

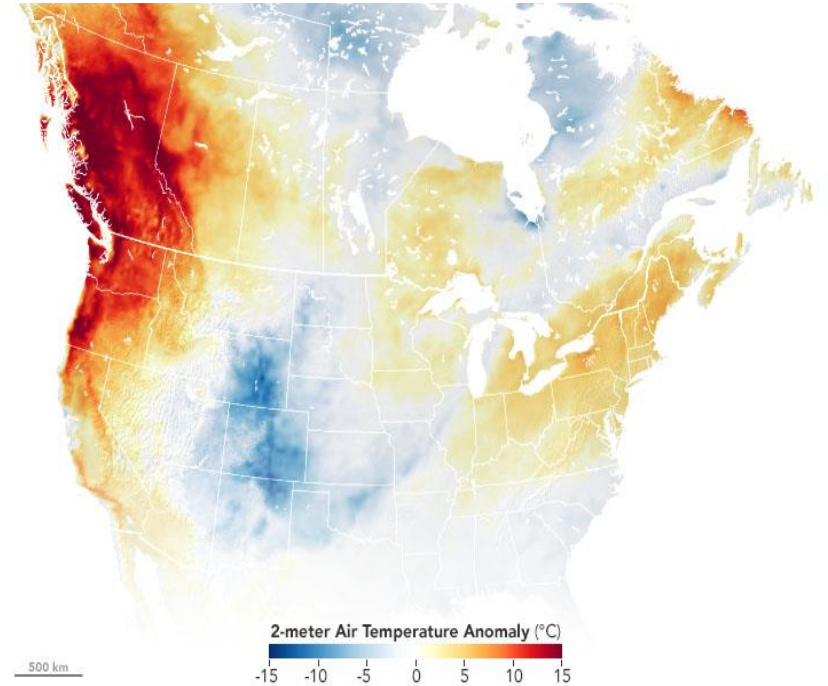
# NORTH AMERICAN HEATWAVES NOW AND IN THE FUTURE

BY

DR. STEVEN CRIMP



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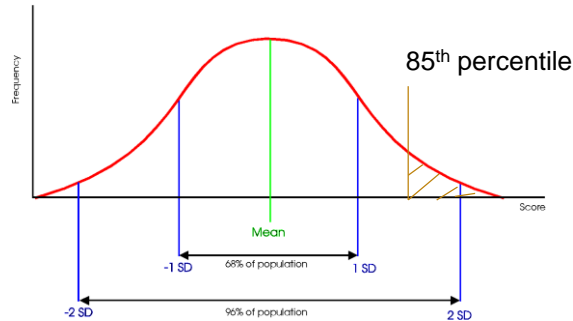


June 27, 2021, compared to 2014-2020 baseline

# Defining a Heatwave

- A heat wave is defined (*although some geographic variation*) as a period of two or more consecutive days where the daily maximum and minimum temperatures exceed the long-term 85th percentile.

The Normal Distribution Curve



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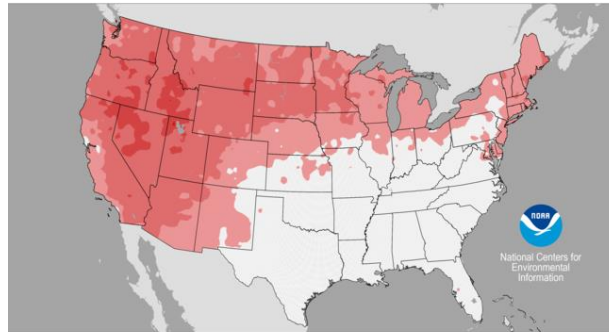


# The Recent North American Heatwave (Associated Facts And Figures)

- **Globally** – Sixth Warmest May and fifth warmest June in 142 years.
- **North America** - Coldest May since 2011 but hottest June on record (1.2°C warmer than 1991 to 2020 average, 2.3°C above the LTA).
- Some locations recorded June temperature departures of 16°F (9 to 10°C) above the LTA.
- At least four large scale heatwaves occurred across NA from 19 May till July 7, culminating in the extended heatwave from 26 June till July 7.
- New all-time maximum temperature records were set for a number of locations across the northwest on June 27 and 28, with new all-time state temperature records set for Oregon and Washington.



