

# Storm Clouds Over the Heartland: Changes to Midwest Weather



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# Adult Education Principles Apply Today

## 14% of Americans say there is no solid evidence that climate change is happening

*% of U.S. adults who say the following*



Note: Respondents who did not give an answer are not shown.

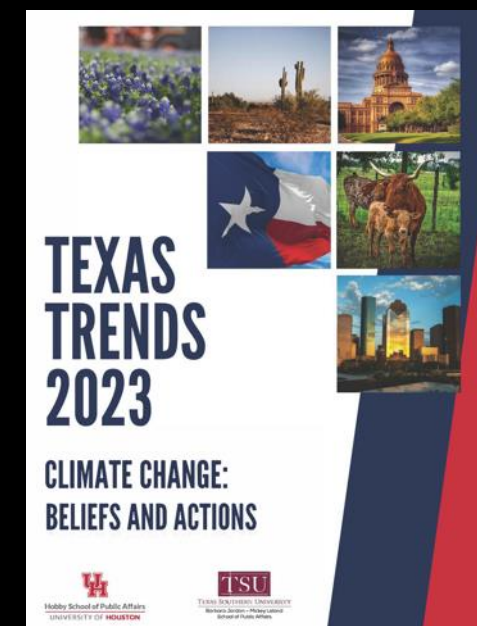
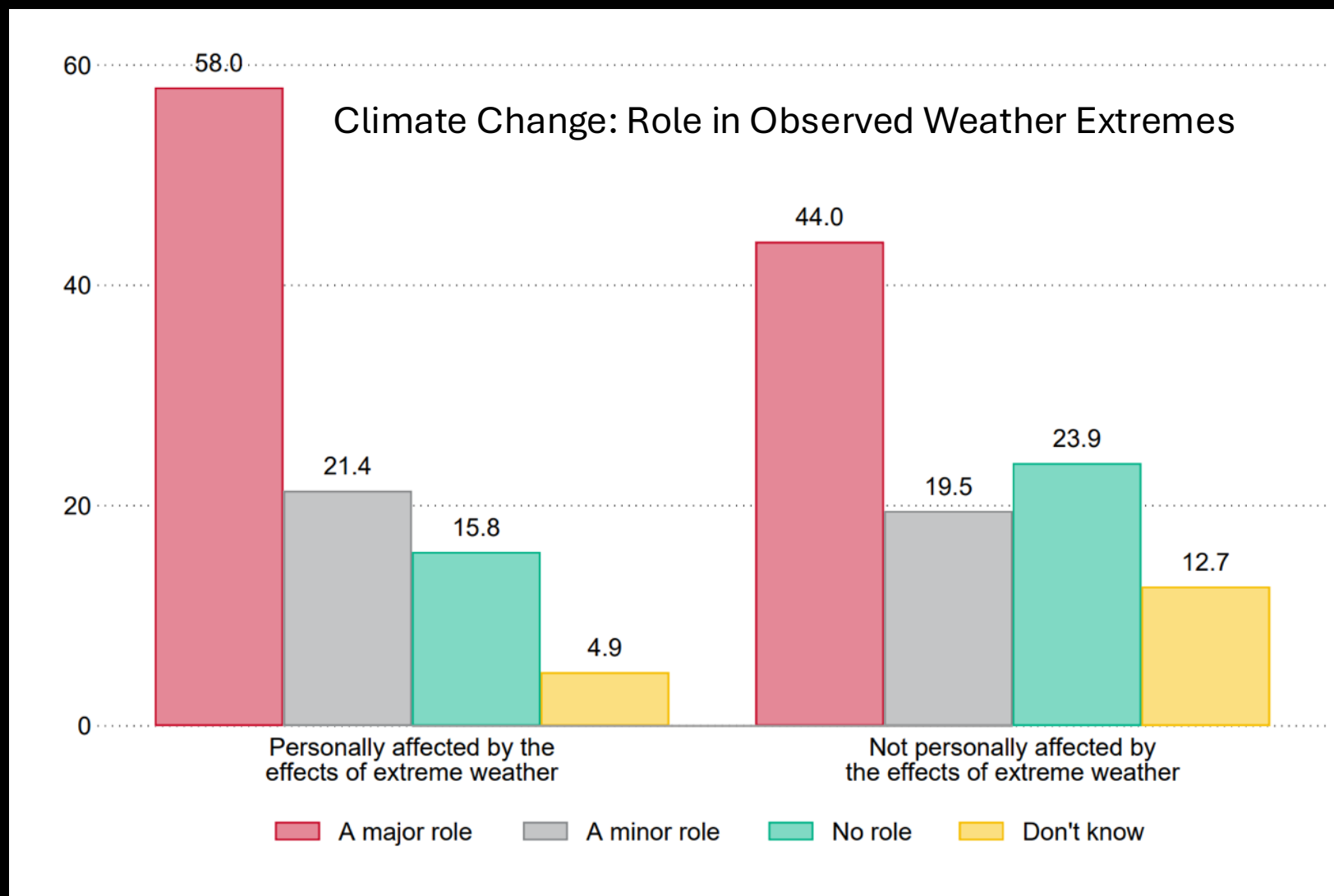
Source: Surveys of U.S. adults conducted May 30-June 4, 2023 and Jan. 18-24, 2023.

"Why Some Americans Do Not See Urgency on Climate Change"

