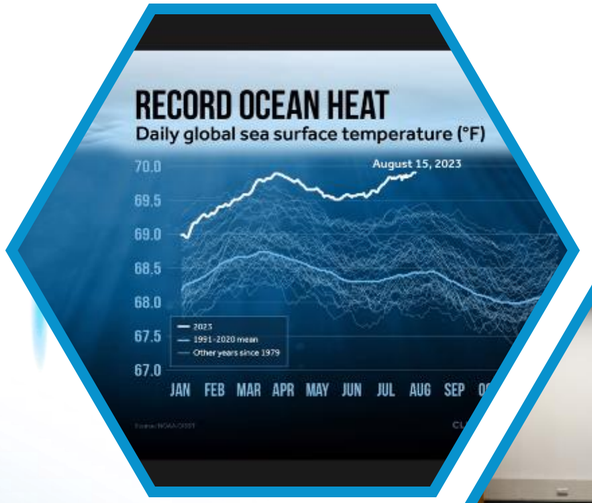
15TH SESSION OF THE PACIFIC ISLANDS CLIMATE OUTLOOK & STAKEHOLDER FORUM

PICOF-15

14 - 15 OCTOBER, 2024

HYBRID
IN-PERSON: NUKU'ALOFA, TONGA
ONLINE: ZOOM



WMO | PACIFIC REGIONAL CLIMATE CENTRE NETWORK | ClimSA | SPREP Secretariat of the Pacific Regional Environment Programme | Pacific Community Communauté du Pacifique | COSPPac | Australian Government Bureau of Meteorology | CSIRO | NIWA Taihoro Nukurangi | APCC APEC CLIMATE CENTER | NOAA | METEO FRANCE

REVIEW & EVALUATION OF MAY TO OCTOBER - OCEAN

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Meteorologist

NIWA

PICOF-14 outlook (May-October 2024)

- The 2023/24 El Niño event, which began in the second to third quarter of 2023, is in decline. However, the effects of this event may continue to be felt across the region for several more months.

- Several models suggest there is a chance of La Niña developing in the second half of this year, preceded by a period of ENSO neutral conditions.

- From May-October, warmer than average sea surface temperatures (SSTs) are favoured in most areas. This includes the potential for marine heatwaves, which can impact marine ecosystems and regional climate.

PICOF-14 outlook review

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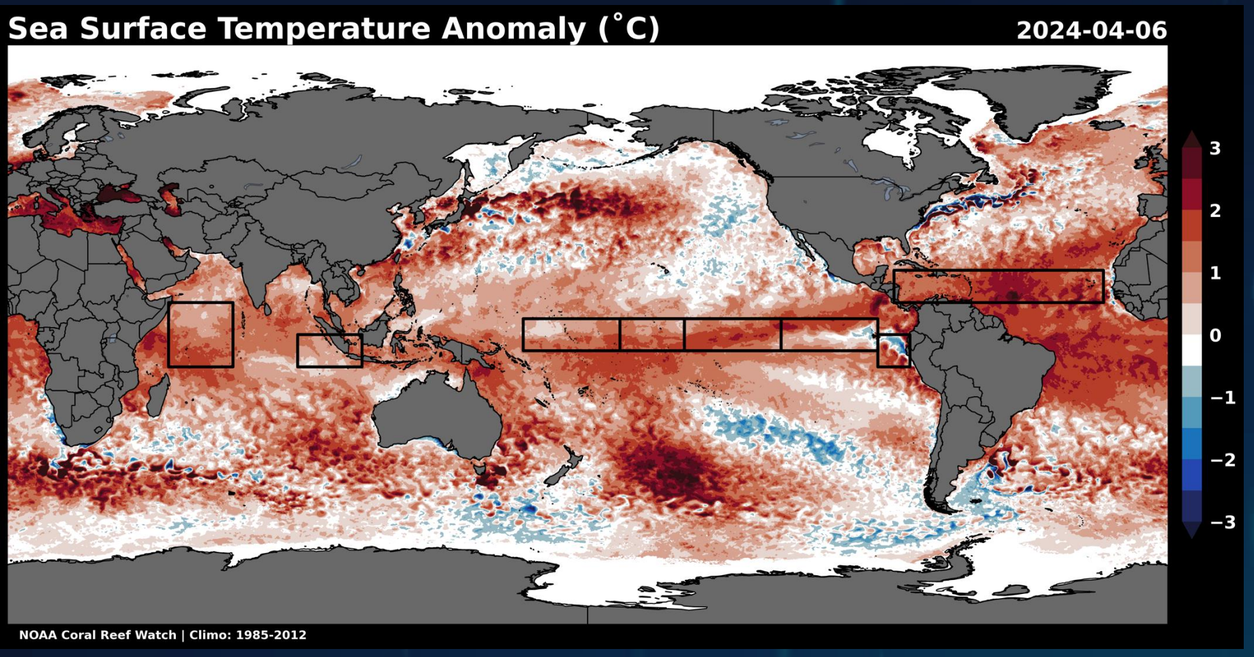

