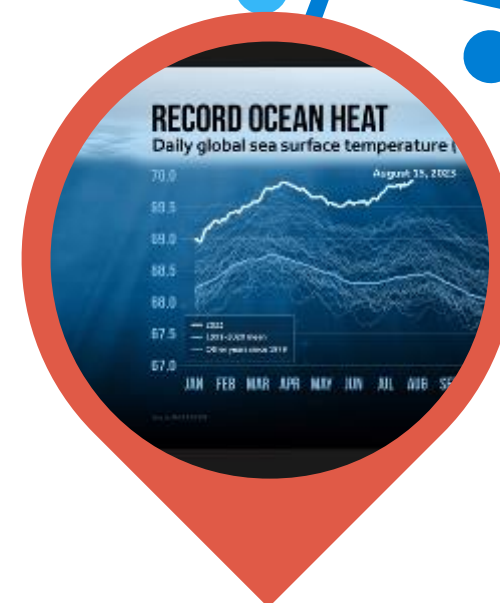
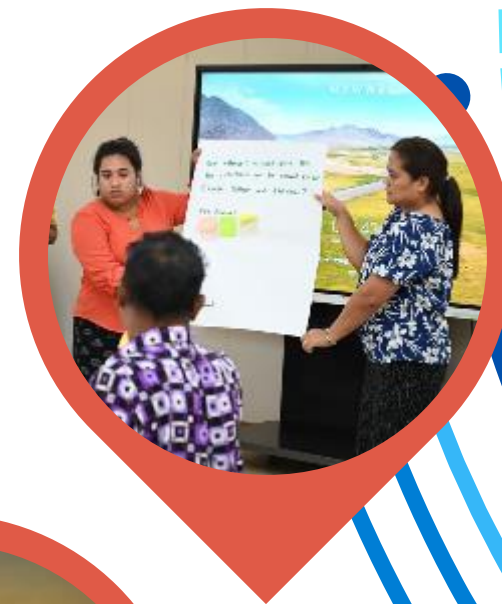


16TH SESSION OF THE PACIFIC ISLANDS CLIMATE OUTLOOK FORUM

PICOF-16

23 APRIL, 2025

ONLINE: ZOOM



Agenda 4iii: Looking Forward

Tropical Cyclones: Monthly/Seasonal Outlooks for April 2025 to October 2025 (and 2024 Summary)

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SPREP
Secretariat of the Pacific Regional
Environment Programme



Pacific Community
Communauté
du Pacifique



COSPPac
Climate and Disaster Preparedness
Programme



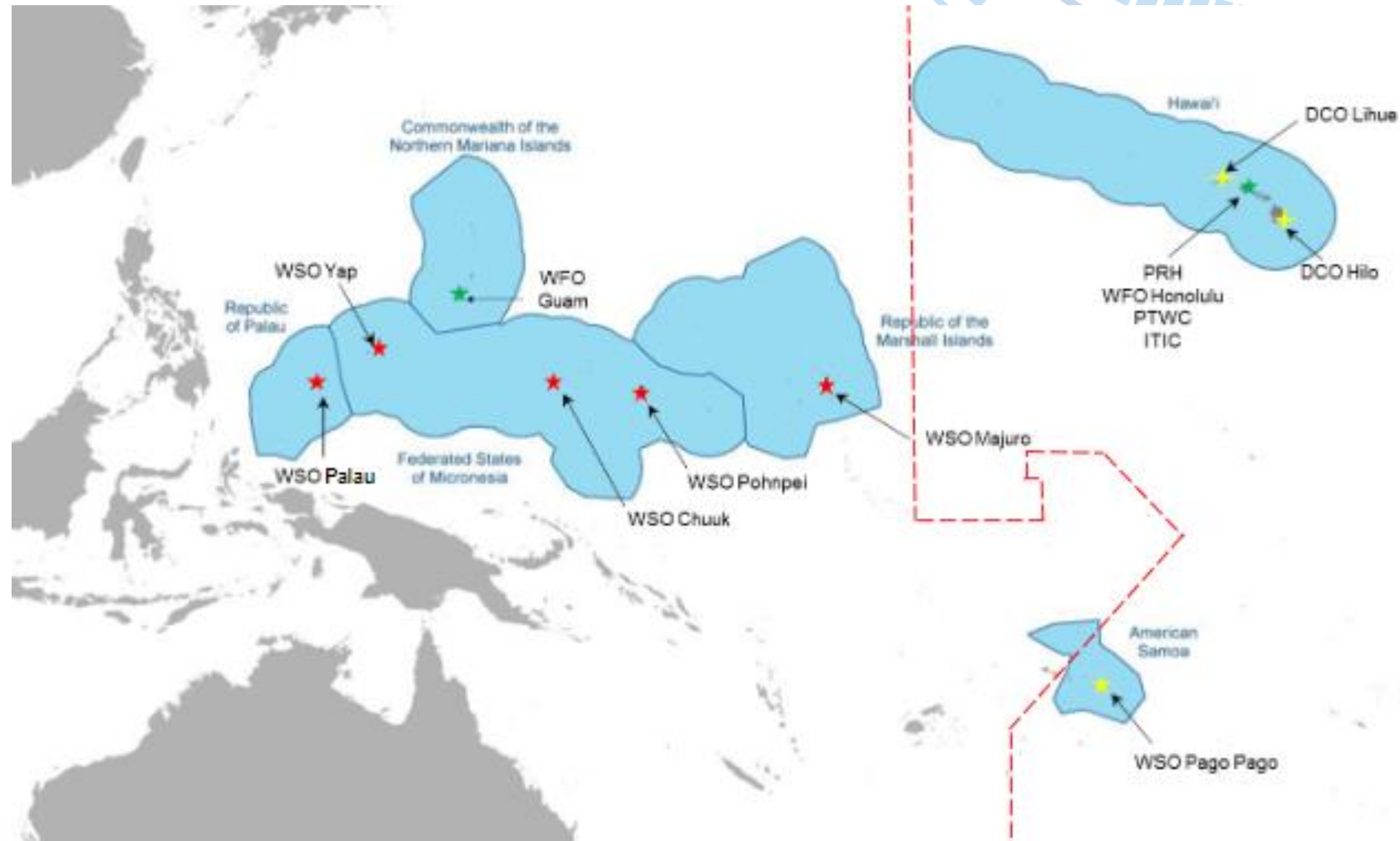
NIWA
Taihoro Nukurangi



Outline

- WFO Guam and NWS Pacific Region
- Typical TC Genesis Zones during ENSO phases
- Quick summary of the 2024 Western North Pacific (WNP) and Central North Pacific (CNP) TC Seasons
- ***Unofficial 2025 WNP and CNP Outlook**
 - ***Official** outlooks May 15 (CNP) and May 22 (WNP)

Map of the U.S. National Weather Service (NWS) Pacific Region and the Weather Forecast Office (WFO) Guam Area of Responsibility



PACIFIC REGIONAL
CLIMATE CENTRE NETWORK



SPREP
Secretariat of the Pacific Regional
Environment Programme



Pacific Community
Communauté
du Pacifique



COSPPac



NIWA
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Summary of 2024 WNP TC Season

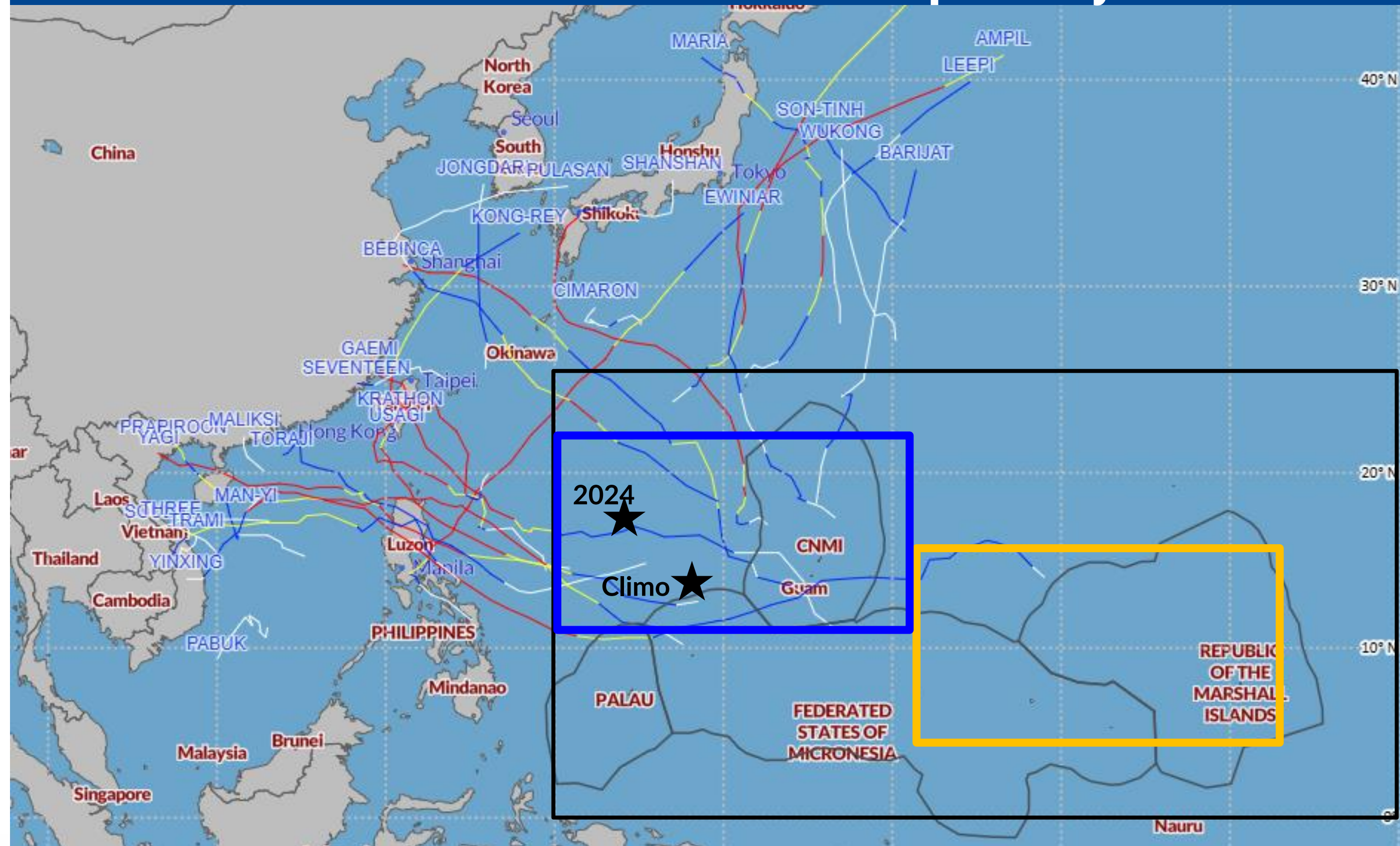
- El Niño fades to ENSO neutral, with La Niña-like pattern as early as Sep 2024

