

Eight Pacific Islands Climate Outlook Forum

November 2020 to April 2021 summary and May to October 2021 climate and tropical cyclone outlook | Issued: 29 April 2021

Outlook for May to October 2021

- Climate model outlooks favour the tropical Pacific Ocean being at neutral El Niño-Southern Oscillation (ENSO) levels for most of this period.
- The continuing influence of La Niña is evident in atmospheric and ocean seasonal forecasts especially for May to July.
- Drier than normal conditions are favoured for island groups close to the equator. Existing drought (including in Tarawa, western Kiribati and Penrhyn, northern Cook Islands) is likely to continue for a few more months. Forecast confidence for this region is high. Normal to above normal rainfall is likely for most off-equatorial countries. Forecast confidence is moderate.
- Most countries in the south west Pacific are entering their dry season and this should be taken into account when considering the above rainfall outlooks. In countries where above normal rainfall is favoured, the dry season may be wetter than usual. In countries where below normal rainfall is favoured, water stress may be experienced.
- Ocean surface and air temperatures are favoured to be above normal for many western Pacific Islands, except closer to the equator east of the Dateline where cooler than normal temperatures are expected.
- Coral Bleaching alerts have been issued for the NW Pacific, northern coastline of Papua New Guinea (PNG), Nauru and western Kiribati for May to July.
- Sea level over May to July is favoured to be notably higher than normal (>20cm) in the Solomon Islands with most of remaining countries likely to experience slightly above normal (10cm) to near normal sea level. Communities need to be aware of higher tides especially when combined with large waves or swell, this can lead to flooding of low-lying coastal areas. Some countries will experience their highest tides of the year in the coming months.

Climate since November 2020

- The moderate La Niña event which began around September-October 2020 continued into the first quarter of 2021. Depending on agency definition the event has ended or is expected to end in the next month or so.
- Suppressed rainfall and cooler air and sea surface temperatures were observed in the equatorial Pacific over November to April with generally enhanced rainfall and warmer air and sea temperatures occurring for most off-equatorial south Pacific regions.
- Rainfall corresponding to the lowest 10% of the historical record was observed at several locations in the equatorial Pacific. Meteorological droughts at Tarawa, western Kiribati and Penrhyn, Cook Islands are the most severe since those experienced in 2010-11. Exceptional drought was experienced on Kapingamarangi

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Atoll in southern FSM. While river flooding and landslides occur in most SW Pacific wet seasons, the wetter than normal conditions in 2020-21 were associated with more extreme and frequent impacts.

- Ocean surface temperatures in the north and south Pacific were warmer than those experienced during previous similar La Niña events and contributed to coral bleaching alerts in the western Pacific including PNG, Solomon Islands, Vanuatu, Palau and FSM. Surveys reported coral bleaching at PNG and Solomon Islands.
- In the NW Pacific, 26 numbered systems or tropical cyclones (TCs) formed, which is close to the long-term average. Seven were major hurricanes. In the SW Pacific, normal or slightly below normal TC activity was favoured for the 2020-21 season. Seven named TCs formed east of the tip of Cape York, Australia. The long-term average for the SW Pacific is 9. Three cyclones reached severe Category 3-5 status, including *Yasa*, one of the most intense TCs on record in the basin.

Review of November 2020 to April 2021 climate

A moderate La Niña event began around September-October 2020 and was well established by the end of 2020, persisted into the first quarter of 2021. While the Australian Bureau of Meteorology (BOM) declared the event over in late February, the US National Oceanic and Atmospheric Administration (NOAA) and New Zealand National Institute of Water and Atmospheric Research (NIWA) state the event is ongoing according to their definitions. According to NOAA, a transition from La Niña to ENSO-Neutral is likely in the next month or so. As such, La Niña 's influence on rainfall patterns and coral bleaching continues in parts of the tropical and subtropical Pacific. Over November to April, ocean surface temperatures exhibited a classic La Niña pattern, with cool central Pacific ocean surface temperatures indicative of a moderate and partially westward shifted event.

