Weather Outlook 2026-2027

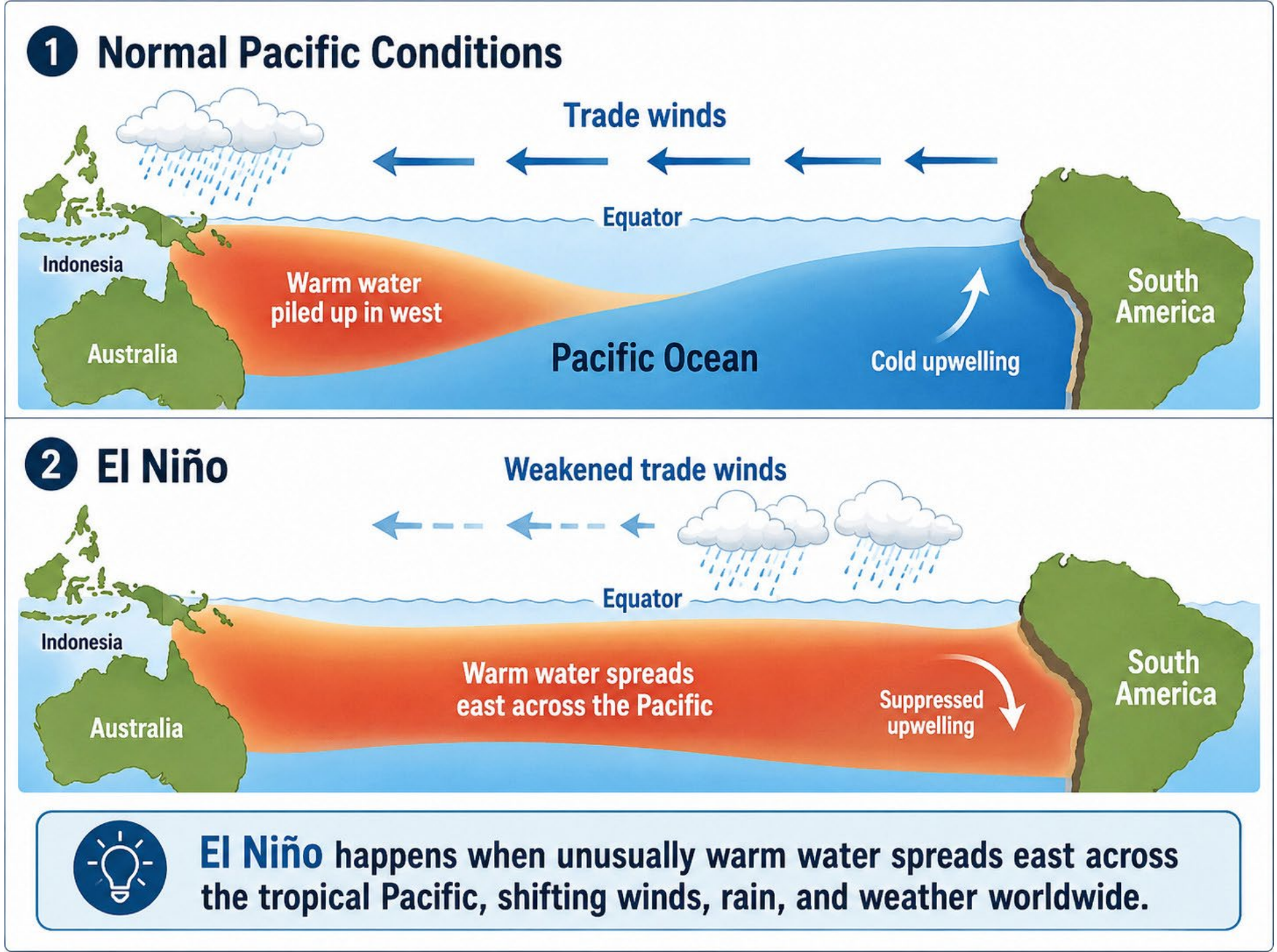
Don Day, Jr.
DayWeather, Inc.

A Very Complicated Situation

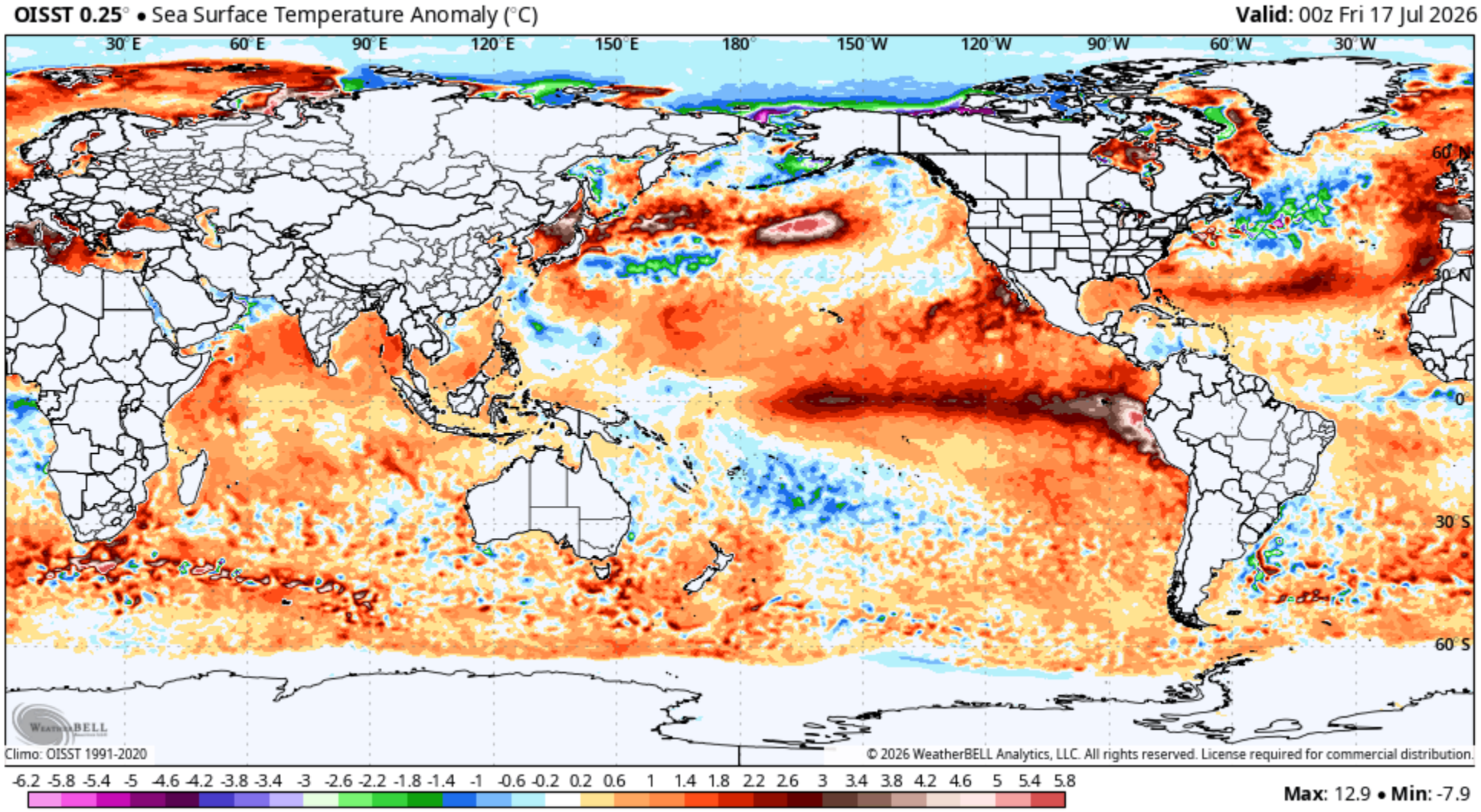
- Developing El Nino, strongest in 30 years or more.
- A colder Atlantic, especially in hurricane forming areas and in the north.
- Record cold summer in the Arctic.
- El Nino in Pacific surrounded by different water temperatures compared to similar events.
- The lingering impacts of the Hunga Tunga volcanic eruption in January 2022.
- Westerly QBO Phase – Last year it was Easterly QBO Phase
- All of these on their own and in some situations working together are leading to high variability and low confidence in seasonal forecasting.

El Nino

- Important points
  - Every El Nino is different, while outcomes my be similar from event to event, they are not always of the same intensity or same outcomes.
  - However, some historical trends are helpful in predicting broad potent outcomes in temperature and precipitation.
  - There are other factors involved in El Nino events other than what happens at the equator region (ie, sea surface temperatures at higher latitudes) that can impact El Nino influenced weather events.
  - Caution is advised in idealized and over simplified forecasts of El Nino impacts based solely on modeling without historical perspectives.

