

# Climate Indicators Summary

## May 2017

PMNM Climate Change Working Group

Dan A. Polhemus

U. S. Fish & Wildlife Service

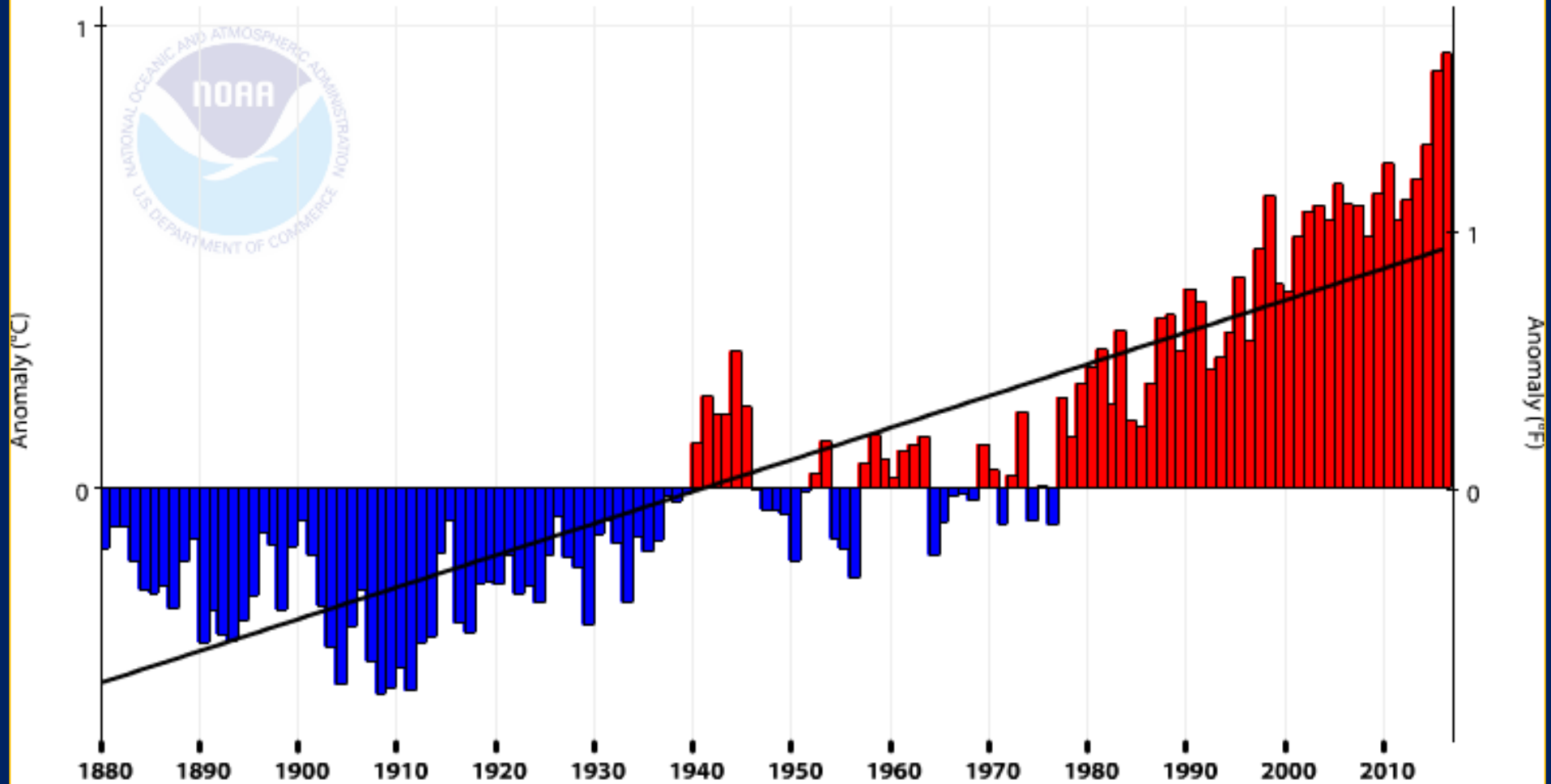
Honolulu, HI

# Early 2017 continues to build on heating trend from 2016

## Global Land and Ocean Temperature Anomalies, January-December

— 1880-2016 Trend  
+0.07°C/Decade

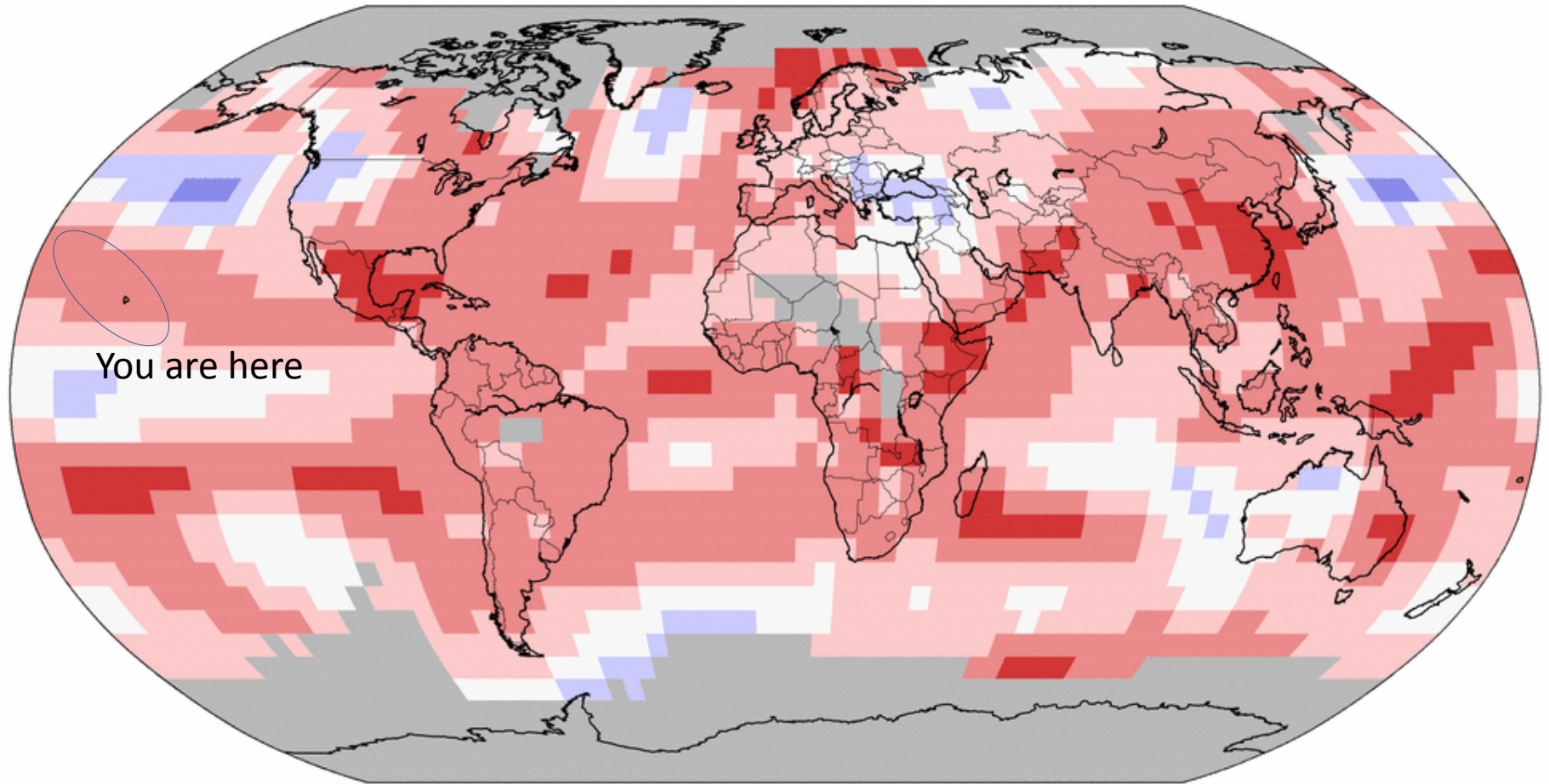
Temperature Anomalies



# Land & Ocean Temperature Percentiles Dec 2016–Feb 2017

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**

