



NOAA/NASA

Annual Global Analysis for 2017

2017 was another top-three record-warm year

Gavin A. Schmidt

*Director, NASA's Goddard Institute
for Space Studies*



Derek Arndt

*Chief, Monitoring Branch, NOAA's National
Centers for Environmental Information*



January 2018

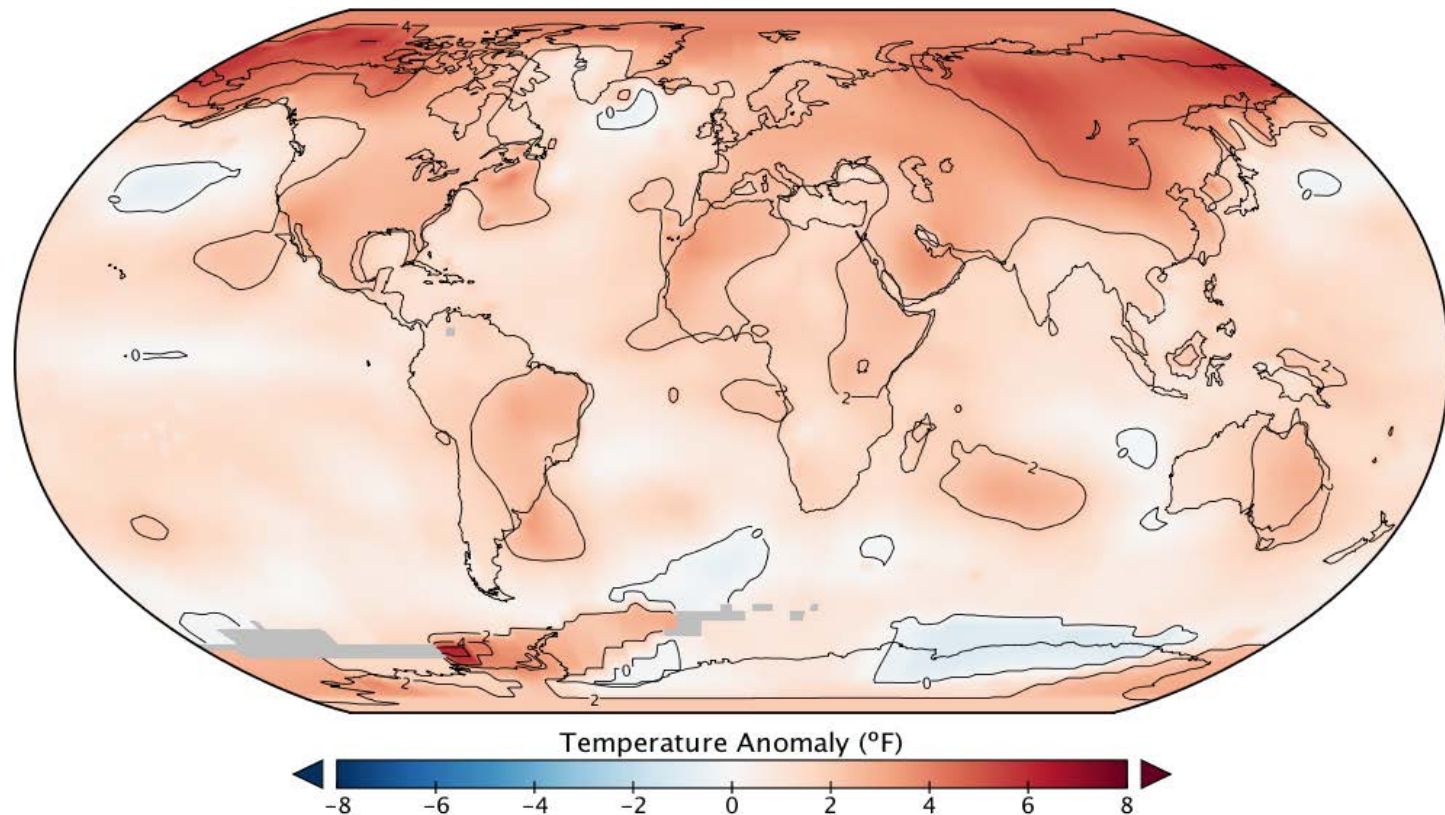
NASA 2017 Global Temperature

2017:

0.9°C / 1.6°F
above 1951-80
average

2nd Warmest
year of NASA
GISTEMP record

GISTEMP Annual Mean 2017
Baseline 1951-1980



NOAA 2017 Global Temperature

0.84°C / 1.51°F above 1901-2000 average; 3rd warmest year of record

USA - CONUS

3rd warmest year
Wetter than
average

ENSO

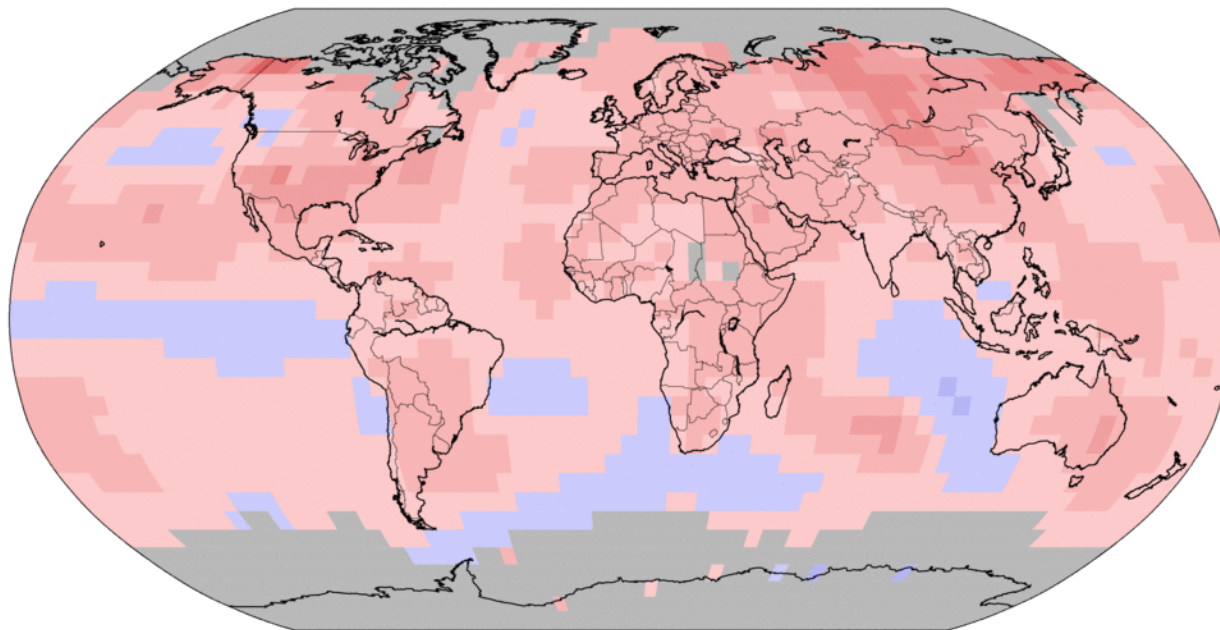
Neutral to La Nina
conditions
prevailed most of
the year

