

Climate Indicators Summary

February 2017

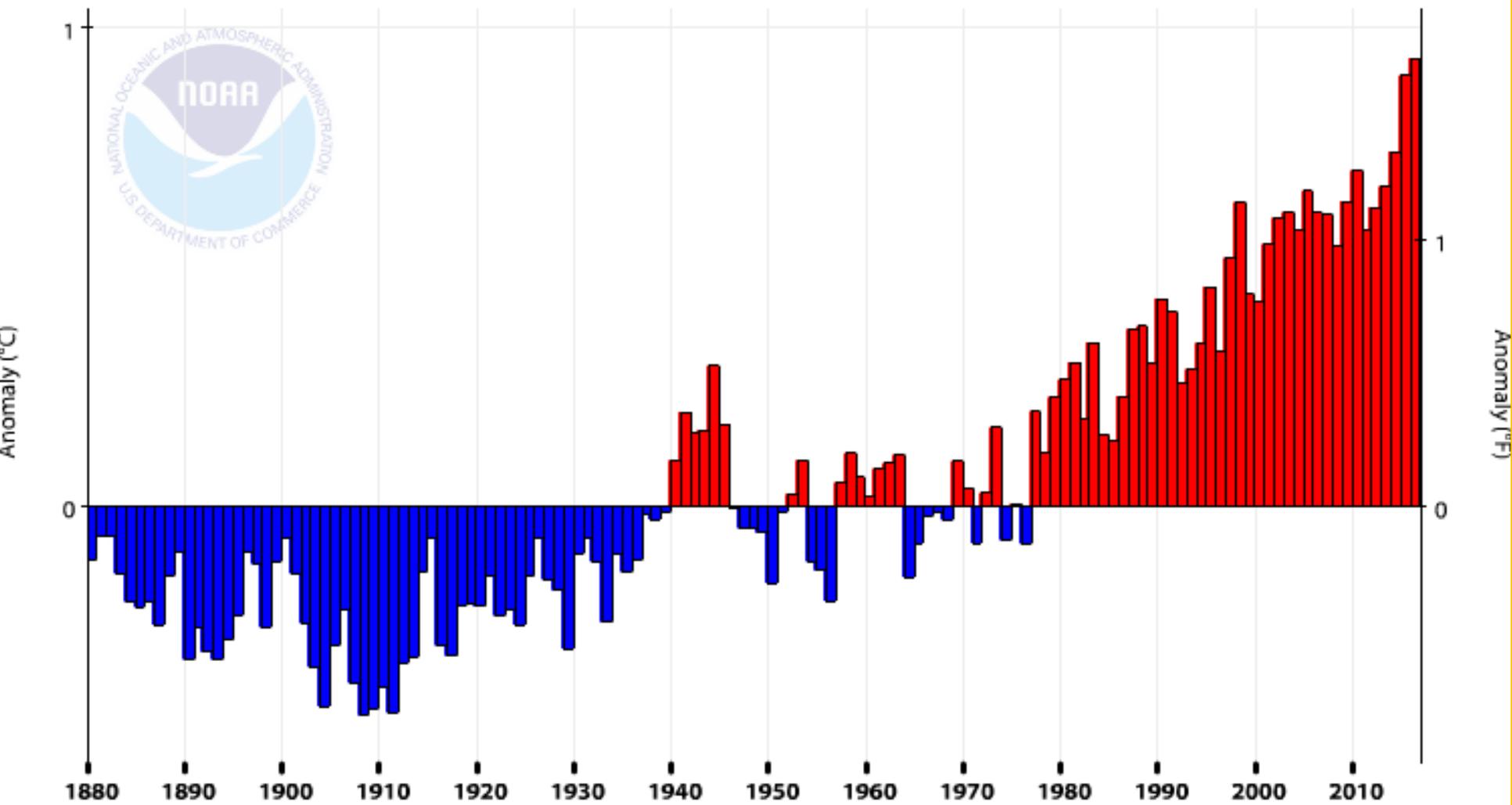
PMNM Climate Change Working Group

Dan A. Polhemus

U. S. Fish & Wildlife Service

Honolulu, HI

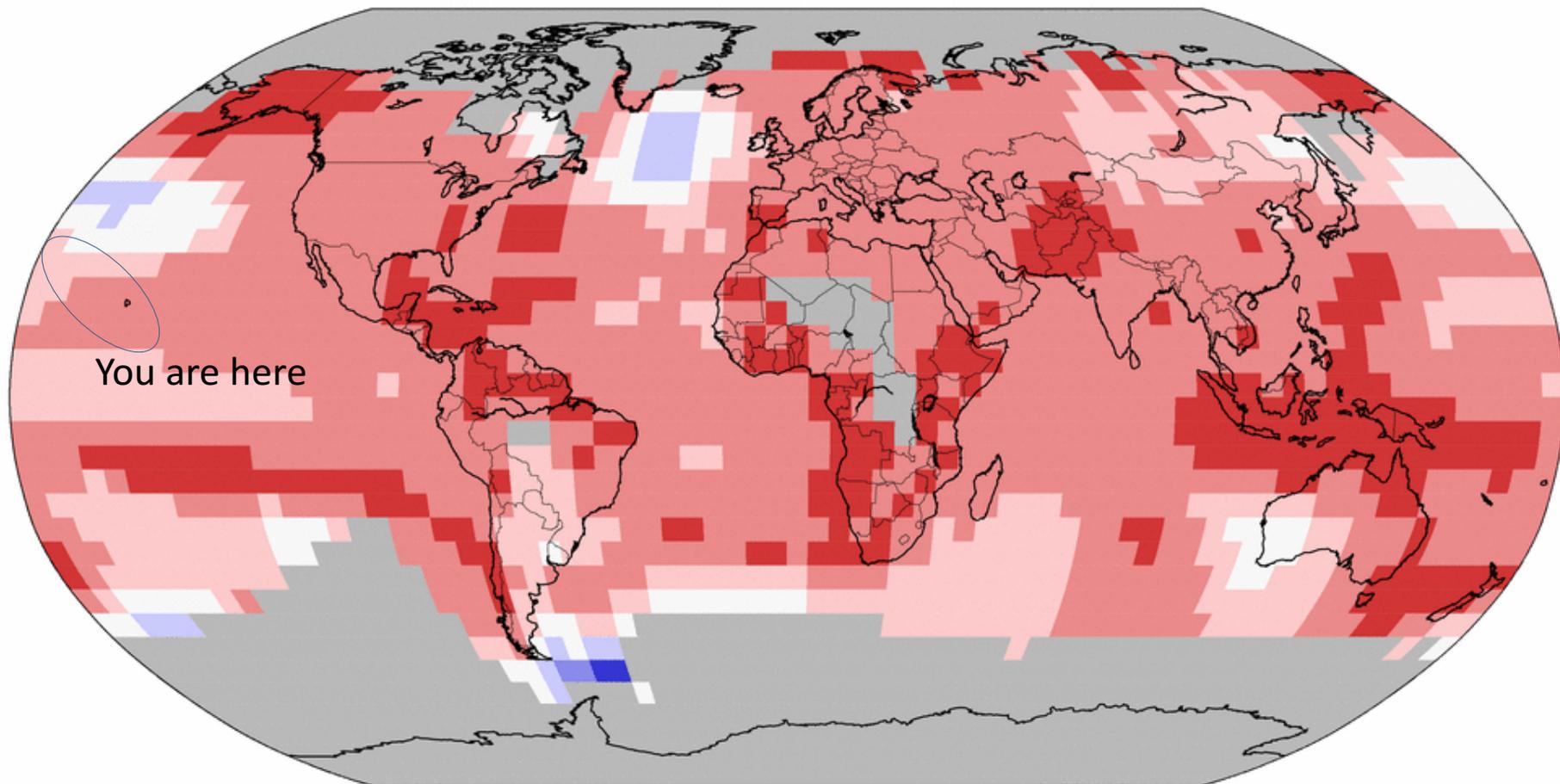
Global Land and Ocean Temperature Anomalies, January-December



