COLUMBIA LAW SCHOOL

SABIN CENTER FOR CLIMATE CHANGE LAW

Climate Projections And Potential Actions By NJ Pinelands Commission

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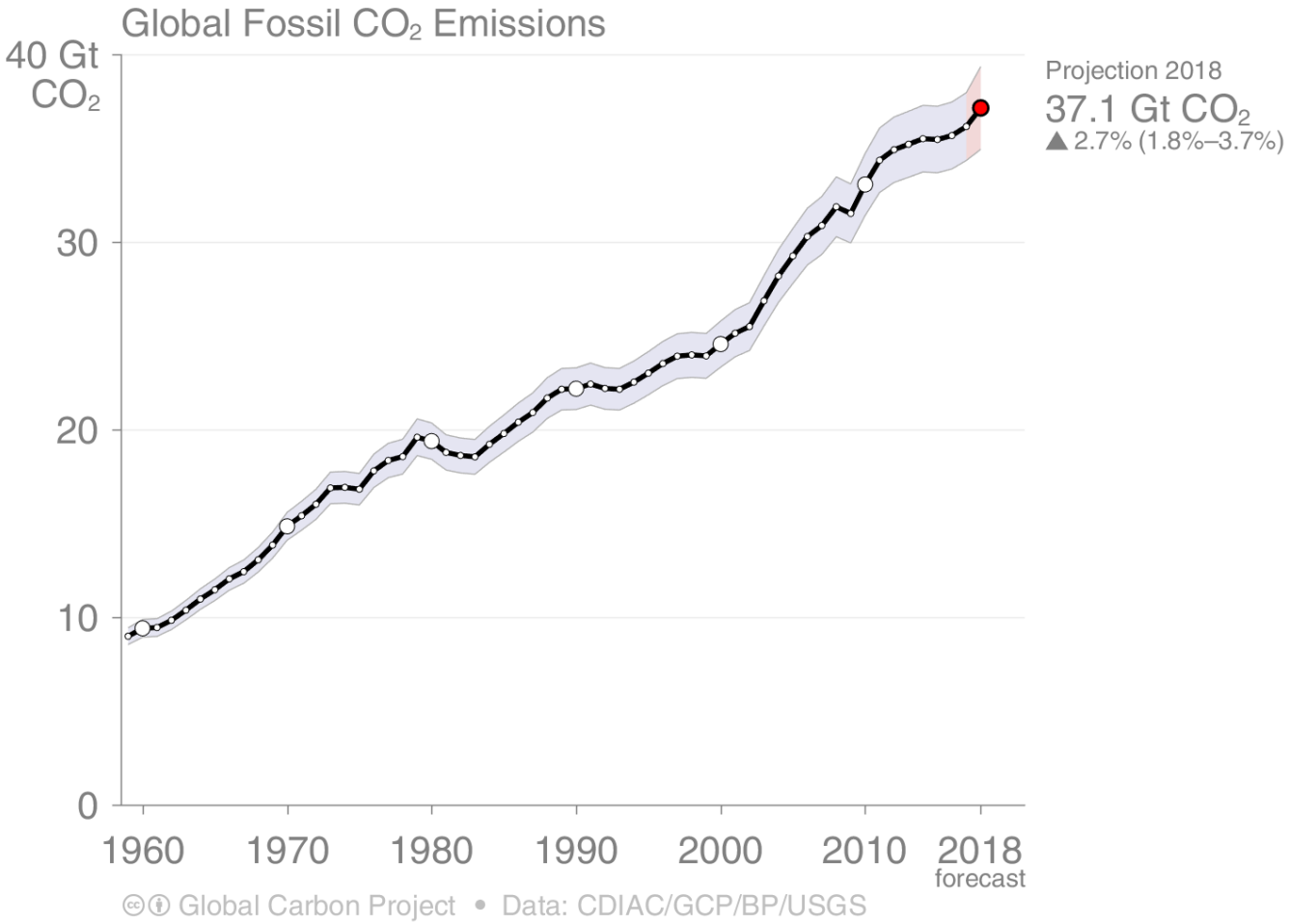
Global Fossil CO_2 Emissions

Global fossil CO_2 emissions have risen steadily over the last decades.
The peak in global emissions is not yet in sight.

