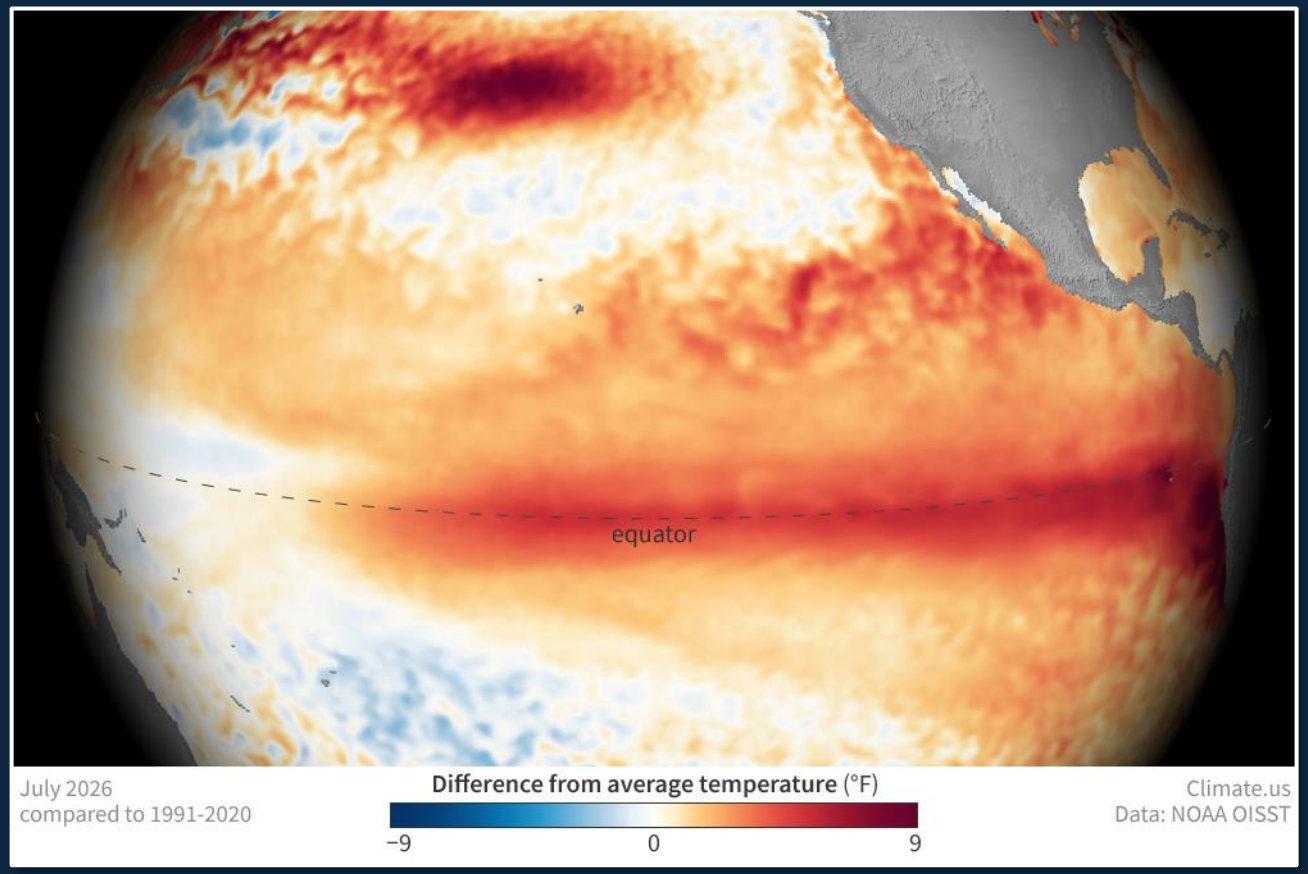
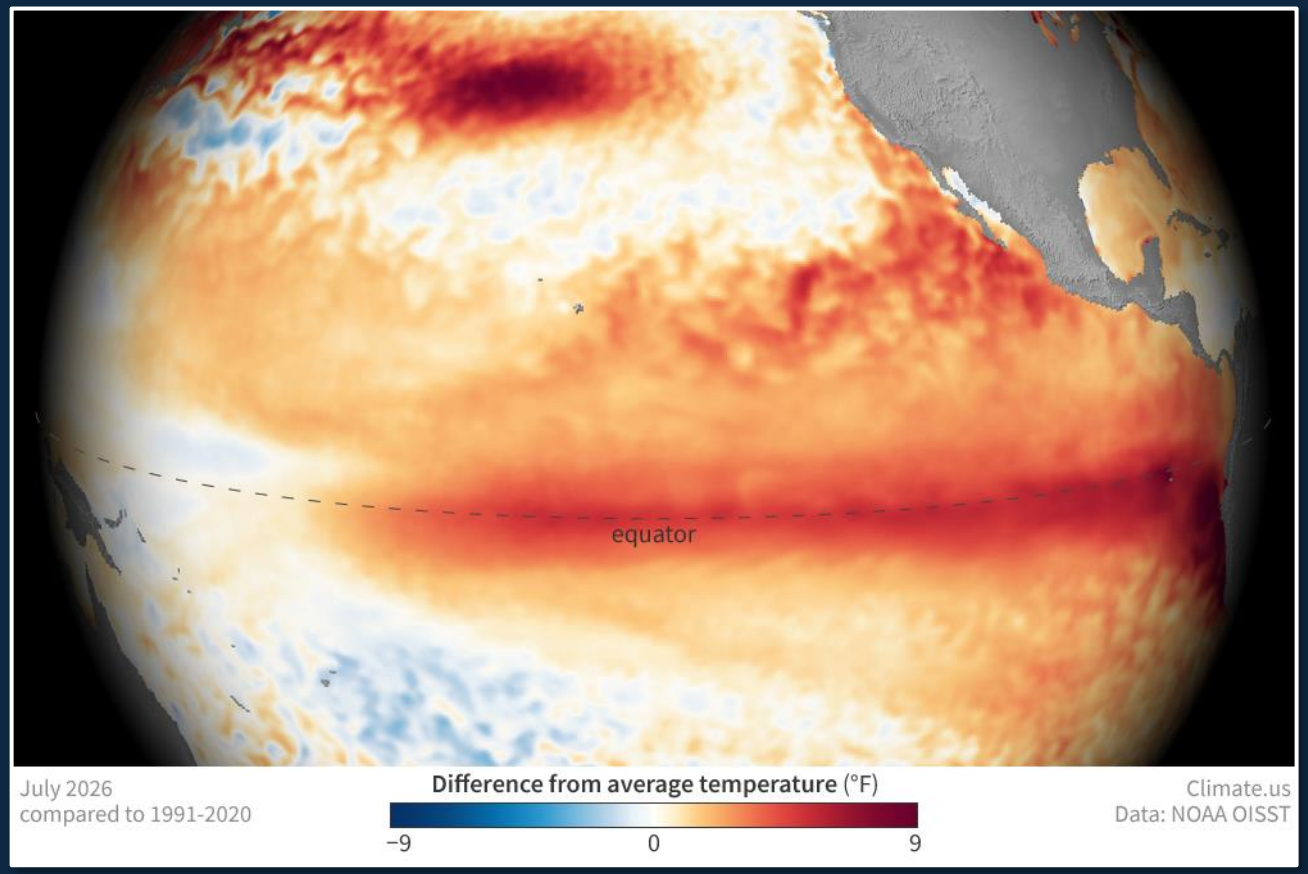


2026 Super El Niño ?

How will it affect our climate this winter ?

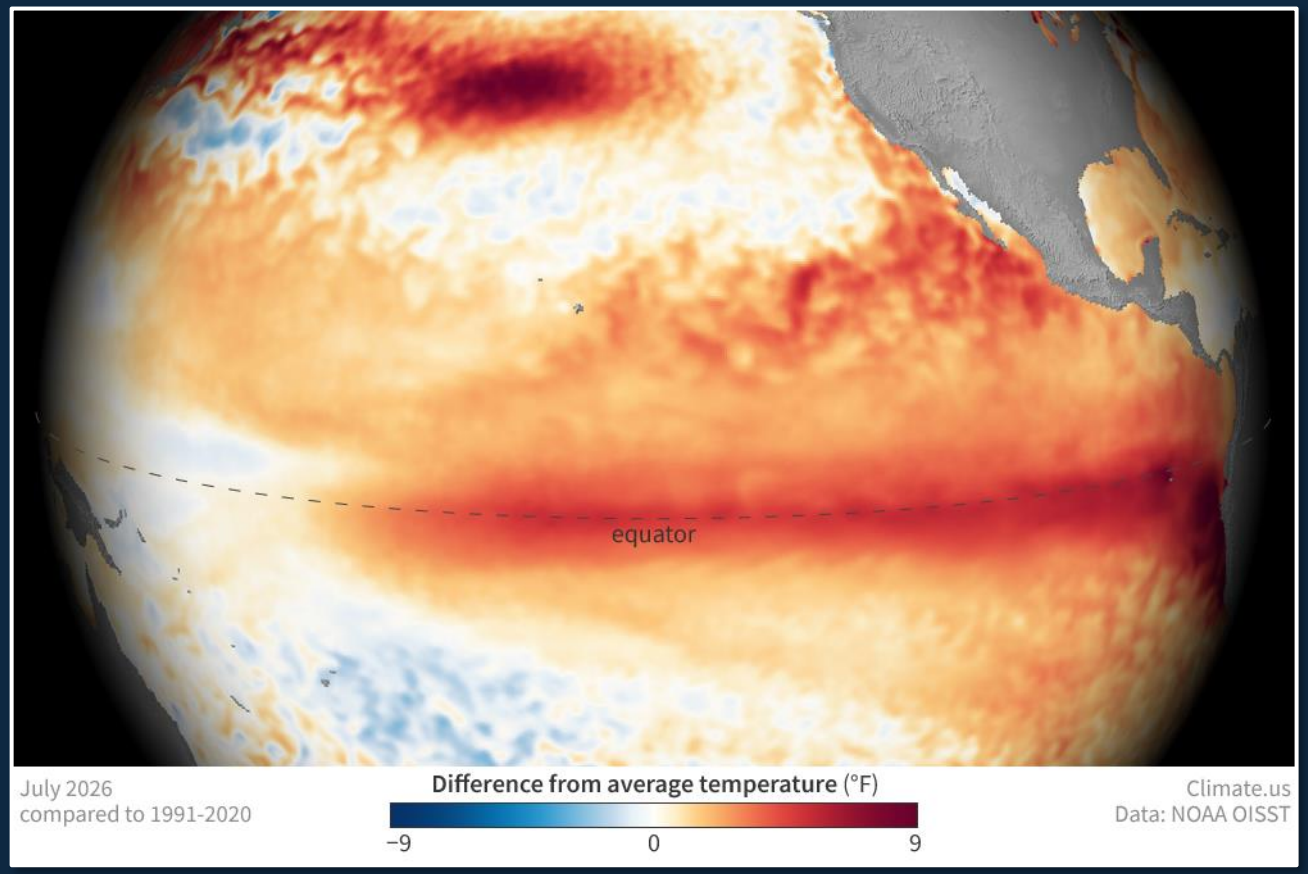
NSTA Webinar
September 10, 2026

Clara Deser
Senior Scientist
Climate Analysis Section
NCAR



Sep 10, 2026: NOAA Climate Prediction Center Advisory

https://cpc.ncep.noaa.gov/products/analysis_monitoring/enso_advisory/ensodisc.shtml



"El Niño is strengthening, with a greater than 90% chance of a very strong event during the Northern Hemisphere fall and winter 2026-27."

Sep 10, 2026: NOAA Climate Prediction Center Advisory

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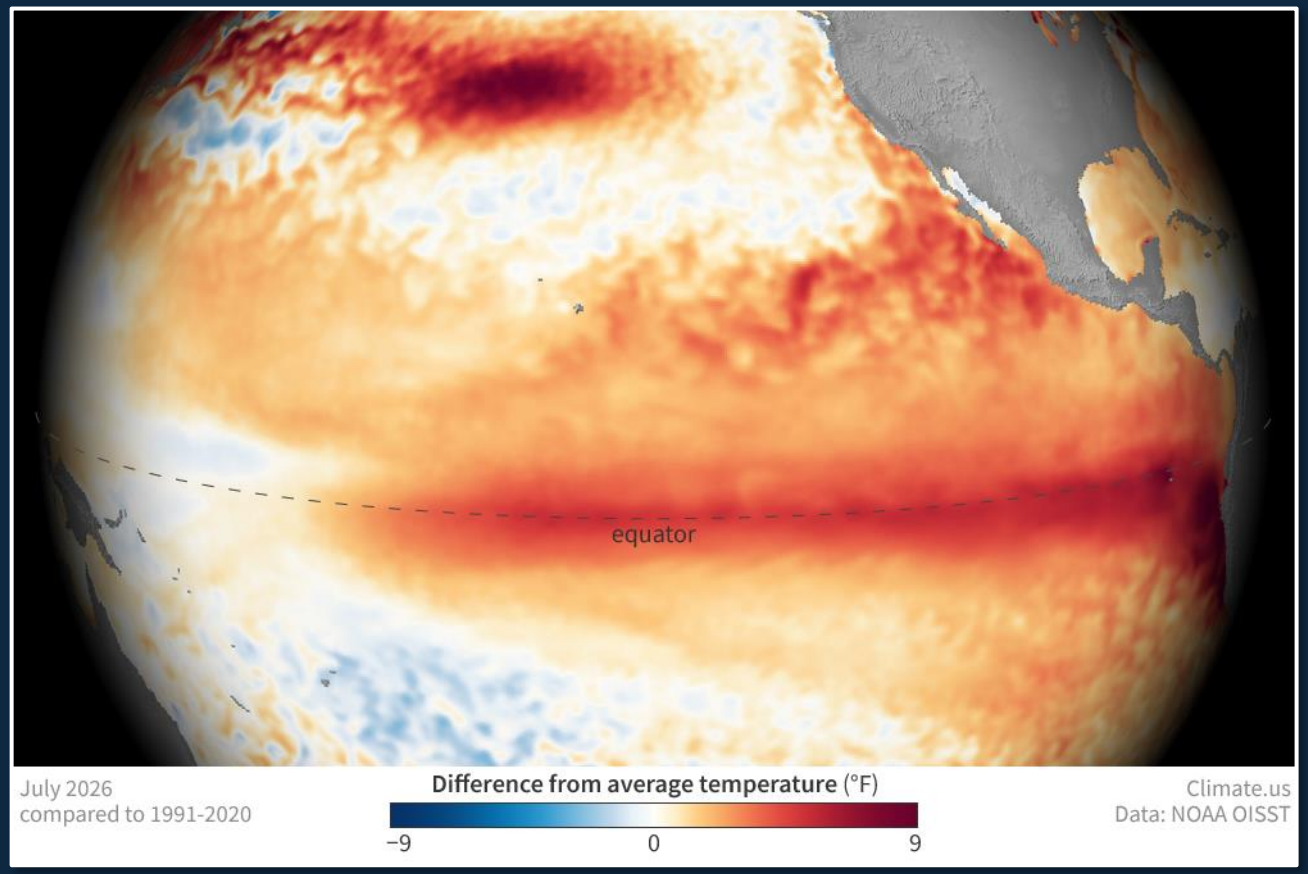

Today's Talk

1) What is El Niño?
2) How does it affect global climate?
3) What is the current status and outlook?

I will pause for questions after each section.

NSTA Webinar
September 10, 2026

My background

30 years at NCAR this month

The National Center for Atmospheric Research

Founded in 1960 with support from the National Science Foundation

Operated by a consortium of universities

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Research Aircraft for Field Campaigns

The National Center for Atmospheric Research

Founded in 1960 with support from the National Science Foundation

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Sun, Weather and Climate Models

The National Center for Atmospheric Research

Founded in 1960 with support from the National Science Foundation

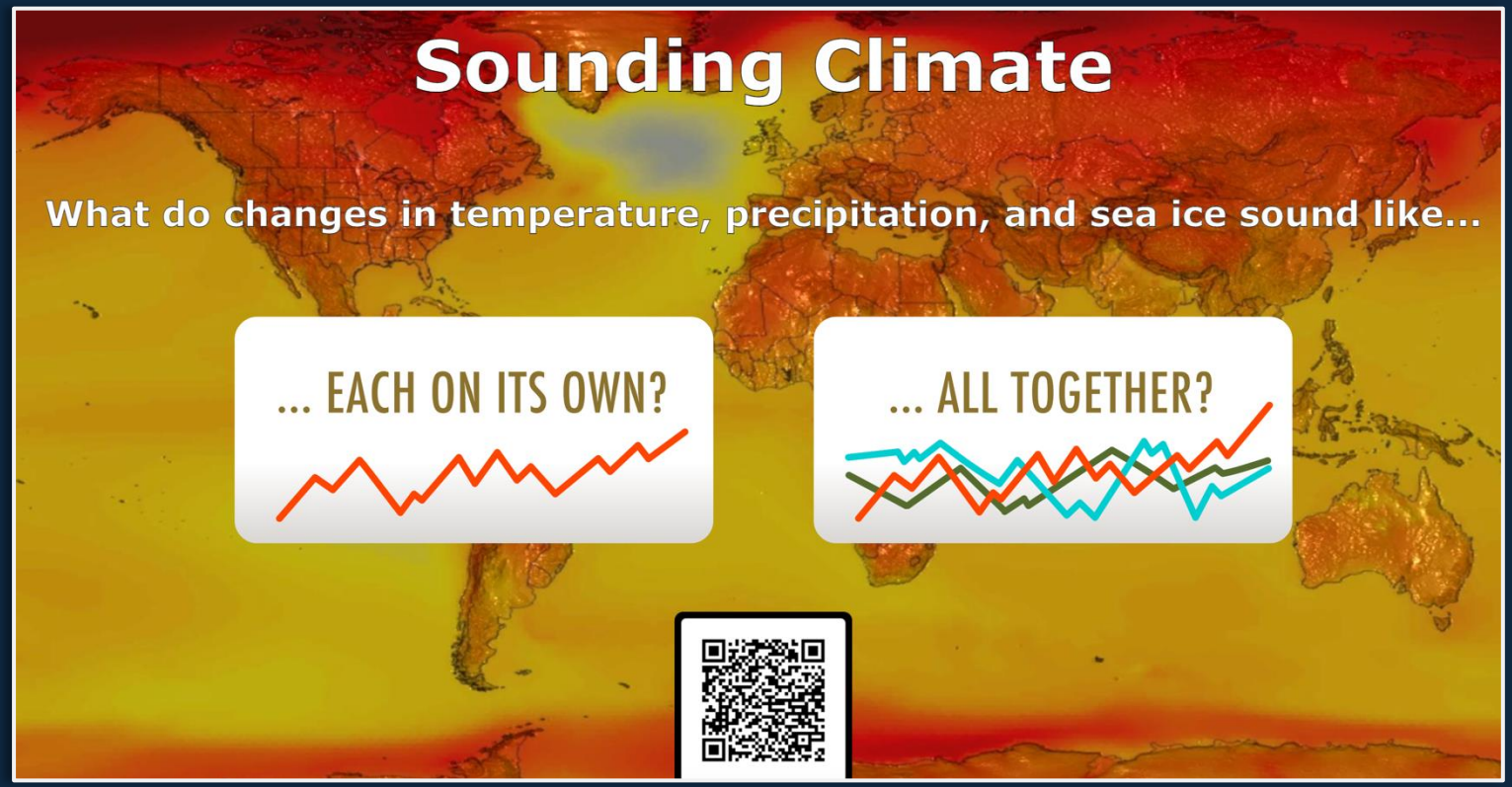
Operated by a consortium of universities

About Me

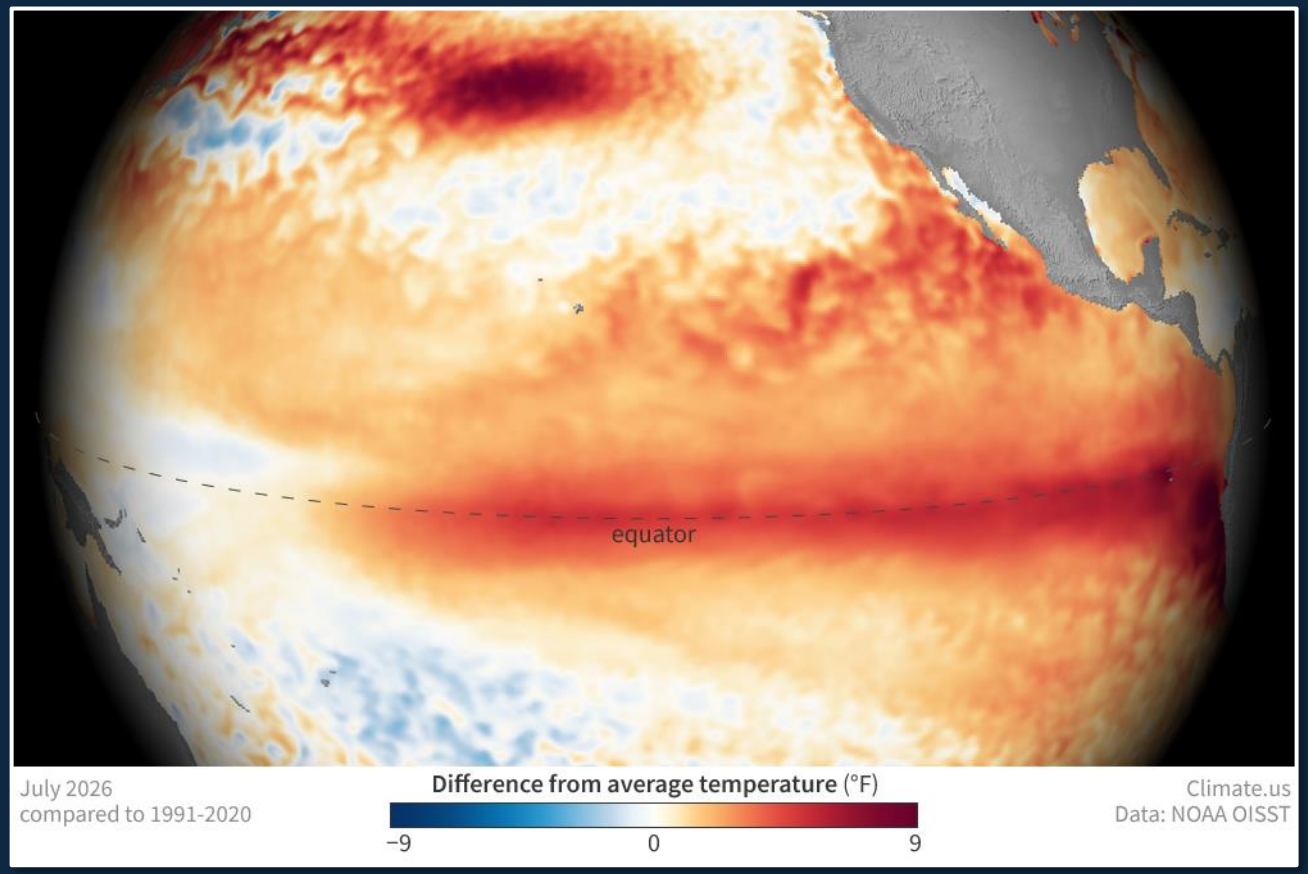
- B.S. at MIT in Earth and Planetary Sciences (1982)
- Sea-going oceanographer at the Woods Hole Oceanographic Institute (1983)
- Ph.D. at U. Washington in Atmospheric Sciences, 1989 (studied El Niño)
- Postdoc at University of Colorado
- NCAR Staff Scientist since 1997
- Research: Global climate variability and change in observations and models
- Member of the U.S. National Academy of Sciences

https://staff.cgd.ucar.edu/cdeser/

About Me



https://scied.ucar.edu/activity/sounding-climate-classroom



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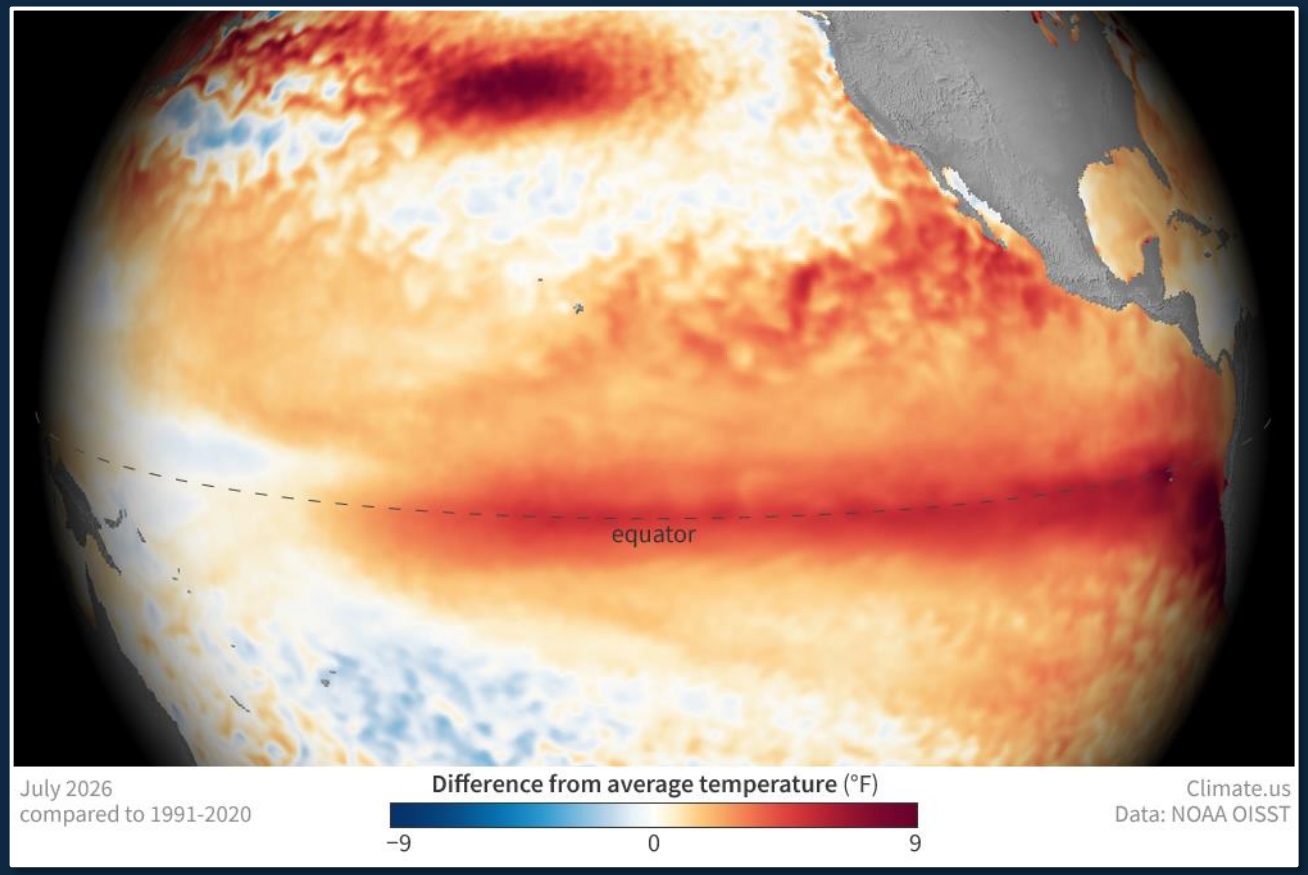
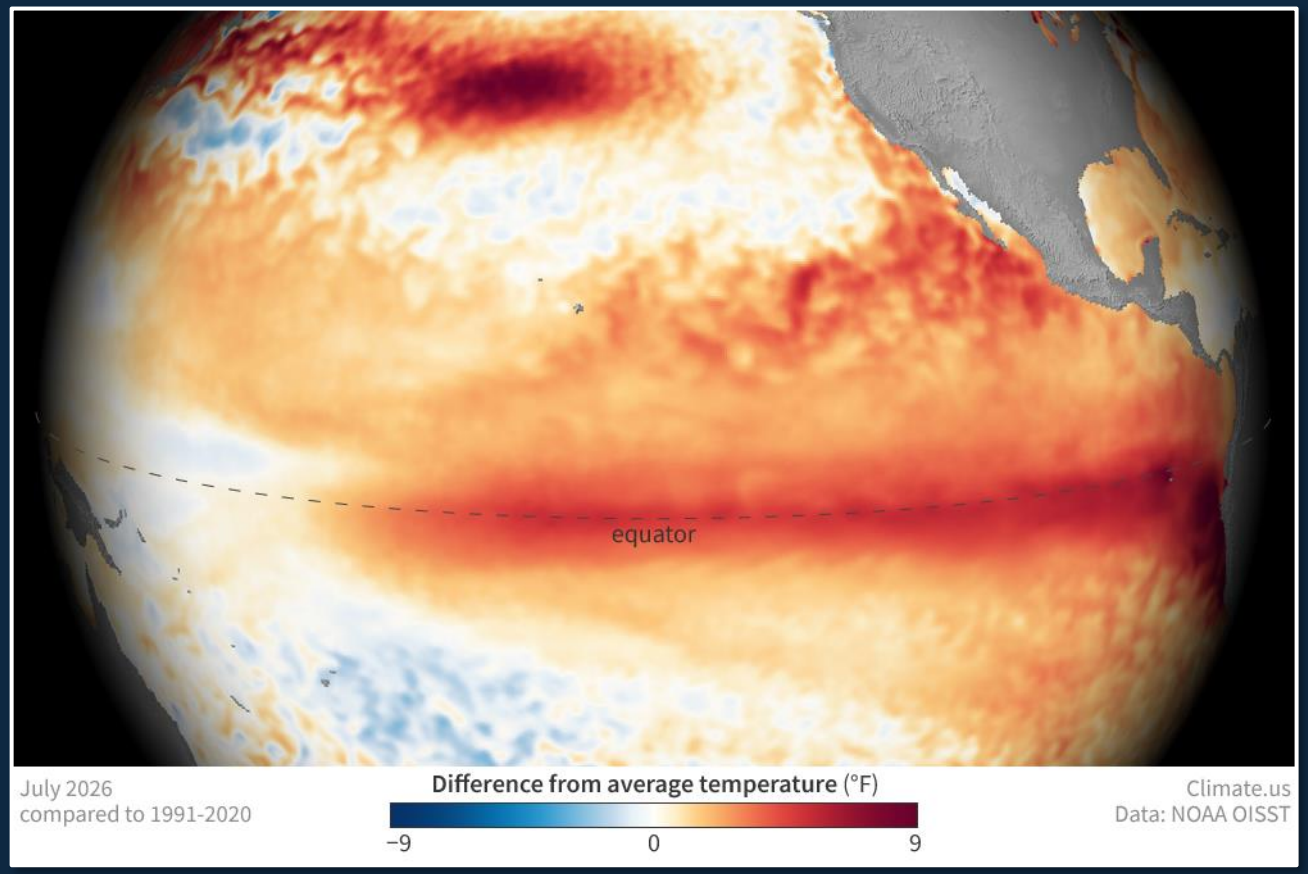


Sea Surface Temperature, July 2026
(departure from “normal”)

El Niño is the single-most impactful phenomenon of year-to-year climate variability worldwide.