PEW RESEARCH CENTER



# Turns out? It's Personal



## U.S. Billion-Dollar Disaster Event Types by Year

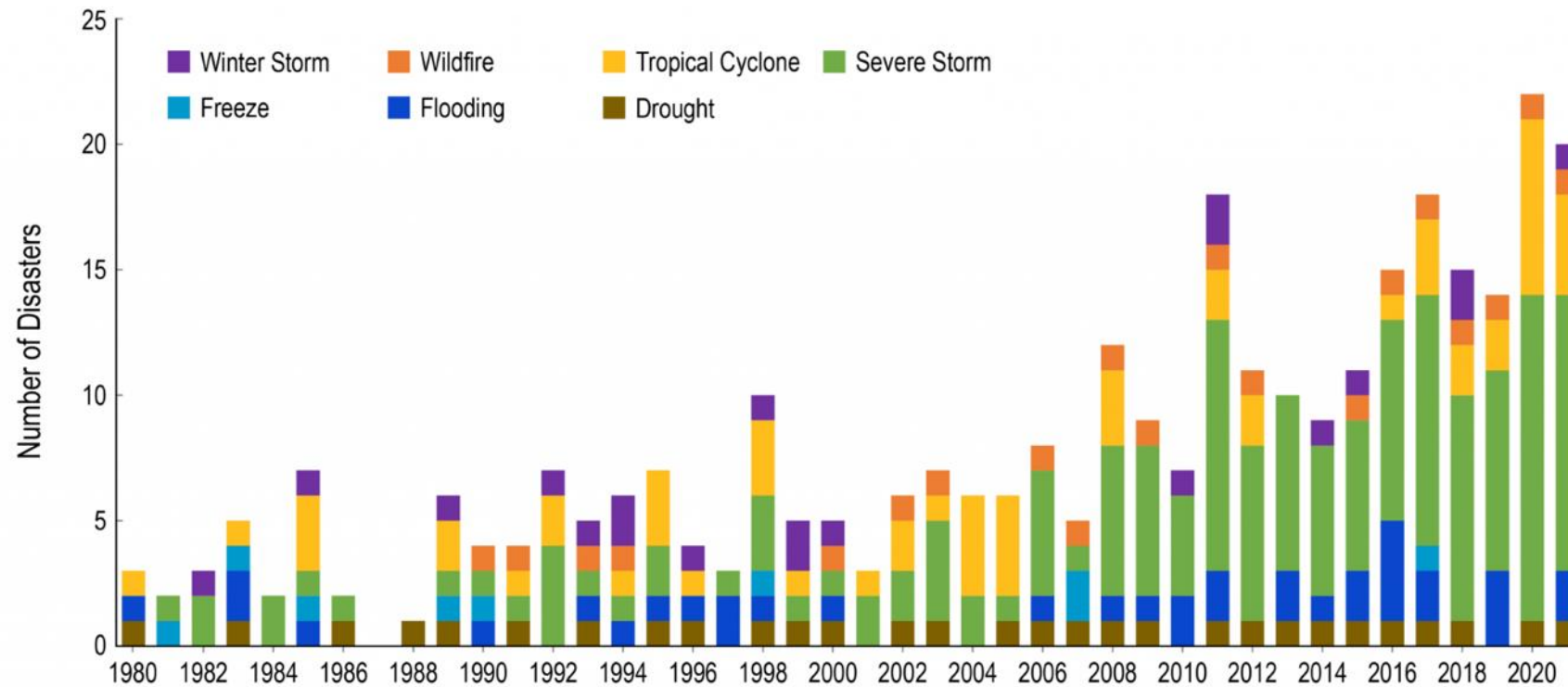
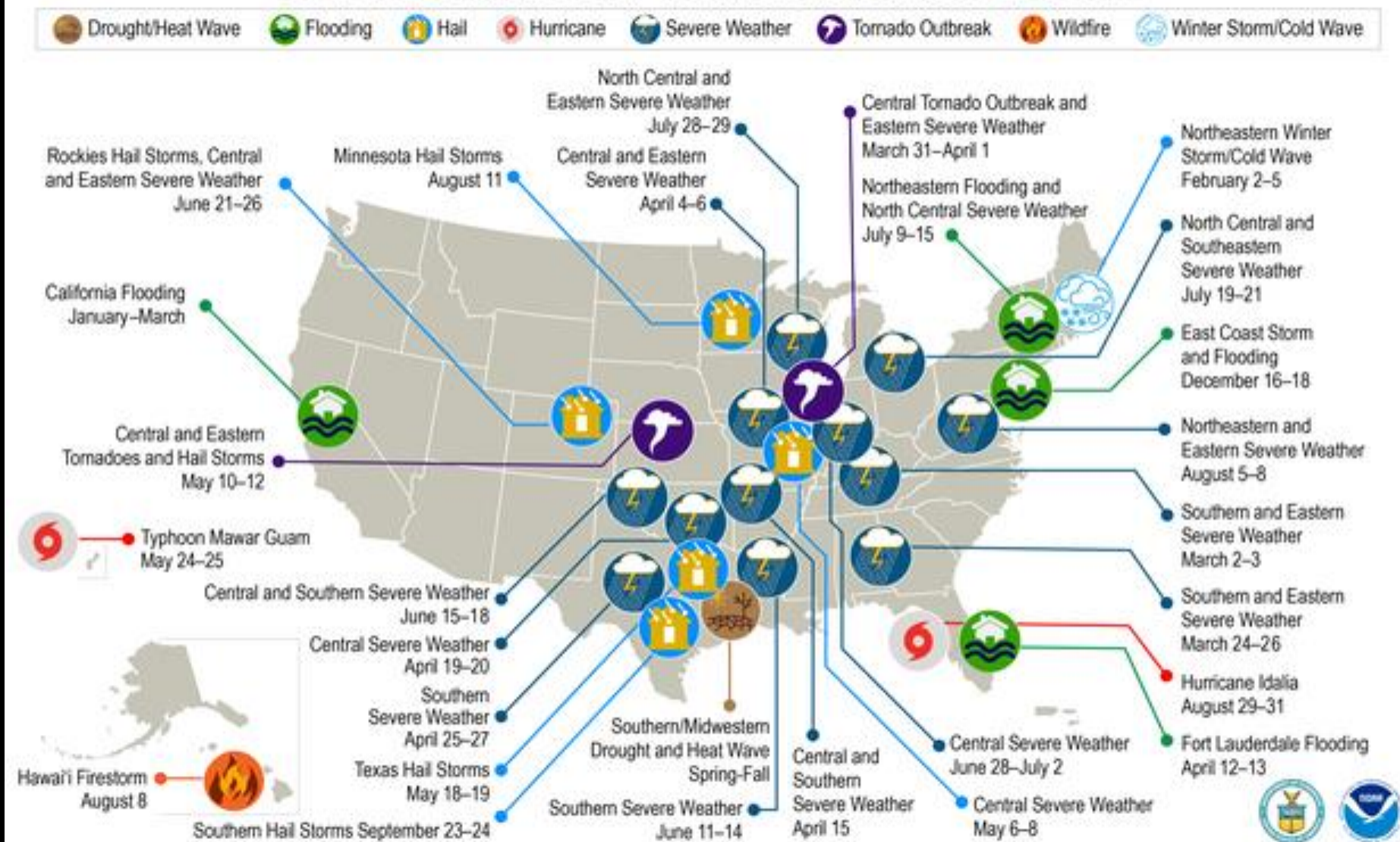


Figure 1: The Billion-Dollar Disasters indicator shows the number of individual climate and weather events that caused more than one billion dollars of direct losses each year. The length of each bar corresponds to the annual number of events. These events are binned into seven hazard types, each represented by its own color. Source: [USGCRP](#).





# U.S. 2023 Billion-Dollar Weather and Climate Disasters

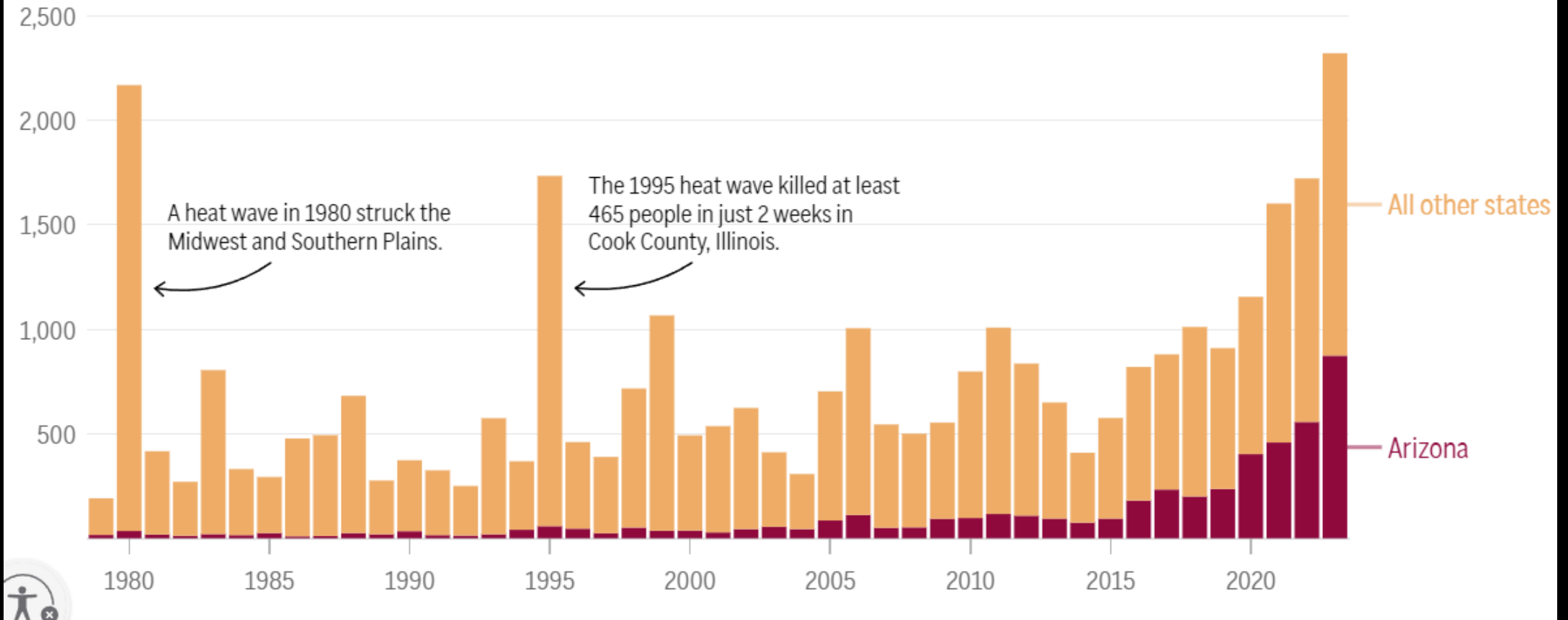


This map denotes the approximate location for each of the 28 separate billion-dollar weather and climate disasters that impacted the United States in 2023.

