Climate Indicators Summary July 2018

PMNM Climate Change Working Group

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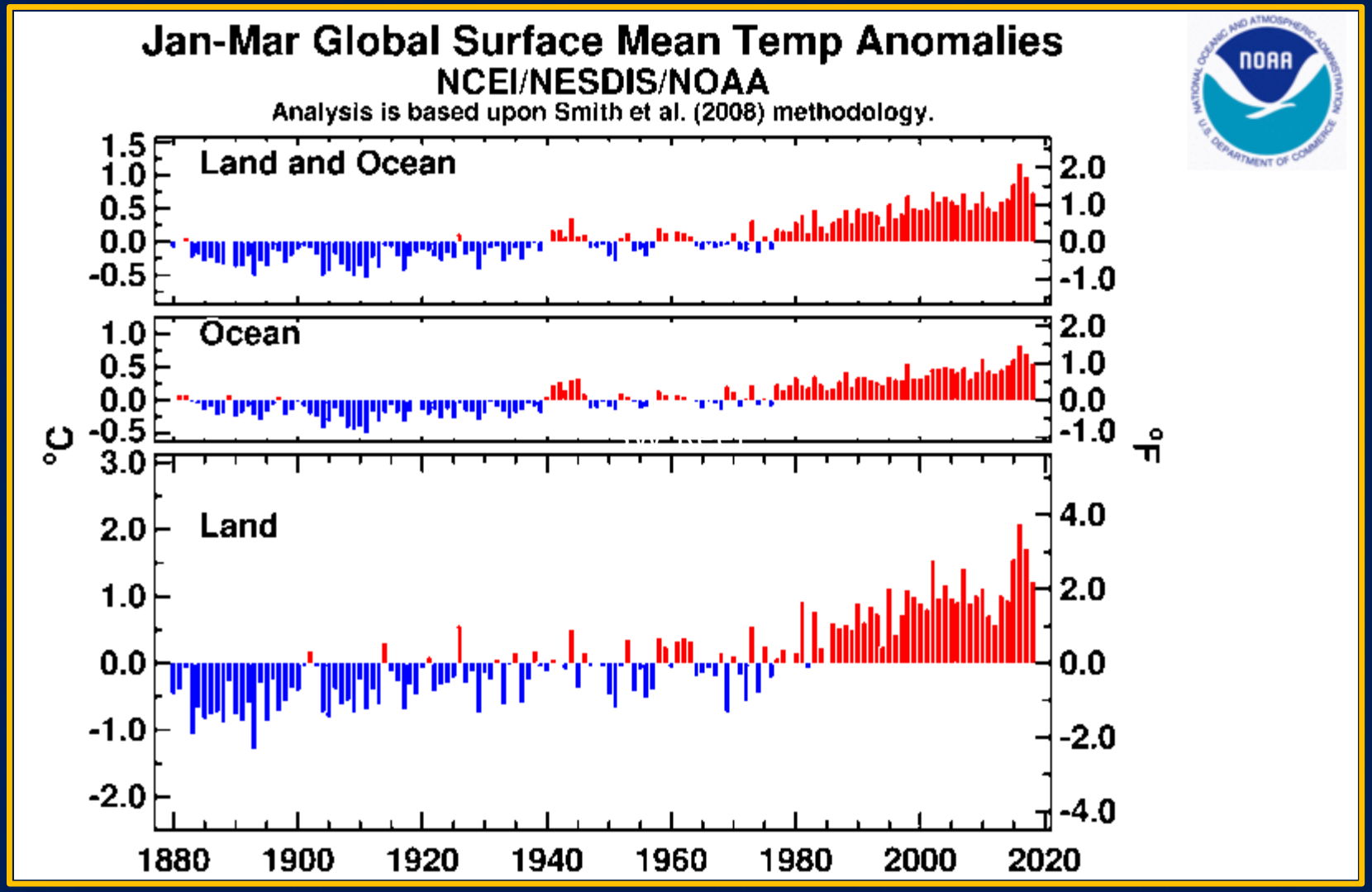
Early 2018 shows a slight abatement from record heating trends

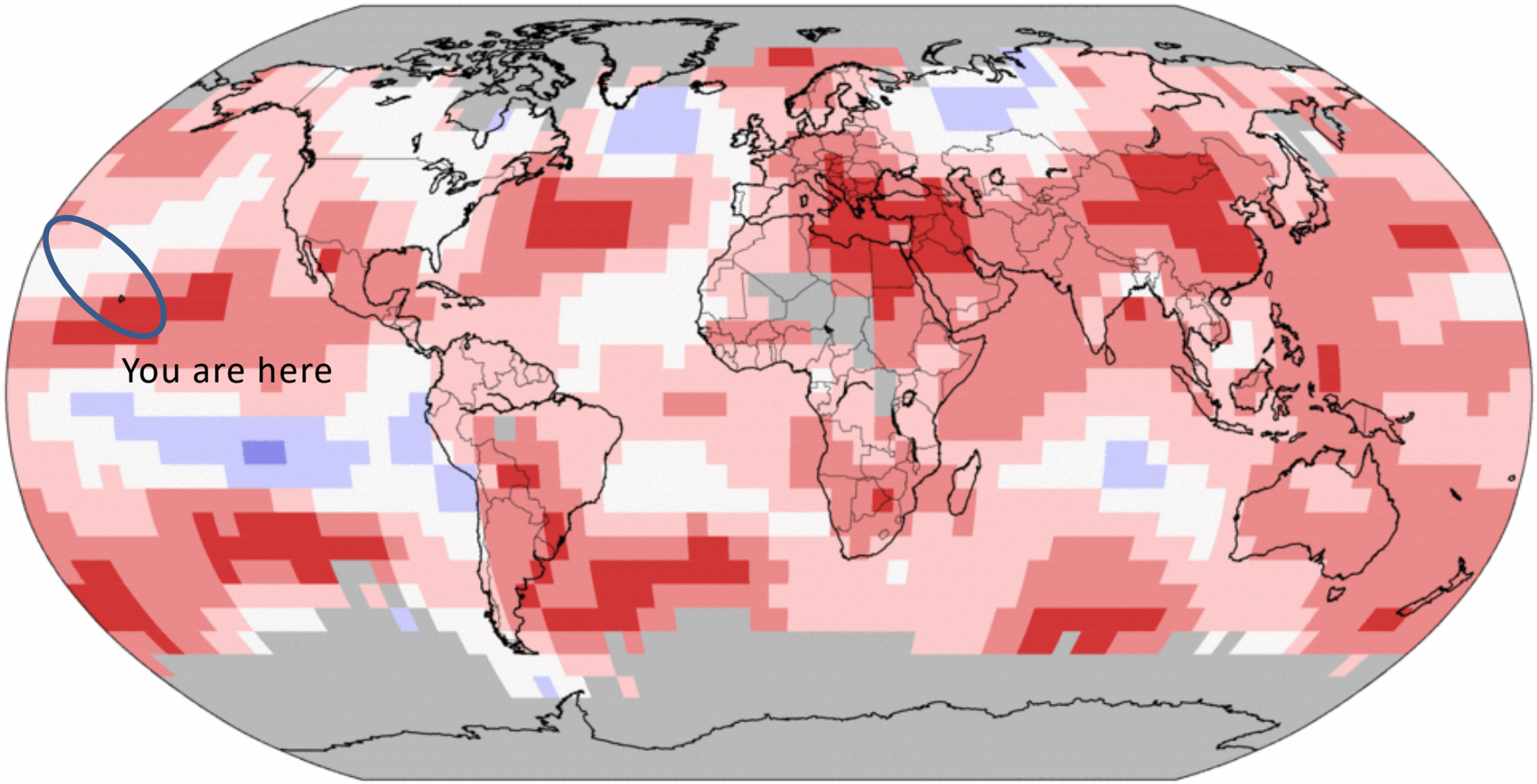


But there is still a long Northern Hemisphere summer to come

Land & Ocean Temperature Percentiles Mar 2018–May 2018

NOAA's National Centers for Environmental Information

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



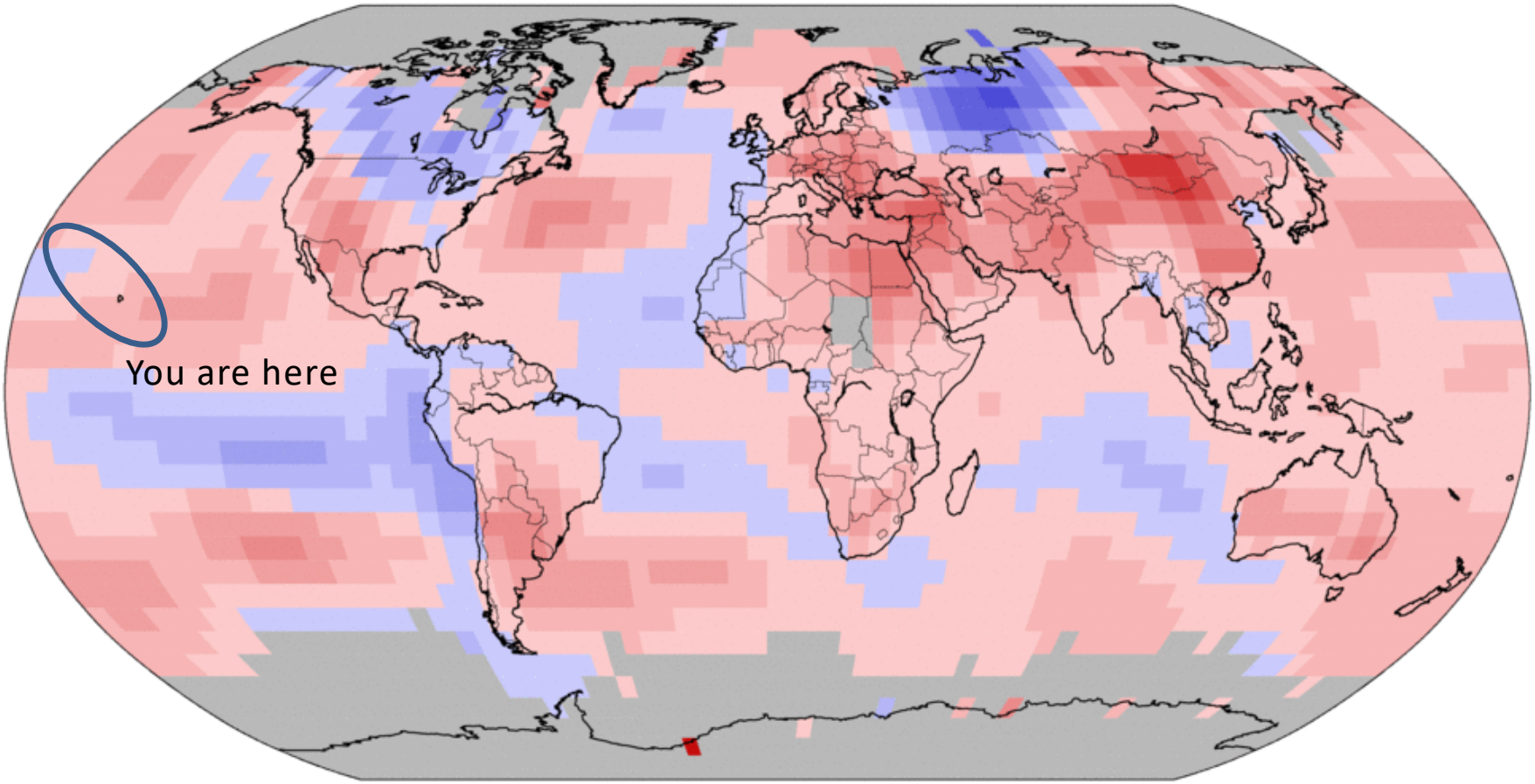
Record Coldest | Much Cooler than Average | Cooler than Average | Near Average | Warmer than Average | Much Warmer than Average | Record Warmest