Sea Surface Temperature, July 2026
(departure from “normal”)

El Niño is the single-most impactful phenomenon of year-to-year climate variability worldwide.

Fortunately, we have some predictive power based on physical understanding.

Ongoing impacts from the 2026 El Niño

Drought in India

Drought in Guatemala

Floods in Kenya

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Drought in India

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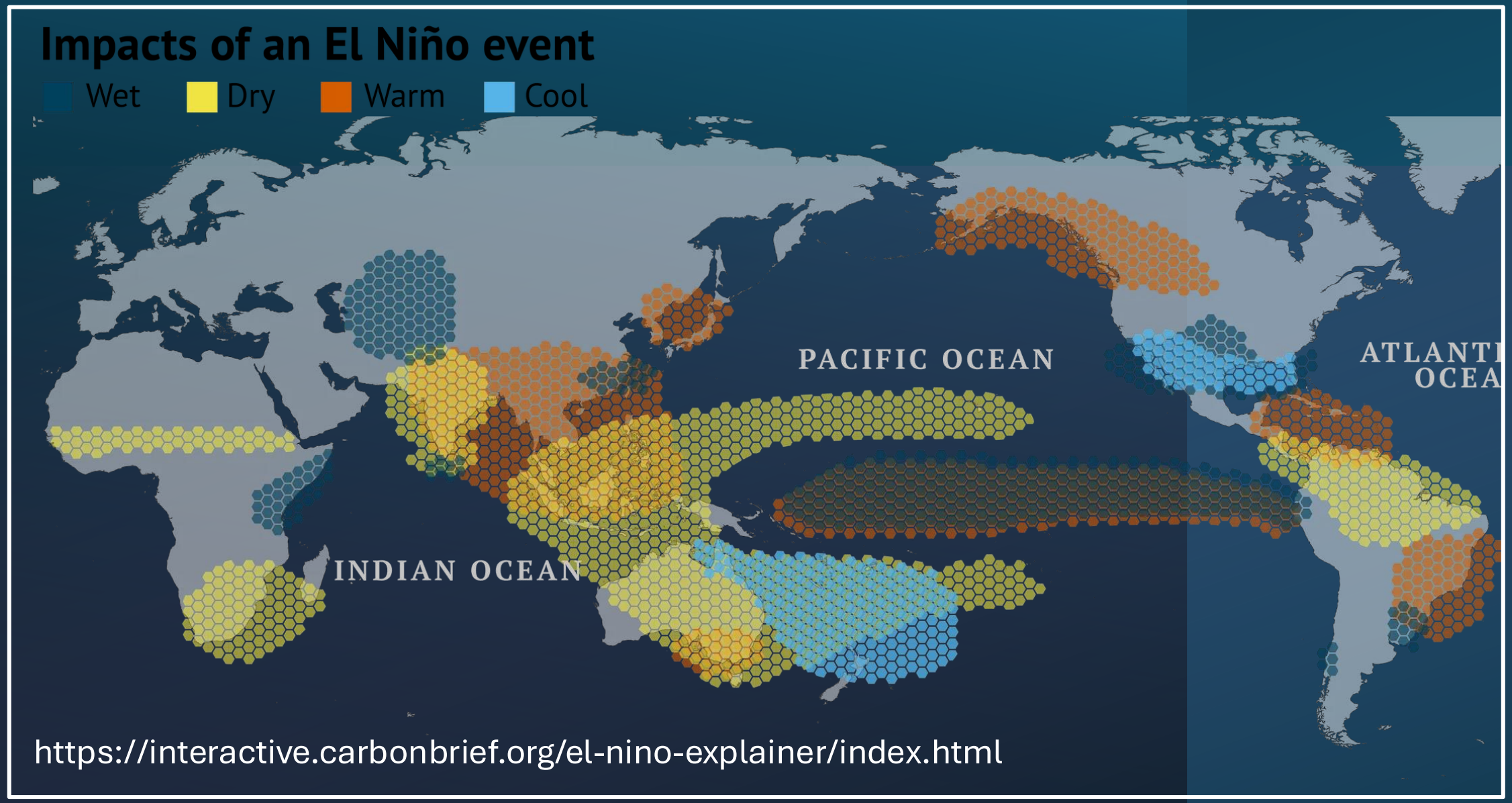
Floods in Kenya

Worldwide Impacts of El Niño



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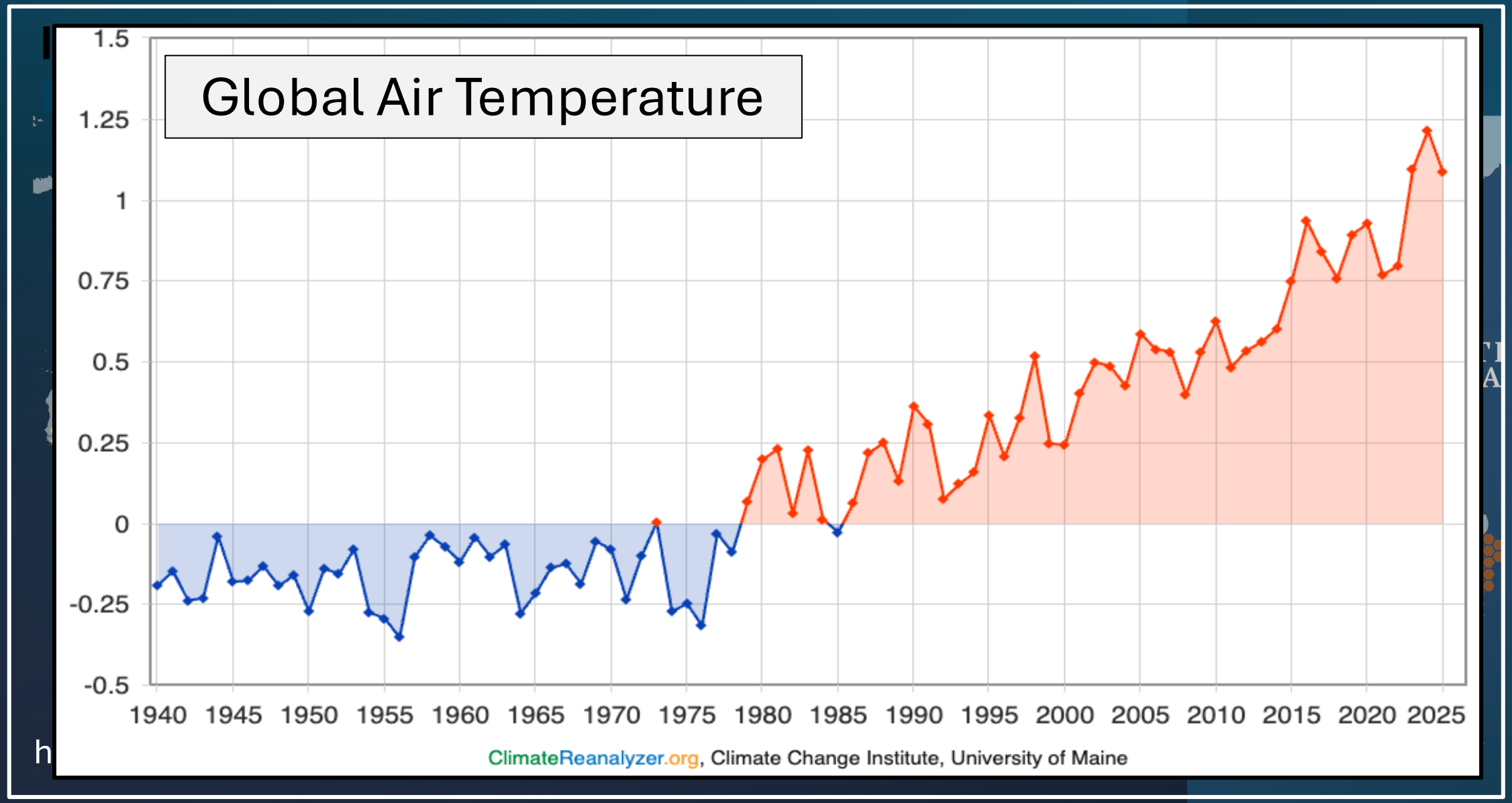

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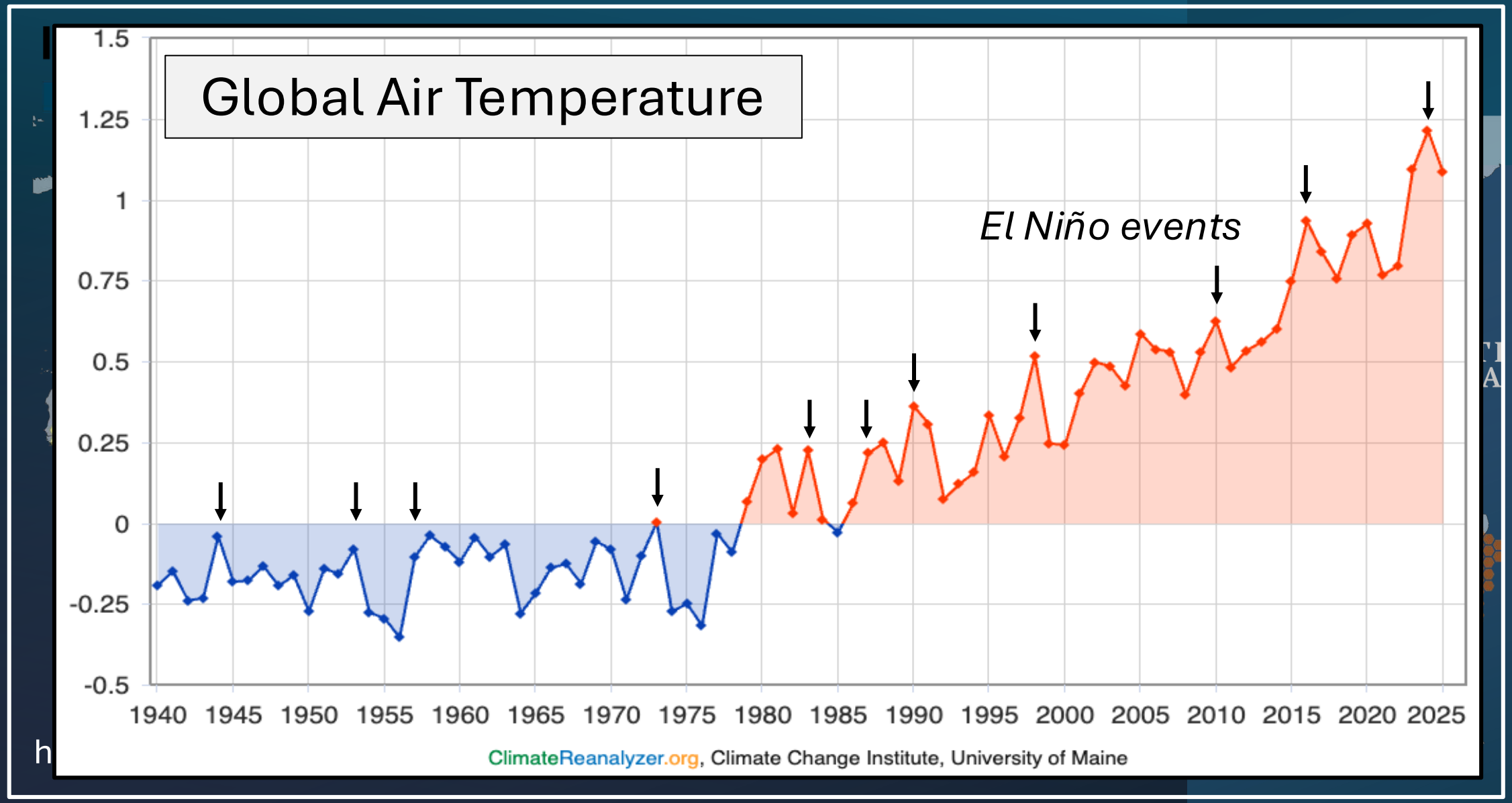

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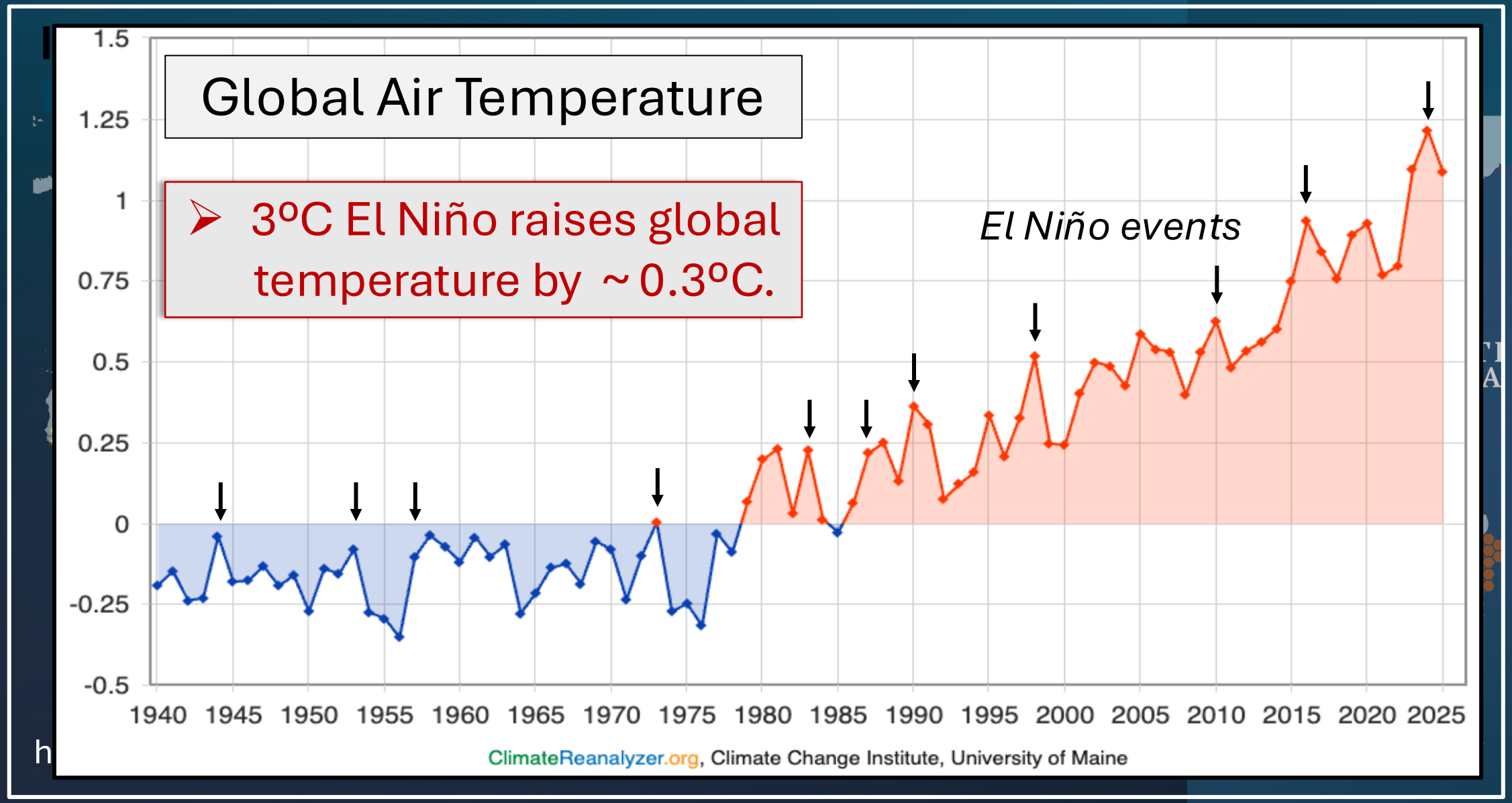

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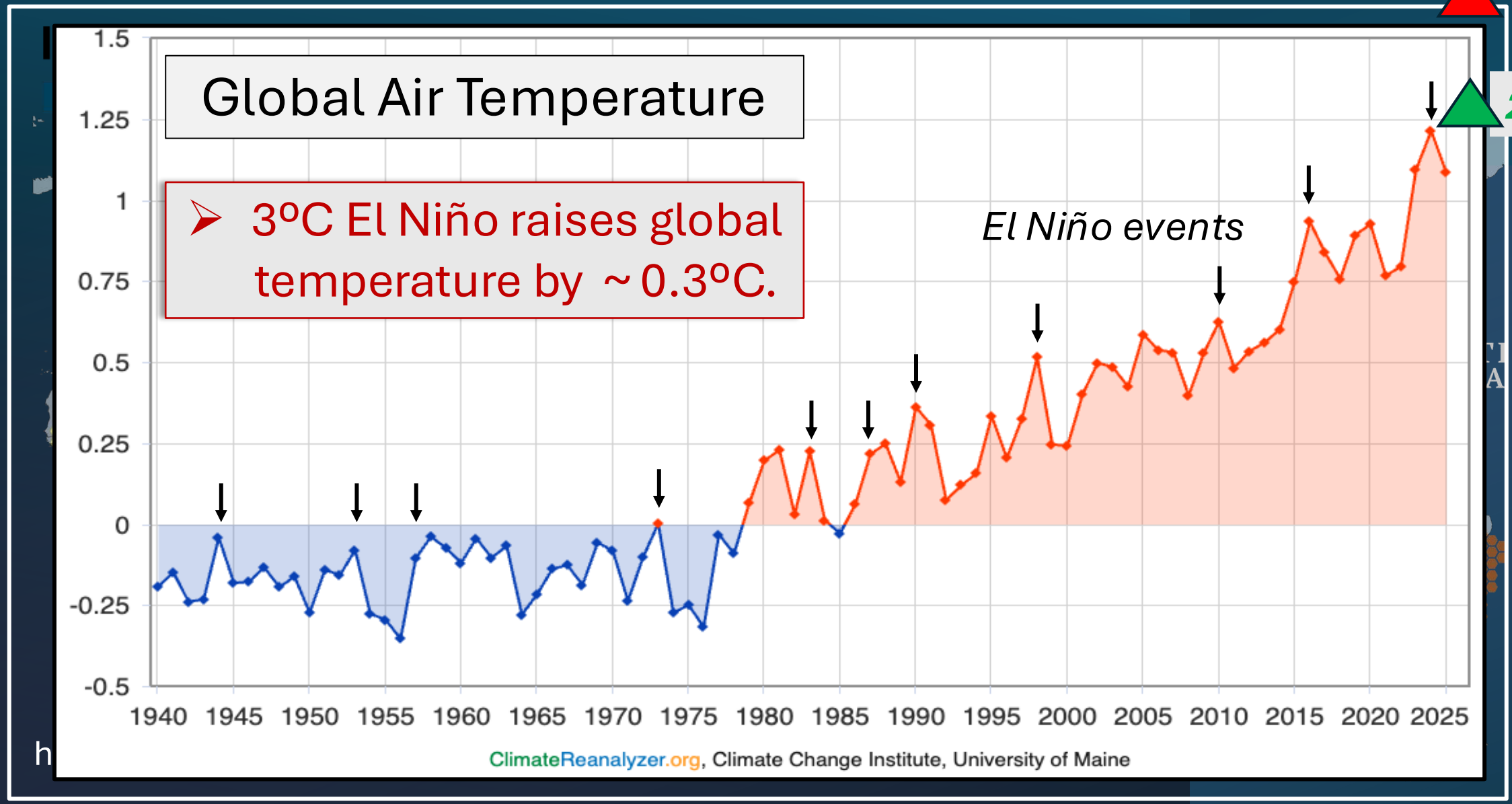
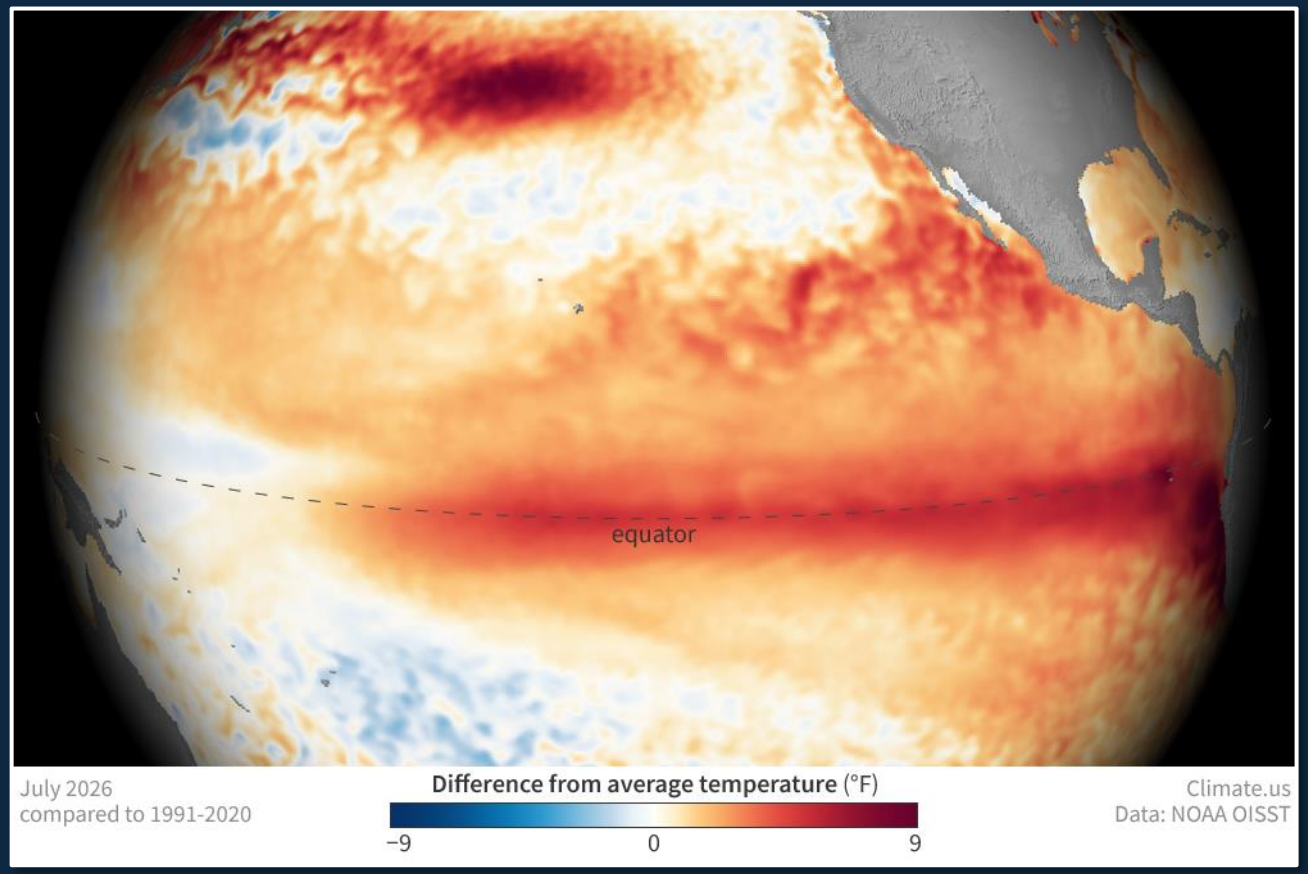
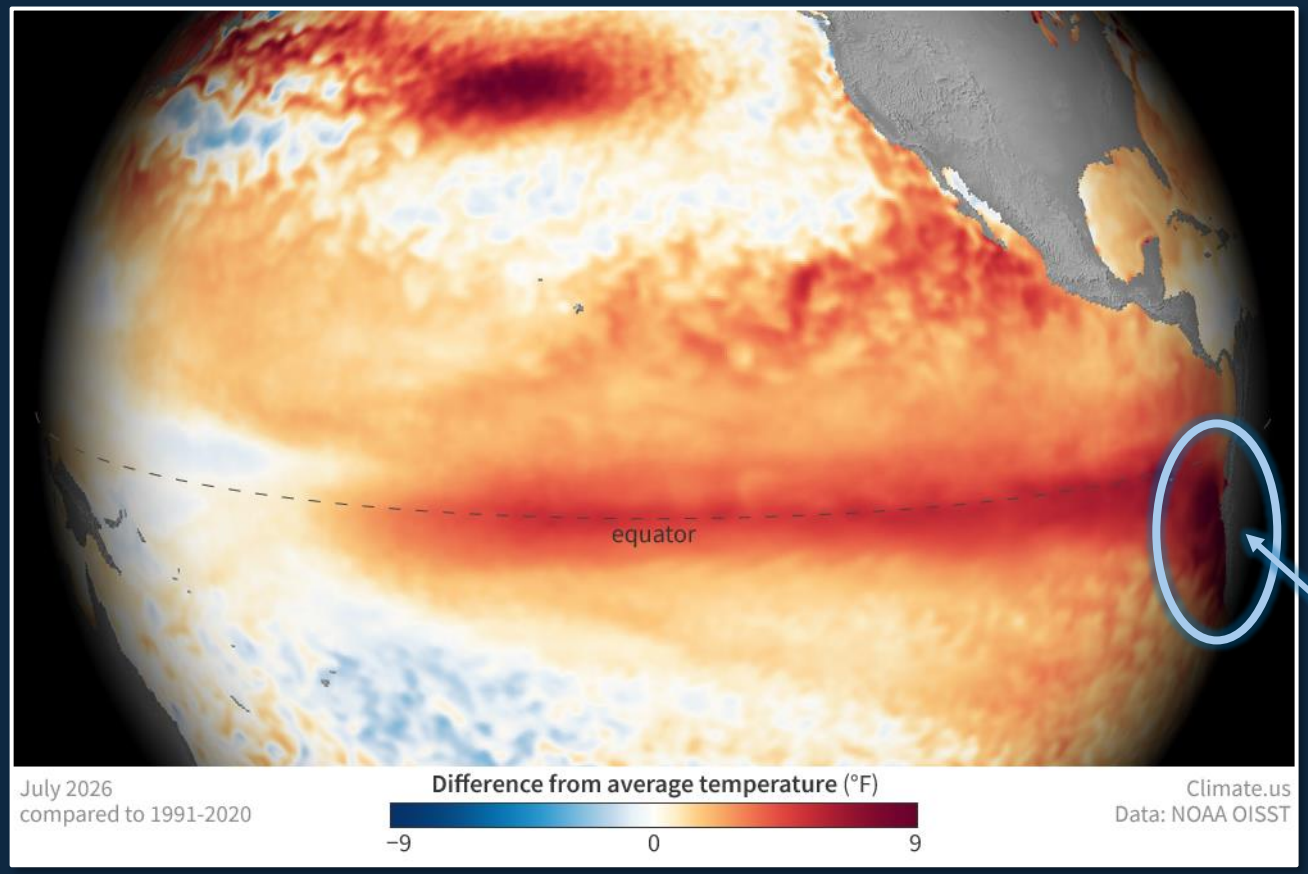




- What is El Niño ?