As typically experienced during La Niña, the South Pacific Convergence Zone (SPCZ) was displaced southwest of its long-term average position, towards Vanuatu, Fiji, Tonga, Niue and the southern Cook Islands over most of November to April. Suppressed rainfall and cooler air and sea surface temperatures were observed in the equatorial Pacific over the same period with generally enhanced rainfall and warmer air and sea temperatures occurring for most off-equatorial South Pacific regions. Observed rainfall was in the highest 10% of the historical record for the off-equatorial region straddling the Dateline including for stations in the Federated States of Micronesia (FSM), Marshall Islands, Fiji, Samoa, American Samoa, Tonga, and Vanuatu. Moderate drought was observed in the Marshall Islands on Kwajalein and Wotje over December to February. 2020 was Pago Pago, American Samoa's wettest year on record. While river flooding and landslides occur in most western Pacific wet seasons, the wetter than normal conditions in 2020-21 were associated with more extreme and frequent impacts. Noteworthy on this occasion was damage to food gardens and infrastructure in PNG, Vanuatu, Fiji and Samoa.

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Rainfall in the lowest 10% of the historical was observed in the equatorial Pacific. Tarawa (and Kiritimati) in western (and eastern) Kiribati respectively are experiencing their 10th (and 13th) most severe meteorological droughts since 1950 (and 1921). These events have been ongoing for eight (and six) months. Similarly, Penrhyn in the northern Cook Islands is experiencing its 12th most severe meteorological drought since 1937 which has been ongoing for five months. The last time Tarawa and Penrhyn experienced a drought of this magnitude was in 2010-11. Exceptional drought was experienced on Kapingamarangi Atoll in southern FSM which is located just north of the equator. September to November 2020 ranked as the second driest three-month period in 25 years. This was followed by the fourth driest December to February period on record. Although meteorological records are not available, similar experiences are likely in the equatorial Pacific. Impacts included water shortages resulting in the need to dig wells in the PNG Islands and water shipments to Banaba in Kiribati and Penrhyn.

There have been consistently high sea levels across the South Pacific since October 2020, with the strongest positive anomalies in the western warm pool region. Ocean surface temperatures in the North and South Pacific were warmer than previous analogous ('similar') La Niña events. The warm anomalies contributed to coral bleaching alerts in the western Pacific including PNG, Solomon Islands, Vanuatu, Palau and FSM. Surveys reported coral bleaching at PNG and Solomon Islands, mentioned as being the worst in 15 years at PNG.

Dynamical and statistical model forecasts have been consistent within the South Pacific for nearly all regions since PICO7, with high confidence, an advantage of an established La Niña event. For most regions, the model forecasts verified well ('were correct'), particularly the seasonal forecasts made in the later part of 2020 during the peak of the La Niña event.

The March 2020 NOAA TC Outlook (2020) called for a near normal to above normal number of storms. For the year, there were 26 numbered systems, compared to a normal of about 26 systems. There were 23 named storms, 12 reached hurricane status, and seven were major hurricanes. In terms of the geographic distribution of storms in the region, all major TCs occurred west or northwest of Micronesia. This is consistent with La Niña conditions.

The PICO7 outlook for the 2020-21 Southwest Pacific TC season suggested normal or slightly below normal TC activity. Seven named TCs formed east of the tip of Cape York, Australia. The long-term average for the SW Pacific is 9. Three cyclones reached severe Category 3 status or higher, including TC *Yasa*, one of the most intense TCs on record in the basin. Even in a slightly less active year, this illustrates the need to be prepared and have an emergency response plan. TC impacts in Fiji included but are not limited to severe wind damage to housing and agricultural crops, river flooding, landslides and disruption to utilities e.g. fallen power lines. River flooding and wave damage was experienced in the Solomon Islands and wind damage in Kiribati. TC *Lucas* and severe TC *Niran* brought damaging winds to New Caledonia, causing some power outages, roof failure and wall

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collapse. Torrential rain associated with TC *Lucas* flooded many houses and triggered landslides, one of them disrupted traffic for several months.

May to October 2021 outlook

Most ENSO models favour ENSO-neutral conditions over this period. At least one model favours the re-emergence of La Niña from about October - November 2021. The ability of models to predict ENSO conditions is lower through March - May, meaning the confidence in the ENSO forecast for June - August and later in the year is low. The confidence of ENSO models is also lower during neutral ENSO conditions.

