Monthly Climate Bulletin

January 2022

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Photo Credit: Powerful Tonga Ha'apai volcanic eruption which triggered a tsunami (Source Tonga Geological Services via Aljazeera

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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Issued 09 February 2022

- A mature La Niña event remains active in the tropical Pacific. Climate models suggest the 2021-22 La Niña is near or at its peak, with a return to neutral El Niño-Southern Oscillation (ENSO) likely early in the southern hemisphere autumn (March 2022).

- The Madden-Julian Oscillation (MJO) is currently at moderate strength over the eastern Indian Ocean. Most climate models agree that a moderately strong pulse of the MJO will track east into the western Maritime Continent in about a week.

- The Intertropical Convergence Zone (ITCZ) was active over the western warm pool region and eastern Pacific with a shift to the north from its normal position, while the South Pacific Convergence Zone (SPCZ) was active and shifted southwest around Vanuatu, Fiji and Tonga.

- The SSTs for January 2022 show weak cool SST anomalies were present across most of the equatorial Pacific including the Banda Sea (Indonesia), while weak warm SST anomalies were largely present across the remainder of the basin west of 165°E, including around the Maritime Continent and northern Australia.

- Coral bleaching status warning 'Alert Level 2' for parts of southeast PNG mainland, southern Solomon Islands, Vanuatu, northern New Caledonia, southern Fiji and southern Tonga. The coral bleaching outlook remains 'Alert Level 2' for parts of southeast PNG mainland, southern Solomon Islands, central and northern Vanuatu, southeastern Fiji and southern Tonga.

- For February-April 2022, the dynamical models (including SCOPIC) agree on above normal rainfall for Palau, FSM, RMI, New Caledonia, Vanuatu, Fiji, Tonga, Niue, southern Cook Islands and southern French Polynesia. The models also agree on below normal rainfall is very likely for PNG islands, northern Solomon Islands, Nauru, Kiribati, Tuvalu, Tokelau, Wallis and Futuna, American Samoa, northern and central Cook Islands, and the northern and central French Polynesia.

- The weekly tropical cyclone forecast from the ACCESS-S model shows significant increased risk in the weeks beginning 12 February and ending 25 February 2022 for the southwest Pacific, especially in areas around the Coral Sea region to New Caledonia and Vanuatu. There is no cyclone risk for the northwest Pacific region.

EL NIÑO–SOUTHERN OSCILLATION

La Niña likely to persist until early autumn

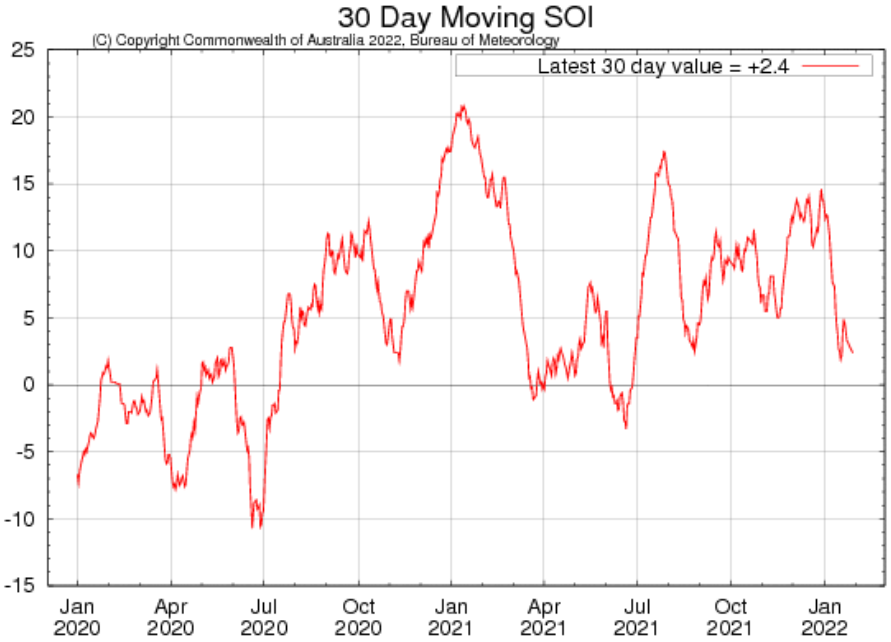
Click link to access Climate Driver Update issued on 01 February 2022

A mature La Niña event remains active in the tropical Pacific. Climate models suggest the 2021-22 La Niña is near or at its peak, with a return to neutral El Niño-Southern Oscillation (ENSO) likely early in the southern hemisphere autumn (March 2022). Autumn is the usual time of the year in which ENSO events decay and return to neutral. La Niña increases the chance of above average rainfall across much of northern and eastern Australia during summer. Significant weather can still occur as La Niña weakens, especially as the peak of the Australian tropical cyclone season is around February/March.

Oceanic indicators of ENSO continue to show a clear La Niña signal, with cooler than average sea surface temperatures in the eastern tropical Pacific, and cooler sub-surface waters supporting the cooler waters at the surface. However, these cooler sub-surface waters continue to ease. Most atmospheric indicators also show clear La Niña patterns, with decreased cloudiness along the Date Line and trade winds either close to average or slightly increased. While the 30-day Southern Oscillation Index (SOI) has experienced some short-term fluctuation, the 90-day SOI is still firmly in La Niña territory.

The Indian Ocean Dipole (IOD) remains neutral. The IOD typically has little influence on global climate from December to April.

The 30-day Southern Oscillation Index (SOI) for the 30 days ending 30 January was +3.2. The 90-day SOI value was +9.6. The 30-day SOI has been close to +3 over the past fortnight. However, it is not uncommon during the northern wet season for the SOI to experience fluctuations from transient tropical weather. The 90-day value remains typical of La Niña.



EL NIÑO–SOUTHERN OSCILLATION

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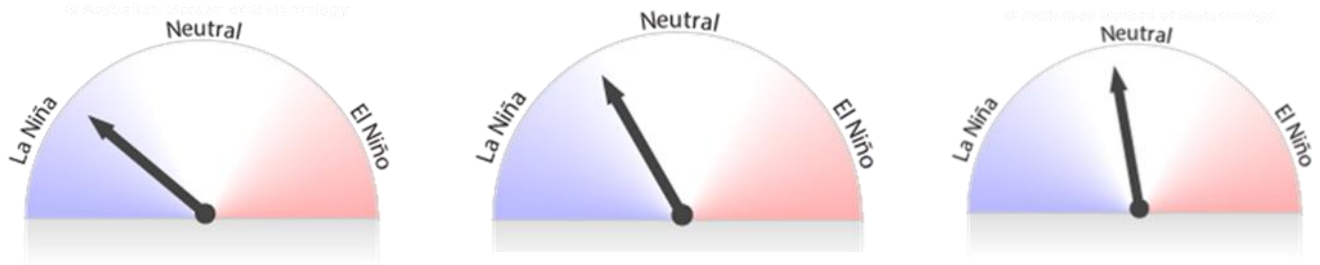
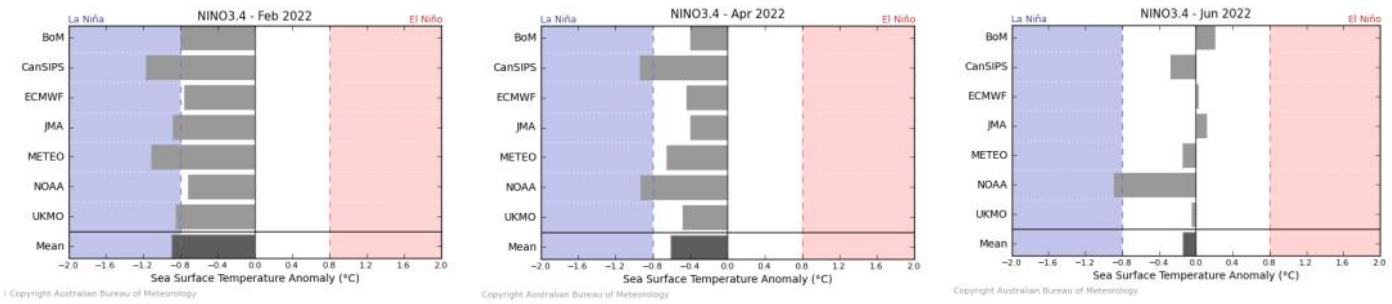
Bureau of Meteorology NINO3.4 ENSO Model Outlooks for February, April and June



Bureau of Meteorology NINO3.4 International Model Outlooks



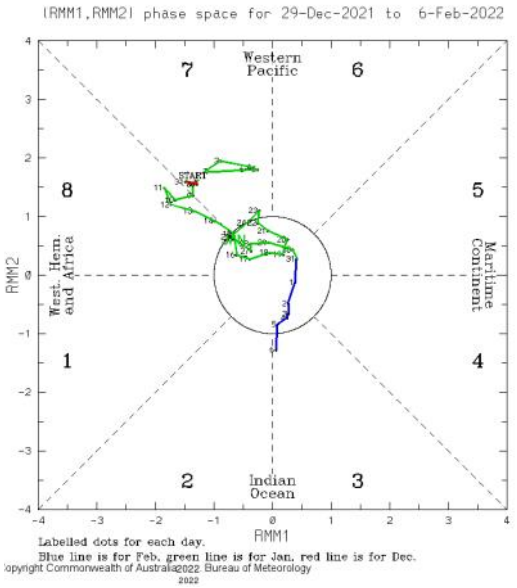
Bureau of Meteorology summary of international model outlooks for NINO3.4: http://www.bom.gov.au/climate/model-summary/#tabs=Pacific-Ocean

