How will global warming of 2°C affect Vermont?

Observed and projected changes in climate and their impacts

CLIMATE SYSTEM RESEARCH CENTER

UMASS AMHERST

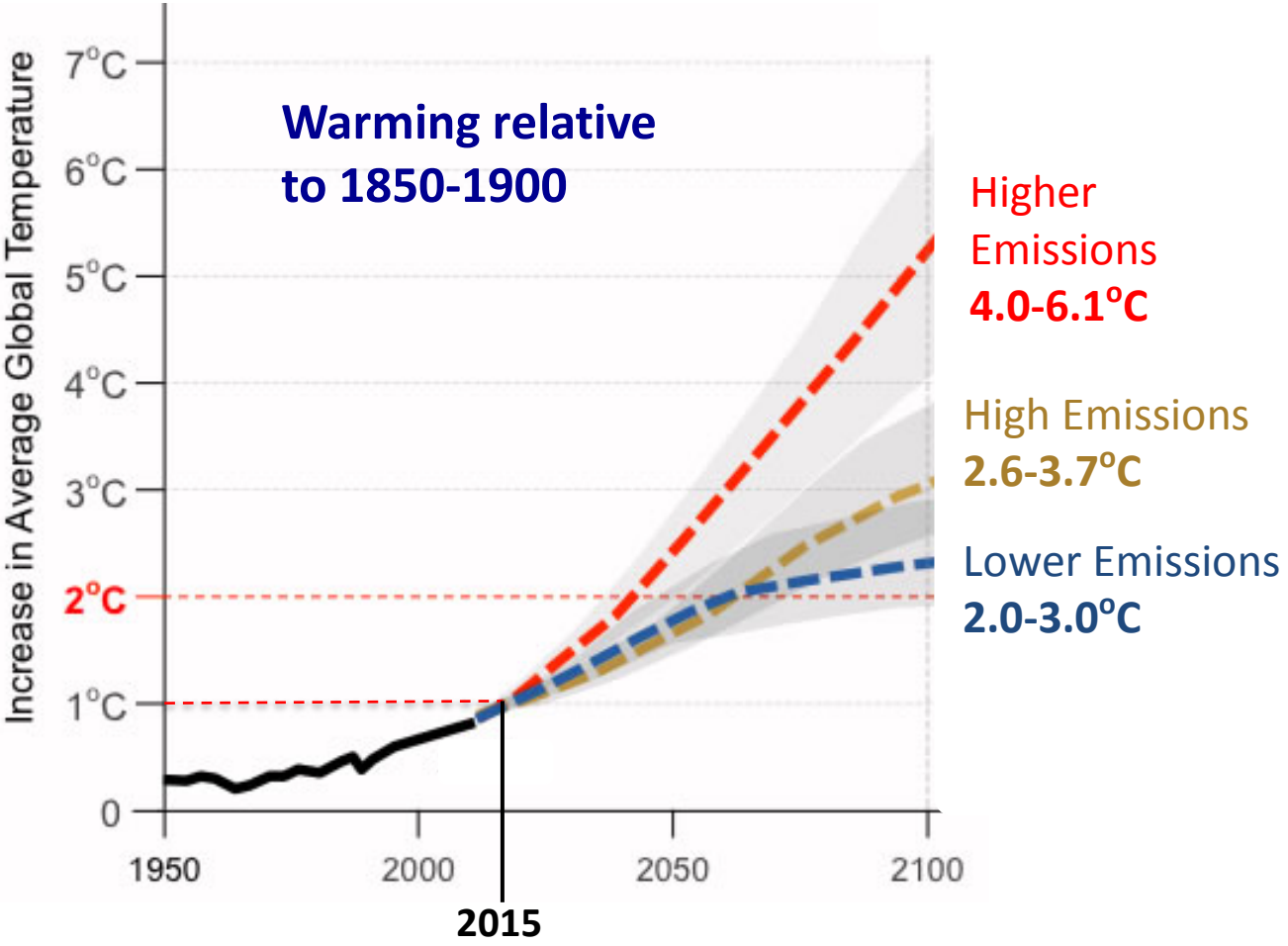
"To prevent dangerous interference with the climate system, the scientific view is that the increase in global temperature should be below 2°C [relative to pre-industrial levels]".

- United Nations Framework on Climate Change, 2010

How will global temperatures change in the Future?

The global average temperature has already increased by about 1°C (1.8°F) relative to pre-industrial levels.

