

A world map showing temperature anomalies for 2019. The map is overlaid with a grid of colored squares. Most of the landmasses, particularly in the Northern Hemisphere, are shaded in various intensities of red, indicating warmer than average temperatures. Some areas in the Southern Hemisphere and the oceans are shaded in light blue or white, indicating cooler than average temperatures. A solid blue horizontal bar is positioned above the main title.

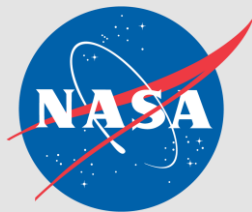
NOAA/NASA

Annual Global Analysis for 2019

2019 was 2nd warmest for globe

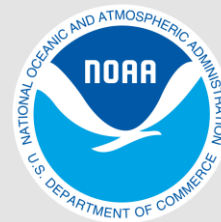
Gavin A. Schmidt

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Derek Arndt

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



January 2020

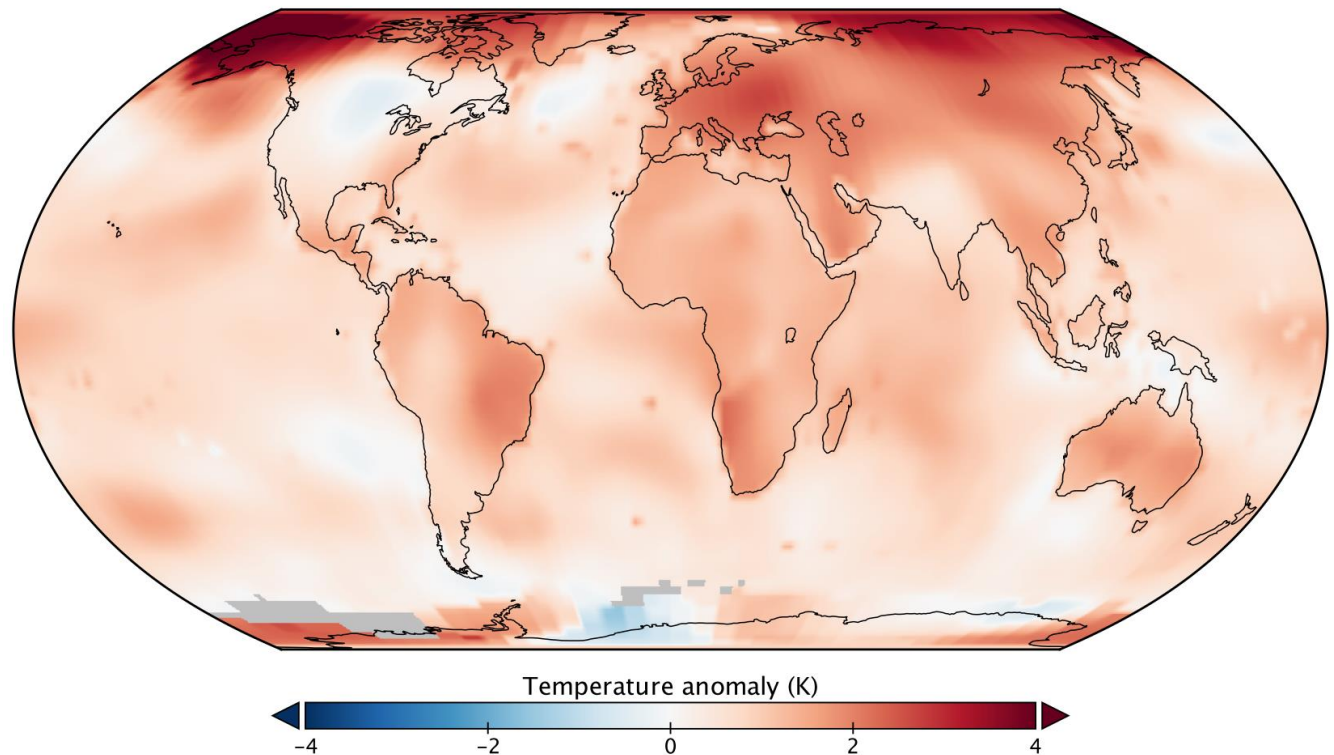
NASA 2019 Global Temperature

2019:

0.98°C/1.8°F
above 1951-80
average

2nd Warmest
year of NASA
GISTEMP record

GISTEMP Annual Mean 2019
Baseline 1950-1981

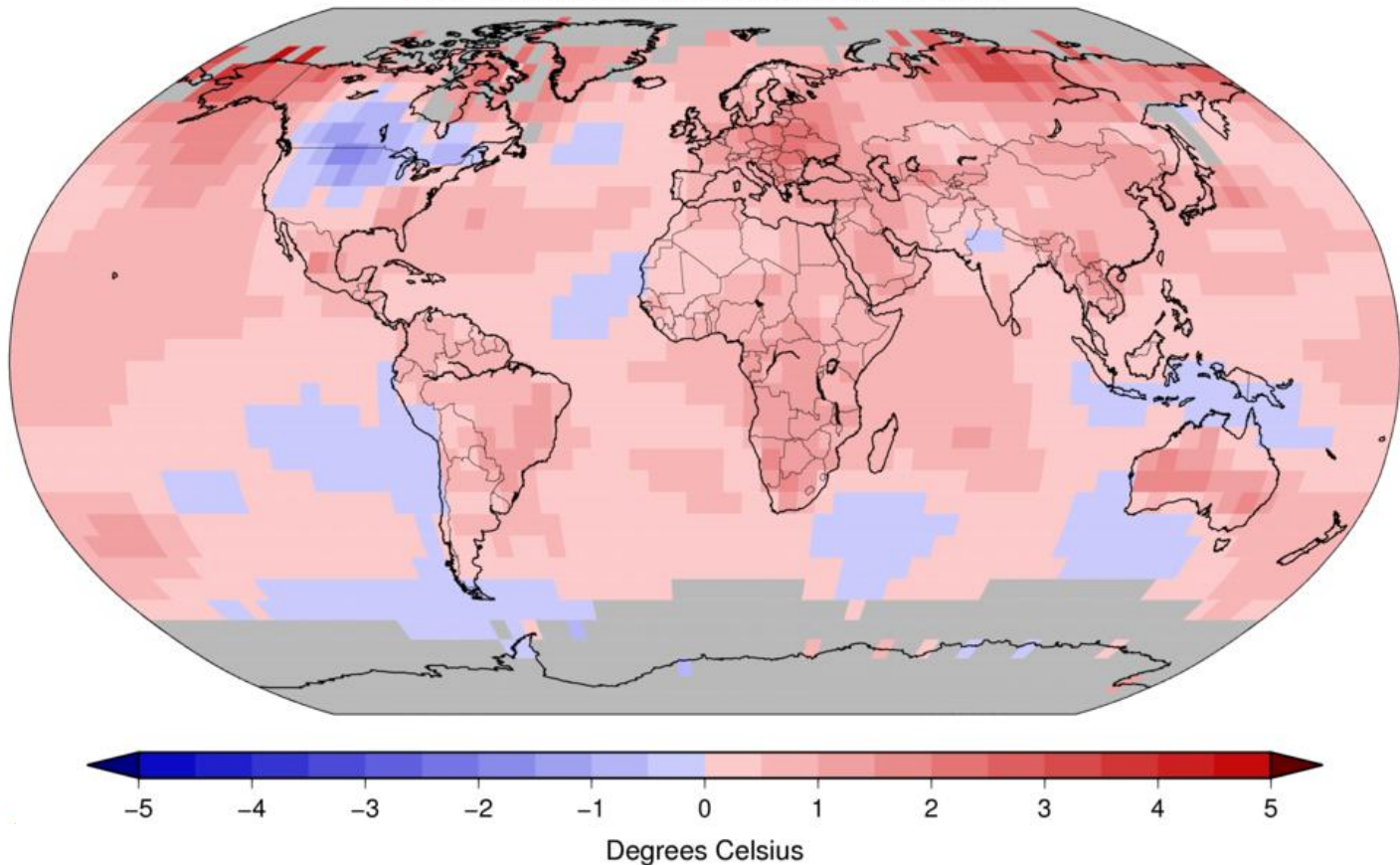


NOAA 2019 Global Temperature

0.95°C / 1.71°F above 1901-2000 average; 2nd warmest year of record

Land & Ocean Temperature Departure from Average Jan–Dec 2019
(with respect to a 1981–2010 base period)