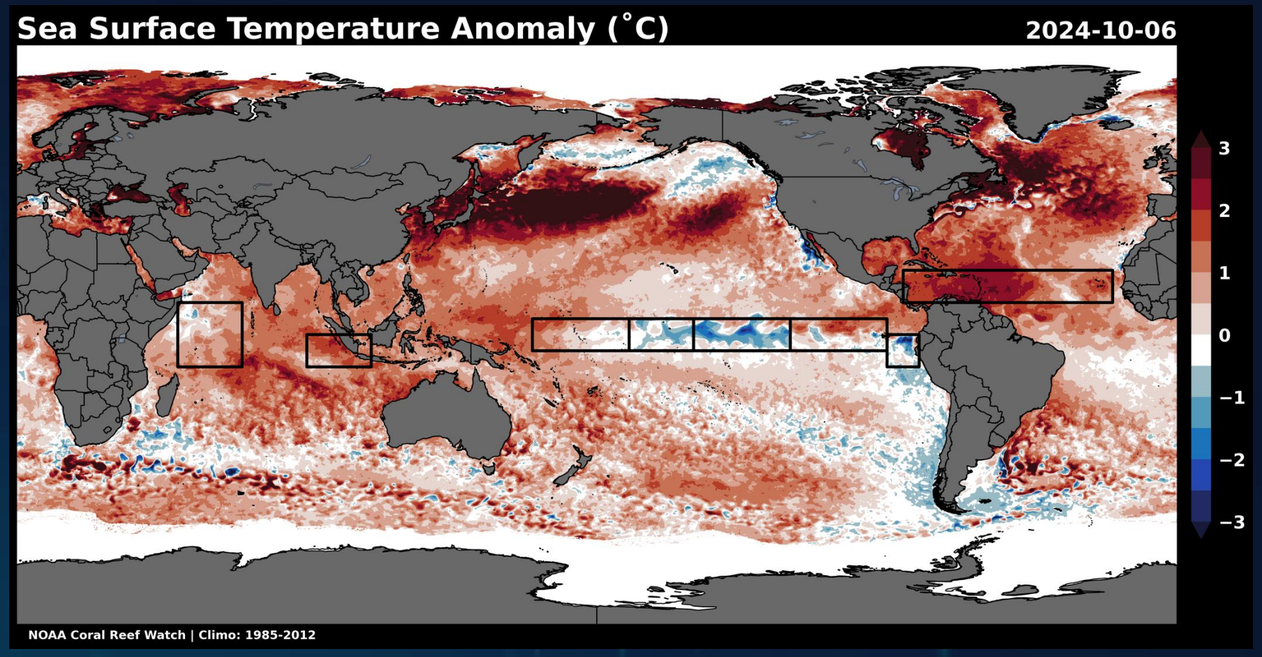

Climatology 1985-2012; data source: NOAA

PICOF-14 outlook review

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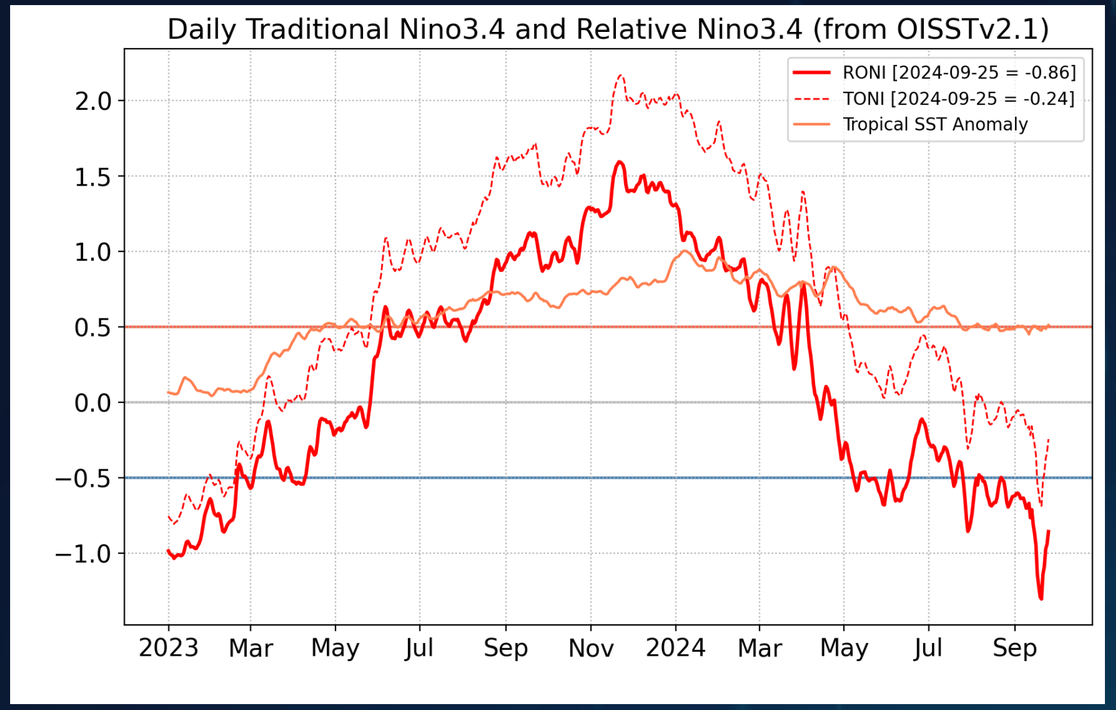