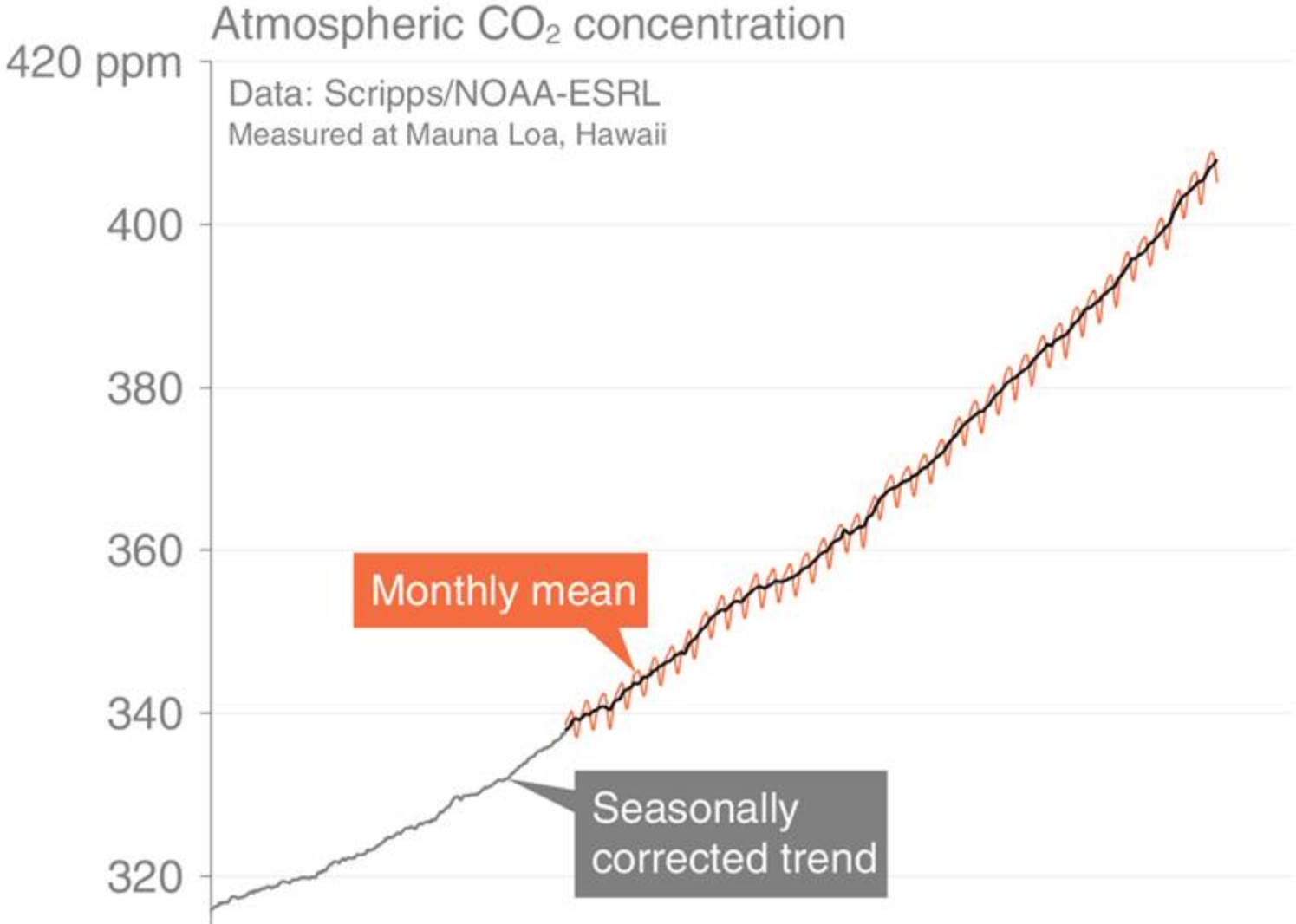


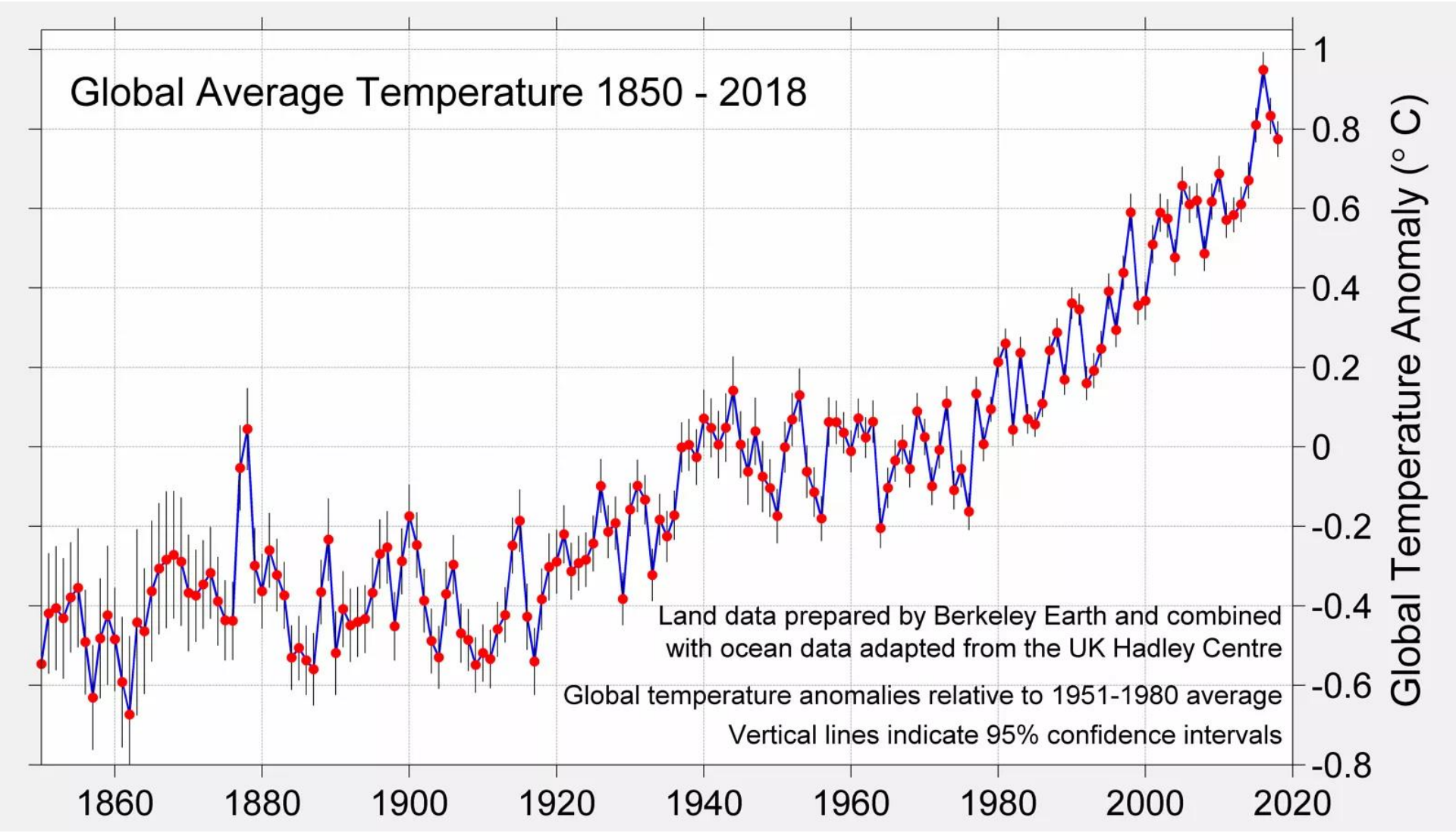
Estimates for 2015, 2016 and 2017 are preliminary ; 2018 is a projection based on partial data.
Source: CDIAC; Le Quéré et al 2018; Global Carbon Budget 2018

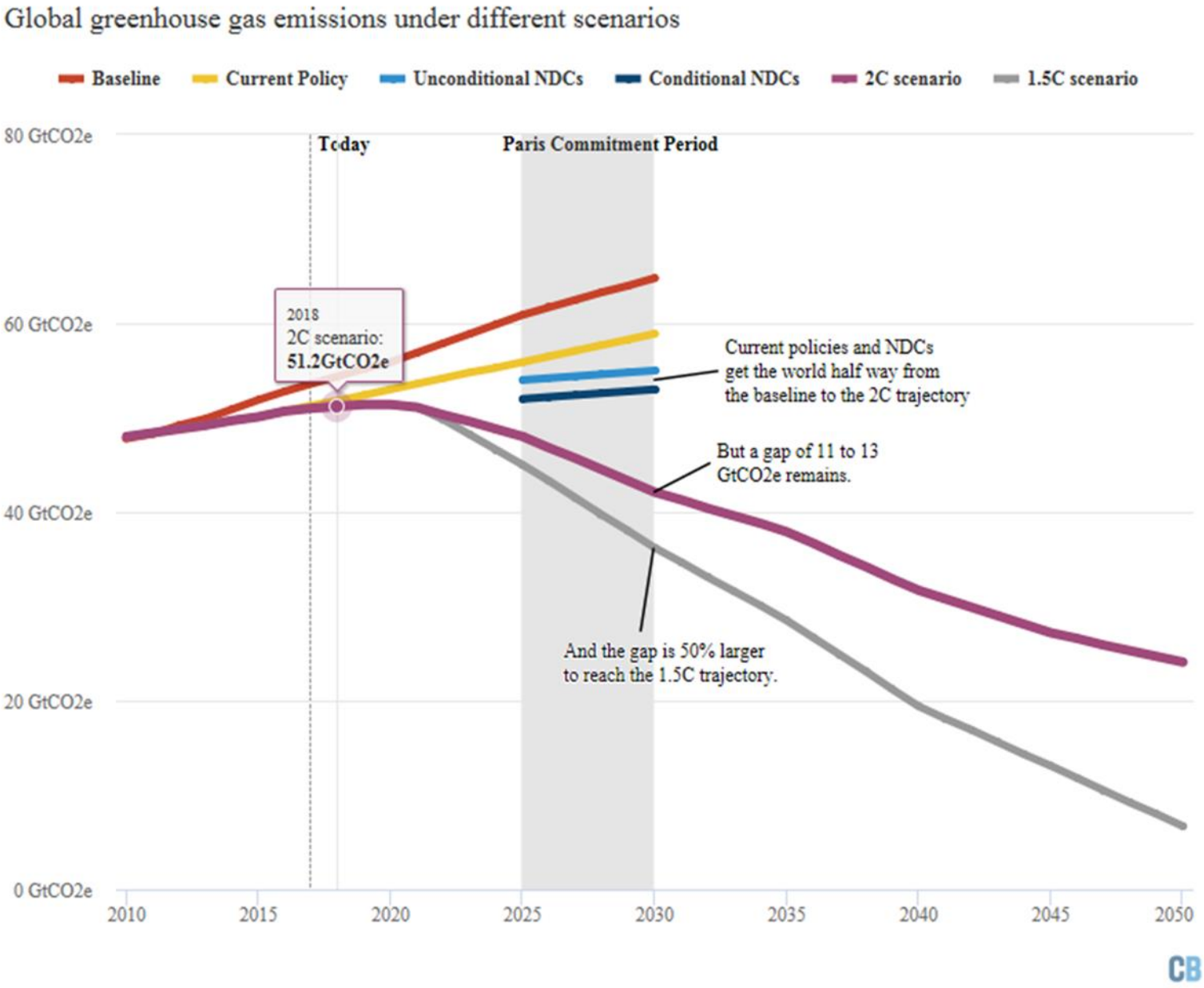
GLOBAL CARBON PROJECT

Atmospheric concentration

The global CO_2 concentration increased from ~277ppm in 1750 to 405pp
2016 was the first full year with concentration above 400

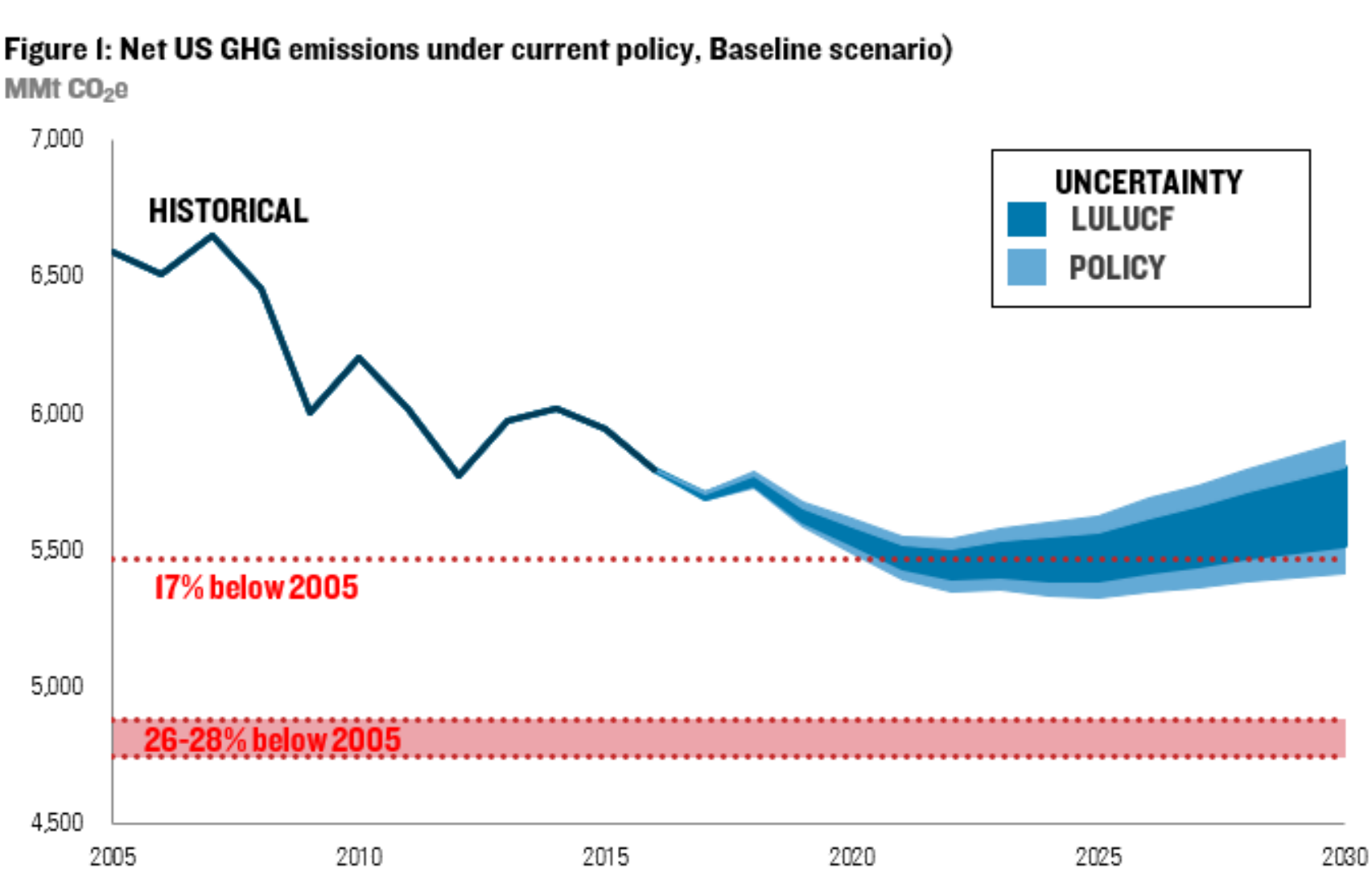



Global Average Temperature 1850 - 2018
Land data prepared by Berkeley Earth and combined
with ocean data adapted from the UK Hadley Centre
Global temperature anomalies relative to 1951-1980 average
Vertical lines indicate 95% confidence intervals
Global Temperature Anomaly (° C)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
1860
1880
1900
1920
1940
1960
1980
2000
2020



