

Hawaii

Climate Indicators Summary

October 2020

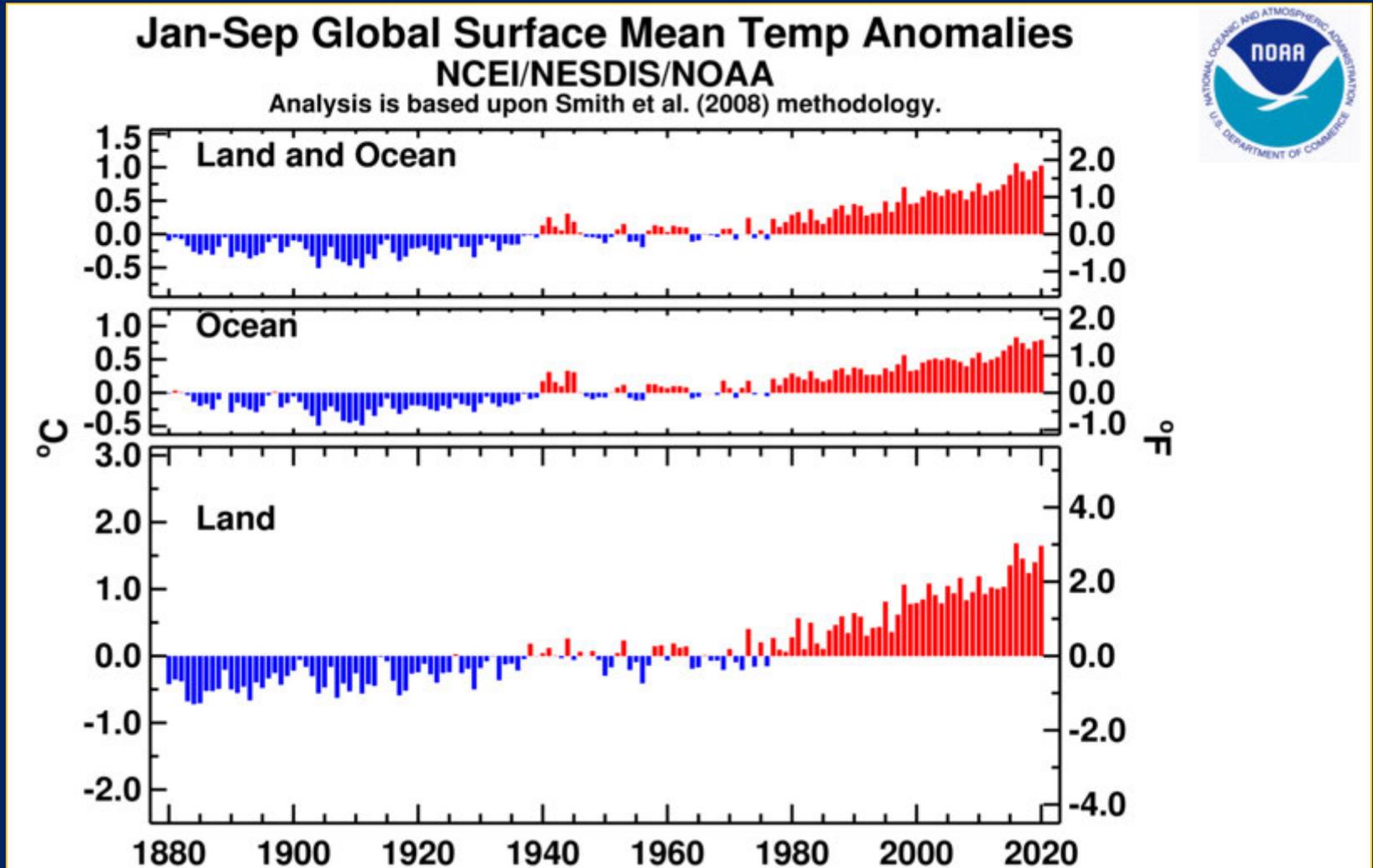
PMNM Climate Change Working Group

Dan A. Polhemus

U. S. Fish & Wildlife Service

Honolulu, HI

2020 is still in the running to be the hottest year on record
A very warm winter in the Northern Hemisphere, then a very hot summer

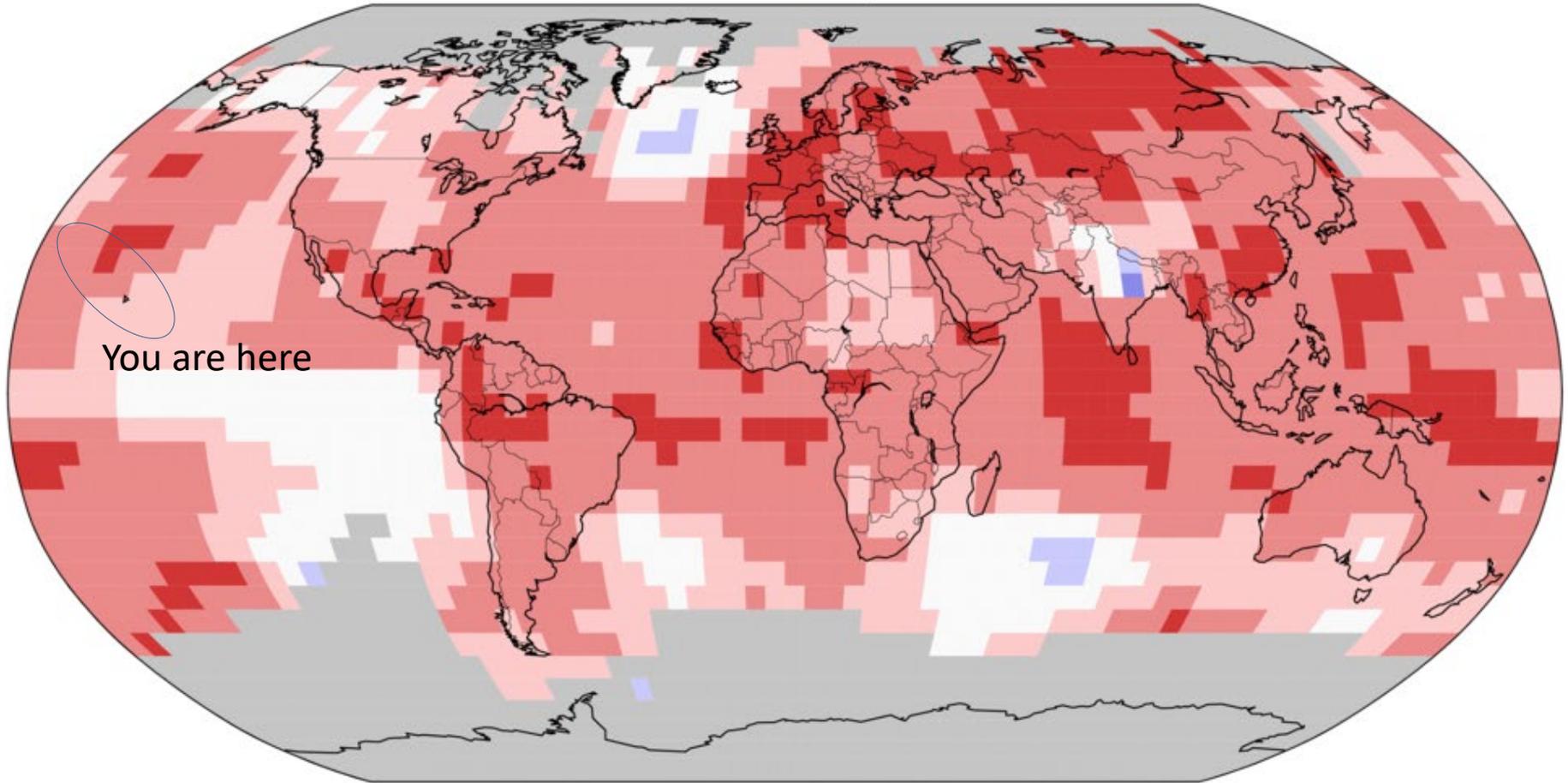


After 3 slightly cooler (?) years, the heat is back in force

Land & Ocean Temperature Percentiles Jan–Sep 2020

NOAA's National Centers for Environmental Information

Data Source: NOAA GlobalTemp v5.0.0–20201007



You are here



Record Coldest



Much Cooler than Average



Cooler than Average



Near Average



Warmer than Average



Much Warmer than Average

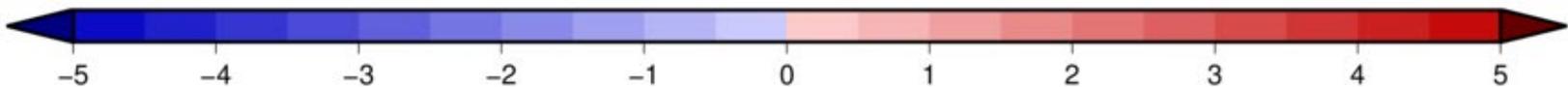
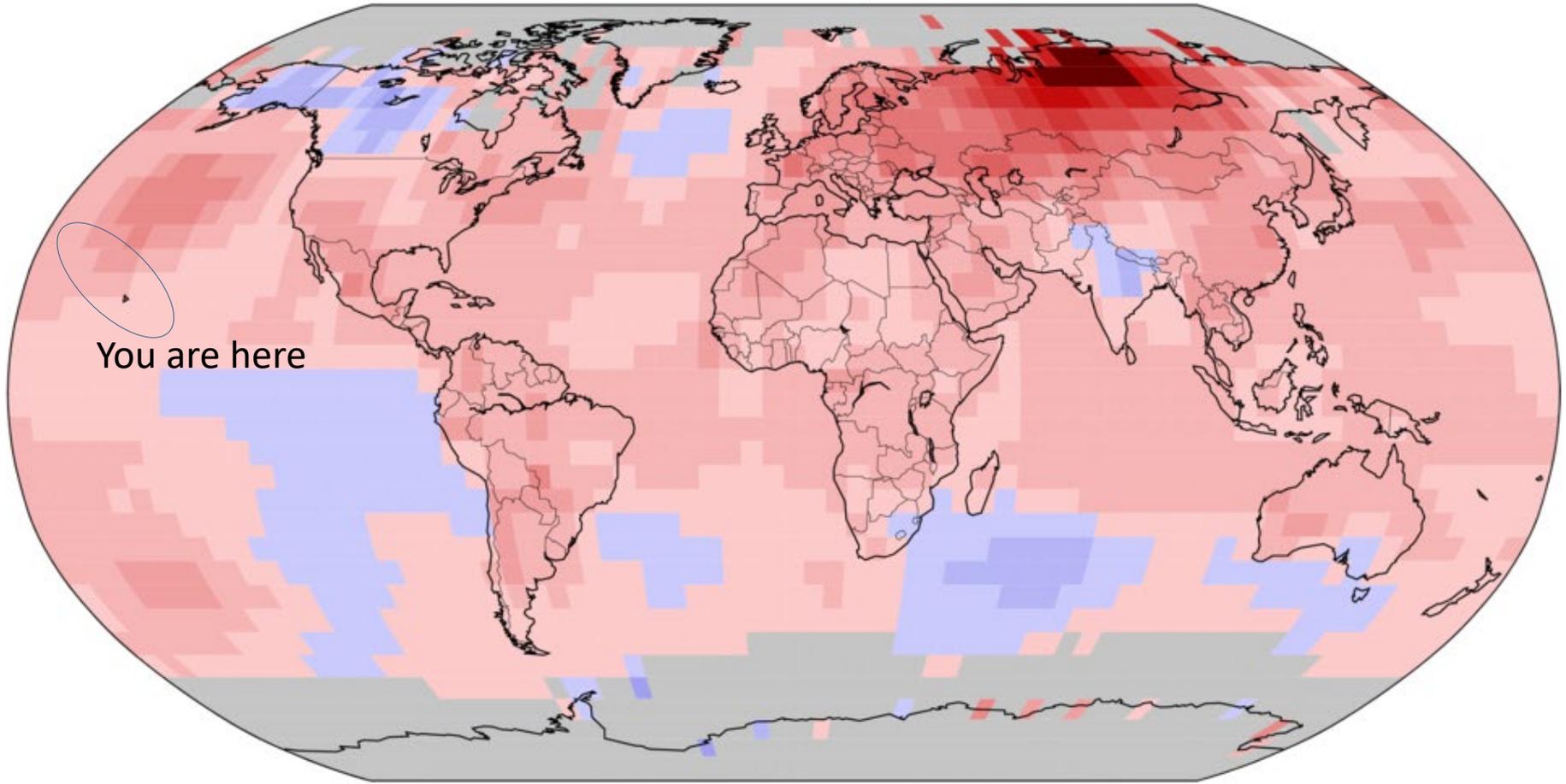