Year	DJF	JFM	FMA	MAM	AMJ	MJJ	JJA	JAS	ASO	SON	OND	NDJ
2020	0.5	0.5	0.4	0.2	-0.1	-0.3	-0.4	-0.6	-0.9	-1.2	-1.3	-1.2
2021	-1.0	-0.9	-0.8	-0.7	-0.5	-0.4	-0.4	-0.5	-0.7	-0.8	-1.0	-1.0
2022	-1.0	-0.9	-1.0	-1.1	-1.0	-0.9	-0.8	-0.9	-1.0	-1.0	-0.9	-0.8
2023	-0.7	-0.4	-0.1	0.2	0.5	0.8	1.1	1.3	1.6	1.8	1.9	2.0
2024	1.8	1.5	1.1	0.7	0.4	0.2	0.0	-0.1	-0.2	-0.3	-0.4	-0.5
2025	-0.6	-0.4										

Source: Climate
Prediction Center

- 2024 TC pattern fairly typical for an El Niño transition to La Niña-like year

2024 Western North Pacific Tropical Cyclones



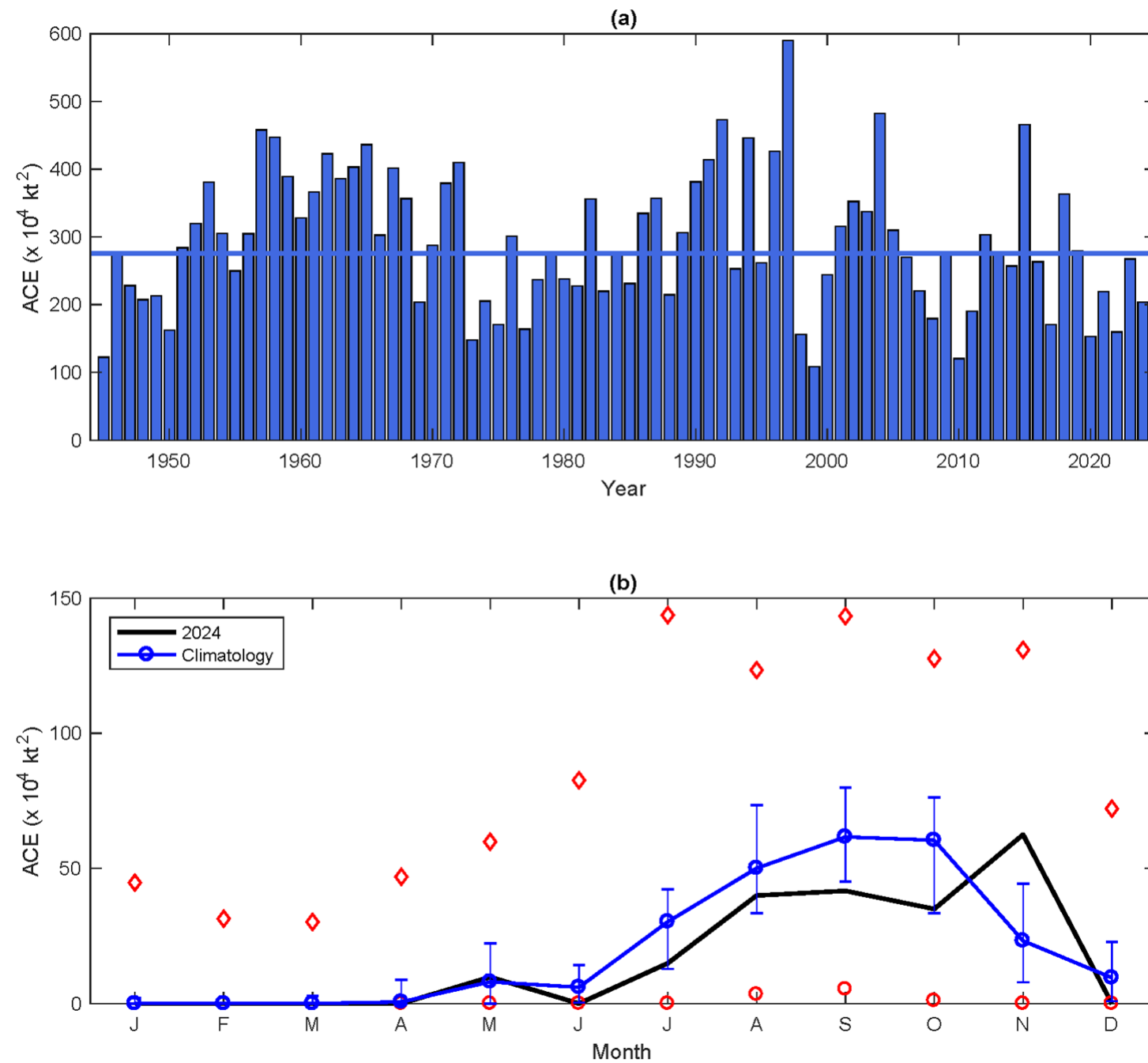
Source: HVX-Hurrevac
(based on JTWC data)

- Lander and Guard
- Chia and Ropelewski 2002
- Camargo and Sobel 2005
- Camargo et al. 2007

★ Typhoon
Genesis Zones

2024 mean vs
climo

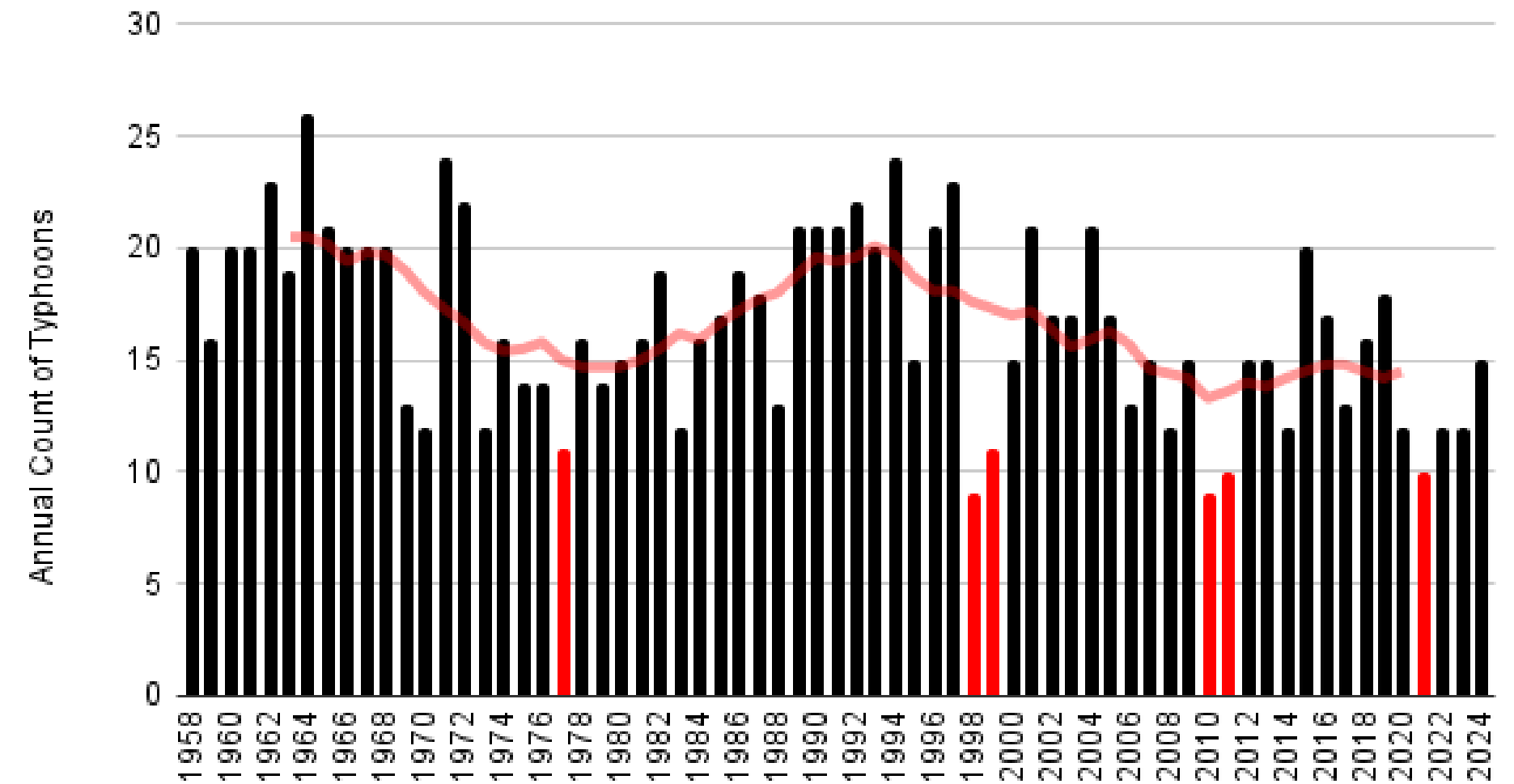
Summary of 2024 WNP TC Season



Source: Camargo (Bulletin of American Meteorological Society: State of the Climate 2024 Tropics Section)

Mean and median # of typhoons: 16

JTWC Annual Count of Typhoons (11 or fewer in red)