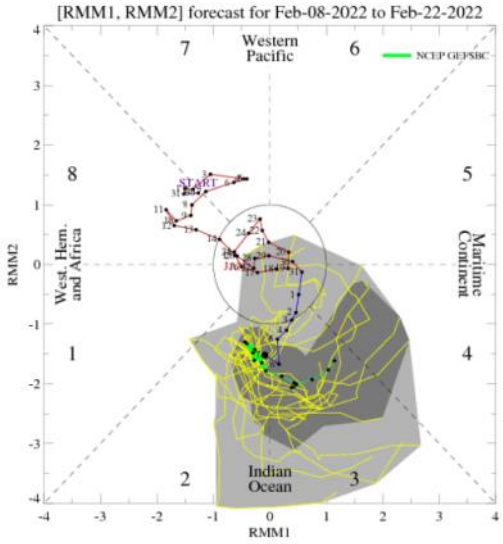
MADDEN–JULIAN OSCILLATION

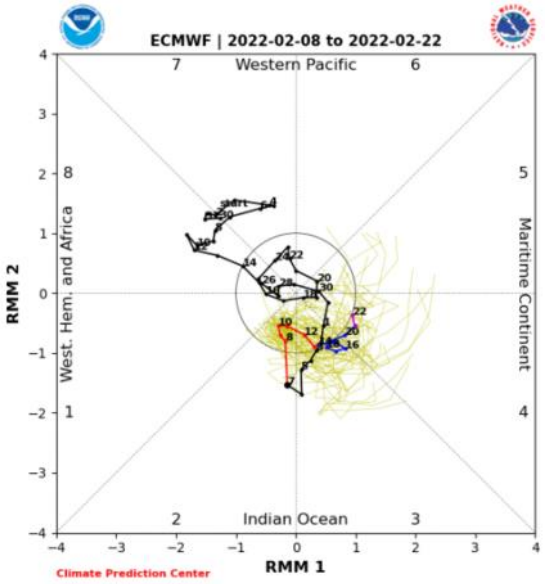
Click link to access *Tropical Climate Update* [Issued on Tuesday 08 February 2022]

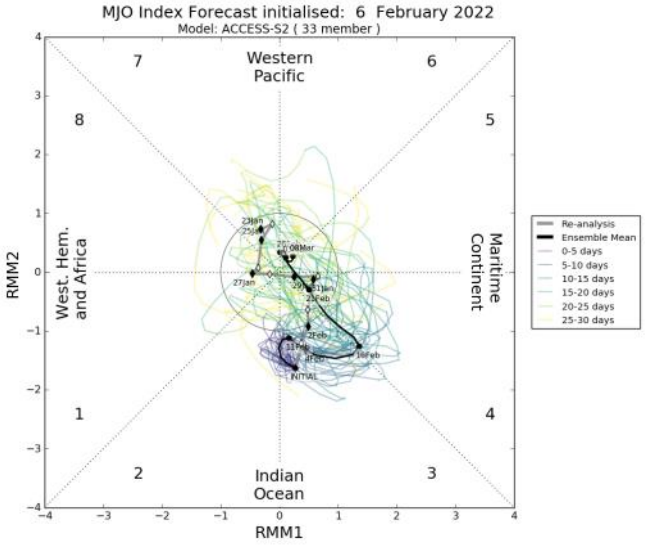
During the month of January, a moderate to strong pulse of Madden-Julian Oscillation (MJO) occurred during the first two weeks tracked across the Western Pacific to the African continent before becoming weak towards the last week. The Madden-Julian Oscillation (MJO) which had been indiscernible in recent weeks, is currently at moderate strength over the eastern Indian Ocean. Most climate models agree that a moderately strong pulse of the MJO will track east into the western Maritime Continent in about a week. At this time of the year, an MJO pulse in the Indian Ocean typically has only a minimal influence on rainfall patterns across the Australian region, while enhancing tropical weather over the northern and southern tropical Indian Ocean. If the MJO pulse moves over the western Maritime Continent at moderate or greater strength, enhanced tropical weather would normally increase over much of Australia's north, particularly to its north-west and the western Pacific. The strongest influence of the MJO for northern Australia and western Pacific at this time of the year is normally associated with an MJO pulse in the eastern Maritime Continent. However, there are currently no indications that this situation will develop in the coming fortnight.

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







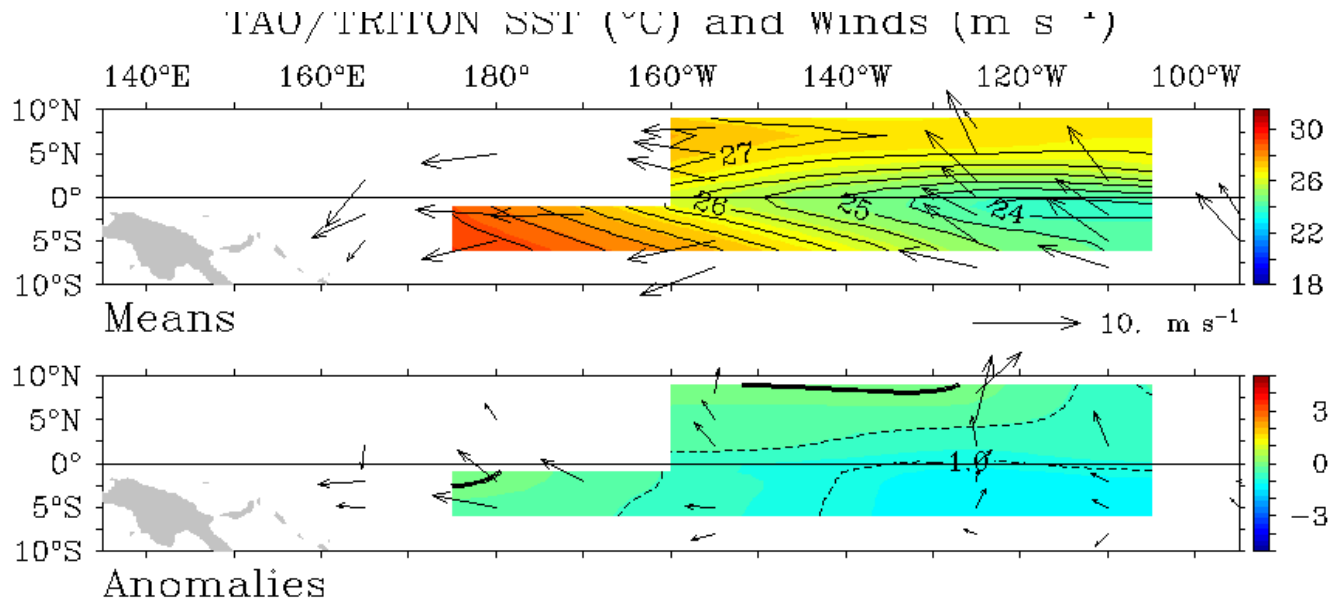


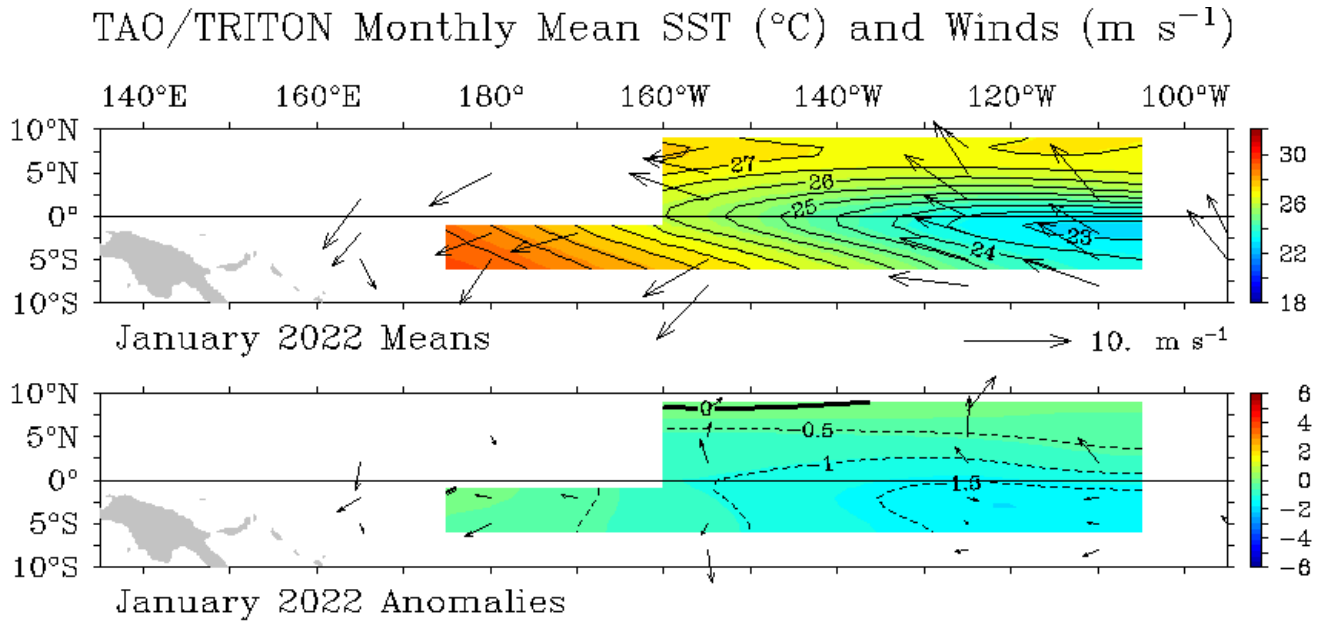
WIND

Click link to access Wind plots link

The trade winds in January were stronger over the equatorial Pacific for most of the month with few occurrence of north to northwesterly winds in the Western 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.





