

## How Could the Changing Climate Affect NIH Campuses?

The effects of climate change are being felt around the globe, yet climate change will likely continue to worsen for at least the next couple decades.<sup>1</sup> Once added to the atmosphere, carbon dioxide and other greenhouse gases remain there for decades to centuries, causing long-term effects well beyond their generation.<sup>2</sup> For this reason, climate change will continue to worsen until net-zero CO<sub>2</sub> emissions are met and sustained.<sup>1</sup> Projections for the maximum global warming vary greatly depending on when net-zero CO<sub>2</sub> emissions are achieved, ranging from just over 1.0 °C warming to upwards of over 2.0 °C warming (relative to the baseline established from 1850-1900).<sup>1</sup> The Intergovernmental Panel on Climate Change has emphasized the importance of limiting the maximum global warming to 1.5 °C, rather than the higher projection of 2.0 °C.<sup>1</sup>

Figure 1 illustrates pathways for how we might reach certain global warming maximums like 1.5C and 2.0C.<sup>1</sup> In general, the effects of climate change are more exaggerated at 2.0 °C versus 1.5 °C.<sup>1</sup>

However, certain parts of the country and world will be affected by some effects more than others. How will climate change effects vary across the country based on these two projections and how might it specifically affect your NIH campus?

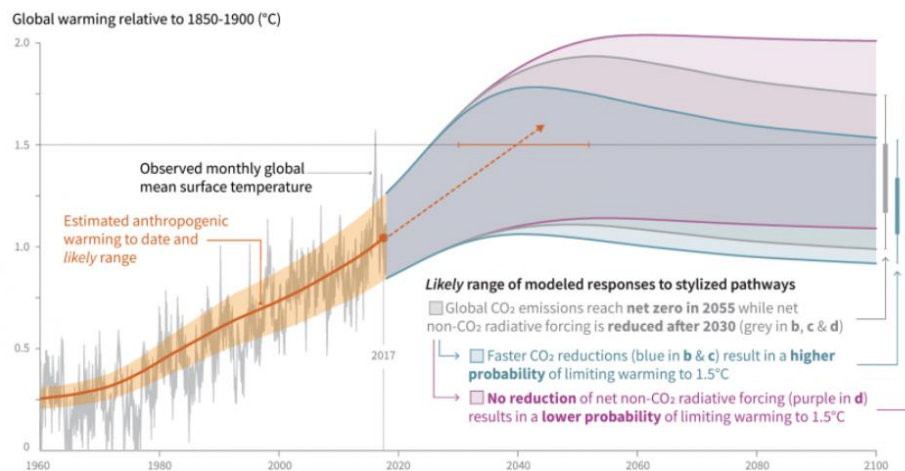


Figure 1. An illustration of various modelled pathways for reaching the maximum global warming, from the 2017 IPCC Report, Section A.<sup>1</sup>

### Rocky Mountain Labs (Montana)

- Located in the Mountain West region, the Rocky Mountain Labs campus has a much different geography and climate compared to the other NIH locations. In particular, extreme hot days will increase by about 3 °C with 1.5 °C global warming, compared to about 4 °C warmer with 2.0 °C global warming.<sup>1</sup>
- The shift to a warmer climate will lead to an increased growing season.<sup>3</sup> This will require more water and will likely lead to water scarcity, especially for the 2.0 °C warming scenario.<sup>1</sup>
- Global warming will lead to a change in ecosystems, particularly the nearby boreal (snow) forests. A maximum global warming of 1.5 °C would lead to a loss of 1.5 million km<sup>2</sup> of boreal forests, compared to the 2.0 °C scenario that would create a loss of 2.5 million km<sup>2</sup>.<sup>1</sup>
- Snowpack on the mountains in Montana are already estimated to melt 1-2 weeks early due to 1.0 °C of global warming.<sup>4</sup> This situation will continue to worsen with increased global warming.

### Research Triangle Park (North Carolina)

- Situated in the Southeast region, the Research Triangle Park campus is most likely to struggle with extreme heat and drought.<sup>5</sup>
- Raleigh, NC recently set a new record for days in a year over 90 °F, with 91 days in 2019.<sup>6</sup> This is well above the average number of days per year over 90 °F, which is 48 days.<sup>6</sup> This type of extreme weather can be expected to worsen along with climate change, especially in the 2.0 °C maximum global warming scenario.
- Increased global warming will also cause more frequent and more intense droughts, particularly in the 2.0 °C global warming scenario.<sup>1</sup>

### Bayview (Baltimore)

- The Bayview campus in Baltimore, MD is located only a mile or so from the Baltimore Harbor. This location is likely to experience the climate change effects most closely related to the ocean and other large bodies of water.
- A maximum global warming of 1.5 °C is predicted to cause the sea level to rise between 0.26m and 0.77m by 2100 (sea levels will continue to rise after the maximum global warming is achieved).<sup>1</sup> If the maximum global warming reaches 2.0 °C, then an additional sea level rise of 0.1m is expected over the 1.5 °C scenario.<sup>1</sup> This additional rise, although seemingly small, would affect an additional 10 million people.<sup>1</sup>
- This area is also likely to suffer from increased water temperature, increased water acidity, and decreased dissolved oxygen levels that will change the aquatic climate and make it difficult for aquatic species to survive.<sup>1</sup>

### Bethesda (and other D.C.-area locations)

- The Bethesda campus and other locations in the D.C. area are likely to experience situations similar to the Bayview and RTP campuses. In particular, extreme heat and extended droughts are likely to combine with intense weather events to cause severe strain on the infrastructure of this area.<sup>1</sup>
- A complicating factor of being located in a highly-populated area is the amplifying effect of urban heat islands, which is likely to increase the extreme heatwaves in this area.<sup>1</sup> This will likely lead to higher heat-related mortality and ozone-related mortality.<sup>1</sup>

Achieving the goal of limiting global warming to 1.5 °C will require significant CO<sub>2</sub> reductions in the next decade and net-zero CO<sub>2</sub> emissions by 2055. This is mirrored by new Executive Orders, like [E.O. 14008](#) (Tackling the Climate at Home and Abroad), which calls for carbon pollution-free electricity sectors for the Federal Government by 2035 and net-zero emissions for the U.S. by 2050. Achieving these goals would significantly reduce the impacts of climate change over the next century.