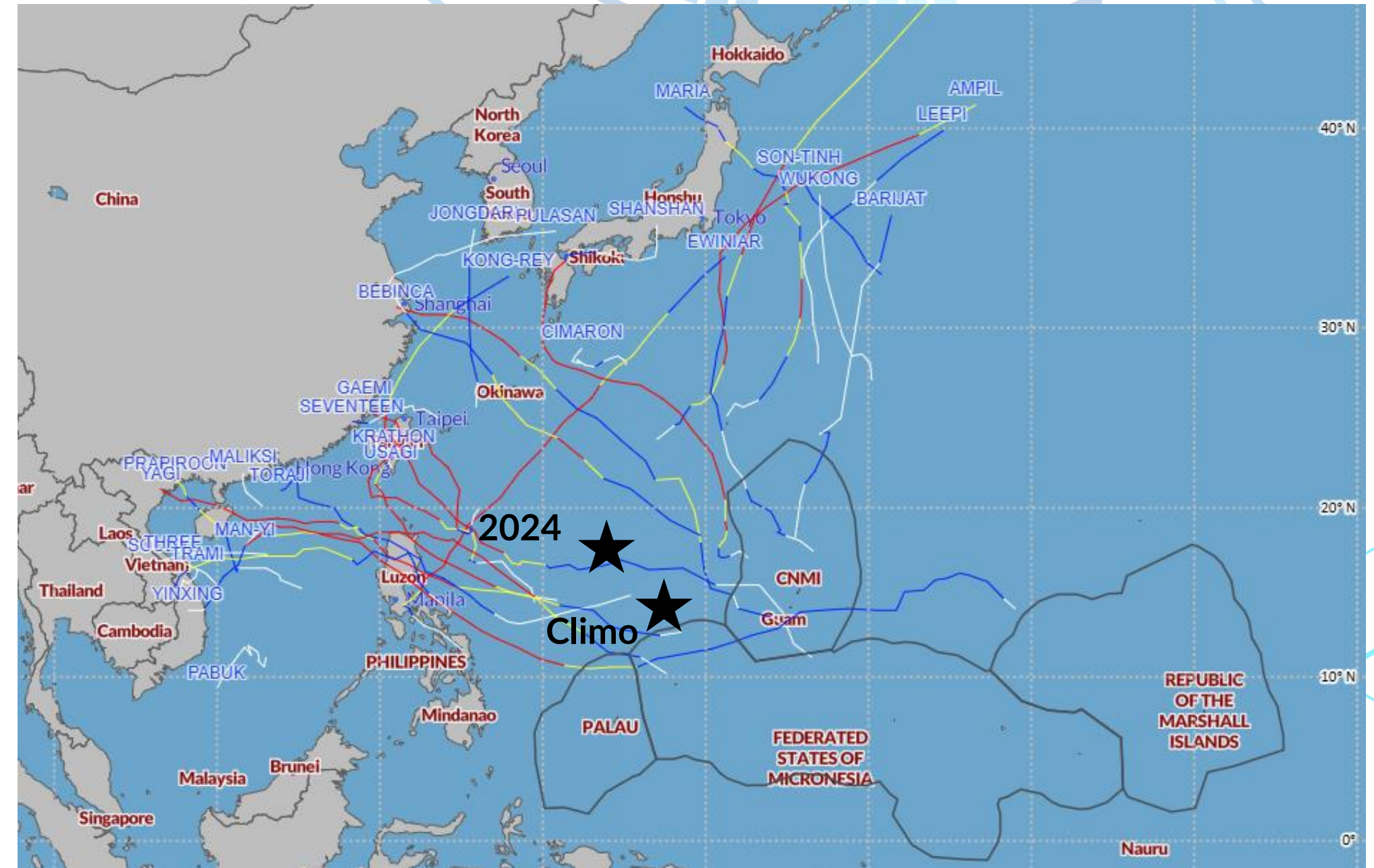


Source: Joint Typhoon Warning Center Best Track Data

Western North Pacific Tropical Cyclones in 2024

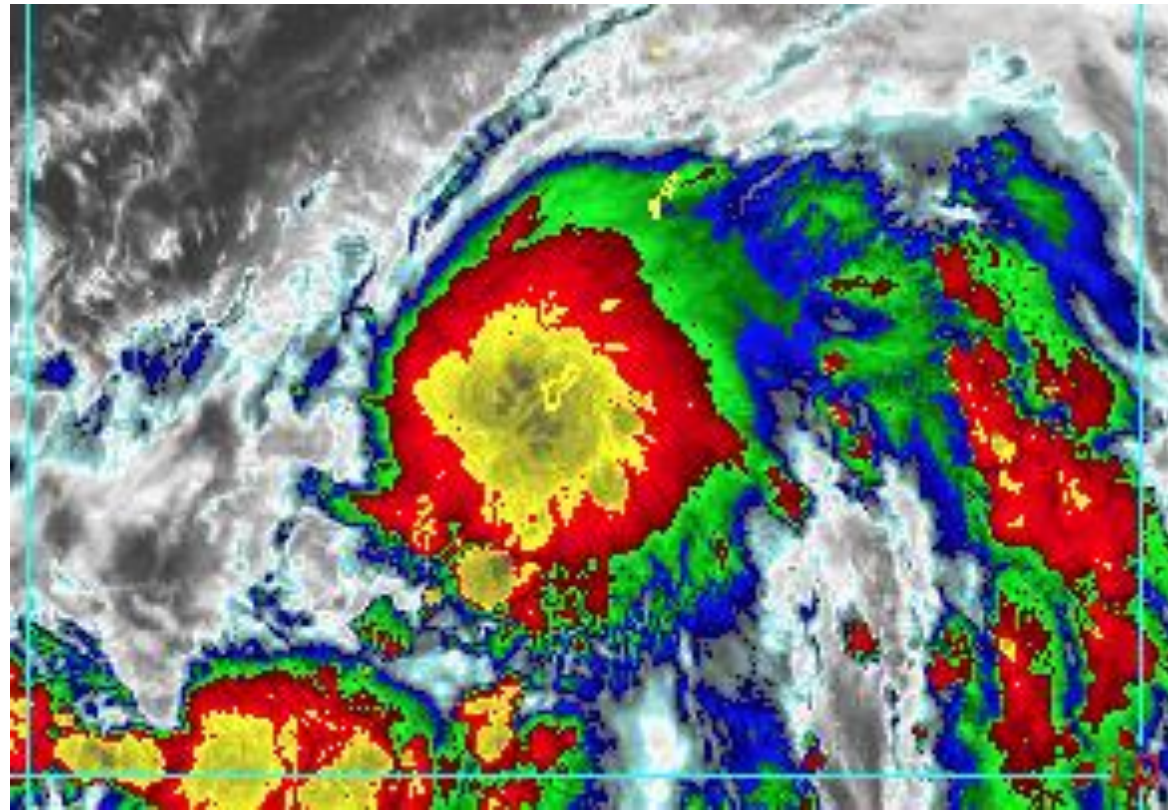
Source: Weather Forecast Office Guam & JTWC

- 24 TCs of tropical storm strength or greater (91% of long-term average 1959-2023)
- 15 Typhoons (90% of long-term average)
- “Nexus” of budding TCs near the Marianas (Bebinca/Jebi/Man-Yi) triggered tropical storm warnings
- Mean typhoon genesis zone ~ 875 km northwest of climo genesis zone (Camargo State of the Climate Report)
- TC metrics consistent with La Niña → northwestward shift of activity, low accumulated cyclone energy (ACE) and reduced impacts for Micronesia islands
- 10 TCs originated near the USAPI in 2024, only 2 with significant impacts

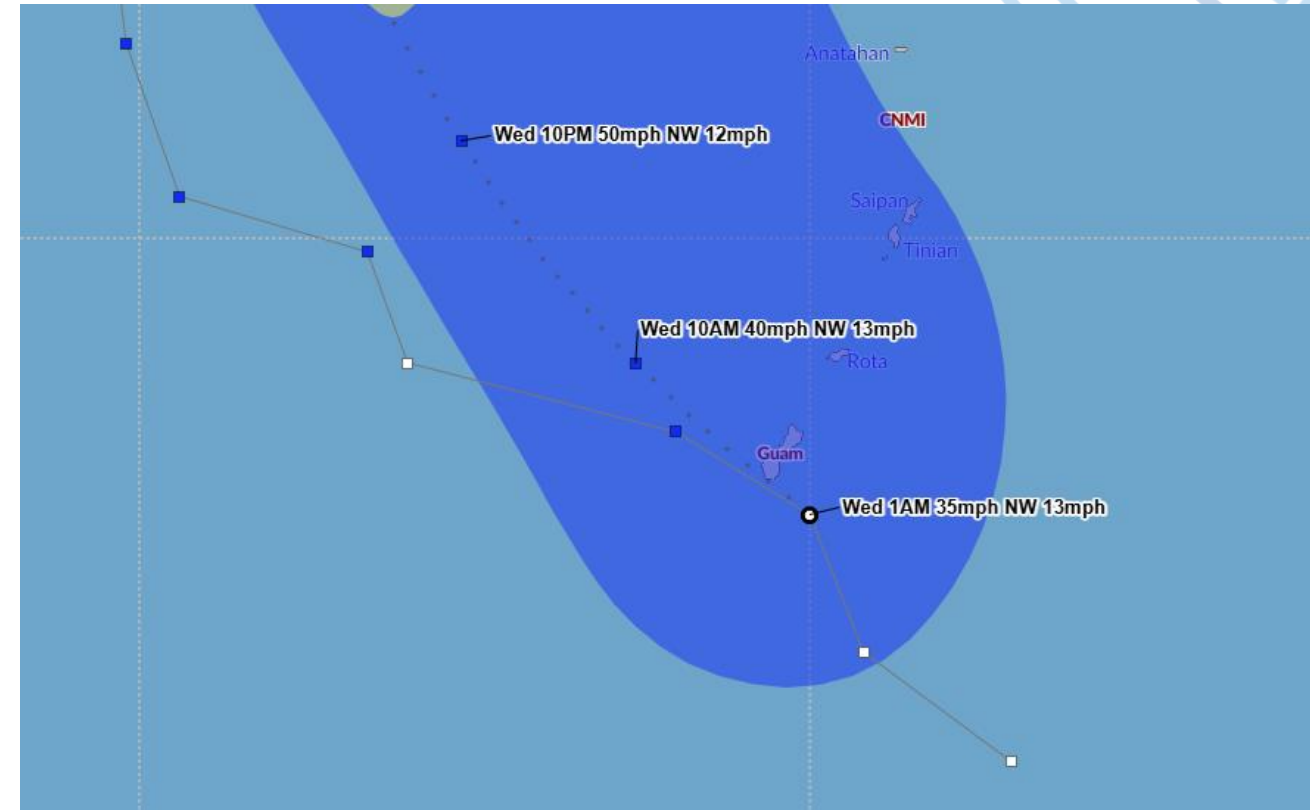


Western North Pacific Tropical Cyclones in 2024

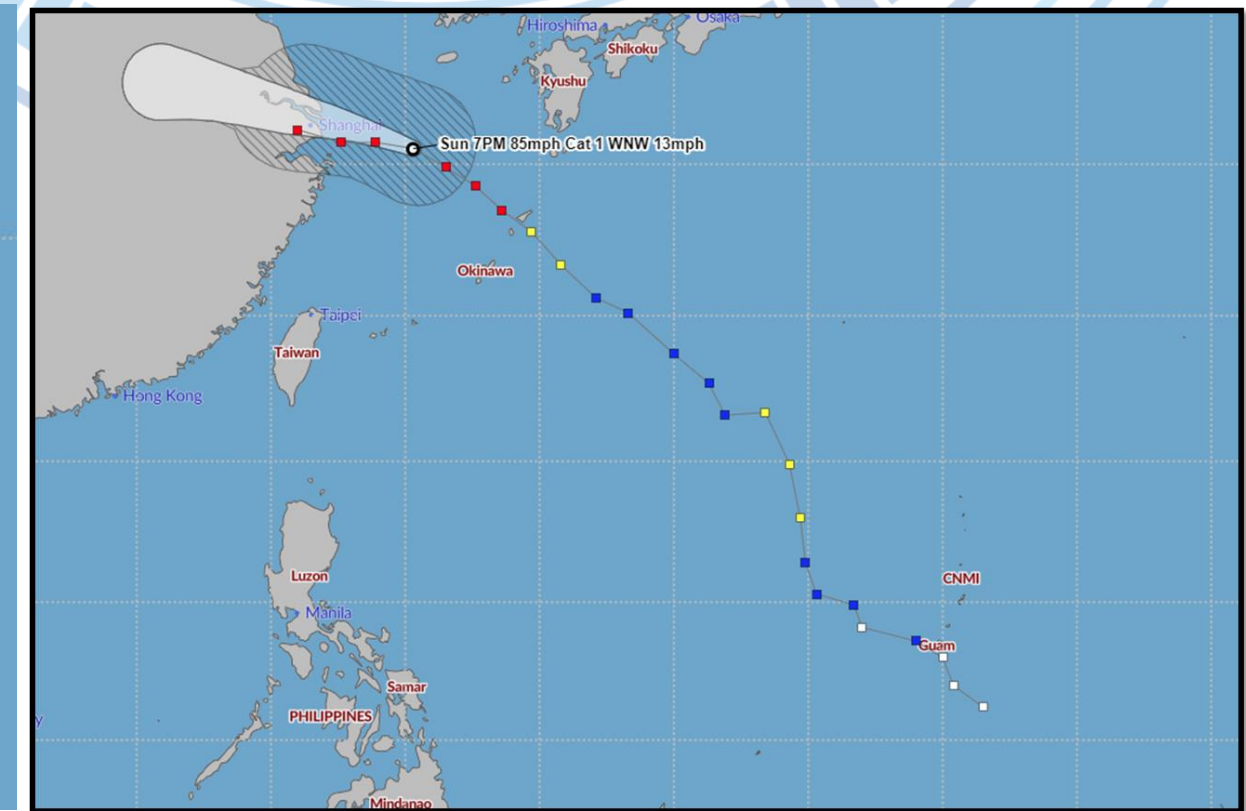
Source: Weather Forecast Office Guam & JTWC