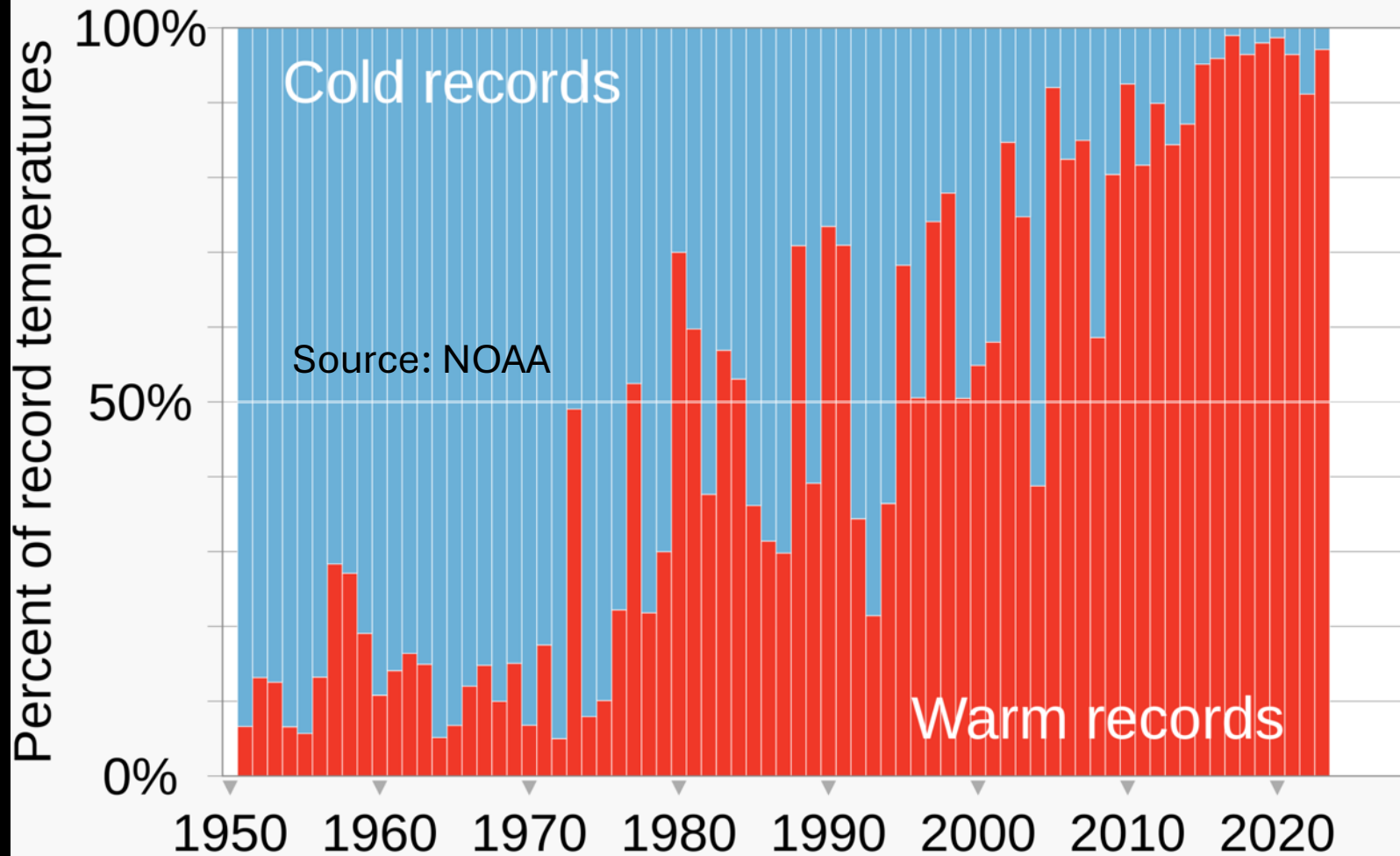


# Heat-related deaths in the US reached new high in 2023

A heat wave in July of last year contributed to a higher recorded death toll in 2023 — about 2,300 people in total — than historic heat waves in 1980 and 1995.