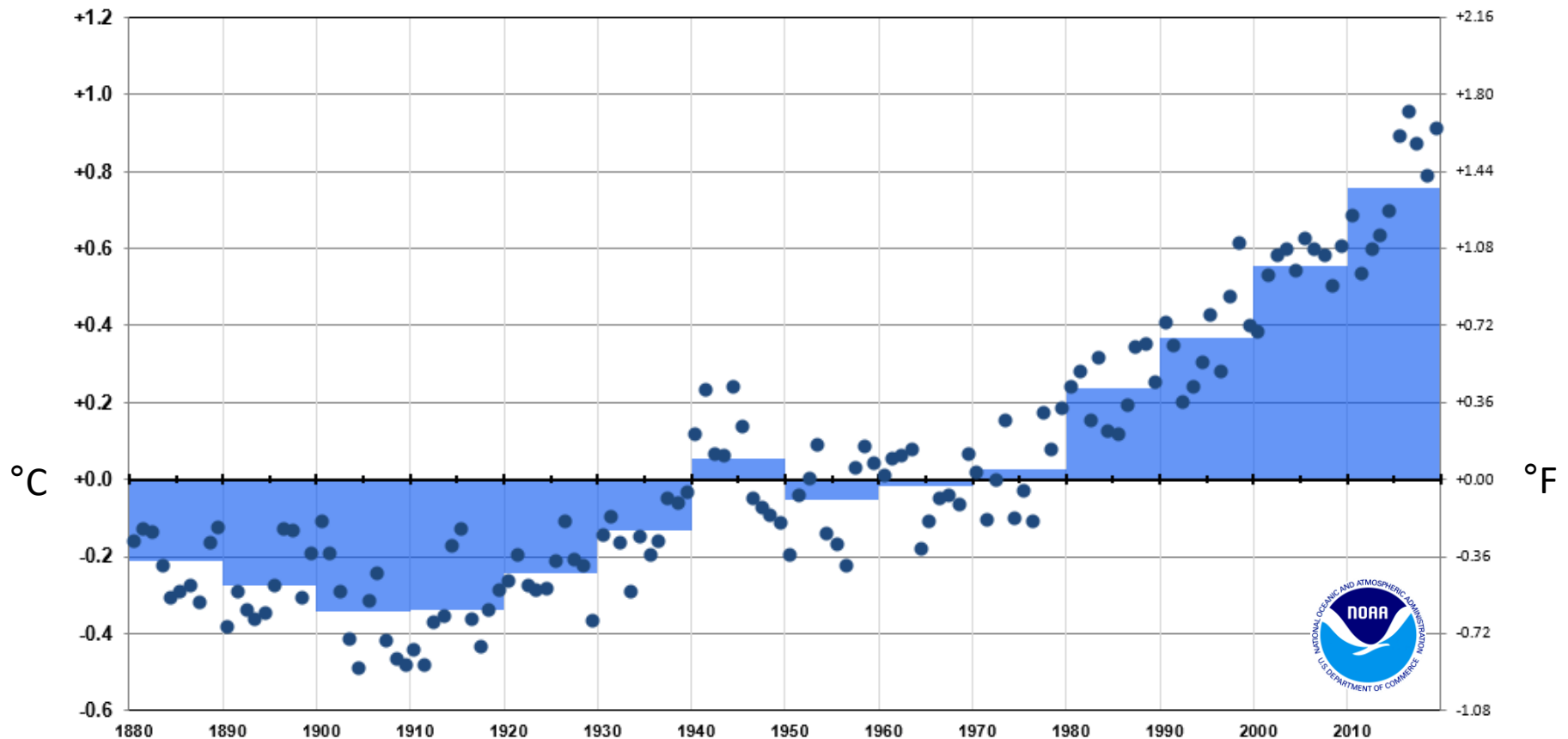
Data Source: NOAA GlobalTemp v5.0.0–20200108



Global Temperature Time Series

NOAA GlobalTemp

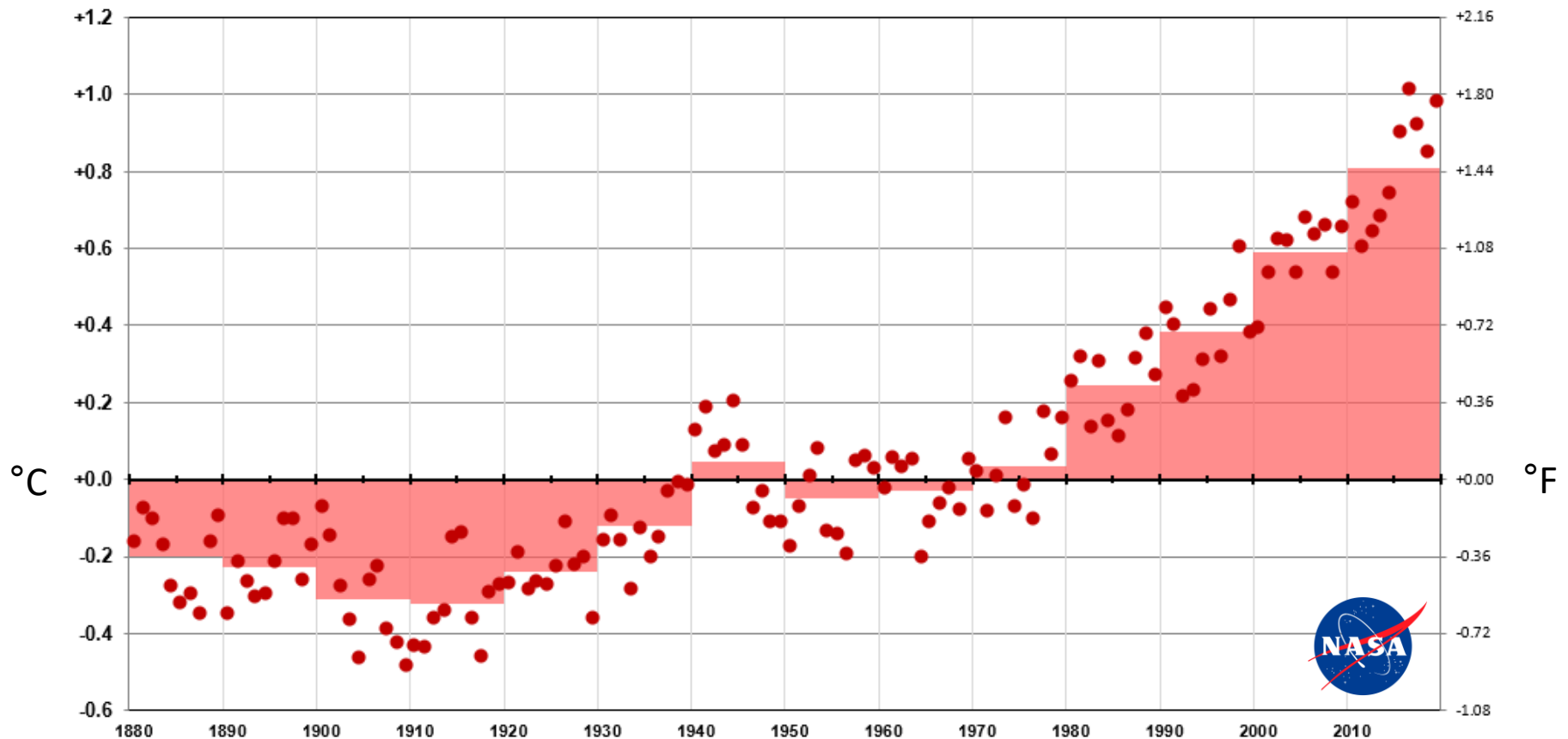
Annual Global Temperature: Difference From 1951-80 Average



