

Hawaii

Climate Indicators Summary

March 2019

PMNM Climate Change Working Group

Dan A. Polhemus

U. S. Fish & Wildlife Service

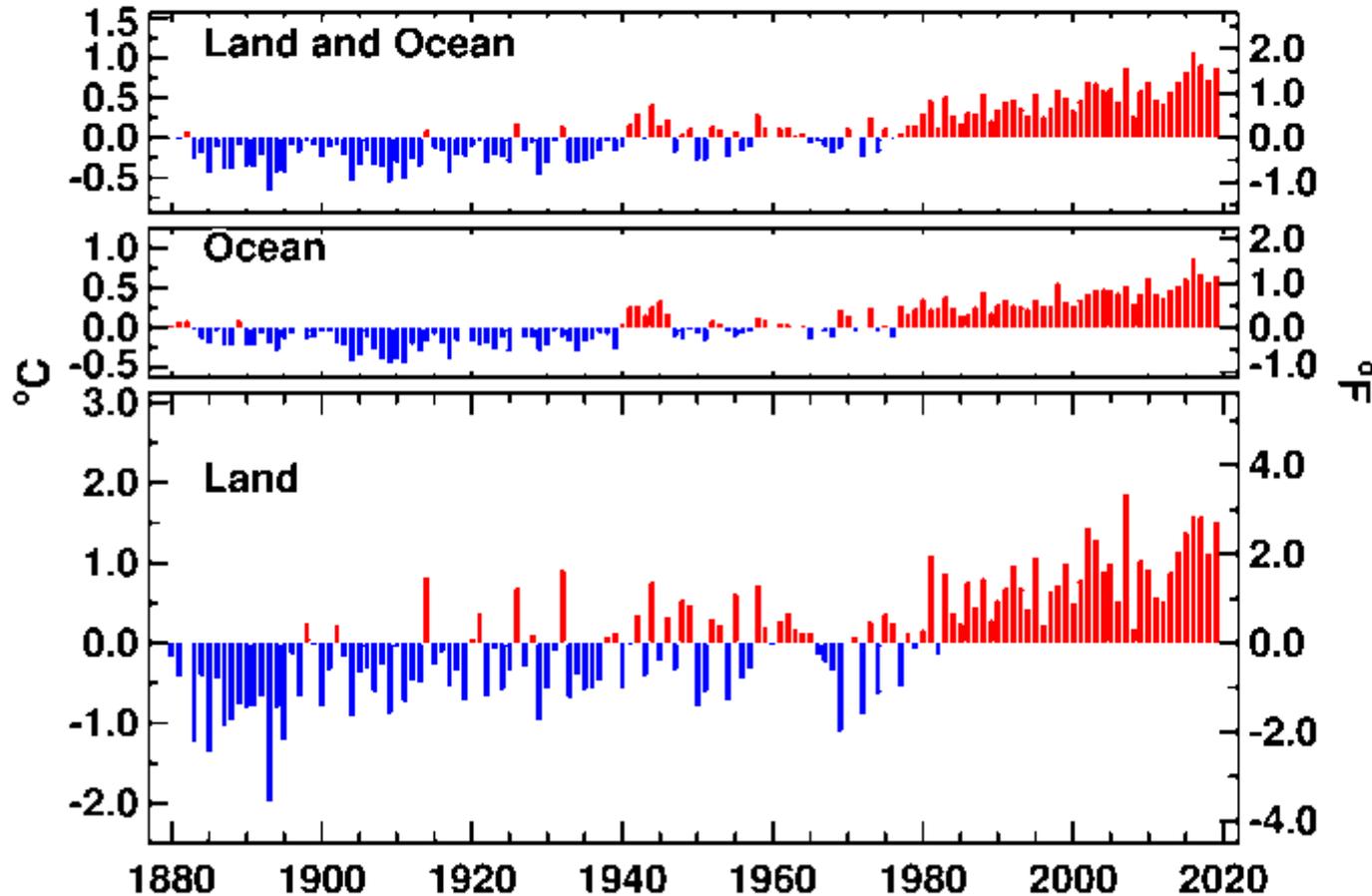
Honolulu, HI

2019 is starting out warmer than 2018 did

January Global Surface Mean Temp Anomalies

NCEI/NESDIS/NOAA

Analysis is based upon Smith et al. (2008) methodology.



