Ohio's Changing Climate & Impacts on Agriculture

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Ohio Smart Agriculture: Solutions from the Land
Steering Committee Meeting
November 8, 2017

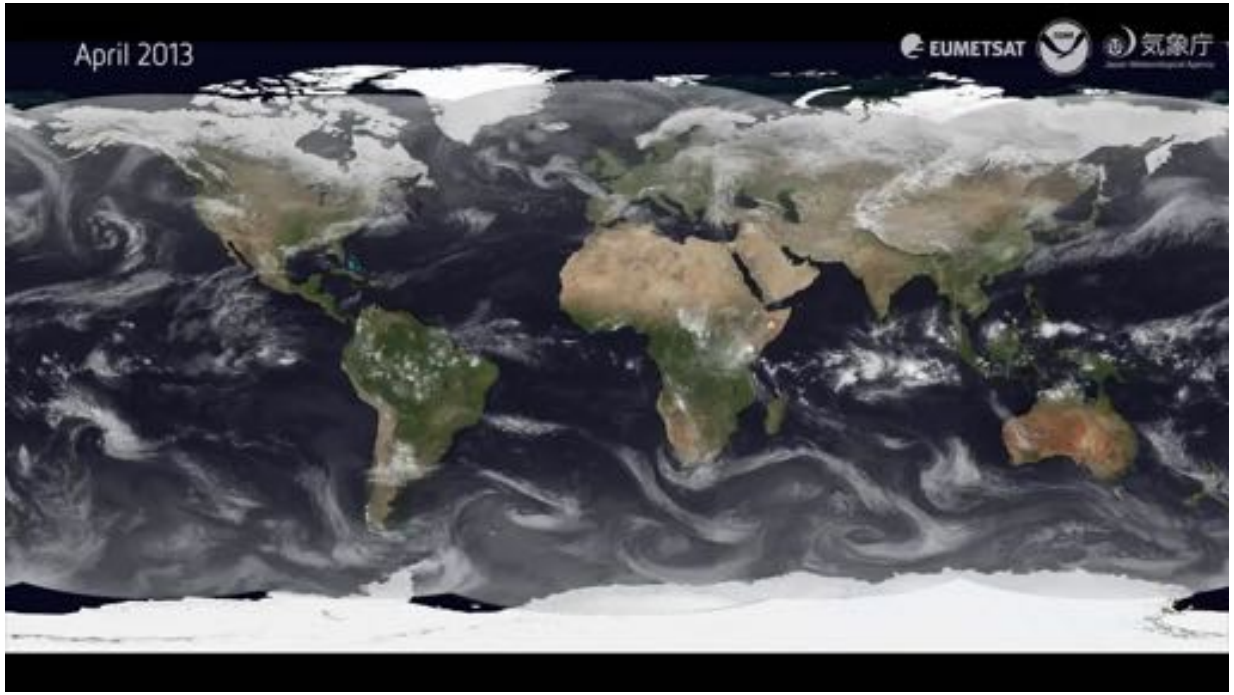
THE OHIO STATE UNIVERSITY

DEPARTMENT OF EXTENSION - COLLEGE OF FOOD, AGRICULTURAL, AND ENVIRONMENTAL SCIENCES

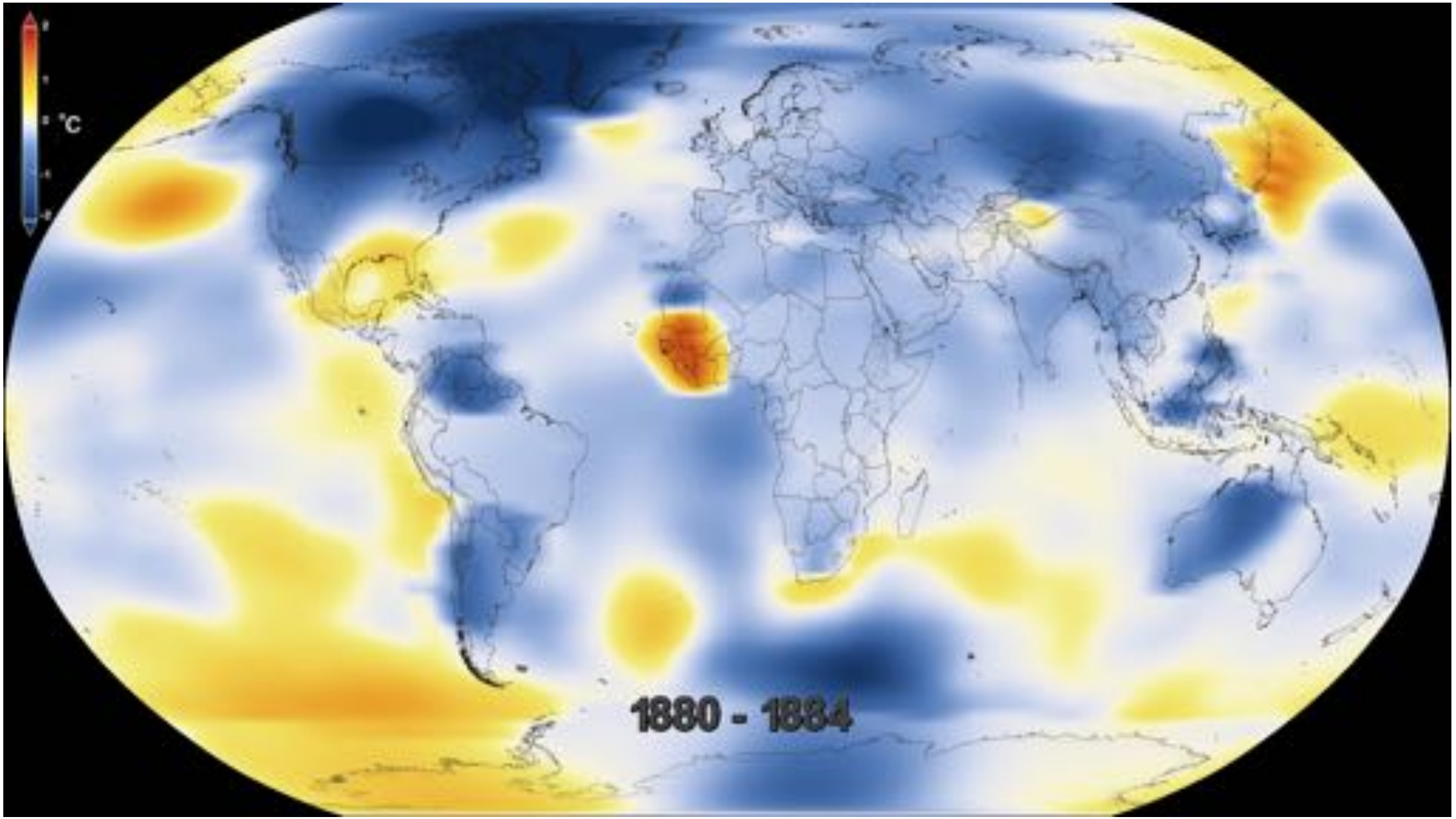
BYRD POLAR & CLIMATE RESEARCH CENTER

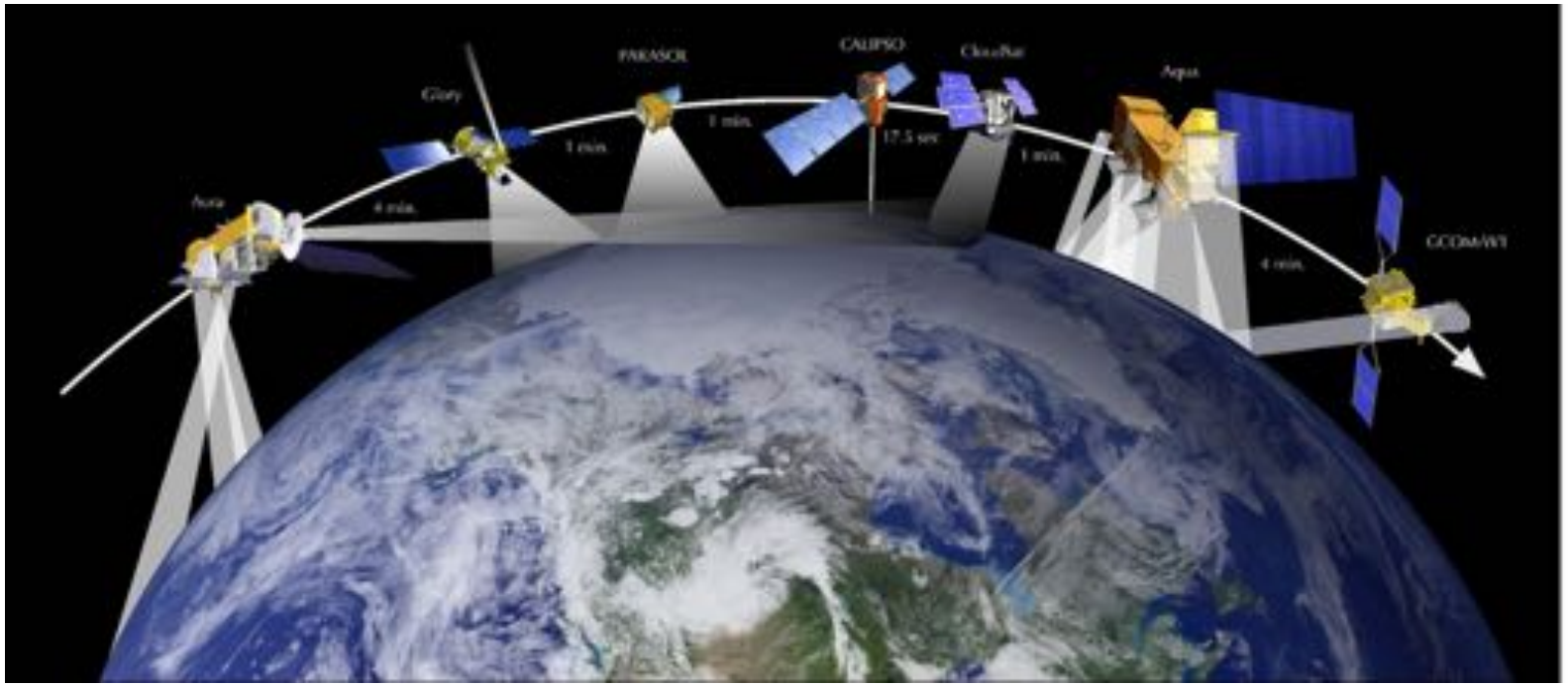
Start with the Basics

What is Weather?

