

Hawaii

Climate Indicators Summary

December 2021

PMNM Climate Change Working Group

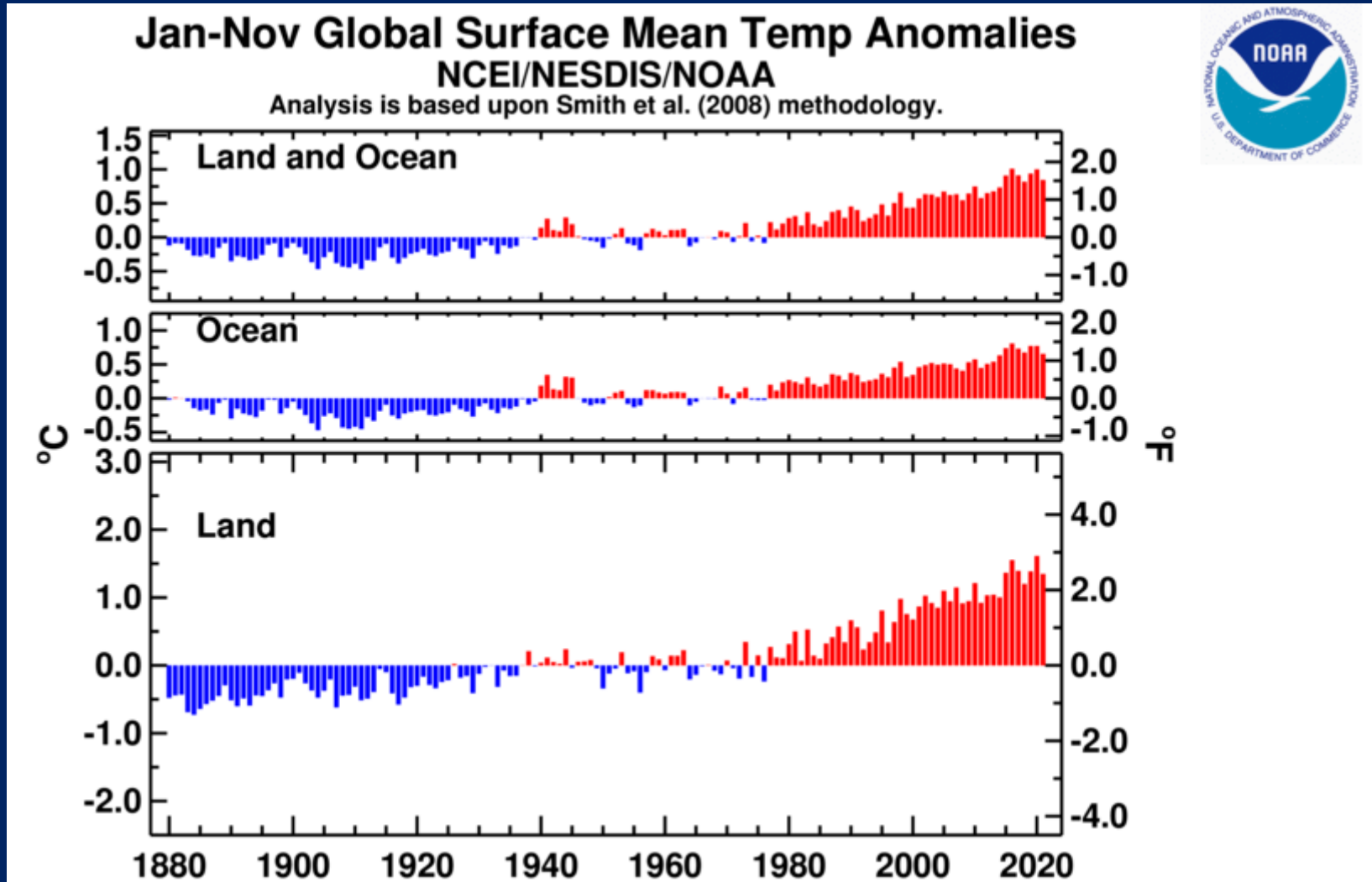
Dan A. Polhemus

U. S. Fish & Wildlife Service

Honolulu, HI

2021 basically was not as warm as 2019 or 2020

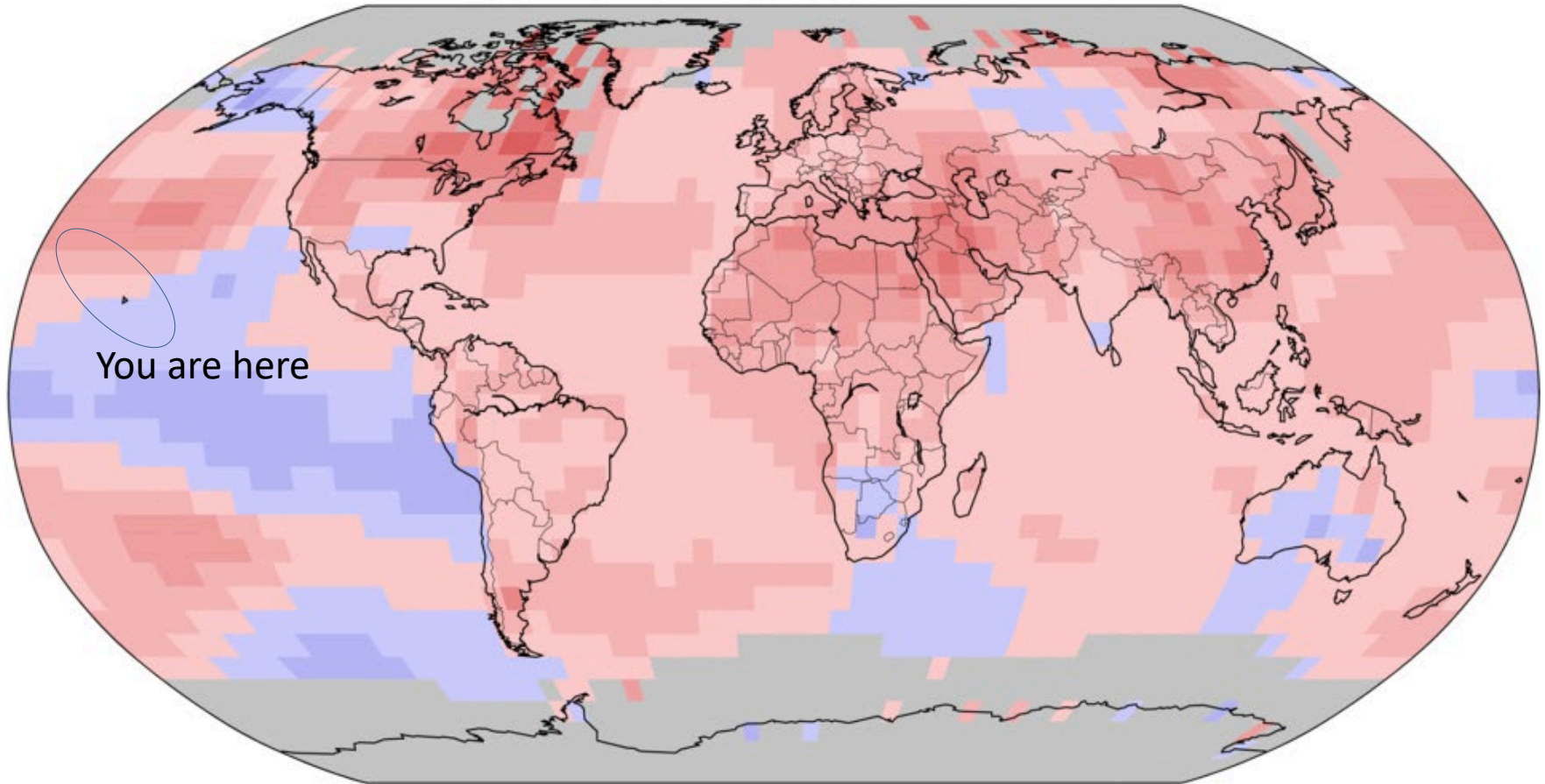
But will still be among the top 10 warmest years since records began in the late 19th Century