## Increase in warm temperature records





**Might we find some answers? In a pancake?**

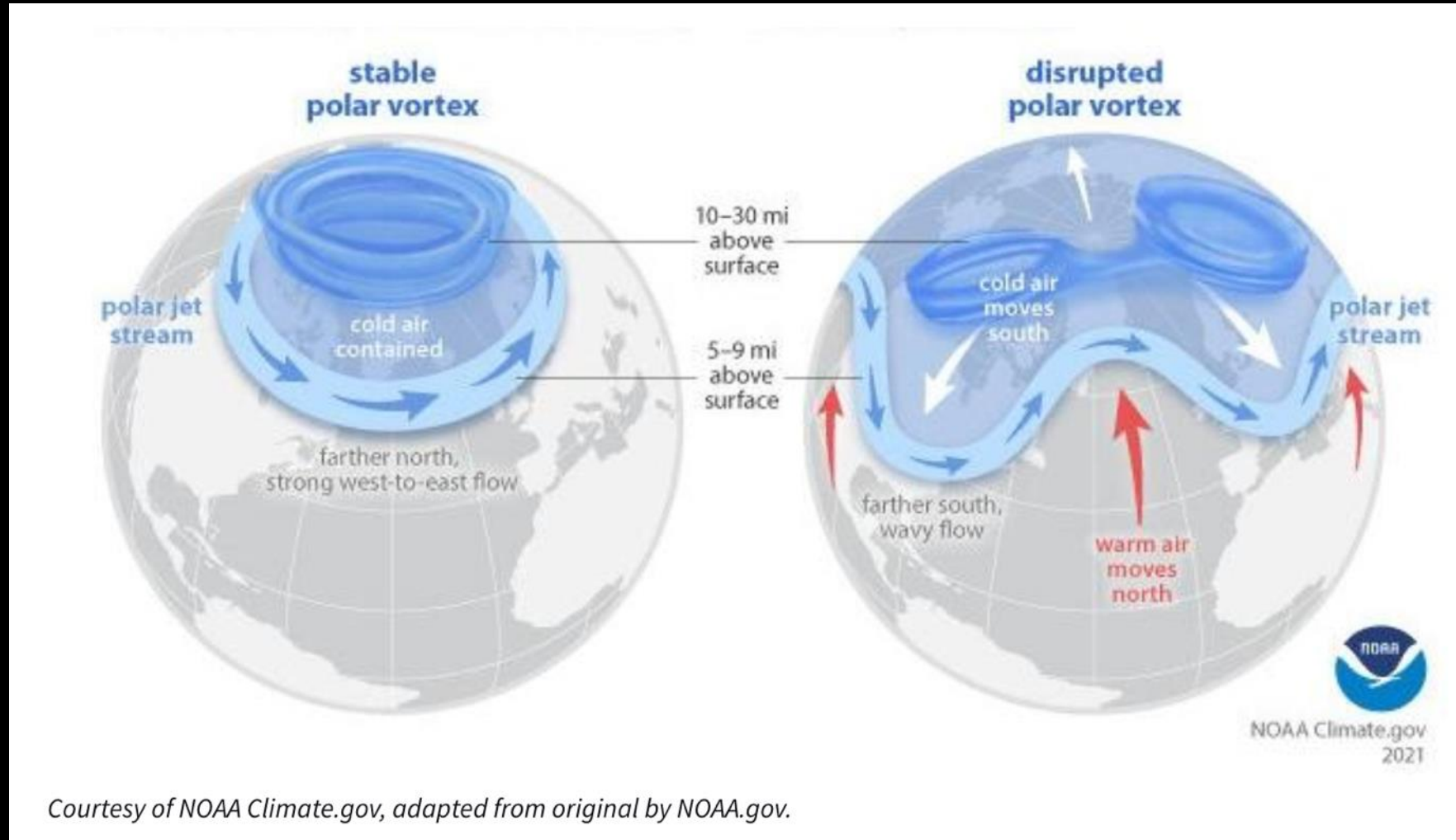




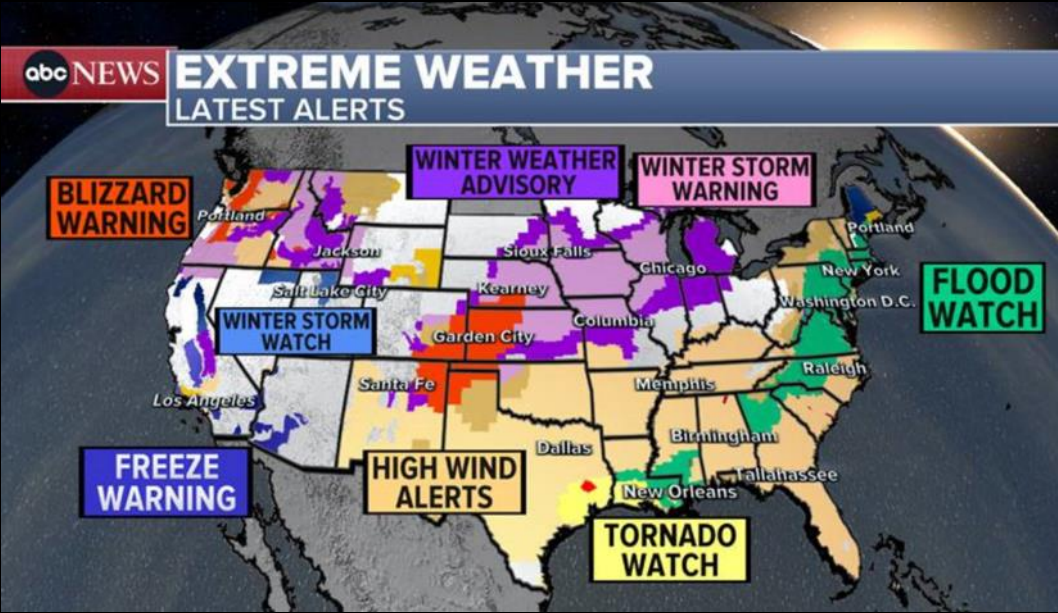
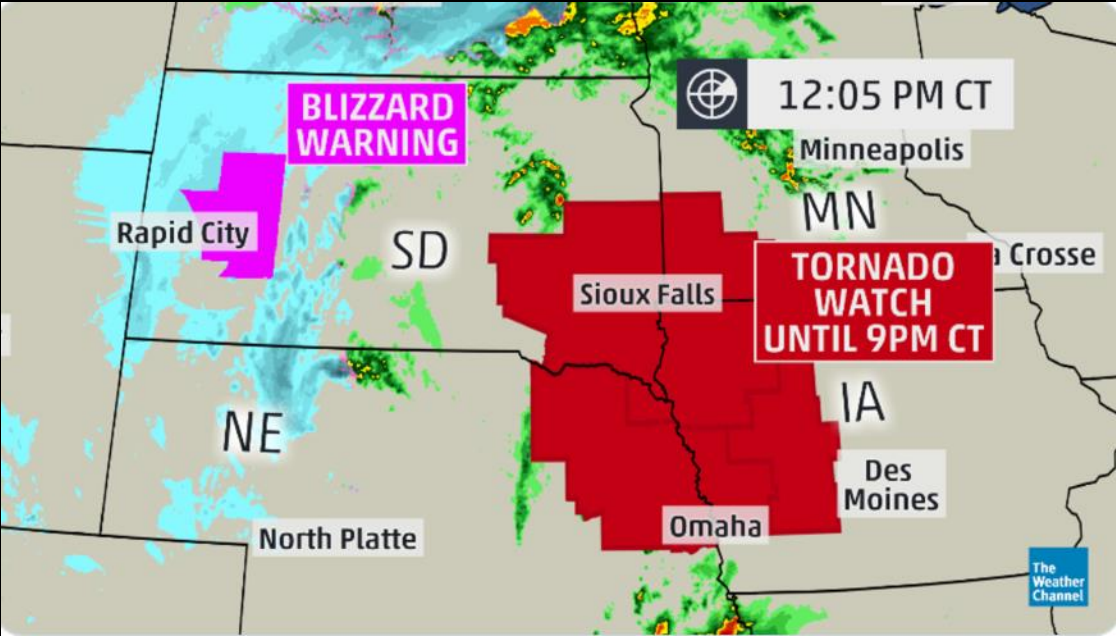