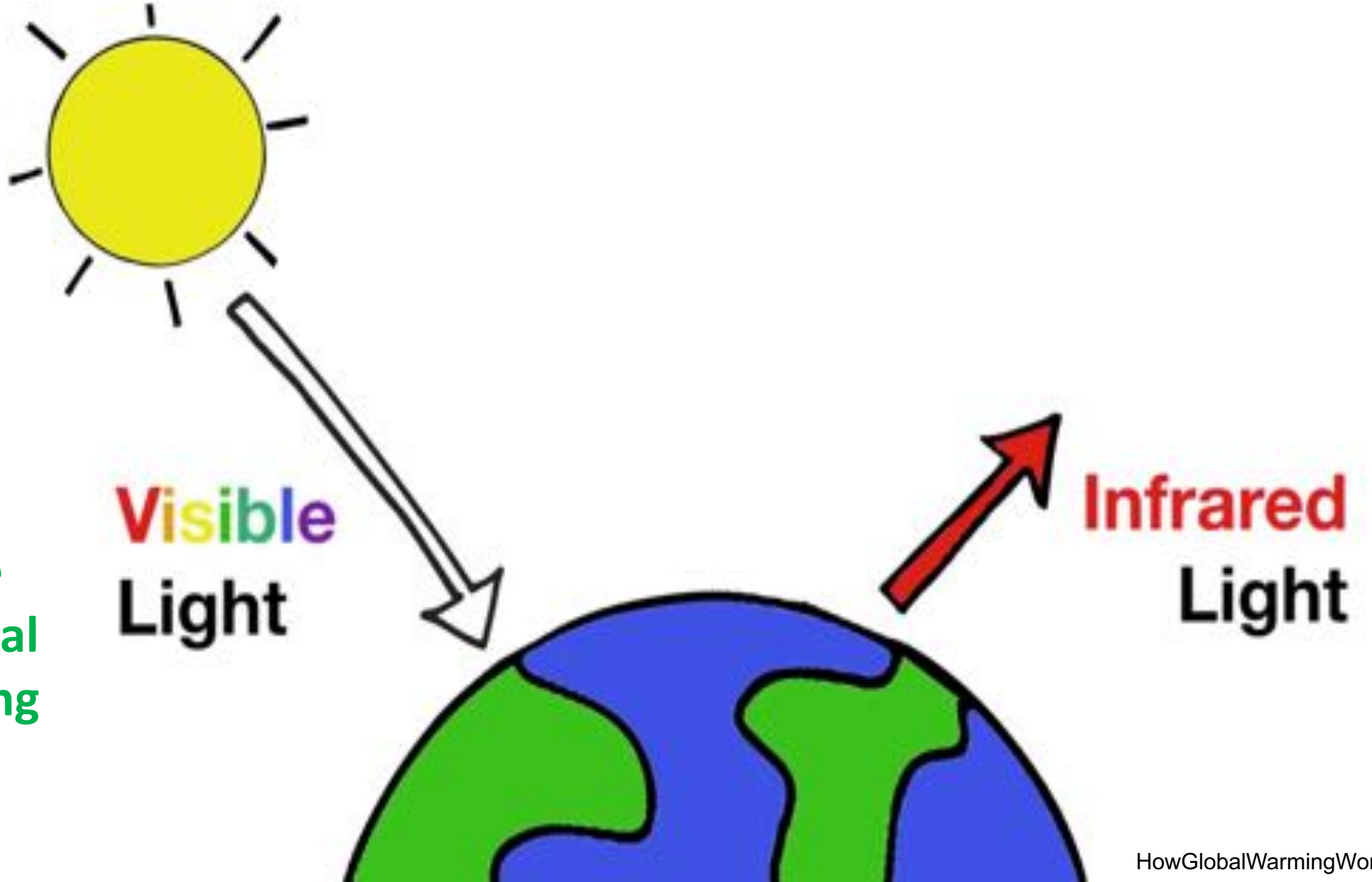


What is Climate?


°C
1880 - 1884

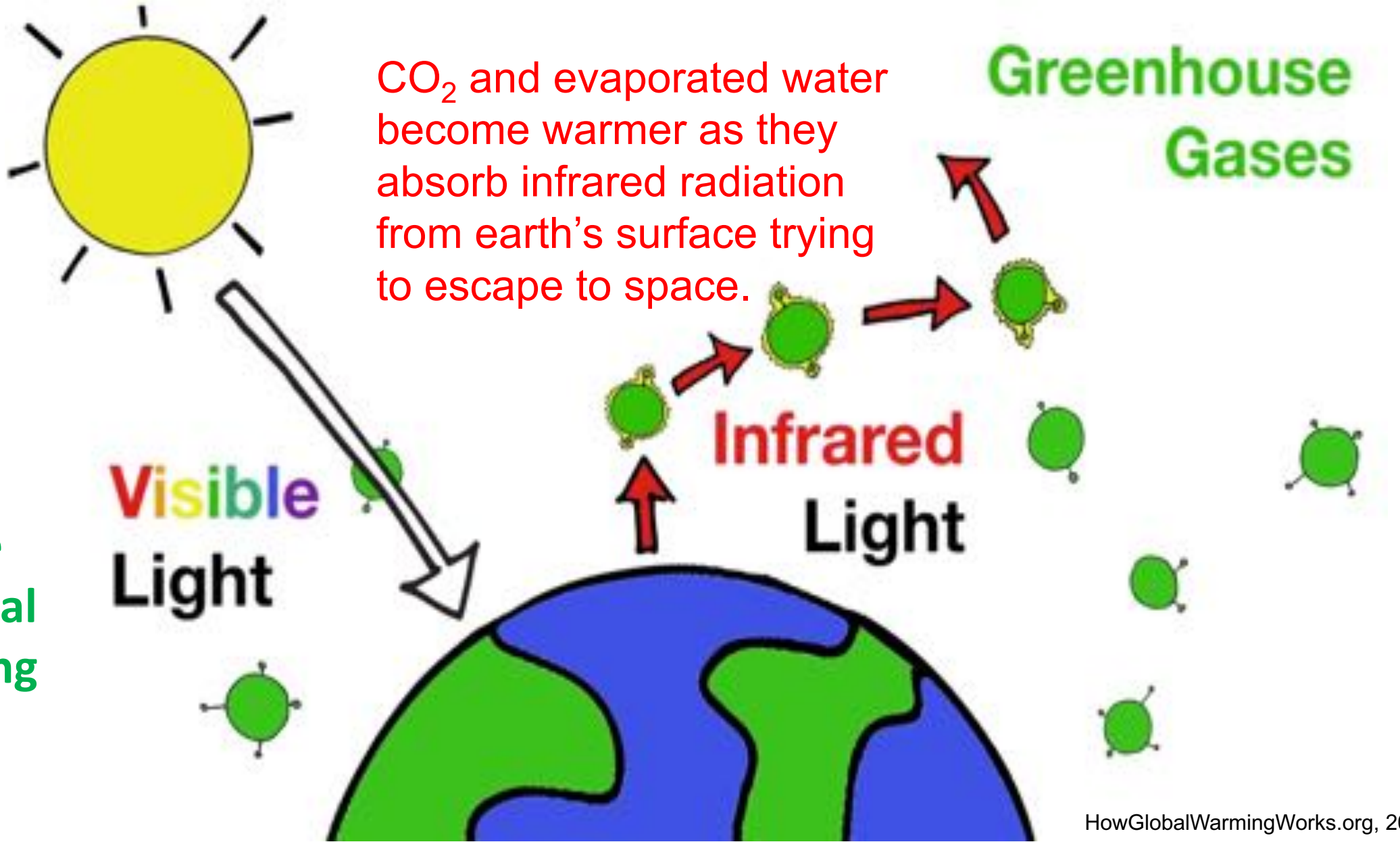

Glory
PARASOL
CALIPSO
CloudSat
Aqua
Aura
GCOM-W1
1 min.
1 min.
17.5 sec
1 min.
4 min.
4 min.

