Session 3: Looking Back: Review and Evaluation of November to April Climate Outlook

i. Atmosphere

Key messages from PICOF-11

11th Pacific Islands Climate Outlook Forum Statement

This statement was produced by the WMO RA-V Pacific Regional Climate Centre Network *following the 11th Pacific Islands Climate Outlook Forum (PICOF-11) held on 25 October 2022, for use by National Meteorological and Hydrological Services (NMHSs) in the Pacific Islands. For more information, please see the* background section *and/or contact your local meteorological office.*

Key messages   **Climate in review**   **ENSO**   **Rainfall**   **Air temperature & wind**   **Sea level**   **Tropical cyclones**

Key messages – November 2022 to April 2023

- Climate model outlooks favour La Niña conditions in the tropical Pacific Ocean from November to February. Between February and April, La Niña will most likely transition to ENSO-neutral, with the second most likely outcome being a continuation of La Niña.
- Drier than normal conditions are favoured for island groups near and west of the Date Line that are located close to the equator. Drier than normal conditions are forecast to extend northeast and southeast from the Date Line towards the sub-tropics, especially in the Southern Hemisphere. Dry conditions in the norther hemisphere seem to zonally span (along the latitude 5° N) in the northeast direction
- Wetter than normal conditions are favoured for islands located between Palau and the central Marshall Islands in the North Pacific and from southeast Papua New Guinea (PNG) to the southernmost French Polynesian islands.
- Sea surface temperatures (SSTs) are favoured to be above normal in the western Pacific and Coral Sea. Below normal SSTs are favoured near the equator typical of La Niña. This is reflected in the air temperature outlook.
- The risk for coral bleaching is enhanced in the tropical west Pacific.
- Sea level is favoured to be notably higher than normal for most of the countries in the region. Communities are encouraged to note periods of higher-than-normal tides, especially when a tropical cyclone (TC) is in the vicinity.
- There is an enhanced risk for TC activity in the western tropical Pacific. In the central part of the region, TC risks are generally near normal to below normal.
- It does not take a severe TC to produce severe impacts. Coastal and river flooding rainfall can occur with a distant, weak, or former TC. Communities should remain vigilant and follow forecast information provided by their NMHS.