Argentina

110°F on 27 Jan at
Puerto Madryn
was highest
temperature
recorded this far
south

Land & Ocean Temperature Departure from Average Jan–Dec 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
Tue Jan 16 07:02:18 EST 2018

Degrees Celsius

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

Continental Temperatures

records begin 1910

S. America

2nd warmest year

Asia

3rd warmest year

Africa

4th warmest year

Europe

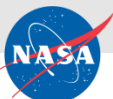
5th warmest year

N. America, Oceania

6th warmest year

South of 20°S latitude:

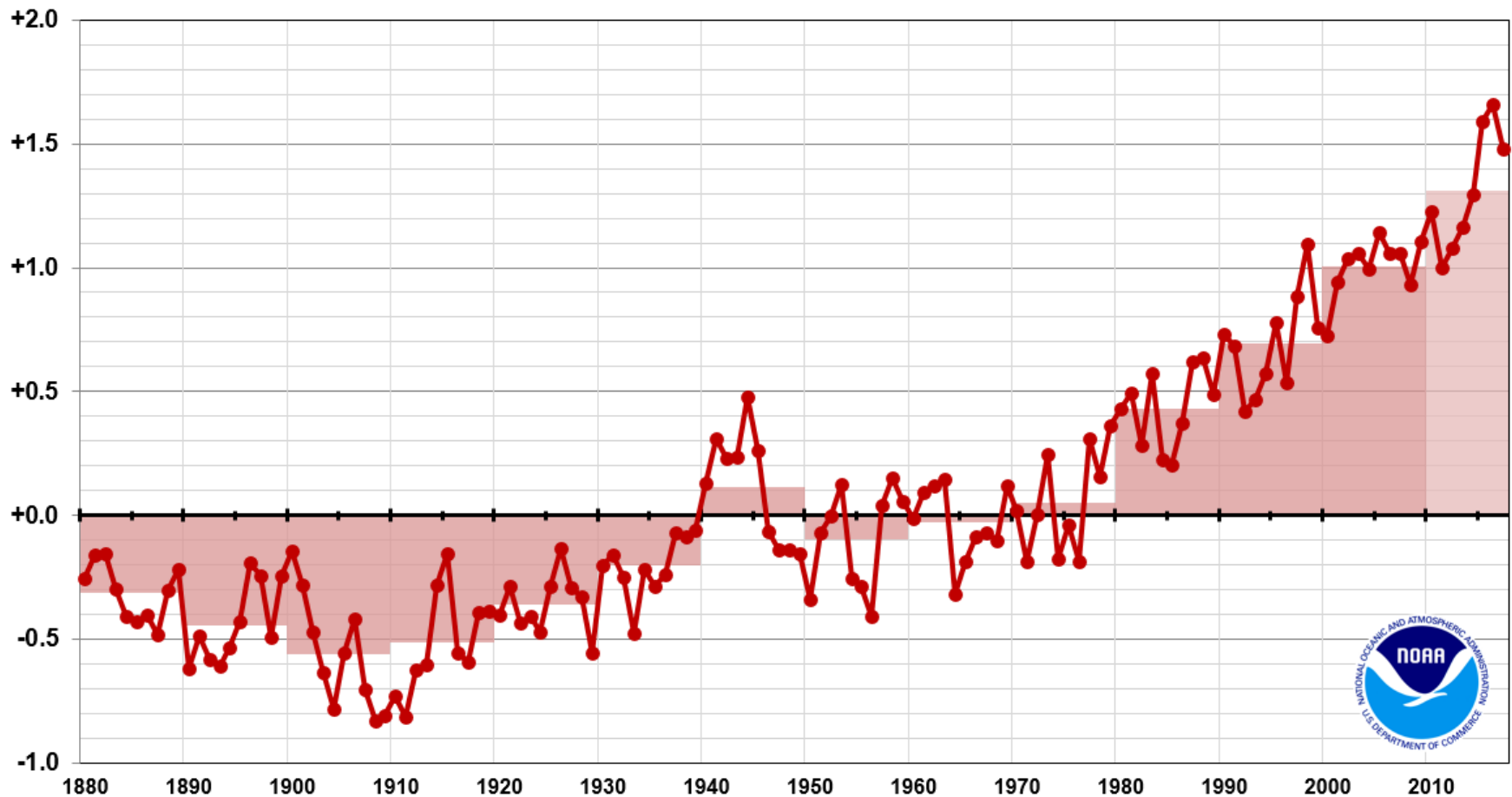
Warmest year of
record



Global Temperature Time Series

NOAA GlobalTemp

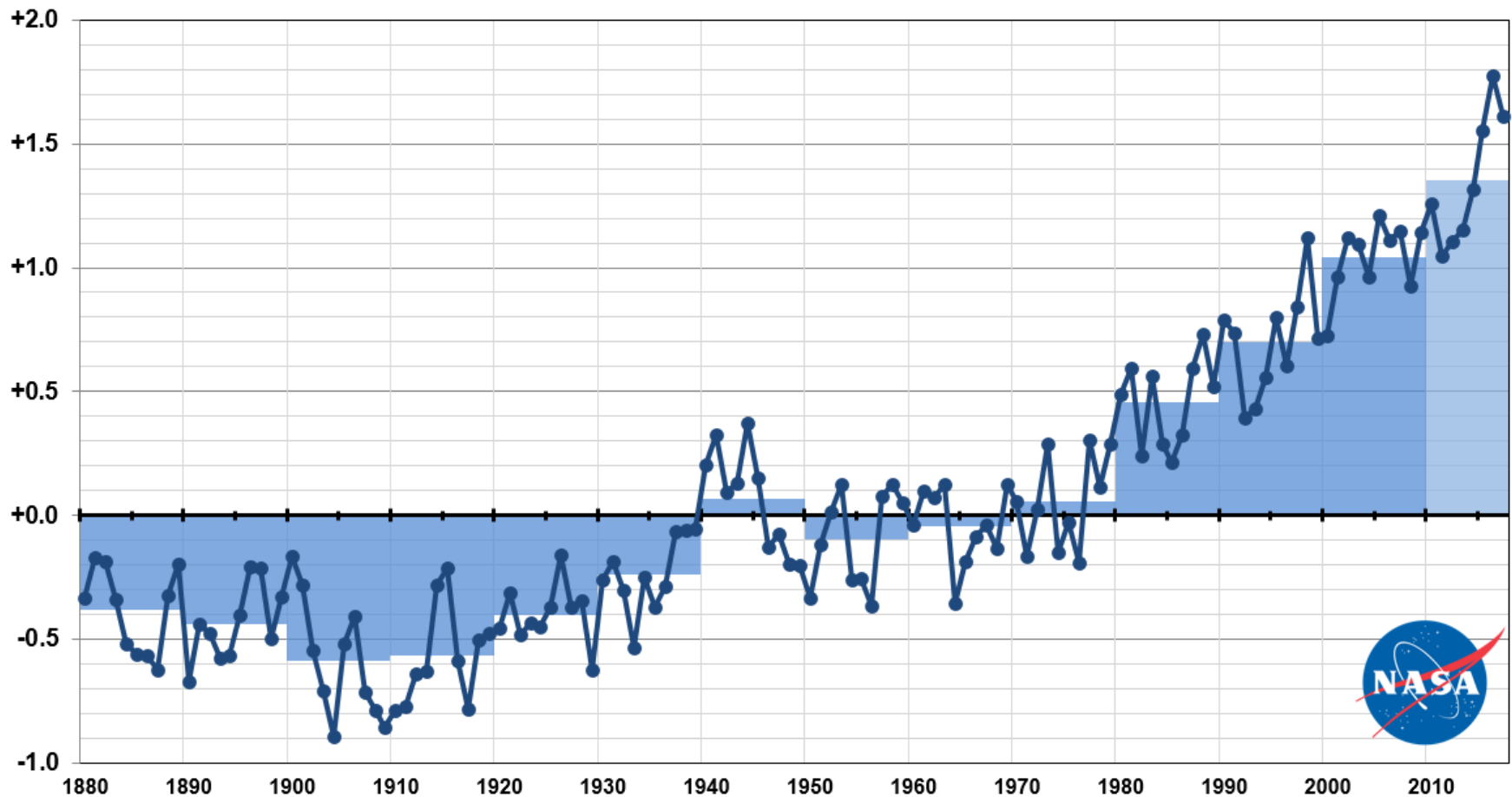
Annual Global Temperature: Difference From 1951-80 Average, in °F