July 2021 was the hottest month ever in 142 years of record keeping

Land & Ocean Temperature Departure from Average Jan–Nov 2021 (with respect to a 1981–2010 base period)

Data Source: NOAA GlobalTemp v5.0.0–20211210



Degrees Celsius



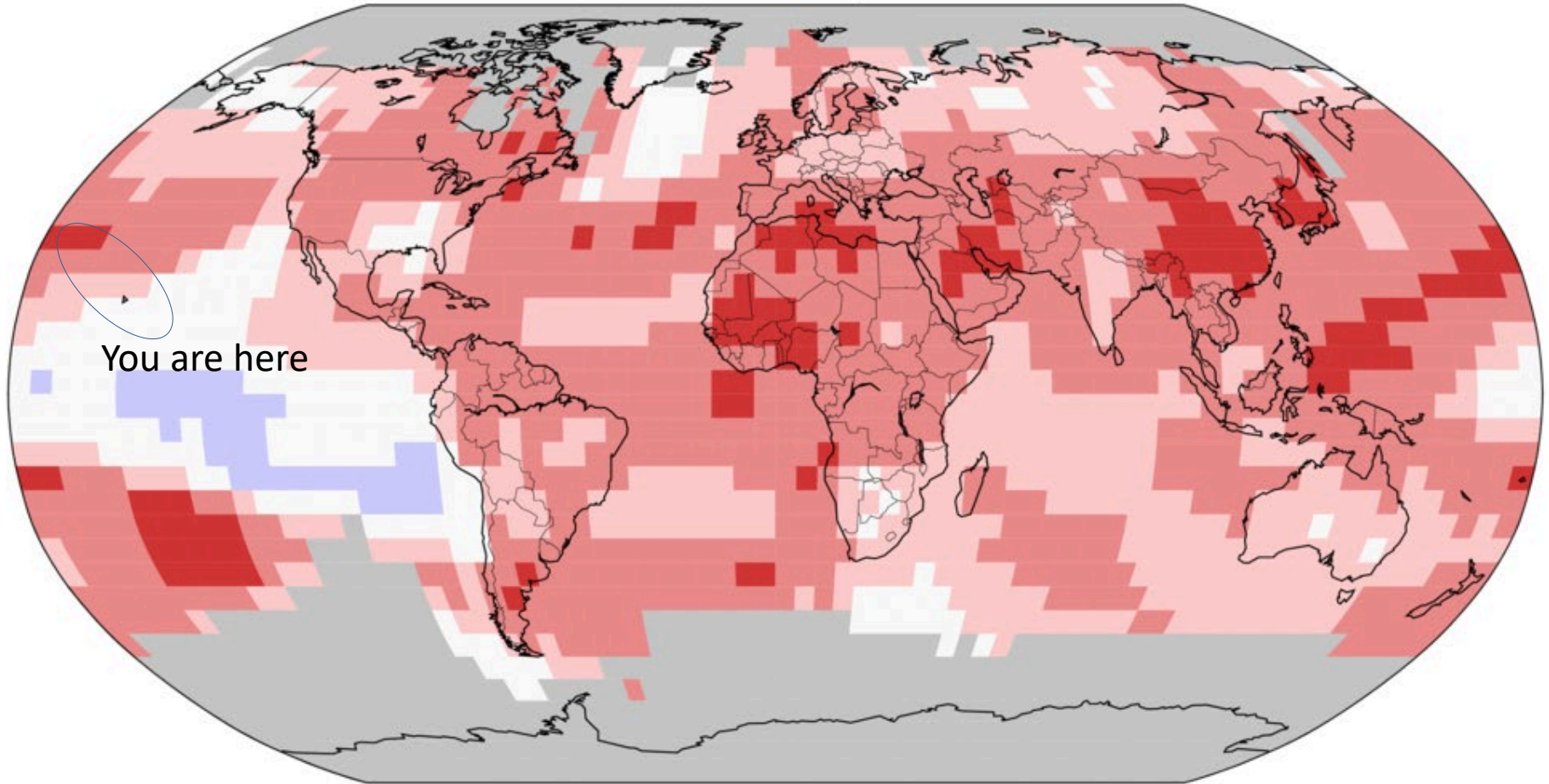
National Centers for Environmental Information
GHCNM v4.0.1.20211207.qfe

Please Note: Gray areas represent missing data
Map Projection: Robinson

Land & Ocean Temperature Percentiles Jan–Nov 2021

NOAA's National Centers for Environmental Information

Data Source: NOAA GlobalTemp v5.0.0–20211210




You are here


Record Coldest


Much Cooler than Average


Cooler than Average


Near Average


Warmer than Average

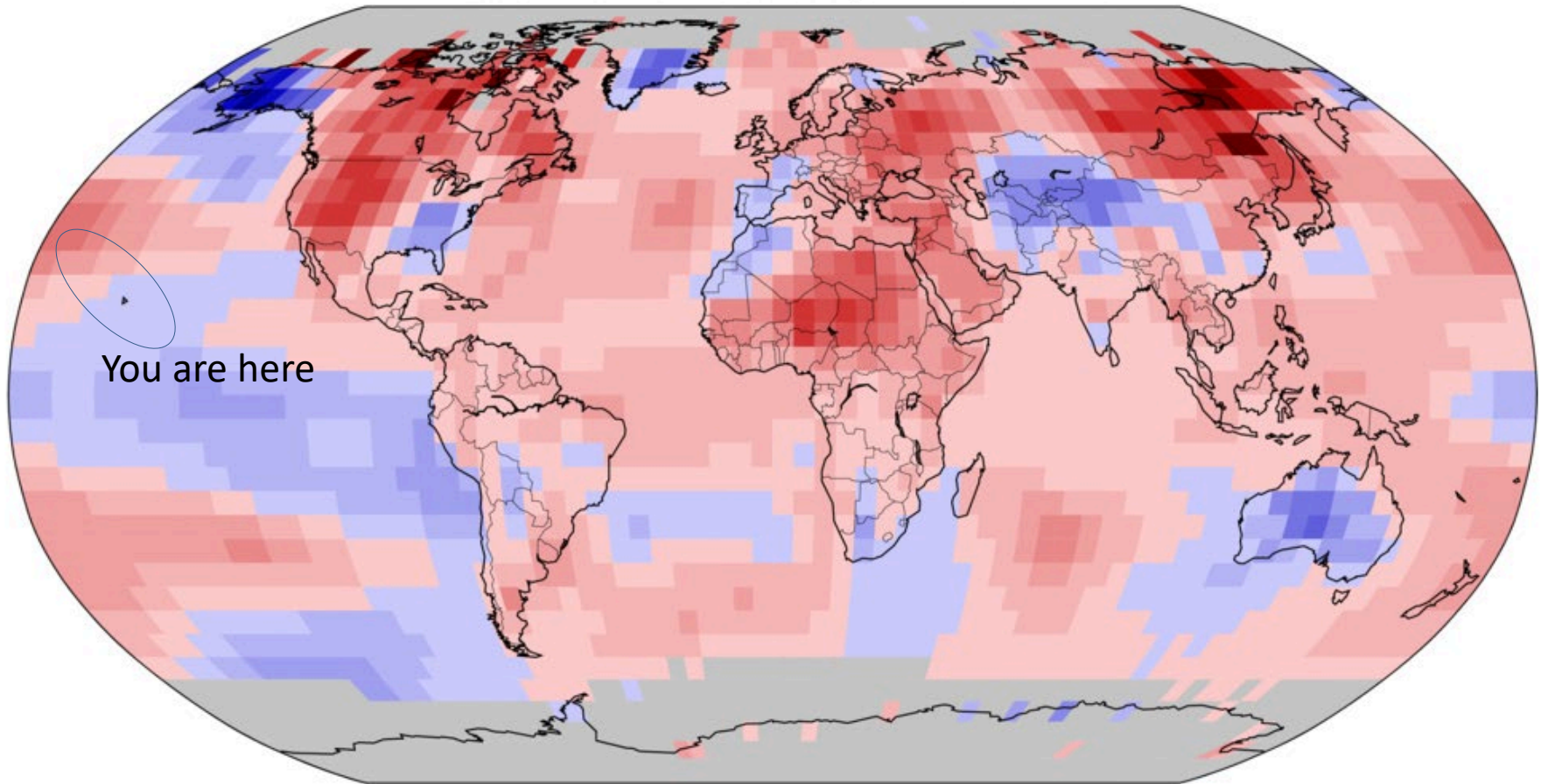

Much Warmer than Average


Record Warmest



Land & Ocean Temperature Departure from Average Nov 2021 (with respect to a 1981–2010 base period)

