

15TH SESSION OF THE PACIFIC ISLANDS CLIMATE OUTLOOK & STAKEHOLDER FORUM

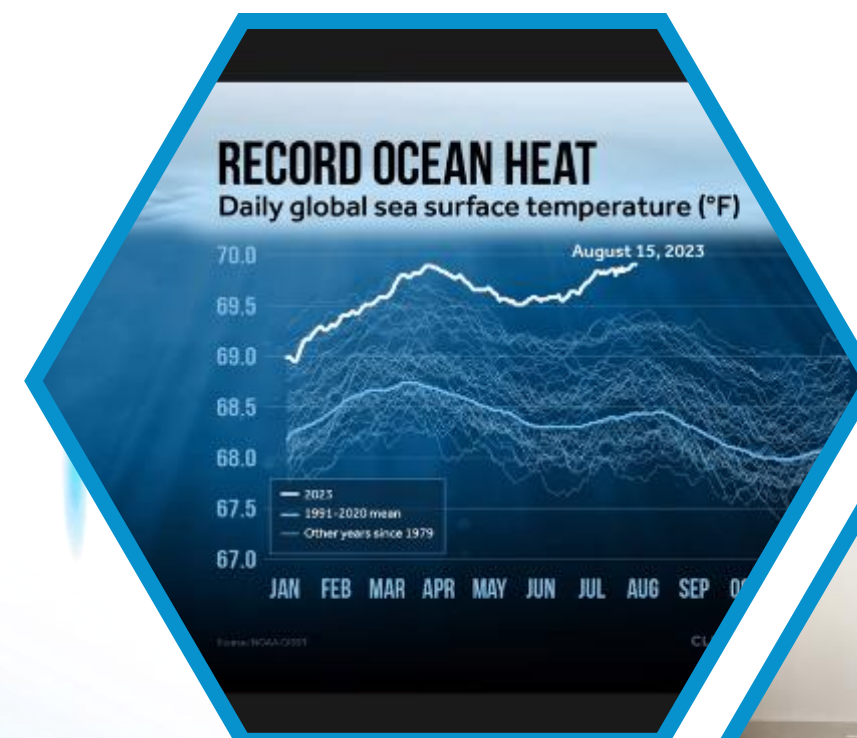
PICOF-15

14 - 15 OCTOBER, 2024

HYBRID

IN-PERSON: NUKU'ALOFA, TONGA

ONLINE: ZOOM



AGENDA 2: REVIEW AND EVALUATION OF ATMOSPHERIC CONDITIONS (MAY TO OCTOBER)

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Meteorologist

NOAA NWS



Outline of Presentation

- Review of PICOF-14 Outlook
- Air pressure and wind flow patterns
- Synoptic drivers (SPCZ and monsoon trough/ITCZ)
- Rainfall and temperature forecasts vs observations
- Velocity potential / Madden-Julian Oscillation
- Key points / takeaways

Review of PICOF-14 predictions

Rainfall outlook

May-Jun-Jul:

- **Below normal rainfall** favored for off-equatorial South Pacific (>15S) around New Caledonia, Vanuatu, Fiji, and parts of Micronesia near and north of 8N. ✓
- ✗ Marshall Islands ended up a bit wetter than forecasts
- **Above normal rainfall** favored for southern portions of Palau, extending east-southeastward through PNG and Solomon Islands, Samoa, northern Cook Islands to the Tuamotus ✓

Aug-Sep-Oct:

- **Below normal rainfall** favored near the equator ✓
- **Above normal rainfall** for off-equatorial South Pacific (La Niña-like pattern) ✓

Temperature Outlook

May-Oct:

- **Above normal temps** favored for all countries, *exception being eastern parts of Kiribati during Aug-Oct* ✓

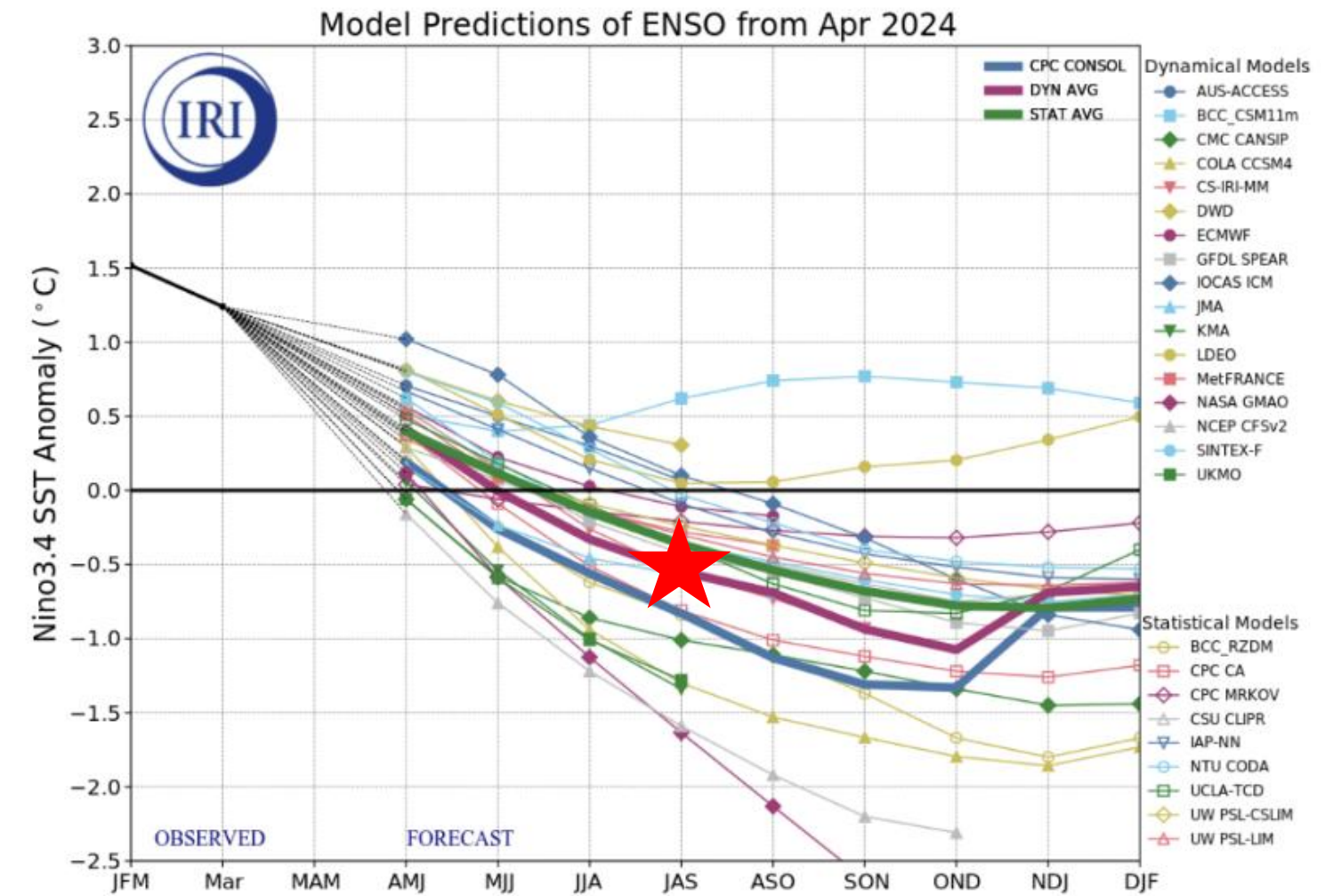
ENSO Outlook

- El Niño to fade to ENSO neutral ~April with lingering El Niño effects through June ✓
- Several models suggested La Niña during the second half of 2024 ✓ ✗

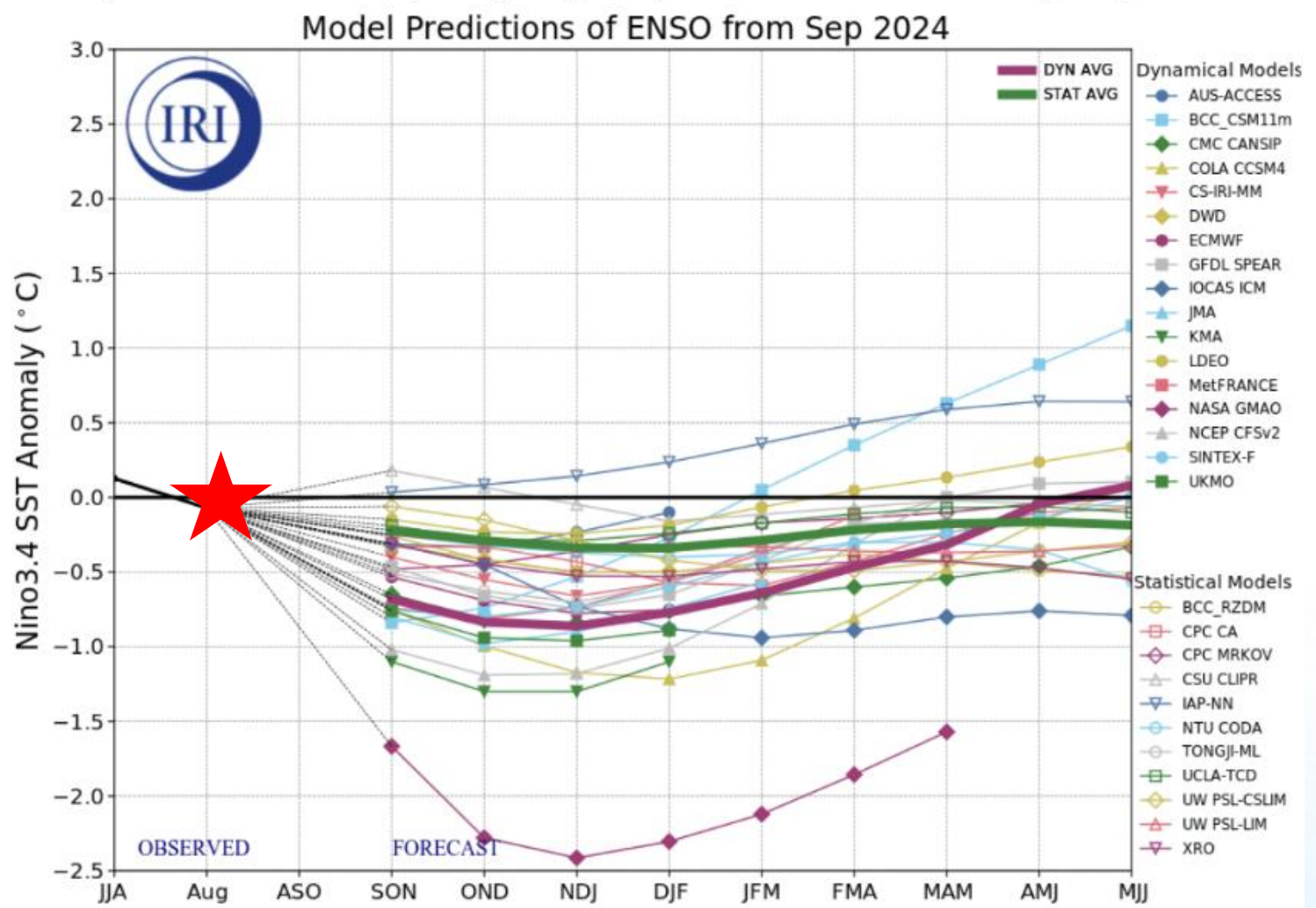
Review of ENSO Outlook

- Probabilities of La Niña have both lowered and been delayed the past several months
- **Important to note** that borderline ENSO events often hinge/depend on the criteria used to define the event...
 - Are we using the BOM, NIWA, NOAA or APCC threshold?
 - Are we using the traditional oceanic niño index (ONI) or the relative ONI?