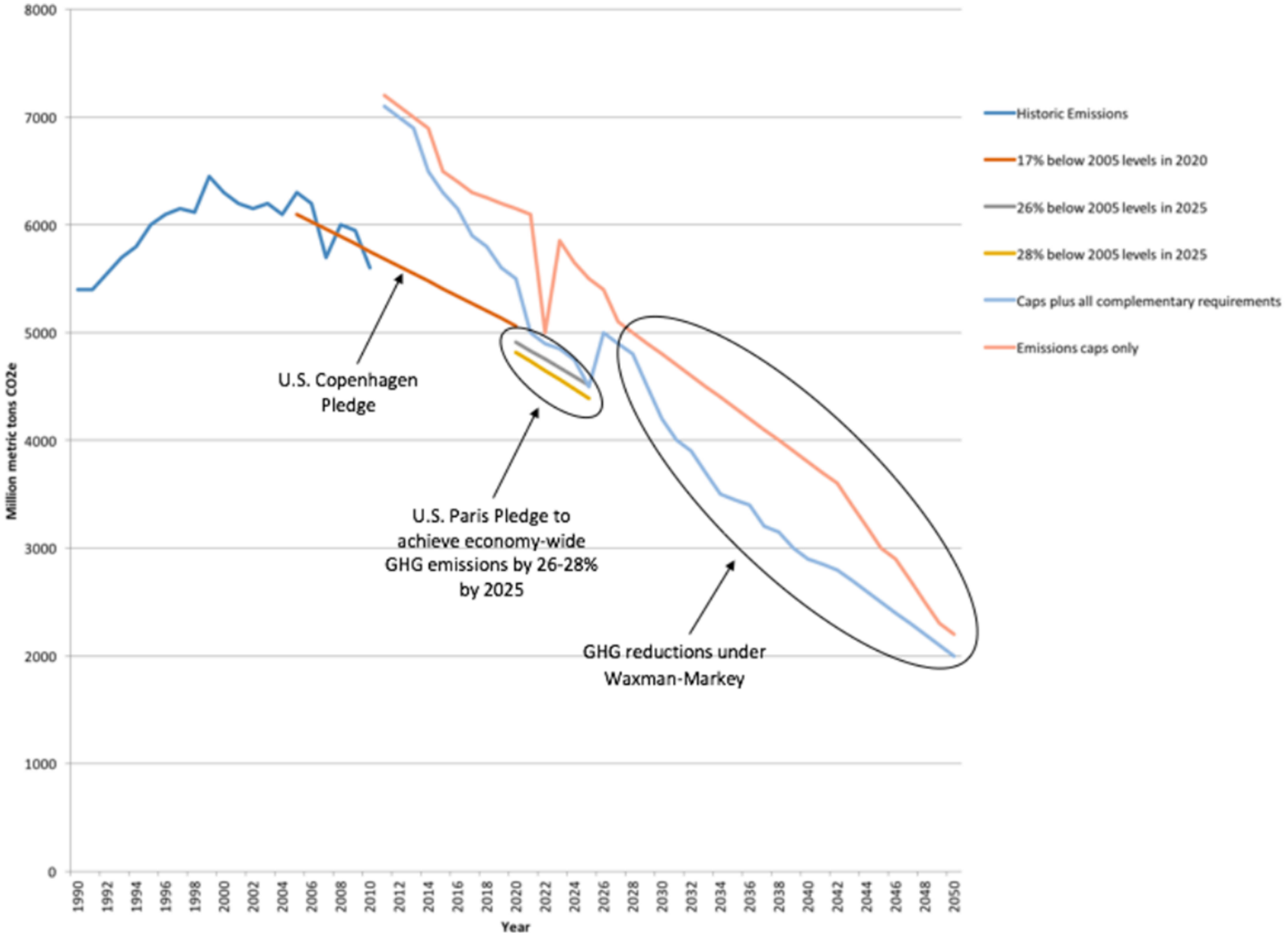
Median emission scenarios adapted from figure 3.1 in the UNEP Emission Gap Report 2017. Chart by Carbon Brief using

Figure I: Net US GHG emissions under current policy, Baseline scenario)



Source: EPA, Rhodium's US Climate Service

Intended Nationally Determined Contributions Compared with Waxman-Markey Caps

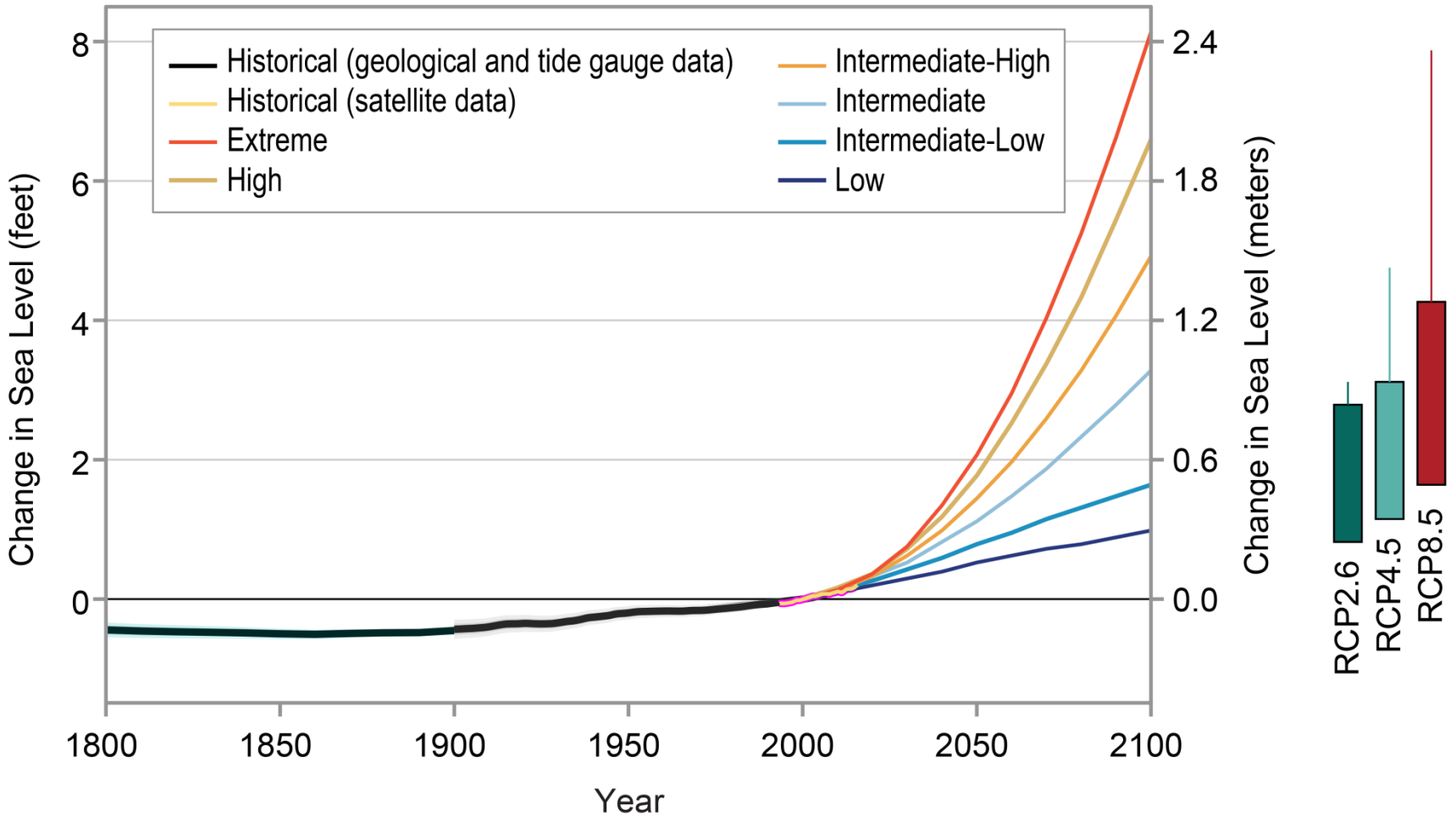


U.S. Global Change Research Program

Fourth National Climate Assessment

Volume II

Impacts, Risks, and Adaptation in the United States


Historical (geological and tide gauge data)
Historical (satellite data)
Extreme
High
Intermediate-High
Intermediate
Intermediate-Low
Low
Change in Sea Level (feet)
Change in Sea Level (meters)
Year
8
6
4
2
0
2.4
1.8
1.2
0.6
0.0
1800
1850
1900
1950
2000
2050
2100
RCP2.6
RCP4.5
RCP8.5