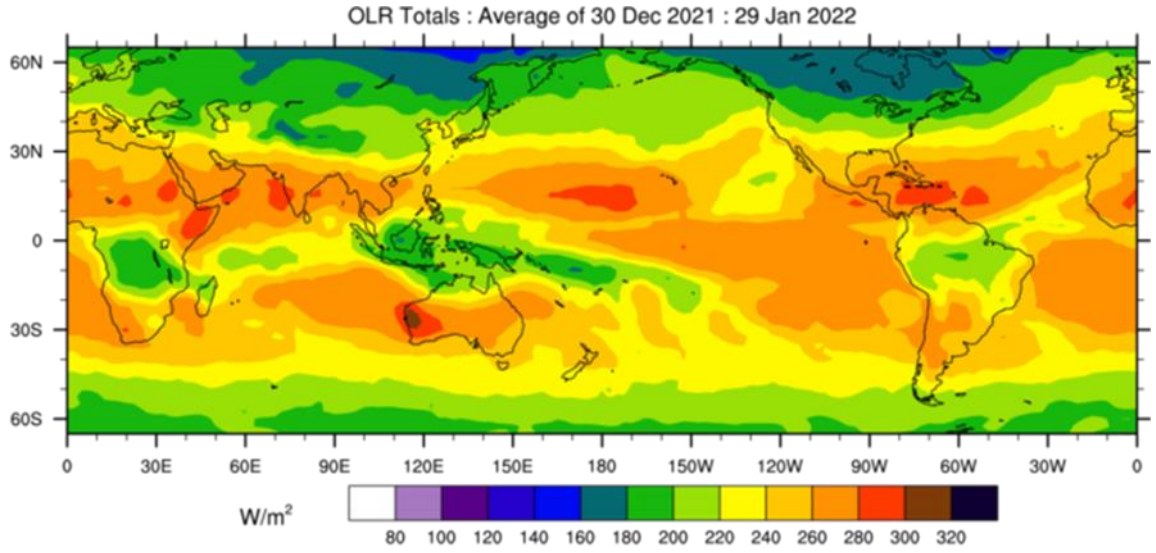
CLOUD AND RAINFALL

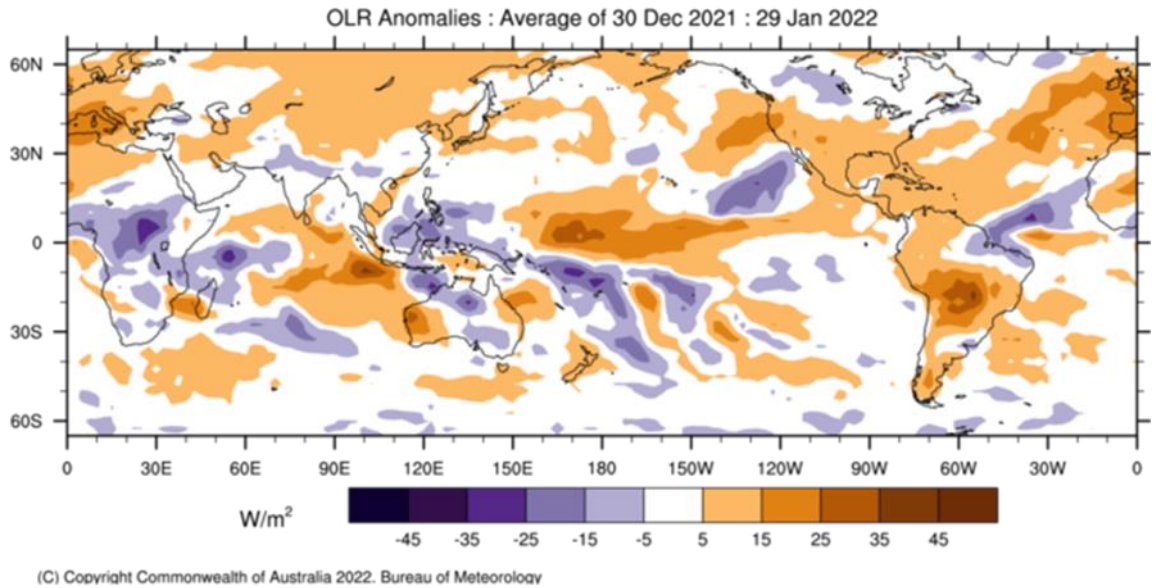
Click link to access OLR

The January 30-day OLR total and anomaly maps suggest the Intertropical Convergence Zone (ITCZ) was active over the western warm pool region and eastern Pacific with a shift to the north from its normal position, while the South Pacific Convergence Zone (SPCZ) was active and shifted southwest around Vanuatu, Fiji and Tonga.

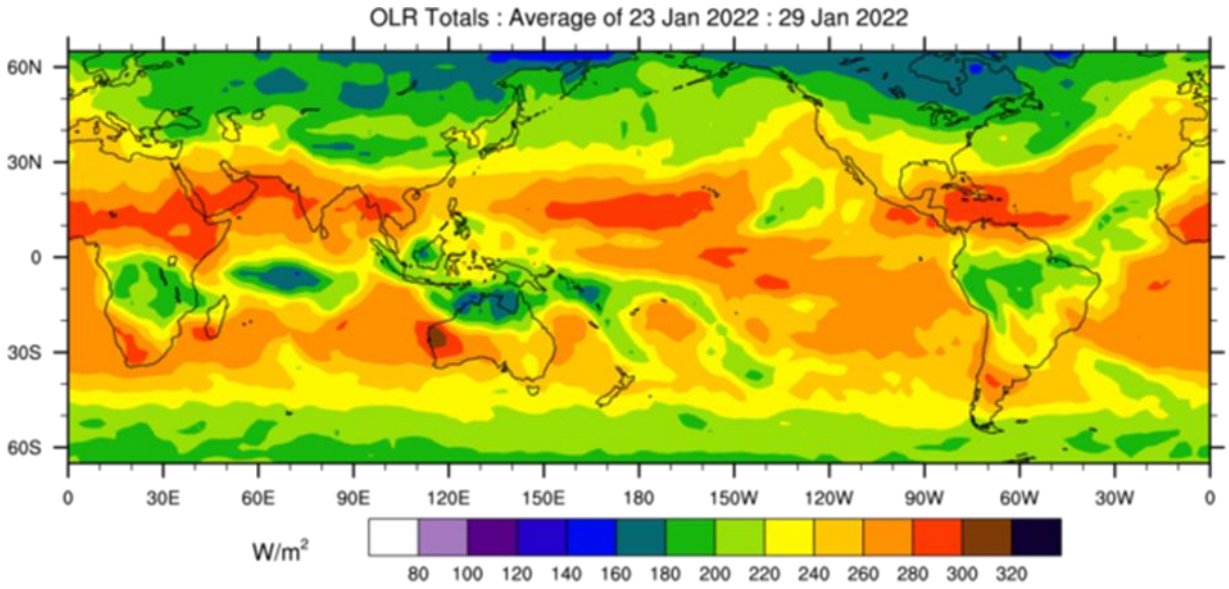
Note: Global maps of OLR below highlight regions experiencing increased or decreased cloudiness. The top panel is the total OLR in Watts per square metre (W/m^2) and the bottom panel is the anomaly (current minus the 1979-1998 climate average), in W/m^2. In the bottom panel, negative values (blue shading)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