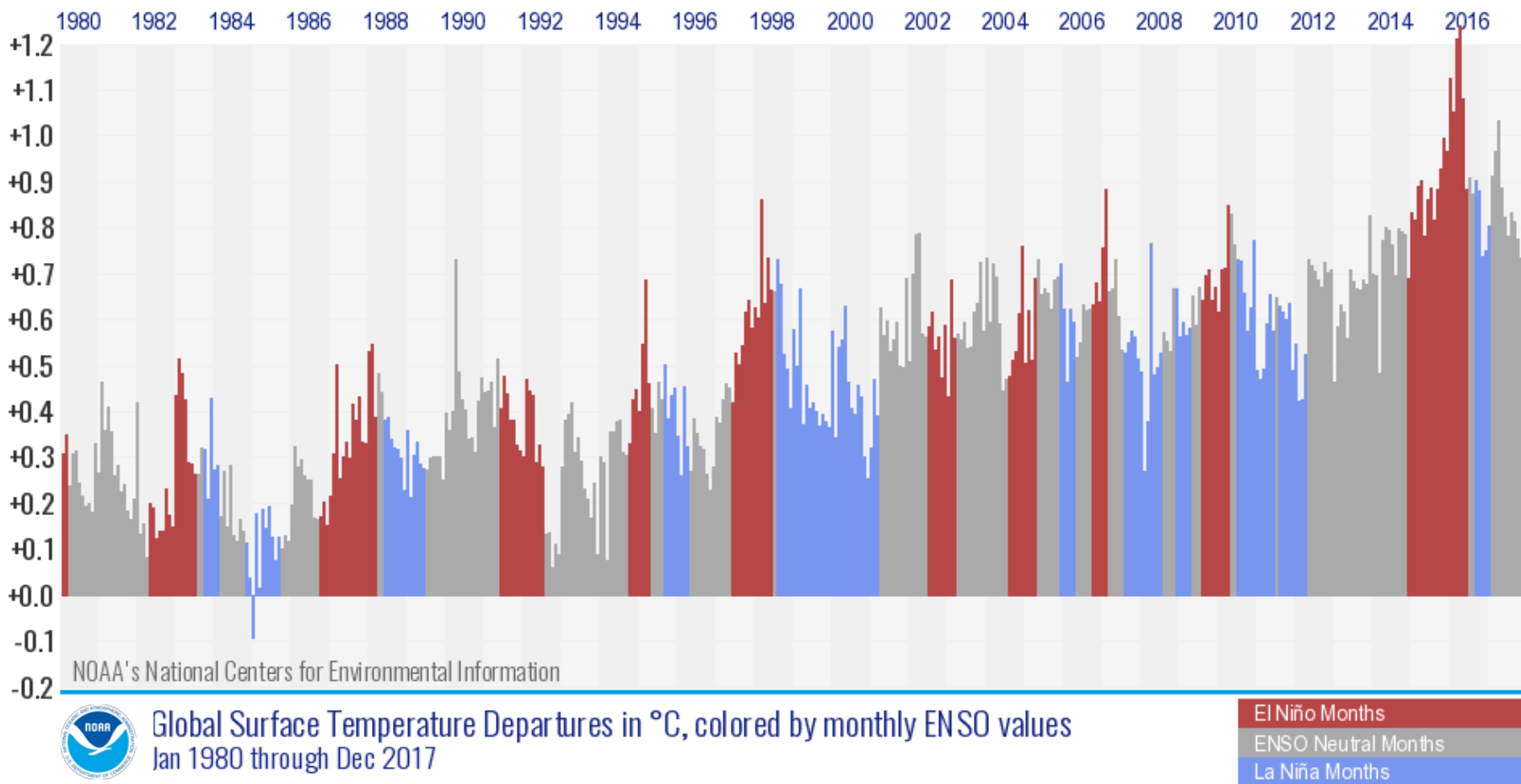
Global Temperature Time Series

NASA GISTEMP

Annual Global Temperature: Difference From 1951-80 Average, in °F



El Niño / La Niña & Global Temperature



Months with La Niña conditions in blue
Months with El Niño conditions in red

Impact of ENSO on NASA analysis

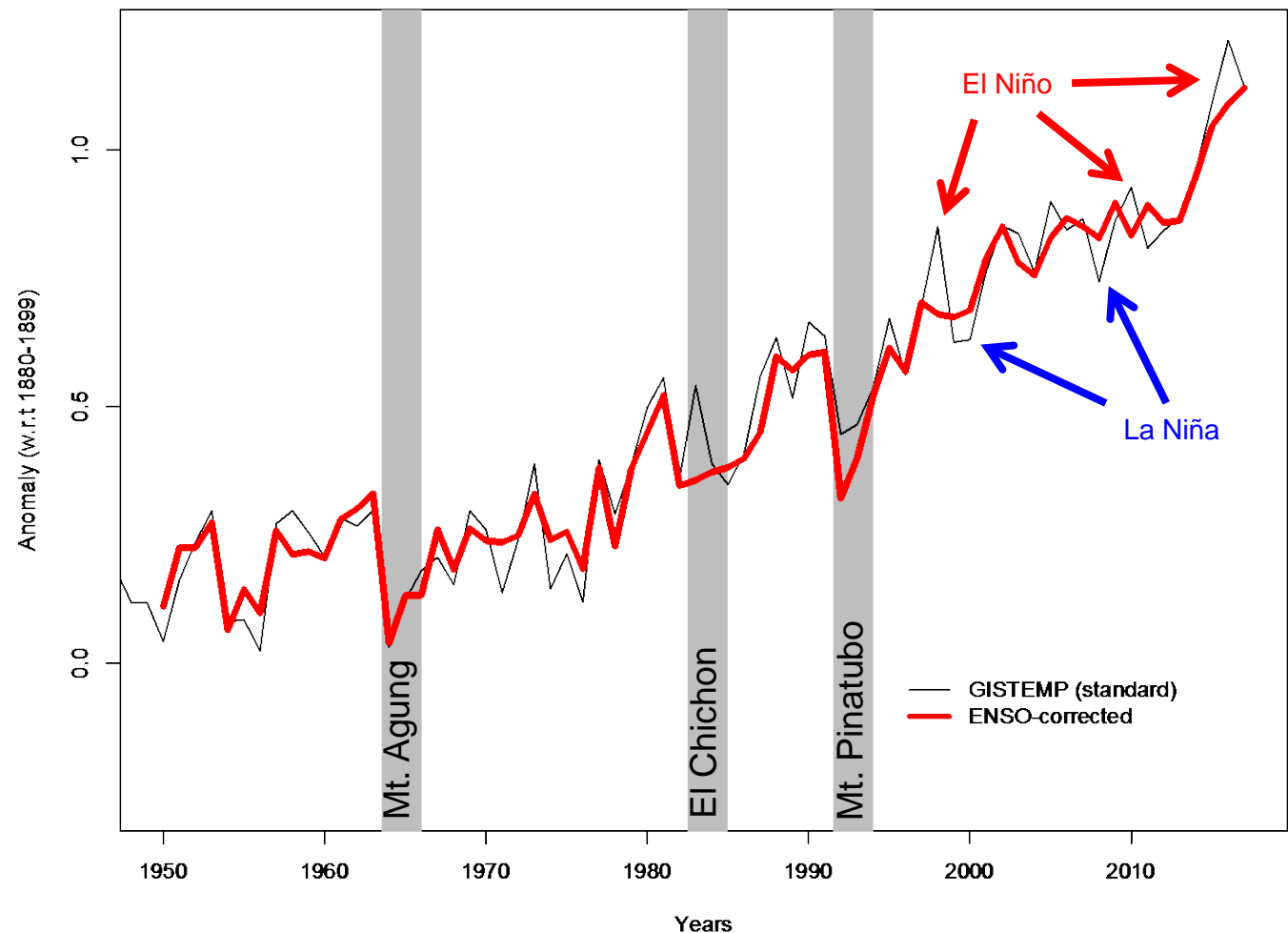
Maximum correlation to annual mean is Feb-Mar ENSO index

ENSO contribution to specific years:

2015: 0.04°C

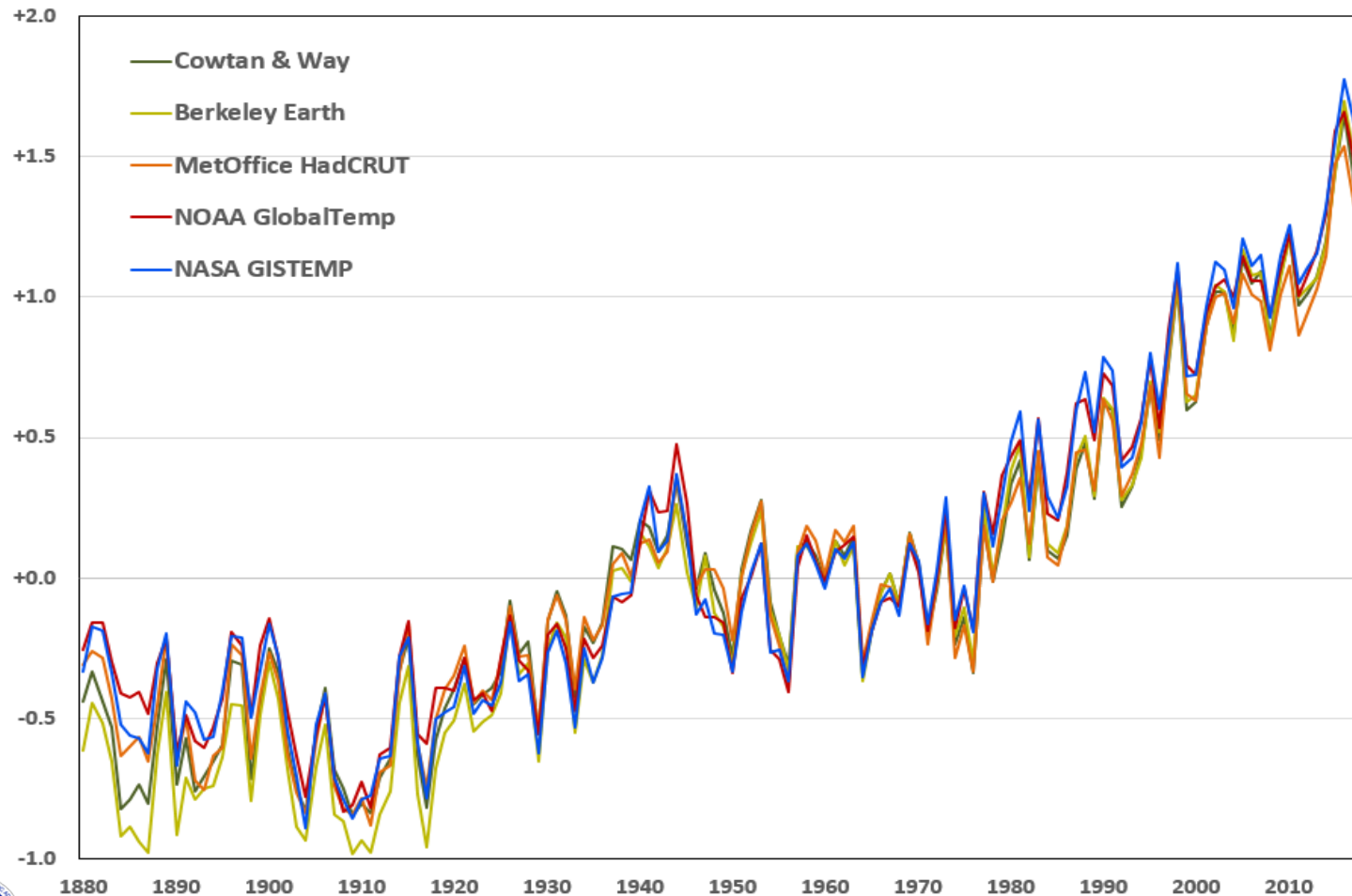
2016: 0.12°C

2017: 0.00°C



Global Analyses Side by Side

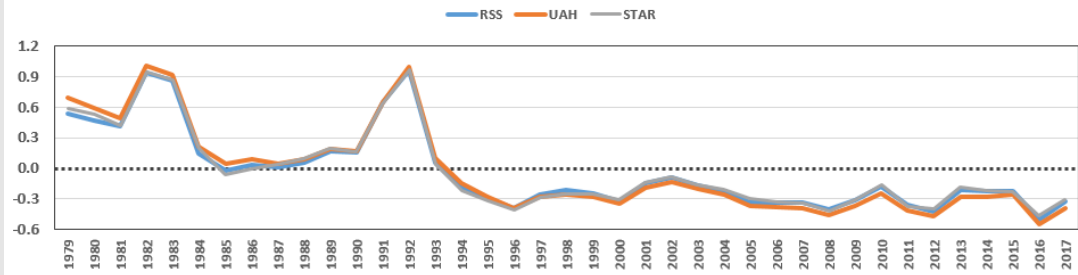
Several major datasets: relative to a common 1951-1980 base period



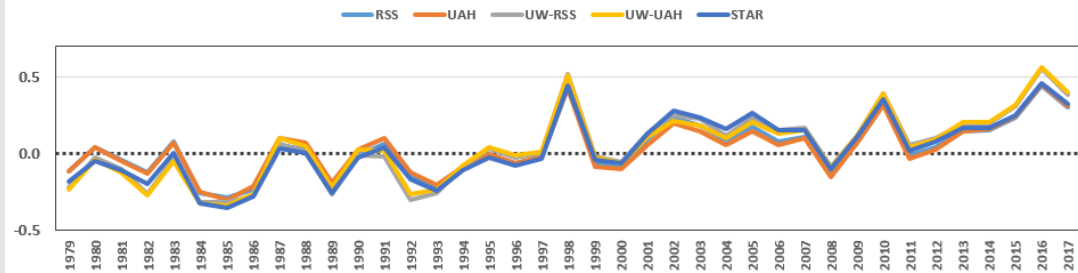
Looking at the Atmosphere

- **Lower Stratosphere (38 yr record)**
 - RSS, NESDIS: 9th coolest (tie)
 - UAH: 5th coolest (tie)
- **Middle Troposphere (38 yr record)**
 - UAH, RSS, UW-RSS, NESDIS: 4th warmest
 - UW-UAH: 3rd warmest
- **Lower Troposphere (38 yr record)**
 - RSS: 4th warmest
 - UAH: 3rd warmest
- **Radiosonde / balloon data (59 yr record, not shown)**
 - ~5,000 ft (850mb): 2nd warmest
 - ~10,000 ft (700mb): 2nd warmest
 - ~18,000 ft (500mb): 2nd warmest
 - ~30,000 ft (300mb): 2nd warmest
 - ~40,000 ft (200mb): 16th warmest

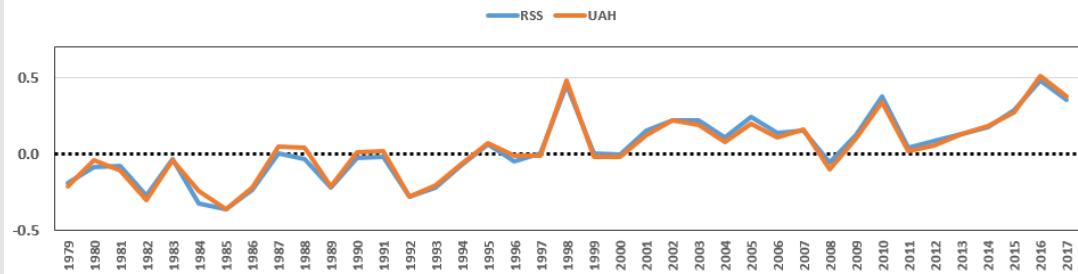
Lower Stratosphere (approx. 45,000 to 70,000 ft) temperature departure, °C



