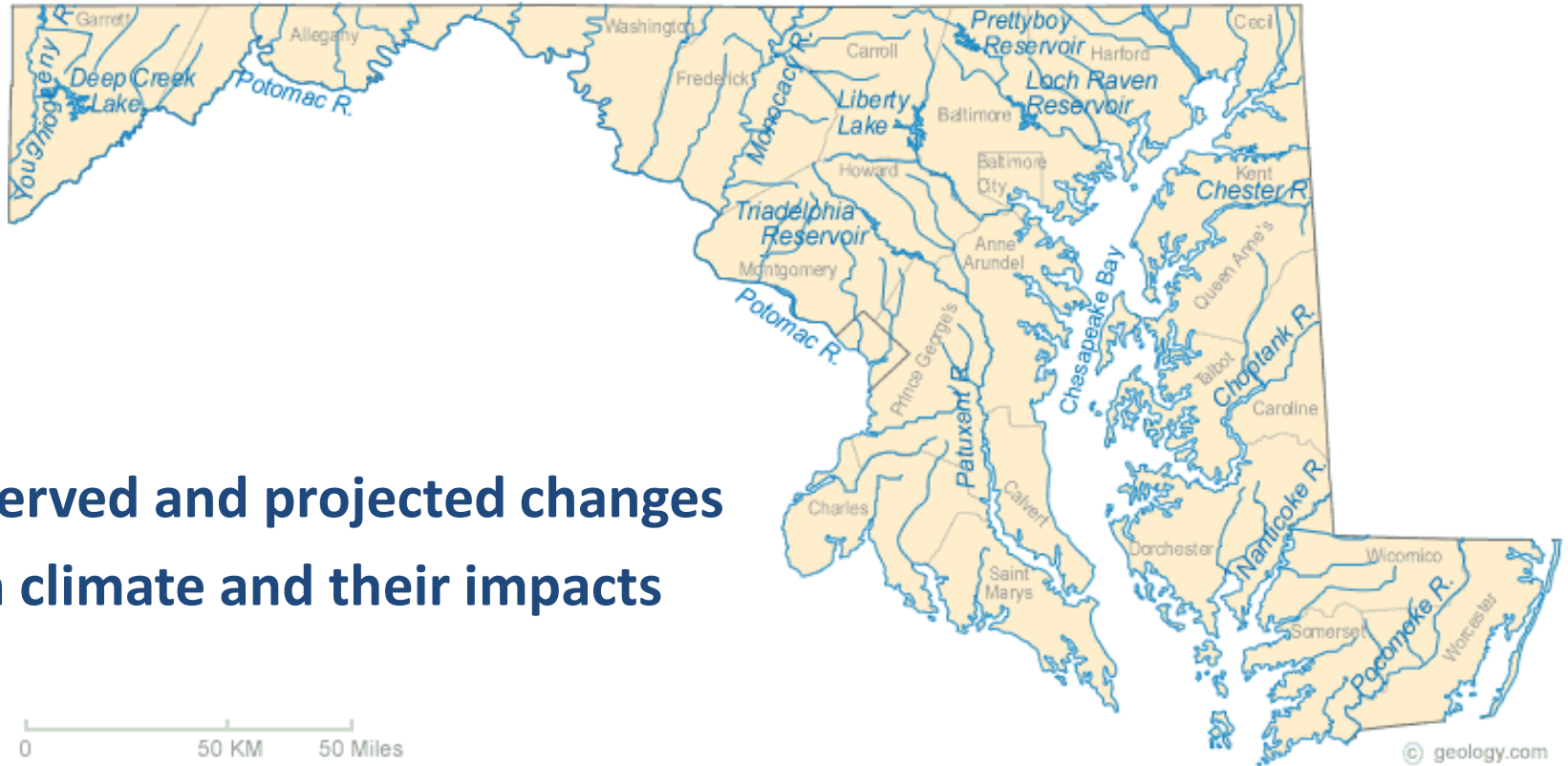


# How will global warming of 2°C affect Maryland?



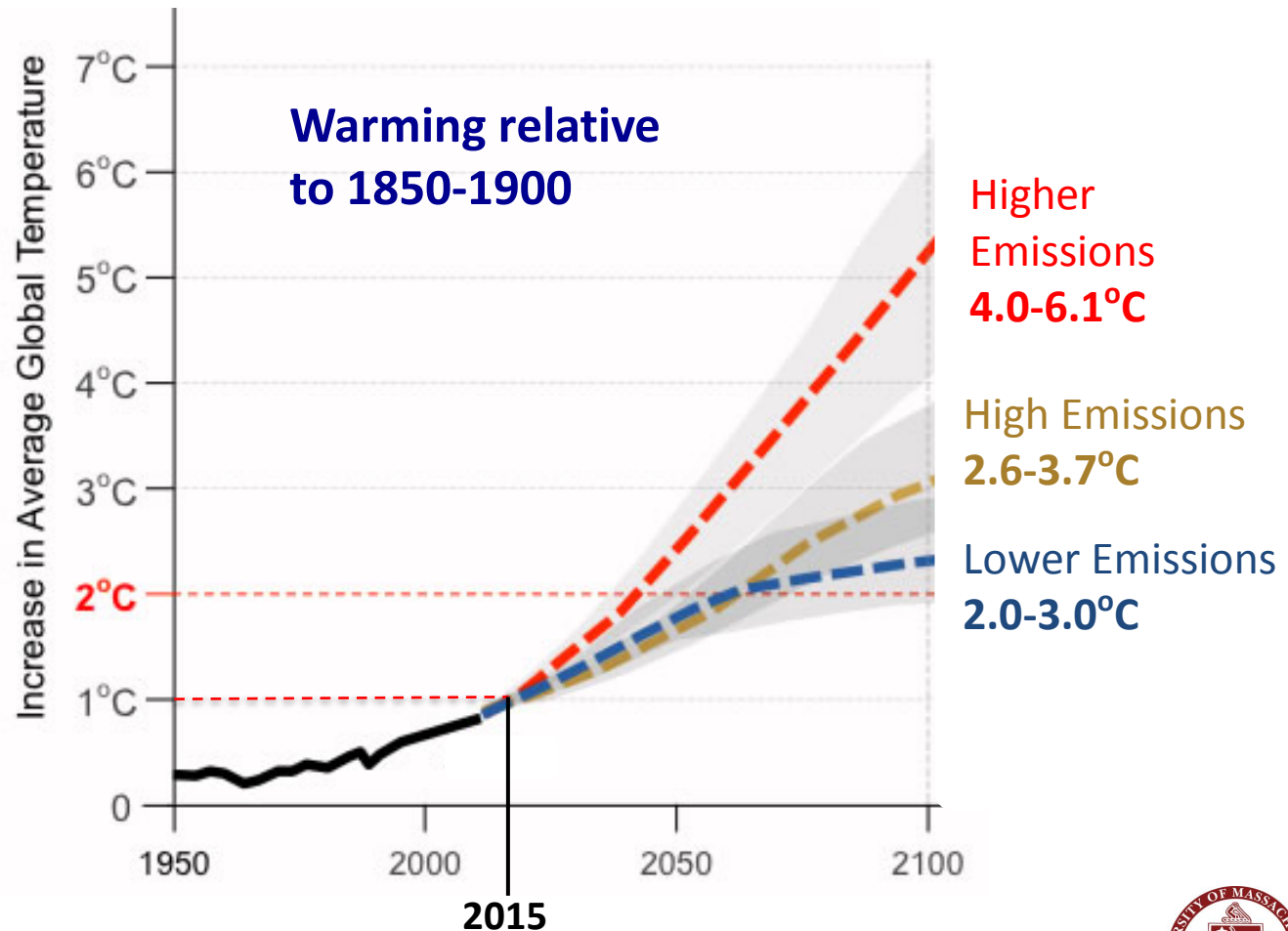
***“To prevent dangerous interference with the climate system, the scientific view is that the increase in global temperature should be below 2°C [relative to pre-industrial levels]”.***

- 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<sub>2</sub> emissions are tracking the 'higher emissions' scenario; unless emissions are reduced, the 2°C threshold will be crossed before 2050.