The Science of Global Warming



HowGlobalWarmingWorks.org, 2014

The Science of Global Warming



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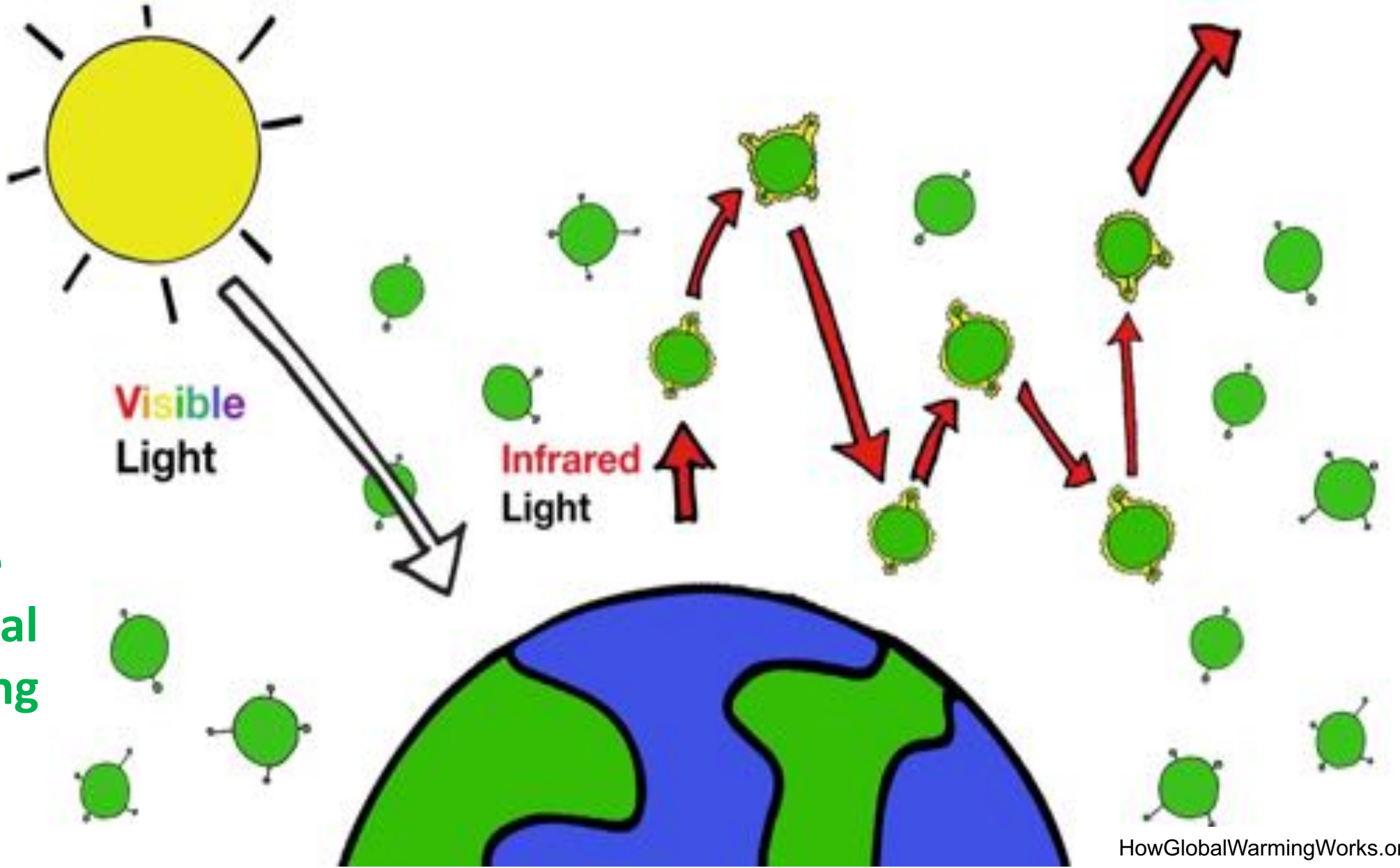