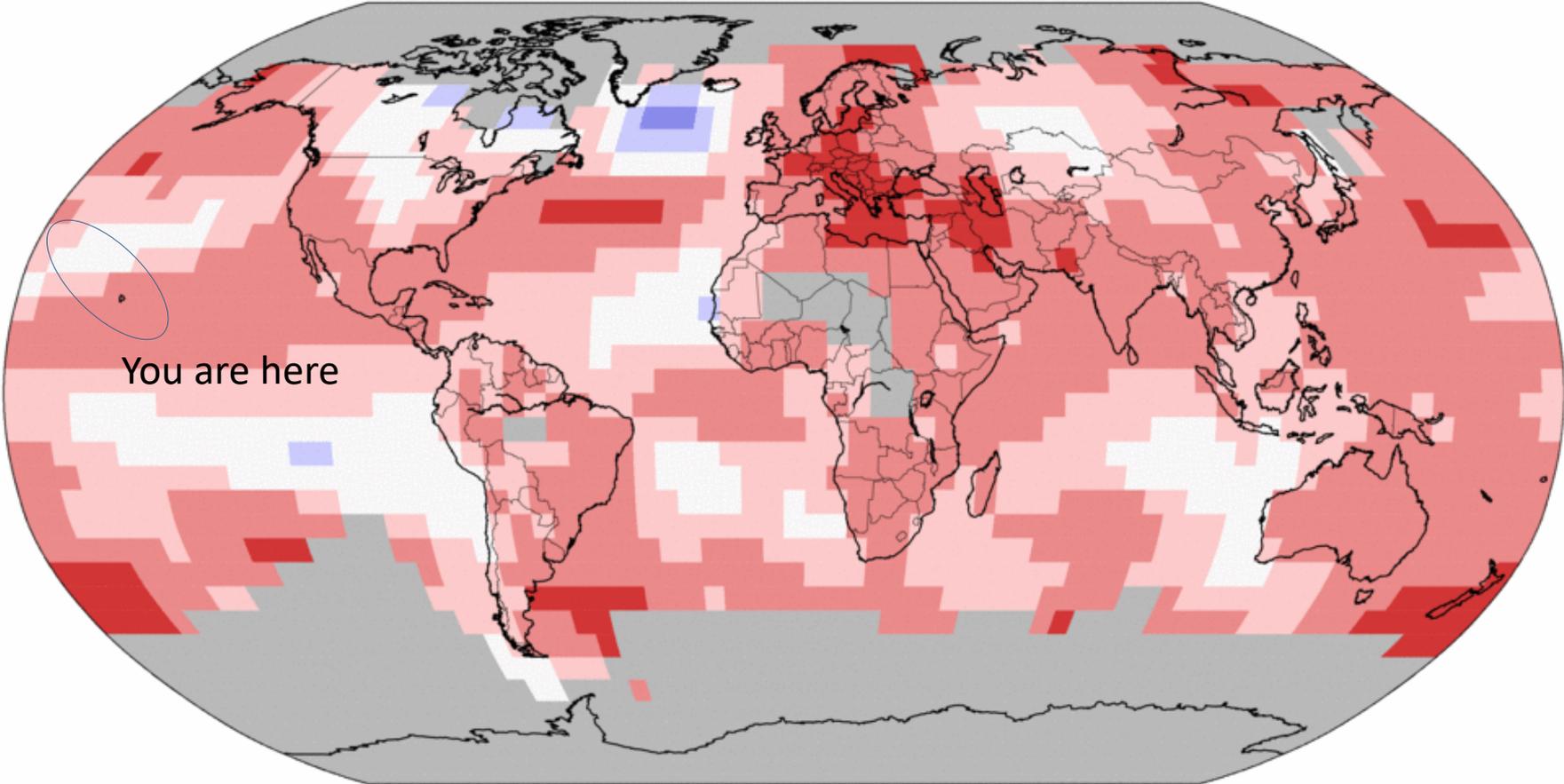
Third warmest January since 1880

No record cold temperatures recorded anywhere

Land & Ocean Temperature Percentiles Jan–Dec 2018

NOAA's National Centers for Environmental Information

Data Source: GHCN–M version 3.3.0 & ERSST version 4.0.0



You are here



Record Coldest



Much Cooler than Average



Cooler than Average



Near Average



Warmer than Average



Much Warmer than Average

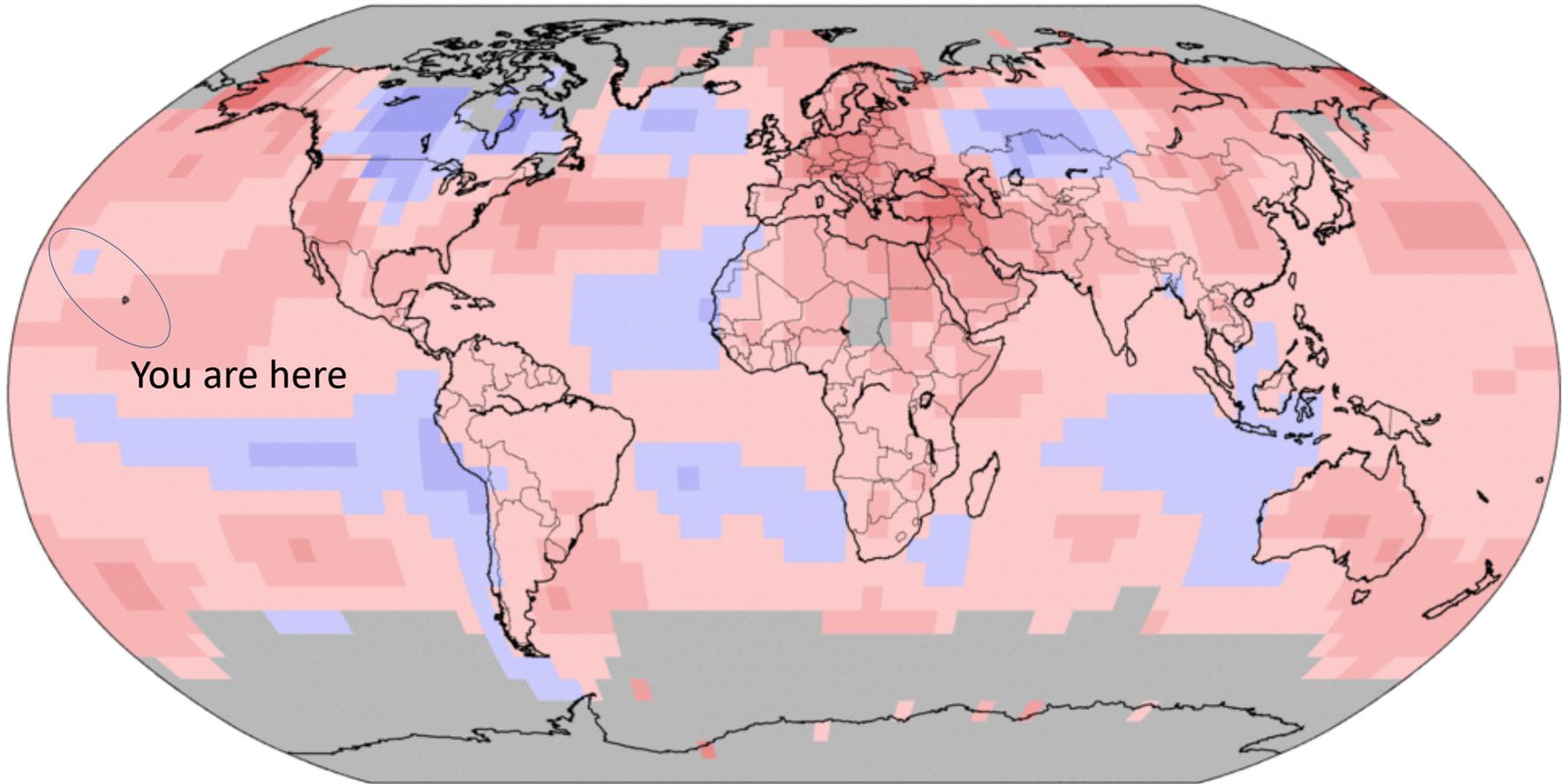


Record Warmest



Land & Ocean Temperature Departure from Average Jan–Dec 2018 (with respect to a 1981–2010 base period)

Data Source: GHCN–M version 3.3.0 & ERSST version 4.0.0



-5

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Degrees Celsius



National Centers for Environmental Information

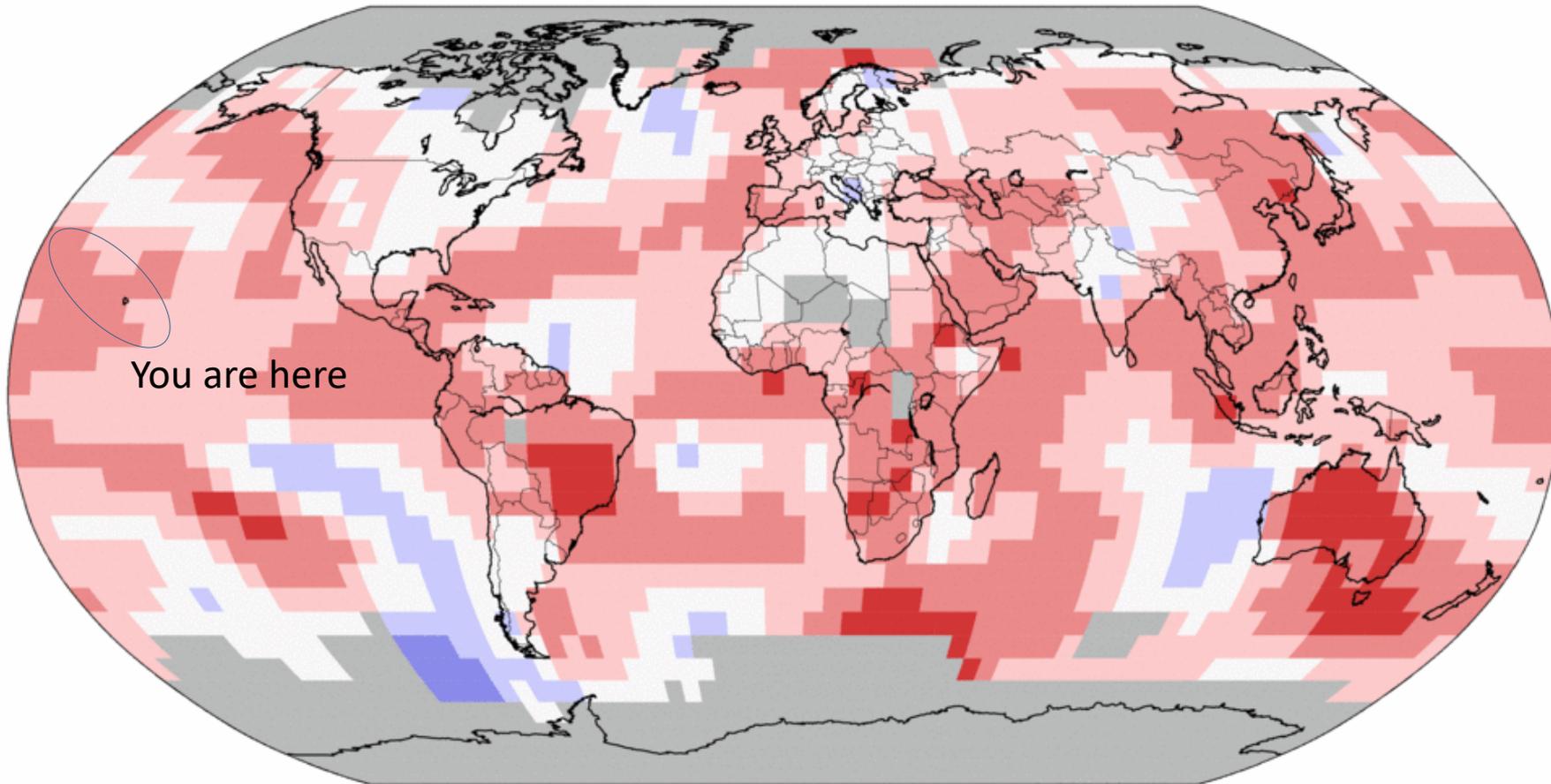
Thu Jan 31 15:29:20 EST 2019

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

Land & Ocean Temperature Percentiles Jan 2019

NOAA's National Centers for Environmental Information

Data Source: GHCN-M version 3.3.0 & ERSST version 4.0.0



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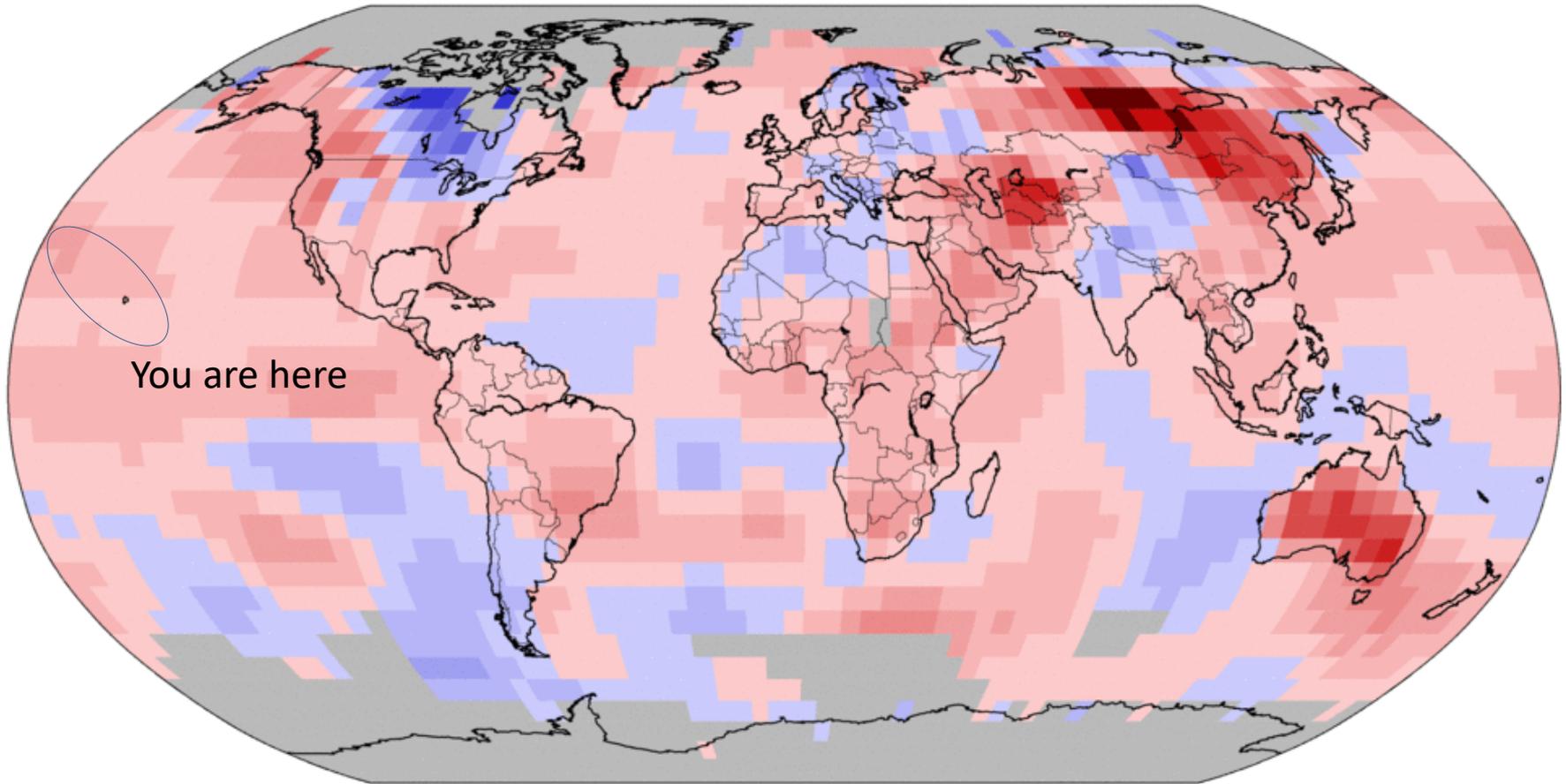


Record Warmest



Land & Ocean Temperature Departure from Average Jan 2019 (with respect to a 1981–2010 base period)