Data Source: NOAA GlobalTemp v5.0.0–20211210



Degrees Celsius



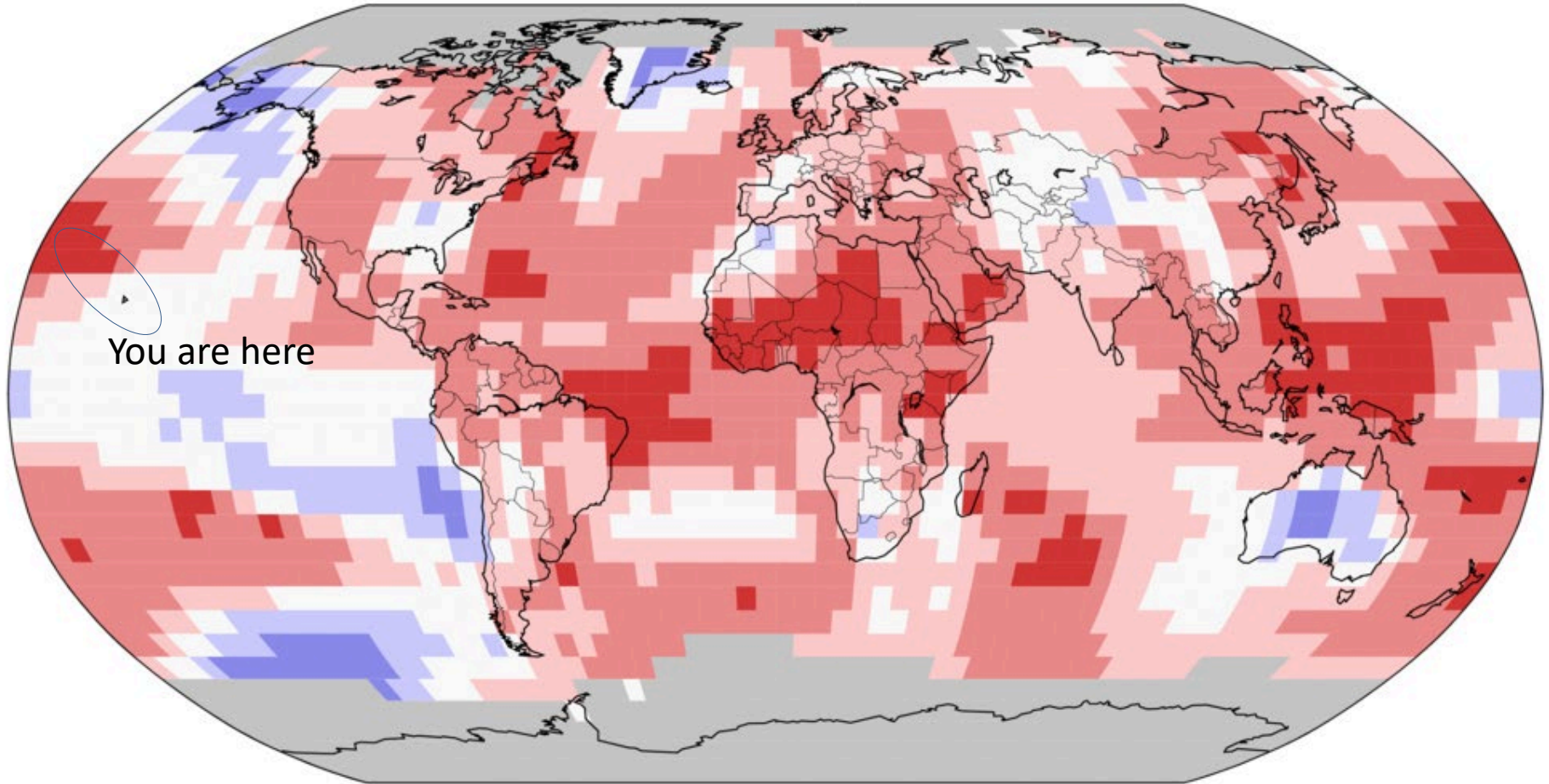
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Land & Ocean Temperature Percentiles Nov 2021

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You are here



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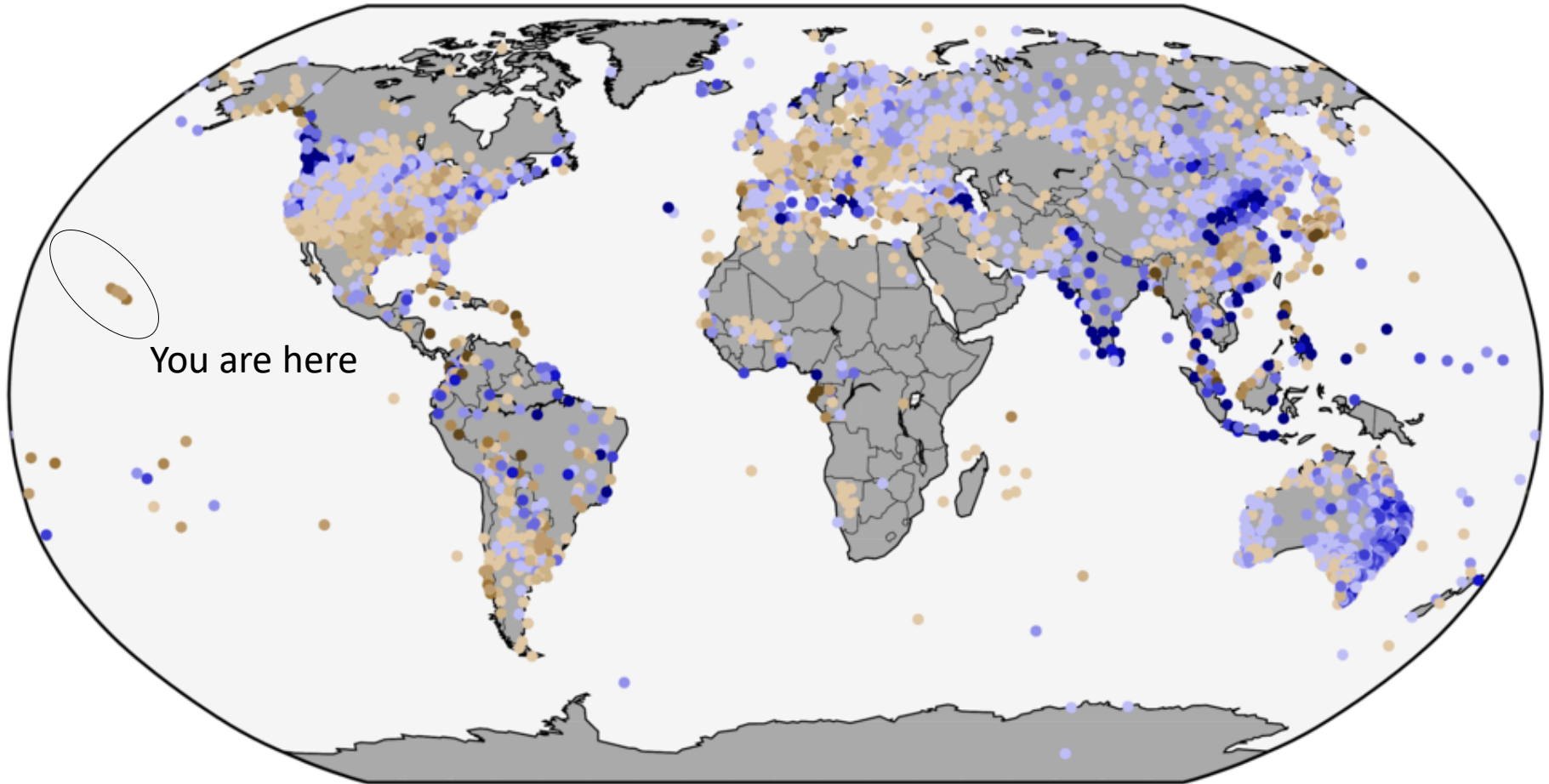