Southern-Oscillation Index
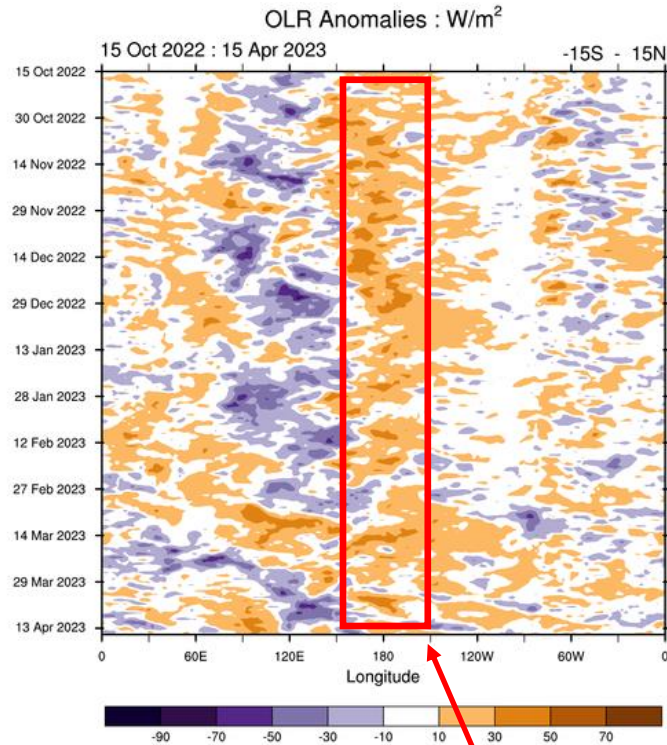

30 Day Moving SOI
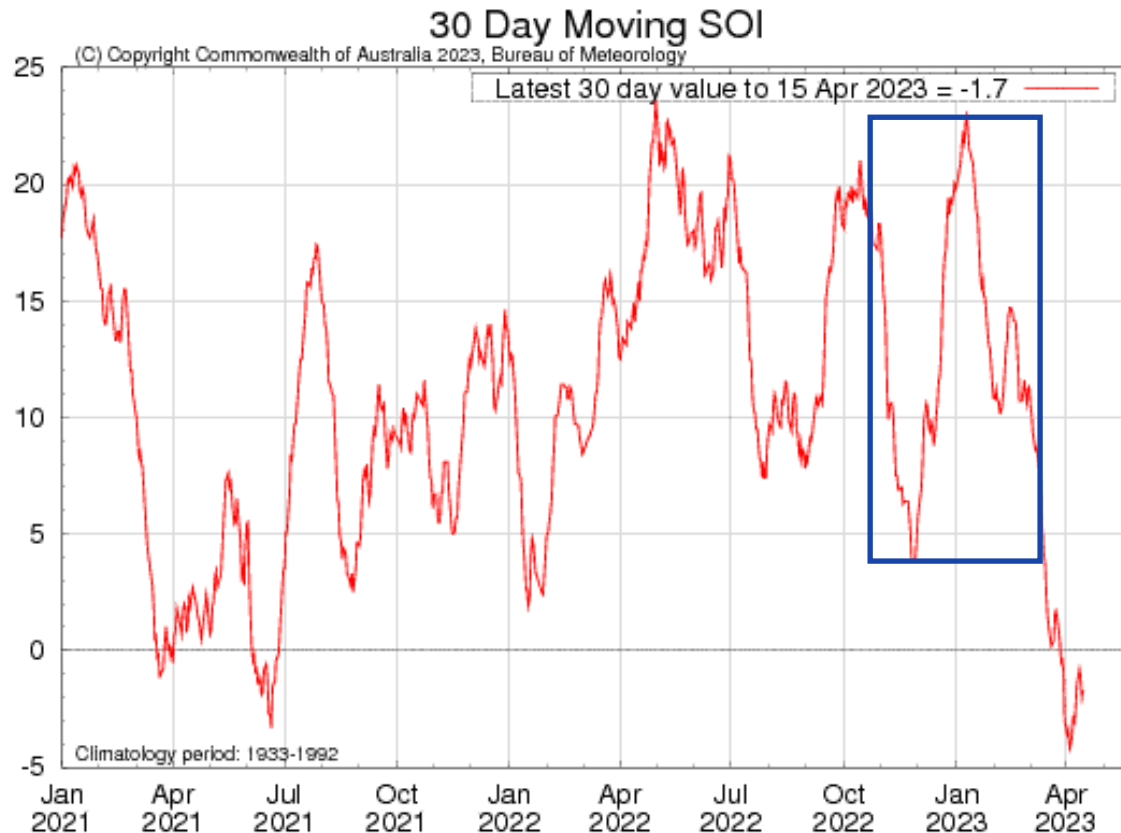
SOI remained positive between July 2021 and April 2023.

SOI was above +7 for most of November to March, strongly indicating the atmospheric response to La Niña