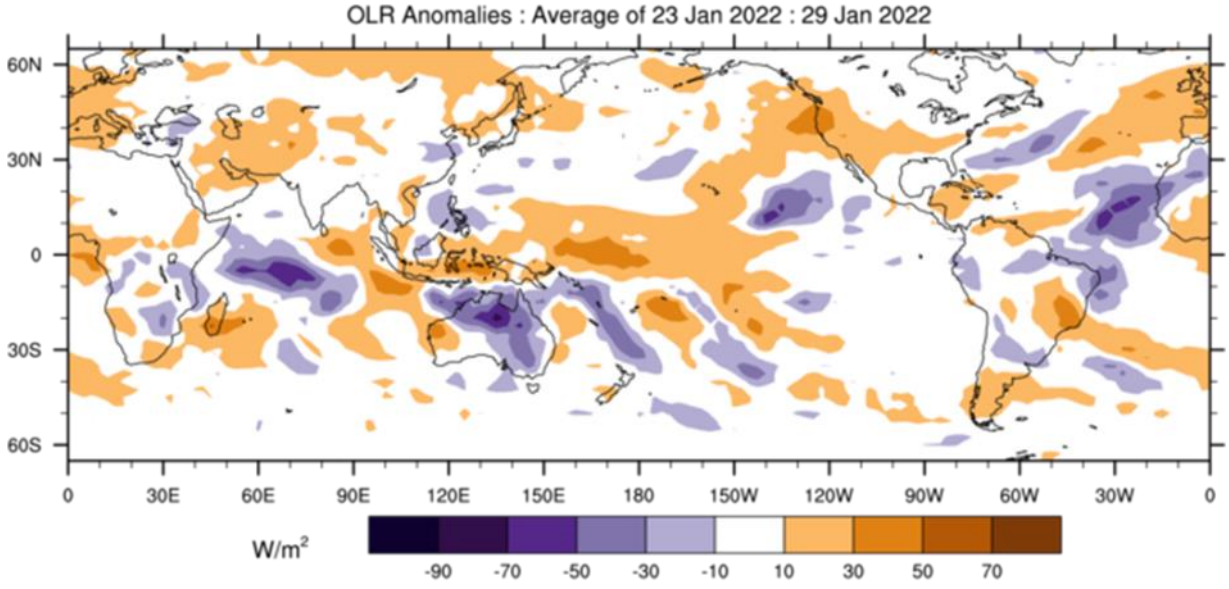
OLR Total and Anomalies, 30 Day OLR

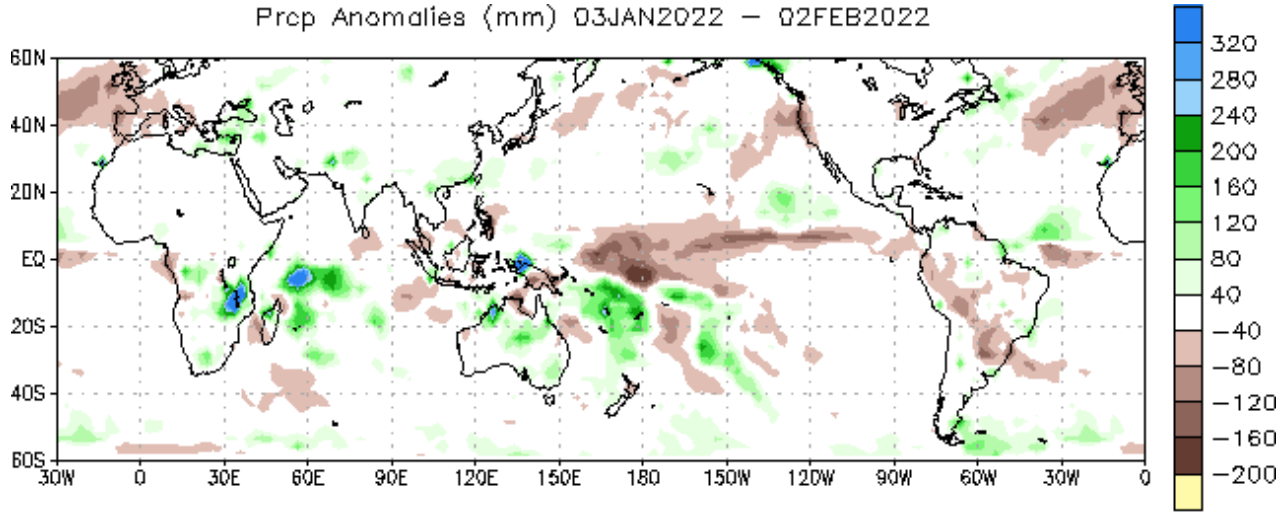




OLR Total and Anomalies, 7 Day OLR

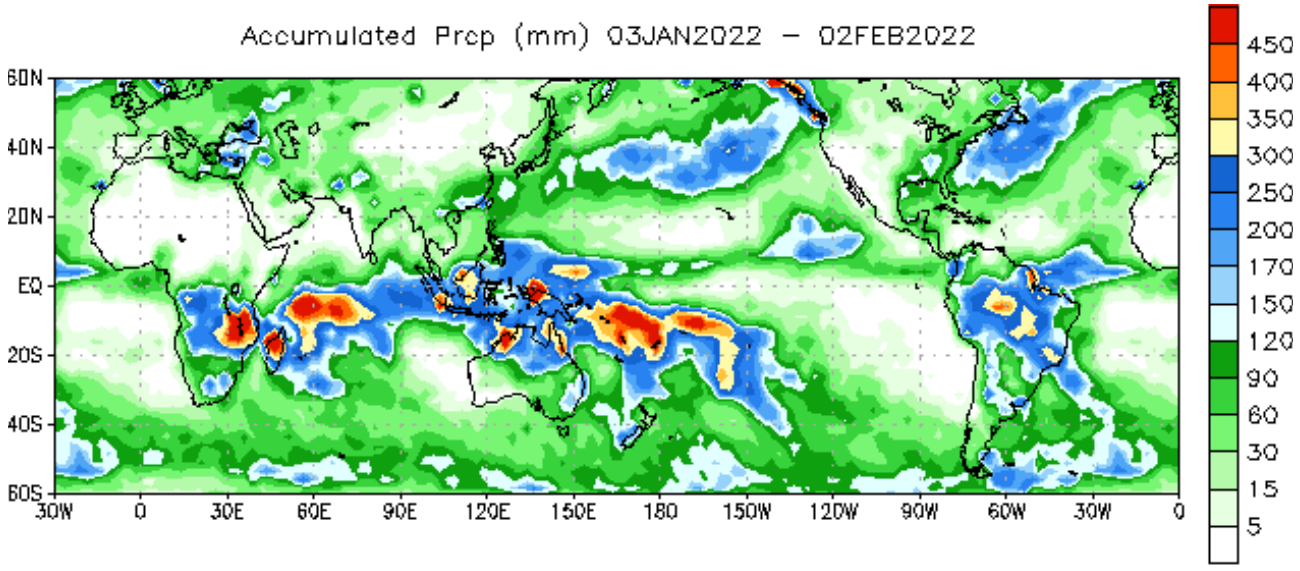




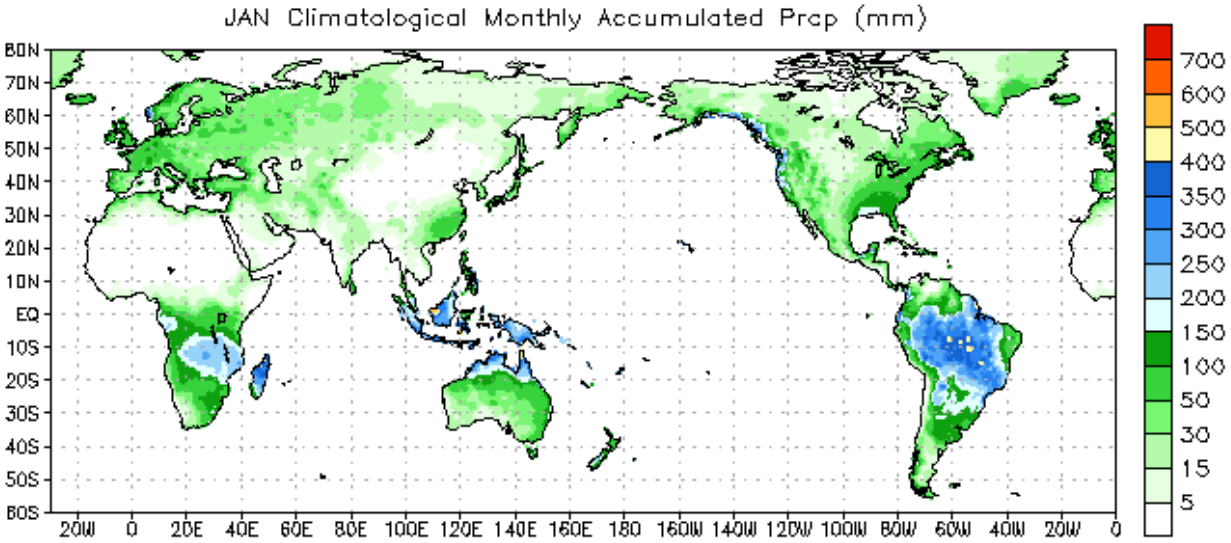


Data Source: NCEP CMAP Precipitation Climatology (1991–2020)

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

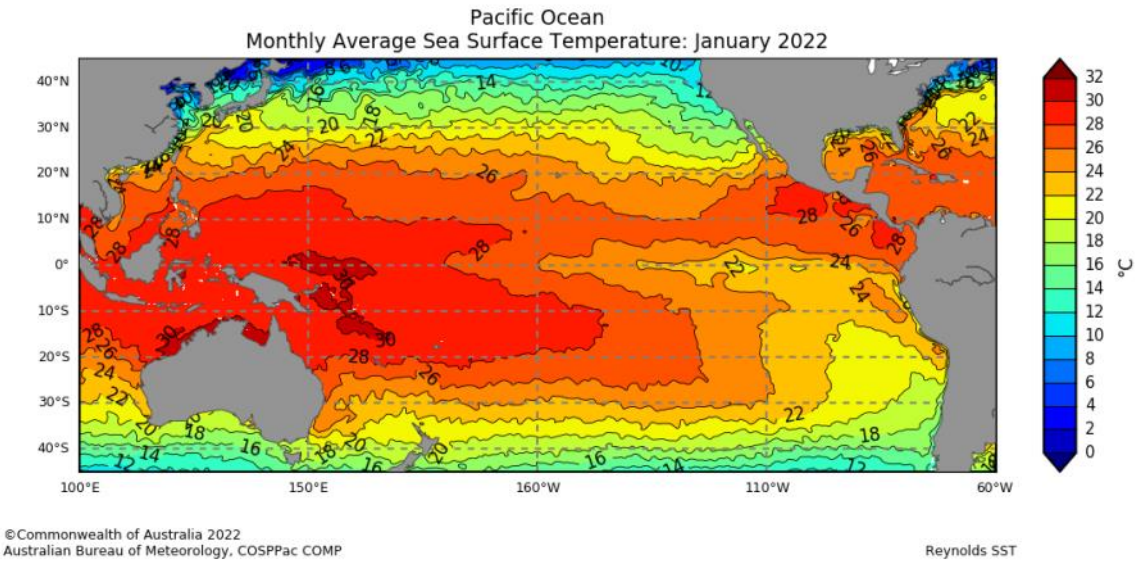
SEA SURFACE TEMPERATURE

Click link to access [Pacific Community COSPPac Ocean Portal]

The SSTs for January 2022 show weak cool SST anomalies were present across most of the equatorial Pacific including the Banda Sea (Indonesia), while weak warm SST anomalies were largely present across the remainder of the basin west of 165°E, including around the Maritime Continent and northern Australia.

In terms of the deciles, highest on record occurred in northern FSM, Vanuatu, northern New Caledonia and southern Tonga. Regions of very much above average (deciles 10) SSTs spanned across parts of FSM, western RMI, southern Solomon Islands, New Caledonia, Vanuatu, Fiji and Niue. The regions of above average (deciles 8-9) for January occurred across majority of the COSPPac countries from Palau to southern Cook Islands. In contrast, average (4-7) to below average (deciles 2-3) SSTs were observed in PNG, Solomon Islands, Nauru, northern Tuvalu, Kiribati with patches of very much below average (decile 1) over parts of eastern Kiribati.