Data Source: GHCN–M version 3.3.0 & ERSST version 4.0.0



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Degrees Celsius



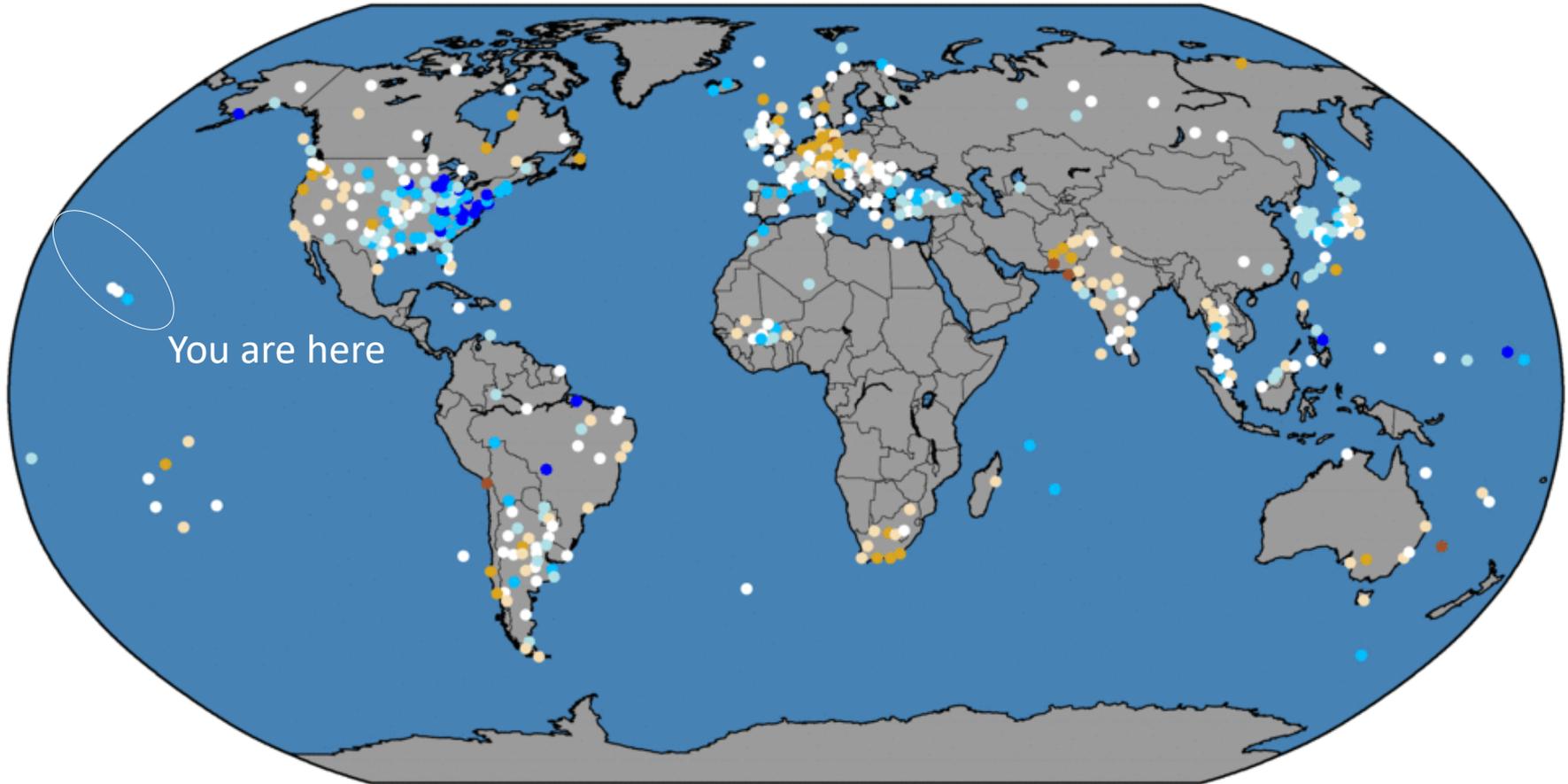
National Centers for Environmental Information
Wed Feb 13 03:48:41 EST 2019

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

Land-Only Precipitation Percentiles Jan–Dec 2018

NOAA's National Centers for Environmental Information

Data Source: GHCN–M version 2



**Record
Driest**



**Much
Drier than
Average**



**Drier than
Average**



**Near
Average**



**Wetter than
Average**



**Much
Wetter than
Average**



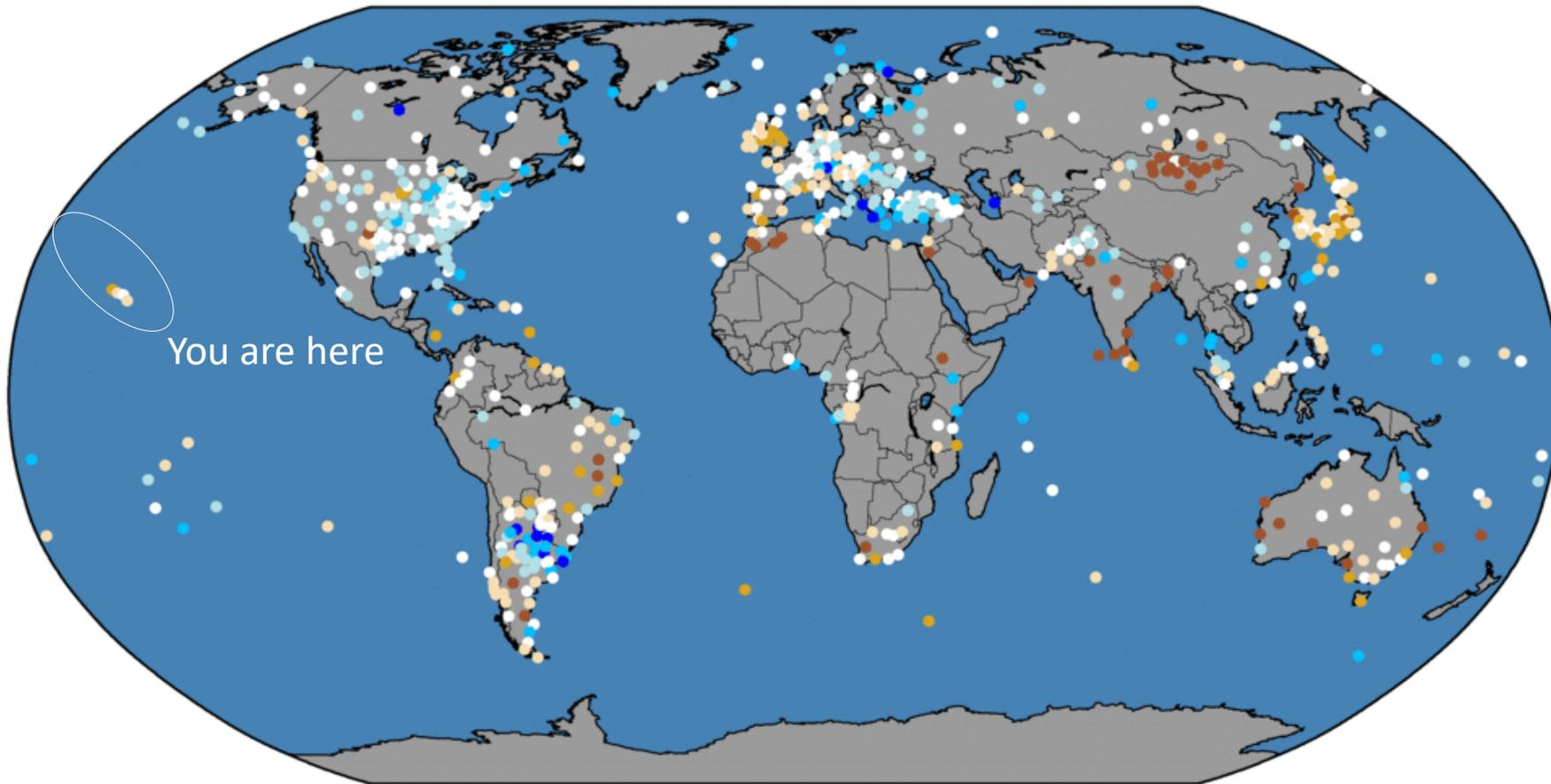
**Record
Wettest**



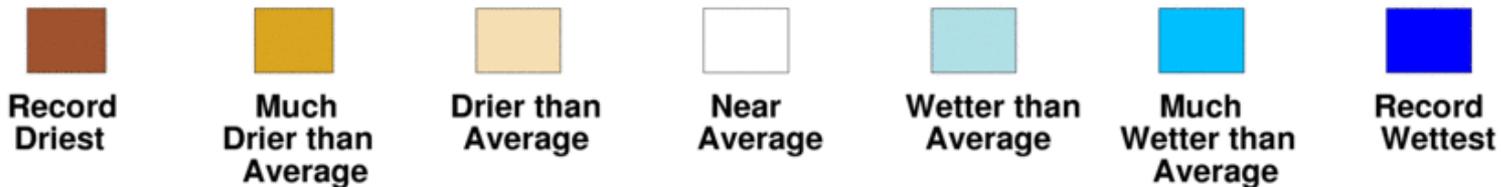
Land-Only Precipitation Percentiles Jan 2019

