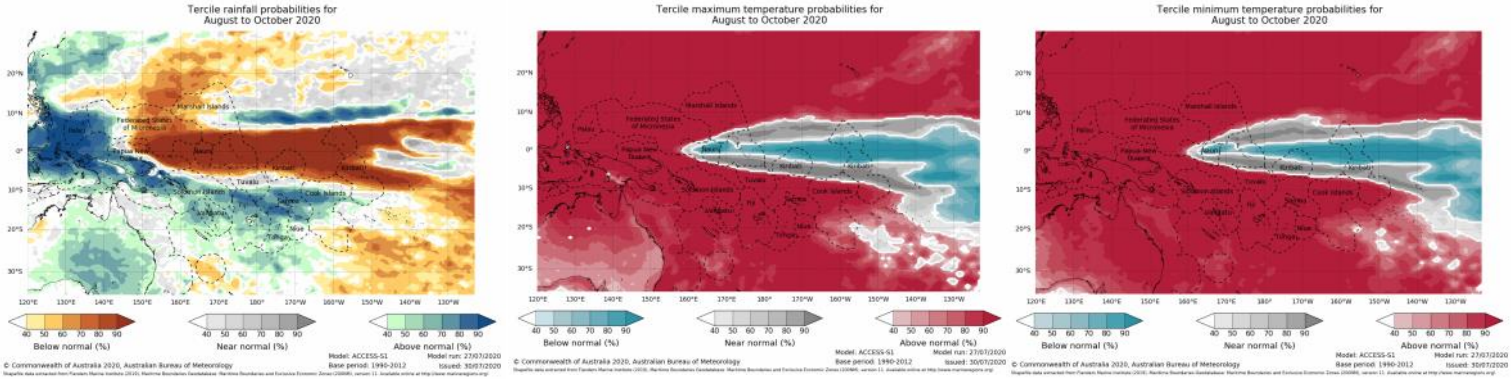




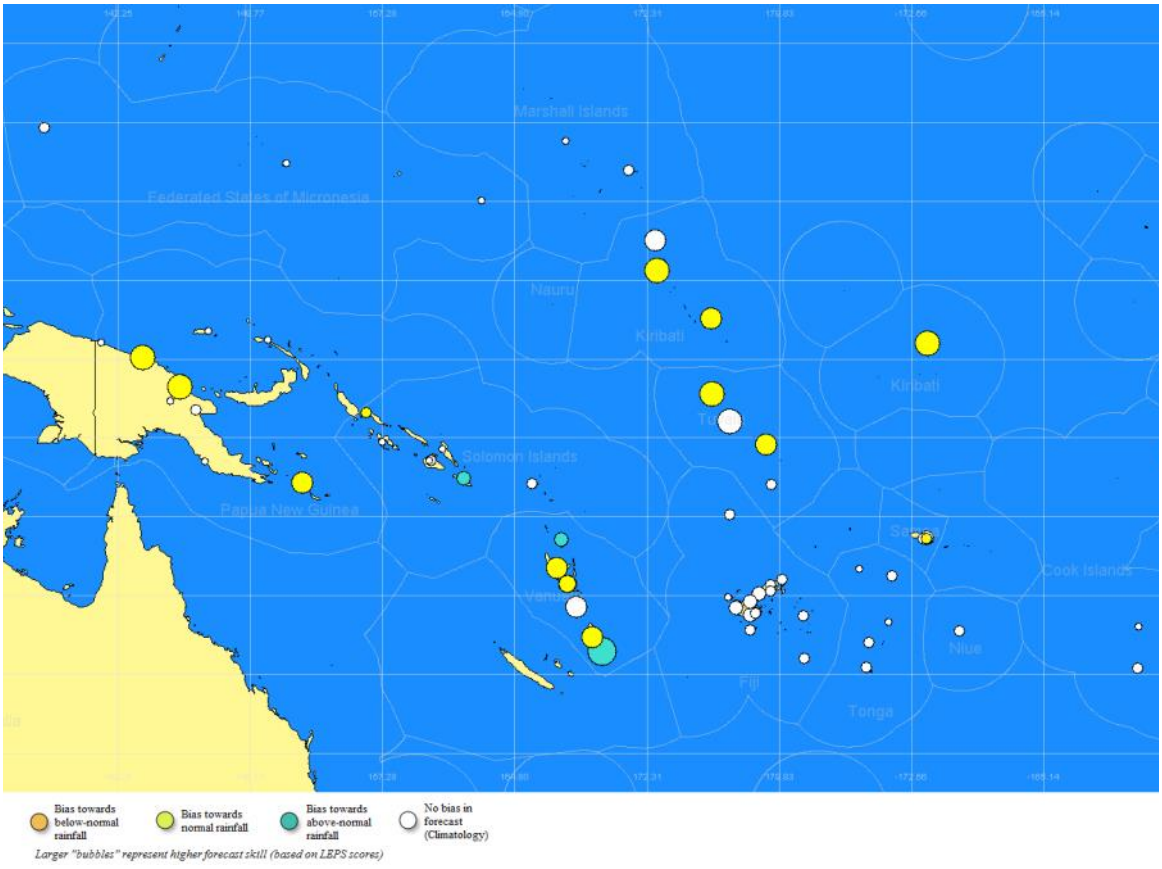
SEASONAL RAINFALL OUTLOOK

August—October 2020

Seasonal ACCESS-S maps