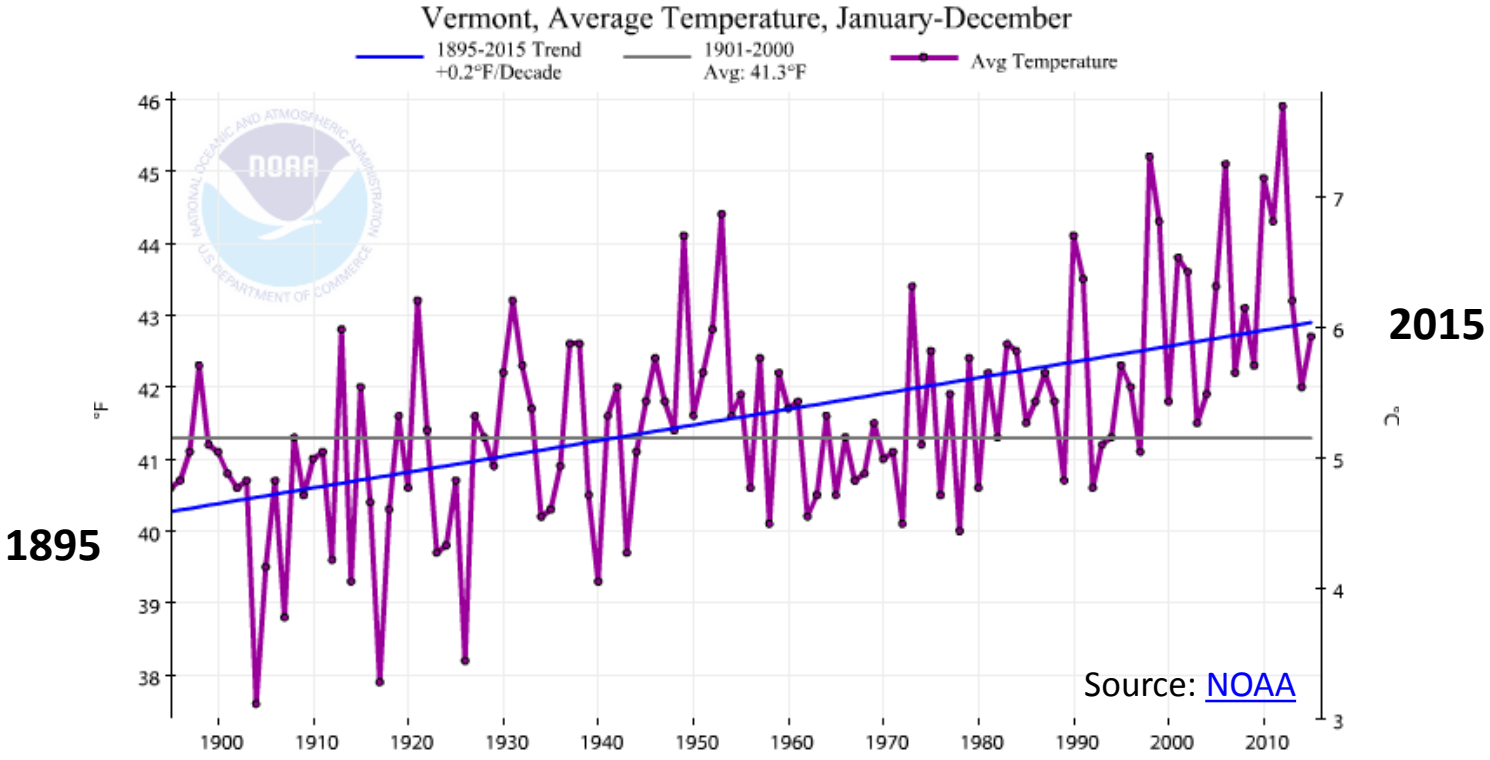
Current CO_2 emissions are tracking the 'higher emissions' scenario; unless emissions are reduced, the 2°C threshold will be crossed before 2050.



CLIMATE SYSTEM RESEARCH CENTER

Warming in Vermont

OBSERVATIONS **The annual mean temperature in VT has already increased by about 2.4°F (1.3°C) since 1895 – faster than the rise in global mean temperature.**



The annual mean temperature in VT exceeded the 20th-century average every year since 1998 (the last 17 years).