NOAA's National Centers for Environmental Information

Data Source: GHCN-M version 2

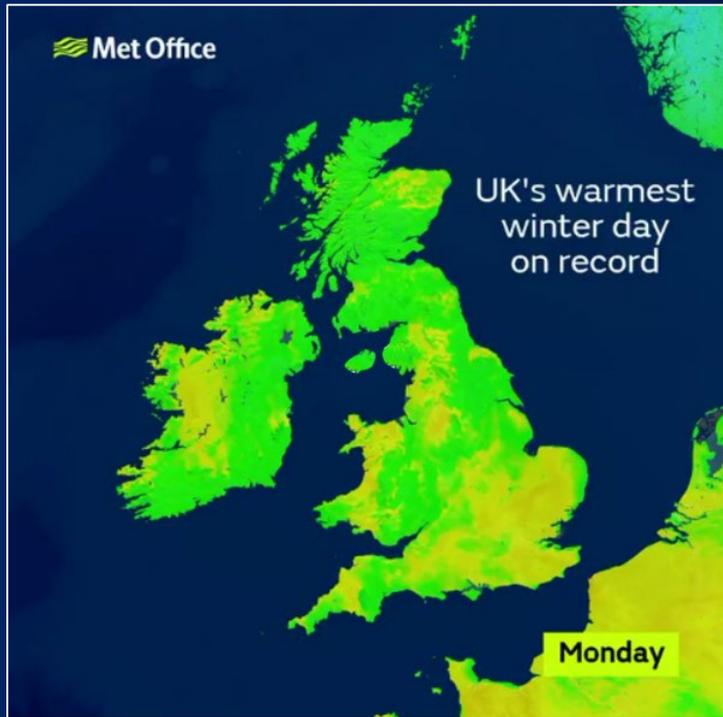


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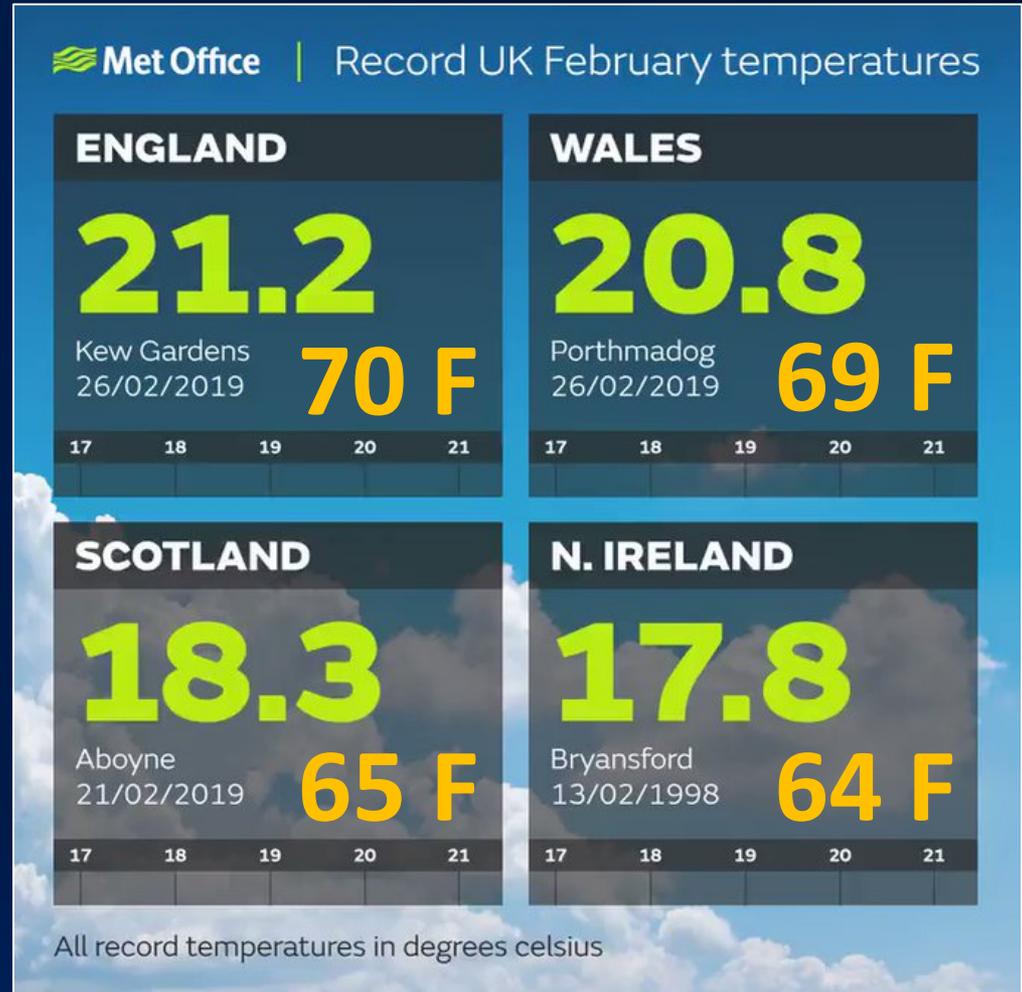


Digression #1 – Britain is having a very warm winter

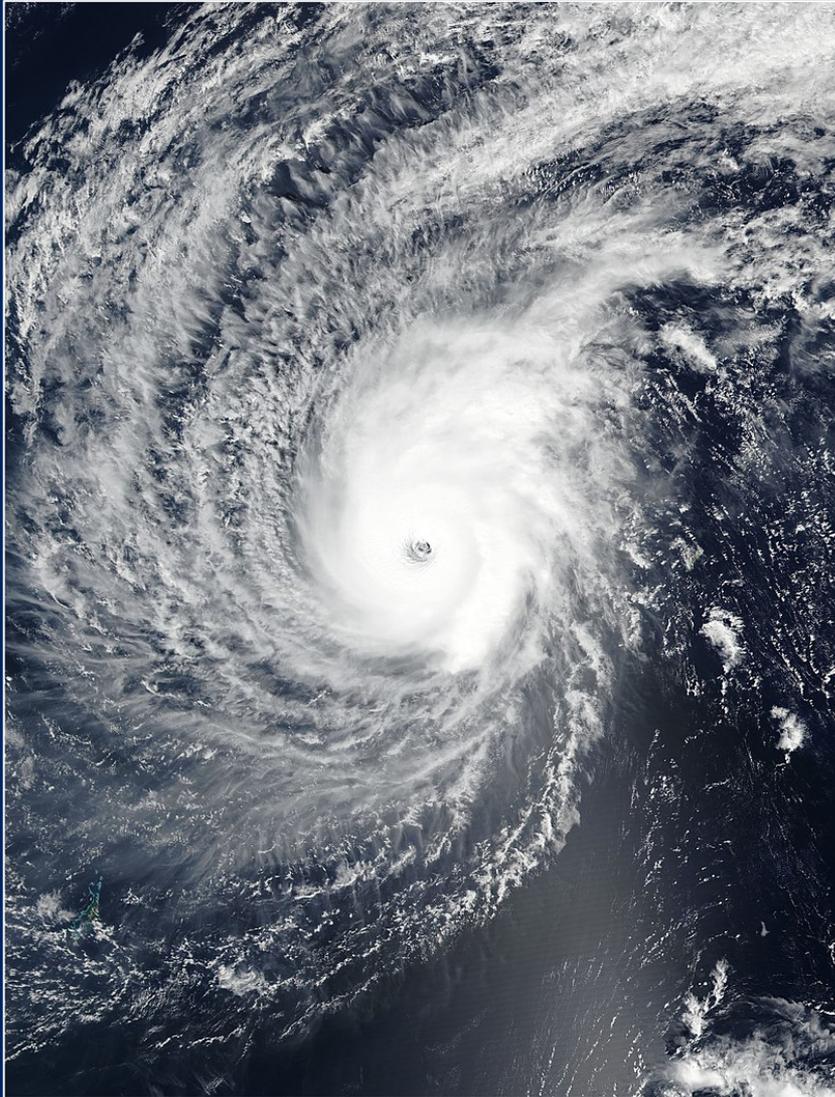
Record high February temperatures across the UK



25 February 2019



During the same week, out-of-season cyclogenesis was occurring in the Western Pacific



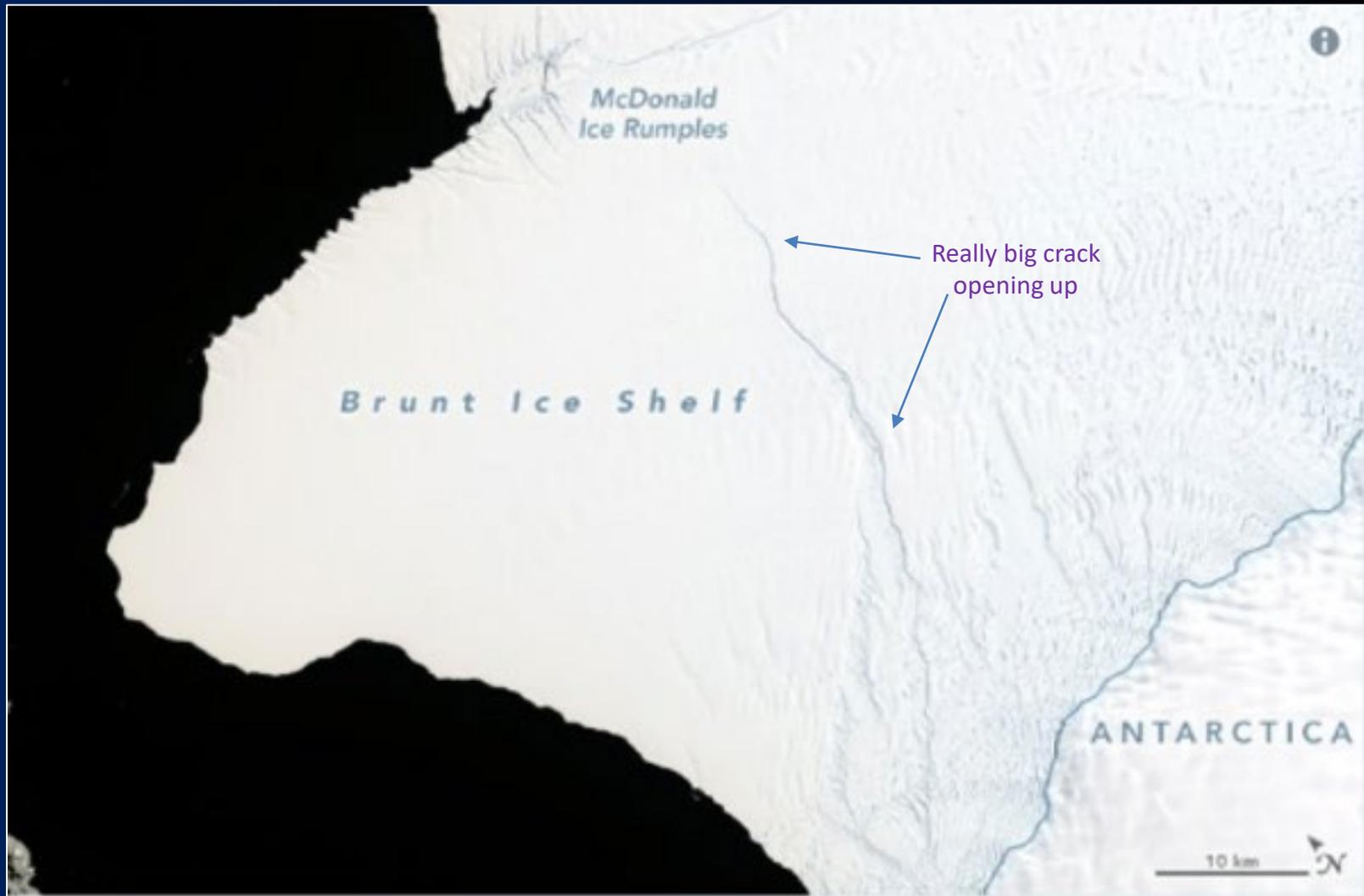
Typhoon Wutip



Briefly reached category 5 status southwest of Guam
with 120 mph winds on 25 February 2019
\$1.3 million damage on Guam