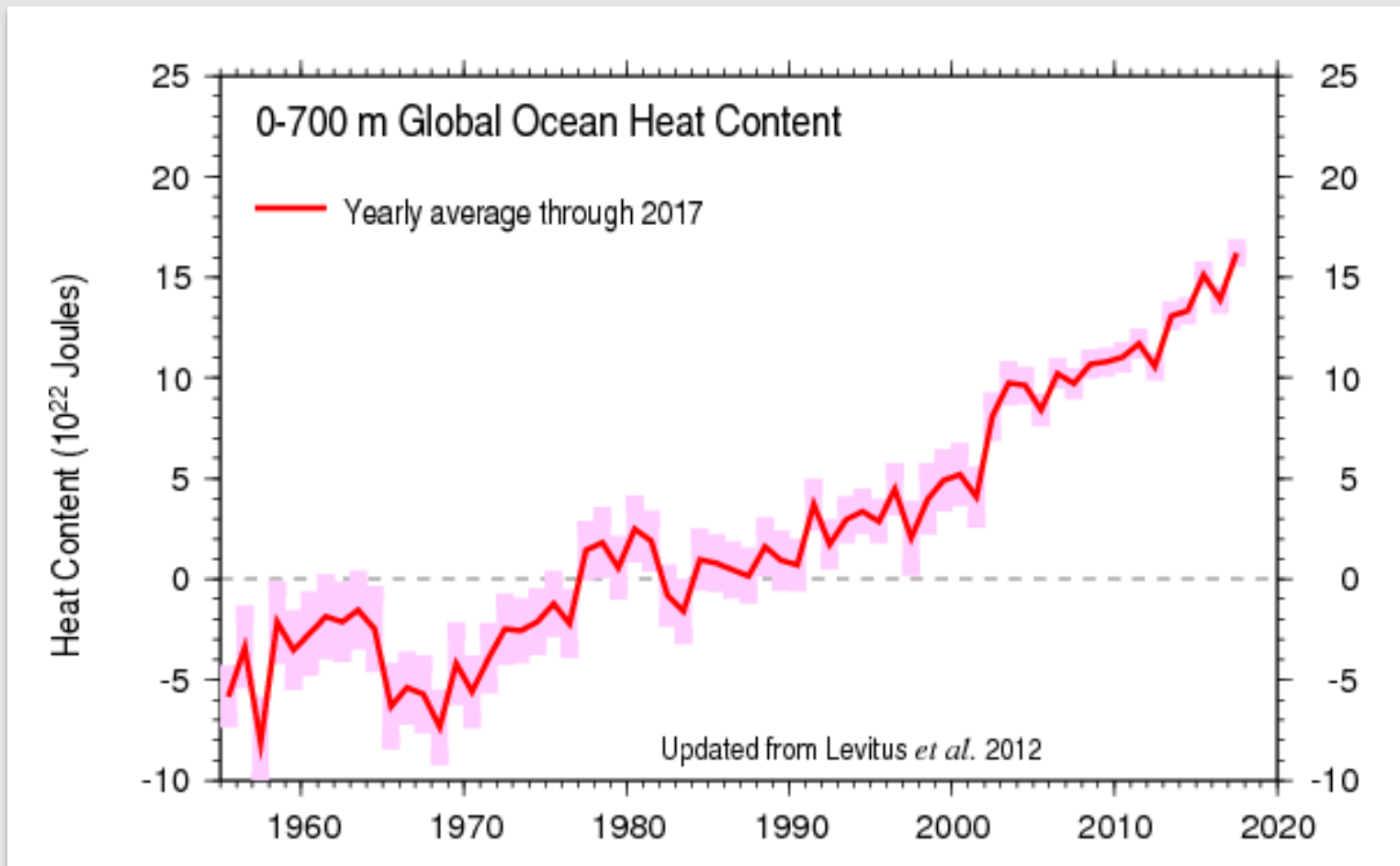
Middle Troposphere (approx. 10,000 to 33,000 ft) temperature departure, °C