# Remember that MUCH of the weather impacting the US originates elsewhere!

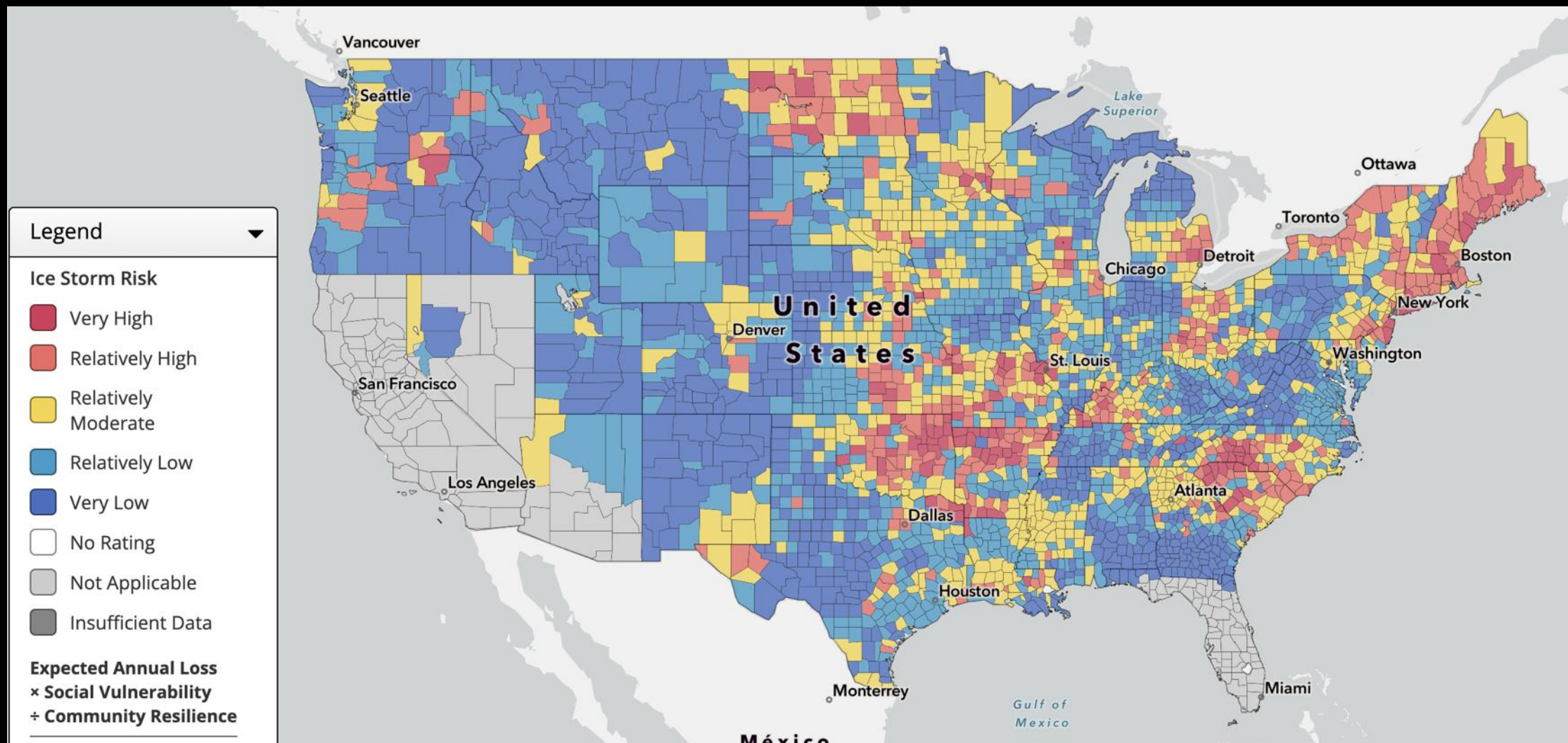


# Increased Weather Volatility/Extremes





# Warming.... Leads to More Ice Storms?





# Warming... leads to Deep Freeze? (butter on pancakes!)

Bloomberg Green

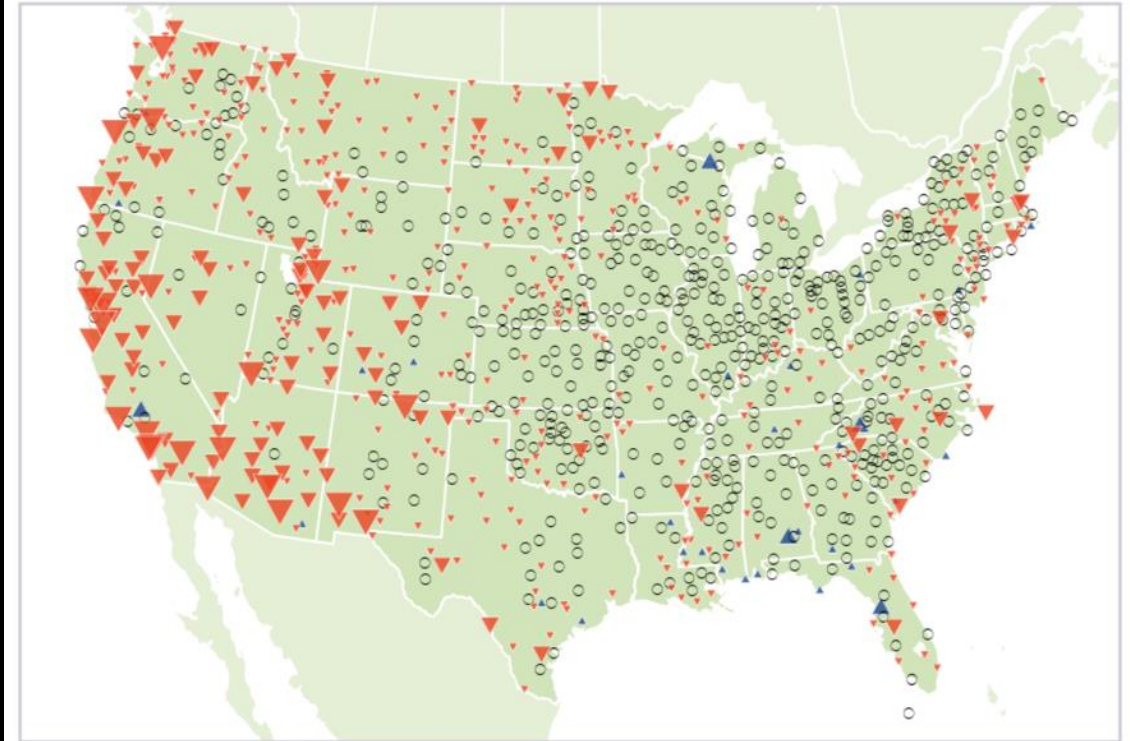
Climate Adaptation

## How the Warming Arctic Helped Drive a Deep Freeze Into Texas

The sub-zero temperatures causing blackouts across the southern U.S. are connected to climate change.

By Brian K. Sullivan  
February 16, 2021, 11:10 AM PST

Change in Unusually Cold Temperatures in the Contiguous 48 States, 1948–2015

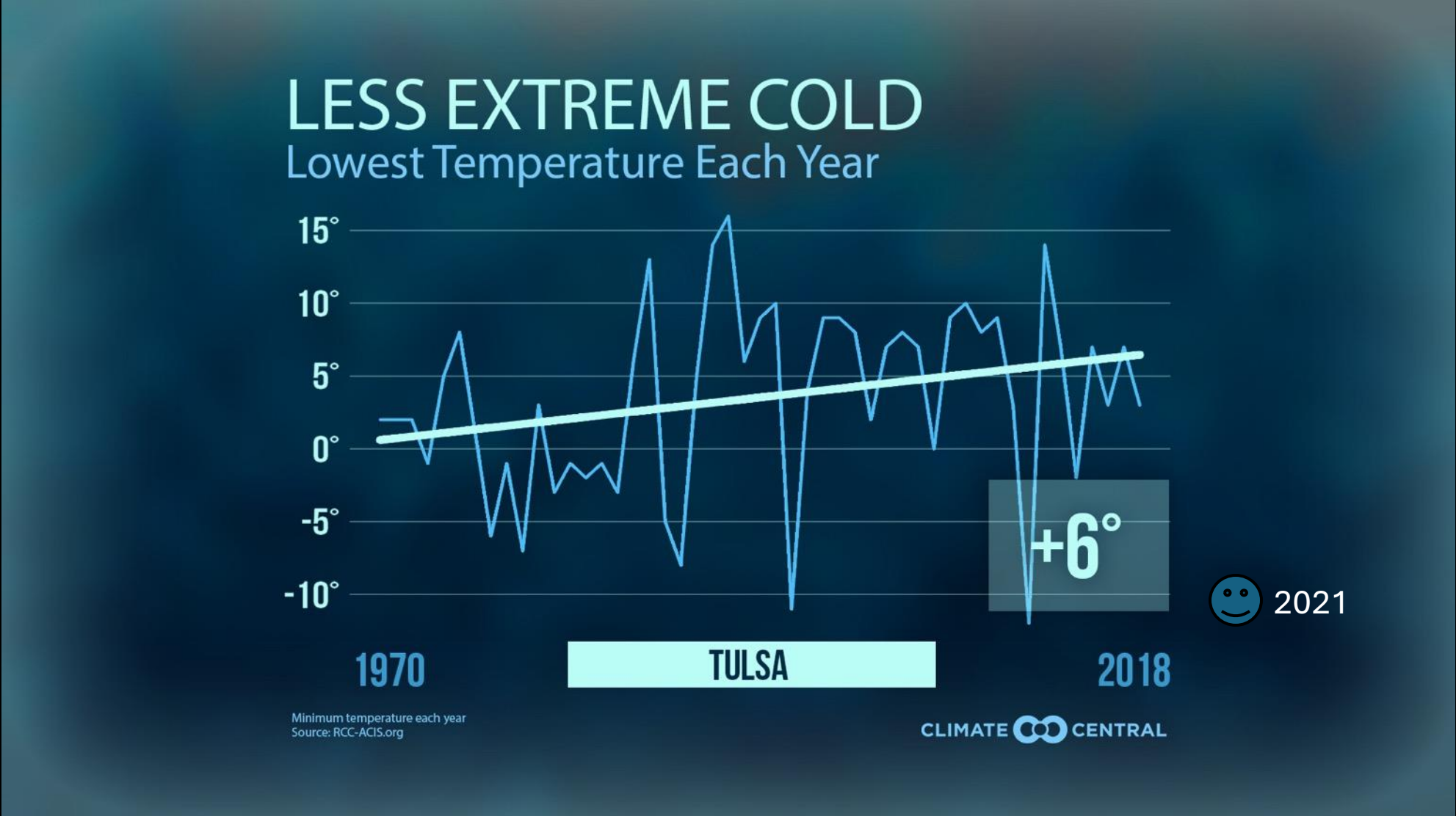


Data source: NOAA (National Oceanic and Atmospheric Administration). 2016. National Centers for Environmental Information. Accessed May 2016. [www.ncdc.noaa.gov](http://www.ncdc.noaa.gov).