Wed Jun 13 04:30:15 EDT 2018

Land & Ocean Temperature Departure from Average Mar 2018–May 2018

(with respect to a 1981–2010 base period)

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



−5 −4 −3 −2 −1 0 1 2 3 4 5

Degrees Celsius

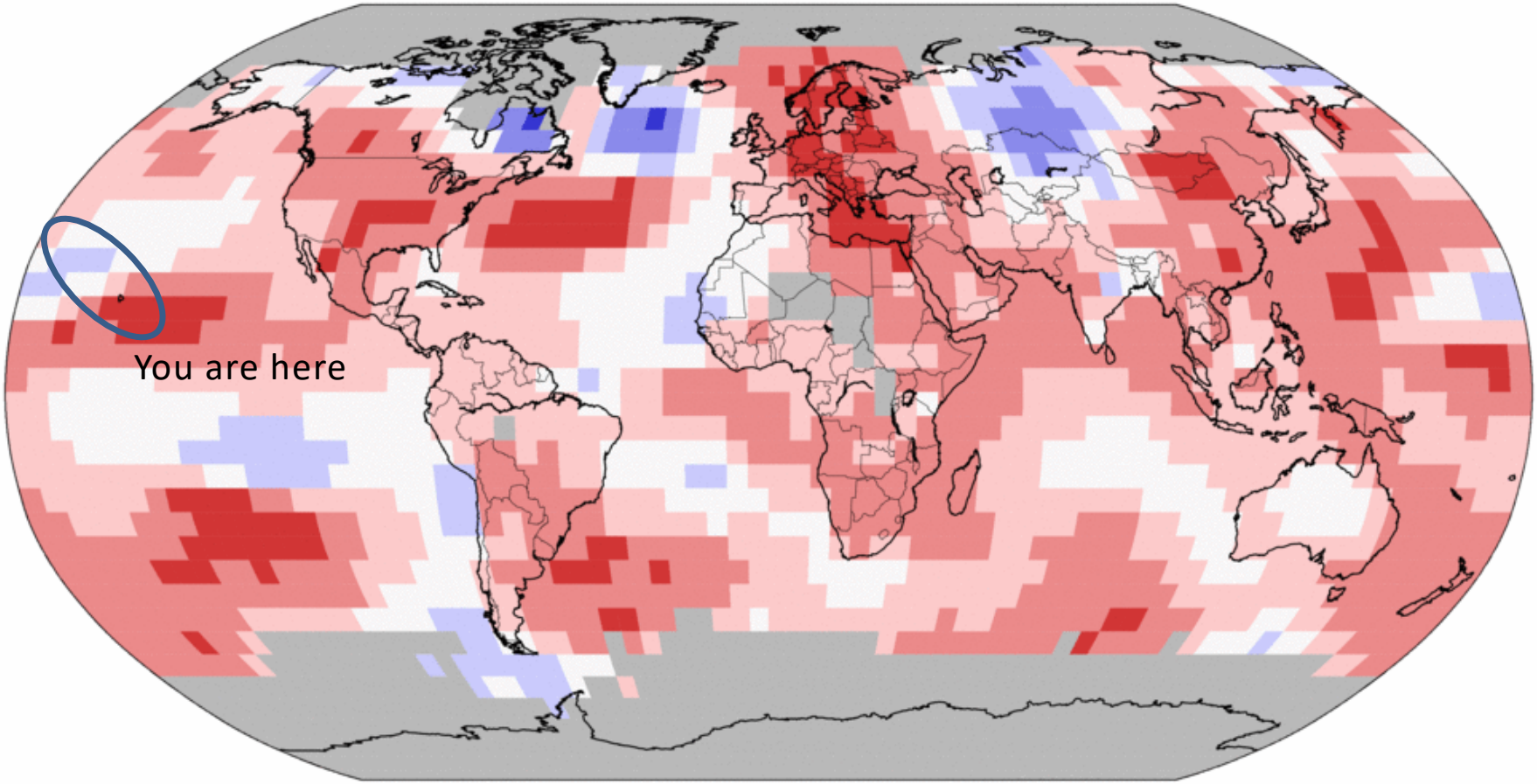
National Centers for Environmental Information
Wed Jun 13 04:29:56 EDT 2018

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

Land & Ocean Temperature Percentiles May 2018

NOAA's National Centers for Environmental Information

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

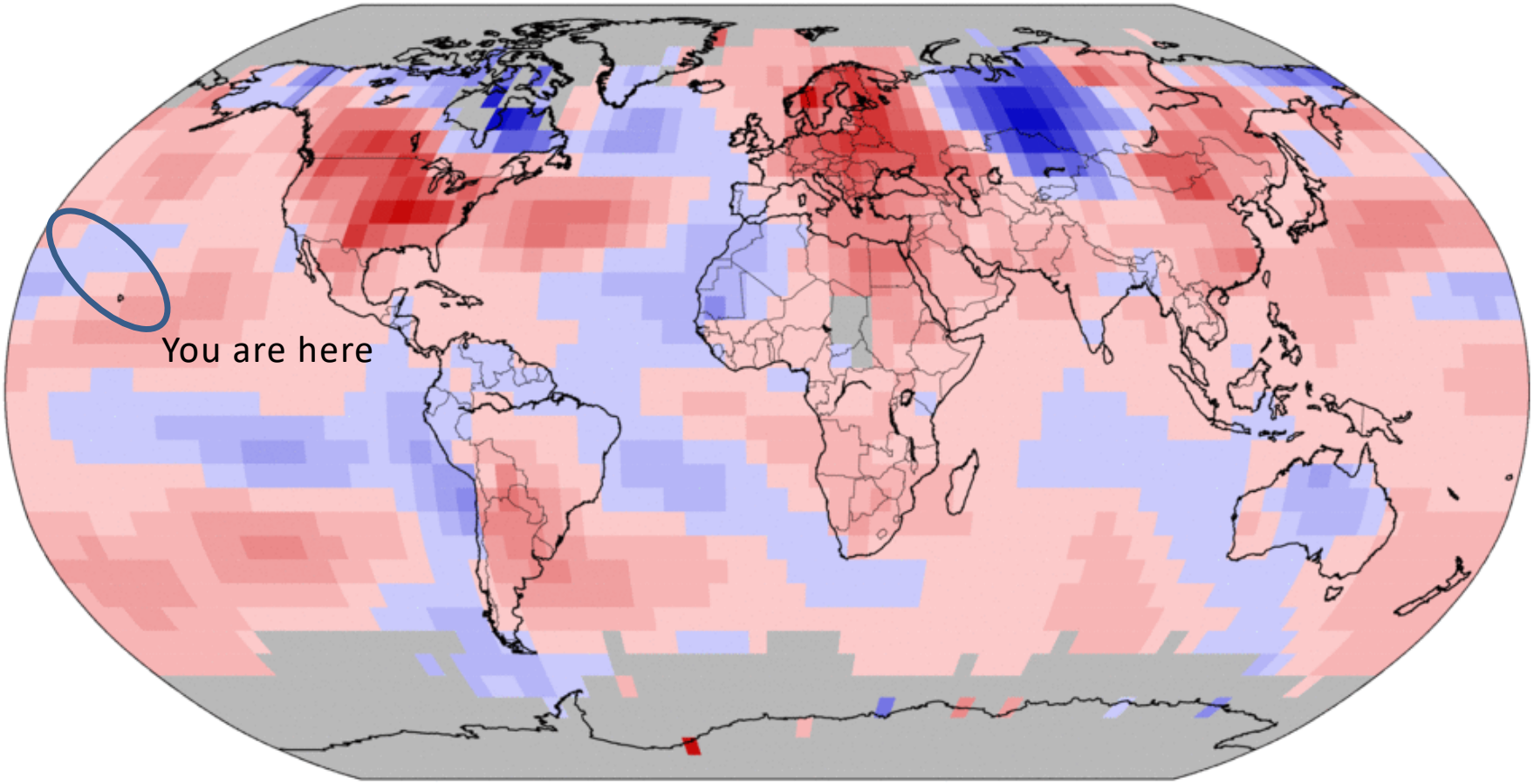


Wed Jun 13 04:30:15 EDT 2018

Land & Ocean Temperature Departure from Average May 2018

(with respect to a 1981–2010 base period)