Tropical Depression Bebinca (14W)
2024-09-11 04:00 AM CHST



Tropical Depression Bebinca (14W)
2024-09-11 01:00 AM CHST
NWS Guam Advisory #3

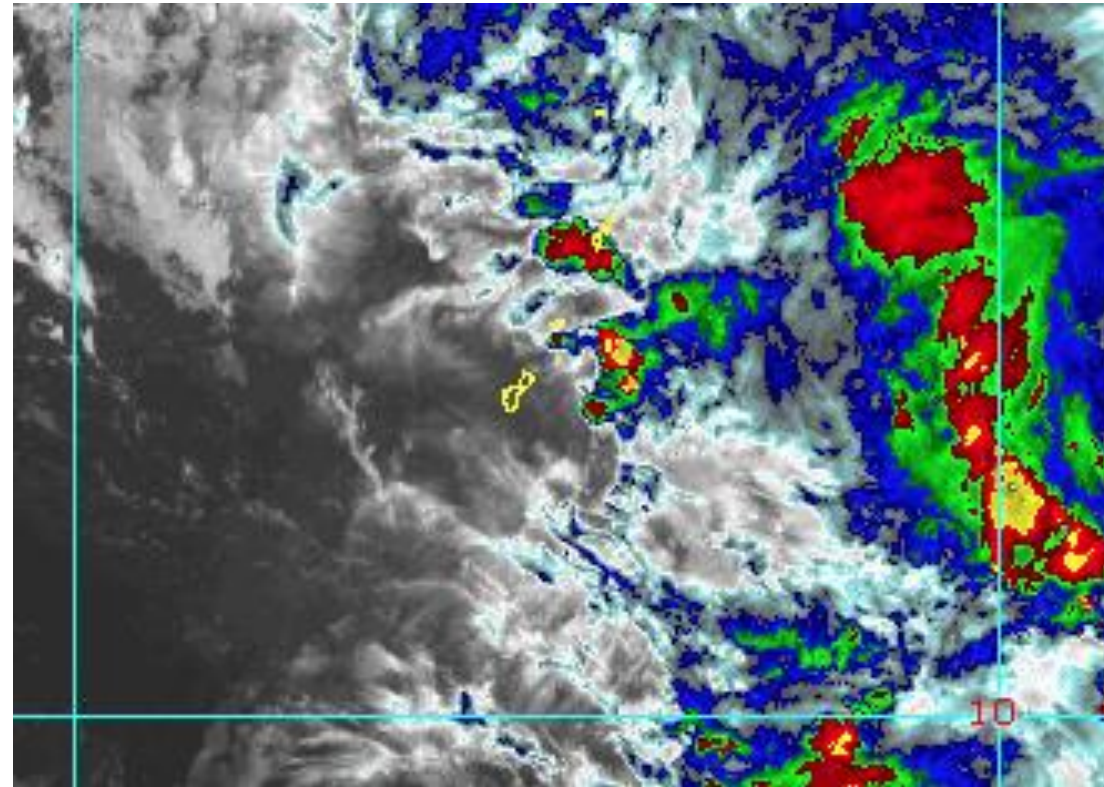


Full Track of Typhoon Bebinca (14W)
Joint Typhoon Warning Center

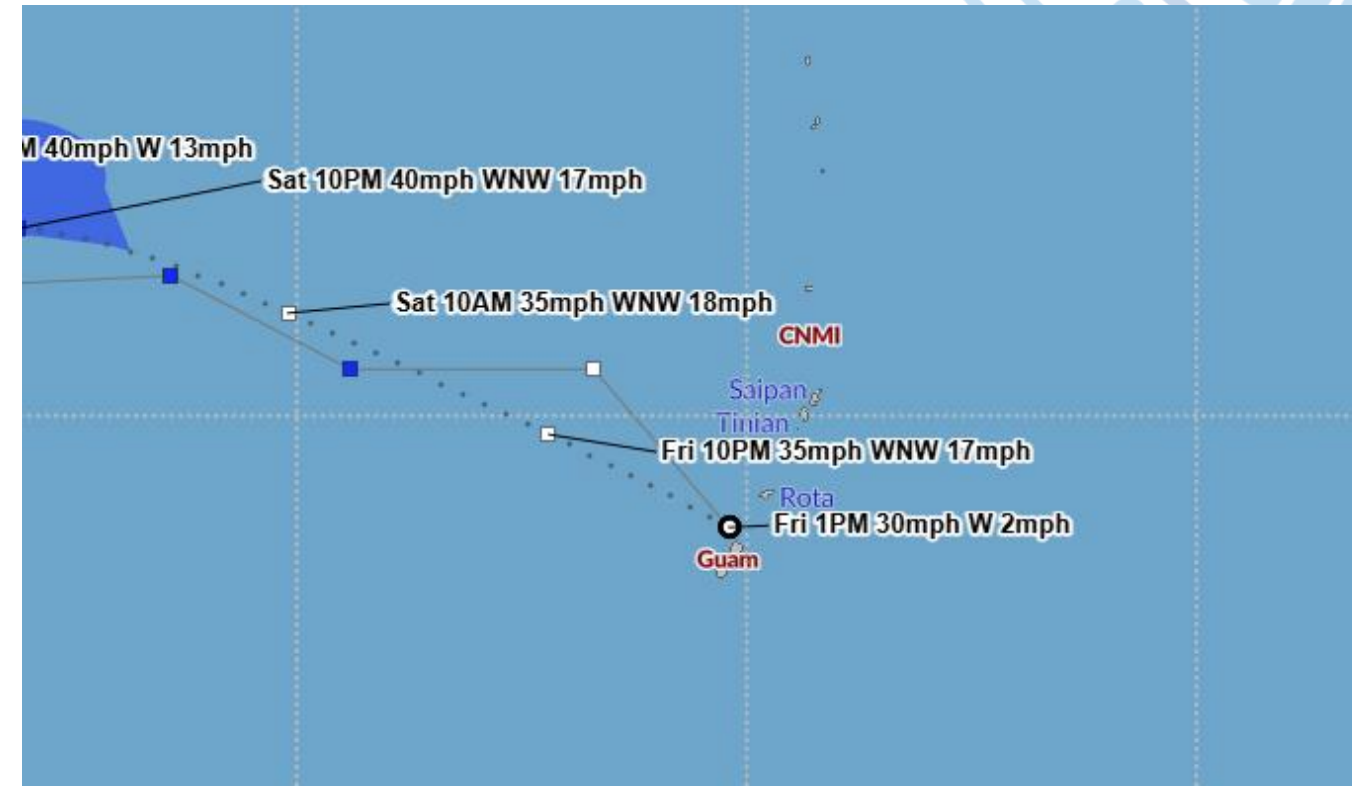
Approached Guam as a strengthening tropical depression; became tropical storm as it passed over Guam
Minimal damage on Guam: banana trees, loose limbs, political/campaign signs, power outages, flash flooding

Western North Pacific Tropical Cyclones in 2024

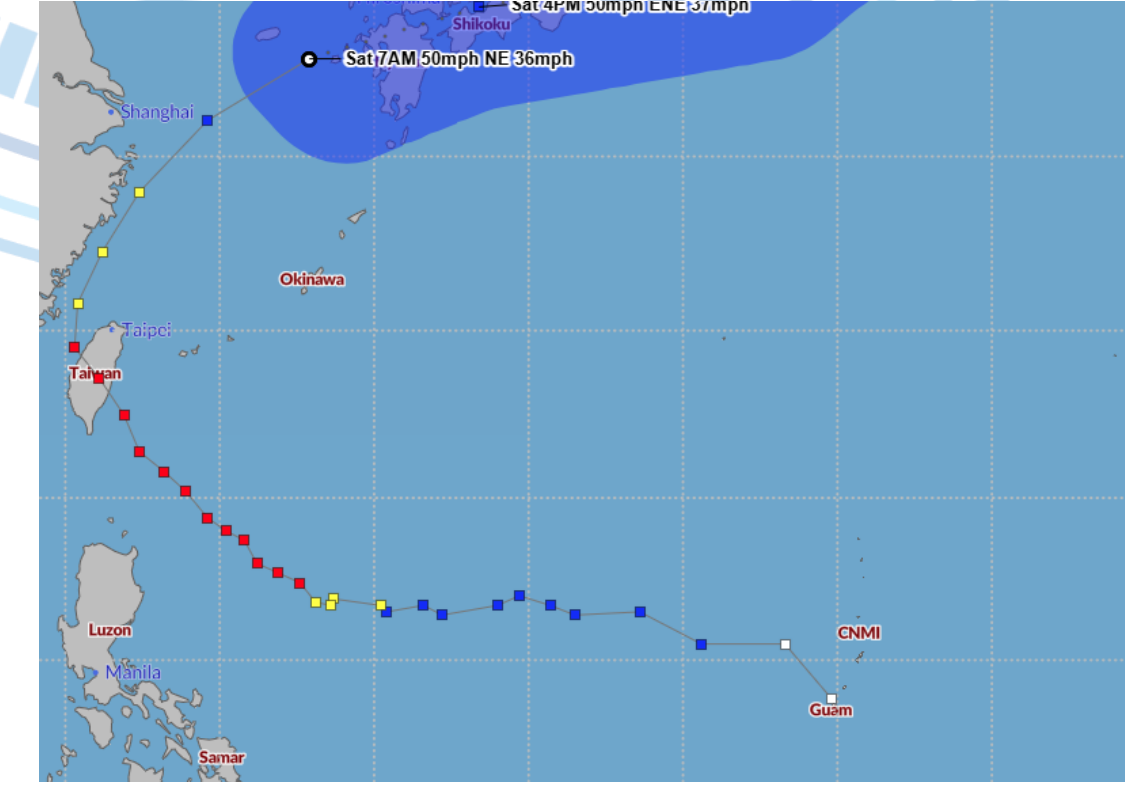
Source: Weather Forecast Office Guam & JTWC