For more information, visit U.S. EPA's "Climate Change Indicators in the United States" at [www.epa.gov/climate-indicators](http://www.epa.gov/climate-indicators).



But we **MUST** be more careful with the data! Look beyond the averages!!!



## We tend to remember Santayana

**“THOSE WHO CANNOT  
REMEMBER THE PAST  
ARE CONDEMNED  
TO REPEAT IT”**

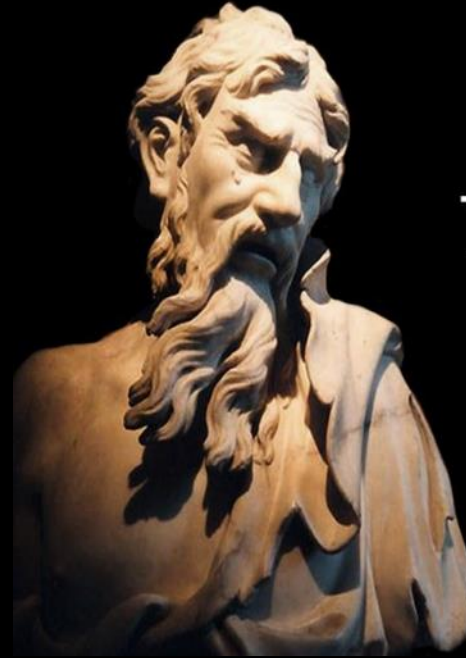
-George Santayana-



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-George Santayana-



There is nothing **permanent**  
except **change**.

- Heraclitus

But forget Heraclitus







Statistical thinking will  
one day be as  
necessary for efficient  
citizenship as the  
ability to read and  
write.

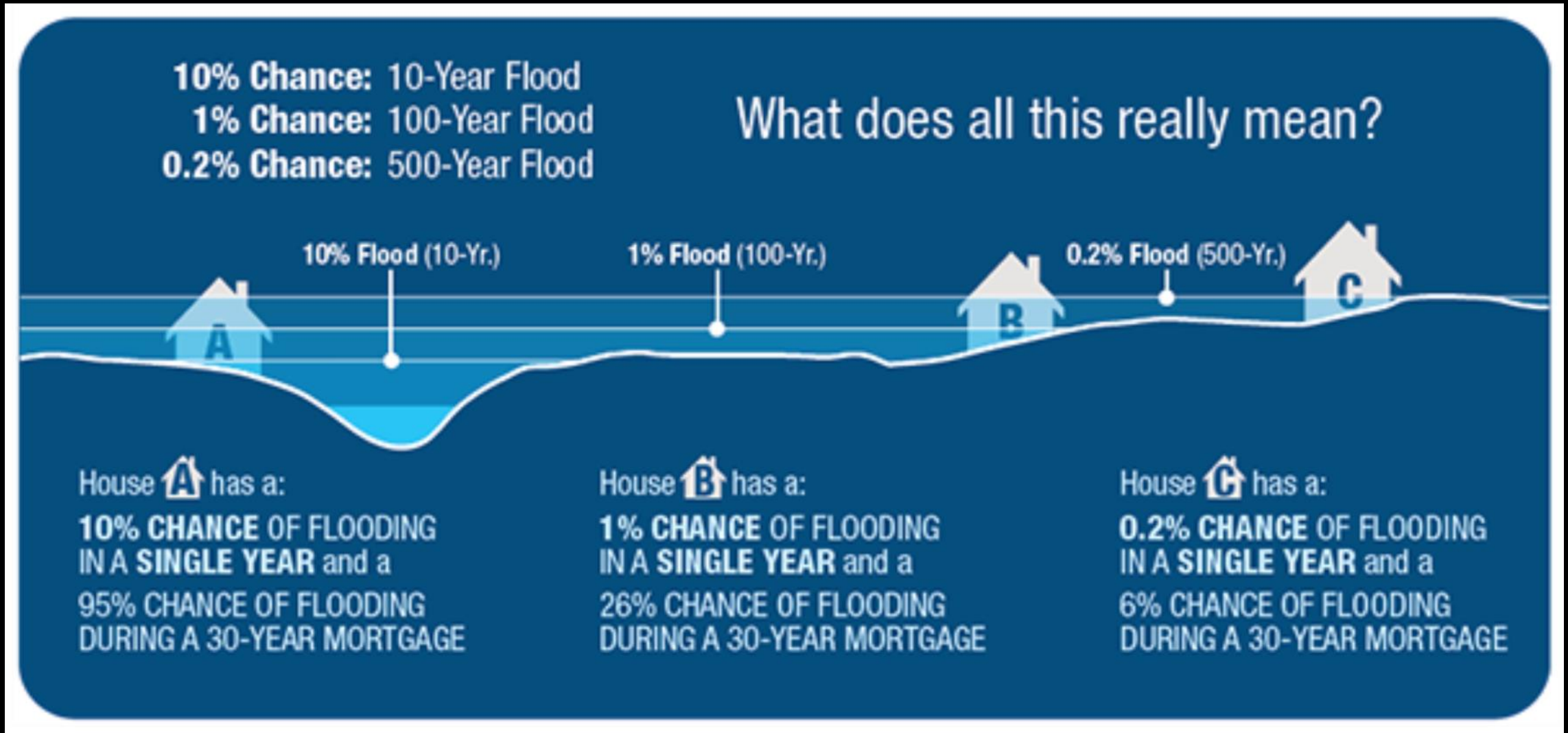
- H.G. Wells



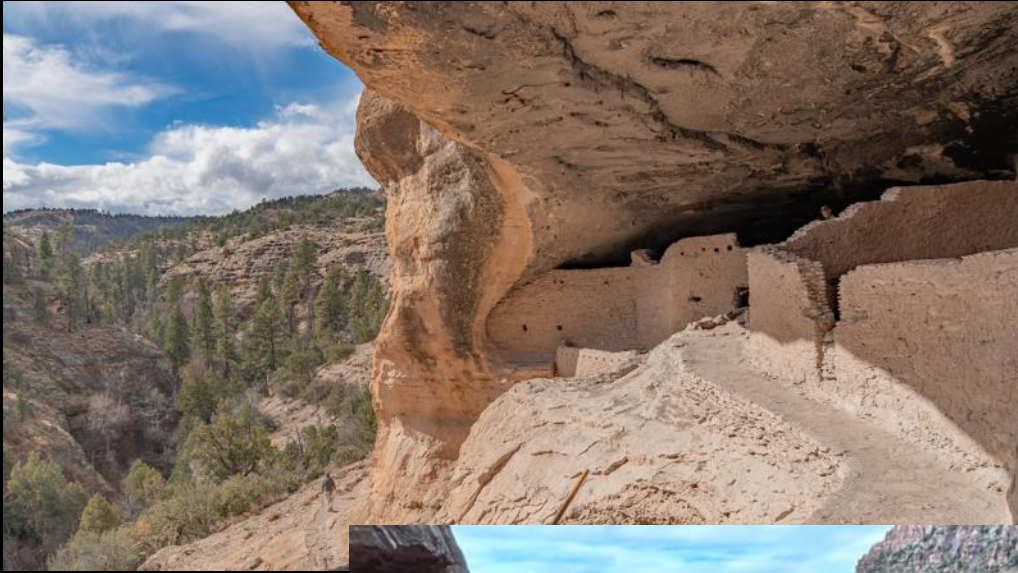
**Reliance on averages  
instead of extremes  
leads to doing stupid stuff**