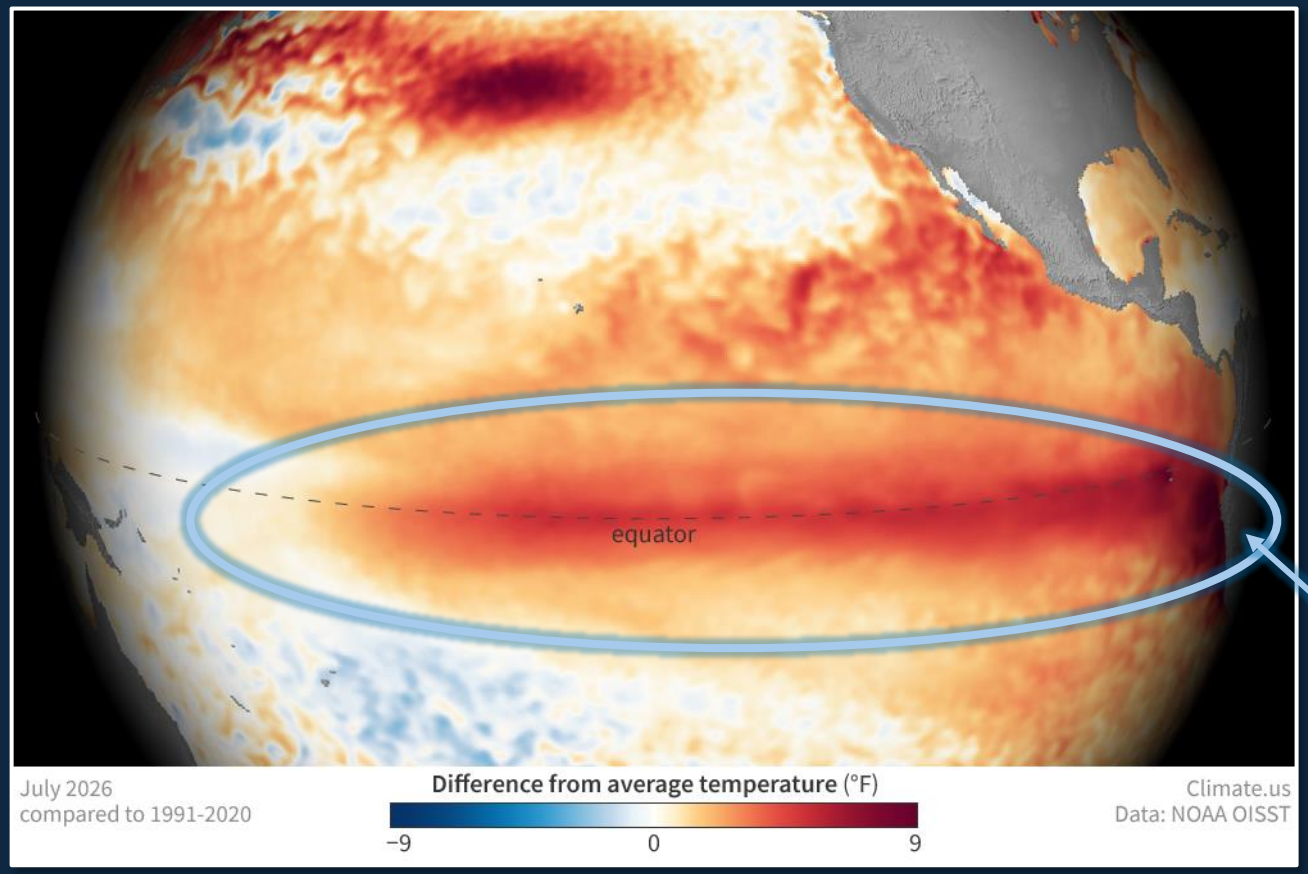
- # What is El Niño ?

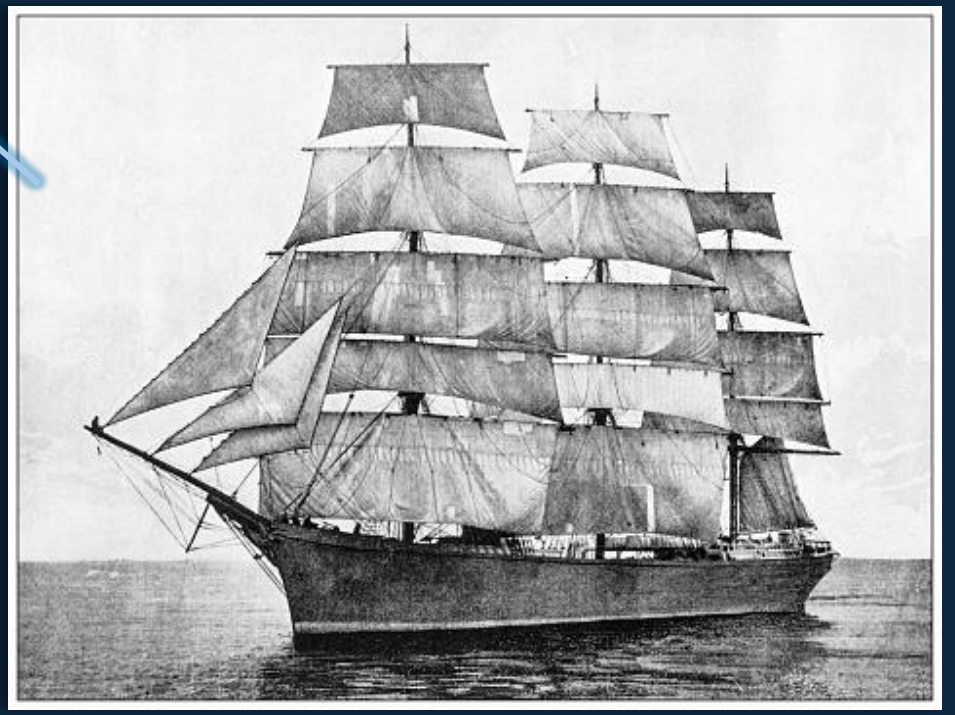
Early definition (circa 1500s):
A warm water current along Peru and Ecuador, appearing every 3-8 years around Christmas time
(“El Niño de Navidad”).

Detrimental for the local cold-water anchovy fishery.

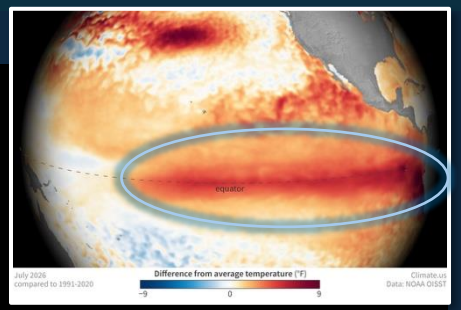
What is El Niño ?

Contemporary definition:
Episodic warming events that extend across the width of the equatorial Pacific Ocean (20,000 km).

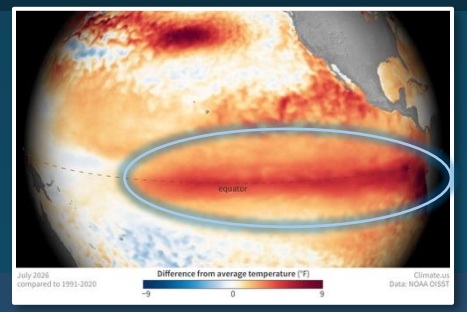




Record of sea surface temperatures in the equatorial Pacific Ocean since 1950



Record of sea surface temperatures in the equatorial Pacific Ocean since 1865



El Niño

La Niña

°C

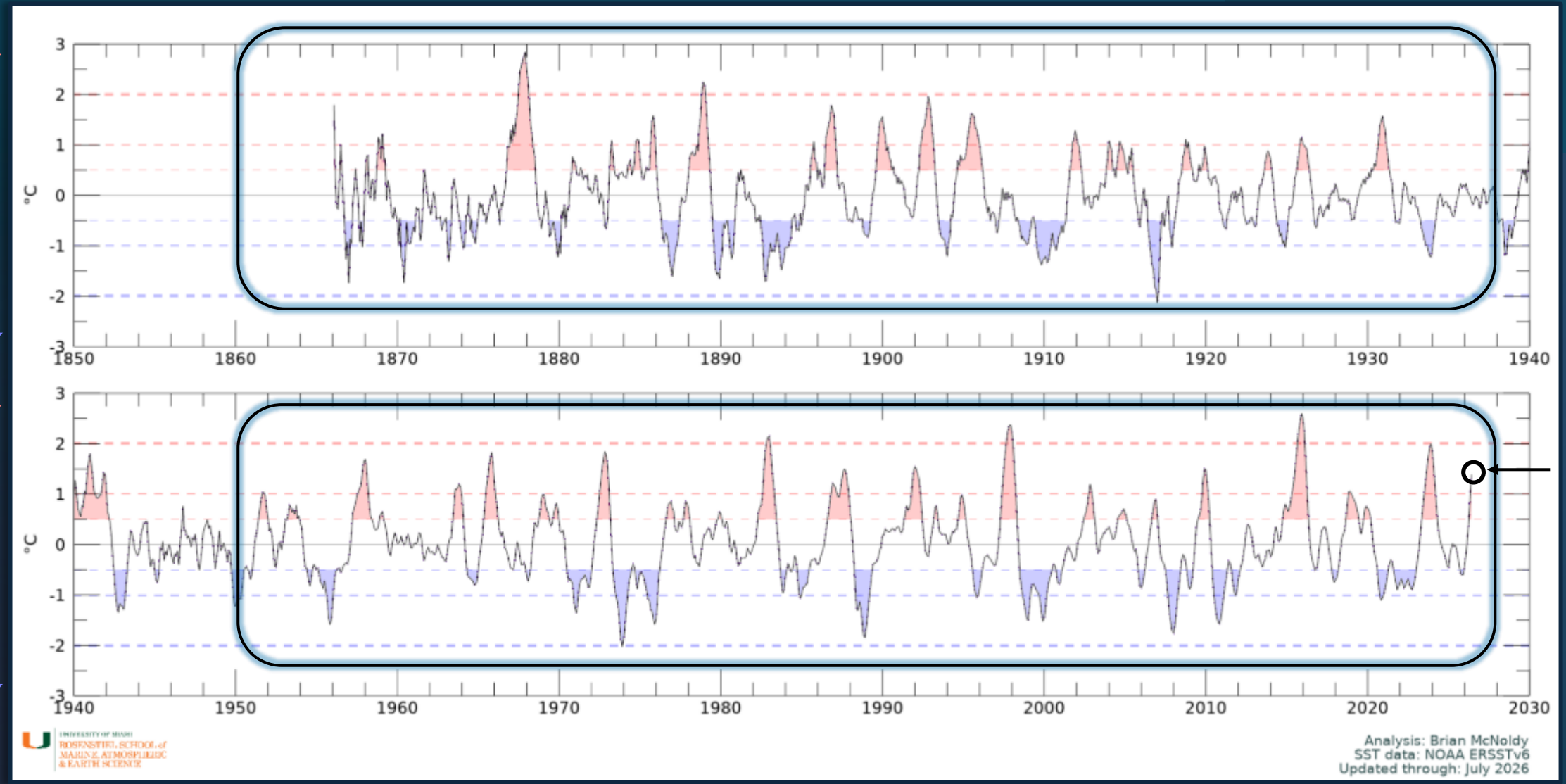
3
2
1
0
-1
-2
-3

1940
1950
1960
1970
1980
1990
2000
2010
2020
2030

JJA 2026

Analysis: Brian McNoldy
SST data: NOAA ERSSTv6
Updated through: July 2026

Record of sea surface temperatures in the equatorial Pacific Ocean since 1865



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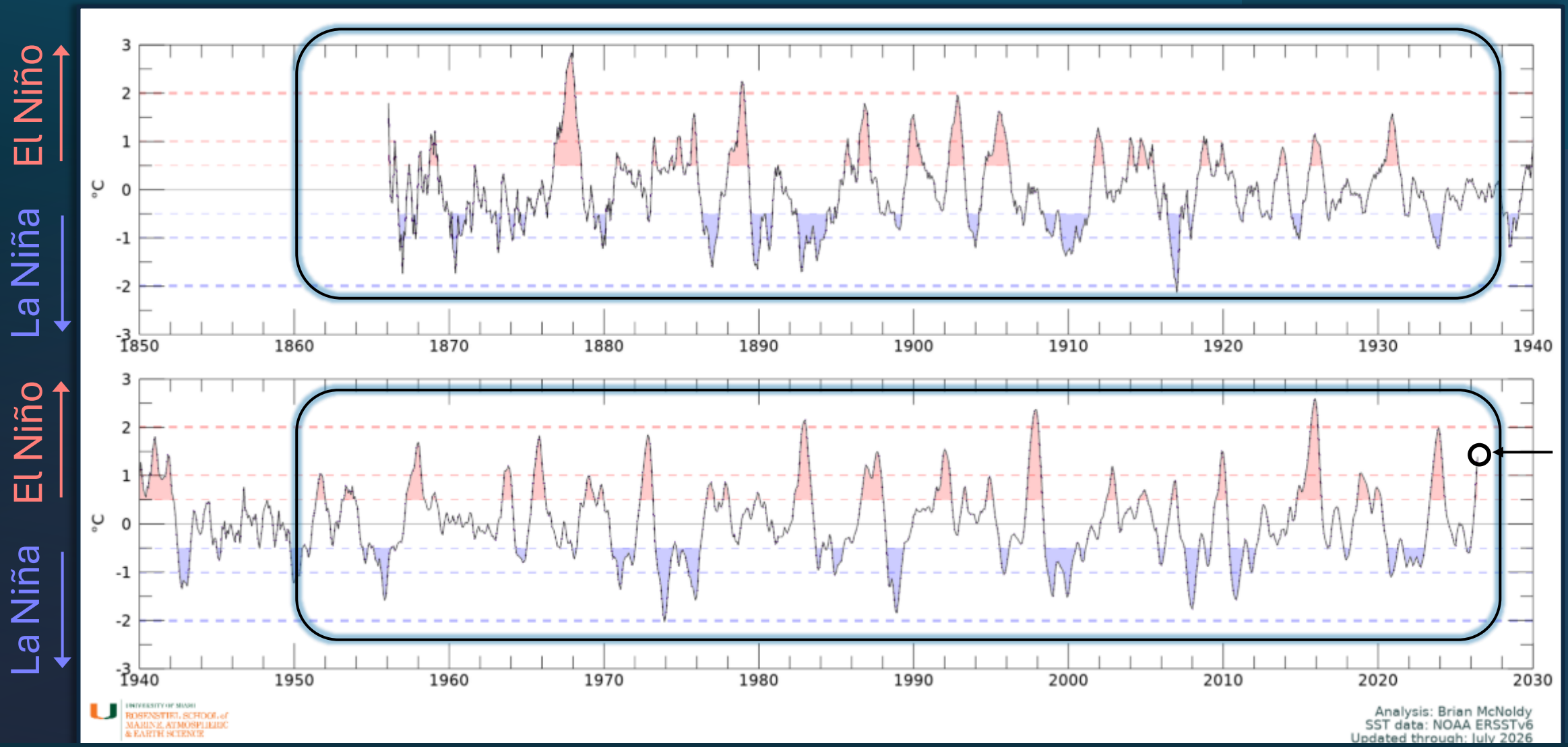
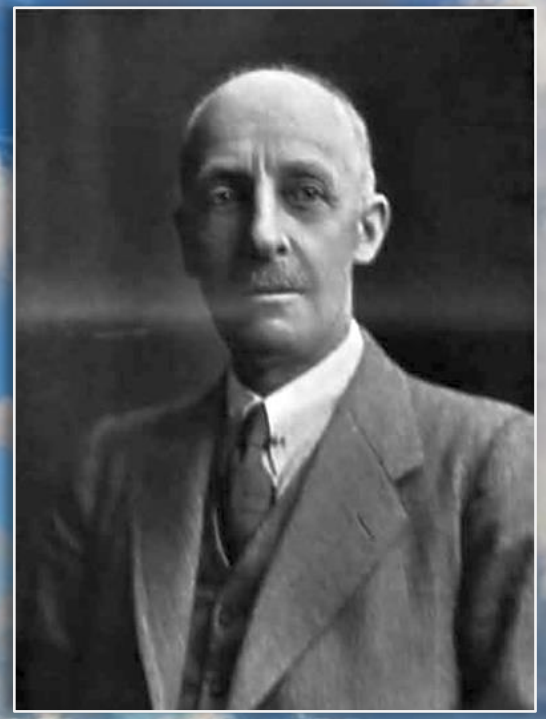


Irregular oscillation, difficult to predict more than ~6 months ahead of time.

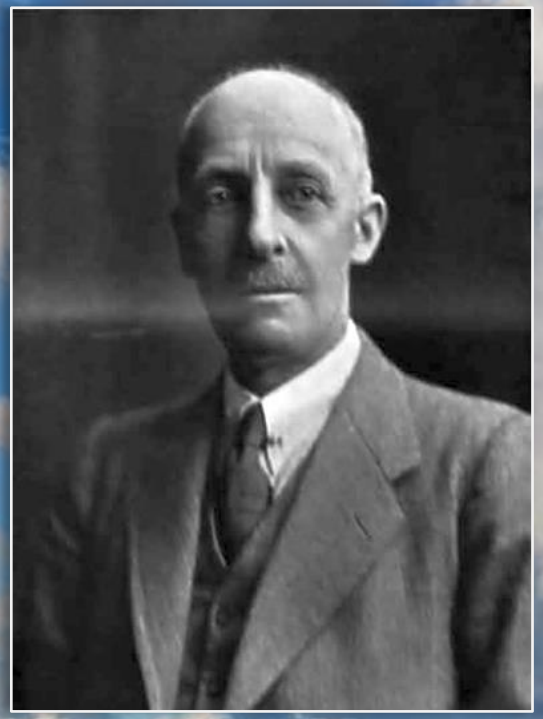
But El Niño is not just an oceanic phenomenon…

The Atmospheric “Southern Oscillation”



Sir Gilbert Walker
(1868-1958)

The Atmospheric “Southern Oscillation”



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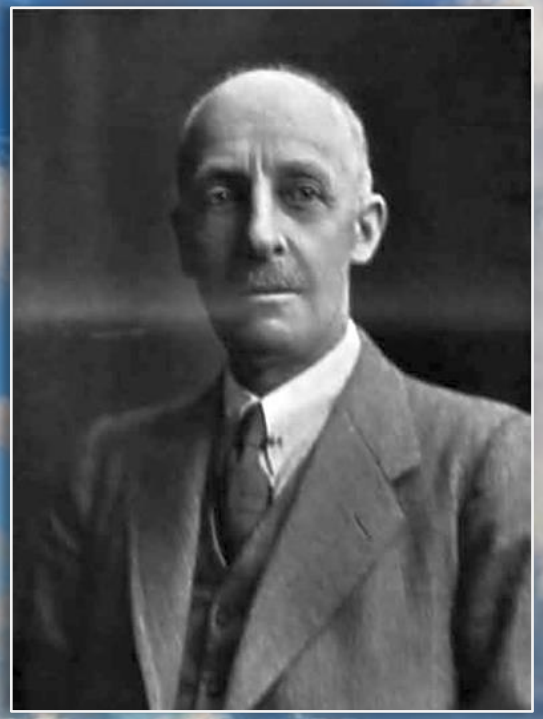

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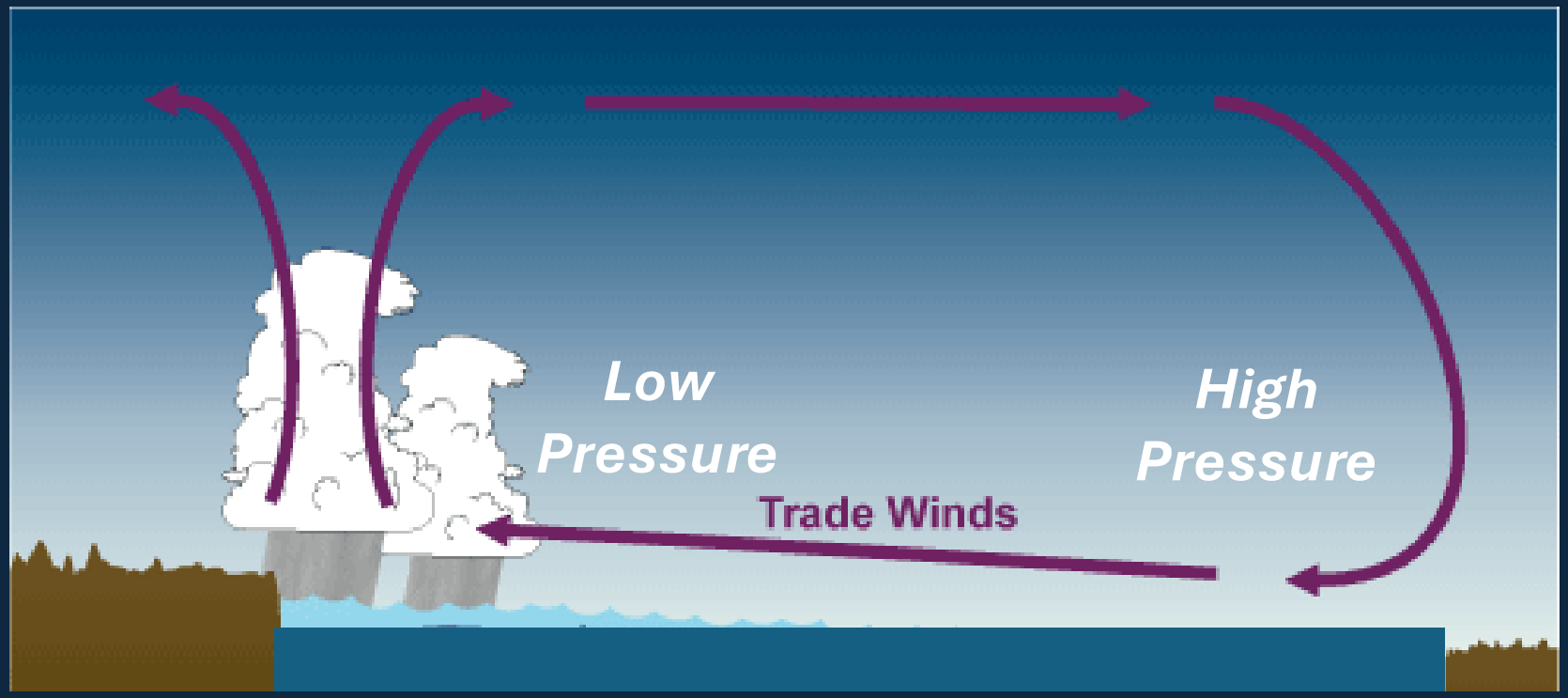
Discovered the “Southern Oscillation”, a barometric pressure seesaw between the tropical Indian and Pacific Oceans, which is directly correlated with the strength of the Pacific Trade Winds.

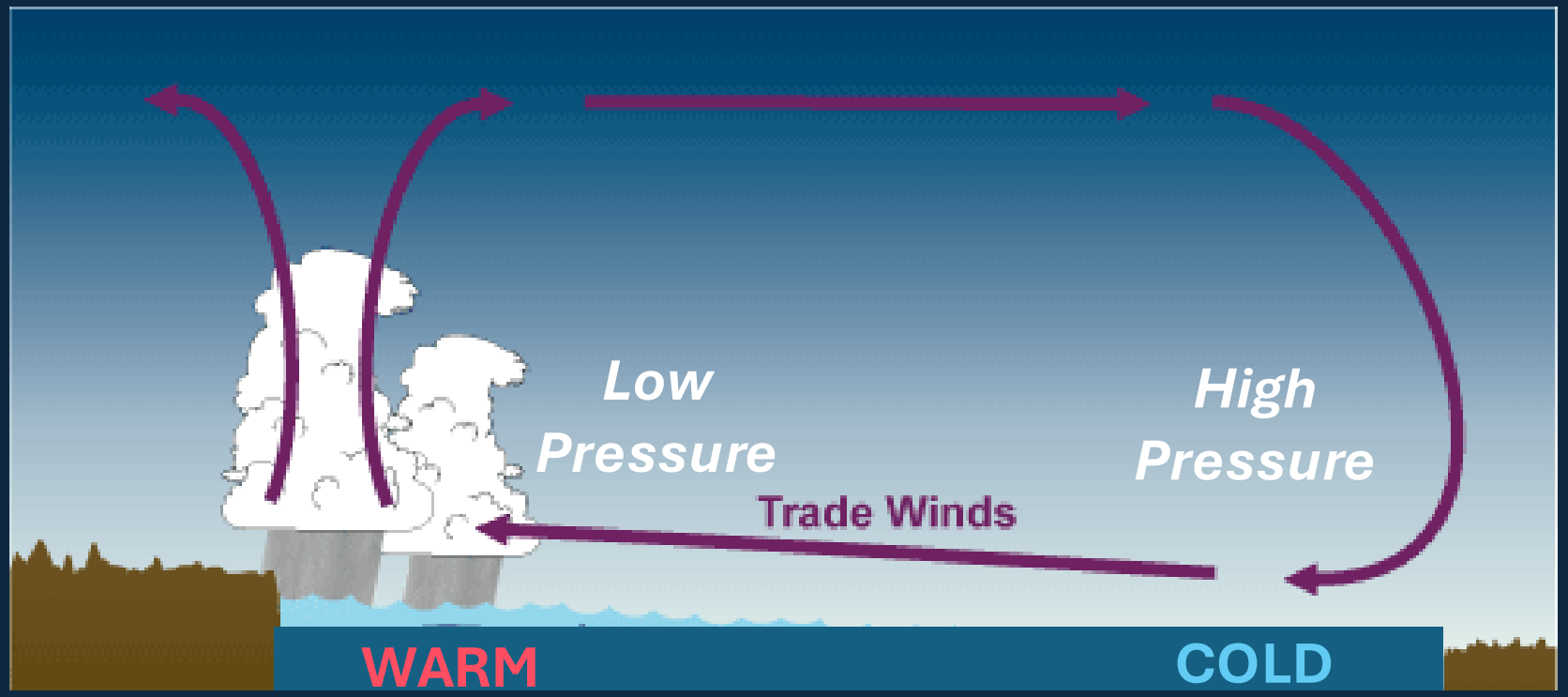
The “Southern Oscillation” (aka “Walker Circulation”)



Indonesia Pacific Ocean (20,000 km) Peru

- Winds blow from high to low pressure on the equator.
- The strength of this circulation varies from year-to-year.