Projected Relative Sea Level Change in the United States by 2100

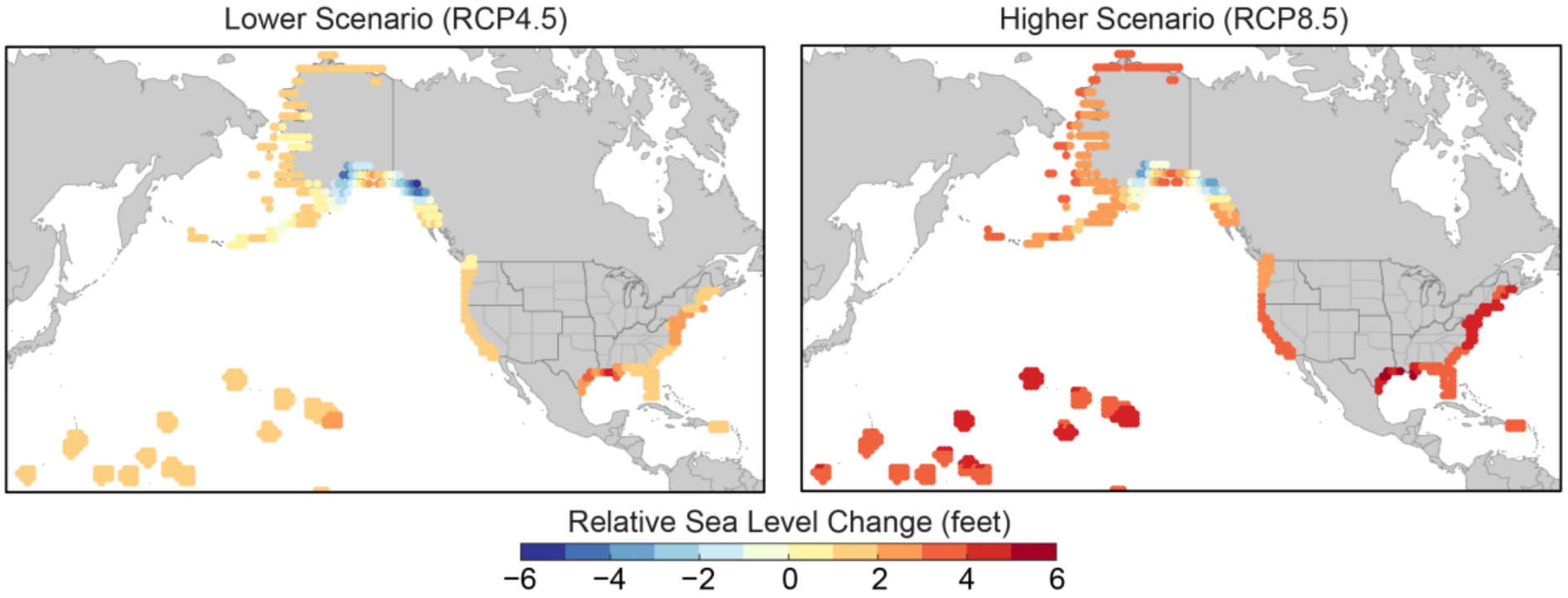
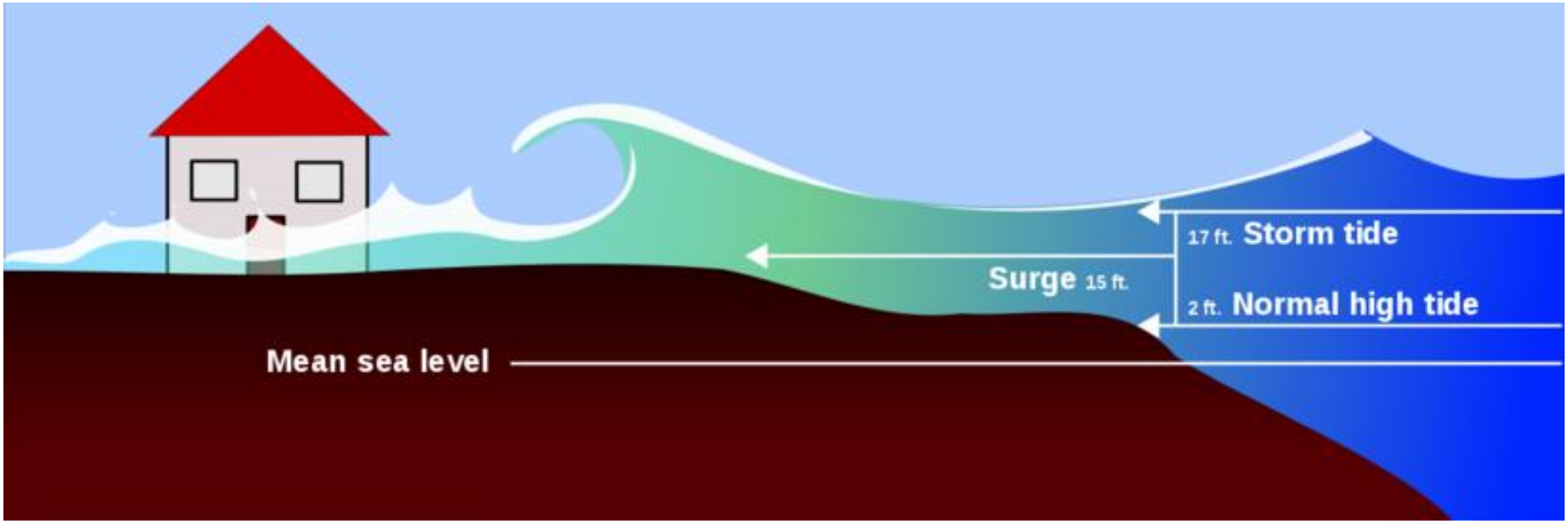
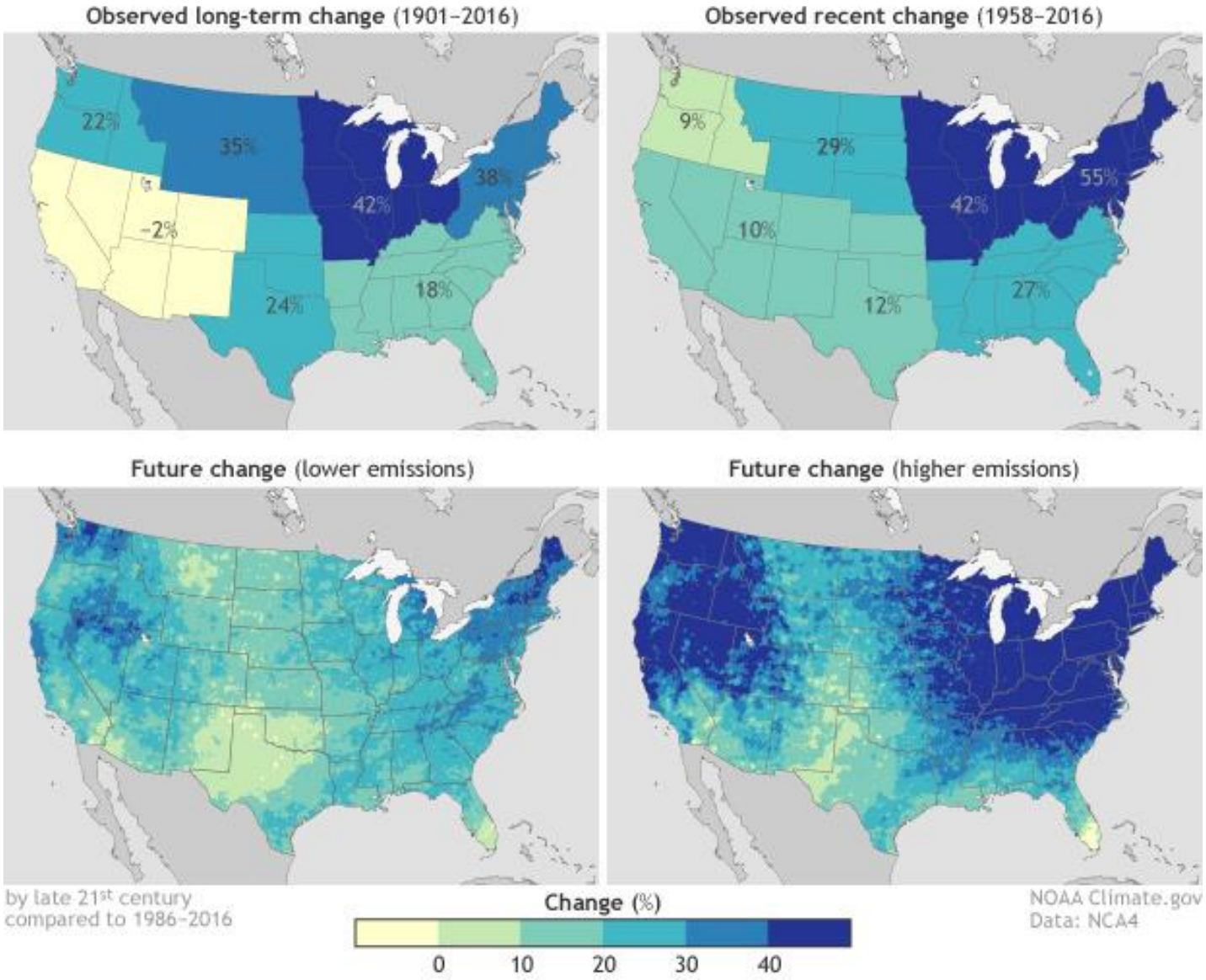