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



−5 −4 −3 −2 −1 0 1 2 3 4 5

Degrees Celsius

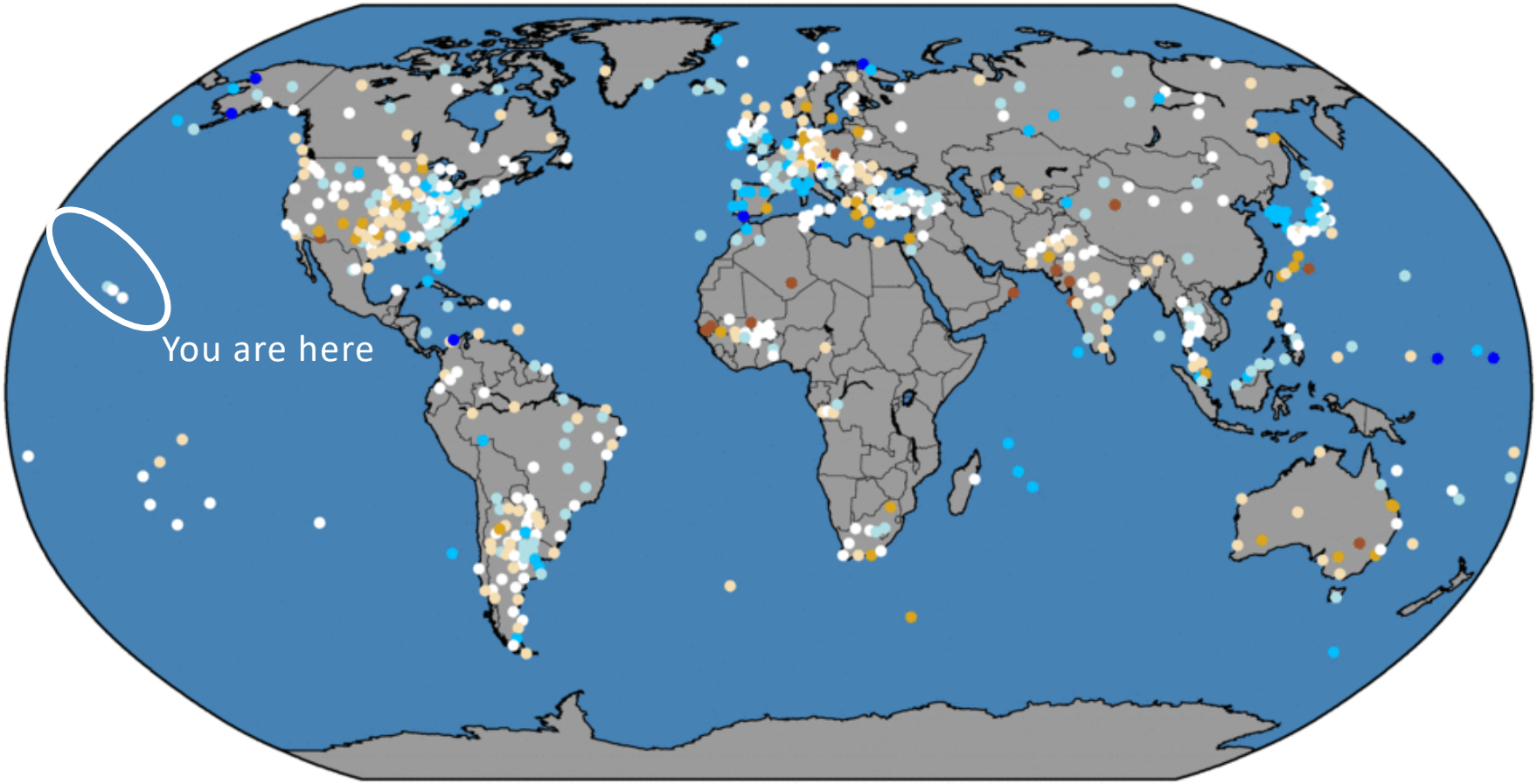
National Centers for Environmental Information
Wed Jun 13 04:29:56 EDT 2018

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

Land–Only Precipitation Percentiles Mar 2018–May 2018

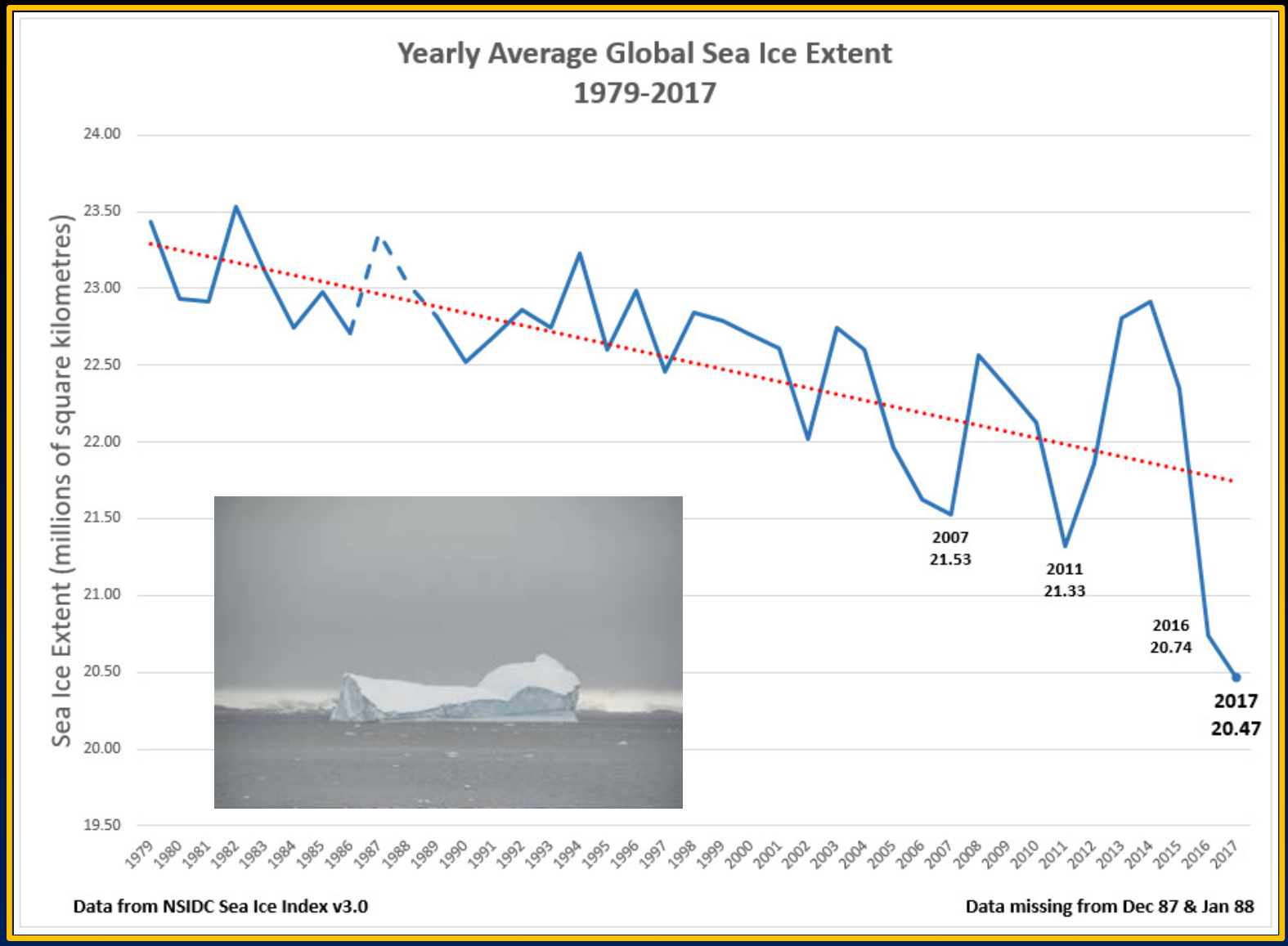
NOAA's National Centers for Environmental Information

Data Source: GHCN–M version 2



Thu Jun 14 03:52:13 EDT 2018

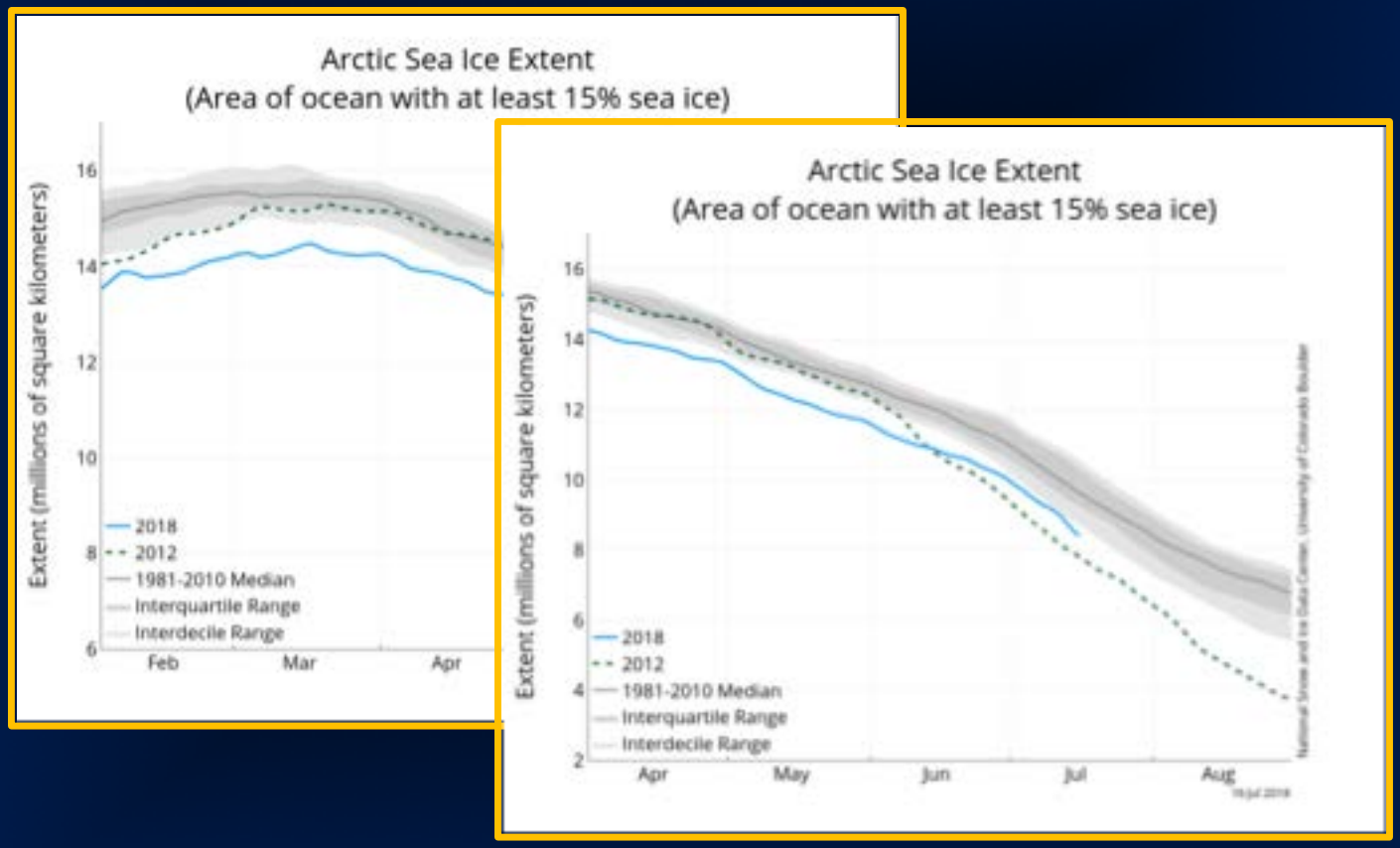
Digression #1 – The World Continues to Lose Ice