Strongest February typhoon on record

Meanwhile in Antarctica, a big chunk of ice shelf was breaking off

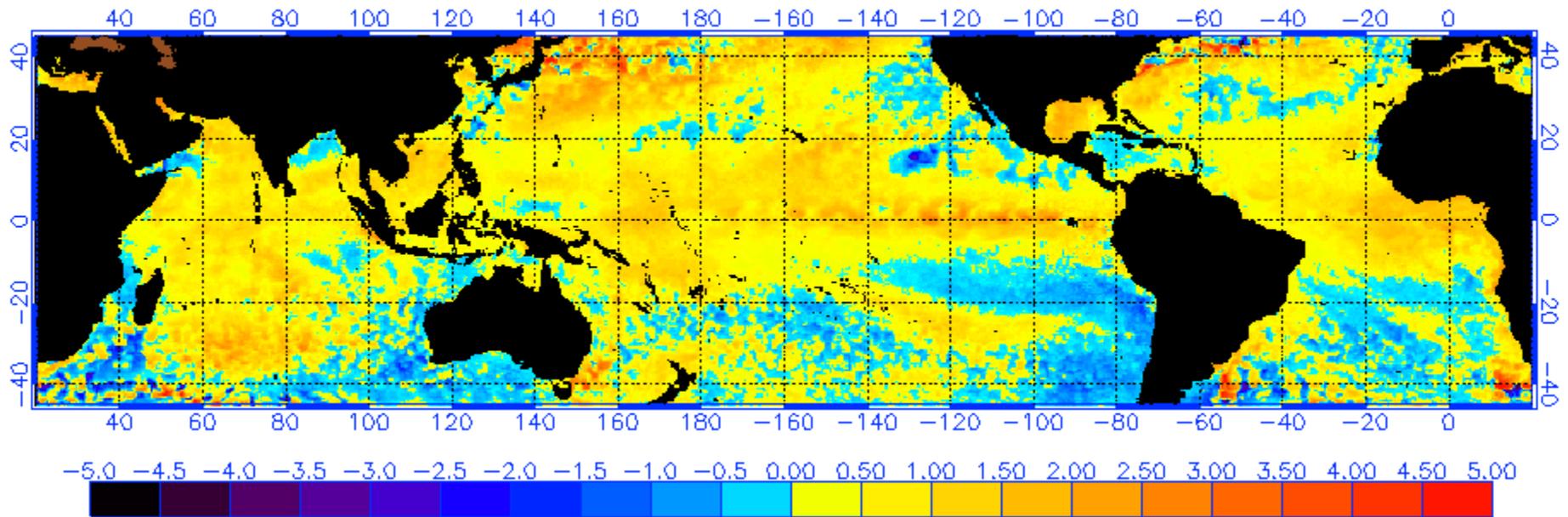


24 February 2019

The Brunt Ice Shelf prepares to shed an iceberg 660 mi² in area

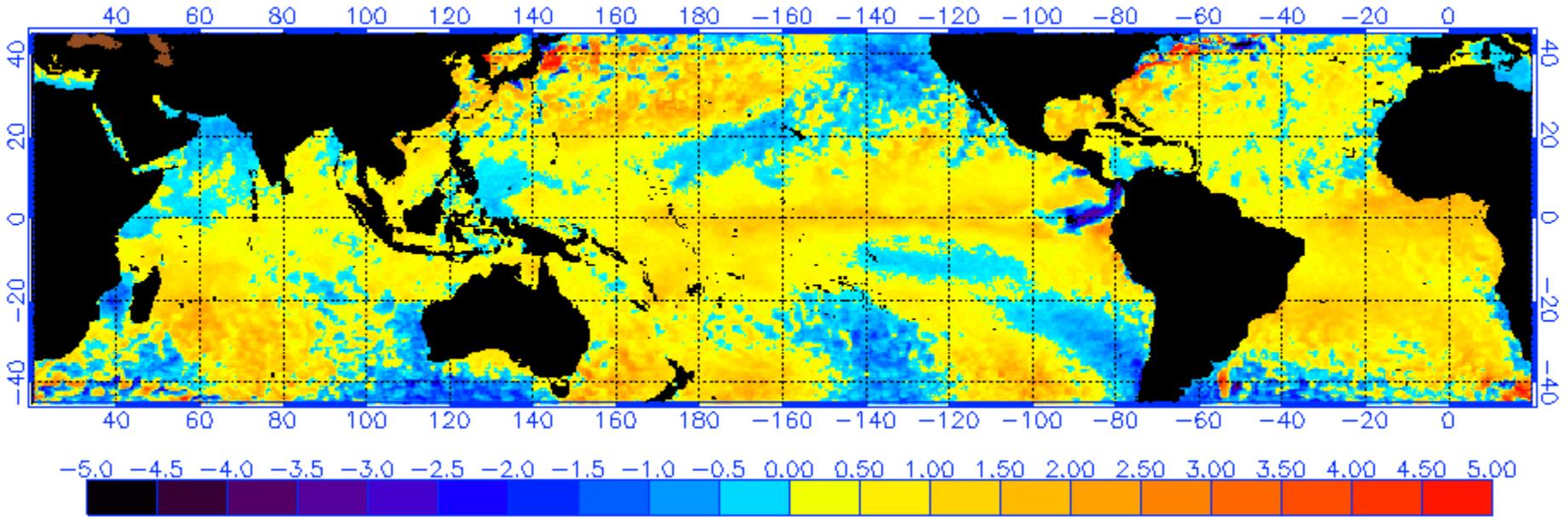
Global Sea Surface Temperature Anomaly – 25 October 2018

NOAA/NESDIS SST Anomaly (degrees C), 10/25/2018



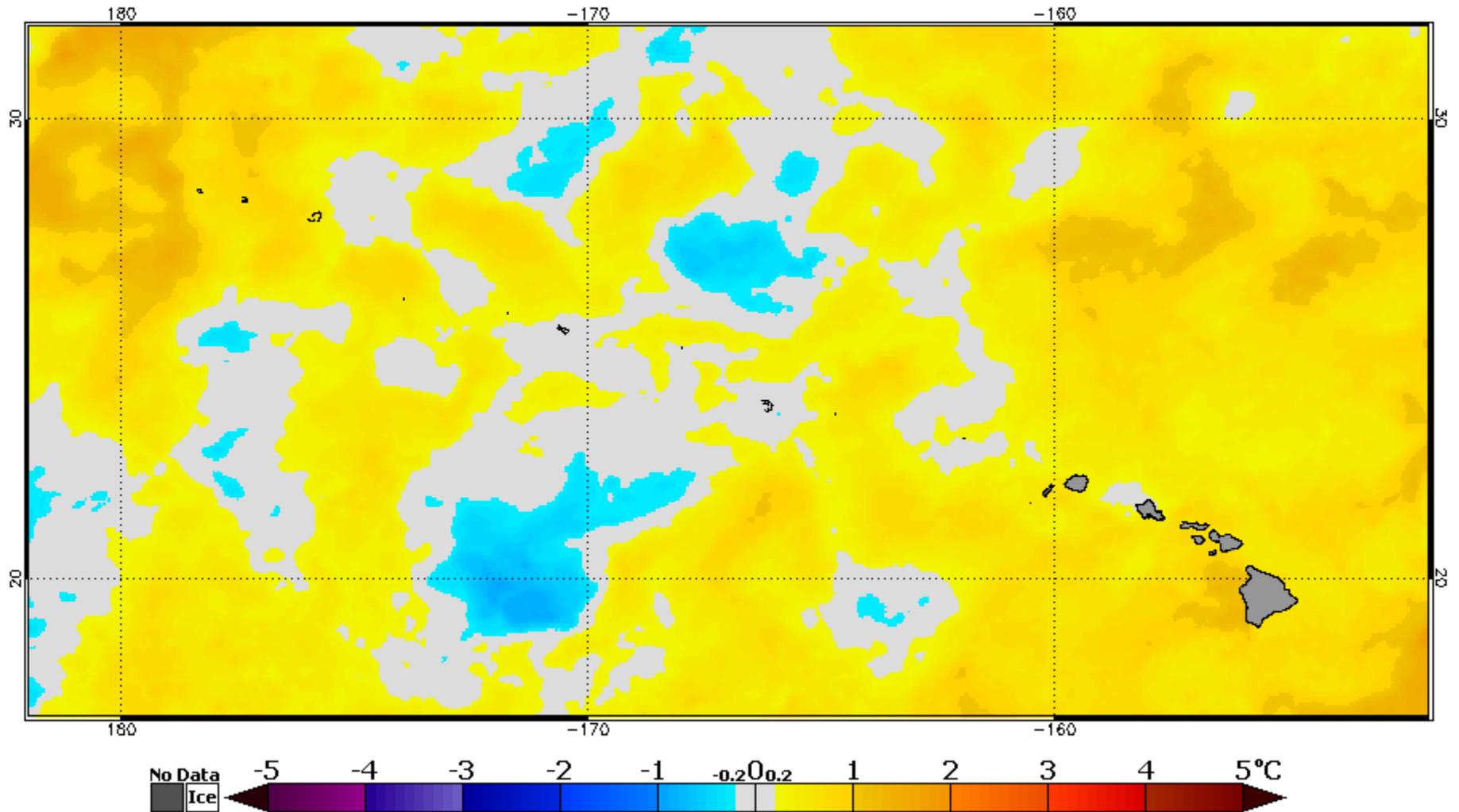
Global Sea Surface Temperature Anomaly – 18 March 2019

NOAA/NESDIS SST Anomaly (degrees C), 3/18/2019



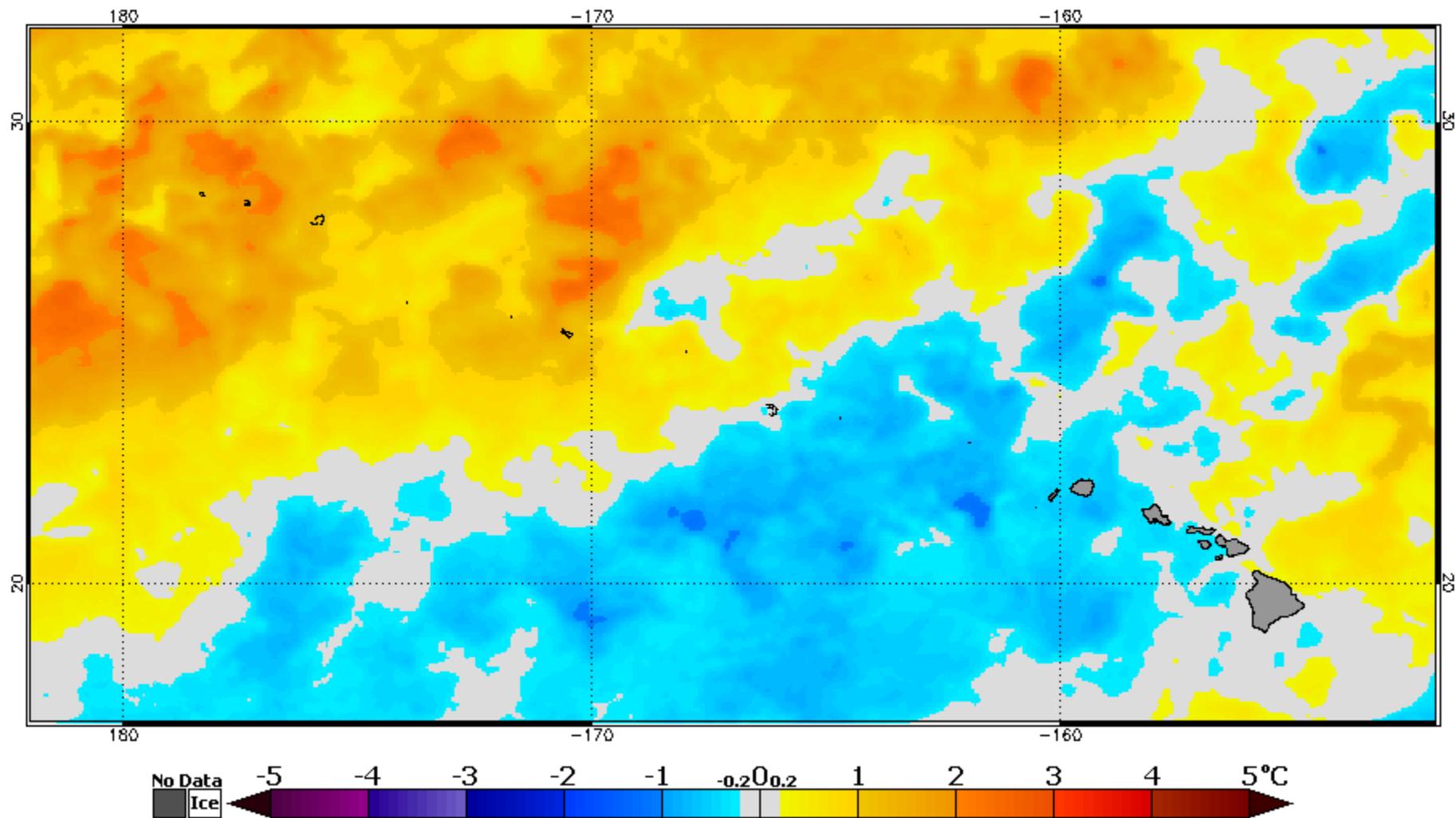
Sea Surface Temperature Anomaly, Hawaii Sector – 25 Oct. 2018