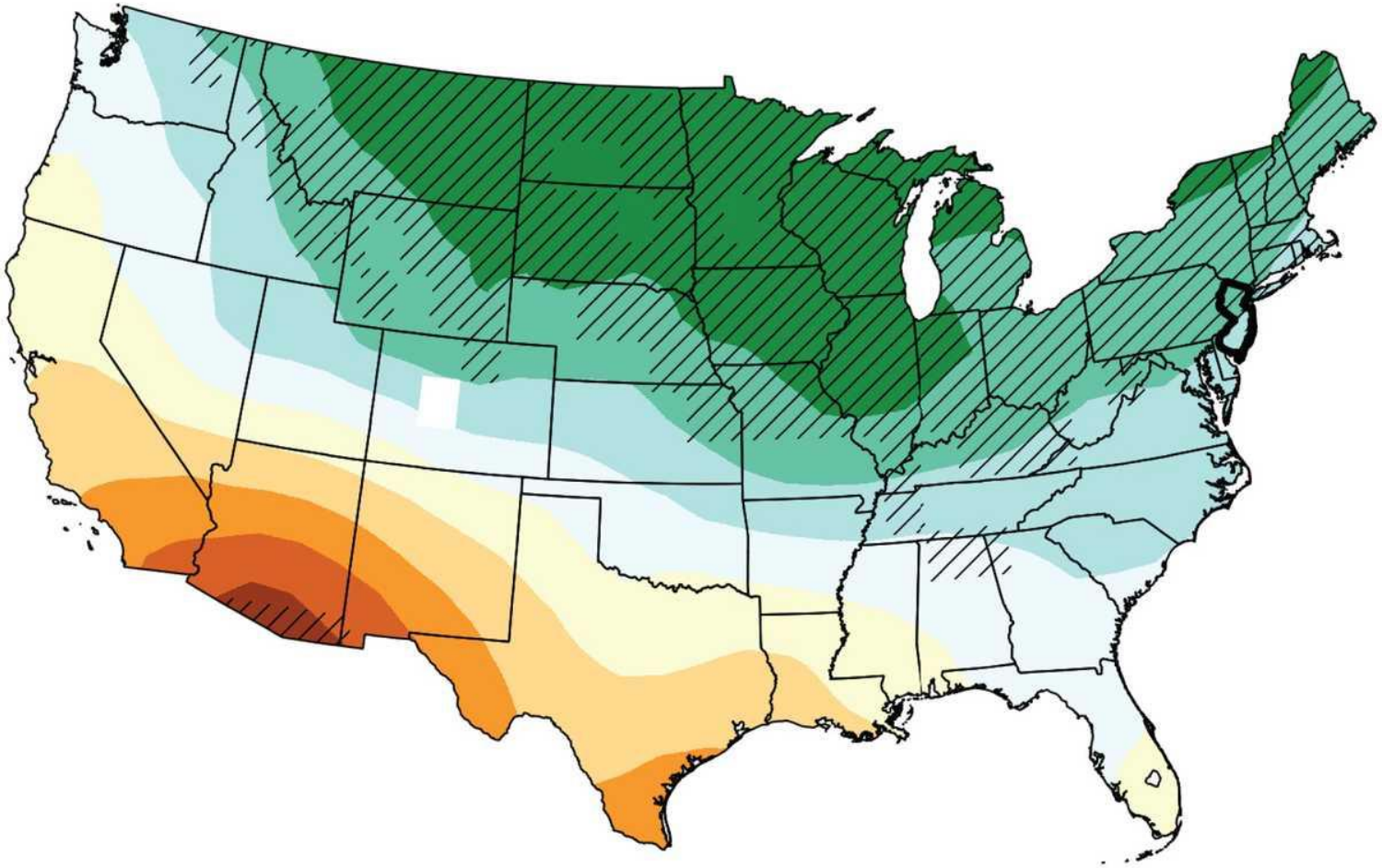
Figure 1.4: The maps show projections of change in relative sea level along the U.S. coast by 2100 (as compared to 2000) under the lower (RCP4.5) and higher (RCP8.5) scenarios (see CSSR, Ch. 12.5). Globally, sea levels will continue to rise from thermal expansion of the ocean and melting of land-based ice masses (such as Greenland, Antarctica, and mountain glaciers). Regionally, however, the amount of sea level rise will not be the same everywhere. Where land is sinking (as along the Gulf of Mexico coastline), relative sea level rise will be higher, and where land is rising (as in parts of Alaska), relative sea level rise will be lower. Changes in ocean circulation (such as the Gulf Stream) and gravity effects due to ice melt will also alter the heights of the ocean regionally. Sea levels are expected to continue to rise along almost all U.S. coastlines, and by 2100, under the


17 ft. Storm tide
Surge 15 ft.
2 ft. Normal high tide
Mean sea level

Change in extreme precipitation across the United States

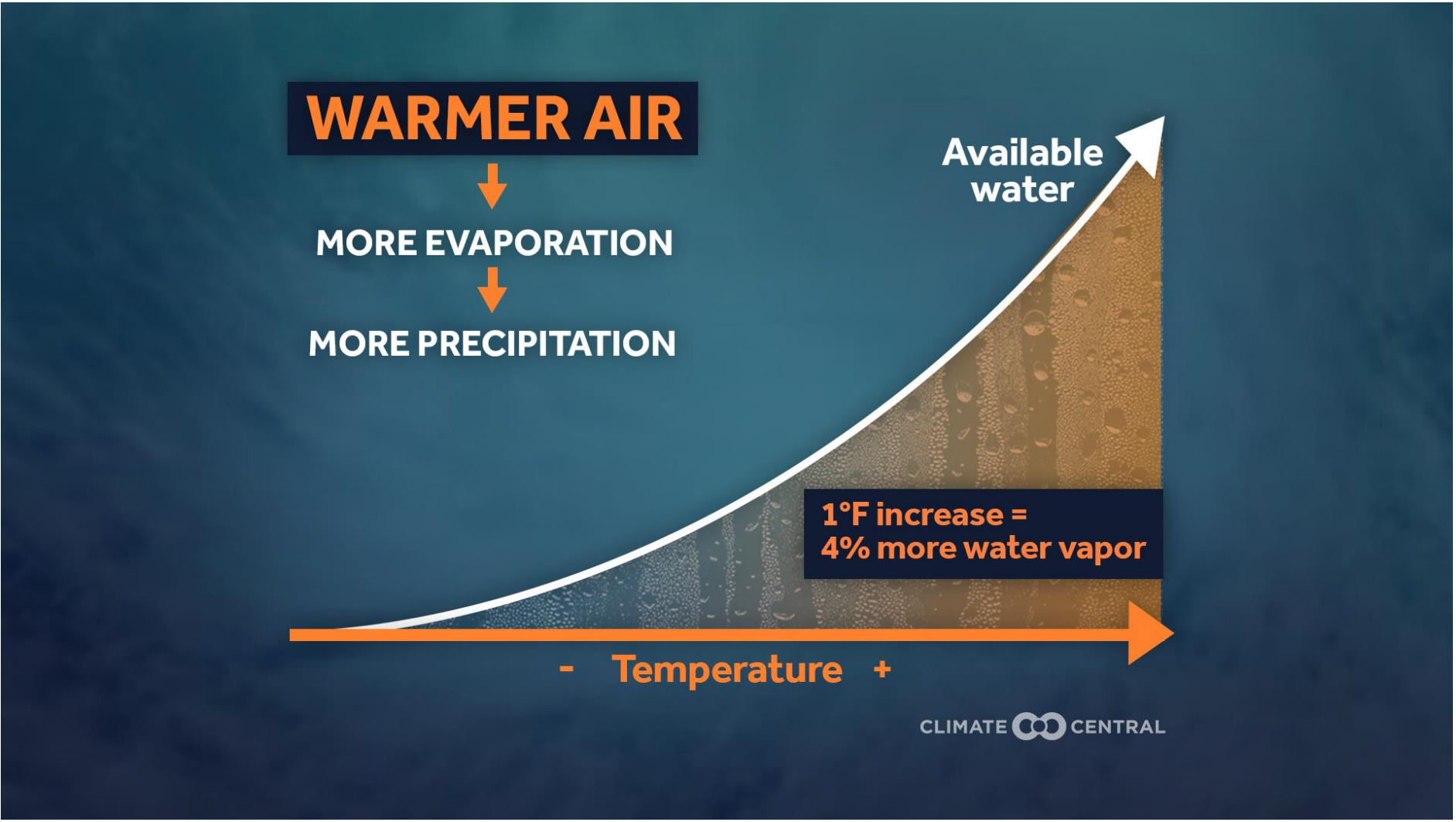


Projected Change in Spring Precipitation



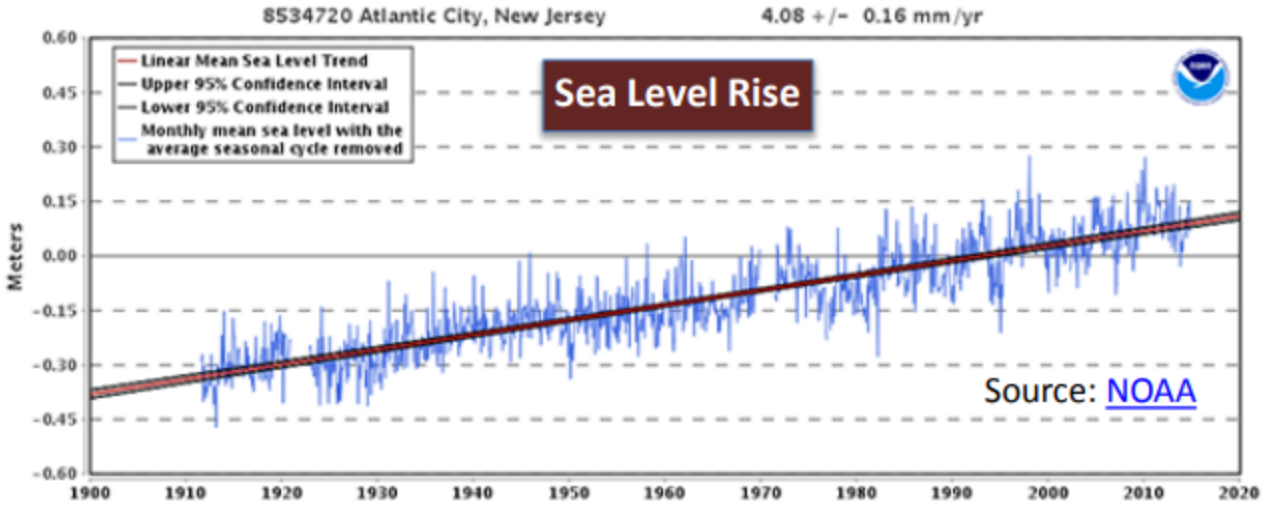
Change in Spring Precipitation (%)

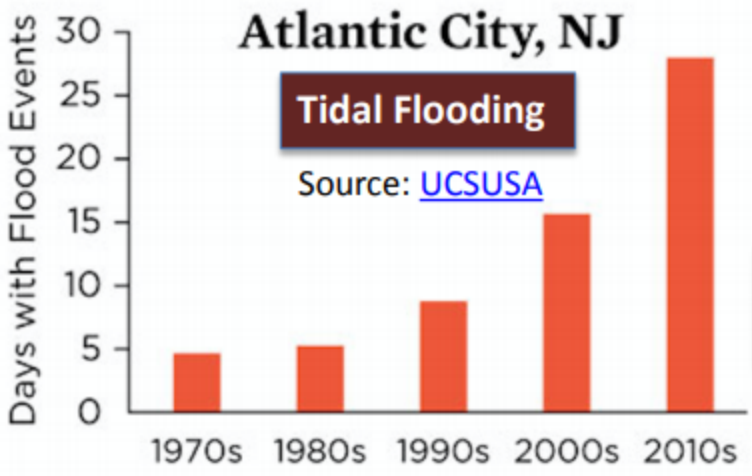
<–20 –15 –10 –5 0 5 10 >15


WARMER AIR
MORE EVAPORATION
MORE PRECIPITATION
Available water
1°F increase = 4% more water vapor
- Temperature +
CLIMATE CENTRAL

Sea Level Rise

OBSERVATIONS Over the last century, sea level has risen by over 1.3 feet around Atlantic City, NJ.