Global Temperature Time Series

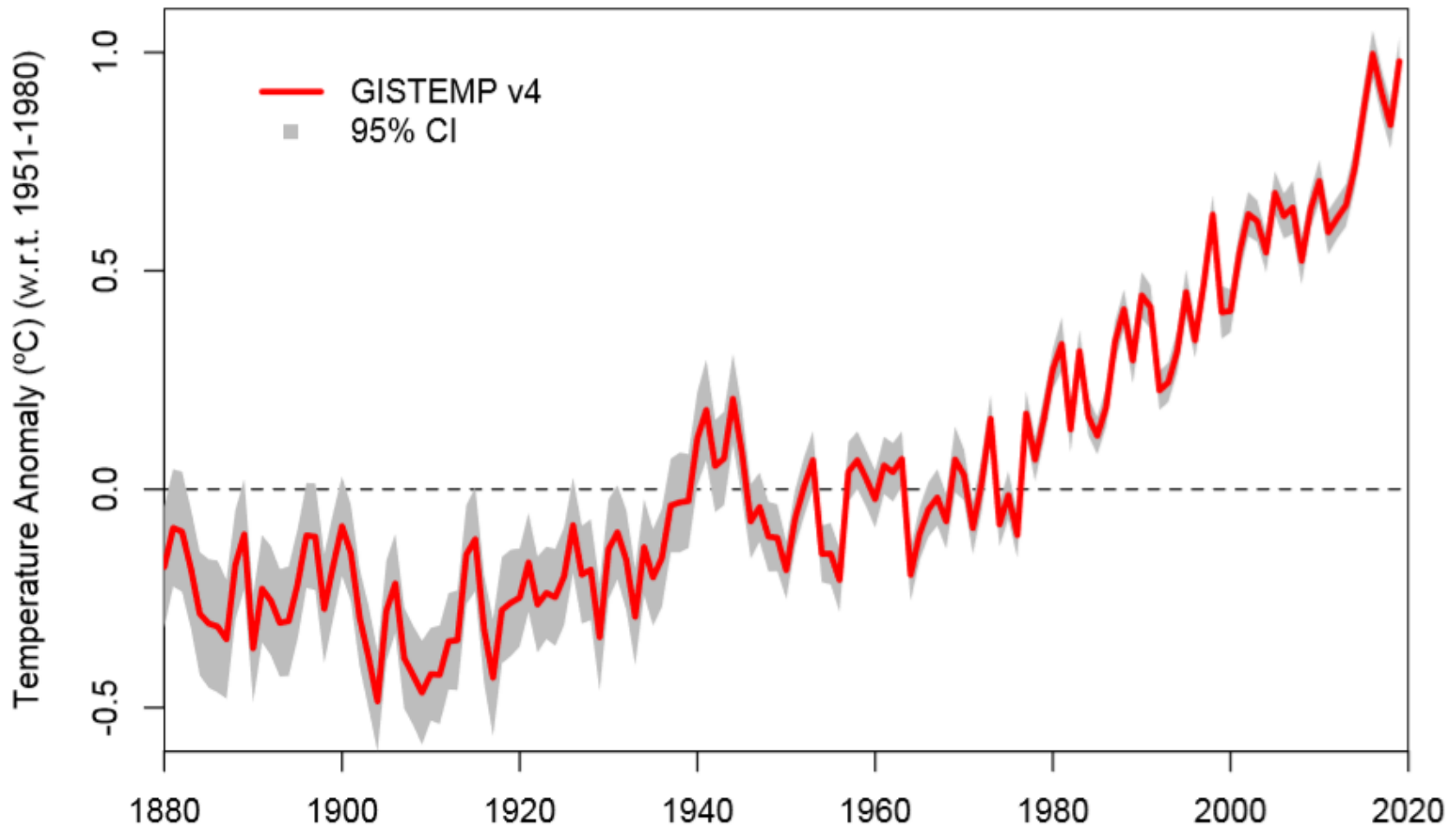
NASA GISTEMP

Annual Global Temperature: Difference From 1951-80 Average



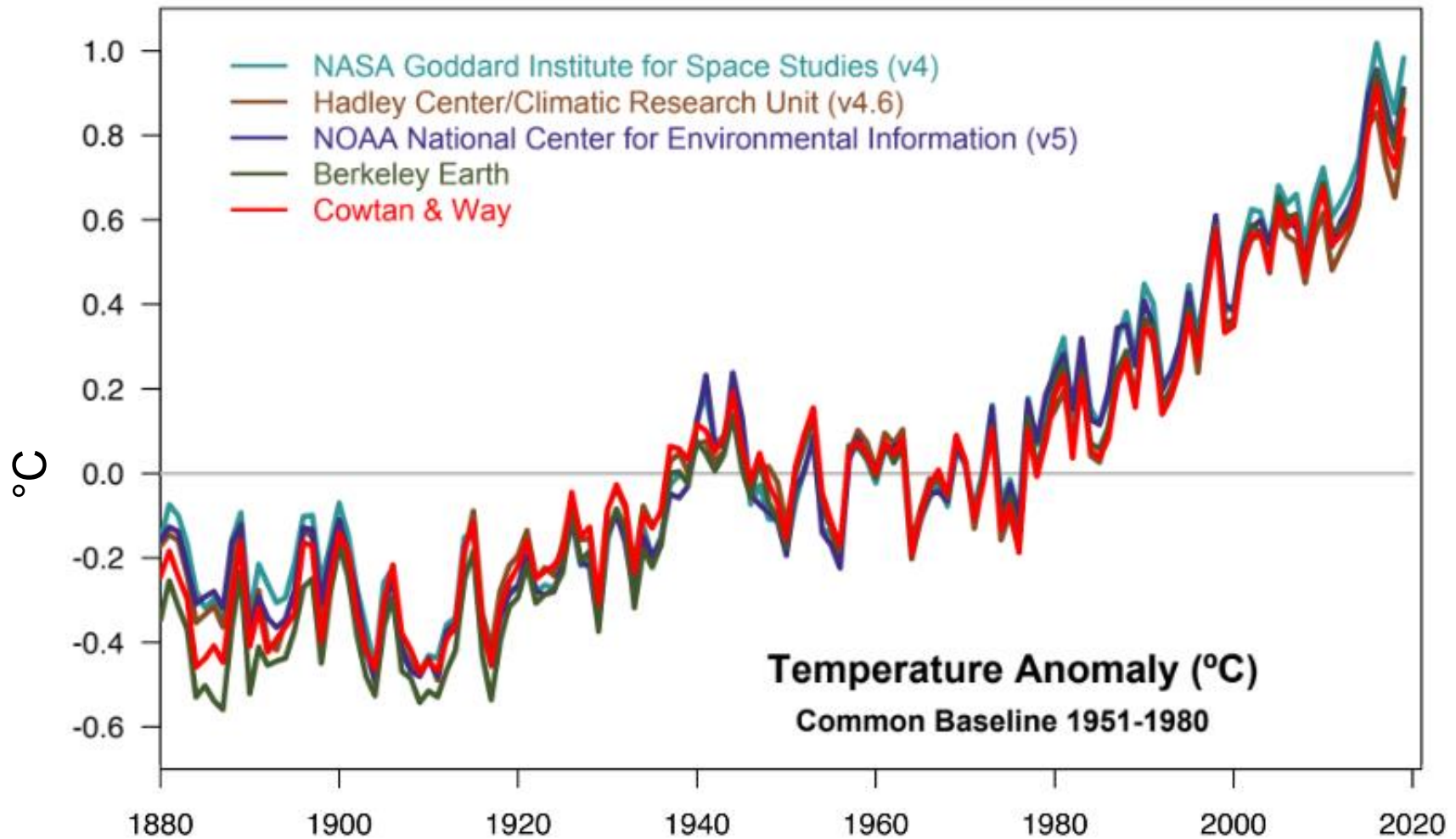
Global Temperature Time Series

NASA GISTEMP, with Uncertainty Analysis