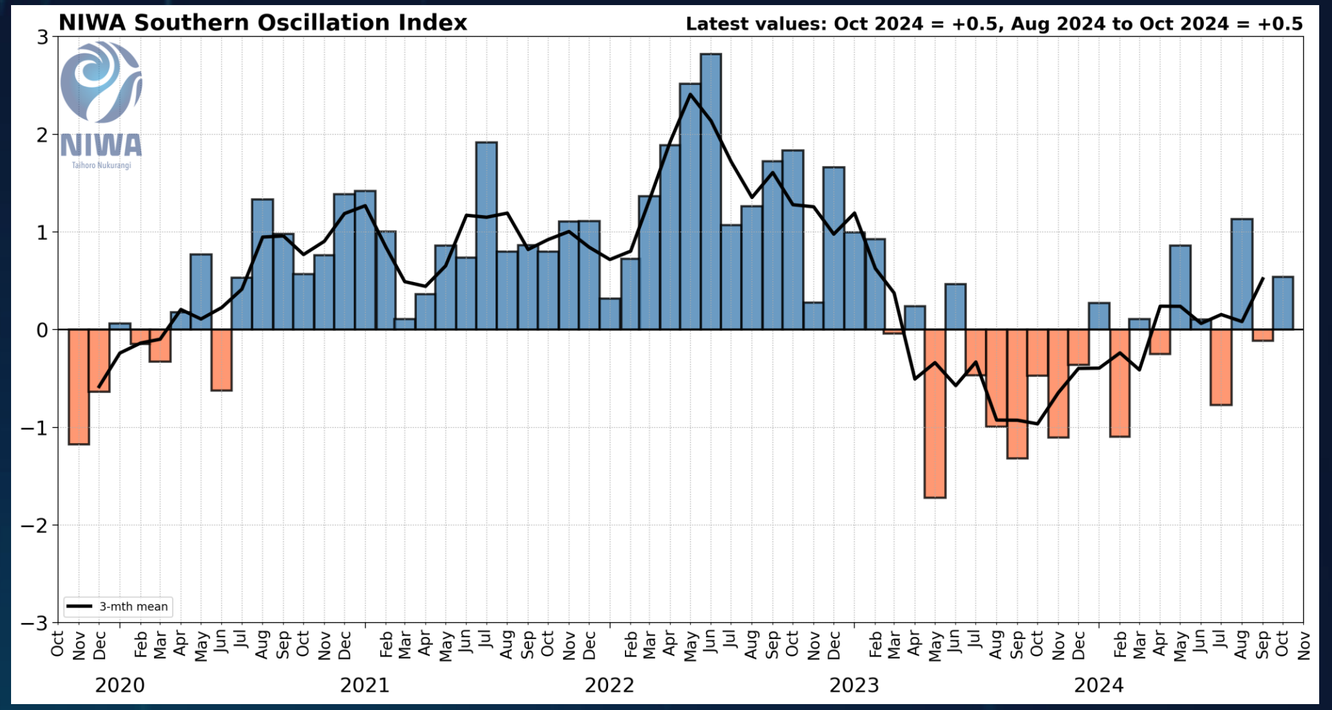

Climatology 1991-2020; data sources: NOAA, BoM

PICOF-14 outlook review

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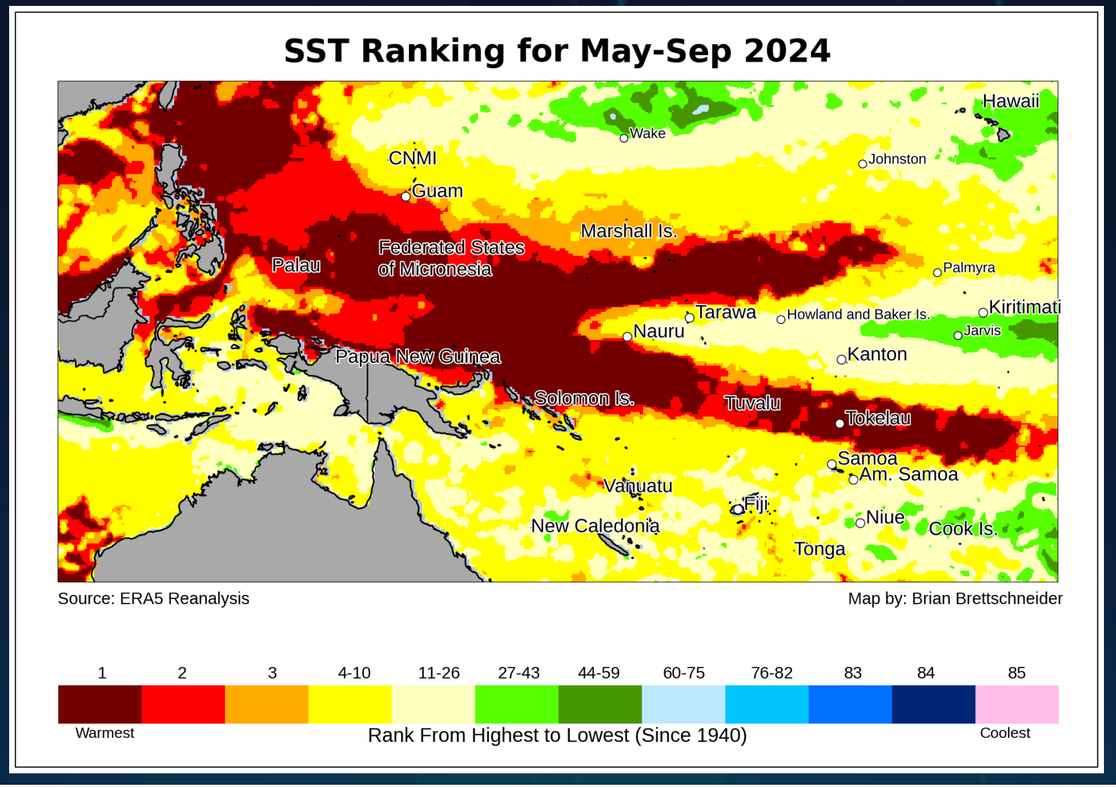

http://data.61n150w.com/ERA5RankMaps.php
Source: ERA5 / B Brettschneider

PICOF-14 outlook review

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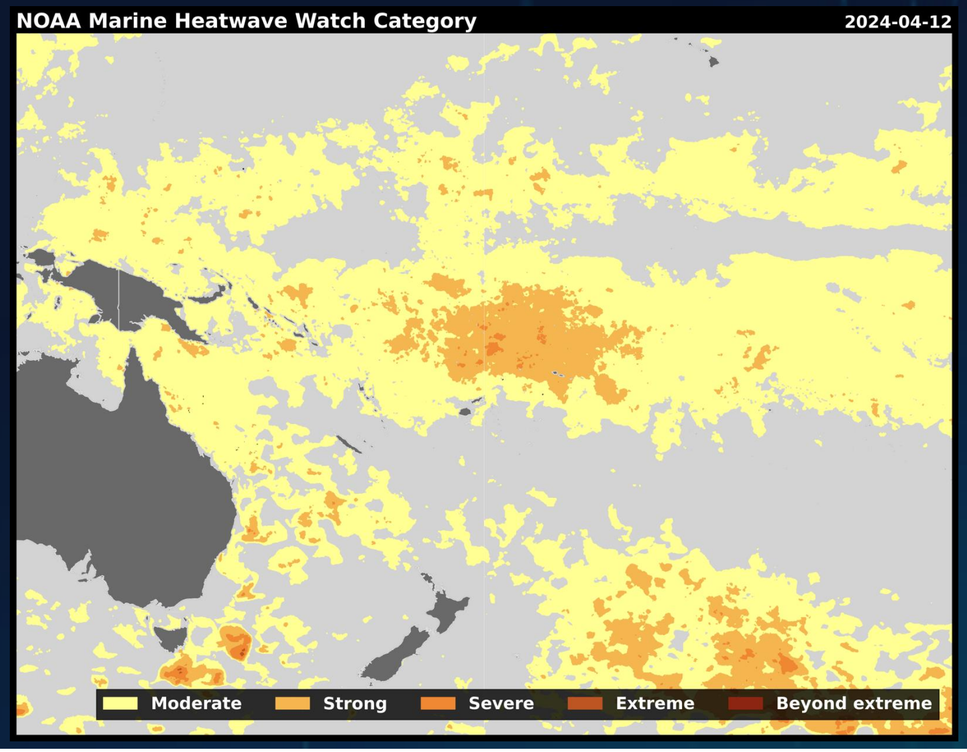
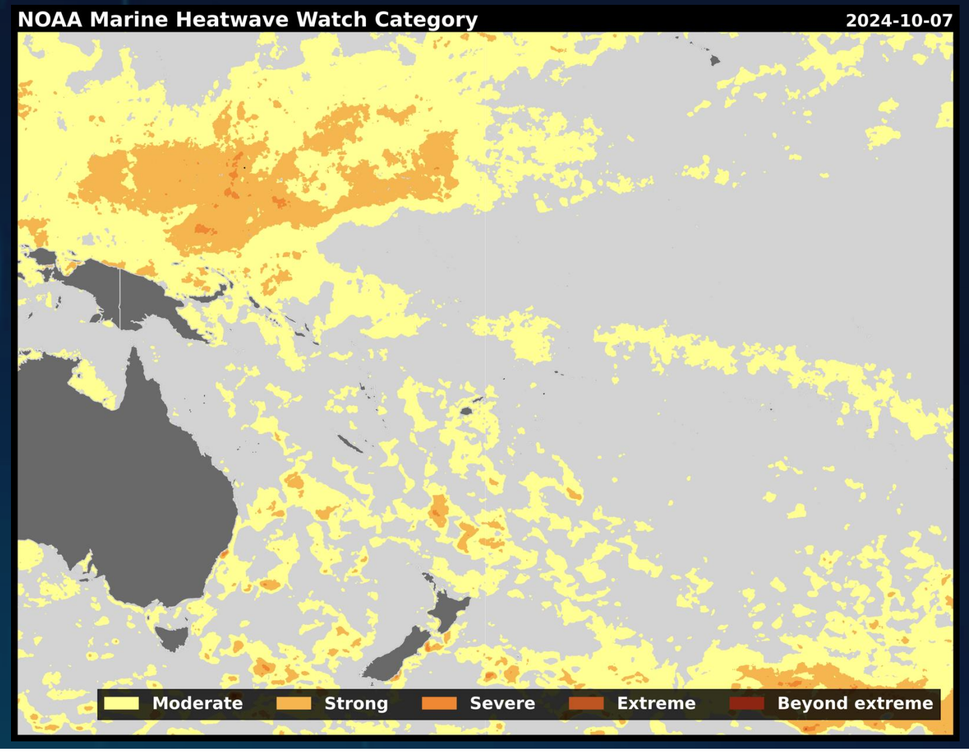
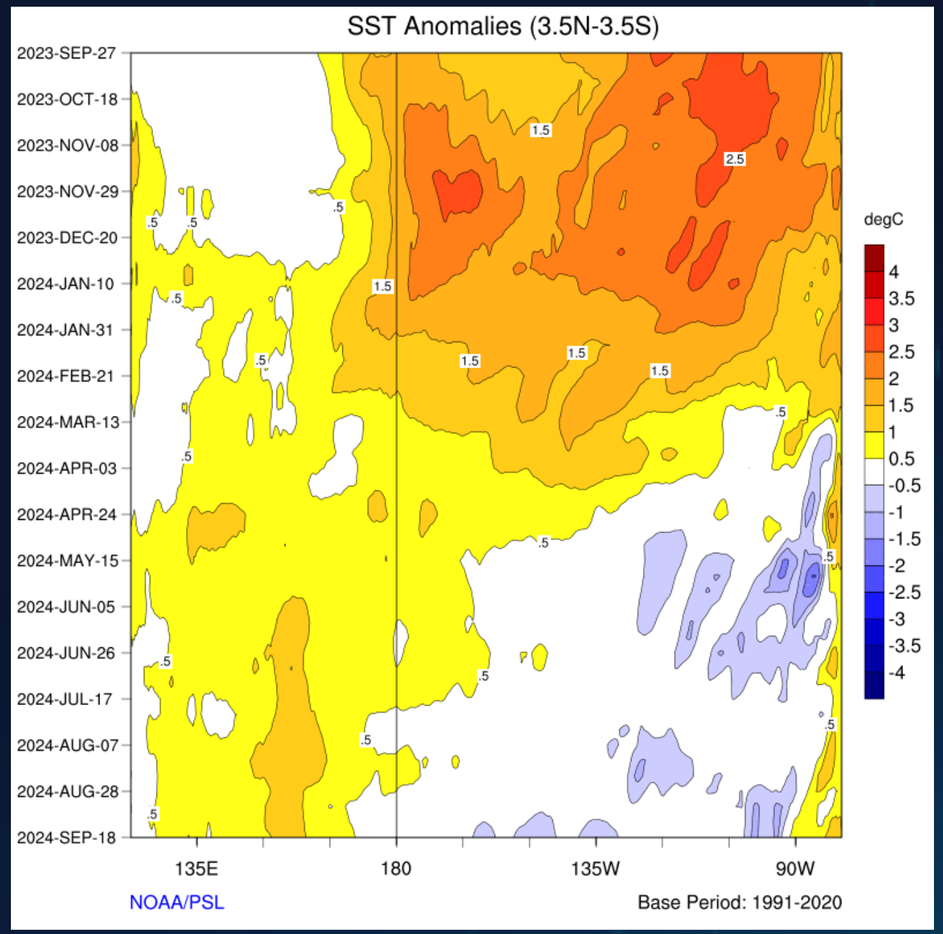