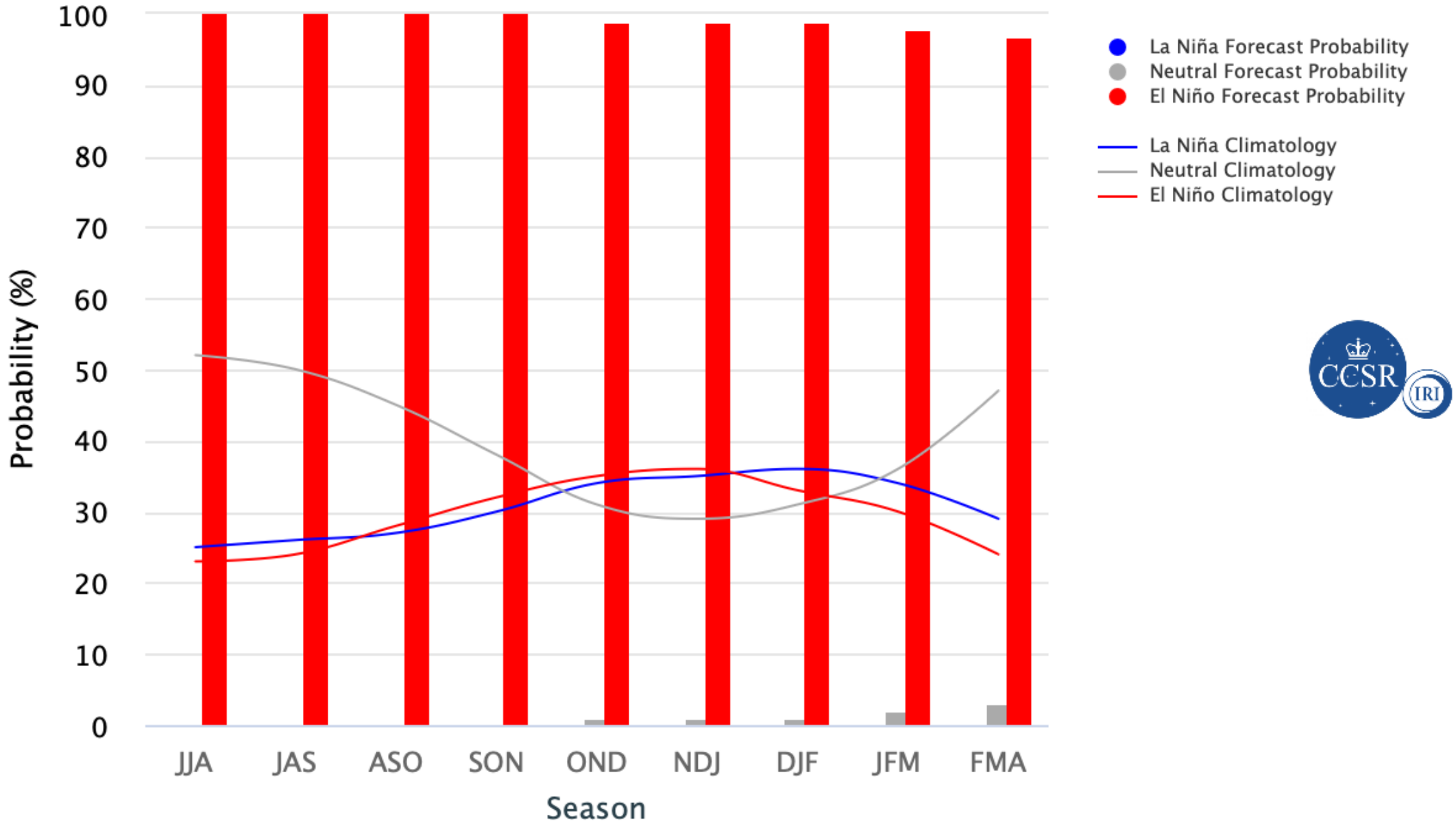

1 Normal Pacific Conditions
Trade winds
Equator
Indonesia
Australia
Warm water
piled up in west
Pacific Ocean
Cold upwelling
South
America
2 El Niño
Weakened trade winds
Equator
Indonesia
Australia
Warm water spreads
east across the Pacific
Suppressed
upwelling
South
America
El Niño happens when unusually warm water spreads east across the tropical Pacific, shifting winds, rain, and weather worldwide.

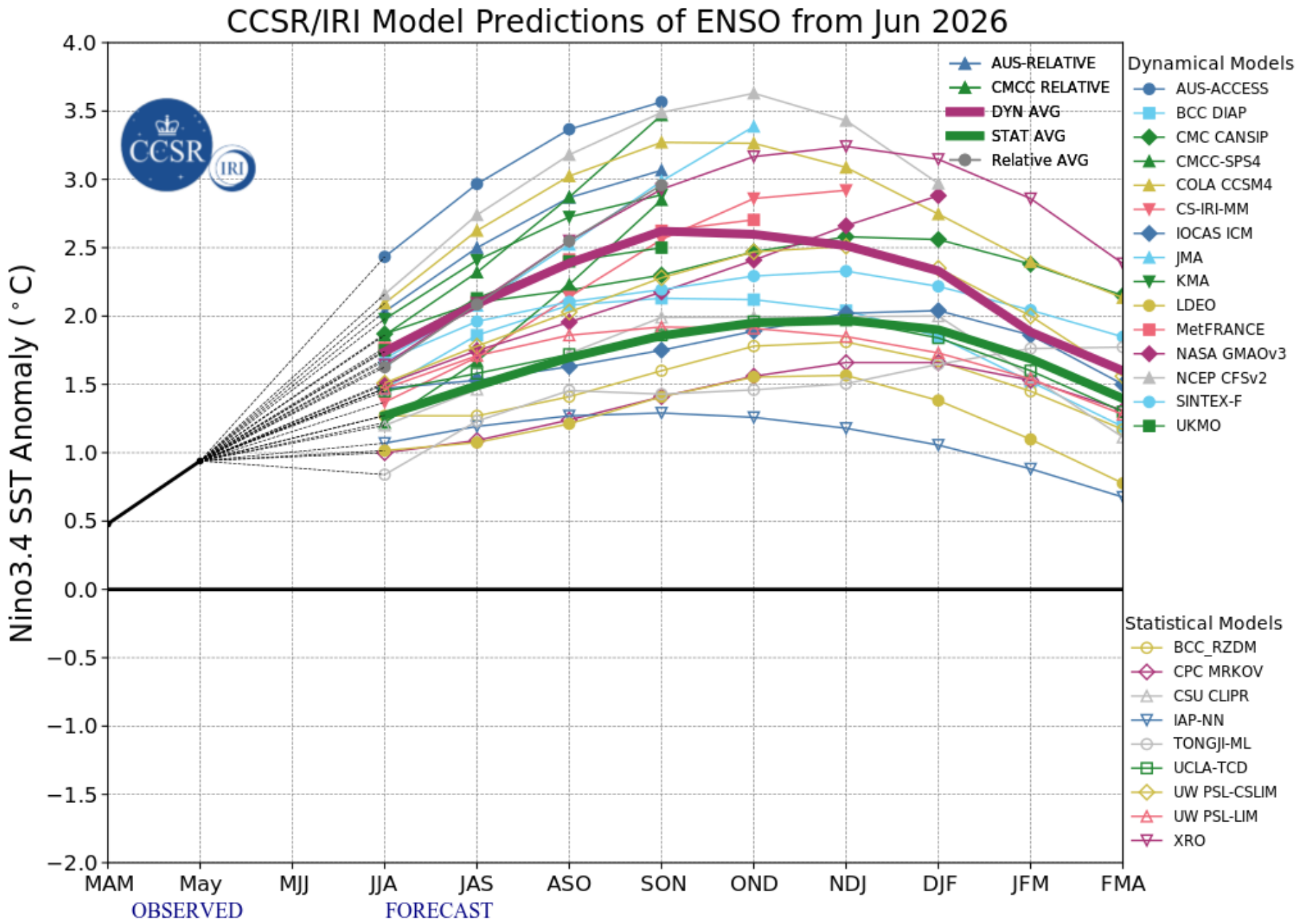
El Nino of 2026 as of 7/17/2026



Mid-June 2026 CCSR/IRI Model-Based Probabilistic ENSO Forecasts

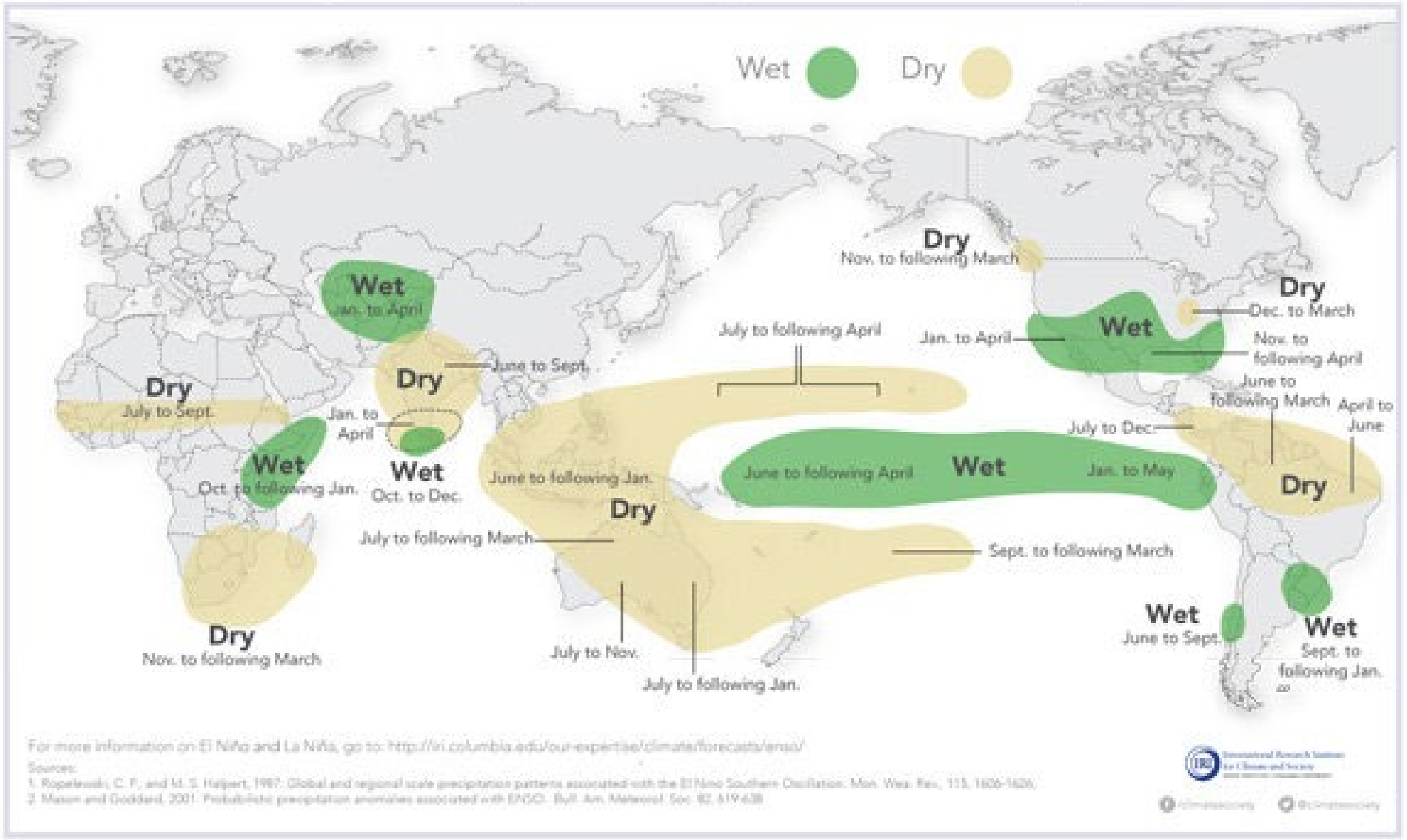
ENSO state based on NINO3.4 SST Anomaly Neutral ENSO: -0.5 °C to 0.5 °C




CCSR/IRI Model Predictions of ENSO from Jun 2026
Nino3.4 SST Anomaly (°C)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
−2.0
MAM
May
MJJ
JJA
JAS
ASO
SON
OND
NDJ
DJF
JFM
FMA
OBSERVED
FORECAST
AUS-RELATIVE
CMCC RELATIVE
DYN AVG
STAT AVG
Relative AVG
Dynamical Models
AUS-ACCESS
BCC DIAP
CMC CANSIP
CMCC-SPS4
COLA CCSM4
CS-IRI-MM
IOCAS ICM
JMA
KMA
LDEO
MetFRANCE
NASA GMAOv3
NCEP CFSv2
SINTEX-F
UKMO
Statistical Models
BCC_RZDM
CPC MRKOV
CSU CLIPR
IAP-NN
TONGJI-ML
UCLA-TCD
UW PSL-CSLIM
UW PSL-LIM
XRO

El Niño and Rainfall

El Niño conditions in the tropical Pacific are known to shift rainfall patterns in many different parts of the world. Although they vary somewhat from one El Niño to the next, the strongest shifts remain fairly consistent in the regions and seasons shown on the map below.