Tropical Depression Kong-rey (23W)
2024-10-25 13:00 PM CHST



Tropical Depression Kong-rey (23W)
2024-10-25 13:00 PM CHST
NWS Guam Advisory #1



Full Track of Typhoon Kong-rey
(23W)
Joint Typhoon Warning Center

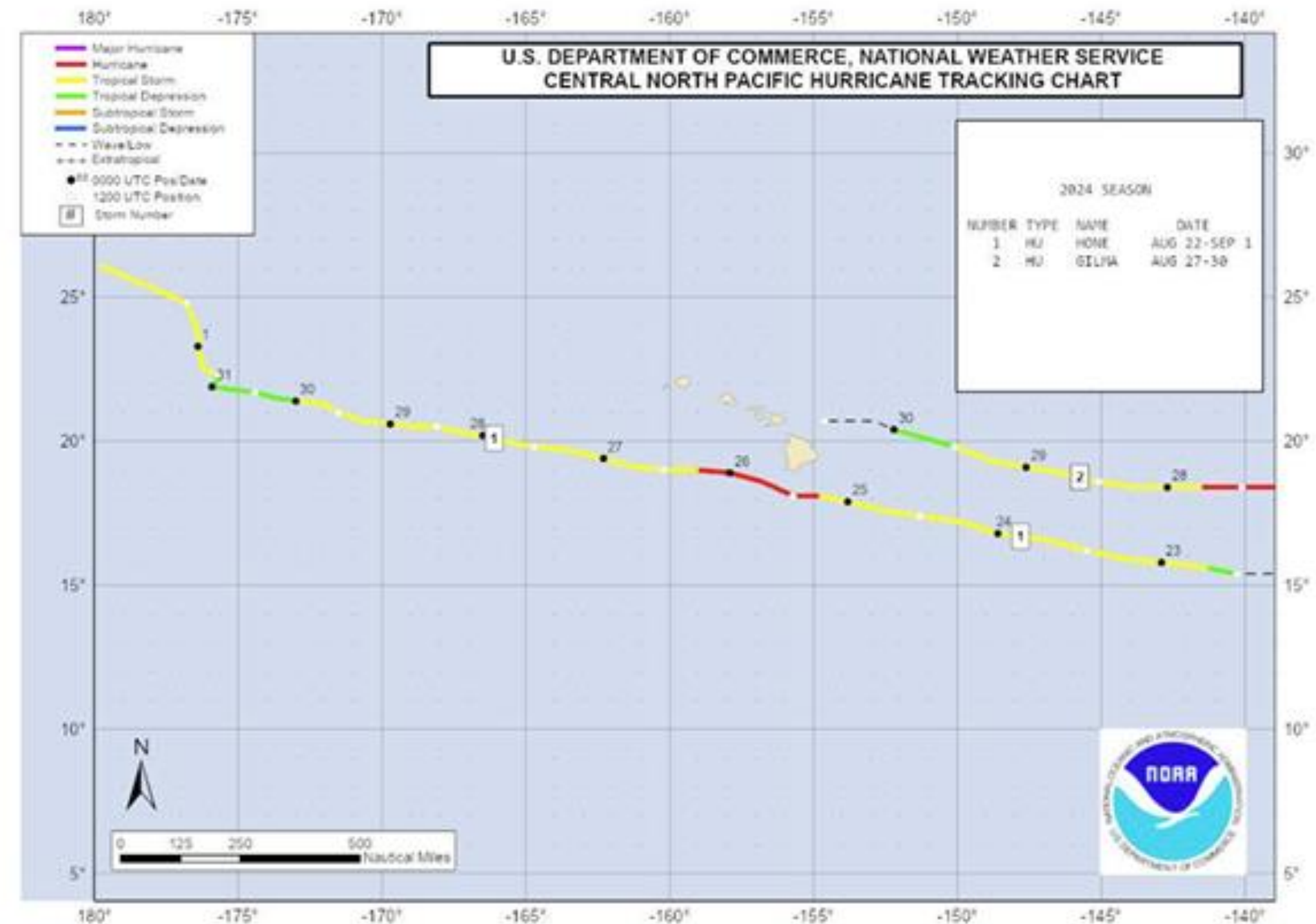
Formed as a cluster of weak LLCCs, becoming Tropical Depression 23W near Guam
Passed very near northern Guam, but most significant impacts extended well away from the center
Wind gusts up to 50 knots in Saipan with significant flooding (300-400 mm in 24 hrs)
4 lives lost at sea in the Chuuk Lagoon due to strong waves and currents

Central North Pacific Tropical Cyclones in 2024

Source: Central Pacific Hurricane Center

- 2 TCs in the CNP basin during 2024 (50% average)
- August 2024 (Hone & Gilma)
 - Hone strengthened as it approached the state, becoming a hurricane south of the Big Island of Hawaii. Hone remained intact to the west of the dateline before dissipating
 - Gilma was a hurricane in the East Pacific and weakened rapidly east of Hawaii

2024 Hurricane Season Tropical Cyclone Track Map (Preliminary):



Where are we now?

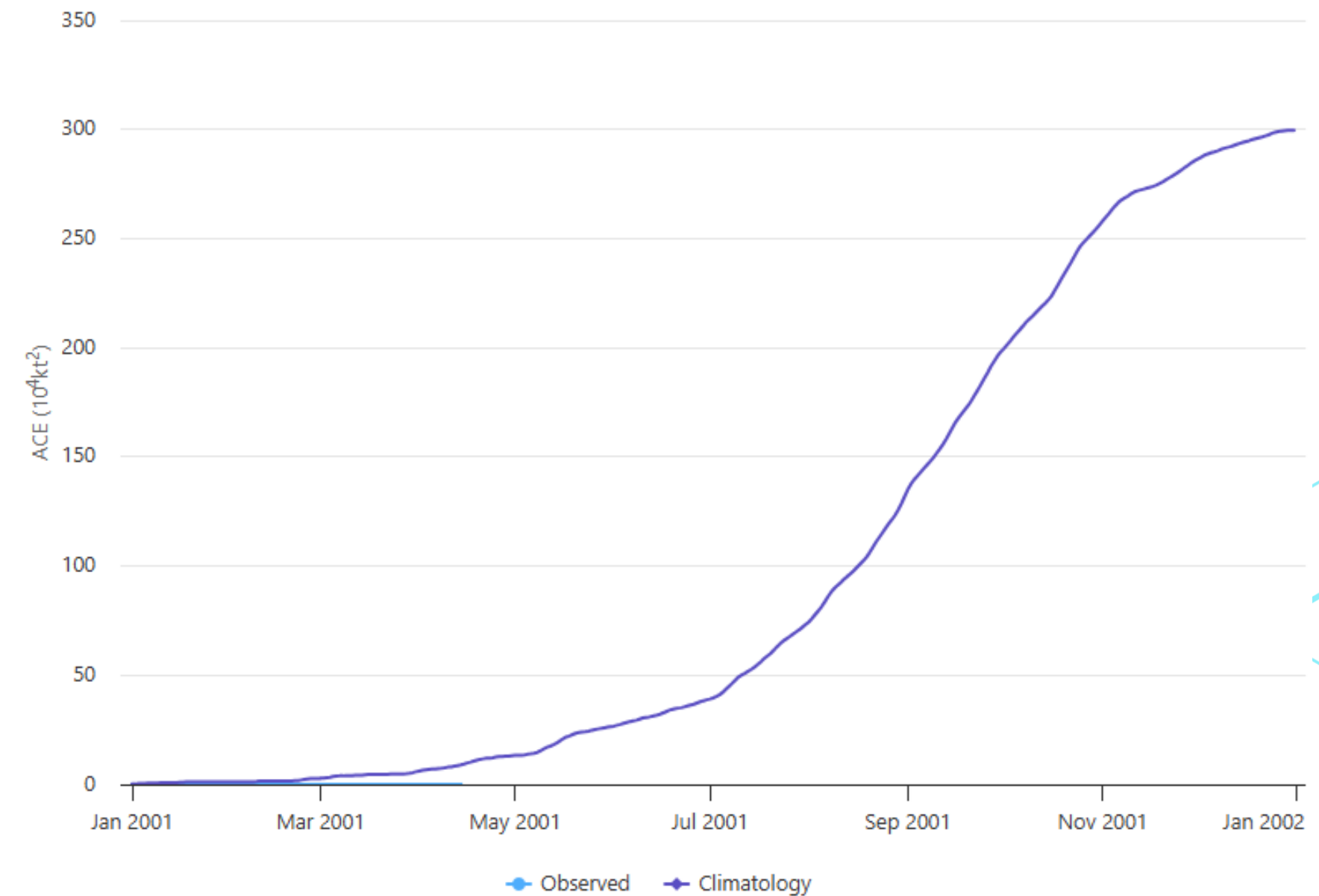
2025 TC Activity so far (1991-2020 climatology in parenthesis)

1991-2020 Climatological Activity Through April 14 in Parentheses

Basin	Named Storms	Named Storm Days	Hurricanes	Hurricane Days	Major Hurricanes	Major Hurricane Days	Accumulated Cyclone Energy
North Atlantic	0 (0.0)	0.00 (0.3)	0 (0.0)	0.00 (0.0)	0 (0.0)	0.00 (0.0)	0 (0.3)
Northeast Pacific (East of 180°)	0 (0.1)	0.00 (0.5)	0 (0.1)	0.00 (0.2)	0 (0.0)	0.00 (0.0)	0 (0.8)
Northwest Pacific (West of 180°)	0 (1.3)	0.00 (5.3)	0 (0.6)	0.00 (1.6)	0 (0.3)	0.00 (0.8)	0 (8.9)
North Indian	0 (0.2)	0.00 (0.4)	0 (0.0)	0.00 (0.0)	0 (0.0)	0.00 (0.0)	0 (0.2)
Northern Hemisphere	0 (1.6)	0.00 (6.5)	0 (0.7)	0.00 (1.8)	0 (0.3)	0.00 (0.8)	0 (10.2)
South Indian (West of 135°E)	21 (14.7)	119.00 (71.4)	12 (8.4)	43.25 (27.6)	9 (4.8)	16.75 (9.5)	209.5 (128.3)
South Pacific (East of 135°E)	8 (8.7)	28.50 (36.0)	3 (4.3)	5.75 (14.0)	1 (2.3)	1.50 (4.6)	36.9 (65.4)
Southern Hemisphere	29 (23.4)	147.50 (107.4)	15 (12.7)	49.00 (41.6)	10 (7.1)	18.25 (14.1)	246.4 (193.7)

Global statistics were last modified: April 14 2025 21:00 MT

Current Season Northwest Pacific Ocean ACE (1991-2020 Climatology)



<https://tropical.atmos.colostate.edu/Realtime/>



Looking Ahead...Rest of 2025



Looking Ahead...rest of 2025...conceptually...