These details matter as we attempt to compartmentalize mother nature into a “3-tray bin” of El Niño, La Niña or ENSO neutral



April Model Predictions

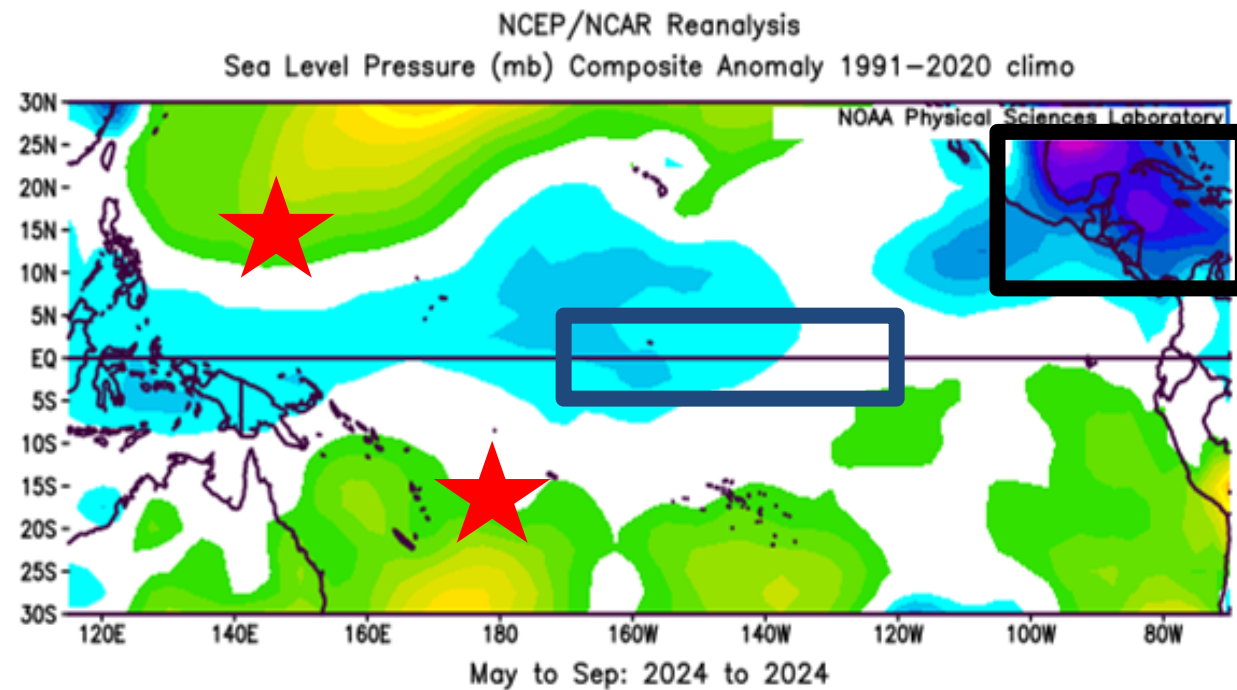


September Model Predictions

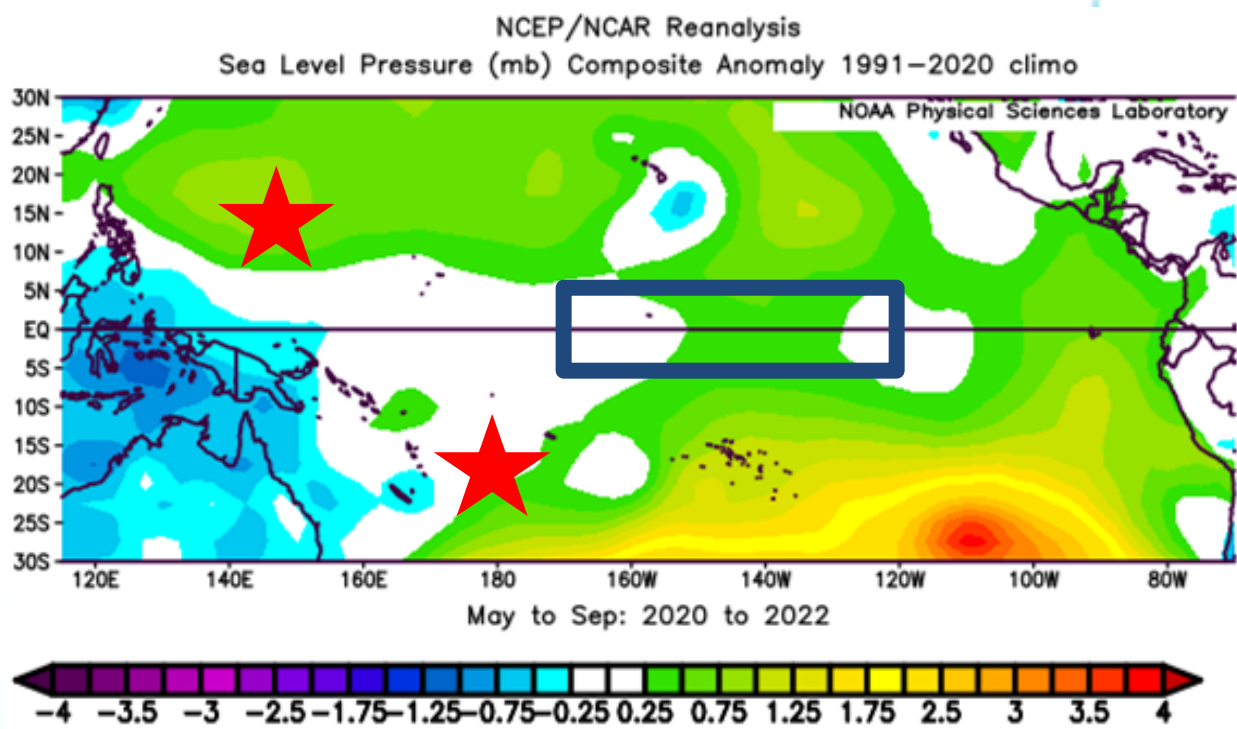
Air pressure anomalies (2024 vs 2020-2022)

- 2024: broad expanse of slightly lower pressures across much of the tropical Pacific (linked to residual El Niño? and vast expanse of record SSTs?)
- Strong low-pressure signal in Gulf of Mexico & Central America
- Fluctuating SOI signal that cannot “*make up its mind*”

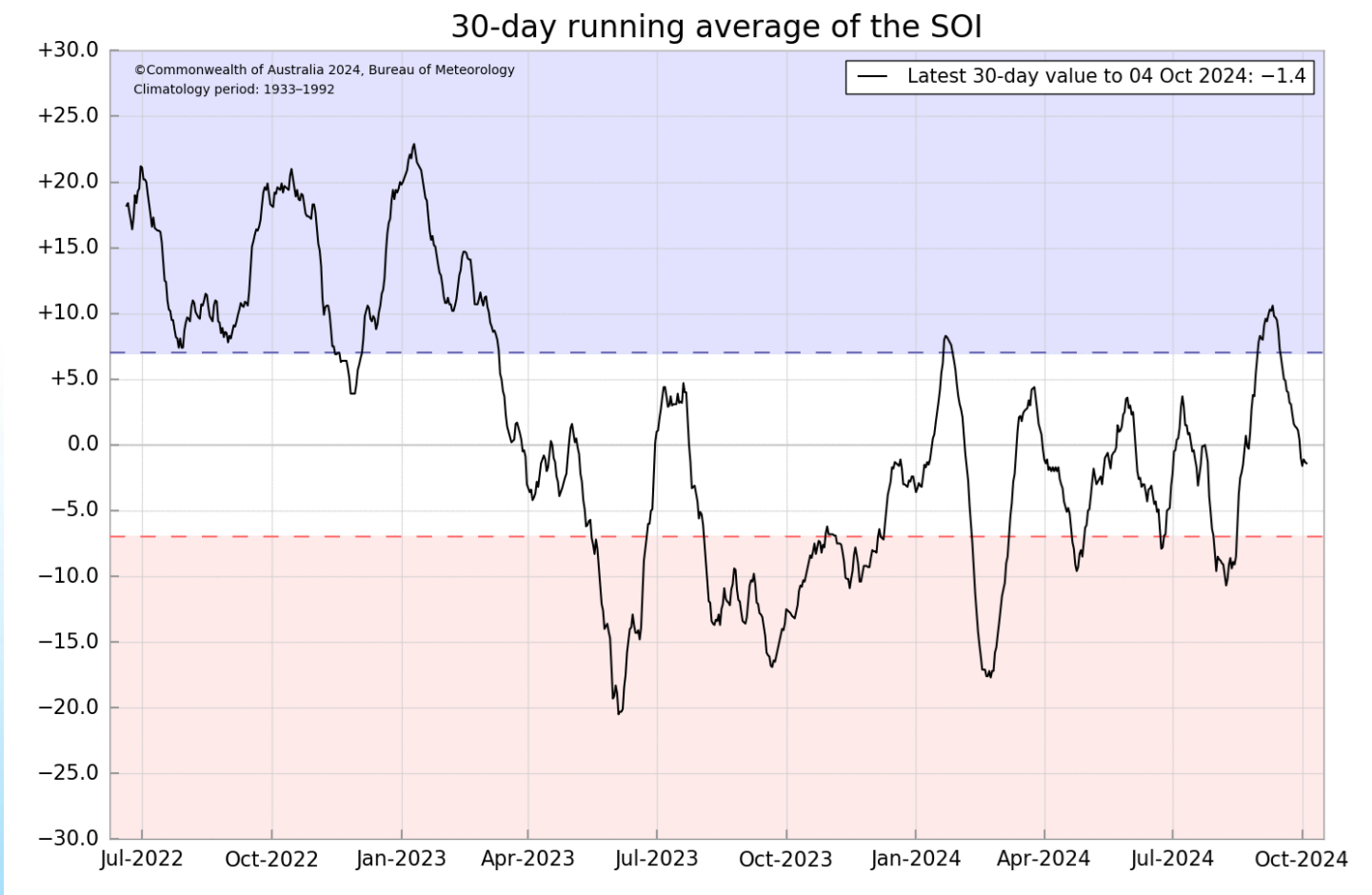
2024
May-Sep
SLP Anomalies



2020-2022
May-Sep
SLP Anomalies



<https://psl.noaa.gov/cgi-bin/data/composites/printpage.pl>



<http://www.bom.gov.au/climate/enso/#tabs=Pacific-Ocean&pacific=SOI>

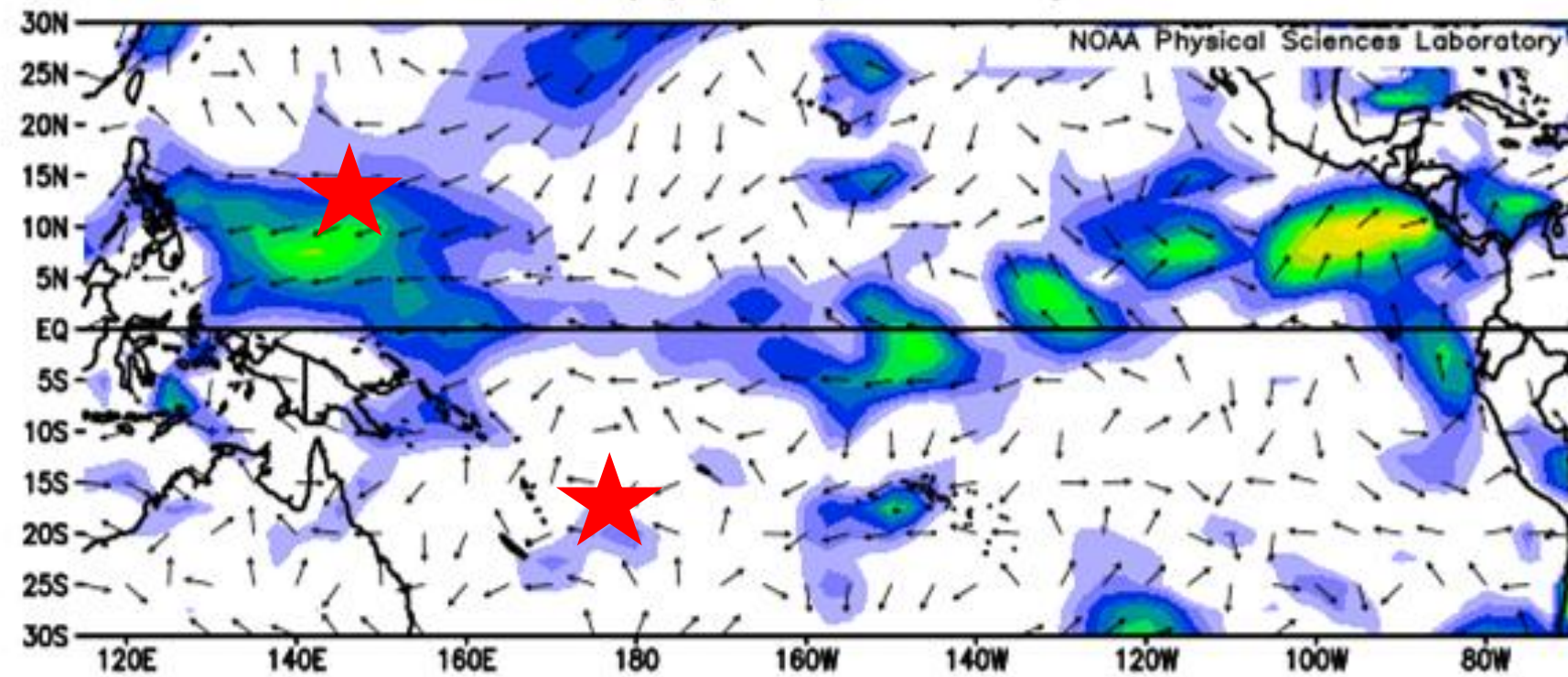
Surface wind anomalies (2024 vs 2020-2022)