For more information on El Niño and La Niña, go to: http://iri.columbia.edu/our-expertise/climate/forecasts/enso/

Sources:
1. Ropelewski, C. F., and M. S. Halpert, 1987: Global and regional scale precipitation patterns associated with the El Niño Southern Oscillation. Mon. Wea. Rev., 115, 1606-1626.
2. Mason and Goddard, 2001: Probabilistic precipitation anomalies associated with ENSO. Bull. Am. Meteorol. Soc. 82, 619-638.

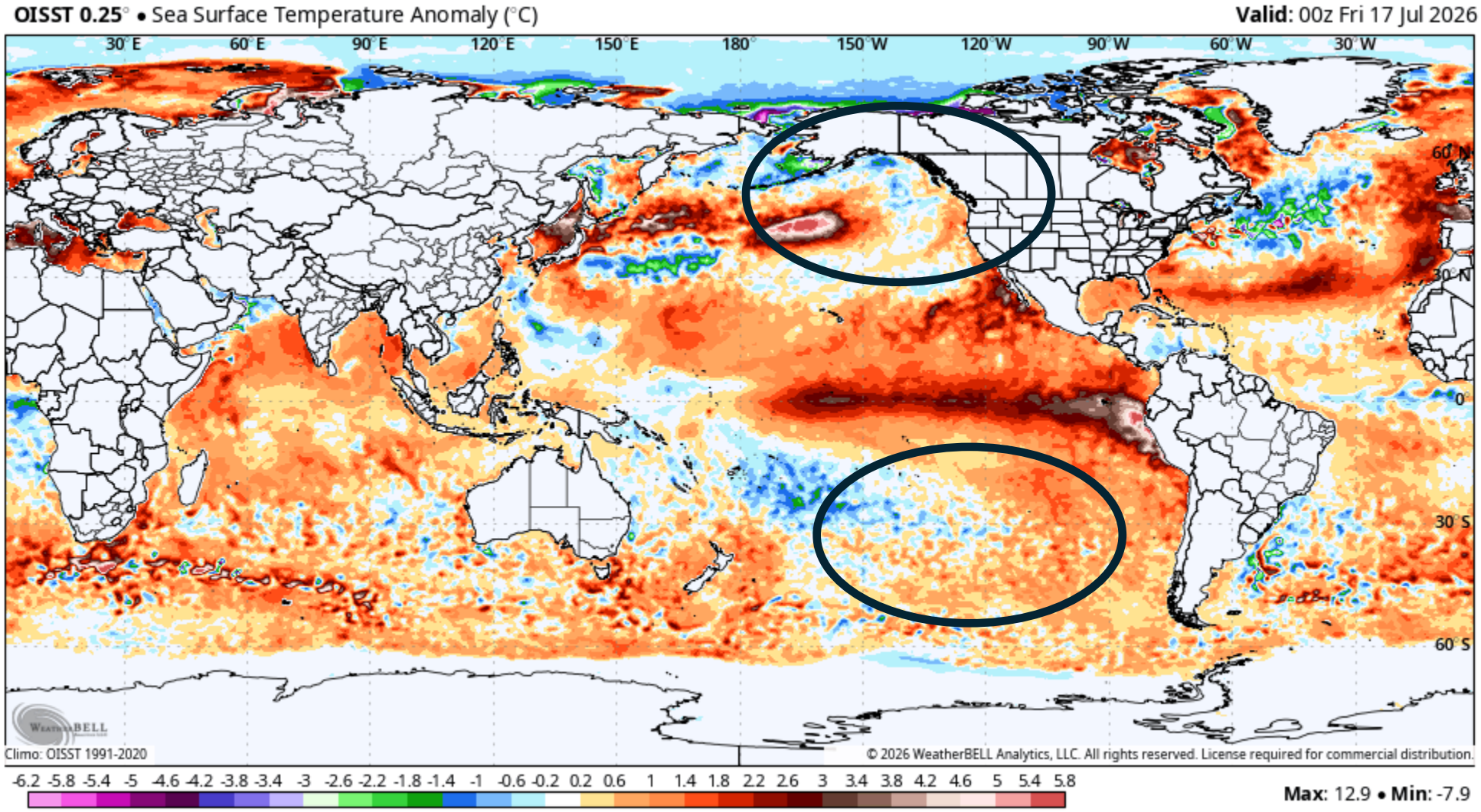
Recent Strong El Nino Events

- 1997-1998*
- 2015-2016*
- 2022-2023

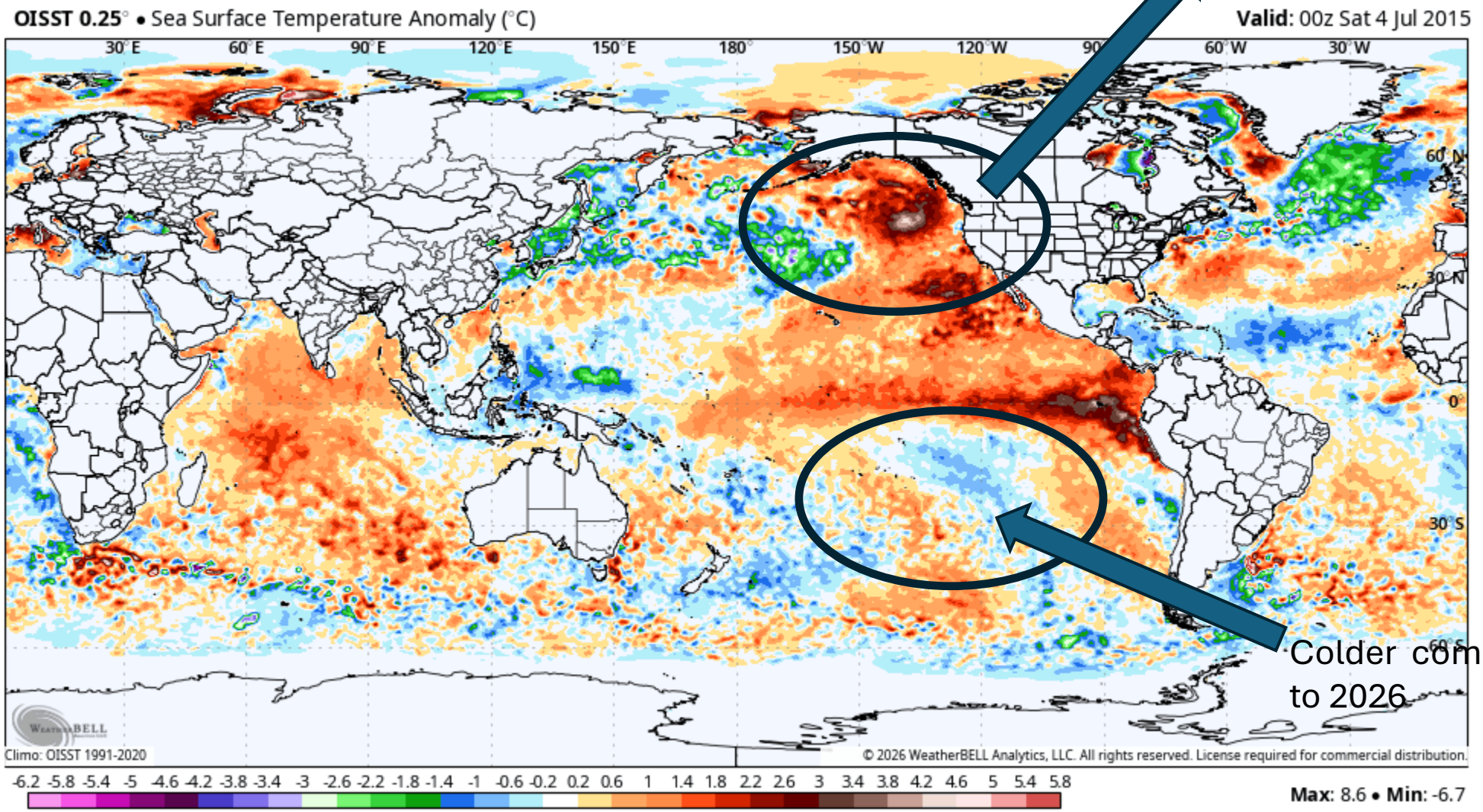
Are There Similarities between El Nino 15/16 and El Nino 26/27?

- Yes – the intensity of warm SST anomalies in the subtropics are very similar.
- No – other parts of the Pacific Ocean are in different this year as compared to 2015/16.
- See next slide that shows differences in the North Pacific and South Pacific SST compared to 2015.
- Therefore, we can expect some similar outcomes, however, impacts may not be as exactly the same with the developing El Nino and the El Nino of 2015/16.