Record Warmest

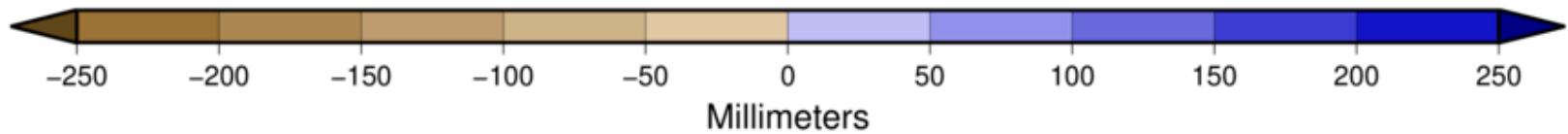


Land-Only Precipitation Anomalies Sep 2021–Nov 2021 (with respect to a 1961–1990 base period)

Data Source: GHCN-M version 4beta



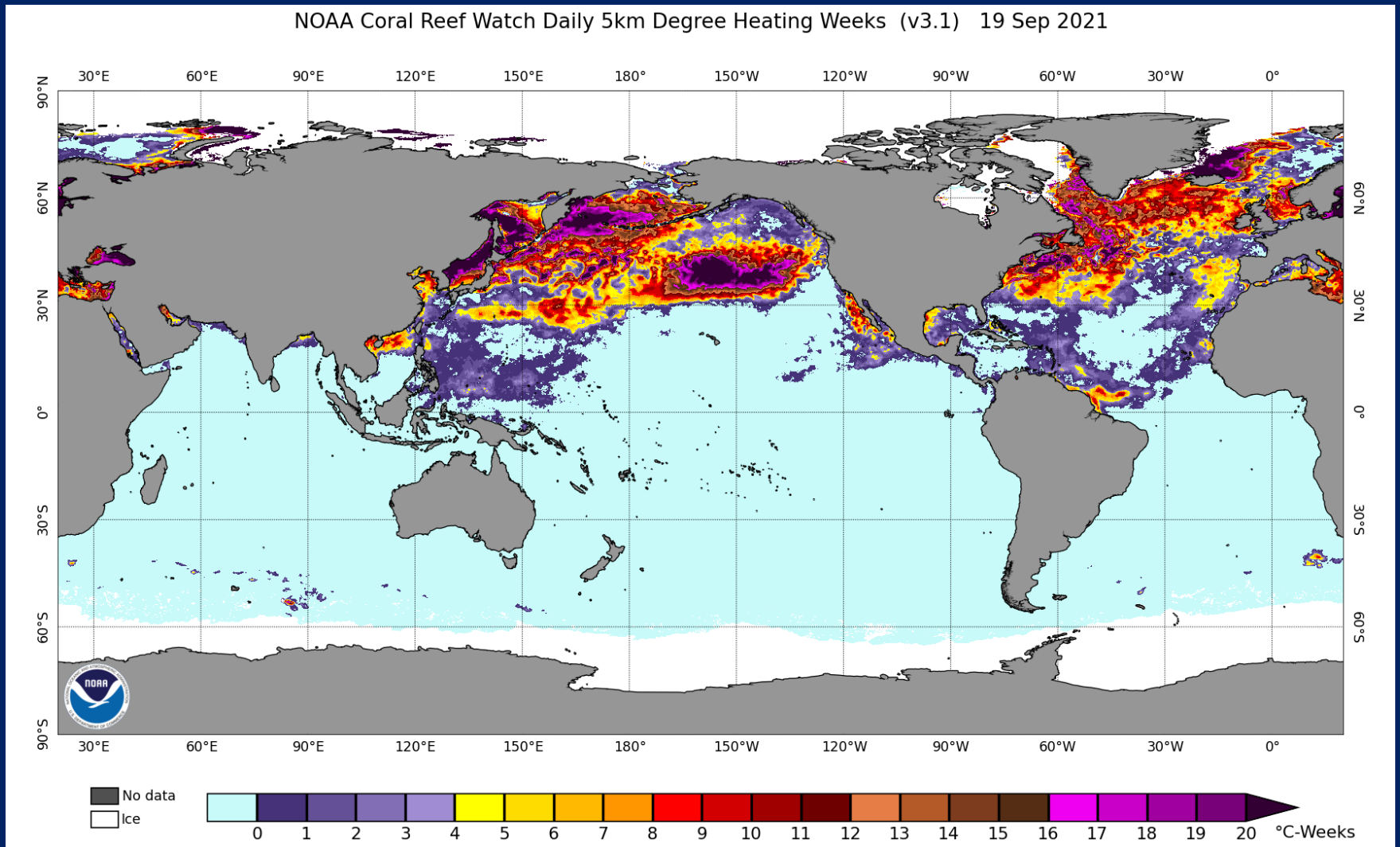
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National Centers for Environmental Information

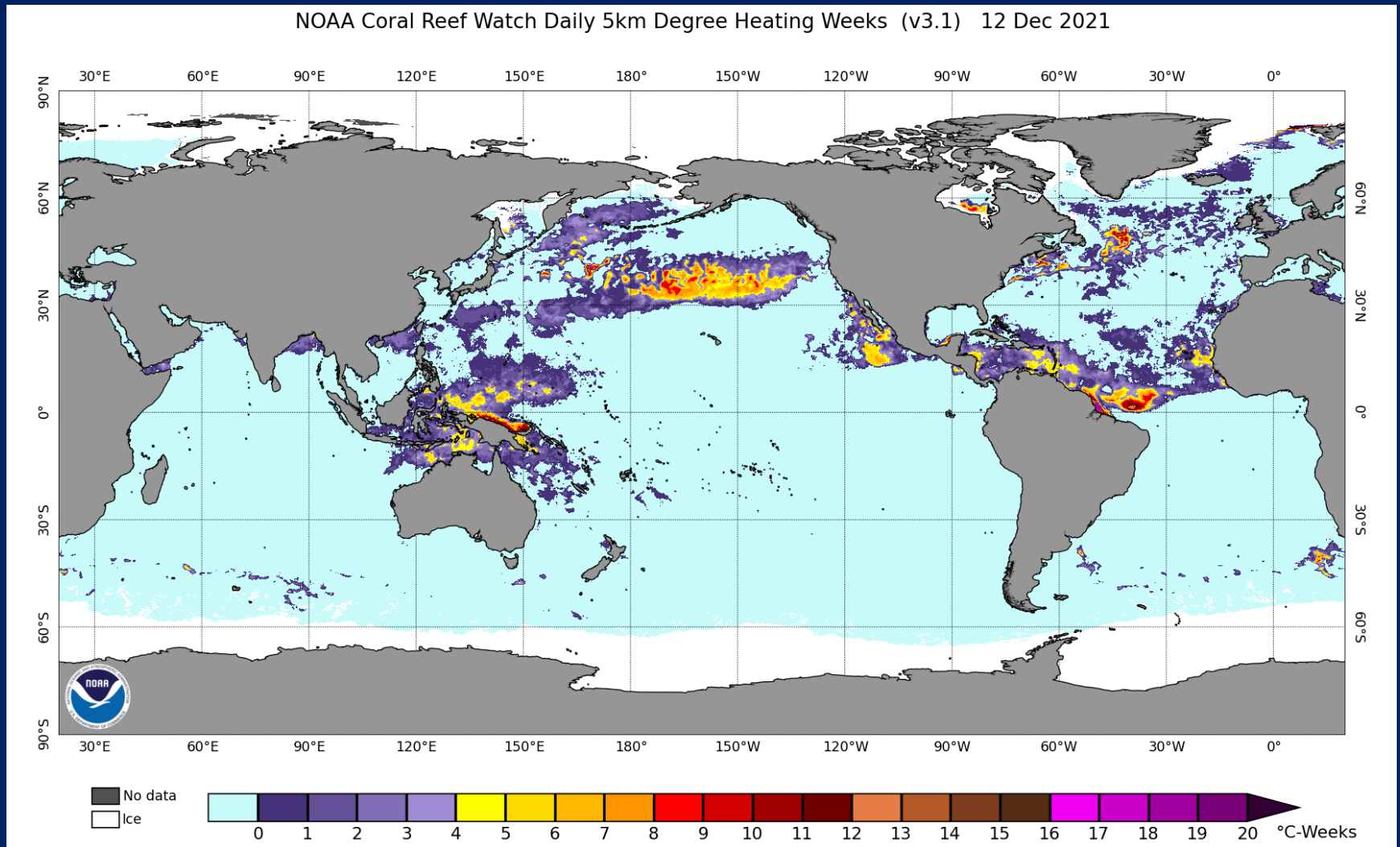
Please Note: Gray areas represent missing data
Map Projection: Robinson