Land & Ocean Temperature Percentiles Jan–Dec 2016

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

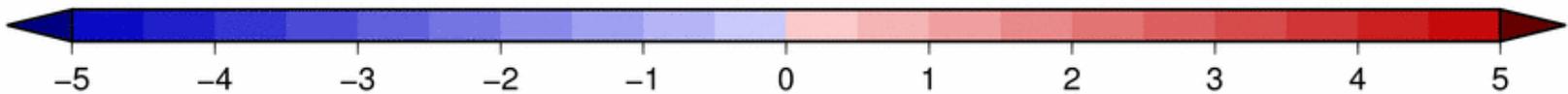
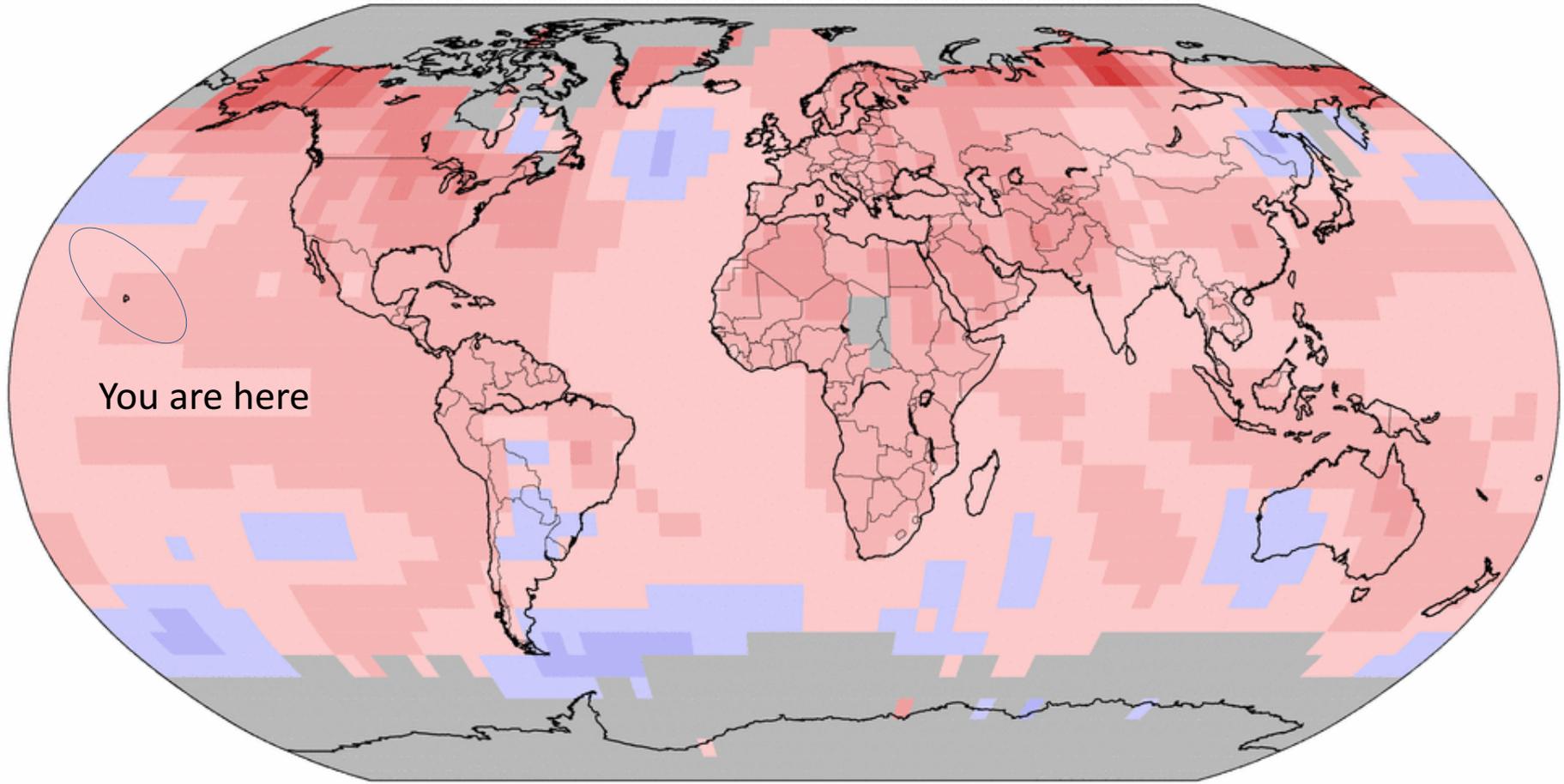


Record Warmest



Land & Ocean Temperature Departure from Average Jan–Dec 2016 (with respect to a 1981–2010 base period)

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



Degrees Celsius

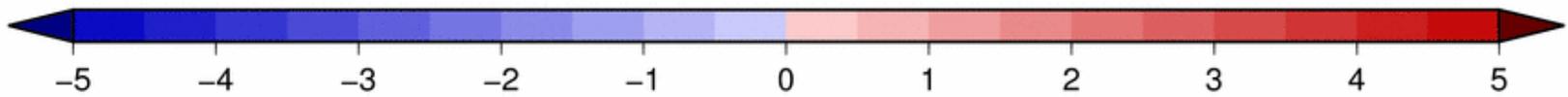
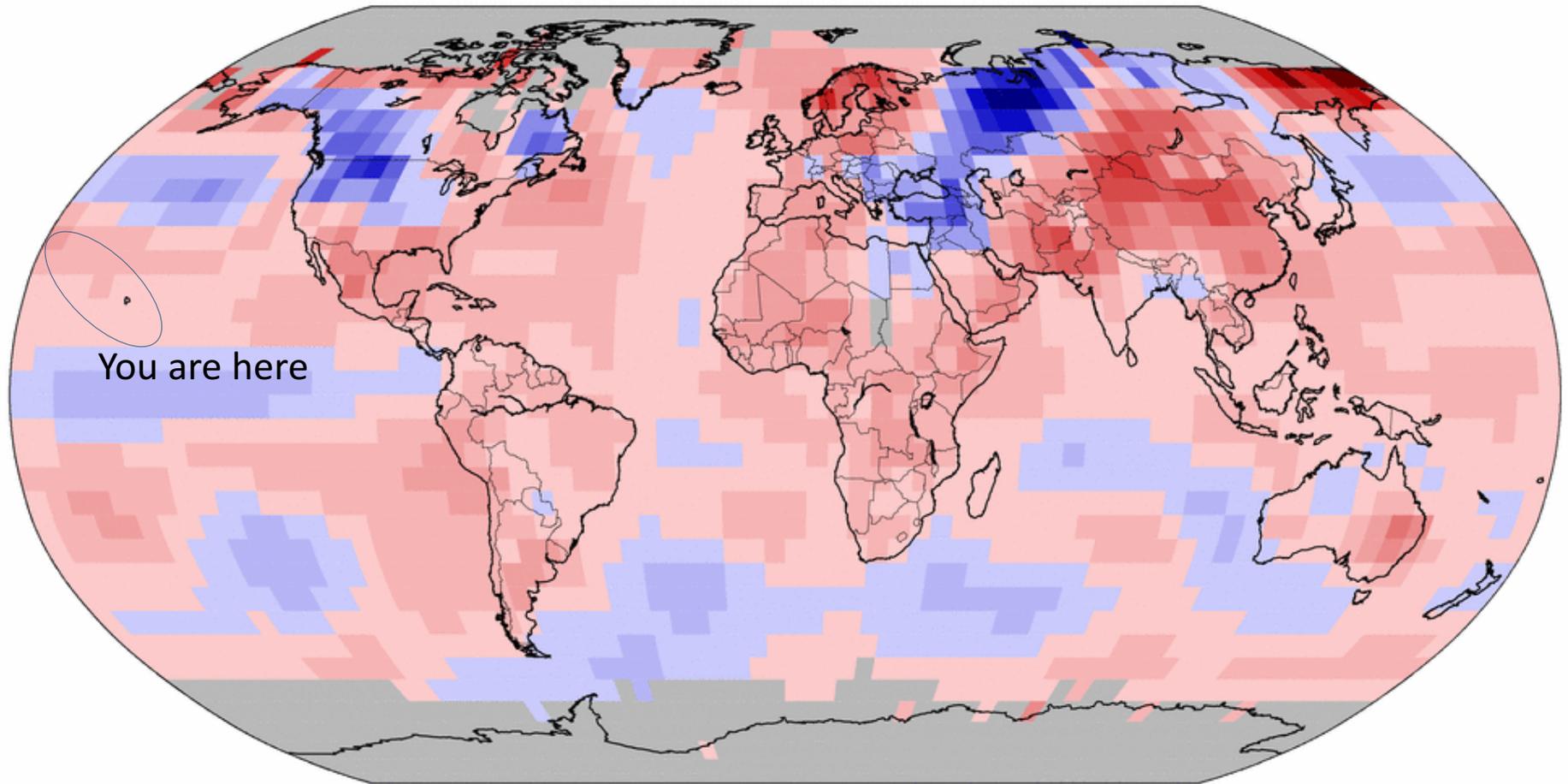


National Centers for Environmental Information
Wed Jan 11 07:07:27 EST 2017

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

Land & Ocean Temperature Departure from Average Dec 2016 (with respect to a 1981–2010 base period)