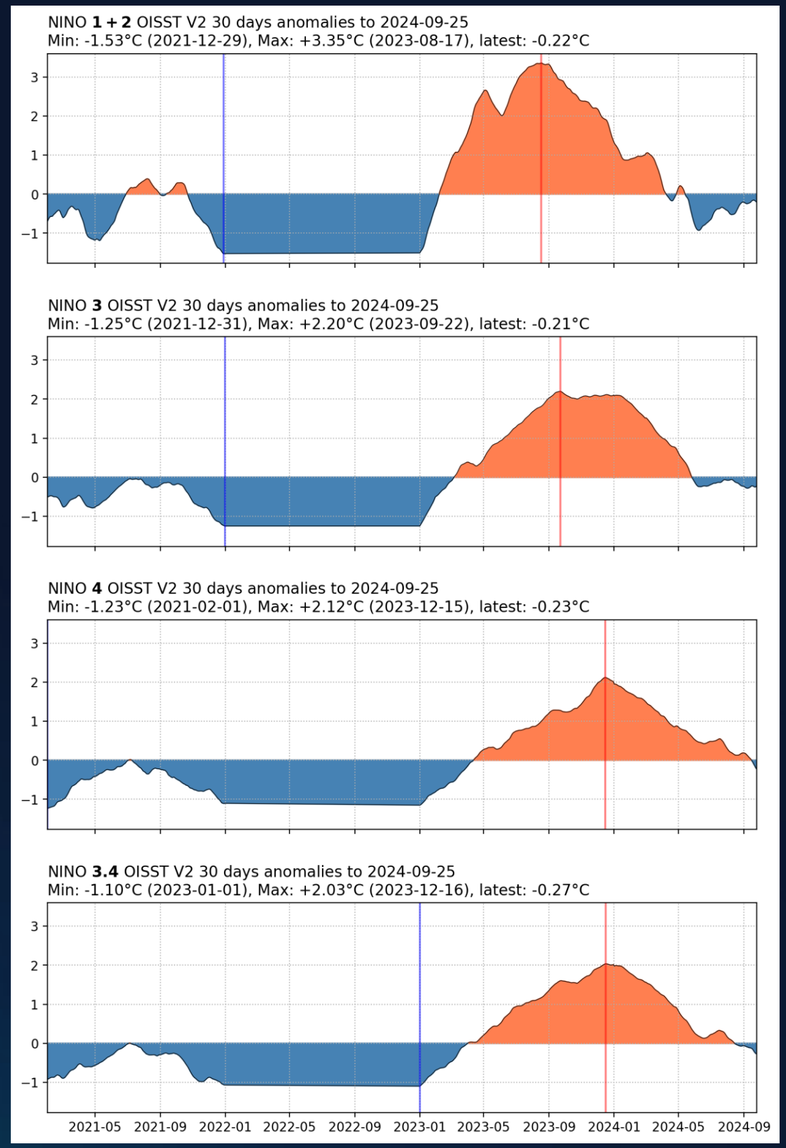
Based on Hobday et al. 2018; data source: NOAA

Oceanic trends – surface



https://psl.noaa.gov/map/images/sst/sst.anom.hov.gif

- Traditional Niño indices weakly cooler than average, reflective of an ENSO-neutral oceanic condition