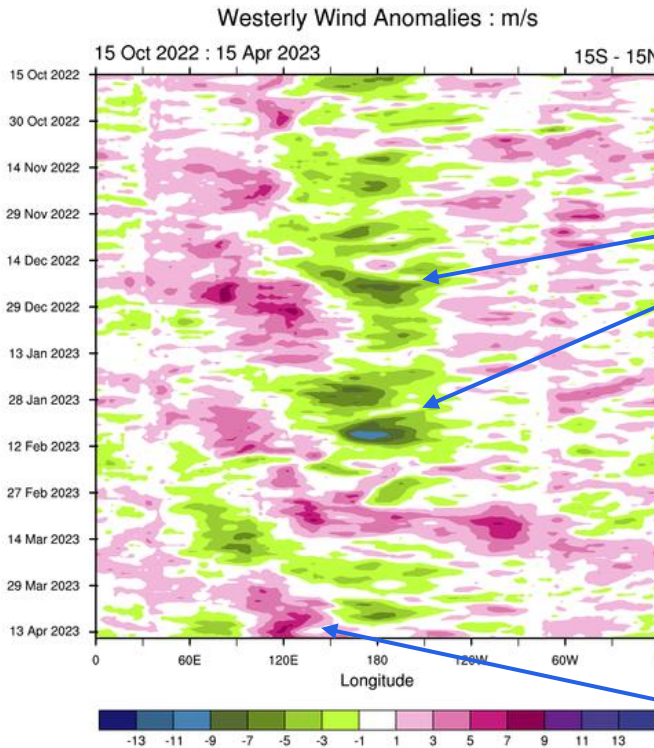SOI of +20 for December was the highest since +27.1 in December 2010

OLR and Westerly Wind Anomalies

Cloudiness near the Date Line has been below average, typical for La Niña
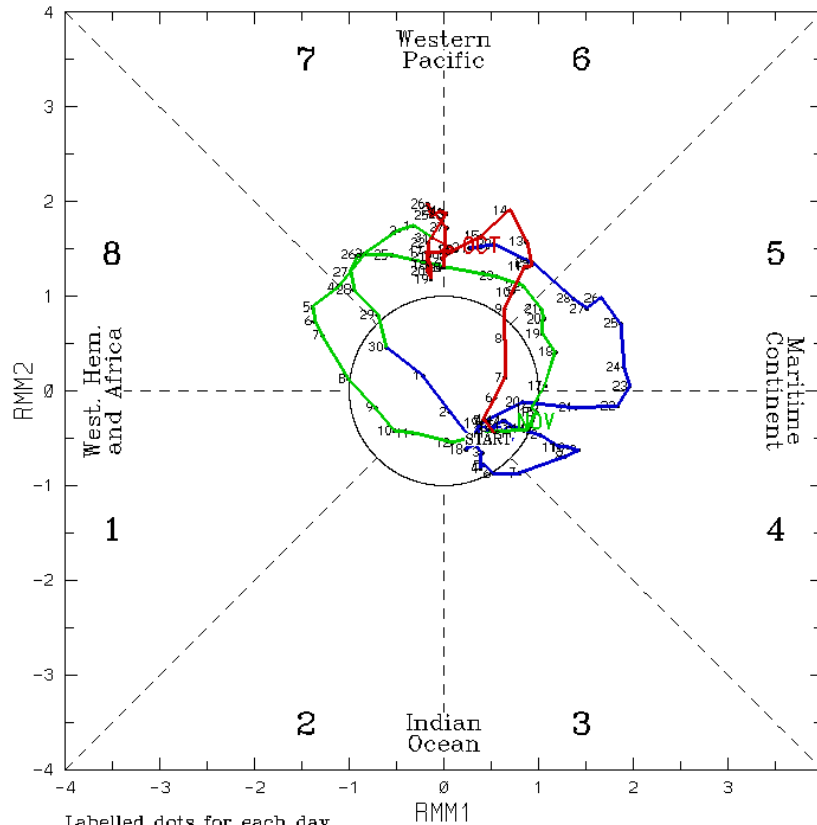
Enhanced trade winds, typical of La Niña