Most favored scenario.... ENSO Neutral or cool side of ENSO neutral favored with ongoing negative Pacific Decadal Oscillation (Negative IPO-like pattern)

*****Caution:** the ongoing spring predictability barrier and recent ENSO flavors (e.g. 2023 El Niño not aligning with “convention” are important to keep in mind)

WNP Basin (Micronesia)

- Average to below average with respect to numbers and threat to islands of Micronesia

Central North Pacific Basin (Hawaii + Surrounding Waters)

- Average year

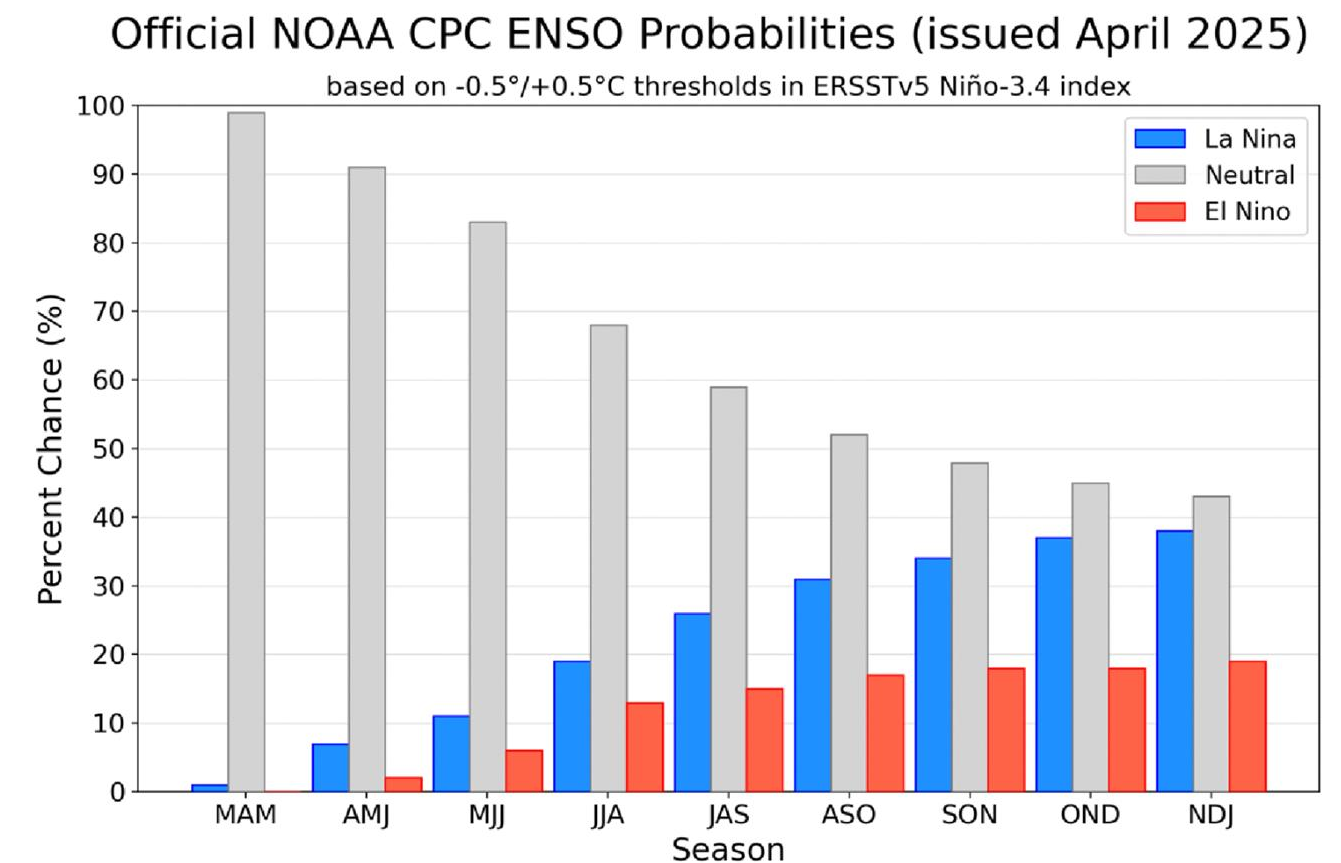


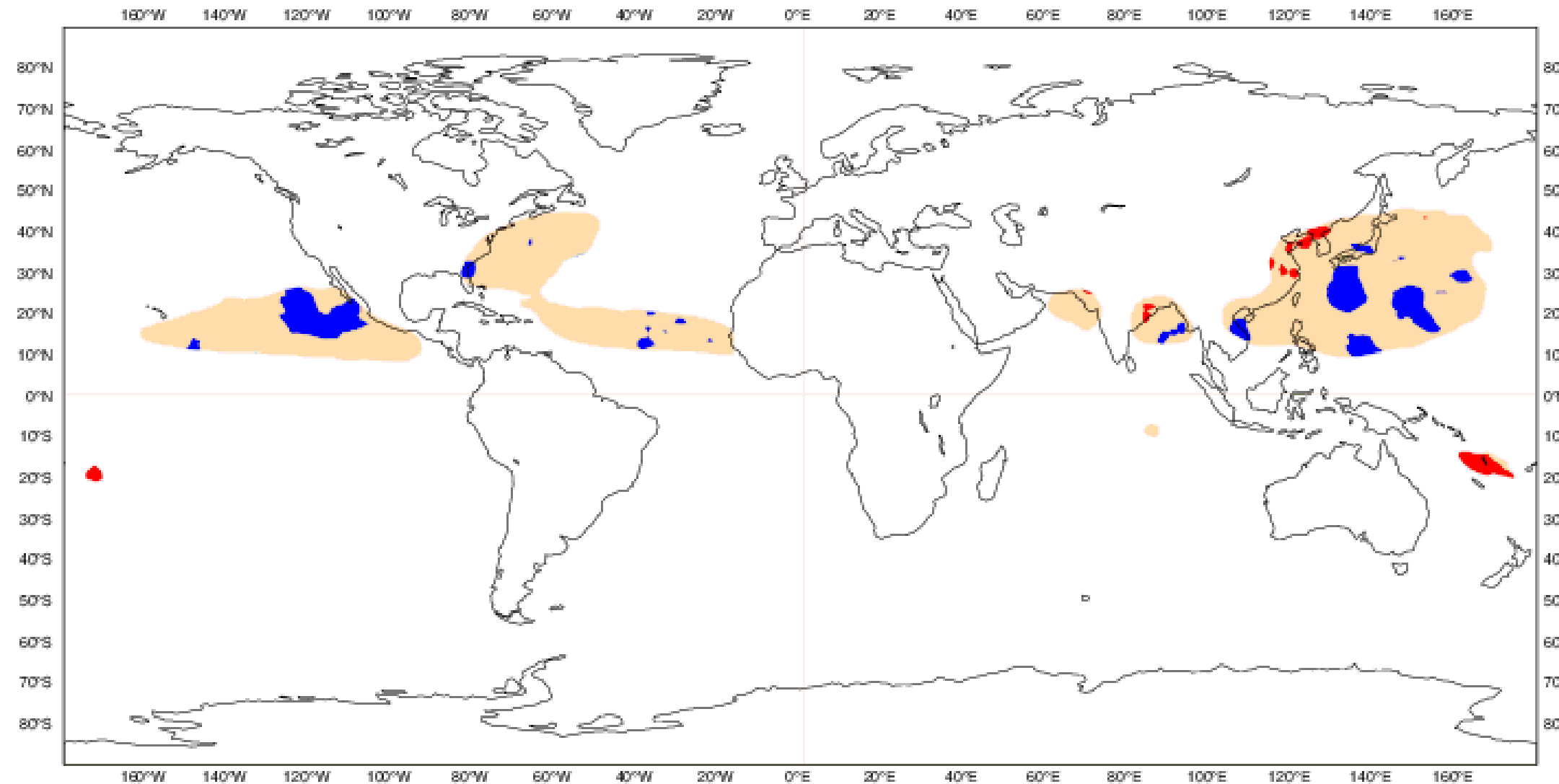
Figure 7. Official ENSO probabilities for the Niño 3.4 sea surface temperature index (5°N - 5°S , 120°W - 170°W). Figure updated 10 April 2025.

Looking Ahead...Rest of 2025

ECMWF Seasonal Forecast
Standardized Tropical Storm Density
Forecast start reference is 01/04/2025
Ensemble size = 51, climate size = 575

SEAS5
MJJASO 2025
Climate (initial dates) = 1993-2015

Reduced expected value Usual expected value Enhanced expected value



<https://charts.ecmwf.int/?facets=%7B%22Parameters%22%3A%5B%22Tropical%20cyclones%22%5D%7D>

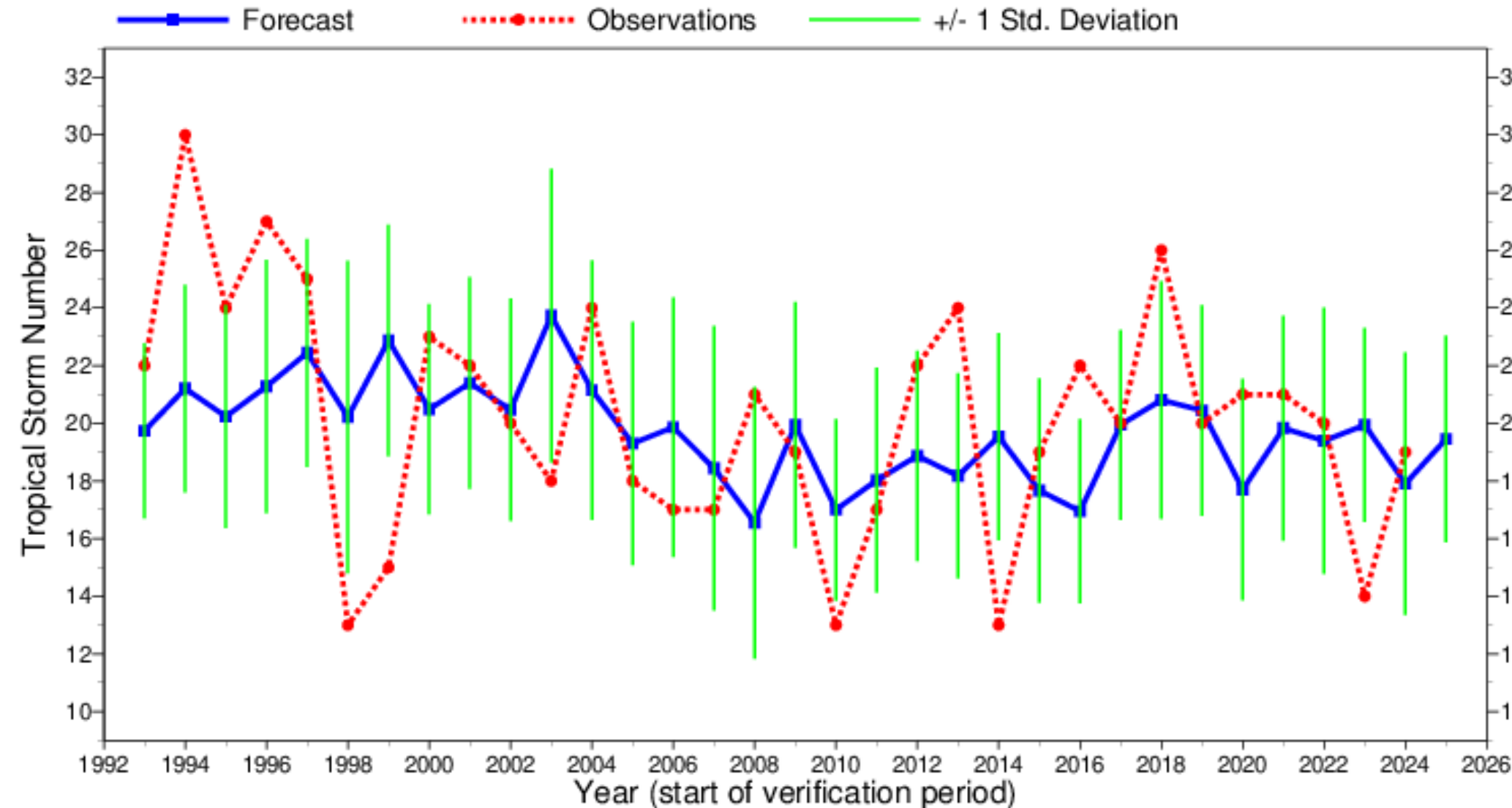


Looking Ahead...Rest of 2025

ECMWF Seasonal Forecast
Western North Pacific Tropical Storm Frequency
Forecast start reference is 01/04/YYYY
Calibration uses moving interval of previous 10 years
Ensemble size = 25 (real time = 51)