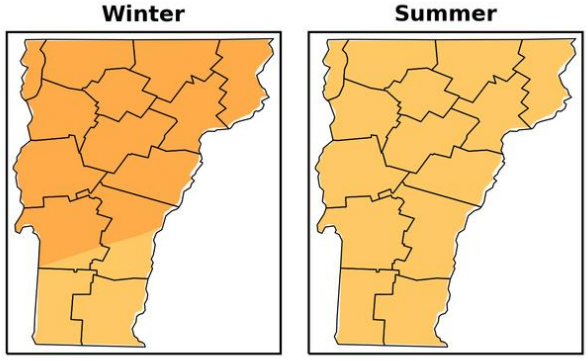
CLIMATE SYSTEM RESEARCH CENTER

UNIVERSITY OF MASSACHUSETTS AMHERST 1863

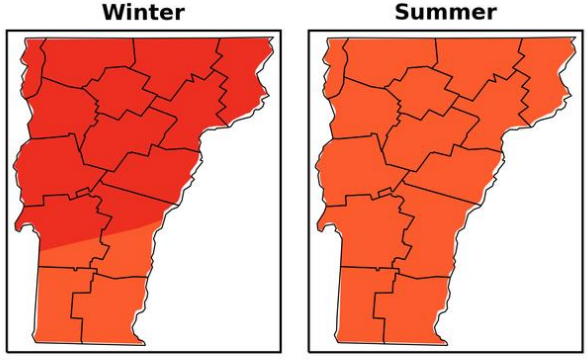
Warming in Vermont

PROJECTIONS **In the next 50-60 years, when global warming crosses the 2°C threshold, VT average summer and winter temperatures are projected to increase by over 5°F (2.8°C) relative to pre-industrial levels.**

