

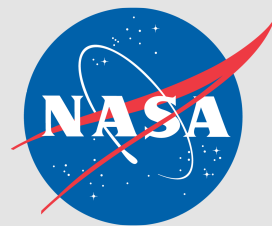
A world map showing temperature anomalies for 2016. The map is overlaid with a grid of colored squares. Most of the landmasses and surrounding oceans are shaded in various intensities of red, indicating above-average temperatures. There are some patches of light blue and white, particularly in the Arctic region and parts of the North Atlantic, indicating below-average temperatures. The map is set against a dark blue background at the top and a grey background at the bottom.

NOAA/NASA

Annual Global Analysis for 2016

2016 was third successive record-warm year

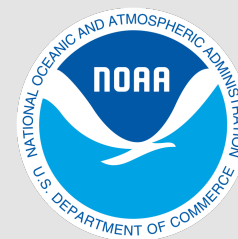
Gavin A. Schmidt



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

January 2017

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Centers for Environmental Information*

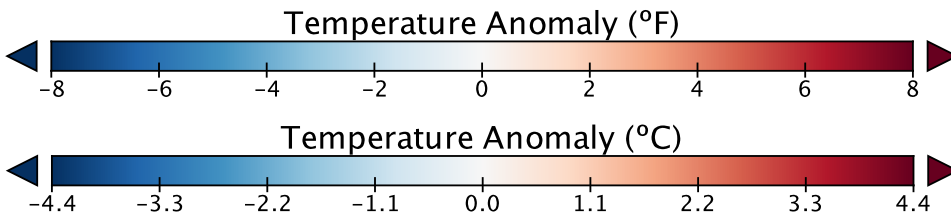
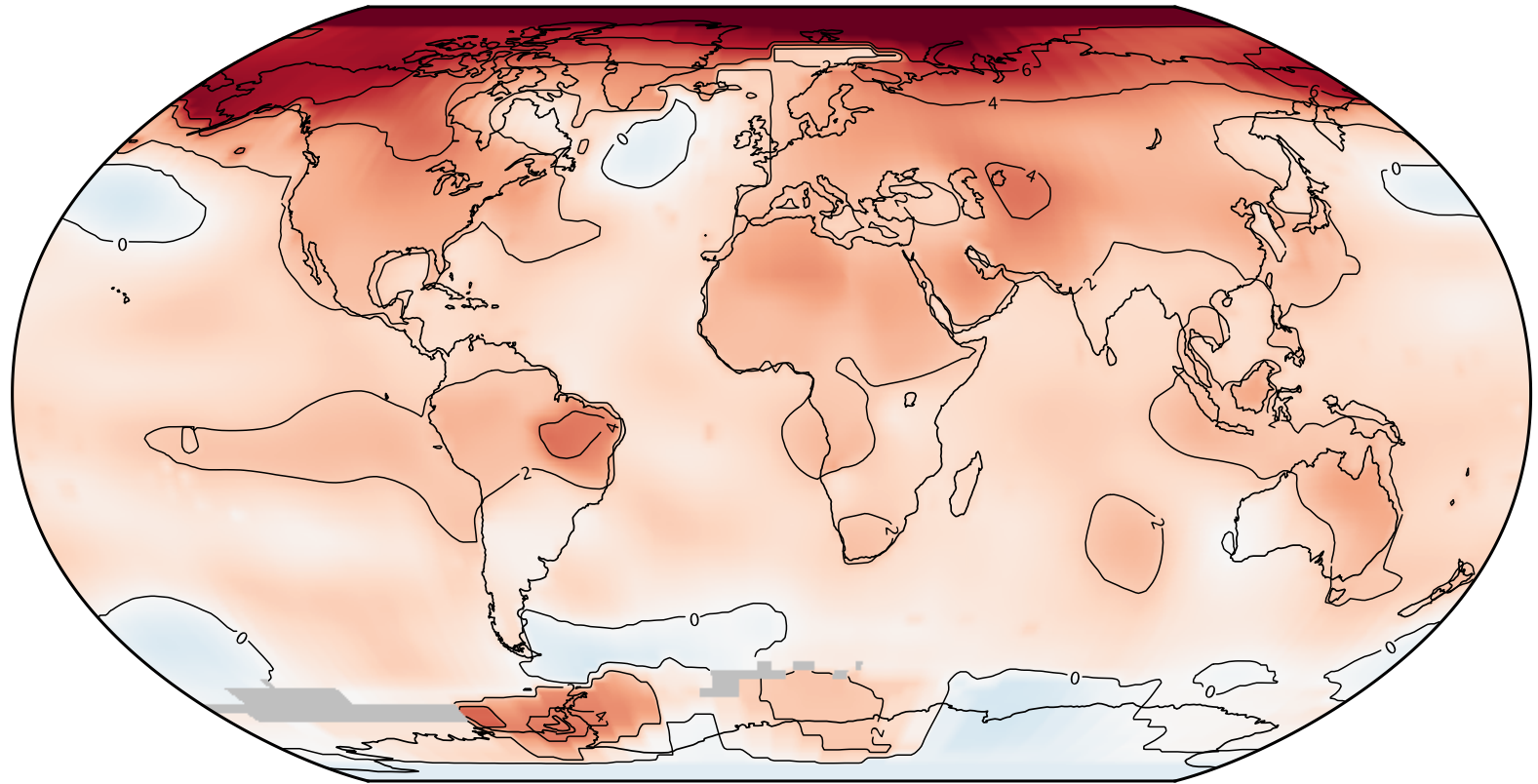
NASA 2016 Global Temperature

2016:

0.99°C / 1.8°F
above 1951-80
average

Warmest year of
NASA GISTEMP
record

GISTEMP Annual Mean 2016
Baseline 1951-1980

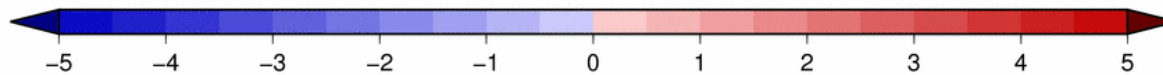
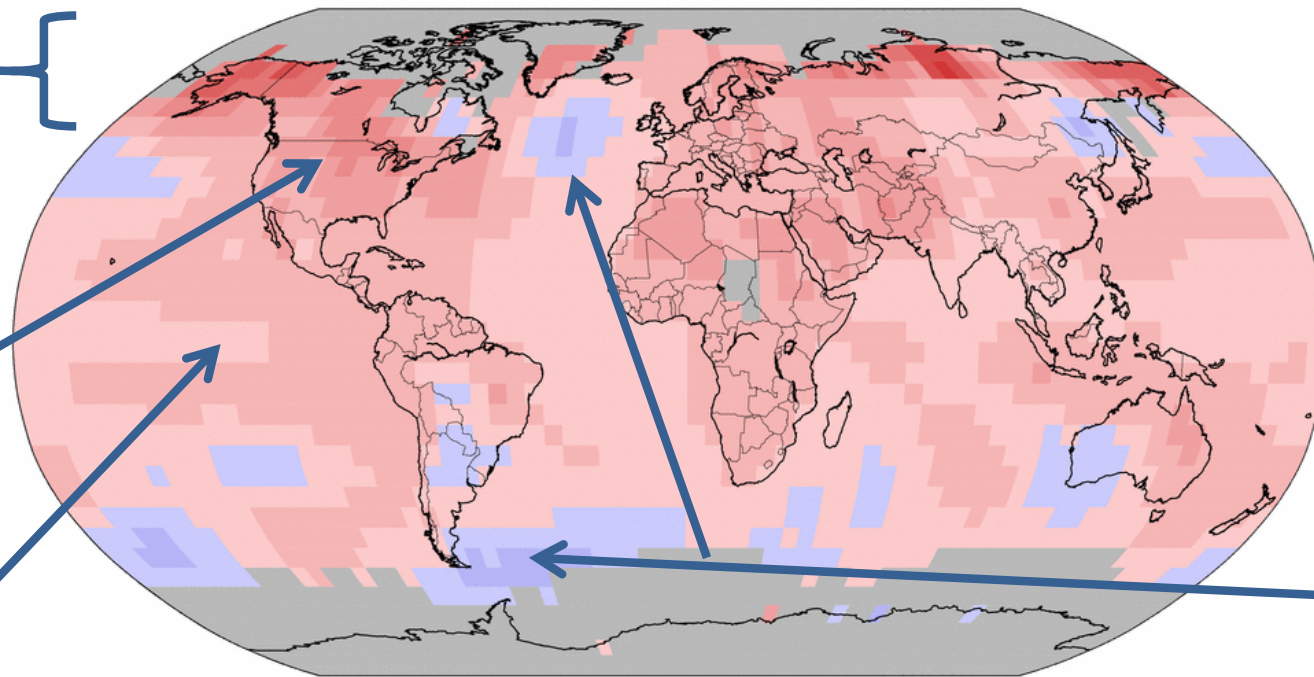


NOAA 2016 Global Temperature

0.94°C / 1.69°F above 1901-2000 average; warmest year of record

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



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

North of 60°N latitude:

Warmest year of record by 0.94°F

USA - CONUS

2nd warmest year
Wetter than average
Alaska
Warmest year

Tropical Pacific

El Niño fades in early 2016

Continental Temperatures

records begin 1910

N. America
Warmest year

Africa, S. America
2nd warmest year

Asia, Europe
3rd warmest year

Oceania
5th warmest year

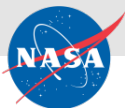
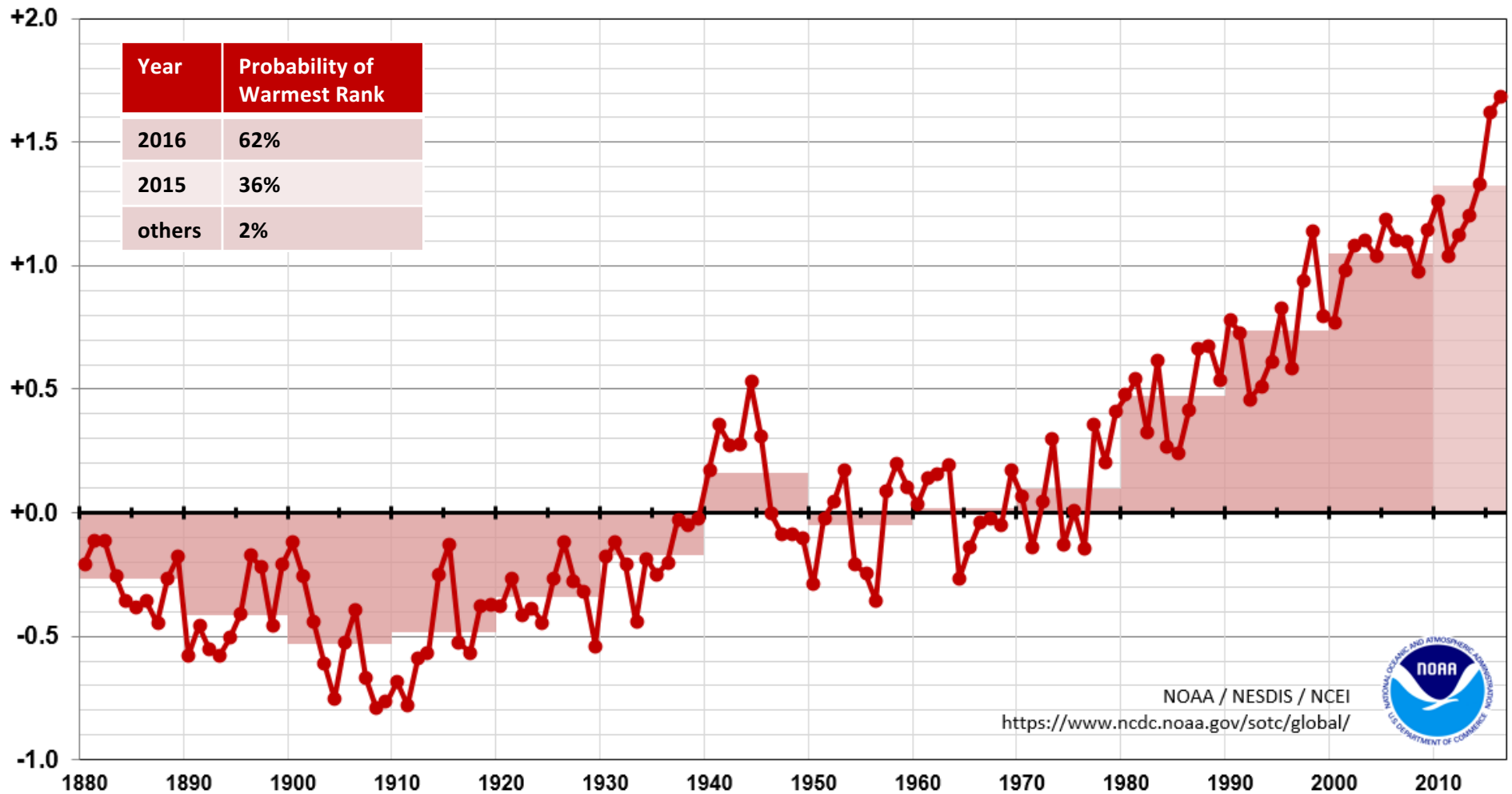
N. Atlantic cool spot fades somewhat
S. Atlantic spot persists