2024 May-Sep Surface Wind Anomalies

NCEP/NCAR Reanalysis

Surface Vector Wind (m/s) Composite Anomaly 1991–2020 climo

NOAA Physical Sciences Laboratory



May to Sep: 2024 to 2024

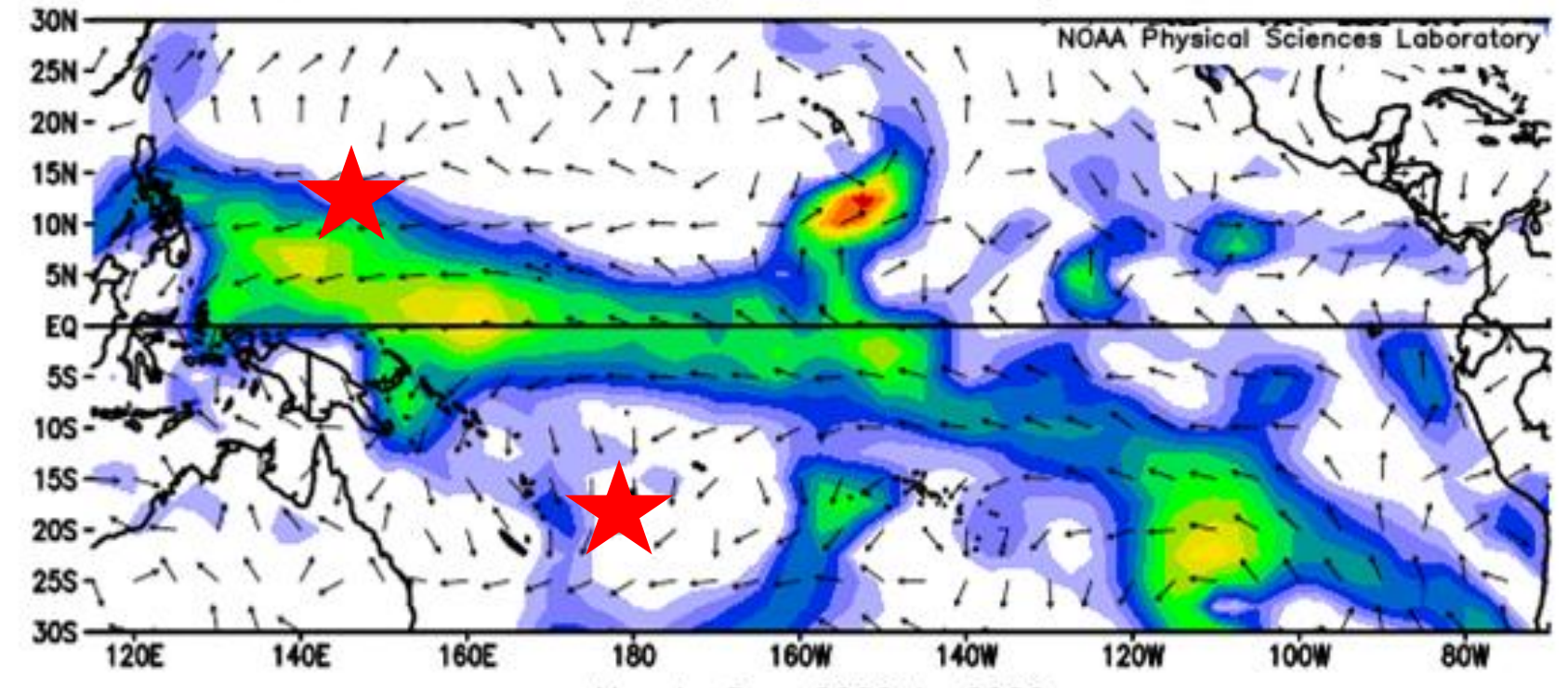


2020-2022 May-Sep Surface Wind Anomalies

NCEP/NCAR Reanalysis

Surface Vector Wind (m/s) Composite Anomaly 1991–2020 climo

NOAA Physical Sciences Laboratory



May to Sep: 2020 to 2022



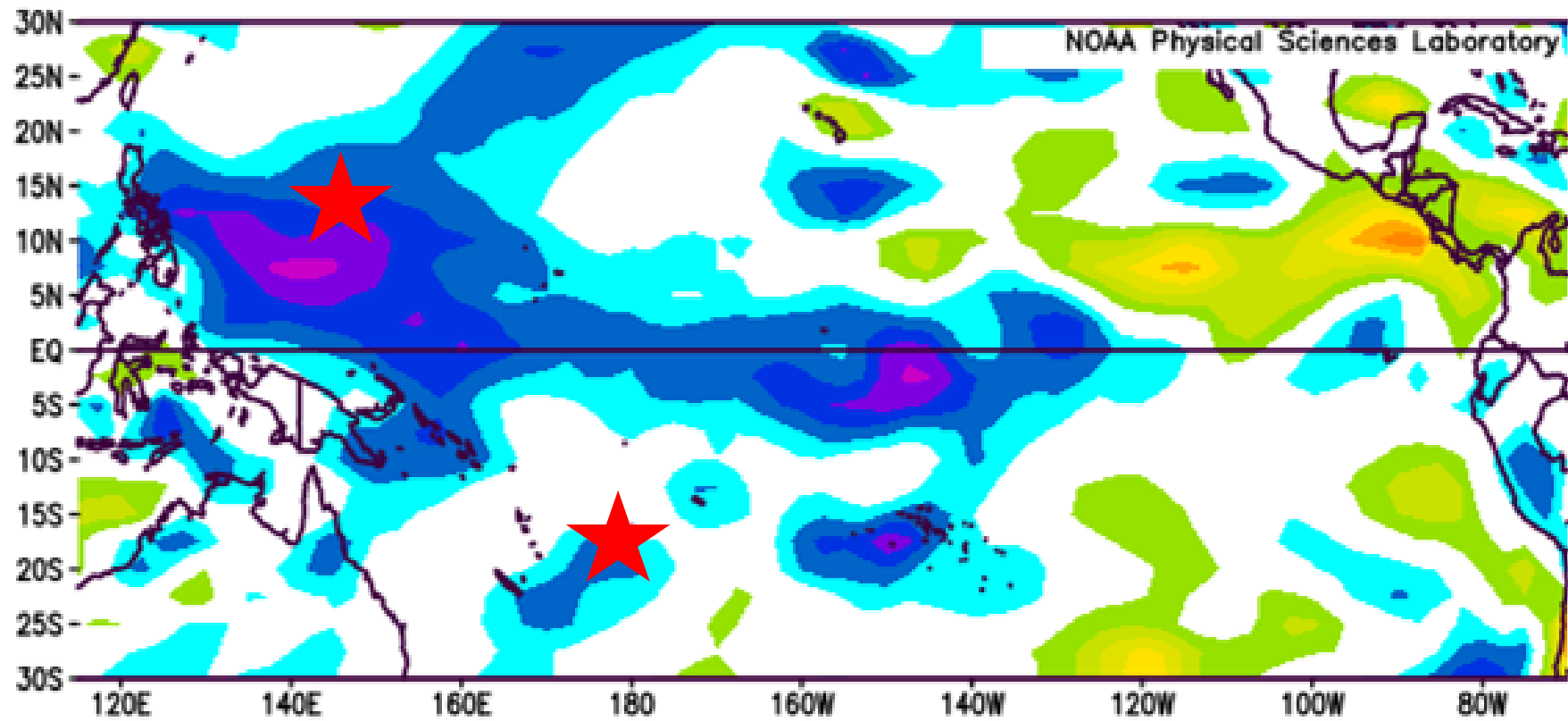
- mixed bag of off equatorial winds in Southern Hemi
- **pockets** of enhanced trades along and north of equator
- pronounced cross-equatorial flow in far eastern Pacific feeding into anomalous low-pressure area in Caribbean

Zonal wind comparison

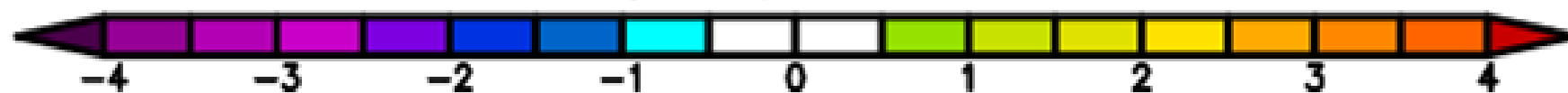
2024 May-Sep Surface Wind Anomalies

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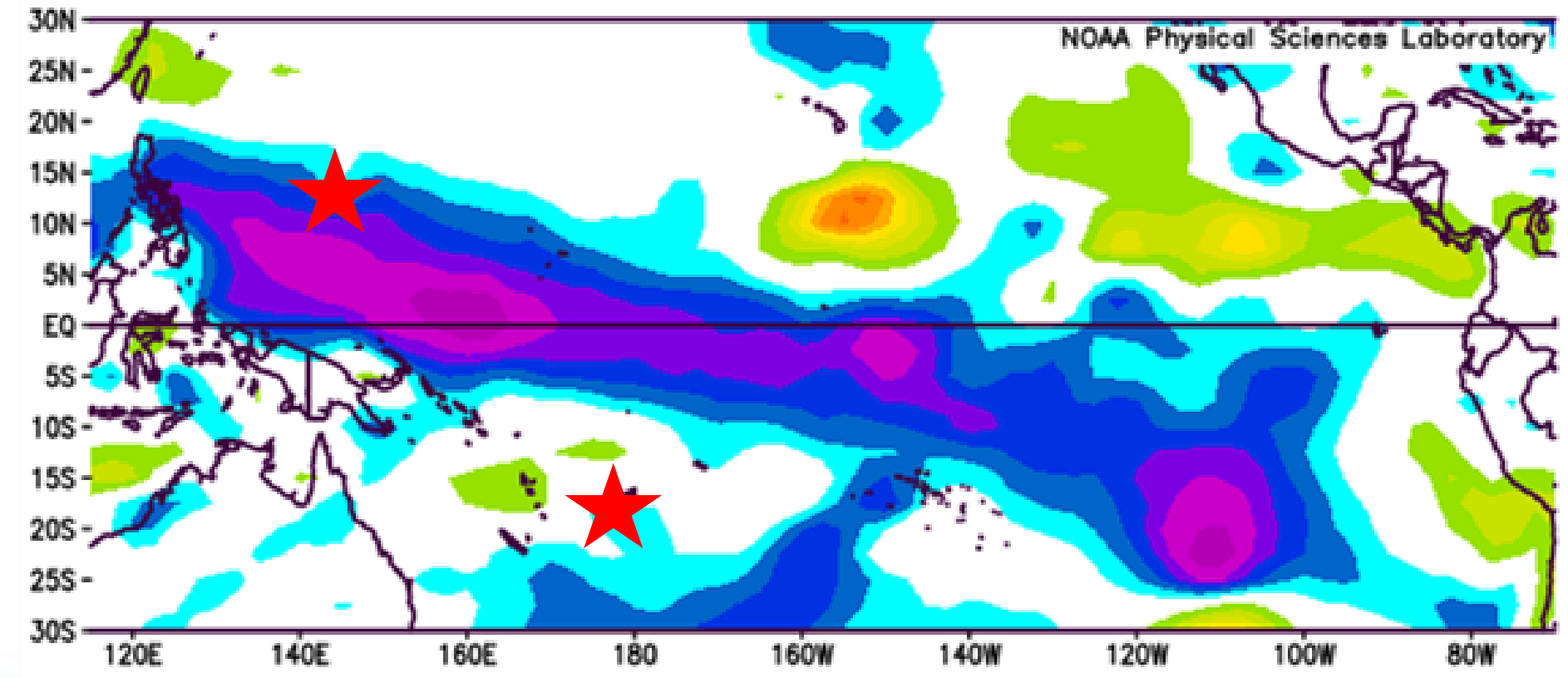
May to Sep: 2024 to 2024



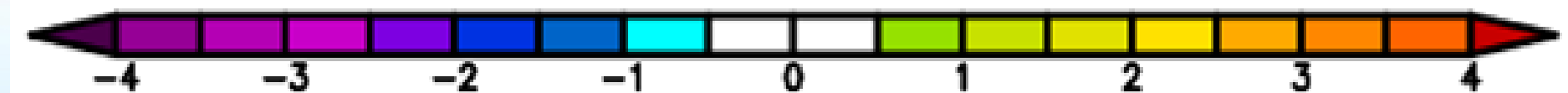
2020-2022 May-Sep Surface Wind Anomalies