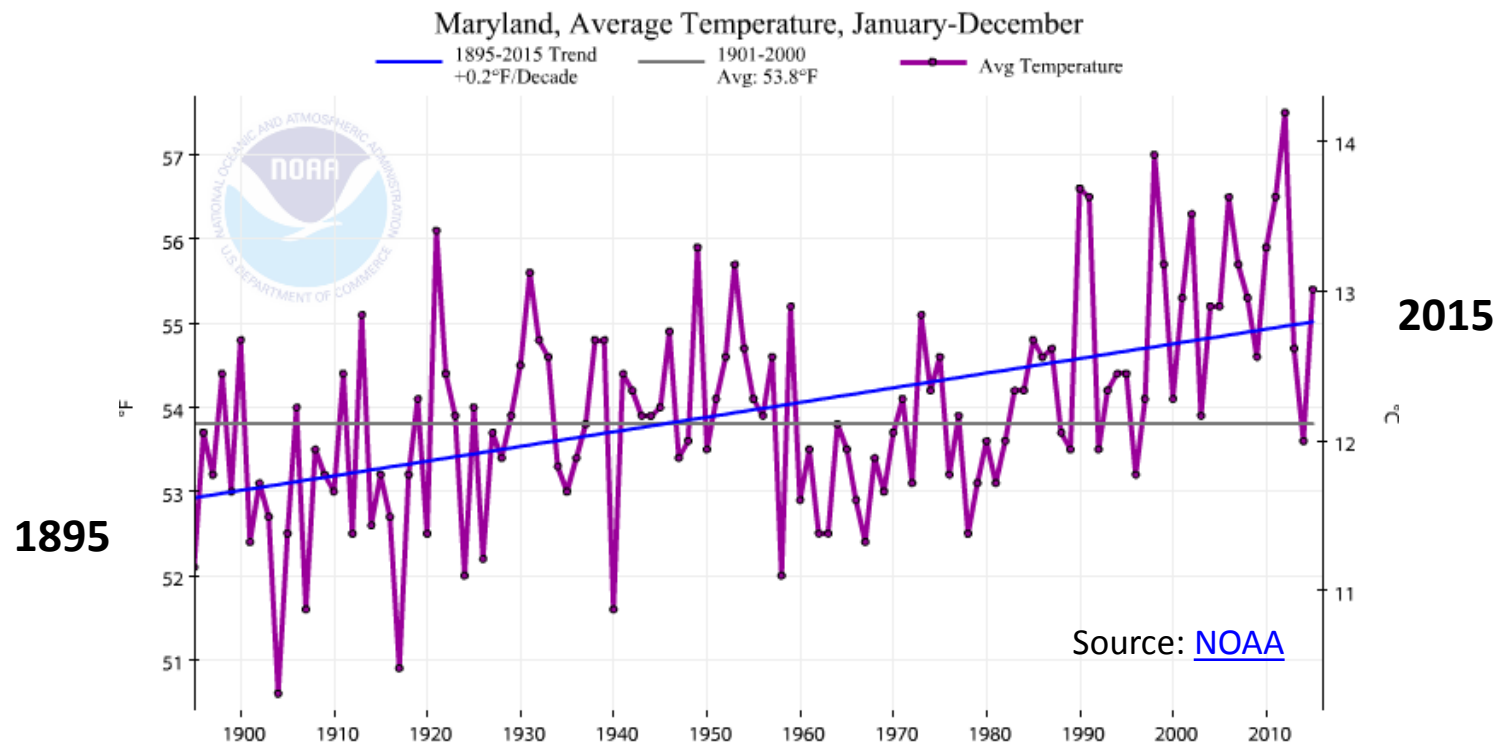


# Warming in Maryland



## OBSERVATIONS

The annual mean temperature in MD has already increased by about 2.1°F (1.1°C) since 1895 – faster than the rise in global mean temperature.



*The annual mean temperature in MD exceeded the 20th-century average almost every year since 1997 (the last 18 years).*

# Warming in Maryland

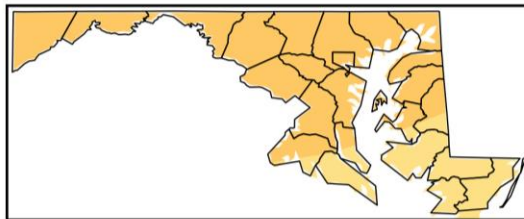


## PROJECTIONS

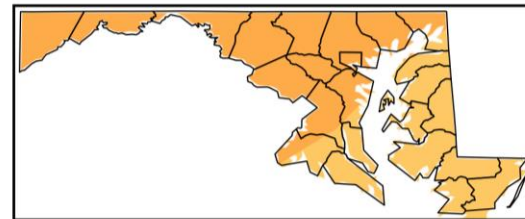
In the next 50-60 years, when global warming crosses the 2°C threshold, MD average summer and winter temperatures are projected to increase by over 6°F (3.3°C) relative to pre-industrial levels.