The “Southern Oscillation” (aka “Walker Circulation”)



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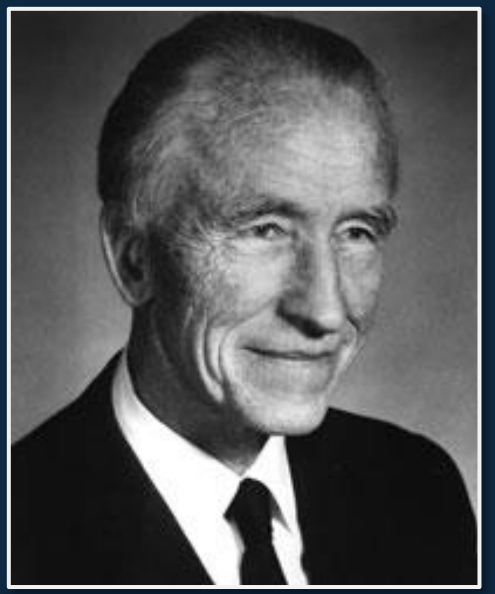
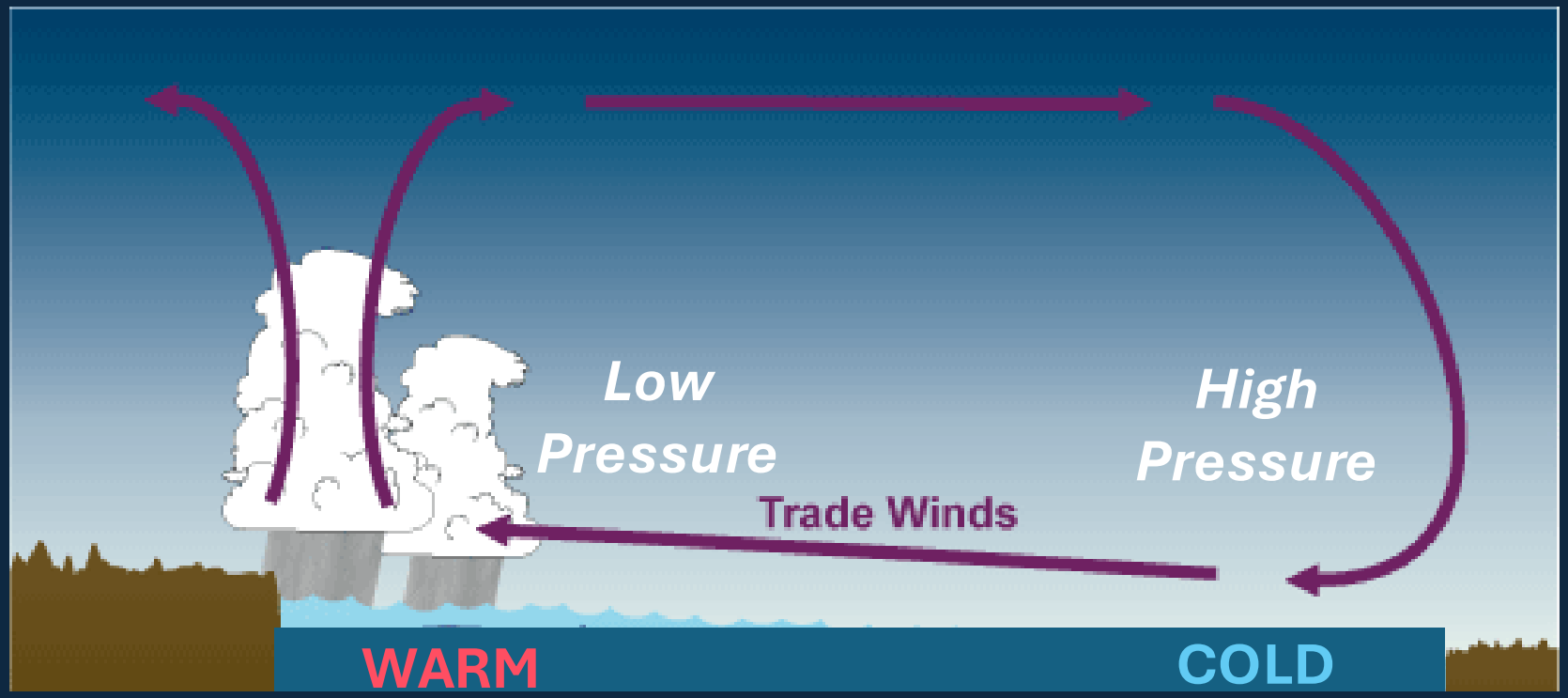
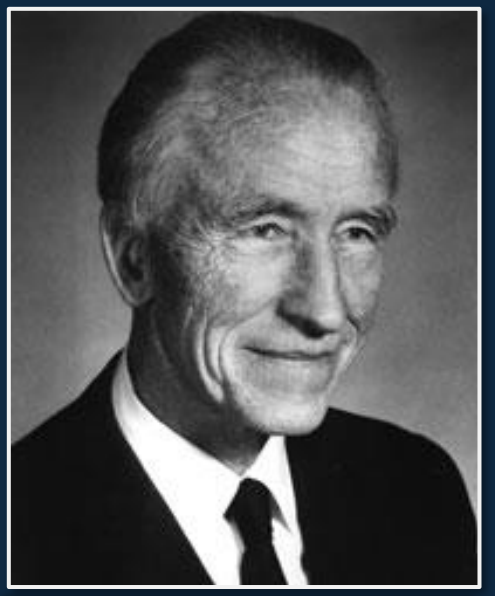


Jacob Bjerknes
(1897-1975)

The “Southern Oscillation” (aka “Walker Circulation”)





Jacob Bjerknes (1897-1975)

- Recognized that sea surface temperatures associated with El Niño and Trade Wind strength associated with the Southern Oscillation are mutually connected (1966, 1969).

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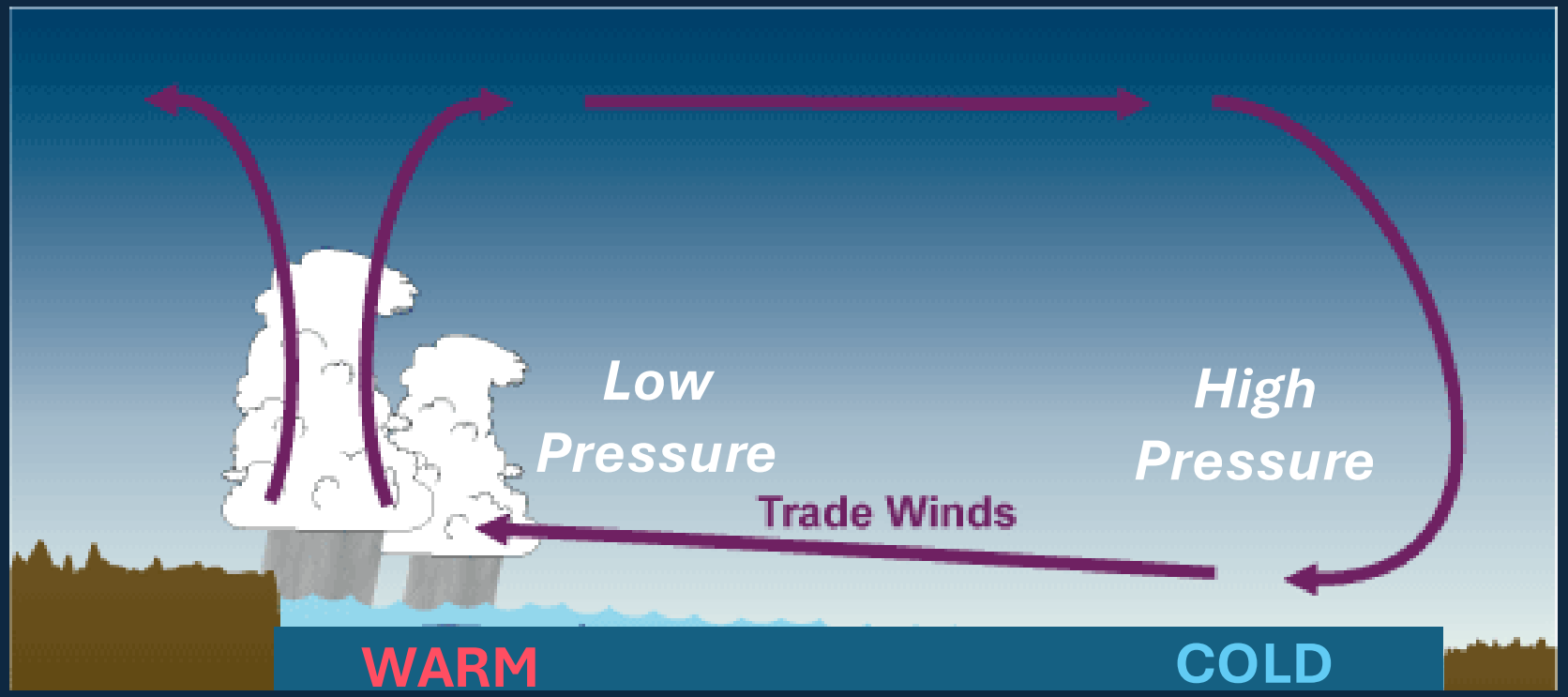

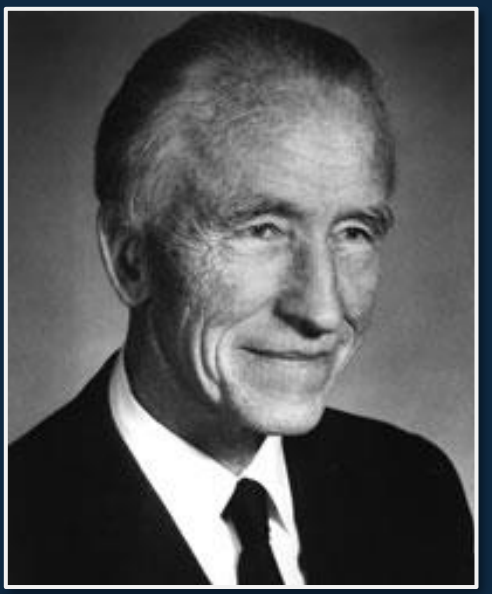

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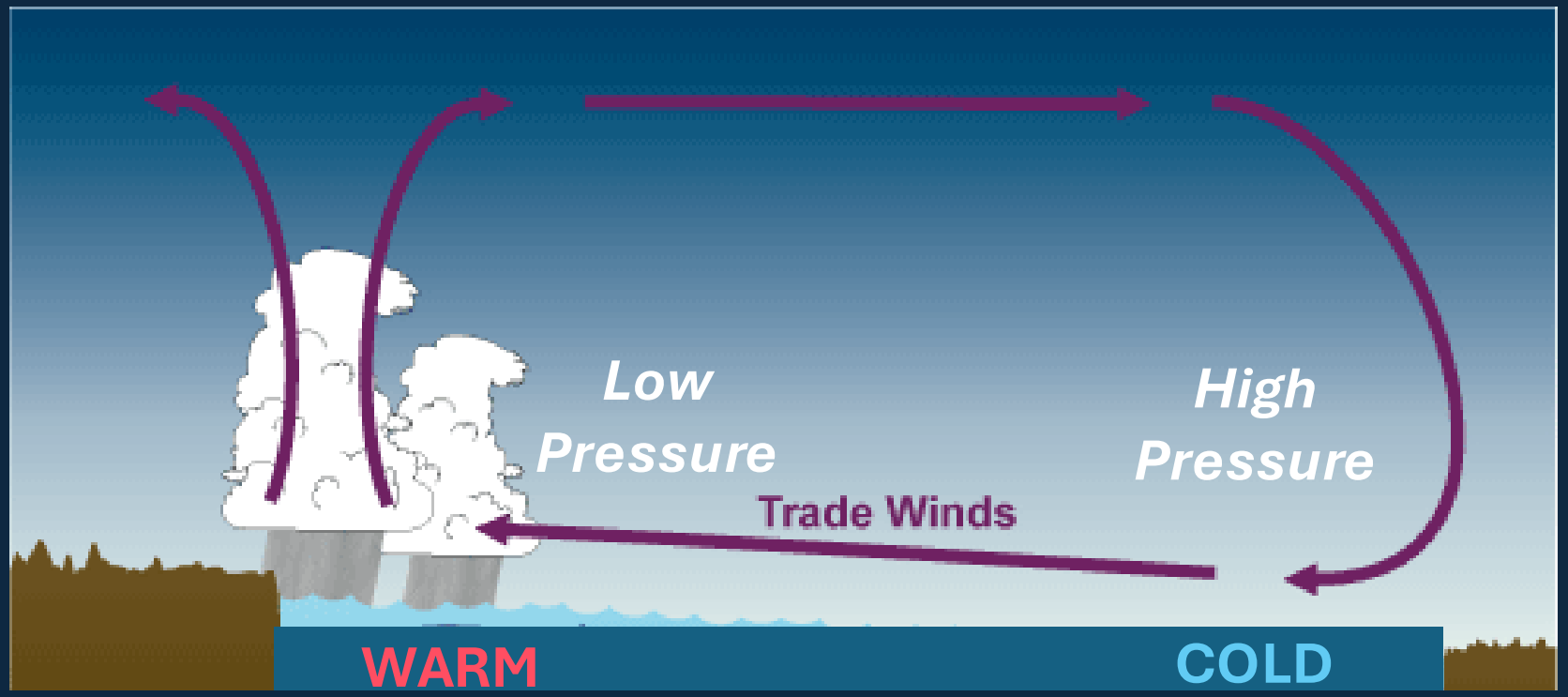
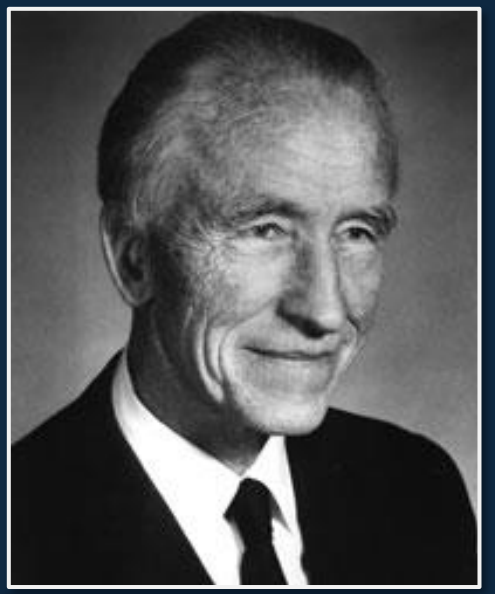
El Niño – Southern Oscillation (ENSO)



Indonesia Pacific Ocean (20,000 km)



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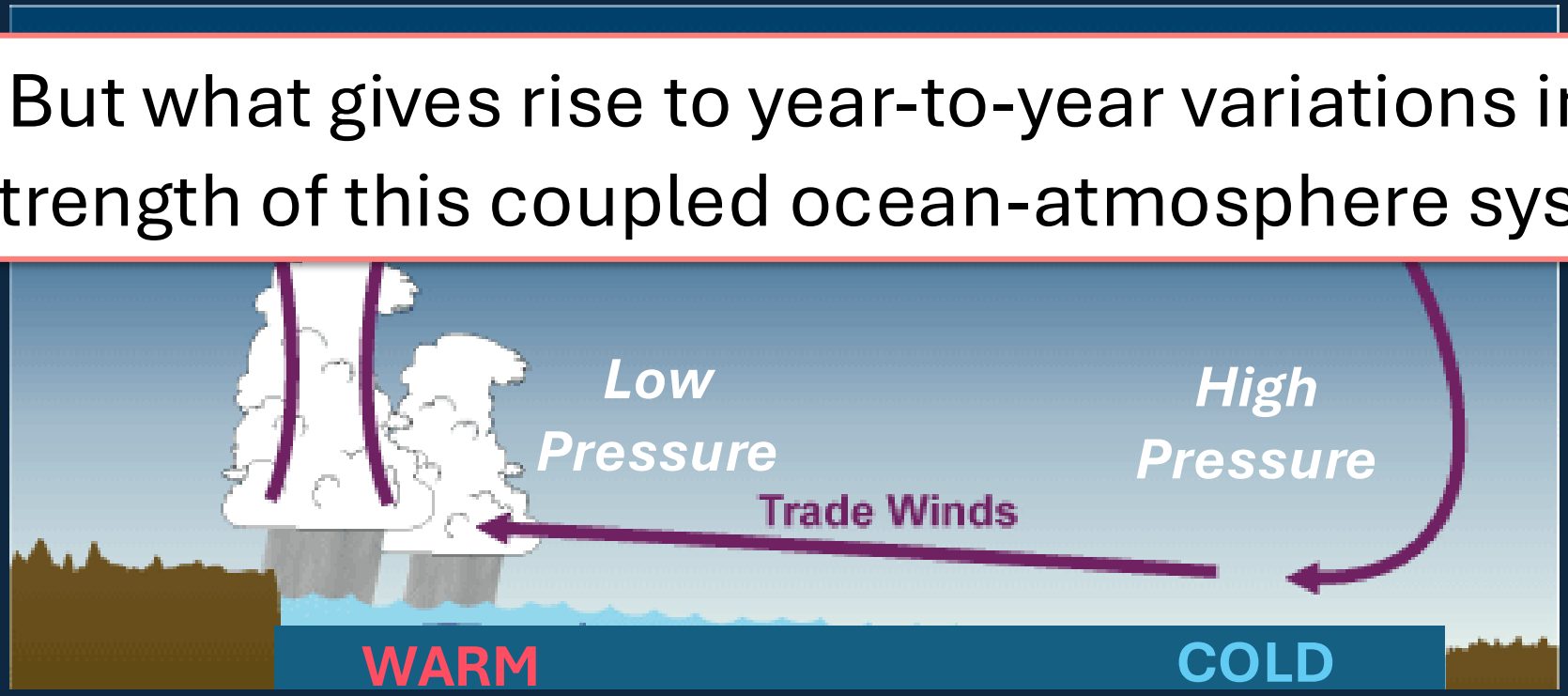
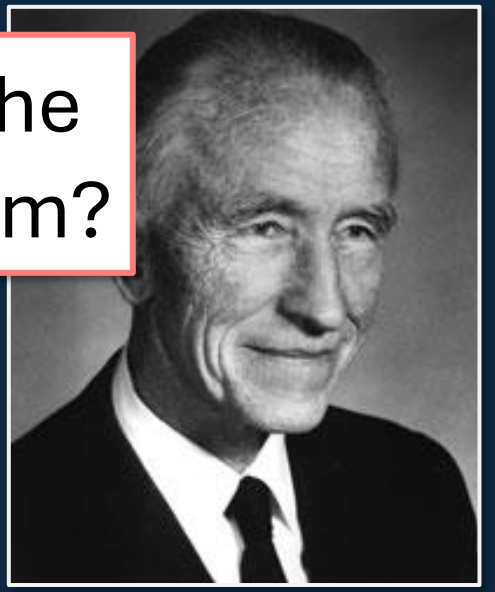
El Niño – Southern Oscillation (ENSO)

- But what gives rise to year-to-year variations in the strength of this coupled ocean-atmosphere system?





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Why does ENSO oscillate from year-to-year ?

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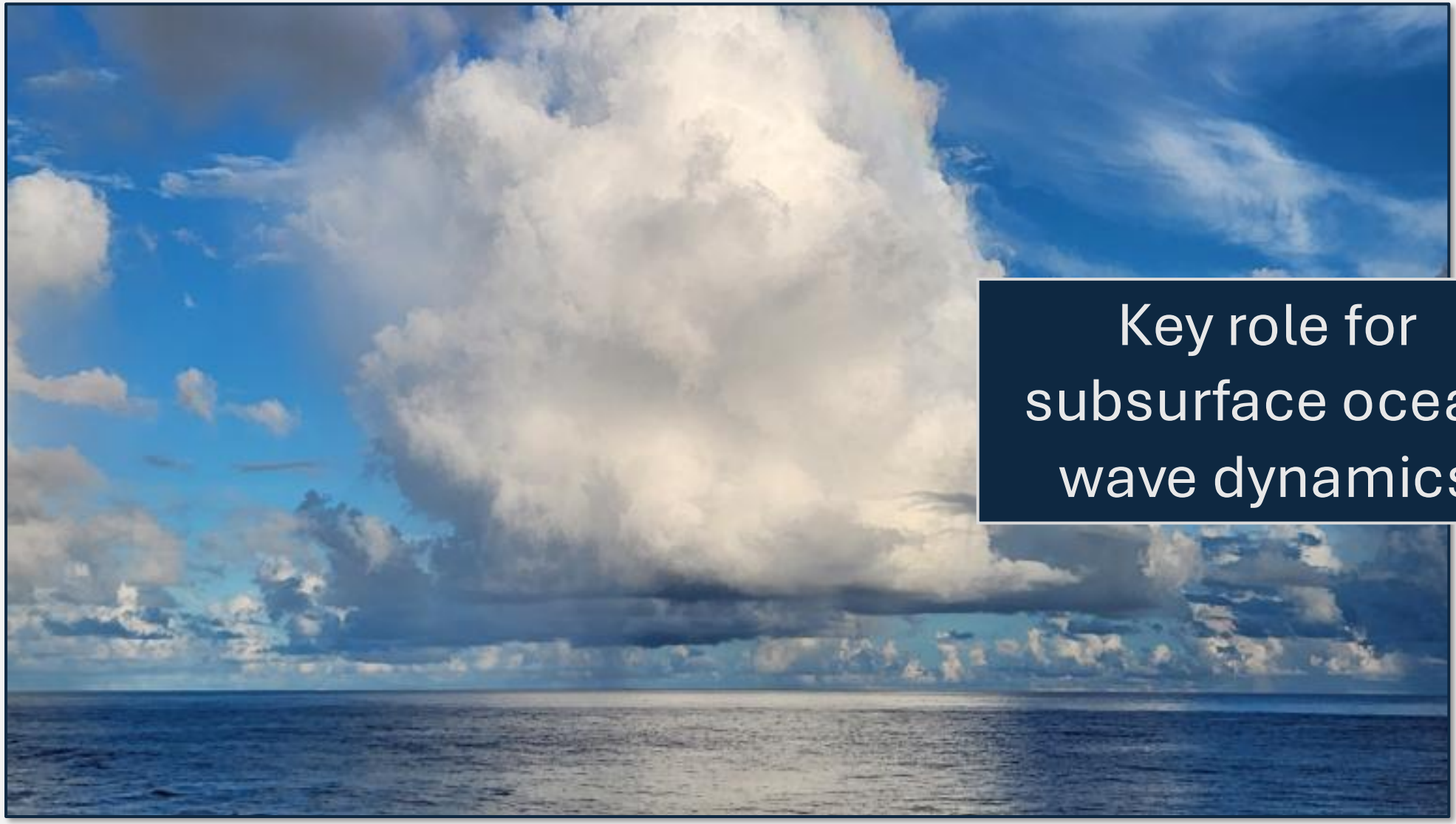
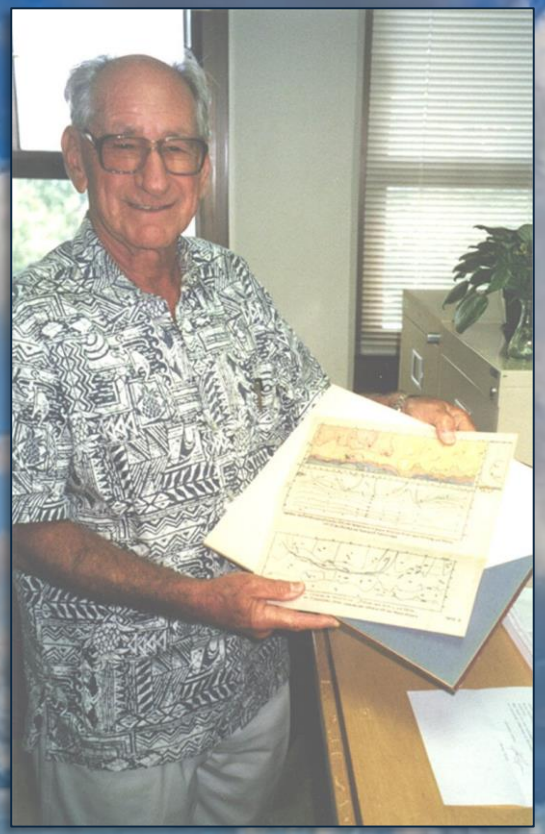


Key role for subsurface ocean wave dynamics

Why does ENSO oscillate from year-to-year ?

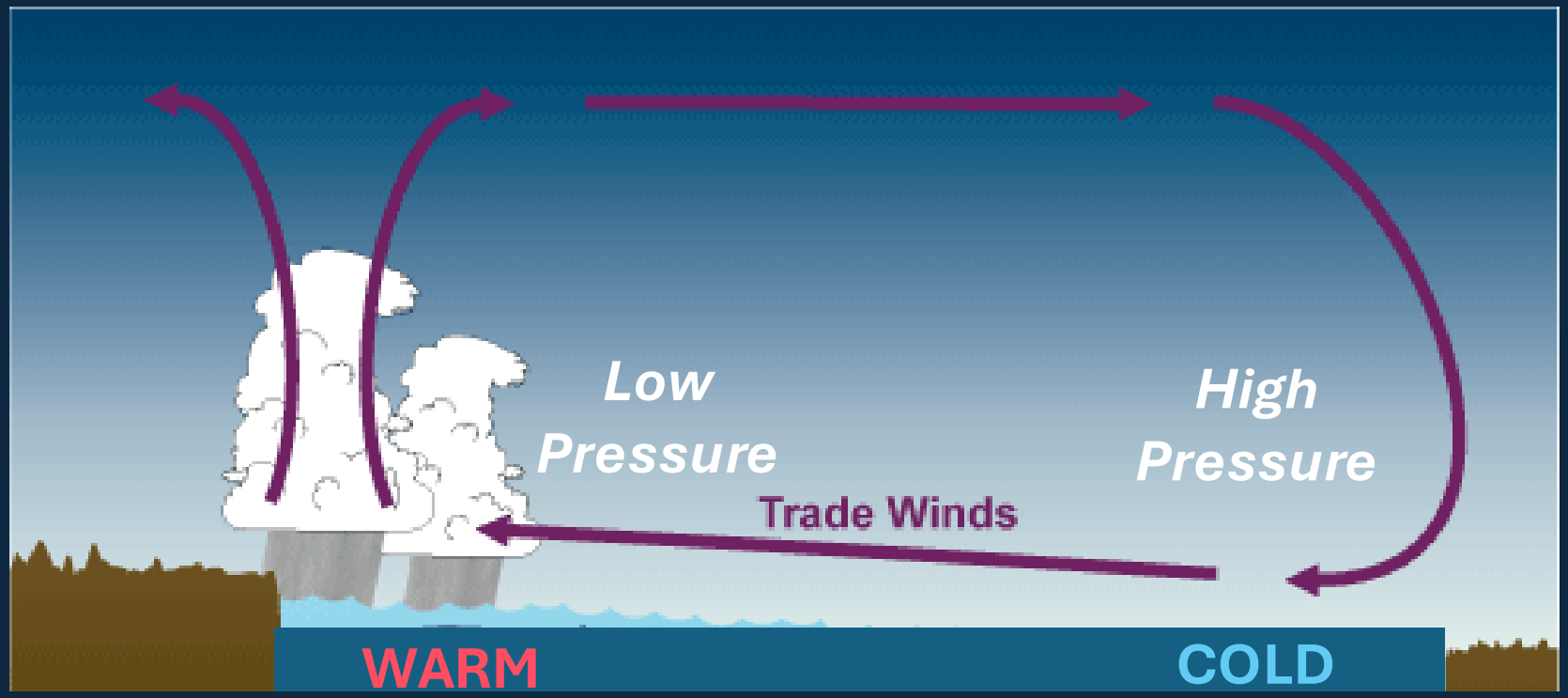


Klaus Wyrtki
(1925-2013)

Mark Cane
(1944-)

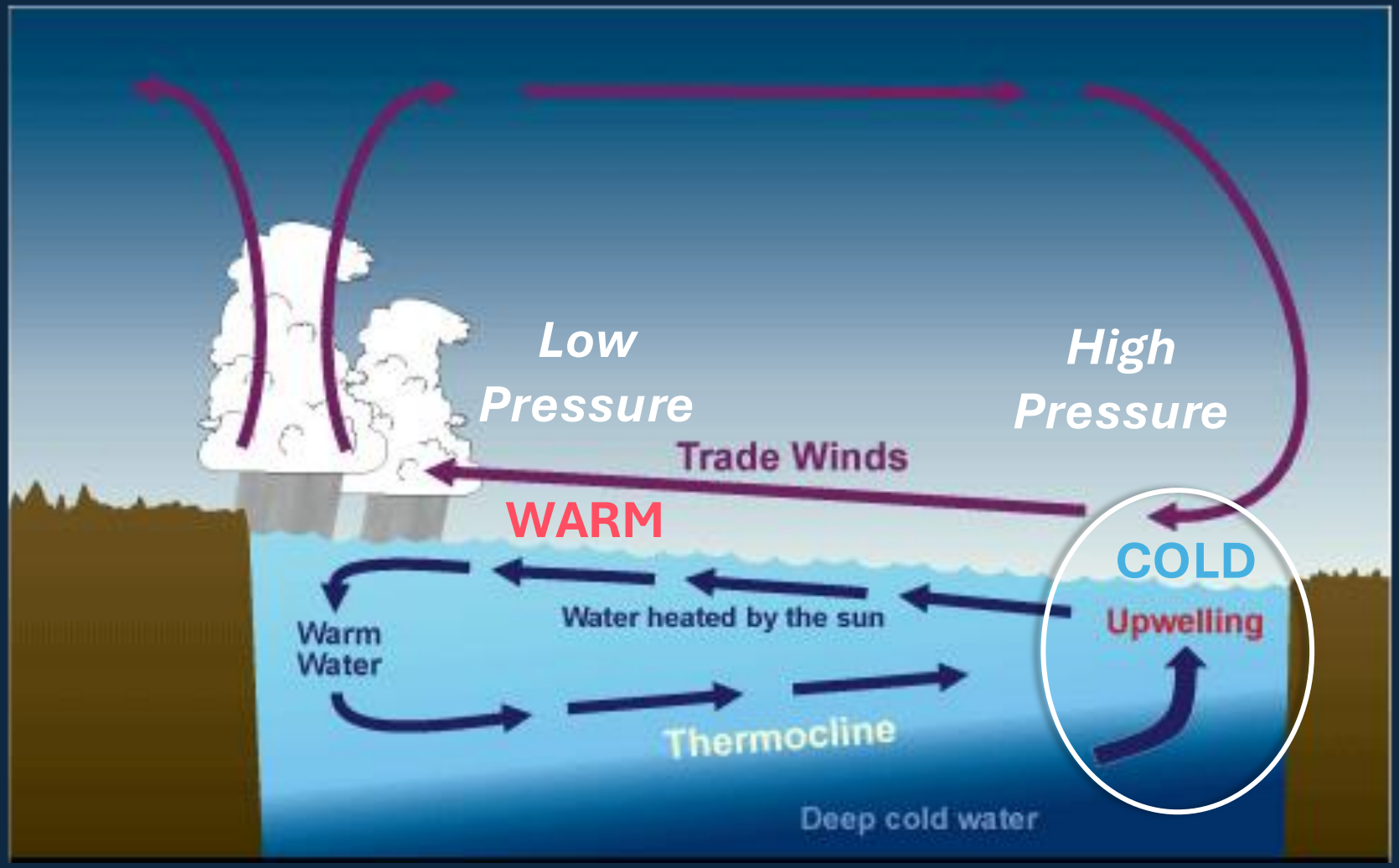
Key role for subsurface ocean wave dynamics

