

# CHANGES IN EARTH'S CLIMATE 1850 - 2017

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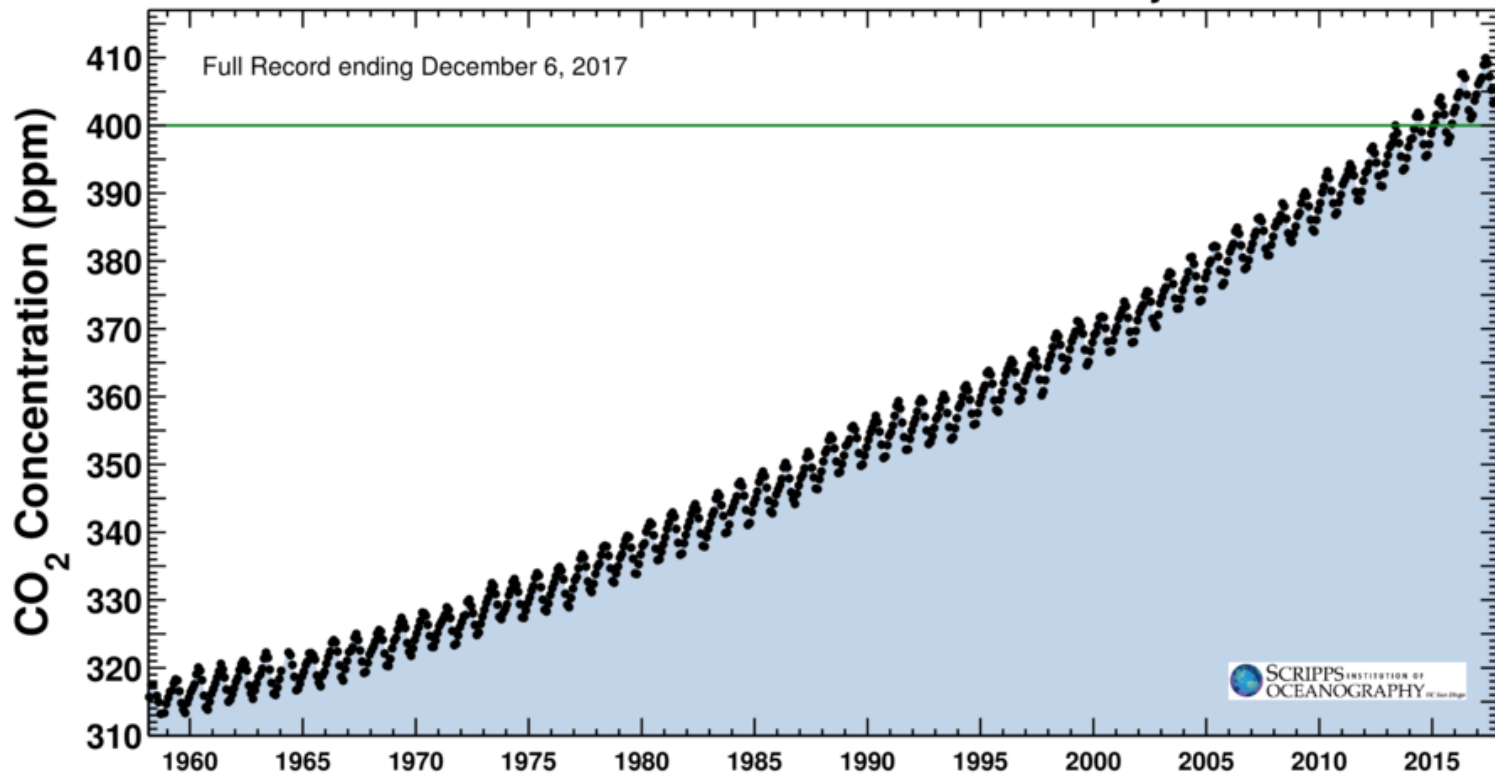
# Atmospheric CO<sub>2</sub>