NOAA Coral Reef Watch Daily 5km SST Anomalies (Version 3.1) 25 Oct 2018



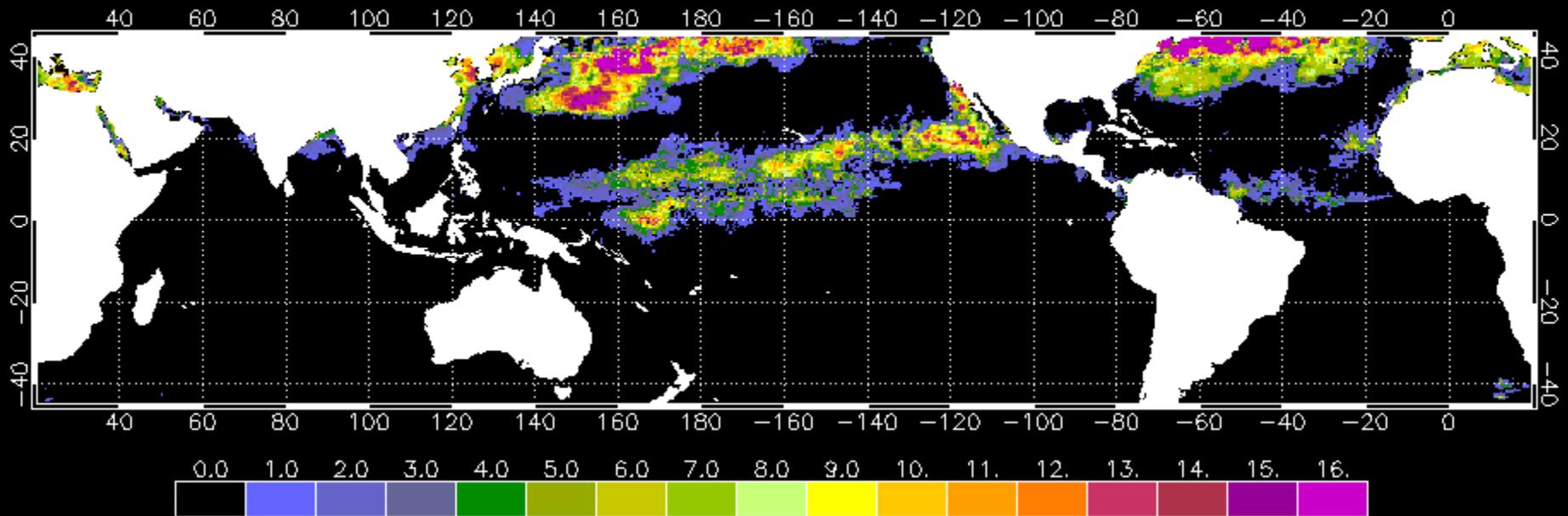
Sea Surface Temperature Anomaly, Hawaii Sector – 7 May 2018