Global Analyses Side by Side

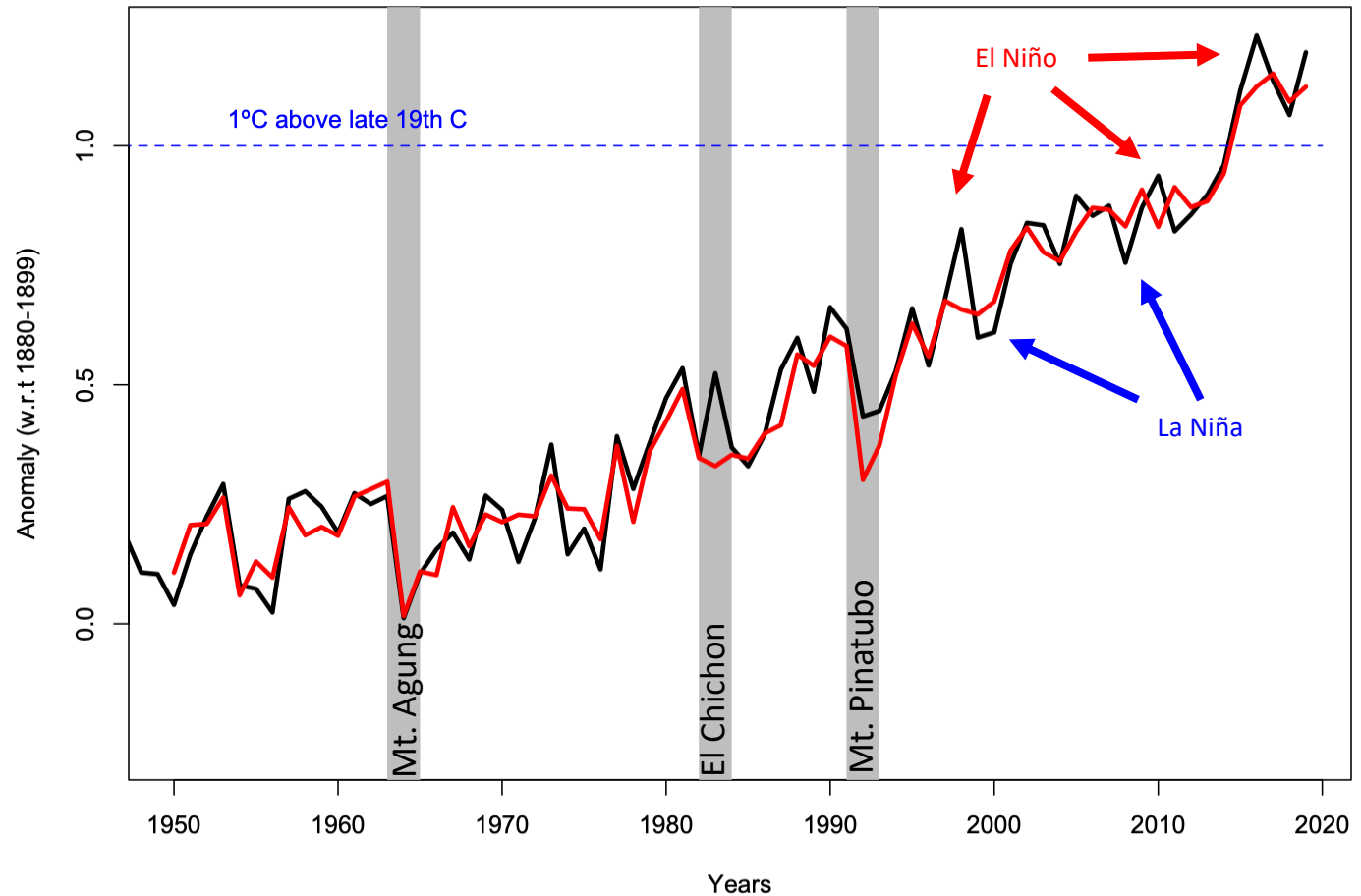
Several major datasets relative to a common 1951-1980 based period



Impact of ENSO on NASA analysis

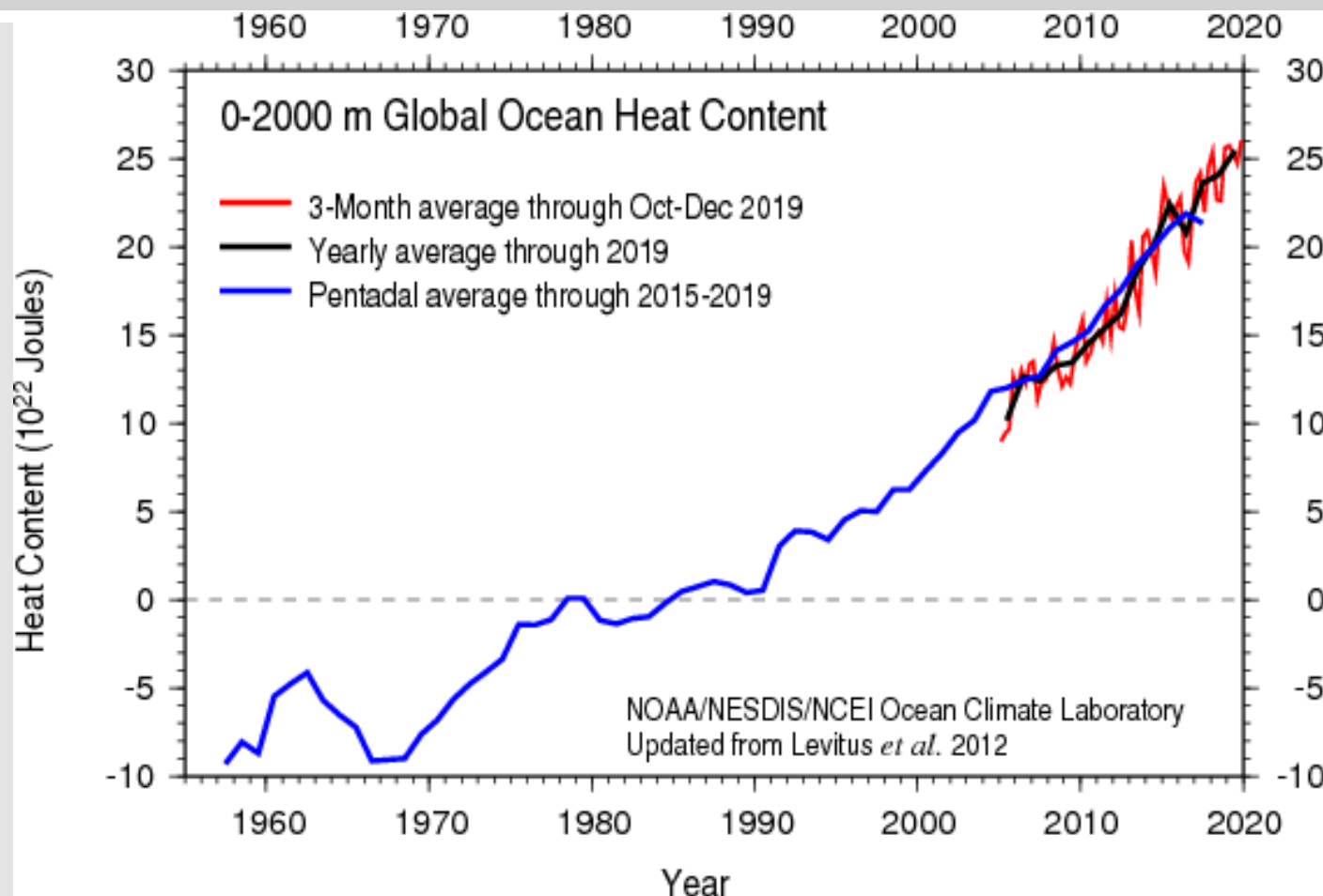
Maximum correlation to annual mean is Feb-Mar ENSO index