NCEP/NCAR Reanalysis

Surface Zonal Wind (m/s) Composite Anomaly 1991–2020 climo



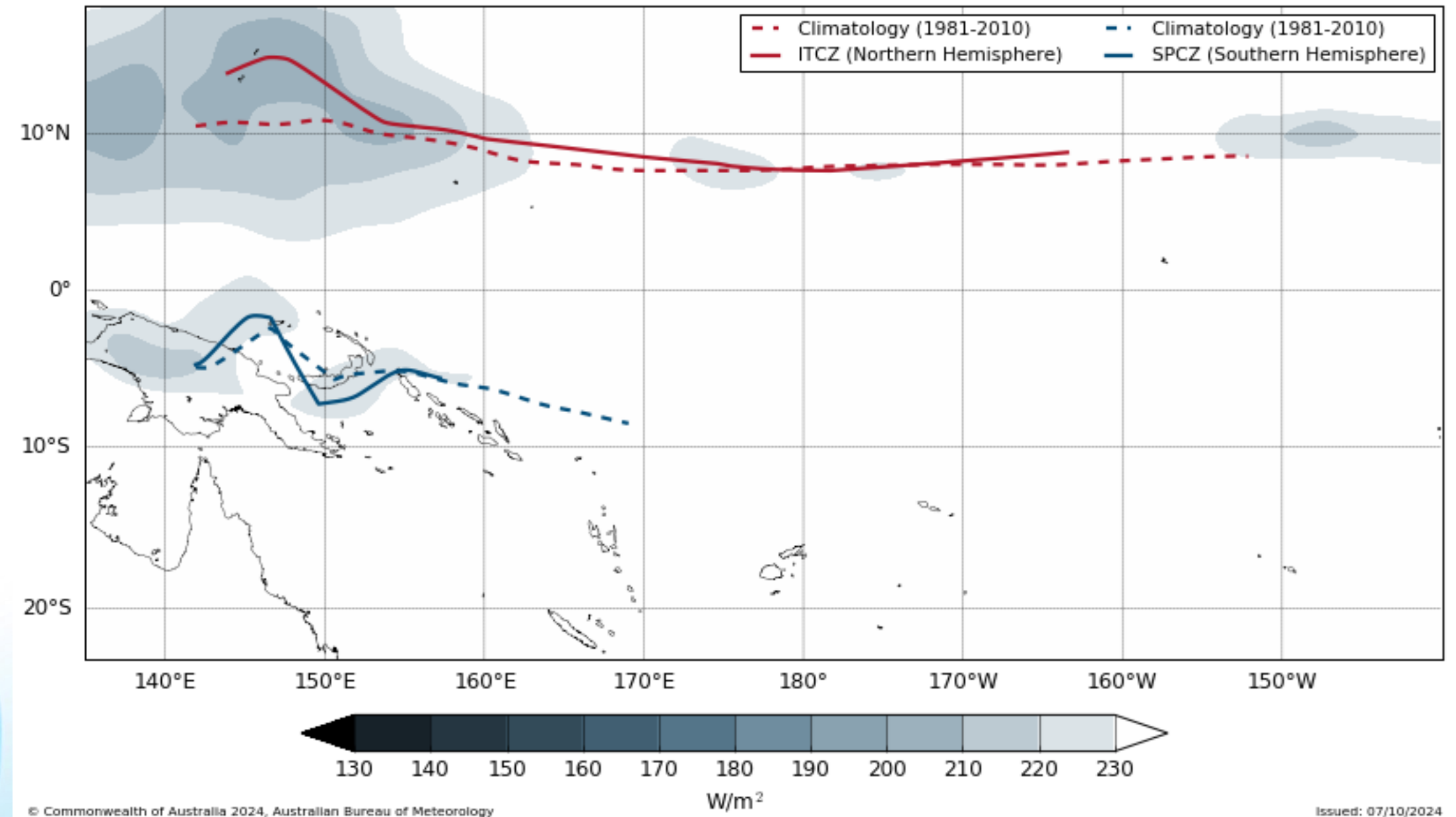
May to Sep: 2020 to 2022



SPCZ / ITCZ / Monsoon Trough

- SPCZ currently very close to climatological position
- ITCZ very close to climo position
- Far western extent of the ITCZ (arguably defined as monsoon trough) is displaced northward across western Micronesia/Marianas

30 Day Average Outgoing Longwave Radiation (OLR) minimum to 2024-10-04



http://access-s.clide.cloud/files/climate_drivers/spcz.png

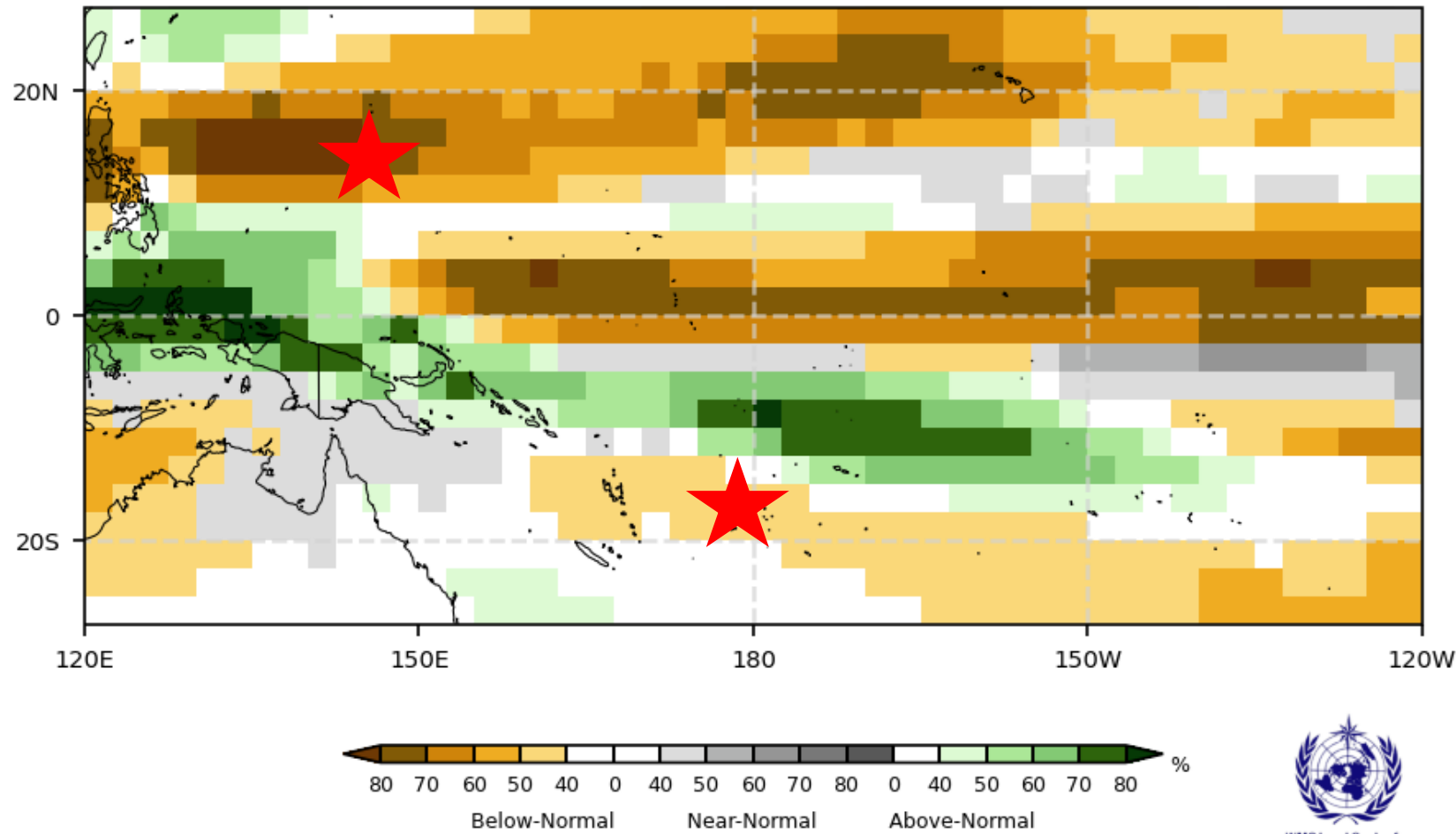
Rainfall outlook vs observations

Probabilistic Multi-Model Ensemble Forecast

Beijing, CMCC, CPTEC, ECMWF, Exeter, Melbourne, Montreal, Offenbach, Seoul, Tokyo, Toulouse, Washington

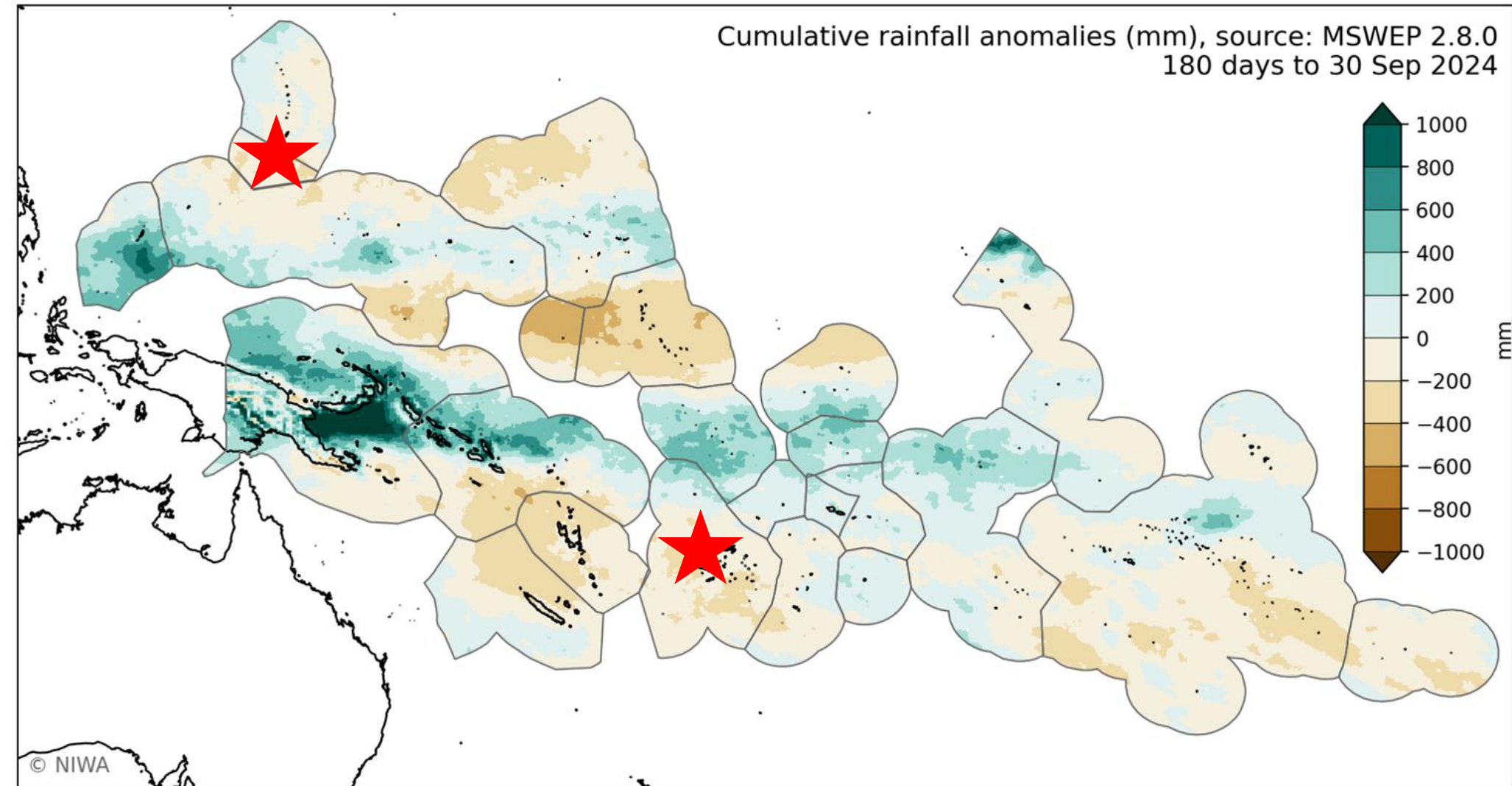
Precipitation : MJJAS2024

(issued on Apr2024)



