

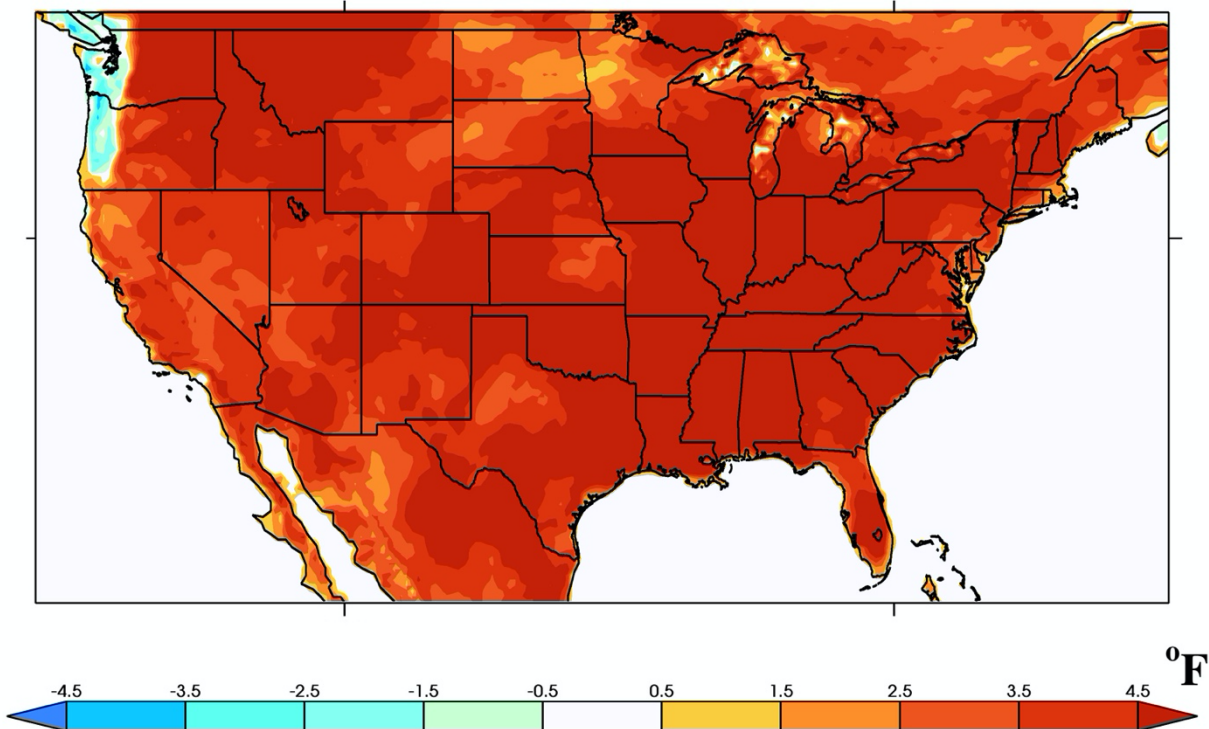
## **The effect of anthropogenic climate change on heat waves in the United States.**

Michael Wehner

The human influence on extreme heat waves is clear (Min et al. 2013; Zwiers et al. 2011).

The unusually hot temperatures in the western United States in the summer of 2021 are a case in point. Below is an attribution statement about how climate change has currently affected the US heat waves as well as some projections of how much climate change will further increase their severity. These statements are based on previously published papers.