SCOPIC

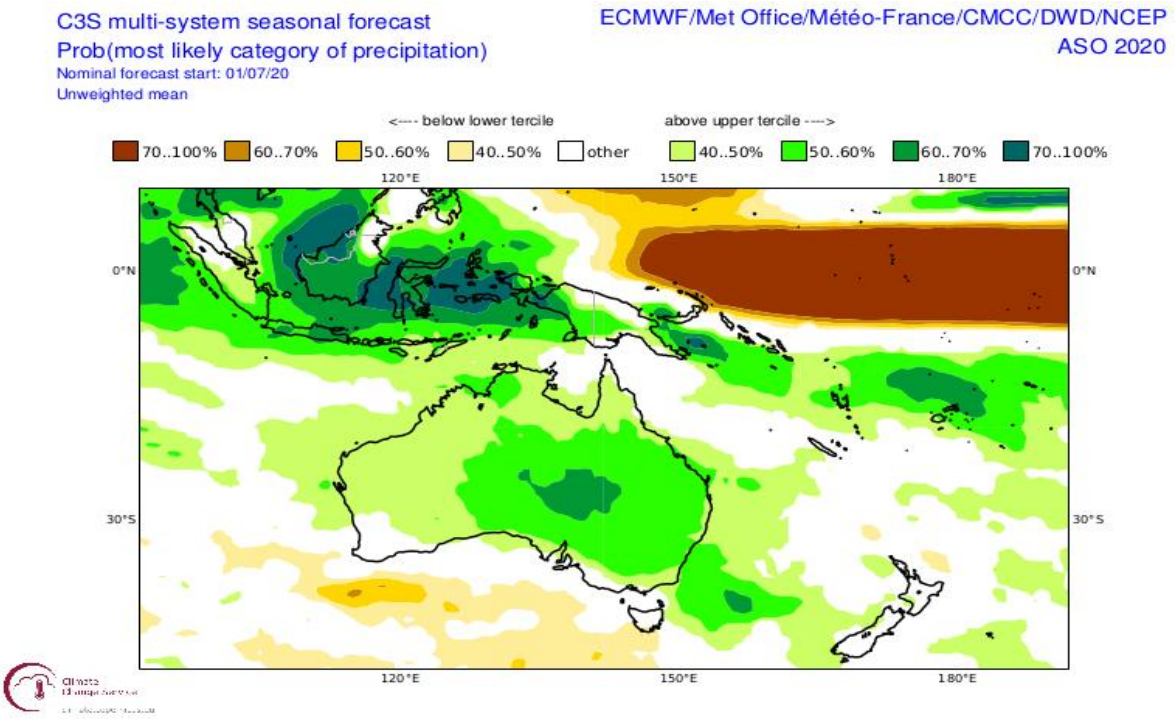


'About SCOPIC' www.pacificmet.net/project/climate-and-ocean-support-program-pacific-cosppac