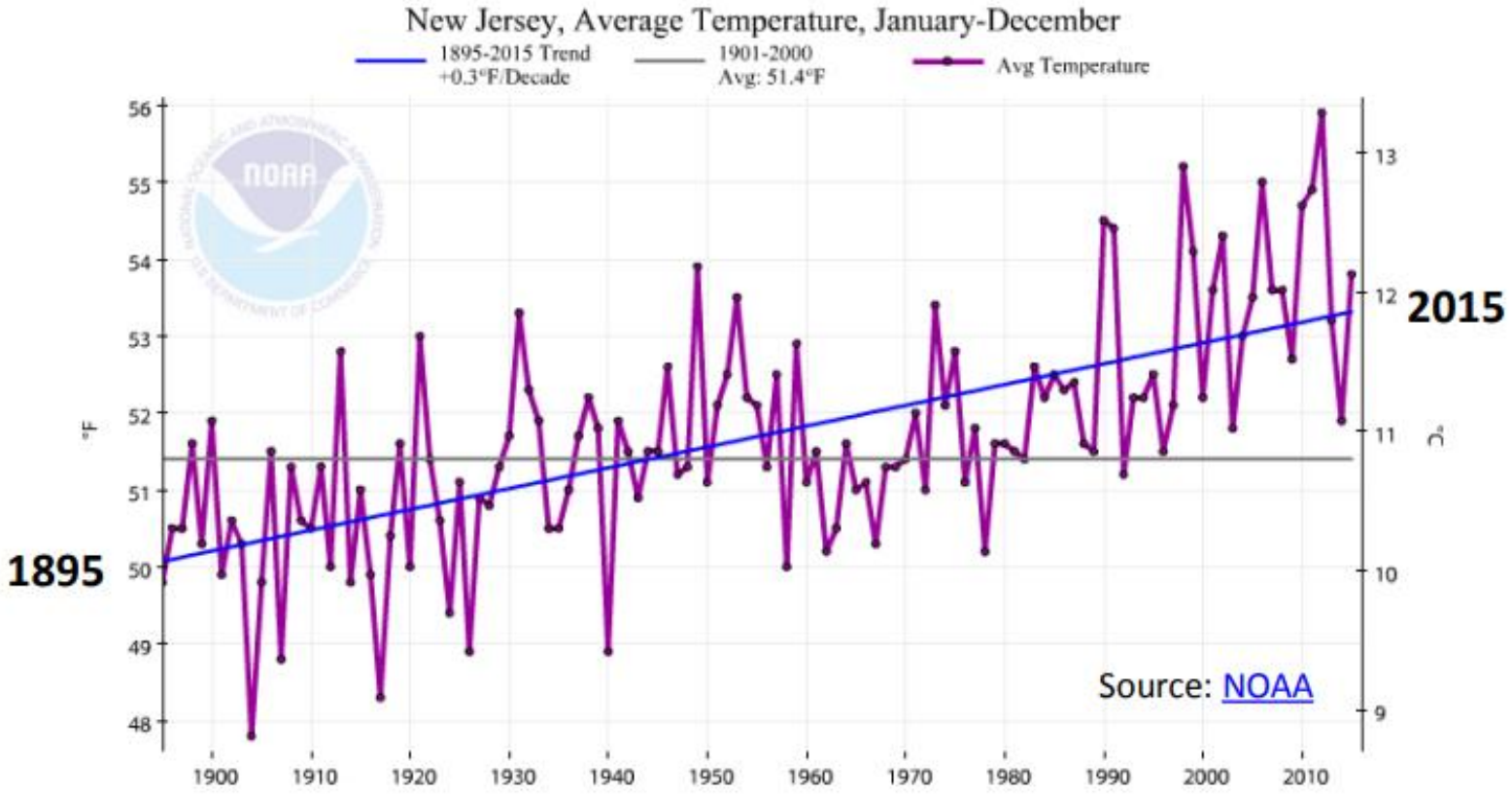


Seemingly small increases in sea level can have large impacts along the coast due to storm surges and exceptionally high tides.

Communities in Atlantic City are now seeing more days with tidal flooding.

Warming in New Jersey

OBSERVATIONS **The annual mean temperature in NJ has already increased by about 3.6°F (2°C) since 1895 – faster than the rise in global mean temperature.**

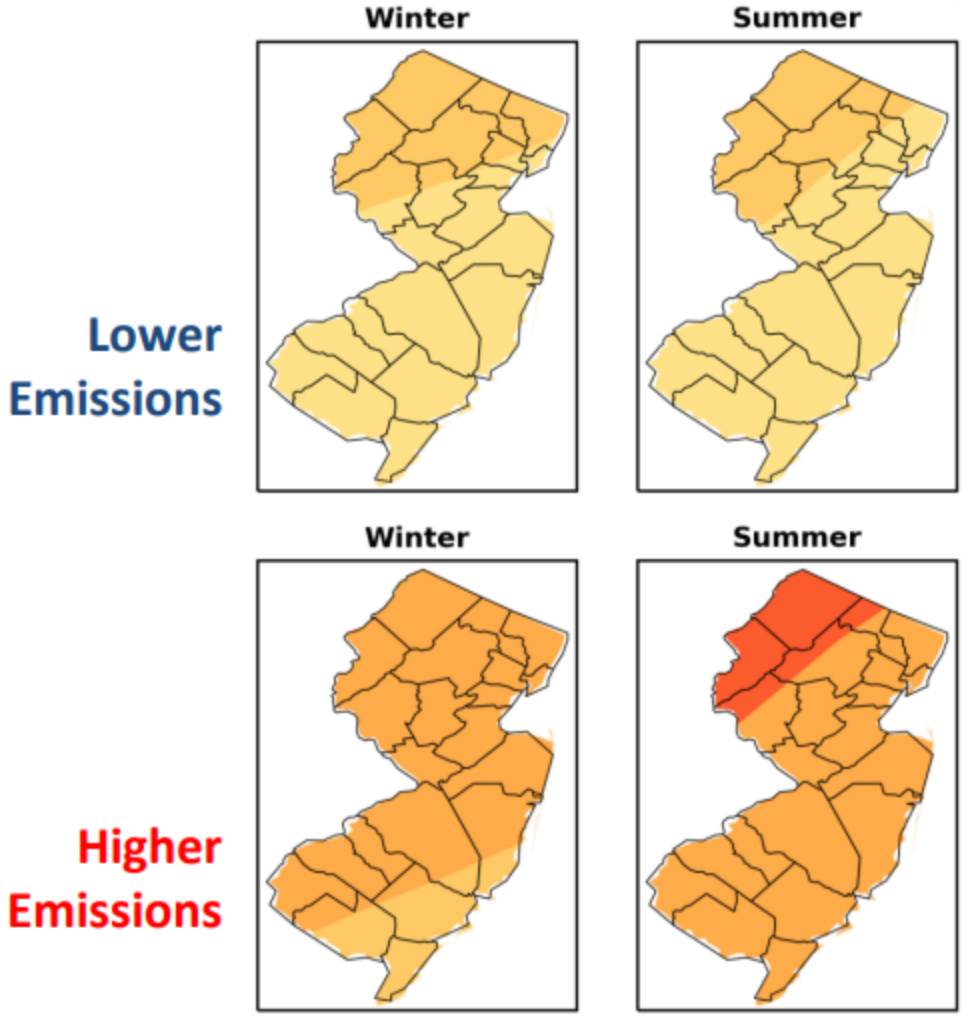


The annual mean temperature in NJ exceeded the 20th-century average every year since 1993 (the last 22 years).