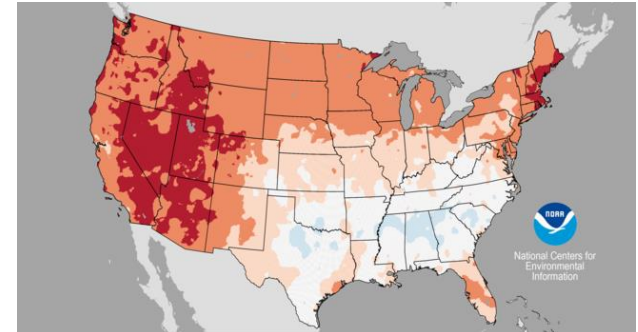
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Created: Wed Jul 07 2021

Degrees Fahrenheit

Data Source: nClimGrid



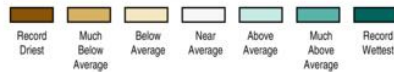
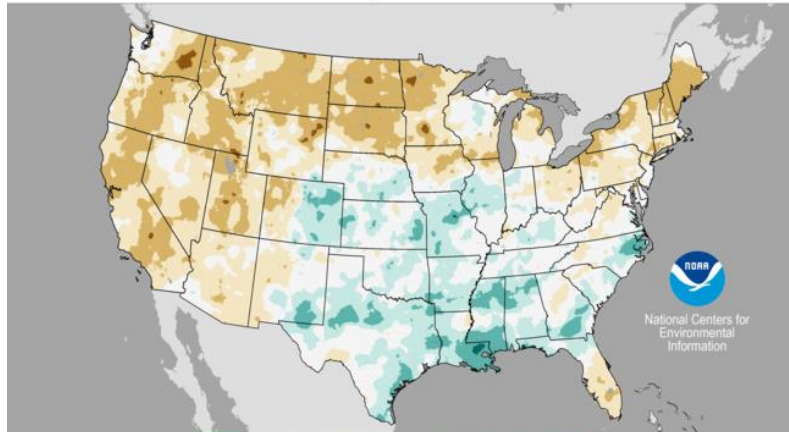
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# Other Contributing Factors

- The extreme heat wave occurred over parts the country experiencing extreme drought.
- Over 20% of the country is in the worst two categories of drought

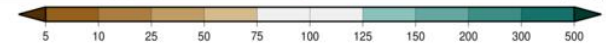
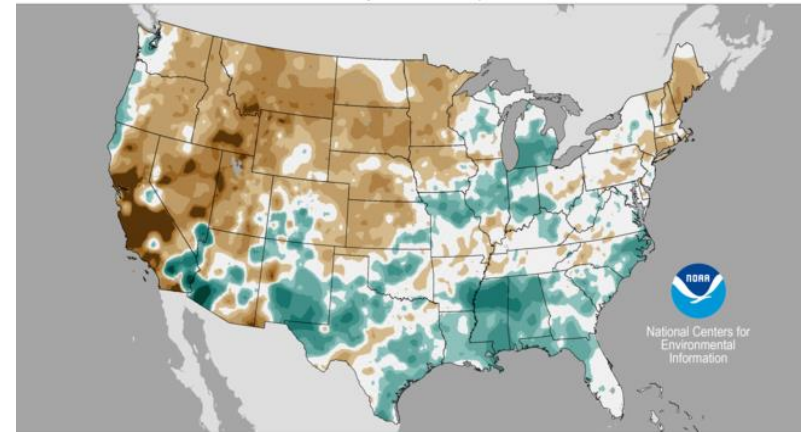
Total Precipitation Percentiles  
January–June 2021  
Ranking Period: 1895–2021



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Precipitation Percent of Average  
June 2021  
Average Period: 20<sup>th</sup> Century