Degree Heating Weeks – 19 September 2021



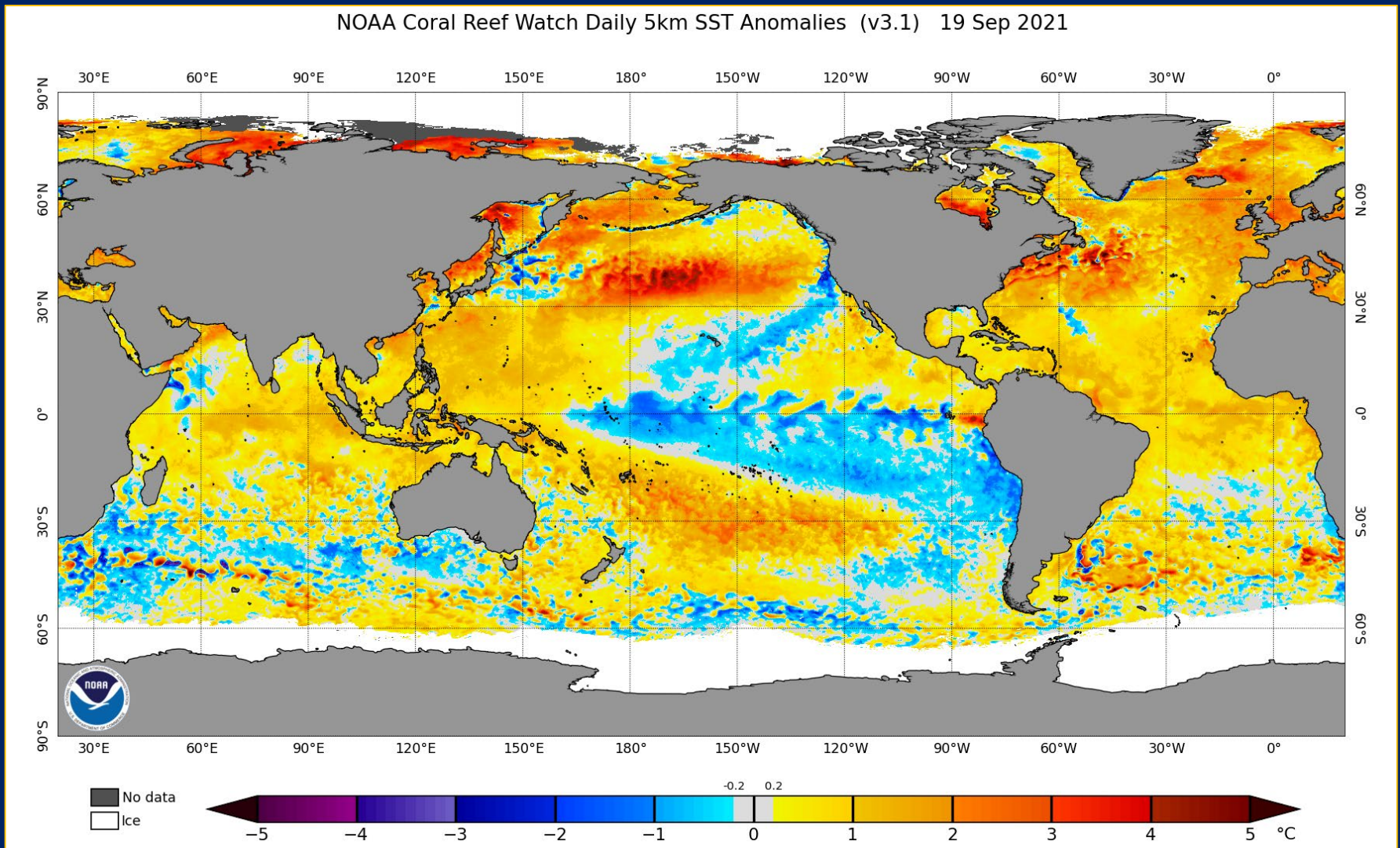
Significant heat accumulated during the summer,
but was fortunately concentrated in the ocean sector north of the Monument

Degree Heating Weeks – 12 December 2021



Going into winter, there is still some excess ocean heat content lingering north of the Monument

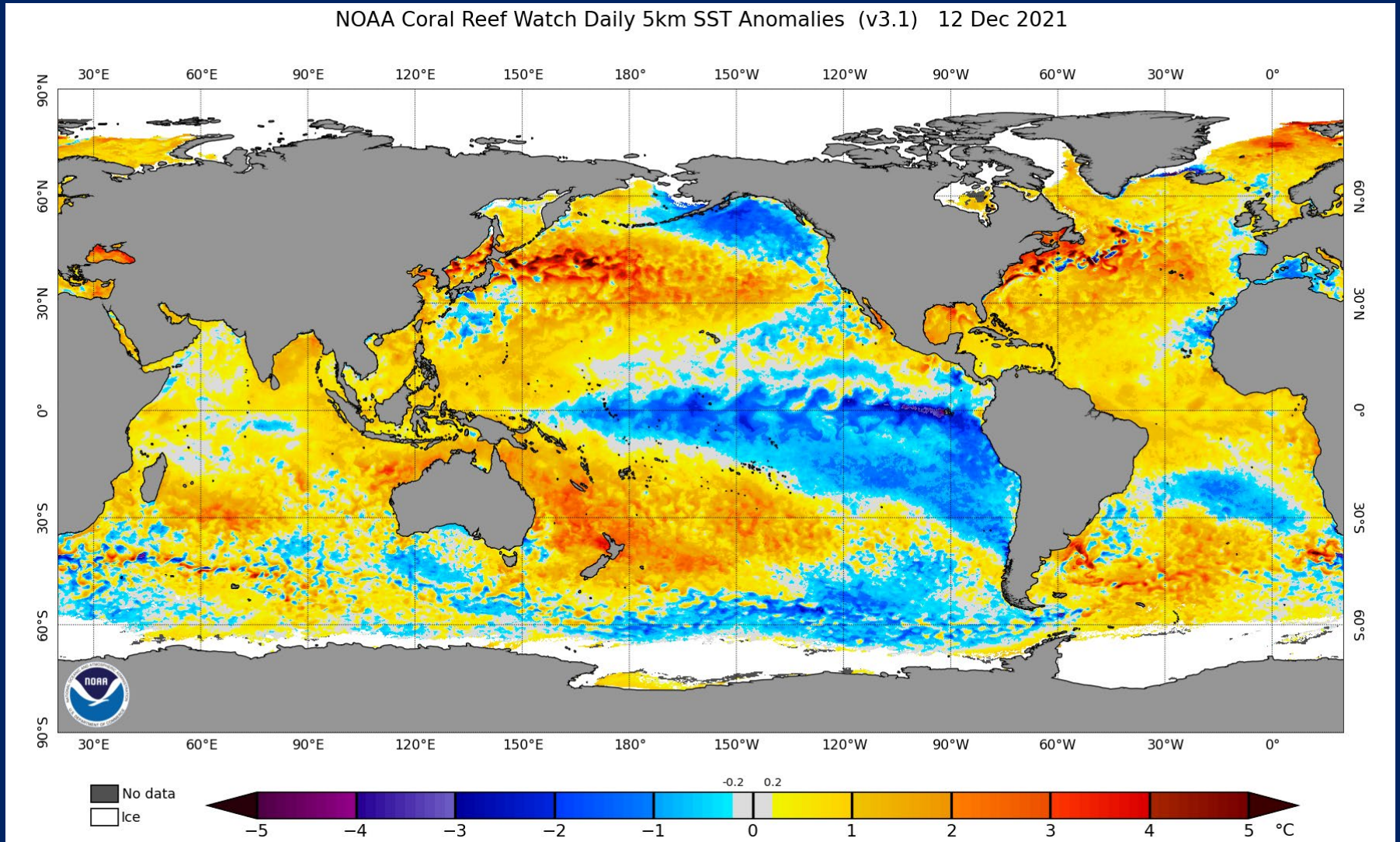
Global Sea Surface Temperature Anomaly – 19 September 2021