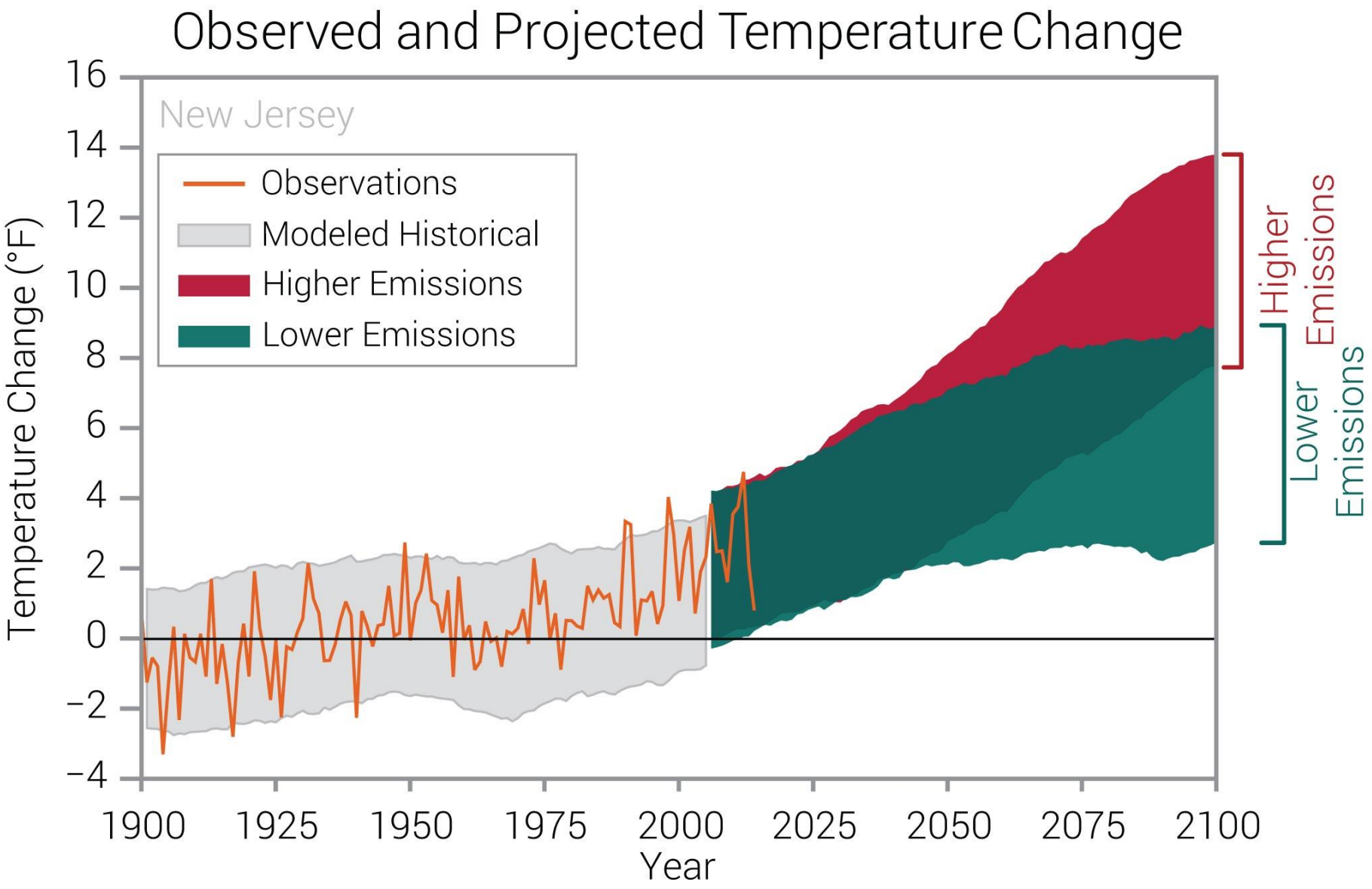
Warming in New Jersey

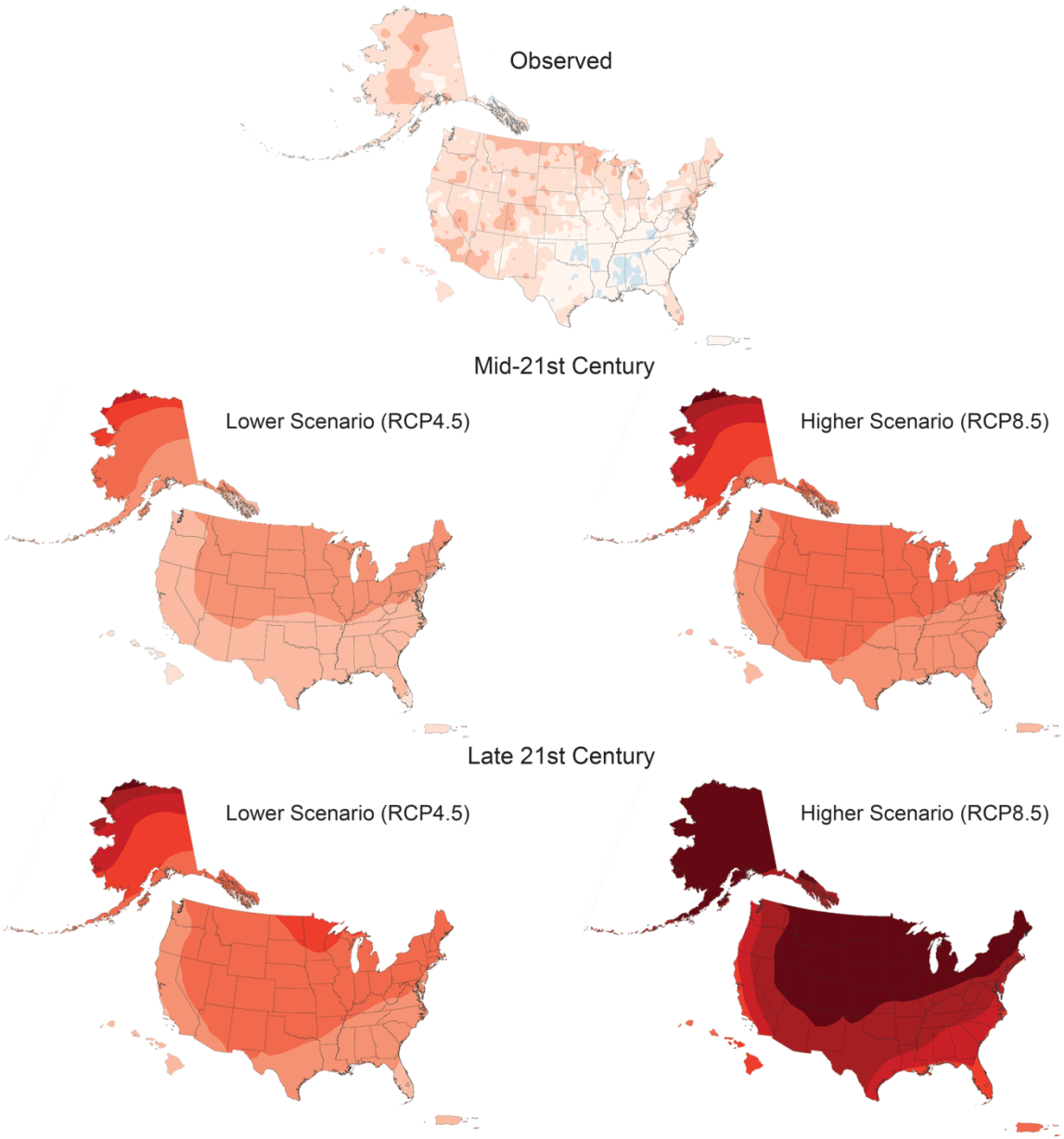
PROJECTIONS

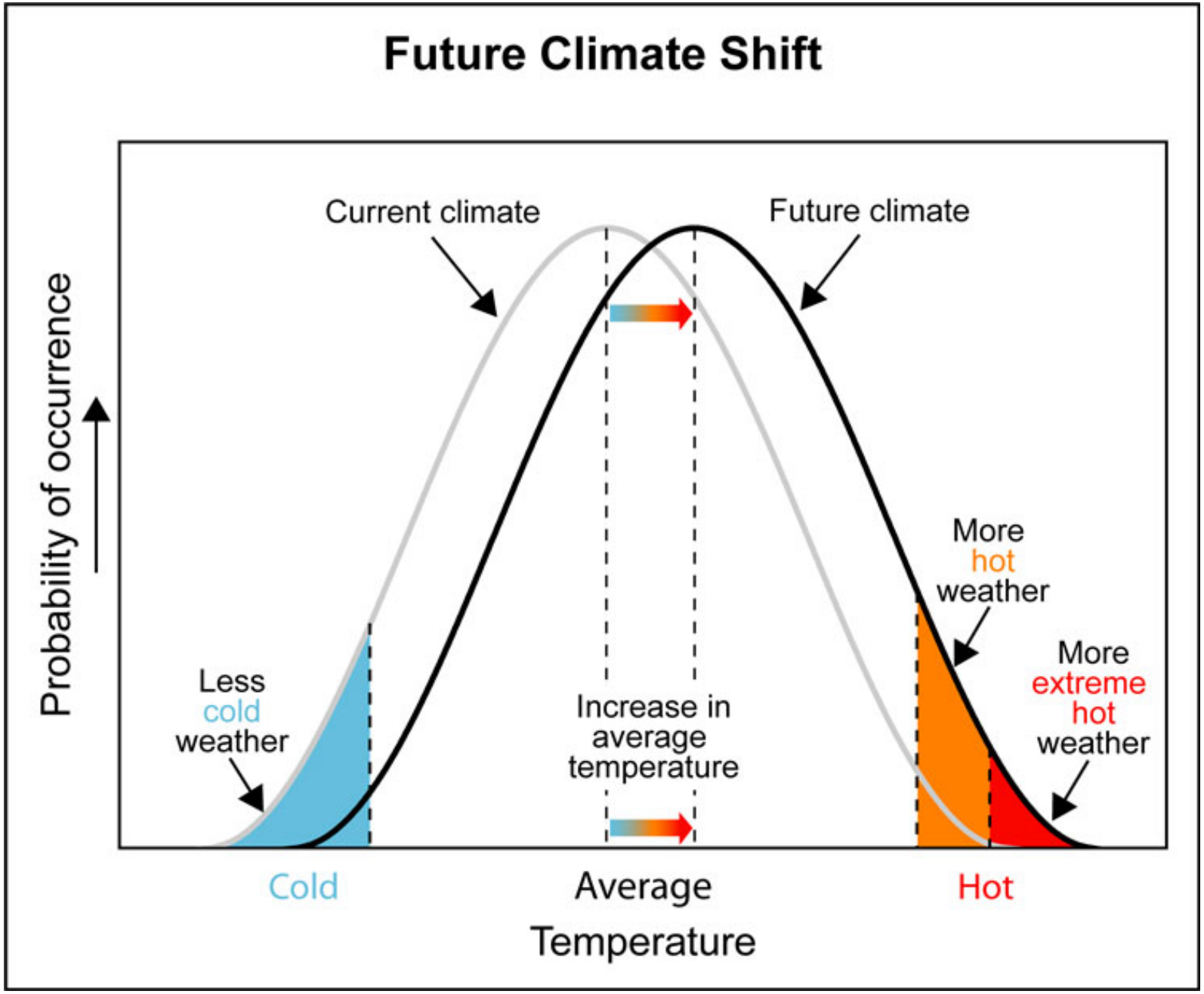
In the next 50-60 years, when global warming crosses the 2°C threshold, NJ average summer and winter temperatures will increase by over 6°F (3.3°C).