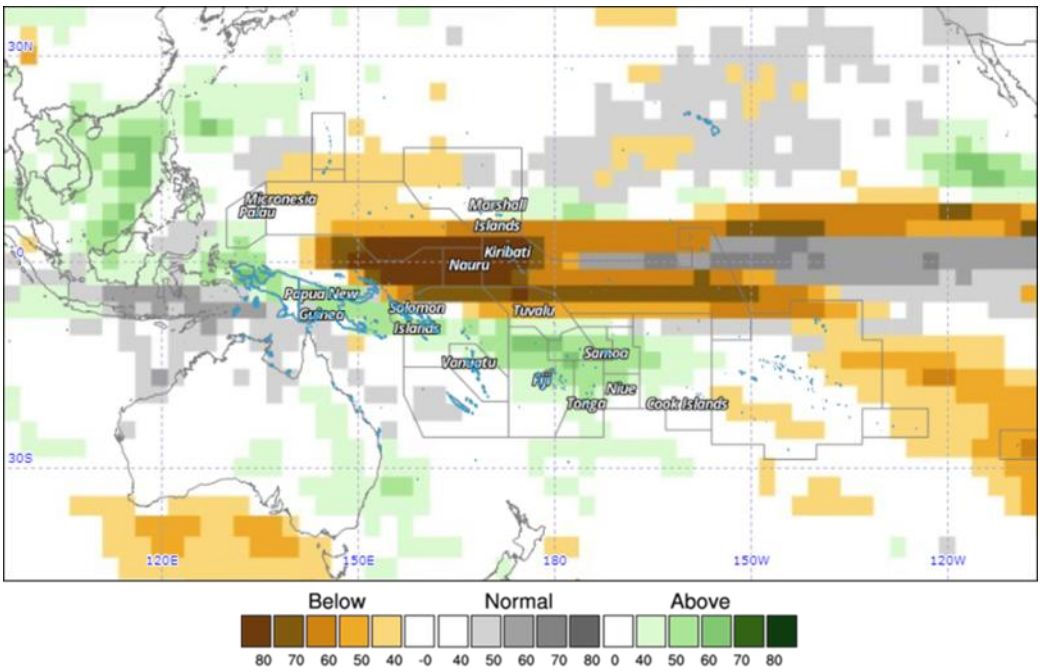
SEASONAL RAINFALL OUTLOOK

August—October 2020

Copernicus (C3S multi-system)-Rainfall



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



Year: 2020, Season: ASO, Lead Month: 3, Method: GAUS
Model: APCC, CMCC, CWB, MSC, NASA, NCEP, PNU, POAMA
Generated using CLIK® (2020-8-3)