https://wmo.org/seasonPmmeUI/plot_PMME

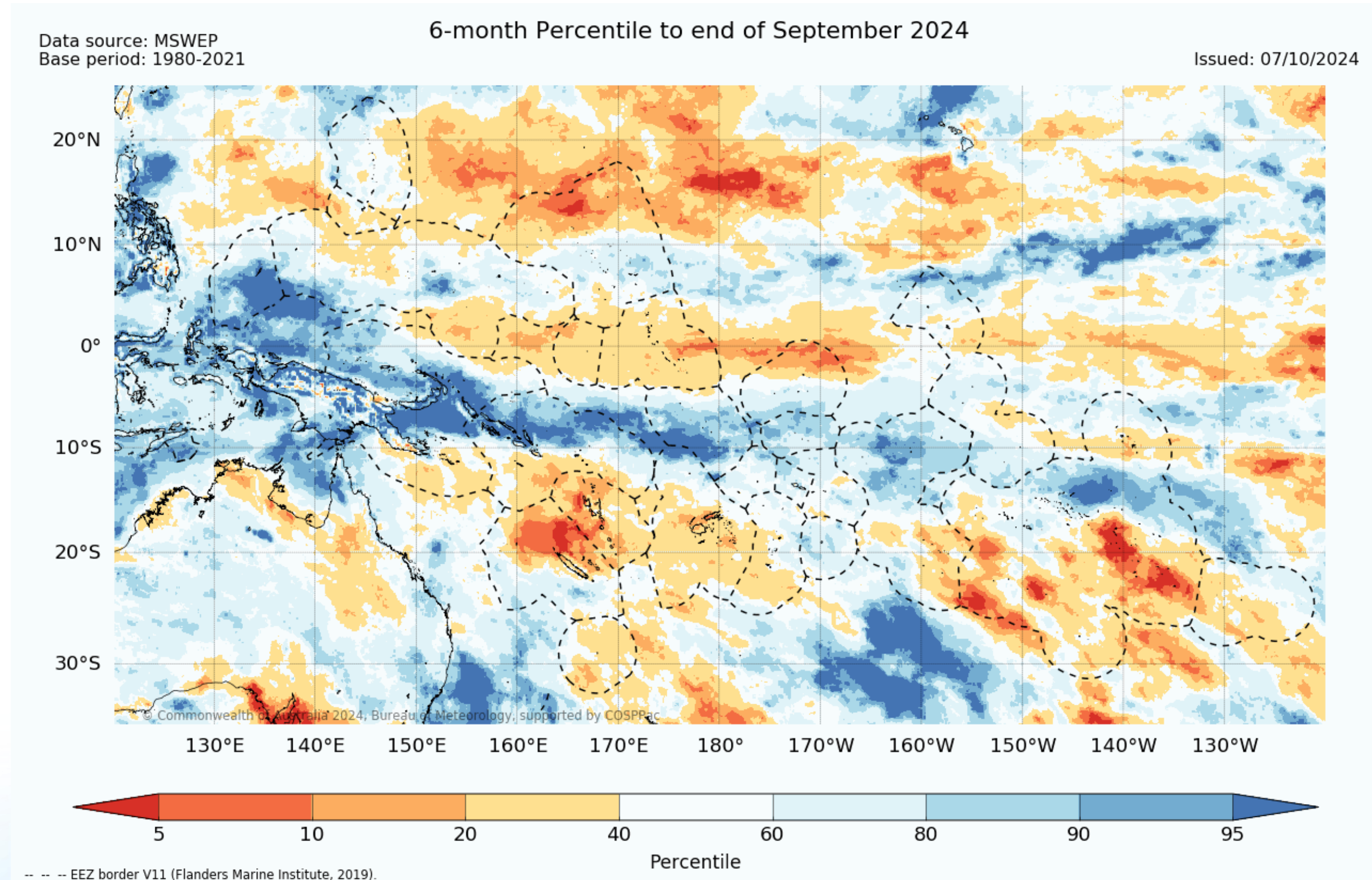
Cumulative rainfall anomalies (mm), source: MSWEP 2.8.0
180 days to 30 Sep 2024



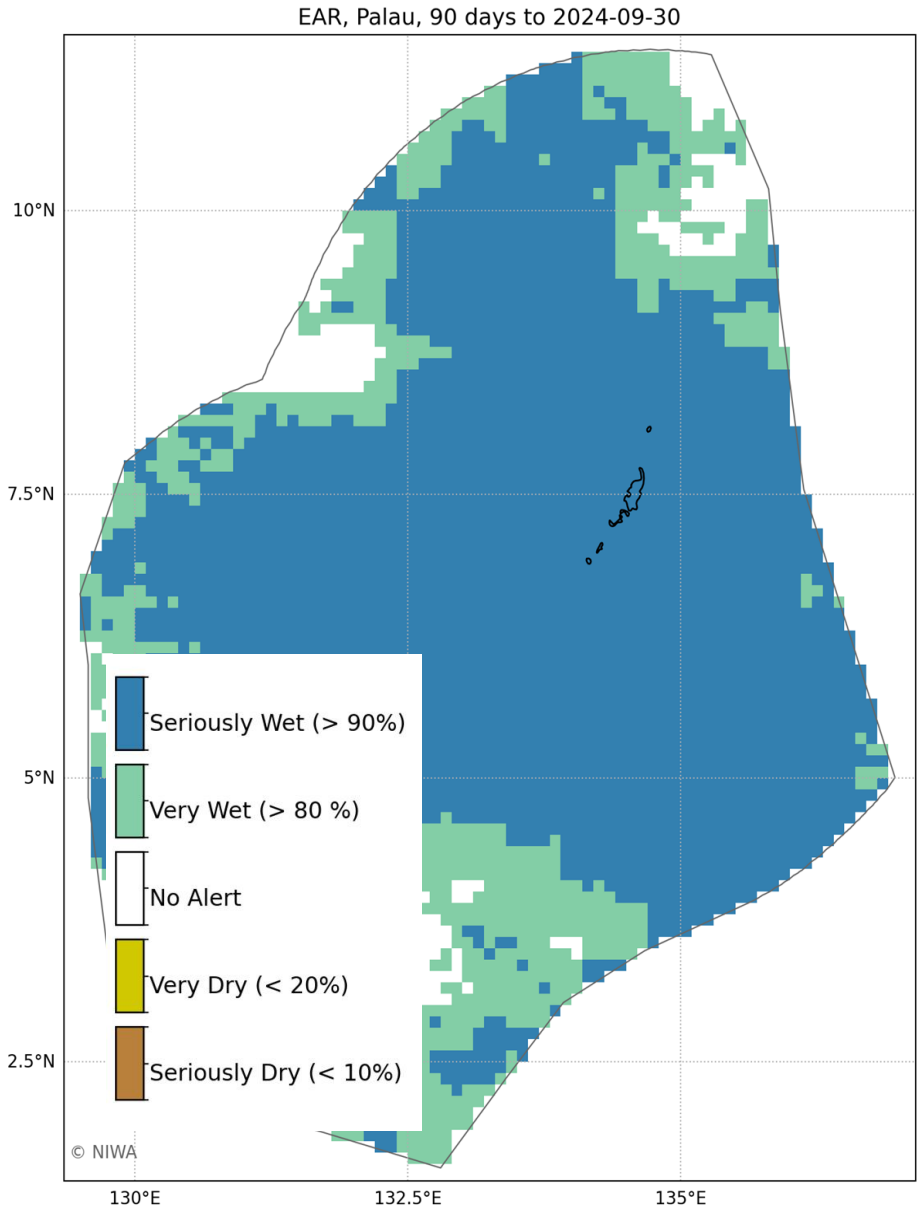
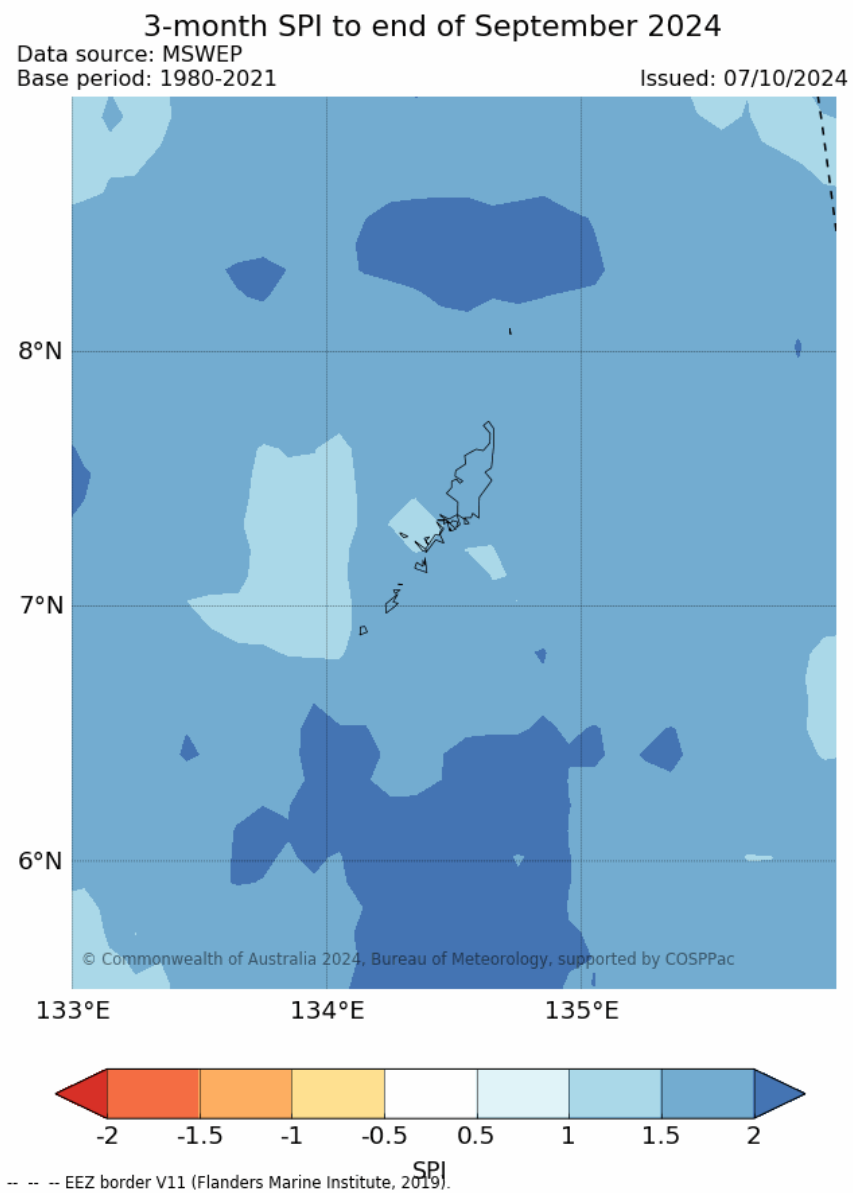
<https://shiny.niwa.co.nz/icu-app/>

- Wetter across east-to-west belt of Micronesia around 5-7N, including most of the Marshall Islands
- Modeled dryness along equator overdone compared to observations (linked to residual SST warmth and fading El Nino signal?)

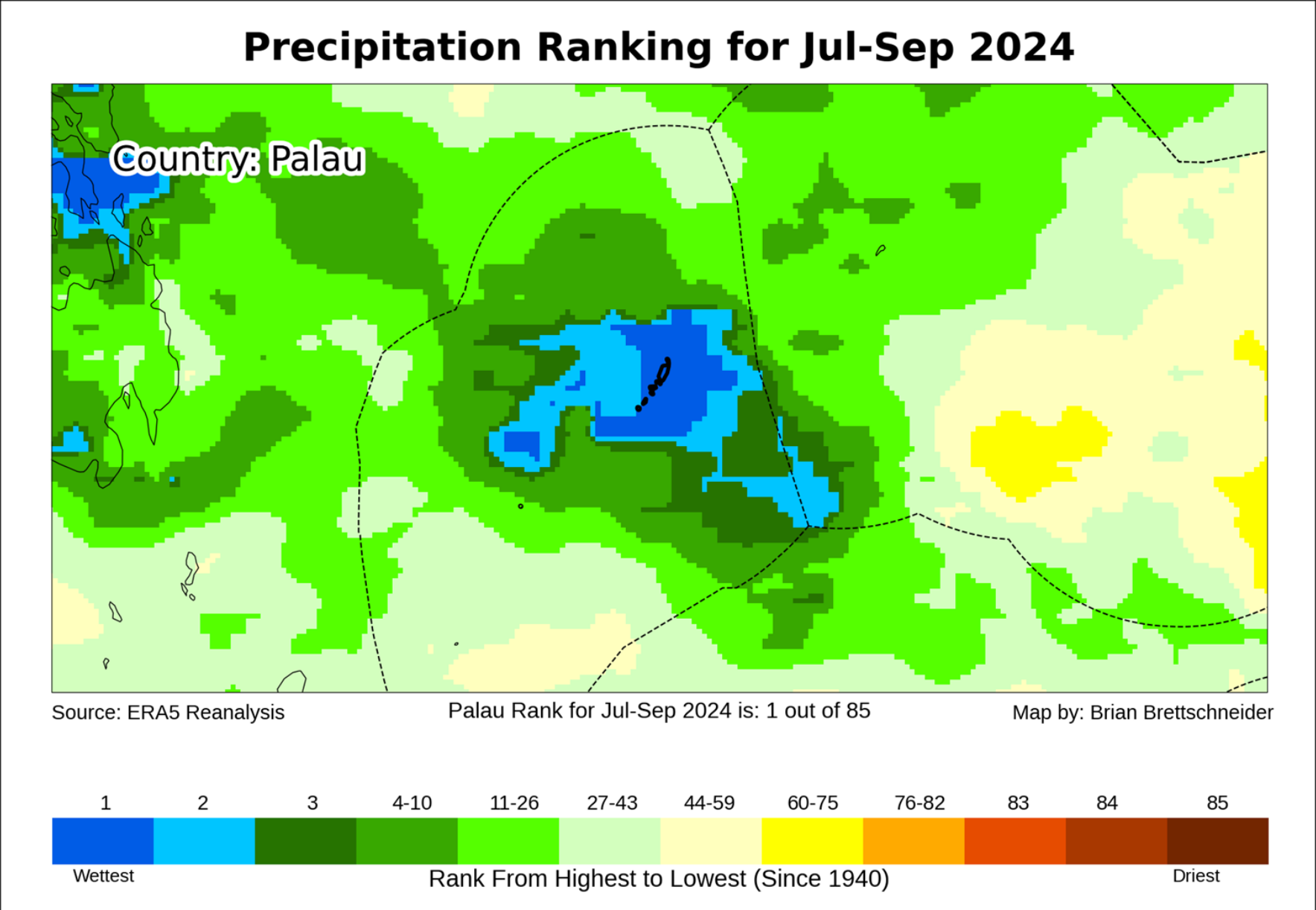
Who's been wet and who's been dry?