ENSO contribution to specific years:
2015: 0.03°C
2016: 0.11°C
2017: -0.01°C
2018: -0.03°C
2019: 0.07°C



Ocean Heat Content (NOAA/NCEI)

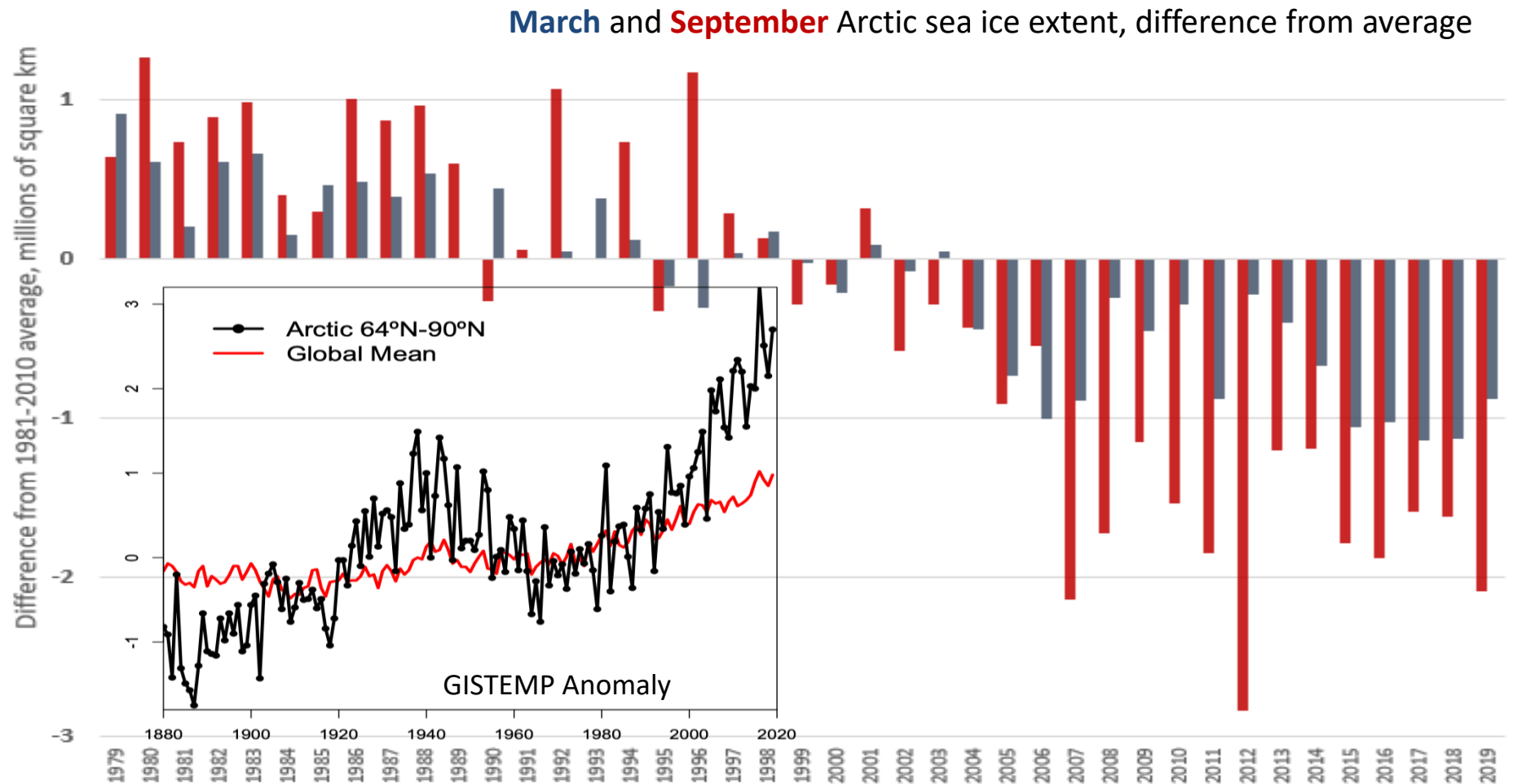
from surface to 2000m depth



Upper ocean heat content was the largest on record

Arctic Sea Ice Extent Since 1979

(inset: Arctic temperature change vs. Global average)



Evaluation against Reanalyses and Remote Sensing

ERA-5 is the latest reanalysis from ECMWF.

Trends 1979-2019:

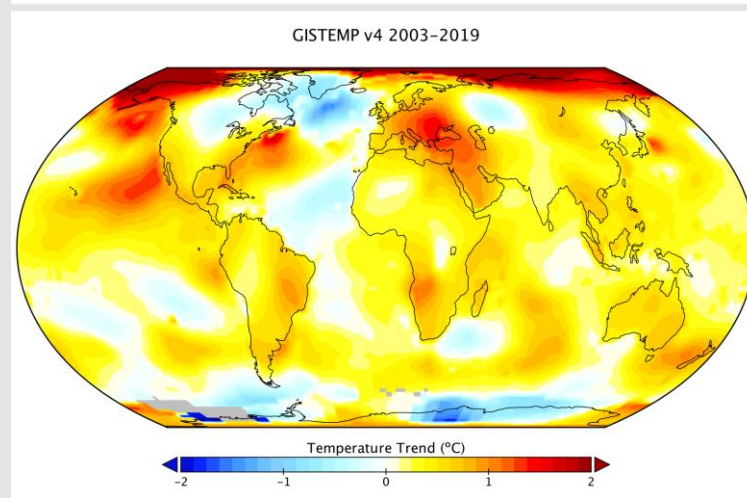
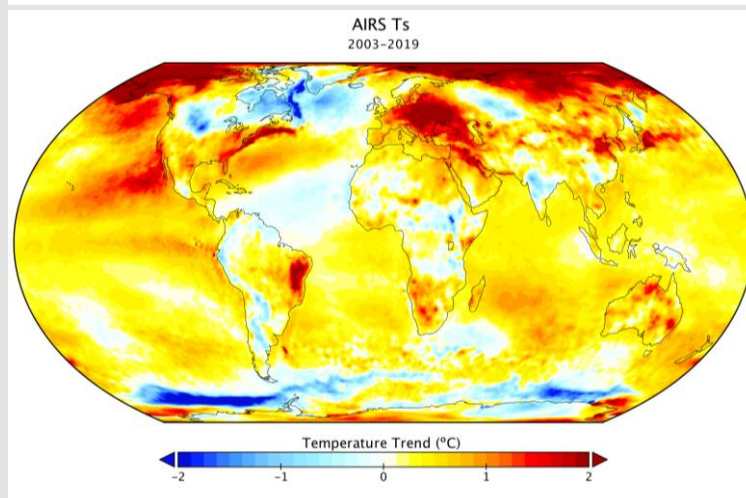
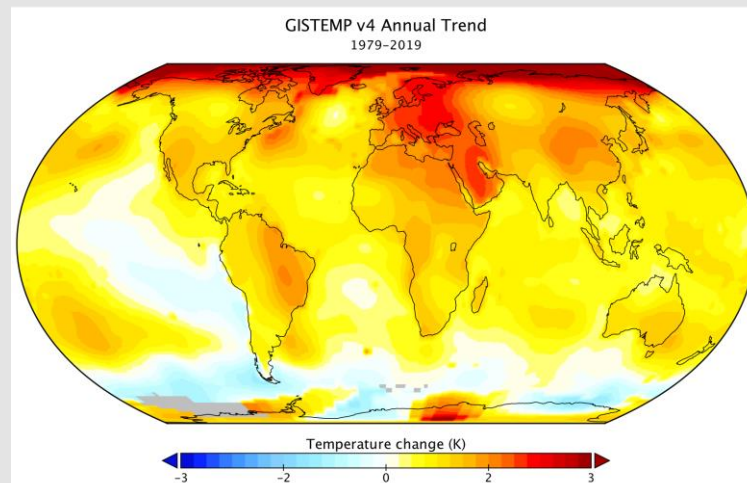
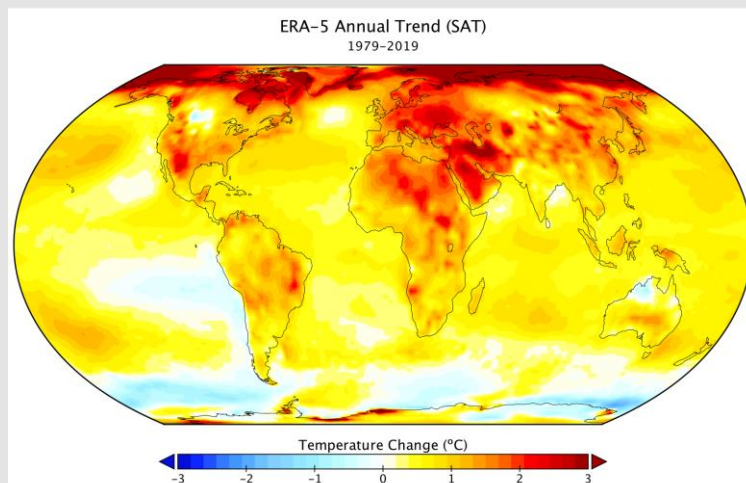
ERA5: 0.77°C