Latest CO<sub>2</sub> reading

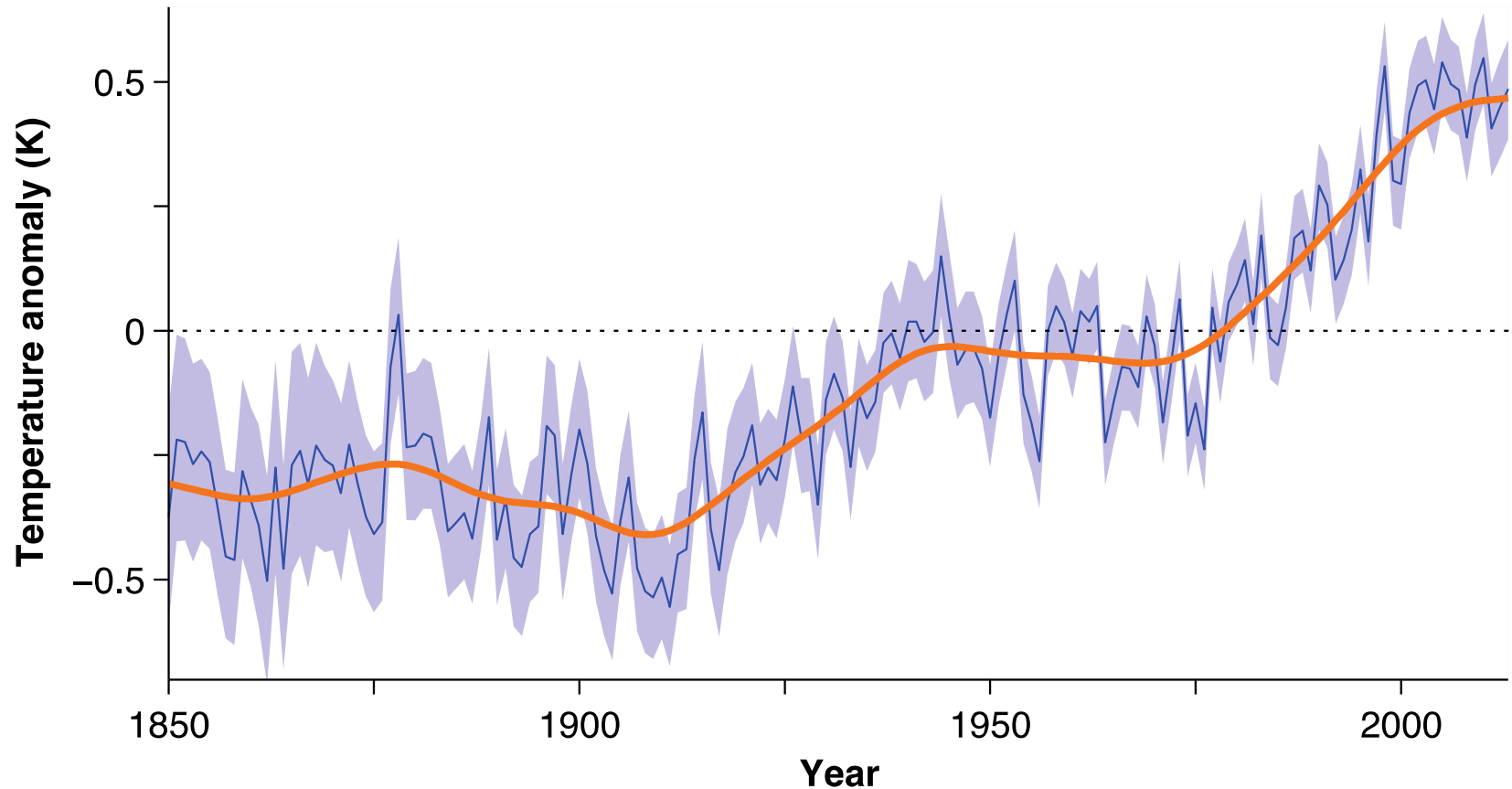
December 06, 2017

406.93 ppm