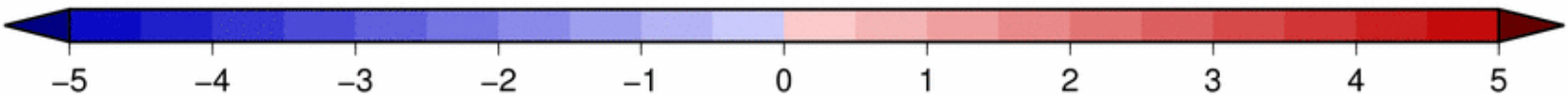
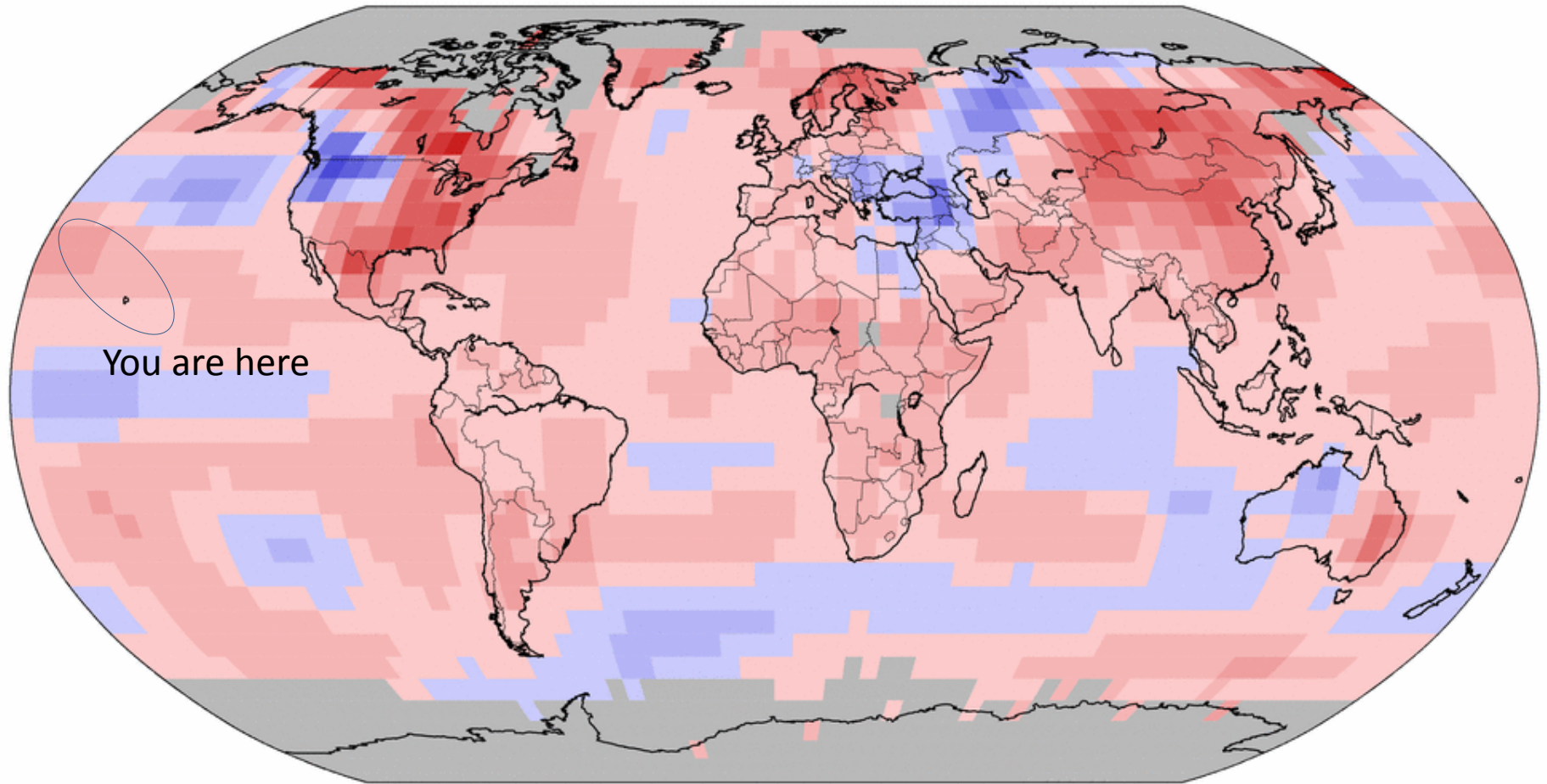


**Record  
Warmest**



# Land & Ocean Temperature Departure from Average Dec 2016–Feb 2017 (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  
Sun Mar 12 07:32:41 EDT 2017

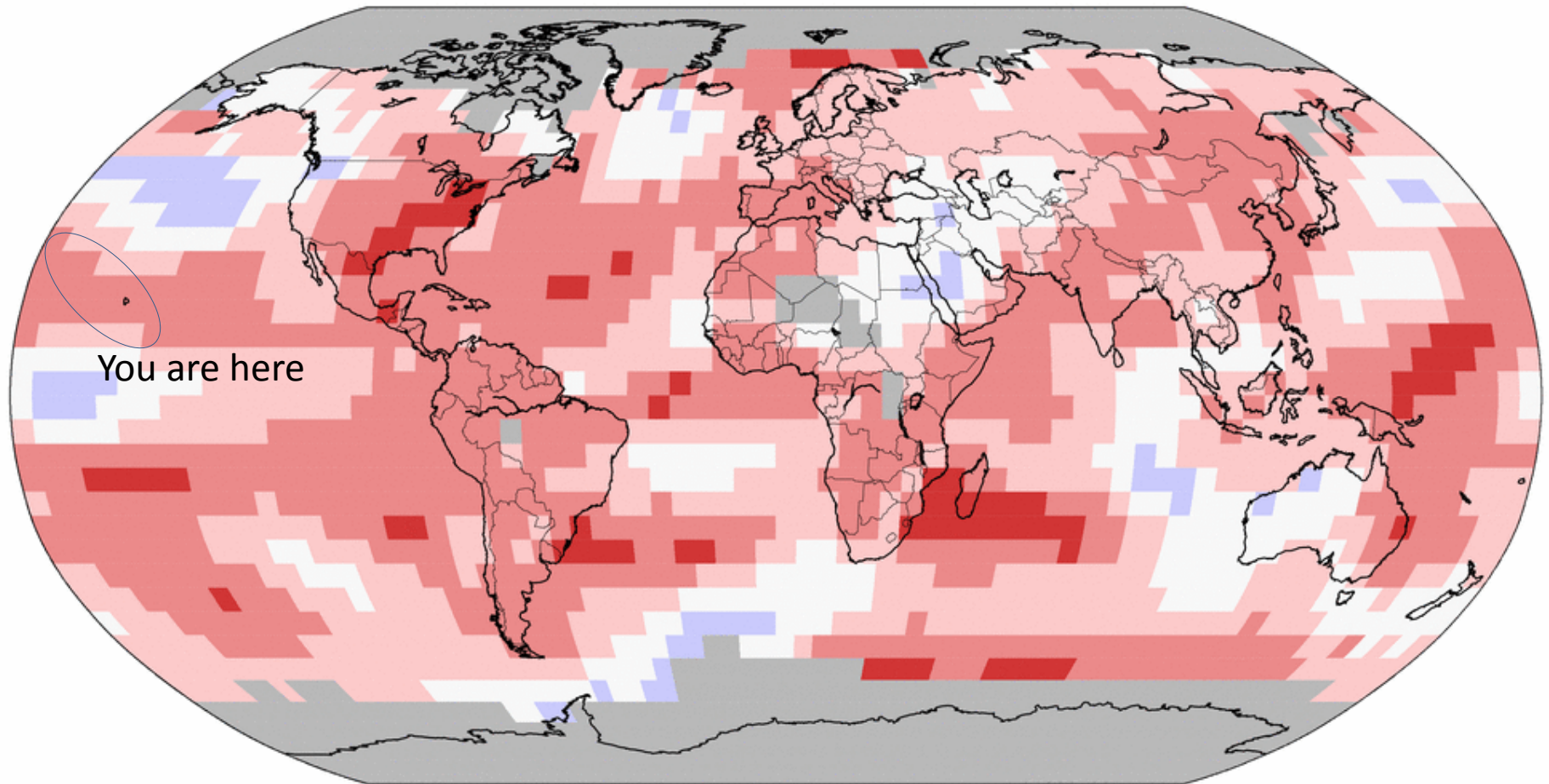
Degrees Celsius

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

# Land & Ocean Temperature Percentiles Feb 2017

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

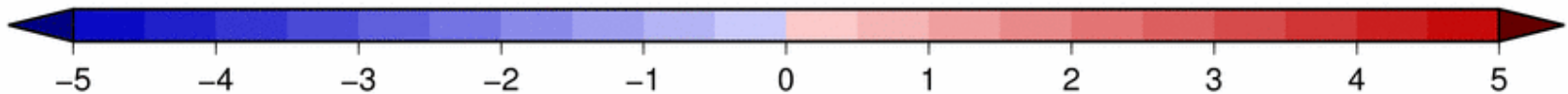
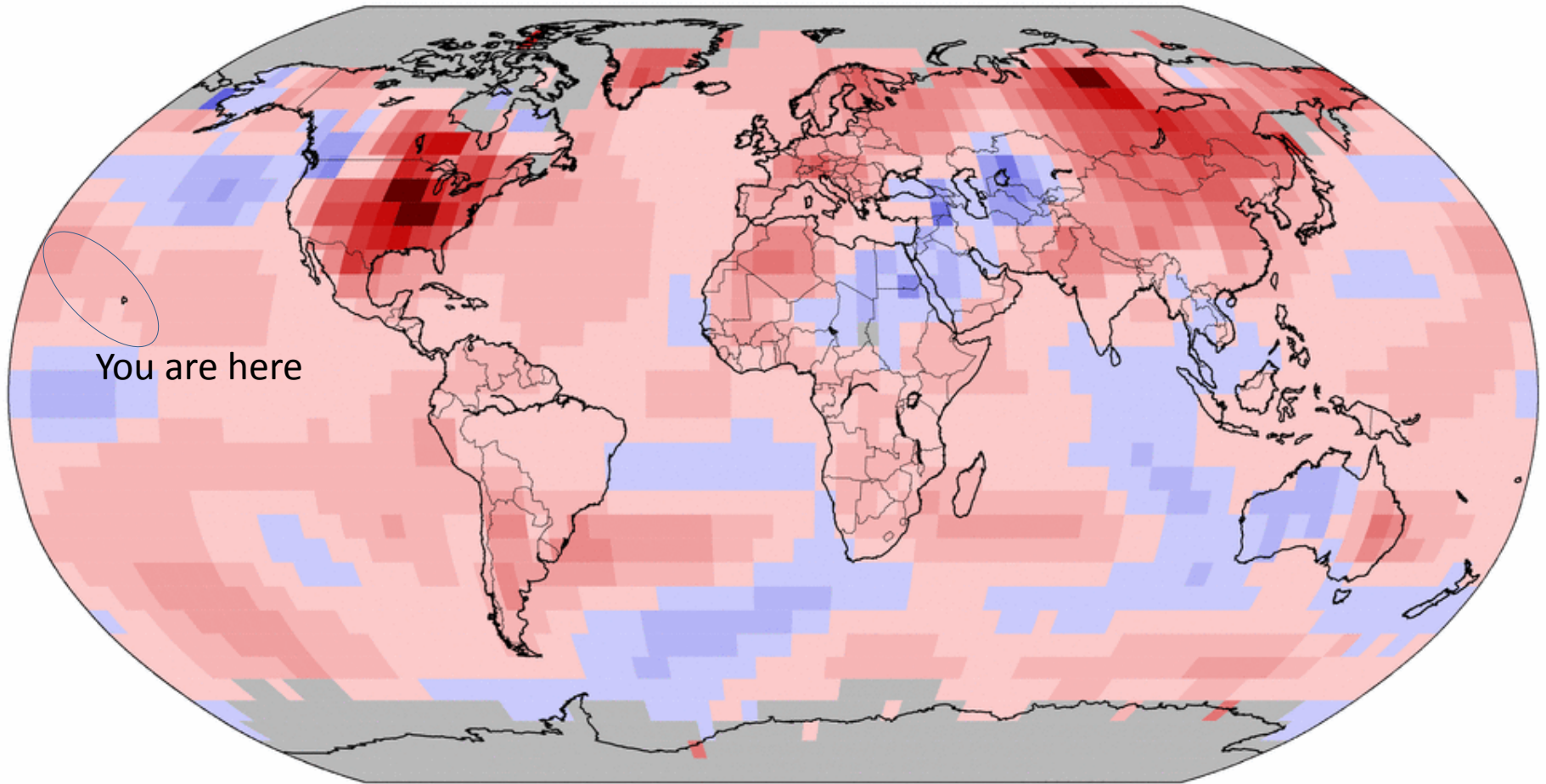
  