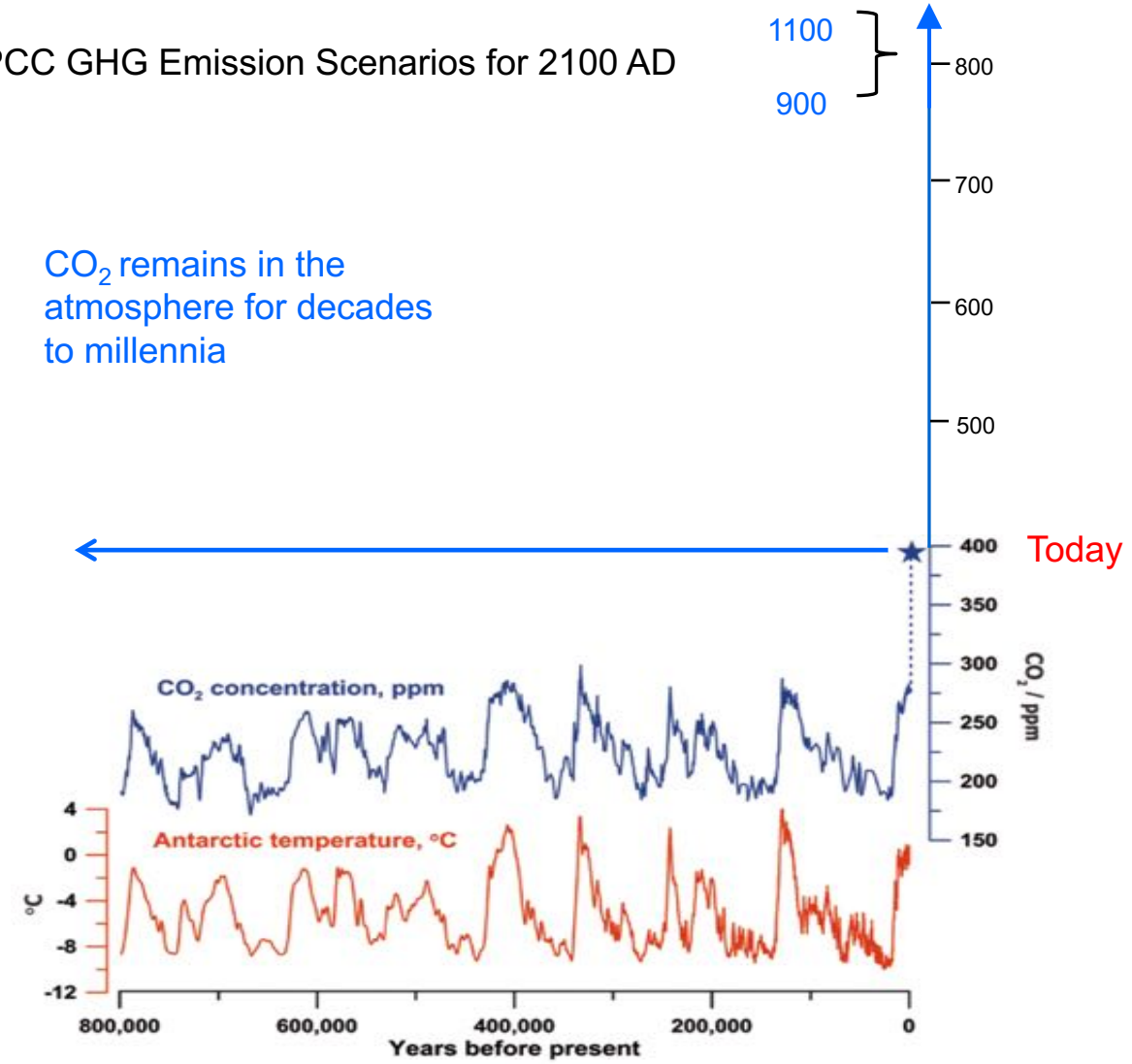
HowGlobalWarmingWorks.org, 2014

IPCC GHG Emission Scenarios for 2100 AD

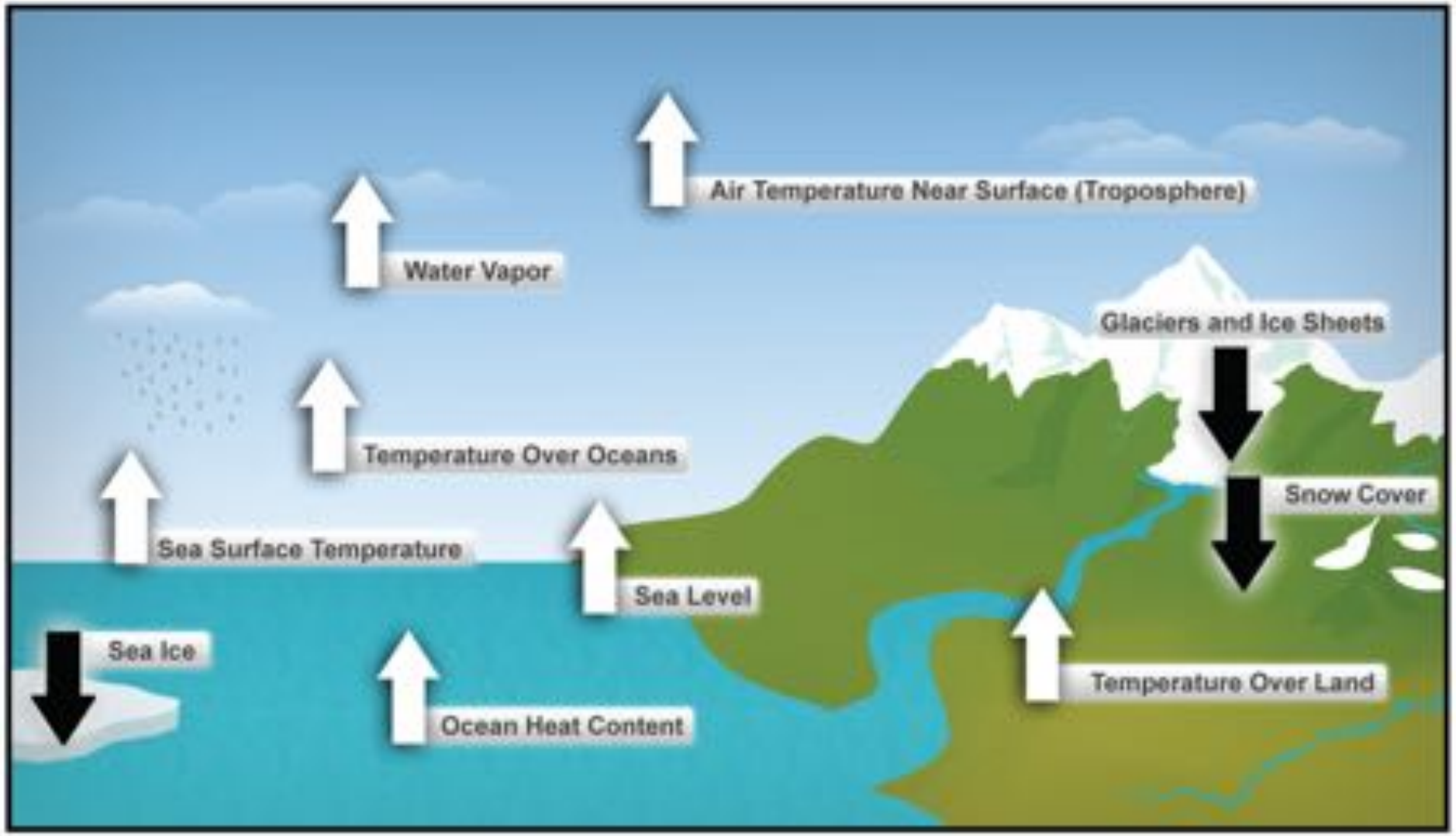
1100

900

CO_2 remains in the atmosphere for decades to millennia



Ten Indicators of a Warming World



Y“OUR” Climate Change

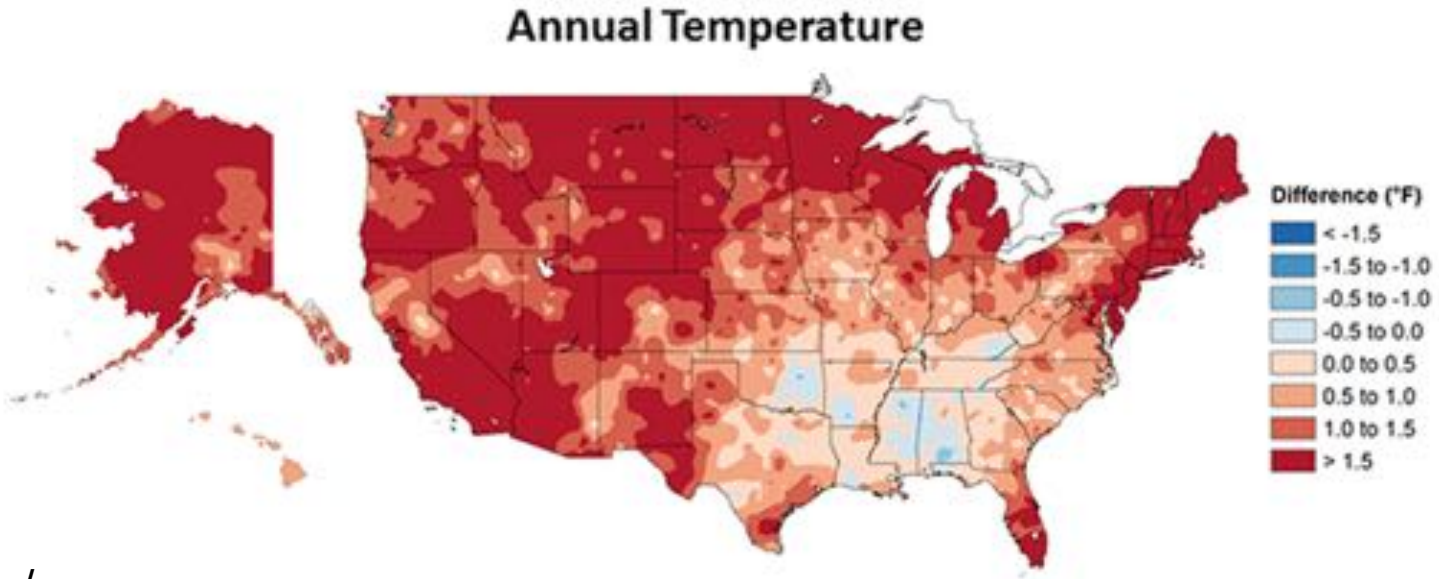
Global Challenge with Local Impacts!

https://health2016.globalchange.gov/climate-change-and-human-health

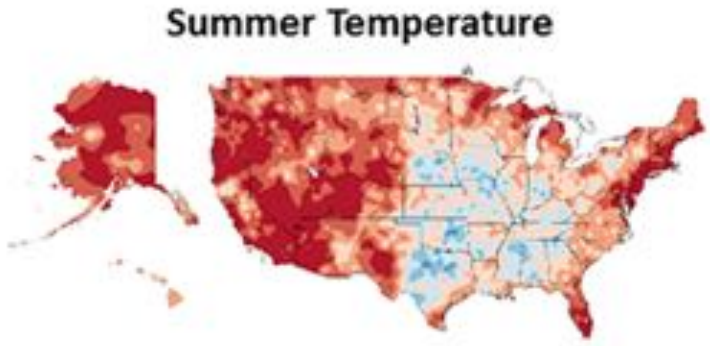
Temperature Trends & Ag Impacts

Annual average temperature over the contiguous United States has increased by 1.2°F (0.7°C) for the period 1986–2016 relative to 1901–1960 and by 1.8°F (1.0°C) based on a linear regression for the period 1895–2016

Average (1986-2016) minus Average (1901-1960)



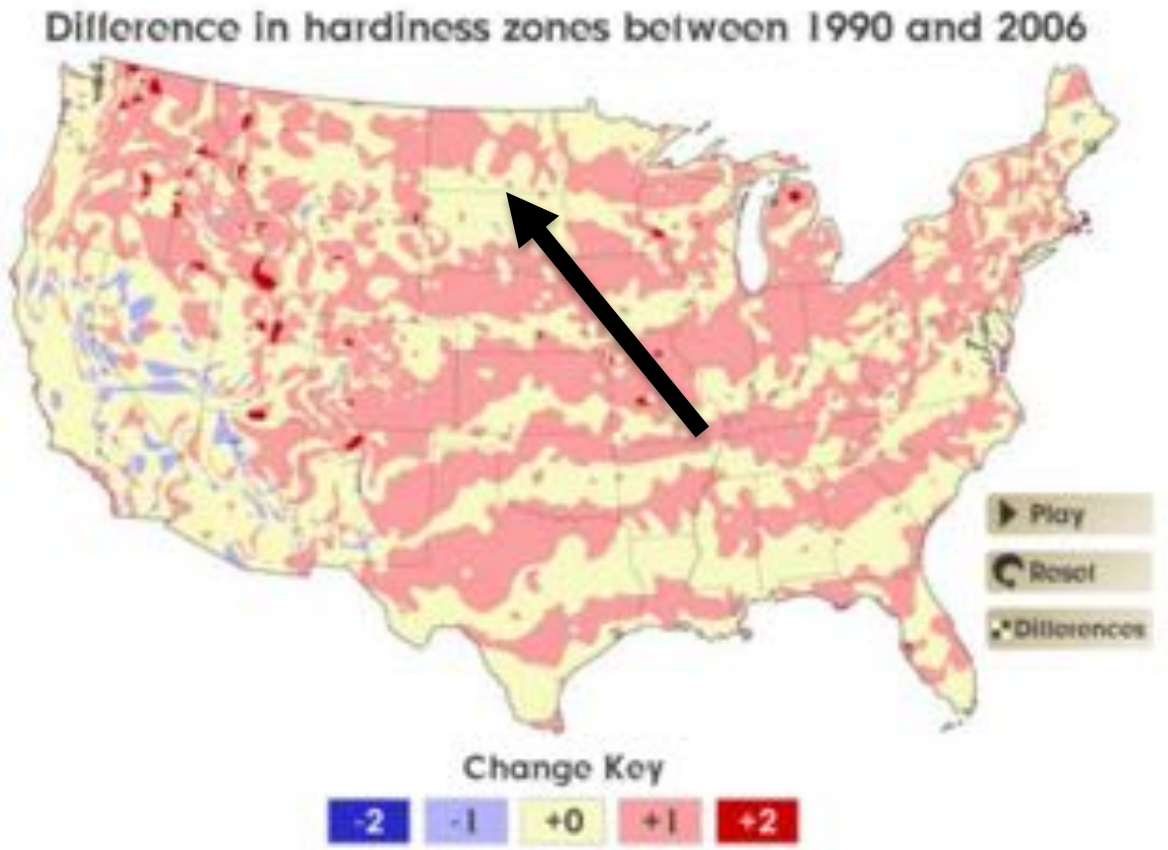
National Climate Assessment
CCSR: https://science2017.globalchange.gov/



https://science2017.globalchange.gov/chapter/6/

Zone Changes

This animation illustrates the general warming that has occurred from 1990 to 2006. Click the play button to see how the hardiness zones have changed.