SEAS5
MJJASO

Correlation= 0.21(0.74)
RMS Error= 4.10(4.59)



<https://charts.ecmwf.int/?facets=%7B%22Parameters%22%3A%5B%22Tropical%20cyclones%22%5D%7D>



Looking Ahead...Rest of 2025

ECMWF Seasonal Forecast

Tropical Storm Frequency

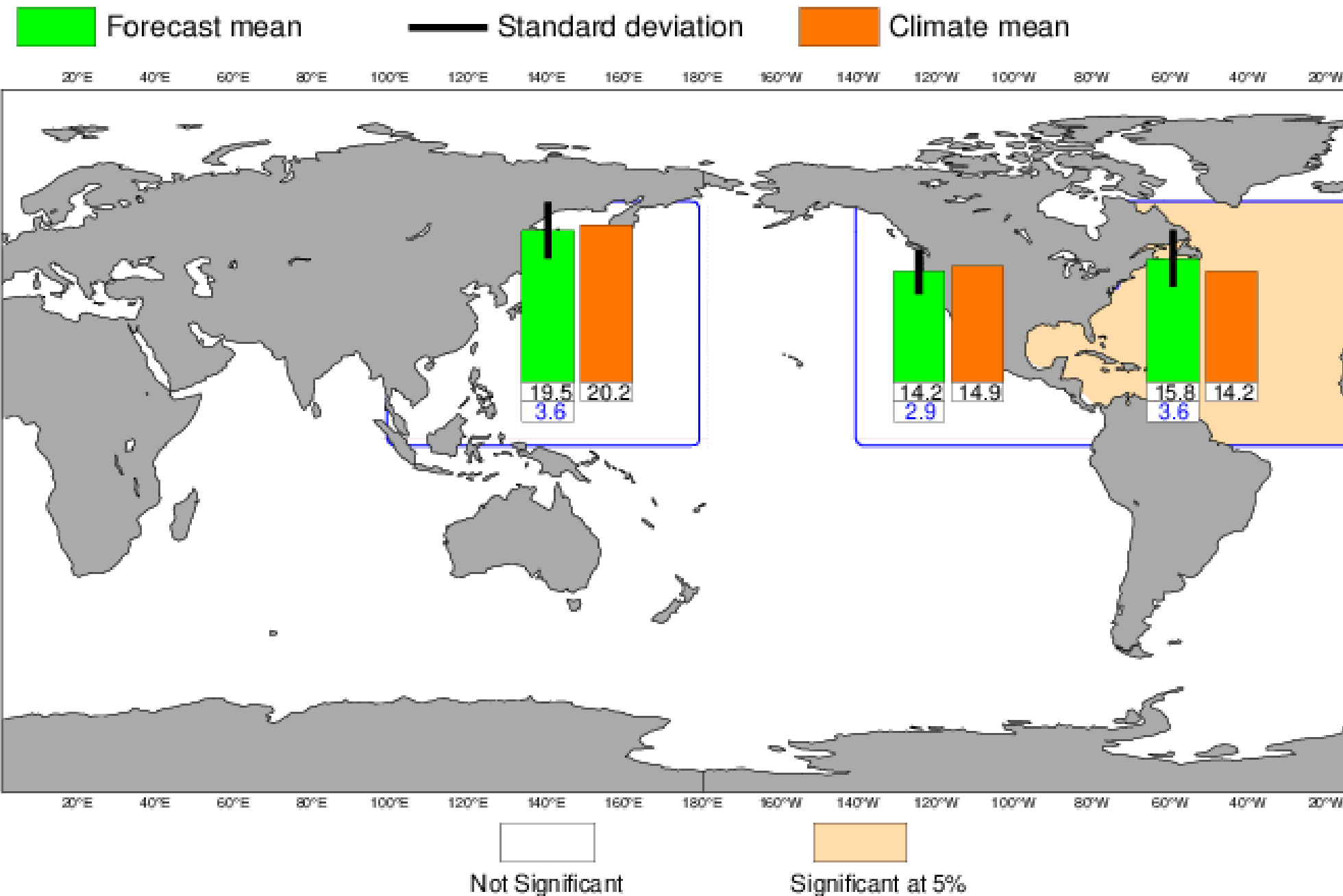
Forecast start reference is 01/04/2025

Ensemble size = 51, climate size = 800

SEAS5

MJJASO 2025

Climate (initial dates) = 1993-2024



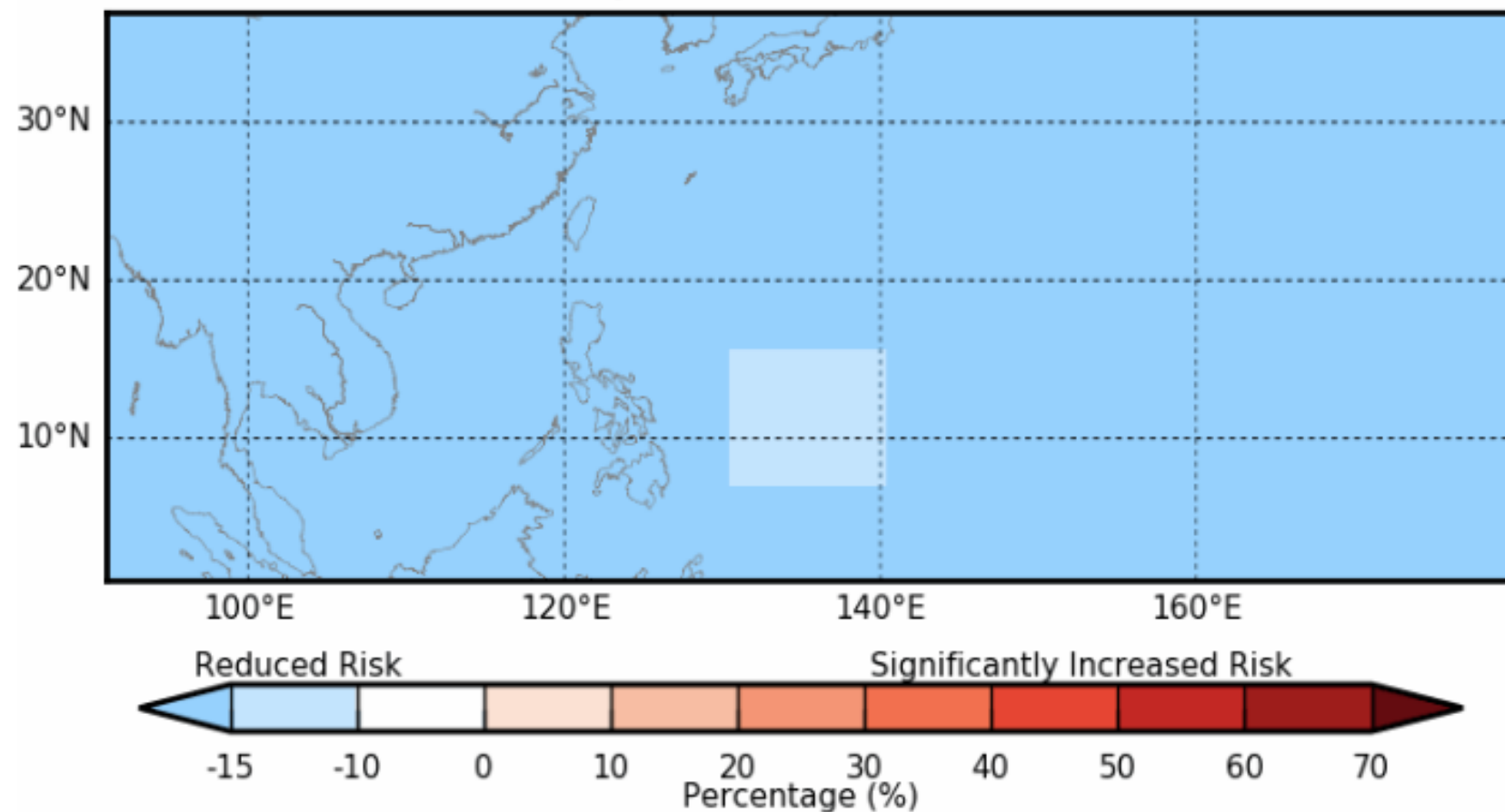
<https://charts.ecmwf.int/?facets=%7B%22Parameters%22%3A%5B%22Tropical%20cyclones%22%5D%7D>



Multi-week TC Outlook Resources

ACCESS S Week 2-4 Model Guidance

Difference from normal chance of Tropical Cyclone's in the Northern Pacific
Forecast period: 28/04/2025 - 04/05/2025



Calibrated Model anomaly probability in overlapping 15 x 20 degree boxes
© Commonwealth of Australia 2025, Australian Bureau of Meteorology

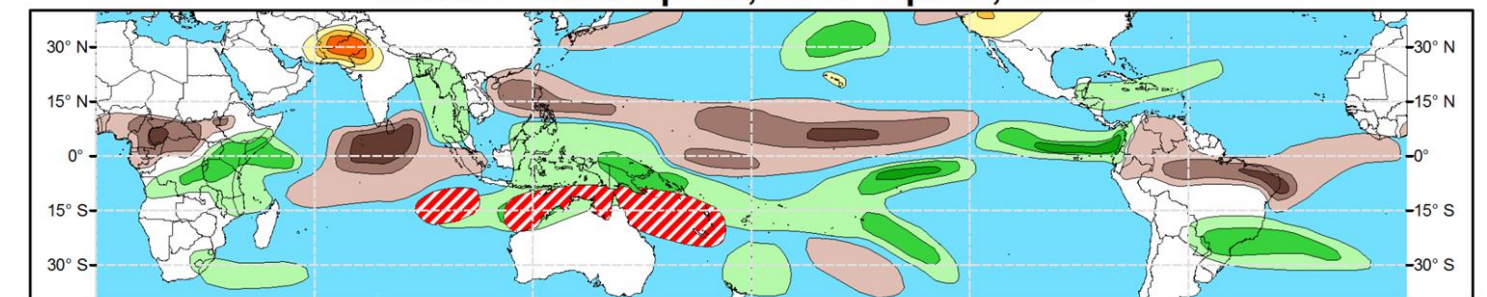
Model: ACCESS_S2 Model Run: 13/04/2025 Issued: 15/04/2025