Record Warmest



Land & Ocean Temperature Departure from Average Jan–Sep 2020 (with respect to a 1981–2010 base period)

Data Source: NOAA GlobalTemp v5.0.0–20201007



Degrees Celsius



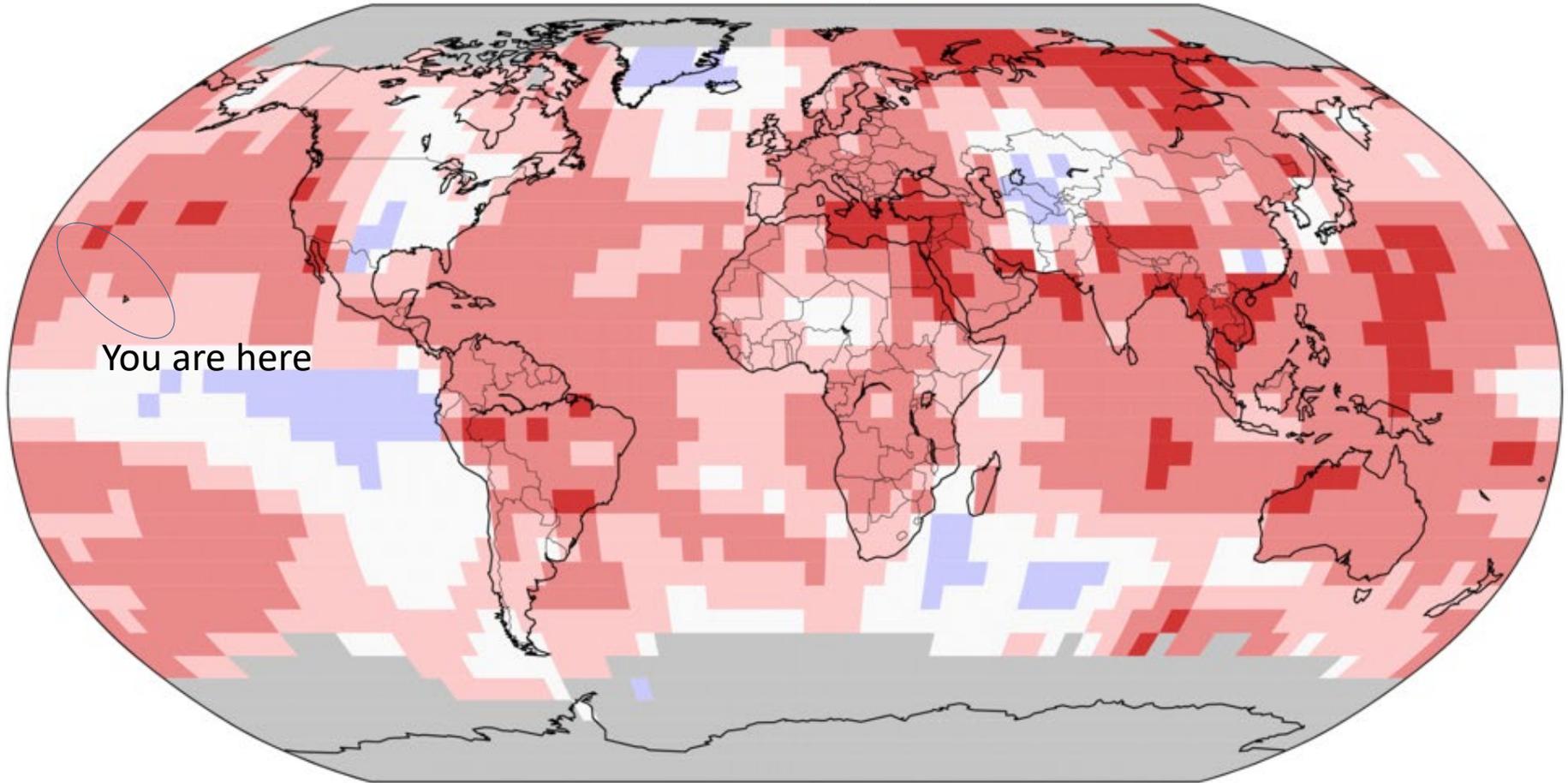
National Centers for Environmental Information
GHCNM v4.0.1.20201006.qfe

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

Land & Ocean Temperature Percentiles Sep 2020

NOAA's National Centers for Environmental Information

Data Source: NOAA GlobalTemp v5.0.0-20201007



You are here



Record Coldest



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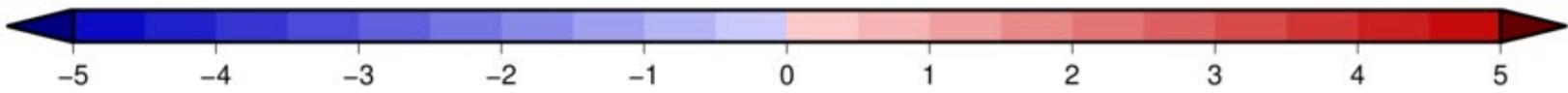
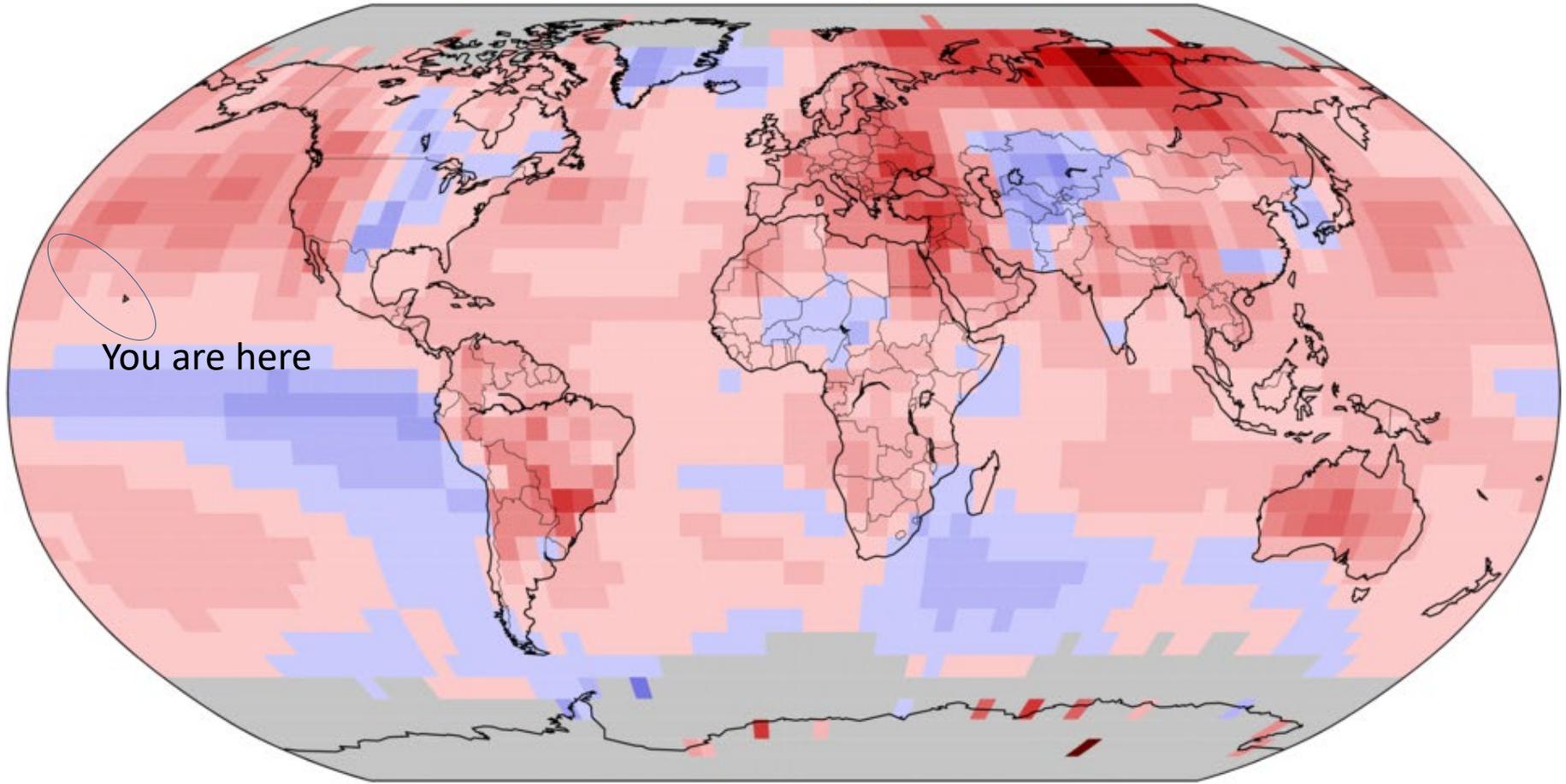


Record Warmest



Land & Ocean Temperature Departure from Average Sep 2020 (with respect to a 1981–2010 base period)