The equatorial La Niña pattern was evident in September, with warm water to the north of the Monument

Global Sea Surface Temperature Anomaly – 12 December 2021

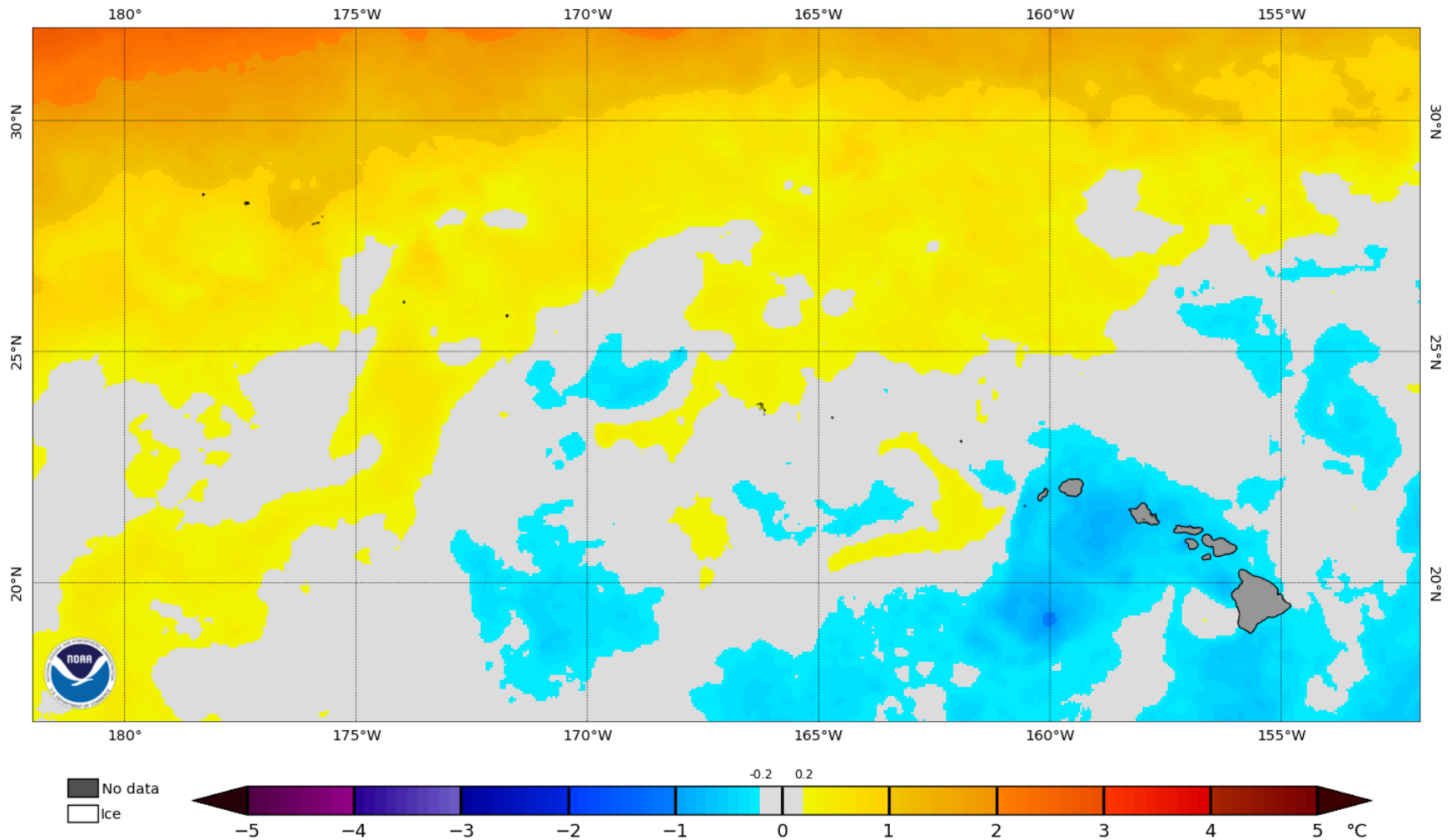
NOAA Coral Reef Watch Daily 5km SST Anomalies (v3.1) 12 Dec 2021



By December, La Niña had intensified, but the warmest waters had moved further NW of the Monument

Sea Surface Temperature Anomaly, Hawaii Sector – 19 Sept. 2021

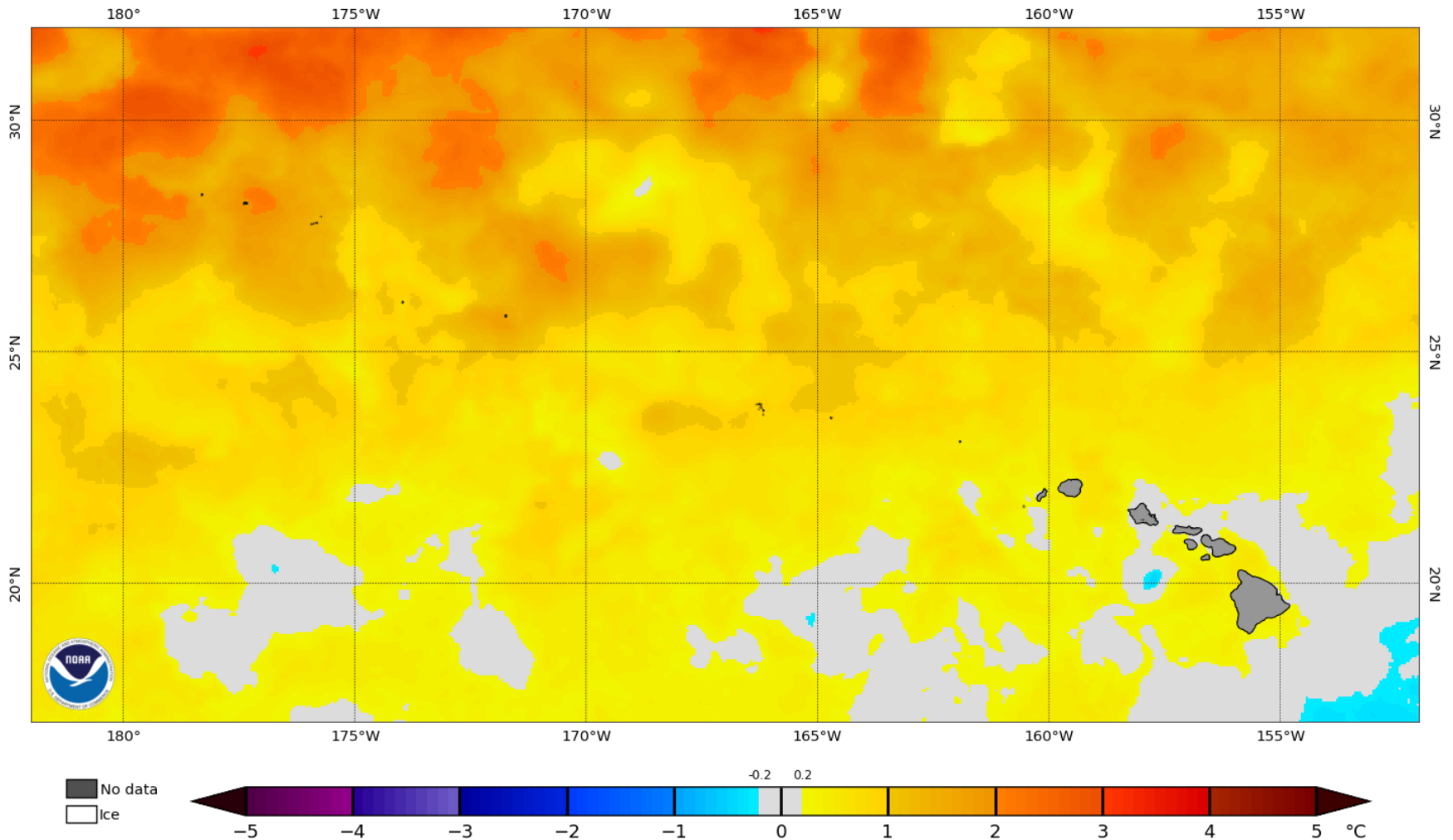
NOAA Coral Reef Watch Daily 5km SST Anomalies (v3.1) 19 Sep 2021