Positive westerly wind anomalies associated with the strong MJO event
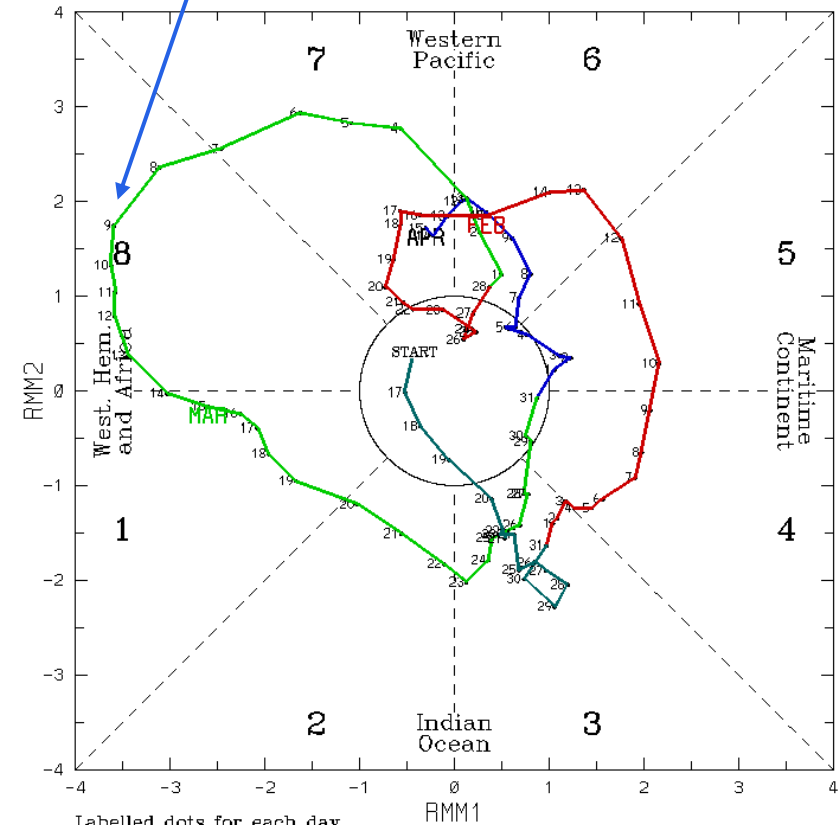
Madden-Julian Oscillation

Close to the record for largest MJO amplitude – 4.63 on 16 March 2015

(RMM1,RMM2) phase space for 1-Oct-2022 to 31-Dec-2022

(RMM1,RMM2) phase space for 16-Jan-2023 to 15-Apr-2023

Labelled dots for each day.
Blue line is for Dec, green line is for Nov, red line is for Oct.
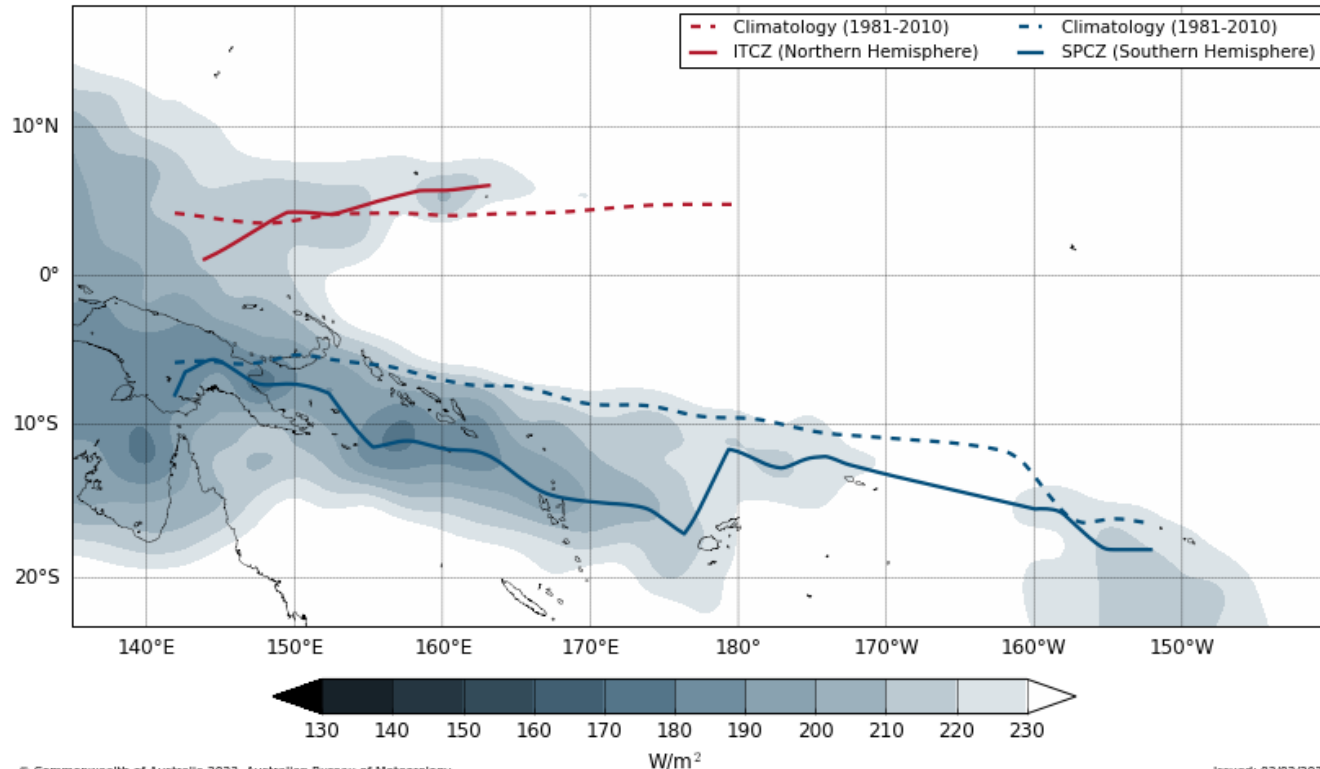(C) Copyright Commonwealth of Australia 2023. Bureau of Meteorology 2023