NOAA Coral Reef Watch Daily 5km SST Anomalies (Version 3.1) 17 Mar 2019



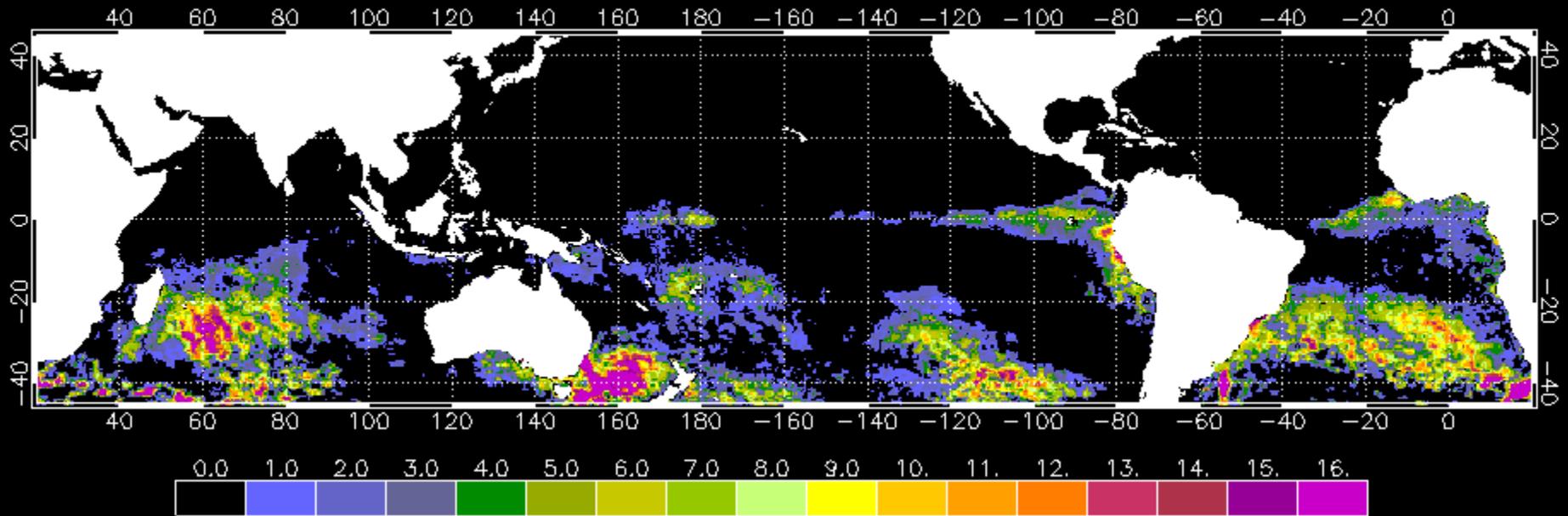
Degree Heating Weeks – 25 October 2018

NOAA/NESDIS Degree Heating Weeks for last 12 Weeks – 10/25/2018



Degree Heating Weeks – 7 May 2018

NOAA/NESDIS Degree Heating Weeks for last 12 Weeks – 3/18/2019

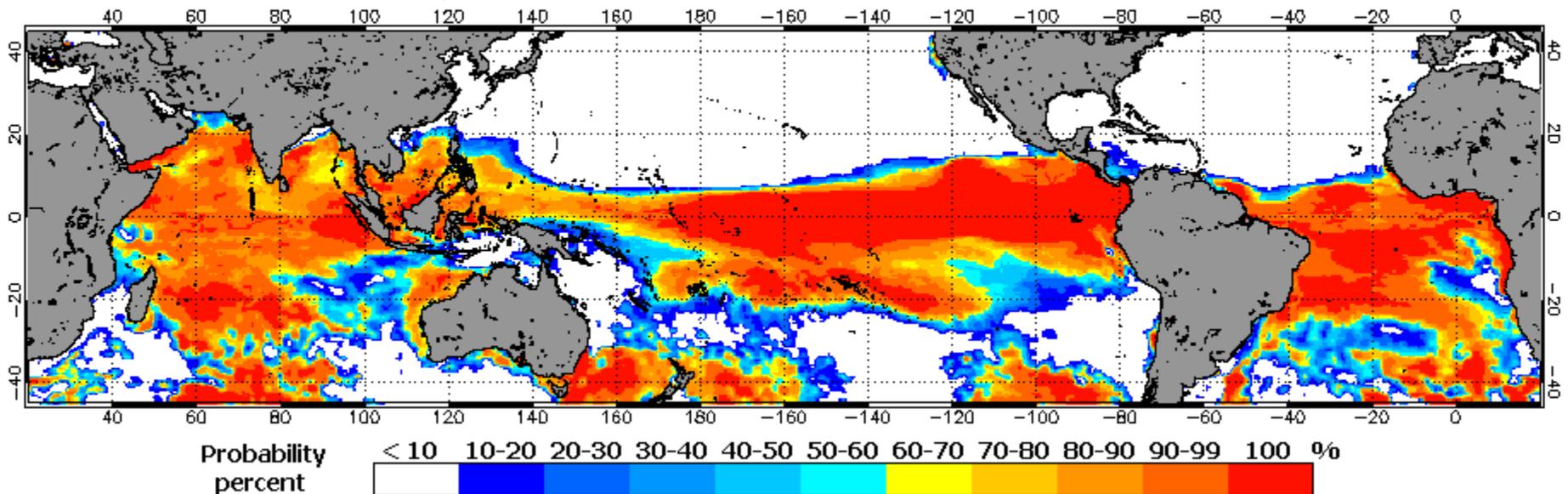


Bleaching Stress Probability – March-June 2019

Prediction as of 12 March 2019

2019 Mar 12 NOAA Coral Reef Watch Bleaching Heat Stress Probabilities (Warning & Higher) for Mar–Jun 2019

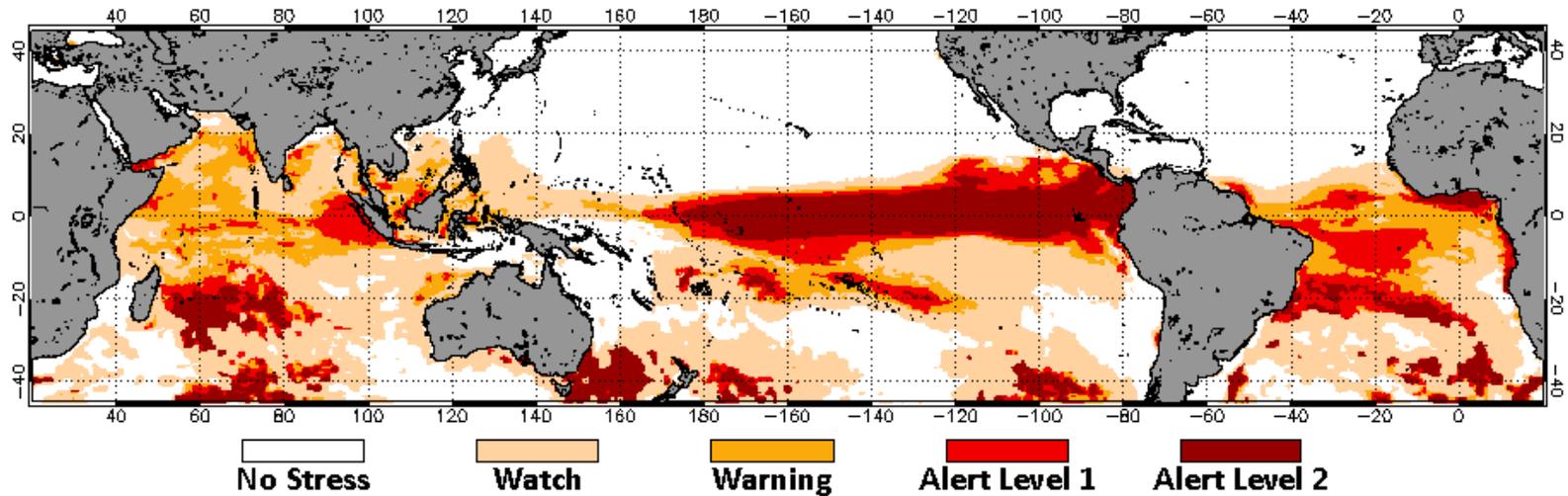
Experimental, v5.0, CFSv2-based, 28 to 112 Ensemble Members



Experimental product indicates near zero probability of significant thermal stress for Monument reefs from now through June 2019

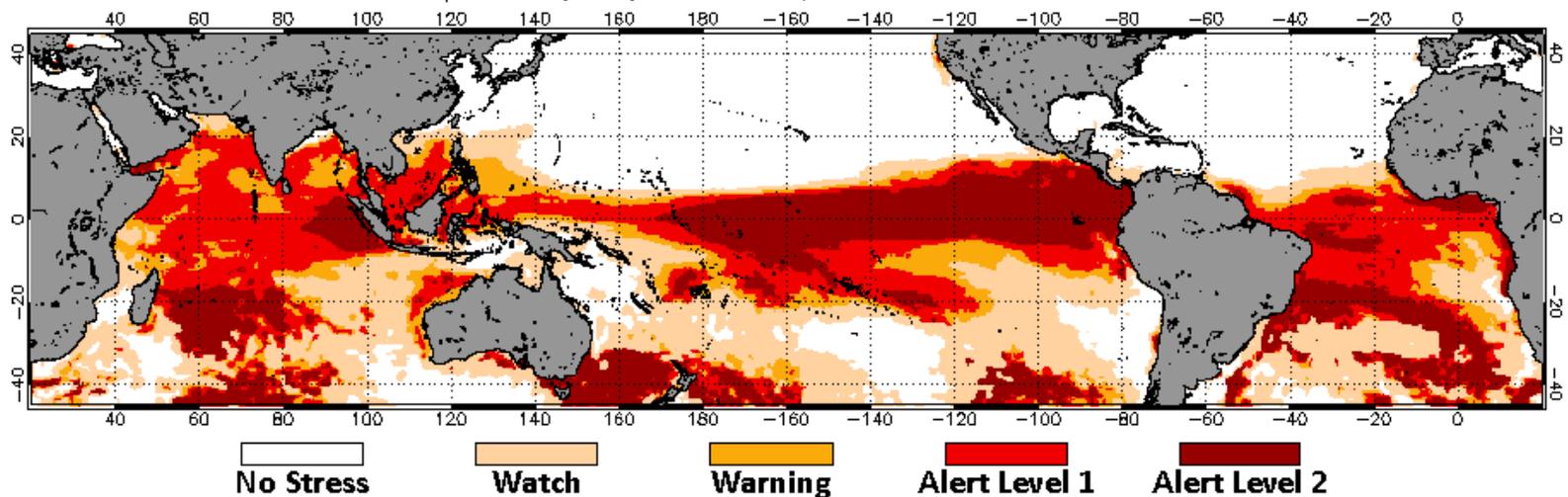
90% Stress Level Probability – March-June 2019

2019 Mar 12 NOAA Coral Reef Watch 90% Probability Coral Bleaching Heat Stress for Mar–Jun 2019
Experimental, v5.0, CFSv2-based, 28 to 112 Ensemble Members



60% Stress Level Probability – March-June 2019

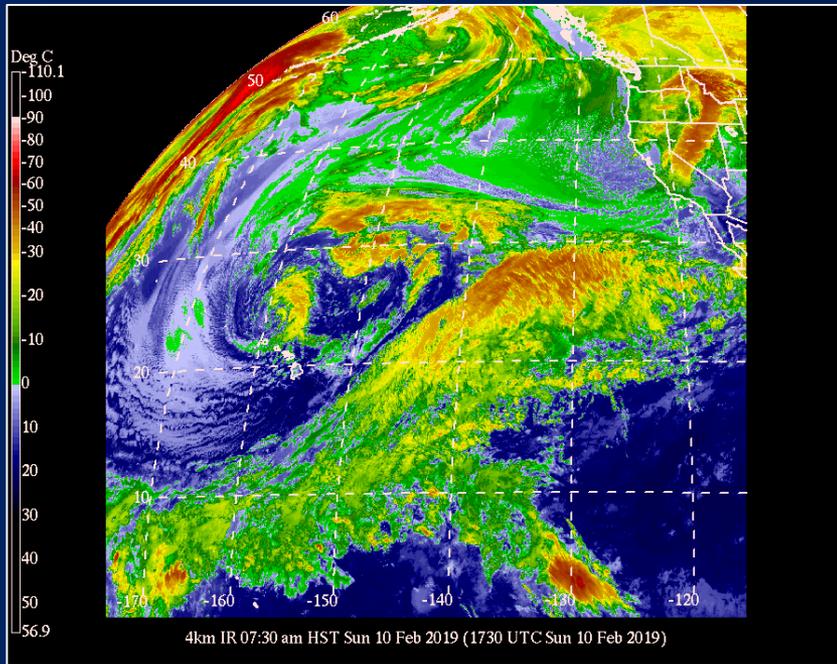
2019 Mar 12 NOAA Coral Reef Watch 60% Probability Coral Bleaching Heat Stress for Mar–Jun 2019
Experimental, v5.0, CFSv2-based, 28 to 112 Ensemble Members



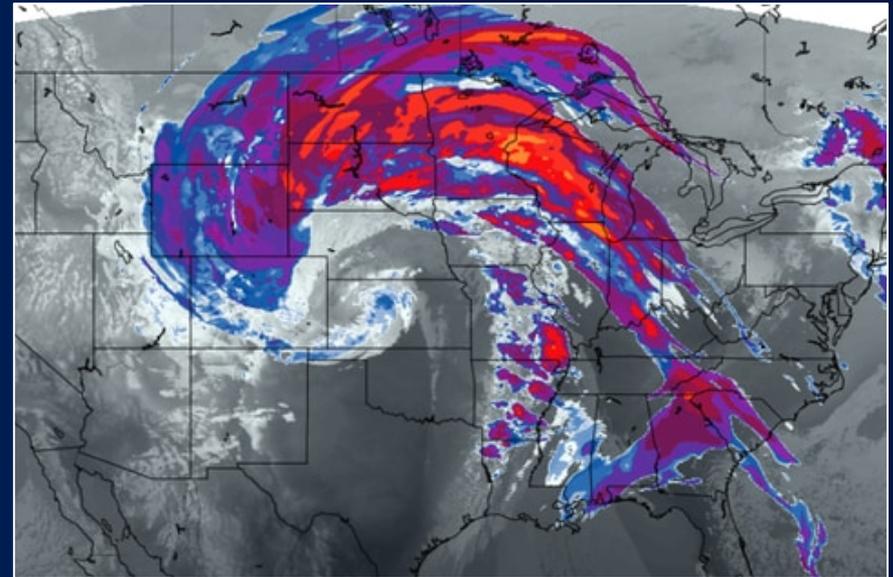
Digression #2 – A warmer atmosphere produces stronger storms