Global Temperature Time Series

NOAA GlobalTemp

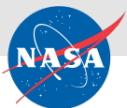
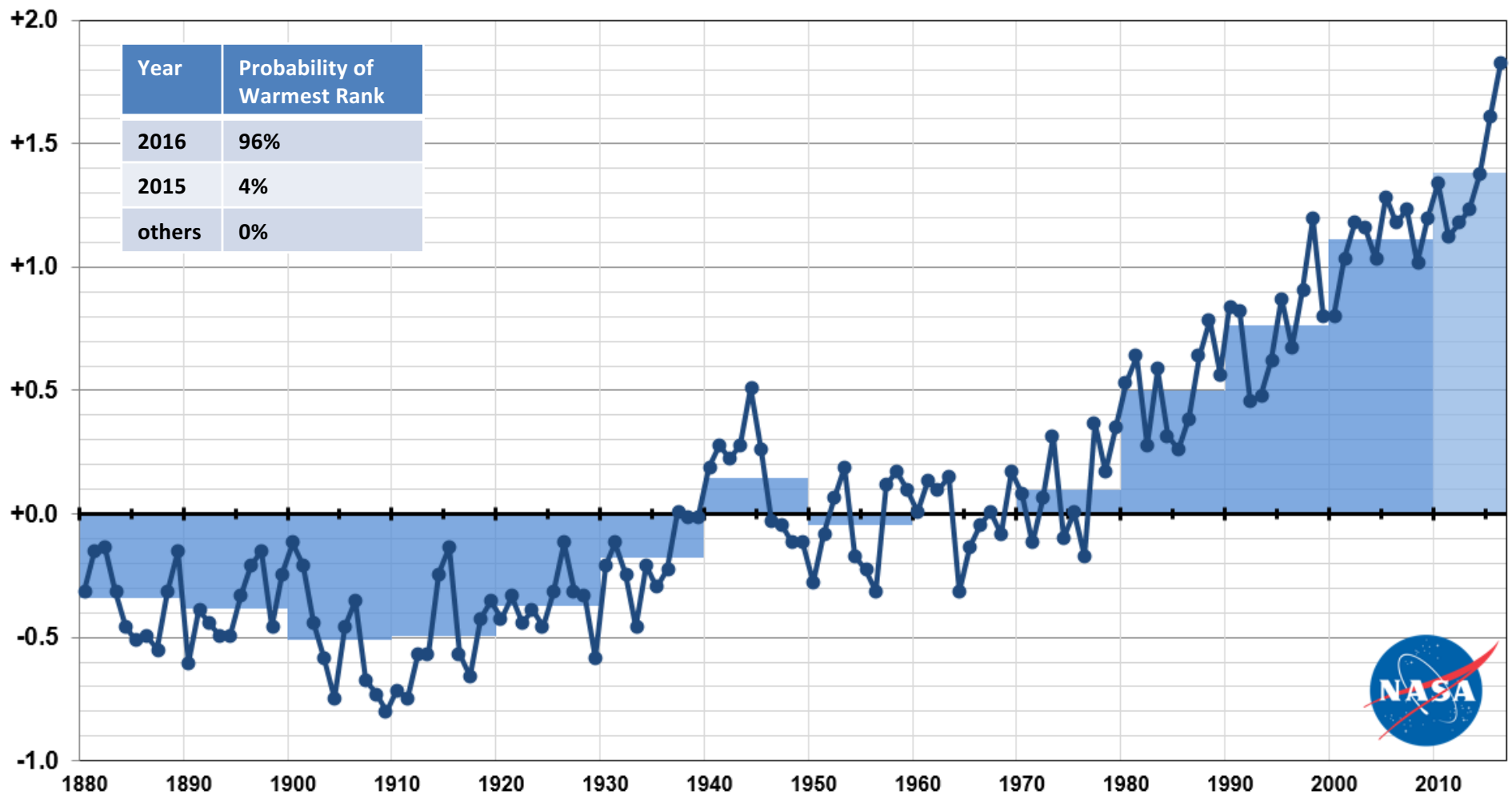
Annual Global Temperature: Difference From 20th Century Average, in °F