Data Source: NOAA GlobalTemp v5.0.0–20201007



Degrees Celsius

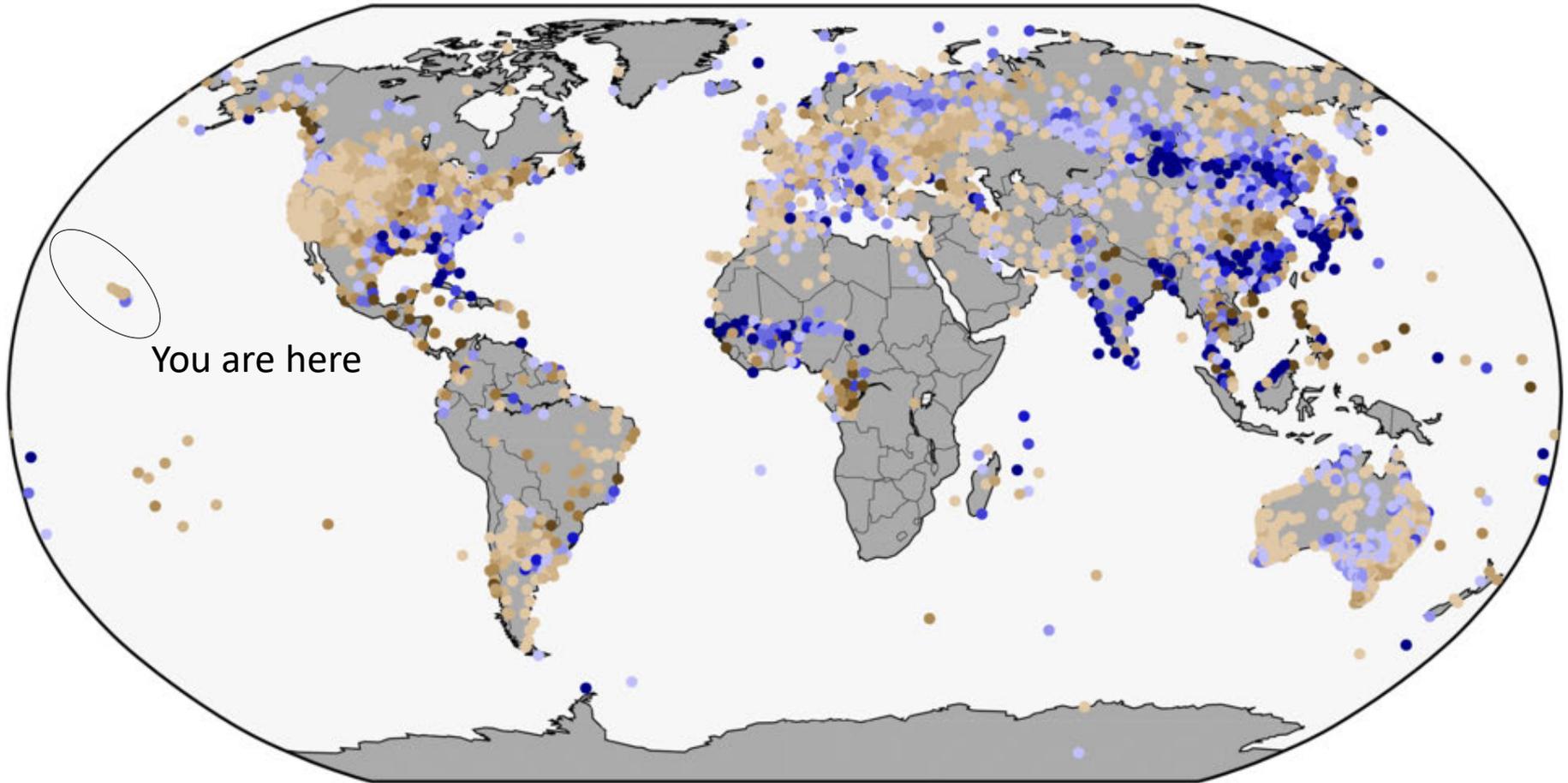


National Centers for Environmental Information
GHCNM v4.0.1.20201006.qfe

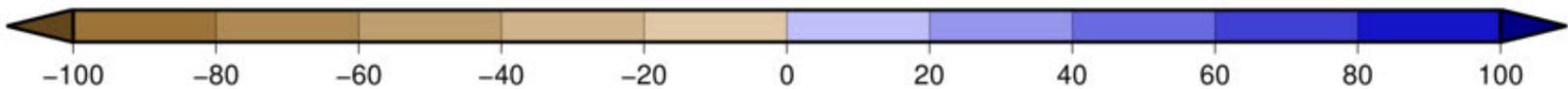
Please Note: Gray areas represent missing data
Map Projection: Robinson

Land-Only Precipitation Anomalies Sep 2020 (with respect to a 1961–1990 base period)

Data Source: GHCN-M version 4beta



You are here



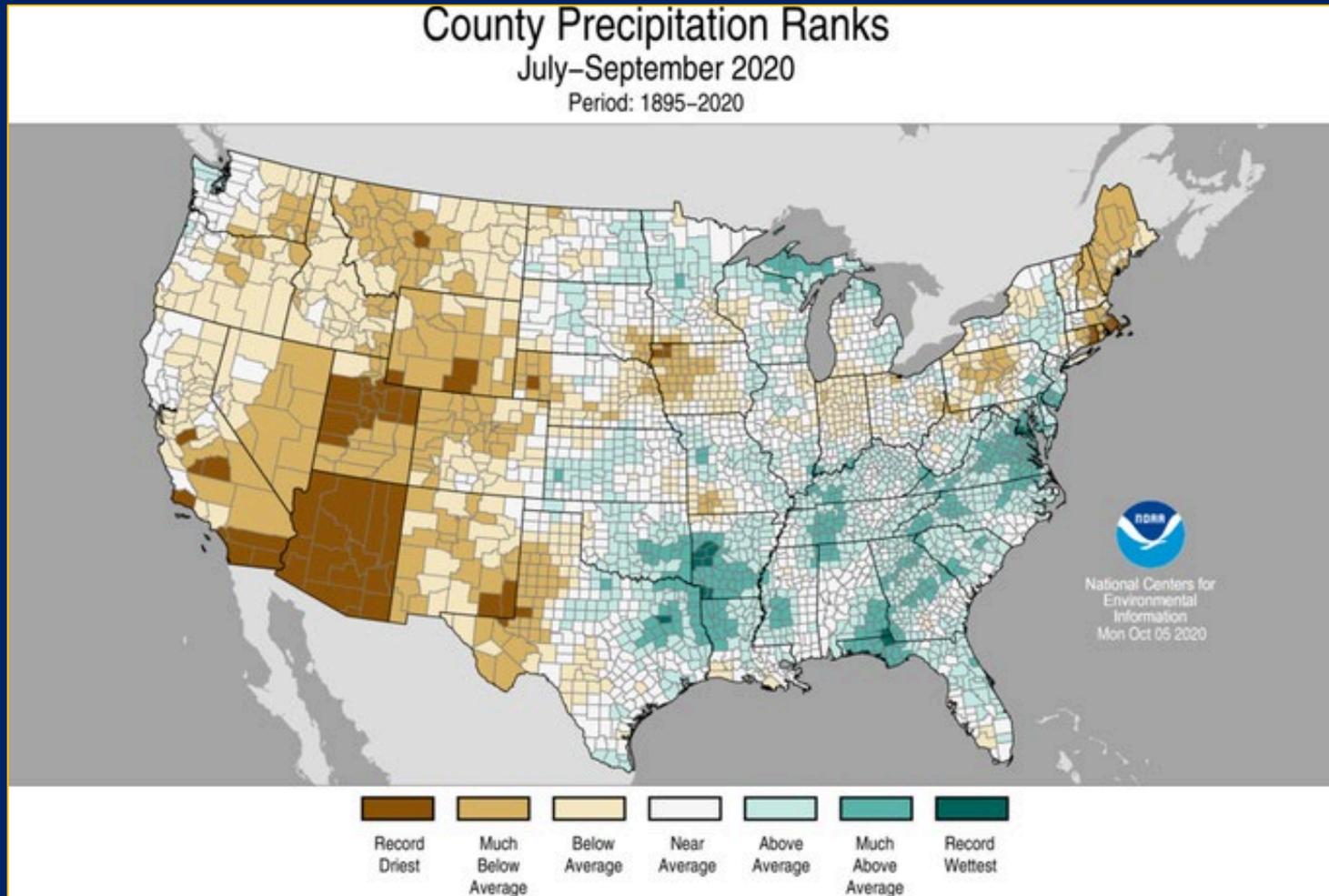
Millimeters



National Centers for Environmental Information

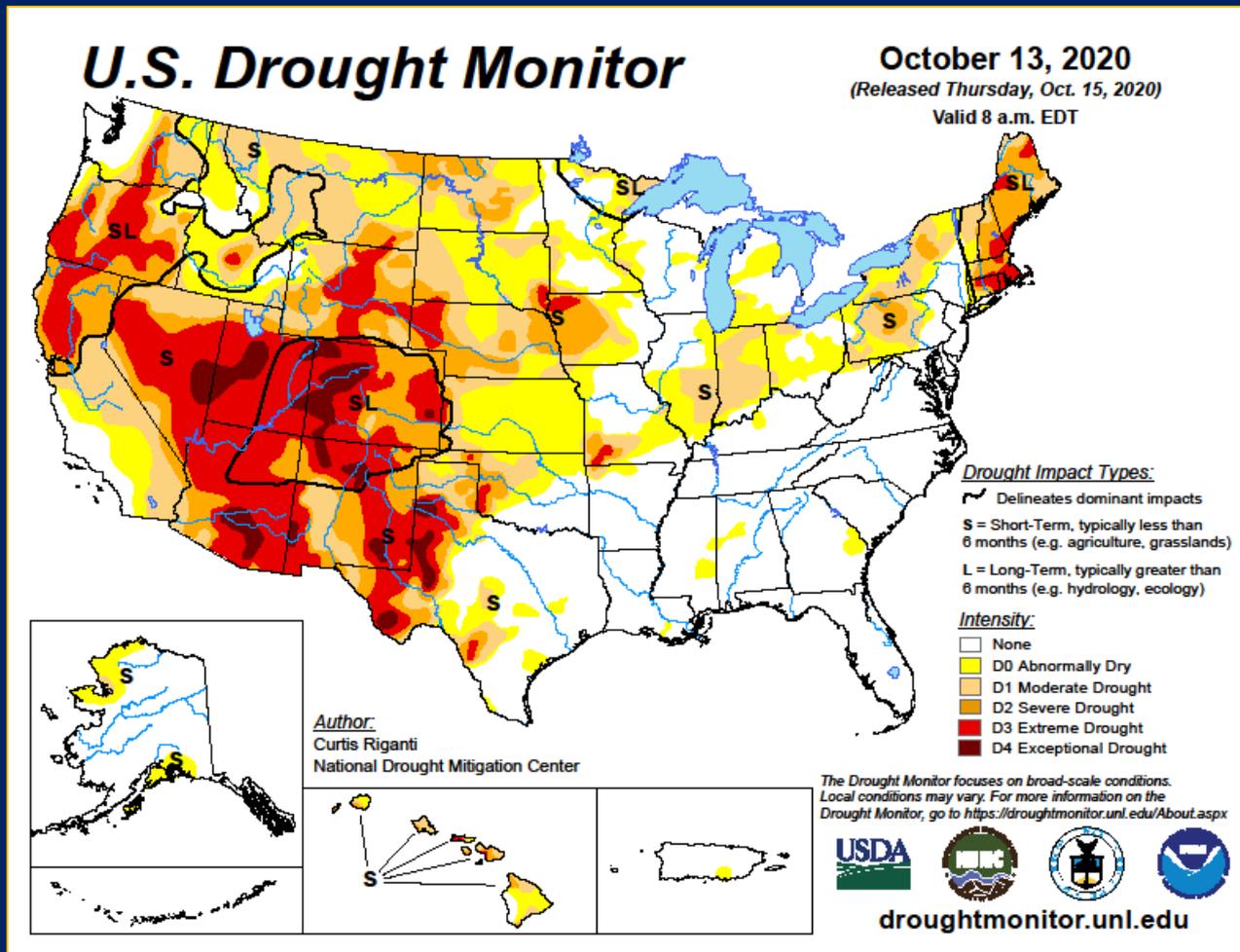
Please Note: Gray areas represent missing data
Map Projection: Robinson