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



National Centers for Environmental Information
Wed Jan 11 07:07:27 EST 2017

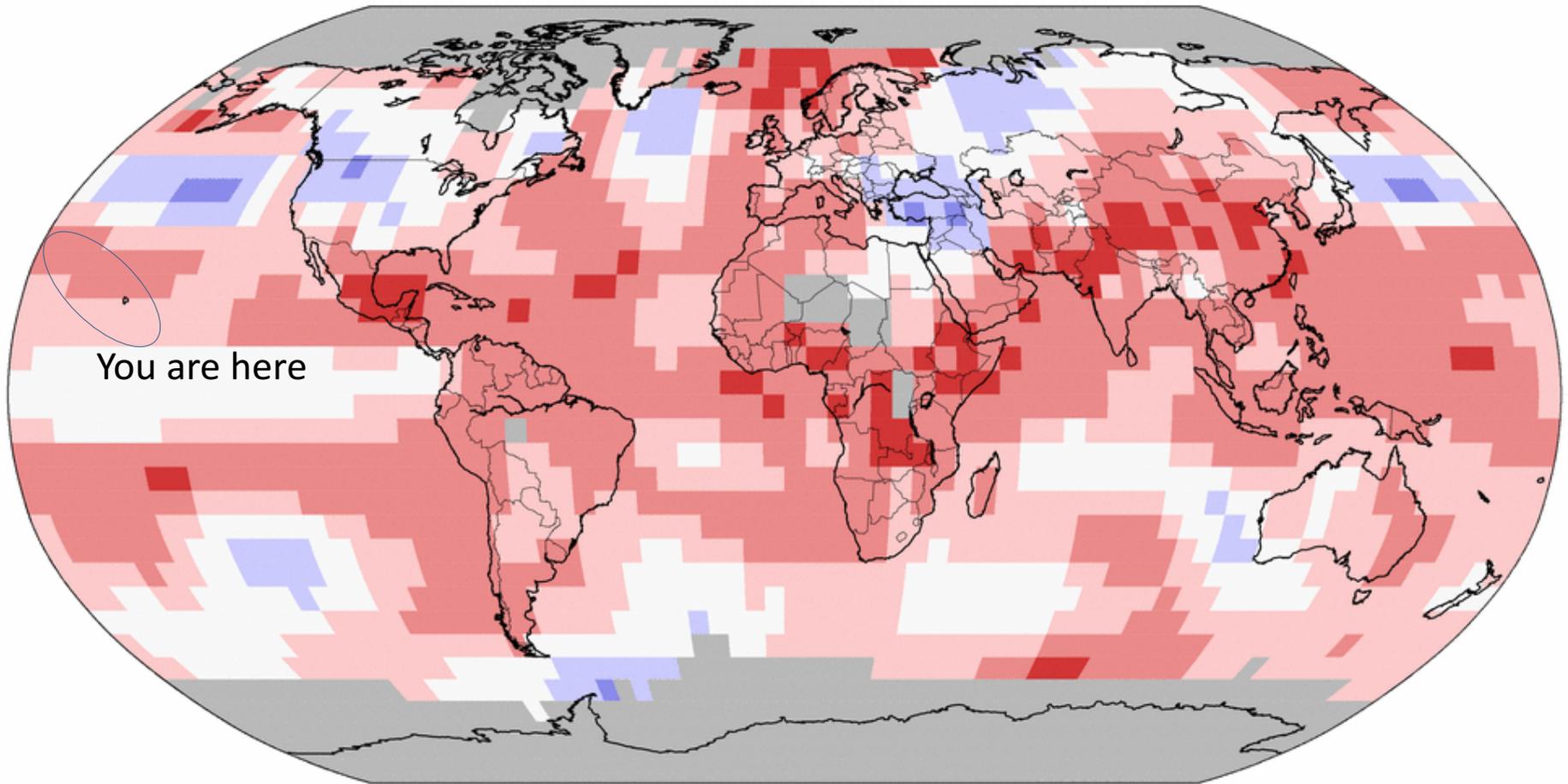
Degrees Celsius

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

Land & Ocean Temperature Percentiles Dec 2016

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

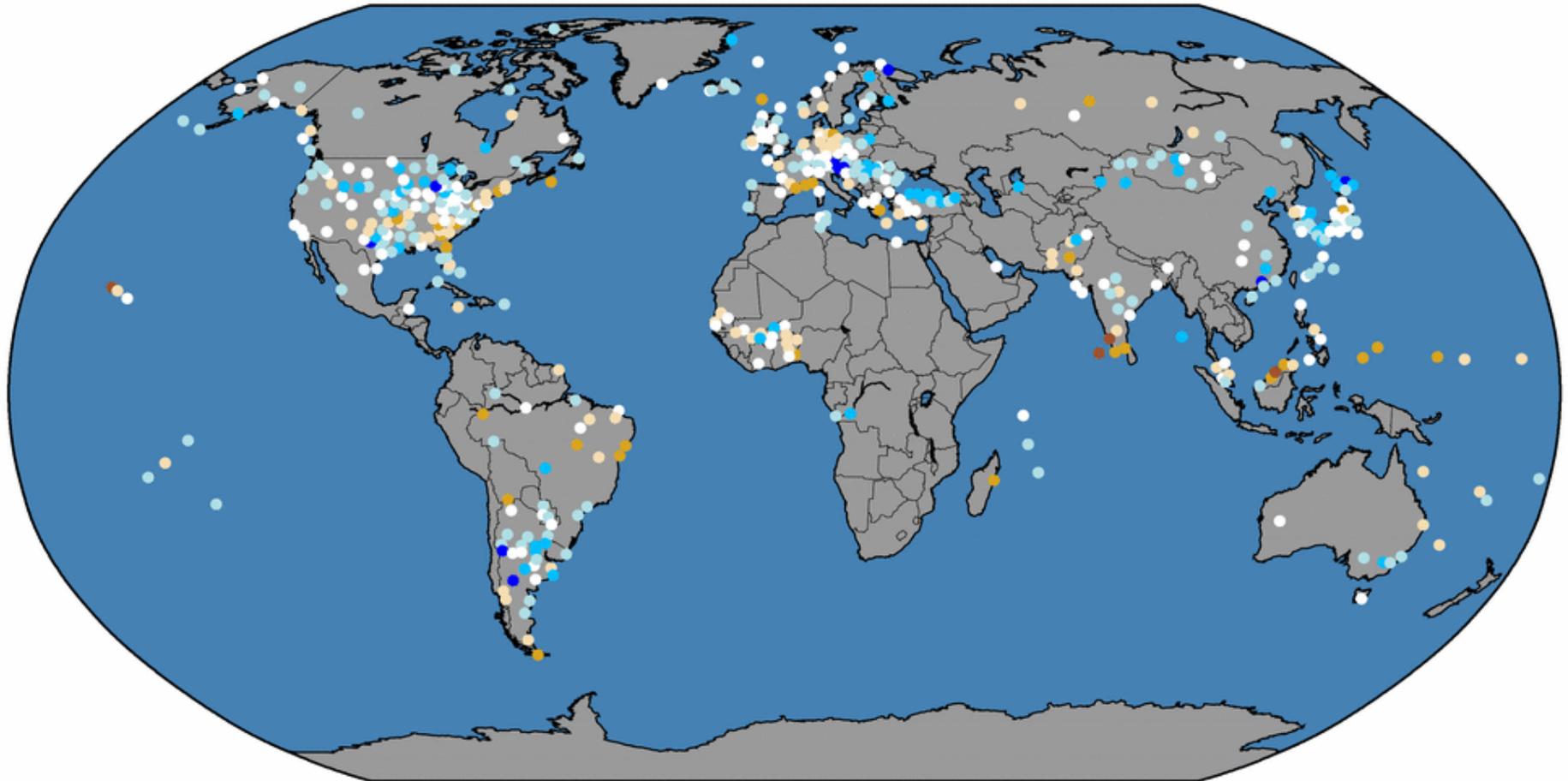

Record
Warmest