“Normal” State of the Equatorial Pacific Climate System



Indonesia Pacific Ocean (20,000 km) Peru

“Normal” State of the Equatorial Pacific Climate System



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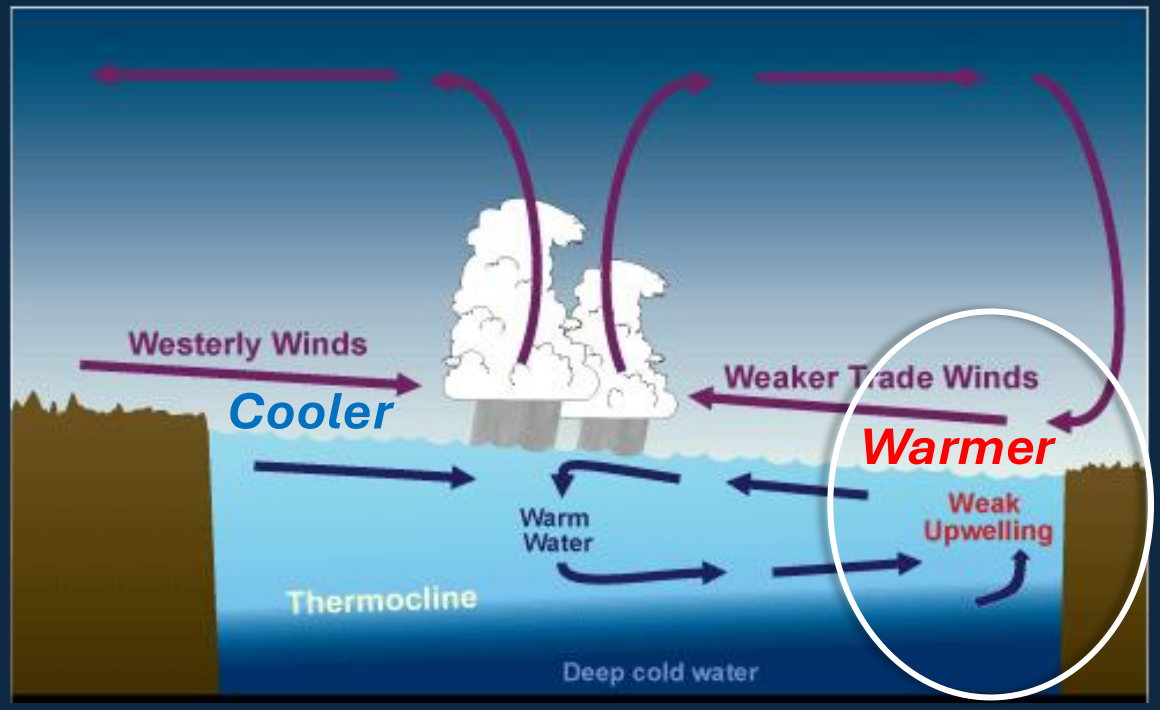
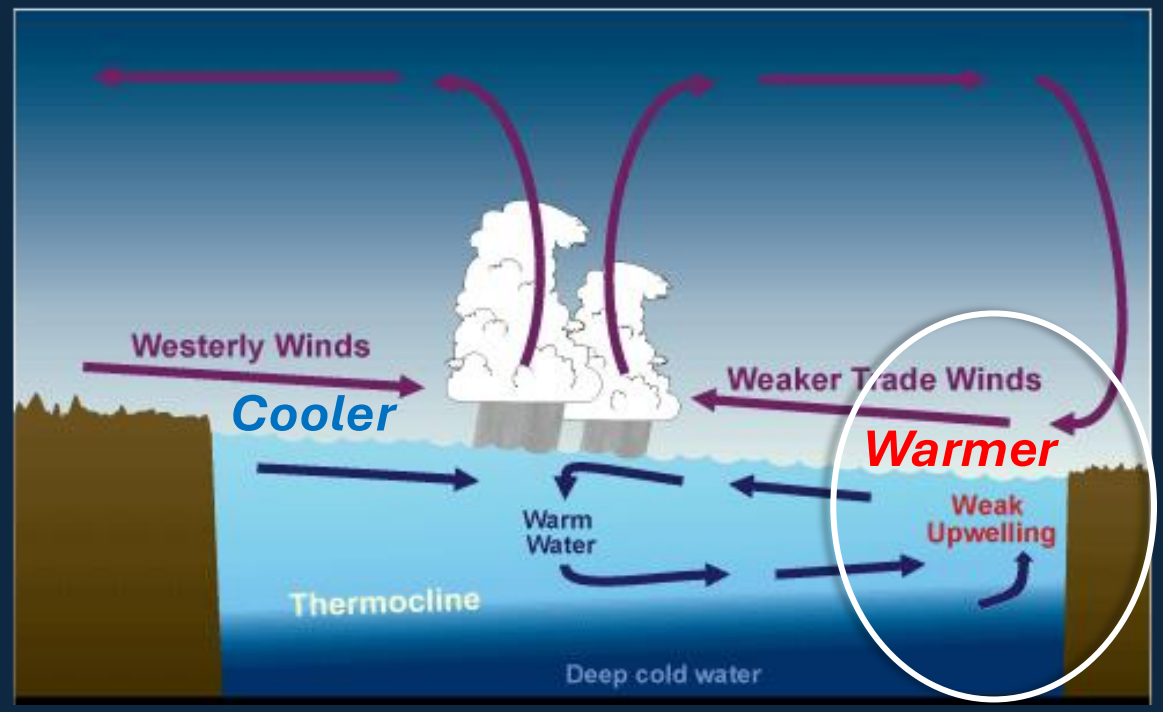
Conditions during El Niño



Indonesia

Peru

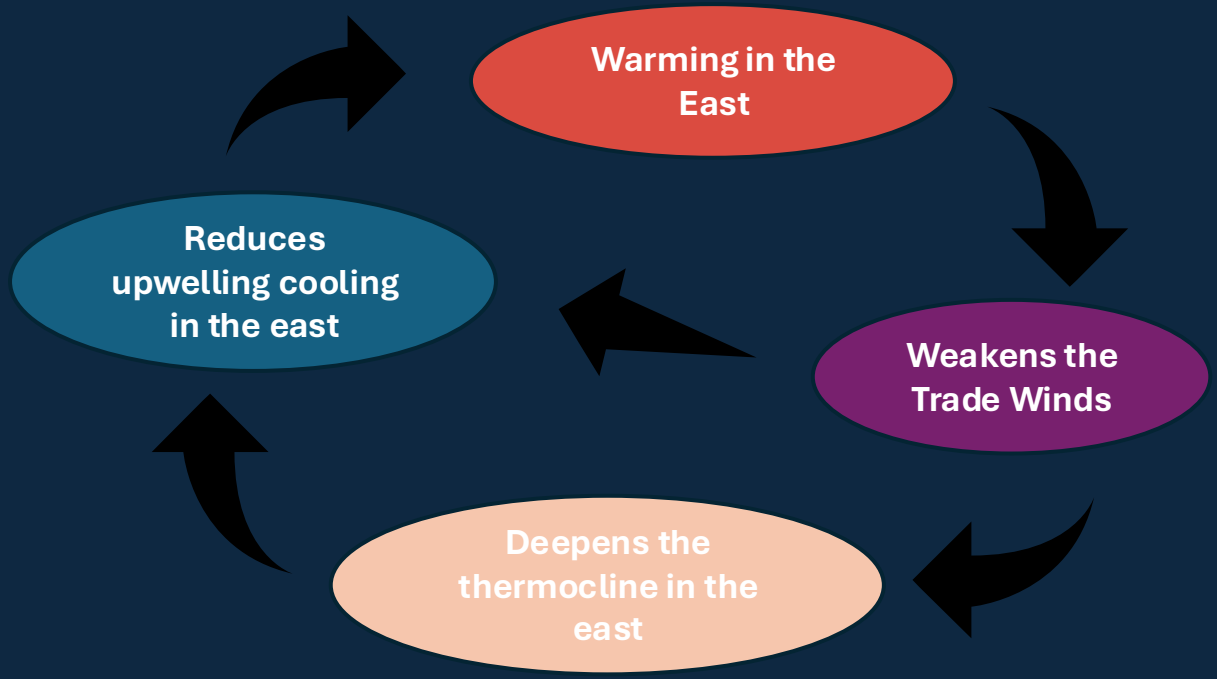
Conditions during El Niño



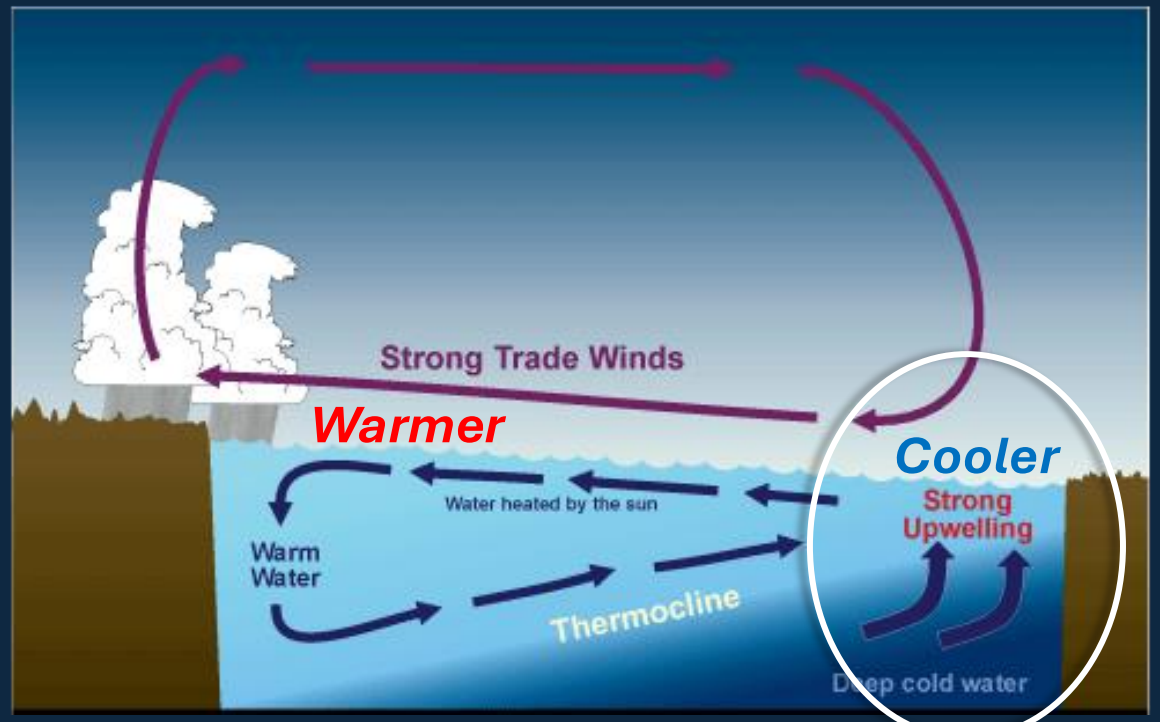
Indonesia

Peru

Reinforcing Feedback loop



Conditions during La Niña



Indonesia

Peru

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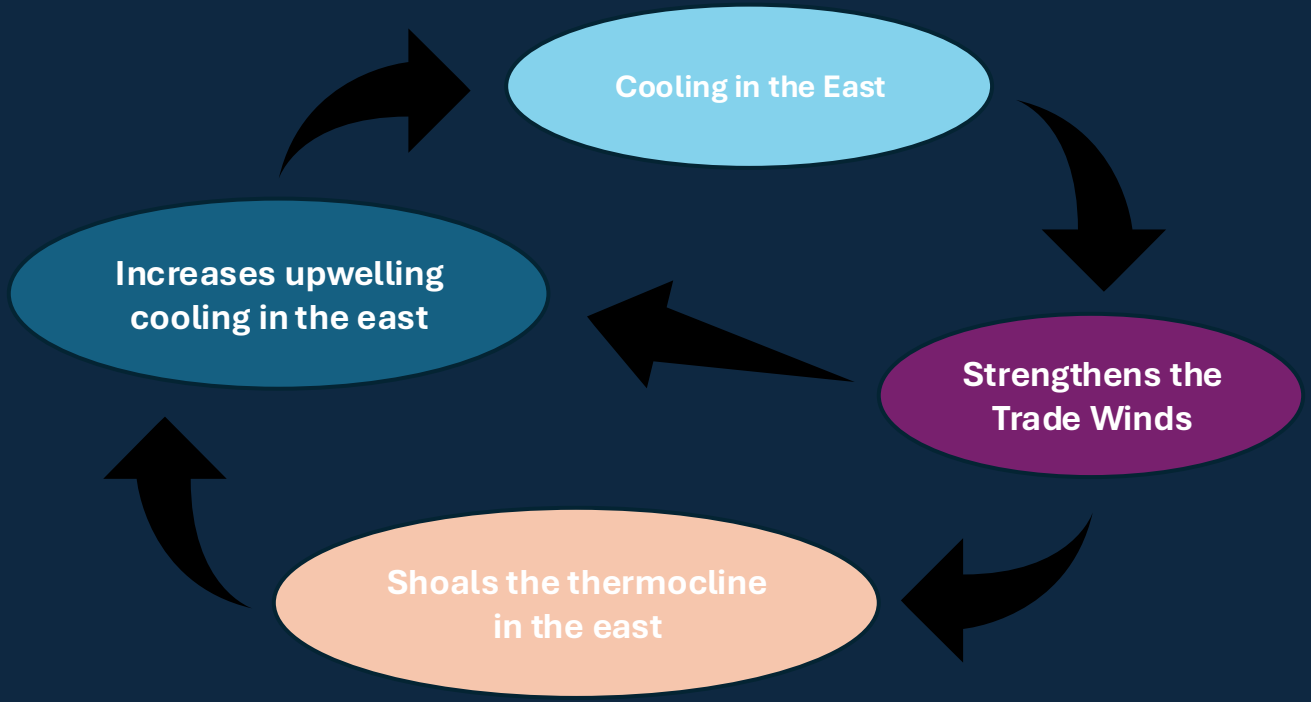

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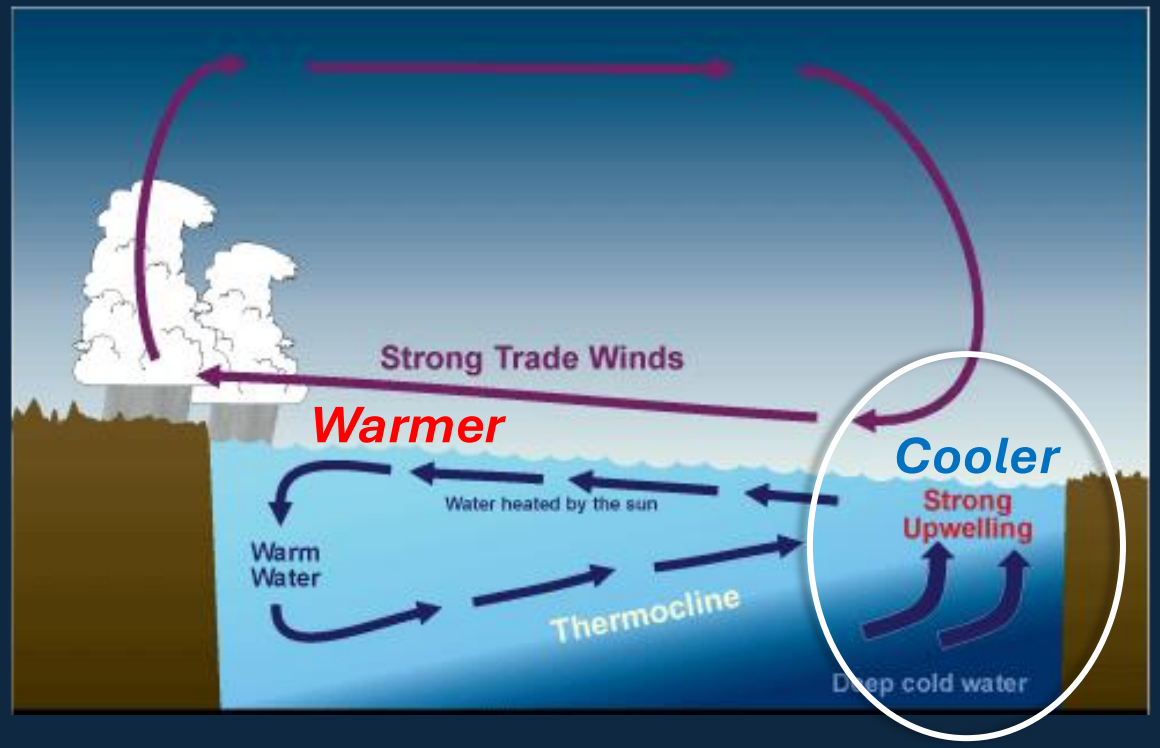
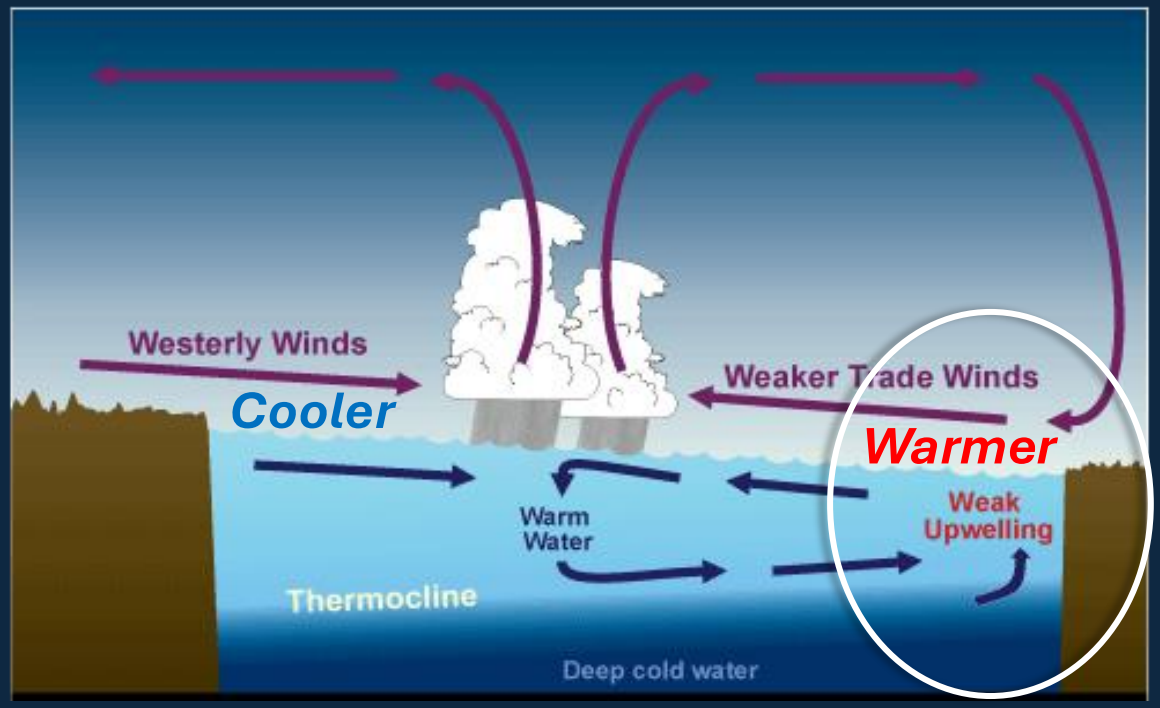


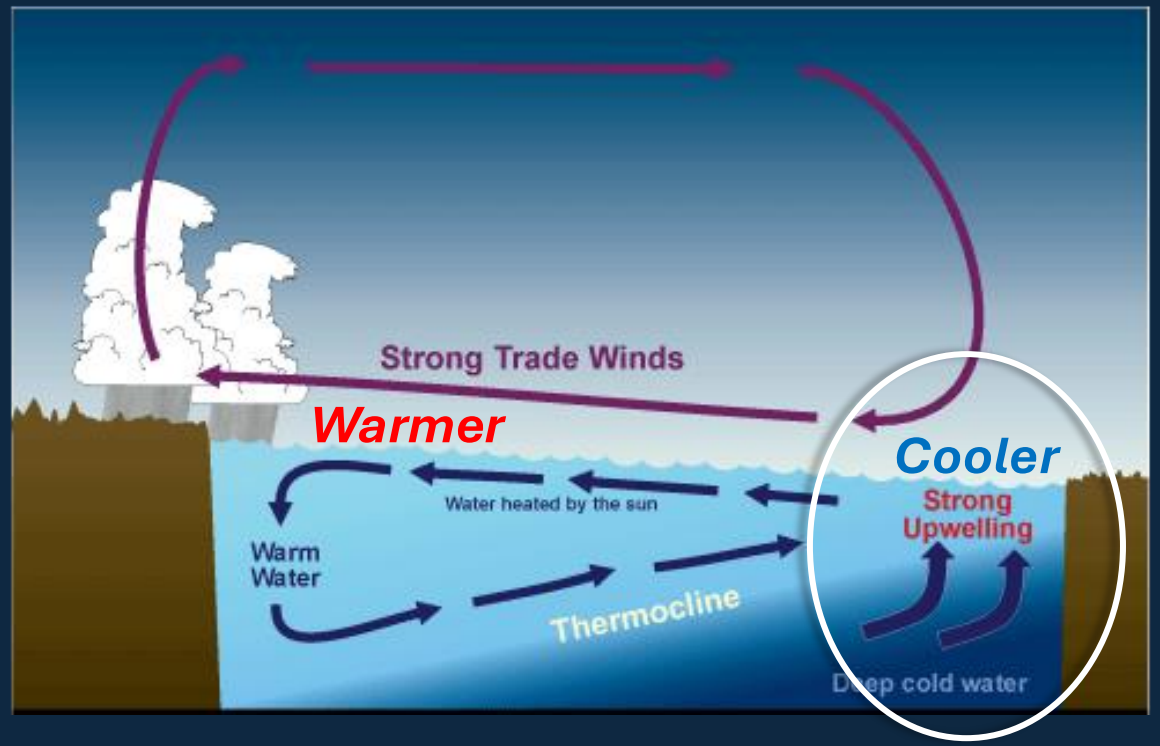
Conditions during El Niño



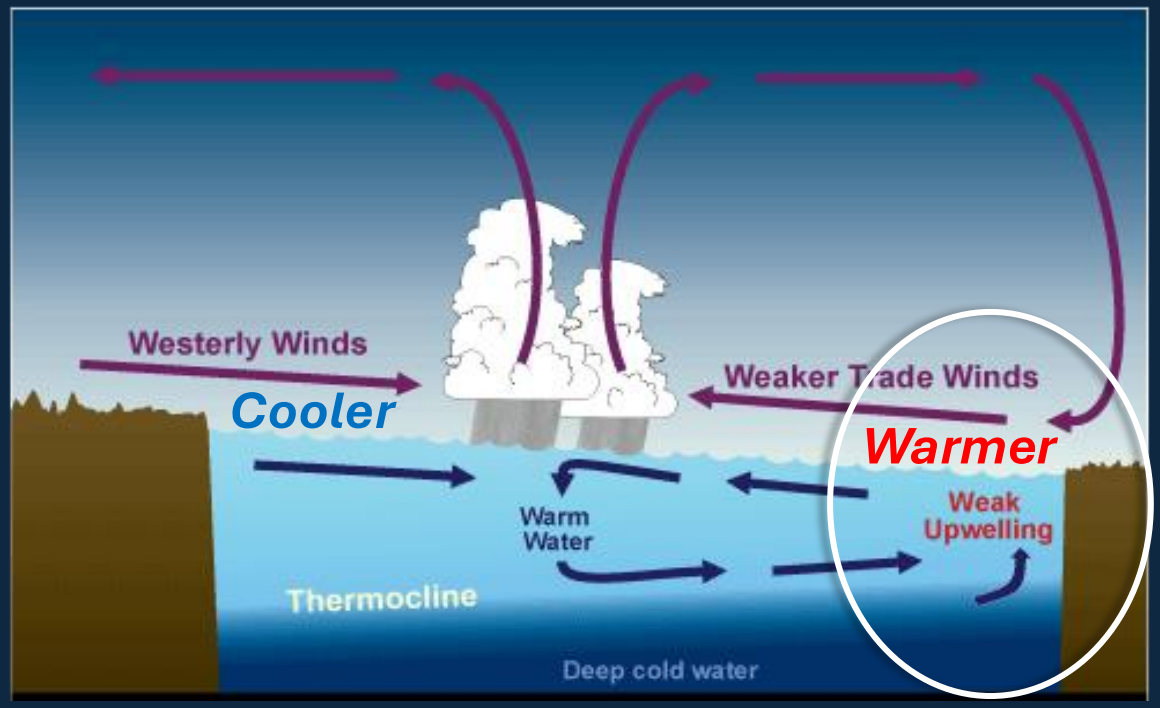
https://interactive.carbonbrief.org/el-nino-explainer/index.html

- Ocean wave dynamics allows the system to fluctuate between these two states, albeit in an irregular fashion.