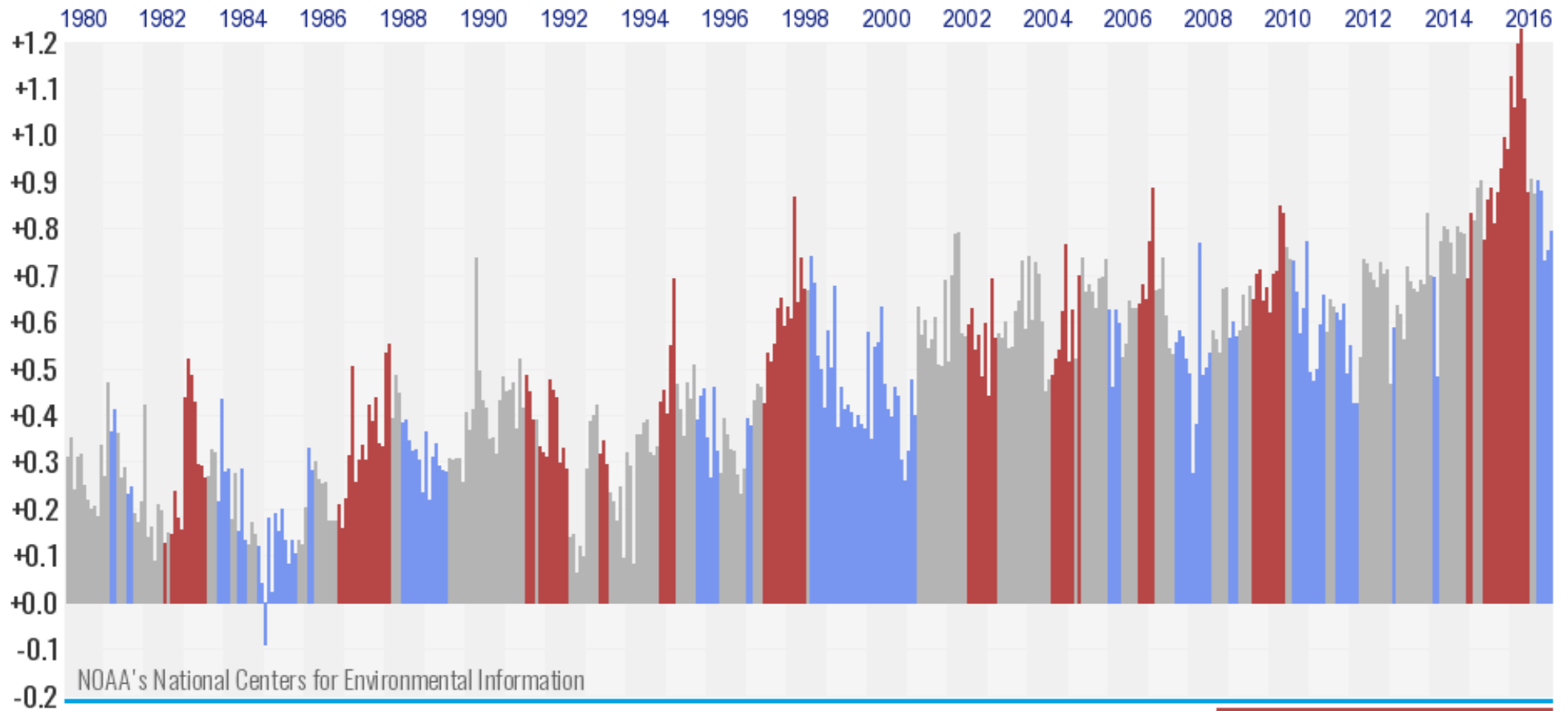
Global Temperature Time Series

NASA GISTEMP

Annual Global Temperature: Difference From 20th Century Average, in °F



El Niño / La Niña & Global Temperature



Global Surface Temperature Departures in °C, colored by monthly Niño3.4 values
Jan 1980 through Dec 2016

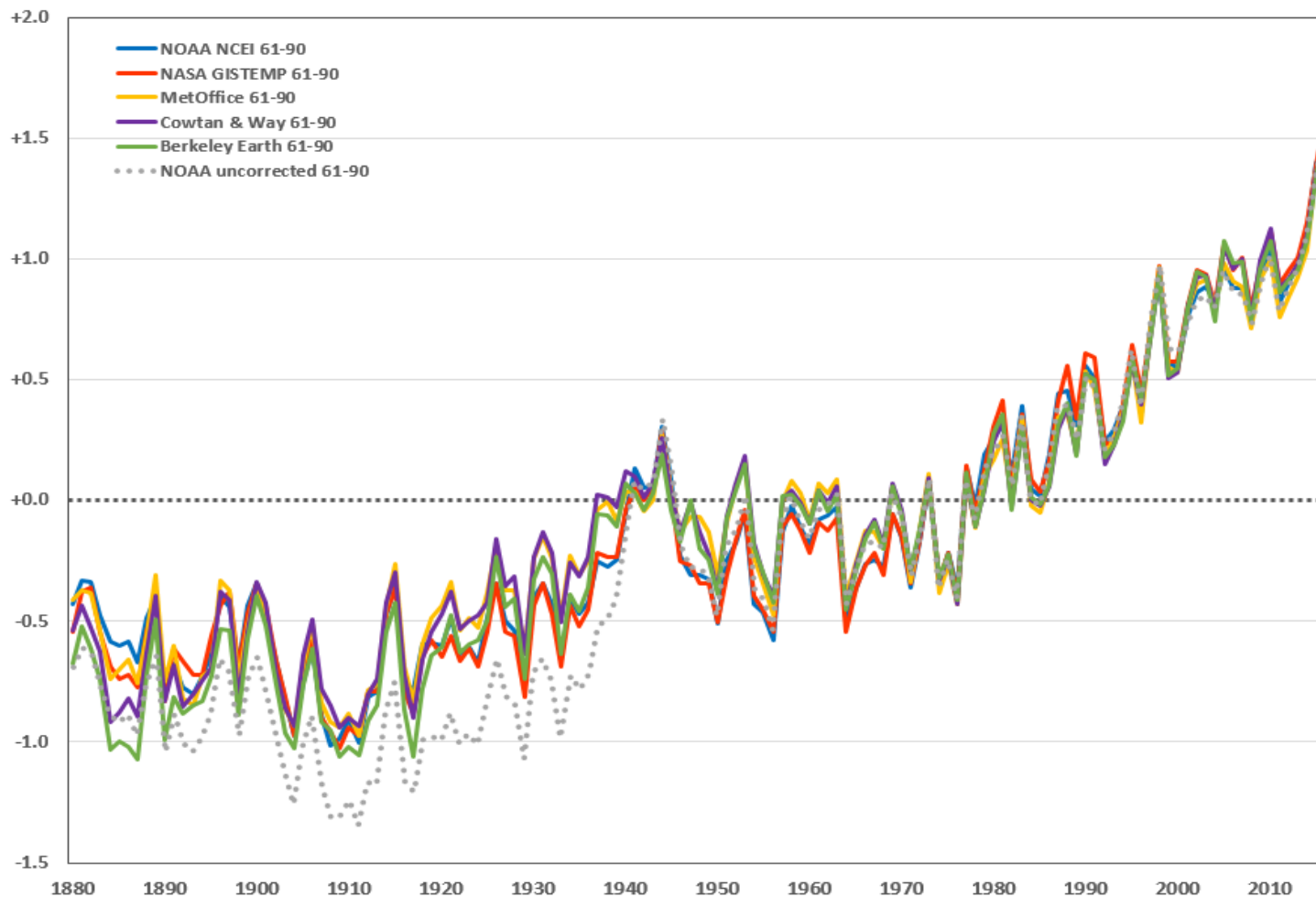
Conditions similar to El Niño
ENSO Neutral Months
Conditions similar to La Niña

Months with La Niña sea-surface temperature conditions in blue
Months with El Niño sea-surface temperature conditions in red