Land-Only Precipitation Percentiles Jan–Dec 2016

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**



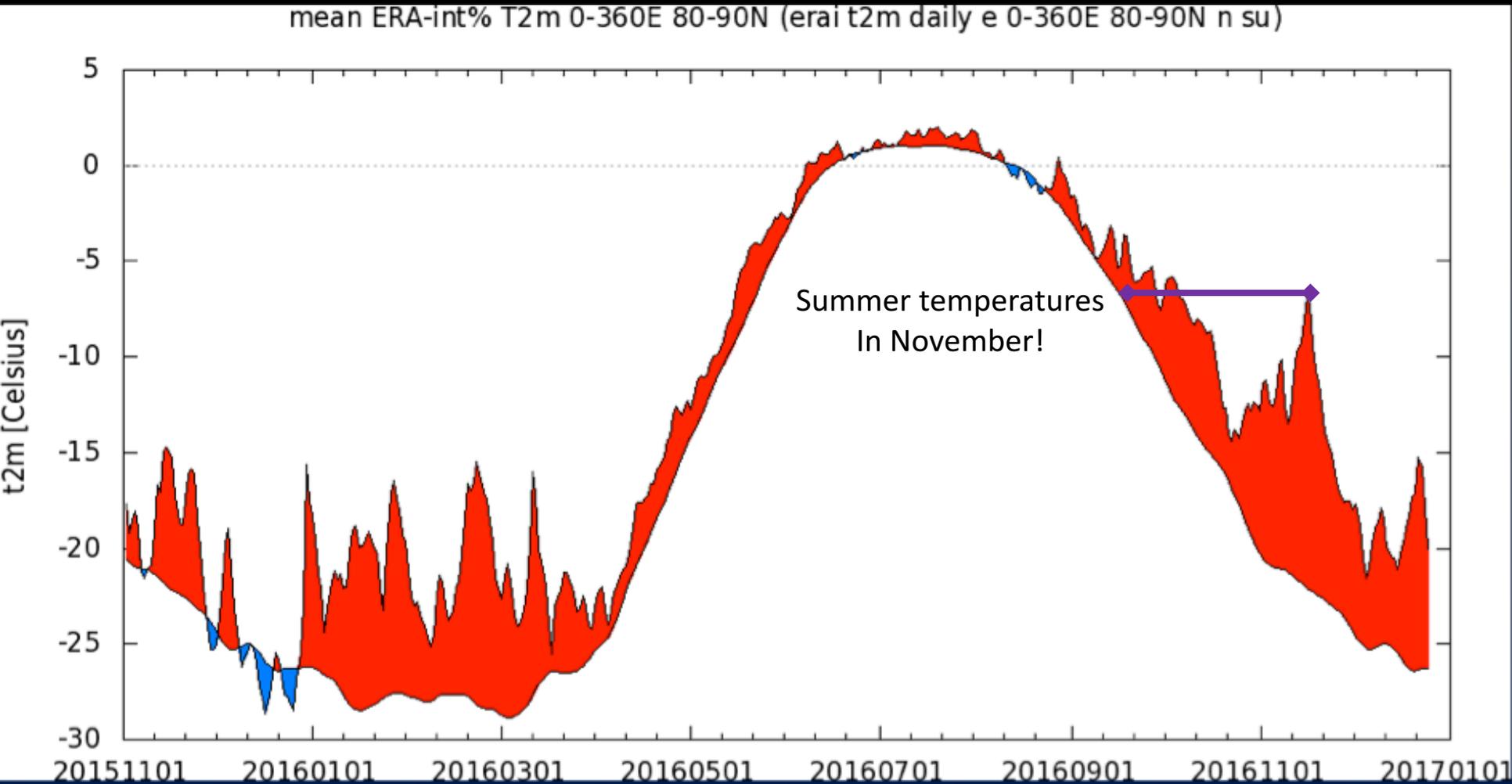
**Much
Wetter than
Average**



**Record
Wettest**



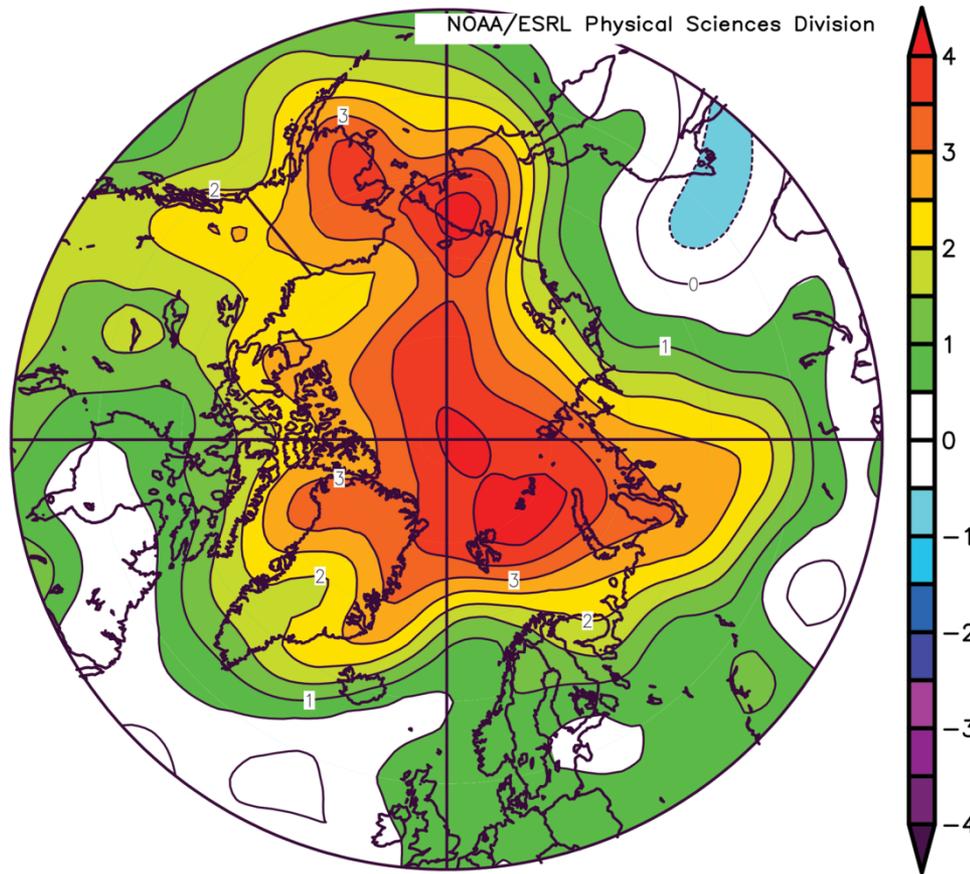
Digression #1 – The Arctic Has Been Unusually Warm



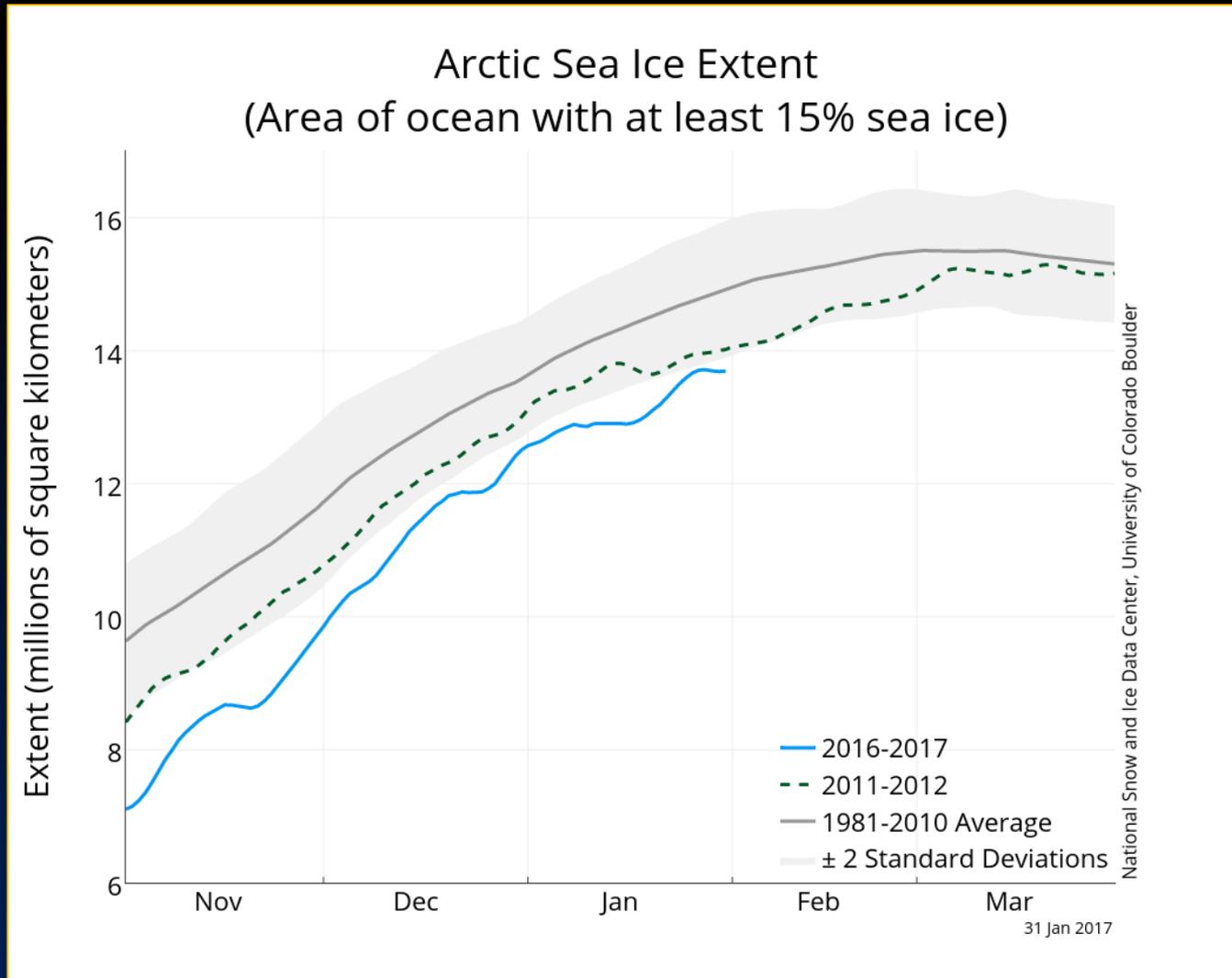
Temperature anomalies from 1 Nov. 2015 to 1 Jan. 2017
Note the two successive very warm winters in the Arctic