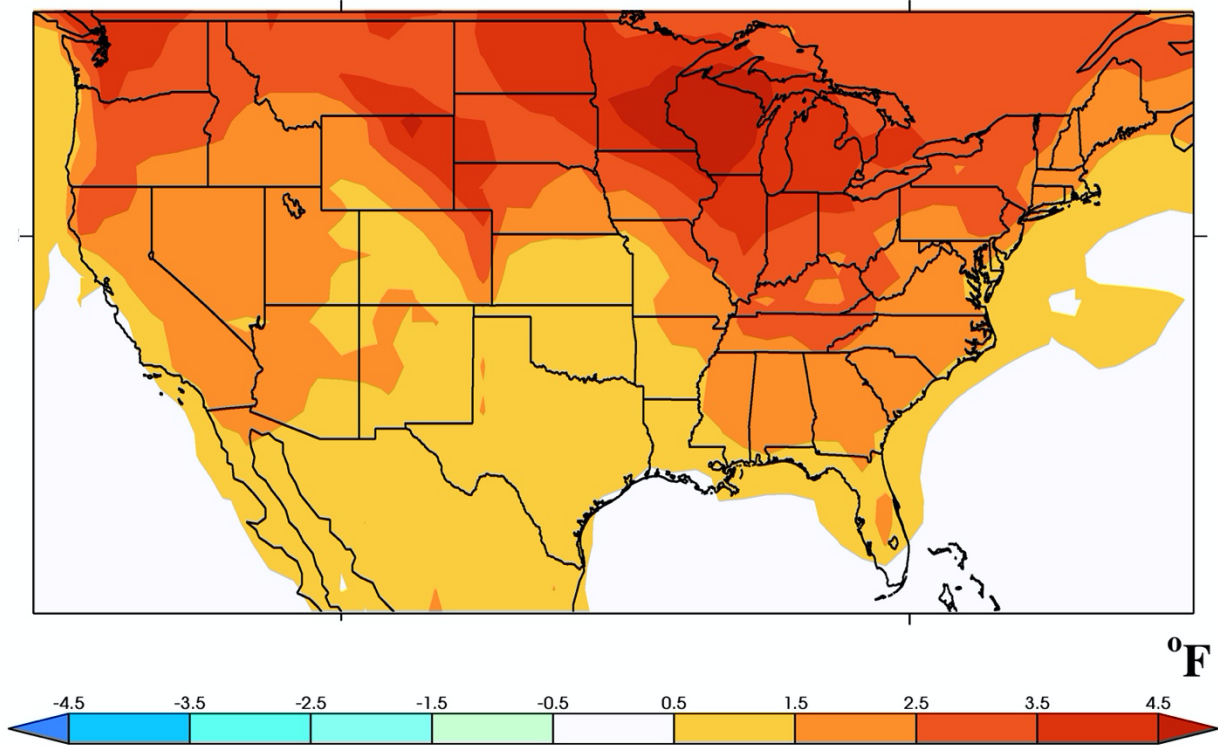
### **Attributable human temperature increase in rare heat waves**



Currently, climate change has caused rare heat waves to be 3 to 5 degrees warmer over most of the United States (adapted from Wehner et al 2018 using the high resolution version of CAM5.1 described in Wehner et al. 2014)

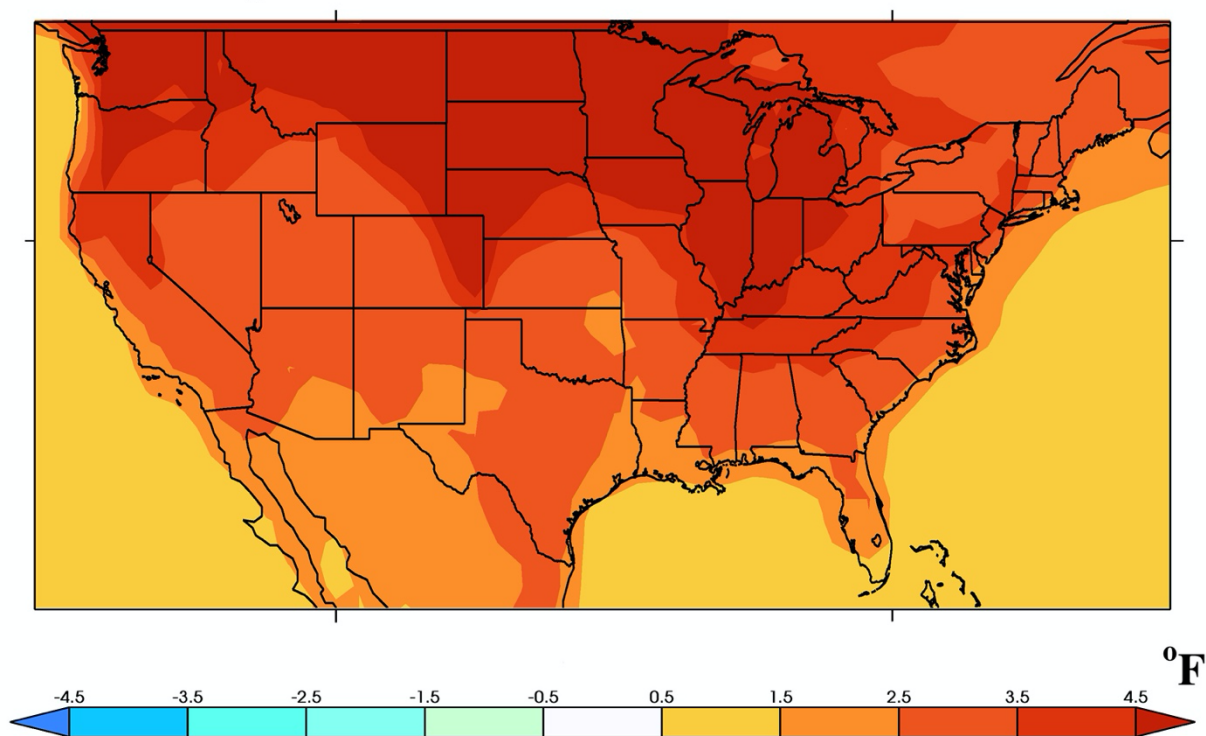
Heat waves will continue to get hotter in the future. Taken directly from Tebaldi and Wehner 2018:

### **Projected change in rare heat wave temperatures at 2050 under a low emissions scenario**



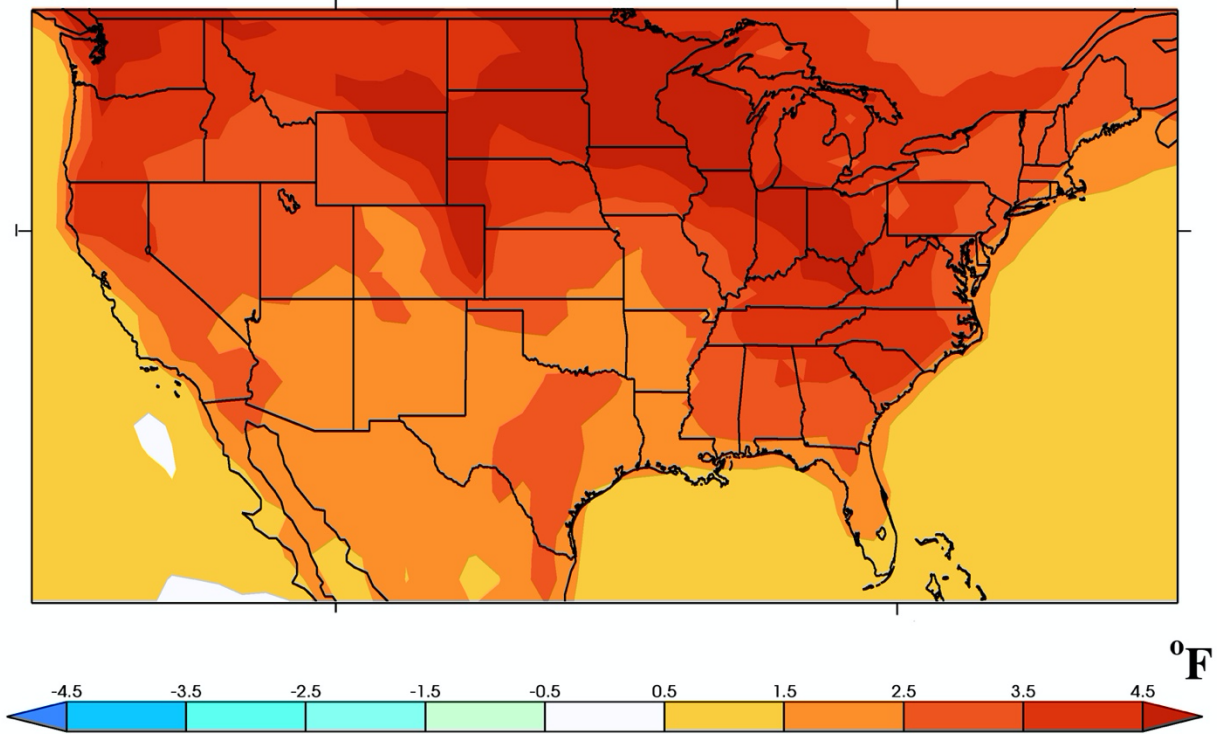
Under the lower emissions scenario, US heat waves would be about 1-3 degrees Fahrenheit warmer than now at mid-century (2050).