Conditions during La Niña



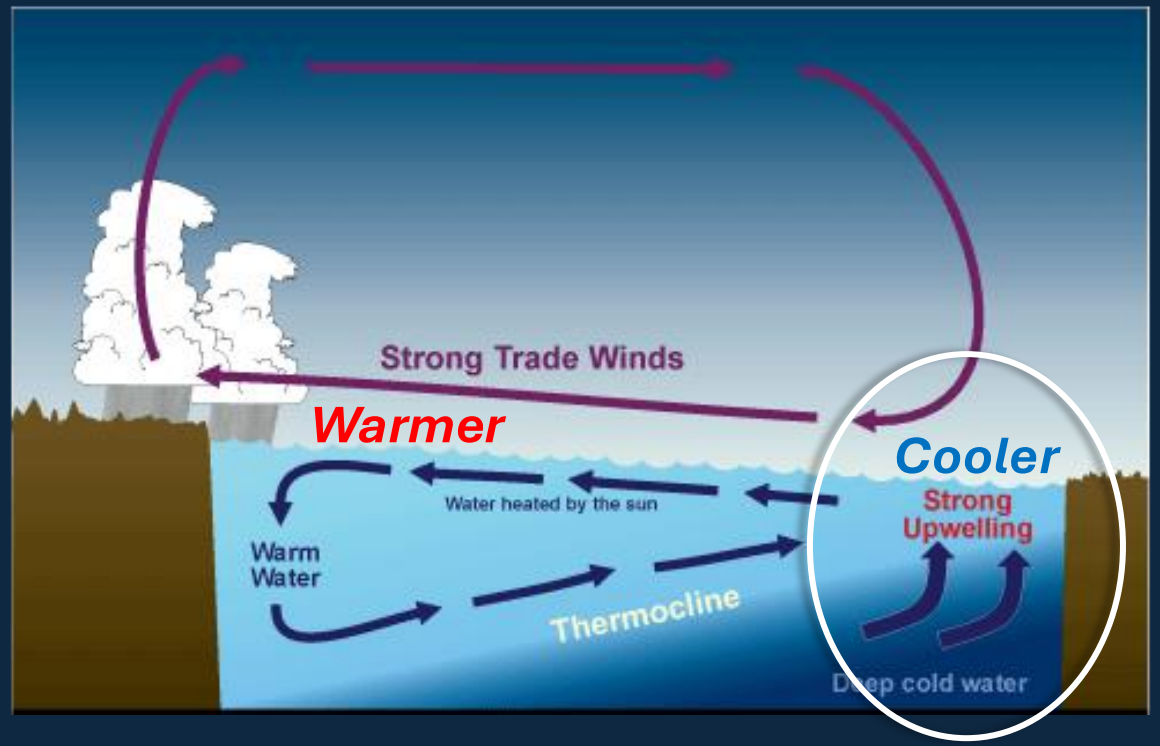
Conditions during El Niño



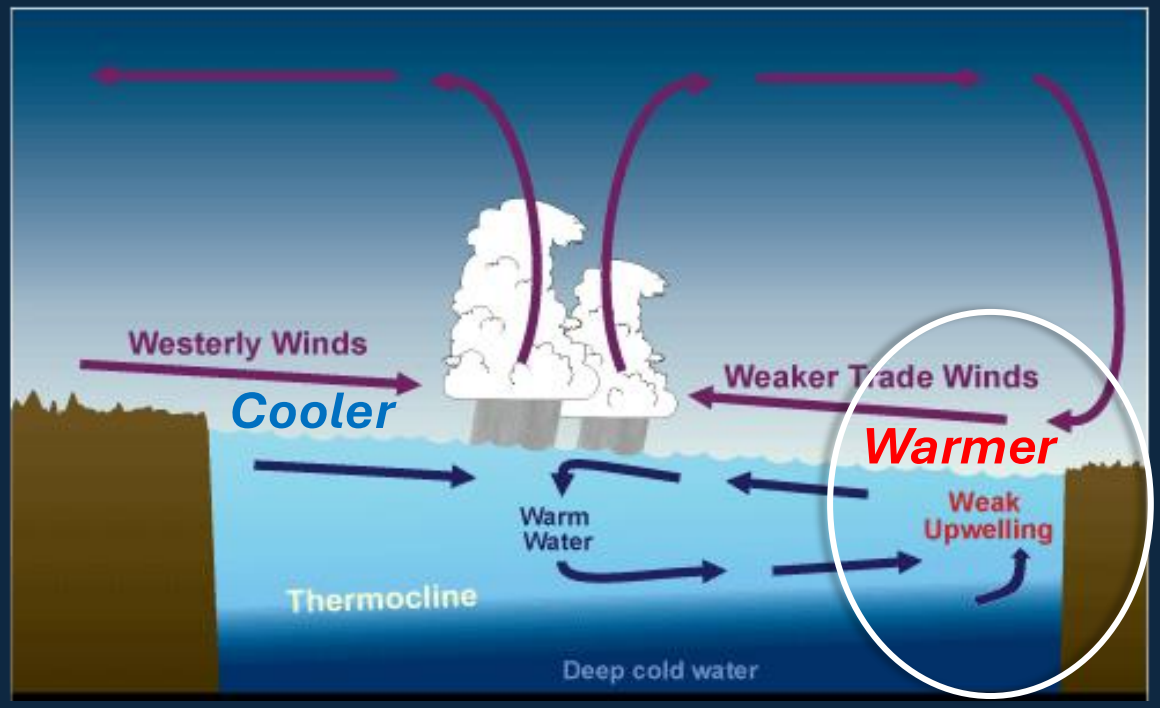
https://interactive.carbonbrief.org/el-nino-explainer/index.html

➢ Ocean wave dynamics allows the system to fluctuate between these two states, albeit in an irregular fashion.

Conditions during La Niña



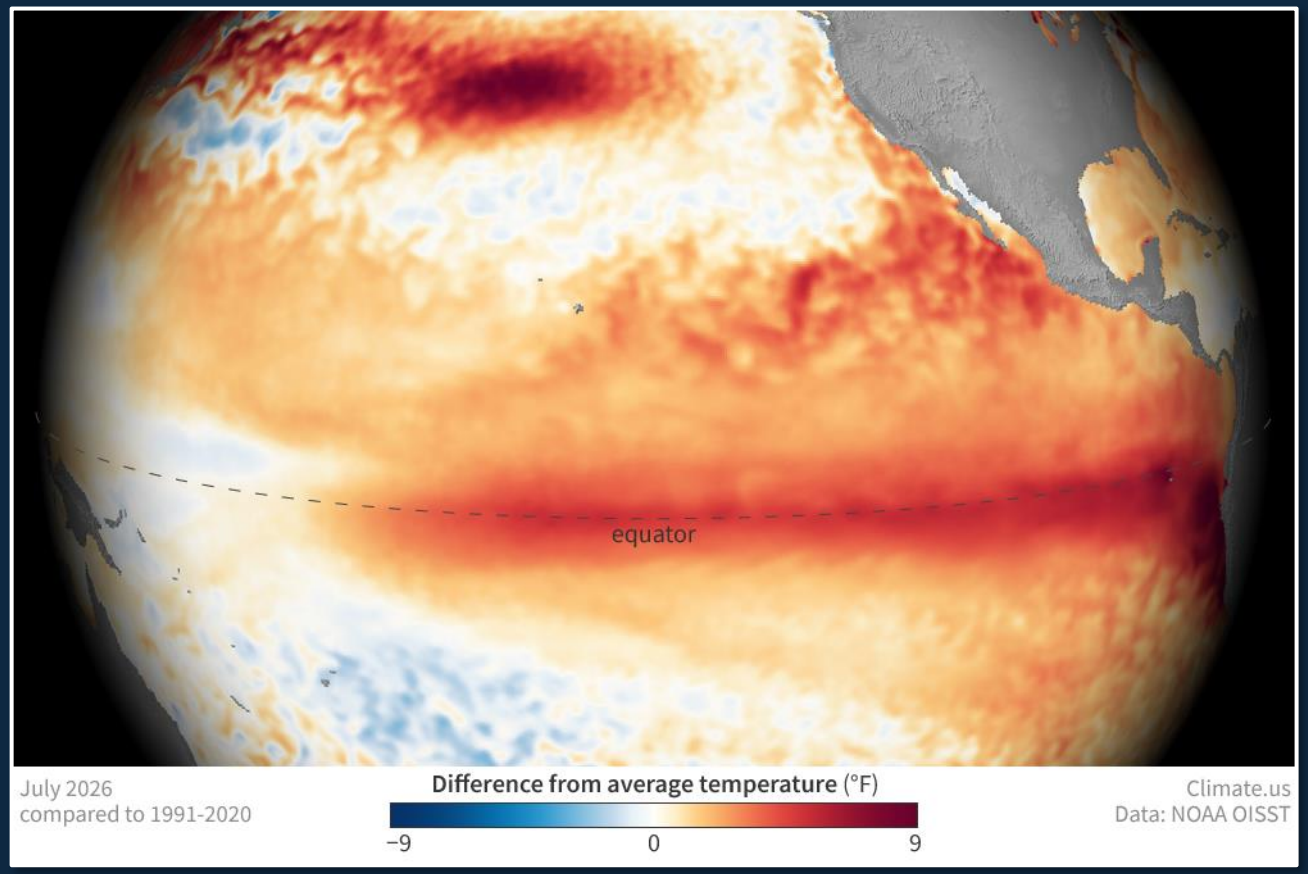
Conditions during El Niño



➢ But ENSO is not a self-sustained oscillation:
It requires a trigger to set it off, limiting predictability.

https://interactive.carbonbrief.org/el-nino-explainer/index.html

Pause for Questions

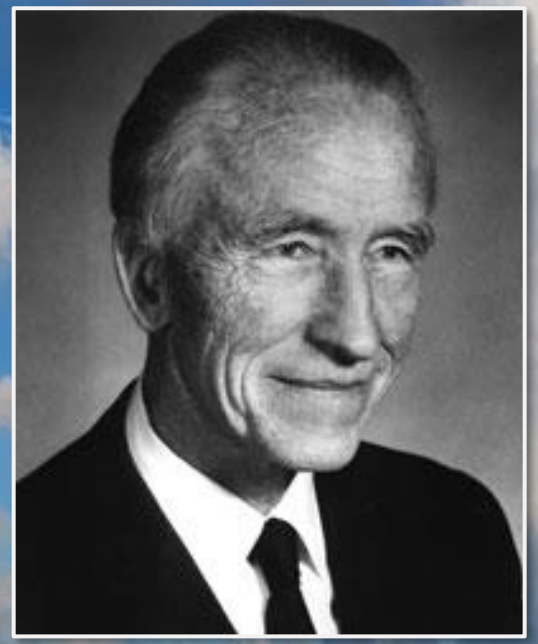


Today's Talk

1) What is El Niño?
2) How does it affect global climate?
3) What is the current status and outlook?

NSTA Webinar
September 10, 2026

The Global Atmospheric Response to ENSO



Jacob Bjerknes
(1897-1975)

Atmospheric Teleconnections

Teleconnections = Atmospheric waves

Teleconnections = Atmospheric waves

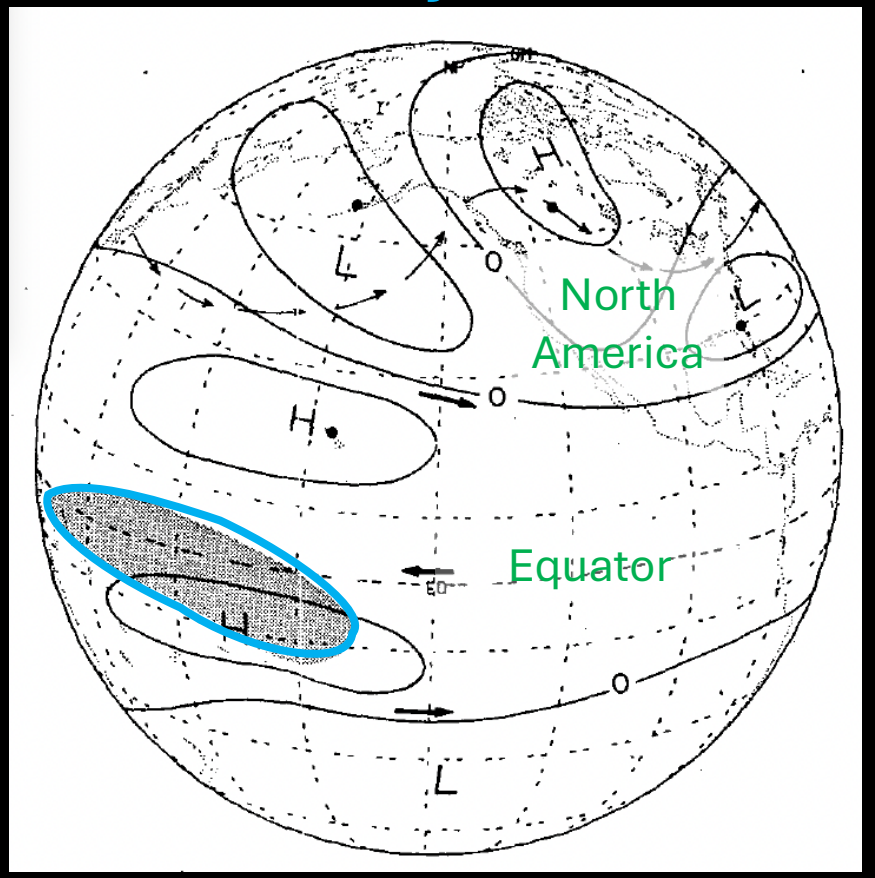
Pebble

Gravity Wave

Teleconnections = Atmospheric waves

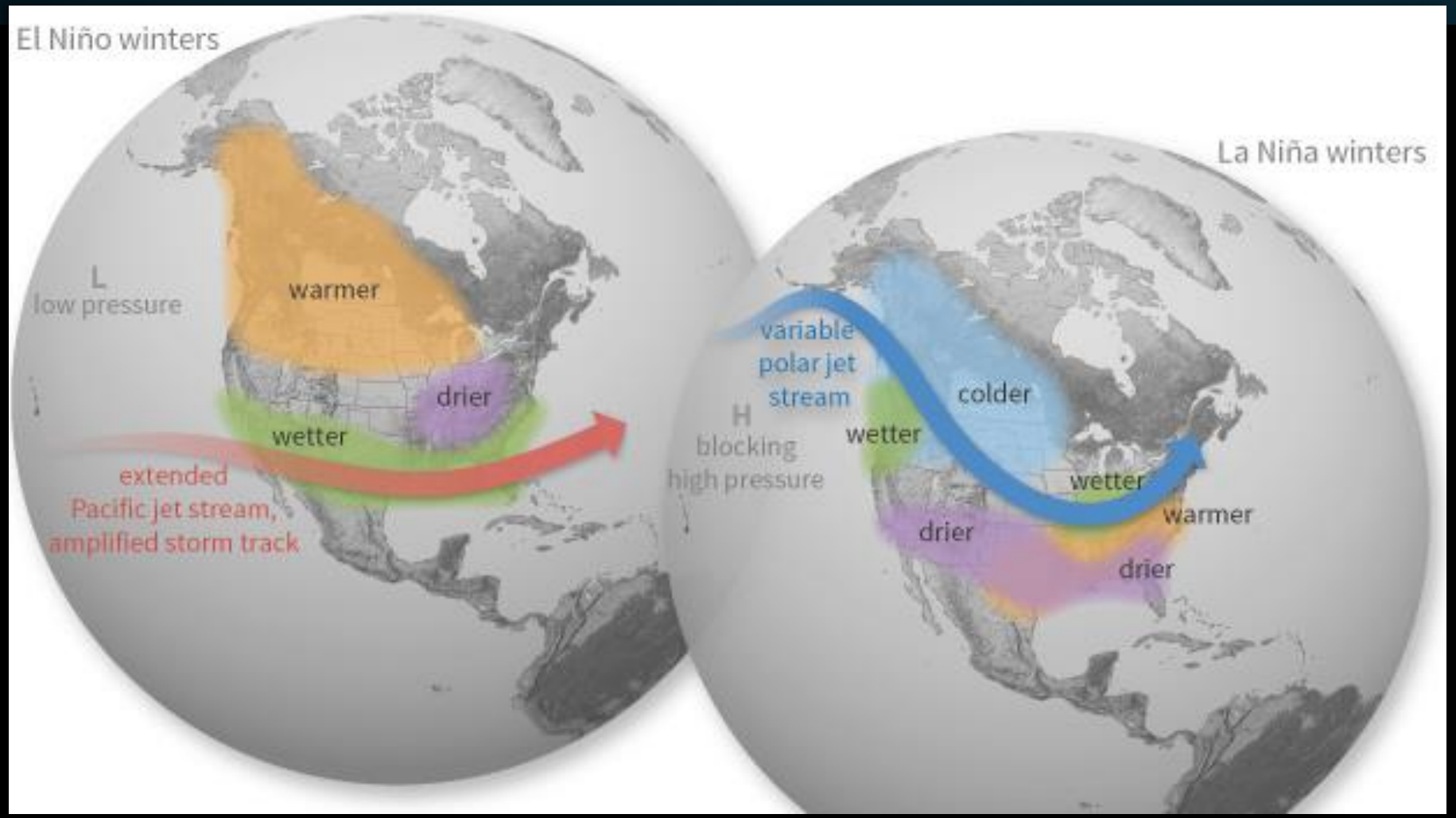
Tropical Deep Convection

Rossby Wave



Horel and Wallace 1981

Teleconnections produce climate impacts



https://www.climate.us/news-features/blogs/enso/super-duper-or-el-nino-warming-world

Precipitation during 6 strongest El Niño winters since 1950

December–February compared to 1991–2020 average, sorted by peak event strength

1982–83

1997–98

2015–16

1991–92

1972–73

1965–66

Difference from average precipitation (inches)

−12 0 12+

CLIMATE.US
Data: nClimgrid

https://www.climate.us/news-features/blogs/enso/super-duper-or-el-nino-warming-world

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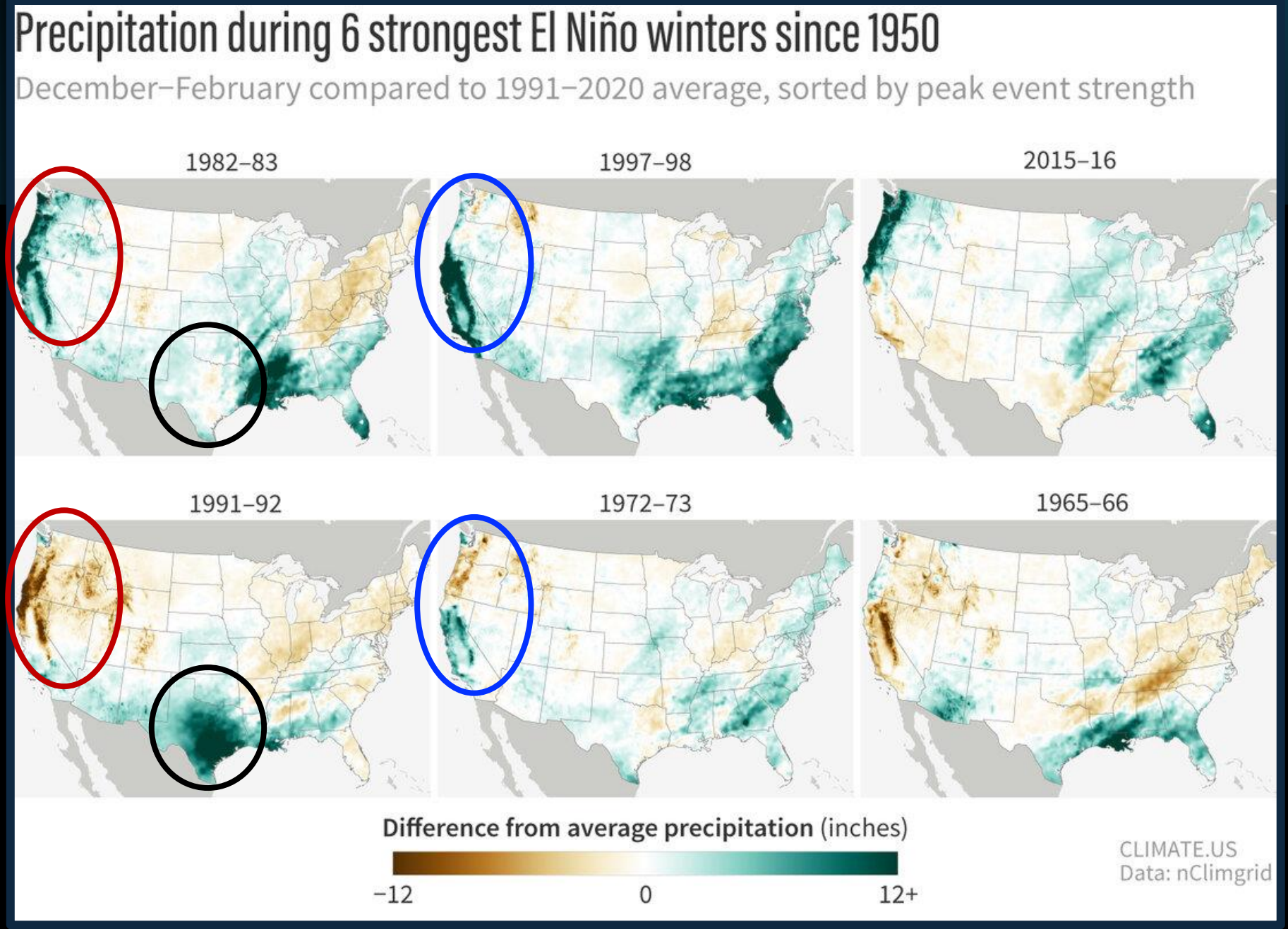
CLIMATE.US
Data: nClimgrid

The canonical impacts of El Niño do not always play out, even if the event is a strong one.

https://www.climate.us/news-features/blogs/enso/super-duper-or-el-nino-warming-world