Much  
Warmer than  
Average

  
Record  
Warmest



# Land & Ocean Temperature Departure from Average Feb 2017 (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  
Sun Mar 12 07:32:41 EDT 2017

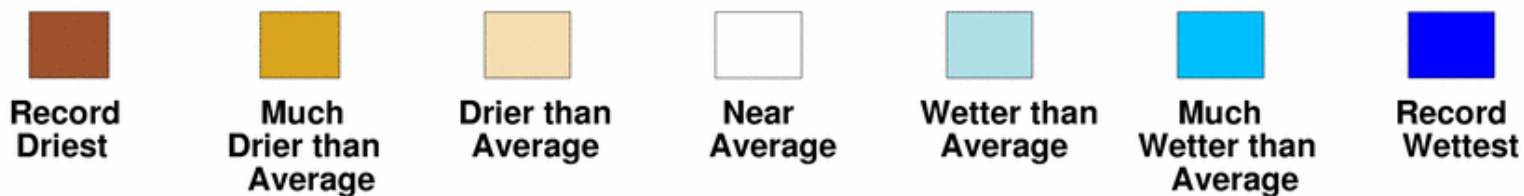
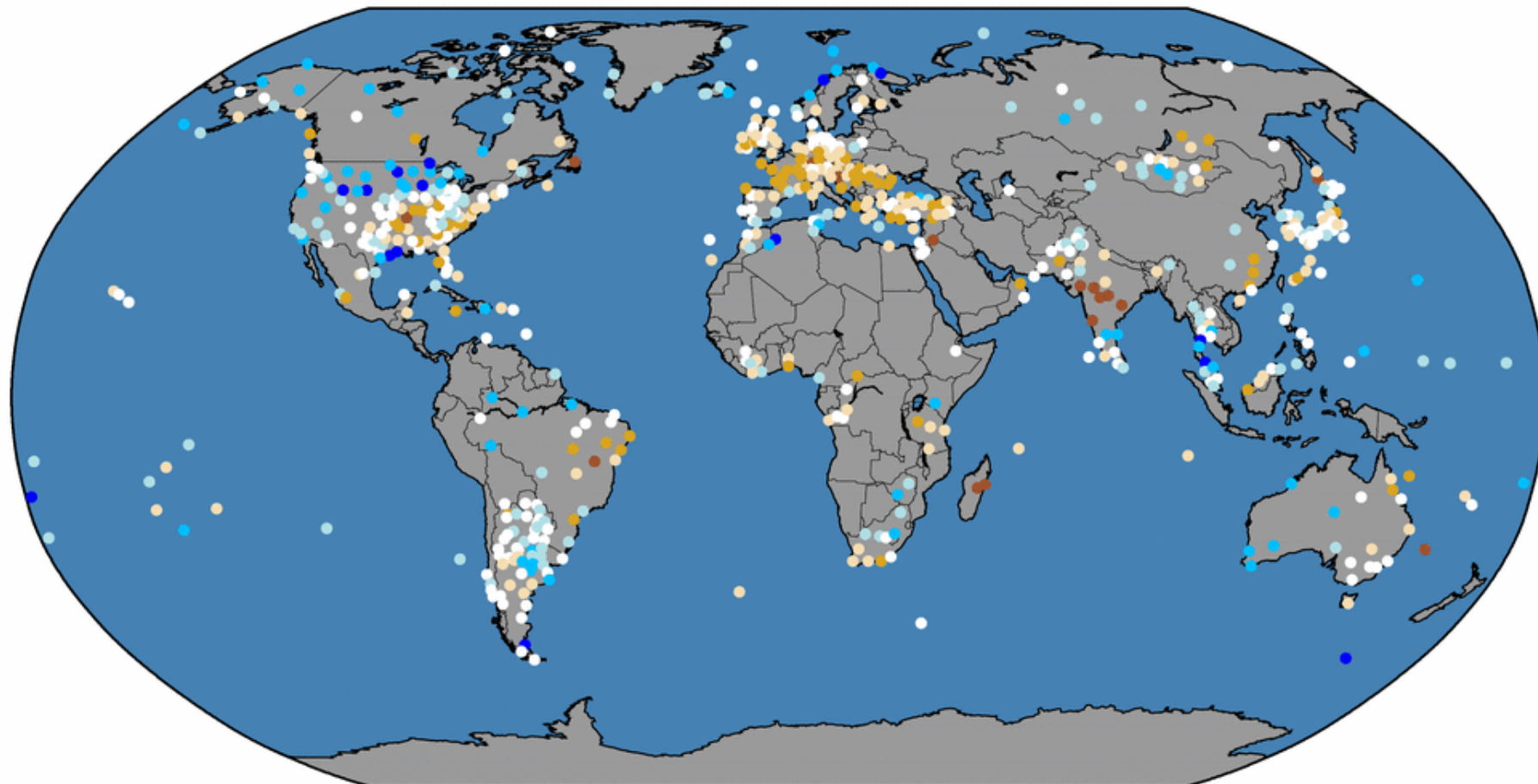
Degrees Celsius

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

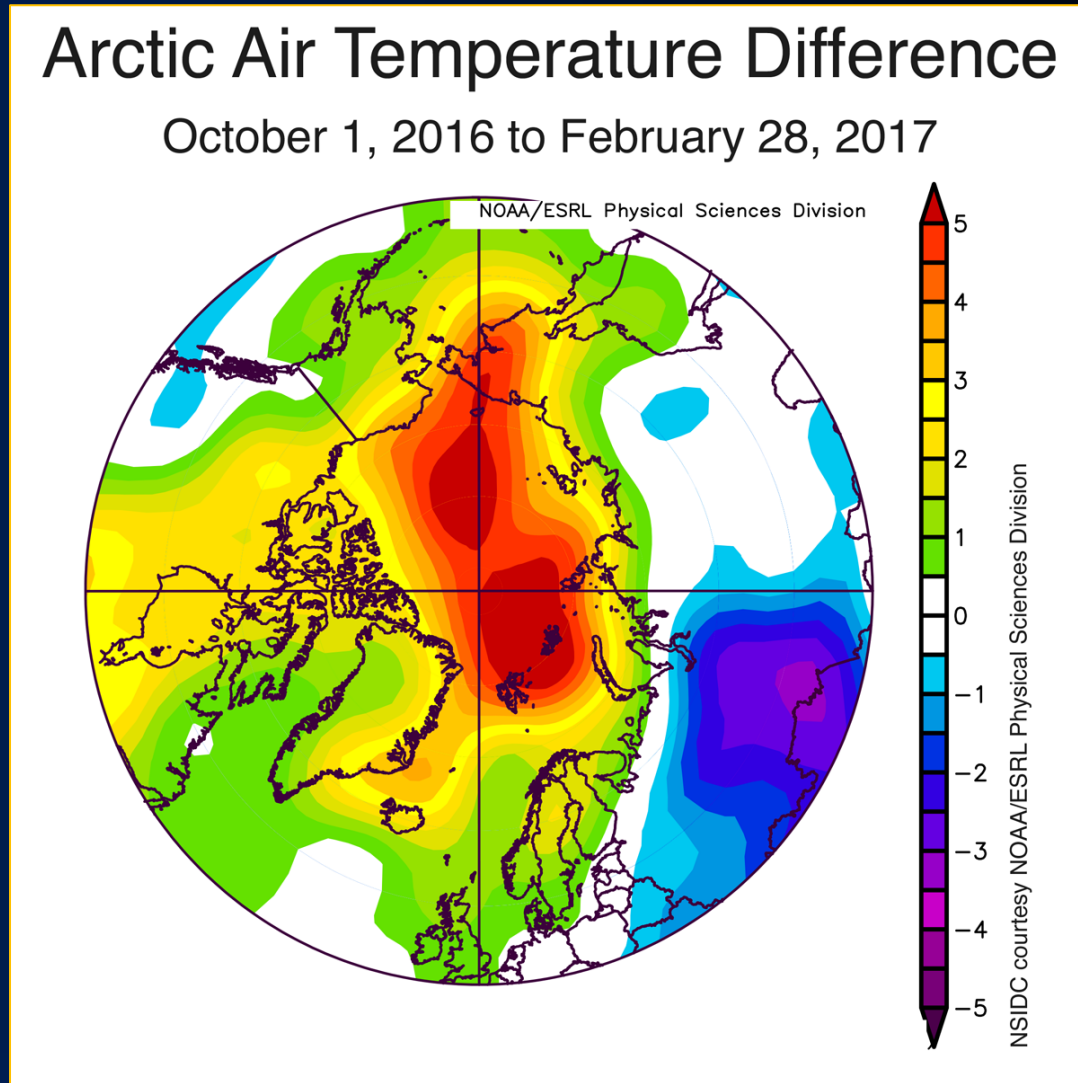
# Land-Only Precipitation Percentiles Dec 2016–Feb 2017

