Monthly Climate Bulletin

June 2020













Pacific Community Communauté du Pacifique

Climate and Oceans Support Program in the Pacific



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SUMMARY

Issued 07 July 2020

- Both the El Niño Southern Oscillation (ENSO) and Indian Ocean Dipole (IOD) remain neutral. However, cooling in the tropical Pacific Ocean has continued, and the majority of models anticipate this cooling will be close to the threshold for La Niña by early spring. Consequently, the Bureau's ENSO Outlook has shifted to La Niña WATCH.
- The Madden Julian Oscillation (MJO) is currently weak, and is not expected to influence Australia's and Pacific climate in the coming fortnight.
- The Intertropical Convergence Zone (ITCZ) was marginally weakened in the central and western Pacific though some clouds associate with this remains in the eastern Pacific. The South Pacific Convergence Zone (SPCZ) was active and shifted slightly to the south of its normal position over Vanuatu, Fiji, Samoa, Cook Islands to French Polynesia resulting in higher than normal rainfall for these countries.
- Sea level in June was higher than normal for most of countries in the region with anomalies (2-3cm) situated around eastern Palau, New Guinea Islands, Solomon Islands, southern Tuvalu and Samoa. Parts southern PNG, Solomon Islands, New Caledonia, Vanuatu and Kiribati experienced negative sea level anomalies.
- The Coral Bleaching Alert for early July shows a region of Alert Level 1 spanning northern PNG and southern FSM. Areas of Warning exist around Palau, southern FSM and New Guinea Islands. The remainder of south west Pacific Island countries are on Watch and no stress. The four weeks Coral Bleaching Outlook till 26 July shows the region of Alert Level 1 to persist over south Palau, FSM, northern PNG and New Guinea Islands. The remainder of the south west Pacific countries are on warning, Watch or no stress.
- For July to September, the models tend to agree on below normal rainfall for New Guinea Islands, Nauru, Kiribati and northern Tuvalu. The models also agree on above normal rainfall for PNG Highlands, western and southern region of PNG, Solomon Islands, central and northern Vanuatu, Fiji, Wallis and Futuna and Samoa. The models disagree elsewhere.

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EL NIÑO-SOUTHERN OSCILLATION

La Niña WATCH -Likelihood of tropical Pacific reaching La Niña in spring

Climate Driver Update issued on 23 June 2020

increases

Both the El Niño Southern Oscillation (ENSO) and Indian Ocean Dipole (IOD) remain neutral. However, cooling in the tropical Pacific Ocean has continued, and the majority of models anticipate this cooling will be close to the threshold for La Niña by early spring. Consequently, the Bureau's ENSO Outlook has shifted to La Niña WATCH.

La Niña WATCH means the chance of La Niña forming in 2020 is around 50%- roughly double the average likelihood. Three models indicate a La Niña could form by late winter, with another two models suggesting thresholds could be approached during early spring. La Niña events typically bring above average spring rainfall in northern, central, and eastern Australia.

Key indicators of ENSO, such as the Southern Oscillation Index (SOI), trade winds, cloudiness near the Date Line, and sea surface temperatures in the tropical Pacific Ocean, are consistent with a neutral ENSO state. However, sea surface temperatures across the tropical Pacific Ocean have cooled over the past two months, and are supported by temperatures below the surface of the tropical Pacific Ocean, which are also cooler than average.

Most international climate models surveyed by the Bureau indicate central tropical Pacific sea surface temperatures in the NINO3.4 region will cool in the coming months. Three of the eight surveyed models reach the La Niña threshold during August, with another two models approaching thresholds in September and October. The other three models remain more clearly at neutral levels.

Despite recent cooling in the eastern Indian Ocean, three of six models continue to suggest the possibility of a negative IOD developing during winter (June-August) or early spring (September). Most models show a broad spread of likely scenarios between the neutral and negative IOD range. A negative IOD typically brings above average winter to spring rainfall to southern Australia. IOD do not have much influence in the Pacific region.

The approximate 30-day and 90-day Southern-Oscillation Index (SOI) values to 21 June were -9.7 and -3.7 respectively. While the 30-day SOI has dropped over the past fortnight, mostly due to higher pressure at Darwin, the longer-term 90-day SOI is still well within the ENSO neutral range.



EL NIÑO-SOUTHERN OSCILLATION

La Niña WATCH -Likelihood of tropical Pacific reaching La Niña in spr

Climate Driver Update issued on 23 June 2020

increases

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



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 30 June 2020

The Madden Julian Oscillation (MJO) is currently weak, and is not expected to influence Australia's and Pacific climate in the coming fortnight. Climate models indicate the MJO will likely strengthen near Africa or the western Indian Ocean in the coming week, and then track slowly eastwards. In this scenario, the only influence on northern Australia may be an increase in onshore flow across the north Queensland east coast, potentially leading to isolated areas of above-average rainfall.

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





The equatorial trade winds in the 5-day snapshot ending 29 June and for the month of June show near normal trade winds across the equatorial tropical Pacific, consistent with neutral EN-SO conditions.

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

The June 30-day OLR total and anomaly maps suggest the Intertropical Convergence Zone (ITCZ) was marginally weakened in the central and western Pacific though some clouds associate with this remains in the eastern Pacific. The South Pacific Convergence Zone (SPCZ) was active and shifted slightly to the south of its normal position over Vanuatu, Fiji, Samoa, Cook Islands to French Polynesia resulting in higher than normal rainfall for these countries.

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.