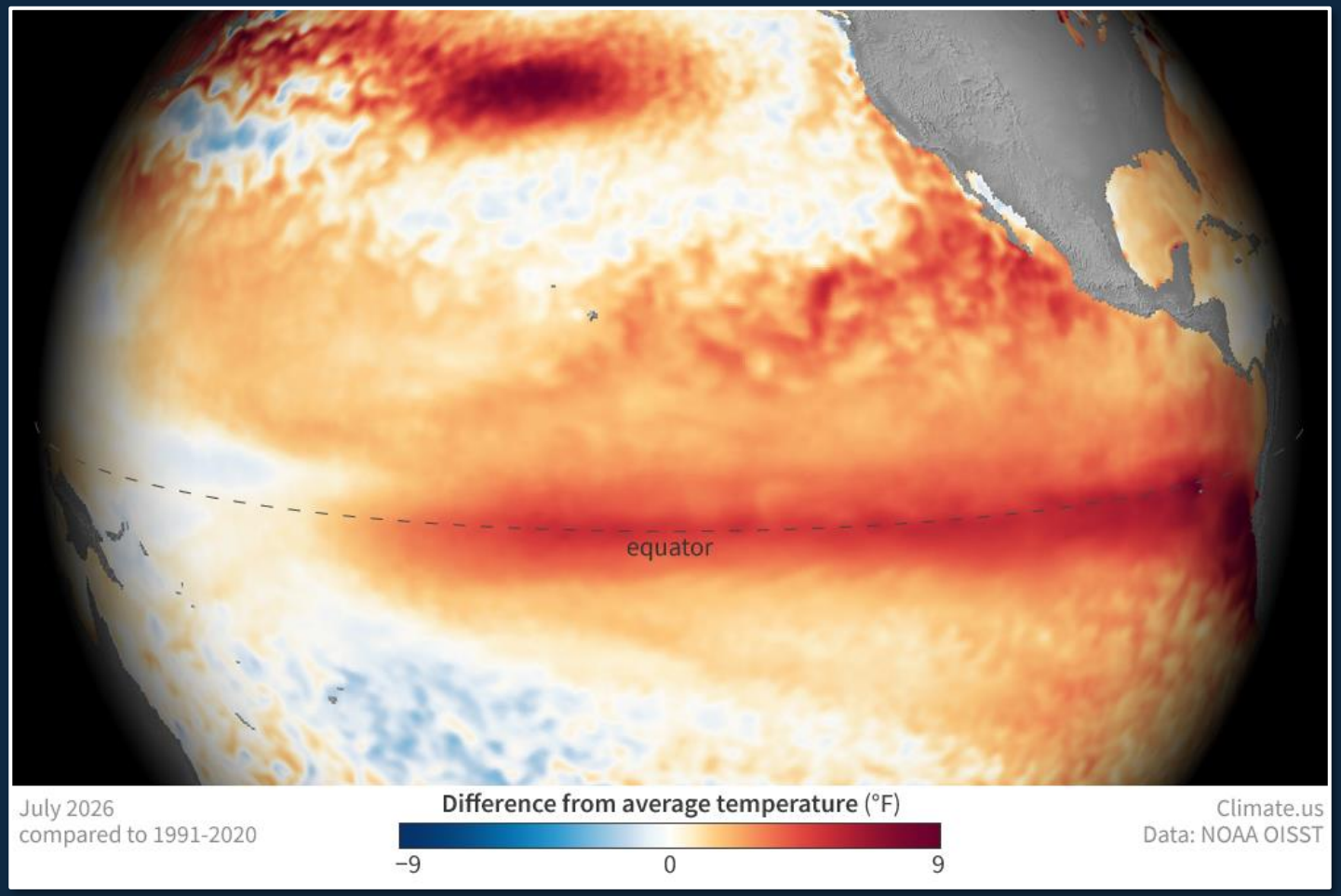


Pause for Questions

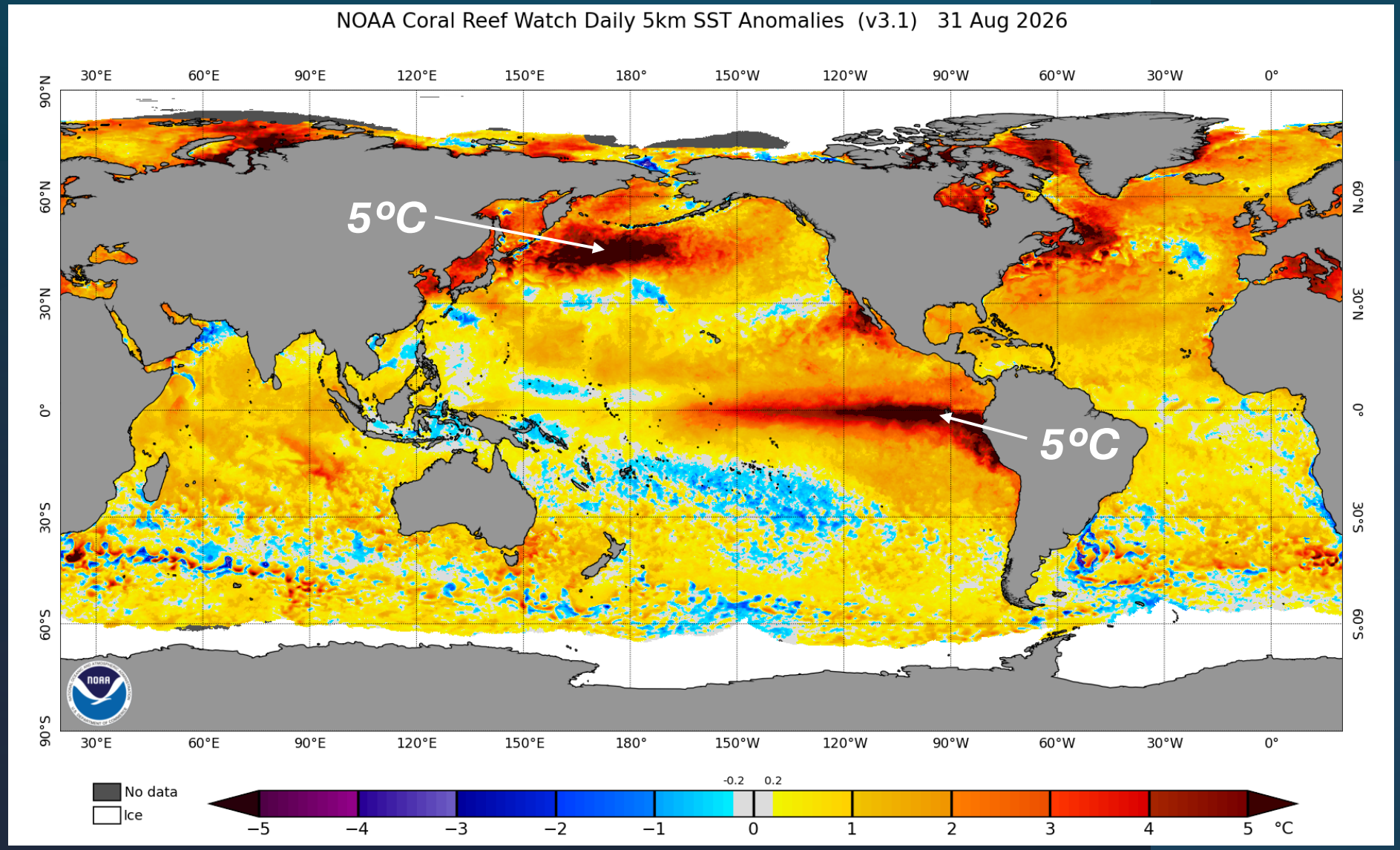
The 2026 El Niño

Current status & Outlook

Sea Surface Temperature, July 2026

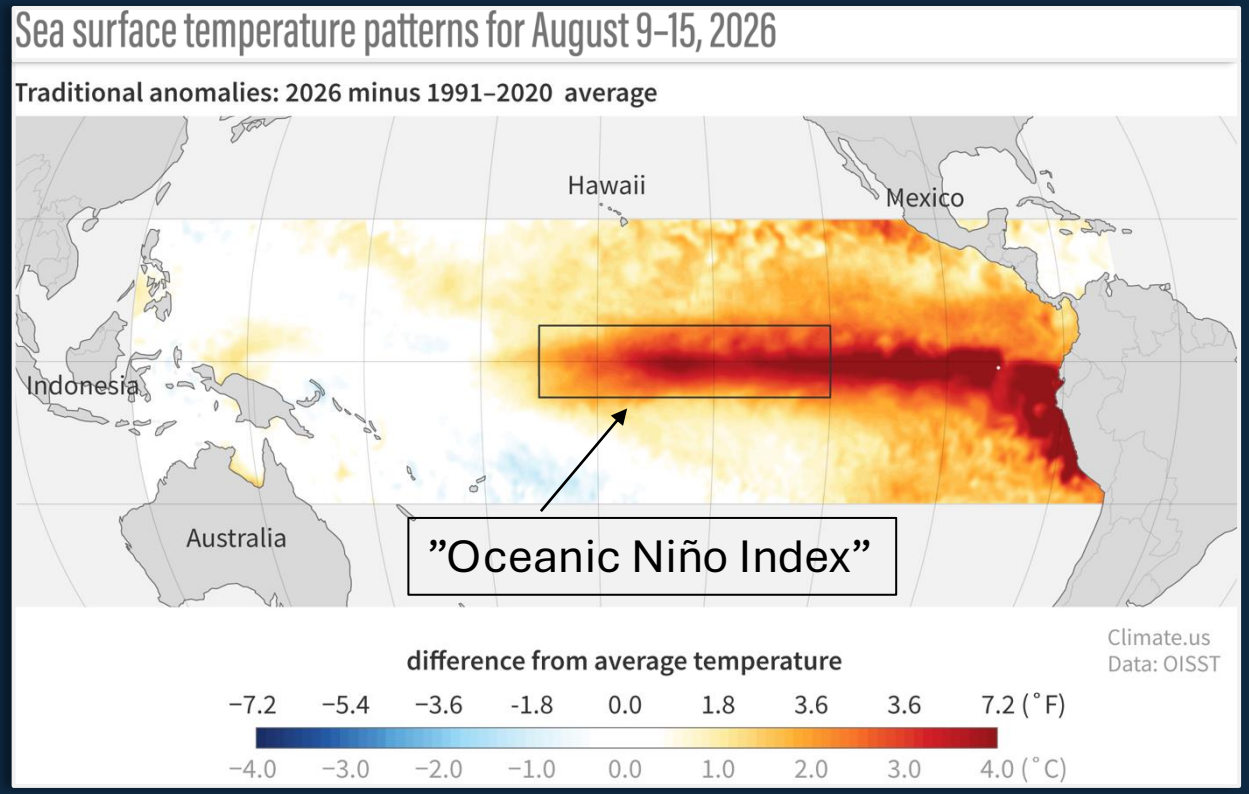


Sea Surface Temperature, 31 August 2026



Measuring El Niño in a warming climate

Traditional

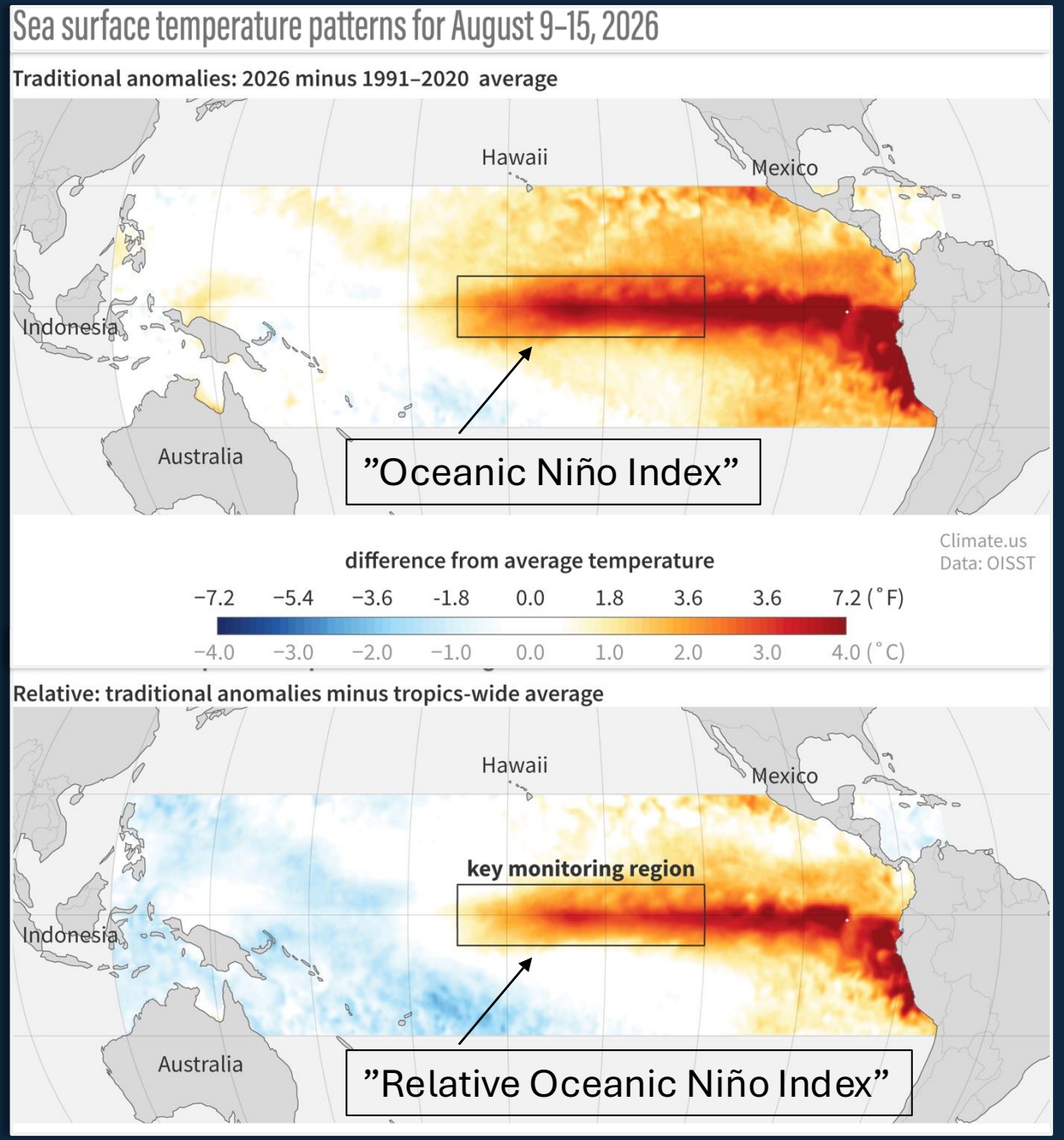


https://www.climate.us/news-features/blogs/enso/super-duper-or-el-nino-warming-world

Measuring El Niño in a warming climate

Traditional

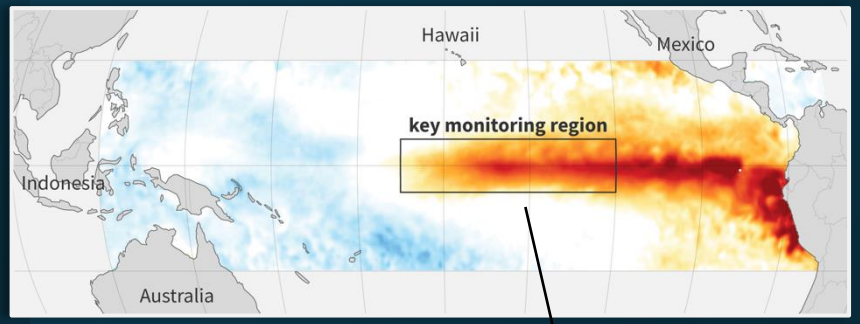
Relative to the entire Tropics (New)