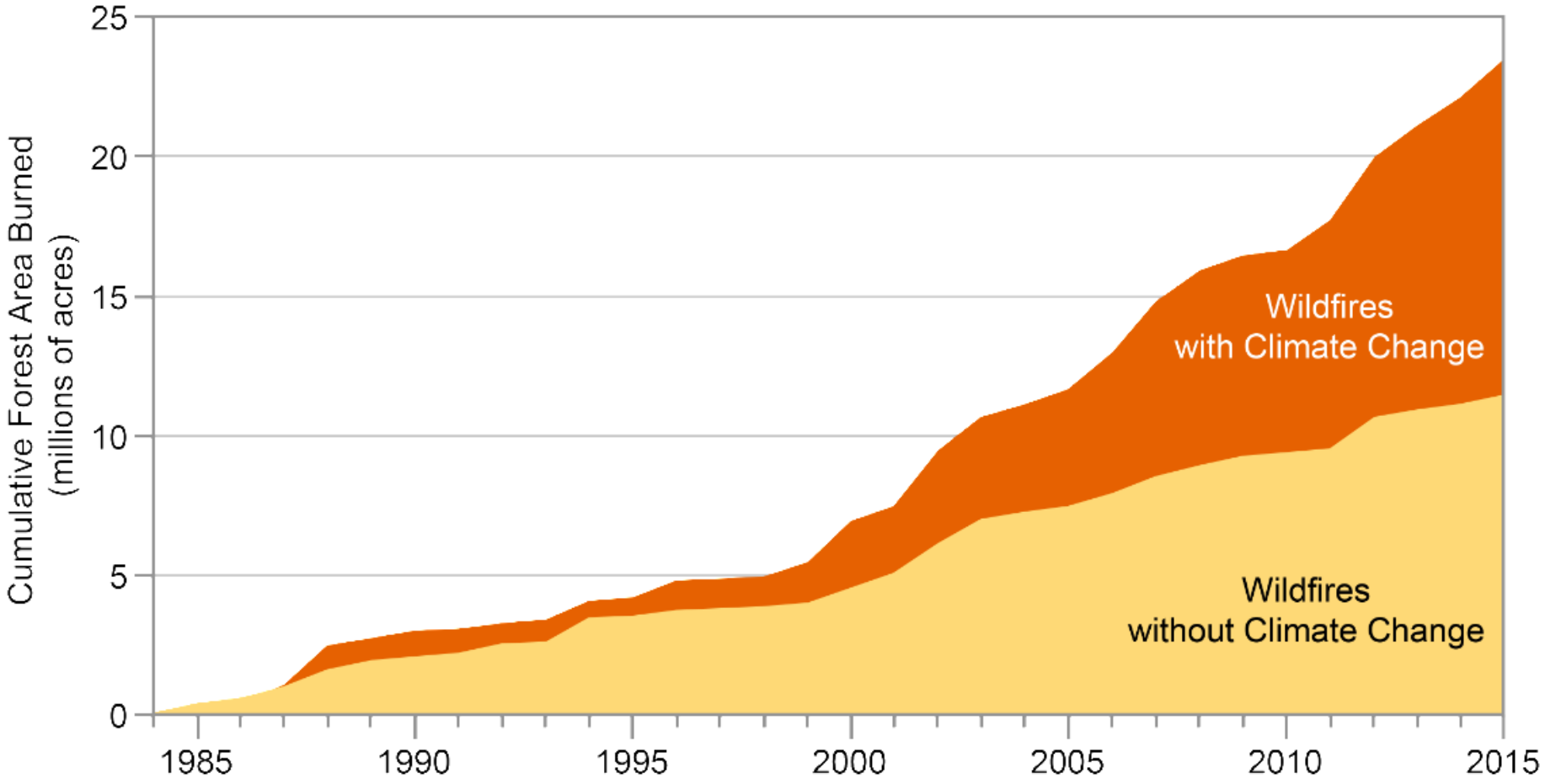


Source: *produced by CSRC, UMass Amherst*


Observed and Projected Temperature Change
New Jersey
Observations
Modeled Historical
Higher Emissions
Lower Emissions
Temperature Change (°F)
16
14
12
10
8
6
4
2
0
−2
−4
1900
1925
1950
1975
2000
2025
2050
2075
2100
Year
Higher Emissions
Lower Emissions


Observed
Mid-21st Century
Lower Scenario (RCP4.5)
Higher Scenario (RCP8.5)
Late 21st Century
Lower Scenario (RCP4.5)
Higher Scenario (RCP8.5)
Change in Temperature (°F)
−1
0
1
2
3
4
5
6
7
8


Future Climate Shift
Current climate
Future climate
Probability of occurrence
More
hot
weather
More
extreme
hot
weather
Less
cold
weather
Increase in
average
temperature
Cold
Average
Temperature
Hot


Cumulative Forest Area Burned
(millions of acres)
25
20
15
10
5
0
1985
1990
1995
2000
2005
2010
2015
Wildfires
with Climate Change
Wildfires
without Climate Change

New Jersey Greenhouse Gas Sources and Sinks – 2018

42% Transportation

19% Electricity generation

17% Commercial and industrial

16% Residential

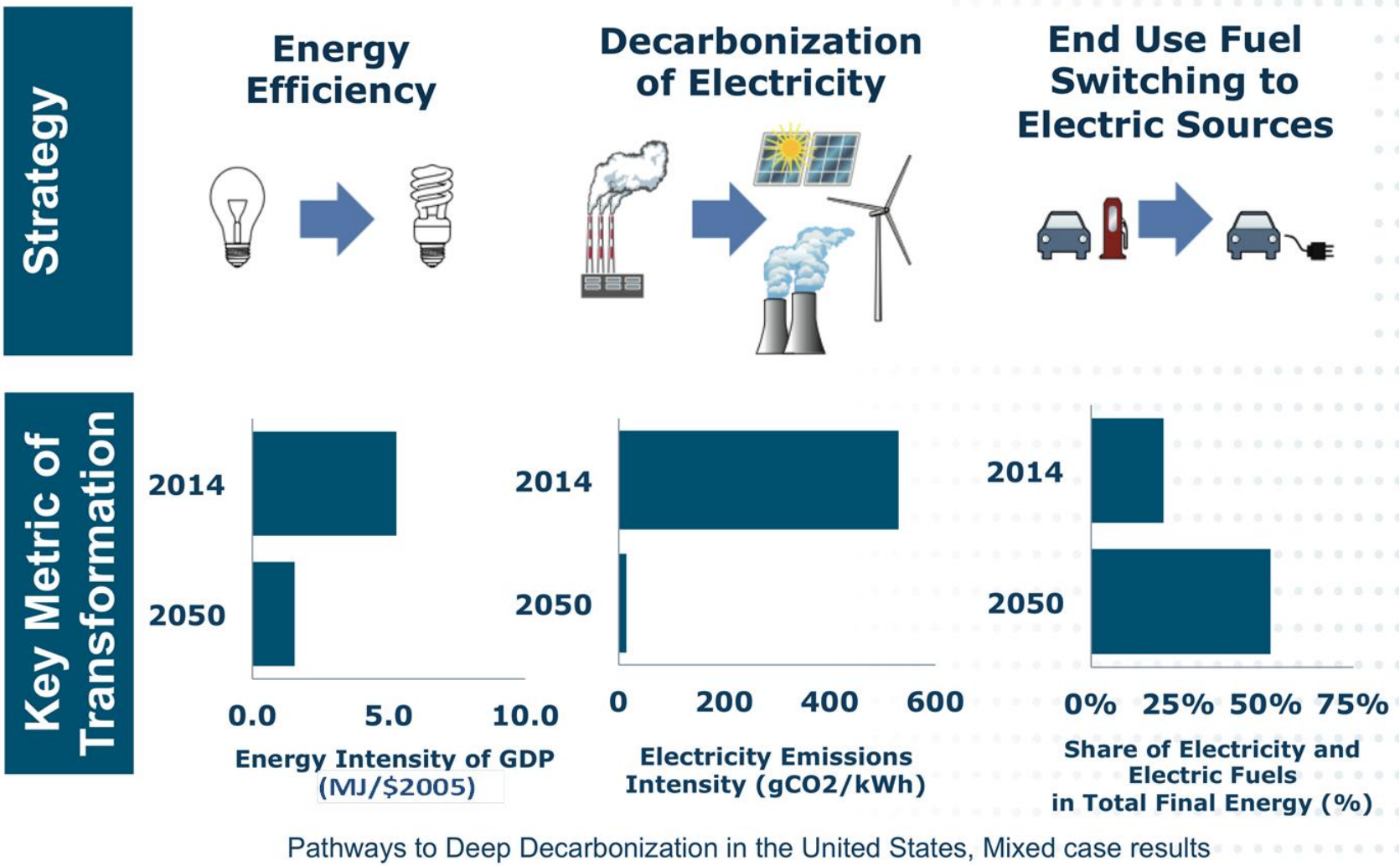
8% Highly warming gases

5% Waste management

1% Land clearing

-8% Terrestrial carbon sequestration

Three Pillars of Deep Decarbonization



Pathways to Deep Decarbonization in the United States, Mixed case results

Energy Efficiency

New buildings

Old buildings

Appliance standards [but: preemption]

Energy audits of buildings

Decarbonization of electricity

Distributed renewables (e.g. rooftop solar)

Renewables on existing gravel, sand, clay mines

Offshore wind – cable landings

Electrification

- Electric vehicles
  - Purchases
  - Charging stations
- Building heating and cooling; water heating

Adaptation to climate change

Drainage and stormwater

- Pipes, culverts, retention basins

Fire

- Development at wildland-urban interface
- Fire resistant materials in buildings
- Buffer zones
- Prescribed burns
- Timber harvesting
- Wildfire suppression