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Percent

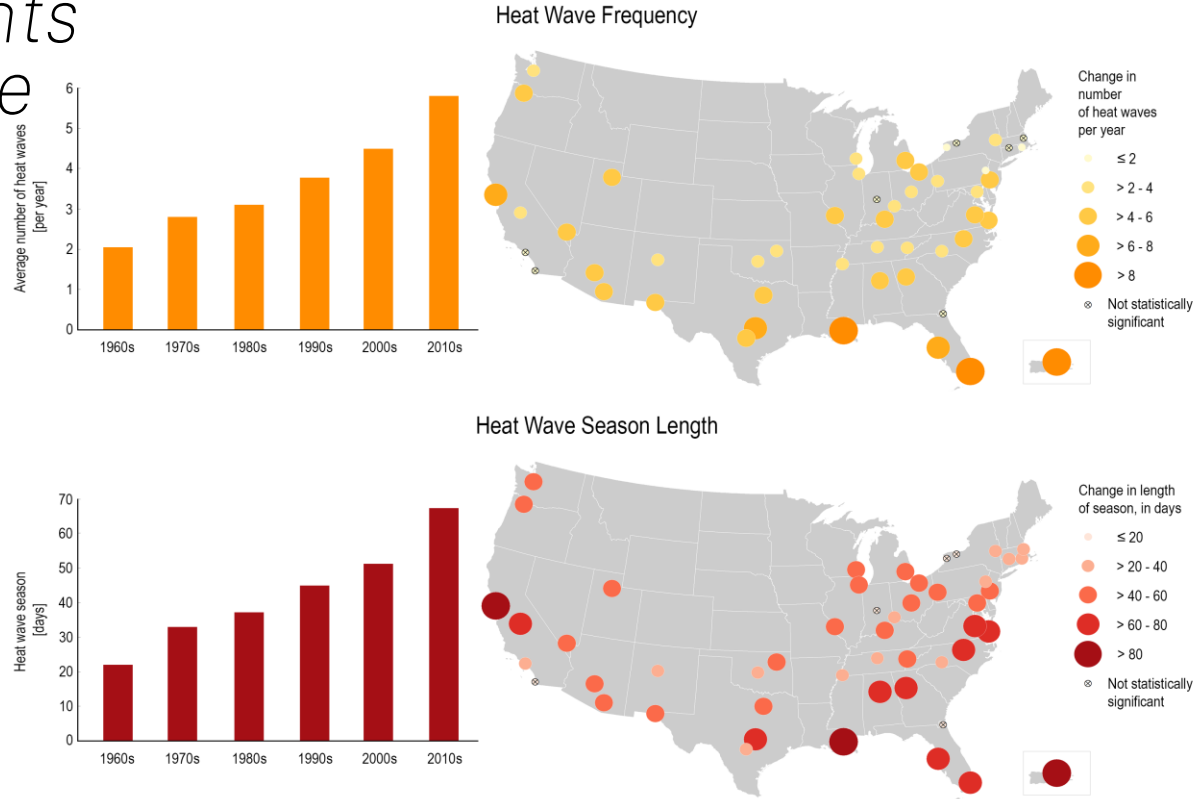
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# *Planetary Waves, Blocking and Heat Domes*