NOAA's National Centers for Environmental Information

Data Source: GHCN-M version 2



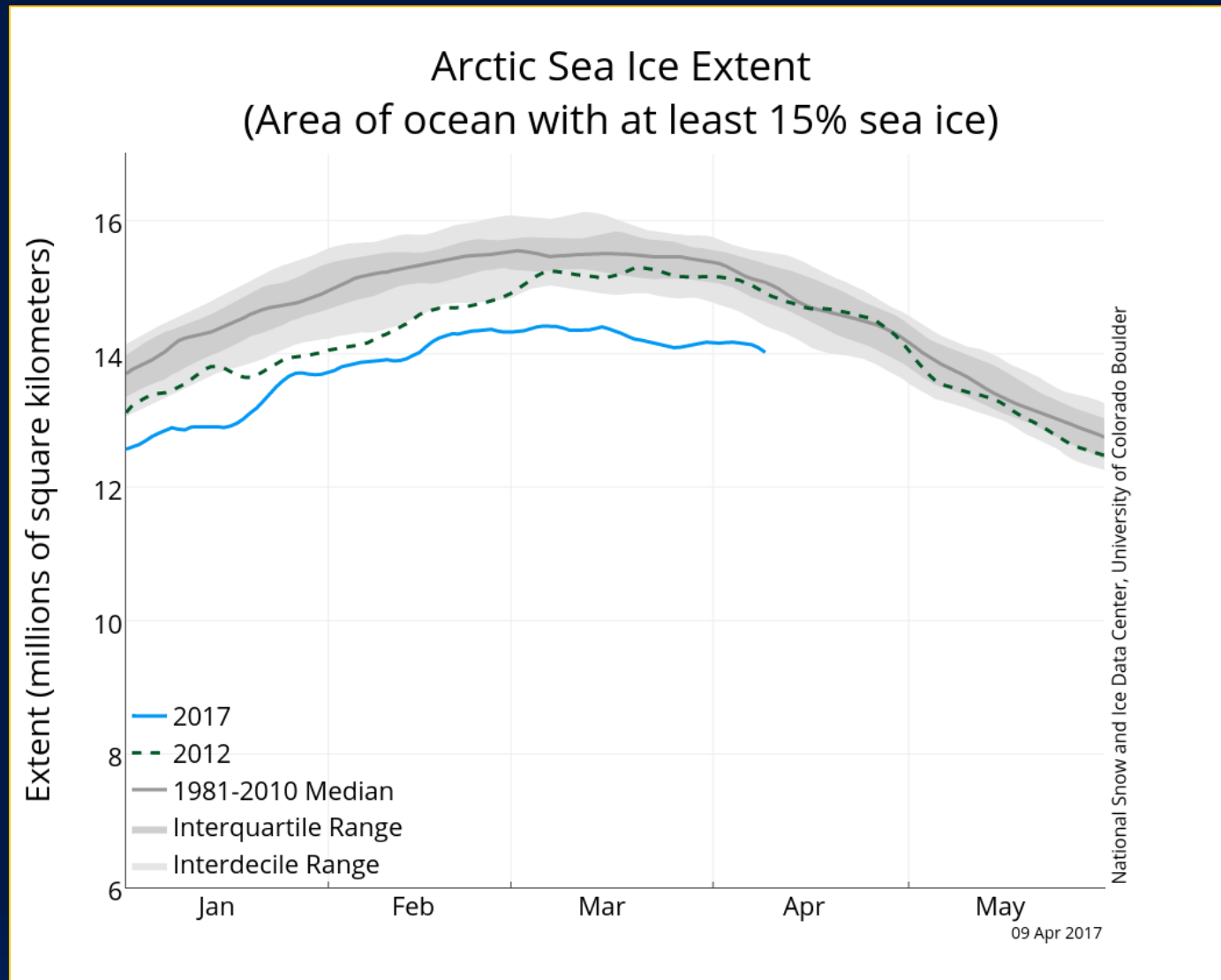
# Digression #1 – The Arctic Continues to be Warm



5 degrees C. above long term average for the past winter  
This has led to record low sea ice formation