Combined ice extents in the Arctic and Antarctic were at a record low in 2017

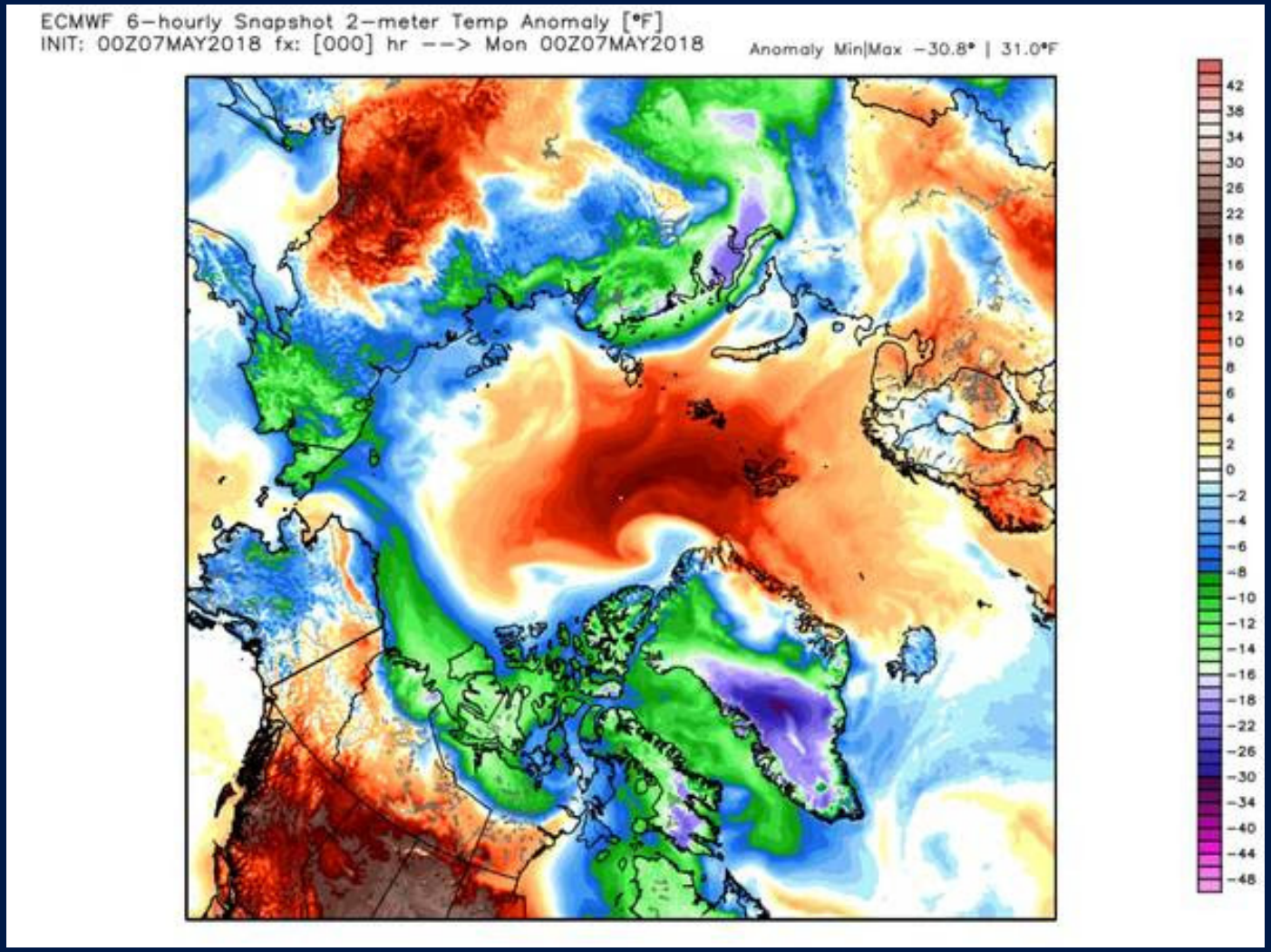
For 2018, the Arctic maximum sea ice extent was the second-lowest in the satellite record

3 standard deviations below long-term mean



2017 remains the record low winter maximum extent, and we did not recoup the deficit