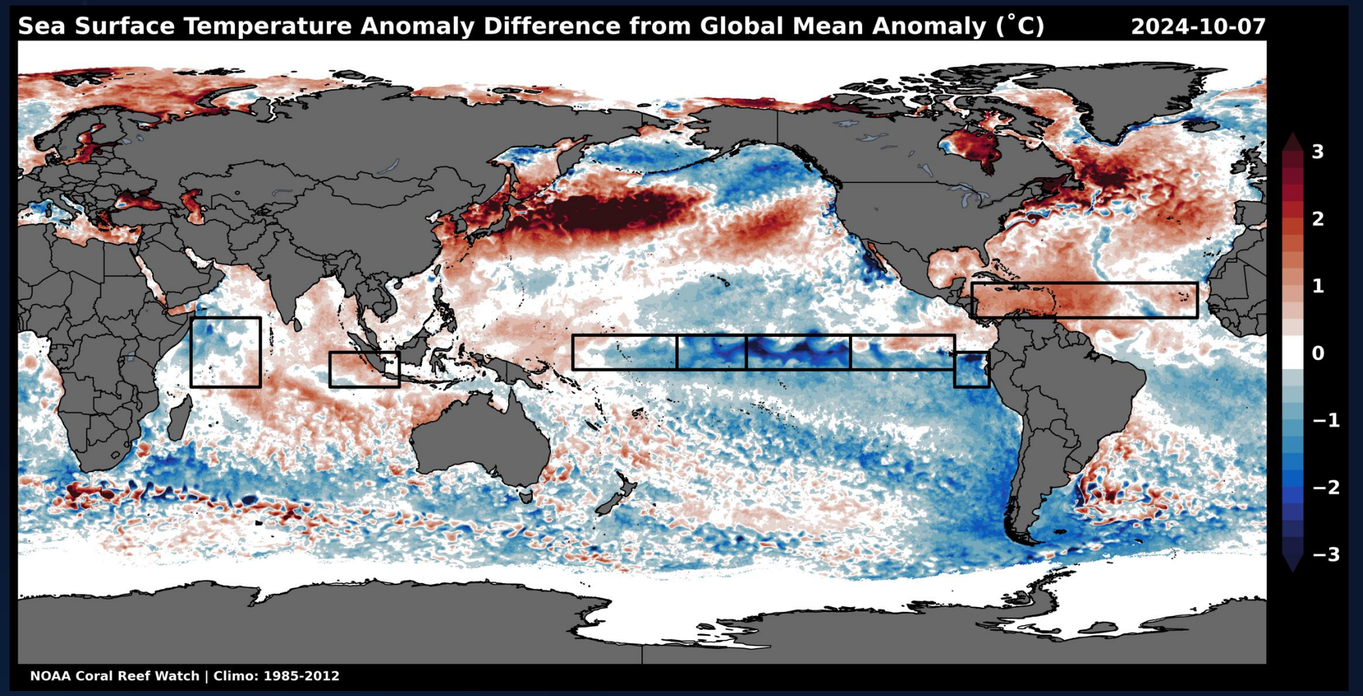


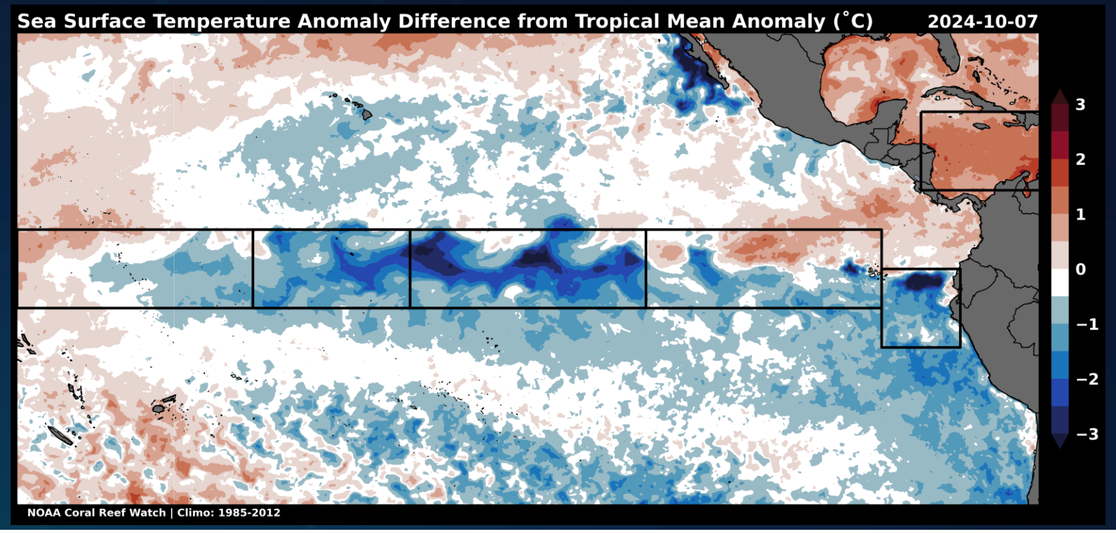
Oceanic trends – surface

- Relative Niño Index, an alternative way of measuring ENSO in a warming world, is near the La Niña threshold

- It compares the sea surface temperature in the Niño regions with the average in the global tropical band (20˚N to 20˚S)

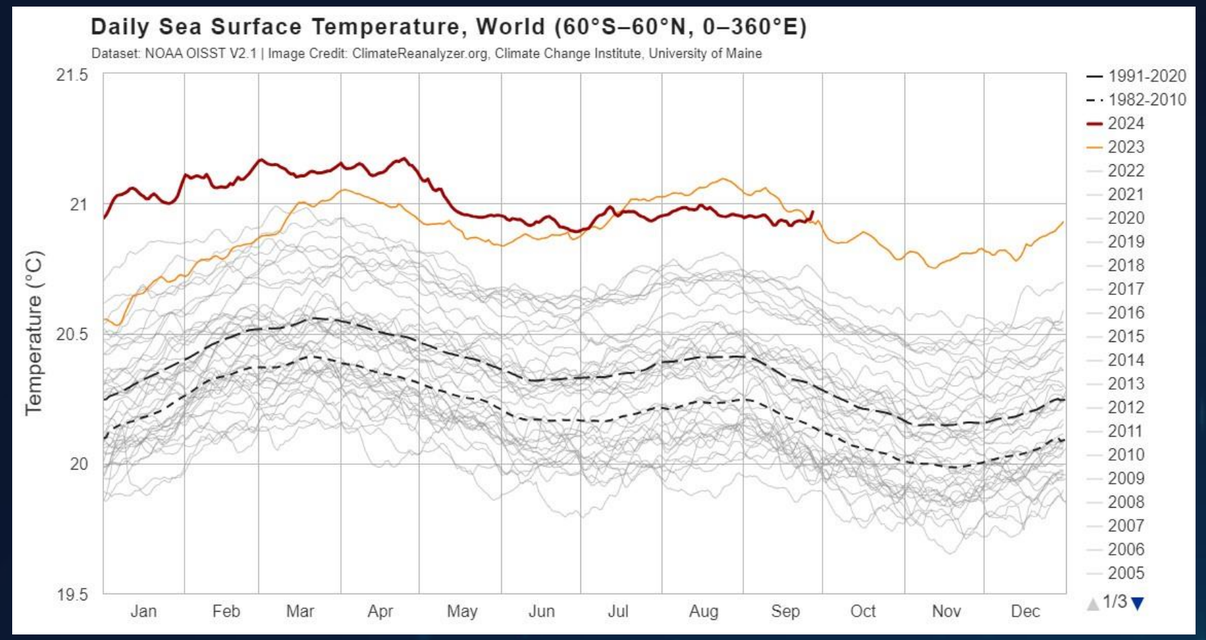
- Although traditional indicators may not be too bullish on La Niña, this alternative index suggests that the ocean is exhibiting La Niña-like conditions