The statements below have been crafted using the WMO Lead Centre (LC) for Long-Range Forecast (LRF) Multi-Model Ensemble (MME) <https://www.wmolc.org/> outlooks. Where an element forecast is not available e.g., for TCs or coral bleaching, outlooks are obtained from Pacific RCC Network Node for LRF members <https://www.pacificmet.net/rcc>. **These outlook statements are provided for use by National Meteorological and Hydrological Services (NMHSs). They do not constitute an official outlook for any nation. For more information, please contact your local meteorological office.**

All communities should remain vigilant and follow forecast information provided by their National Meteorological and Hydrological Service (NMHS).

The continuing influence of La Niña is evident in the upcoming seasonal forecasts especially for the May to July (Fig. 1). The persistence of drier than normal conditions for island groups close to the equator (e.g. Nauru, Kiribati and the northern Cook Islands) is favoured. Islands that have experienced low rainfall over the last 3 to 6 months are likely to continue to experience these conditions. Forecast confidence for this region is high. Normal to above normal rainfall for most off-equatorial countries is likely. Forecast confidence for this region is moderate. It is worth noting that the impact of a wetter outlook during the dry season will be different from that of a dry outlook during the wet season.

Warmer than normal ocean surface temperatures are favoured over May to July for most countries in the western Pacific, extending east to the Marshall Islands and southeast to the southernmost French Polynesian islands. Cooler than normal ocean surface temperatures are favoured just south of the equator close to and east of the Dateline and further southeast towards French Polynesia. A similar pattern is apparent in the six-month forecast from May, however in this forecast the below normal temperatures are confined to the northern Cook Islands and French Polynesia region. Coral Bleaching alerts have been issued for the NW Pacific, northern coastline of PNG, Nauru and western Kiribati over the coming three months.

Associated with ocean surface temperature patterns, warmer than normal air temperatures are expected for many island groups, particularly in the west, extending southeastward into the sub-tropics (Fig. 2). Cooler than normal air temperatures are more likely closer to the equator (e.g. for Kiribati) east of the Dateline due to the lag effect of recent La Niña conditions.

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Sea level over May to July is favoured to be notably higher than normal (>20cm) in the Solomon Islands with most of remaining countries likely to experience slightly above normal (10cm) to near normal sea level. Patches of below normal sea level could be seen in few countries such as southern Tonga and southern Cook Islands. Communities need to be aware of higher tides especially when combined with large waves or swell, this can lead to flooding of low-lying coastal areas. Some countries will experience their highest tides of the year in the coming months.

Although there is strong cross-model agreement, it is worth noting that the transition from La Niña to ENSO neutral can have a minor negative effect on model skill.

Madden-Julian Oscillation (MJO) events in the Pacific can influence TC development. The MJO is forecasted to be active over the tropical oceans near the Americas, the Atlantic, and Africa in early May, decreasing the risk for out-of-season cyclone development in the Southwest Pacific. In mid-2021, there is an indication that the MJO may not commonly be active over the Pacific.

The NOAA Central and Eastern North Pacific Hurricane season outlooks will be released on 19 and 20 May respectively. TC activity in the Western North Pacific occurs year around. The NOAA Hurricane Outlook for this region will be issued around 1 June. 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. BOM multi-week TC forecasts have proven valuable in terms of providing early warning of the chances of TC risk in the NW Pacific in 2021 especially in the case of recent Typhoon *Surigae*. These multi-week and daily Regional Specialized Meteorological Centre (RSMC) Tokyo and RSMC Honolulu TC warning products will be available through the upcoming season.

Recommendations from PICOF-8

Regional Climate Outlook Forums such as the PICOF are important mechanisms for sharing climate and ocean information, best practices, and lessons learnt on climate and ocean prediction and its likely implications on sectors where productivity is heavily dependent on the state of climate. This should continue and be linked to the functions of the Pacific Islands Regional Climate Centre Network (PI-RCC Network).

Close working relationships between Pacific rim and Pacific Island NMHSs, regional organisations and WMO are critical to effective warning of climate hazards leading to early preparedness. Further enhancement of these relationships is essential, as well as relationships between NMHSs, their primary stakeholders and the community. These can be frequent meetings such as one-on-one discussions, cluster group meetings, and national climate outlook forums.

In addition to the production of national seasonal climate outlooks, there is a need for simplified products and messaging especially for rural and remote communities. Sectoral impacts are most often related to prolonged drier or wetter than normal conditions. NMHSs

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should continue to develop climate products tailored for national sectors, relevant to their needs, and incorporating where possible traditional knowledge elements.