# Our reliance on averages keeps getting us in trouble.







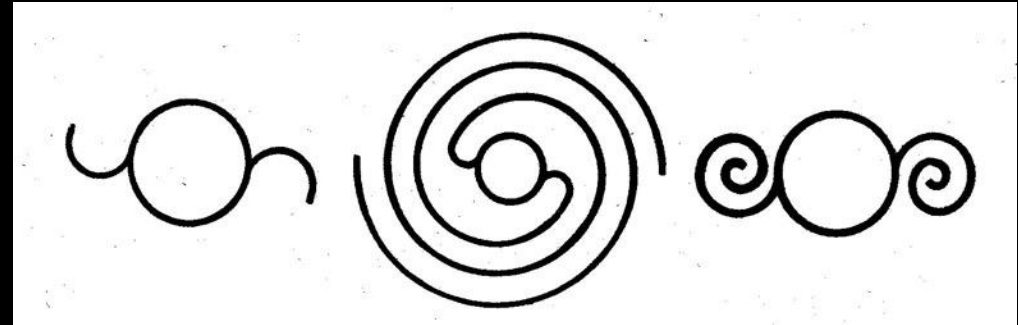
**We can STILL learn from the past if  
we do it thoughtfully**





**Because our love/hate relationship with atmospheric extremes is as old as time.**

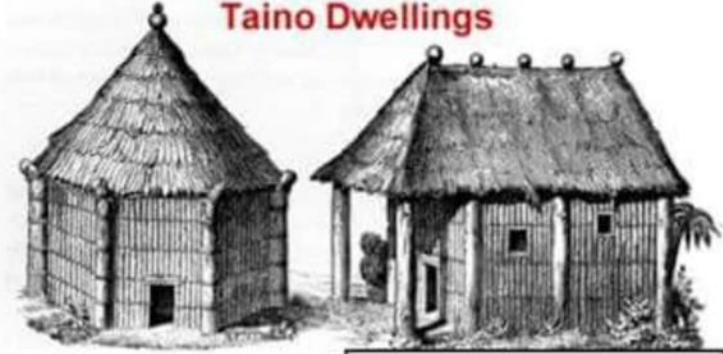






## Vivienda de los taínos

### Taino Dwellings



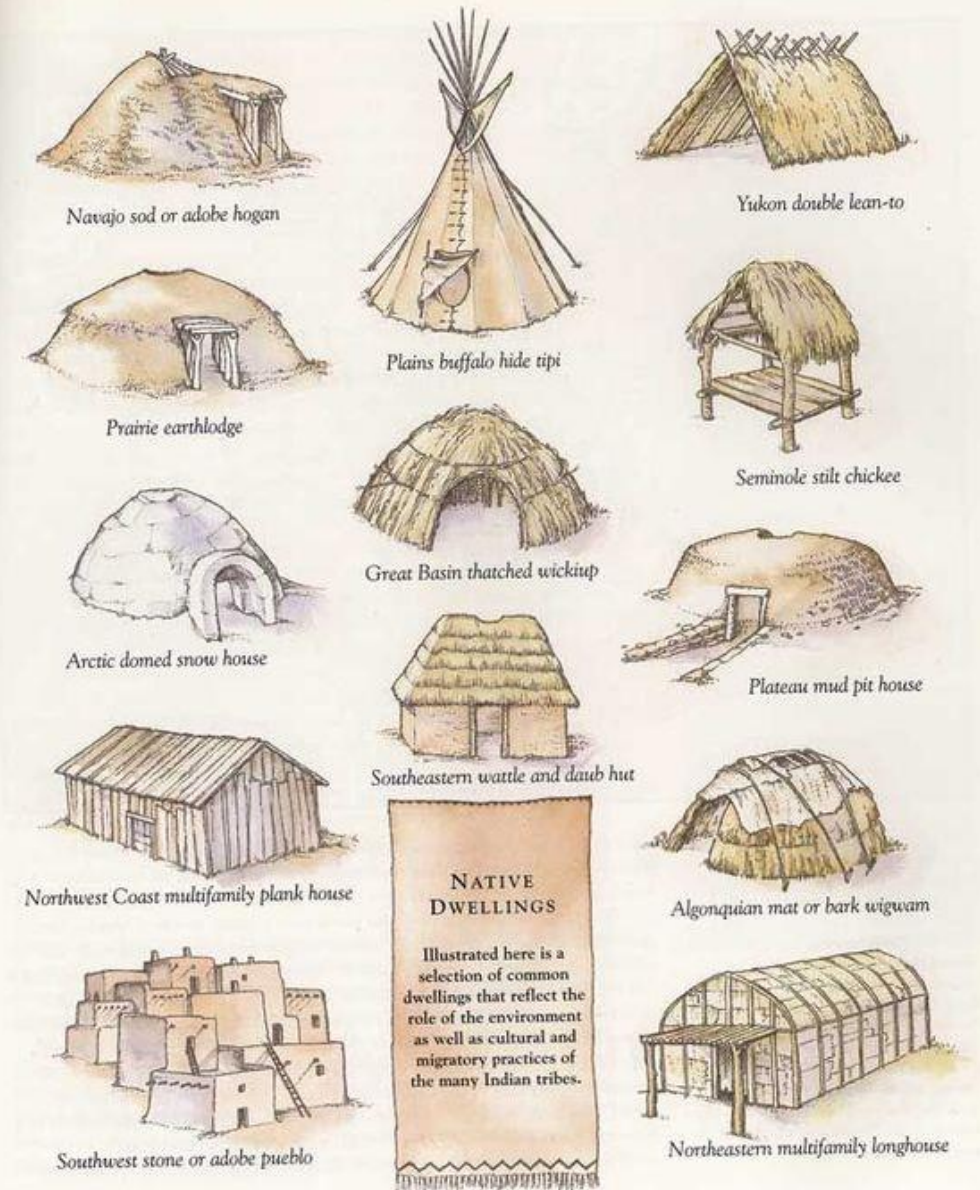
Bohío- casa del taíno

Caney- casa del cacique



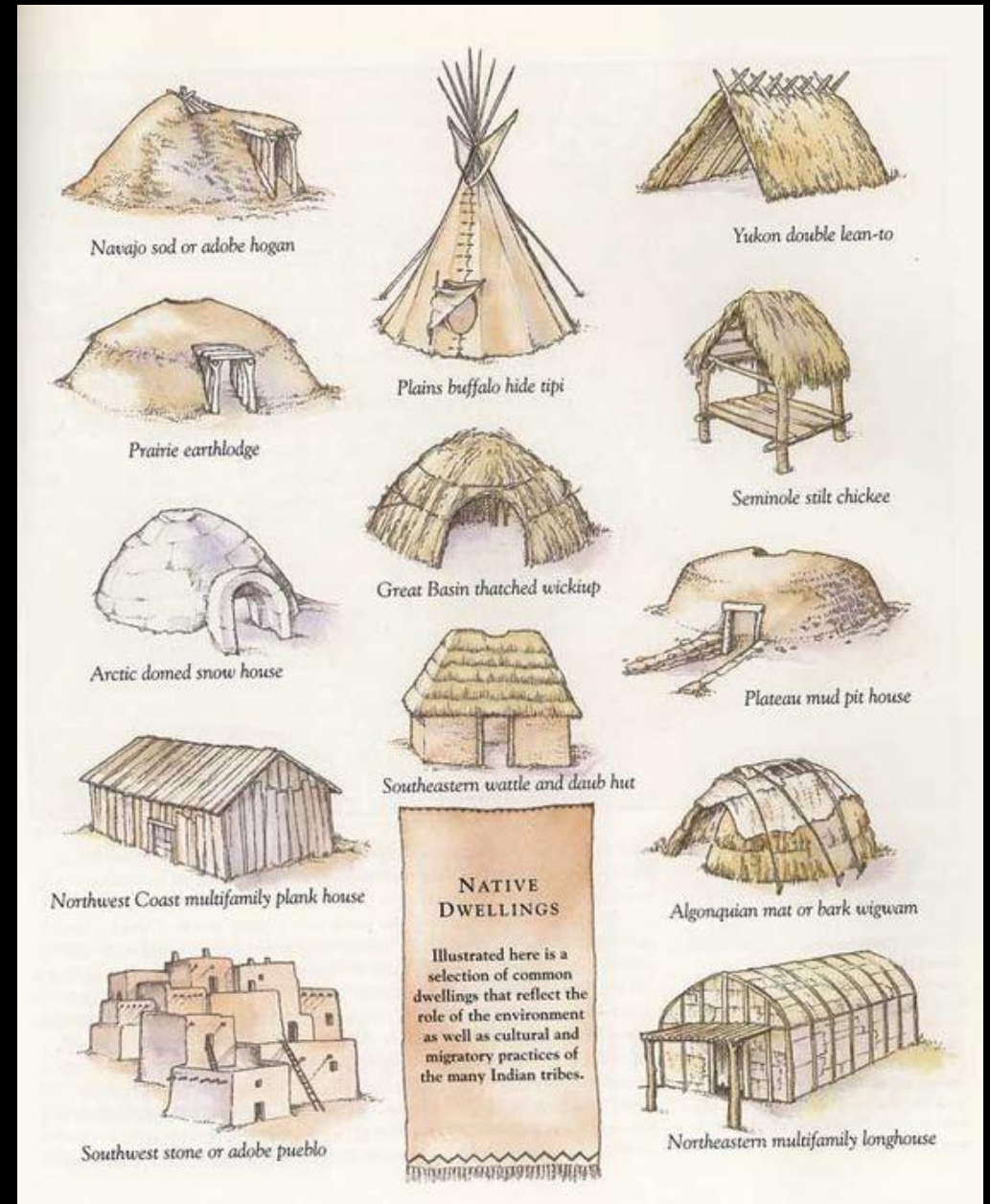
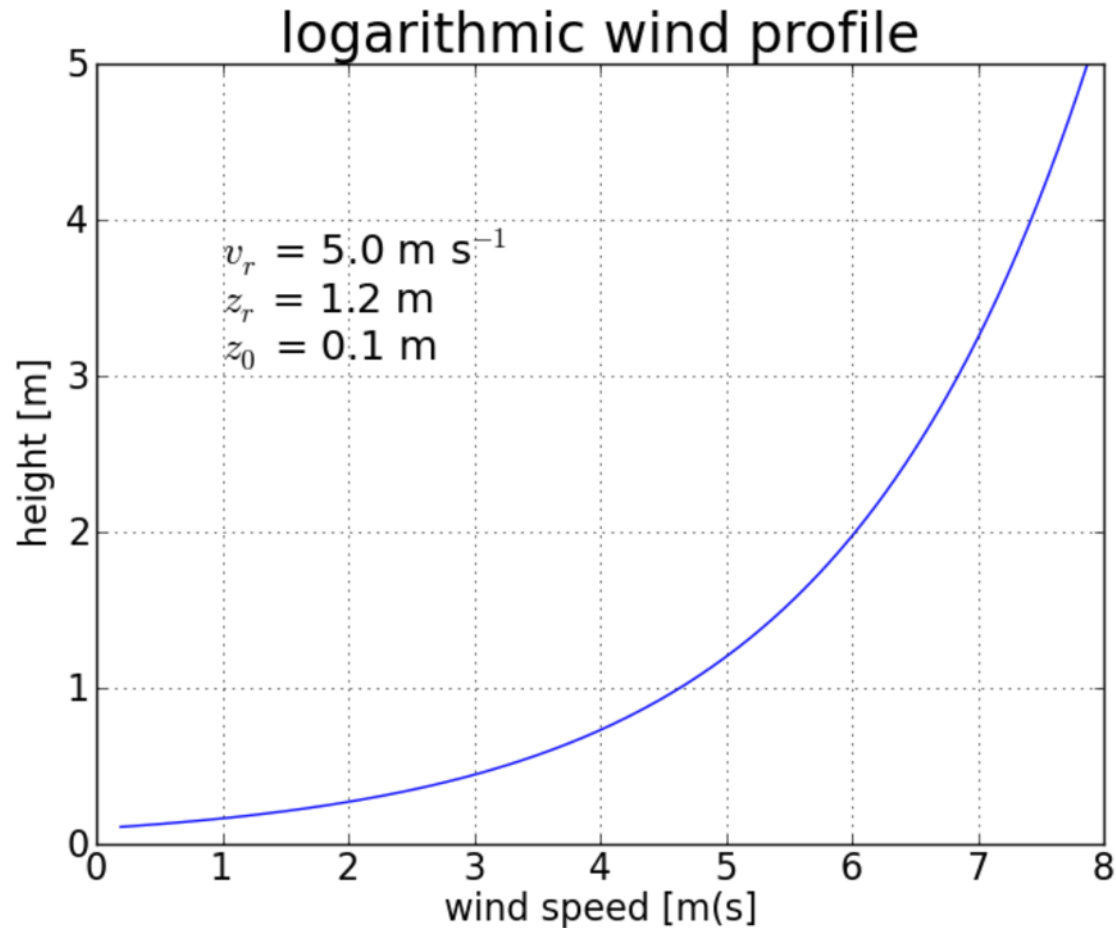