Meanwhile, on the mainland



The West was record dry, while parts of the South were record wet

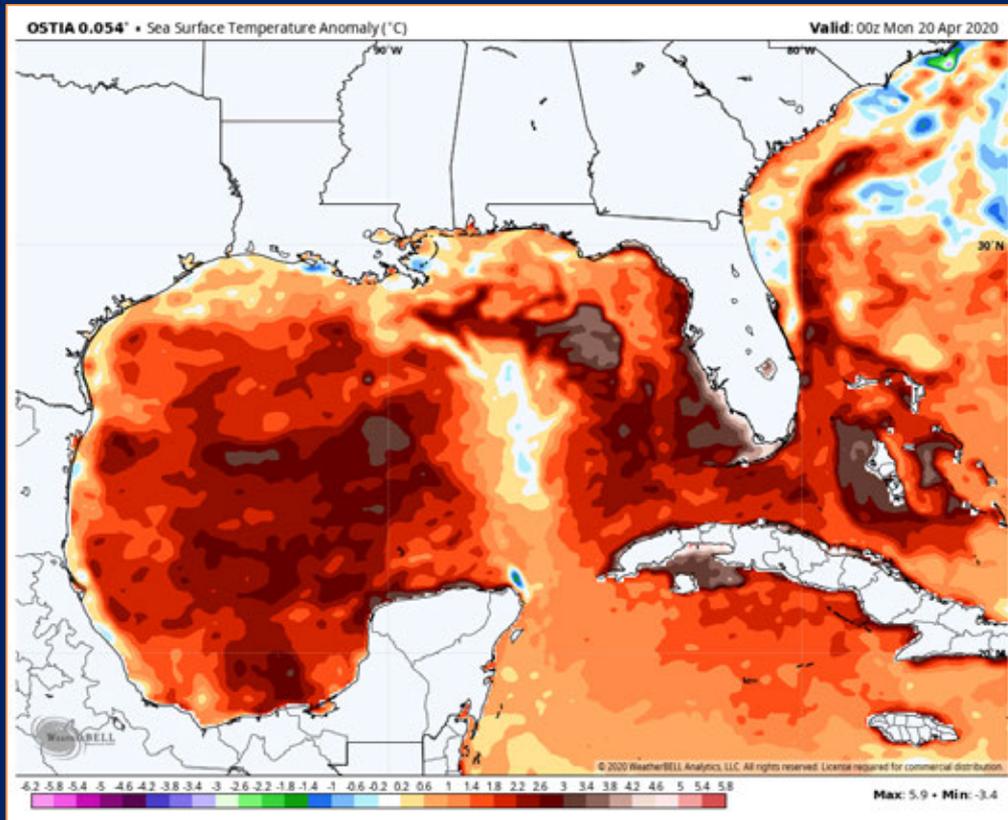
Much of the United States is in drought status Including the main Hawaiian Islands



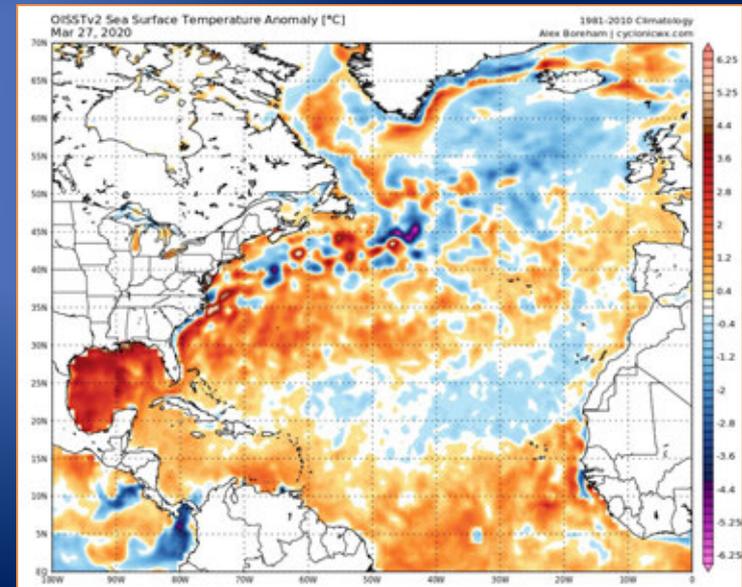
We currently do not have drought assessments for the NWHI

Digression #1

Looking back to my RAC briefing in May 2020



Gulf of Mexico with record SST heat anomaly, 20 April 2020

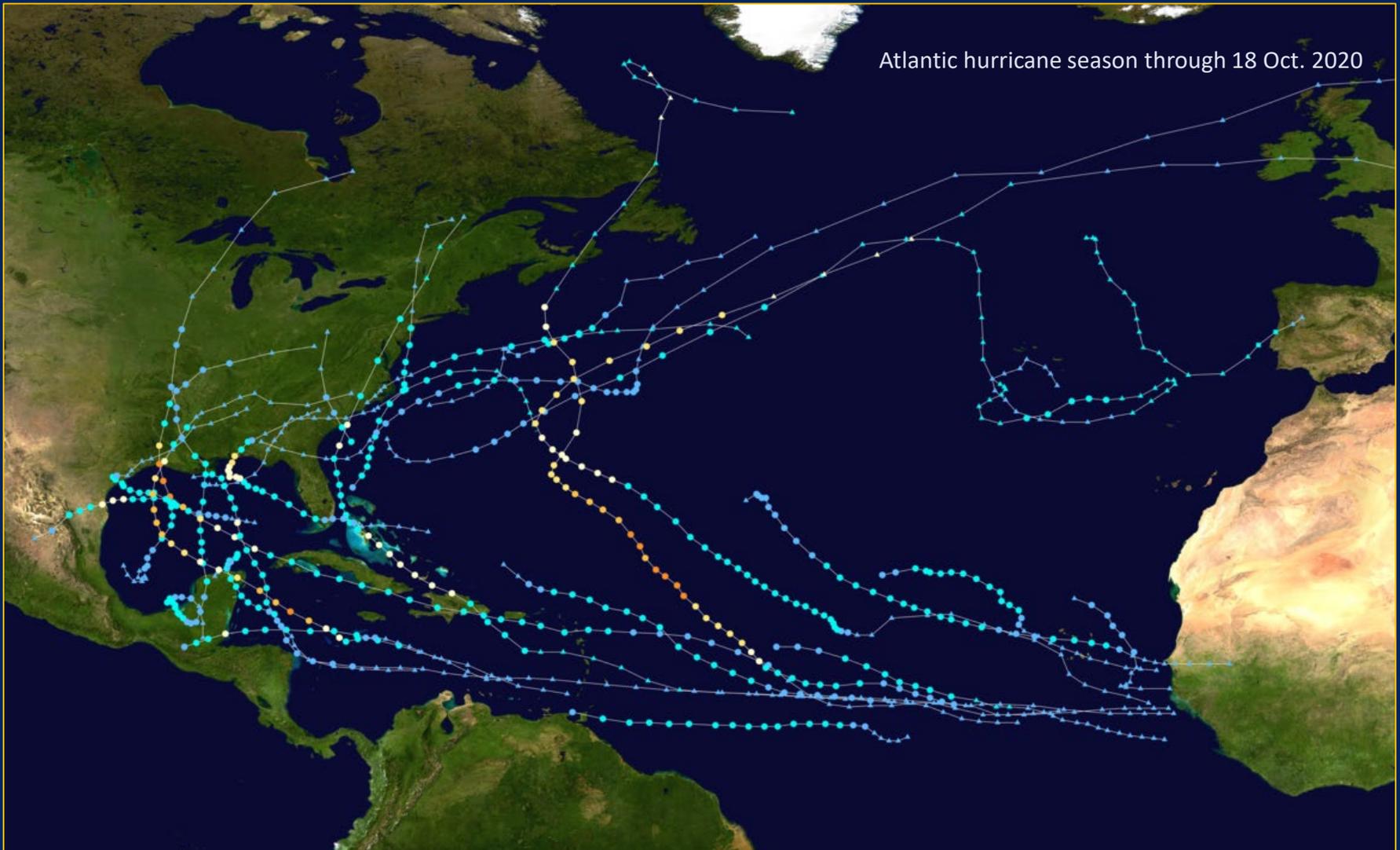


Atlantic SST anomaly, 27 May 2020

Noted the Gulf of Mexico was starting the summer with very high heat content, as was the Atlantic
This was setting the stage for a very active Atlantic hurricane season

Digression #1

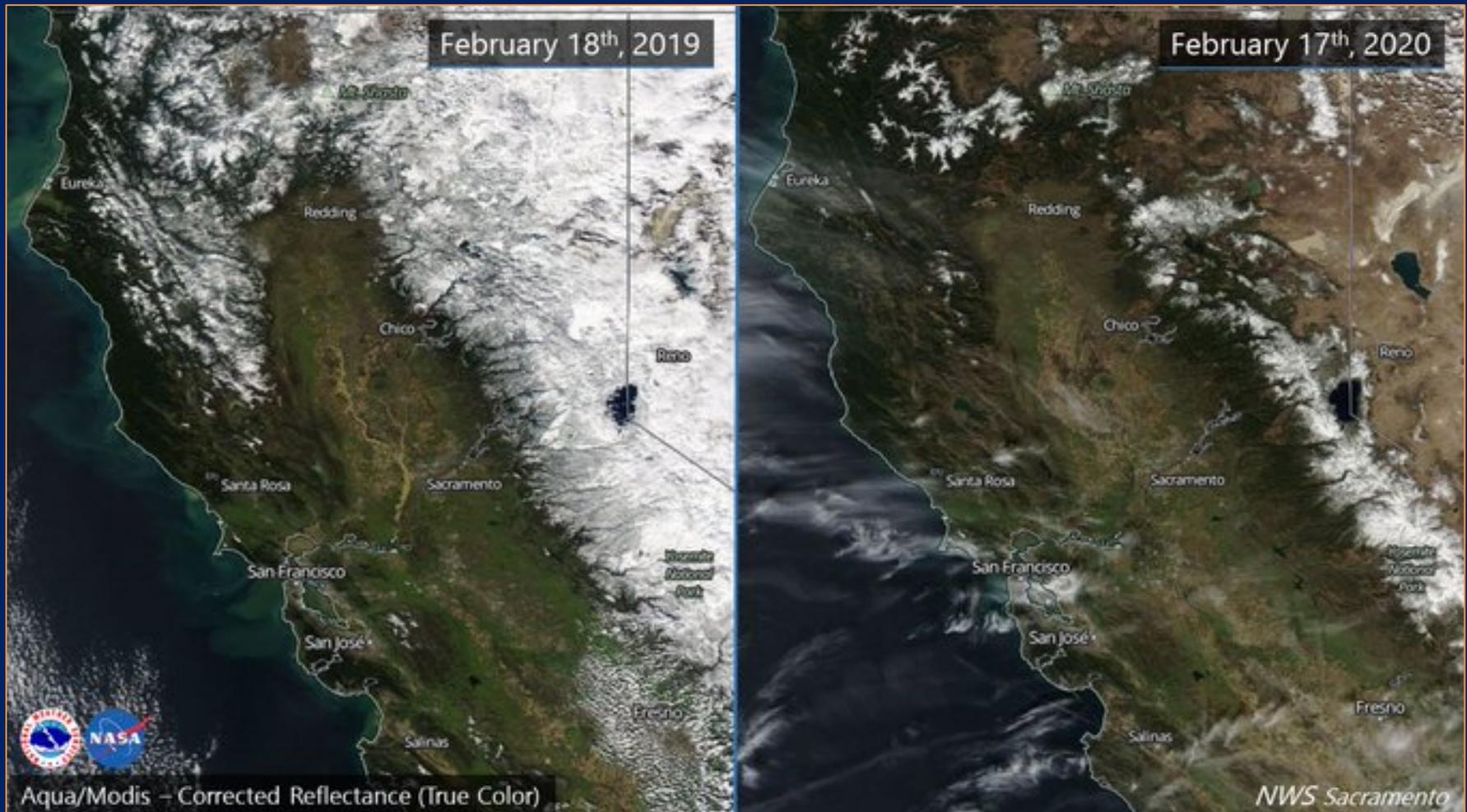
And here is what happened...



So many storms formed that we went through the alphabet and had to use Greek letter names
Lake Charles, Louisiana was hit twice by major storms within one month

Digression #1

Looking back to my RAC briefing in May 2020



Noted that California snowpack was far below average
It was a striking contrast to 2019 – the drought was back

Digression #1

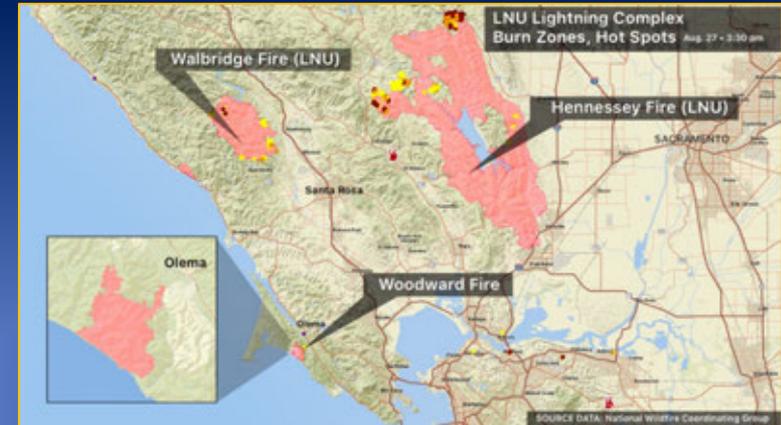
And here is what happened...