Further Information

The PICS Panel and Pacific Regional Climate Centre (RCC) Network Node for Long Range Forecasting have been coordinating the Pacific Islands Climate Outlook Forum (PICOFF) since 2015 in collaboration with WMO with the support of other international and regional partners. PICOFF is a platform used to discuss the seasonal outlook (cyclone, precipitation, temperature and oceanic conditions) for the upcoming season and state of ENSO, capacity build and enable knowledge exchange between National Meteorological and Hydrological Services (NMHSs) and strengthen relationships between NMHSs and stakeholders. PICOFF is held twice a year, a face-to-face session, when possible, in October focusing on November to April season and a virtual session in April to produce a seasonal outlook for May to October season.

This statement was produced during the eighth virtual session of Pacific Islands Climate Outlook Forum (PICOFF-8) held on 21 April 2021. The forum had a specific focus on the overview of regional climate of November 2020 to April 2021 as well as May to October 2021 rainfall, air temperature, ocean, sea level and North Pacific TC outlooks where available.

PICOFF-8 was attended virtually by members from American Samoa, Australia, Fiji, French Polynesia, Kiribati, Republic of the Marshall Islands, New Caledonia, New Zealand, Niue, Palau, Papua New Guinea, Samoa, Solomon Islands, Republic of Korea, Tonga, Tuvalu, United States of America, and Vanuatu (Fig. 4). Secretariat of the Pacific Regional Environment Programme (SPREP), World Meteorological Organisation (WMO), Pacific Community (SPC), Australian Bureau of Meteorology (BoM), United States National Oceanic and Atmospheric Administration (NOAA), University of Hawaii, Météo-France, New Zealand National Institute of Water and Atmospheric Research (NIWA), Asia-Pacific Economic Cooperation (APEC) Climate Center (APCC) and Dr Olivia Warrick provided technical support.

This statement is consistent with the Nuku'alofa Ministerial Declaration and Honiara Ministerial Statement for Sustainable Weather, Water, Ocean and Climate Services for the Resilient Pacific, which recognises the importance of Meteorological and Hydrological Services in support of relevant national needs, including protection of life and property, sustainable development and safeguarding the environment. The same noted that weather and climate services are not an option but are a responsibility and a basic human right.

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Probabilistic Multi-Model Ensemble Forecast

Beijing,ECMWF,Exeter,Melbourne,Montreal,Moscow,Offenbach,Seoul,Tokyo,Toulouse,Washington

Precipitation : MJJ2021

(issued on Apr2021)

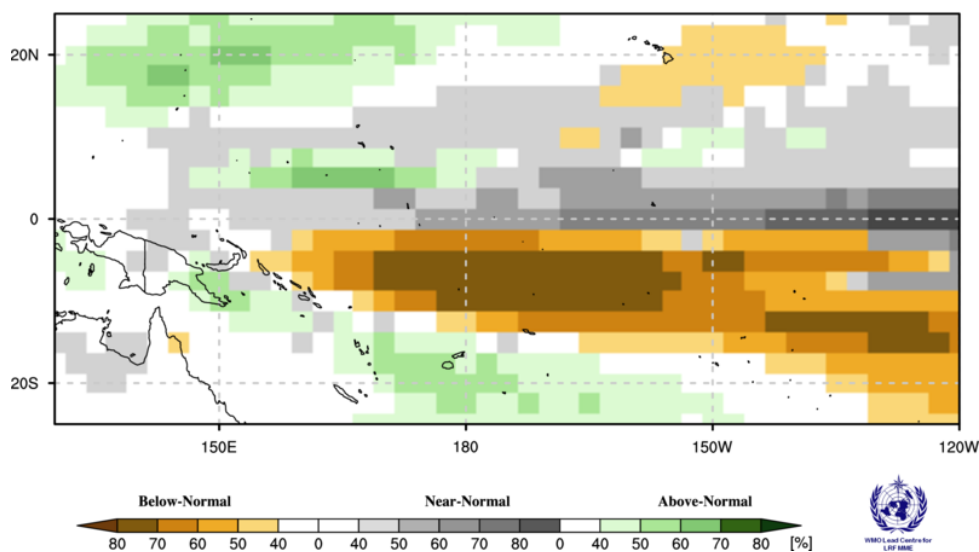


Fig. 1: Rainfall forecast for May to July 2021 for the western Pacific region.