**Carbon dioxide concentration at Mauna Loa Observatory**

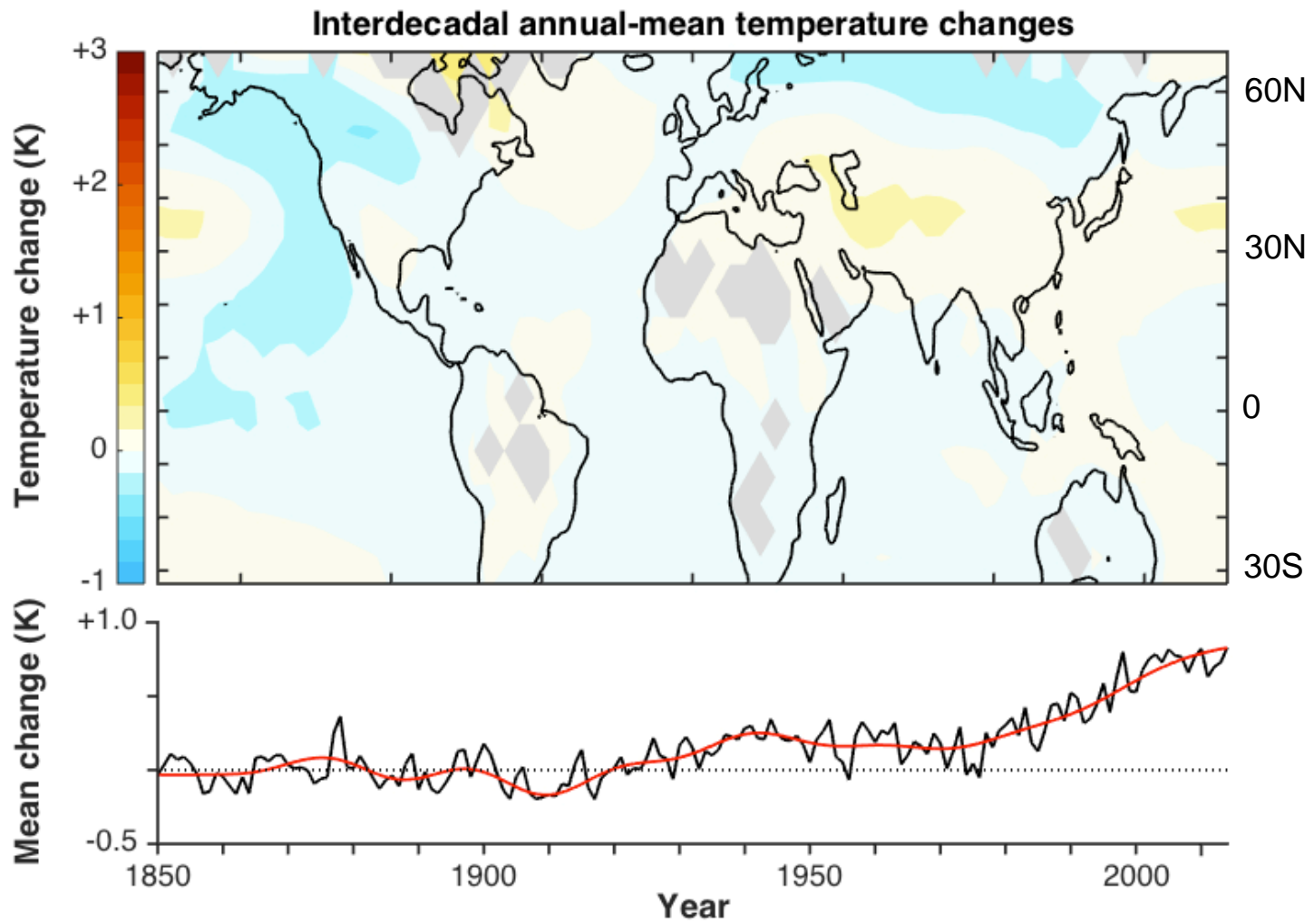


# Global mean surface