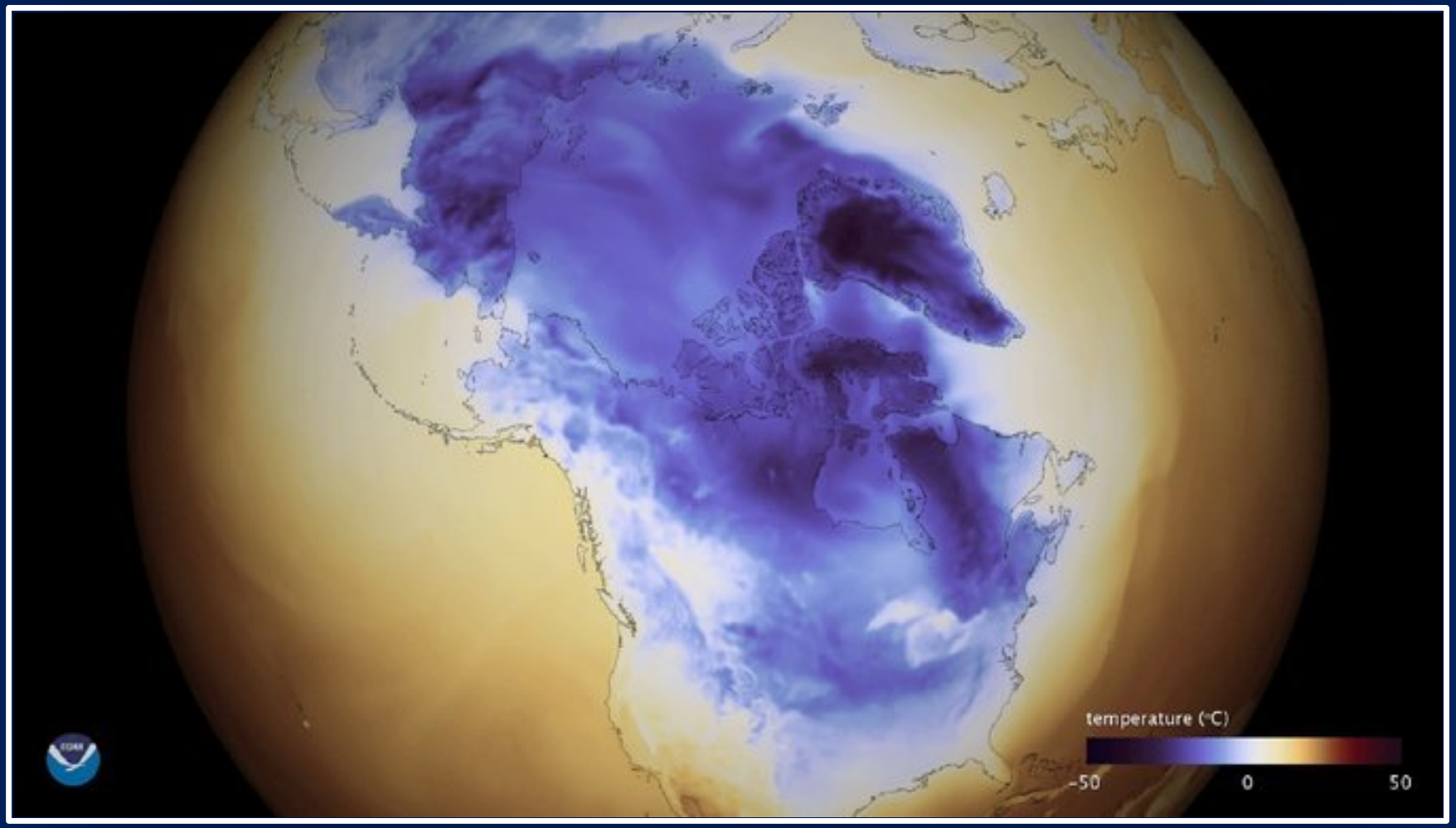
Warm Arctic vs. Cold Continents



This trend repeated all winter

The Year of the Polar Vortex

When the Arctic warms up, all the displaced cold air has to go somewhere



Polar vortex cold outbreak in North America – January 2017

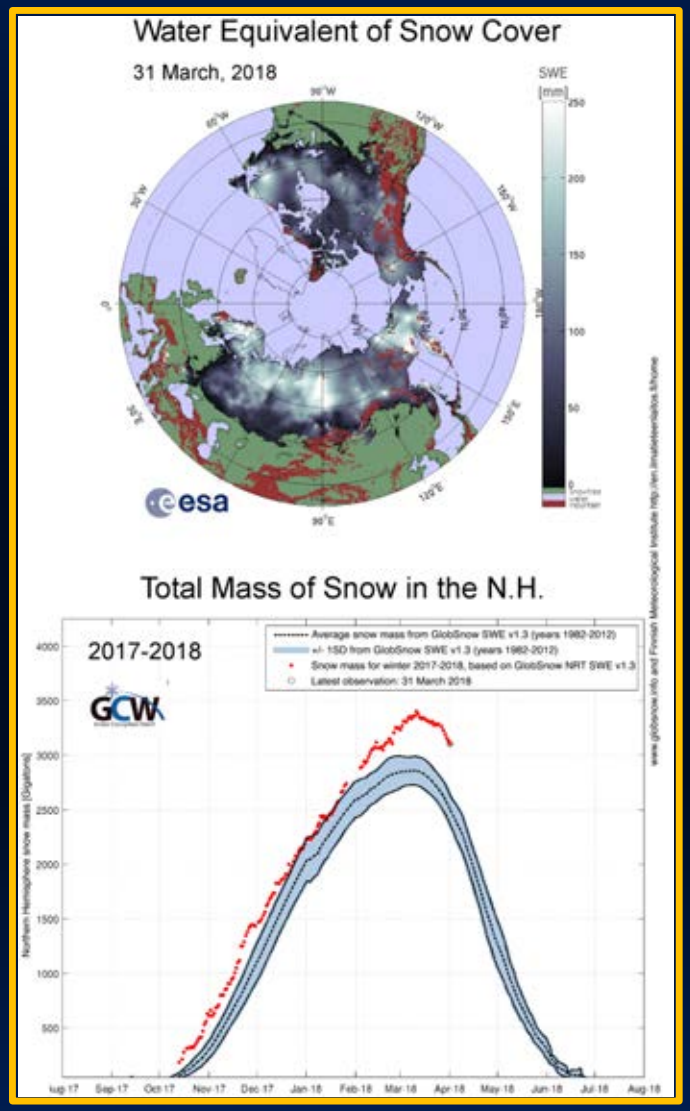
Strong thermal disparities breed strong storms

"Bomb Cyclone" hits the Northeast Coast – January 2017

Basically a cold extra-tropical hurricane

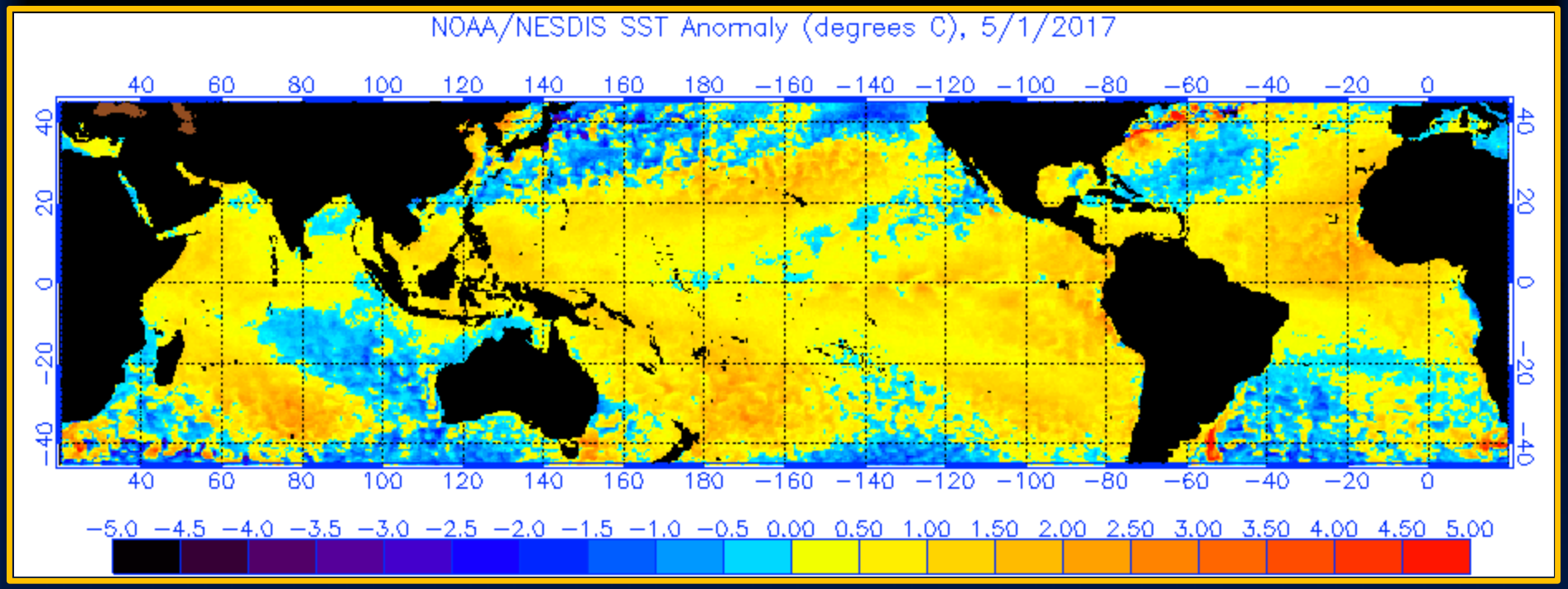
A Paradox

Northern Hemisphere winter sea ice was low, but snowfall was high

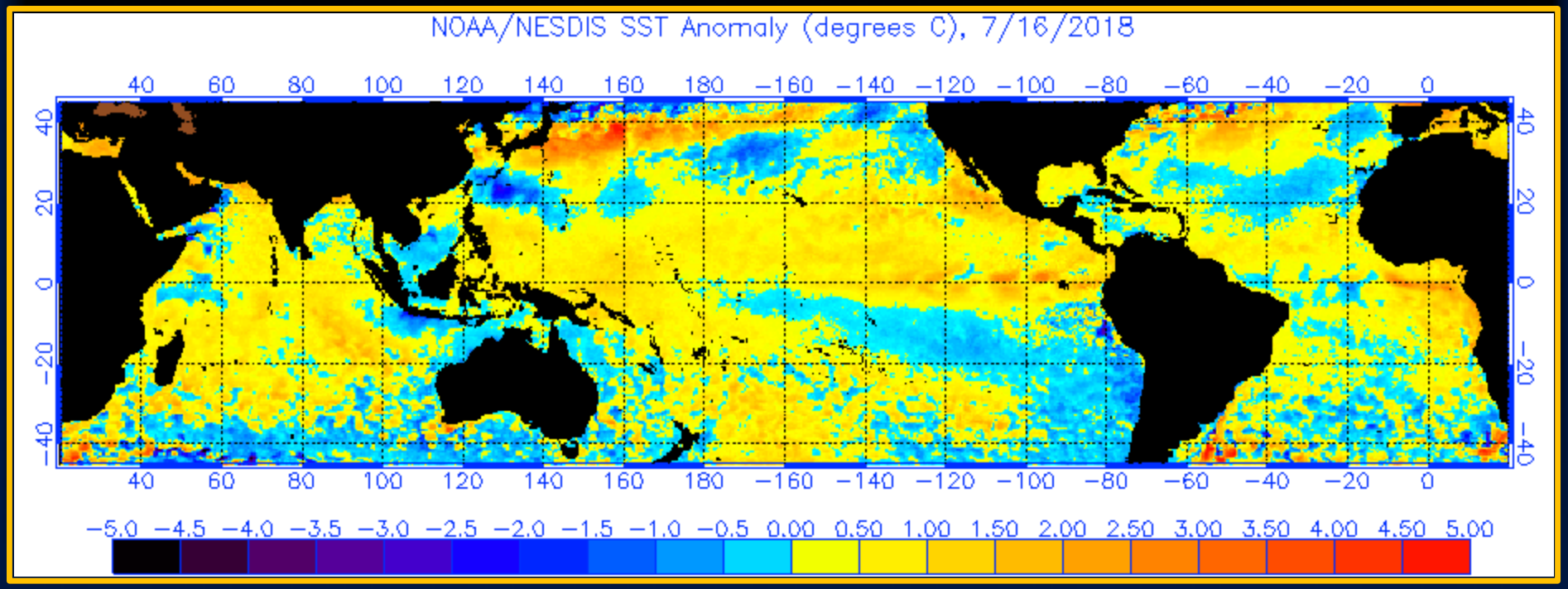


Bottom line: just because the Arctic gets warmer, it does not mean that everywhere else does