El Nino of 2026 as of 7/17/2026



El Nino of 2015 as of 7/4/2015

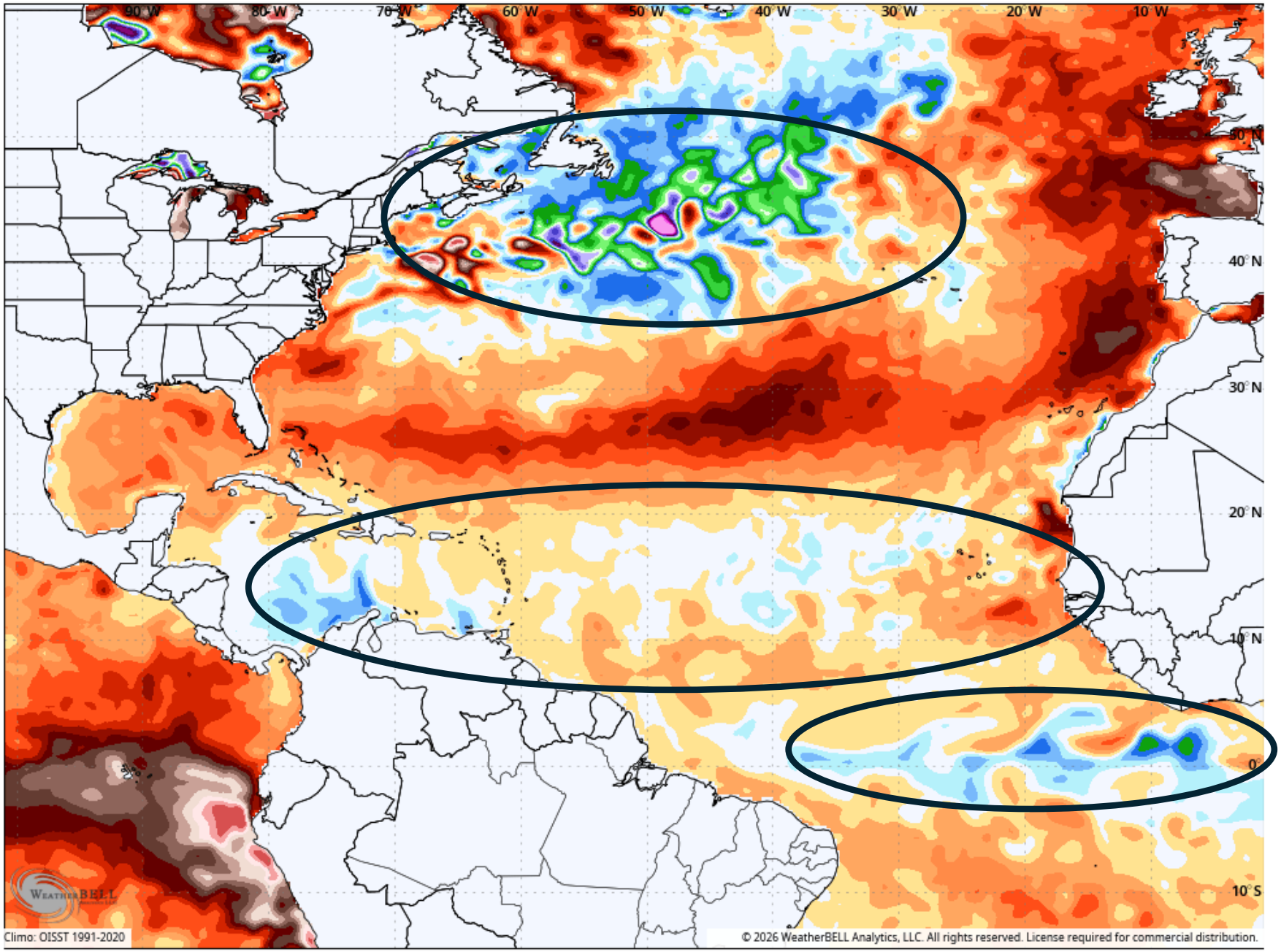


El Nino Tendencies for Precipitation

- Parts of South America can experience heavy rainfall/flooding, especially Southern Brazil and Northern Argentina.
- Parts of South America and Central America can experience drought including Panama Canal area and northern Brazil, Venezuela and Columbia.
- In India, the summer monsoon can be interrupted or weakened considerably causing drought conditions.

Cooler Atlantic

- An Atlantic La Nina – combined with El Nino will “suppress” hurricane activity in the Atlantic.
- Cooler SST in the North Atlantic.


OISST 0.25° • Sea Surface Temperature Anomaly (°C)
Valid: 00z Fri 17 Jul 2026
90 W
80 W
70 W
60 W
50 W
40 W
30 W
20 W
10 W
50 N
40 N
30 N
20 N
10 N
0
10 S
Climo: OISST 1991-2020
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-6.2 -5.8 -5.4 -5 -4.6 -4.2 -3.8 -3.4 -3 -2.6 -2.2 -1.8 -1.4 -1 -0.6 -0.2 0.2 0.6 1 1.4 1.8 2.2 2.6 3 3.4 3.8 4.2 4.6 5 5.4 5.8
Max: 13.8 • Min: -8.1

2026 FORECAST AS OF 8 JULY 2026

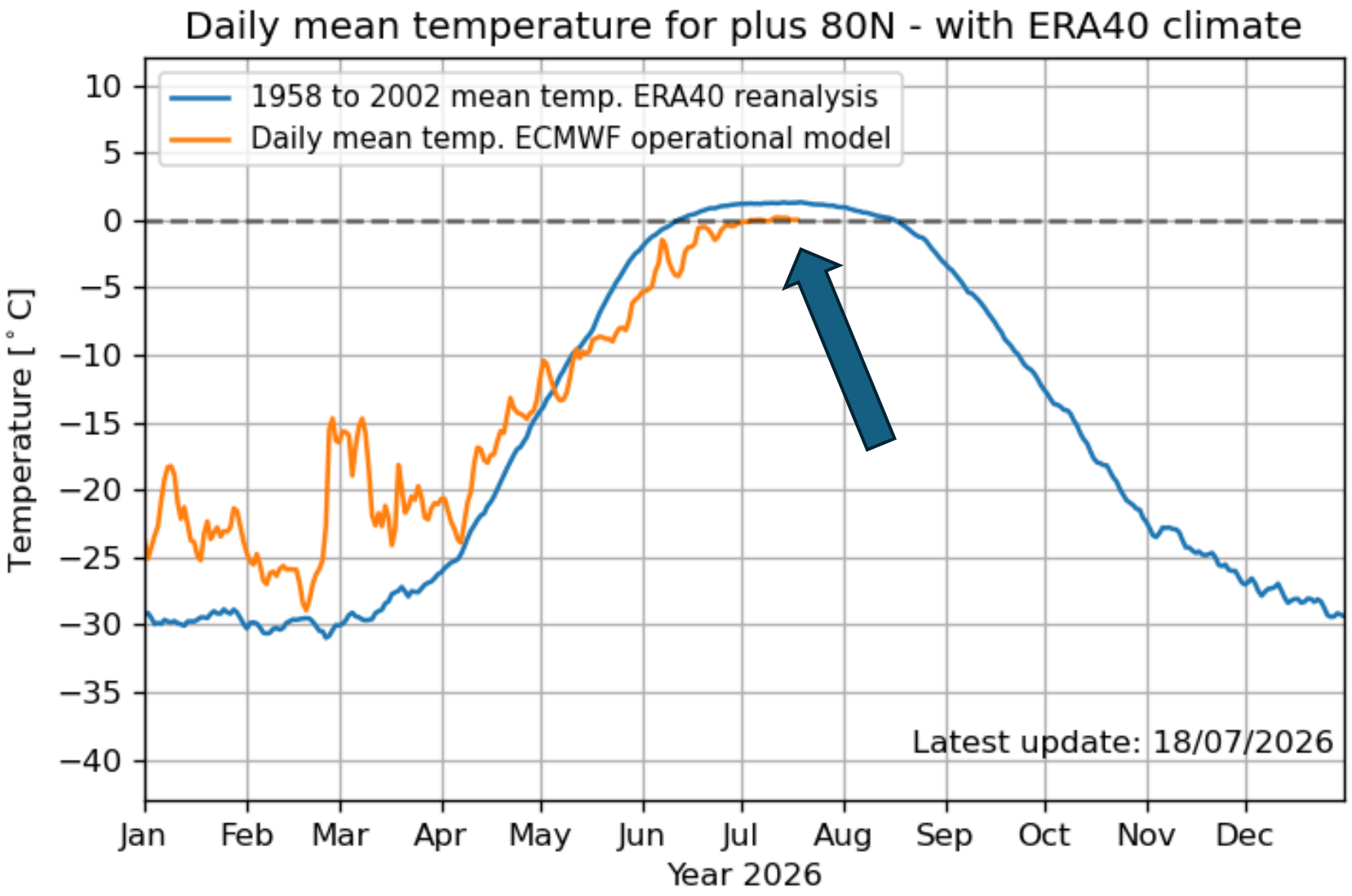
Forecast Parameter	CSU Forecast	1991–2020 Average
Named Storms (NS)	9*	14.4
Named Storm Days (NSD)	35	69.4
Hurricanes (H)	4	7.2
Hurricane Days (HD)	12	27.0
Major Hurricanes (MH)	1	3.2
Major Hurricane Days (MHD)	2	7.4
Accumulated Cyclone Energy (ACE)	50	123
ACE West of 60°W	25	73
Net Tropical Cyclone Activity (NTC)	60	135

