Jan-Sep Global Surface Mean Temp Anomalies
NCEI/NESDIS/NOAA
Analysis is based upon Smith et al. (2008) methodology.

- Land and Ocean
- Ocean
- Land

°C

1880 1900 1920 1940 1960 1980 2000

Temperature anomalies for land and ocean from 1880 to 2000, showing a gradual increase over time.
Year-to-Date Global Temperatures
for 2016 and the other seven warmest years on record

Difference (°C) from the 20th century average

Jan  Feb  Mar  Apr  May  Jun  Jul  Aug  Sep  Oct  Nov  Dec

2016
2015
2014
2010
2009
2005
2004
1998
Land & Ocean Temperature Departure from Average Sep 2016
(with respect to a 1981–2010 base period)

Data Source: GHCN–M version 3.3.0 & ERSST version 4.0.0
Land & Ocean Temperature Percentiles Sep 2016
NOAA’s National Centers for Environmental Information
Data Source: GHCN–M version 3.3.0 & ERSST version 4.0.0
(with respect to a 1961–1990 base period)

Data Source: GHCN–M version 2

Please Note: Gray areas represent missing data
Map Projection: Robinson
NOAA’s National Centers for Environmental Information
Data Source: GHCN–M version 2
Land–Only Precipitation Anomalies Sep 2016
(with respect to a 1961–1990 base period)

Data Source: GHCN–M version 2

Millimeters

Please Note: Gray areas represent missing data
Map Projection: Robinson
Digression #1 – A Warmer Atmosphere Holds More Water

Rainfall totals from Hurricane Matthew, 10 October 2016
Precipitation was equivalent to 75% of the volume of Chesapeake Bay
Global Sea Surface Temperature Anomaly 14 November 2016

NOAA/NESDIS SST Anomaly (degrees C), 11/14/2016
Sea Surface Temperature Anomaly, Hawaii Sector, 2 August 2016
Sea Surface Temperature Anomaly, Hawaii Sector, 14 Nov. 2016
Projected SST Trend, Hawaii Sector, 14 Nov. 2016

NOAA Coral Reef Watch Daily 5-km Geo-Polar Blended Night-Only SST Trend (Past 7 Days) 14 Nov 2016
Bleaching Stress Probability, November 2016-February 2017
Prediction as of 15 November 2016
60% Bleaching Probability, 15 November 2016
Digression #2 – A Warmer Ocean Means a Melting Arctic
Lowest sea ice extent ever for this date in the modern record
A Melting Arctic Means Drastically Increased Shoreline Erosion
from both wave attack and permafrost melting

Shoreline collapse in the New Siberian Islands, September 2016
Melting permafrost shores release methane – a potent greenhouse gas
Looking Forward

An ensemble of 25 climate models predicts mild La Nina or ENSO neutral conditions by late 2016.
Fun New Time Series
CO₂ Data from Midway
(with thanks to the NOAA Carbon Cycle Greenhouse Gases Group)
Conclusions

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

El Nino has dissipated, and ENSO neutral to mild La Nina conditions are developing
   This generally means cooler ocean temperatures and fewer hurricanes

So far there are no reports of additional bleaching in the NWHI in 2016
   With the change to fall weather patterns, the threat for this year is over

Cyclogenesis was anomalously high in the Eastern Pacific again this year
   A worrisome trend, since this was not an El Nino year; is this the new normal?

Sea level continues to rise at 3-5 mm per year
   Inundation is a long-term problem that will not go away
Questions?

Eh, brah—
I really feel
for ya!

PAPA-
HANAU-
MOKU-
AKEA
MARINE
NATIONAL
MONUMENT
EXPANSION

FISHERMEN