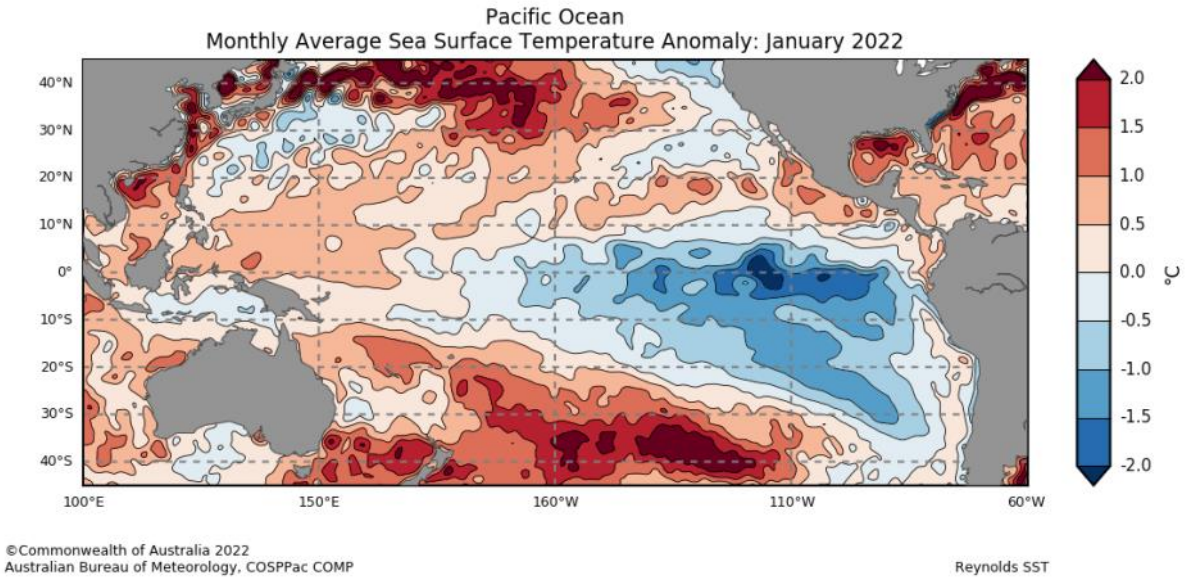
Mean Sea Surface Temperature



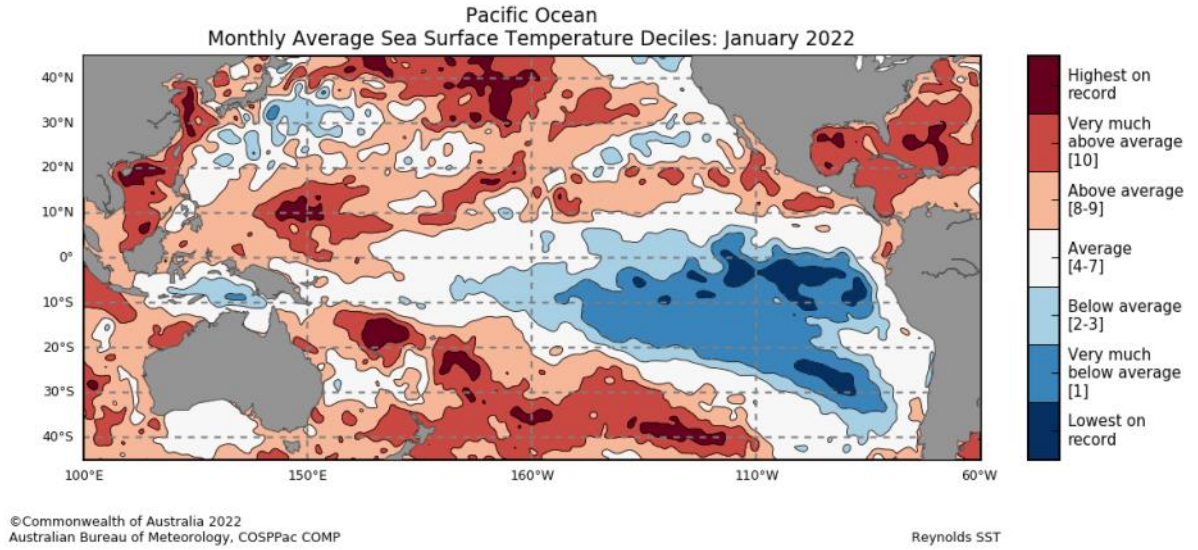
OCEAN CONDITIONS

Click link to access SEA SURFACE TEMPERATURE

Anomalous Sea Surface Temperature



Sea Surface Temperatures Deciles

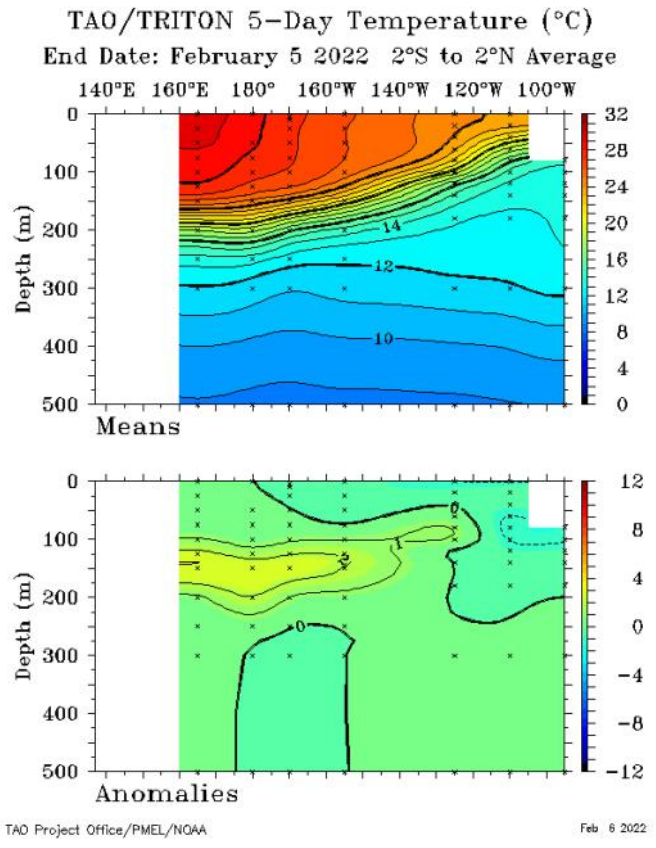


OCEAN CONDITIONS

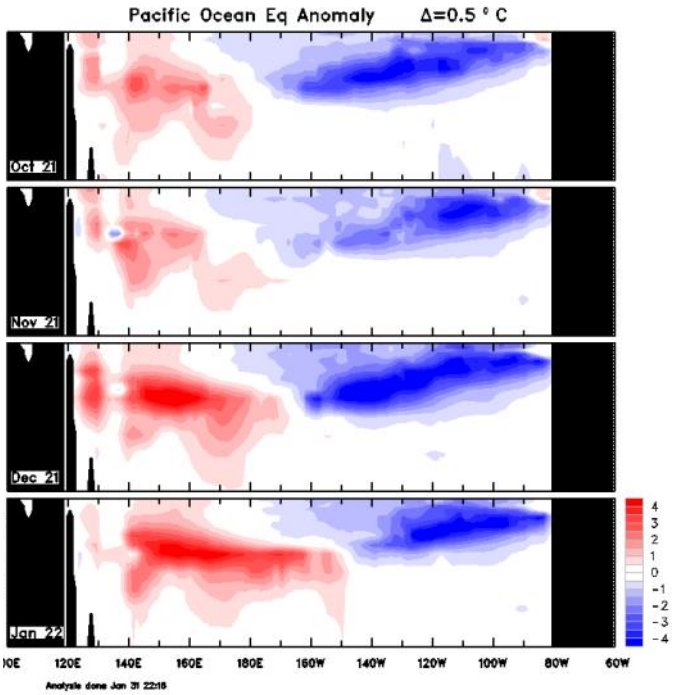
SUB SURFACE

The four-month sequence of equatorial Pacific sub-surface temperature anomalies (to 27 January 2022) shows cool anomalies across the sub-surface of the central to eastern equatorial Pacific, with anomalies declining slightly in strength during January compared to December. For January, waters were more than three degrees cooler than average across a large region east of 130°W, and more than four degrees cooler than average in some areas. Warm anomalies continue across parts of the central to western equatorial Pacific. These warm anomalies now reach to around 150°W between 125 m and 225 m depth, whereas for December warm anomalies were mostly confined to the region west of the Date Line (180°E).

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/

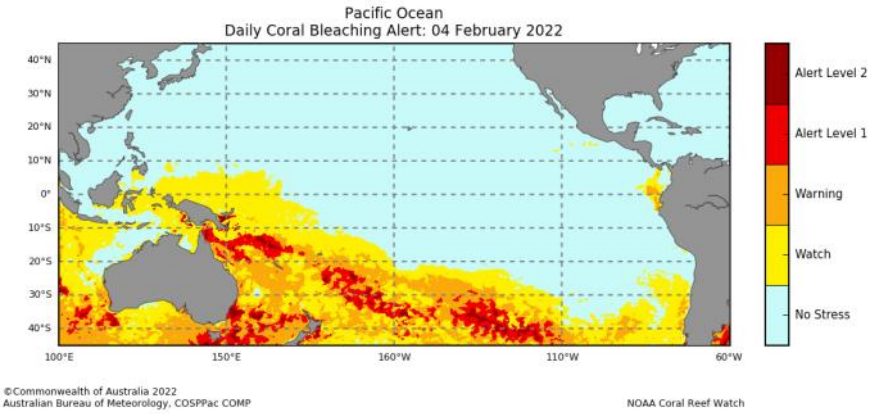
OCEAN CONDITIONS

CORAL BLEACHING

The daily Coral Bleaching Alert for 04th February 2022 shows 'Alert Level 1' for parts of south and southeast PNG, southern Solomon Islands, Vanuatu, northern New Caledonia, southern Fiji and southern Tonga. 'Warning' for southern Solomon Islands, central and northern Vanuatu, New Caledonia, parts of Fiji, central and southern Tonga and Niue. 'No Stress or Watch' for the rest of COSPPac partner countries. The four weeks Coral Bleaching Outlook to 27th February 2022 shows 'Alert Level 2' for parts of southeast PNG mainland, southern Solomon Islands, central and northern Vanuatu, southeastern Fiji and southern Tonga while 'Alert Level 1' for other parts of southern and southeast PNG, southern Solomon Islands, southern Vanuatu, New Caledonia, southern Fiji and central Tonga. 'Warning' for northern PNG, Solomon Islands, northern Fiji, northern Tonga, Niue, and southern Cook Islands. 'No Stress or Watch' for the rest of COSPPac partner countries.

Daily Coral Bleaching Alert

(Source: Pacific Community COSPPac Ocean Porta Coral Bleaching)



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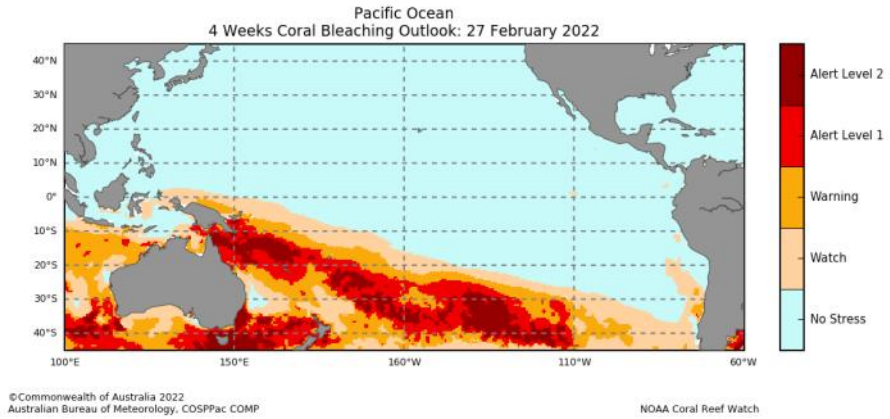