GISTEMP: 0.77°C

AIRS is an IR instrument on Eos Aqua. Trends 2003-2019:

AIRS: 0.43°C

GISTEMP: 0.41°C



Questions?

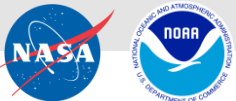
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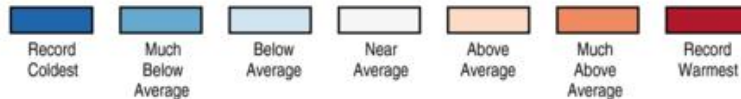
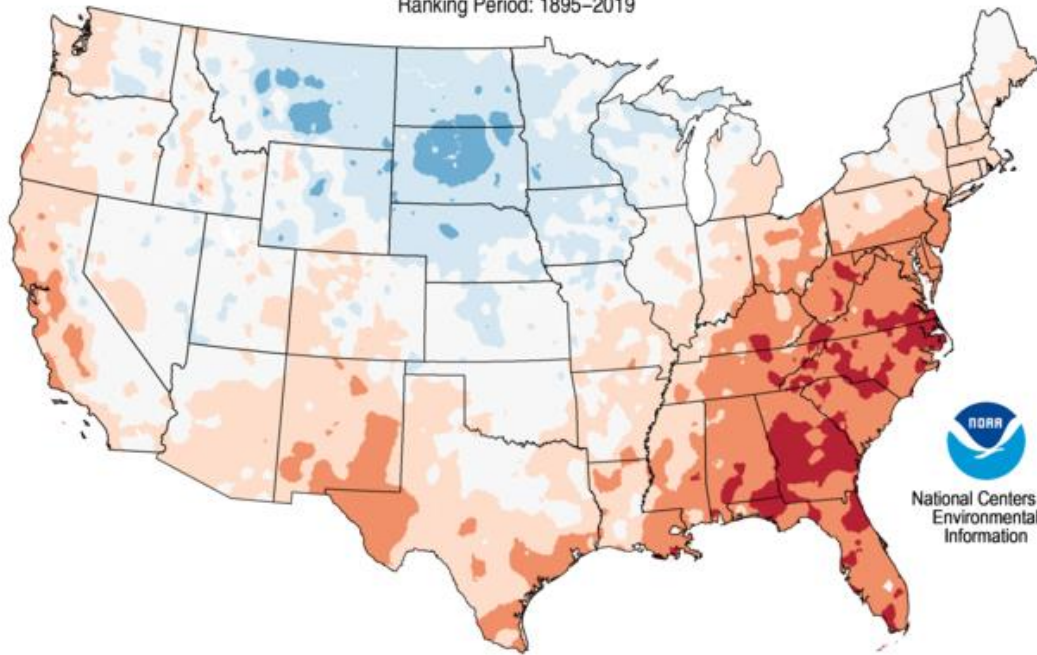
Chief, Monitoring Branch, NOAA's National Centers for Environmental Information



U.S. Temperature Conditions: 2019

CONUS: 52.7°F; 0.7°F above 20th century average; 34th warmest of 126

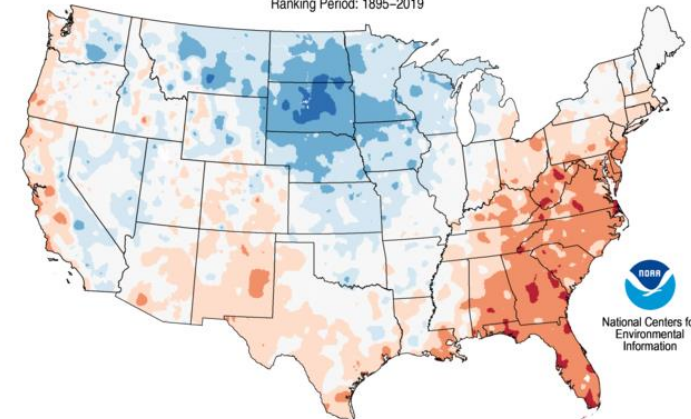
Mean Temperature Percentiles
January–December 2019
Ranking Period: 1895–2019



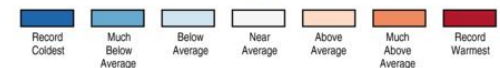
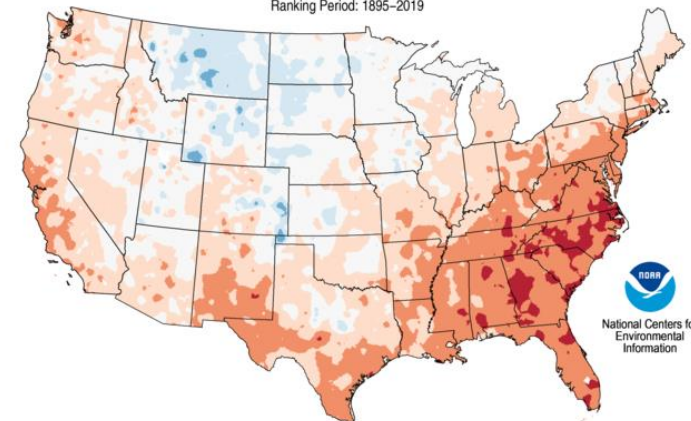
Data Source: 5km Gridded Dataset (nClimGrid)