<http://www.bom.gov.au/climate/pacific/outlooks/>

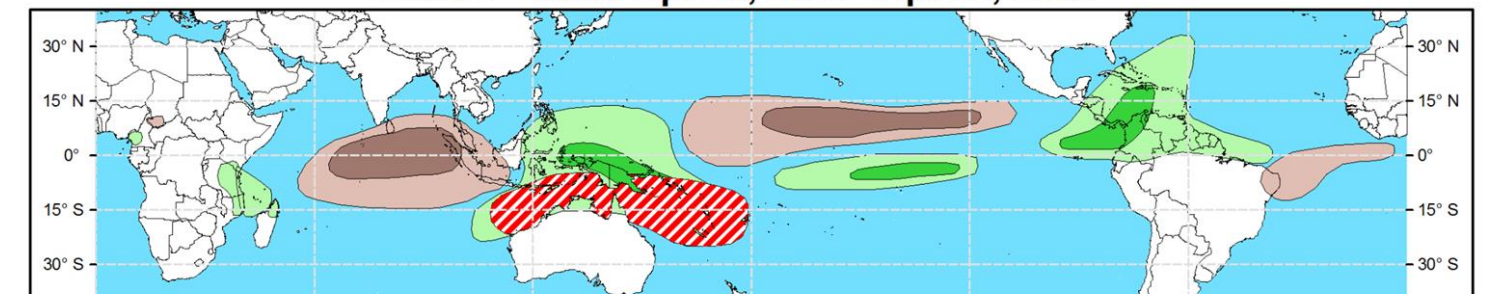
NOAA CPC week 2-3

Global Tropics Hazards Outlook
Climate Prediction Center

Week 2 - Valid: Apr 16, 2025 - Apr 22, 2025



Week 3 - Valid: Apr 23, 2025 - Apr 29, 2025



Tropical Cyclone (TC)
Formation Probability

>20% >40% >60%

Tropical Depression (TD)
or greater strength

Above-Average
Rainfall Probability

>50% >65% >80%

Weekly total rainfall in the
Upper third of the historical range

Below-Average
Rainfall Probability

>50% >65% >80%

Weekly total rainfall in the
Lower third of the historical range

Above-Average
Temperatures Probability

>50% >65% >80%

7-day max temperatures in the
Upper third of the historical range

Below-Average
Temperatures Probability

>50% >65% >80%

7-day min temperatures in the
Lower third of the historical range

Issued: 04/08/2025
Forecaster: Novella

This product is updated once per week and targets broad scale conditions integrated over a 7-day period for US interests only.
Consult your local responsible forecast agency.

<https://www.cpc.ncep.noaa.gov/products/precip/CWlink/ghaz/index.php>

Multi-week TC Outlook Resources

<https://charts.ecmwf.int/?facets=%7B%22Parameters%22%3A%5B%22Tropical%20cyclones%22%5D%7D>

ECMWF | Charts

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Range

- ☒ Medium (15 days)
- ☒ Extended (42 days)
- ☐ Long (Months)

Type

- ☐ Forecasts
- ☐ Verification

Component

- ☐ Surface
- ☐ Atmosphere

Product type

- ☐ Control Forecast (ex-HRES)
- ☐ Ensemble forecast (ENS)
- ☐ Extreme forecast index
- ☐ Point-based products
- ☐ AIFS Single
- ☐ Experimental: AIFS Ensemble forecast

Latest forecast

Tropical cyclone activity (Including genesis)

Tropical cyclone

These charts provide information on current Tropical Cyclone activity. Select the ...

Errors of tropical cyclone forecasts

Errors of tropical cyclone forecasts

Tropical storm probabilities - Extended range forecast

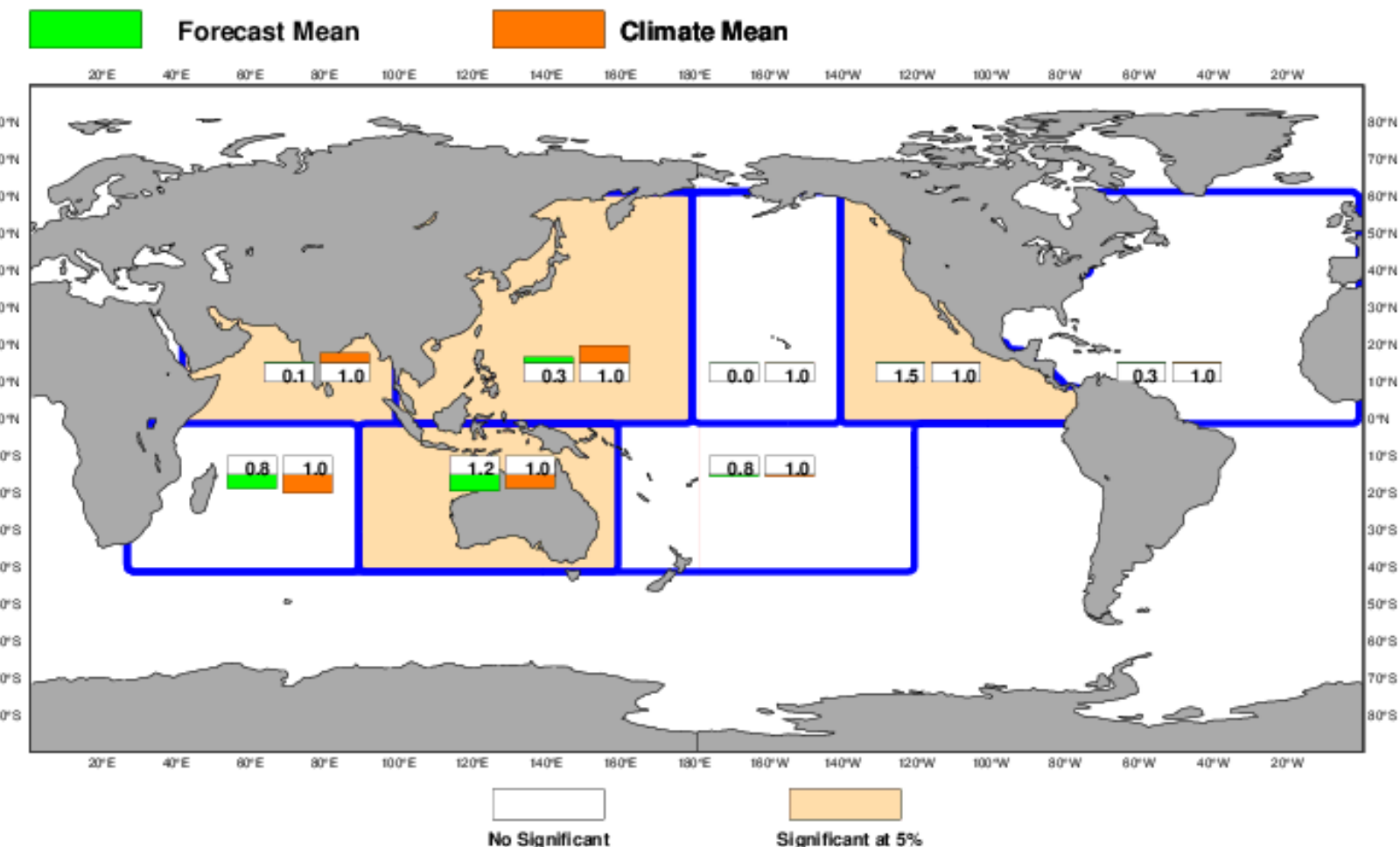
Tropical storm probabilities - Extended range forecast

Tropical storm frequency - Extended range forecast

Tropical storm frequency - Extended

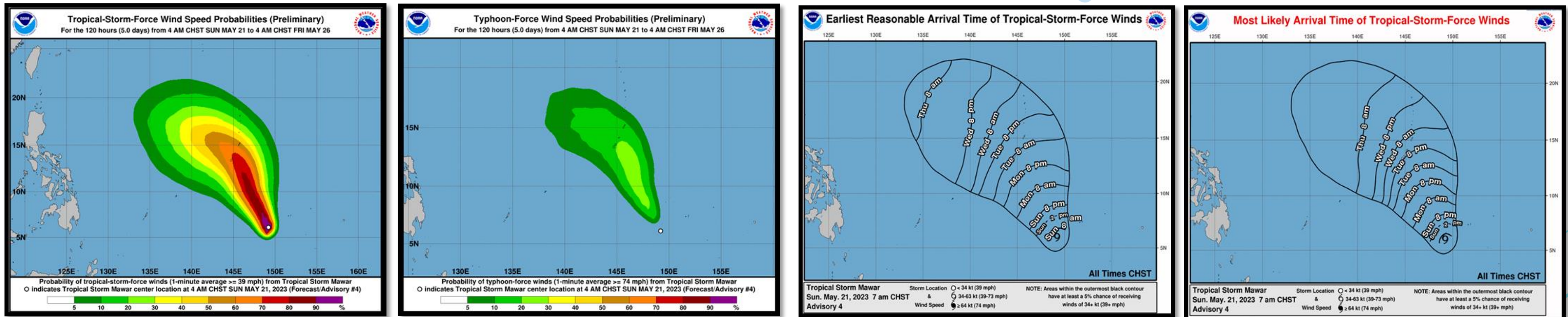
ECMWF Monthly Forecast
Accumulated Cyclone Energy
Forecast start reference is 15/04/2025
Ensemble size =101, climate size =220

DAY 06-12
21/04-27/04/2025
Climate = 2005-2024



Looking Ahead...Rest of 2025

Probabilistic Tropical Cyclone Charts for WNP basin



<https://www.weather.gov/media/gum/Introducing%20New%20Probabilistic%20TC%20Graphics%20to%20the%20Public.pdf>

Summary

- 2024 overview and 2025 thus far: TC activity was largely below normal, with TC metrics and overall distribution that followed a La Niña-like pattern
 - There has been no TC activity in the WNP basin so far in 2025 (JTWC data as of April 21 2025)
- Per NOAA Climate Prediction Center Diagnostic Discussion 10 April 2024
 - ENSO Neutral prevails ([Final La Niña Advisory issued](#)) and strongly favored next several months
 - Nov 2025 - Jan 2026: 43% chance ENSO neutral, 38 % chance La Niña, 19% chance of El Niño
- Unofficial forecast is for an average TC season for WNP and CNP basins
 - Important to note that ENSO based tropical cyclone patterns are typical, but not guaranteed, as evidenced by TC activity during the 2023/2024 El Niño
- Official NOAA TC outlooks for WNP and CNP will be issued next month
 - CNP - 15 May 2025
 - WNP - 22 May 2025

THANK YOU!

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