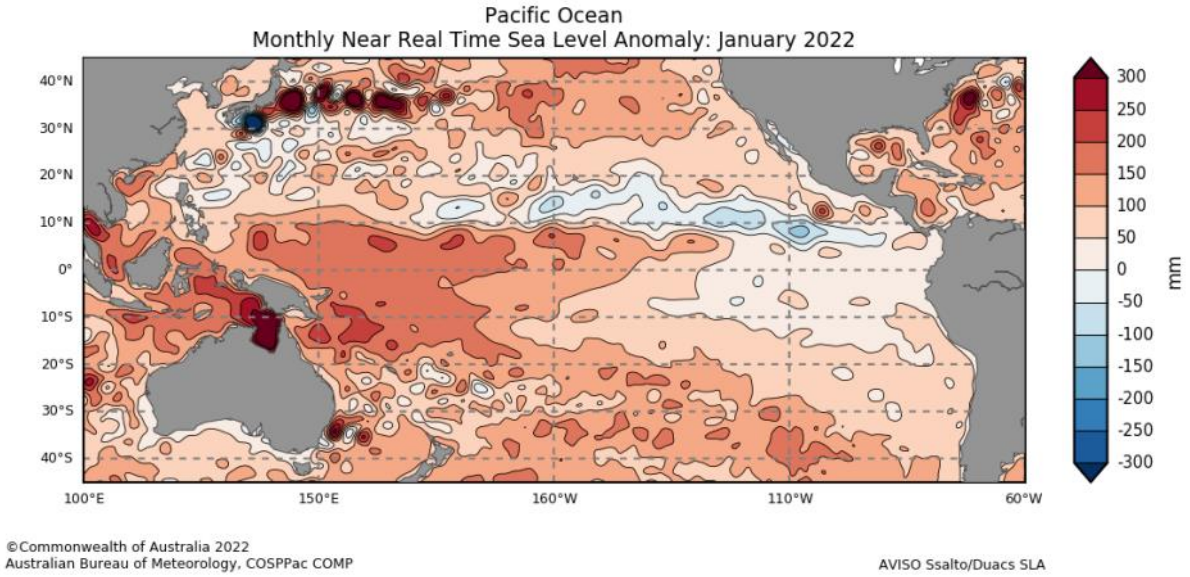
OCEAN CONDITIONS

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 northern Australia, +150mm for countries 10° north and south of the equator which includes FSM, RMI, southeast PNG, Solomon Islands, Vanuatu, Nauru, northern Kiribati, northern Fiji, northern Tonga and northern Niue. Patches of near normal to below normal sea levels were observed east of 180°W for countries north and south of 20°.

Monthly Sea Level Anomalies

Source: Pacific Community COSPPac Ocean Portal

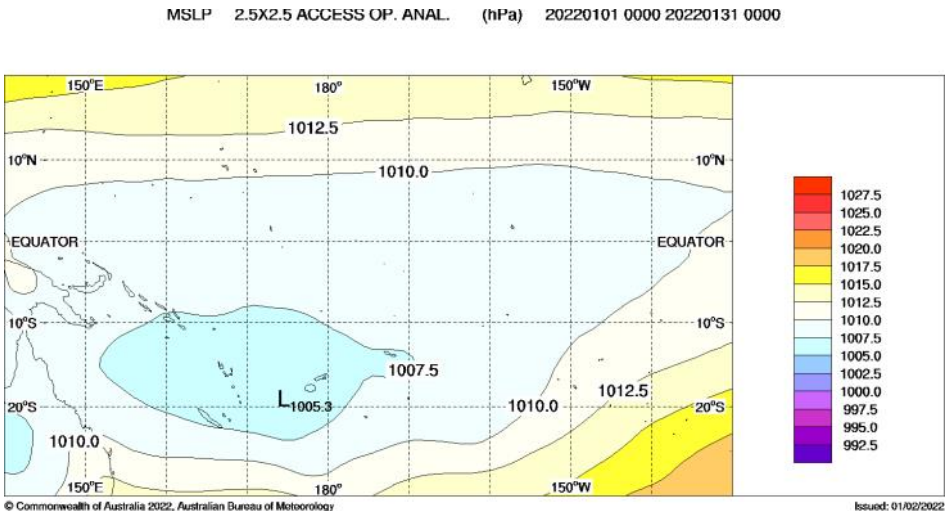


MEAN SEA LEVEL PRESSURE

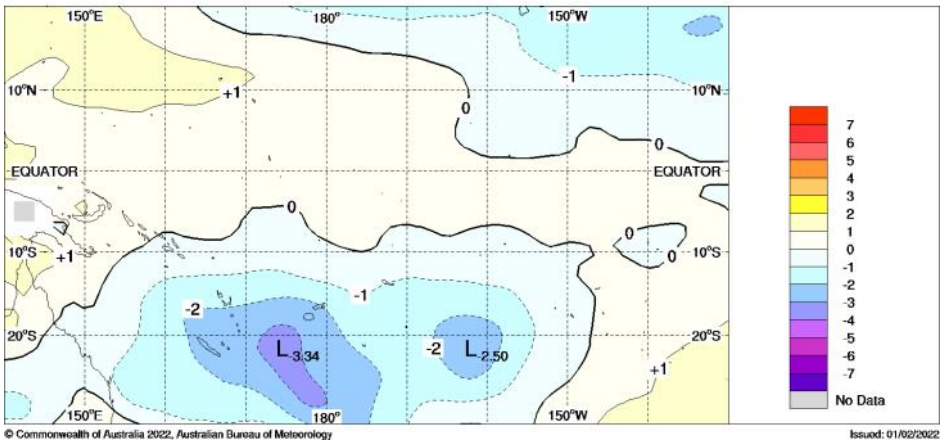
The January mean sea level pressure (MSLP) anomaly map shows negative anomalies of -1 or greater over New Caledonia, central and southern Vanuatu, Fiji, southern Tonga and southern Cook Islands. Positive anomalies of +1 or more were present over southern PNG, northern FSM and RMI.

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

Mean



Anomalous



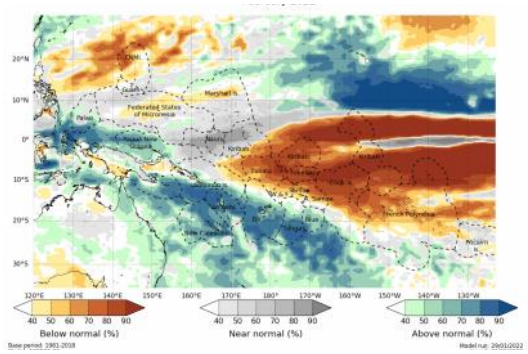
Bureau of Meteorology South Pacific Circulation Patterns: http://www.bom.gov.au/cgi-bin/climate/cmb.cgi?variable=mslp&area=spac&map=anomaly&time=latest

SEASONAL RAINFALL OUTLOOK

February—April 2022

The ACCESS-S model forecast for February 2022 is very likely to be below normal rainfall for CNMI, parts of northern RMI, central FSM, western and northeastern islands region of PNG, Kiribati, Wallis and Futuna, Samoa, Tuvalu, Tokelau, American Samoa, the northern and central Cook Islands, northern and central French Polynesia and parts of Pitcairn Island. Above normal rainfall is very likely for southern Palau, northern PNG islands, central and eastern Solomon Islands, Vanuatu, New Caledonia, Fiji, central and southern Tonga and Niue.
The three-month rainfall outlook (February-April 2022) shows a strong dry signal very likely to affect southern RMI, western PNG mainland and southeastern PNG islands, northern Solomon Islands, Kiribati, Tuvalu, Tokelau, Wallis and Futuna, Samoa, American Samoa, northern and central Cook Islands, northern and central French Polynesia and northern Pitcairn Island. In contrast, the models show an increased chance of wetter very likely in Palau, northern FSM, central and northern RMI, southeast PNG islands, southern Solomon Islands, New Caledonia, Vanuatu, Fiji, Tonga, Niue, southern Cook Islands and French Polynesia. Above normal maximum and minimum temperatures are very likely for most COSPPac countries, except for CNMI, some areas east of 165°E, namely Nauru, Kiribati, northern and central Tuvalu, Tokelau, northeastern Cook Islands, and northern and central French Polynesia, where near-normal to below normal temperatures are favoured.

Monthly ACCESS-S Maps



The Copernicus multi-model outlook for February-April 2022 is very likely to be below normal rainfall for the northeastern PNG Islands, Solomon Islands, Nauru, Kiribati, Tuvalu, Tokelau, Wallis and Futuna, American Samoa, Samoa, northern and central Cook Islands, French Polynesia, and Pitcairn Island. Above normal rainfall is very likely for Palau, FSM, Guam, CNMI, Marshall Islands, New Caledonia, Vanuatu, Fiji, Tonga, Niue and southern Cook Islands.

The SCOPIC statistical model forecast for February-April 2022 is very likely to be above normal rainfall for most of the COSPPac countries except for Momase region and PNG islands, Kiribati, Tuvalu, and northern Cook Islands very likely to have below normal rainfall.