Lower Troposphere (approx. 0 to 26,000 ft) temperature departure, °C



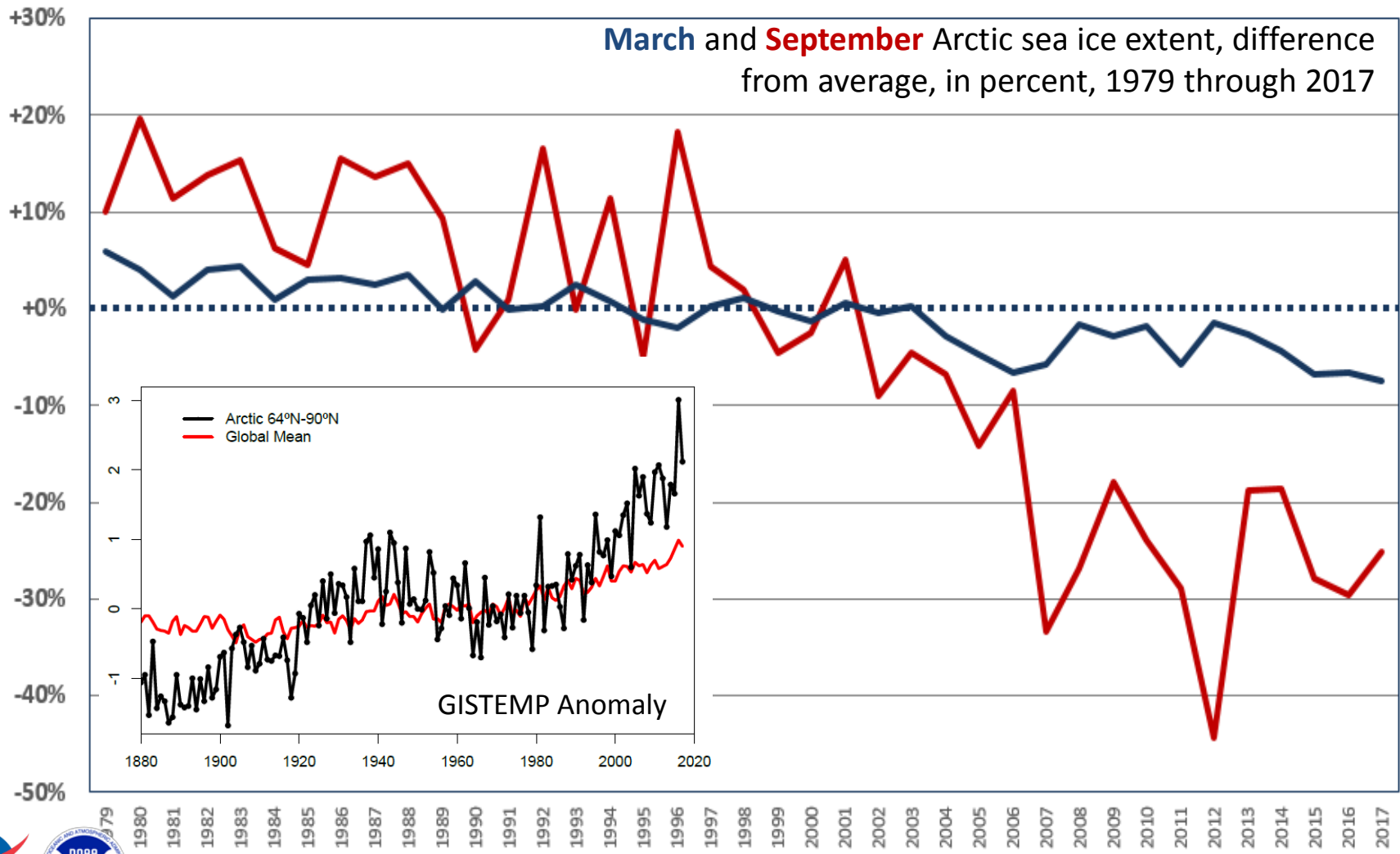
Upper Ocean Heat Content



Source: NOAA/NCEI Center for Coast, Oceans & Geophysics

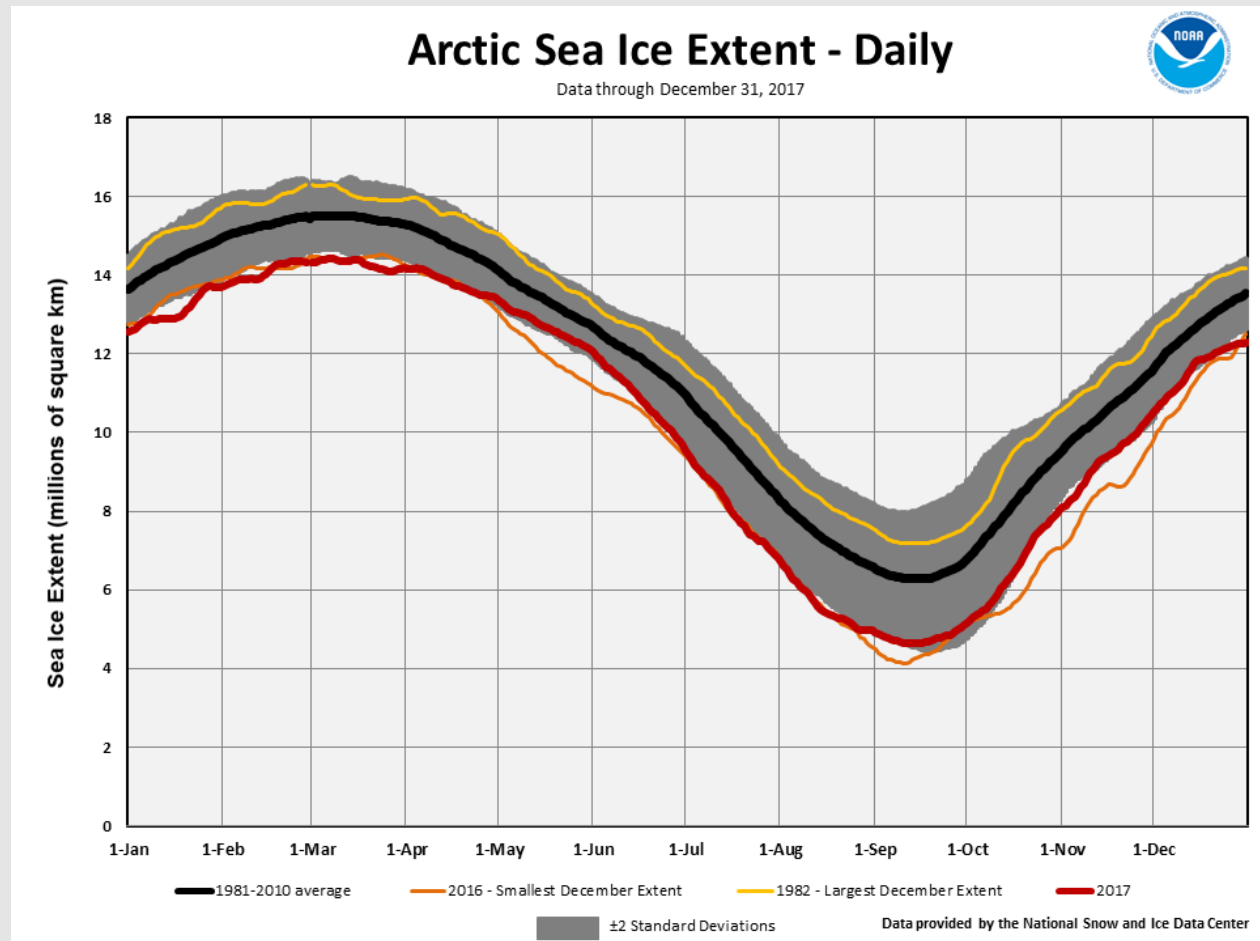
Arctic Sea Ice Extent Since 1979

(inset: Arctic temperature change vs. Global average)



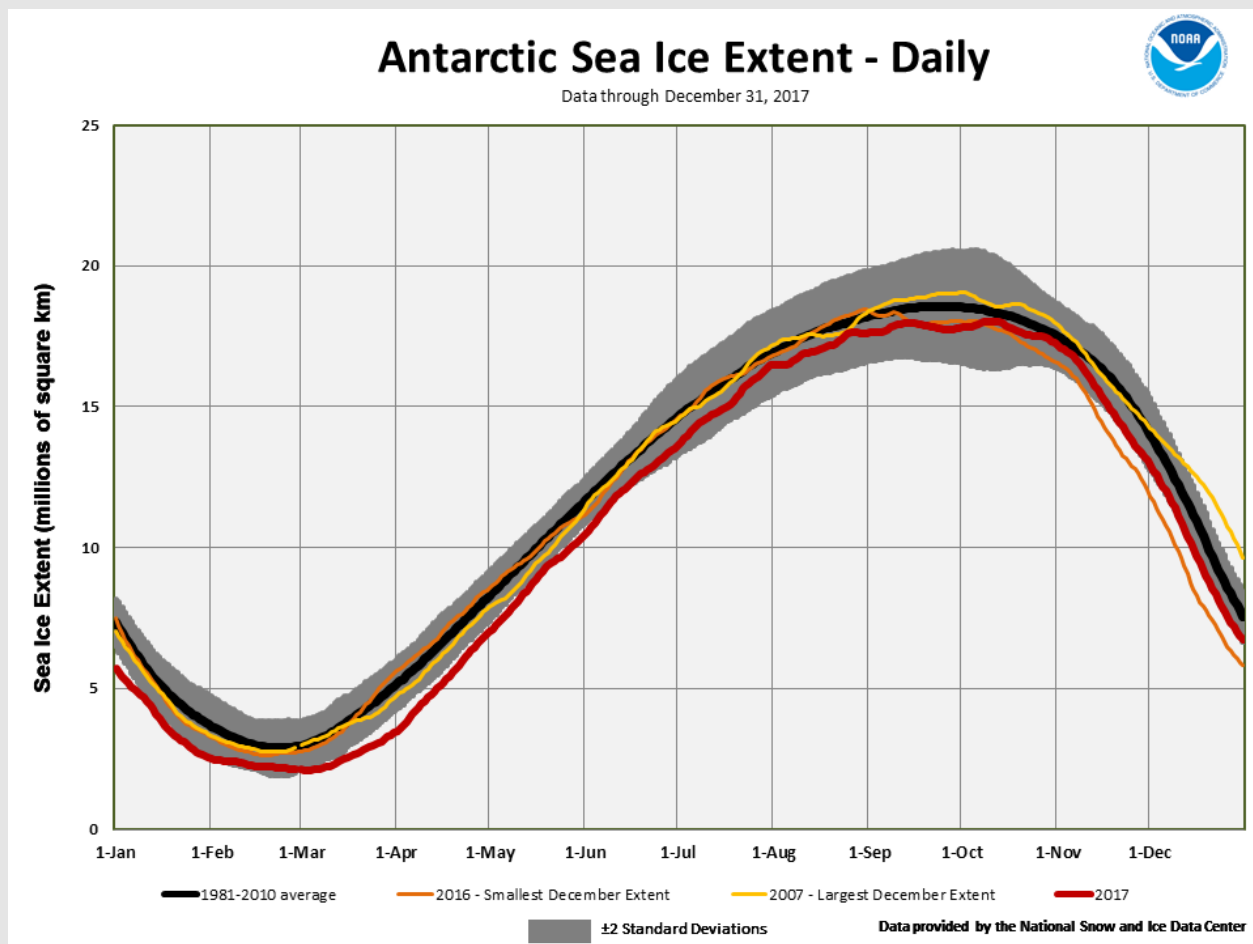
Arctic Sea Ice: Day-by-Day in 2017

Mon	% vs avg	Rank (of 38)
Jan	-8.67%	Smallest
Feb	-7.78%	Smallest
Mar	-7.52%	Smallest
Apr	-6.33%	2 nd smallest
May	-5.04%	5 th smallest
Jun	-8.92%	4 th smallest
Jul	-16.58%	4 th smallest
Aug	-24.03%	4 th smallest
Sep	-25.12%	7 th smallest
Oct	-19.64%	5 th smallest
Nov	-11.59%	3 rd smallest
Dec	-8.45%	2 nd smallest