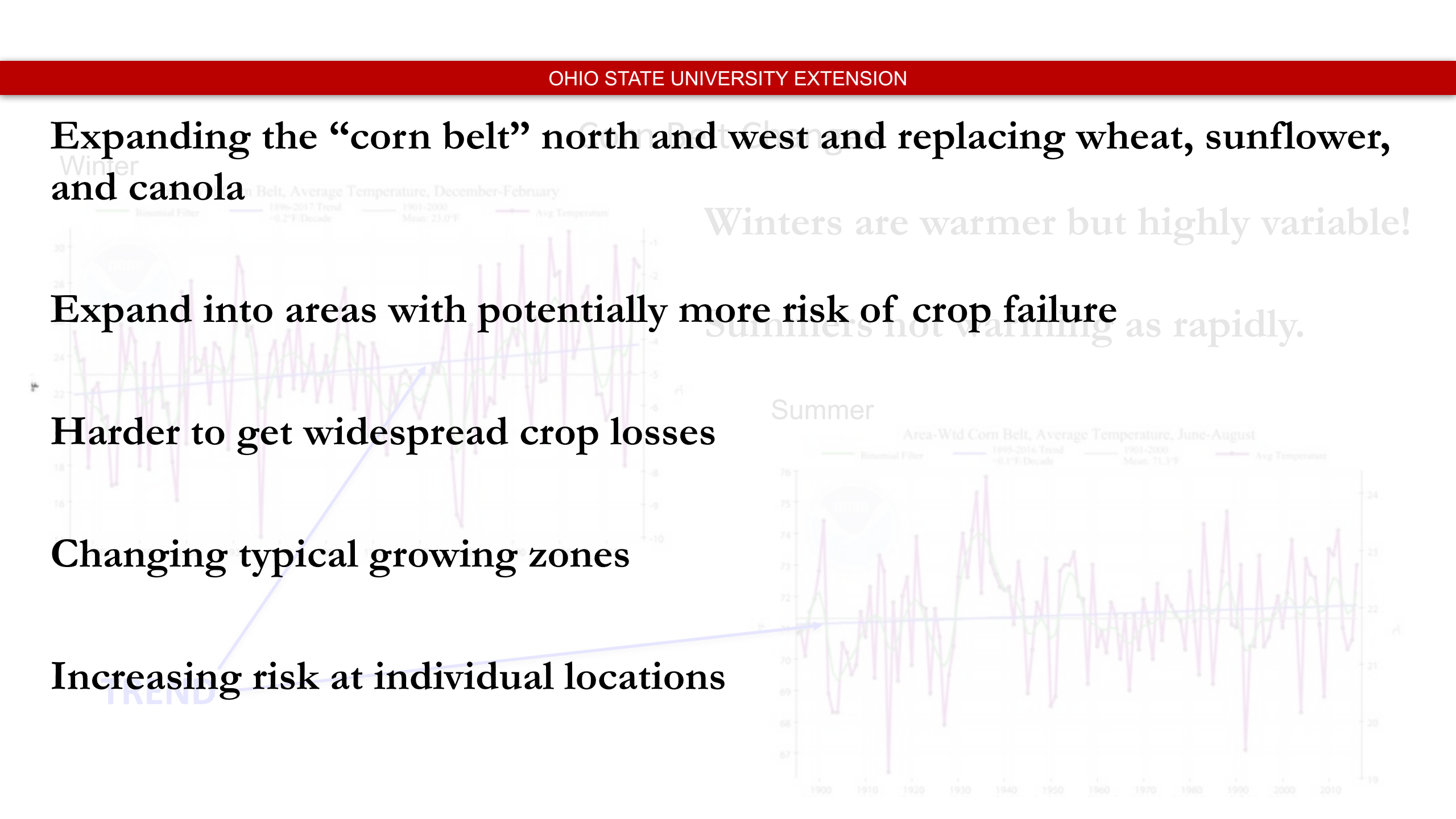
Expanding the "corn belt" north and west and replacing wheat, sunflower, and canola

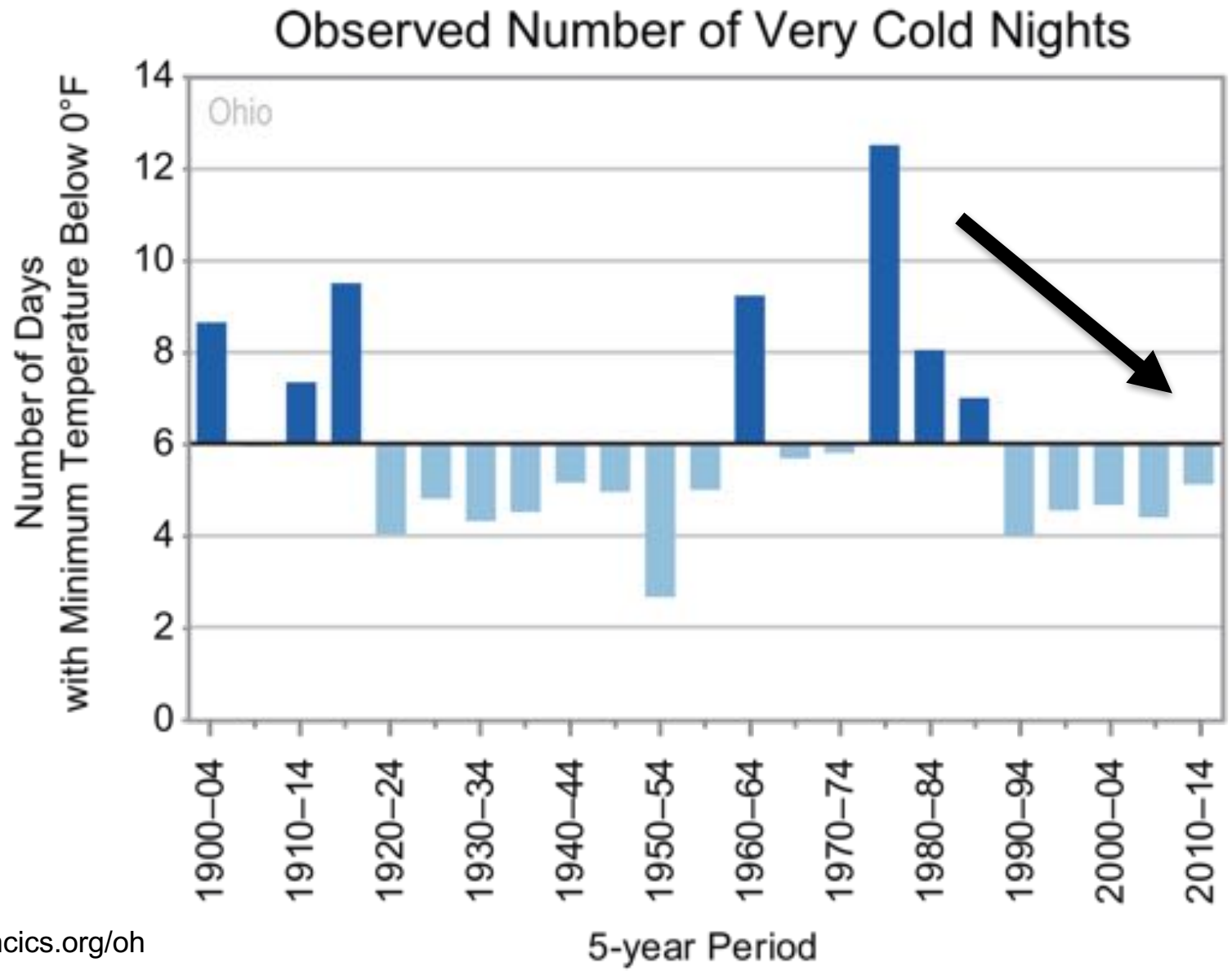
Expand into areas with potentially more risk of crop failure

Harder to get widespread crop losses

Changing typical growing zones

Increasing risk at individual locations





NOAA

https://statesummaries.ncics.org/oh

Warmer nights can lead to:

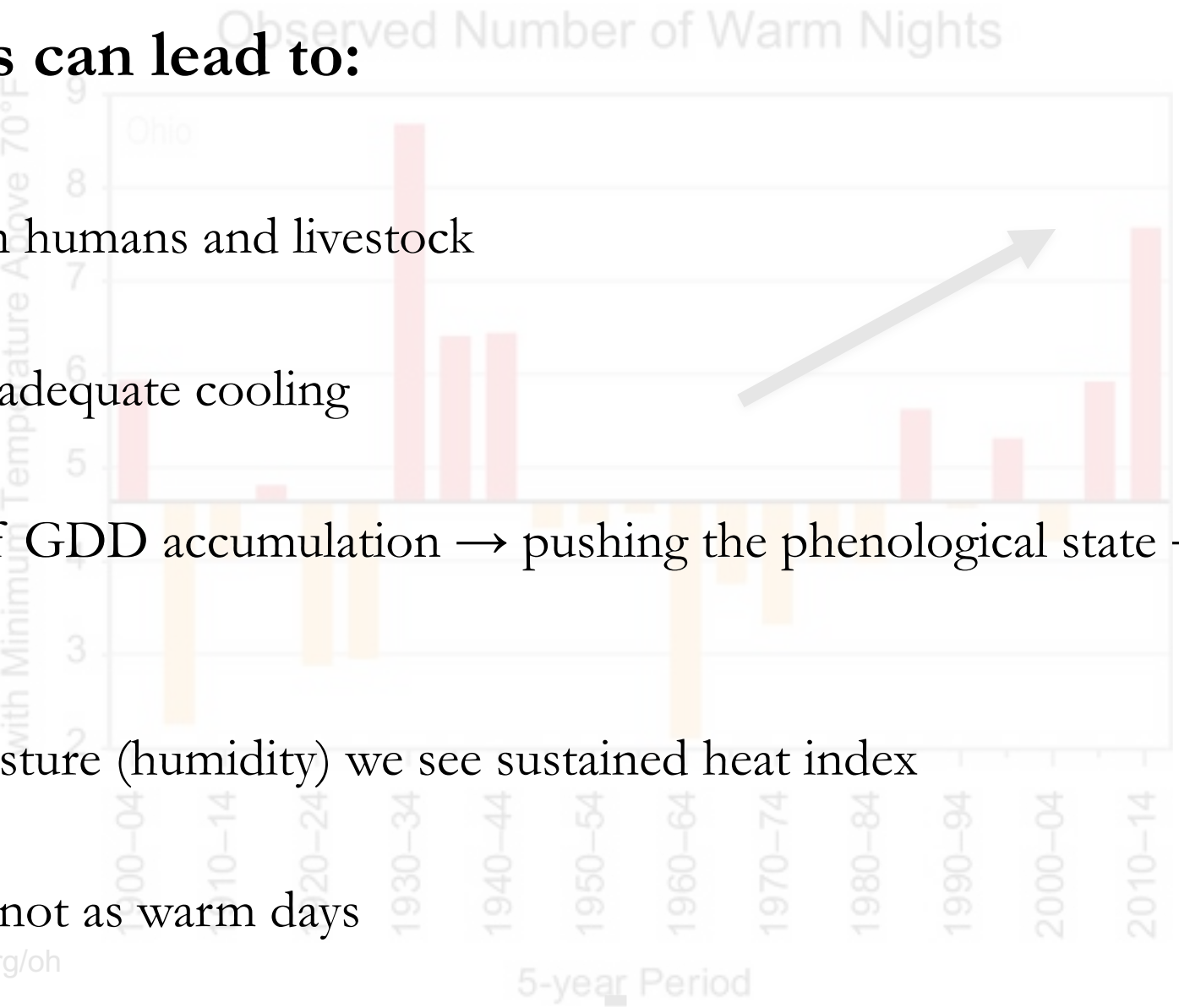
Additional stress on humans and livestock