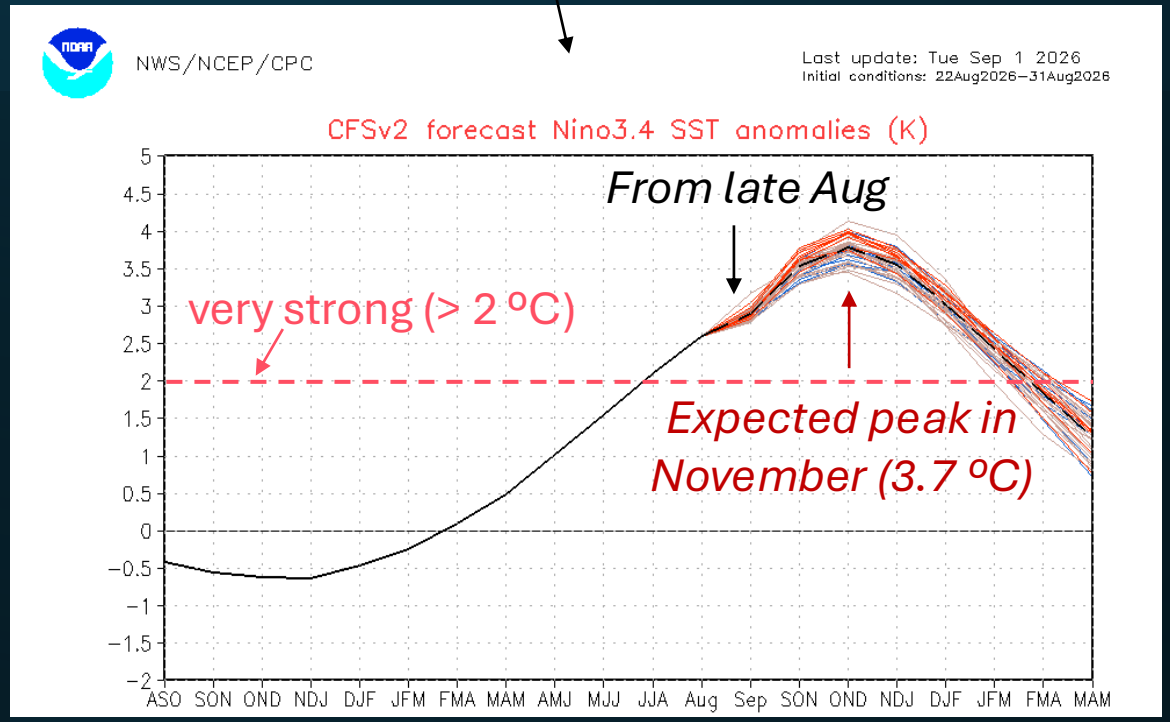
Forecasts

https://www.cpc.ncep.noaa.gov/products/predictions/90day/

Traditional



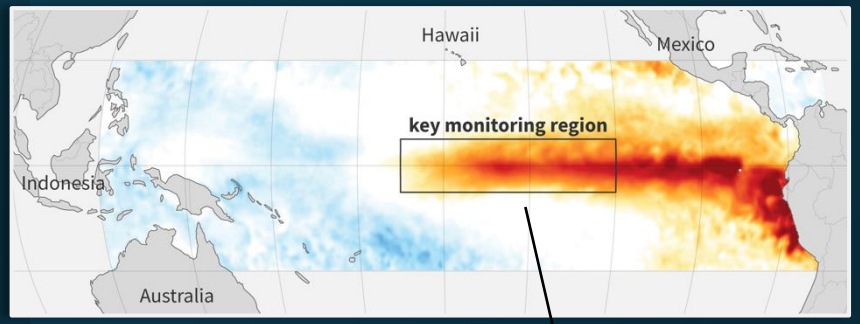
Forecasts



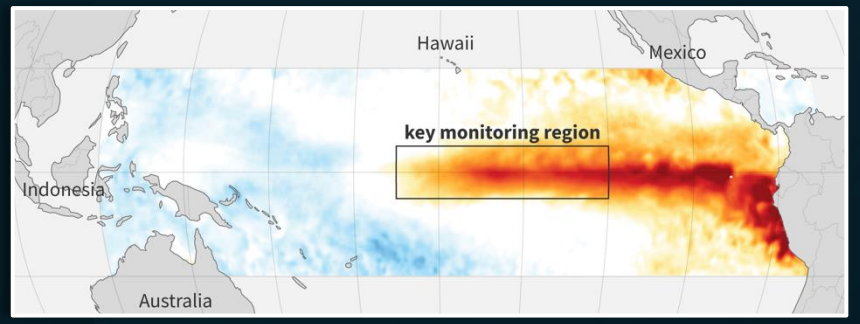
Traditional Index

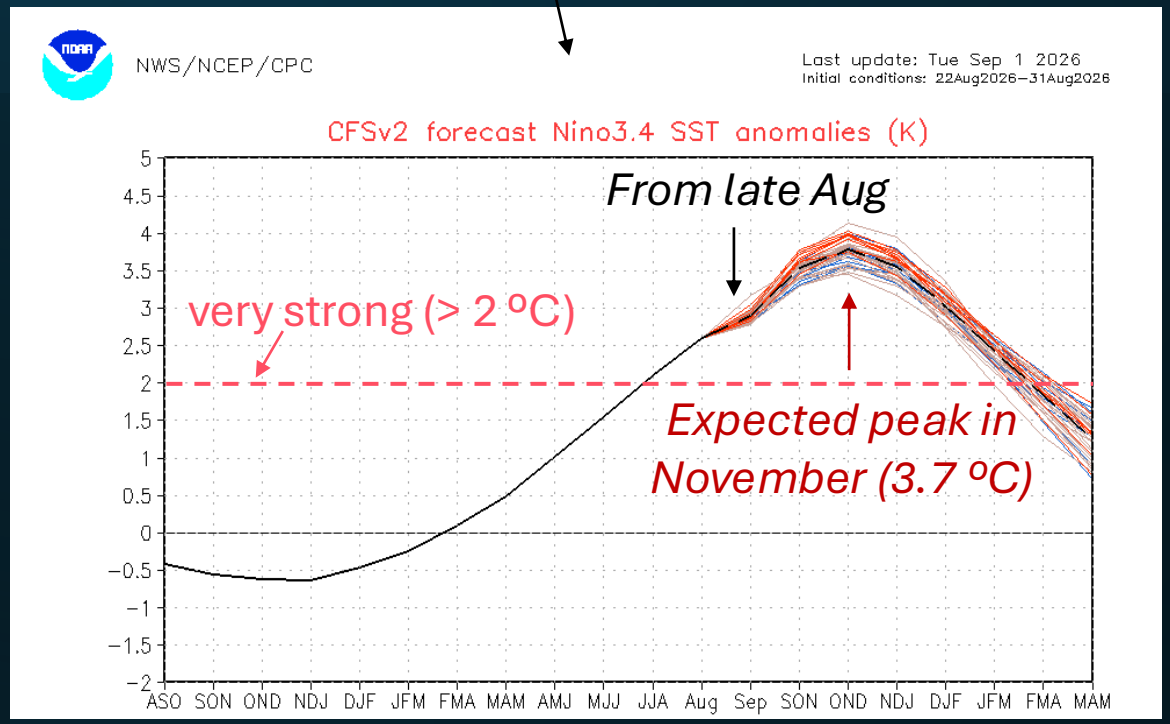
Forecasts

Traditional

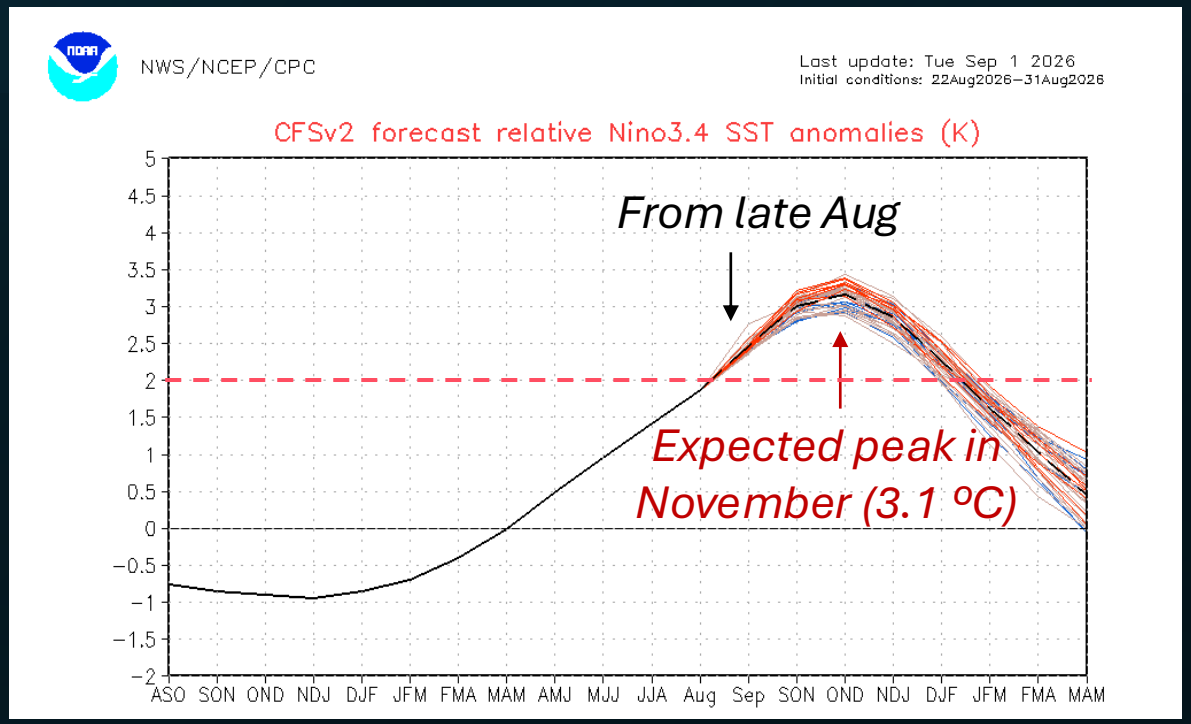


Relative



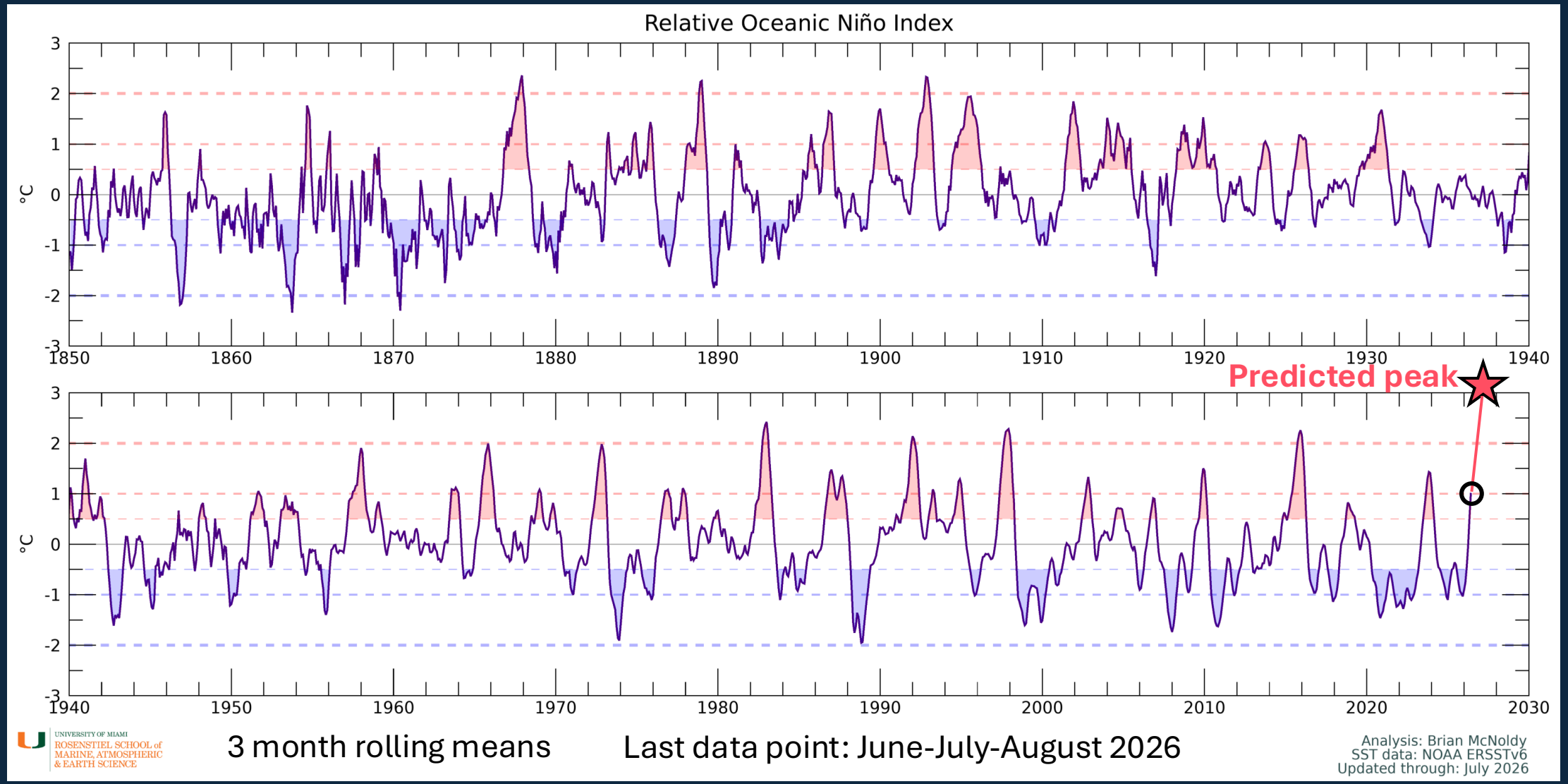


Traditional Index



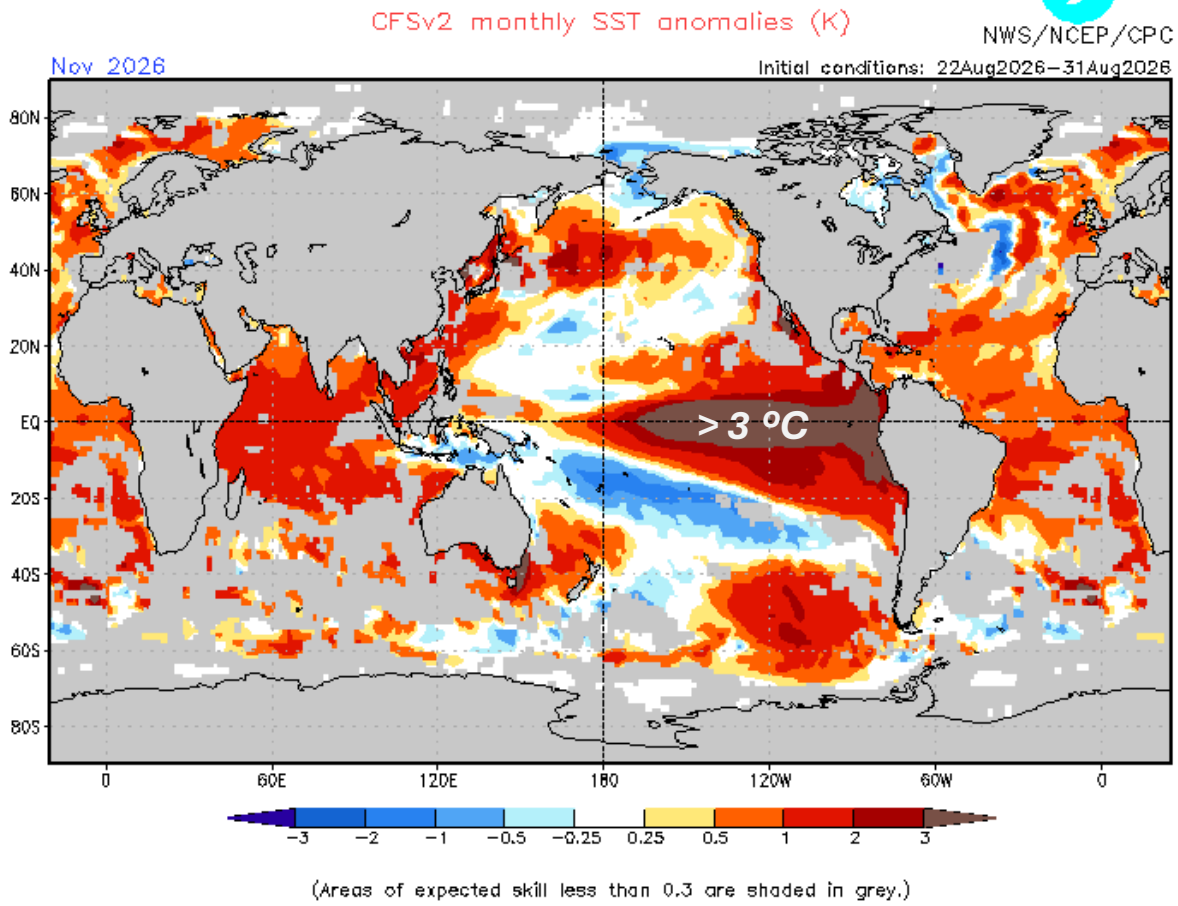
Relative Index

Relative Oceanic Niño Index since 1850



Forecasts

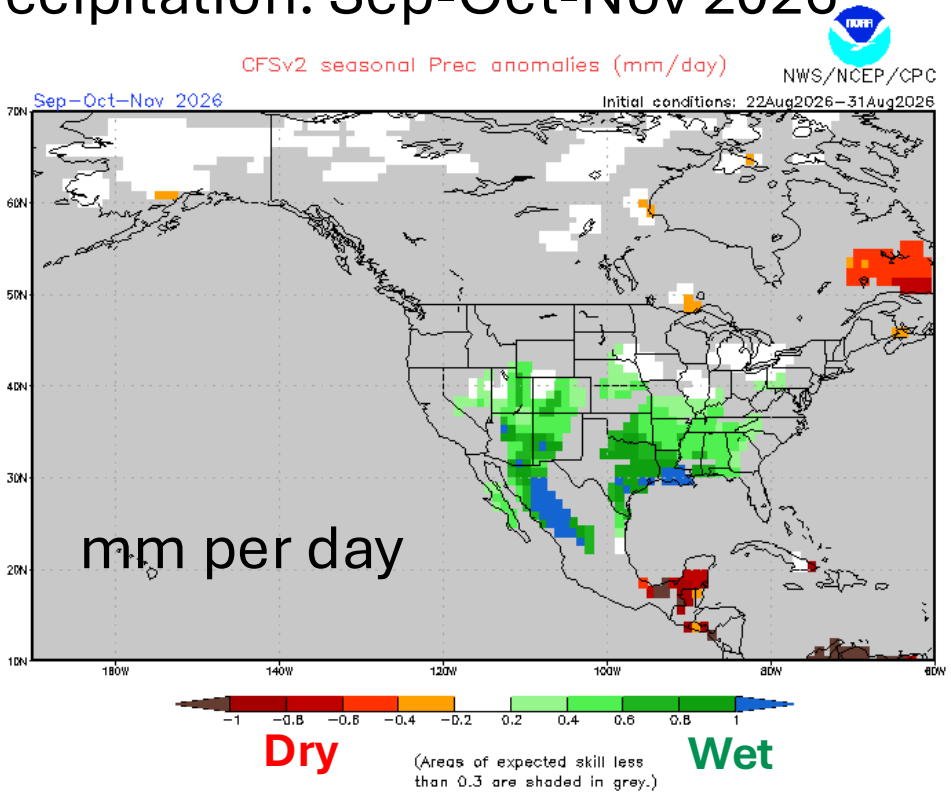
Sea Surface Temperatures: November 2026



Gray areas are not skillful

Forecasts

Precipitation: Sep-Oct-Nov 2026



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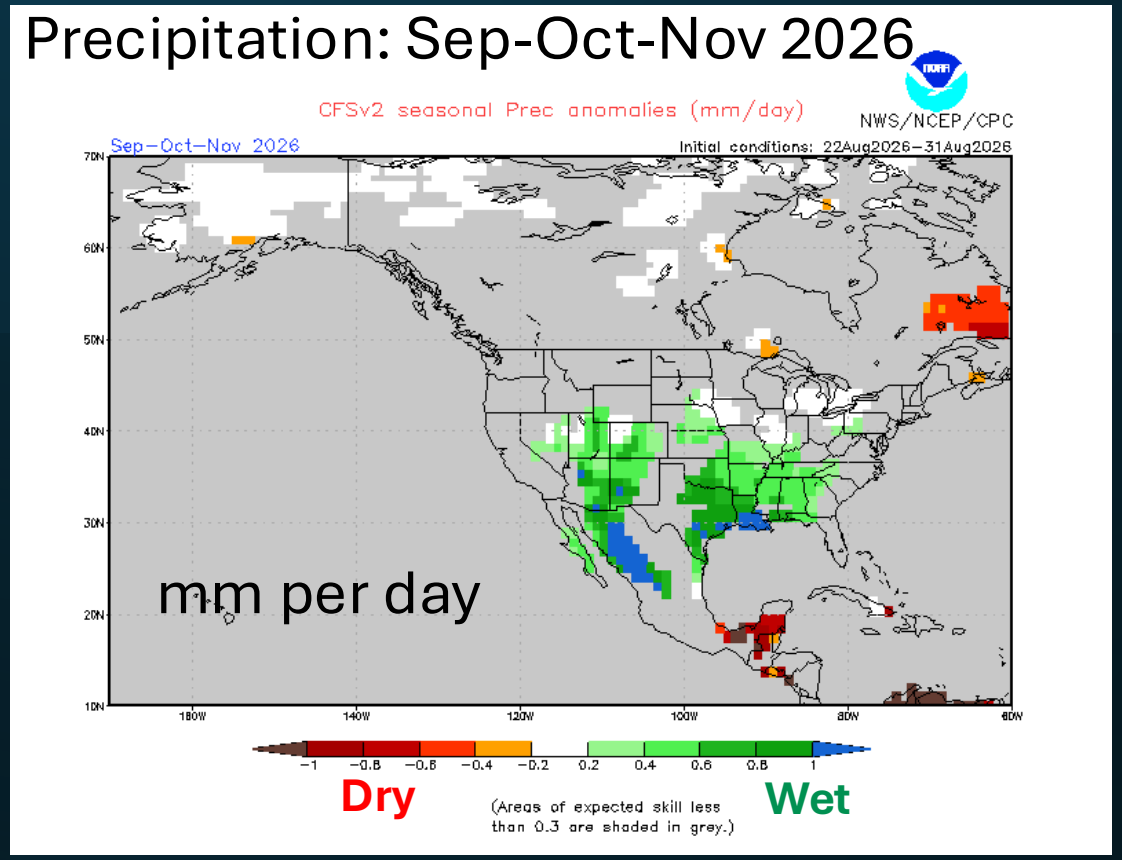
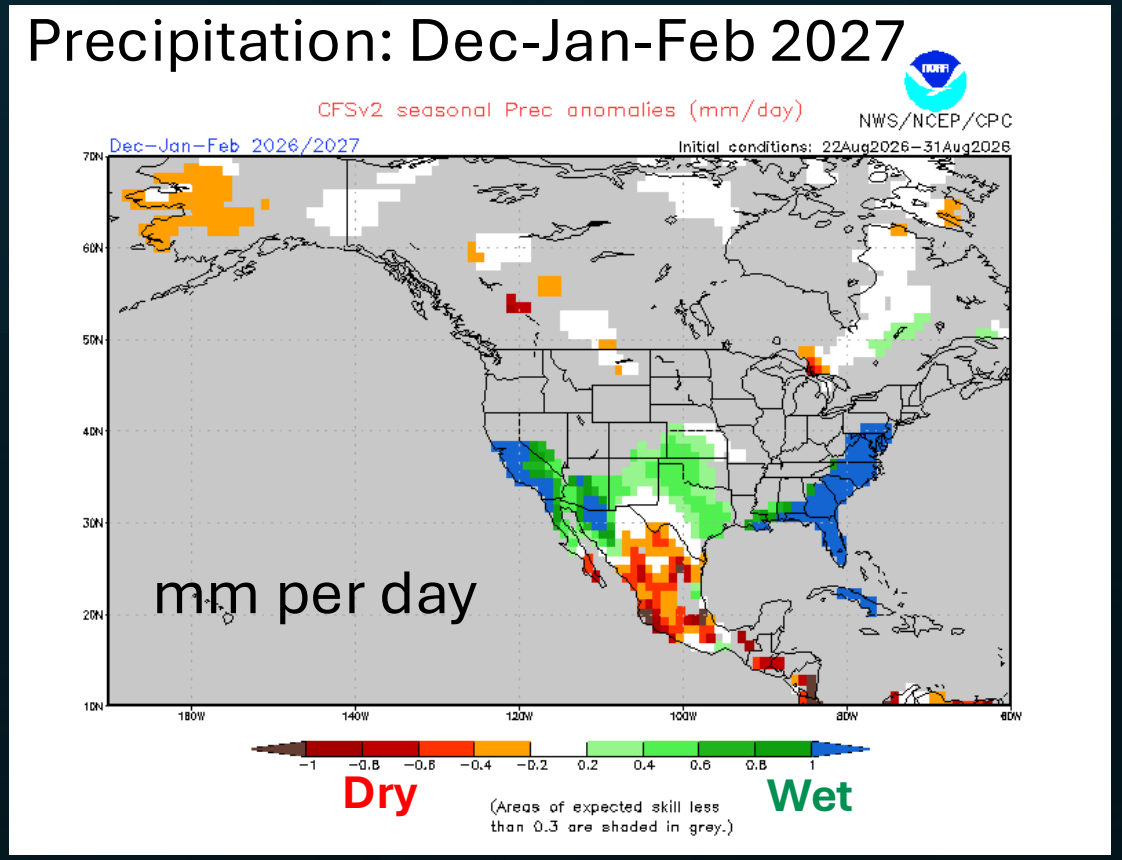
Forecasts

Precipitation: Sep-Oct-Nov 2026



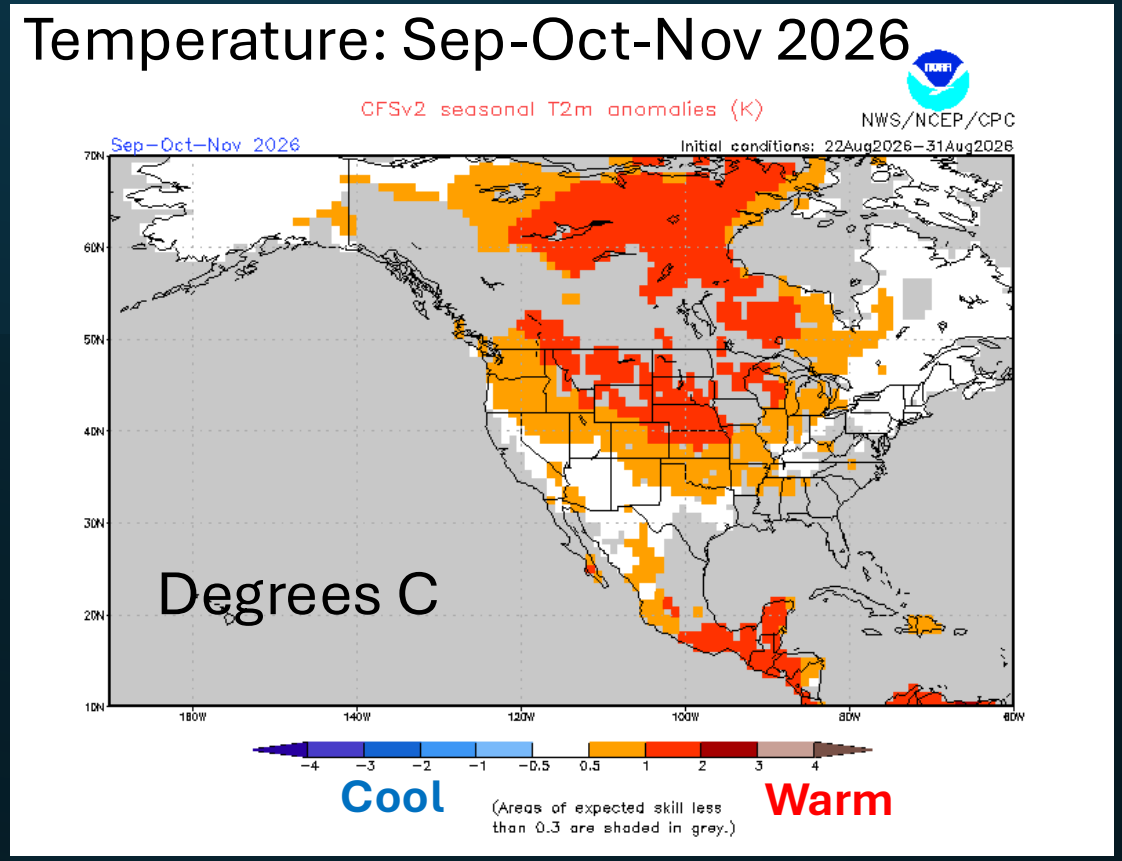
Precipitation: Dec-Jan-Feb 2027



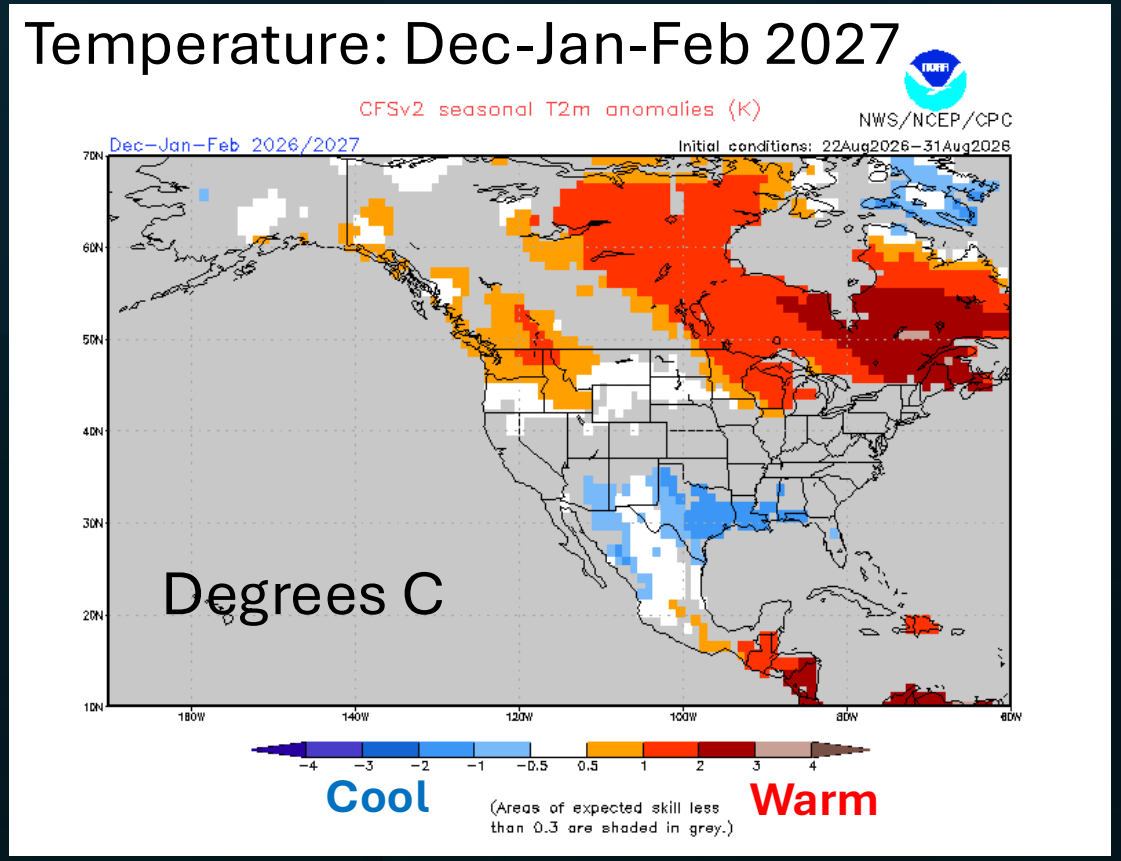
Gray areas are not skillful

Forecasts

Temperature: Sep-Oct-Nov 2026



Temperature: Dec-Jan-Feb 2027



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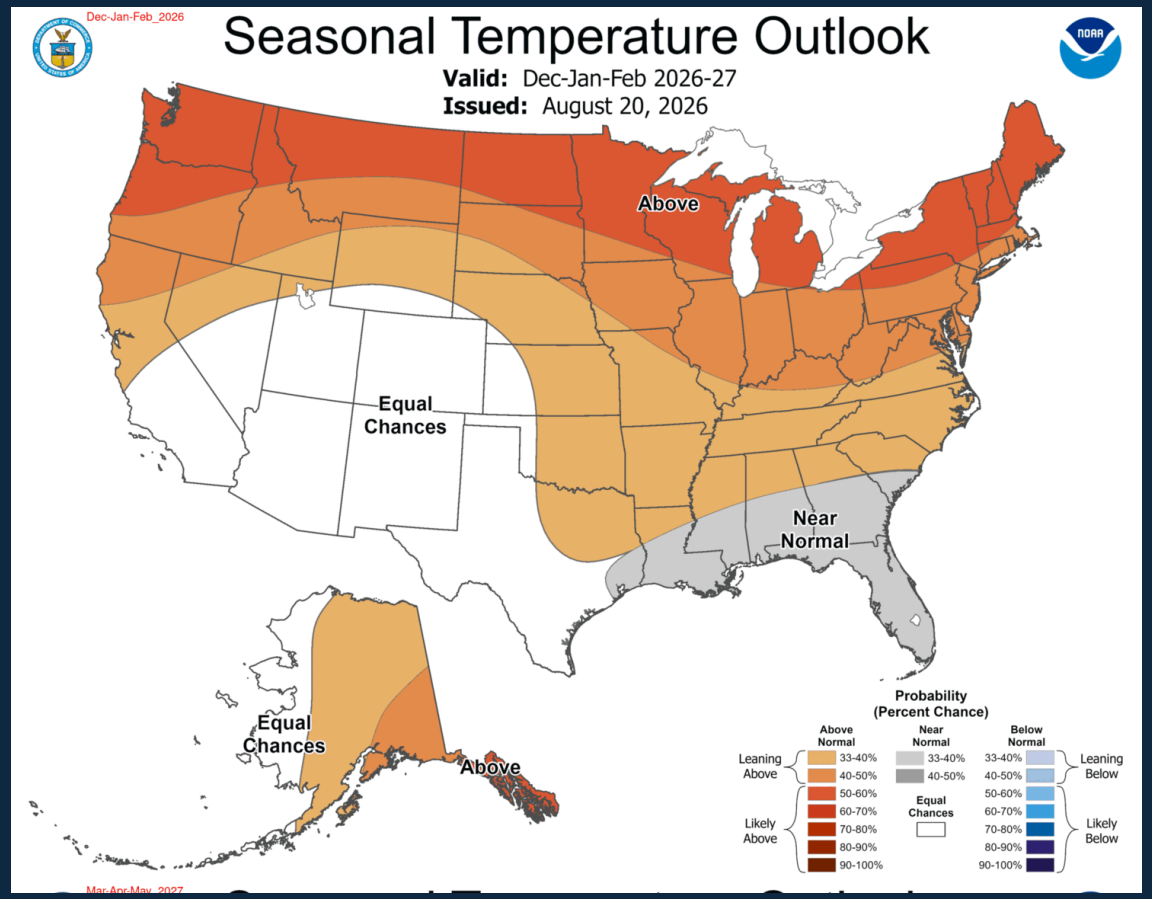
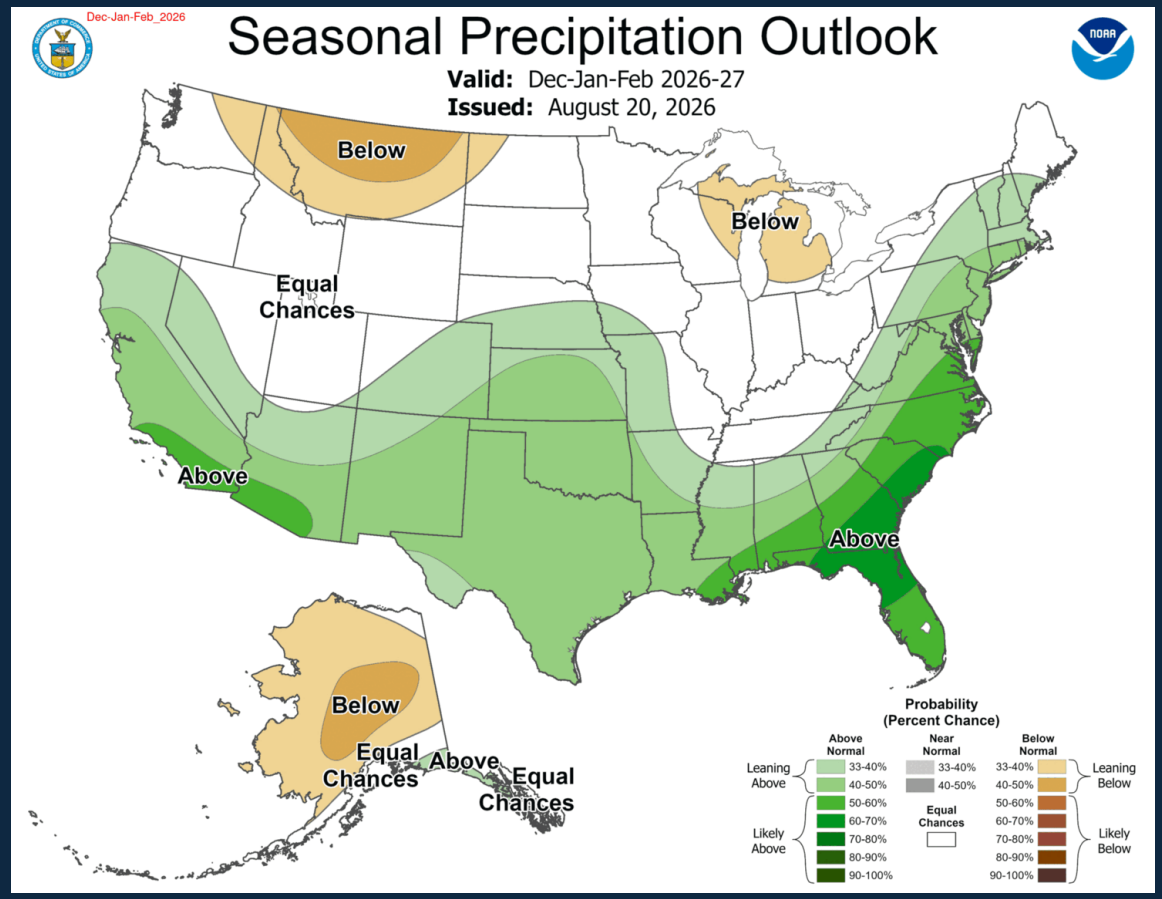
U.S. Seasonal Outlook: Dec-Jan-Feb

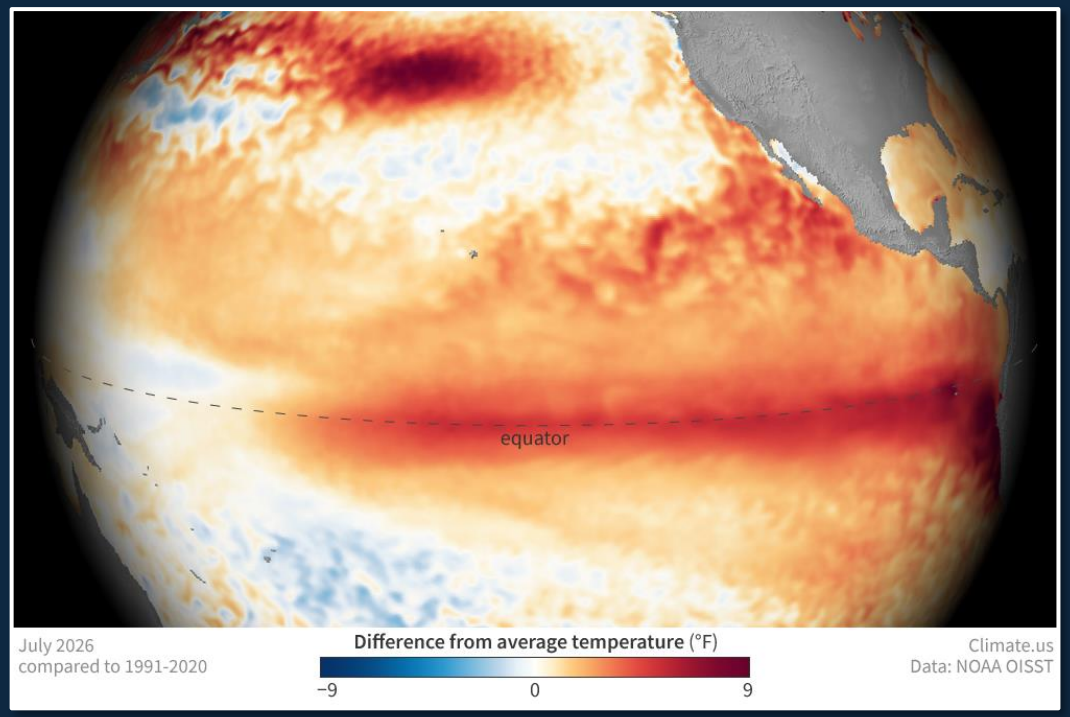




Based on the combined effects of long-term trends and ENSO

https://www.cpc.ncep.noaa.gov/products/predictions/90day/

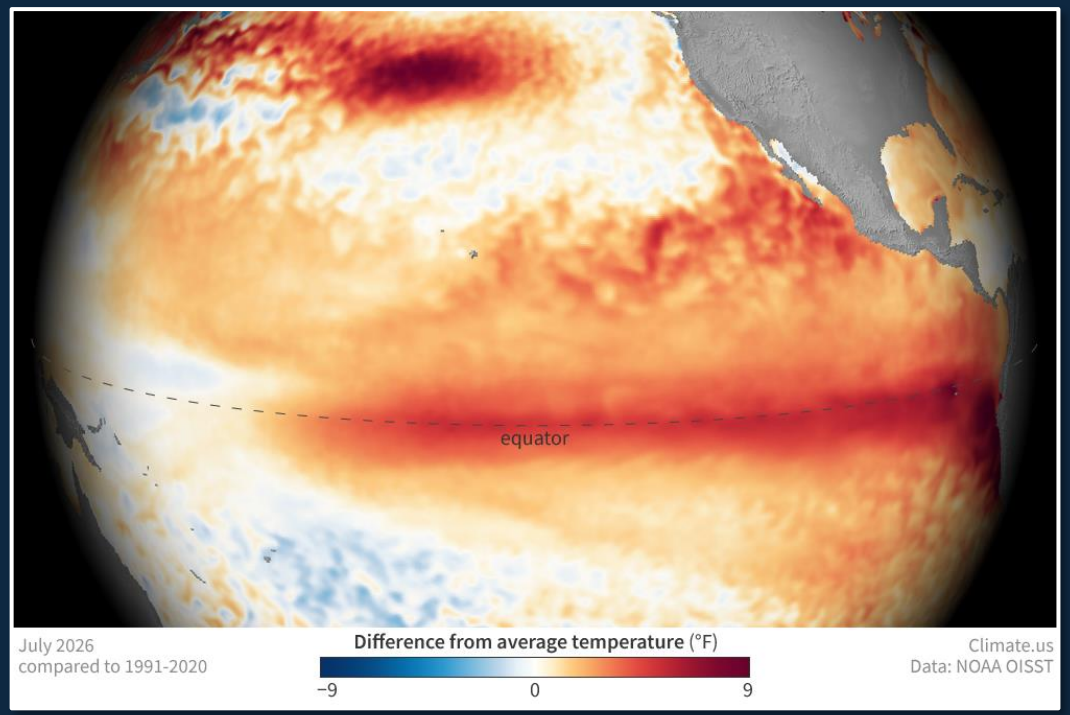
Summary



NSTA Webinar
September 10, 2026

Clara Deser (NCAR)
cdeser@ucar.edu

Summary



A major El Niño is underway. It is expected to peak in November (3.1-3.7 ºC) and last through spring 2027. It might end up being the strongest El Niño since at least 1850.

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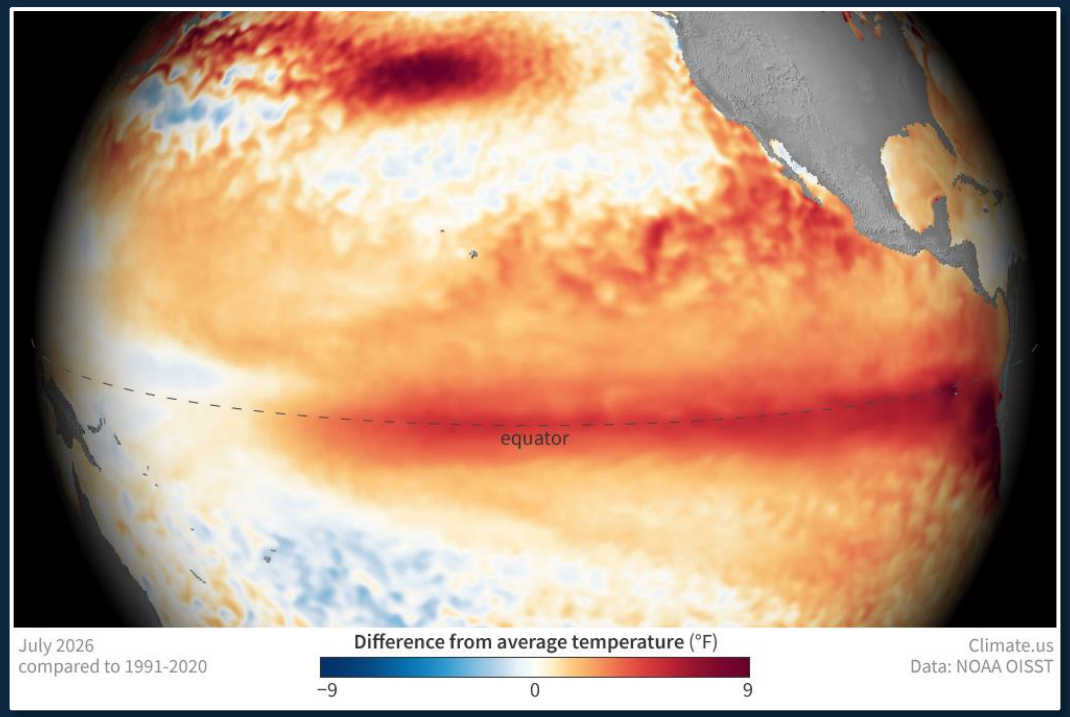

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This event will cause climate impacts over the U.S and beyond.

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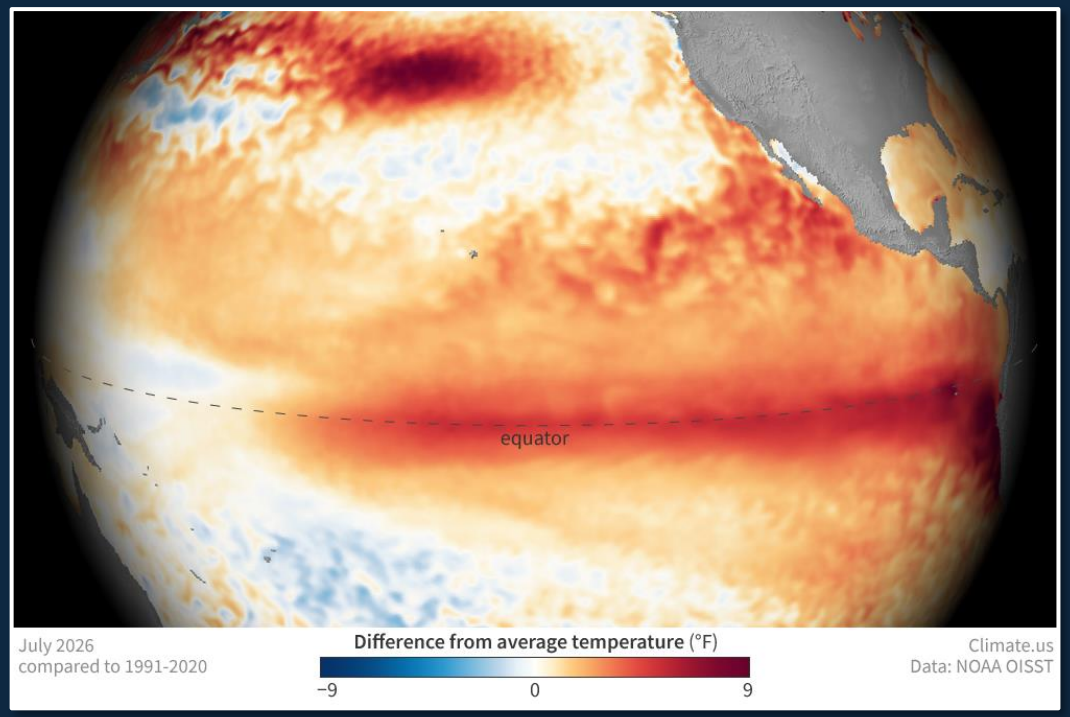

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This event will cause climate impacts over the U.S and beyond.

Outlook for late 2027:
La Niña, which typically follows a strong El Niño.