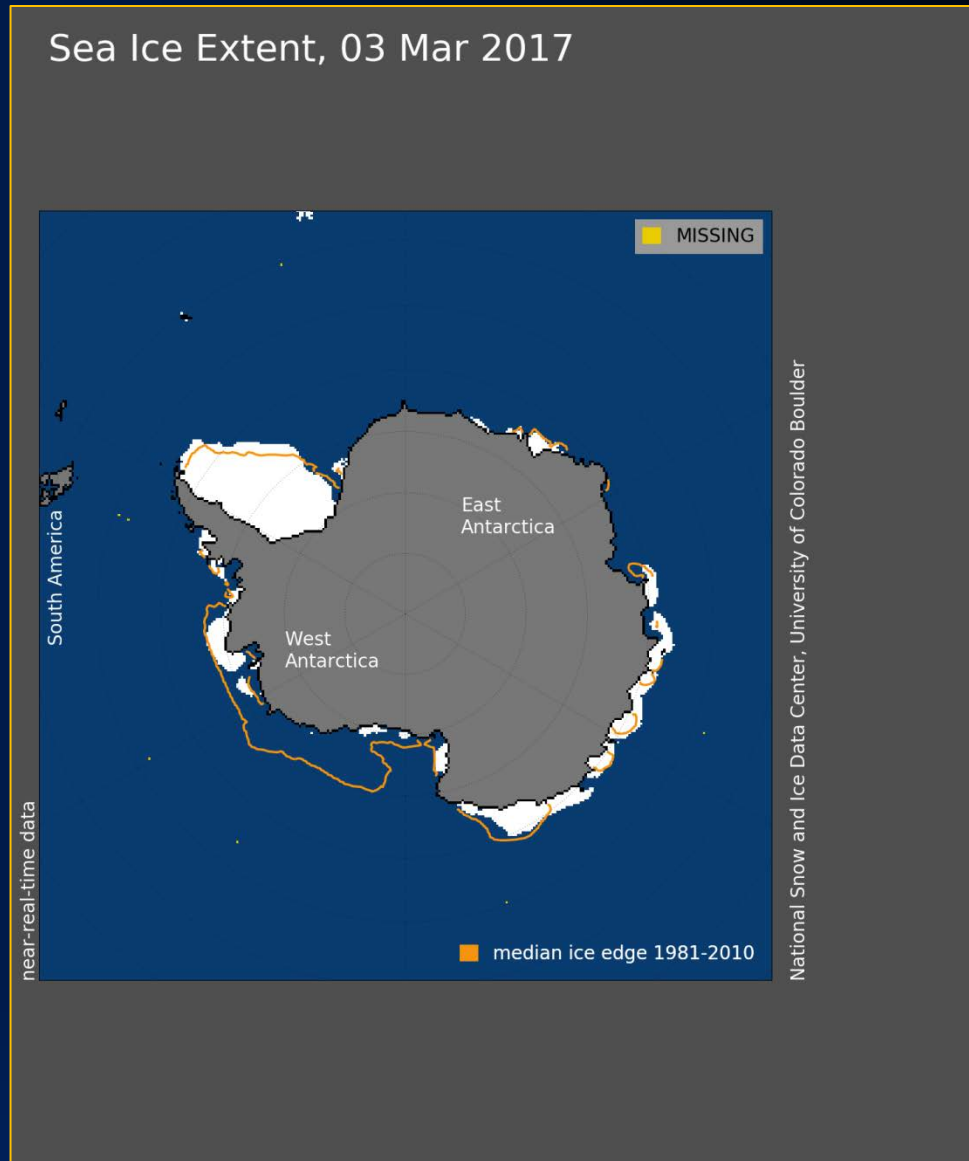


# Arctic sea ice extent is lowest ever seen in the satellite record 3 standard deviations below long-term mean



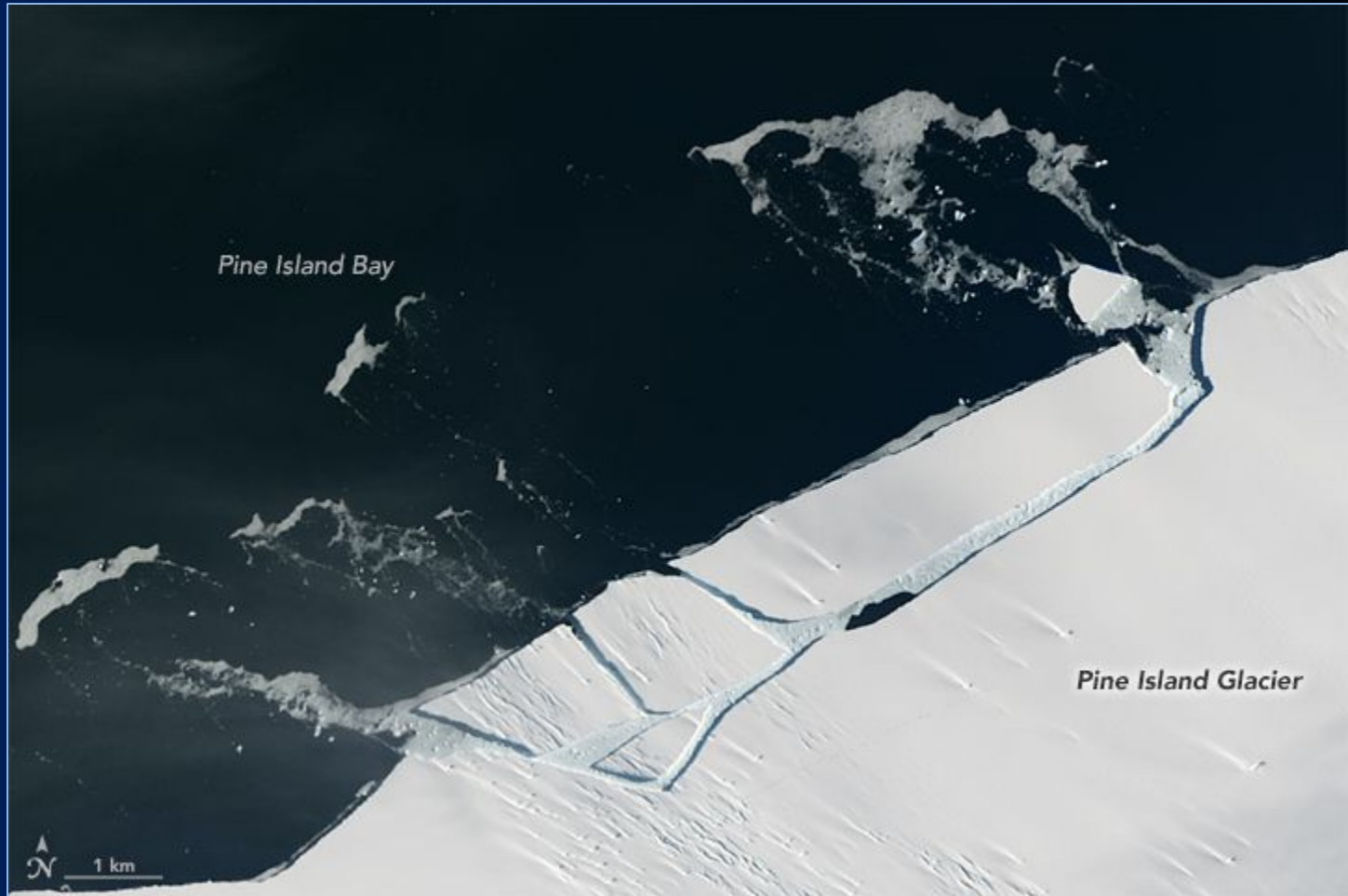
2012 was the previous record low year

# Digression #2 - Antarctic summer sea ice also set a record low



Most of the ice deficit was in West Antarctica

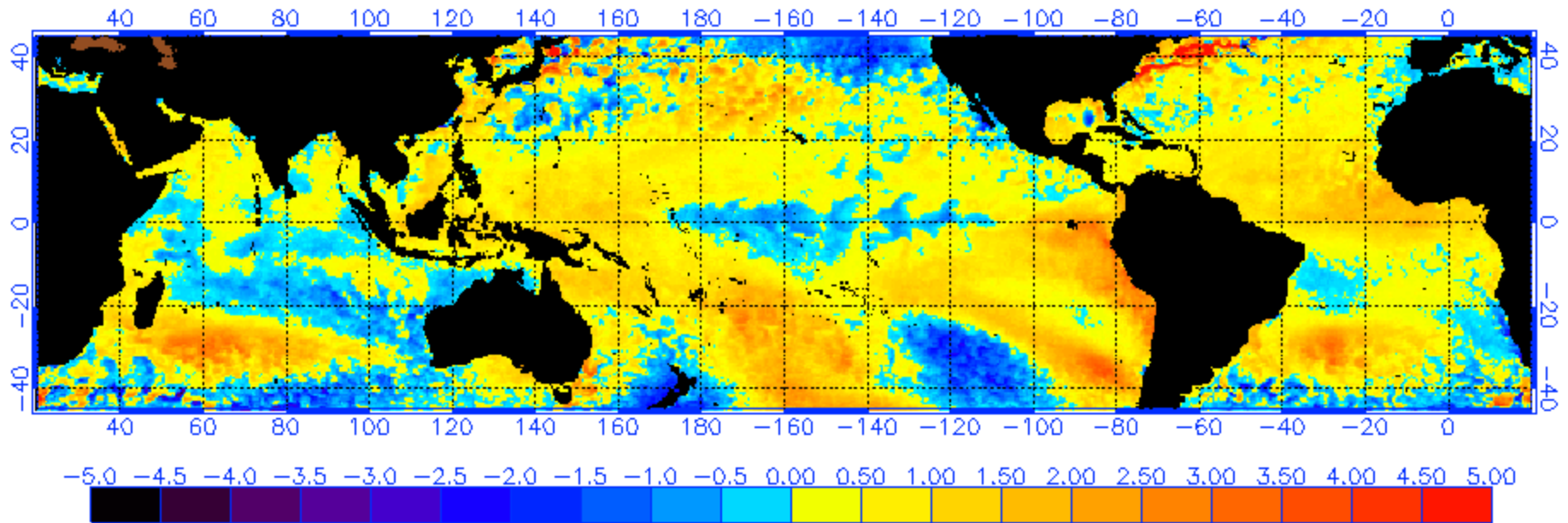
This has been accompanied by ice shelf loss



Iceberg the size of Manhattan Island breaks off Pine Island Glacier on 31 January 2017

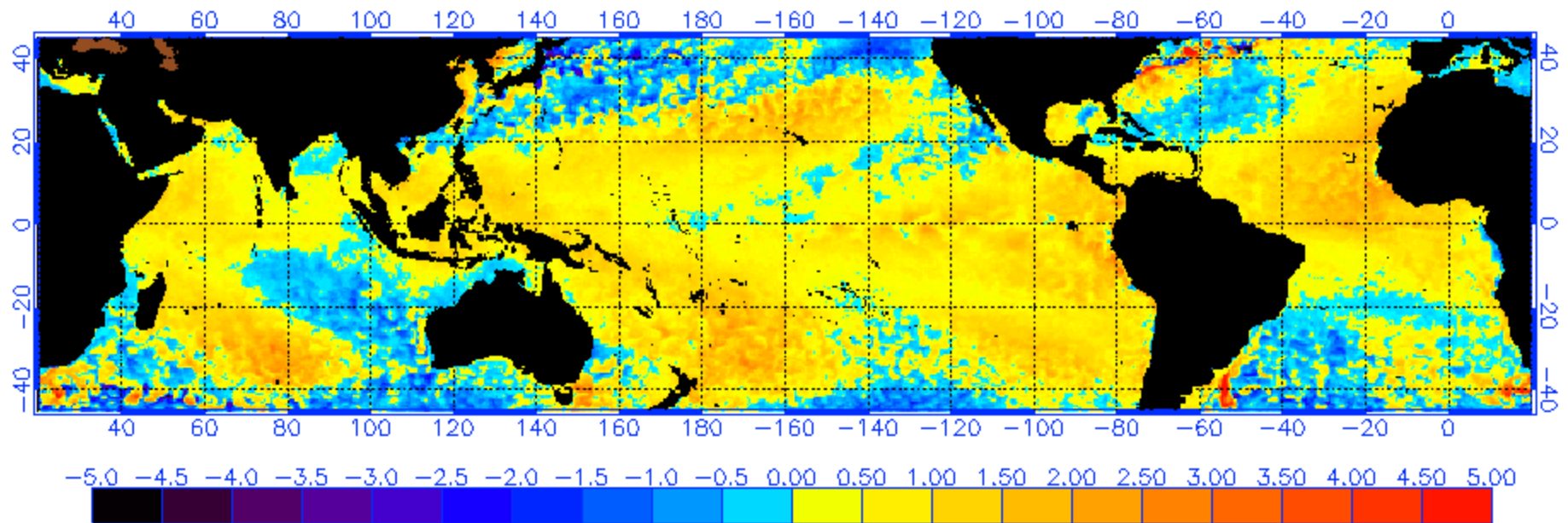
# Global Sea Surface Temperature Anomaly – 30 January 2017

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



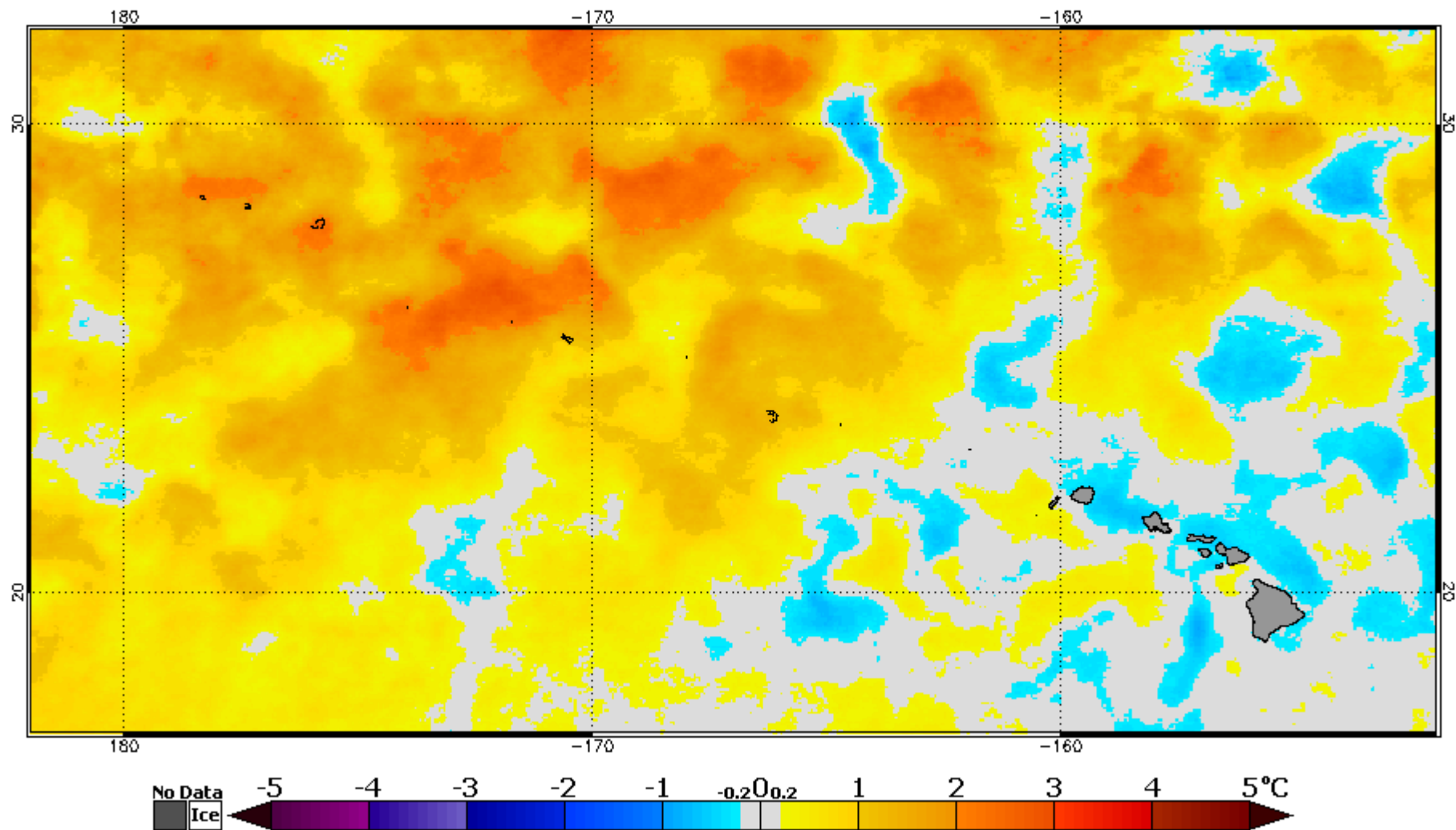
# Global Sea Surface Temperature Anomaly – 1 May 2017