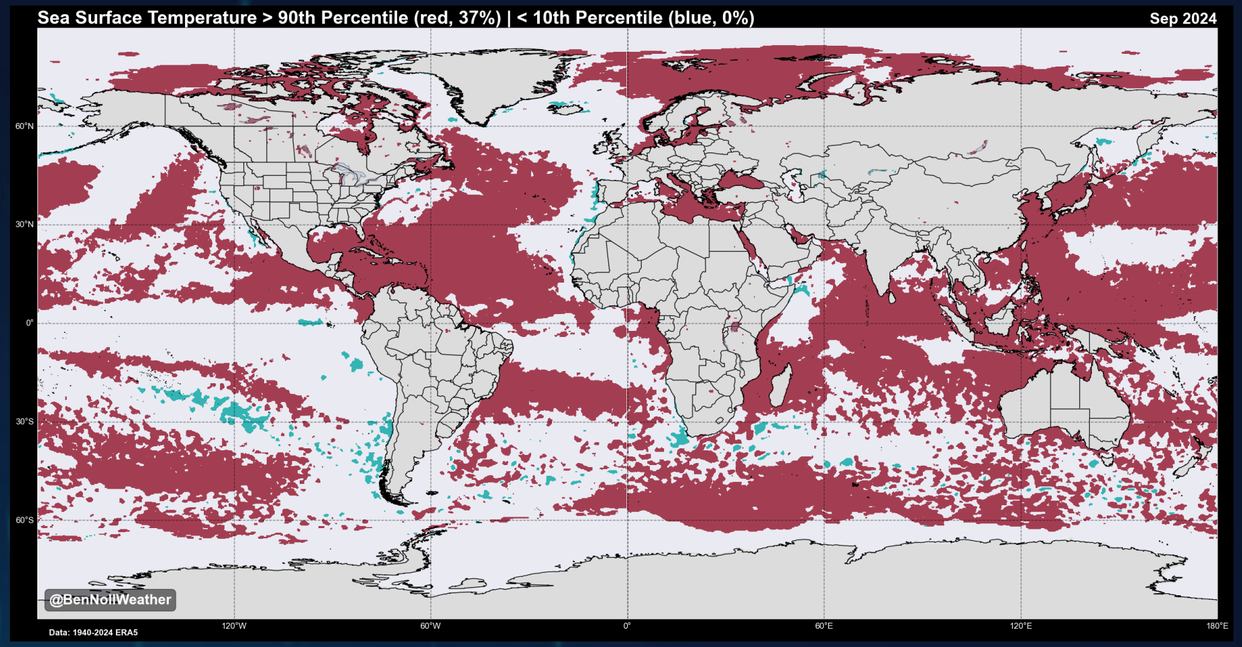
Oceanic trends – global

Daily sea surface temperature comparison to past years



https://climatereanalyzer.org/

Upper decile (top 10%) sea surface temperatures in September

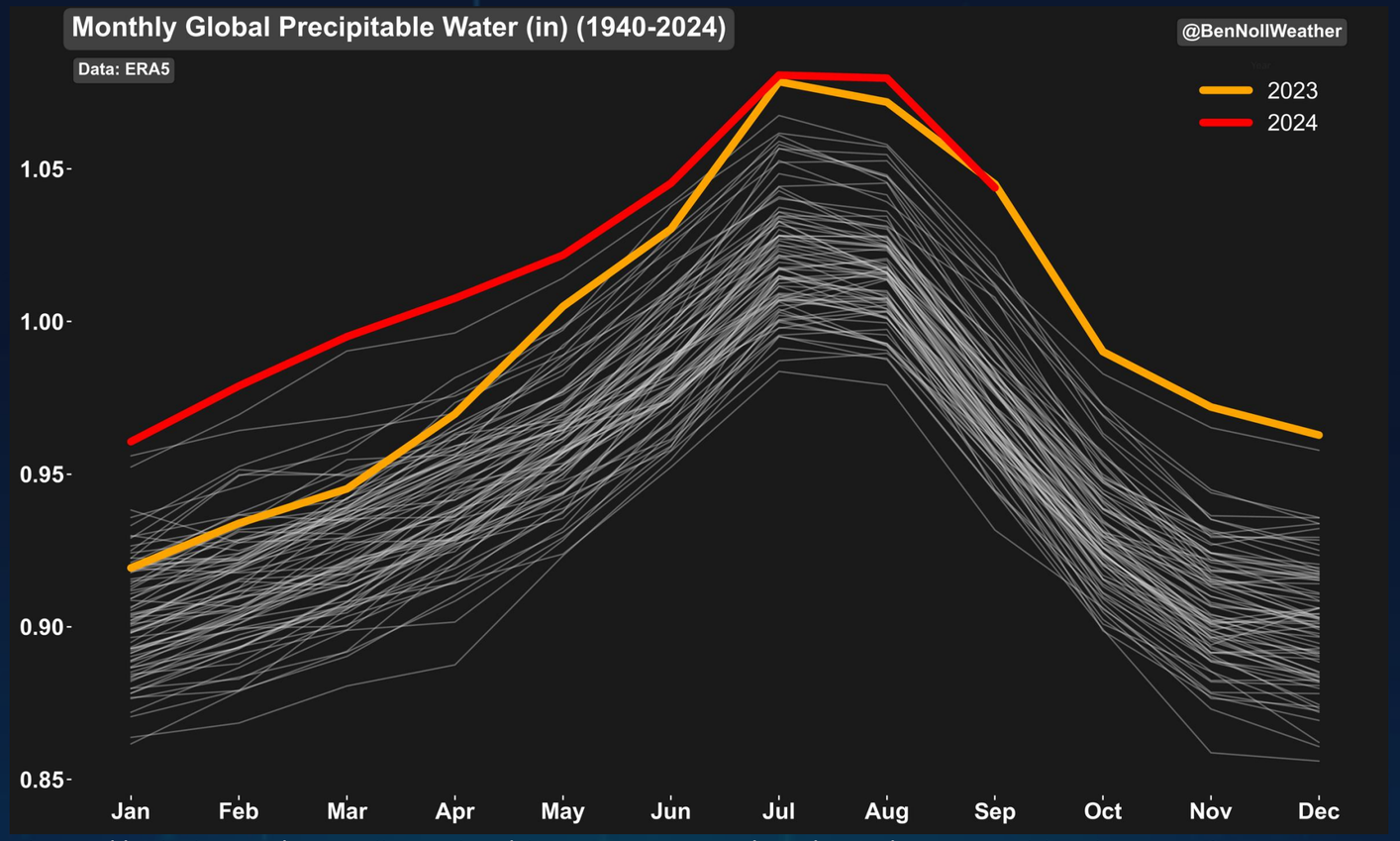


https://github.com/BenNollWeather/climate_extremes/raw/main/era5_sst_percentile.png?raw=true

Data sources: NOAA OISSTv2, ERA5

Oceanic trends – global moisture feedback

Record high atmospheric moisture from July 2023-August 2024

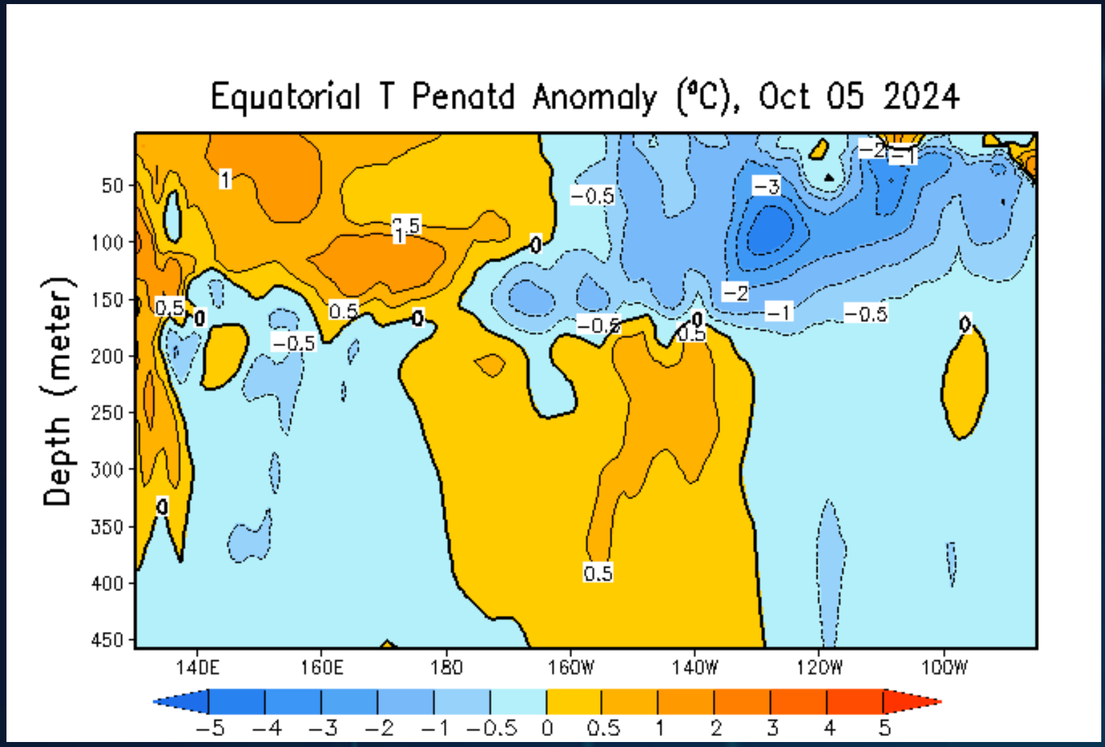


https://github.com/BenNollWeather/climate_extremes/raw/main/tcw_monthly_chart.png?raw=true