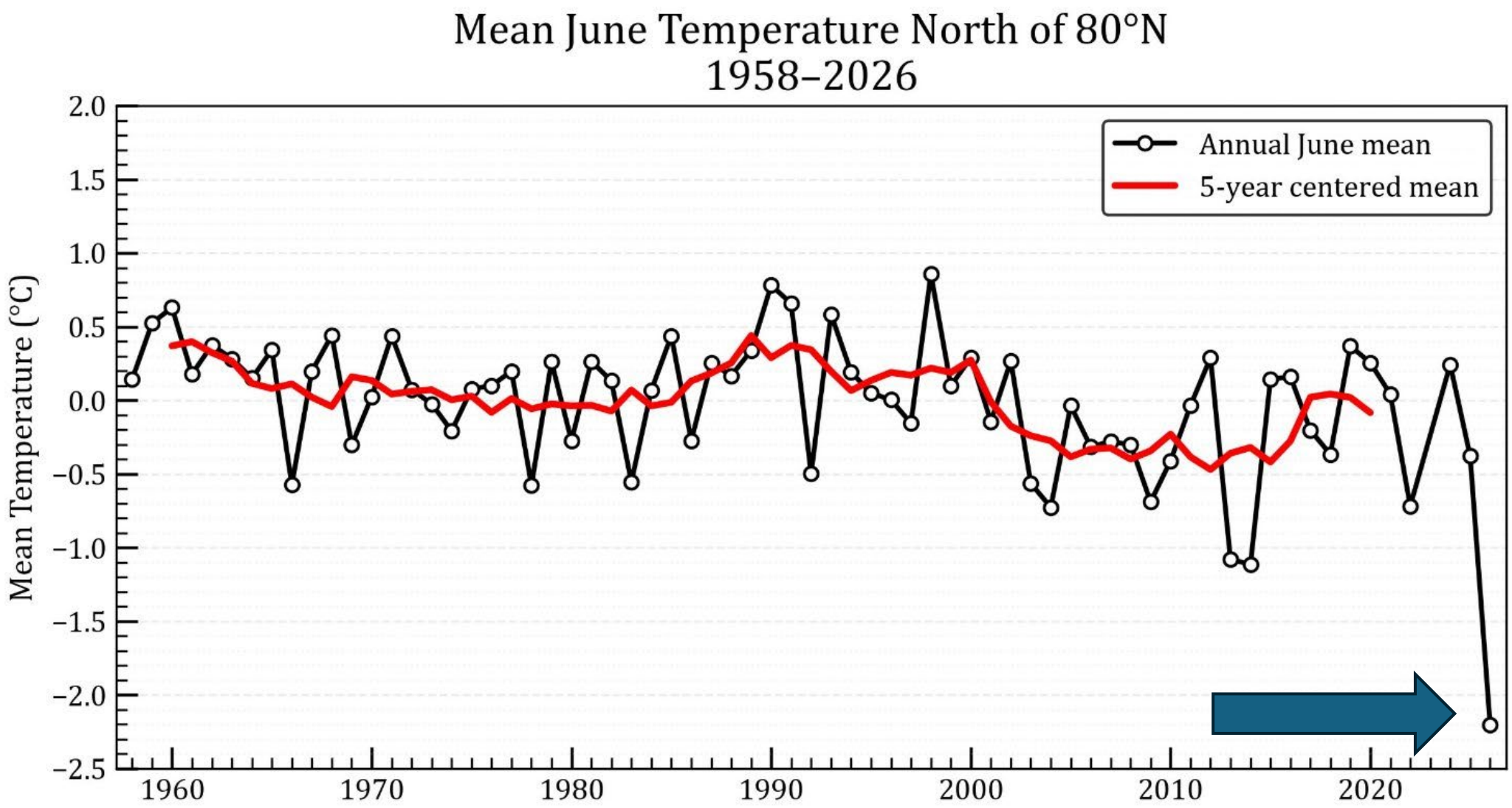
**Forecast includes Arthur*

Cold Arctic

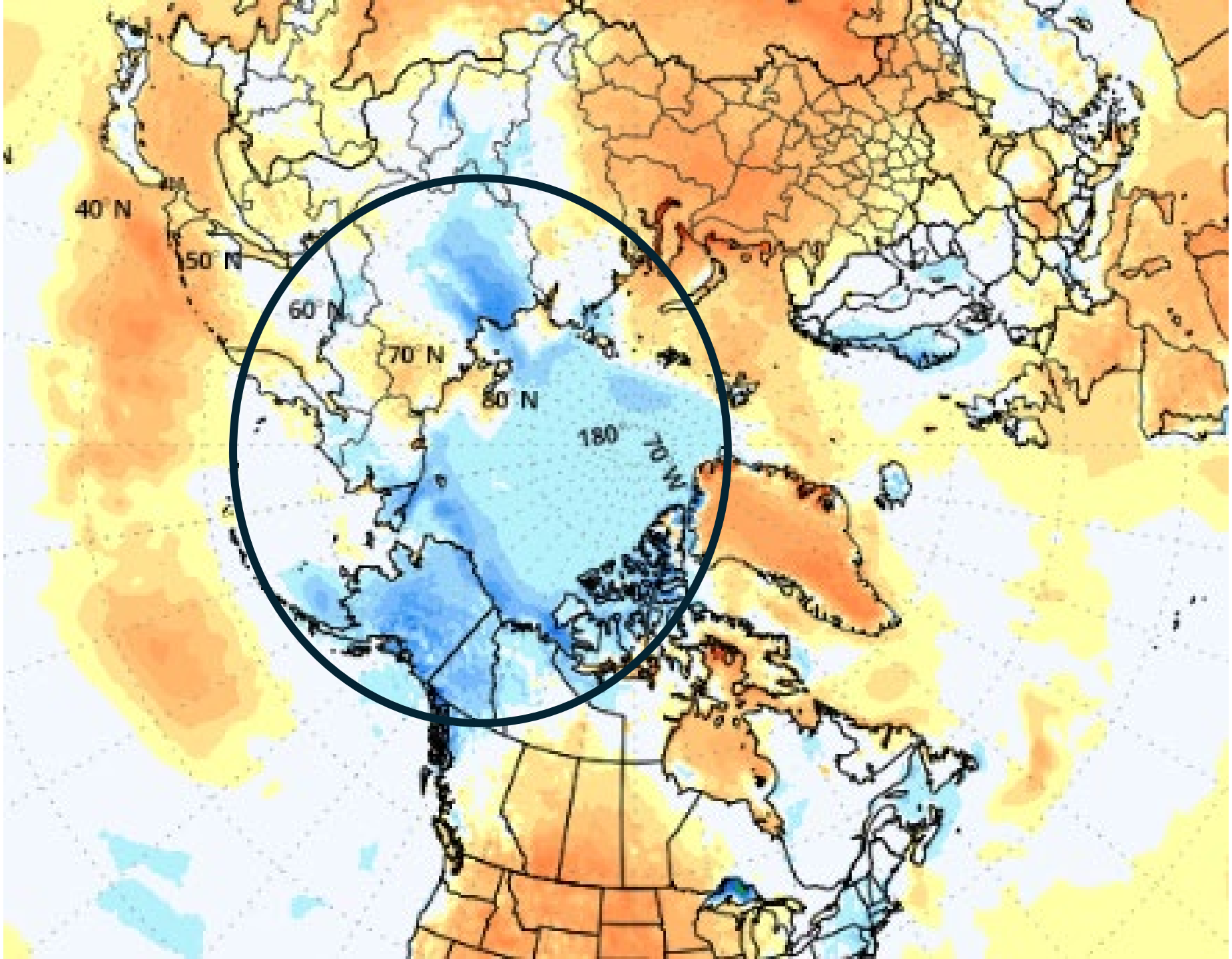
Danish Meteorological Institute has been monitoring and compiling temperature data since 1958.

Coldest June since records have been kept and likely to be coldest or one of the coldest summers since monitoring started.


Daily mean temperature for plus 80N - with ERA40 climate
1958 to 2002 mean temp. ERA40 reanalysis
Daily mean temp. ECMWF operational model
Temperature [°C]
10
5
0
−5
−10
−15
−20
−25
−30
−35
−40
Latest update: 18/07/2026
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Year 2026



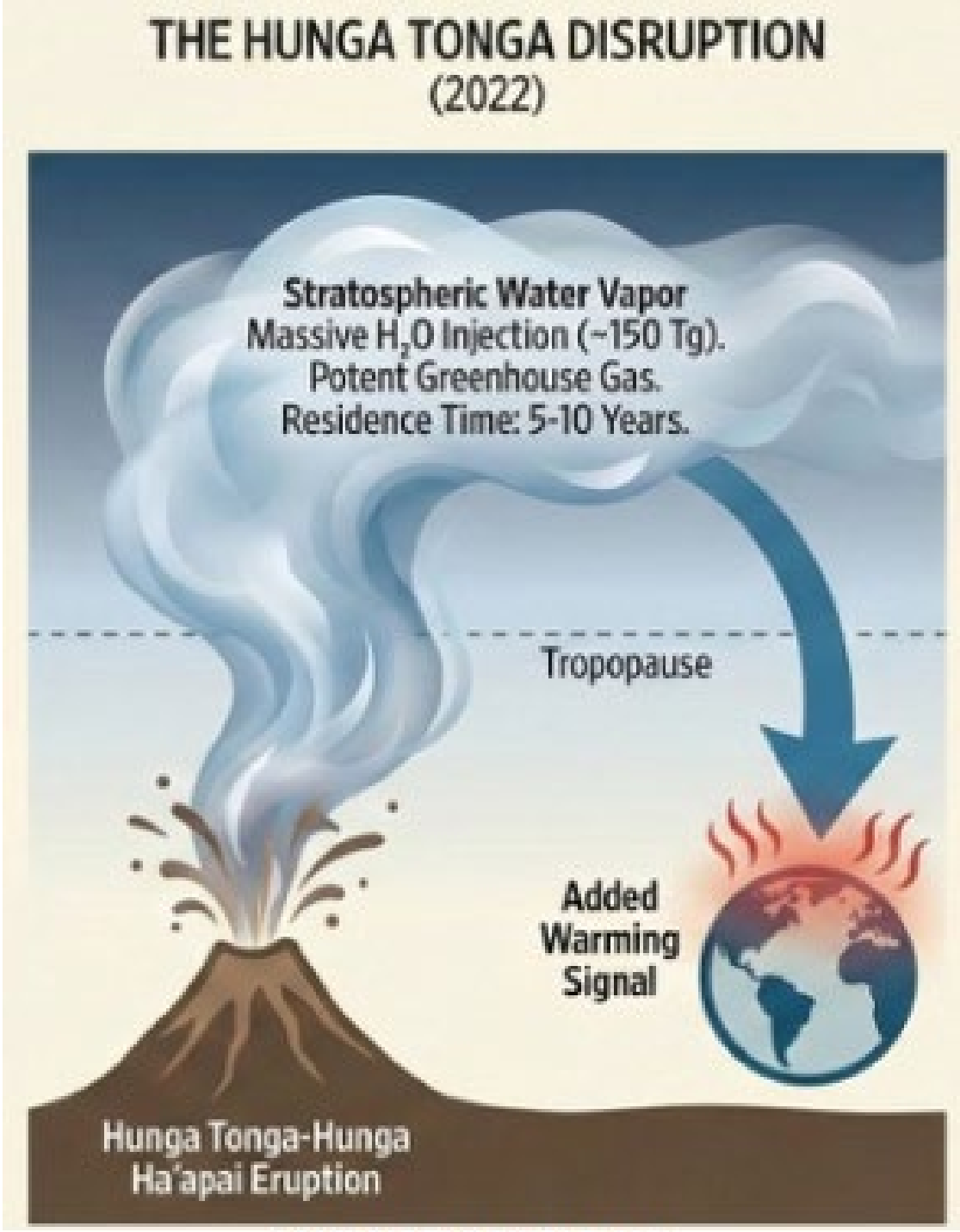
Source: https://ocean.dmi.dk/arctic/meant80n.uk.php


40 N
50 N
60 N
70 N
80 N
180
70 W

2022 Hunga Tonga–Hunga Ha‘apai Eruption


Ask Maps
Japan
East China Sea
North Pacific Ocean
Philippine Sea
Philippines
HI
Mexico
Guatemala
Indonesia
Banda Sea
Papua New Guinea
Arafura Sea
Hunga Tonga
Coral Sea
NT
QLD
Australia
WA
SA
NSW
Great Australian Bight
VIC
TAS
Tasman Sea
New Zealand
South Pacific Ocean
Layers
Google Maps

January 2022



The best way to describe **150 trillion gallons** of water is approximately **1.17 times the volume of Lake Erie** or as a layer of water **3 inches deep** covering the entire contiguous United States.