NOAA/NESDIS SST Anomaly (degrees C), 5/1/2017



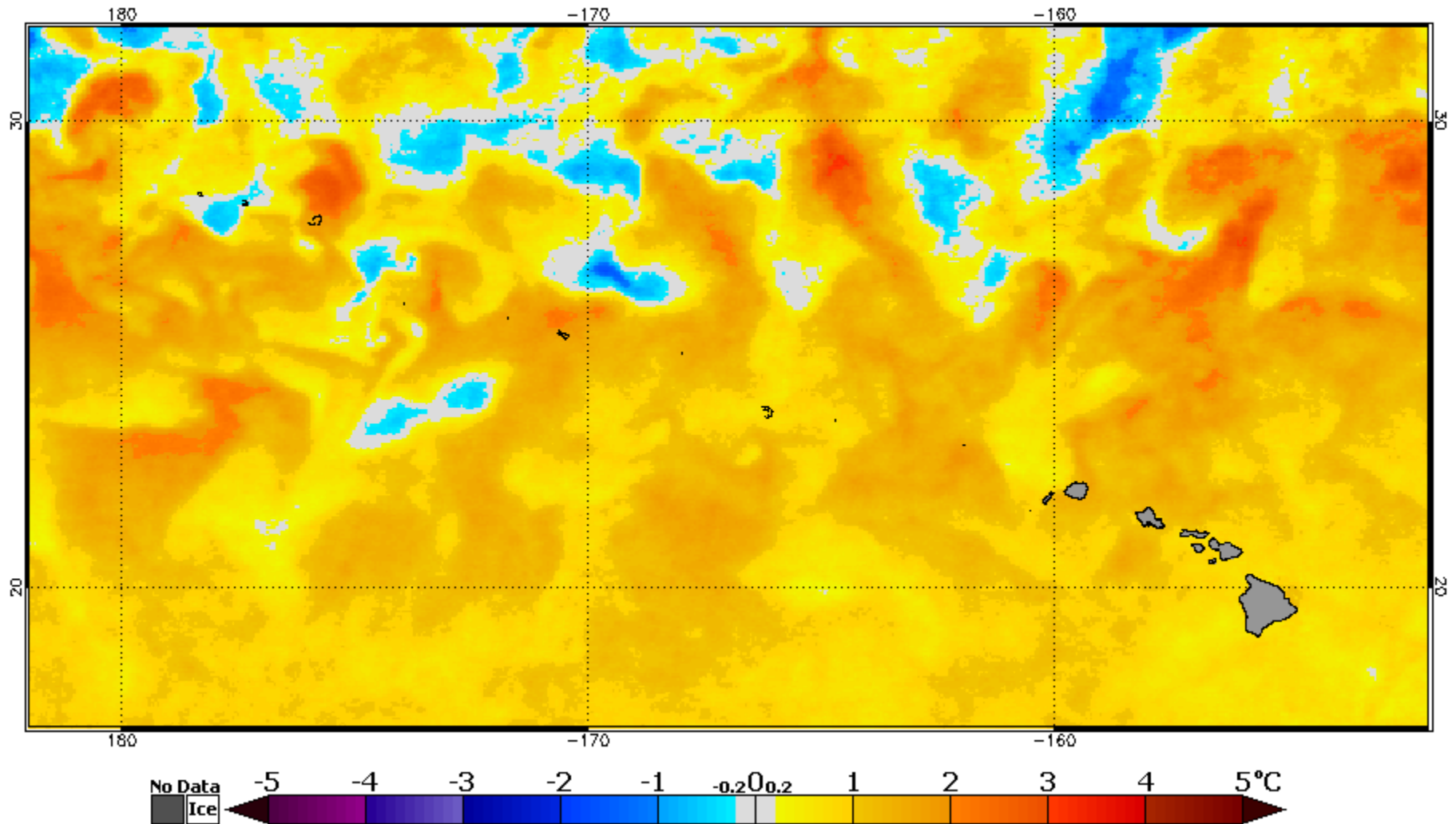
# Sea Surface Temperature Anomaly, Hawaii Sector – 31 January 2017

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



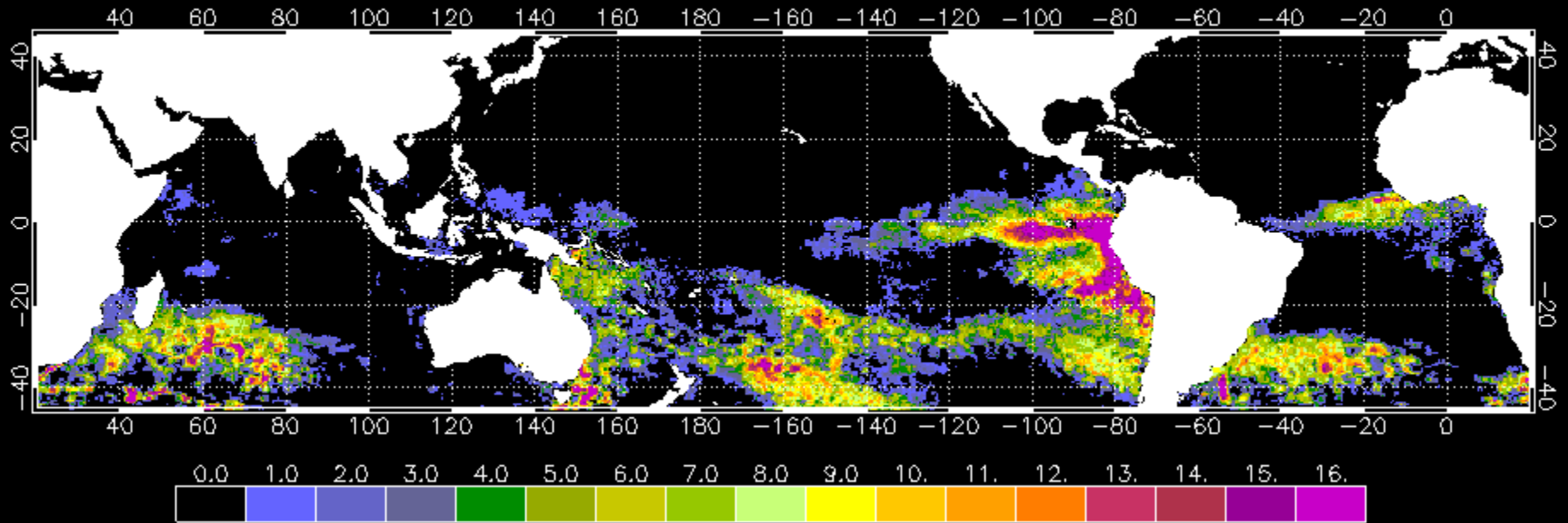
# Sea Surface Temperature Anomaly, Hawaii Sector – 1 May 2017

NOAA Coral Reef Watch Daily 5-km Geo-Polar Blended Night-Only SST Anomalies 1 May 2017