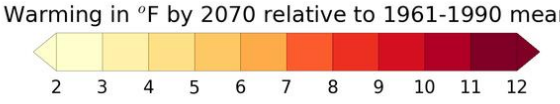
Lower Emissions



Higher Emissions



Source: *produced by CSRC, UMass Amherst*

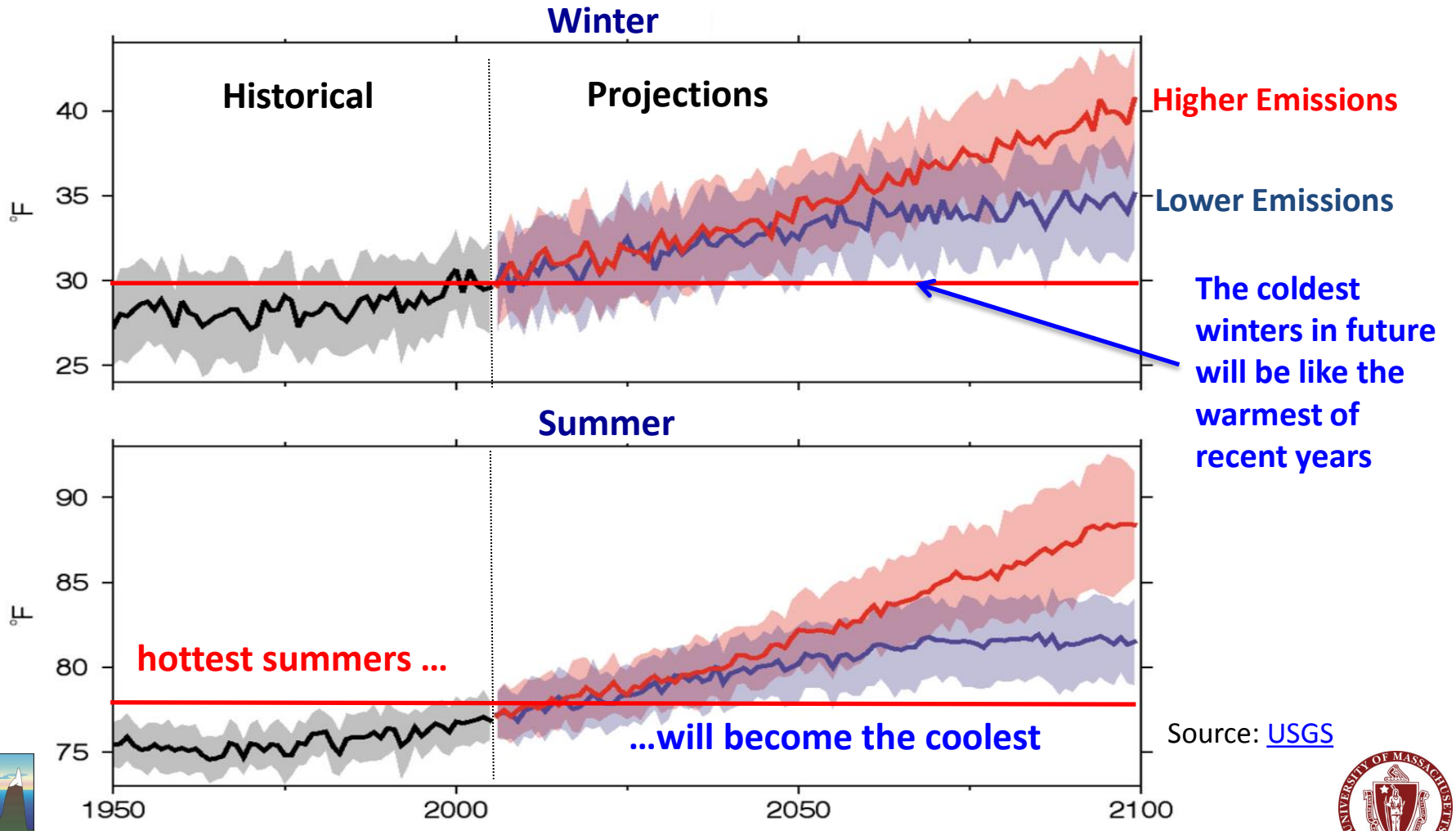


CLIMATE SYSTEM RESEARCH CENTER

UNIVERSITY OF MASSACHUSETTS AMHERST 1863

Warming in Vermont

PROJECTIONS How warm will Winter and Summer temperatures become?

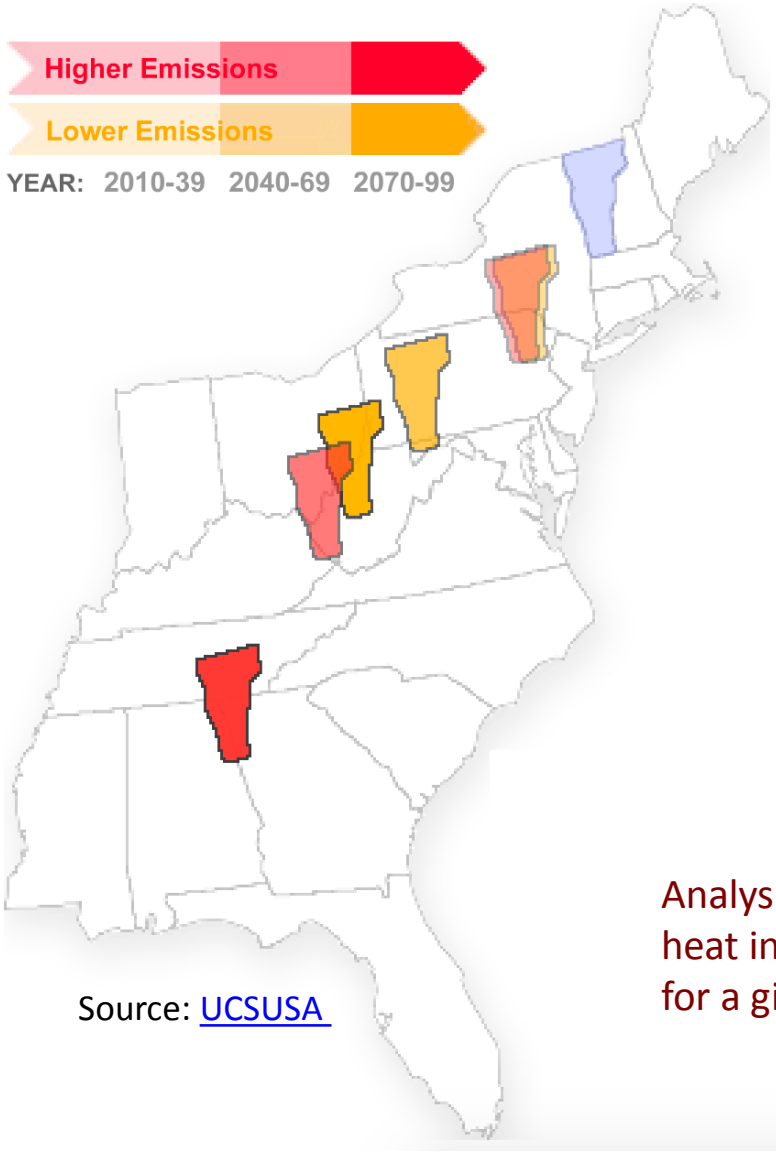


Source: USGS

CLIMATE SYSTEM RESEARCH CENTER

UNIVERSITY OF MASSACHUSETTS AMHERST 1863

Migrating Vermont Climate



Source: UCSUSA

PROJECTIONS

Summer in Vermont by the end of this century could feel like a present-day typical summer in Tennessee or Alabama

Consequences:

Negative impacts on human health, ecosystems, and the economy.