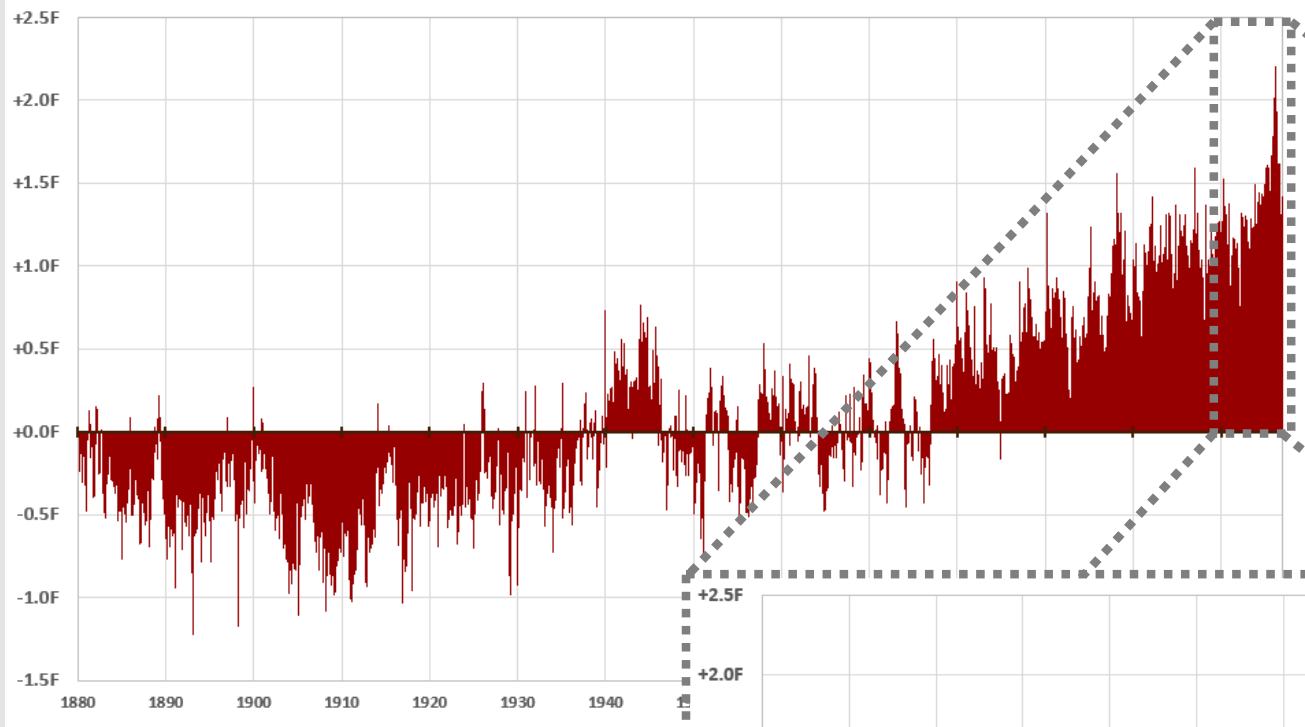


Global Analyses Side by Side

Several major datasets: Relative to a common 1961-90 base period

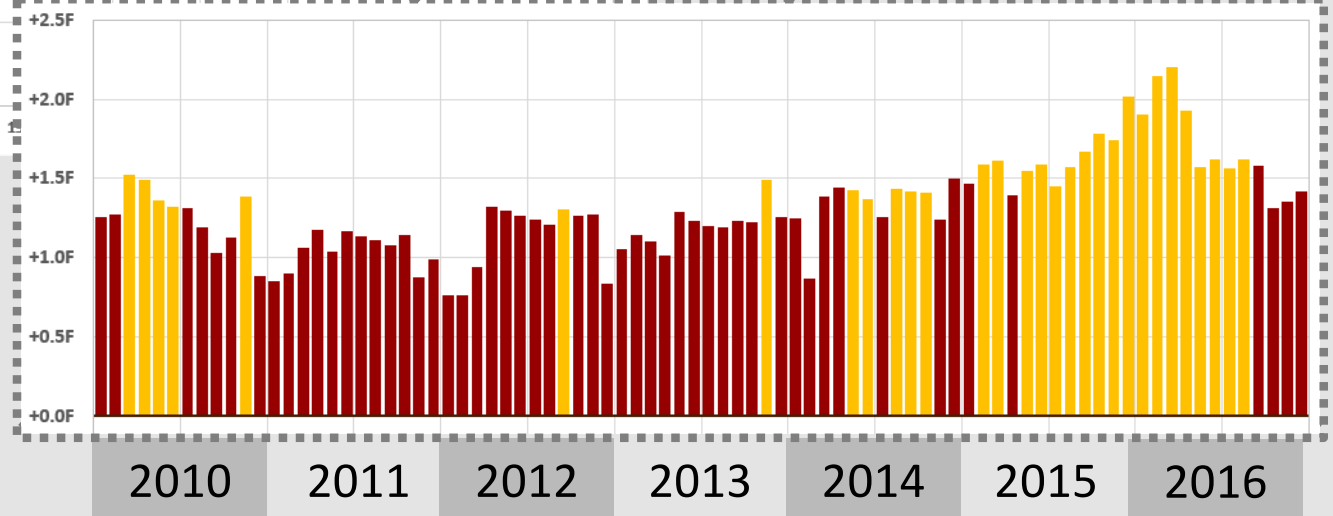


Global Temperature by the Month



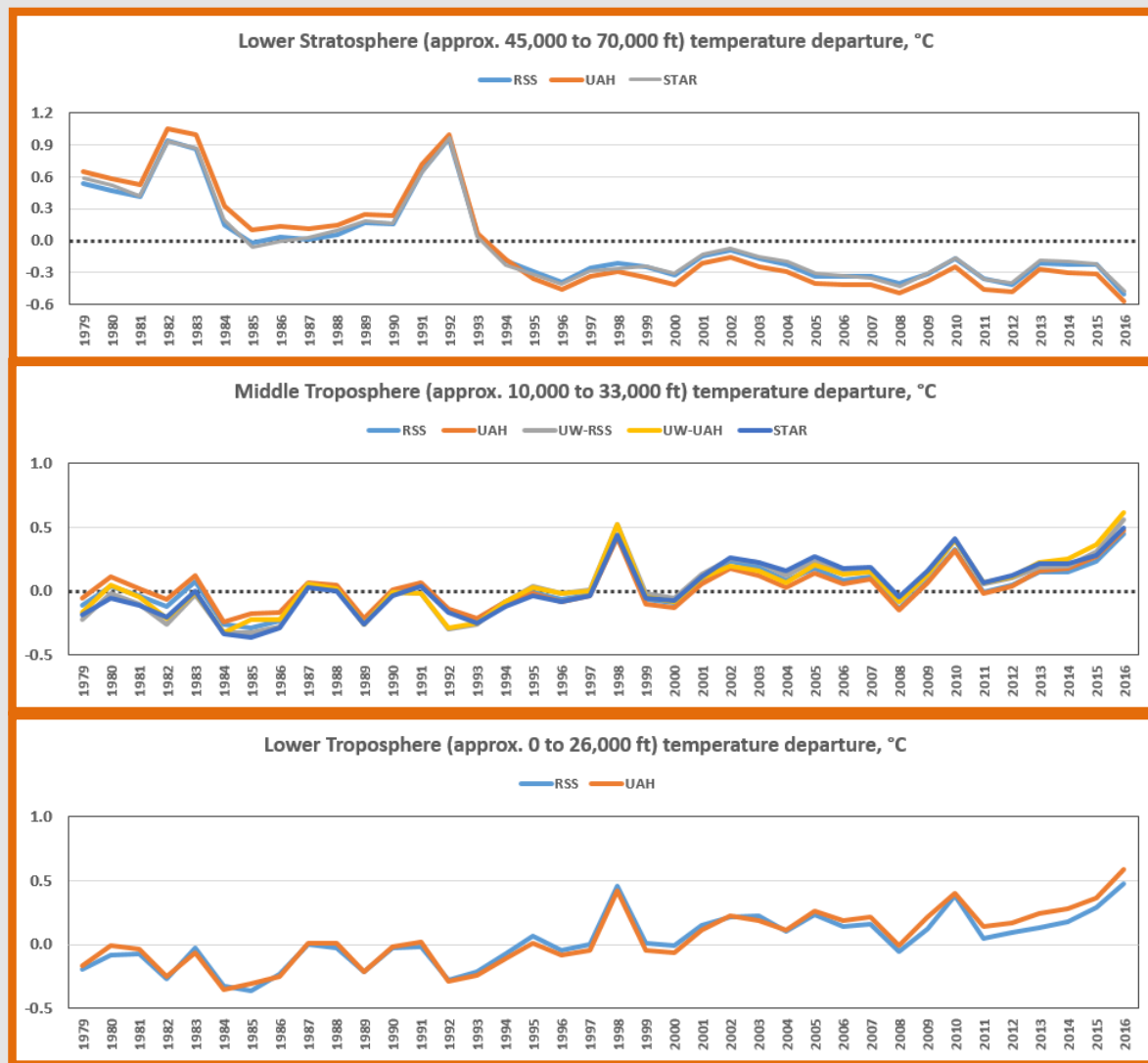
16 successive months (May '15 through Aug '16) broke or tied the previous record for that month. Record months since 2010 are shown in gold (incl. those that have since been broken).