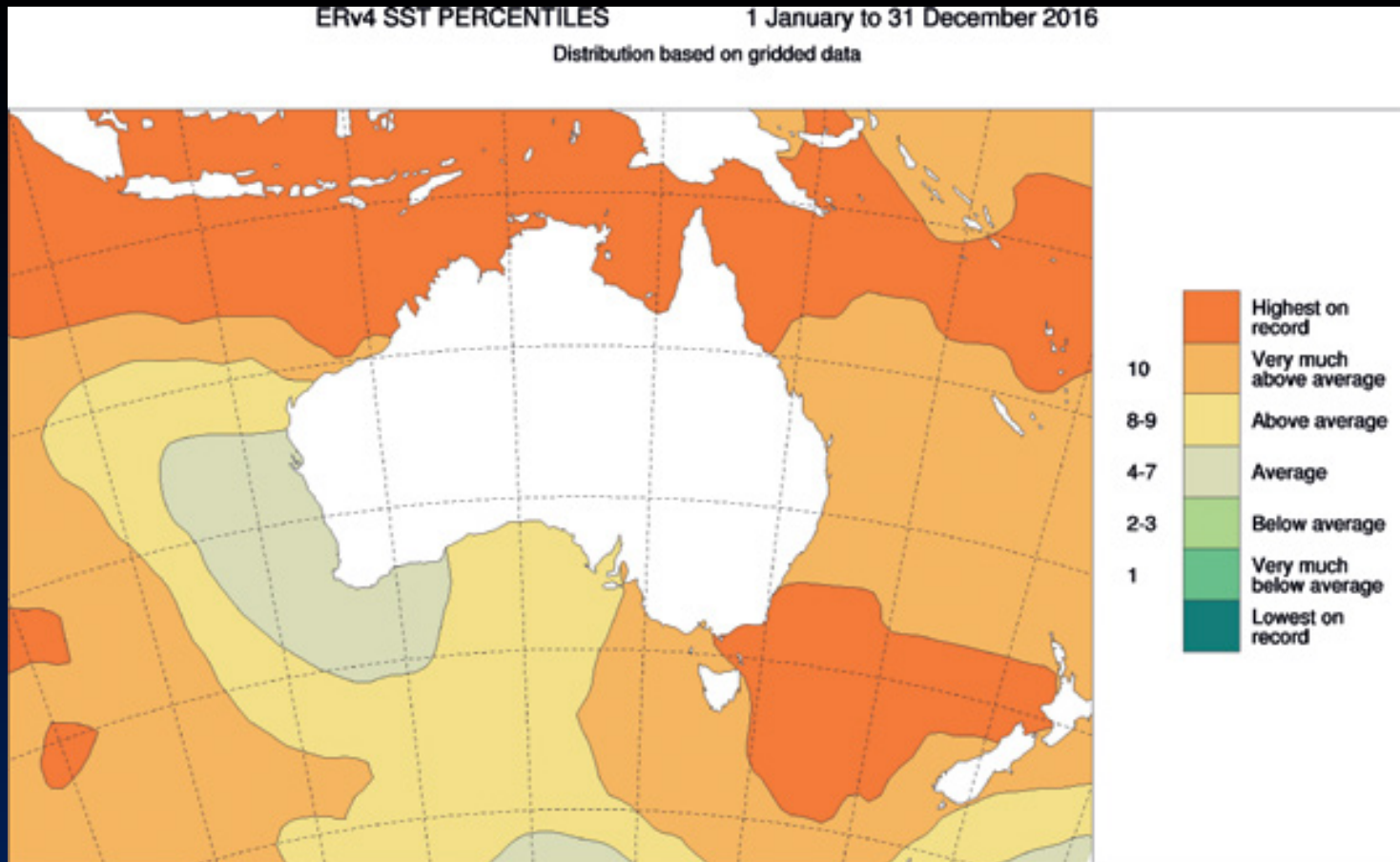
# Degree Heating Weeks – 10 April 2017

NOAA/NESDIS Degree Heating Weeks for last 12 Weeks – 5/1/2017



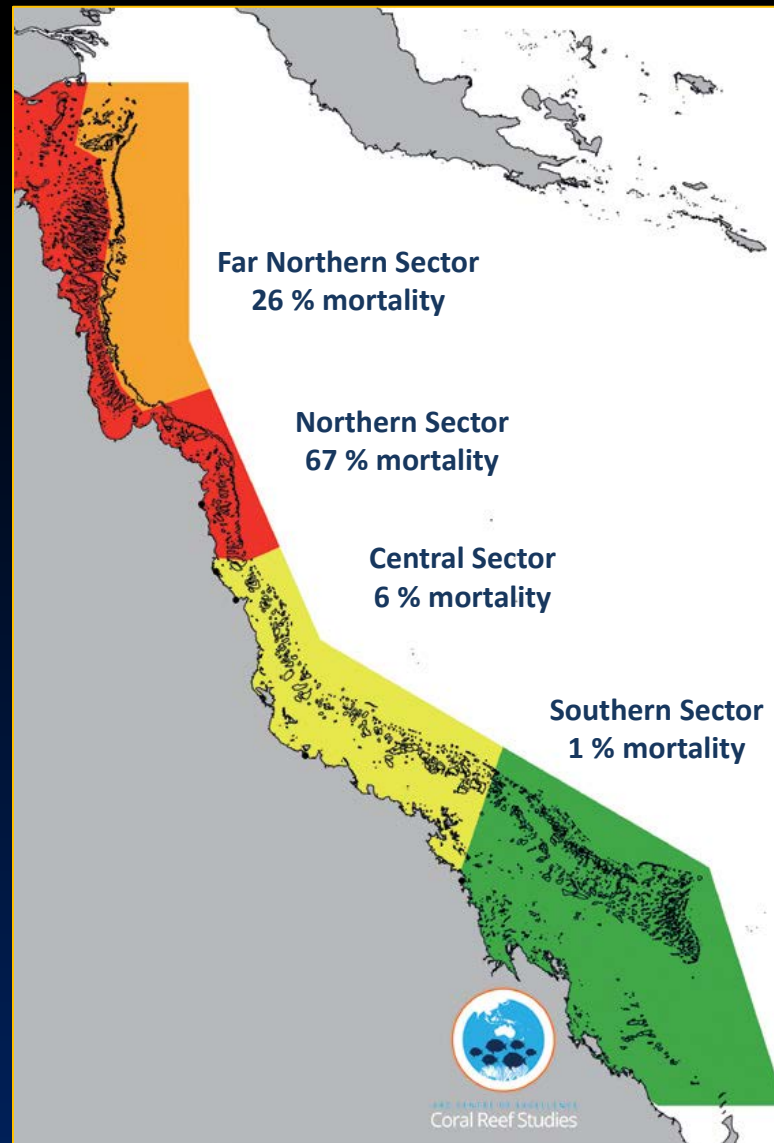


## Digression #2 - Hard Times on the Great Barrier Reef



Sea surface temperatures in northeastern Australia have been the highest ever recorded

This heat has produced significant impacts to the reef

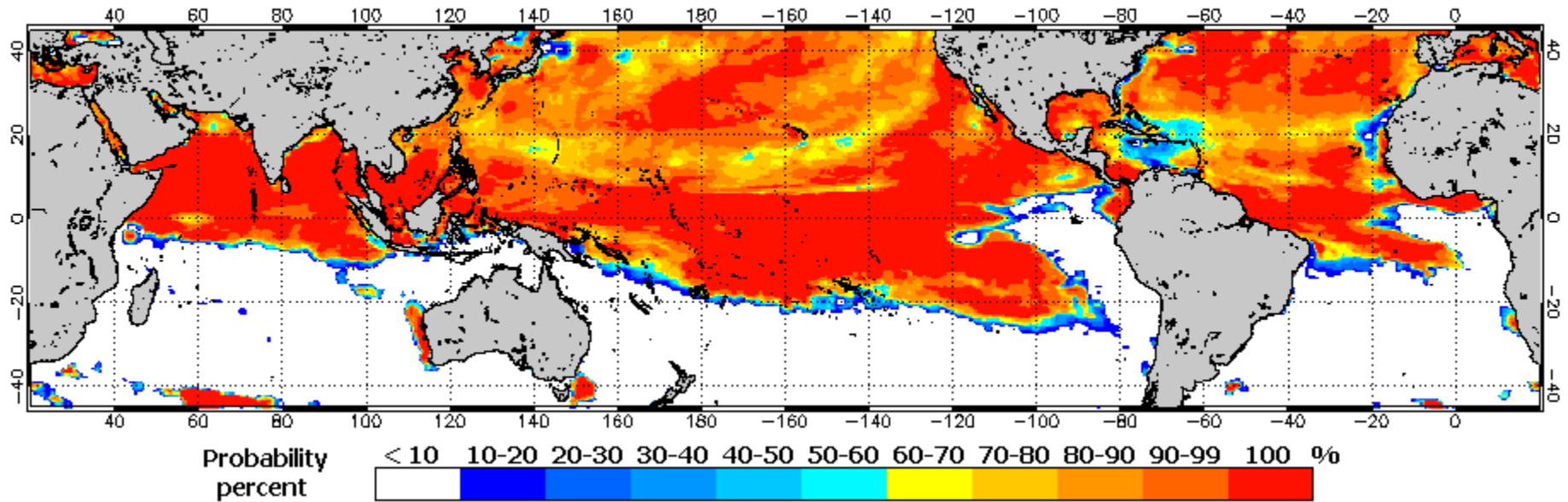


The northern sector of the GBR has suffered significant mortality

# Bleaching Stress Probability – April-July 2017

## Prediction as of 2 May 2017

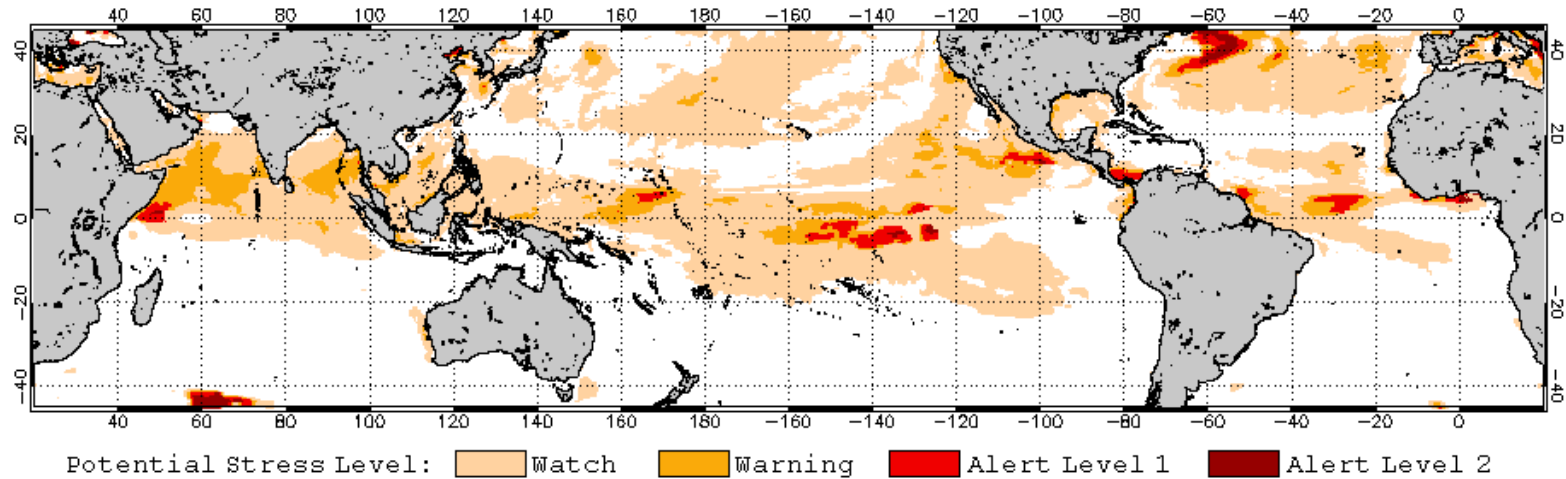
2017 May 2 NOAA Coral Reef Watch Probabilistic Bleaching Thermal Stress Watch for May–Aug 2017  
Experimental, v3.0, CFSv2-based, 28-member Ensemble Forecast