Increased need for adequate cooling

Accelerated pace of GDD accumulation → pushing the phenological state → could lead to yield loss

With increased moisture (humidity) we see sustained heat index

Warmer nights but not as warm days



NOAA
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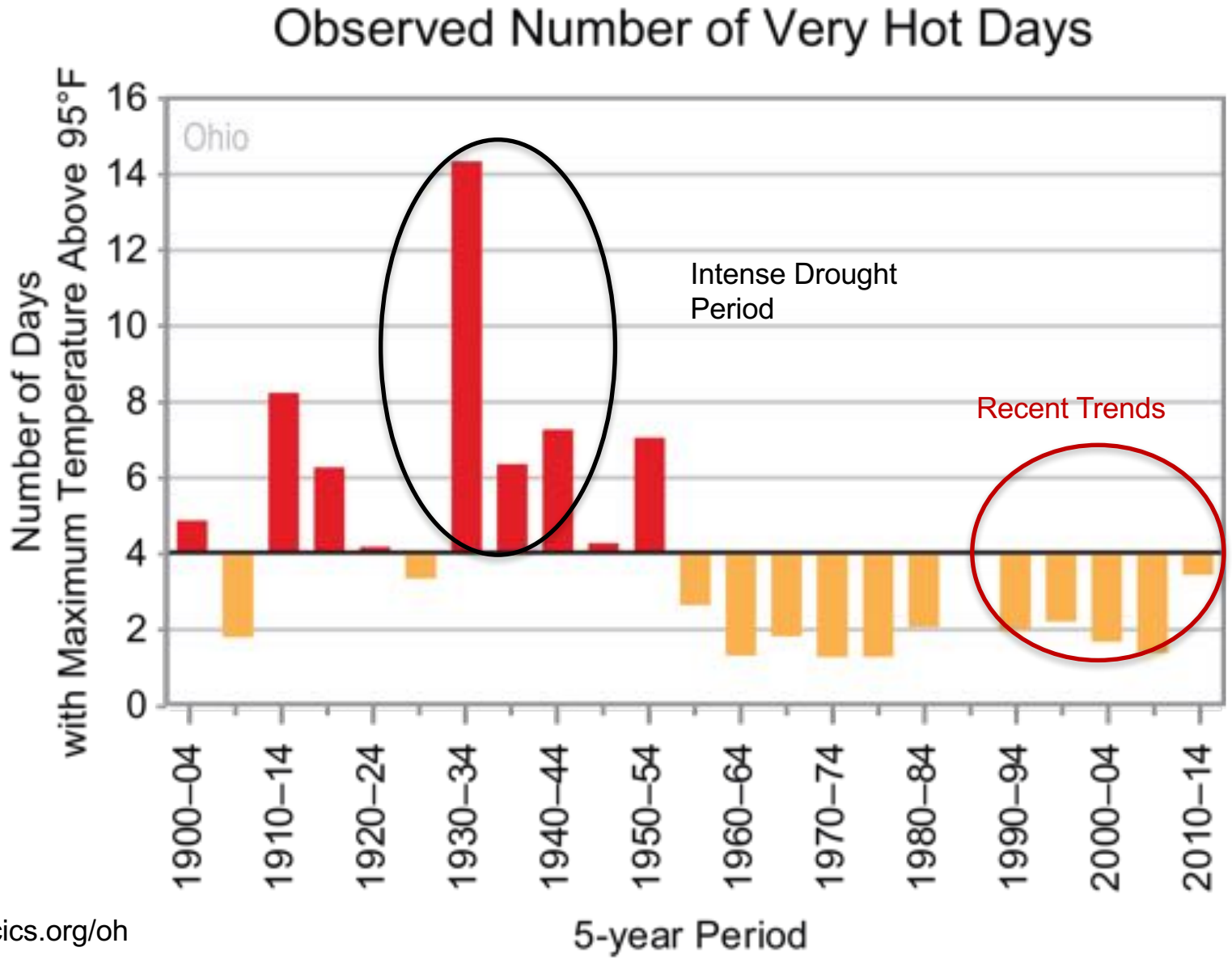


NOAA

https://statesummaries.ncics.org/oh

False Springs lead to:

Earlier planting not always possible/soil conditions

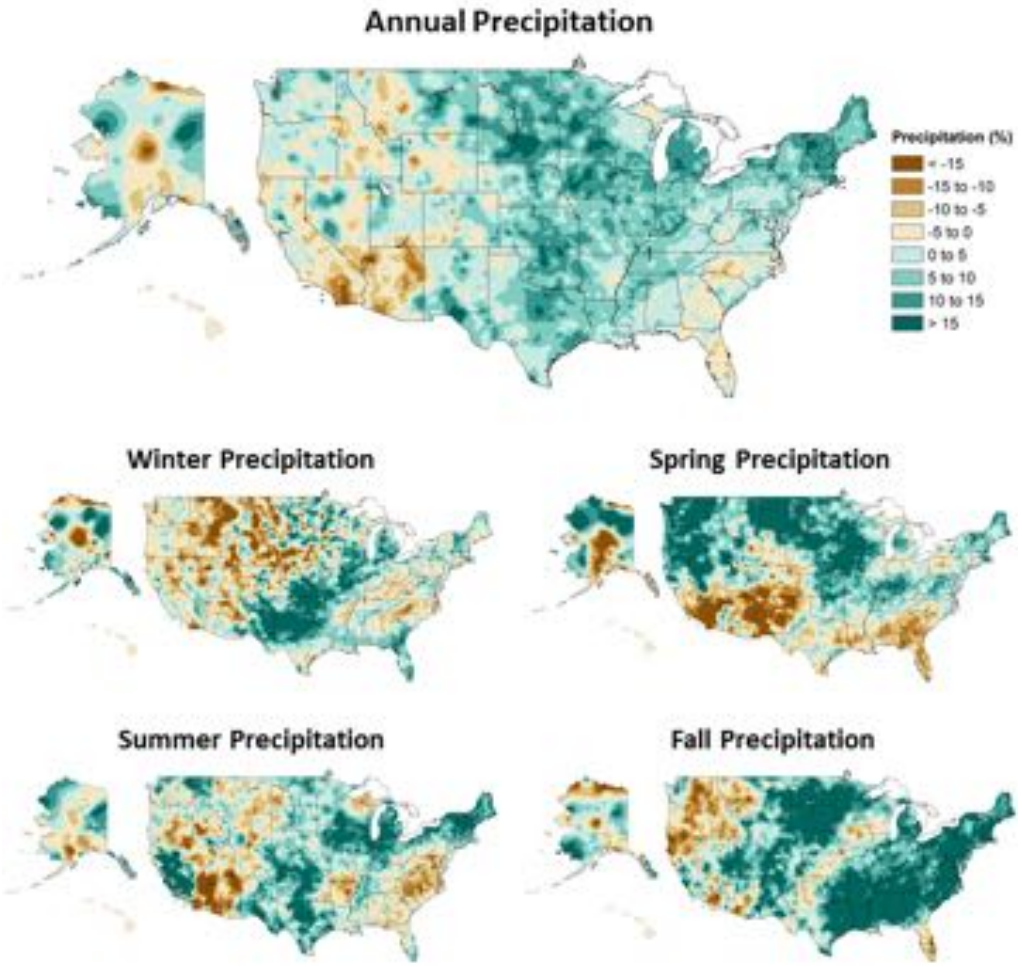
Advance phenological state → susceptibility to late season freeze/frost