Article | Open access | Published: 24 January 2026

Residence time of Hunga stratospheric water vapour perturbation quantified at 9 years

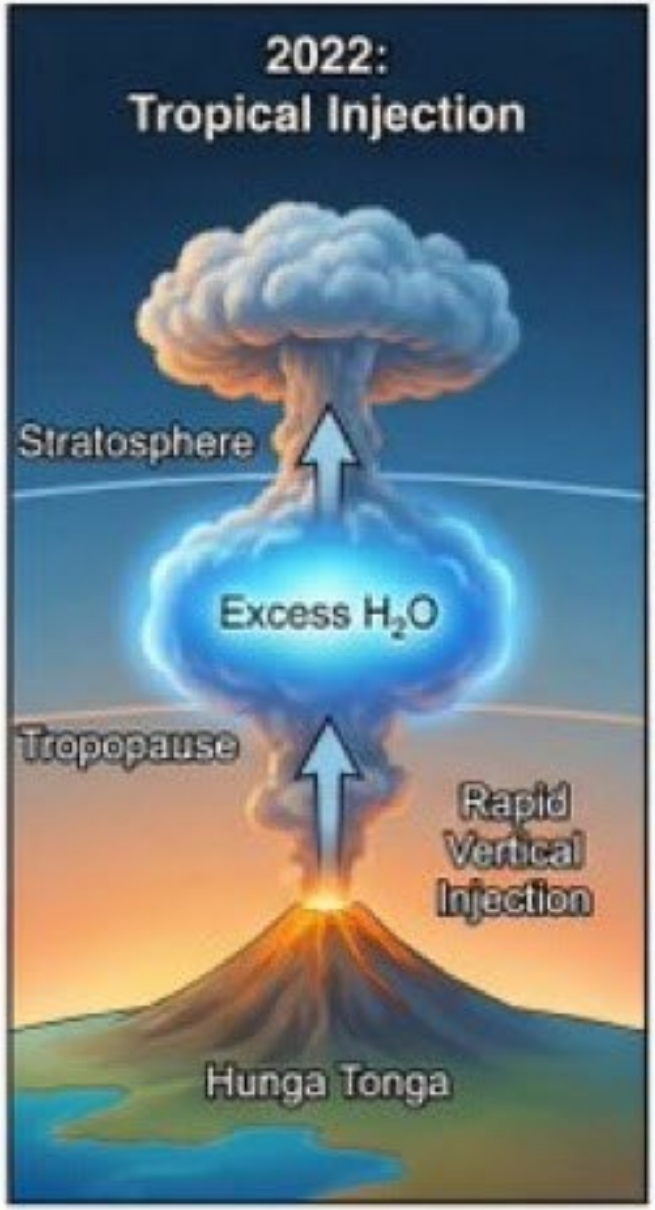
Xin Zhou, Quanliang Chen, Wuhu Feng, Saffron Heddell, Sandip S. Dhomse, Graham Mann, Hugh C. Pumphrey, Luis Millán, Michelle L. Santee & Martyn P. Chipperfield

Communications Earth & Environment , Article number: (2026) | Cite this article

Abstract

The January 2022 eruption of the Hunga volcano (20°S) injected 150 Tg of water vapour into the middle atmosphere, leading to an increase in the stratospheric water burden of 10%, unprecedented in the observational record. In the first two years post eruption the stratospheric burden hardly changed, leaving the residence time of volcanically injected water vapour, a key control on its climate impact, uncertain. Here, using satellite observations, we show a substantial decline from 2024 to early 2025, the largest drop since the eruption. Comparison with 3-D numerical model simulations shows that the long-term removal of the Hunga water has now entered a new phase, with stratosphere-troposphere exchange playing an increasingly important role, exceeding Antarctic dehydration in 2024. We estimate that the additional stratospheric water vapour is now decaying steadily with an e-folding time of 3 years and will reach the observed pre-Hunga range of variability around 2030.

The Journey of Hunga Tonga's Water Vapor: From Eruption to Polar Snow (2022-2030+)



Was the strengthening of the Northern polar vortex in 2024/2025 associated with the Hunga Tonga eruption?

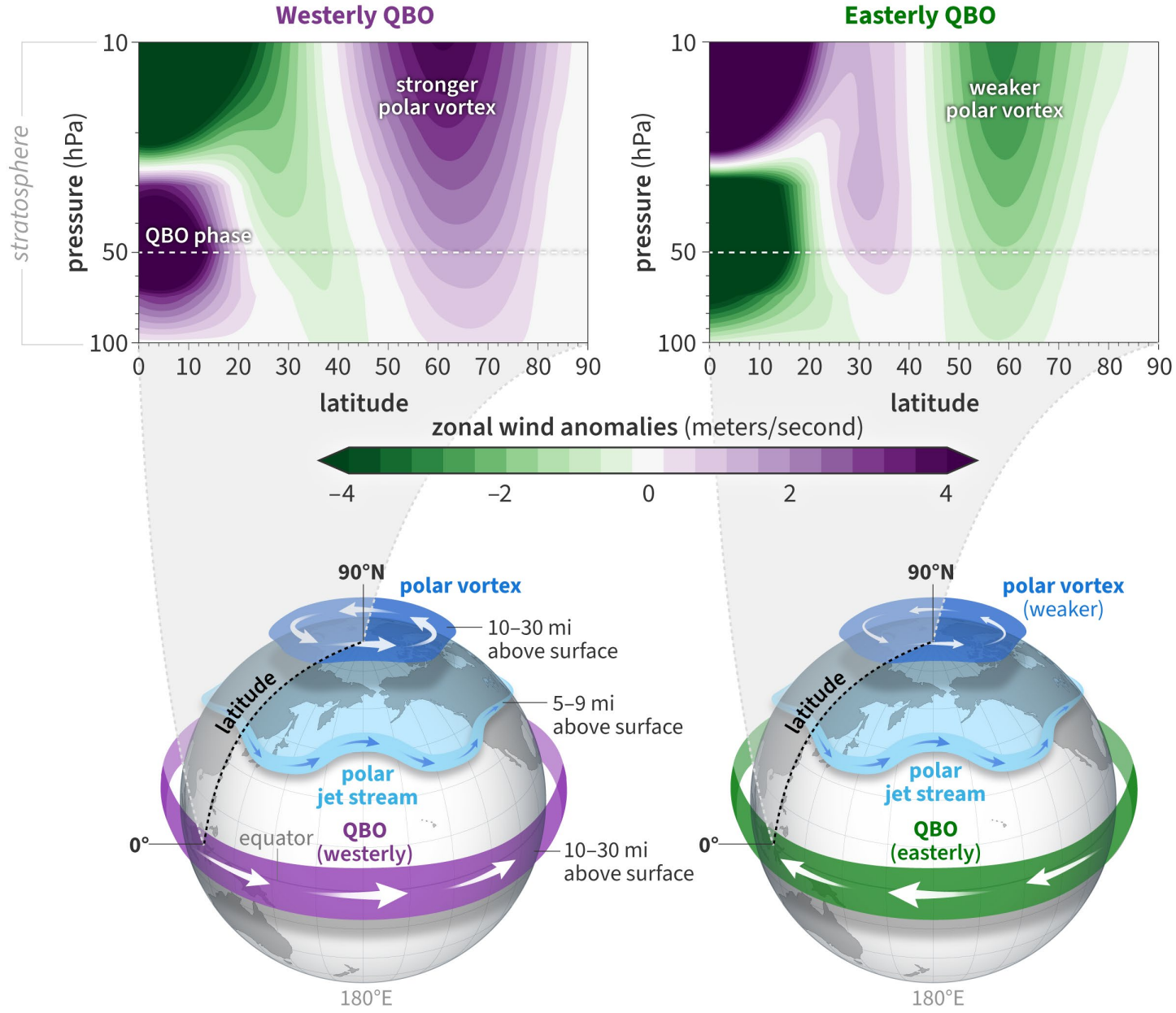
Ales Kuchar ✉, Matthias Stocker, Alistair Bell, Bruno Lehner, Jessica Kult-Herdin, Gabriel Chiodo, Timofei Sukhodolov, Eugene Rozanov, Gunter Stober, and Harald E. Rieder

Kuchar et al. (2025) explored a novel pathway by which water-rich volcanic eruptions, such as HT may modulate stratospheric and mesospheric conditions and influence *regional surface climate.*

2022 Tonga Eruption - Possibilities

- Likely has influenced La Nina/El Nino cycles
- Influenced the very wet and big snowpack winter of 2023 (atmospheric rivers).
- Possibly increased stratospheric warming events 2024 to present, 2025a and 2026 especially…..**this would have enhanced the severe blocking patterns we have experienced this past winter that is persisting into summer (heat waves).**
- Eruption impacts could last up to 10 years.

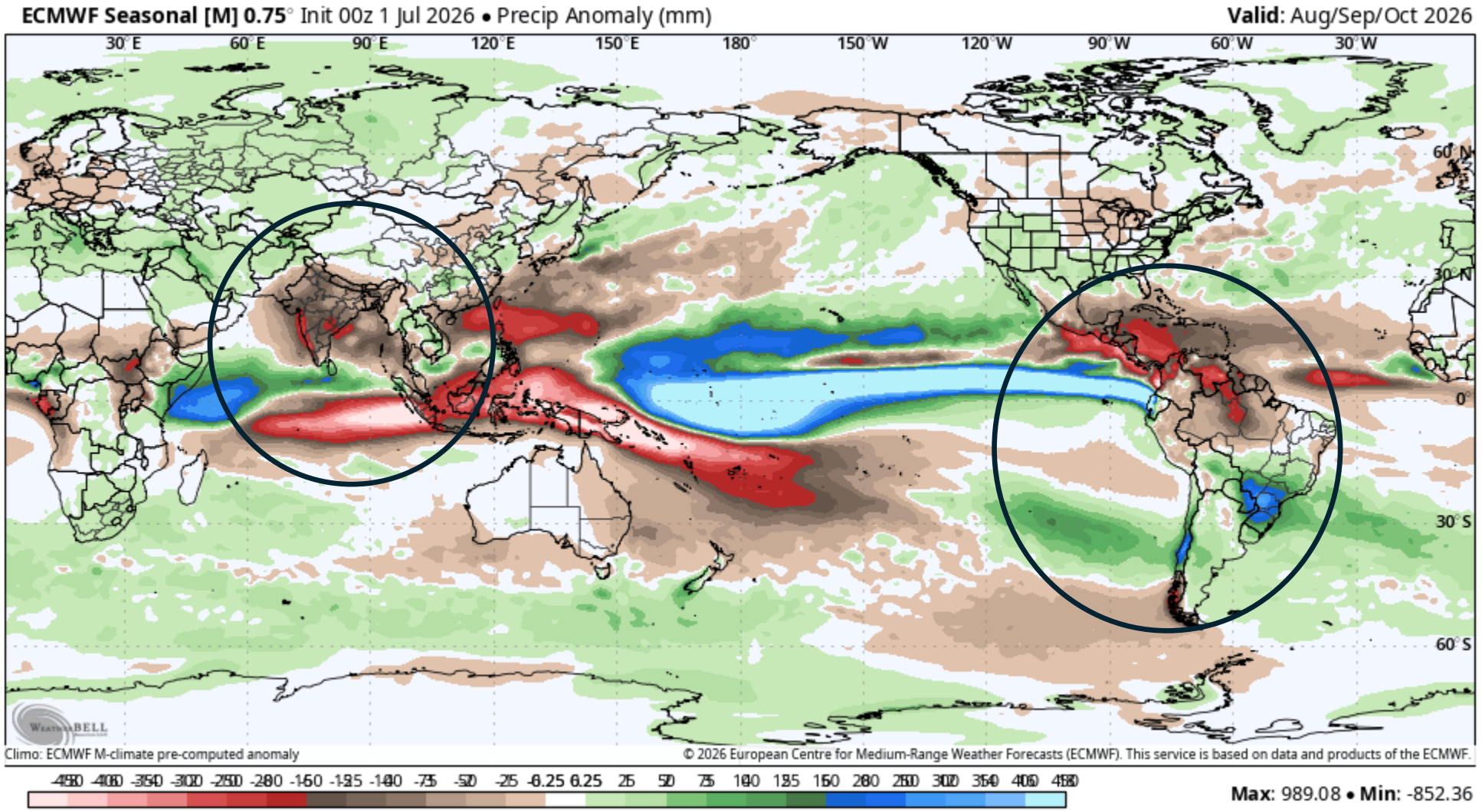
How direction of the Quasi-biennial Oscillation affects polar vortex