Full-year Arctic Air Temperature Anomaly for 2016

Arctic Air Temperature Difference January to December 2016

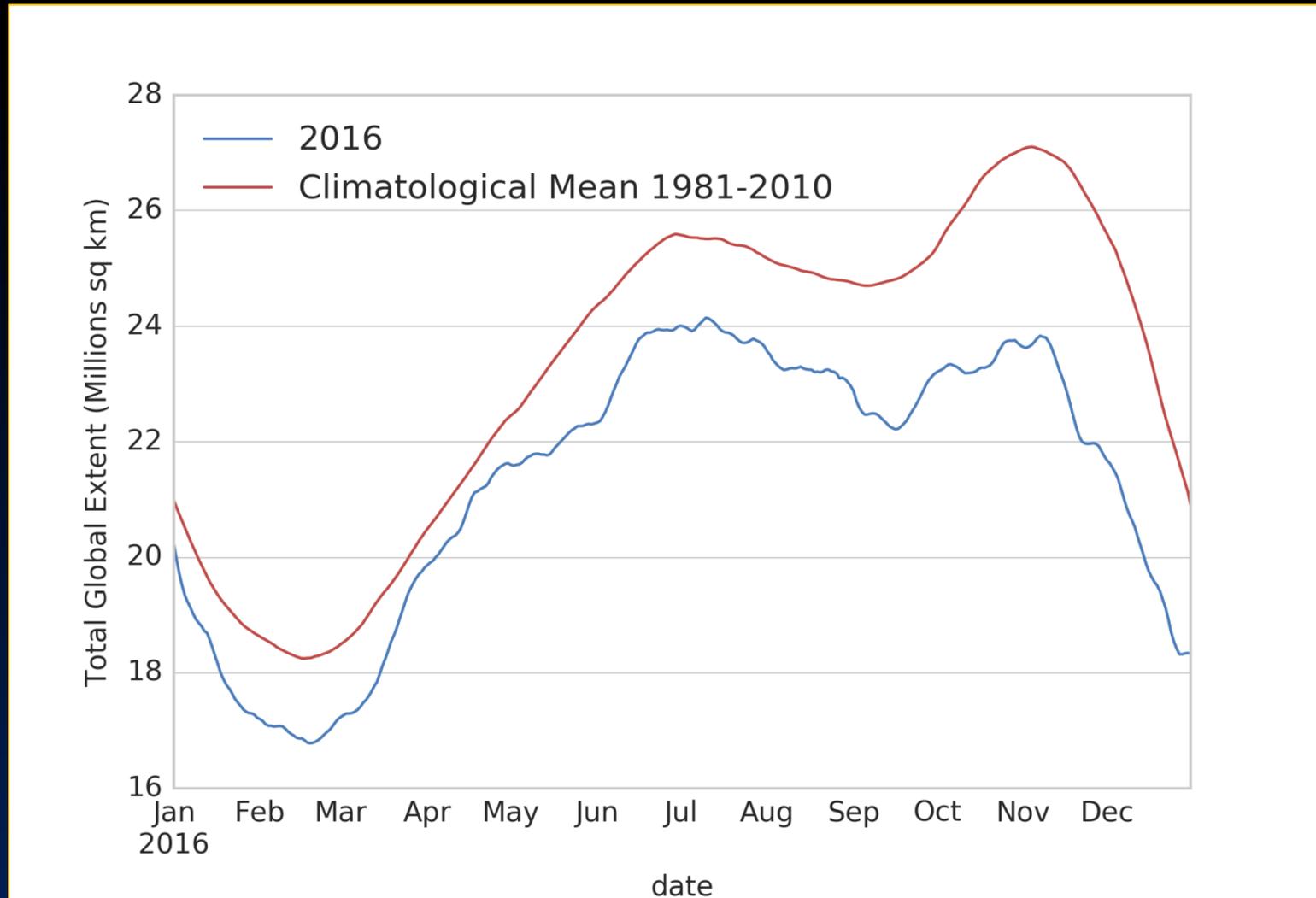


As a result, Arctic sea ice is at a record low



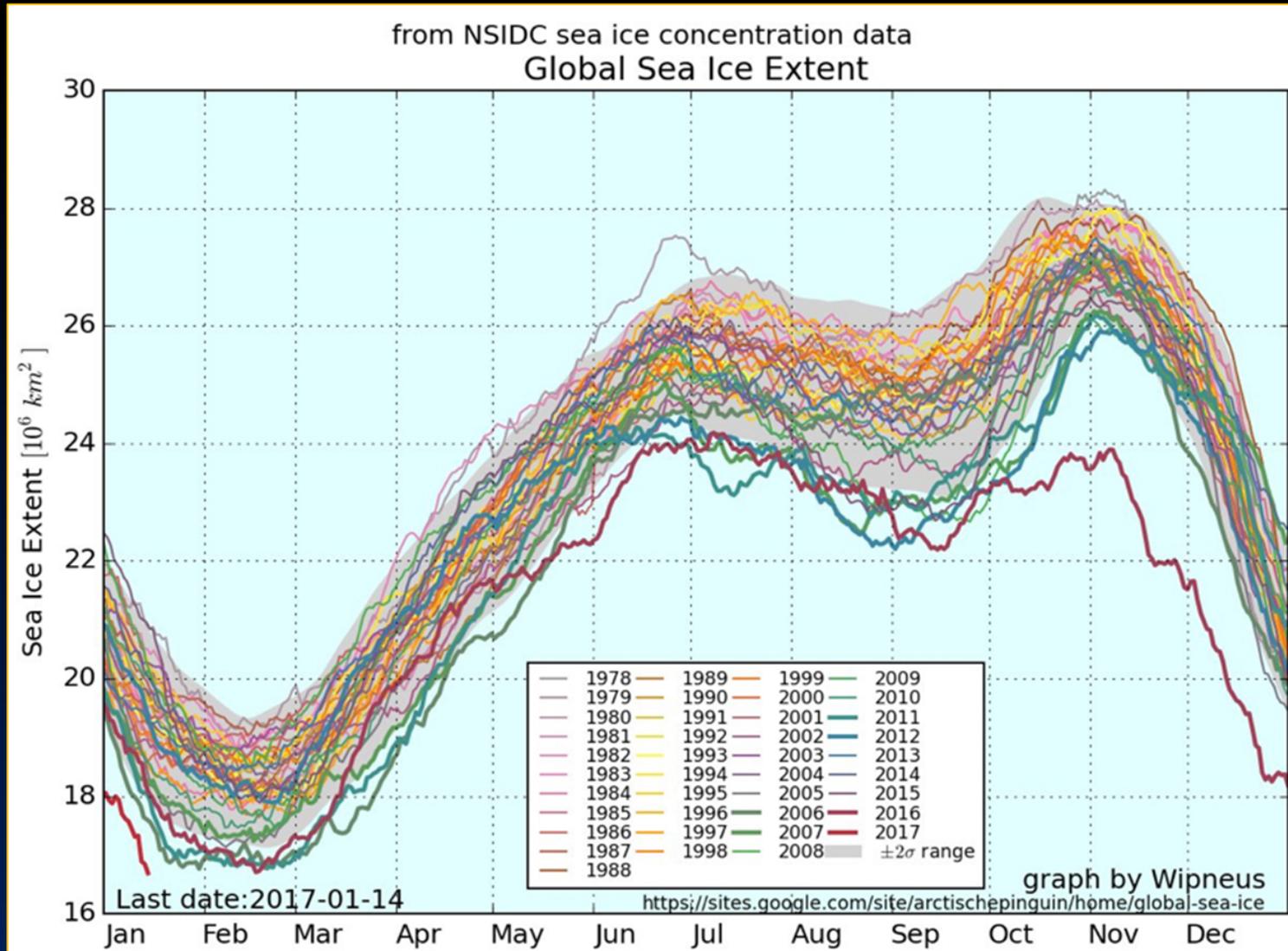
Approximately 3 standard deviations below long-term mean

Global sea ice extent is also at a record low



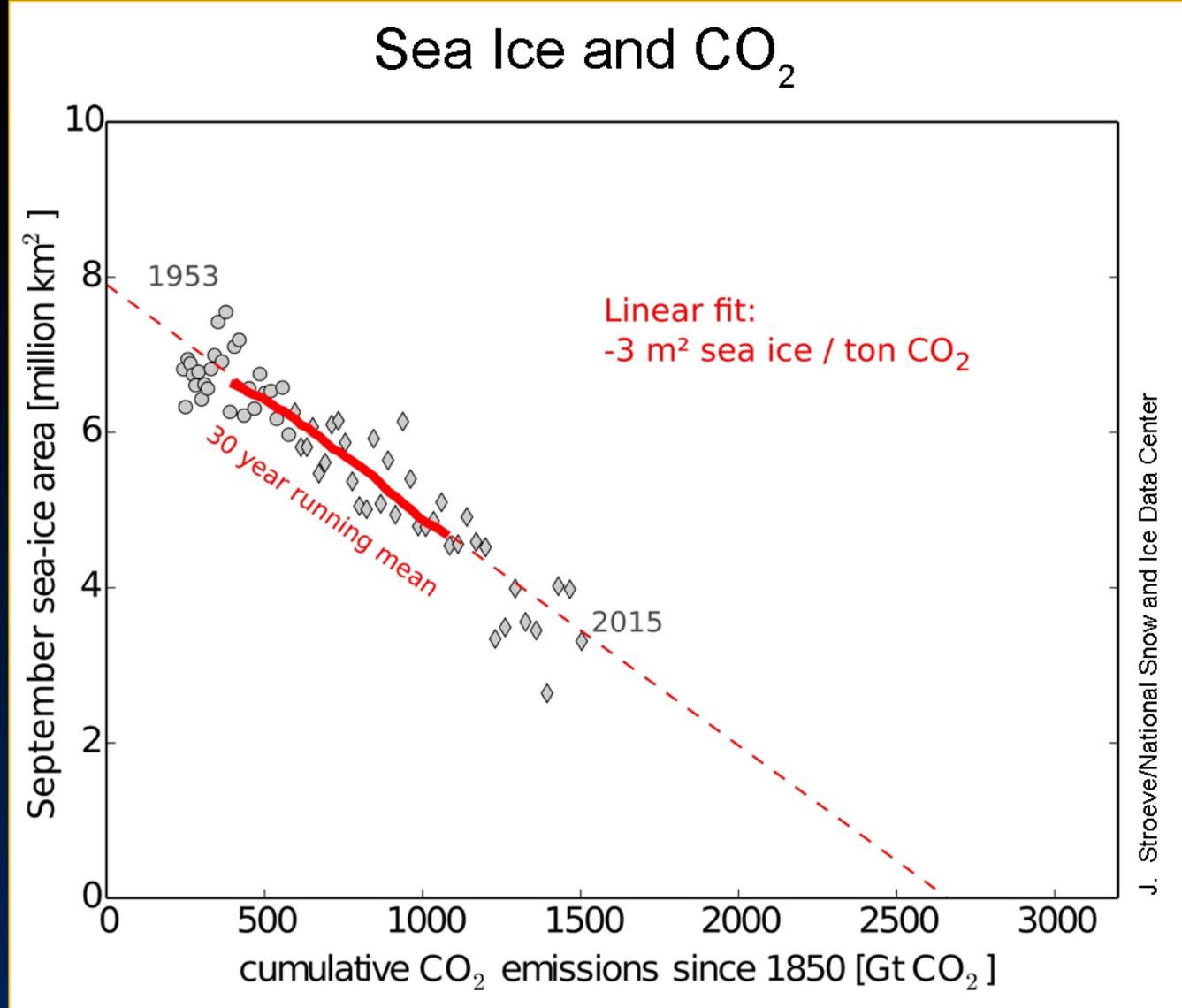
This reflects both Arctic and Antarctic record sea ice lows for their respective seasons

Current trend in context of past 40 years



No analog for current sea ice trajectory

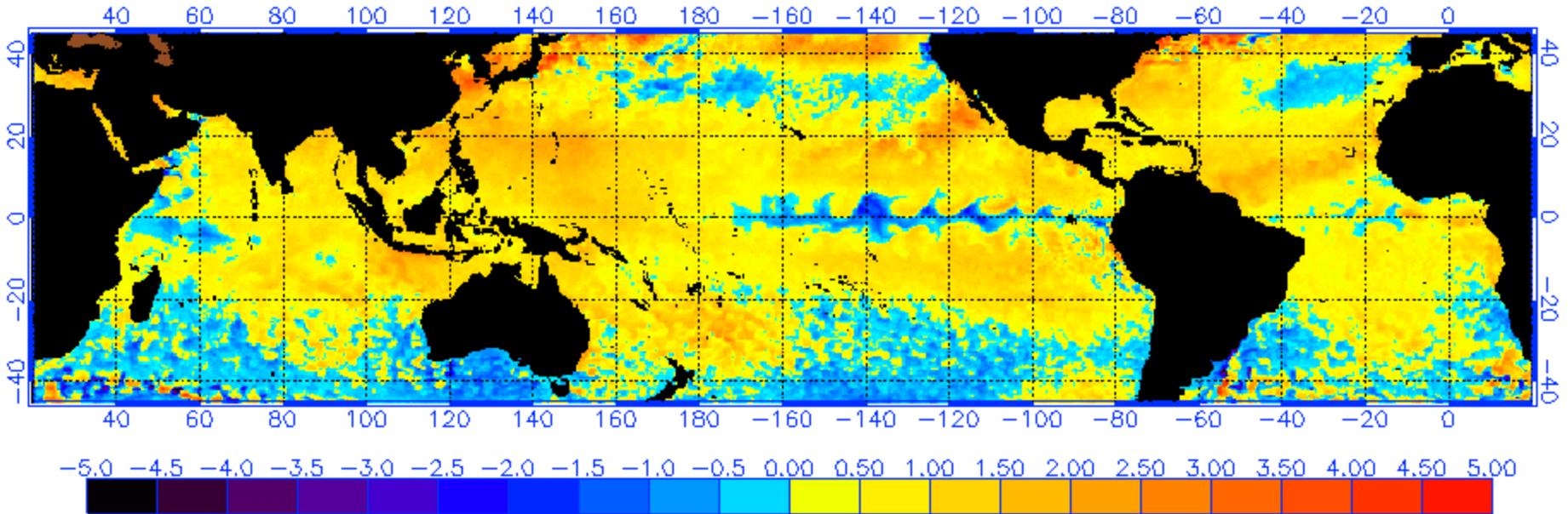
New research also indicates a direct correlation between Arctic sea ice extent and atmospheric CO₂