In September, waters averaged across the Monument were near long-term mean temperatures
And the Main Hawaiian Islands werw cooler than average

Sea Surface Temperature Anomaly, Hawaii Sector – 12 Dec. 2021

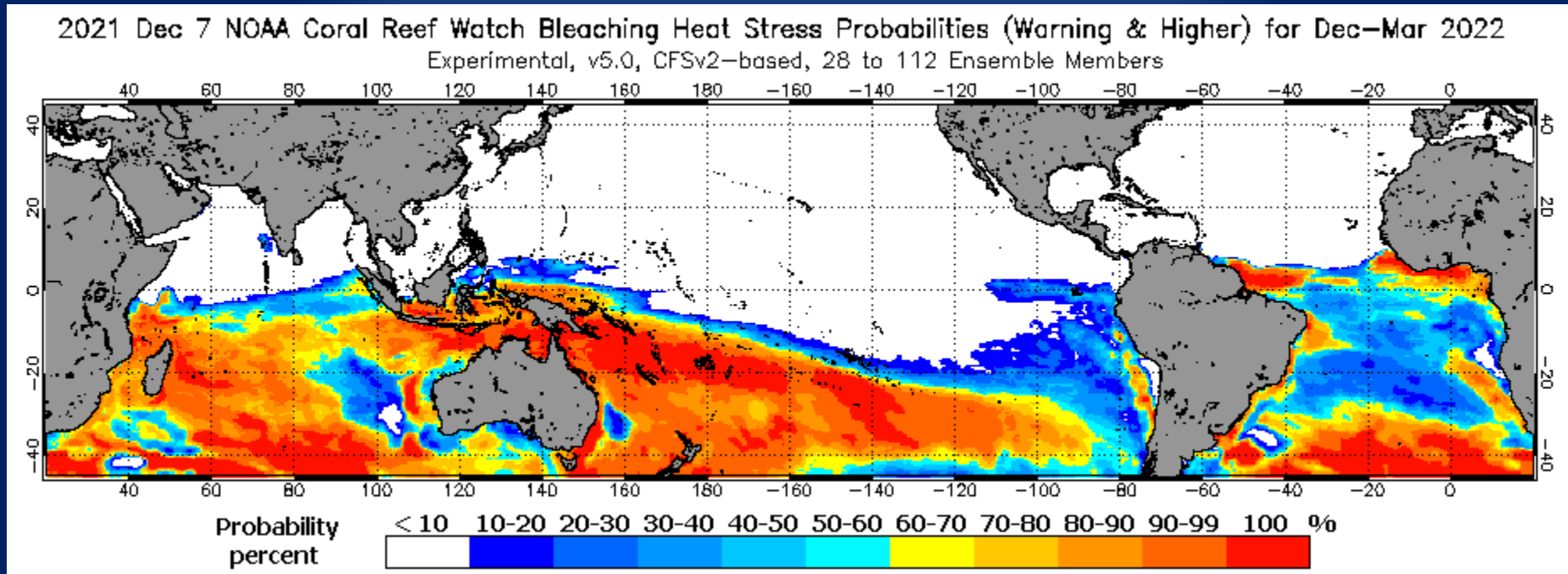
NOAA Coral Reef Watch Daily 5km SST Anomalies (v3.1) 12 Dec 2021



By December, SSTs were running 1-3 degrees C above long-term means

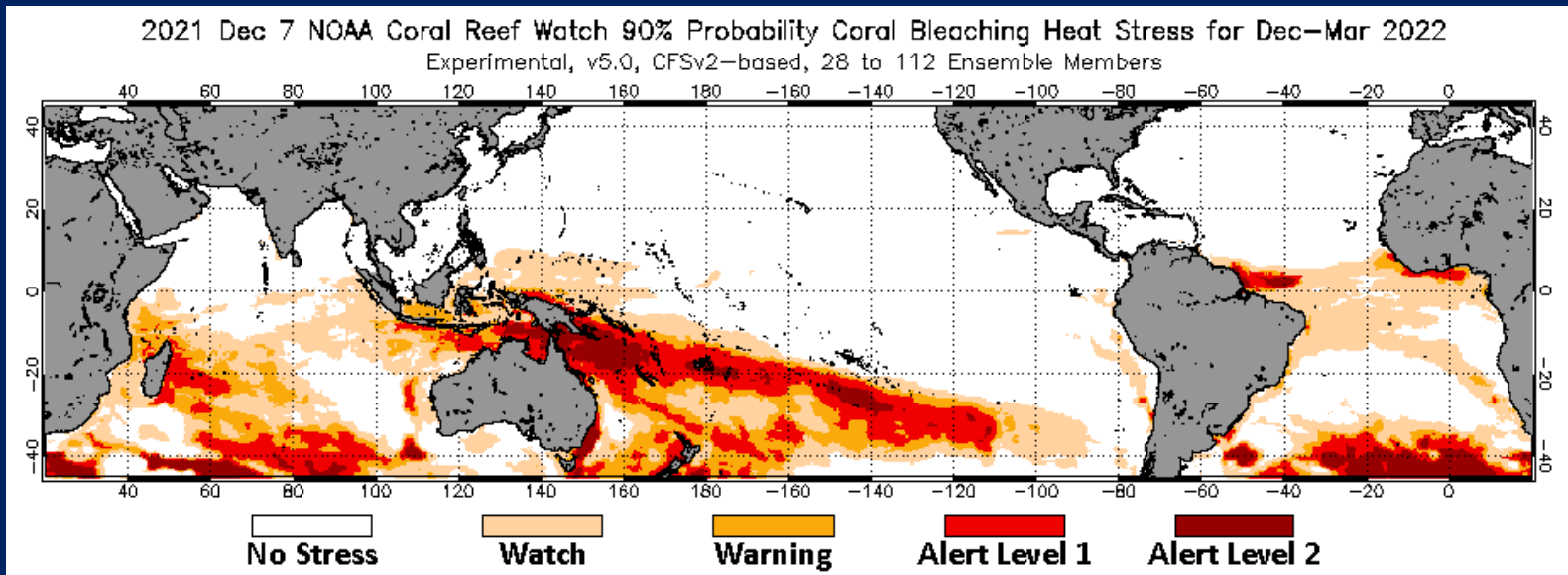
Bleaching Stress Probability – December 2021-March 2022