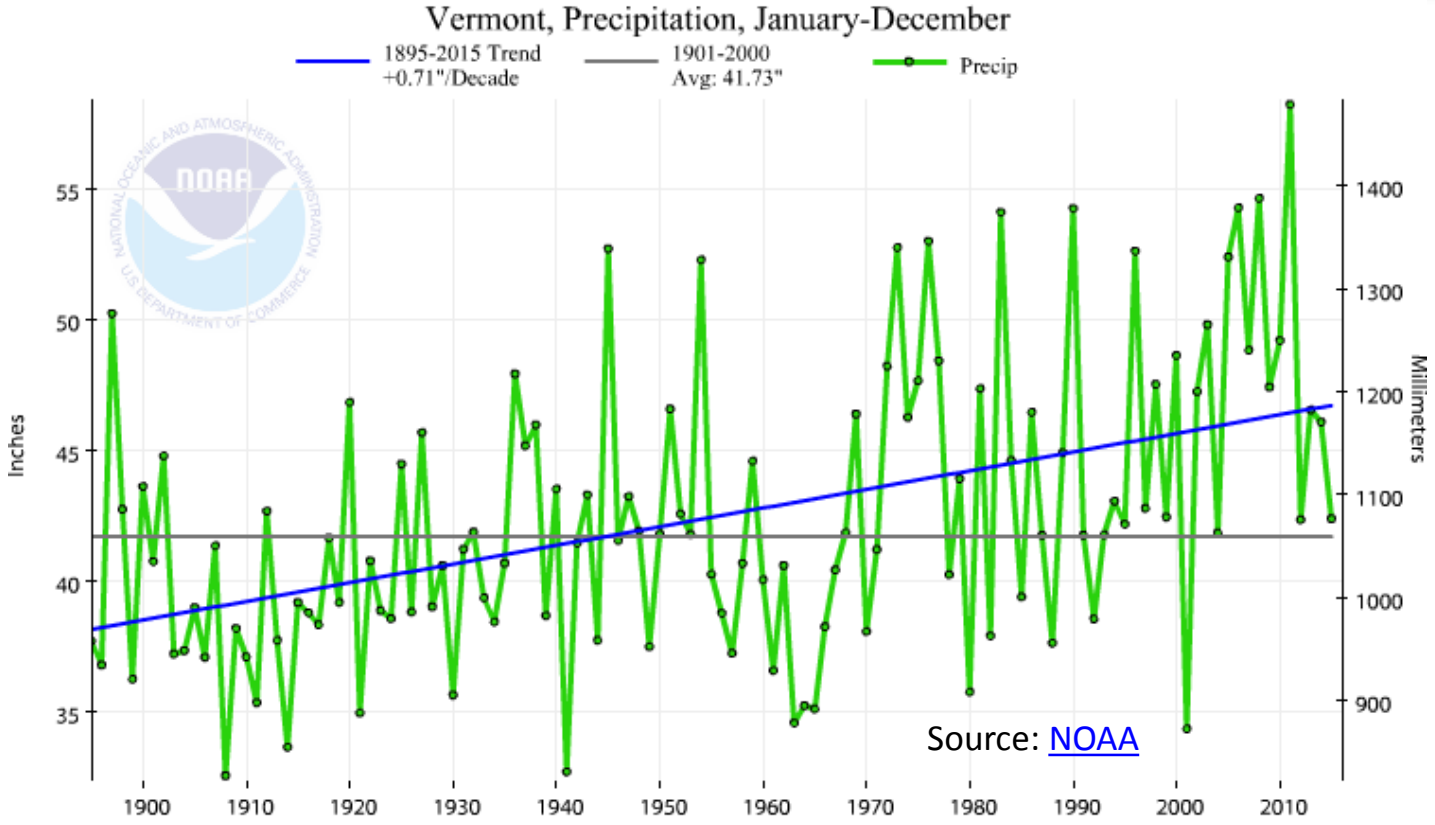
Analysis is based on changes in average summer heat index (a measure of how it actually feels for a given temperature and humidity).