Notz & Stroeve, 2016, Science 354: 747-750

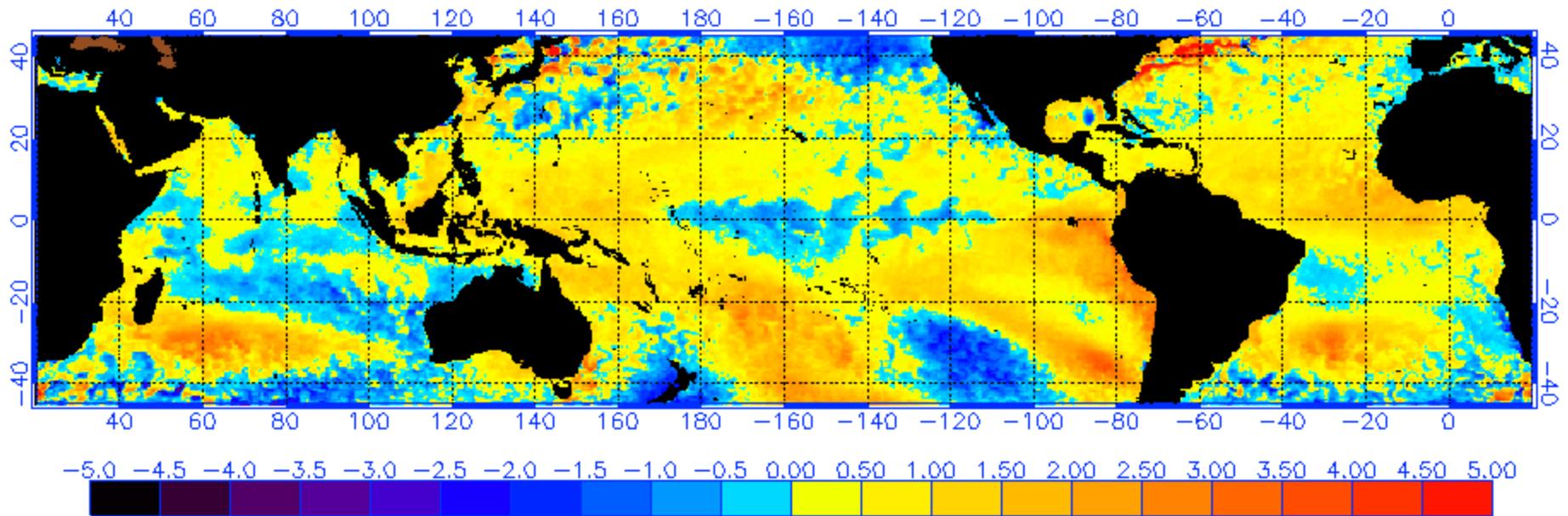
Global Sea Surface Temperature Anomaly - 1 August 2016

NOAA/NESDIS SST Anomaly (degrees C), 8/1/2016



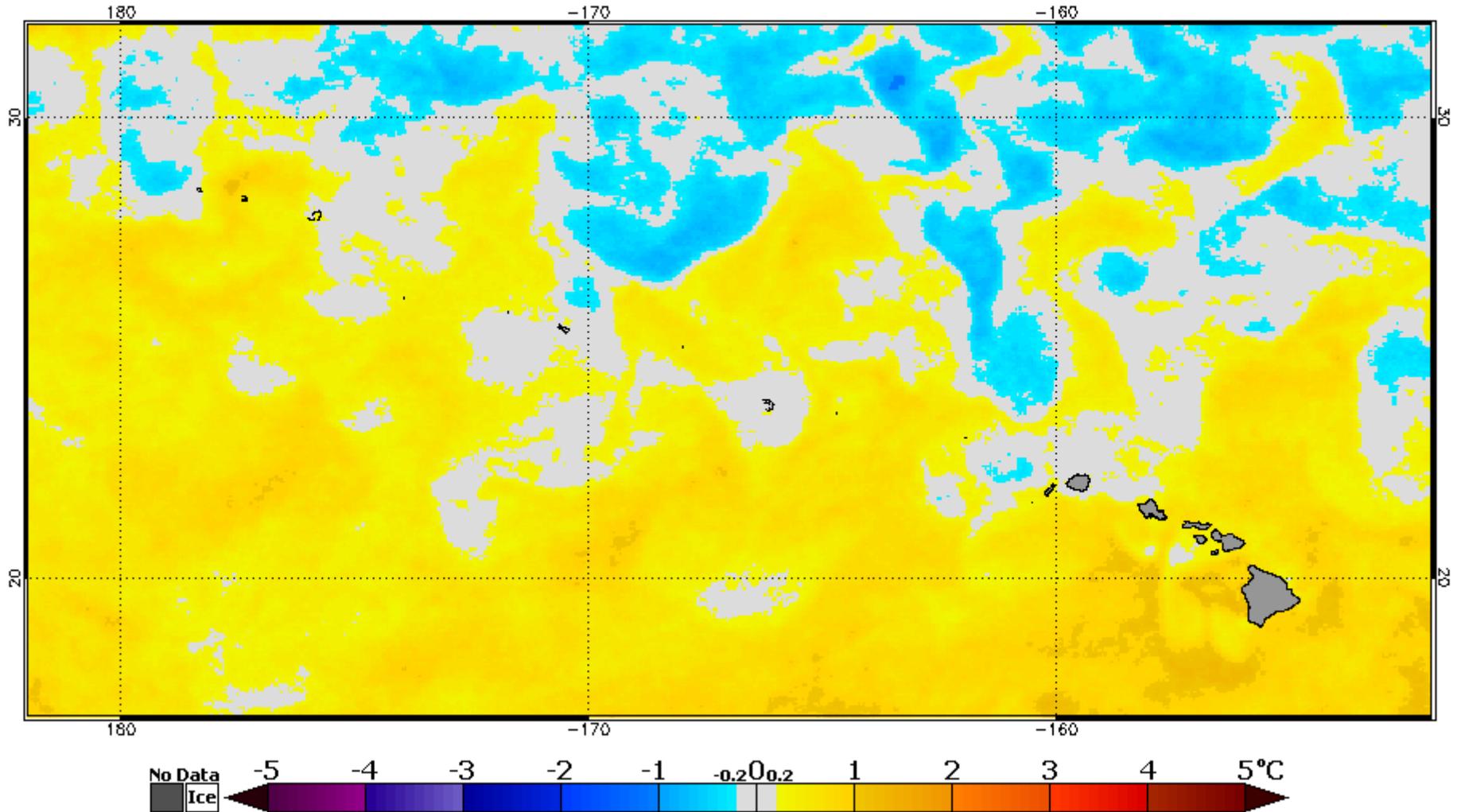
Global Sea Surface Temperature Anomaly – 30 January 2017

NOAA/NESDIS SST Anomaly (degrees C), 1/30/2017



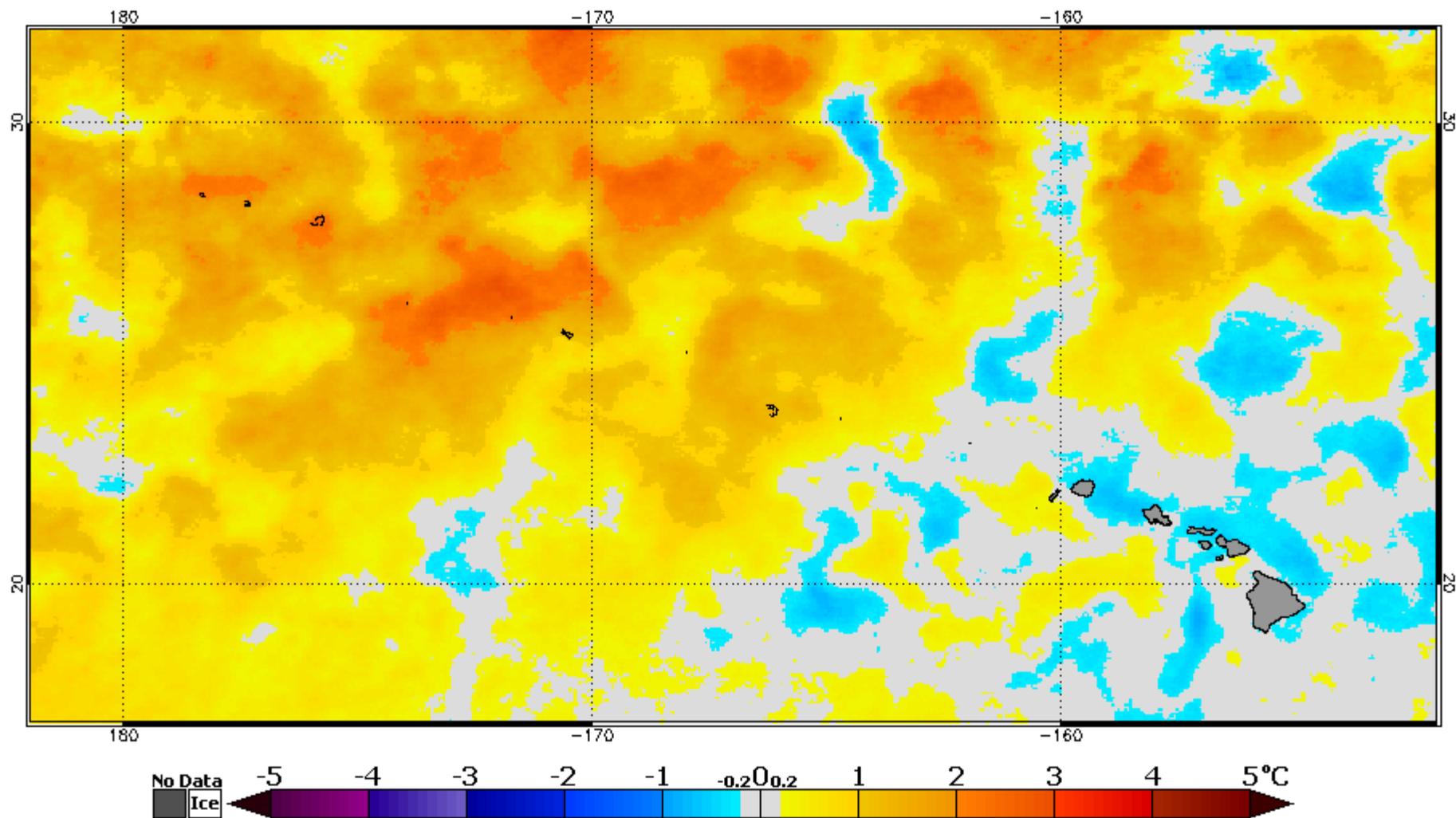
Sea Surface Temperature Anomaly, Hawaii Sector - 2 August 2016