Prediction as of 7 December 2021

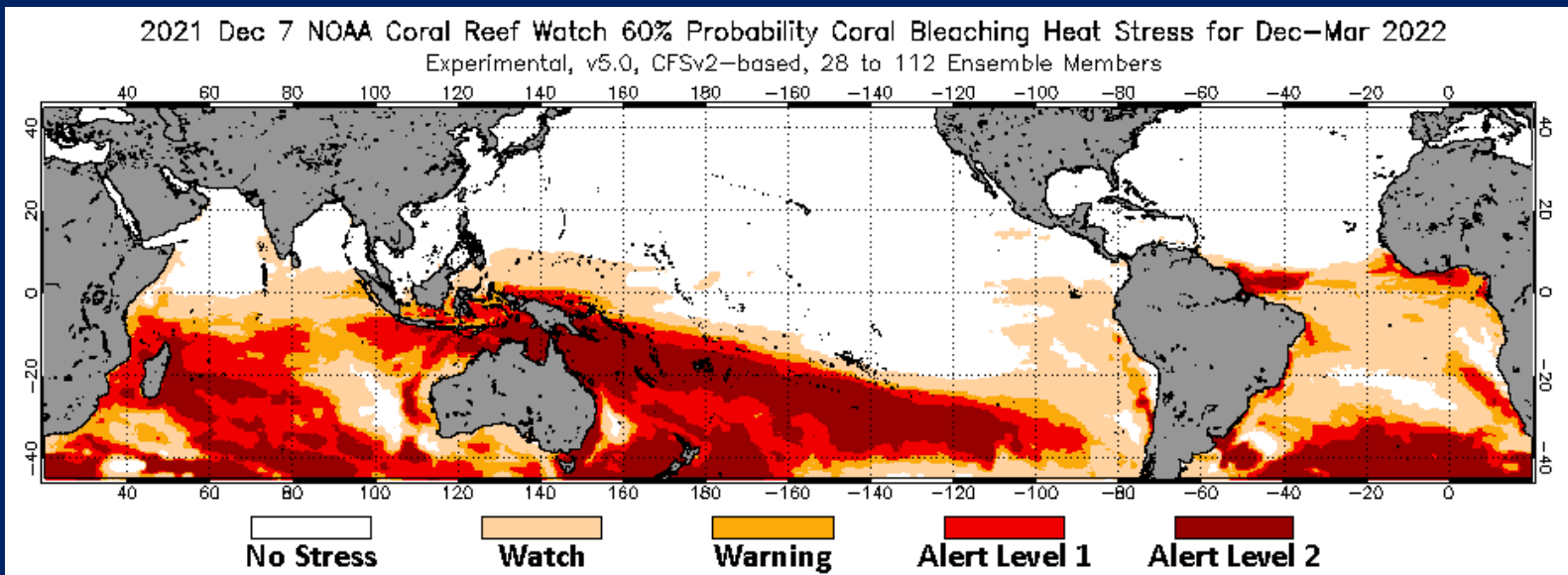


There is currently no likelihood of bleaching in the Monument through March 2022
American Samoa, however, is at risk

90% Stress Level Probability – Dec. 2021-March 2022



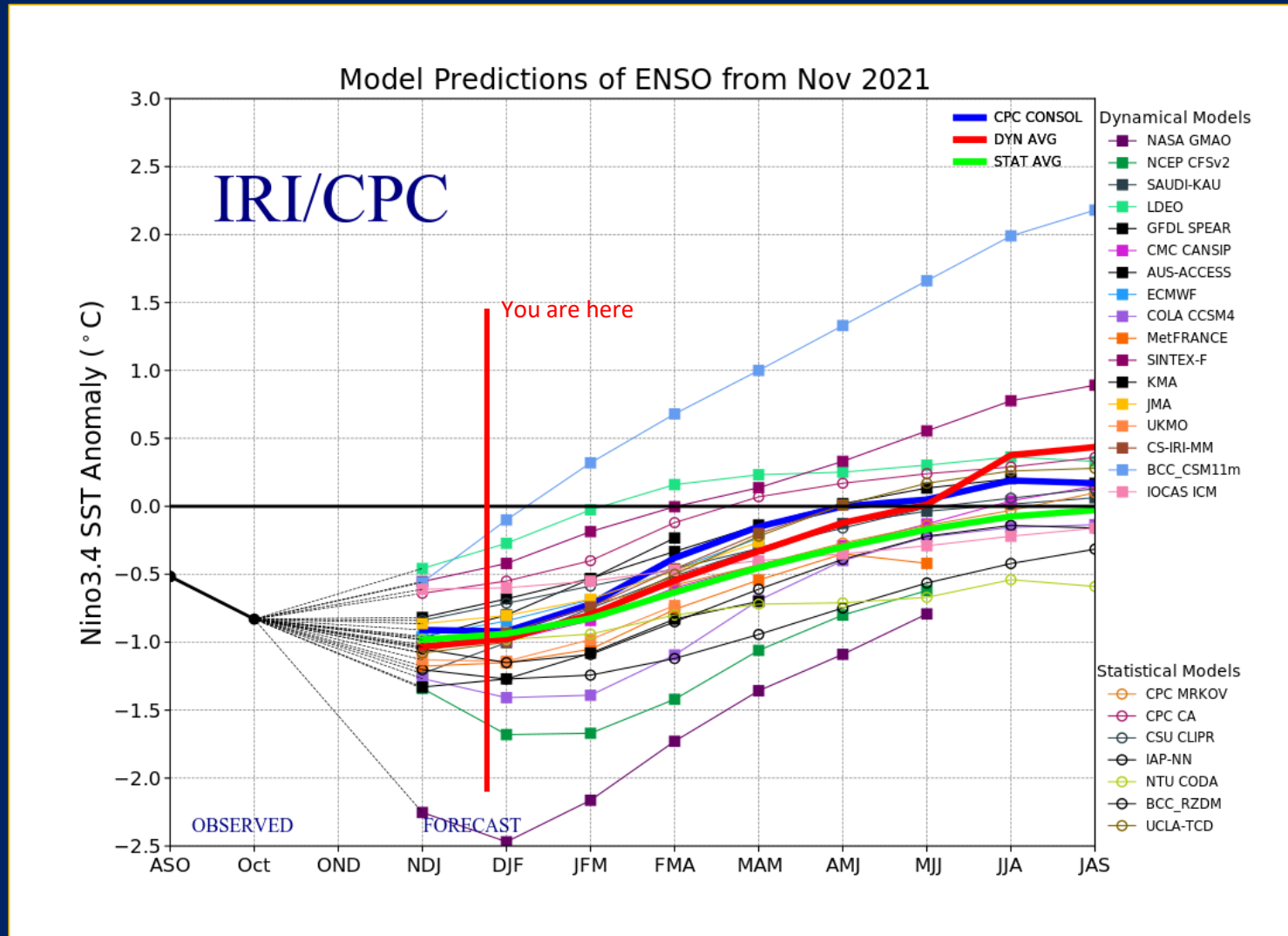
60% Stress Level Probability – Dec. 2021-March 2022



There is no threat to the Monument, but the concerns for American Samoa are evident

Looking Forward

An ensemble of 27 climate models predicts **La Niña** conditions into spring 2022, trending into ENSO-neutral conditions by fall 2022



The range of model predictions is for the most part closely aligned

Conclusions

2021 was not as warm as previous years, but will still be among the top 10 warmest years in the instrumented record

The Northern Pacific Ocean is again carrying excess heat content into the winter months, and SSTs are several degrees C higher than normal in the Monument

Strong La Niña conditions are present, with a 60% probability of a transition to ENSO-neutral conditions by spring or early summer 2022

But managers should be alert to a potential quick transition to El Niño in fall of 2022

There is zero likelihood of any thermal stress to Monument coral reefs over the next 4 months, although sea surface temperatures are warmer than normal in the Monument for this time of year

The next potential period of thermal risk to Monument reefs will come in late 2022

Tropical cyclone formation will not occur over the next 4 months, and is generally not favored under the ENSO-neutral conditions likely to follow

Late summer 2022 is the next potential favorable period for such storms

Sea level continues to rise at 3-5 mm per year, and this trend is increasing

Inundation is a long-term problem that will not go away, and may increase over time depending on future melting trends in Greenland and Antarctica

Questions?