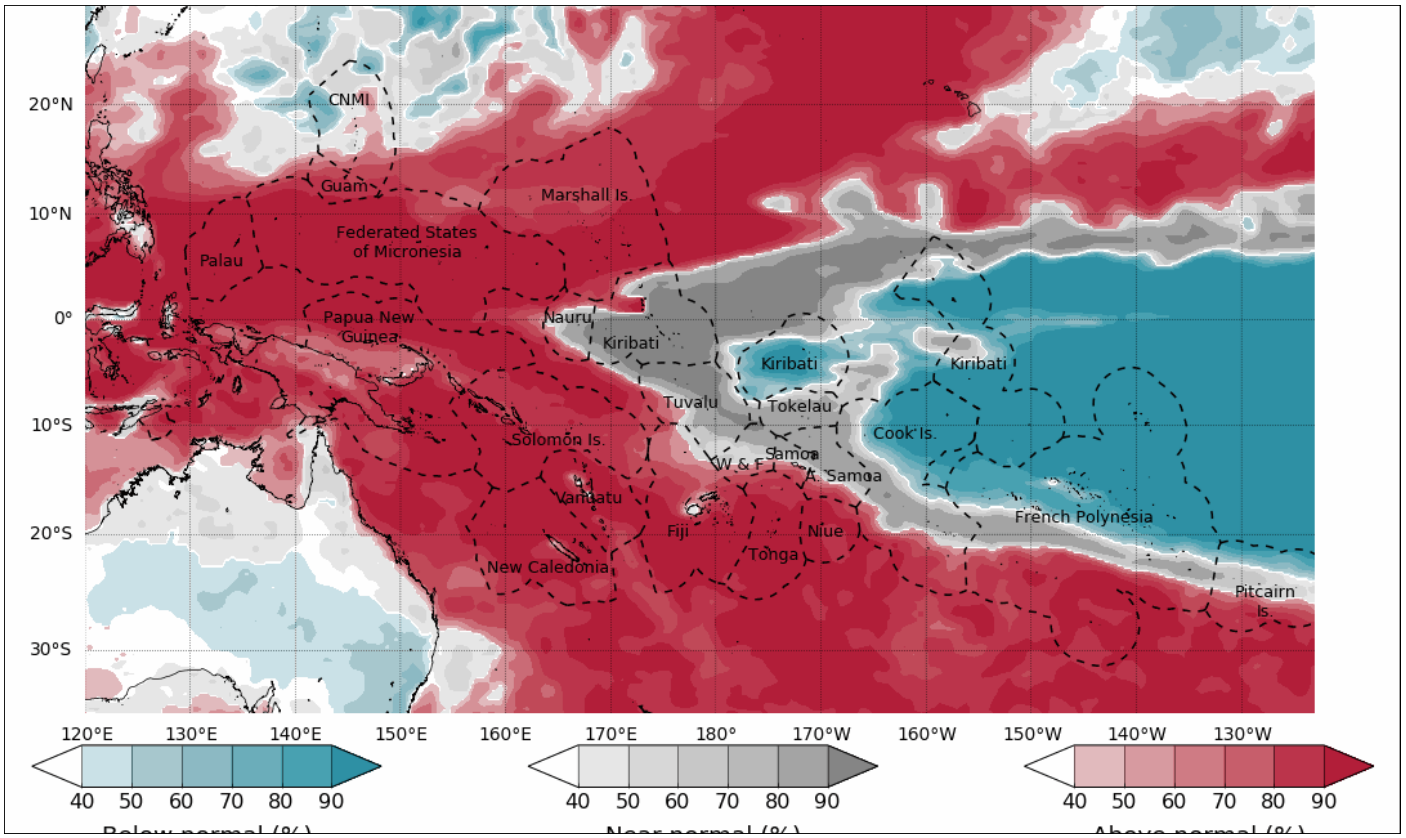
The APEC Climate Centre multi-model for February-April 2022 forecast is very likely to be below normal rainfall for PNG islands, western and northern Solomon Islands, Nauru, Kiribati, Tuvalu, Samoa, Tokelau, Wallis and Futuna, American Samoa, northern Cook Islands, and central to northern French Polynesia. Above normal rainfall is very likely for Palau, most of FSM, most of RMI, southern Solomon Islands, New Caledonia, Vanuatu, Fiji, Tonga, Niue, southern Cook Islands and southern French Polynesia.

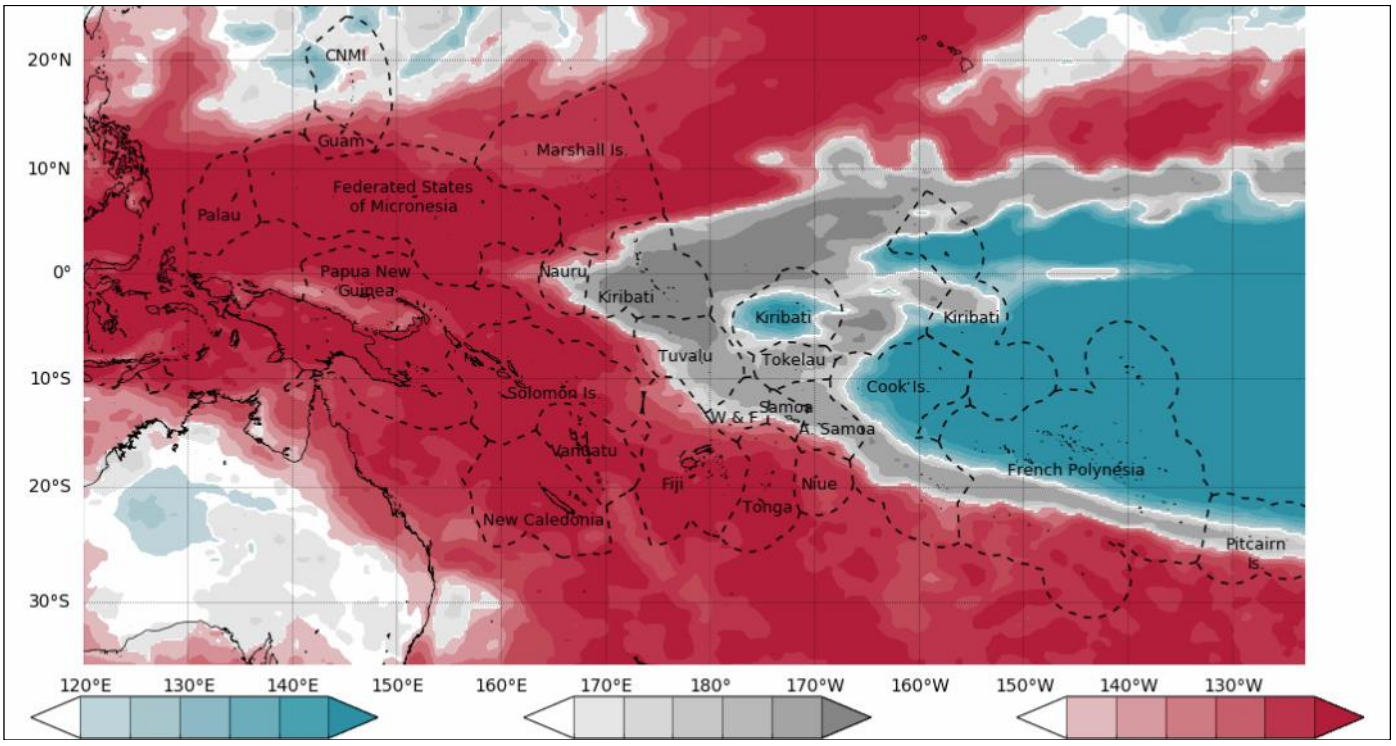
For February-April 2022, the dynamical models (including SCOPIC) agree on above normal rainfall for Palau, FSM, RMI, New Caledonia, Vanuatu, Fiji, Tonga, Niue, southern Cook Islands and southern French Polynesia. The models also agree on below normal rainfall is very likely for PNG islands, northern Solomon Islands, Nauru, Kiribati, Tuvalu, Tokelau, Wallis and Futuna, American Samoa, northern and central Cook Islands, and the northern and central French Polynesia.