CAL FIRE
CALIFORNIA STATEWIDE FIRE SUMMARY
SUNDAY, SEPTEMBER 20, 2020

TODAY THERE ARE **19,000** FIREFIGHTERS BATTLING **27** WILDFIRES THAT IN TOTAL HAVE BURNED OVER **3** MILLION ACRES

RESOURCE BREAKDOWN:
STATE, LOCAL, TRIBAL AND FEDERAL RESOURCES ASSIGNED TO ACTIVE WILDFIRES

- 2,300+** FIRE ENGINES
- 124** ASSIGNED AIRCRAFT
- 313** FIRE CREWS
- 378** BULLDOZERS
- 467** WATERTENDERS

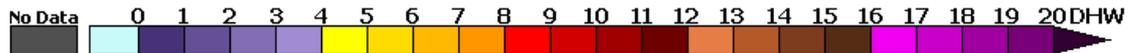
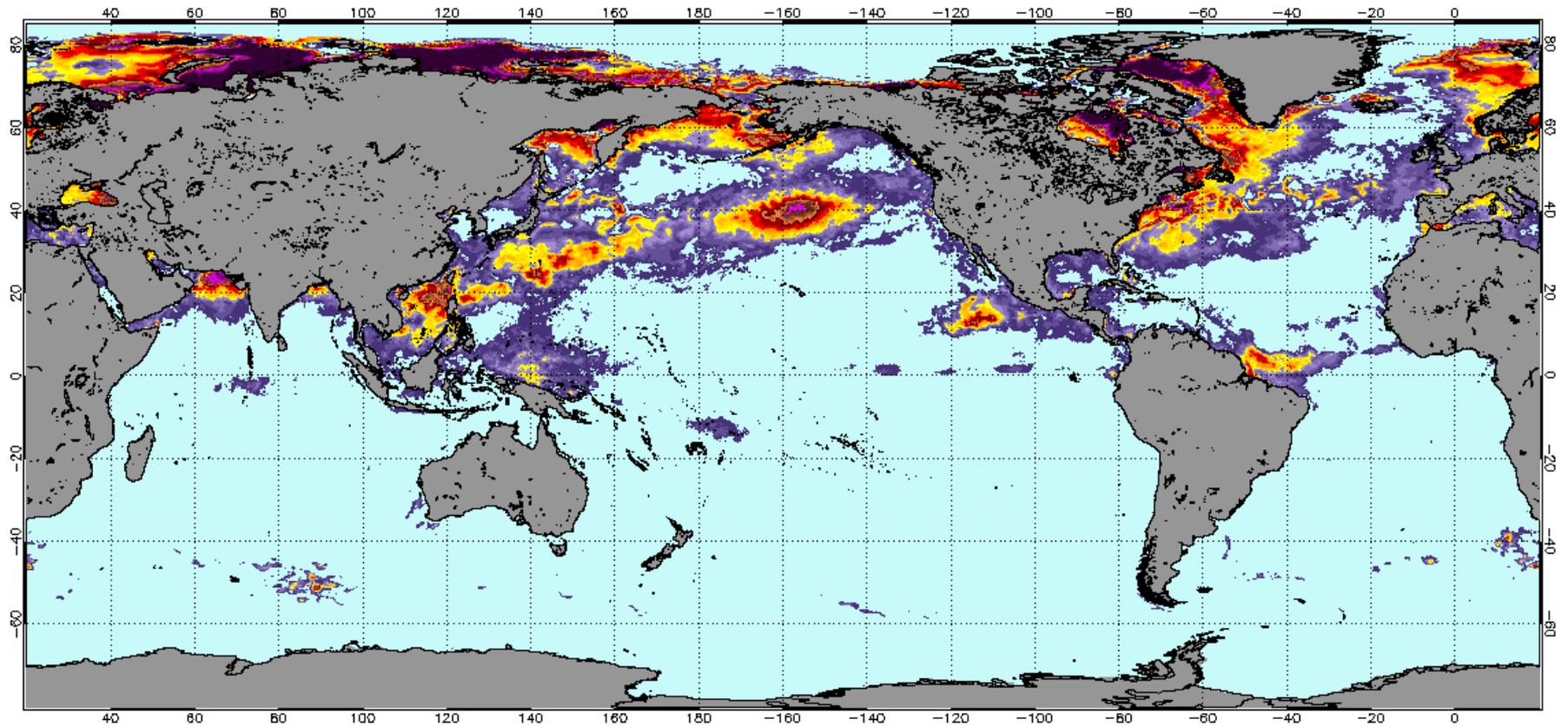


Over 4 million acres of California have burned due to wildfires so far in 2020, and they are still going
Oregon and Colorado have also had their largest fires on record

Back here in the Pacific

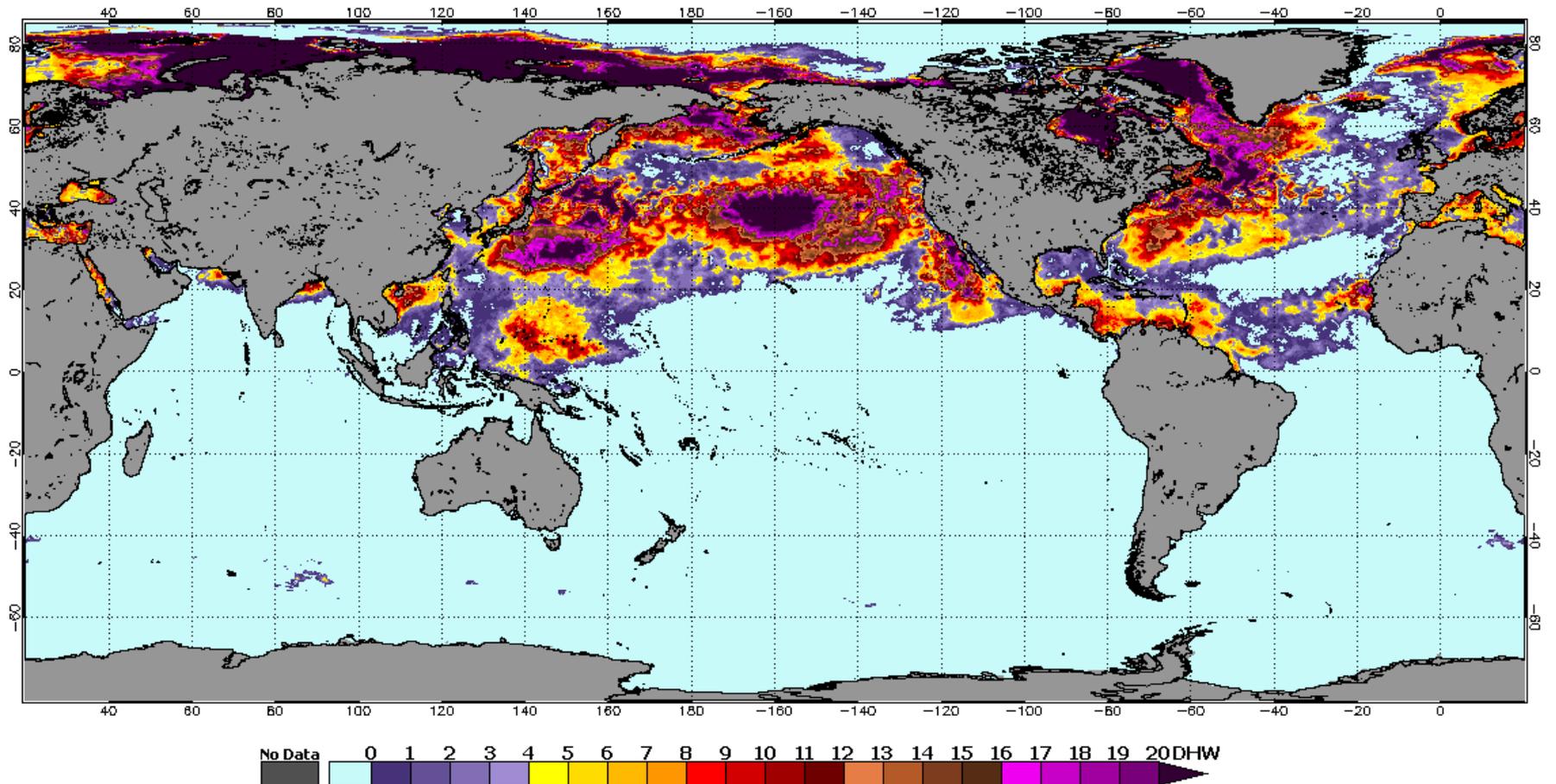
Degree Heating Weeks – 16 August 2020

NOAA Coral Reef Watch Daily 5km Degree Heating Weeks (Version 3.1) 16 Aug 2020



Degree Heating Weeks – 18 October 2020

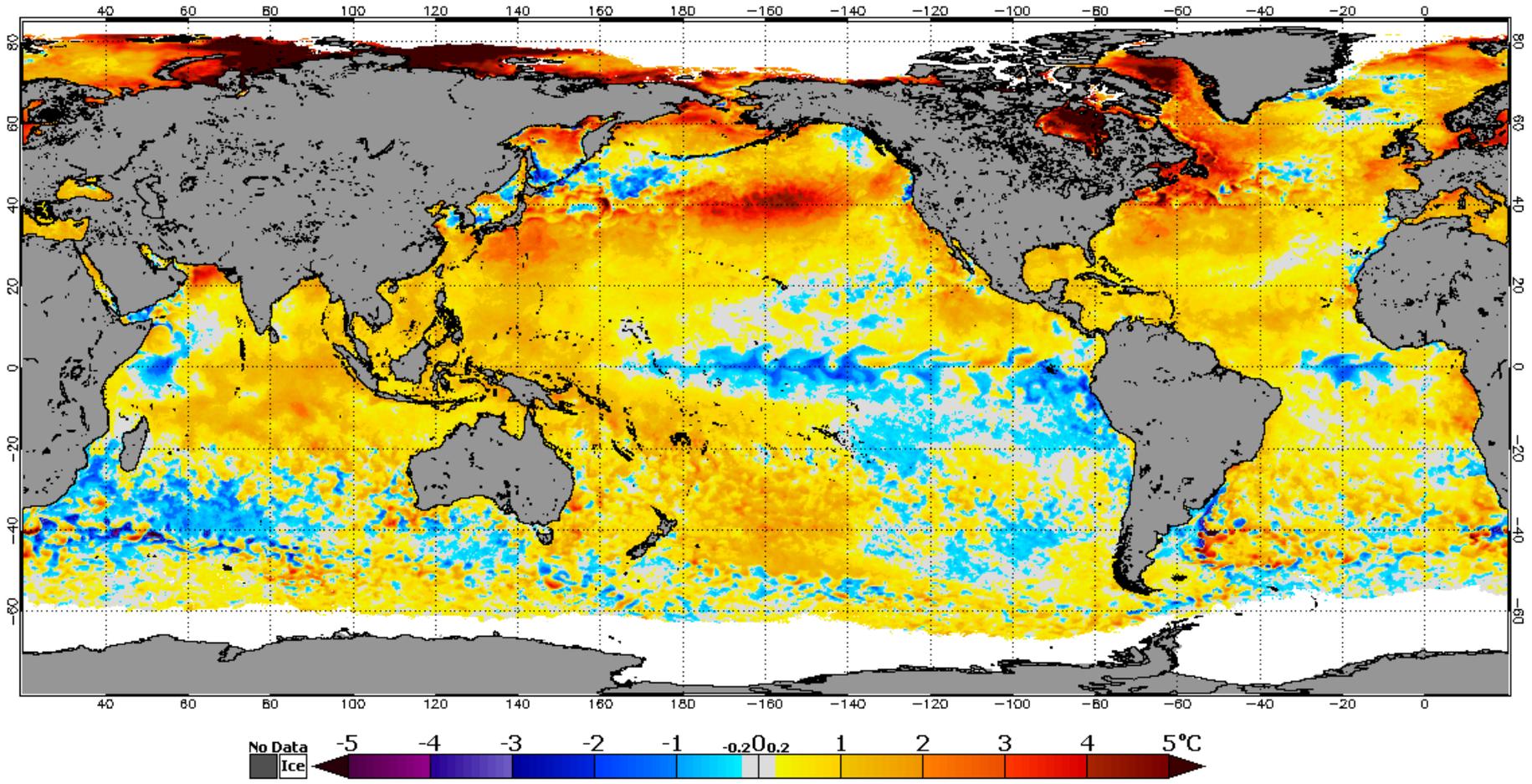
NOAA Coral Reef Watch Daily 5km Degree Heating Weeks (Version 3.1) 18 Oct 2020