Labelled dots for each day.
Blue line is for Apr, green line is for Mar, red line is for Feb.
(C) Copyright Commonwealth of Australia 2023. Bureau of Meteorology 2023

South Pacific Convergence Zone

30 Day Average Outgoing Longwave Radiation (OLR) minimum to 2023-01-31
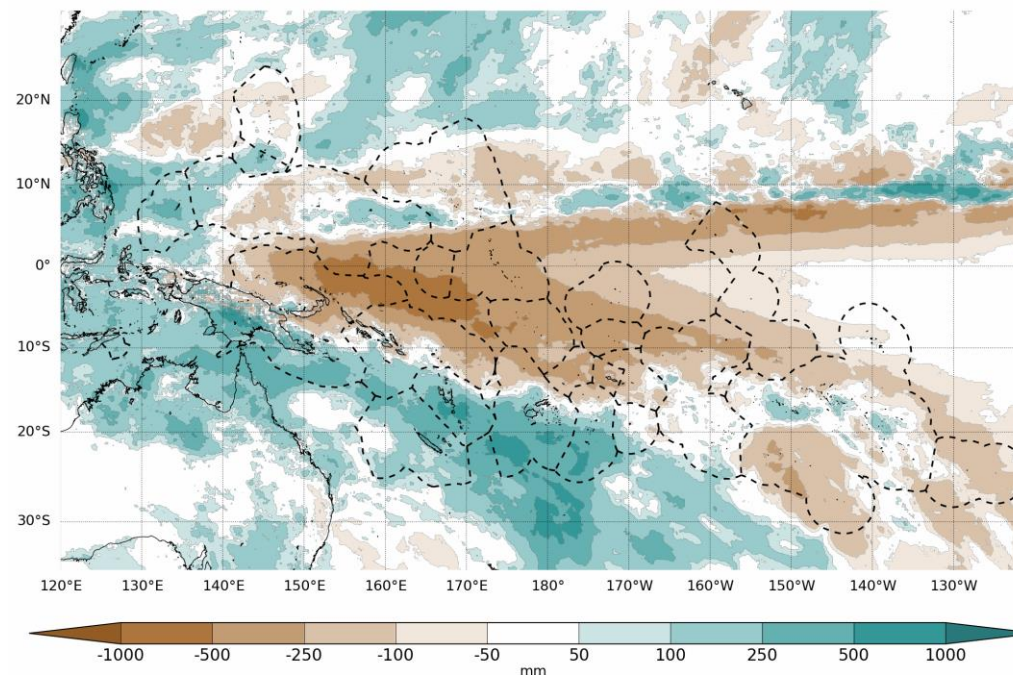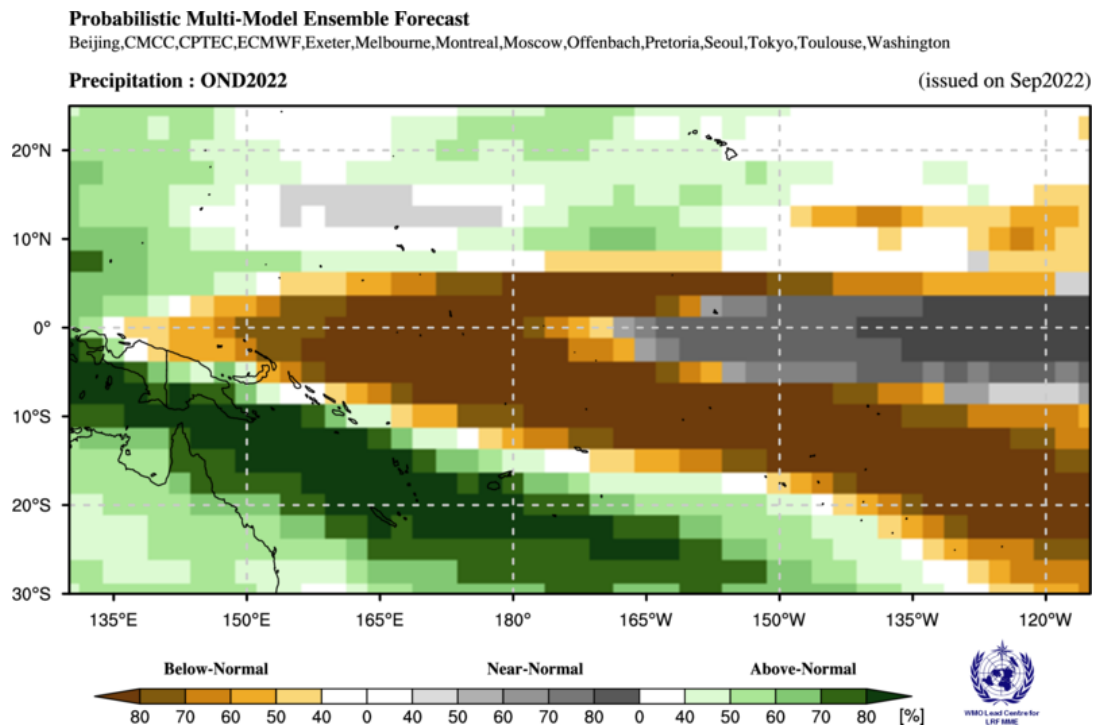
SPCZ has been displaced south of its climatological position for much of the last 6 months