NOAA Coral Reef Watch Daily 5-km Geo-Polar Blended Night-Only SST Anomalies 2 Aug 2016



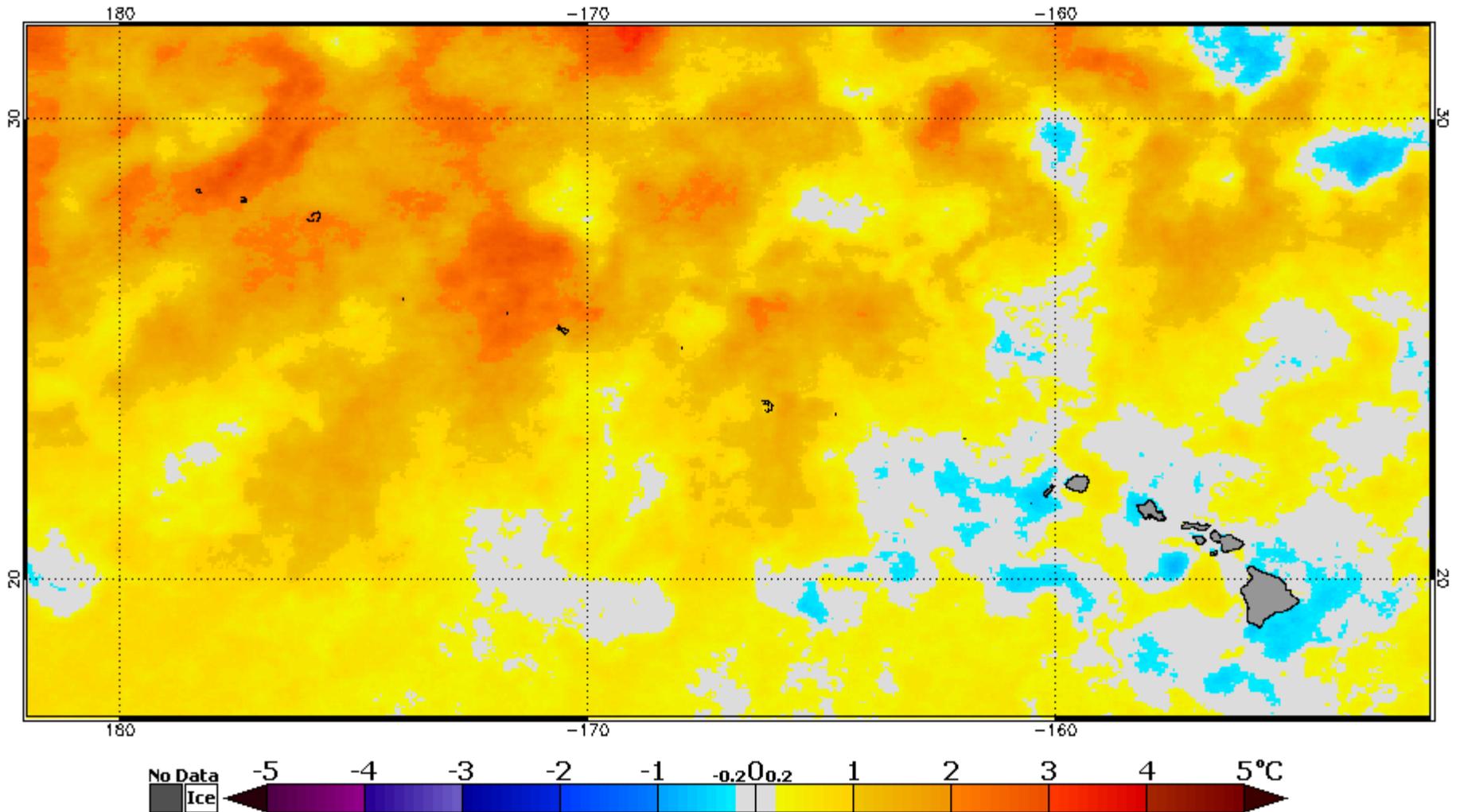
Sea Surface Temperature Anomaly, Hawaii Sector – 31 January 2017

NOAA Coral Reef Watch Daily 5-km Geo-Polar Blended Night-Only SST Anomalies 31 Jan 2017



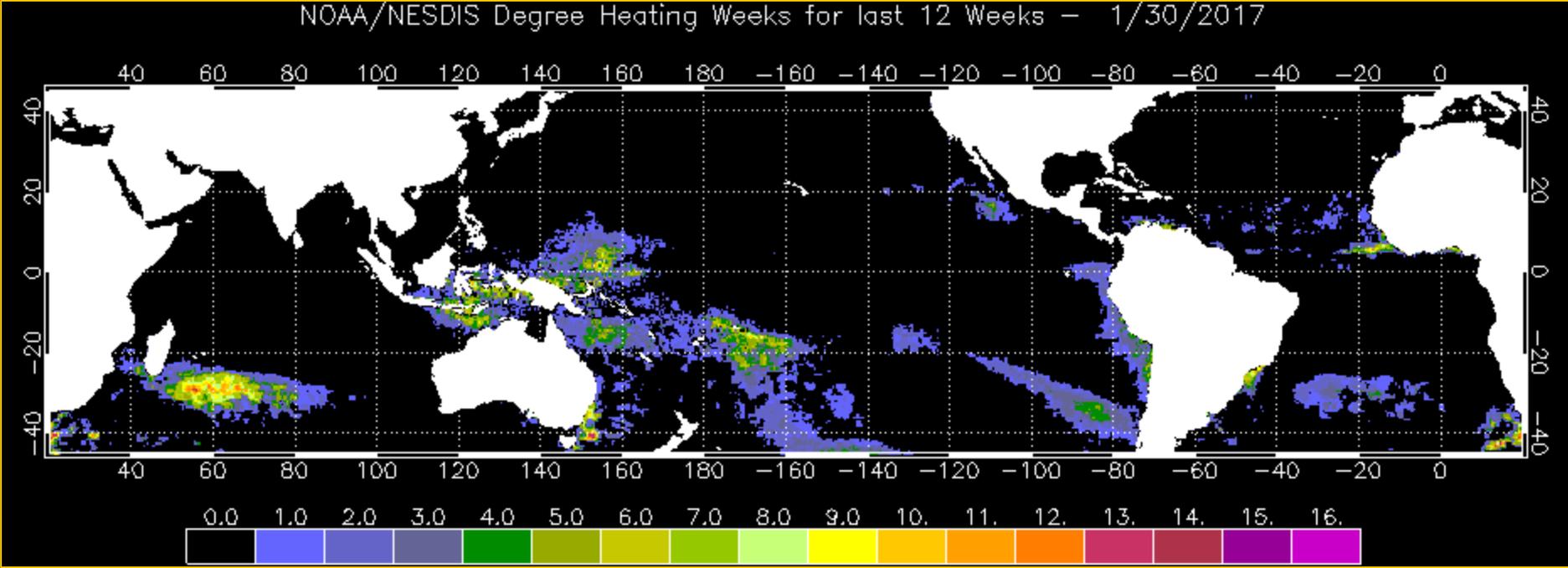
Sea Surface Temperature Anomaly, Hawaii Sector - 8 Jan. 2017

NOAA Coral Reef Watch Daily 5-km Geo-Polar Blended Night-Only SST Anomalies 8 Jan 2017



Degree Heating Weeks - 30 January 2017

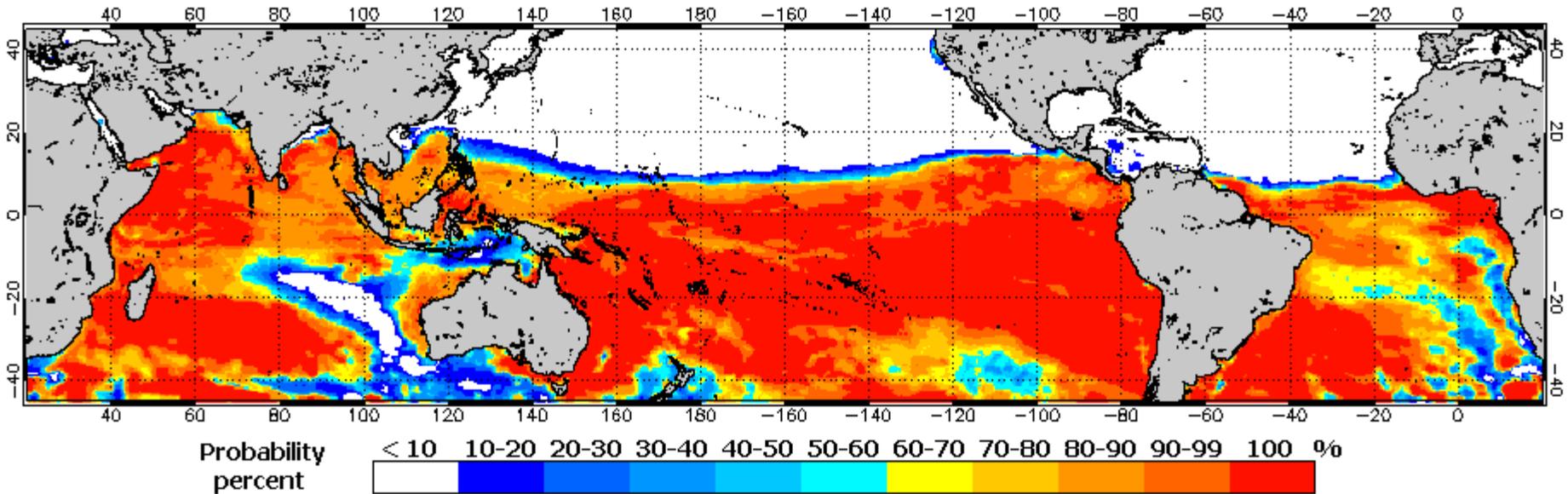
NOAA/NESDIS Degree Heating Weeks for last 12 Weeks - 1/30/2017