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TROPICAL CYCLONE

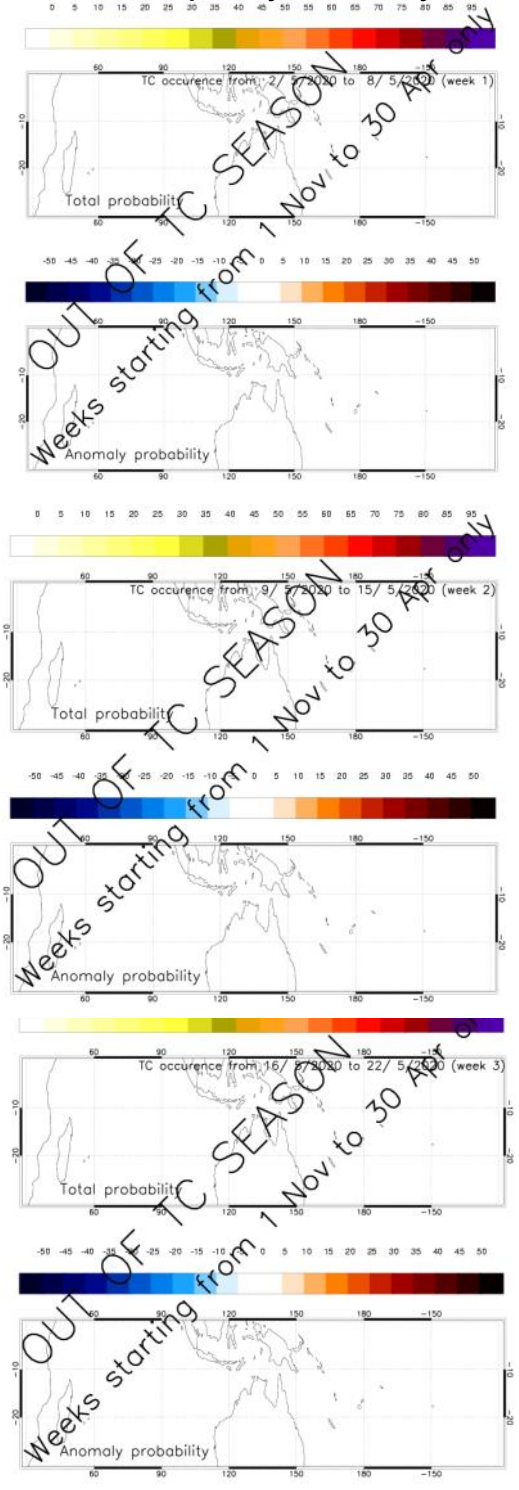
2019/2020 Season

Eight tropical cyclones (Rita, Sarai, Tino, Uesi, Vicky, Wasi, Gretel and Harold) formed in the 2019-20 south Pacific (east of the tip of Cape York, Queensland) cyclone season. These cyclones affected Solomon Islands, New Caledonia, Vanuatu, Fiji, Wallis and Futuna, Tonga, American Samoa, Samoa and Niue. Out of the eight cyclones, four severe cyclones: Rita, Tino, Uesi, and Harold. Harold was one of the most intense cyclones to make landfall in the Pacific Islands during April on record (minimum mean sea level pressure 912 hPa). The long-term average for the period 1969-70 to 2017-18 is nine cyclones. Although the official cyclone season ended in April 2020, historical data has shown that cyclones can formed outside the normal cyclone season. Updates on tropical cyclone forecast from the Meteo France weekly forecasts will resume in October 2020.

The tropical cyclone season outlook for 2019-20 is available via:http://www.bom.gov.au/climate/cyclones/south-pacific/

The tropical cyclone season outlook for 2018-19 is available via: http://www.bom.gov.au/climate/cyclones/south-pacific/

MeteoFrance Tropical Cyclone Weekly Forecasts



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.

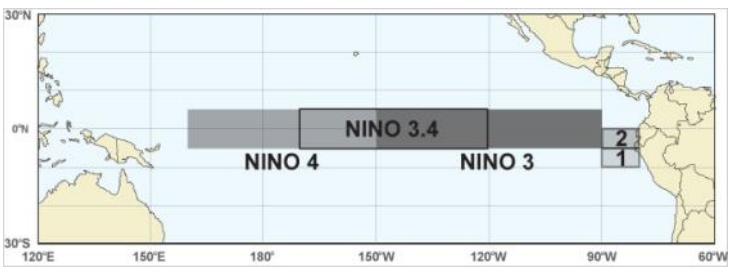
20 degrees Celsius Isotherm Depth

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 deeper than normal 20°C isotherm (positive anomaly) implies a greater heat content in the upper ocean, whilst 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