Loss of Nutrients through multiple dormancy breaks

Precipitation Trends and Ag Impacts

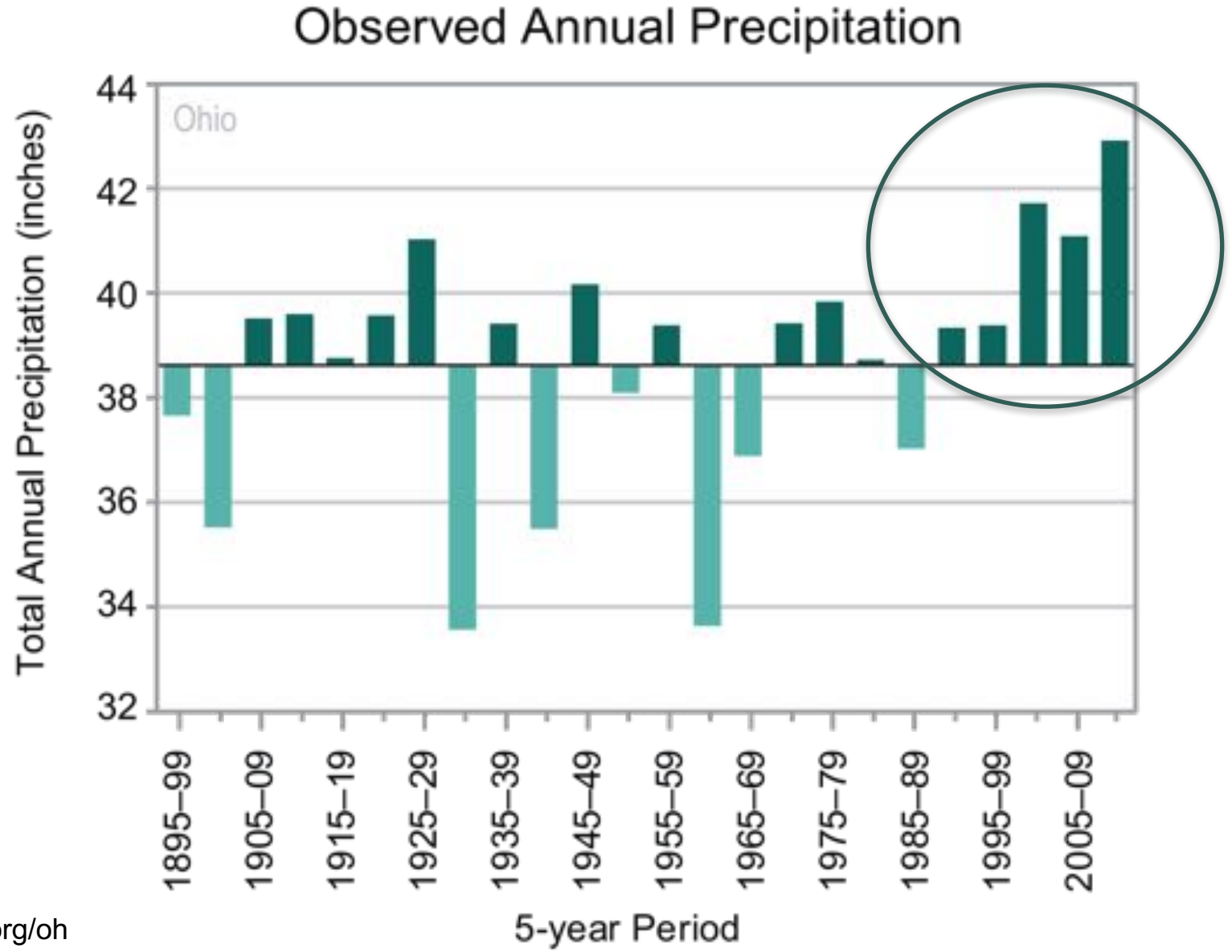
Annual precipitation has decreased in much of the West, Southwest, and Southeast and increased in most of the Northern and Southern Plains, Midwest, and Northeast. A national average increase of 4% in annual precipitation since 1901 mostly a result of large increases in the fall season.

Average (1986-2016) minus Average (1901-1960)



National Climate Assessment
CCSR

https://science2017.globalchange.gov/chapter/7/



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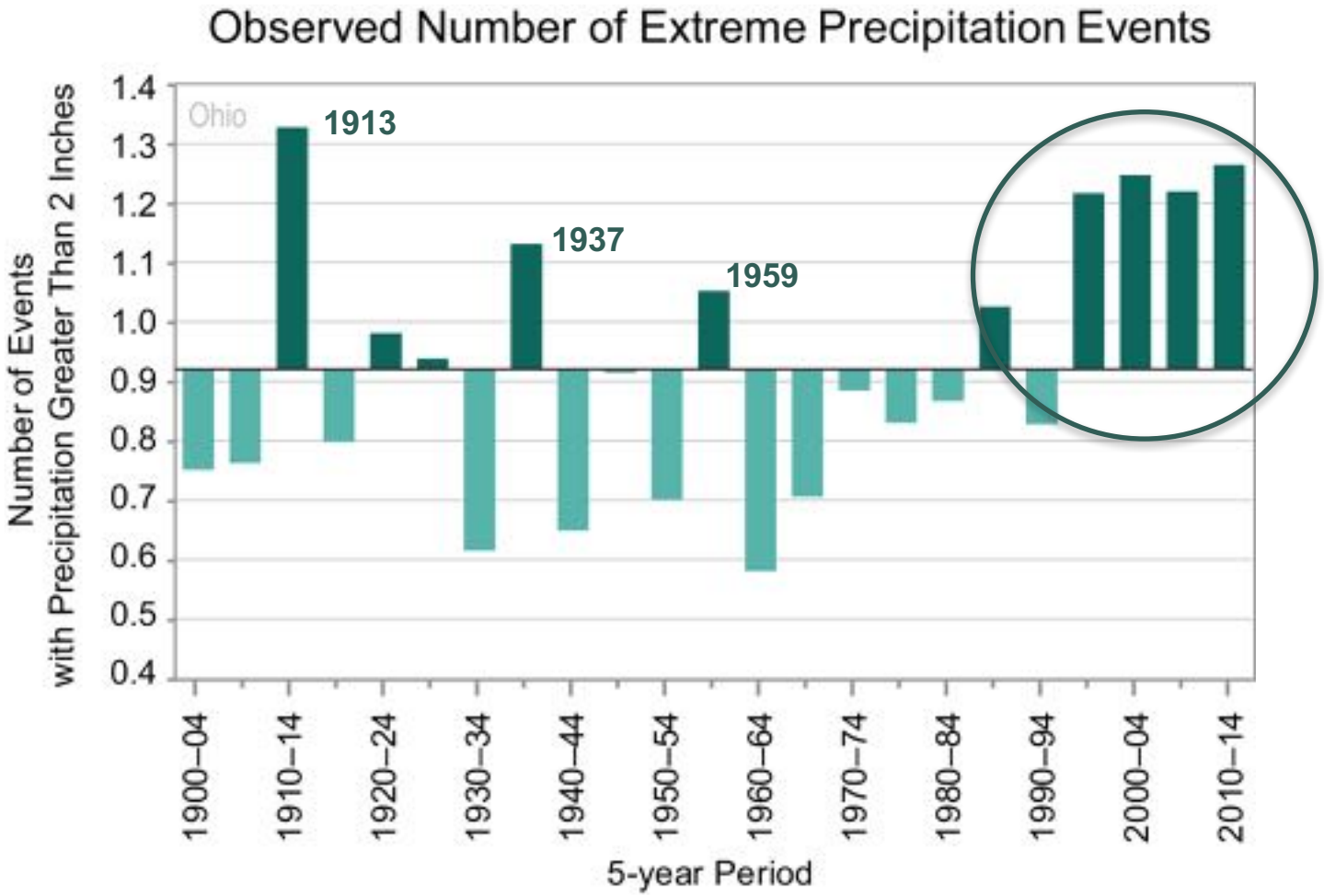

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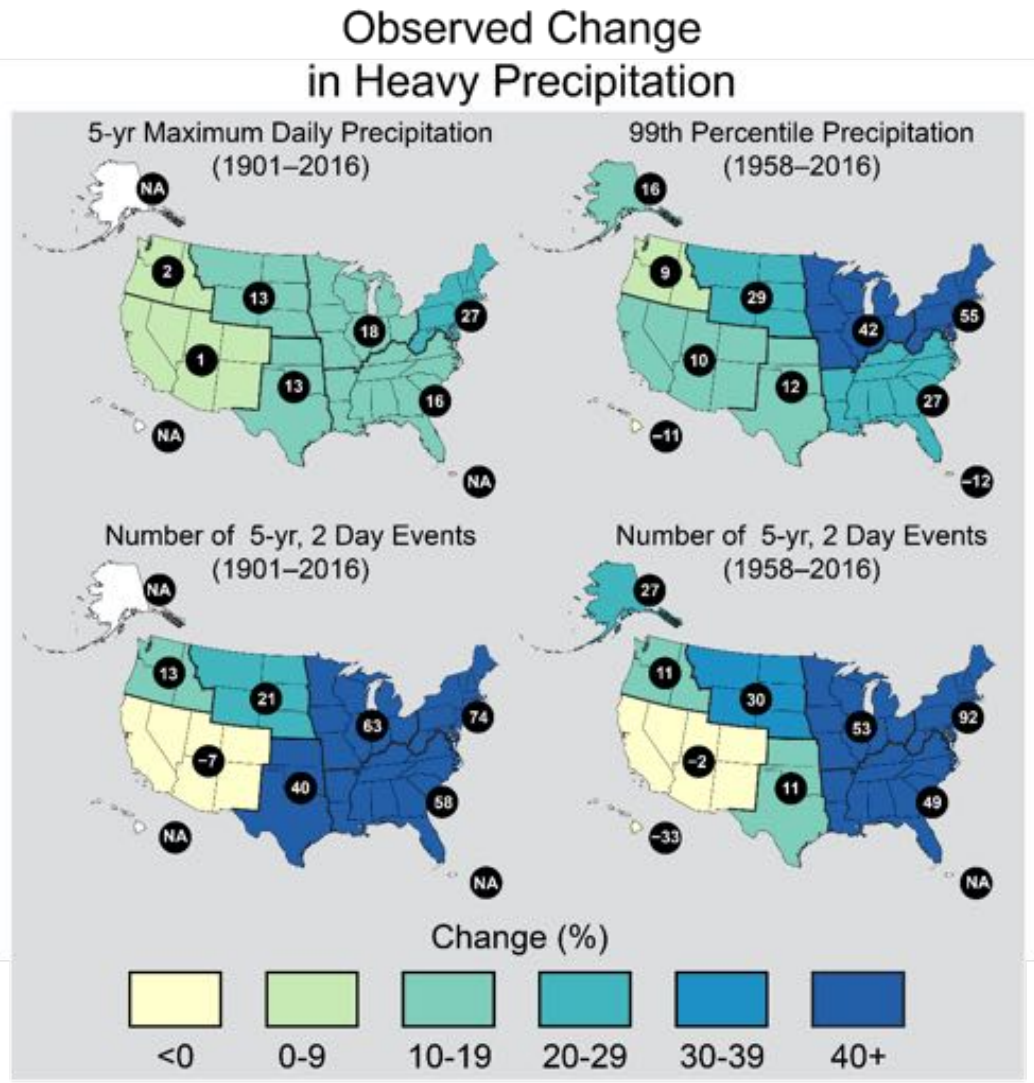