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OLR Total and Anomalies, 7 Day OLR

30-Day Rainfall Anomalies

https://www.cpc.ncep.noaa.gov/products/Global Monsoons /Figures/curr.p.30day.figb.gif

OCEAN CONDITIONS

SEA SURFACE TEMPERATURE

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Sea surface temperatures (SSTs) for June were slightly warmer than average across most of the western and central Pacific Ocean with much of the central tropical Pacific SSTs being close to average for this time of the year. Cooler than average SSTs have increased slightly in the eastern half of the equatorial Pacific Ocean.

SSTs also remain warmer than average around most of the COSPPac countries. SSTs ranged from half to one degree warmer than average around Pacific, and up to one and half degree warmer than average around northern PNG, western Solomon Islands, northern Fiji, southern Tu-valu, Tonga, Samoa and Niue. Cooler than average SST were around the Kiribati, New Caledonia, Vanuatu, Fiji and Cook Islands EEZ. In terms of the deciles, regions of Highest on Record for June spanned across parts of Palau and FSM, PNG, Solomon Islands, Tuvalu, Fiji, Tonga, Samoa and Niue EEZs. Average to below average (2-7) spanned across RMI, Kiribati, Vanuatu, Fiji and Cook Islands EEZ.

Mean Sea Surface Temperature

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Reynolds SST

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OCEAN CONDITIONS

SEA SURFACE TEMPERATURE

Anomalous Sea Surface Temperature

Pacific Ocean Monthly Average Sea Surface Temperature Anomaly: June 2020

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Reynolds SST

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

OCEAN CONDITIONS

SUB SURFACE

The Bureau of Meteorology's four-month sequence of equatorial sub-surface temperature anomalies (to 18 June) shows cooler than average waters extend in a band across the majority of the equatorial Pacific, between about 100 and 200 m in the western to central equatorial Pacific and rising to the top 50 m depth at the eastern edge of the equatorial Pacific. In the western equatorial Pacific very weak warm anomalies persist and have spread slightly in extent compared to May. Since January, the pattern of cooler anomalies at depth has persisted, providing conditions favourable for potential La Niña development.

Weekly Temperatures Mean and Anomalies

Monthly Temperatures Anomalies

OCEAN CONDITIONS

CORAL BLEACHING

The daily Coral Bleaching Alert for 01 July 2020 shows a region of Alert Level 1 spanning northern PNG and southern FSM. Areas of Warning exist around Palau, southern FSM and New Guinea Islands. The remainder of south west Pacific Island countries are on Watch and no stress. The four weeks Coral Bleaching Outlook till 26 July shows the region of Alert Level 1 to persist over south Palau, FSM, northern PNG and New Guinea Islands. The remainder of the south west Pacific countries are on warning, Watch or no stress.

4-Weeks Coral Bleaching Outlook

(Source: Pacific Community COSPPac Ocean Portal)

OCEAN CONDITIONS

OCEAN SURFACE CURRENTS AND SEA LEVEL

Sea level in June was higher than normal for most of countries in the region with anomalies (2-3cm) situated around eastern Palau, New Guinea Islands, Solomon Islands, southern Tuvalu and Samoa. Parts of southern PNG and Solomon Islands, New Caledonia, Vanuatu and Kiribati experienced below normal conditions.

MEAN SEA LEVEL PRESSURE

The June mean sea level pressure (MSLP) anomaly map shows negative anomalies east of the diagonal line from about 165°E to about 150°W. Positive anomalies were present in the western Pacific, over northeast Australia, FSM, Marshall Islands, Papua New Guinea, Solomon Islands, northern New Caledonia and northern Vanuatu.

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

Mean

Anomalous

MSLP 2.5X2.5 ACCESS OP. ANAL.-NCEP2 (hPa) 20200601 0000 20200630 0000

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

July–September 2020

For July, the ACCESS-S model favours below normal rainfall for central FSM, northern Marshall Islands, Nauru, New Caledonia, central and southern Vanuatu, Kiribati, northern Tuvalu, southern Cook Islands and French Polynesia. Wetter than average conditions is favoured for Palau, New Guinea Islands, southern region of PNG, Solomon Islands, northern Vanuatu, Rotuma and eastern region of Fiji, northern Tonga, Samoa, Niue and northern and central Cook Islands. The three months outlook (July-September) favours a similar outlook to that for July with below normal rainfall extending to whole of FSM. Above normal rainfall are also favoured for southern RMI, Vanuatu and northern and central Tonga. Warmer than average maximum and minimum temperature is favoured for all COSPPac countries except for Kiribati and Nauru with near normal temperature is favoured. The eastern equatorial Kiribati Islands are likely to experience below normal temperatures.

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

The SCOPIC statistical model favours below-normal rainfall for Momase region and Misima in PNG, central and northern Vanuatu and Fiji. Above normal rainfall is favoured for Kiribati, Tuvalu and northern Cook Islands.

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

For July to September, the models tend to agree on below normal rainfall for New Guinea Islands, Nauru, Kiribati and northern Tuvalu. The models also agree on above normal rainfall for PNG Highlands, western and southern region of PNG, Solomon Islands, central and northern Vanuatu, Fiji, Wallis and Futuna and Samoa. The models disagree elsewhere.

July-September 2020

Monthly ACCESS-S Maps

Tercile maximum temperature probabilities for July 2020

Tercile minimum temperature probabilities for July 2020

July—September 2020

SCOPIC

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

July-September 2020

Copernicus (C3S multisystem)-Rainfall

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

Year: 2020, Season: JAS, Lead Month: 3, Method: GAUS Model: APCC, MSC, NASA, NCEP Generated using CLIK@ (2020-7-3)

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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 longterm 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