Created: Mon Jan 06 2020

Maximum Temperature Percentiles
January–December 2019
Ranking Period: 1895–2019



Minimum Temperature Percentiles
January–December 2019
Ranking Period: 1895–2019



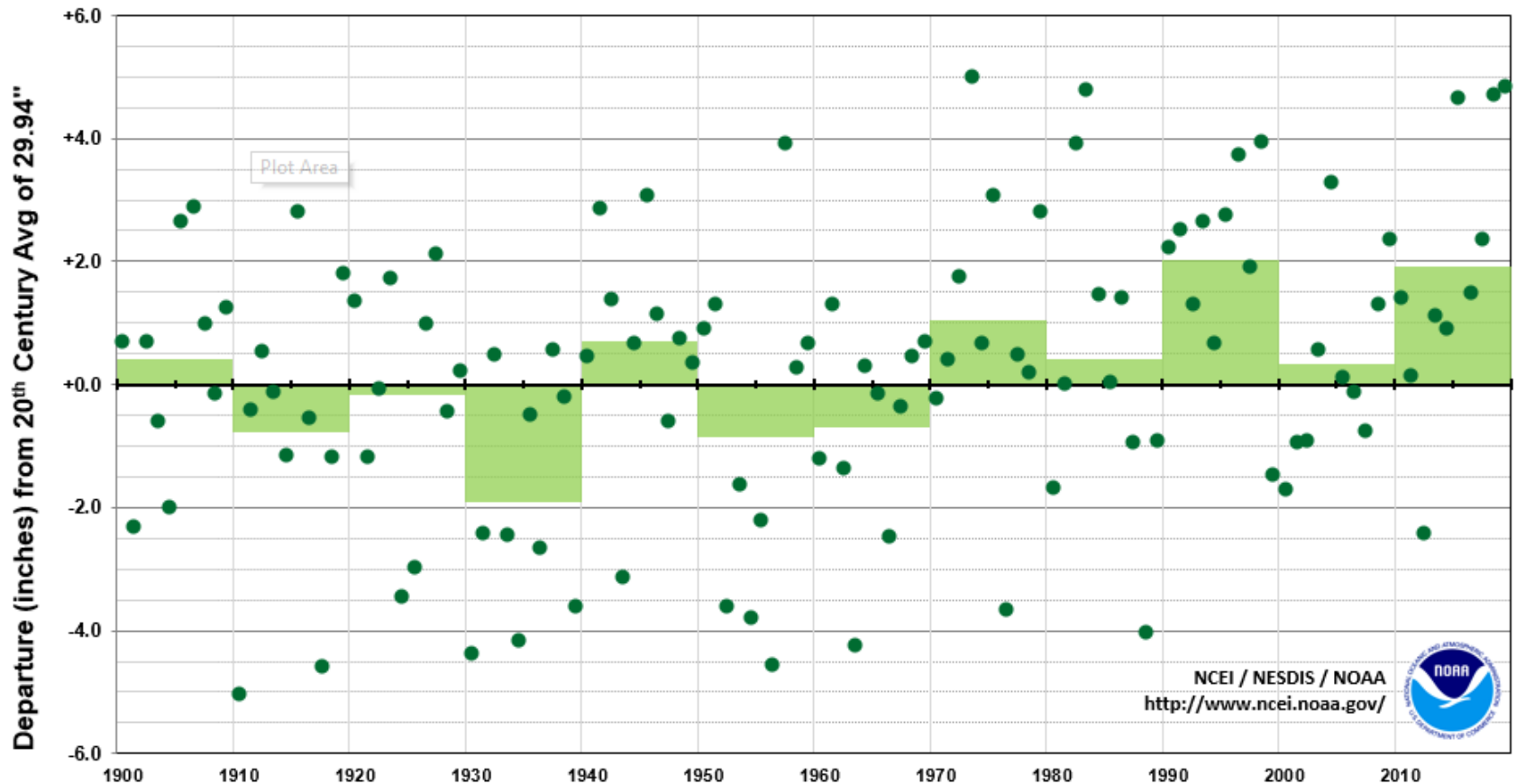
Created: Mon Jan 06 2020

Data Source: 5km Gridded Dataset (nClimGrid)

U.S. Climate Conditions: 2019

Precipitation: 34.78 in.; 4.84 in. above 20th century average; 2nd wettest

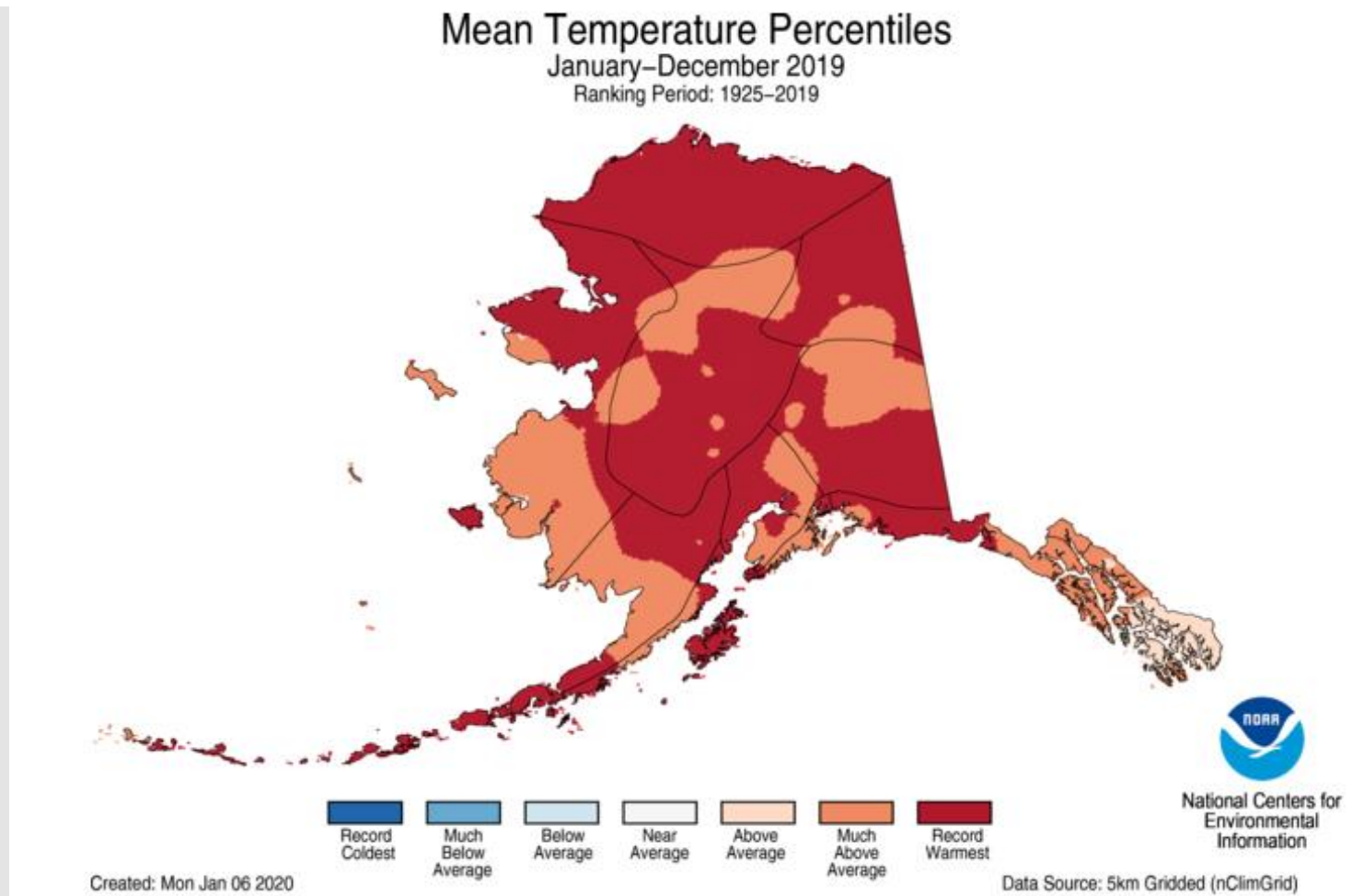
Annual CONUS Precipitation Departure, with Decadal Averages



Data Source: 5km Gridded Dataset (nClimGrid)