Lower  
Emissions

Winter

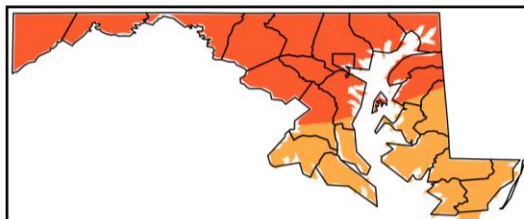


Summer

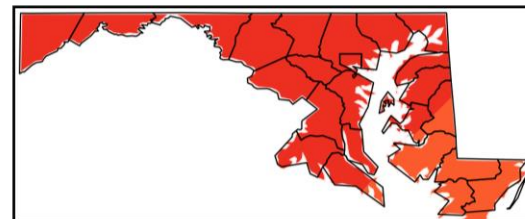


Higher  
Emissions

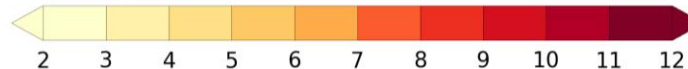
Winter



Summer



Warming in °F by 2070 relative to 1961-1990 mean



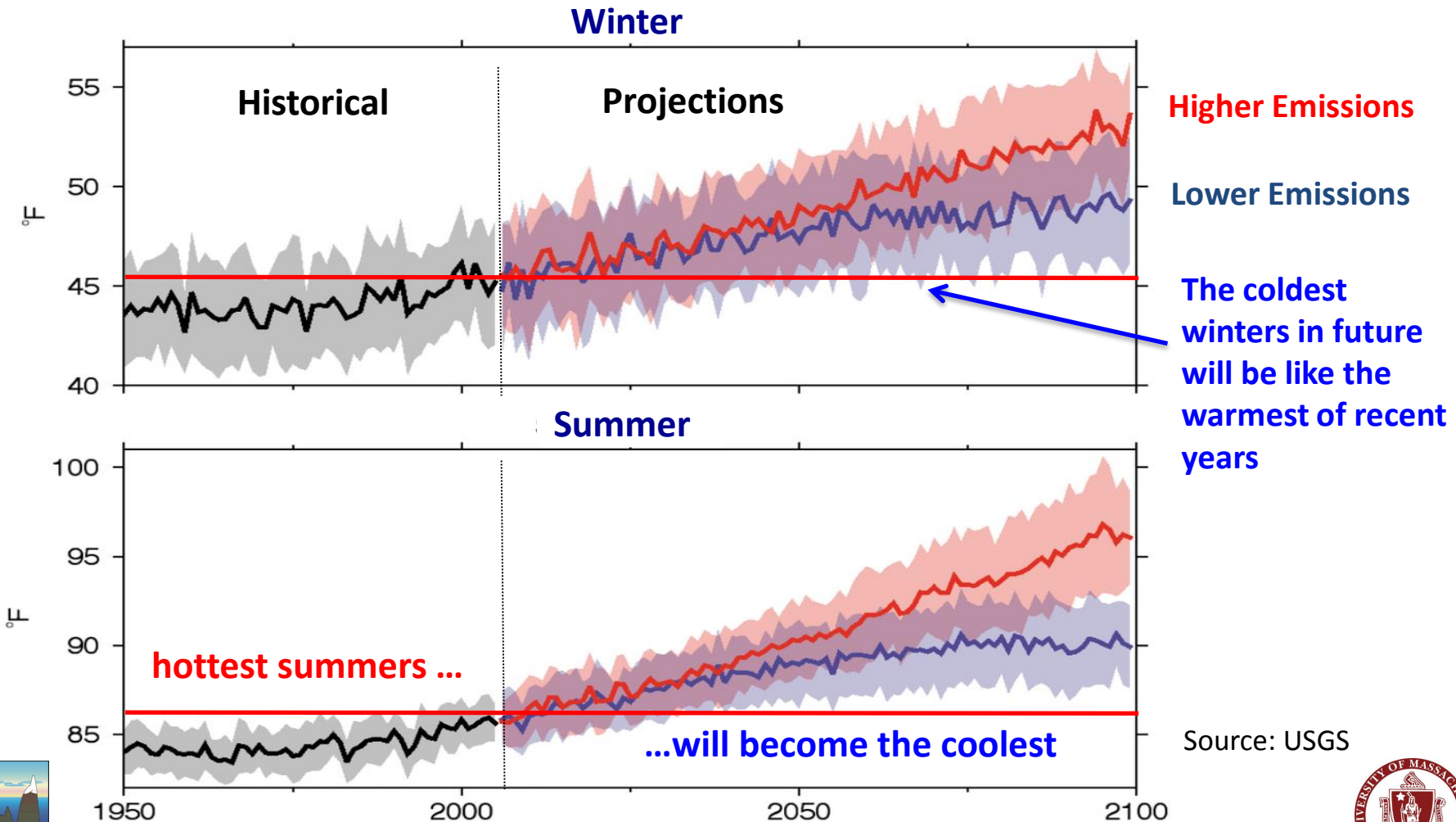
Source: produced by  
CSRC, UMass Amherst

# Warming in Maryland

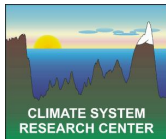


## PROJECTIONS

How warm will Winter and Summer temperatures become?