Quick look @ Palau: Reanalysis/MSWEP vs obs



http://access-s.clide.cloud/files/project/EAR_watch/palau/



SELECTED PACIFIC ISLANDS STANDARDIZED PRECIPITATION INDEX (SPI) SUMMARY
NATIONAL WEATHER SERVICE HONOLULU HI
DATA THROUGH THE END OF SEP 2024

SPI VALUES BASED ON PROVISIONAL COOPERATIVE OBSERVER AND
TELEMETERED RAINFALL DATA FROM SELECTED PACIFIC ISLANDS.

STATION	1-MO	2-MO	3-MO
WSO CHUUK	0.98	0.21	0.38
WFO GUAM	1.90	1.35	0.78
WSO PALAU	0.60	-0.51	-0.20
WSO MAJURO	0.71	-0.22	-0.67

A good reminder of the importance of surface observations to help support/verify/refute what is happening at the ground/local level



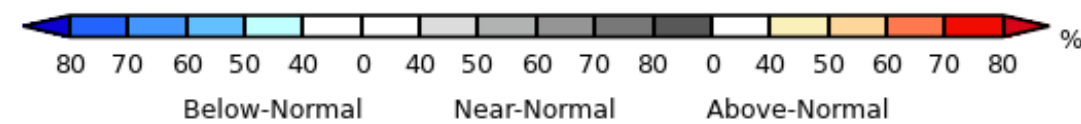
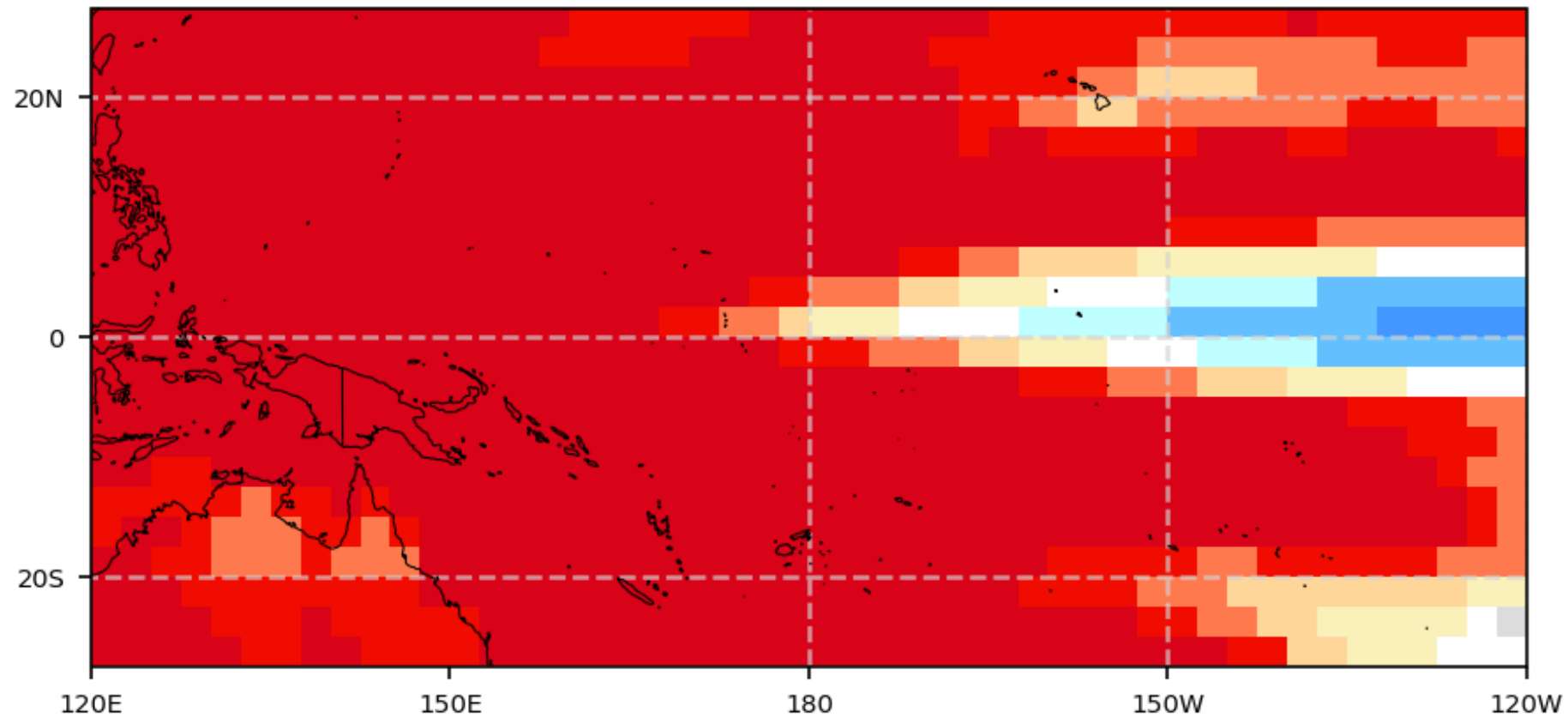
Temperature outlook vs observations

Probabilistic Multi-Model Ensemble Forecast

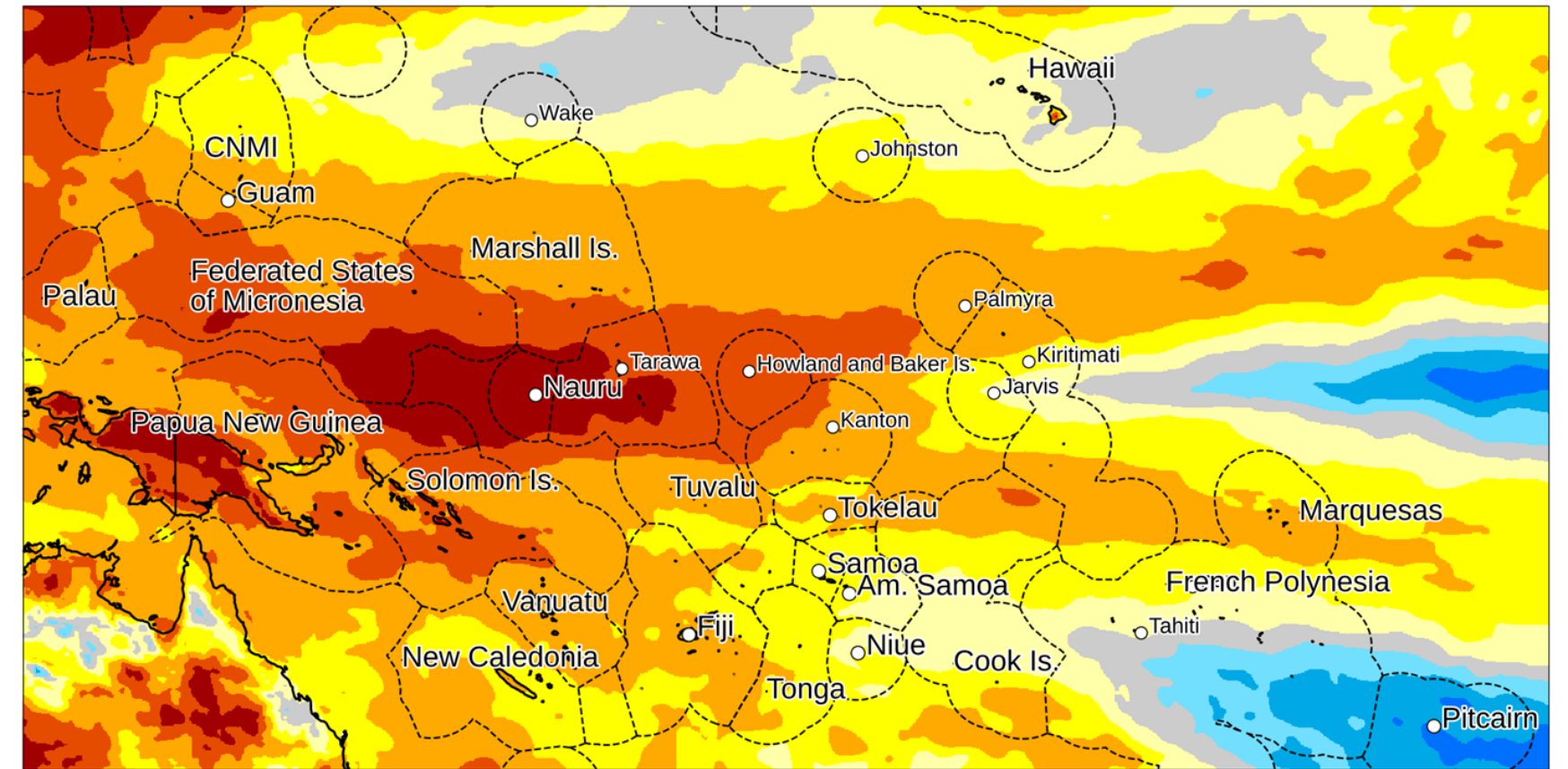
Beijing, CMCC, CPTEC, ECMWF, Exeter, Melbourne, Montreal, Offenbach, Seoul, Tokyo, Toulouse, Washington

2m Temperature : MJJAS2024

(issued on Apr2024)