Probabilistic Multi-Model Ensemble Forecast

Beijing,ECMWF,Exeter,Melbourne,Montreal,Moscow,Offenbach,Seoul,Tokyo,Toulouse,Washington

2m Temperature : MJJ2021

(issued on Apr2021)

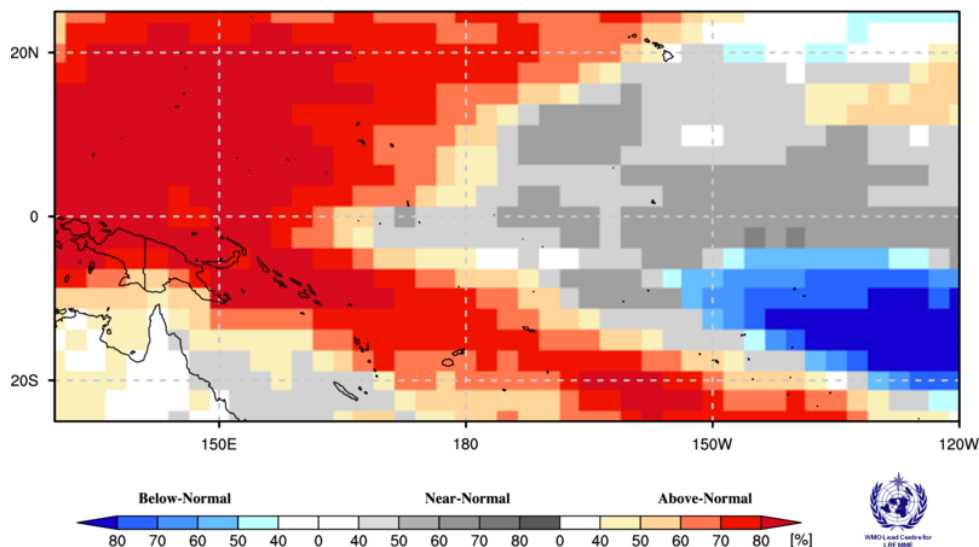


Fig. 2: Air temperature forecast for May to July 2021 for the western Pacific region.

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Probabilistic Multi-Model Ensemble Forecast
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Sea Surface Temperature : MJJ2021

(issued on Apr2021)

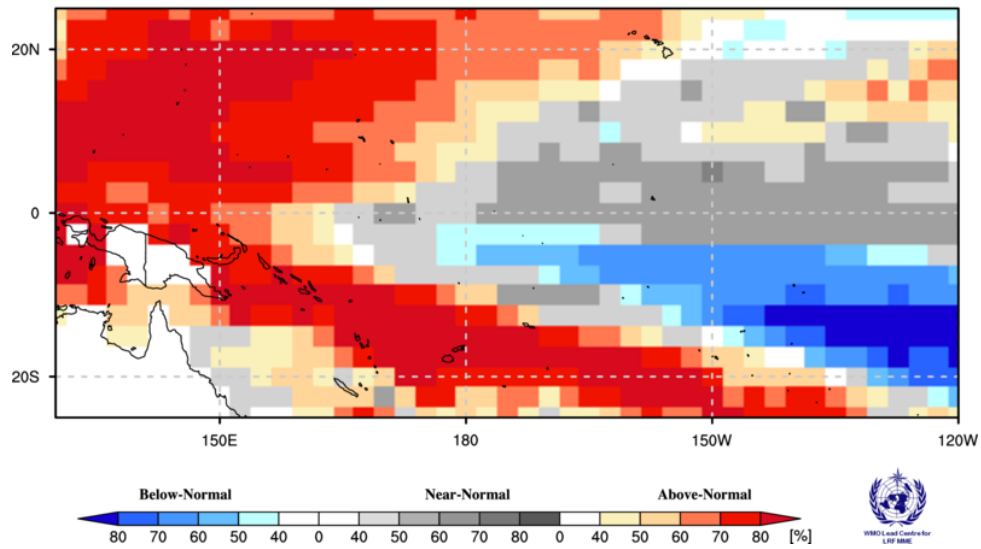


Fig. 3: Ocean surface temperature forecast for May to July 2021 for the western Pacific region.



Fig. 4: Map of the Pacific Islands region including those countries and territories involved in PICOF-8. Source: <https://www.infoplease.com/atlas/pacific-islands>