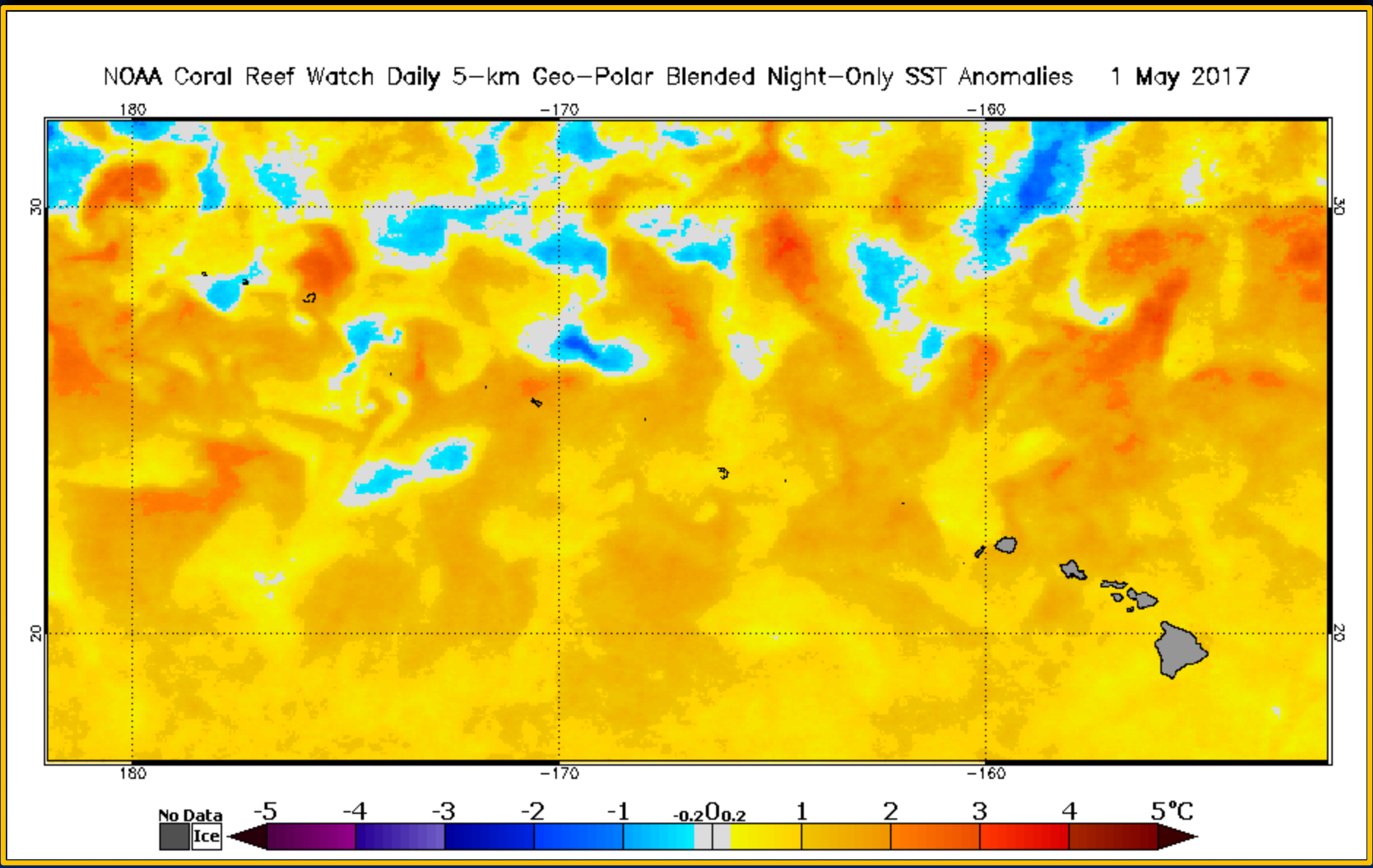
Global Sea Surface Temperature Anomaly – 1 May 2017



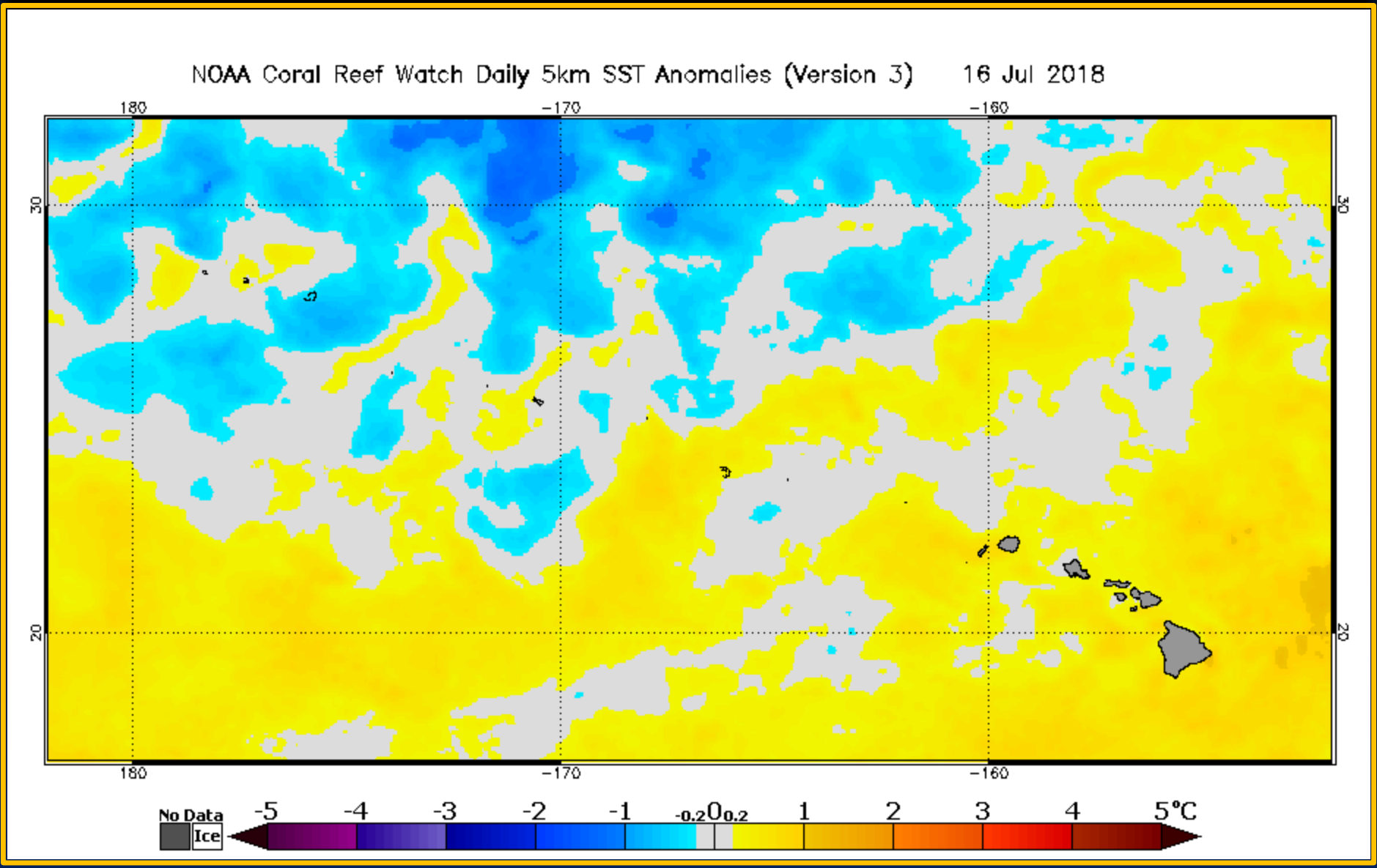
Global Sea Surface Temperature Anomaly – 16 July 2018



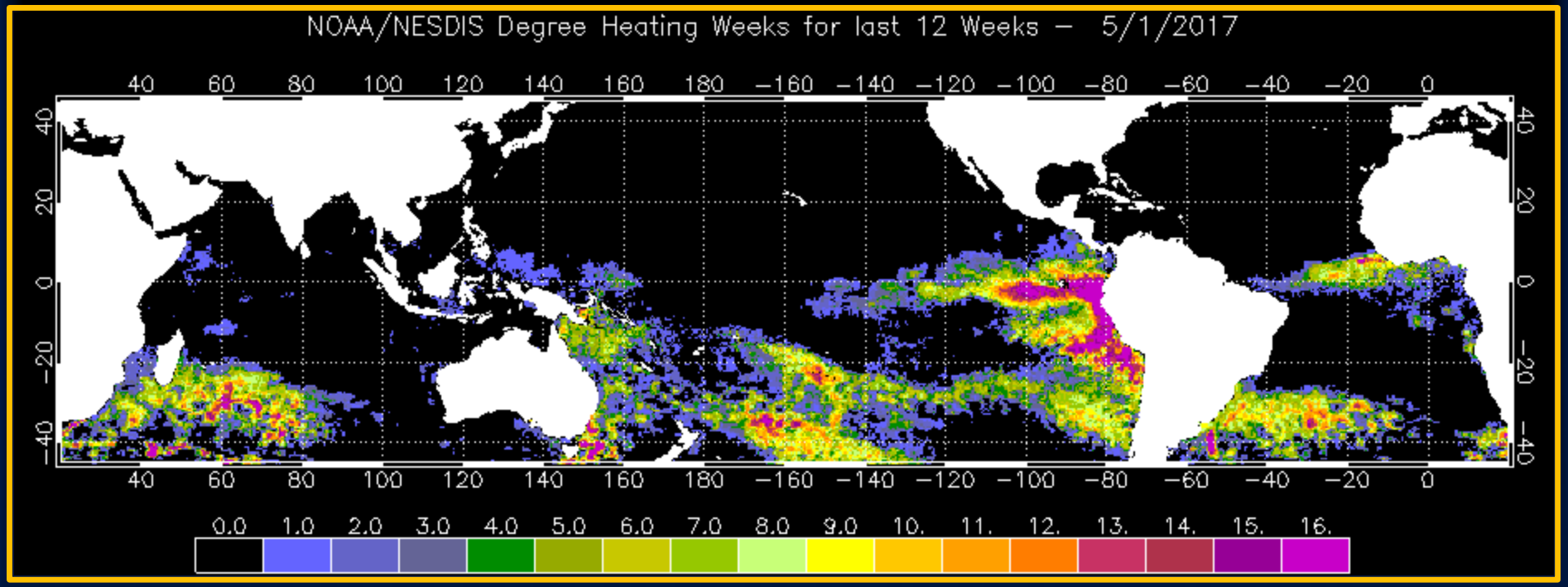
Sea Surface Temperature Anomaly, Hawaii Sector – 1 May 2017