NOAA GlobalTemp

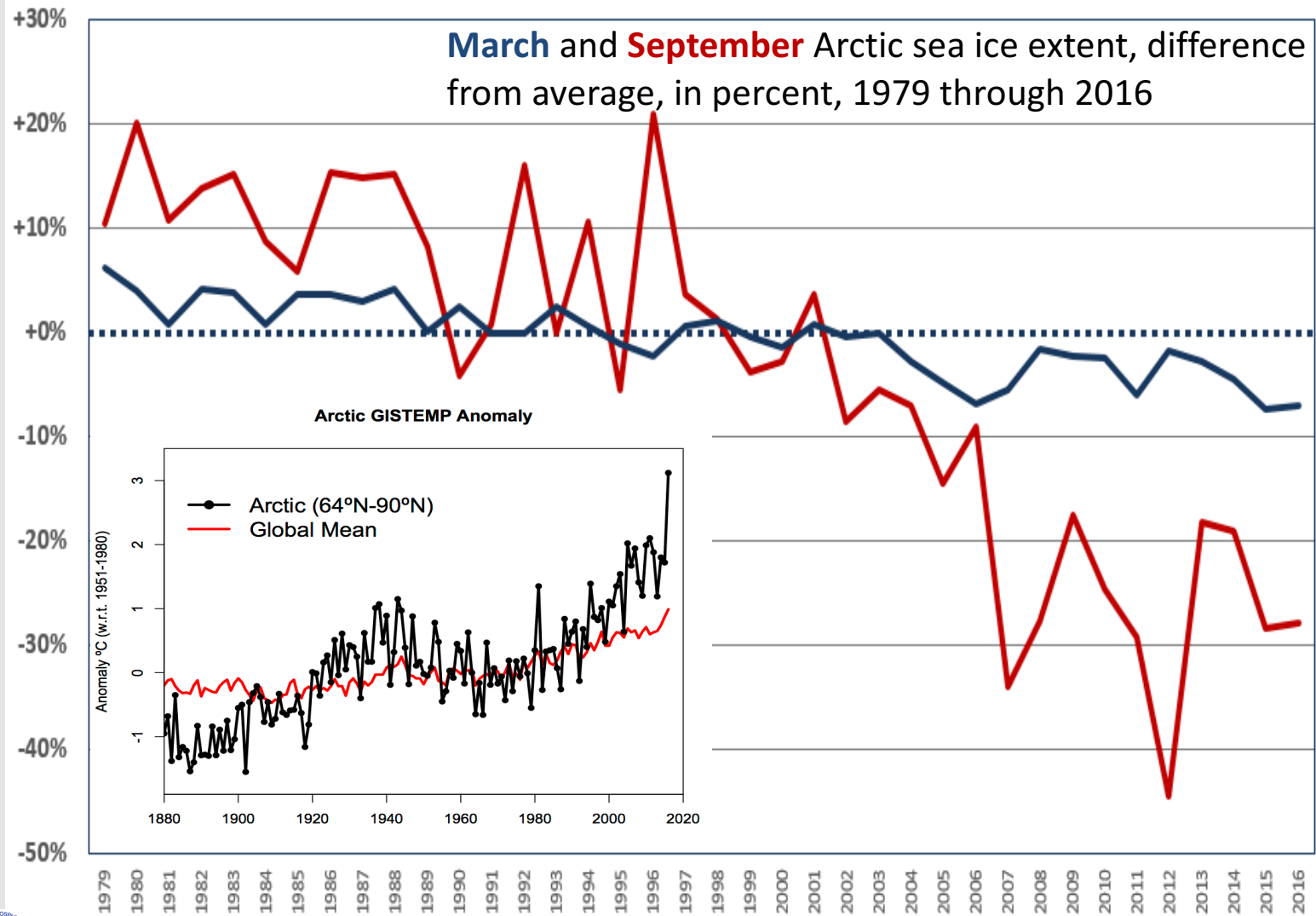


Looking at the Atmosphere

- Lower Stratosphere (37-yr record)
 - All datasets (UAH, RSS, NESDIS): **coolest** on record
- Middle Troposphere (37-yr record)
 - All datasets (UAH, UW-UAH, RSS, UW-RSS, NESDIS): warmest on record
- Lower Troposphere (37-yr record)
 - All datasets (UAH, RSS): warmest on record
- Radiosonde / balloon data (58-yr record, not shown)
 - ~5,000 ft (850mb): warmest
 - ~10,000 ft (700mb): warmest
 - ~18,000 ft (500mb): warmest
 - ~30,000 ft (300mb): warmest
 - ~40,000 ft (200mb): 2nd warmest