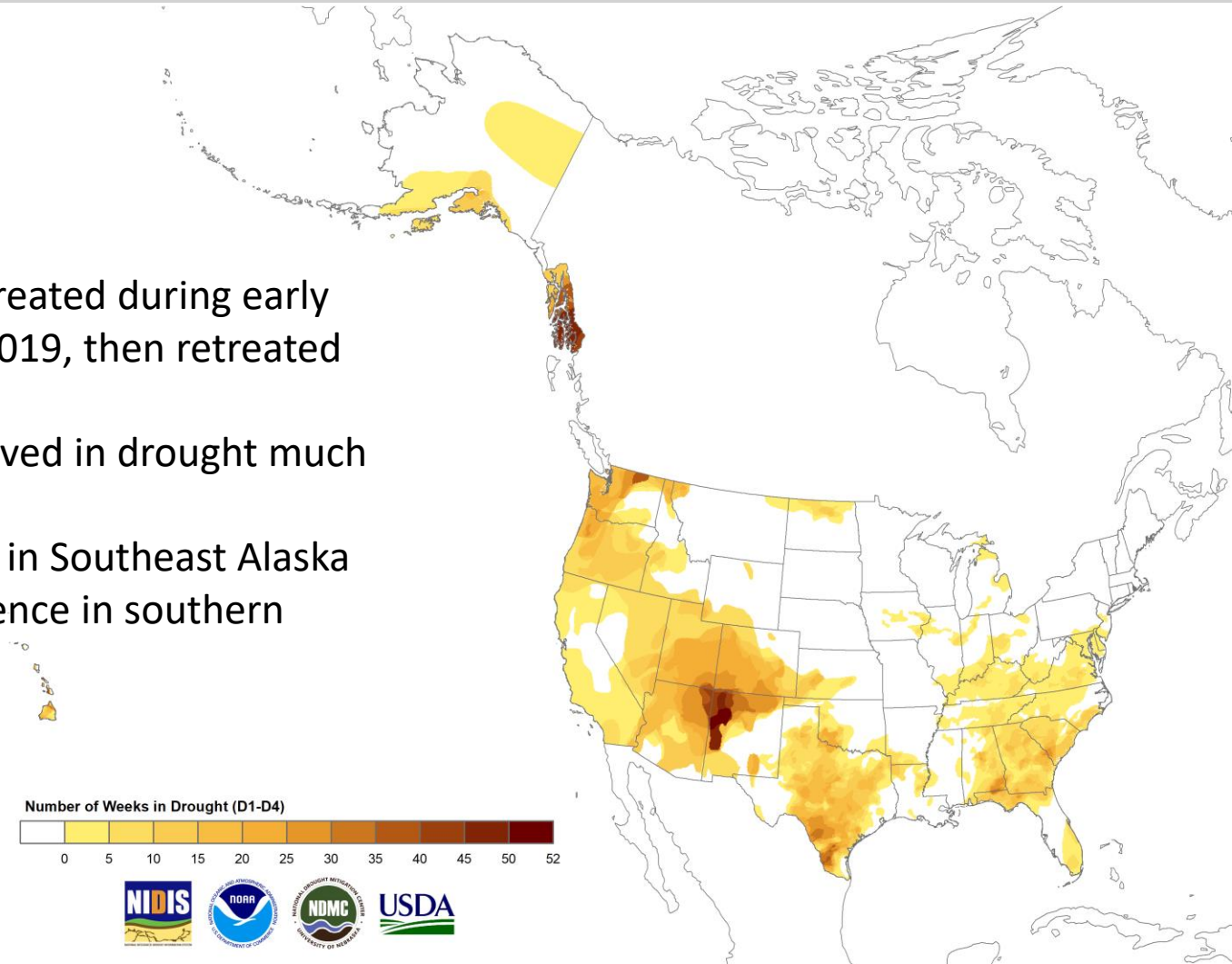
Alaska: Warmest Year on Record

Annual temperature: 32.2°F, +6.2°F vs. 1925-2000 average



U.S. Drought Conditions: 2019

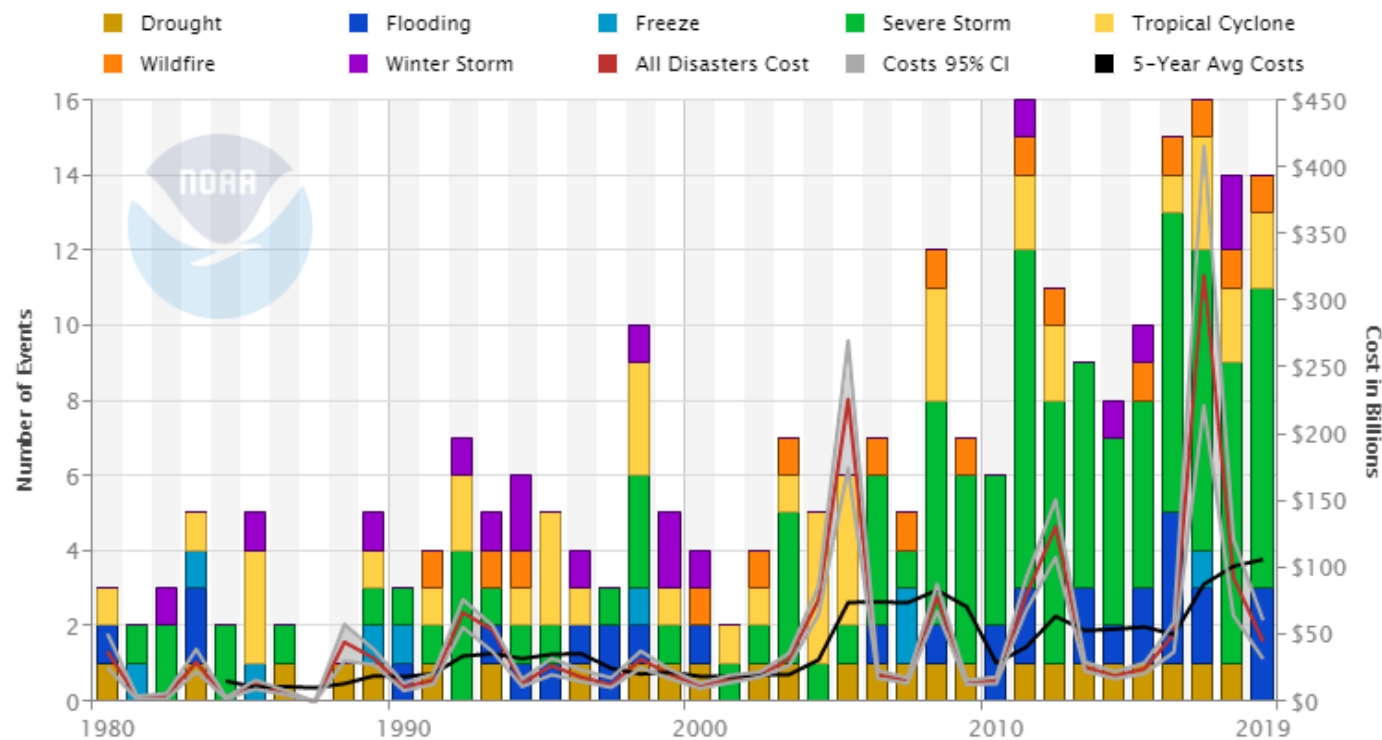
- Drought, on average, retreated during early 2019, expanded in mid 2019, then retreated again late in the year
- Four corners region involved in drought much of the year
- Record drought intensity in Southeast Alaska
- Regional drought emergence in southern plains, southeast



U.S. Billion Dollar Disasters

14 events in 2019

United States Billion-Dollar Disaster Events 1980–2019 (CPI-Adjusted)



Updated: January 8, 2020

14 Billion Dollar Disasters

4th largest total of the 1980-2018 record (ties 2018)

Accounted for \$45B in direct losses