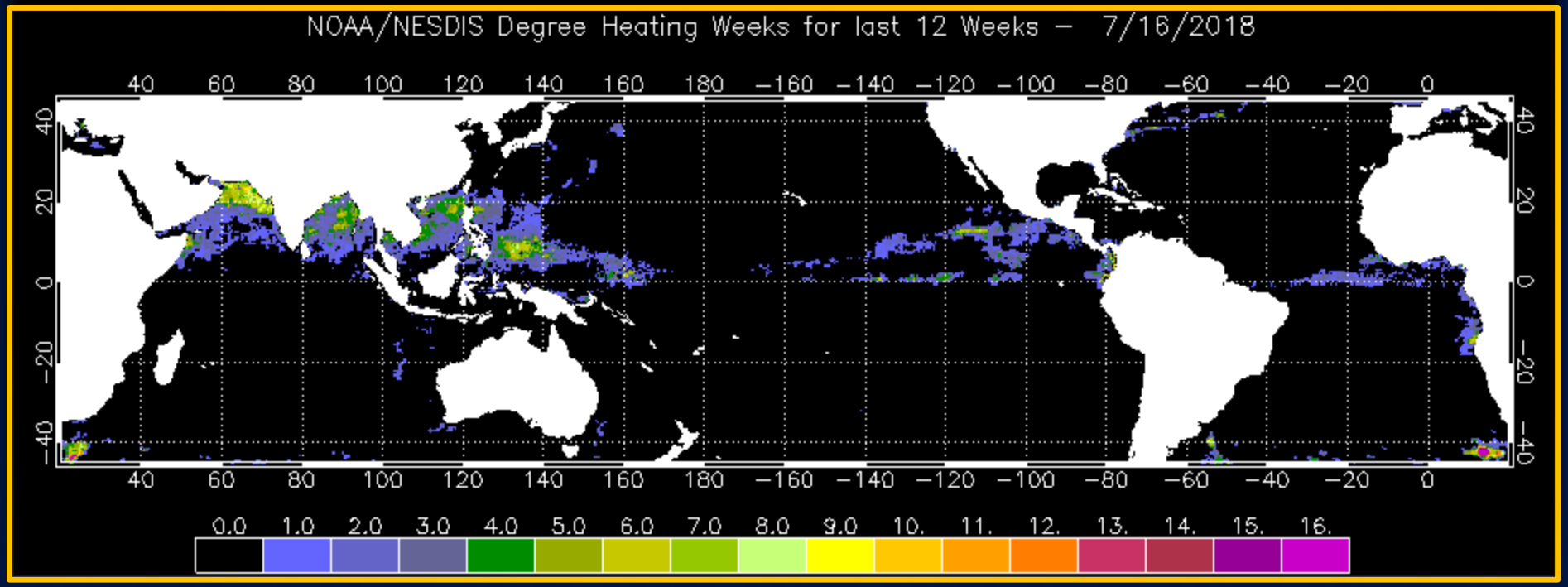
Sea Surface Temperature Anomaly, Hawaii Sector – 16 July 2018



Degree Heating Weeks – 1 May 2017

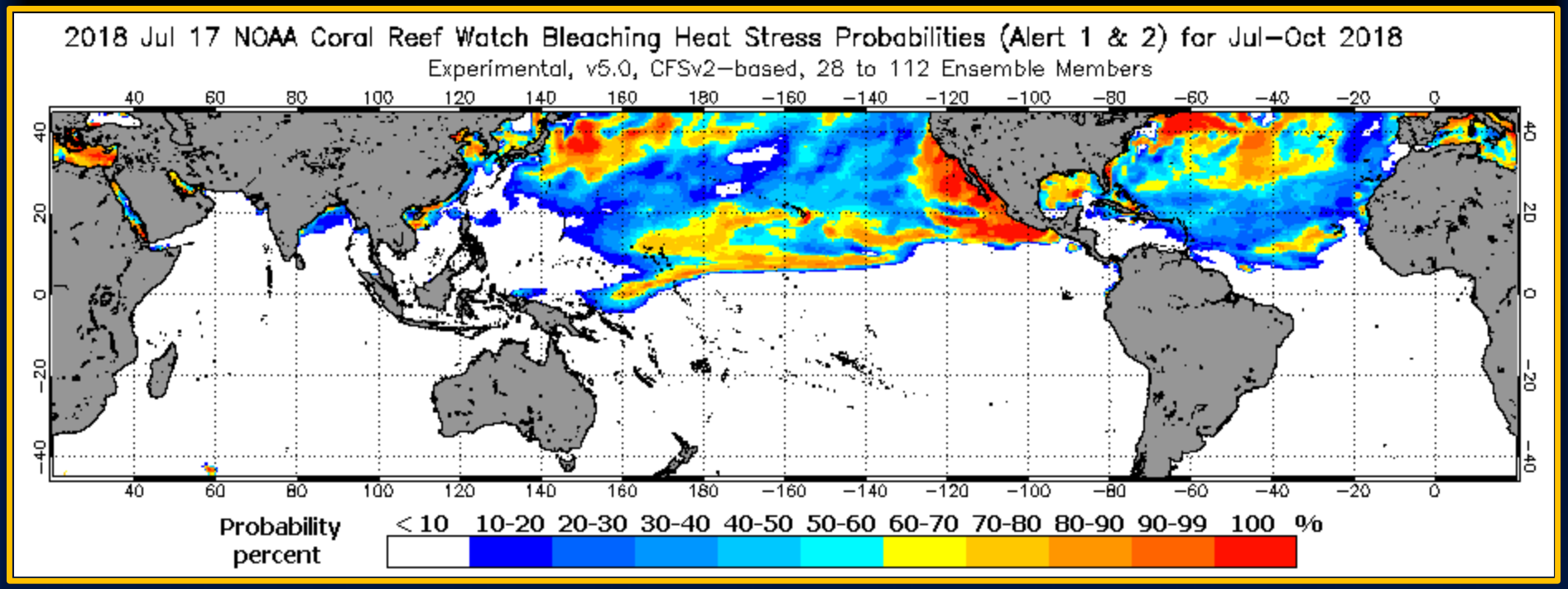


Degree Heating Weeks – 7 May 2018



Bleaching Stress Probability – July-October 2018

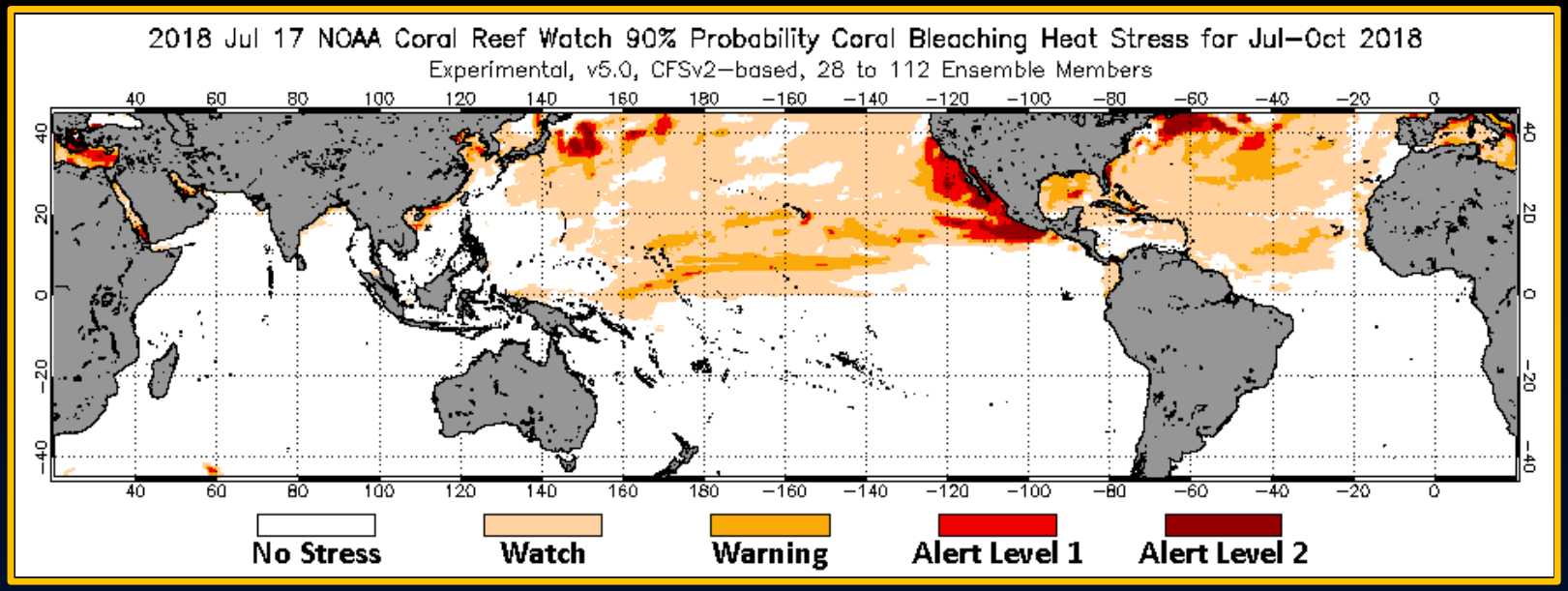
Prediction as of 17 July 2018



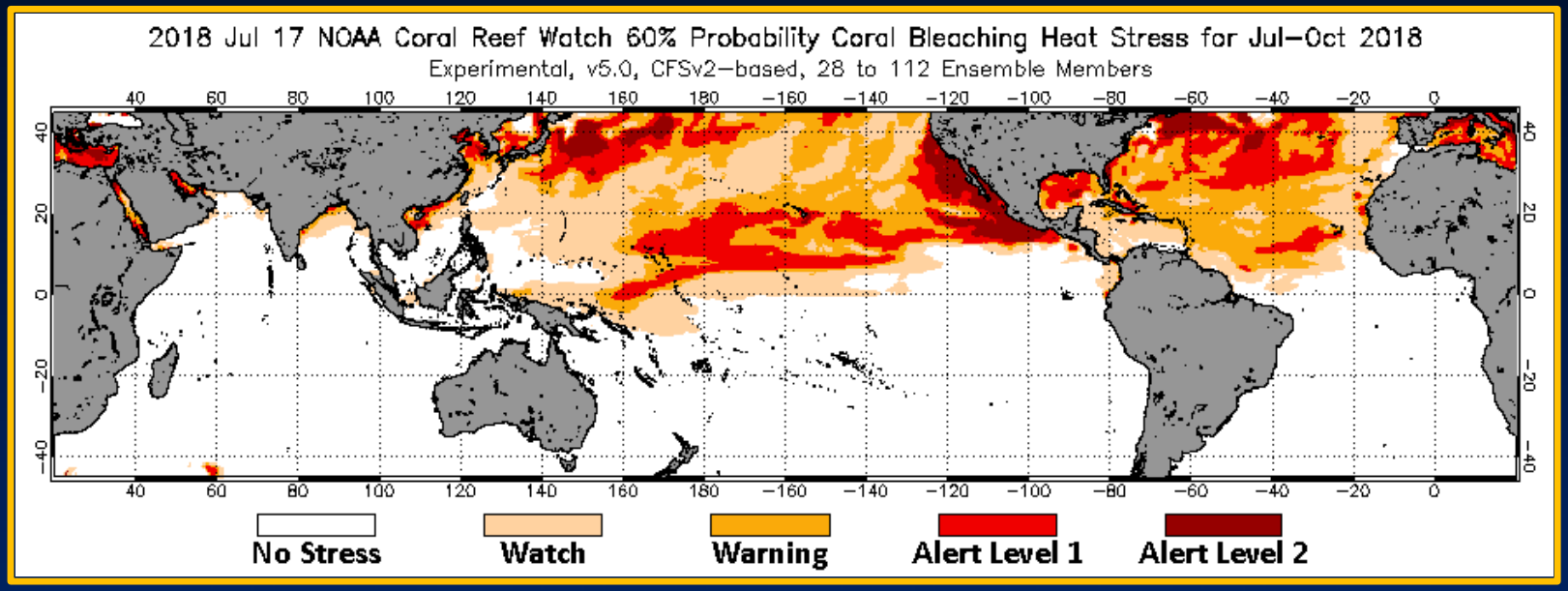
Experimental product indicates low probability of significant thermal stress for Monument reefs from now through October