Source: USGS

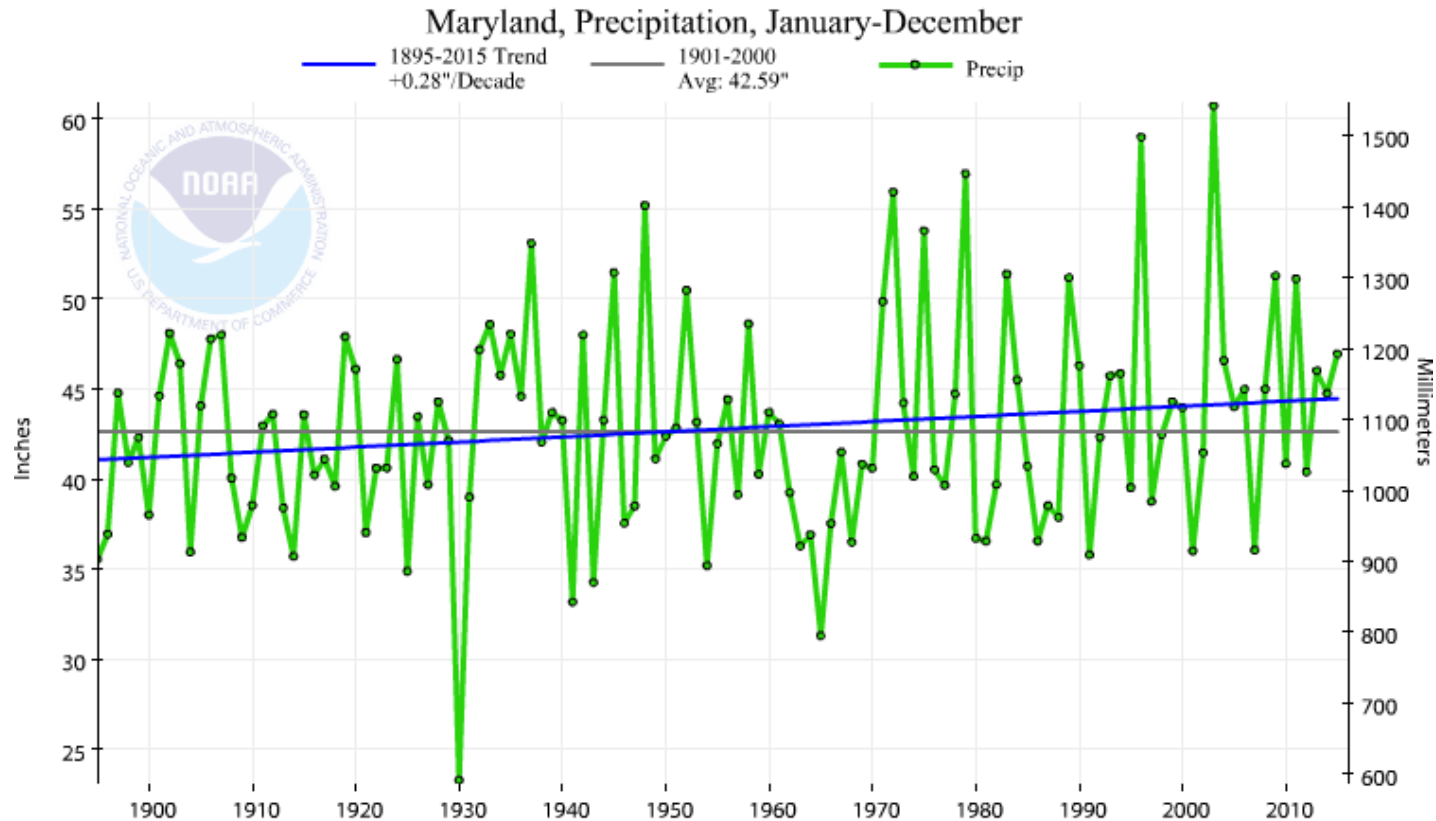


# Rain and Snow in Maryland



## OBSERVATIONS

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



***In 7 out of the last 10 years, Maryland has received more precipitation than the 20<sup>th</sup> century average.***



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





# Coastal flooding threats



Source: Cliff Owen / AP

Coastal Flooding as Hurricane Joaquin moves up the coast, Ocean City, MD, 2015

Annapolis, MD inundated by seawater, 2012



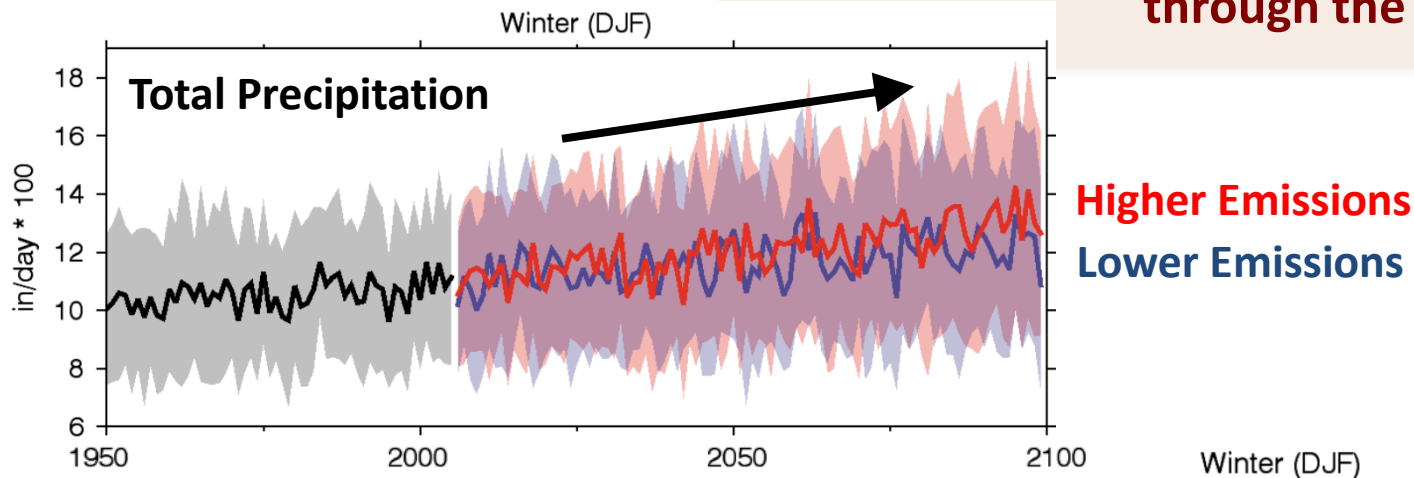
Source: <http://patch.com/maryland/annapolis>