## Projected change in rare heat wave temperatures at 2050 under a high emissions scenario



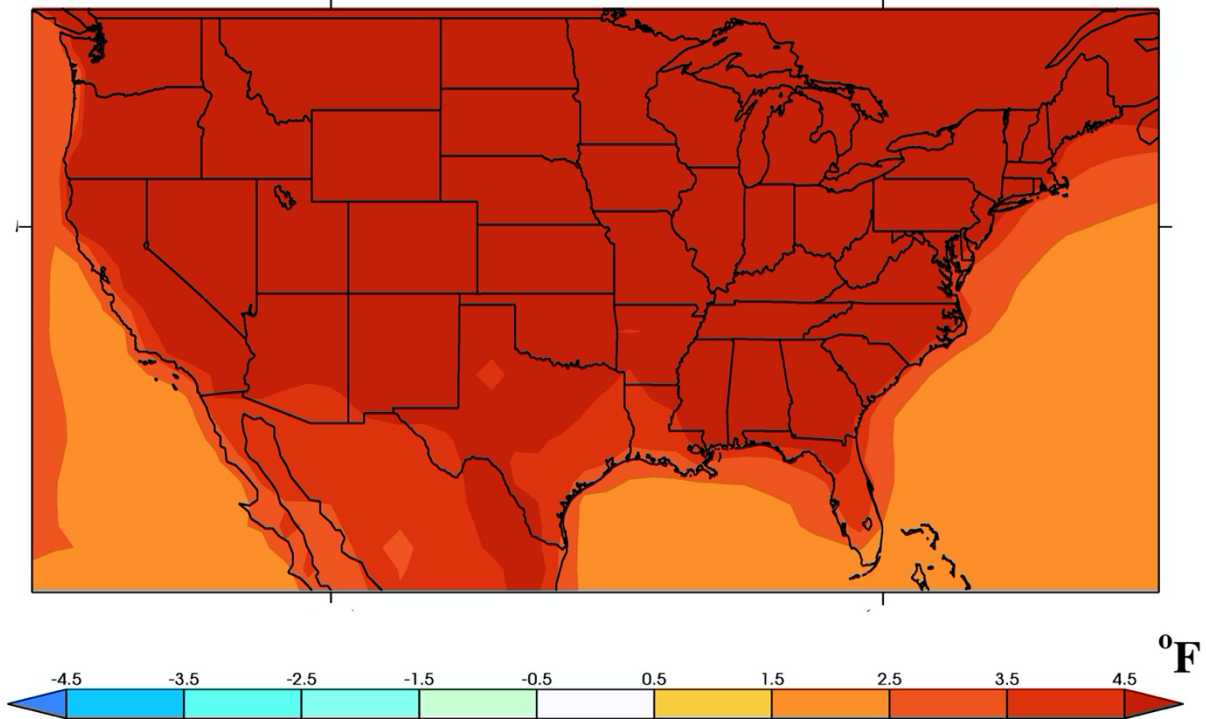
Under the higher emissions scenario, US heat waves would be about 3-5 degrees Fahrenheit warmer at mid-century (2050).

## Projected change in rare heat wave temperatures at 2080 under a low emissions scenario



Under the lower emissions scenario, US heat waves would be also be about 3-5 degrees Fahrenheit warmer than now at late-century (2080).

## Projected change in rare heat wave temperatures at 2080 under a high emissions scenario



Under the higher emissions scenario, US heat waves would be also be more than 5 degrees Fahrenheit warmer than now at late-century (2080).

## References:

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Zwiers, F. W., X. Zhang, and Y. Feng, 2011: Anthropogenic Influence on Long Return Period Daily Temperature Extremes at Regional Scales. *J. Climate*, **24**, 881–892, <https://doi.org/10.1175/2010JCLI3908.1>.

*These statements are my own scientific opinion and do not necessarily reflect the positions of the Lawrence Berkeley National Laboratory, the University of California nor the US Department of Energy.*

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