temperature



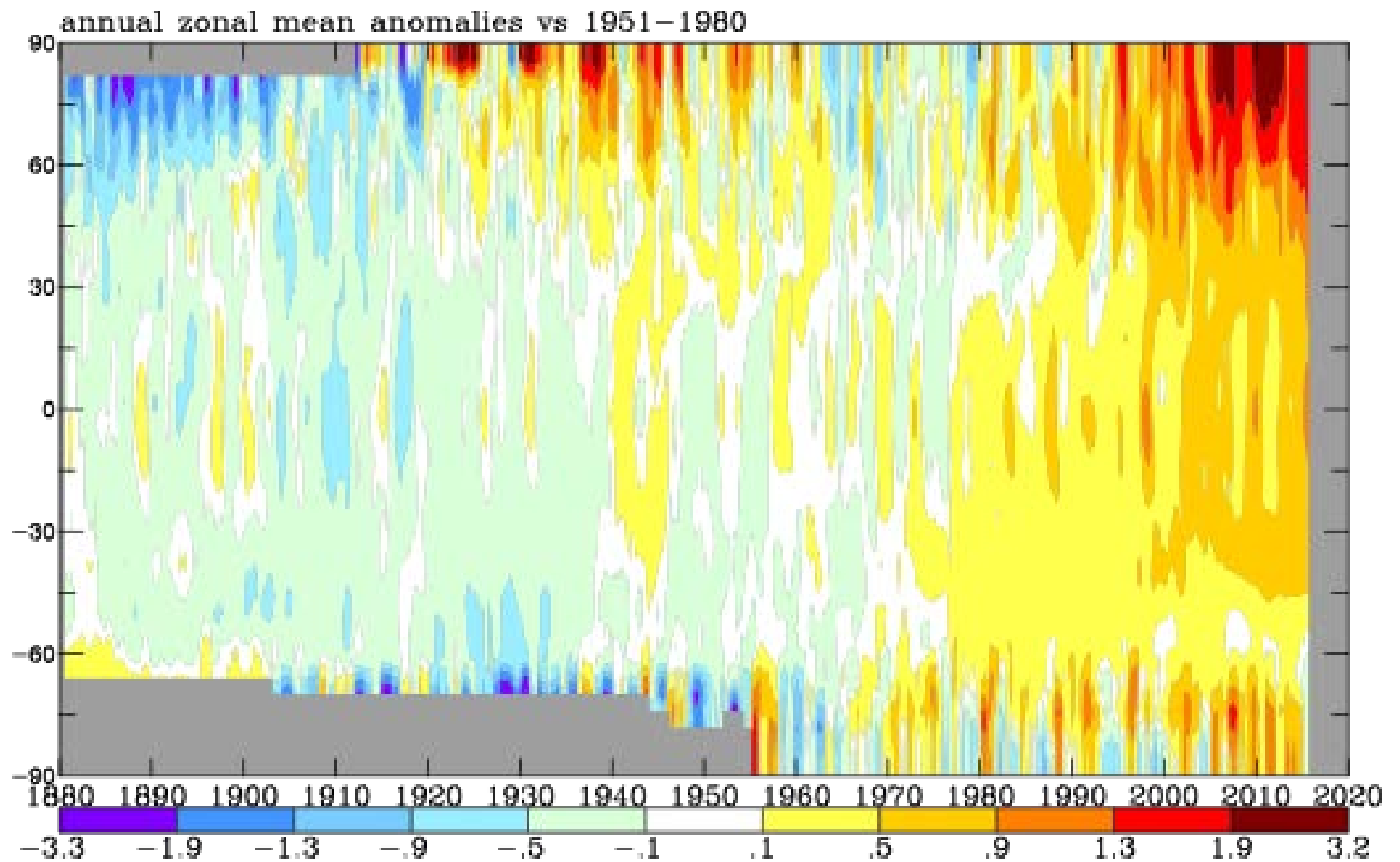
Temperature anomalies relative to the 1961 – 1990 mean