CLIMATE SYSTEM RESEARCH CENTER

UNIVERSITY OF MASSACHUSETTS AMHERST 1863

Rain and Snow in Vermont

OBSERVATIONS **Annual total precipitation (rain + snow) has increased over the last few decades.**



Every year for the last 10 years, Vermont received more precipitation than the 20th century average.

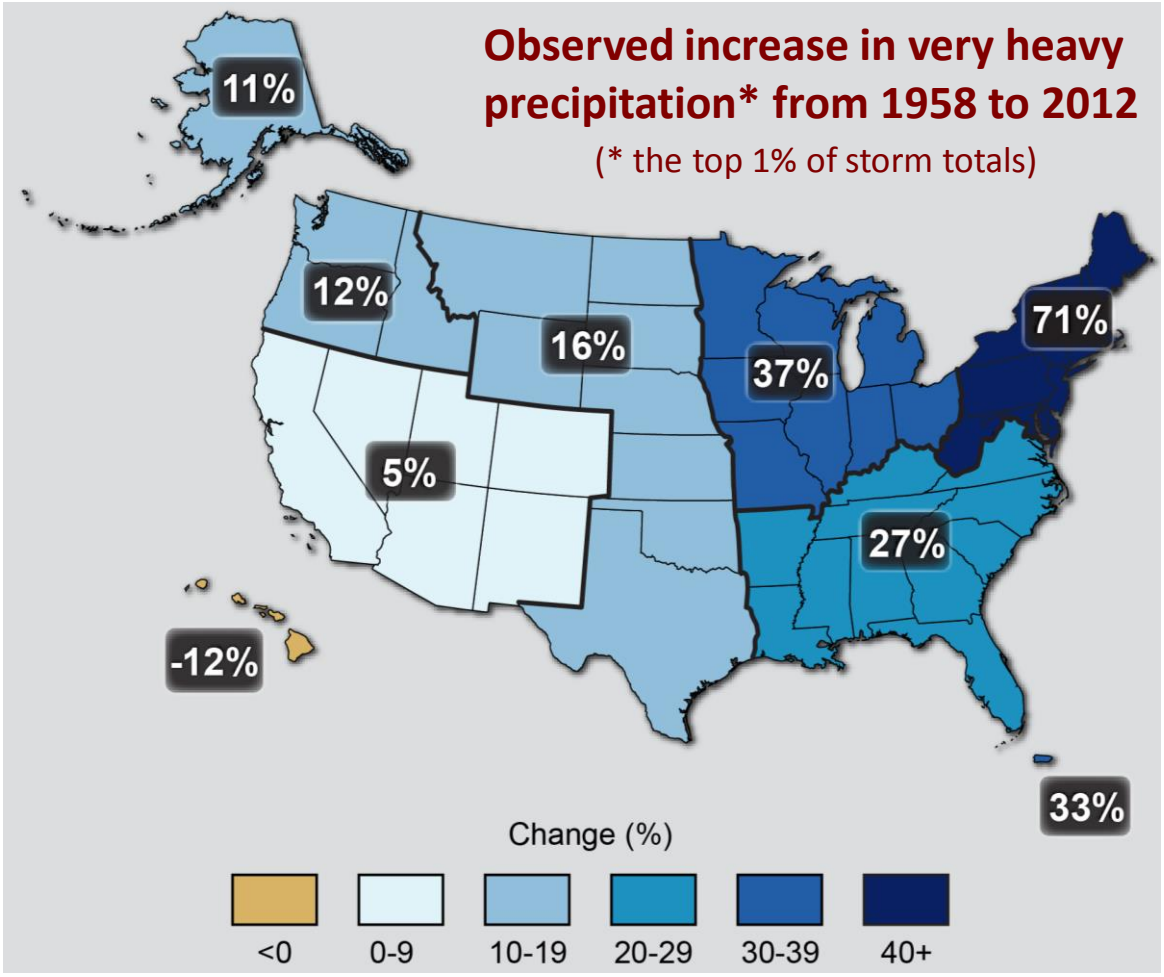
CLIMATE SYSTEM RESEARCH CENTER

UNIVERSITY OF MASSACHUSETTS AMHERST 1863

Very Heavy Rainfall

OBSERVATIONS

The amount of precipitation falling during intense multi-day events has increased significantly in the Northeast US.