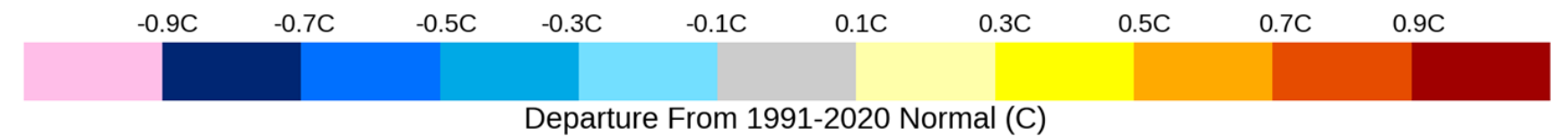


Temperature Departure for May-Sep 2024



Source: ERA5 Reanalysis

Map by: Brian Brettschneider



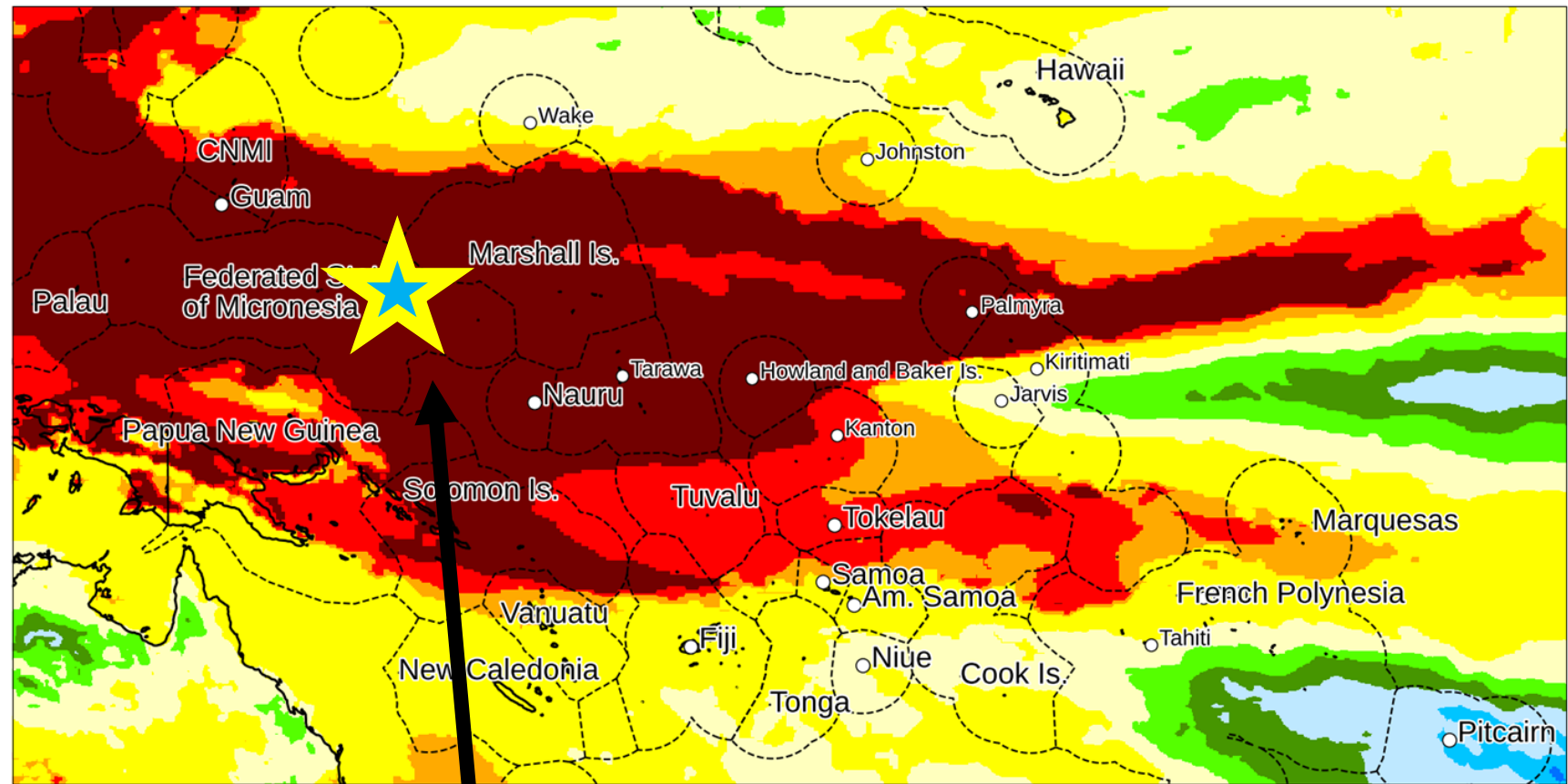
https://wmo.org/seasonPmmeUI/plot_PMME#

<http://data.61n150w.com/ERA5RankMaps.php>



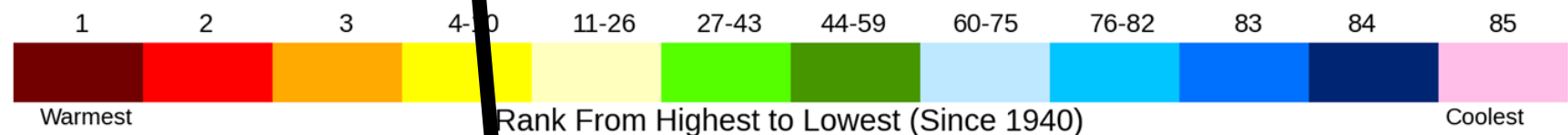
Temperature and dewpoint rankings

Temperature Ranking for May-Sep 2024

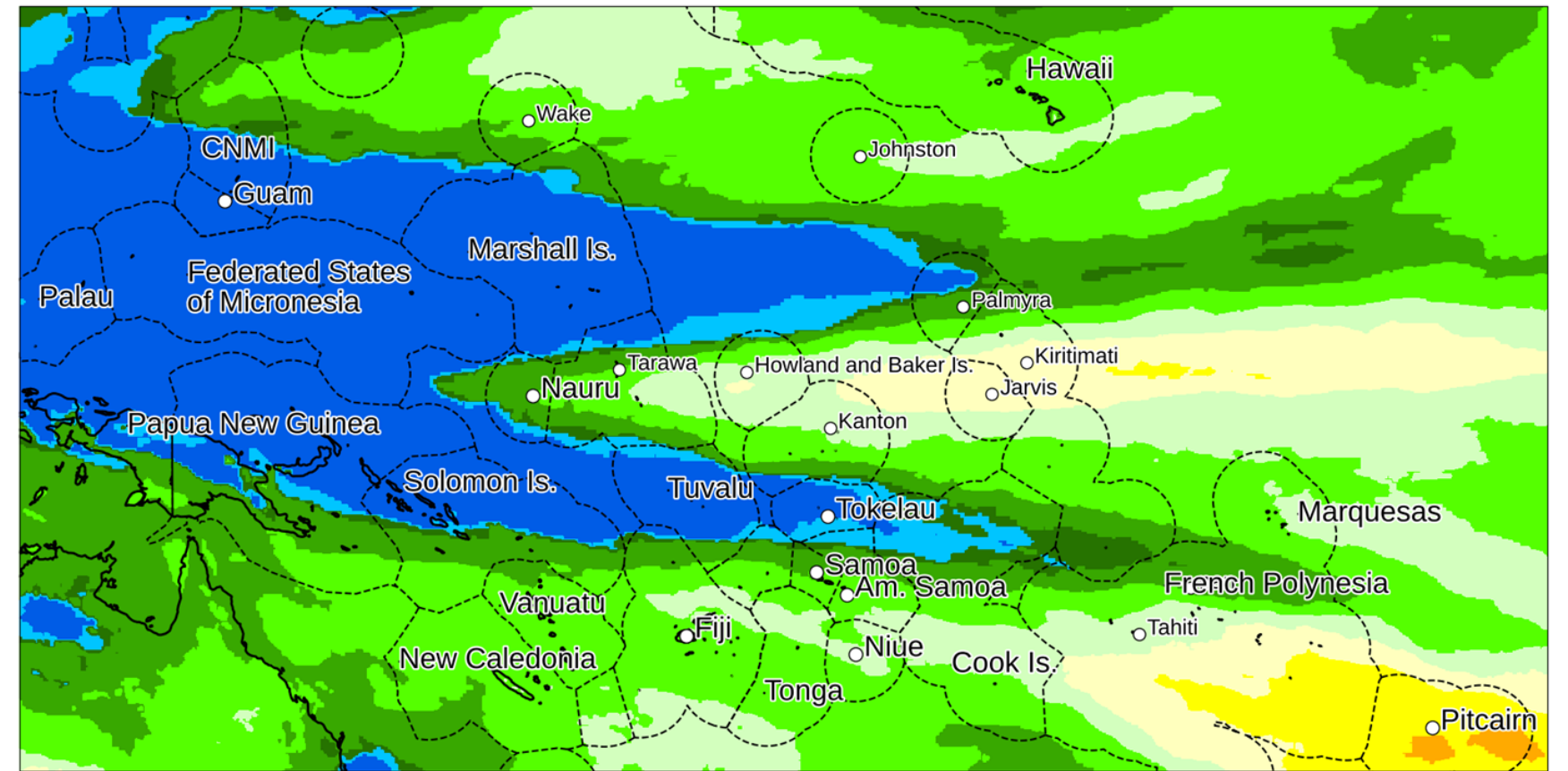


Source: ERA5 Reanalysis

Map by: Brian Brettschneider

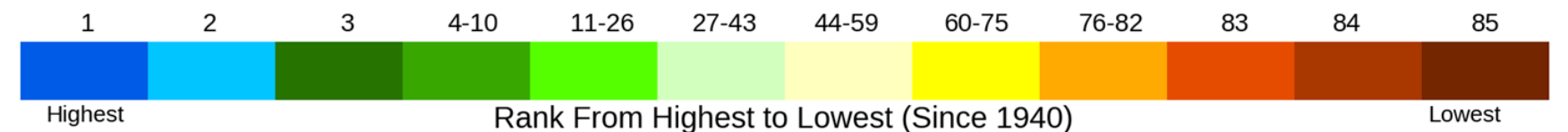


Dew Point Ranking for May-Sep 2024



Source: ERA5 Reanalysis

Map by: Brian Brettschneider



Monthly Mean Avg Temperature for POHNPEI WSO, FM

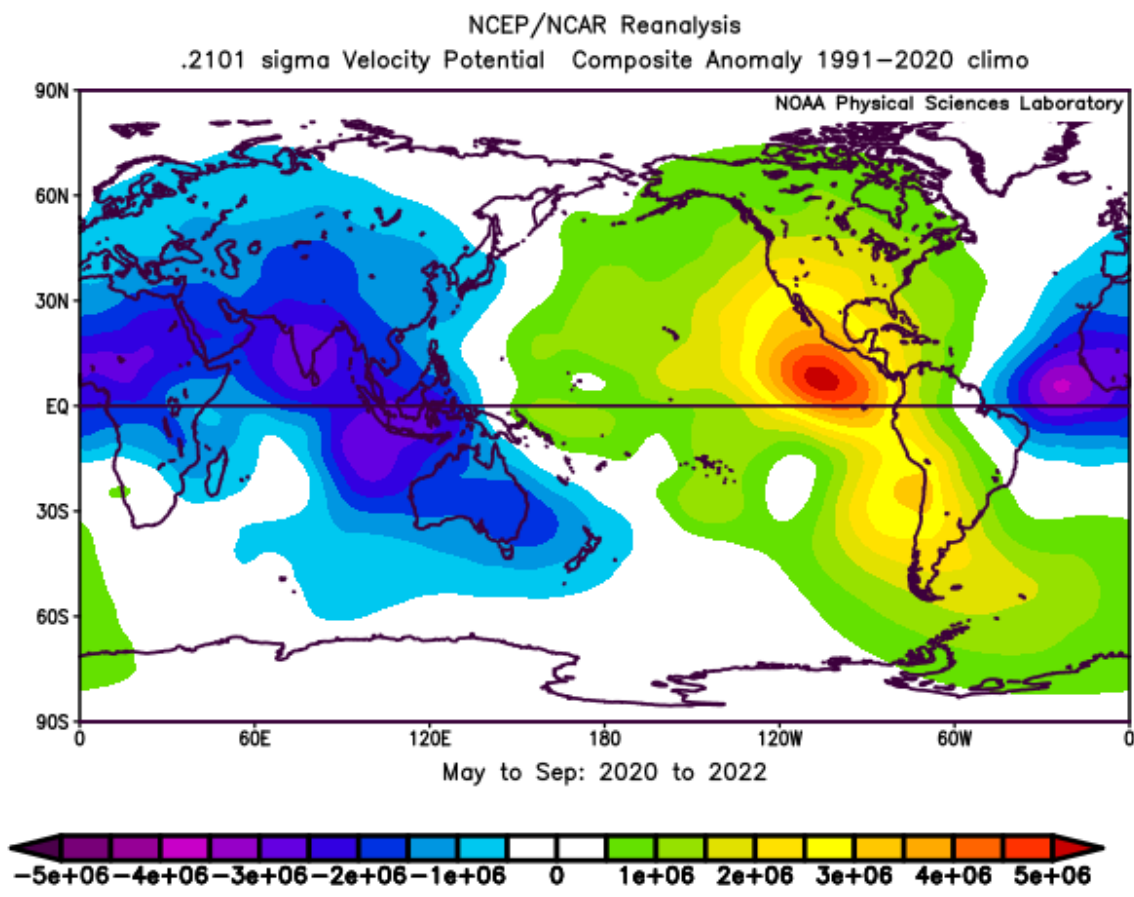
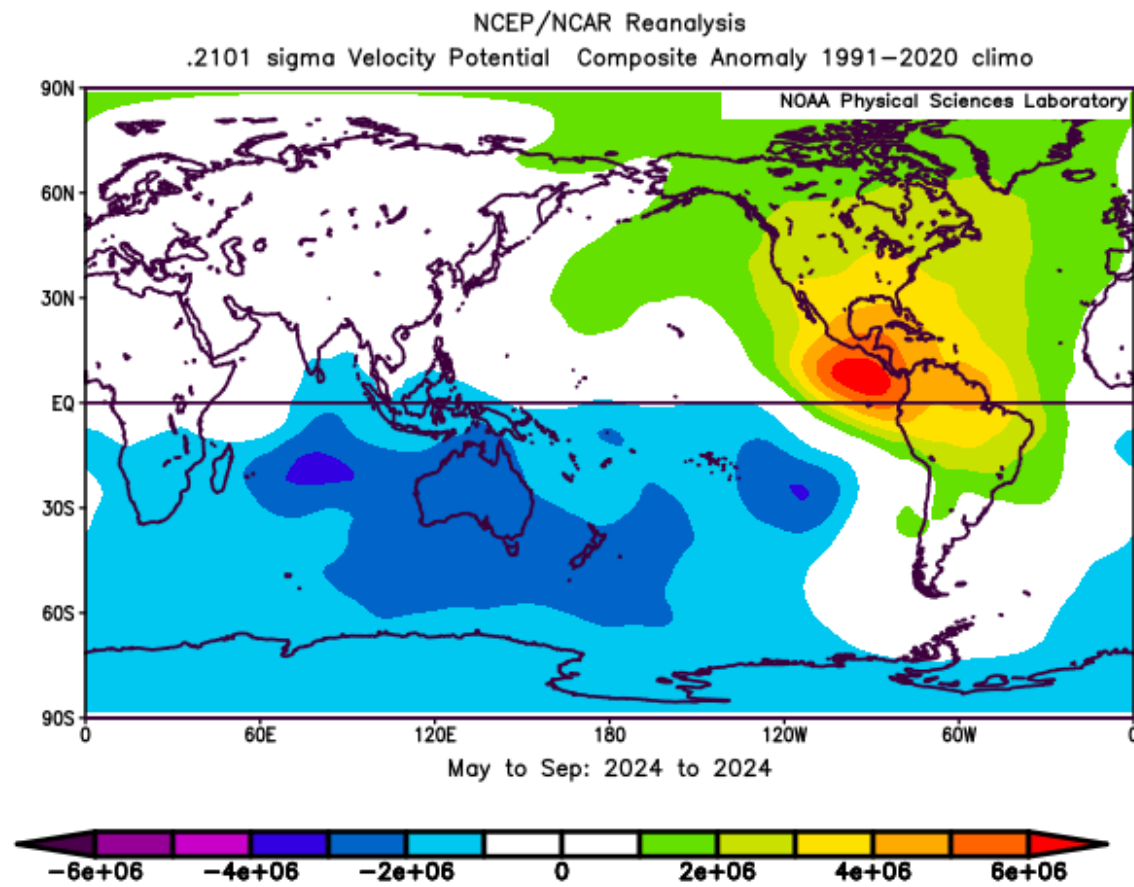
Click column heading to sort ascending, click again to sort descending.