Antarctic Sea Ice: Day-by-Day in 2017

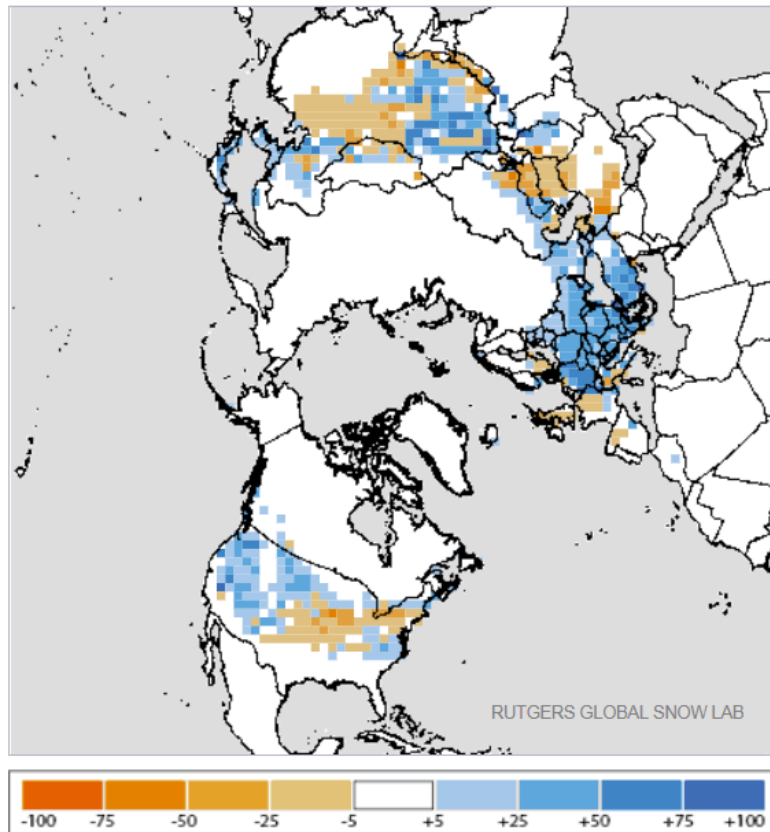
Mon	% vs avg	Rank (of 38)
Jan	-25.20%	Smallest
Feb	-26.06%	Smallest
Mar	-33.25%	Smallest
Apr	-20.73%	2 nd smallest
May	-11.42%	2 nd smallest
Jun	-7.34%	Smallest
Jul	-4.51%	Smallest
Aug	-3.27%	3 rd smallest
Sep	-3.57%	2 nd smallest
Oct	-2.21%	5 th smallest
Nov	-5.66%	2 nd smallest
Dec	-10.28%	4 th smallest



Northern Hemisphere Snow Cover Extent

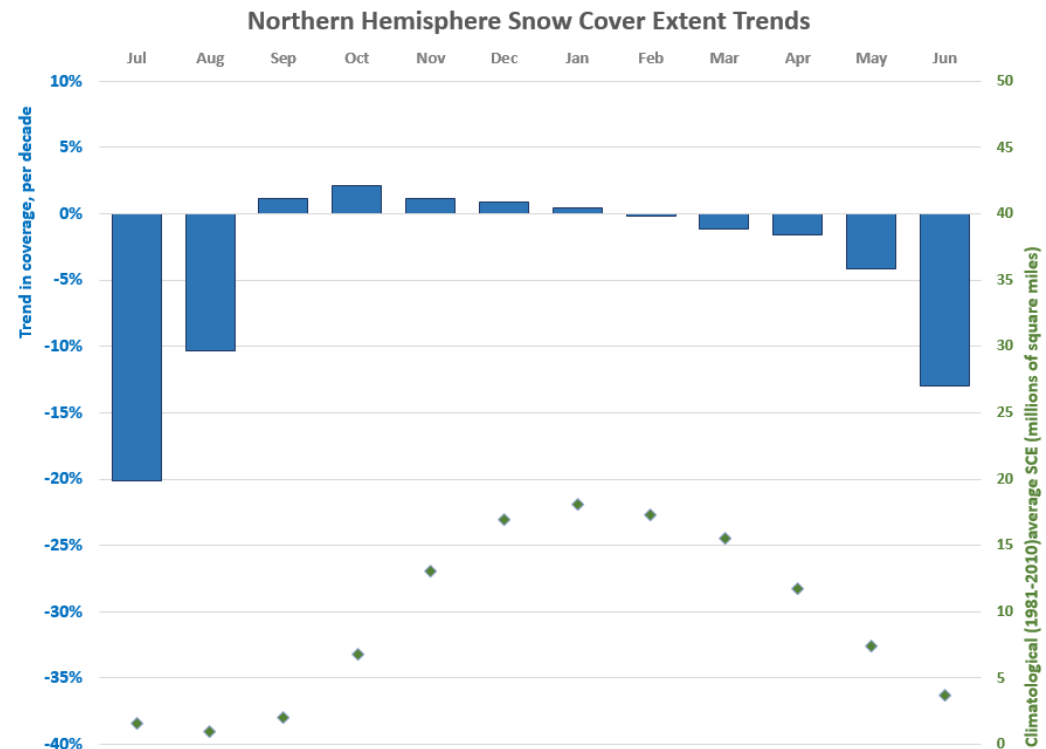
Period of record: 1967-2017 (50 years)

Departure from Normal – January 2017



Data provided by the Rutgers Global Snow Lab
<http://climate.rutgers.edu/snowcover/>

Northern Hemisphere Snow Cover Trends (1967-2017)



Questions?

Gavin A. Schmidt

Director, NASA's Goddard Institute for Space Studies



Deke Arndt

Chief, Monitoring Branch, NOAA's National Centers for Environmental Information