This is consistent with La Niña and the positive rainfall anomalies (particularly Oct-Dec 2022) experienced by PNG, southern Solomon Islands, New Caledonia, Vanuatu, Fiji and Tonga

Rainfall outlook Oct – Dec 2022 v MSWEP anomalies

Probabilistic Multi-Model Ensemble Forecast
Beijing,CMCC,CPTEC,ECMWF,Exeter,Melbourne,Montreal,Moscow,Offenbach,Pretoria,Seoul,Tokyo,Toulouse,Washington

Precipitation : OND2022   (issued on Sep2022)

3-month total rainfall anomaly ending December 2022

Data source: MSWEP

Run: 31/01/2023
Base period: 1980-2021

© Commonwealth of Australia 2023, Australian Bureau of Meteorology, supported by COSPPac

Shapefile data extracted from Flanders Marine Institute (2019), Maritime Boundaries Geodatabase: Maritime Boundaries and Exclusive Economic Zones (200NM), version 11. Available online at http://www.marineregions.org/.

Positives: Outlook was **good** along the equator, from PNG southeast to Tonga, and Palau eastwards
Negatives: Southern Cook Is. and French Polynesia outlook was too dry, near-normal tercile extended too far west along the equator, RMI and Mariana Is. outlook was too wet
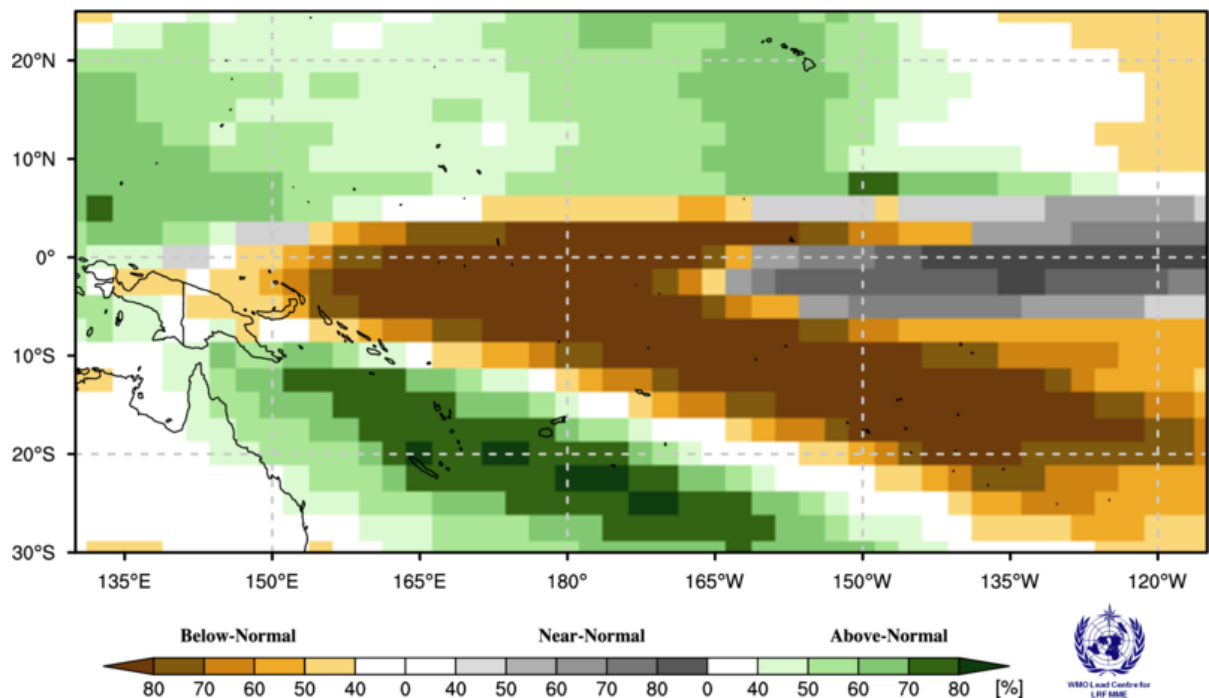
Rainfall outlook Jan – Mar 2023 V MSWEP anomalies
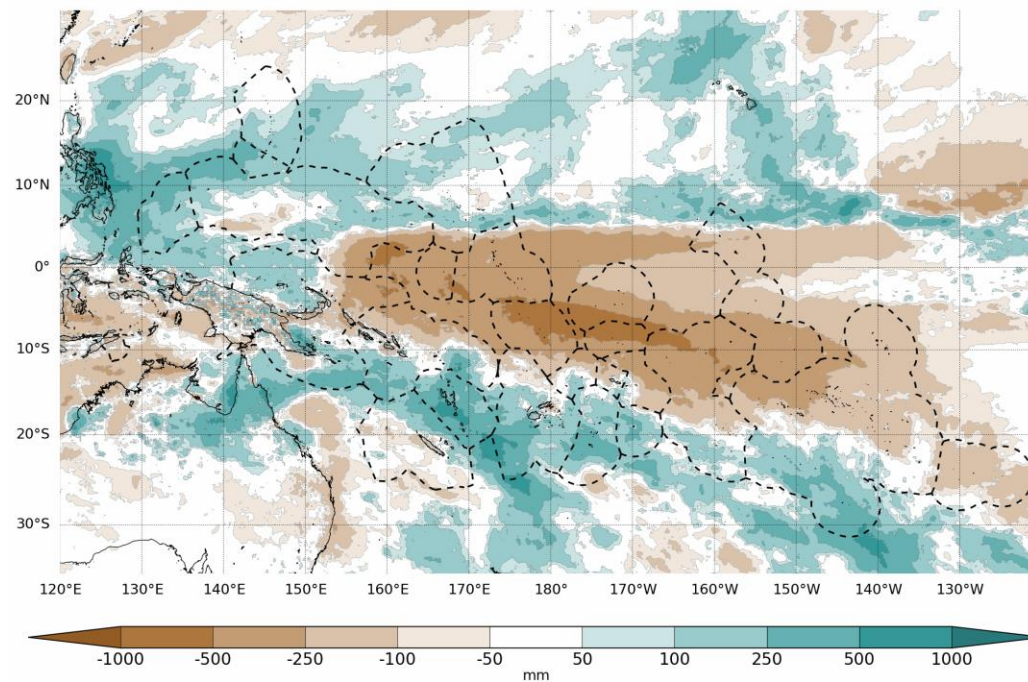

Probabilistic Multi-Model Ensemble Forecast
Beijing,CMCC,CPTEC,ECMWF,Exeter,Melbourne,Montreal,Moscow,Offenbach,Seoul,Tokyo,Toulouse,Washington

Precipitation : JFM2023   (issued on Dec2022)