Source: NCA 2014

CLIMATE SYSTEM RESEARCH CENTER

UNIVERSITY OF MASSACHUSETTS AMHERST 1863

Strong Storms

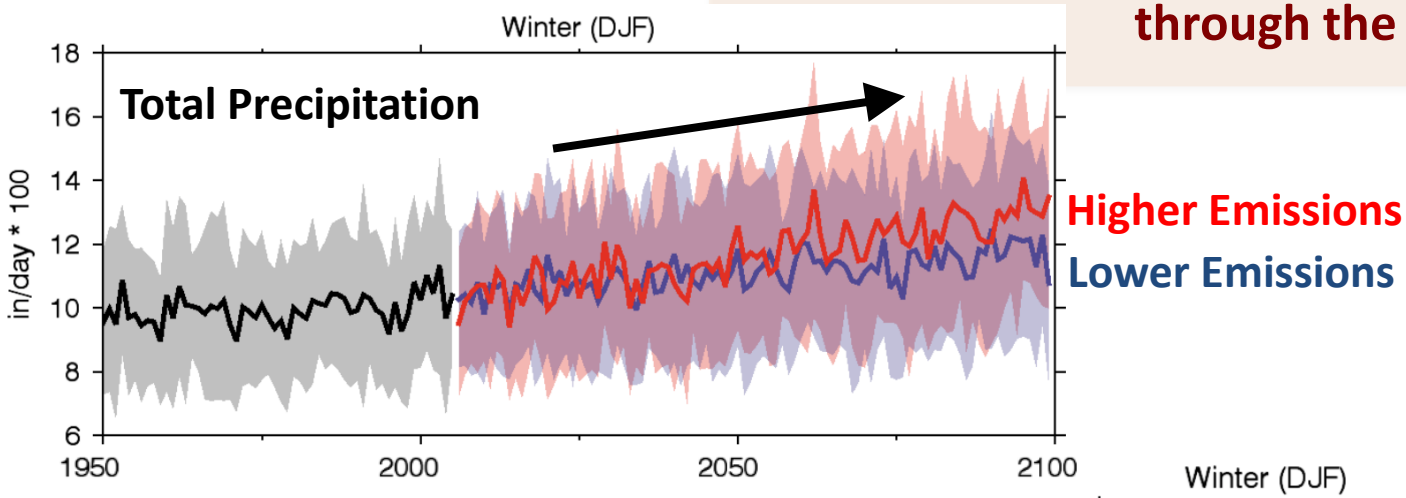
Hurricane Irene devastated Vermont in 2011, causing waterways to flood and infrastructure to crumble

CLIMATE SYSTEM RESEARCH CENTER

UNIVERSITY OF MASSACHUSETTS AMHERST 1863

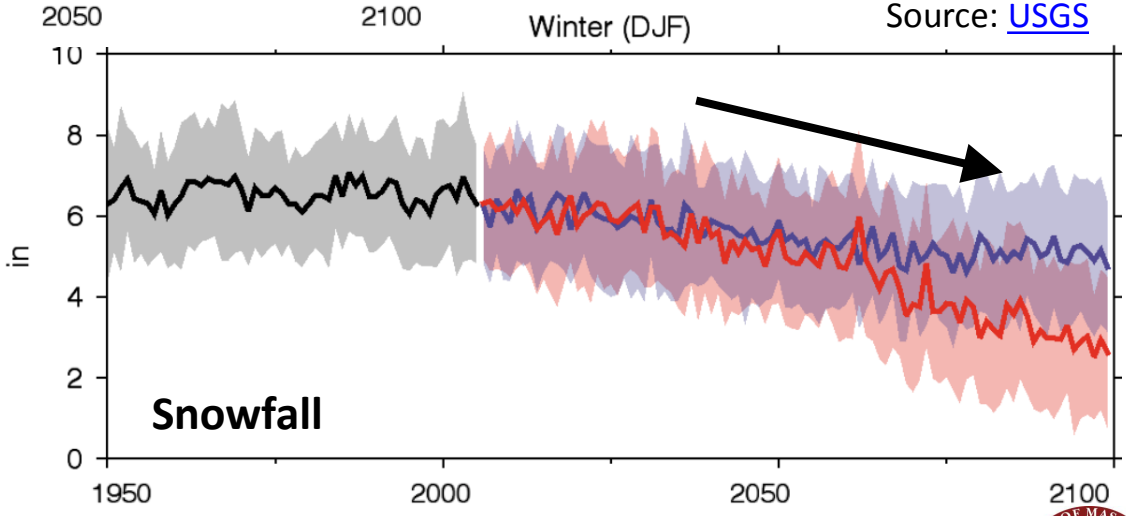
Rain and Snow in Vermont

PROJECTIONS **Winter precipitation is projected to increase through the 21st century.**



Source: USGS

Due to increasing temperatures, there will be more rain and less snow.