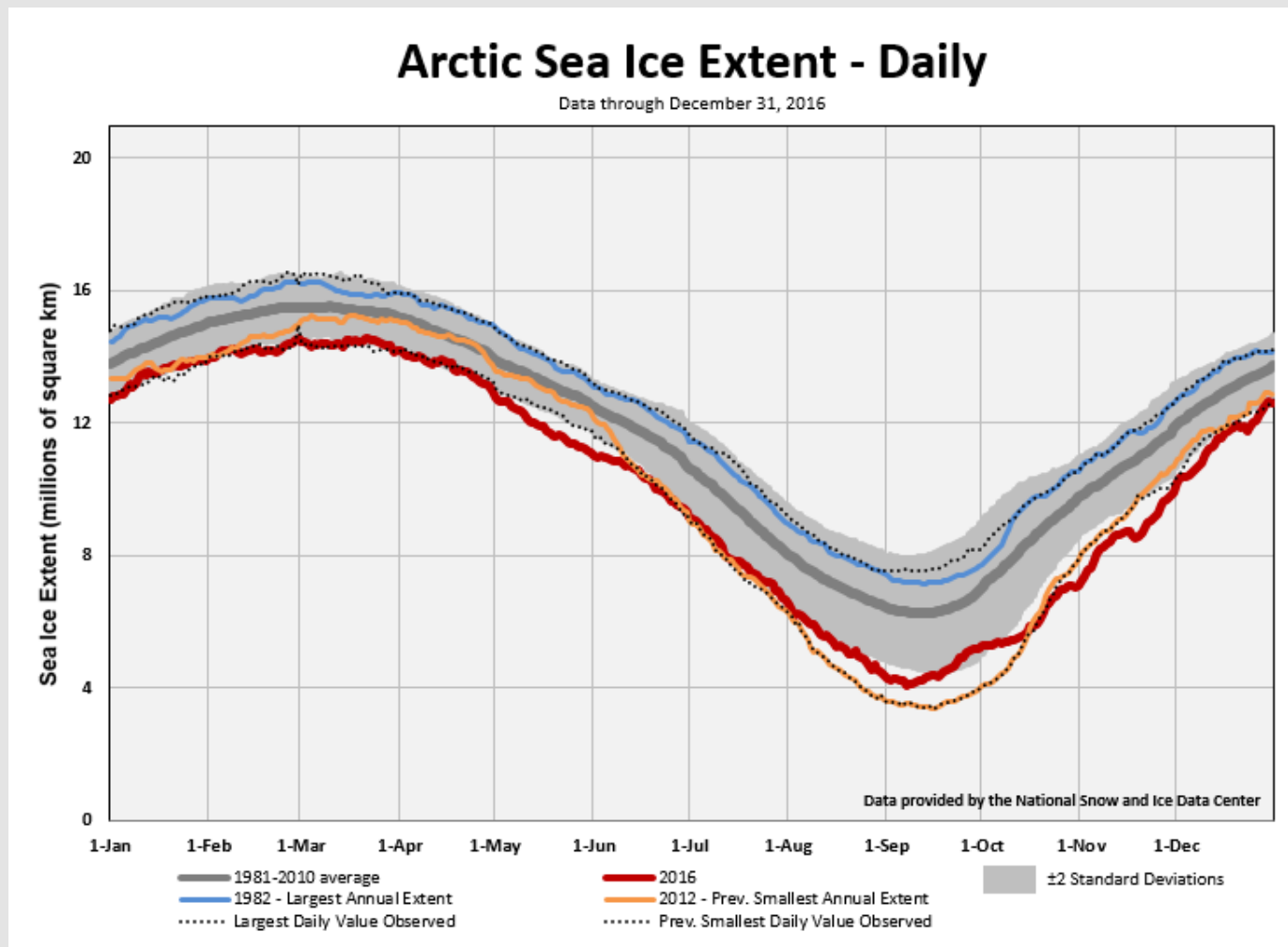


Arctic Sea Ice Since 1979



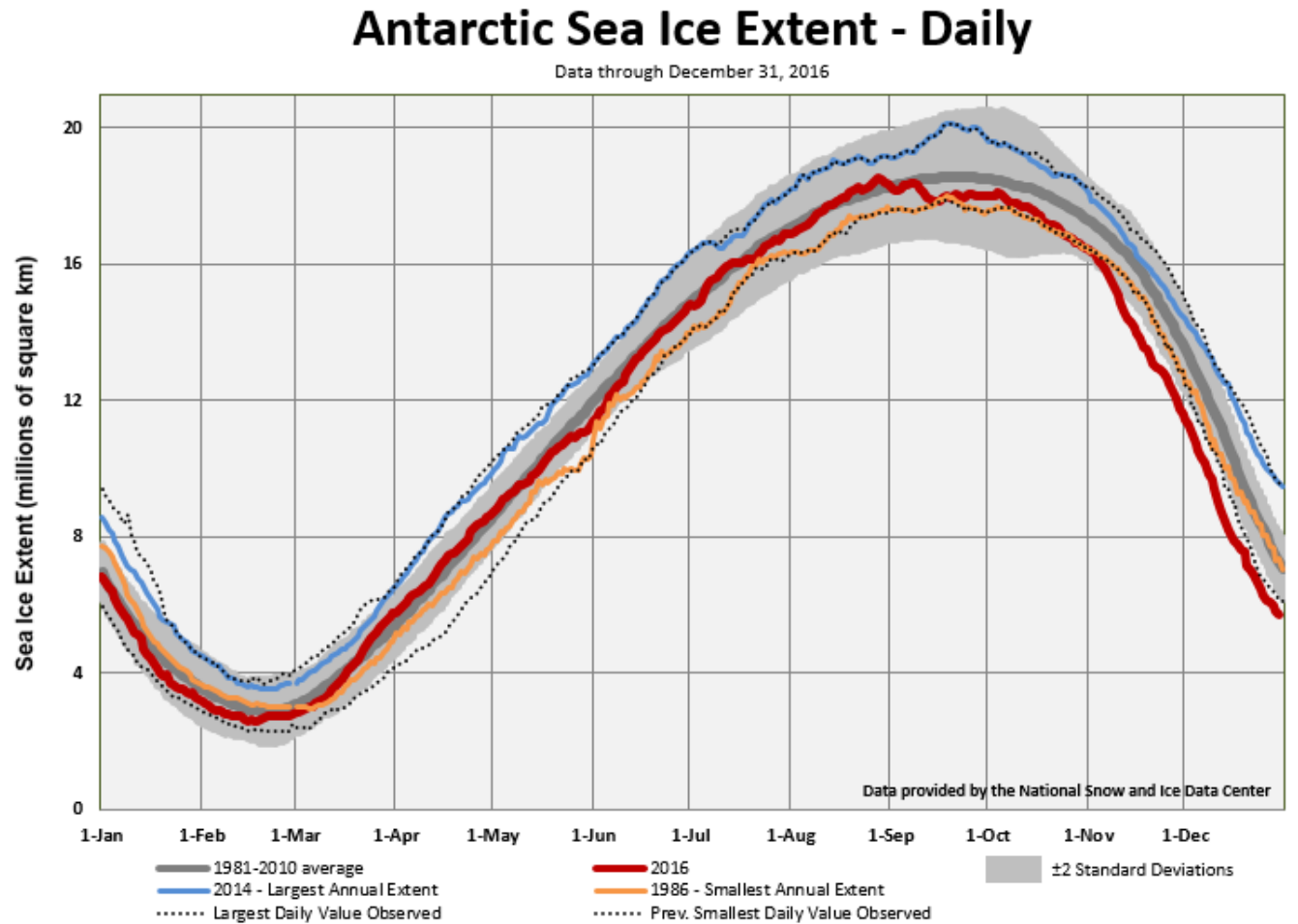
Arctic Sea Ice: Day-by-Day in 2016

Mon	% below average	Rank (of 38)
Jan	-7.14%	Smallest
Feb	-7.54%	Smallest
Mar	-7.02%	2 nd smallest
Apr	-6.87%	Smallest
May	-10.19%	Smallest
Jun	-11.37%	Smallest
Jul	-16.87%	3 rd smallest
Aug	-23.08%	4 th smallest
Sep	-27.83%	5 th smallest
Oct	-28.52%	Smallest
Nov	-17.68%	Smallest
Dec	-7.85%	2 nd smallest
Year	-12.58%	Smallest