This has been the winter of potent extra-tropical lows

Like hurricanes, but composed of cold air

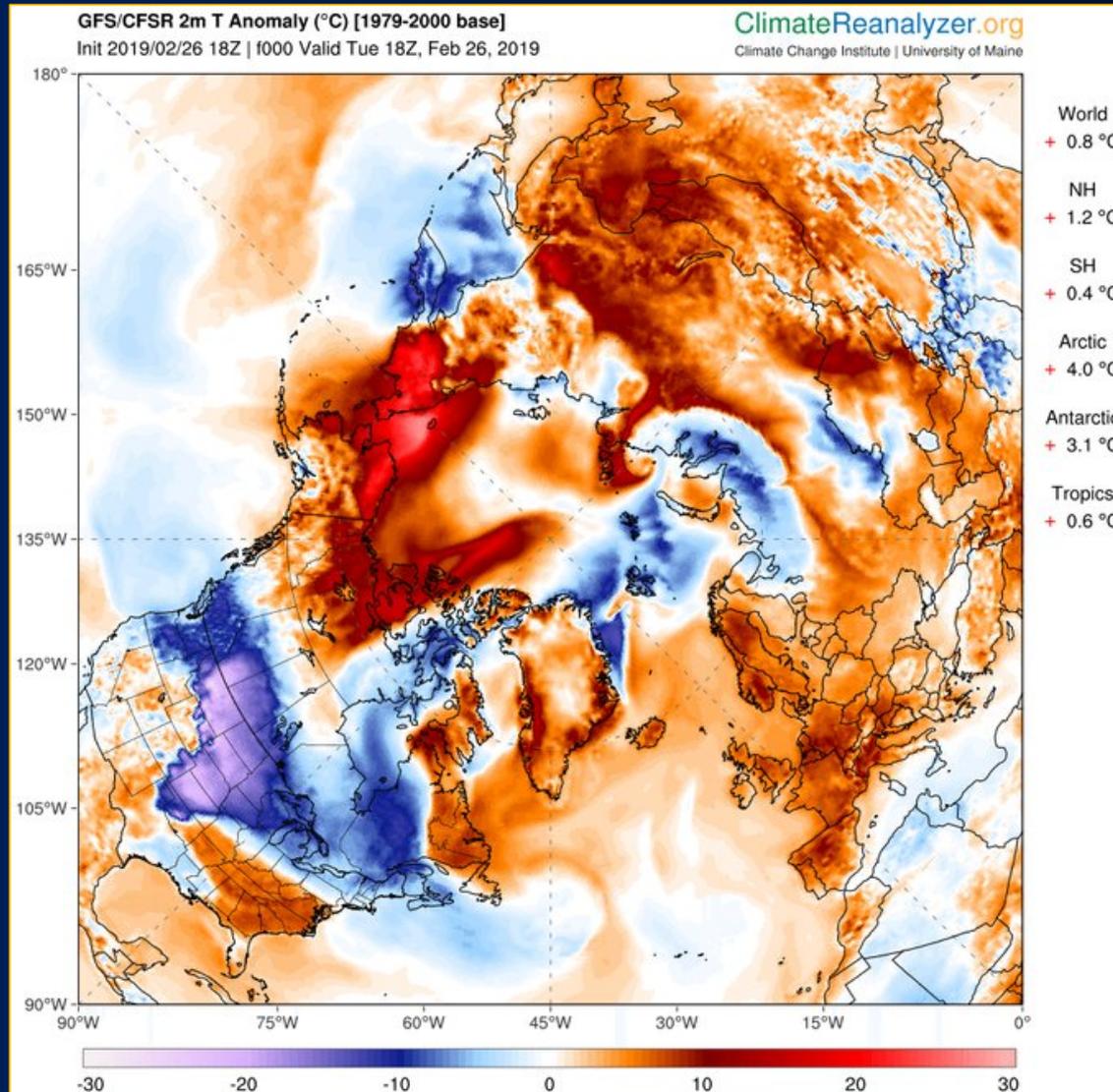


10 Feb. 2019 – Low pressure system from the NW brings record high offshore waves to Kauai and Oahu. Hanalei buoy recorded maximum wave height of 63 feet peak-to-trough, Waimea buoy recorded 48 feet.



12 Mar. 2019 – “Bomb cyclone” brings blizzard conditions to the High Plains. 80 mph wind gusts at Denver airport (hurricane force). Record low pressure ever for eastern Colorado and western Kansas.

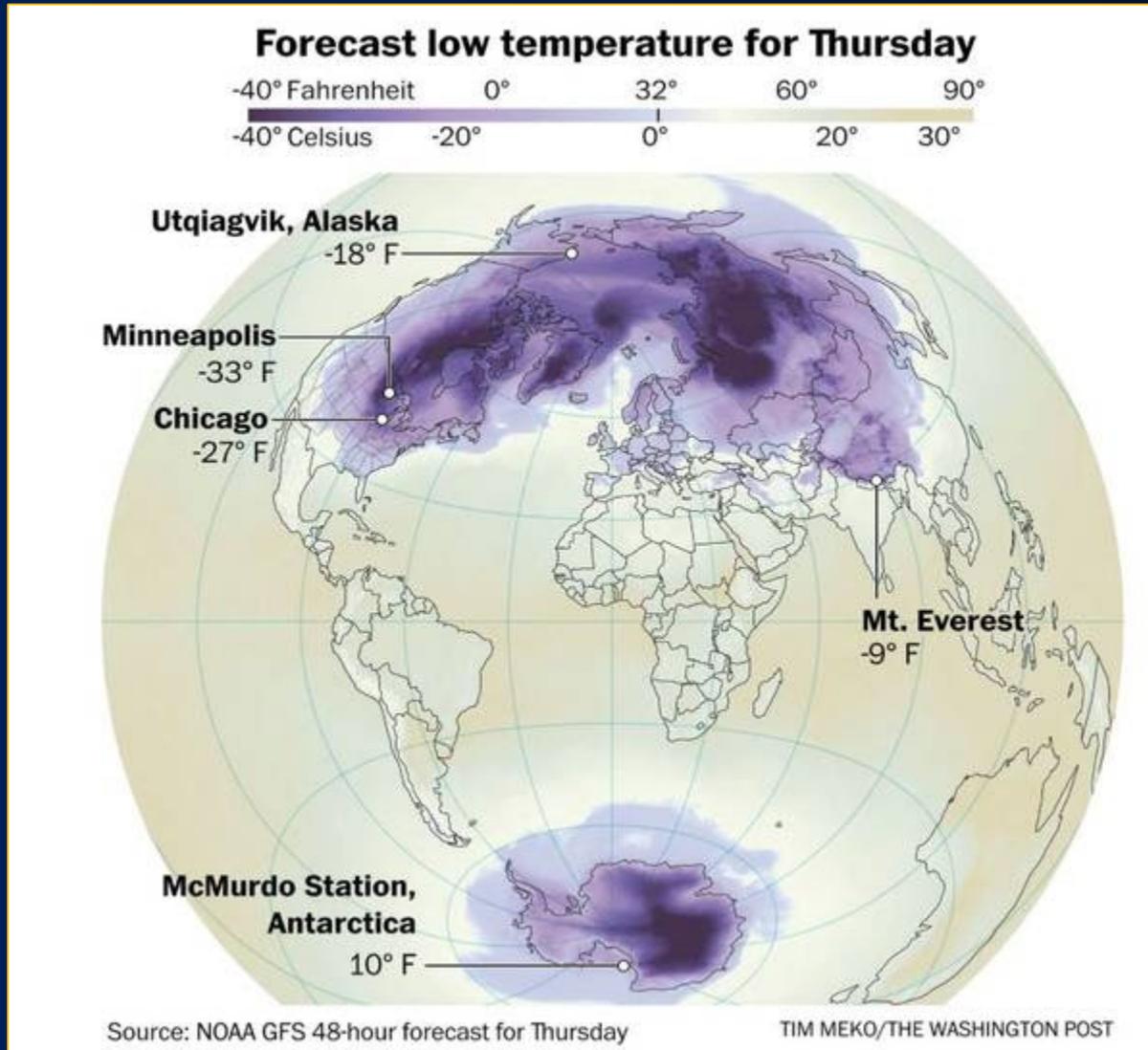
Part of the driver is the Warm Poles – Cold Continents Pattern Creates a so-called “Polar Vortex”



Anomalously warm air over the Arctic displaces very cold air southward into North America and the northern Pacific

This can create some odd thermal disparities

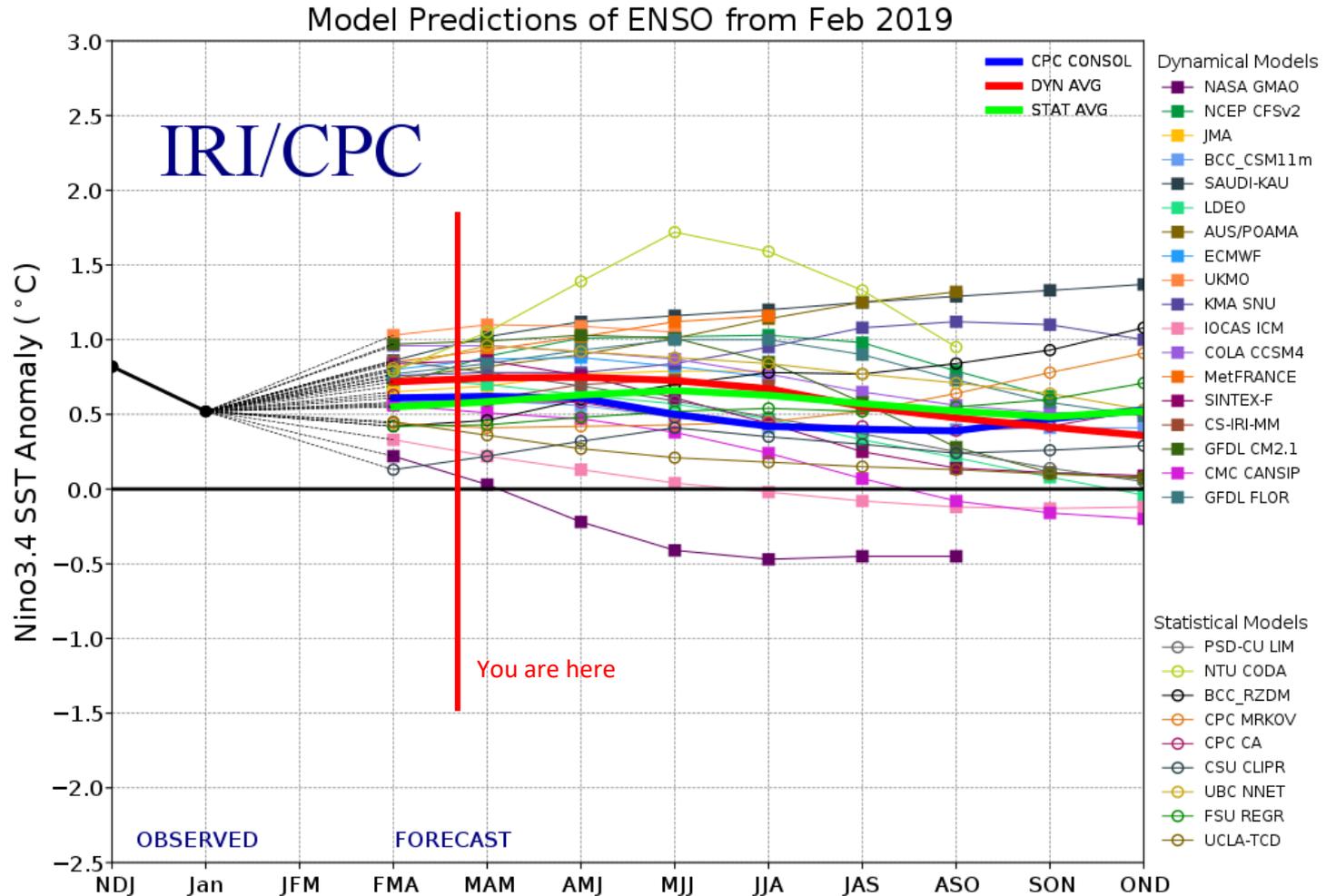
31 January 2019 – North America was the coldest place on Earth



Chicago and Minneapolis were 30 degrees colder than the South Pole

Looking Forward

An ensemble of 27 climate models predicts mild El Niño conditions through early summer of 2019



Conclusions

2019 is starting out warmer than last year, continuing a trend of record hot years

But ocean surrounding Hawaii is not carrying significant extra heat at this time

Mild El Niño conditions are present, and predicted to persist into early summer

Even so, Hawaii has not experienced winter drought typical of such a pattern

There is a near zero chance of significant thermal stress to Monument coral reefs from now through June 2019

Ocean heating is instead occurring to the south of us, in the Central Pacific

Unusual winter cyclogenesis occurred in the Marianas sector, in late February

El Niño conditions also often correlate with higher rates of cyclogenesis in the Eastern Pacific as well...stay tuned

Sea level continues to rise at 3-5 mm per year

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

And although it is not climate, it was pretty cool



INSITE IMAGE

Lunar eclipse over Hawaii, 20 January 2019

Questions?