# Temperatures are rising globally!





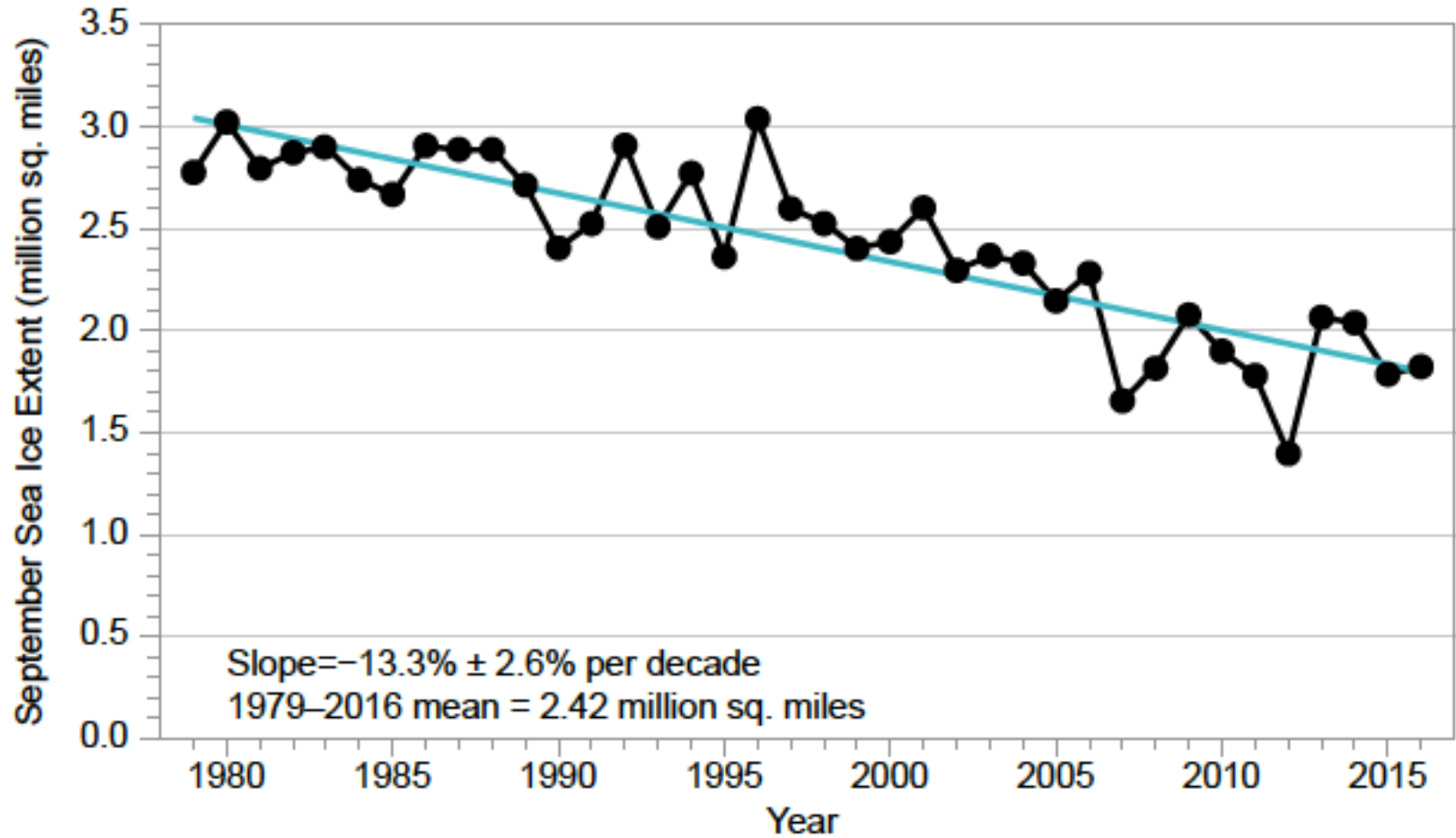
# Polar amplified warming



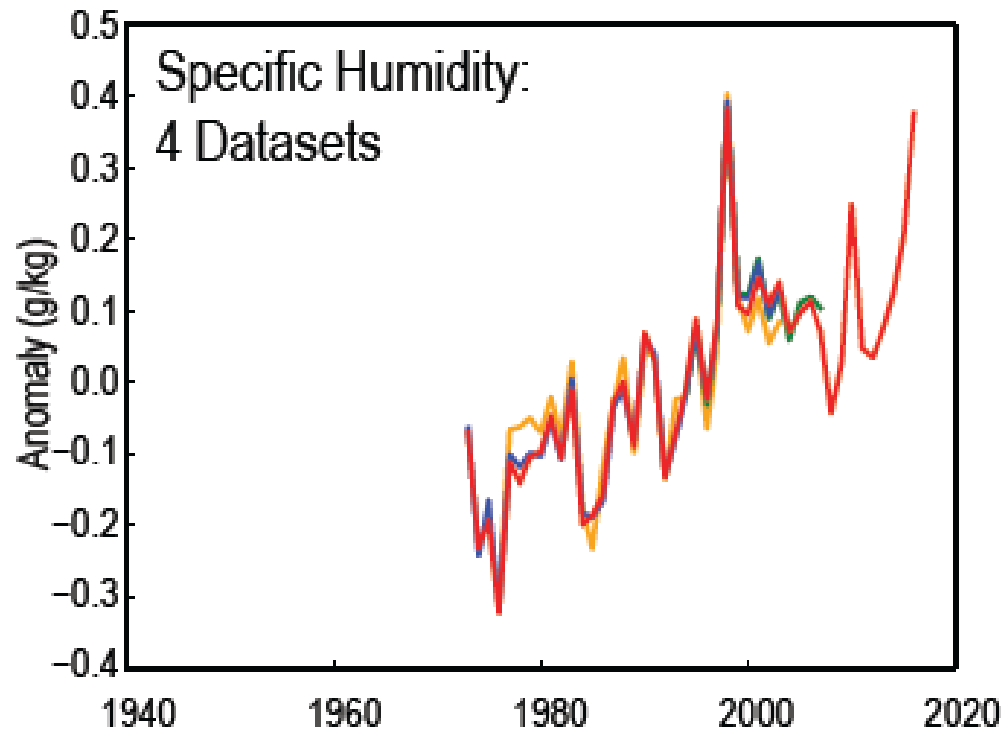
# Rapidly declining Arctic sea ice



## Rapidly declining Arctic sea ice

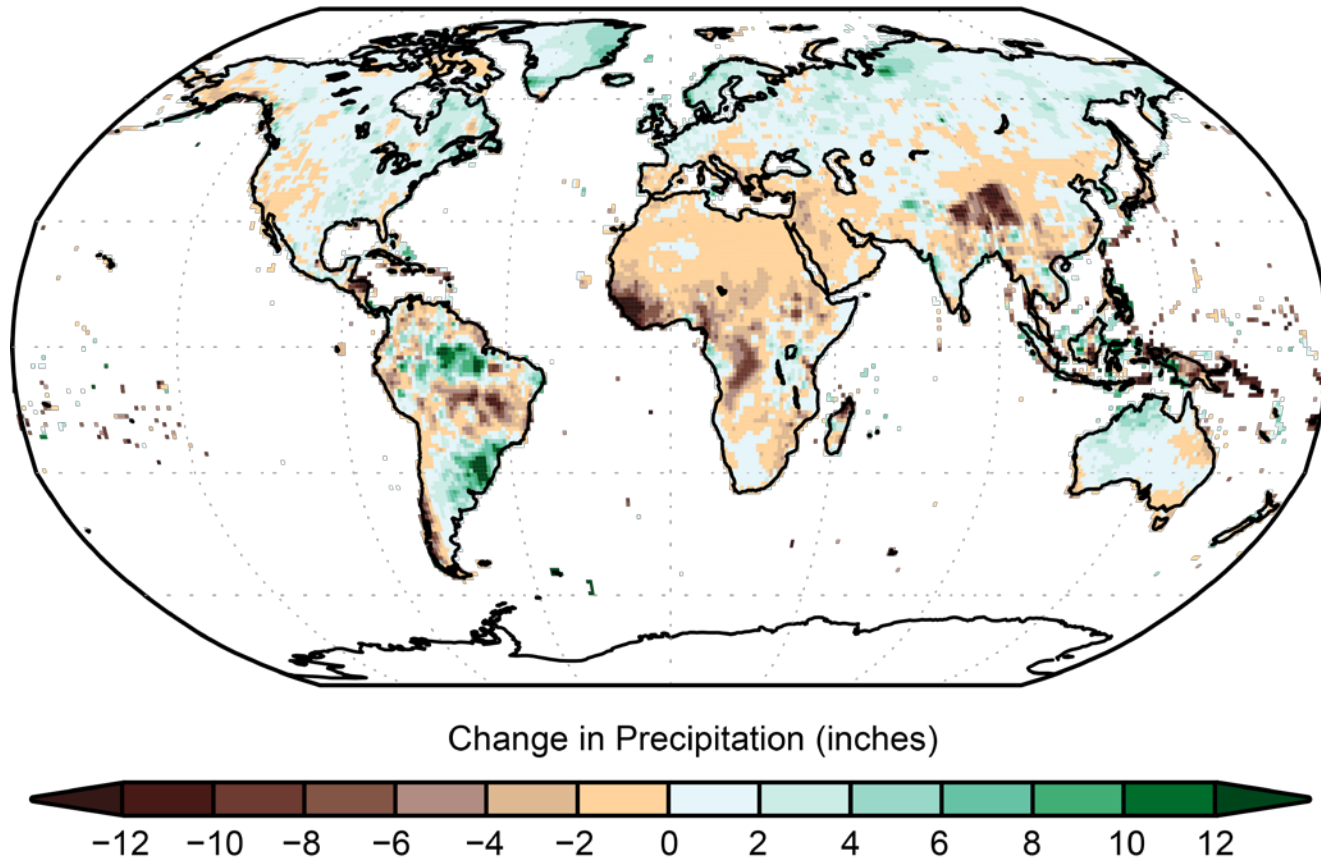