A large amount of heat accumulated to the northeast of the Monument
But fortunately not *in* the Monument

Global Sea Surface Temperature Anomaly – 16 August 2020

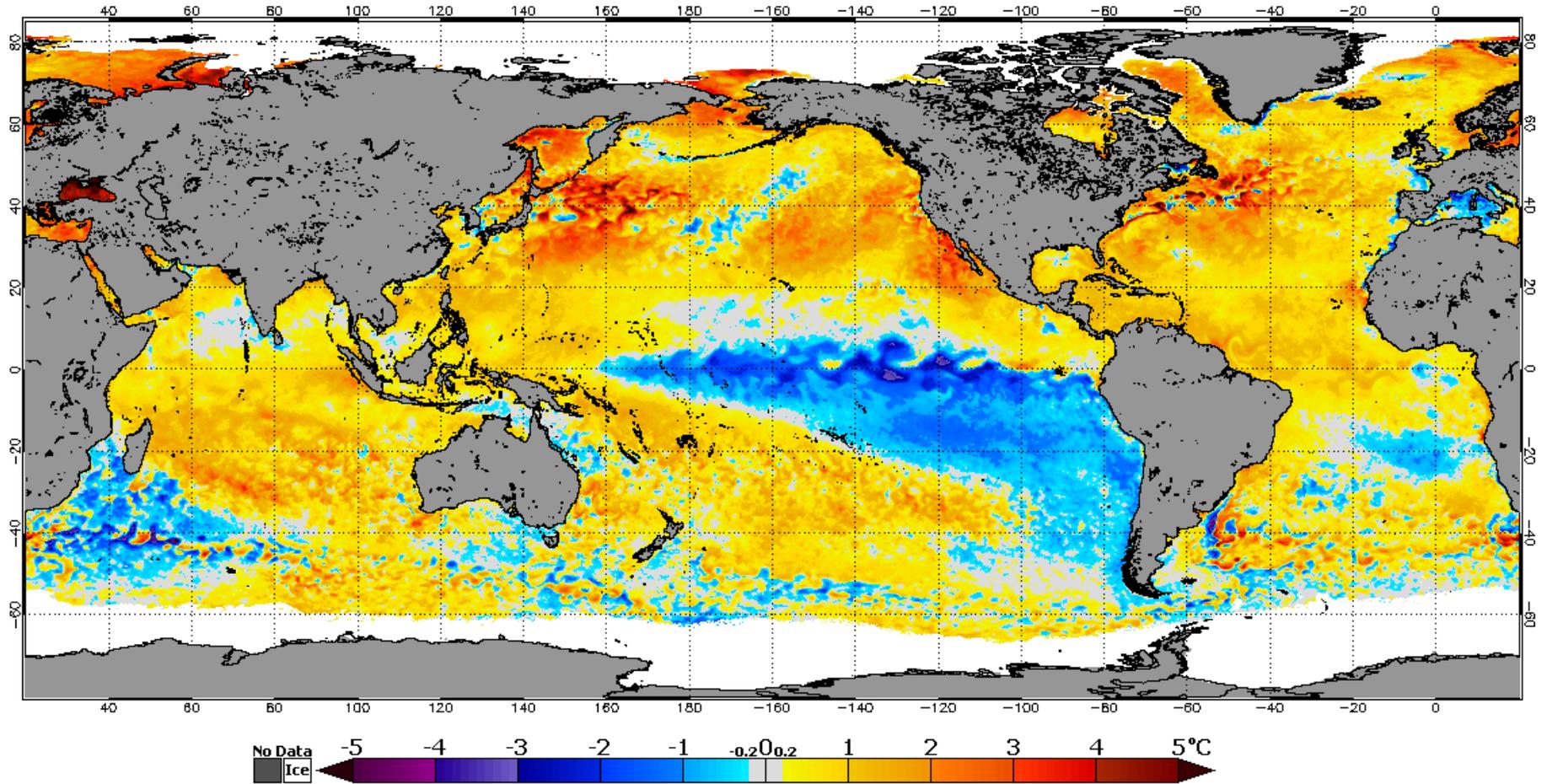
NOAA Coral Reef Watch Daily 5km SST Anomalies (Version 3.1) 16 Aug 2020



A large pool of anomalously warm water was present to the northeast of the Monument in August
Also note the obvious development of La

Global Sea Surface Temperature Anomaly – 18 October 2020

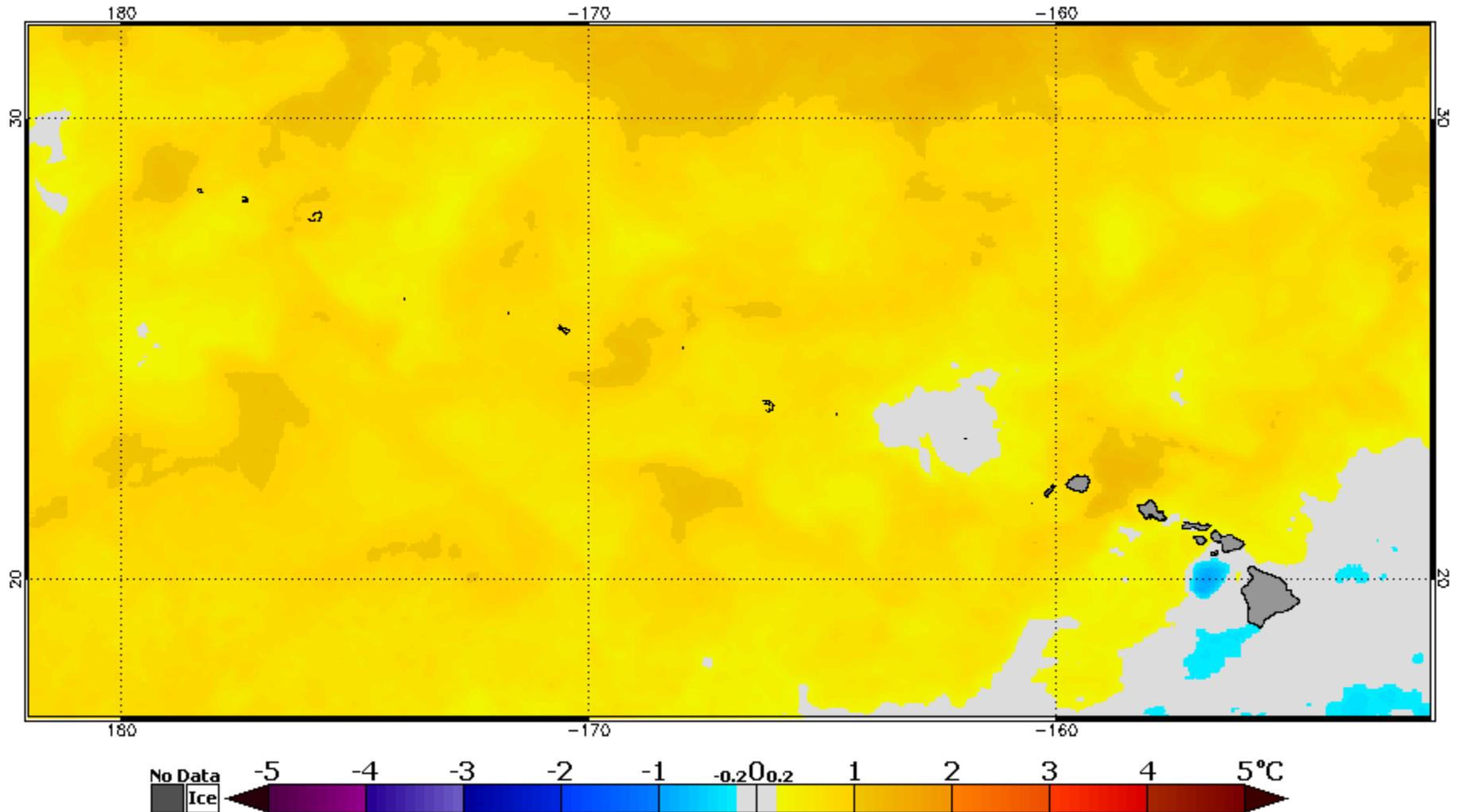
NOAA Coral Reef Watch Daily 5km SST Anomalies (Version 3.1) 18 Oct 2020



The area of higher ocean heat content northeast of Hawaii had shifted and abated slightly by October
Also note the obvious development of a large La Niña pattern off South America