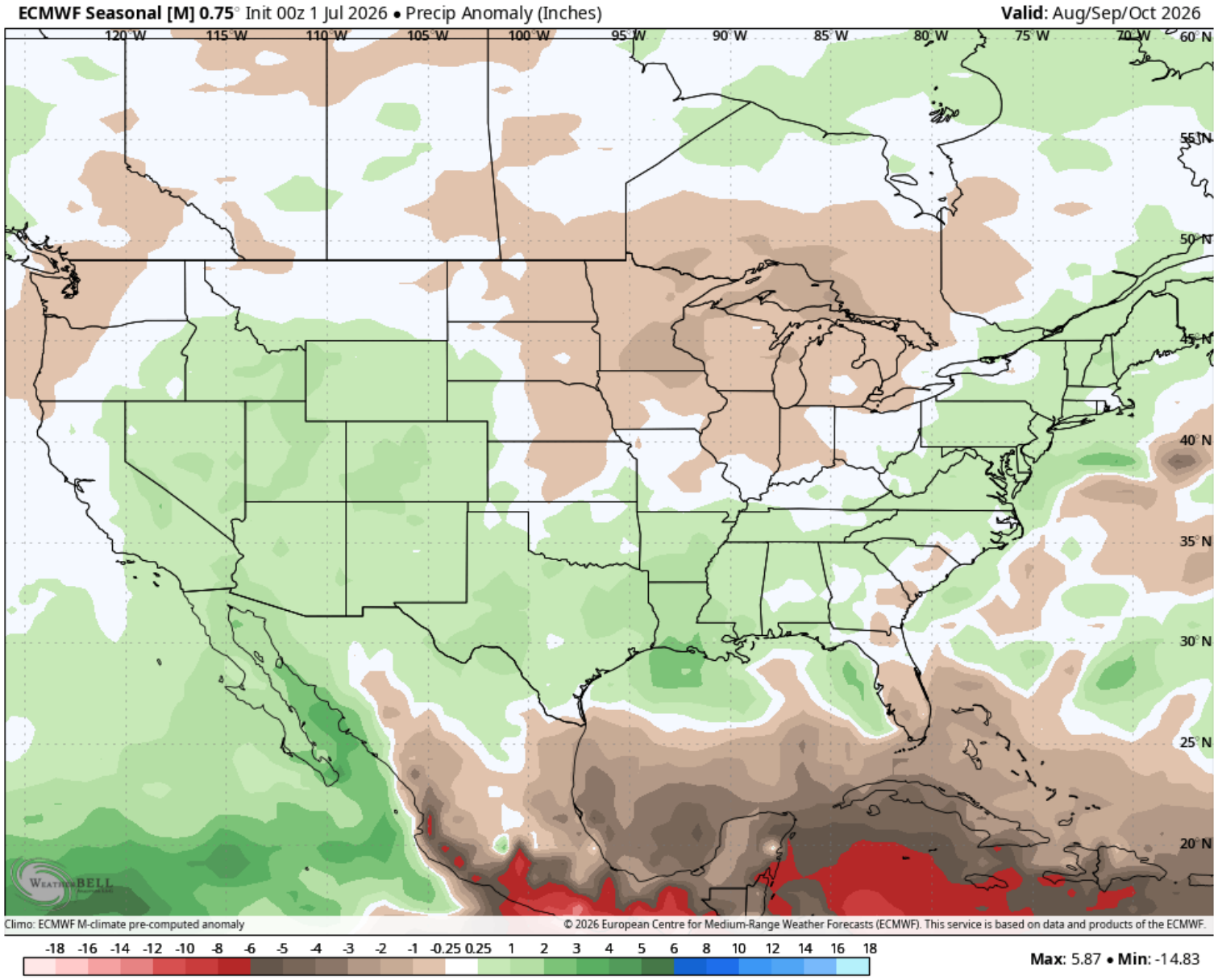
1958–2024

NOAA Climate.gov
Data: ERA5 reanalysis

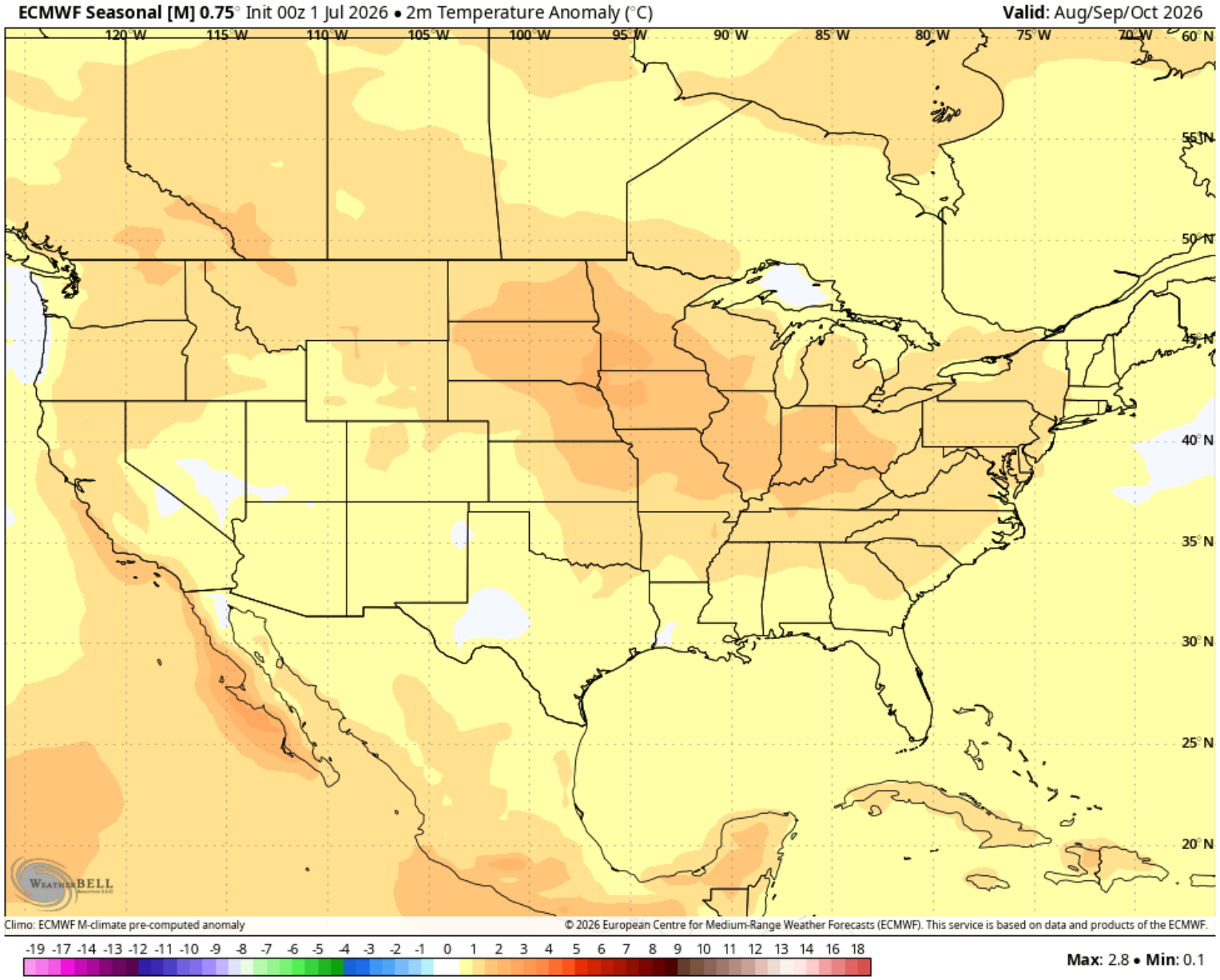
Forecast Precipitation Anomalies August to October 2026