Experimental product indicates 90-100% chance of some degree of thermal stress for Monument reefs from now through August

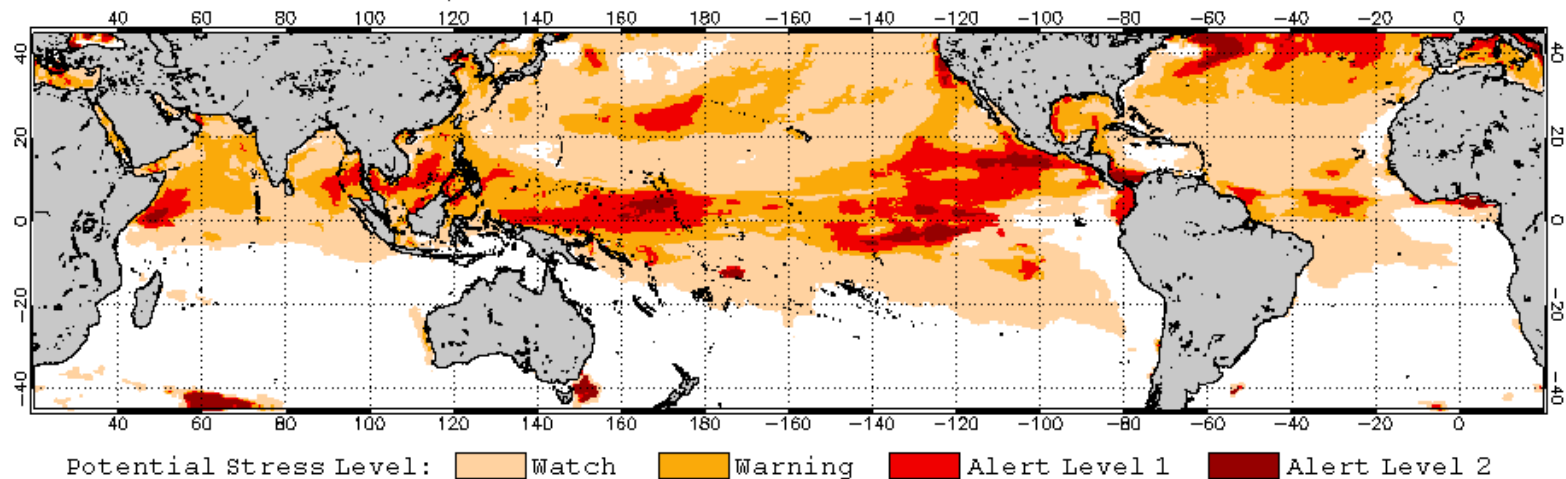
# 90% Stress Level Probability - May-August 2017

2017 May 2 NOAA Coral Reef Watch 90% Probability Coral Bleaching Thermal Stress for May-Aug 2017  
Experimental, v3.0, CFSv2-based, 28-member Ensemble Forecast



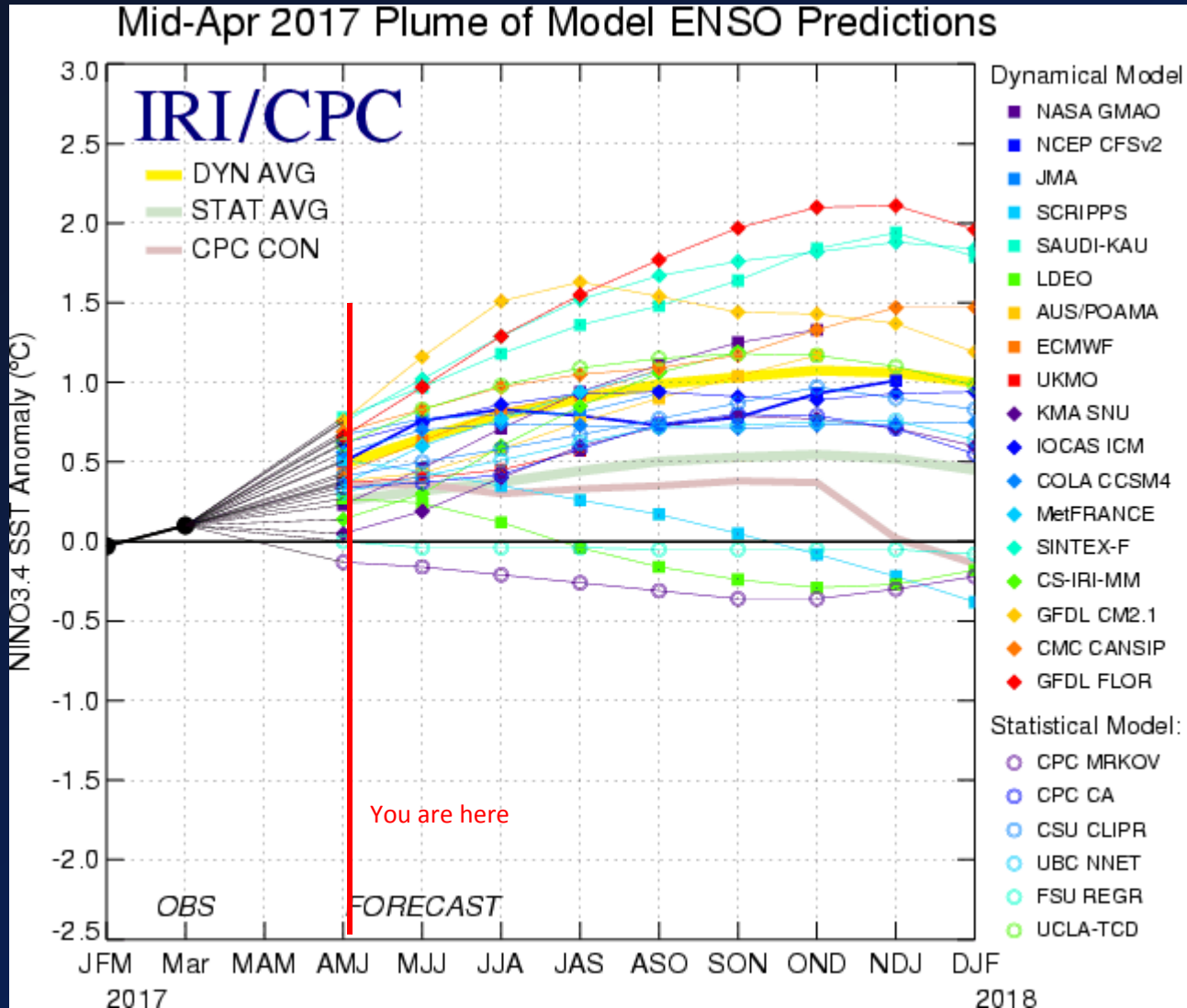
# 60% Stress Level Probability - May-August 2017

2017 Apr 25 NOAA Coral Reef Watch 60% Probability Coral Bleaching Thermal Stress for May-Aug 2017  
Experimental, v3.0, CFSv2-based, 28-member Ensemble Forecast



# Looking Forward

An ensemble of 25 climate models predicts either mild El Niño or ENSO neutral conditions through summer 2017



Dynamical models favor El Niño, whereas statistical models favor ENSO-neutral

# Conclusions

2017 is continuing the trend of record hot years, both on land and in the ocean

The ocean in and near the Monument is still carrying some heat excess content coming out of winter and through spring

ENSO neutral conditions currently prevail, but may change to mild El Niño by summer

May produce warmer ocean temperatures and increased chance of hurricanes

There is a 90-100% chance of some degree of thermal stress to coral reefs in the Monument from now through August 2017

There is a 60% probability of some coral bleaching in the Midway-Kure sector through August 2017

Local cyclogenesis could be a possibility if El Niño returns

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?

*Hawaii is only*

22  $\frac{1}{3}$  MAINLINER HOURS FROM CHICAGO



UNITED AIR LINES

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The advertisement features a Lockheed Constellation aircraft in flight, banking over a tropical coastline. The plane is silver with a dark blue stripe and the word "United" on the fuselage. The registration number "N43750" is visible on the wing. The background shows a sandy beach, turquoise water, and reddish-brown mountains under a yellow sky. The text "Hawaii is only" is written in a cursive font, and "22 1/3 MAINLINER HOURS FROM CHICAGO" is in a bold, sans-serif font. The United Airlines logo is on the tail. At the bottom, the words "UNITED AIR LINES" are printed in a bold, white, sans-serif font on a dark background. A small watermark "UNITED AIRLINES POSTER NET" is visible at the bottom right.