Sea Surface Temperature Anomaly, Hawaii Sector – 16 August 2020

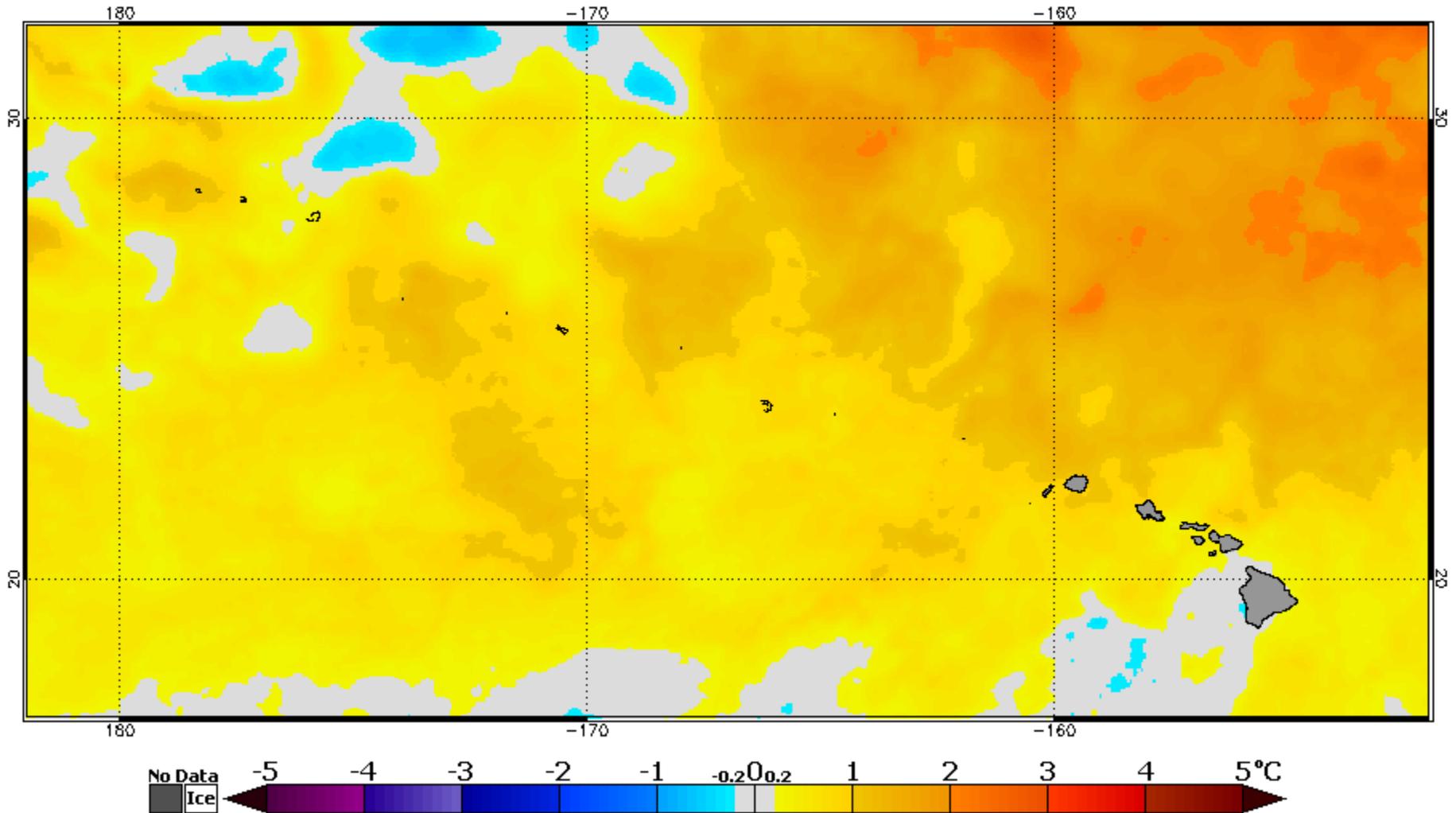
NOAA Coral Reef Watch Daily 5km SST Anomalies (Version 3.1) 16 Aug 2020



In late summer the entire Monument was warmer than average

Sea Surface Temperature Anomaly, Hawaii Sector – 18 October 2020

NOAA Coral Reef Watch Daily 5km SST Anomalies (Version 3.1) 18 Oct 2020

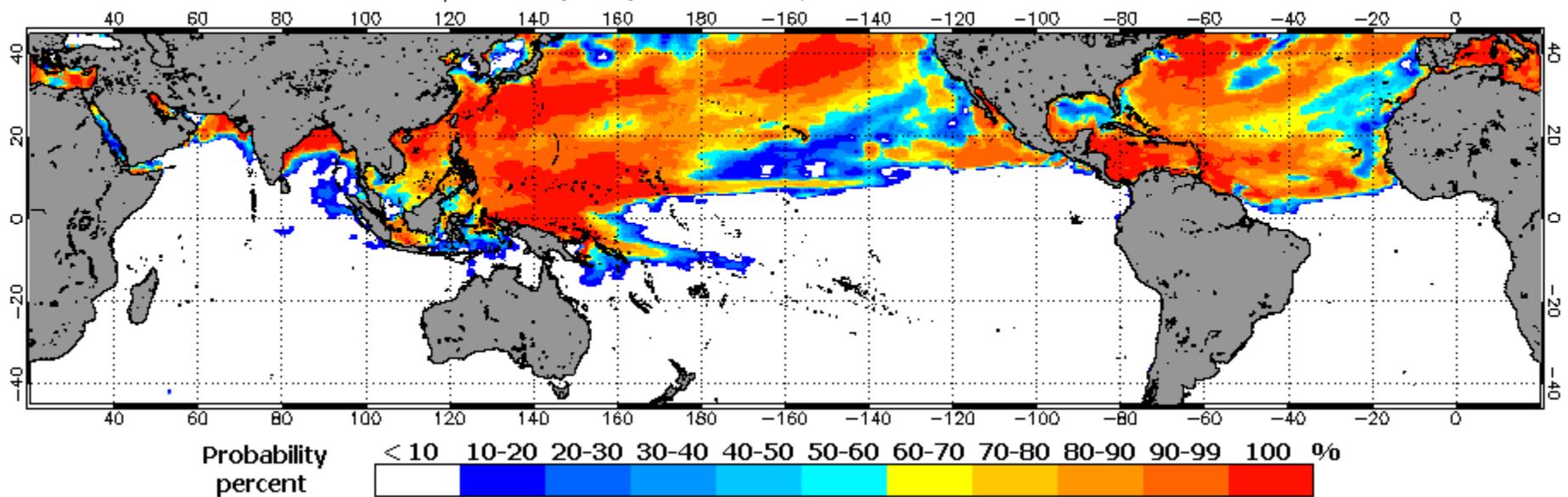


By fall, the Midway sector was returning to more normal conditions

Bleaching Stress Probability – May-Aug. 2020

Prediction as of 16 August 2020

2020 Aug 11 NOAA Coral Reef Watch Bleaching Heat Stress Probabilities (Warning & Higher) for Aug–Nov 2020
Experimental, v5.0, CFSv2-based, 28 to 112 Ensemble Members

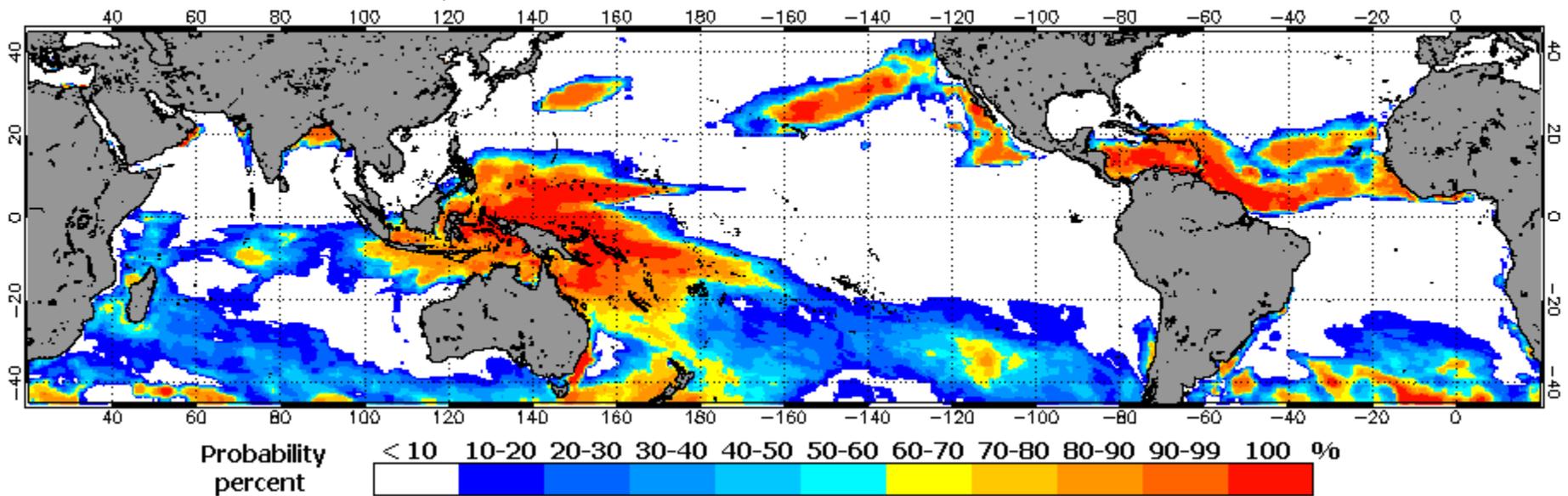


In August, this NOAA product indicated a 80-90 percent chance of some degree of heat stress (warning or higher) for reefs throughout the Hawaiian Islands

Bleaching Stress Probability – October 2020 – January 2021

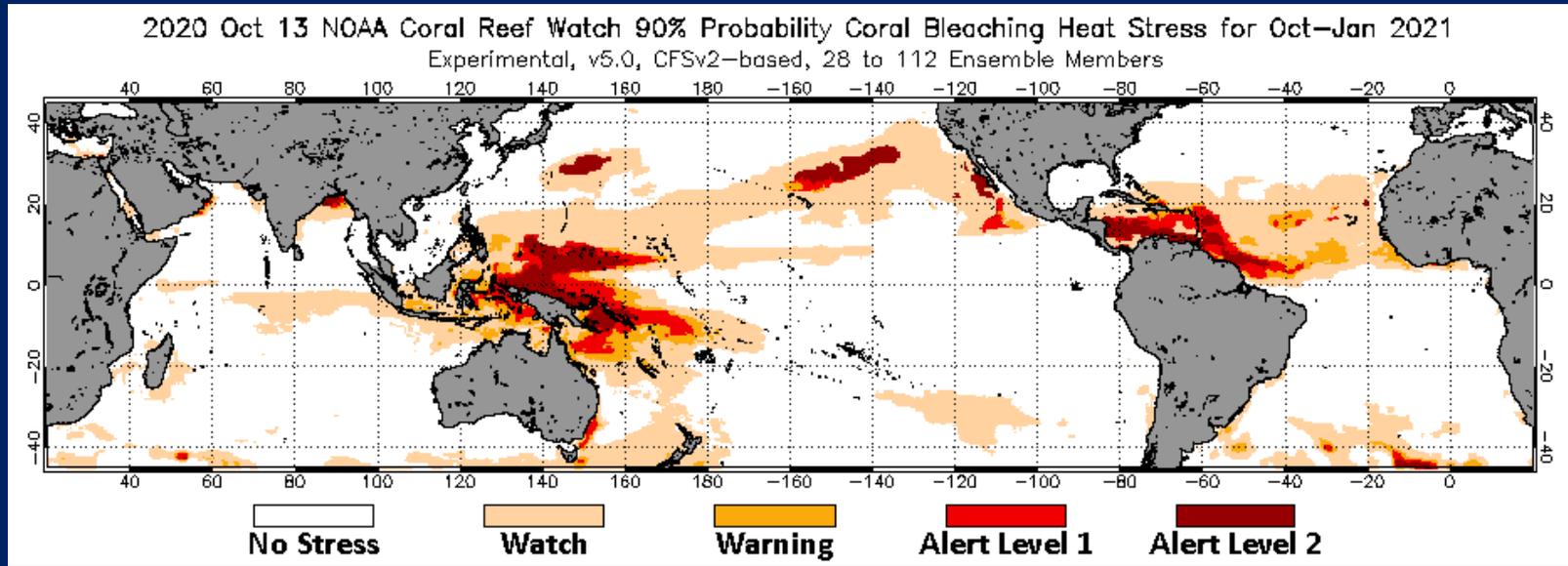
Prediction as of 13 October 2020

2020 Oct 13 NOAA Coral Reef Watch Bleaching Heat Stress Probabilities (Warning & Higher) for Oct–Jan 2021
Experimental, v5.0, CFSv2–based, 28 to 112 Ensemble Members