Below-Normal   Near-Normal   Above-Normal

3-month total rainfall anomaly ending March 2023

Data source: MSWEP

Run: 11/04/2023
Base period: 1980-2021

© Commonwealth of Australia 2023, Australian Bureau of Meteorology, supported by COSPPac
Shapefile data extracted from Flanders Marine Institute (2019), Maritime Boundaries Geodatabase: Maritime Boundaries and Exclusive Economic Zones (200NM), version 11. Available online at http://www.marineregions.org/.
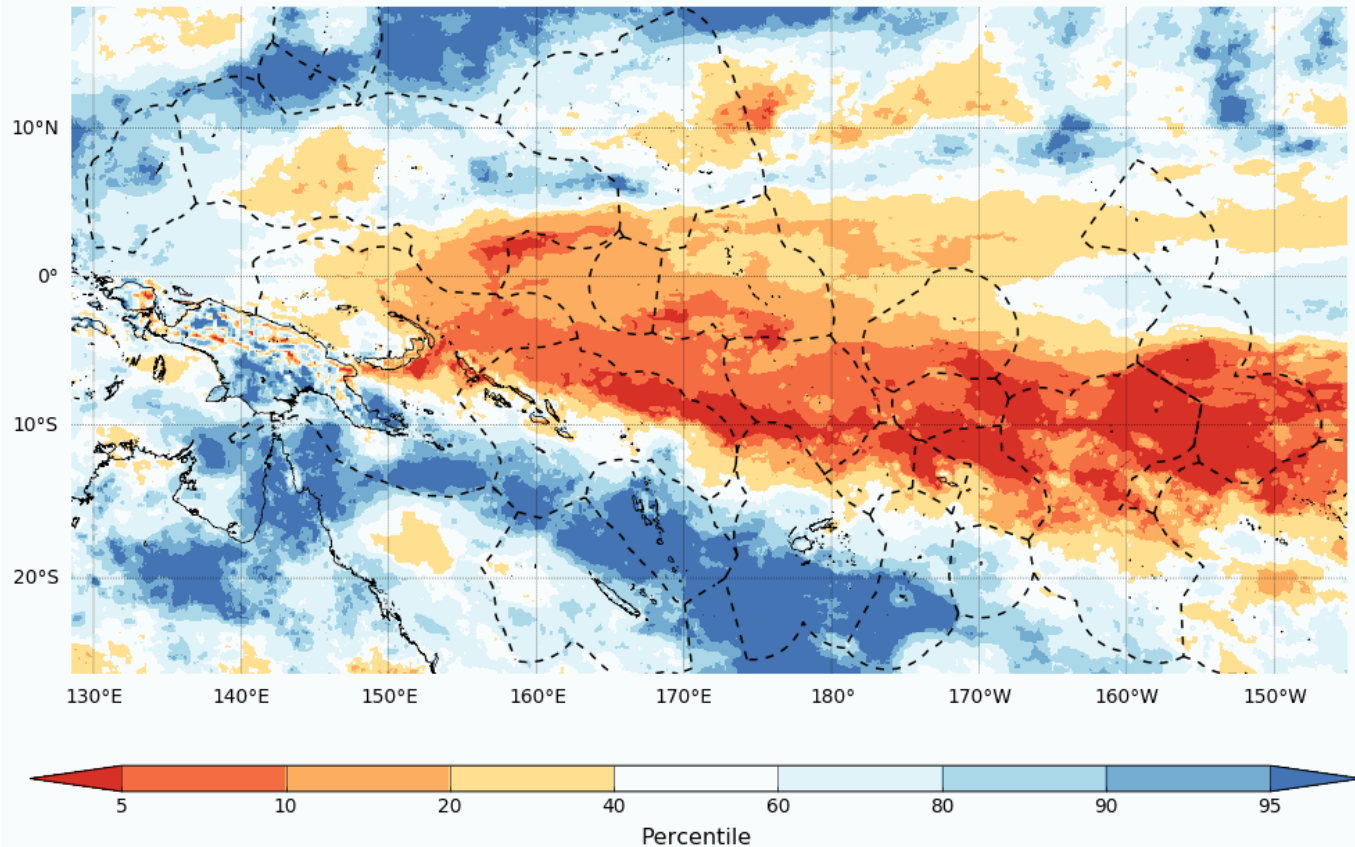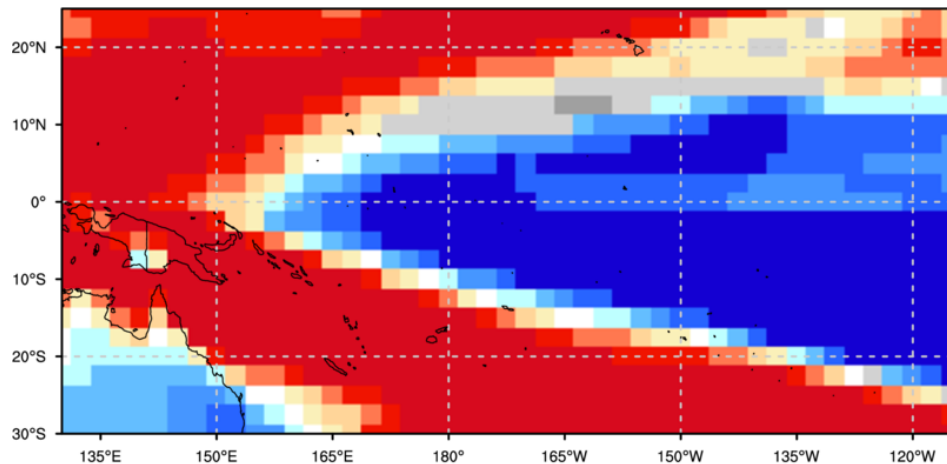
Positives: Outlook was **good** over the central equatorial Pacific, Vanuatu and most of Fiji, and the north Pacific
Negatives: New Caledonia outlook was too wet, southern French Polynesia outlook was too dry

Nov 2022 – Mar 2023 Low Rainfall Regions

6-month Percentile to end of March 2023

Data source: MSWEP

Model Run: 01/03/2023
Base period: 1980-2021

© Commonwealth of Australia 2023, Australian Bureau of Meteorology, supported by COSPPac
Shapefile data extracted from Flanders Marine Institute (2019), Maritime Boundaries Geodatabase: Maritime Boundaries and Exclusive Economic Zones (200NM), version 11. Available online at
http://www.marineregions.org/.

Rainfall below 10th percentile over the past 6 months:
- Southern Gilbert Islands
- Southern Phoenix and Line Islands
- Tokelau
- Northern American Samoa
- North-western Samoa
- Northern Wallis & Futuna
- Northern Cook Islands
- Southern Tuvalu
- North-western Solomon Islands
- Eastern PNG Islands
- North-western Marquise Is.