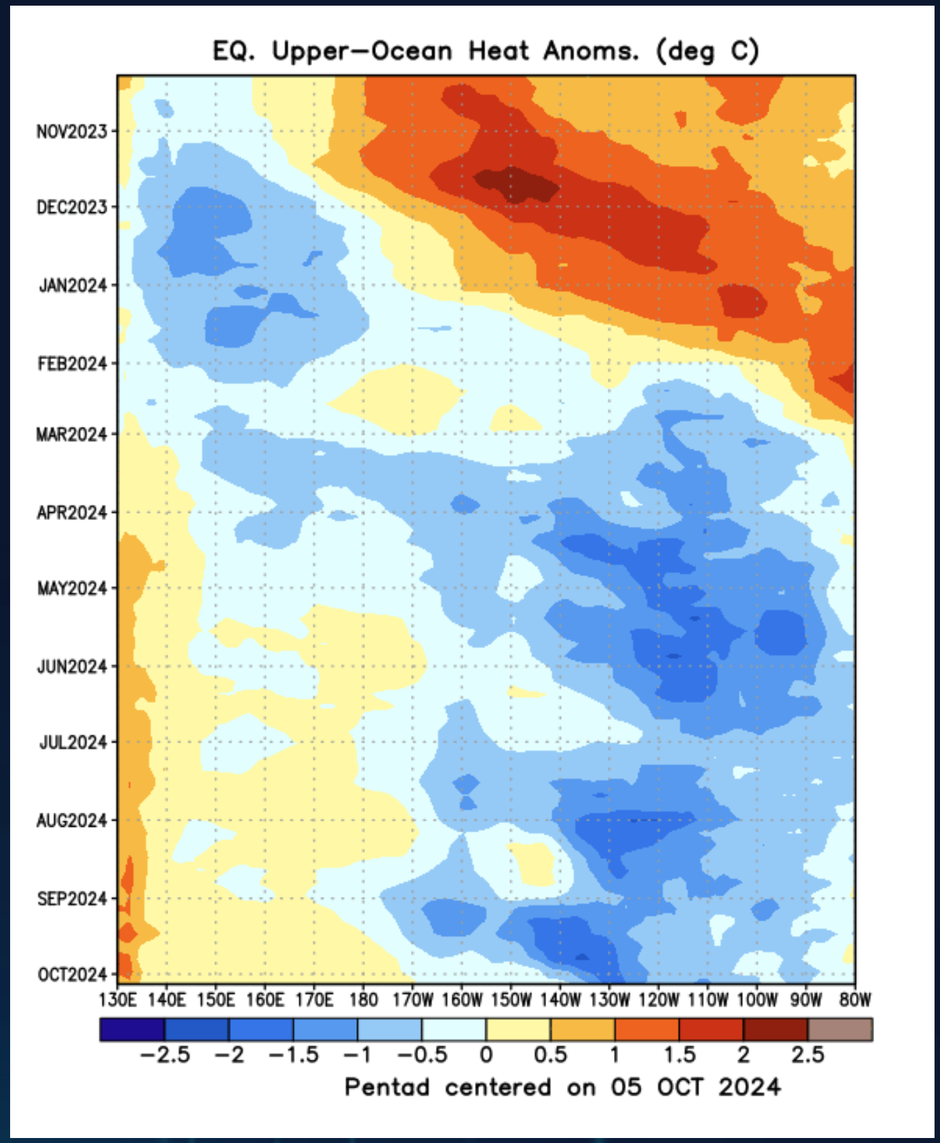
- Record atmospheric moisture is associated with record sea surface temperatures across the planet
- More fuel for heavy rainfall events

Data source: ERA5

Oceanic trends – subsurface & upper-ocean heat content



- East-to-west sea temperature gradient intensifying, a La Niña-like signature



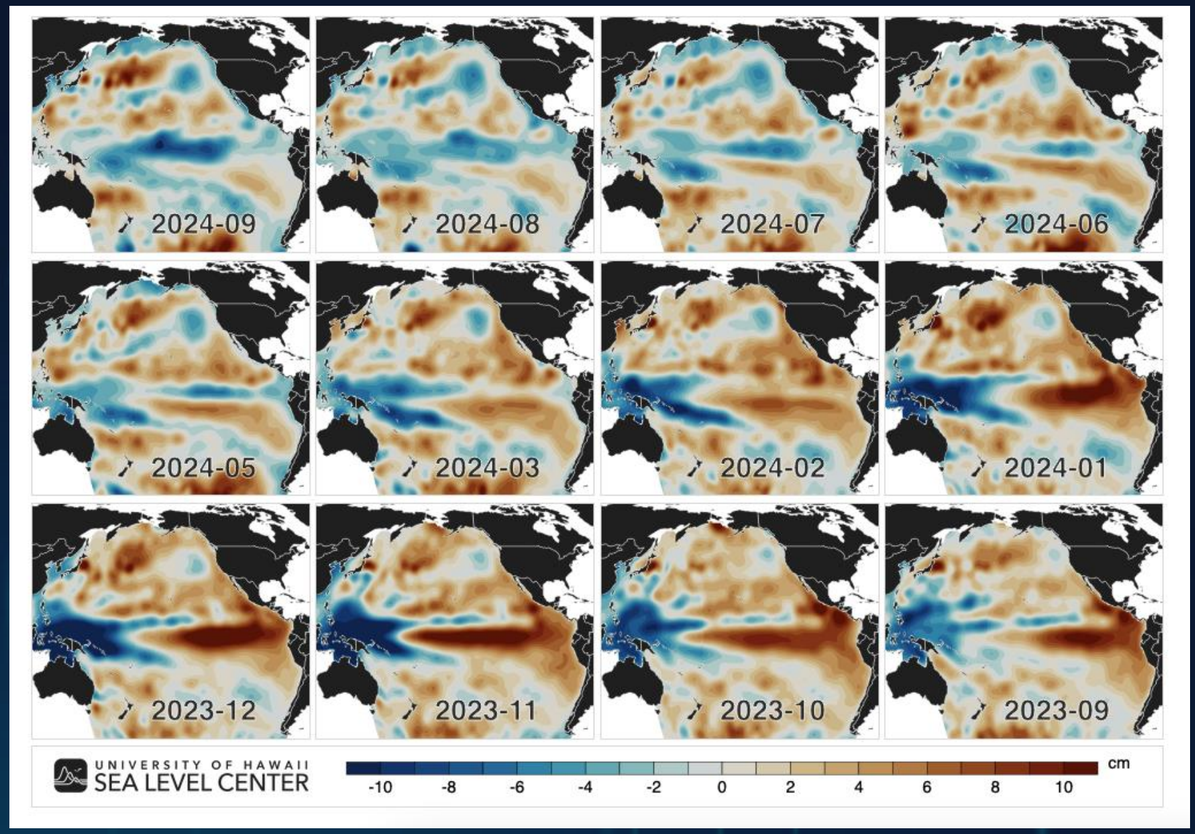
https://www.cpc.ncep.noaa.gov/products/analysis_monitoring/ocean/weeklyenso_clim_81-10/wkteq_xz.gif

https://www.cpc.ncep.noaa.gov/products/intraseasonal/heat_tlon.shtml

PICOF-14 outlook (May-October 2024) – sea level

- **Projection**: above normal sea levels are likely to develop around Palau, the Federated States of Micronesia (FSM), Marshall Islands, PNG, and Solomon Islands. This may lead to a risk for coastal inundation, especially during the highest tides.