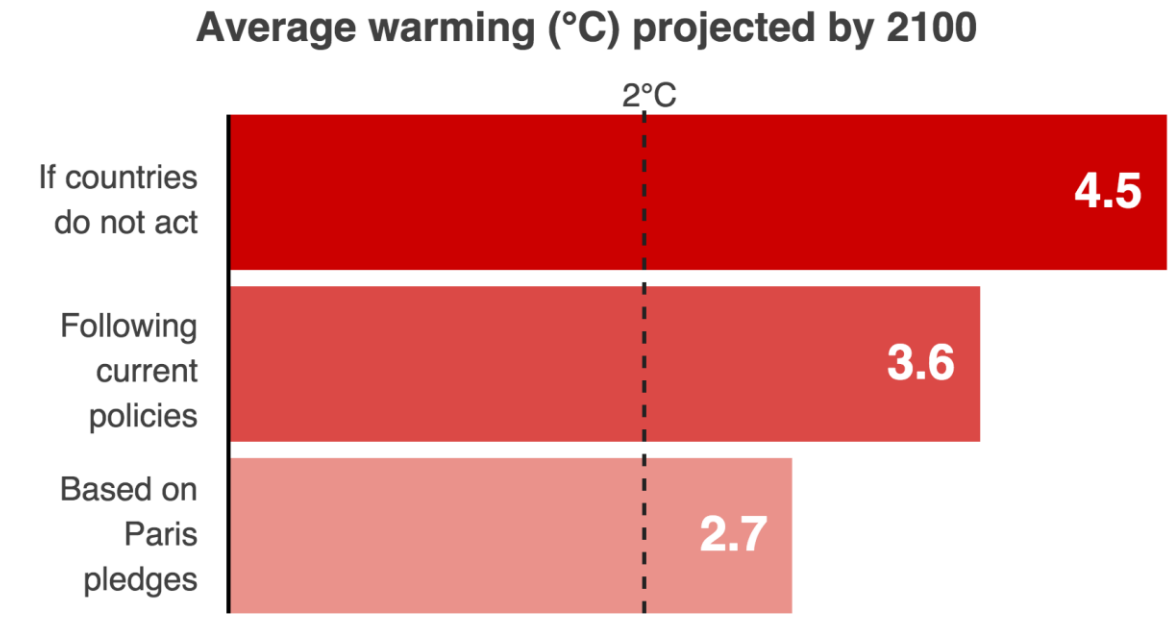
Projected changes in rainfall in summer are uncertain.

CLIMATE SYSTEM RESEARCH CENTER

UNIVERSITY OF MASSACHUSETTS AMHERST 1863

Climate Summit in Paris [COP21]

Immediate action on local and global scales is required to limit the global mean temperature increase to 2°C (3.6°F).



Source: Climate Action Tracker, data compiled by Climate Analytics, ECOFYS, New Climate Institute and Potsdam Institute for Climate Impact Research.

CLIMATE SYSTEM RESEARCH CENTER

UNIVERSITY OF MASSACHUSETTS AMHERST 1863

Strategies and Actions

National Climate Assessment:

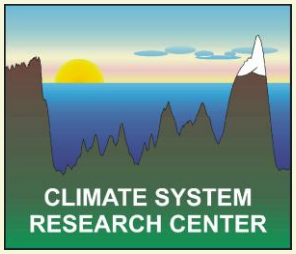
The National Climate Assessment summarizes the impacts of climate change in the US, now and in the future.

Integrating Climate Change into State Wildlife Action Plan (SWAP):

The goals of SWAP are to generate proactive, comprehensive wildlife conservation strategies that assess the health, challenges, and potential actions each State would like to accomplish during the coming decade and beyond.

Climate and Health Assessment:

This scientific assessment examines how climate change is already affecting human health in the US and the changes that may occur in the future.



This report was created by Prof. Raymond Bradley,
Dr. Ambarish Karmalkar, and Kathryn Woods
Climate System Research Center (CSRC)
University of Massachusetts Amherst

CONTACT
climate-inquiry@geo.umass.edu