2m Temperature outlook V IRI anomaly

Oct – Dec 2022
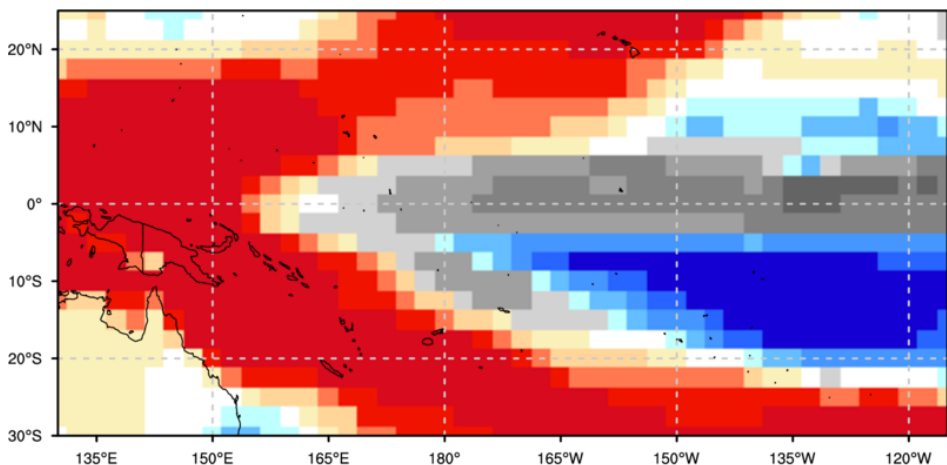
Jan – Mar 2023
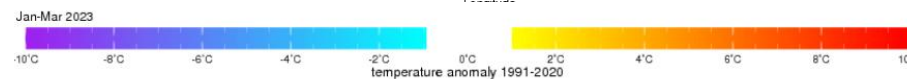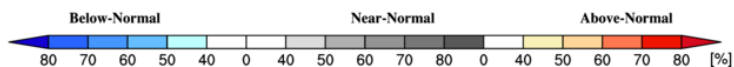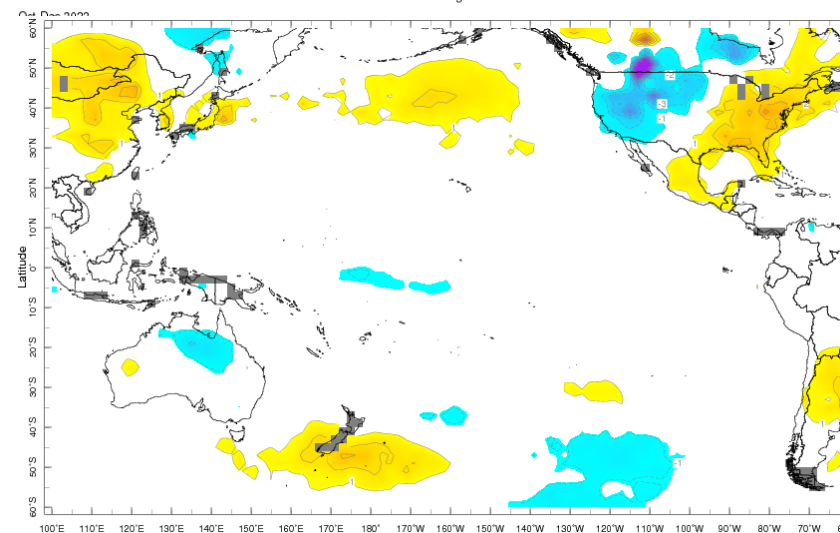
Summary
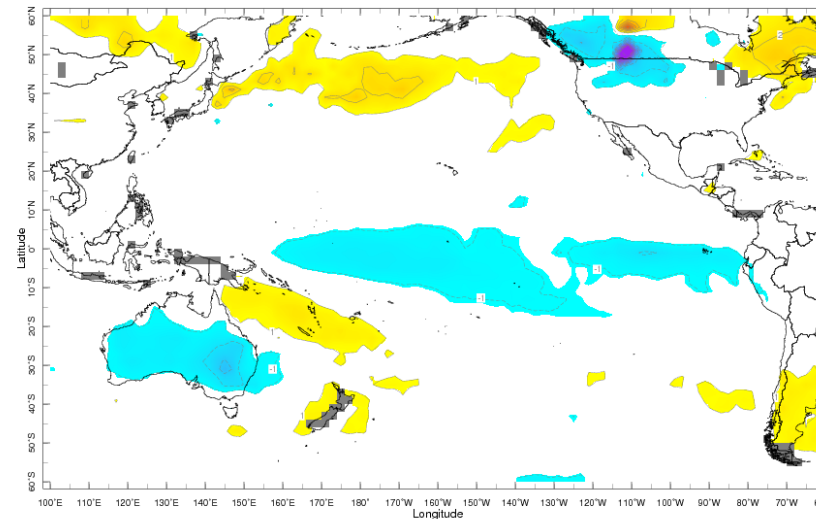
- La Niña was a dominant driver of atmospheric patterns across the Pacific between November 2022 and April 2023. Rainfall, air temperatures and winds reflected an established event.

- The atmospheric response to La Niña begun showing signs of weakening during March 2023, with atmospheric indicators of ENSO returning to ENSO-neutral levels during April.

- Climate outlooks from October 2022 for Oct – Dec were assessed as being good, especially for near-equatorial regions.

- Climate outlooks for Jan – Mar also assessed verified well with strong model agreement throughout the South Pacific

Thank you