# Rain and Snow in Maryland

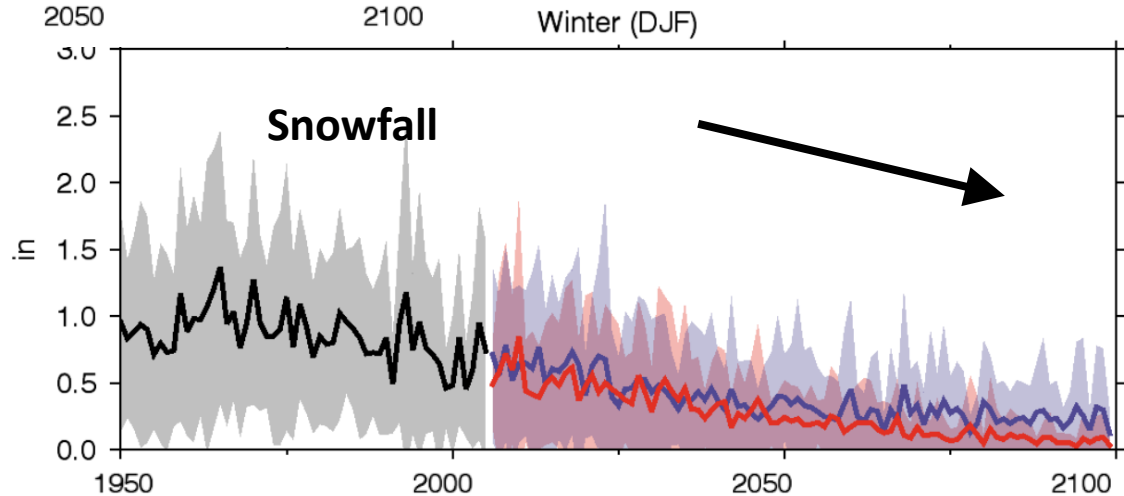


## PROJECTIONS

Winter precipitation is projected to increase through the 21<sup>st</sup> century.



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



Projected changes in rainfall in summer are uncertain.