*Observed trends provide insights into the future*

### Heat Wave Characteristics in 50 Large U.S. Cities, 1961-2017



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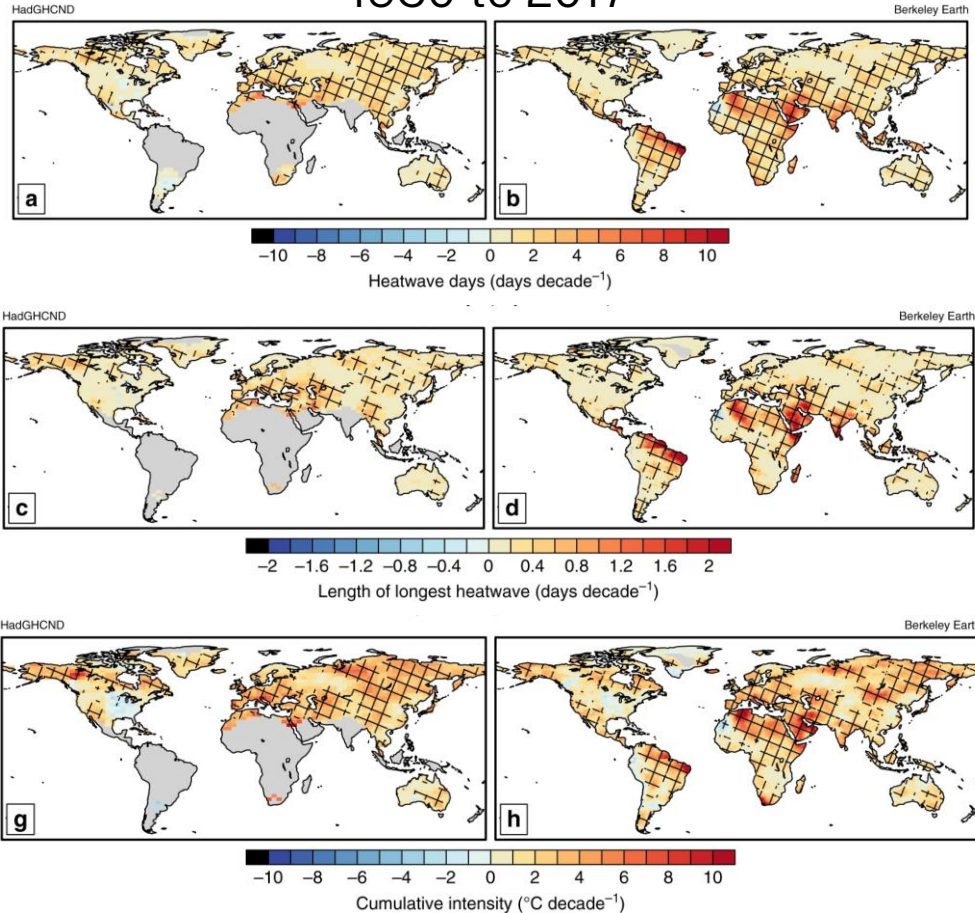
The average heat wave season across 50 major cities is now 45 days longer than it was in the 1960s.

*Observed trends show global change in heatwave characteristics*



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1950 to 2017



Perkins Kirkpatrick and Lewis 2020 - Nature

# Attribution studies provide further insights

- 132 attribution studies have been undertaken worldwide examining the climate change signal on extreme heatwave events.
- 122 (92%) found that climate change had made such an event more likely or more severe.
- No studies found a heatwave had been made less severe by climate change, while two studies (2%) identified no influence a further eight (6%) were inconclusive.
- For this most recent event one study suggests that climate change made the heatwave at least 150 times more likely.



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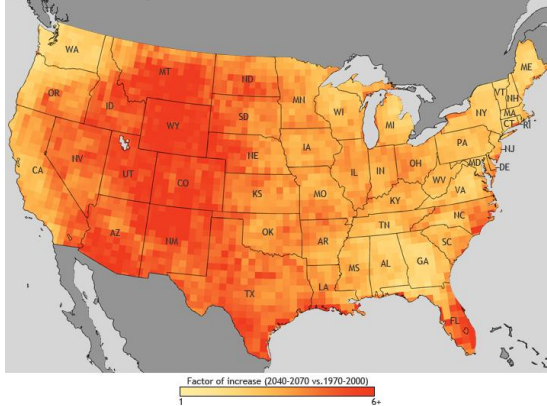