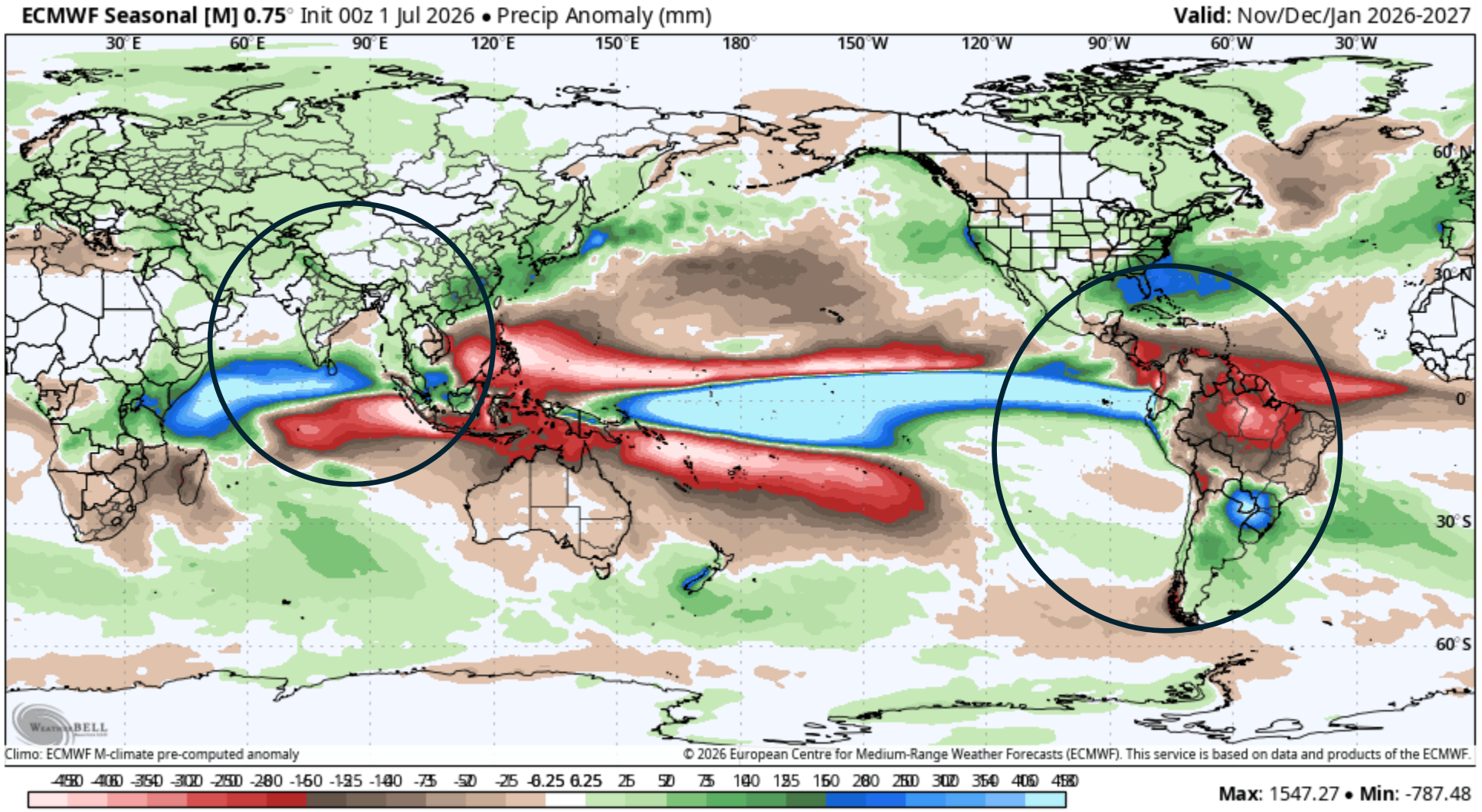
Forecast Precipitation Anomalies July to September 2026



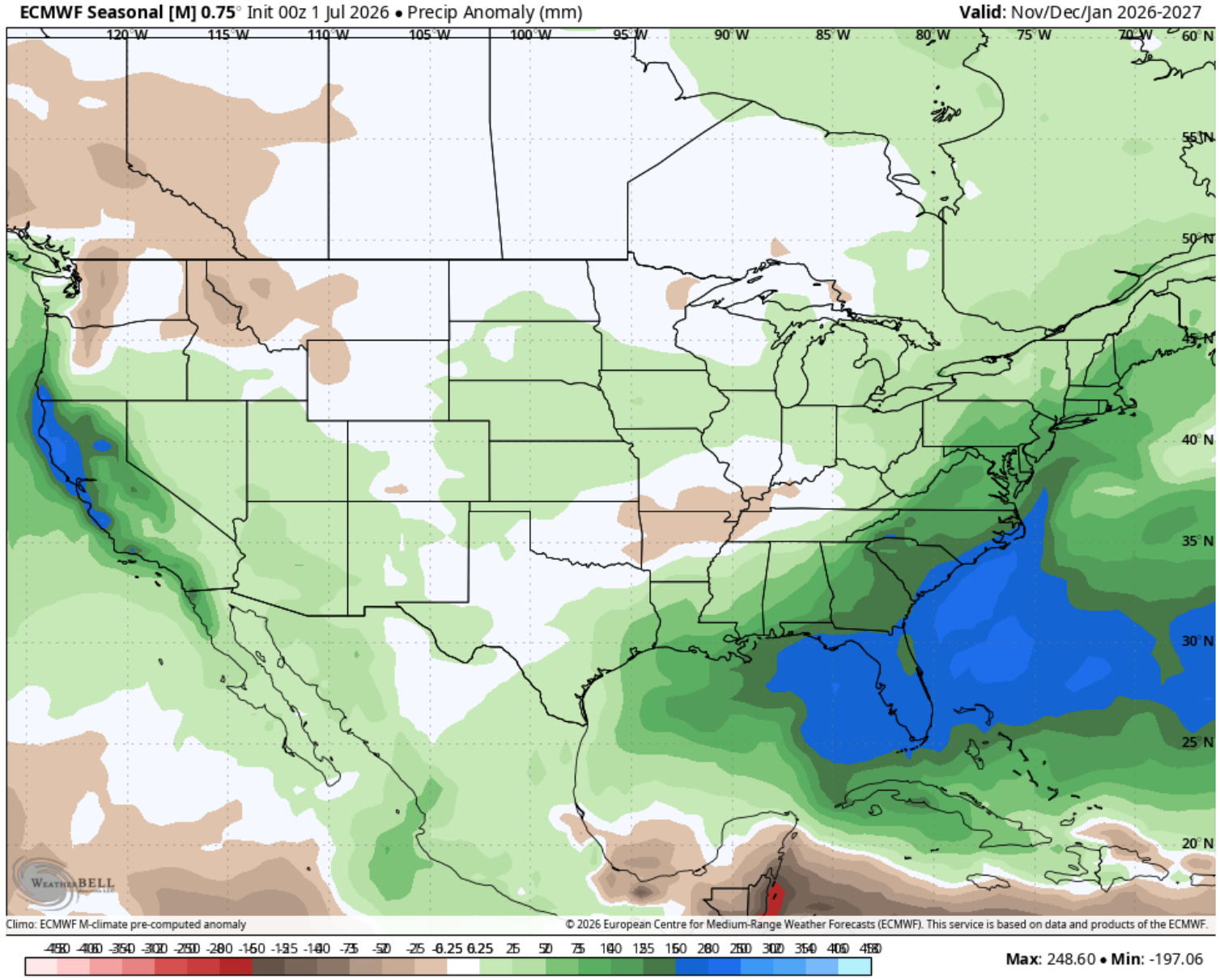
Forecast Temperature Anomalies July to September 2026



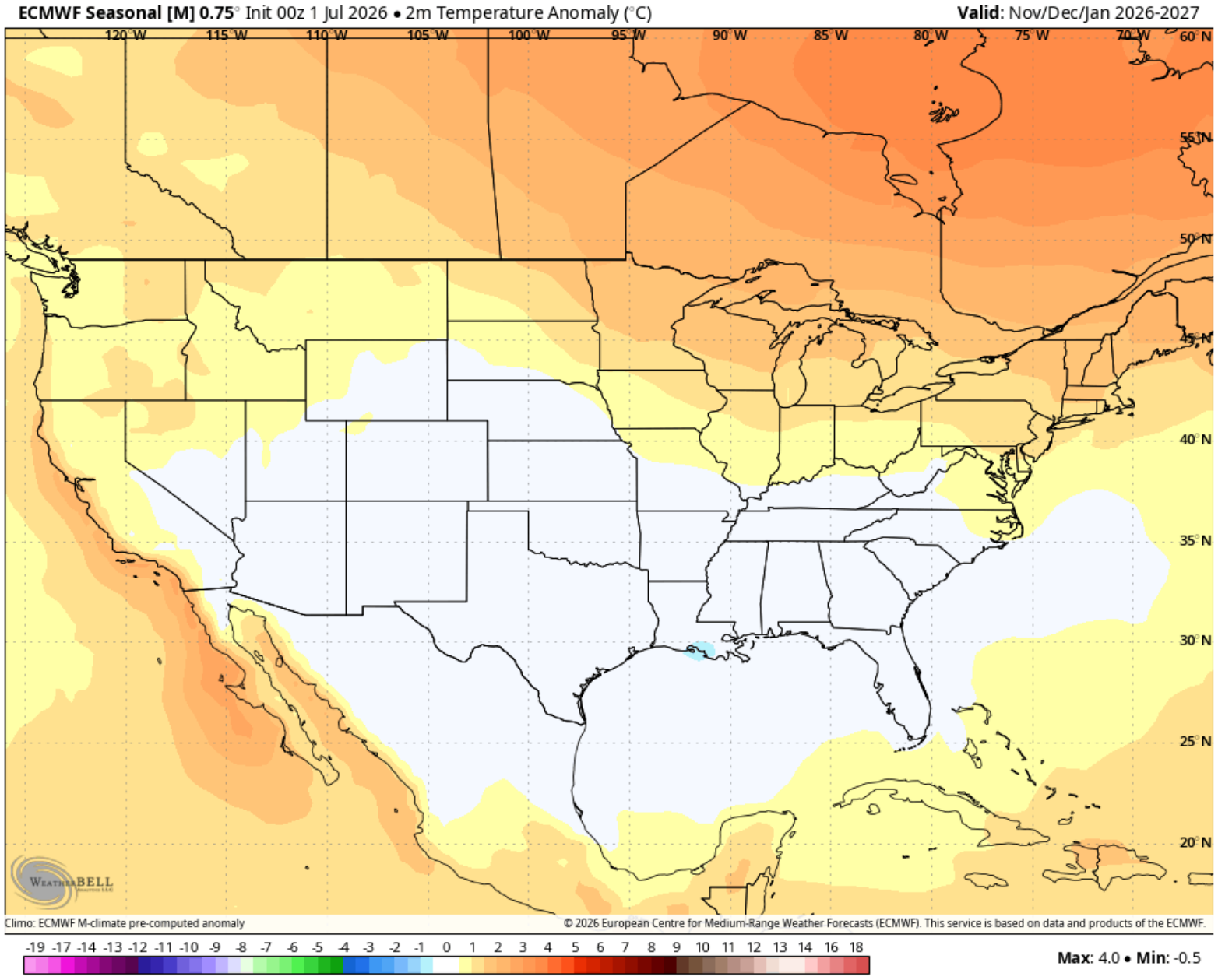
Forecast Precipitation Anomalies November to January 2027



Forecast Precipitation Anomalies November to January 2027



Forecast Temperature Anomalies November to January 2027



Summary

- India, Indonesia/Australia and parts of SA to have very dry conditions in many areas including parts of CA/Panama Canal. Some pockets of heavier rainfall for southern Brazil and Argentina.
- El Nino biggest impacts for USA will be fall through spring.
  - Above normal precipitation across the southern tier of the USA including CA, Southern Rockies, Southern Plains and Southeast, some drought relief.
  - Less Atlantic Hurricane Activity, Increased Hurricane/Typhoon activity in the Pacific.
  - Cooler in the southern tier of the USA, not as cold relative to average in the northern tier.
  - Could have below average precipitation PacNW across the Northern Rockies into the Northern Plains including North Dakota.
  - A natural response to a strong El Nino will be a possible La Nina late 2027-2028.

Questions?

don@dayweather.com