https://science2017.globalchange.gov/chapter/7/

These seasonal changes in precipitation may lead to:

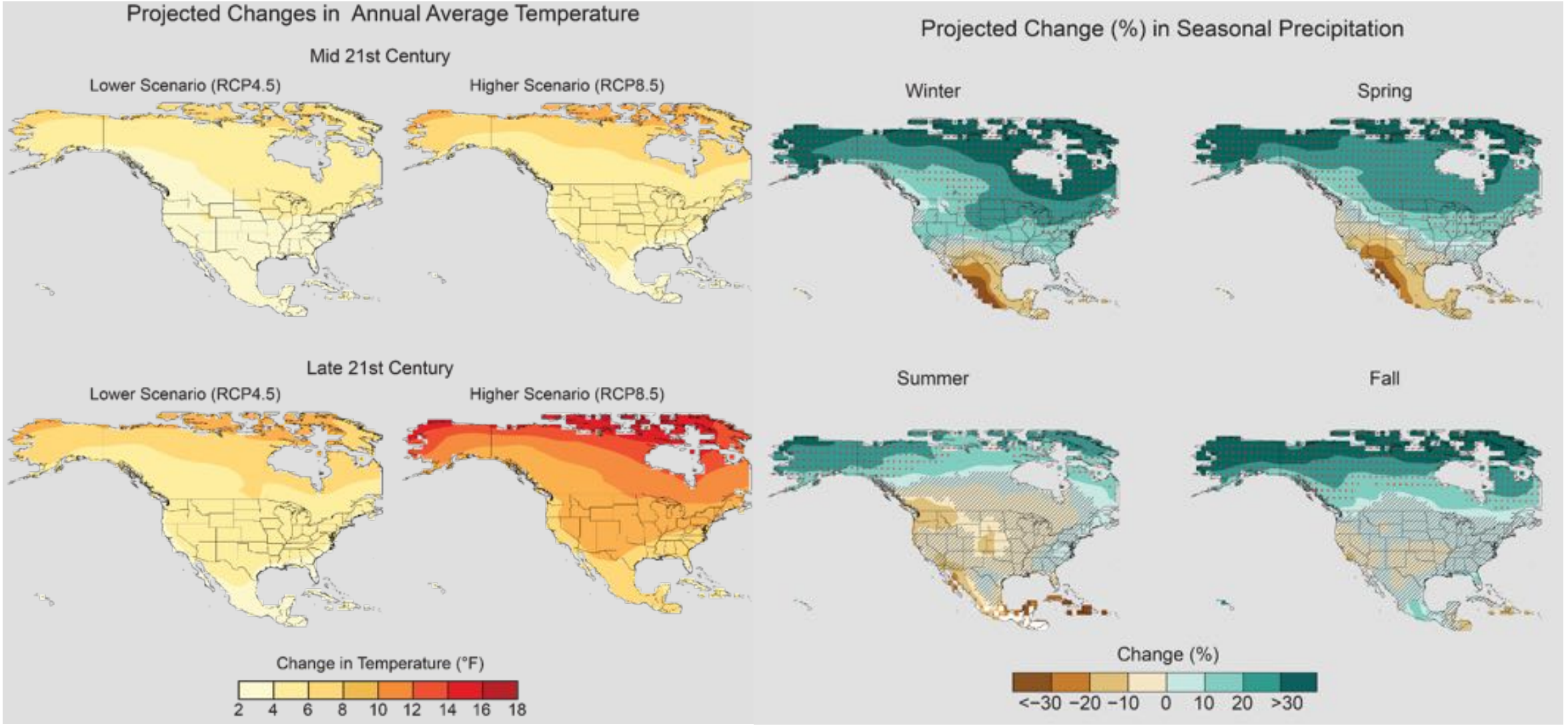
Soil movement and loss (mitigate with reduction in tillage of cover crops)

Nutrient loss and downstream water quality issues (The 4 Rs of nutrient stewardship –RIGHT: Source, Rate, Time, Place)

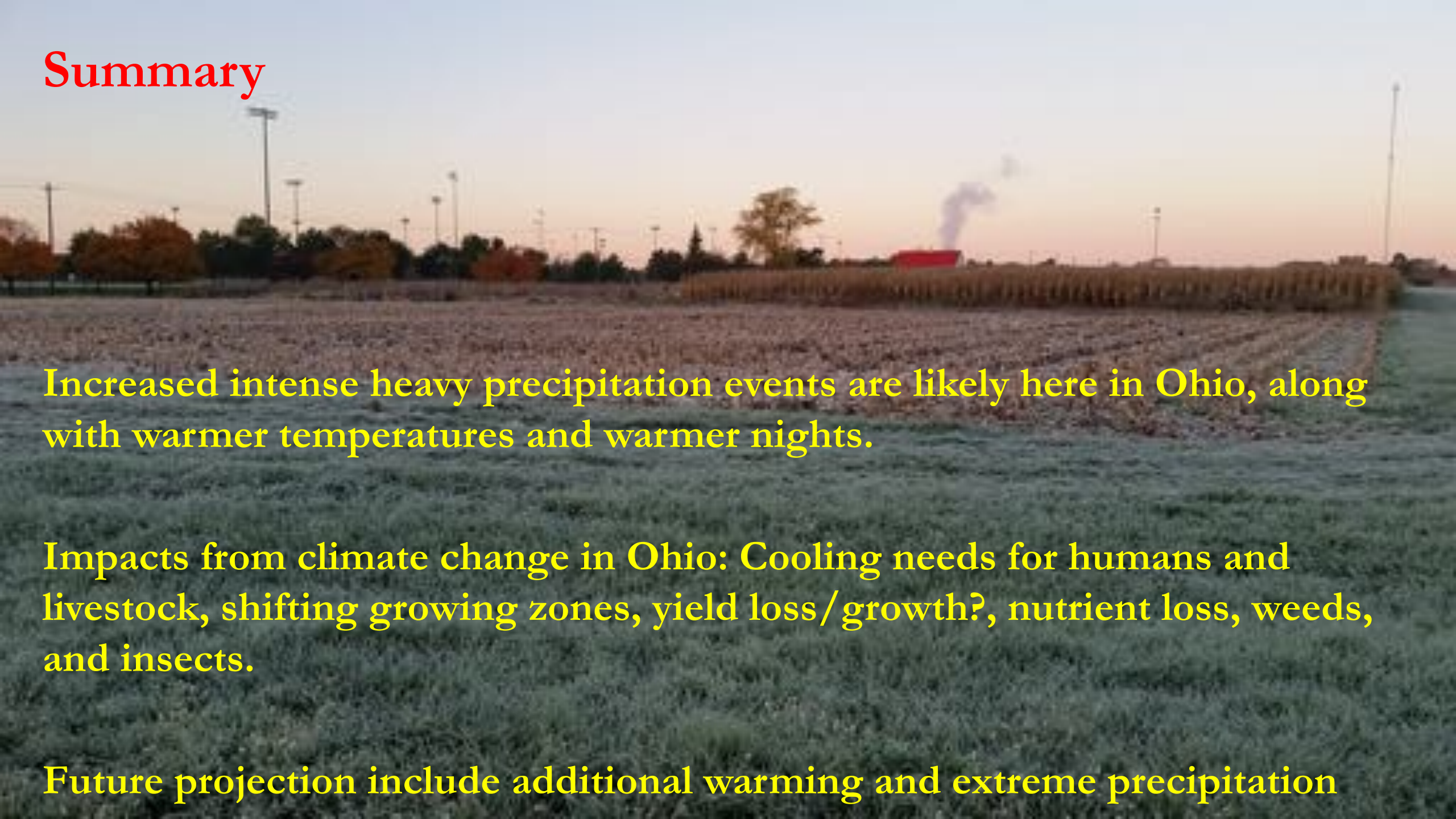
Loss of field work and delayed harvests

In Ohio, Summer and Fall seasons show greatest biggest increaseS in precipitation.

Where are we heading?



Summary



Increased intense heavy precipitation events are likely here in Ohio, along with warmer temperatures and warmer nights.

Impacts from climate change in Ohio: Cooling needs for humans and livestock, shifting growing zones, yield loss/growth?, nutrient loss, weeds, and insects.

Future projection include additional warming and extreme precipitation