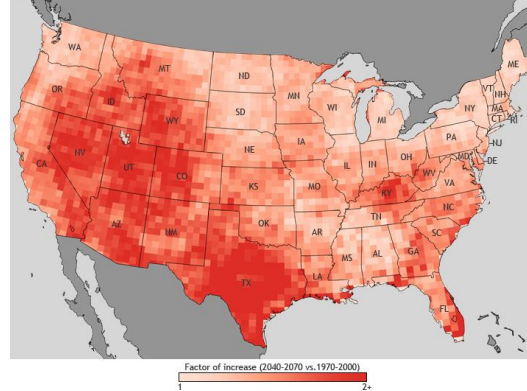
# Future Heatwaves

- *Within the next 30-60 years, the number of days U.S. heatwaves could increase by a factor of 1.2 to nearly 2 times in comparison to similar events occurring between 1970-2000.*
- *When the two characteristics of extreme heat (duration and frequency) were combined, the number of heat wave days per summer could increase by four- to five-fold in many western mountain states and Texas.*

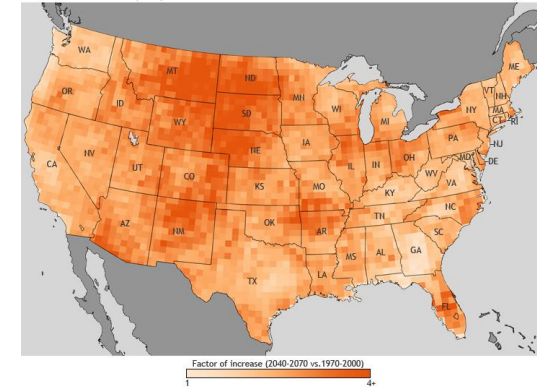
Increase in total heatwave days



Increase in heatwave duration



Increase in heatwave frequency



# THANK YOU

## Contact Us

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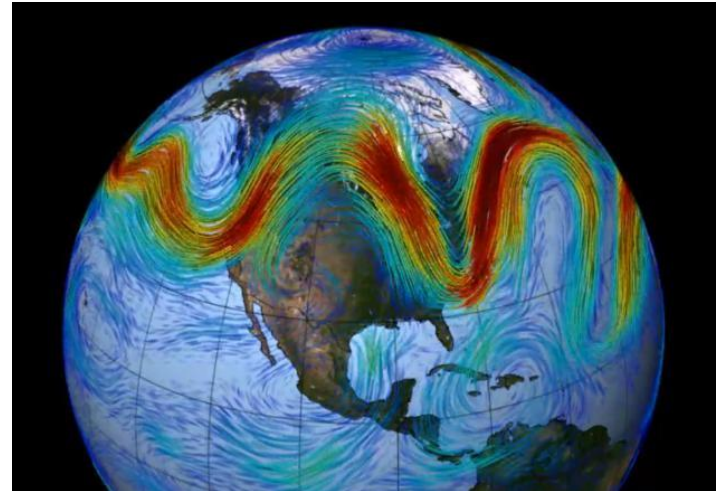
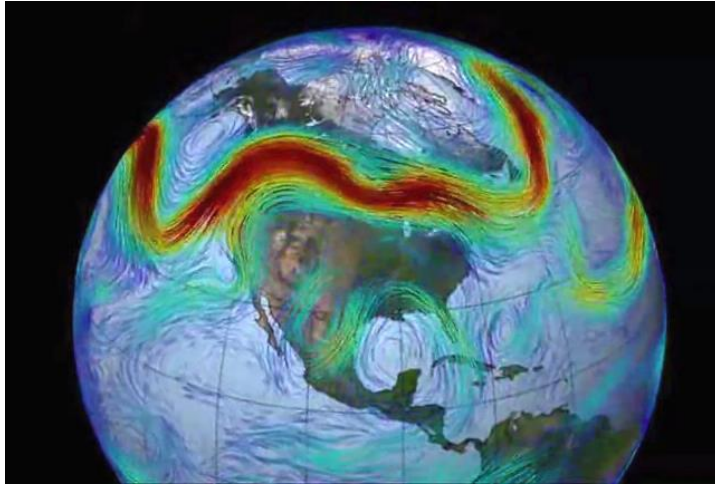
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# *Planetary Waves, Blocking and Heat Domes*



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