SEASONAL TEMPERATURE OUTLOOK

February—April 2022

Monthly Tmax and Tmin ACCESS-S Maps

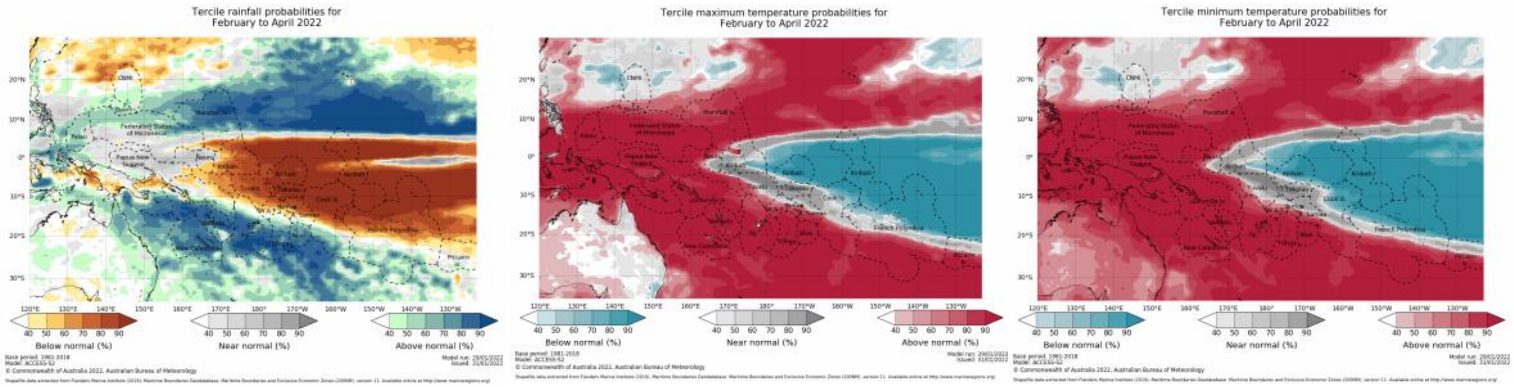




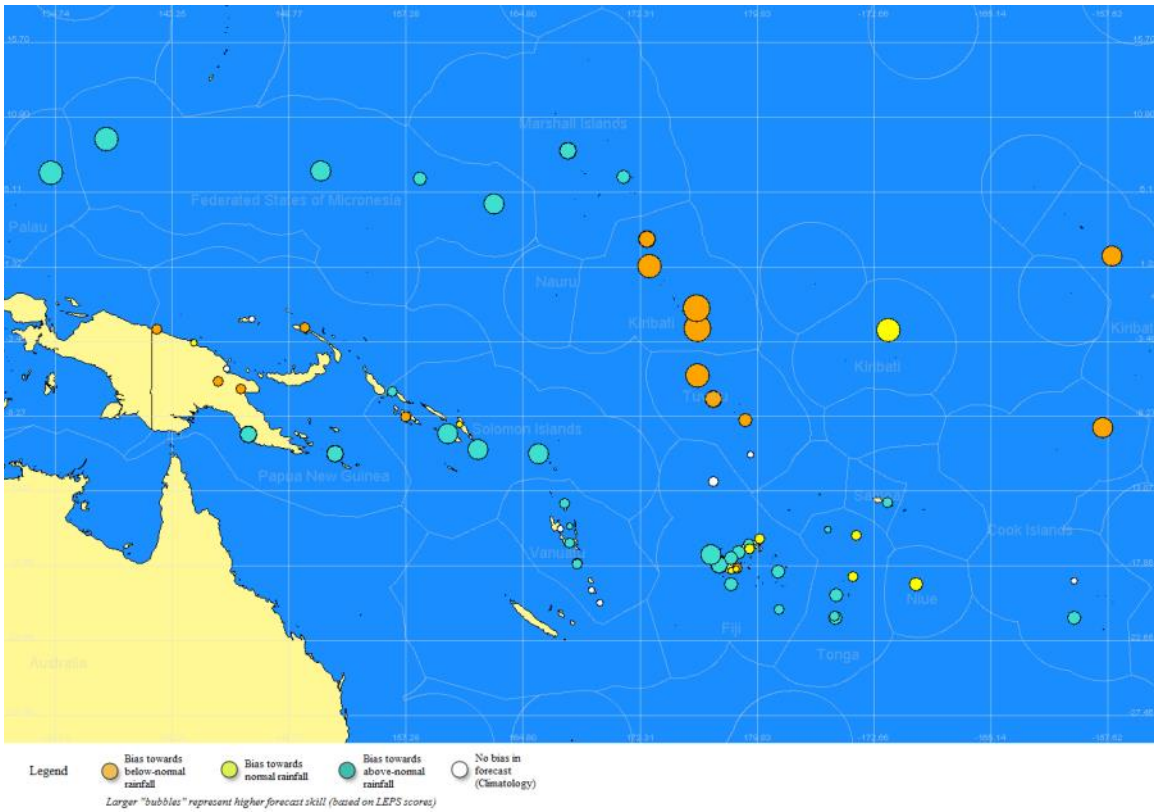
SEASONAL RAINFALL OUTLOOK

February—April 2022

Seasonal ACCESS-S maps



SCOPIC

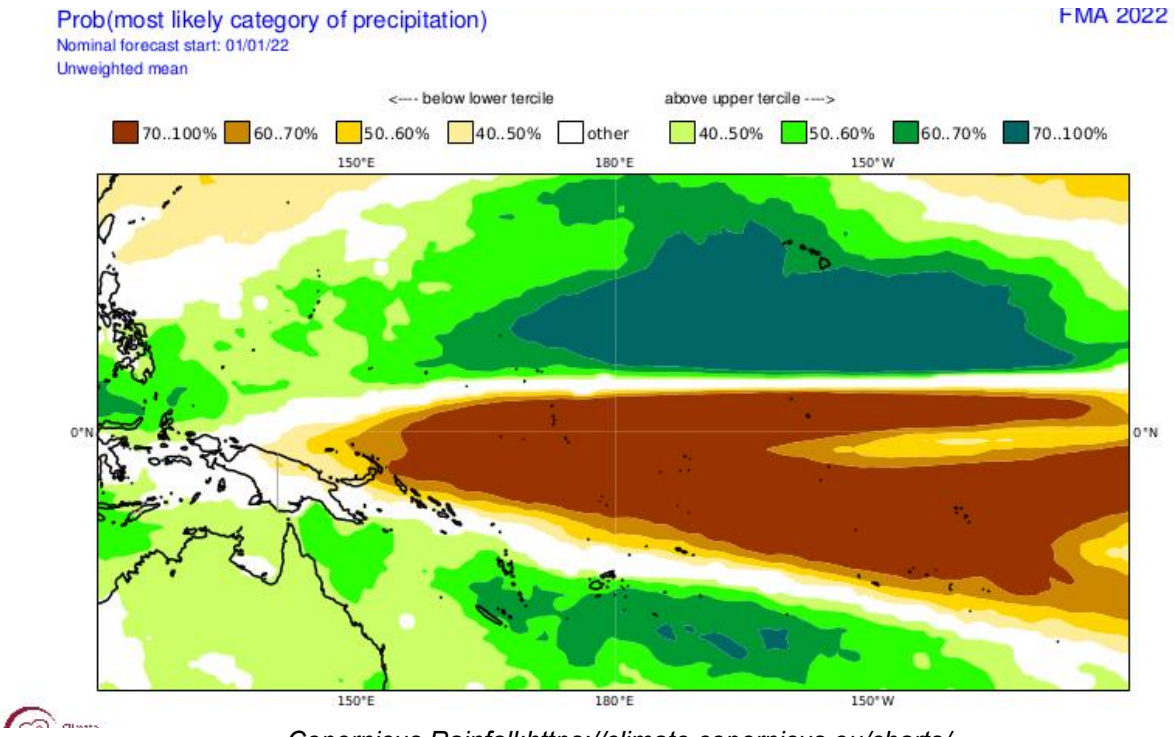


'About SCOPIC' www.pacificmet.net/project/climate-and-ocean-support-program-pacific-cosppac

SEASONAL RAINFALL OUTLOOK

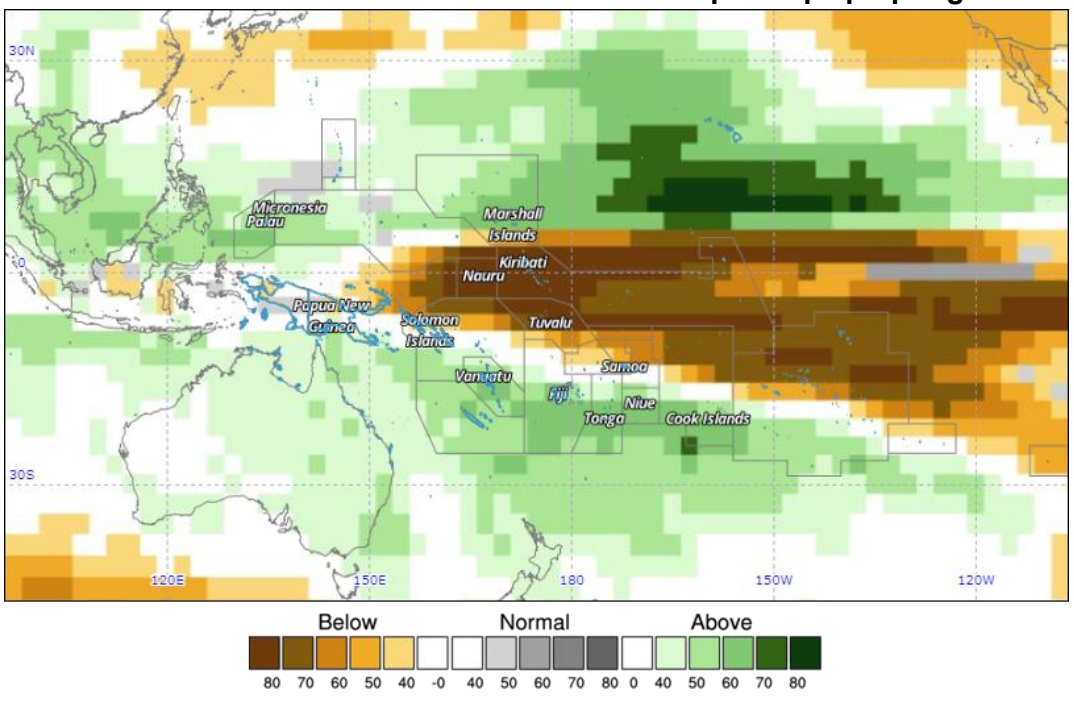
February—April 2022

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: FMA, Lead Month: 3, Method: GAUS
Model: APCC, CMCC, CWB, NASA, NCEP, PNU, POAMA
Generated using CLIK® (2022-2-7)

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TROPICAL CYCLONE

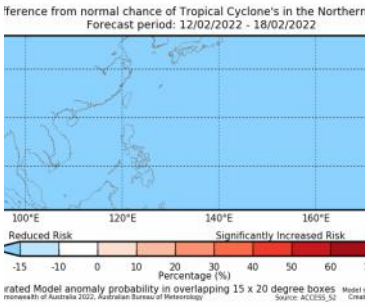
2021/2022 Season

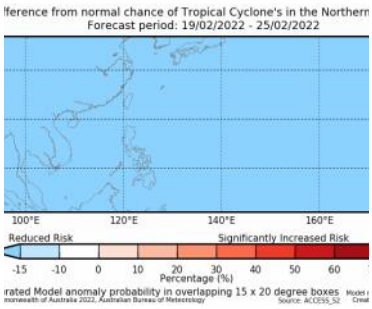
The cyclone activities in the western north Pacific occurs year around with near normal to below normal numbers of TCs anticipated. So far in 2021, there have been 24 typhoons in the western North Pacific. There were 4 tropical depressions, 13 tropical storms, 4 typhoons and 3 super typhoons affection Palau, FSM, RMI, Guam, Saipan and CNMI. In the southwest Pacific, the tropical cyclone season 2021-22 started on the 01 November, 2021. The outlook for the season is 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.

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).

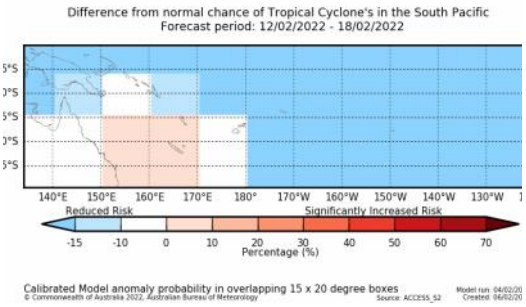
The weekly tropical cyclone forecast from the ACCESS-S model shows significant increased risk in the weeks beginning 12 February and ending 25 February 2022 for the southwest Pacific, especially in areas around the Coral Sea region to New Caledonia and Vanuatu. There is no cyclone risk for the northwest Pacific region.

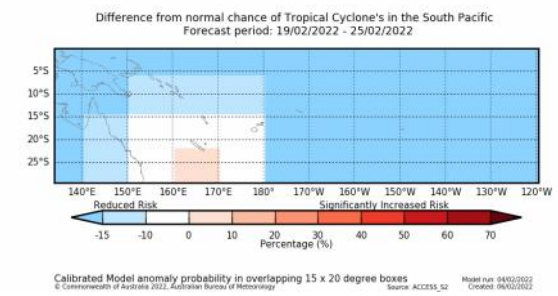
ACCESS-S Weekly Forecasts –Northwest Pacific





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.

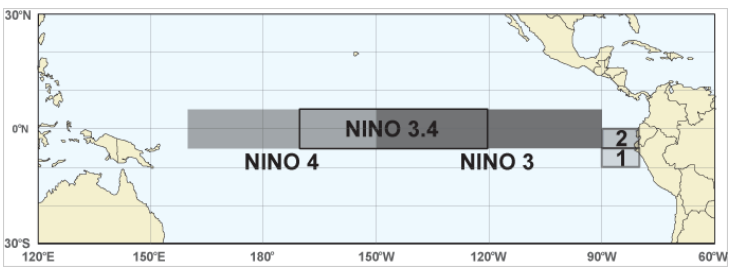
20 degrees Celsius Isotherm Depth

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