(but potential bleaching on Big Island)

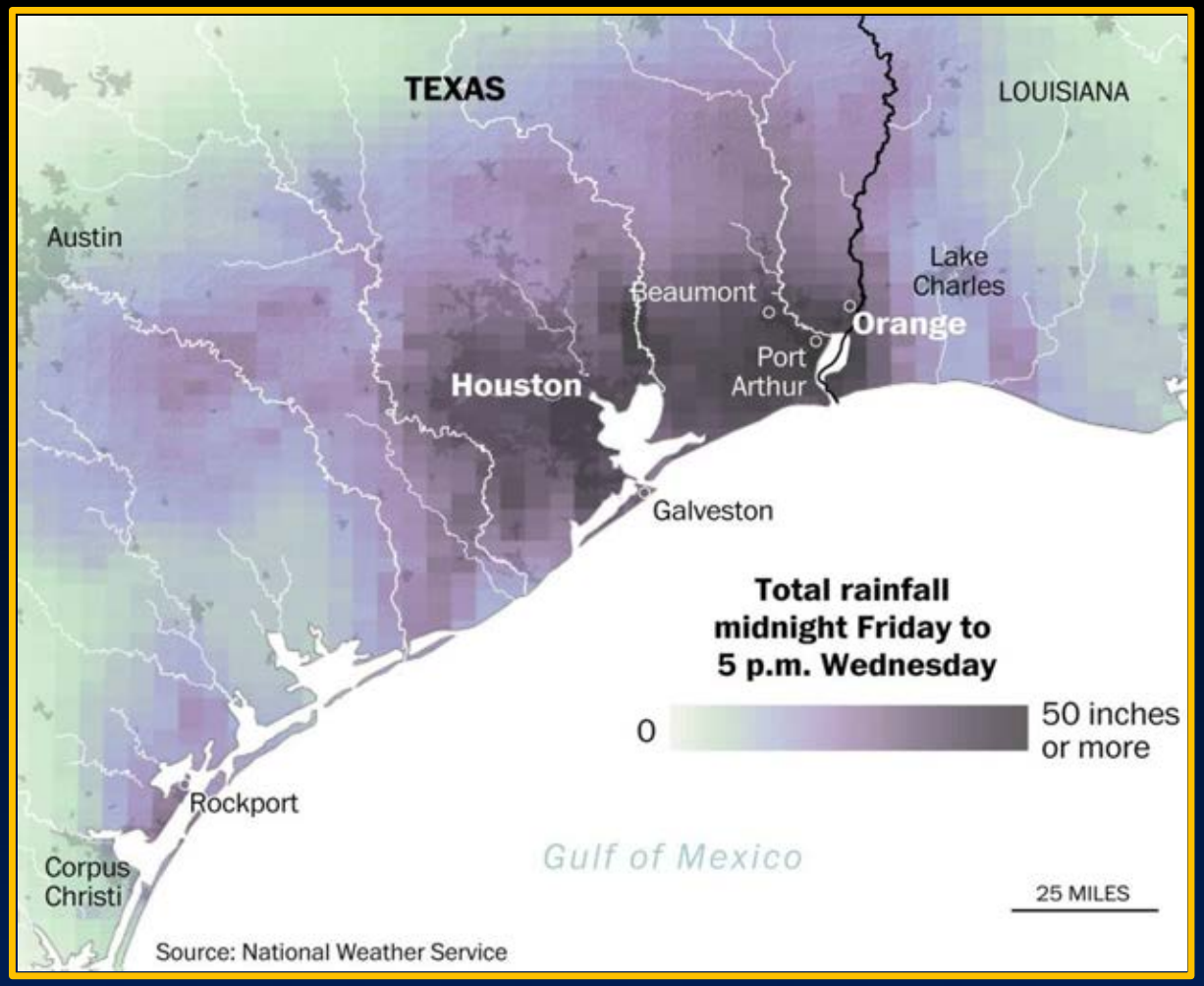
90% Stress Level Probability – July-October 2018



60% Stress Level Probability – July-October 2018



Digression #3 – A Warmer Atmosphere Holds More Water



Truly incredible rainfall totals from Hurricane Harvey in August 2017

50 inches in 6 days

Even More Impressive:
Kauai received the same extreme amount in just 24 hours

Hanalei Valley before and after April 2018 rainfall event

49.69 inches in 24 hours on 15 April 2018 at Waipa gauge

Such events may be more common in the future

A Warmer Planet Also Produces More Lava

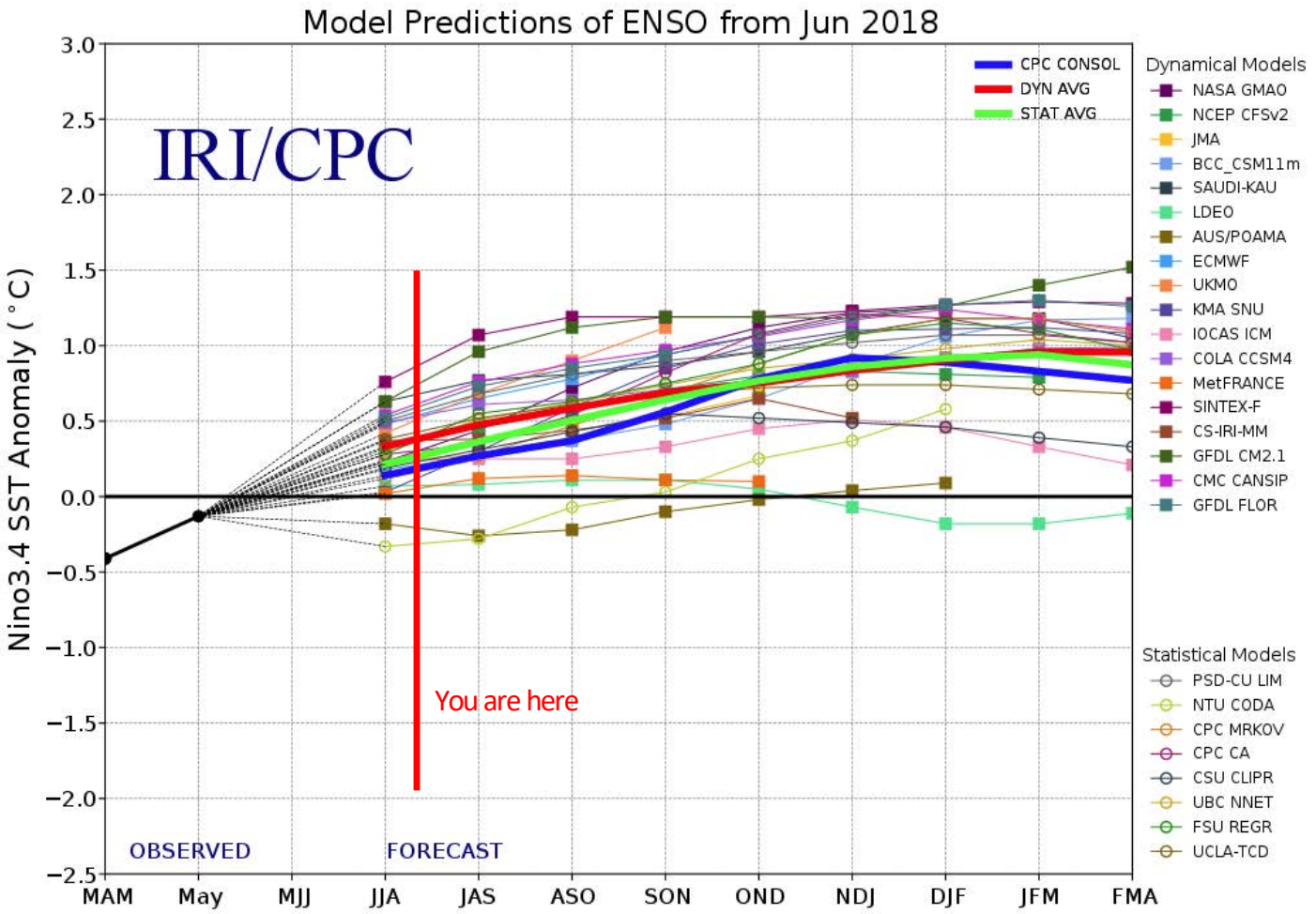
Volcanism in Puna destroys over 600 homes (and counting)

JUST KIDDING

Not everything that happens is attributable to climate change
(but wanted to see if you were still awake)

Looking Forward

An ensemble of 25 climate models predicts ENSO neutral conditions through summer 2018, with chance for El Niño in the coming winter



Conclusions

2018 has shown some abatement from the recent trend of record hot years

The ocean in and near the Monument is not carrying the same amount of heat

La Niña conditions currently prevail, but may change to ENSO-neutral by summer

This generally means a lower chance of coral bleaching or strong hurricanes

There is a only a low chance of significant thermal stress to coral reefs in the Monument from now through October 2018

Only a 60% probability of reaching warning levels in the Nihoa-Mokumanamana sector, and watch levels in the FFS-Kure sector, through October 2018

Local cyclogenesis is unlikely in a La Niña regime, although conditions may be cooler and *wetter* than normal

The Eastern North Pacific hurricane season runs from 15 May to 30 November

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

Questions?