Bleaching Stress Probability – February-May 2017

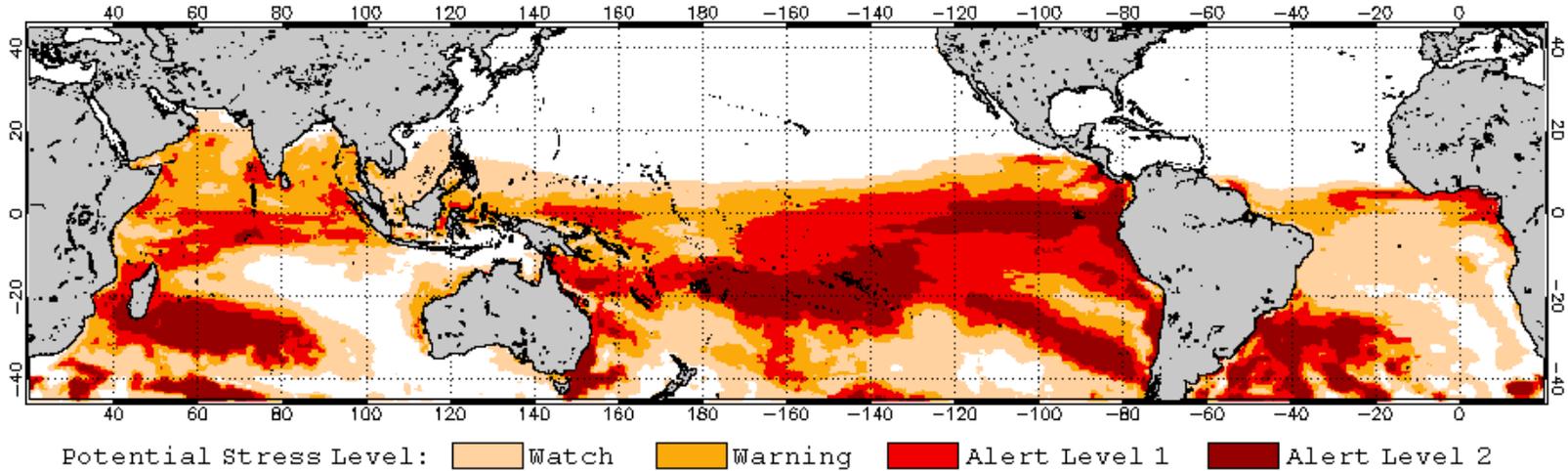
Prediction as of 31 January 2017

2017 Jan 31 NOAA Coral Reef Watch Probabilistic Bleaching Thermal Stress Watch for Feb–May 2017
Experimental, v3.0, CFSv2-based, 28-member Ensemble Forecast



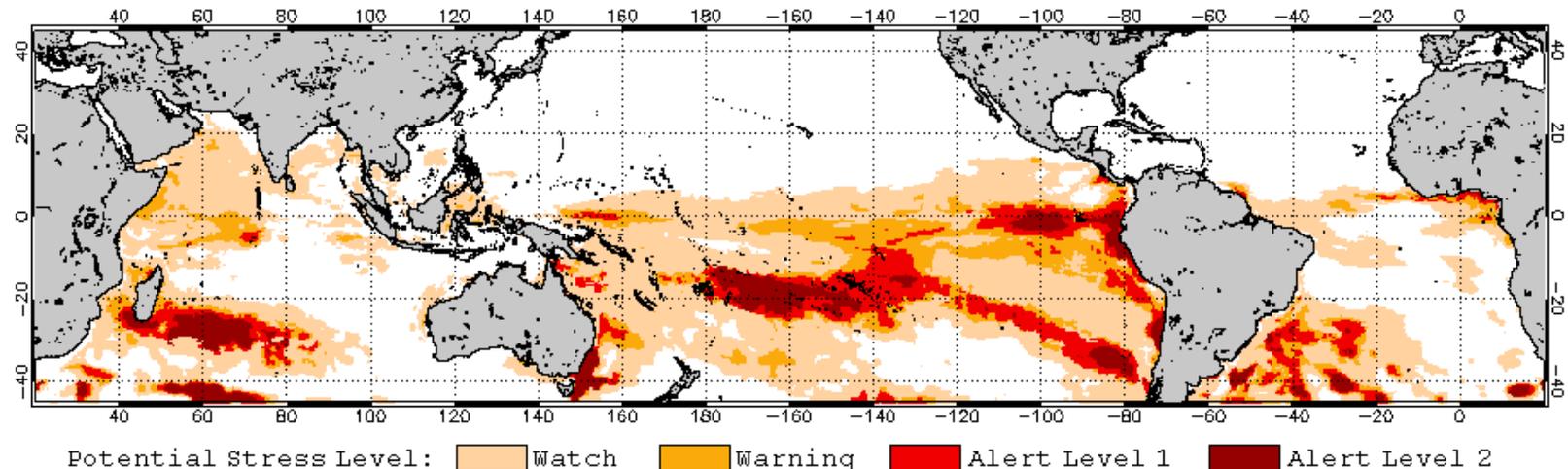
60% Bleaching Probability - February-May 2017

2017 Jan 31 NOAA Coral Reef Watch 60% Probability Coral Bleaching Thermal Stress for Feb-May 2017
Experimental, v3.0, CFSv2-based, 28-member Ensemble Forecast



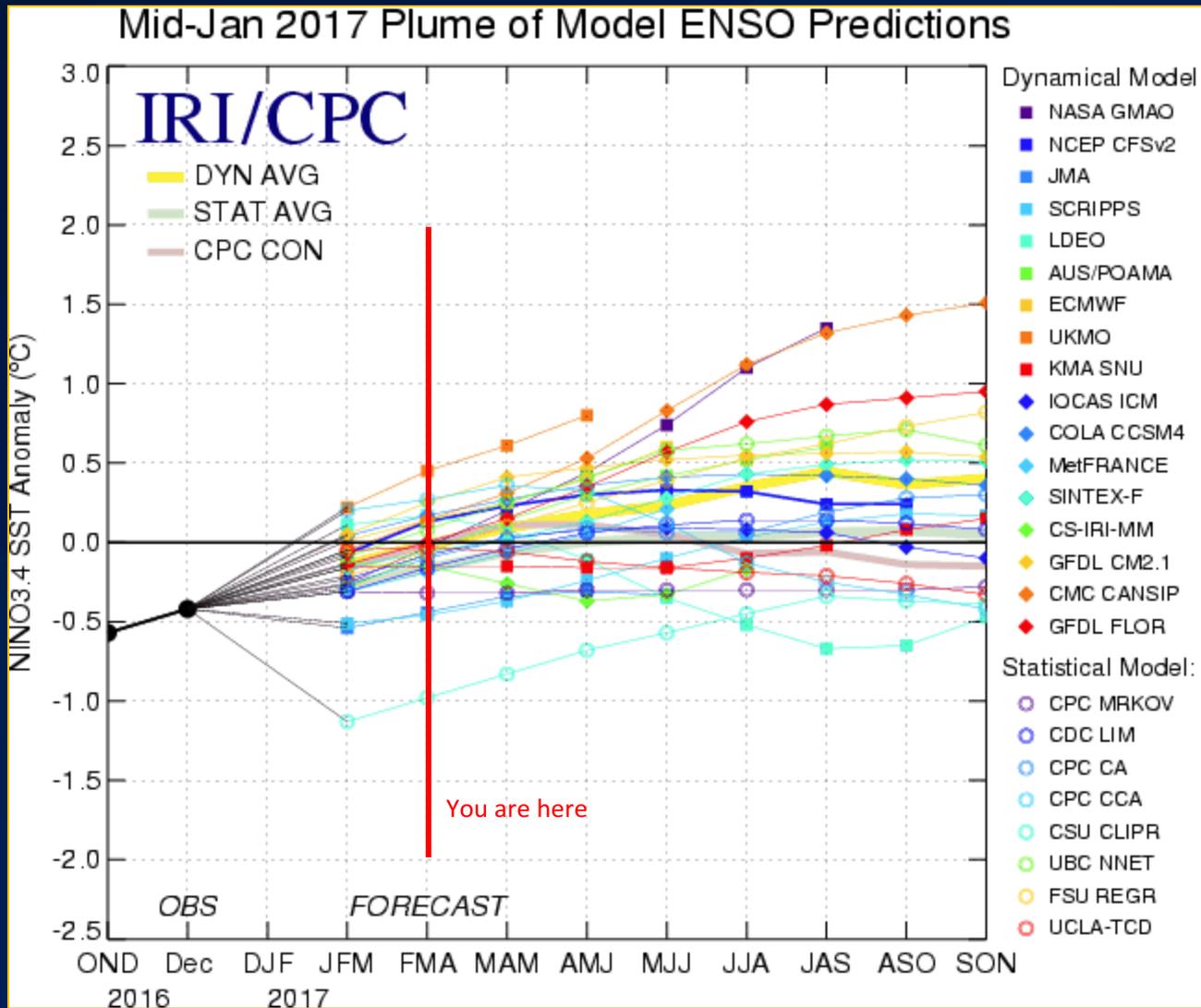
90% Bleaching Probability - February-May 2017

2017 Jan 31 NOAA Coral Reef Watch 90% Probability Coral Bleaching Thermal Stress for Feb-May 2017
Experimental, v3.0, CFSv2-based, 28-member Ensemble Forecast



Looking Forward

An ensemble of 25 climate models predicts La Niña or ENSO neutral conditions through summer 2017



Conclusions

2016 was the warmest year on record globally, both on land and in the ocean
The Monument was spared the worst of this heat

La Niña conditions currently prevail, but may relax to ENSO-neutral by summer
This generally means cooler ocean temperatures and fewer hurricanes

There is no expectation of coral bleaching in the NWHI through May 2017
But the ocean does appear to be carrying some excess heat content through winter in this sector

Cyclogenesis should not be an issue between now and early May 2017
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

Questions?