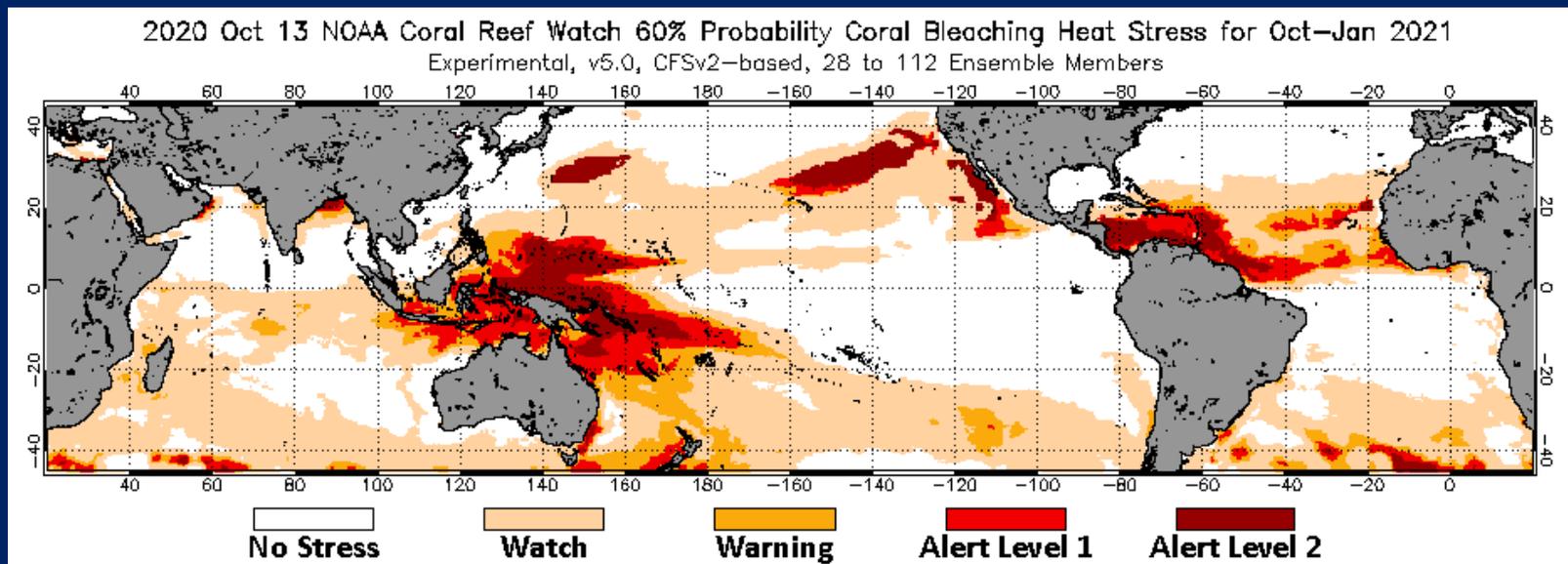


Going into fall, the potential for heat stress has significantly receded

90% Stress Level Probability – Oct. 2020 – Jan. 2021



60% Stress Level Probability – Oct. 2020 – Jan. 2021



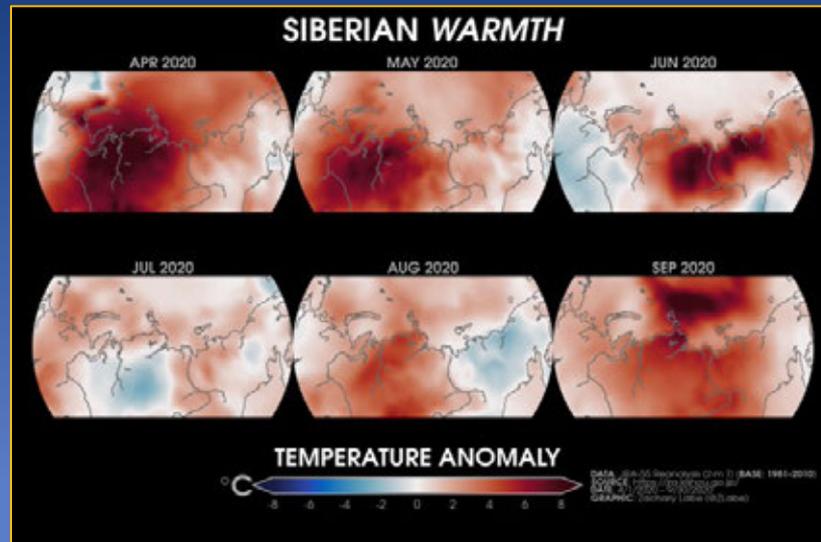
A 90 percent probability of bleaching watch conditions in the Monument continues into fall

Digression #2

Meanwhile, the entire Northern Hemisphere is still record hot



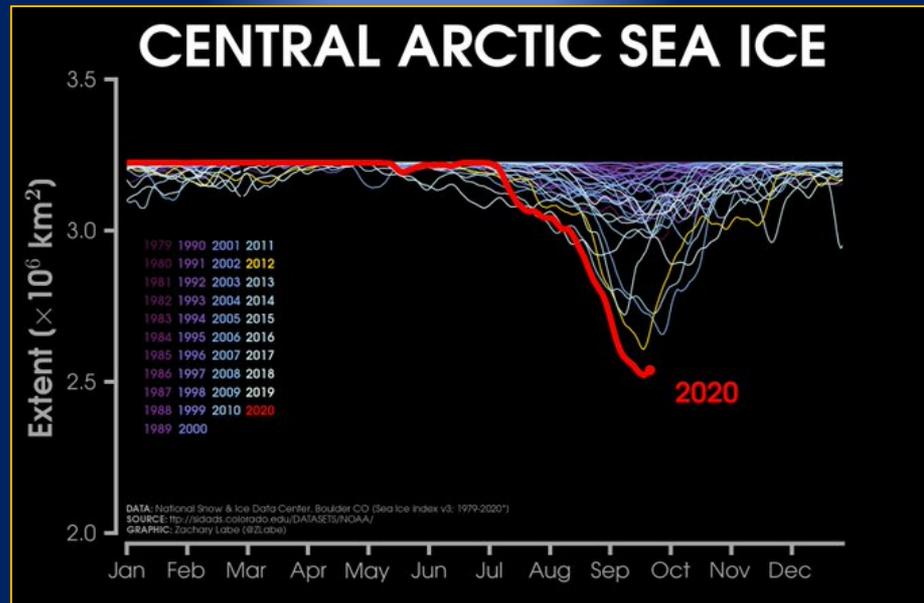
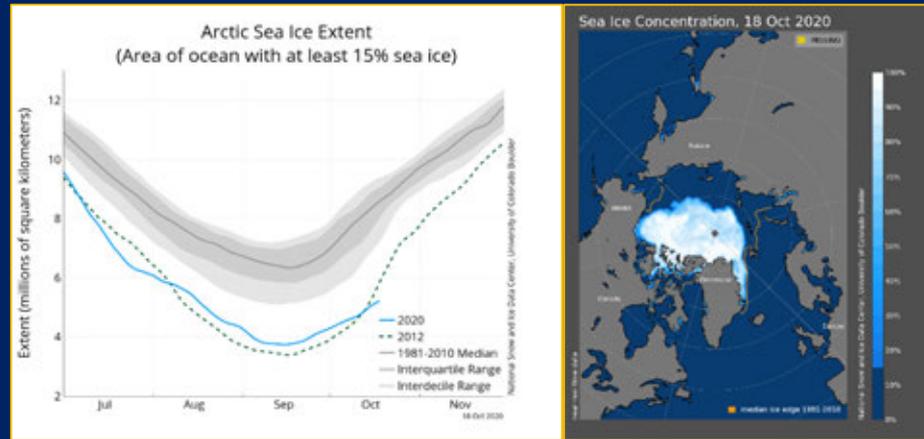
In both Arizona...



...and Siberia

Digression #2

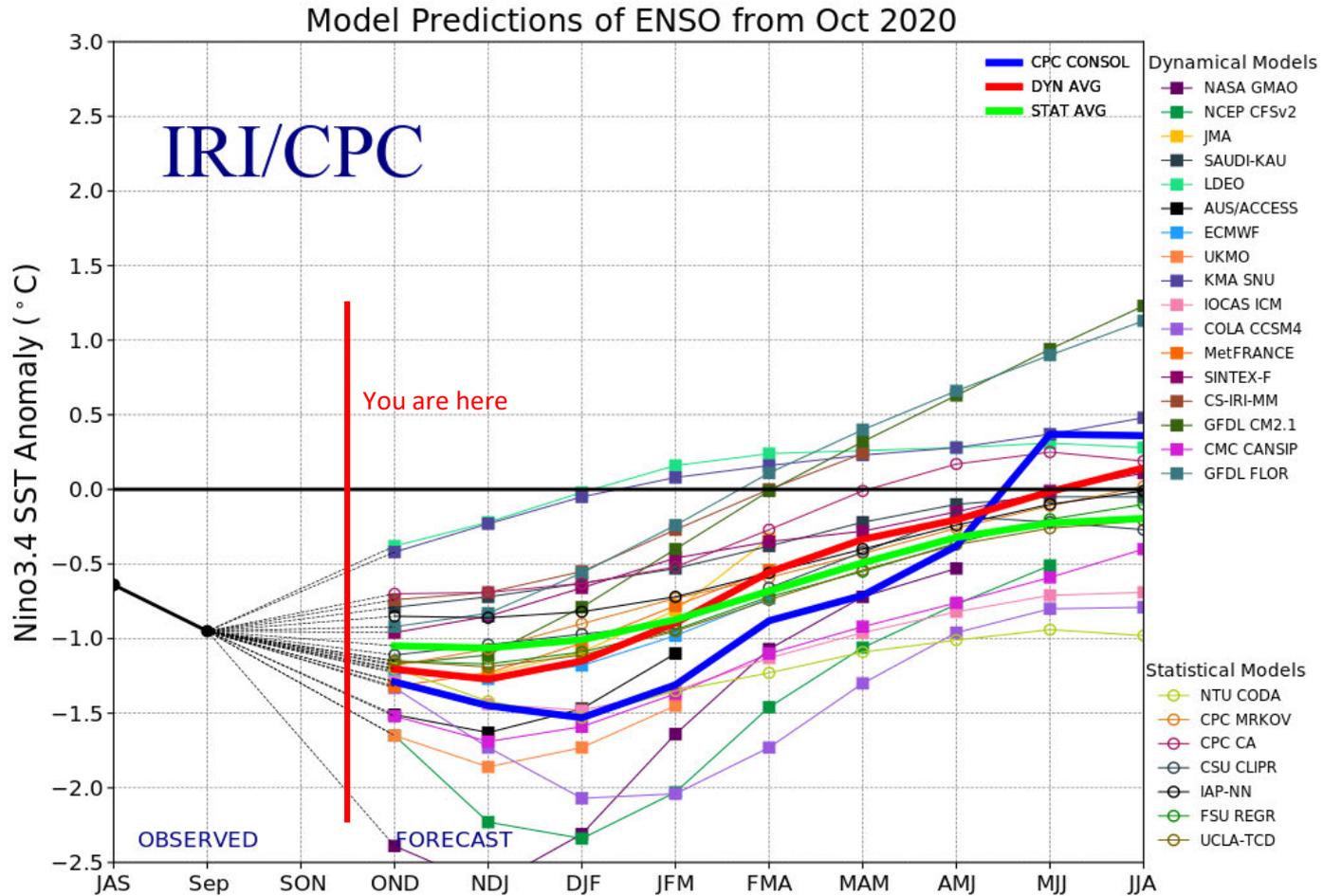
And the Arctic continues to lose ice



Arctic sea ice is now at its lowest level ever for this date

Looking Forward

An ensemble of 27 climate models predicts
La Niña conditions from now through early winter 2020



Conclusions

2020 is currently the second hottest year on record, and could still end up as the hottest year ever

As a result, the Northern Pacific Ocean has carried excess heat content through summer, but most of it accumulated to the northeast of the Monument

La Niña conditions are present, and expected to persist through spring of 2021

This generally leads to cooler and wetter than average winters in Hawaii

There is a 60+% probability of some minor thermal stress to Monument coral reefs this fall, but this probability is steadily declining as we head into winter

Monument reefs will reach Bleaching Watch status, but severe bleaching seems unlikely

No tropical cyclone events have occurred in the Monument this year, and no further are likely given the recent onset of a La Niña pattern

This is not a favorable for Eastern Pacific cyclone formation, whereas high ocean heat content in the Atlantic produced a severe season there

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?