# Sea Level Rise

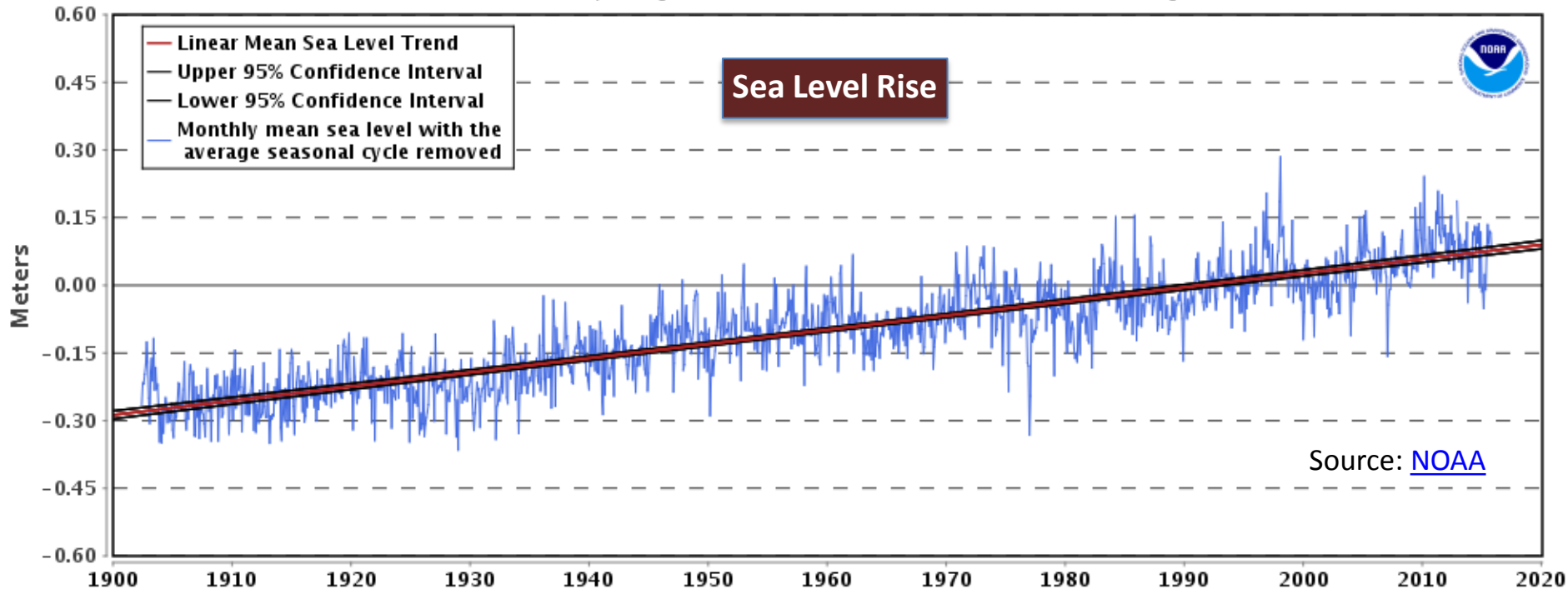


## OBSERVATIONS

Over the last century, sea level has risen by about 1 foot around Baltimore MD.