## Water vapor changes



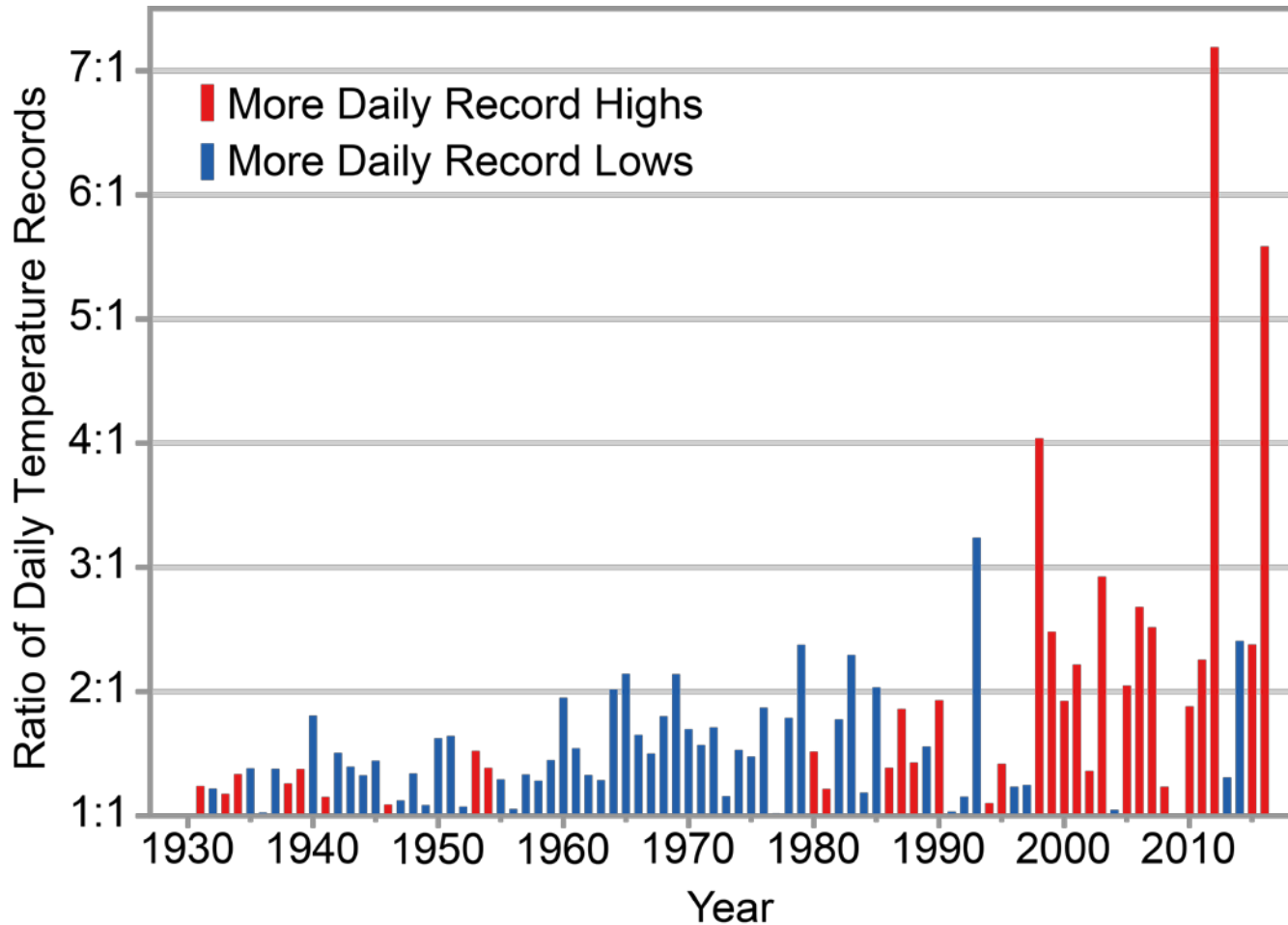
# Precipitation changes

## Annually-averaged Precipitation Trends



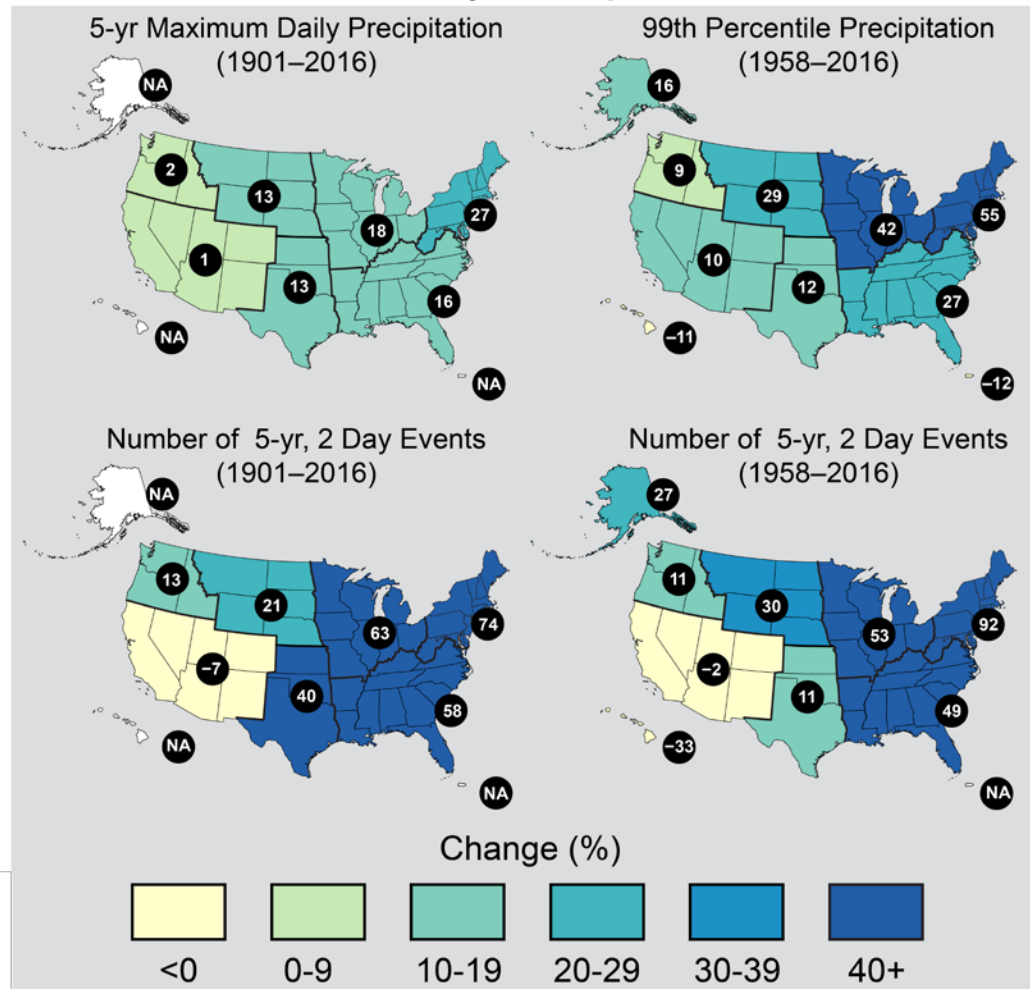
Precipitation changes for 1986 – 2015 relative to 1901 - 1960

## Changes in extreme events



Record setting daily temperatures in the United States

## Observed Change in Heavy Precipitation



## Measures of precipitation extremes in the United States

# Conclusions

Robust evidence of anthropogenic climate change:

- Emissions of greenhouse gases are the dominant cause of observed warming since the mid-20<sup>th</sup> century;
- This is the warmest period in history of modern civilization;
- Documented changes in surface, atmospheric, and oceanic temperatures; melting glaciers, declining snow cover; shrinking sea ice; rising sea level; changes in hydrological cycle and extreme events.