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2024	84.0	83.3	83.4	83.5	83.0	83.1	82.8	83.1	82.8	83.5	M	M	83.3
2023	82.5	82.5	82.8	82.0	82.7	82.5	82.9	82.4	82.8	83.0	82.3	83.7	82.7
2022	82.3	82.9	81.7	81.6	82.0	81.9	81.7	81.8	81.7	81.6	82.8	83.3	82.1
2021	82.0	82.6	80.7	81.5	81.8	81.5	81.6	81.7	82.3	82.0	81.7	82.2	81.8

<http://data.61n150w.com/ERA5RankMaps.php>

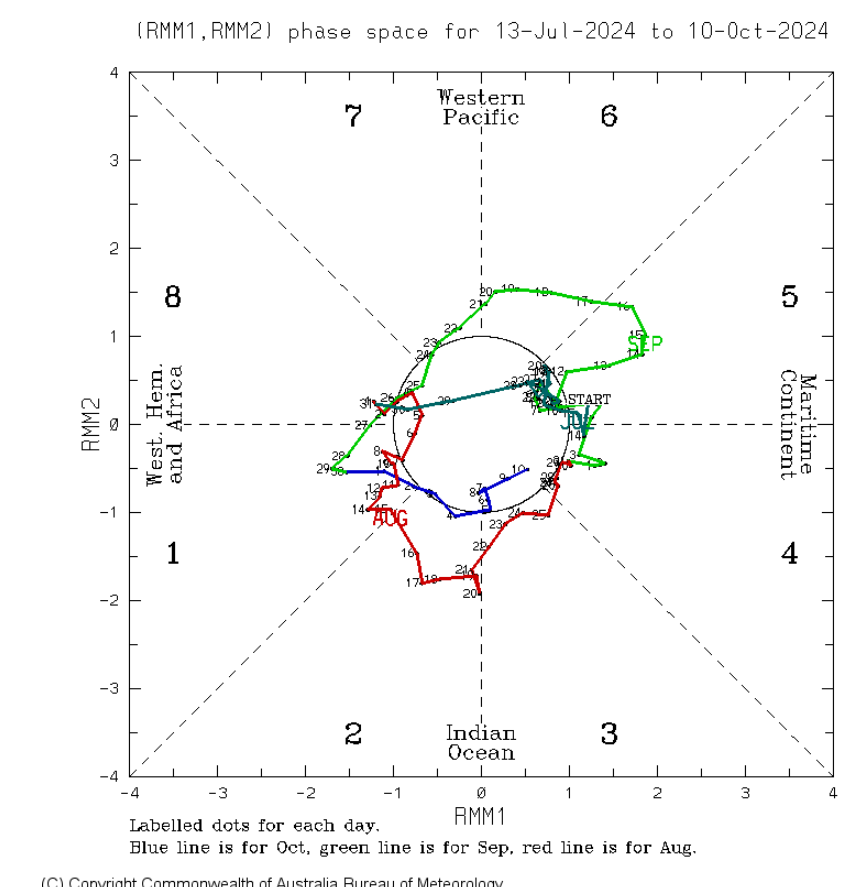
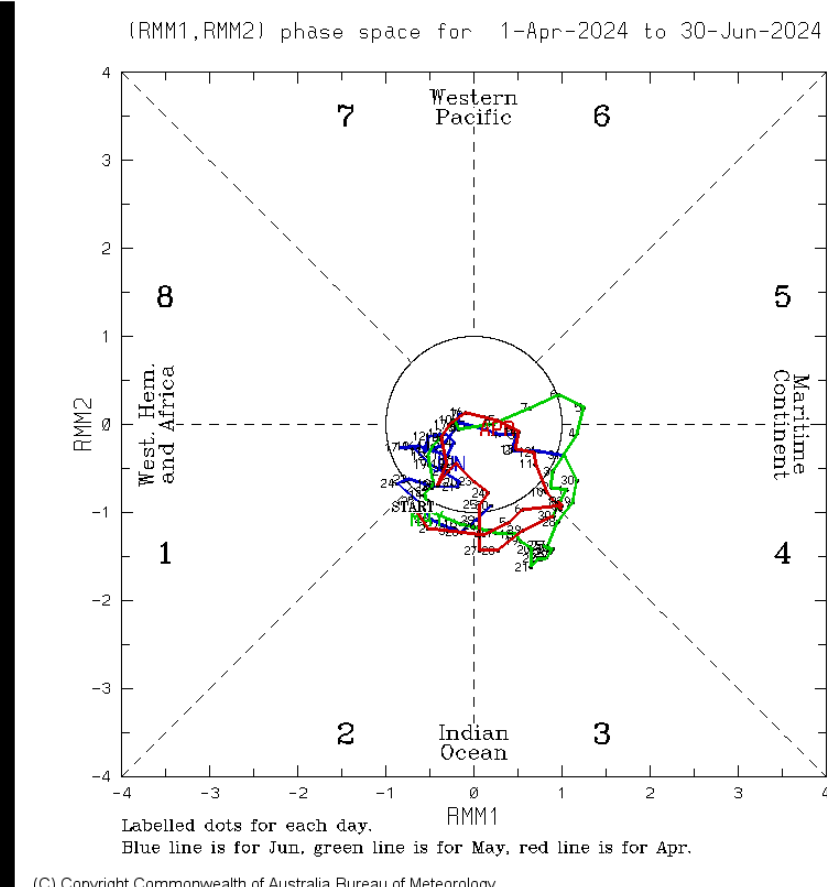
7 of the last 9 months in Pohnpei have experienced record high monthly average temps!

Velocity potential / Madden-Julian Oscillation



VP fields

- 2024 characterized by broad expanse of large-scale rising motion in the Indian and Pacific Ocean
- Some La Niña signal when compared to 3peat La Niña of 2020-2022



MJO

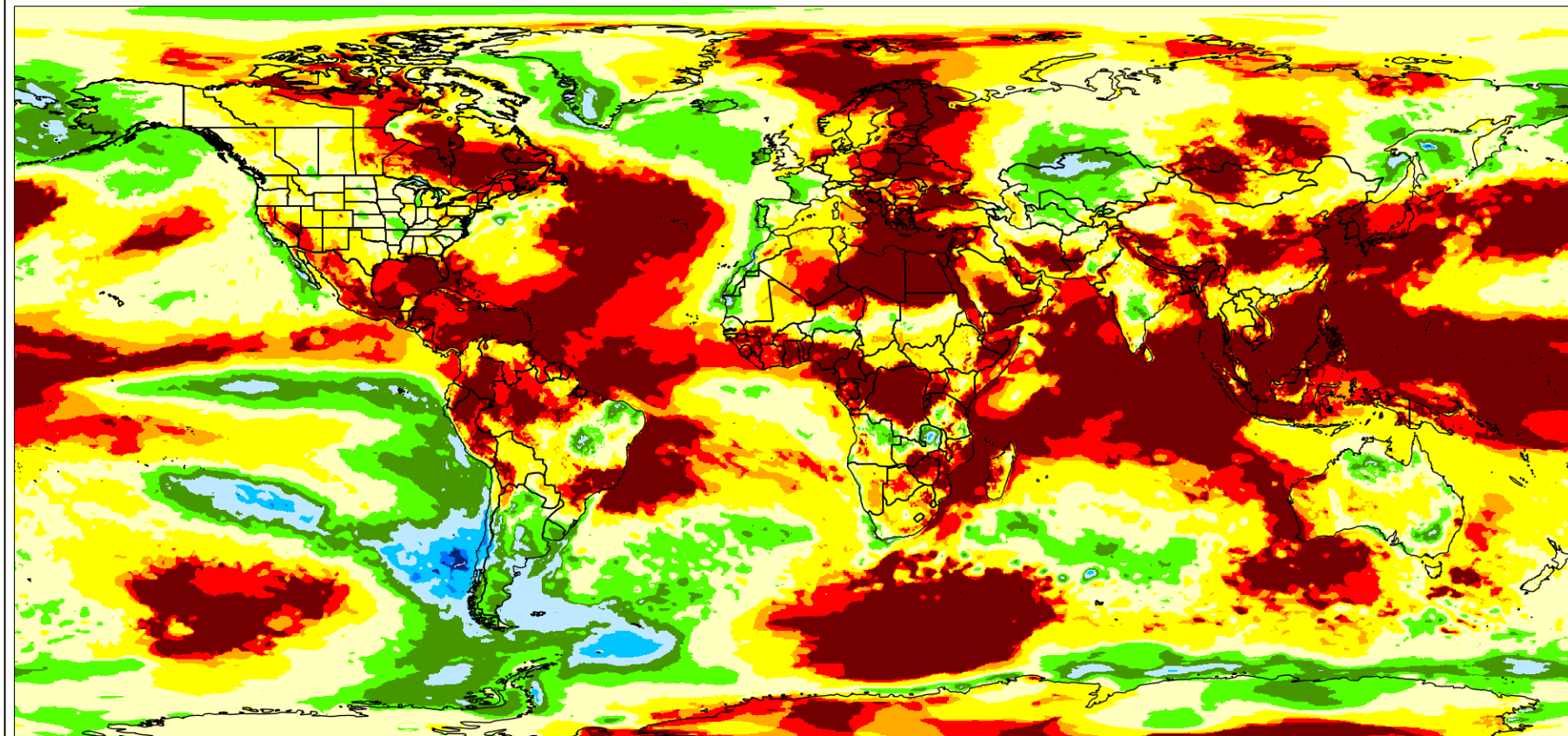
- Apr-Jun: MJO relatively weak with general La Niña-like look
- Jul-Sep: More amplified look with competing signals to support transition to La Niña

<https://psl.noaa.gov/cgi-bin/data/composites/printpage.pl>



Key Messages / Take home points

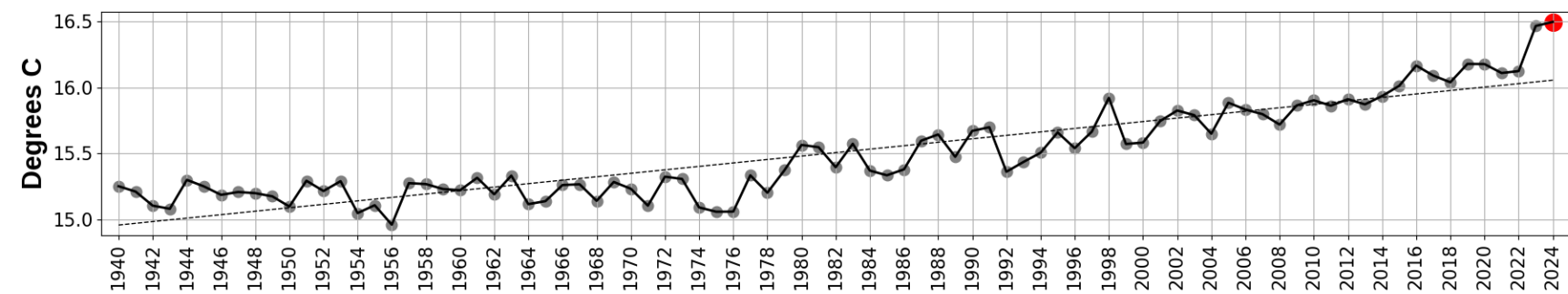
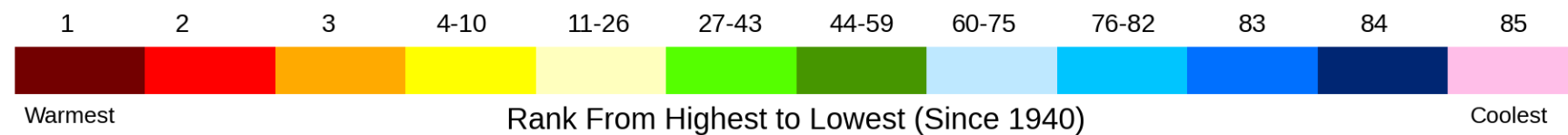
Temperature Ranking for May-Sep 2024



Source: ERA5 Reanalysis

Global Rank for May-Sep 2024 is: 1 out of 85

Map by: Brian Brettschneider



Recap of May thru October

- Overall, atmospheric predictions from PICO-14 were good
- Winds and pressure fields highlight a weak/“messy” transition towards La Niña
 - possibly related to lingering El Niño patterns and residual expanse of overall warmth
- On the ground observations critical to supporting or reducing confidence in regional maps and answering the question “does the data make sense?!?”



THANK YOU!

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