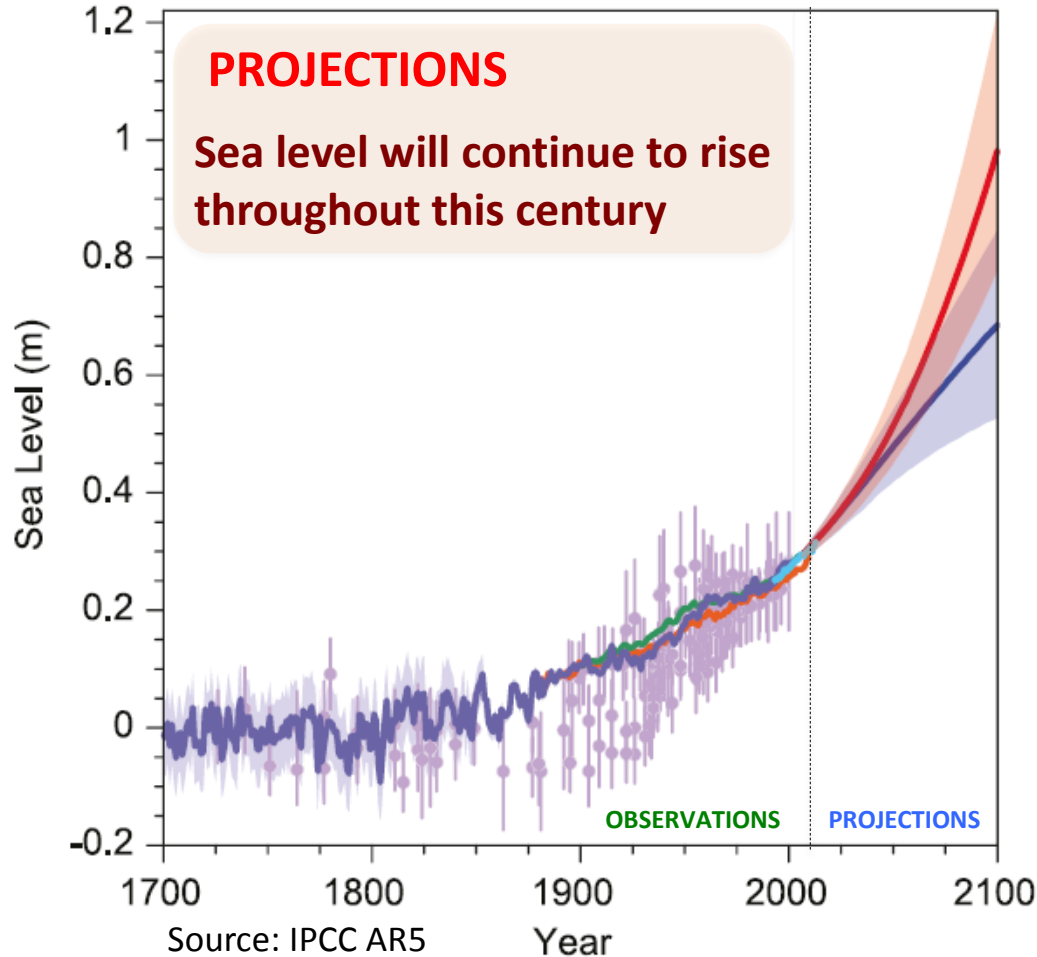
8574680 Baltimore, Maryland

3.14 +/- 0.13 mm/yr

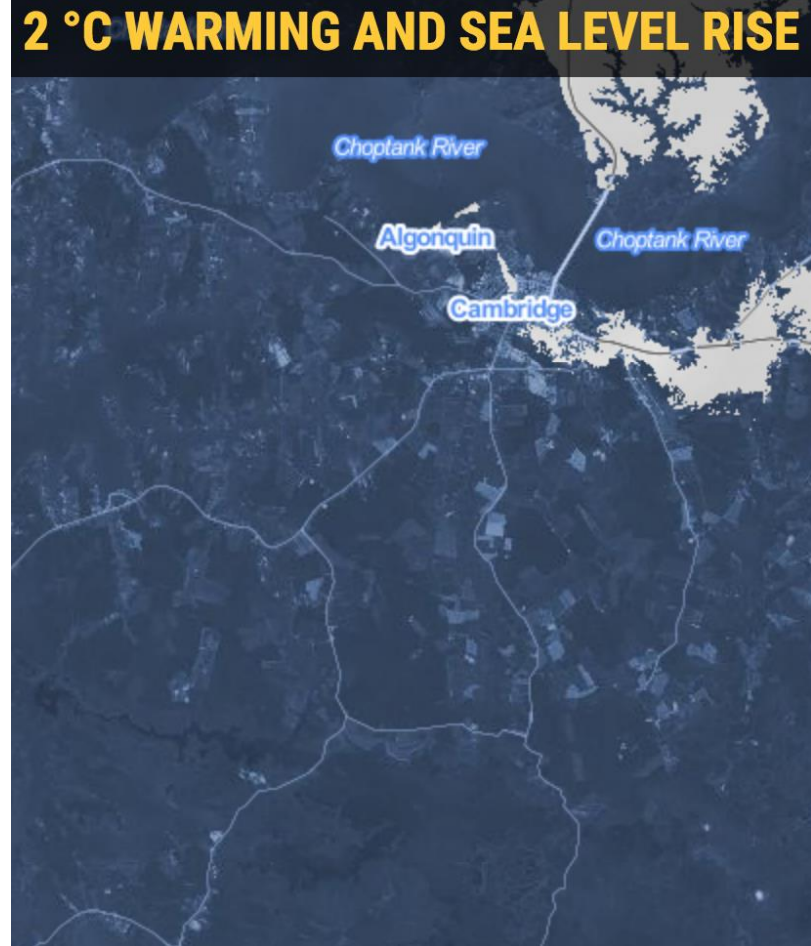


*Seemingly small increases in sea level can have large impacts along the coast due to storm surges and exceptionally high tides.*

# Sea Level Rise



Projected inundation  
around Cambridge, MD



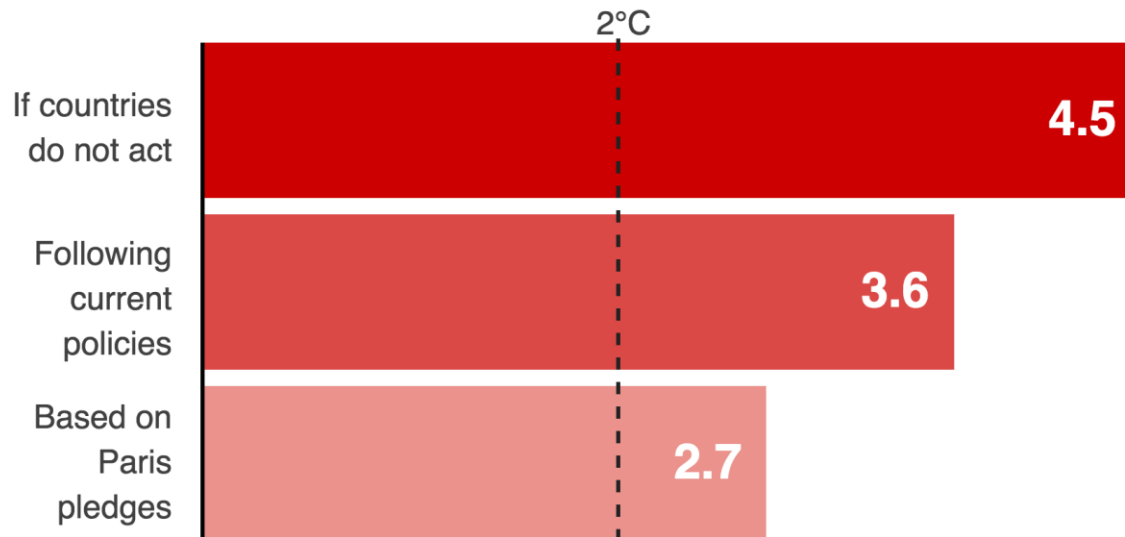
Recent studies indicate that we are  
likely to experience more than 1m  
(3.3ft) of sea level rise by 2100

Source: [Climate Central](#)

# Climate Summit in Paris [COP21]

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

**Average warming (°C) projected by 2100**



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



# Strategies and Actions

## National Climate Assessment:

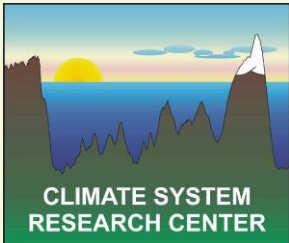
*The National Climate Assessment summarizes the impacts of climate change in the US, now and in the future.*

## **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](mailto:climate-inquiry@geo.umass.edu)