- **Actual**: near or below normal sea levels (up to 10 cm) have occurred in the western and central Pacific with above normal levels toward the sub-tropics.



https://uhslc.soest.hawaii.edu/pacific-sea-level-monitoring/

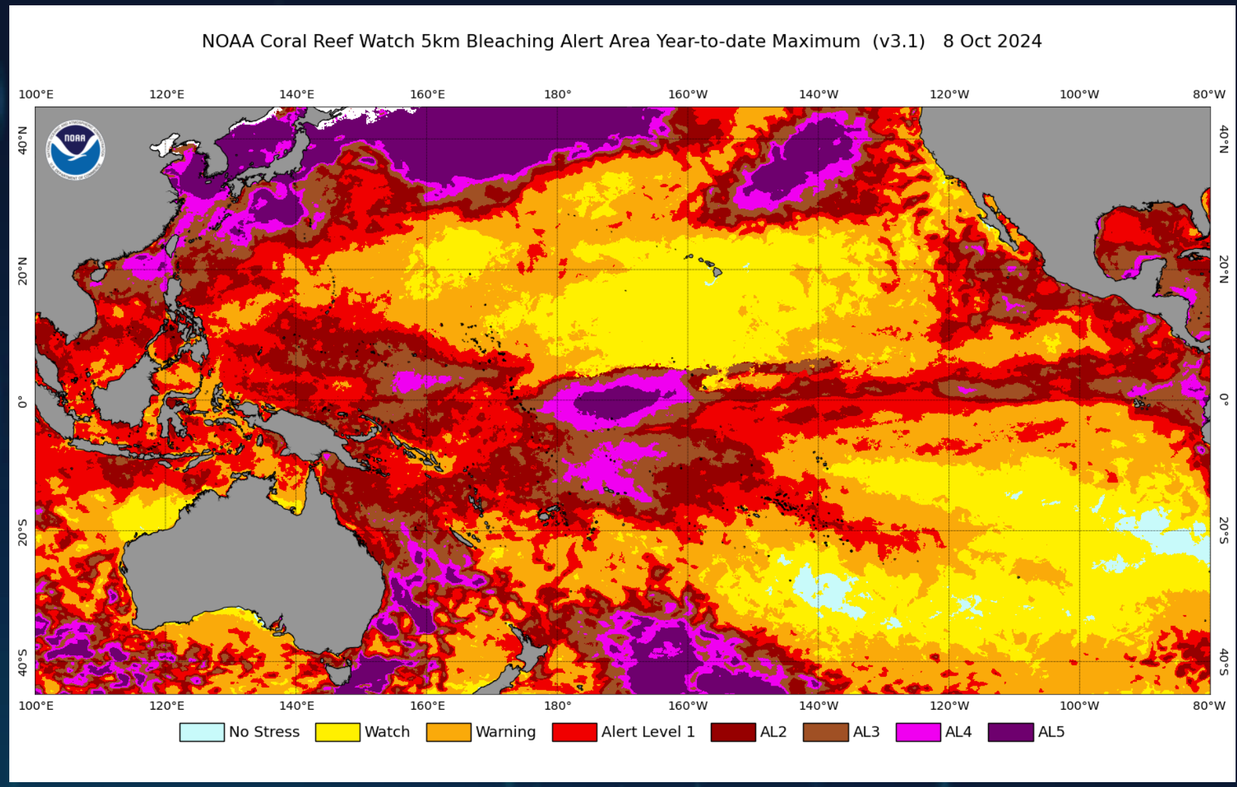
Stress Level	Definition	Potential Bleaching and Mortality
No Stress	HotSpot <= 0	No Bleaching
Bleach Watch	0 < HotSpot < 1	
Bleaching Warning	1 <= HotSpot and 0 < DHW < 4	Risk of Possible Bleaching
Bleaching Alert Level 1	1 <= HotSpot and 4 <= DHW < 8	Risk of Reef-Wide Bleaching
Bleaching Alert Level 2	1 <= HotSpot and 8 <= DHW < 12	Risk of Reef-Wide Bleaching with Mortality of Heat-Sensitive Corals
Bleaching Alert Level 3	1 <= HotSpot and 12 <= DHW < 16	Risk of Multi-Species Mortality
Bleaching Alert Level 4	1 <= HotSpot and 16 <= DHW < 20	Risk of Severe, Multi-Species Mortality (> 50% of corals)
Bleaching Alert Level 5	1 <= HotSpot and 20 <= DHW	Risk of Near Complete Mortality (> 80% of corals)

PICOF-14 outlook (May-October 2024) – coral bleaching

- **Projection**: coral bleaching alerts are in effect for much of western tropical Pacific, highest for Tuvalu, Tokelau, northern Cook Islands, and northern Solomon Islands.

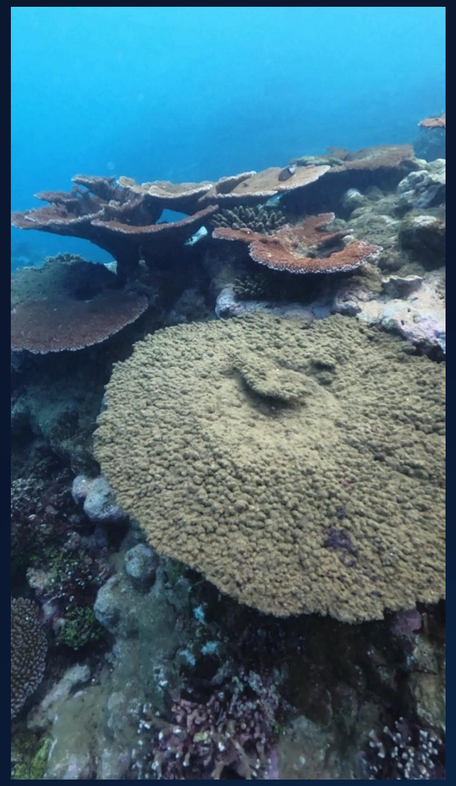
- **Actual**: Bleaching Alert Level 3 or higher encompassed several island groups, including Samoa, American Samoa, Tuvalu, Tokelau, Wallis & Futuna, west-central Kiribati, FSM, and the far southern Marshall Islands. Parts of Papua New Guinea, southern New Caledonia, and northern Vanuatu, northern Fiji, and the northern Cook Islands were affected by at least Bleaching Alert Level 2.

Year-to-date maximum bleaching alert level



https://coralreefwatch.noaa.gov/product/5km/index_5km_baa-max-7d.php

PICOF-14 outlook (May-October 2024) – coral bleaching in American Samoa



Source: National Parks of American Samoa

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Summary – May to October state of the ocean

- **PICOF-14 statement validation**: generally good! El Niño gave way to ENSO neutral / La Niña-like conditions as forecast. The coral bleaching/marine heatwave risk was well-advised. The sea level forecasts were not as skillful and were generally lower than forecast in the west.

- **Sea surface temperatures**: El Niño gave way to ENSO neutral or La Niña-like conditions. The cooling trend in the equatorial Pacific is more notable when using the relative ENSO index.

- **Sub-surface temperatures**: the West Pacific Warm Pool is actively recharging, and a cool-to-warm west-to-east gradient is noted across the basin.

- **Sea level**: as of September 2024, it was generally near or below normal, except toward the Coral Sea and near New Caledonia.

- **Coral bleaching**: Alert Levels 3-5 have been common this year, leading to some profound bleaching events. Record warm sea temperatures affected Tokelau, Tuvalu, Solomon Islands, PNG, Palau & FSM. Bleaching was observed in American Samoa.

THANK YOU!

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