Antarctic Sea Ice: Day-by-Day in 2016

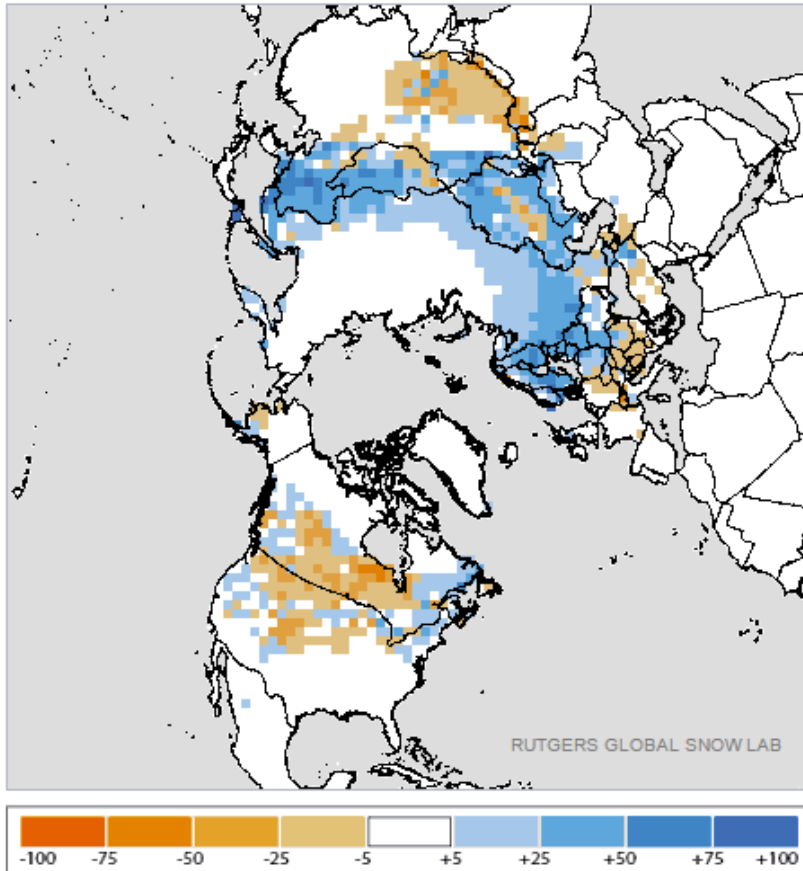
Mon	% vs average	Rank (of 38)
Jan	-4.26%	17 th smallest
Feb	-9.54%	6 th smallest
Mar	+5.44%	14 th largest
Apr	+3.91%	14 th largest
May	-0.74%	14 th smallest
Jun	-0.79%	13 th smallest
Jul	+0.18%	19 th smallest
Aug	+0.22%	19 th smallest
Sep	-2.02%	5 th smallest
Oct	-4.03%	2 nd smallest
Nov	-11.07%	Smallest
Dec	-22.20%	Smallest
Year	-4.16%	2nd Smallest



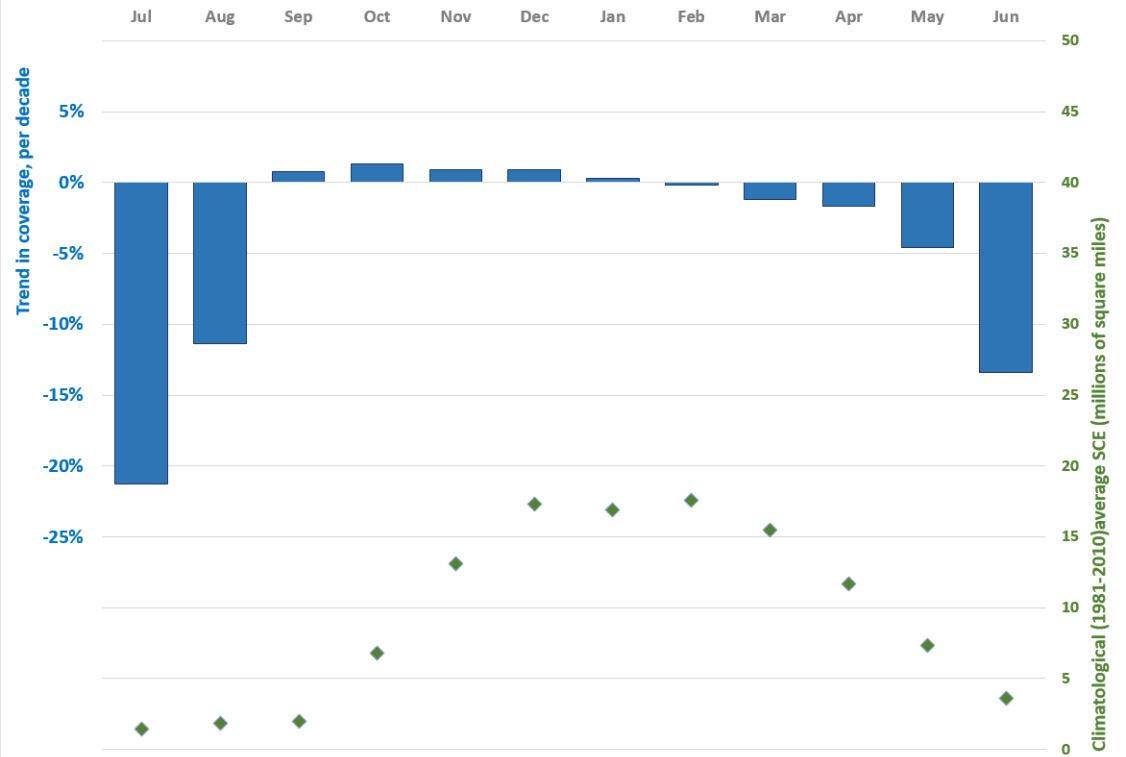
Northern Hemisphere Snow Cover Extent

Period of record: 1967-2016 (49 years)

Departure from Normal – November 2016



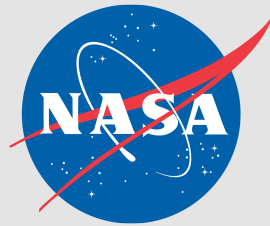
Northern Hemisphere Snow Cover Extent Trends



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

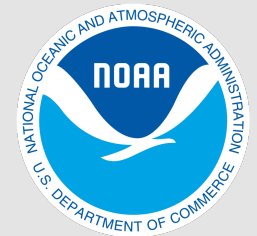


Questions?



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