# Notice Anything?





# Notice Anything?



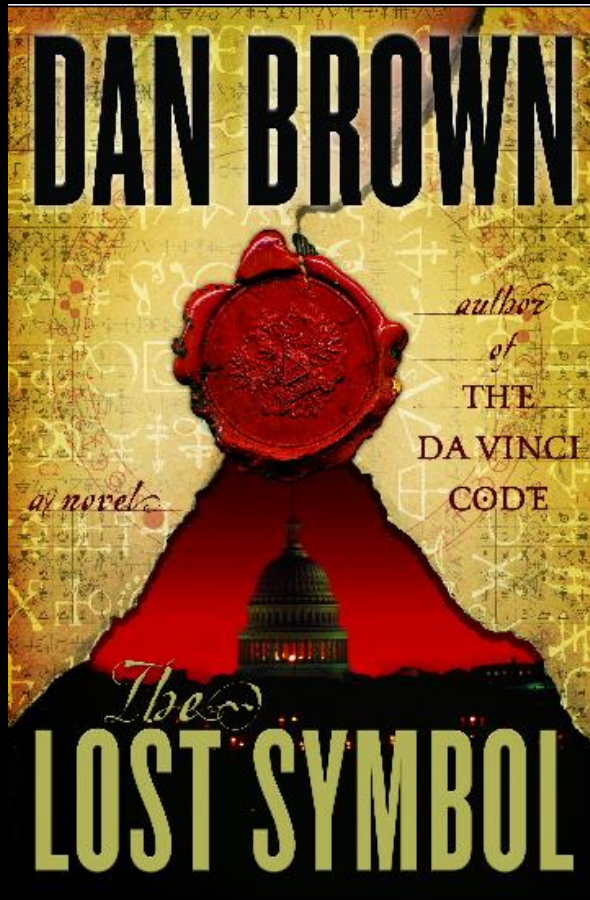
I found these quotes at Barnes and Noble!

“There will come a day when modern science begins in earnest to study the wisdom of the ancients. That will be the day that mankind begins to find answers to the big questions that still elude him.”

“Human beings are poised on the threshold of a new age when they will begin turning their eyes back to nature and to the old ways.”

“Today’s science is not so much making discoveries as it is making rediscoveries.”





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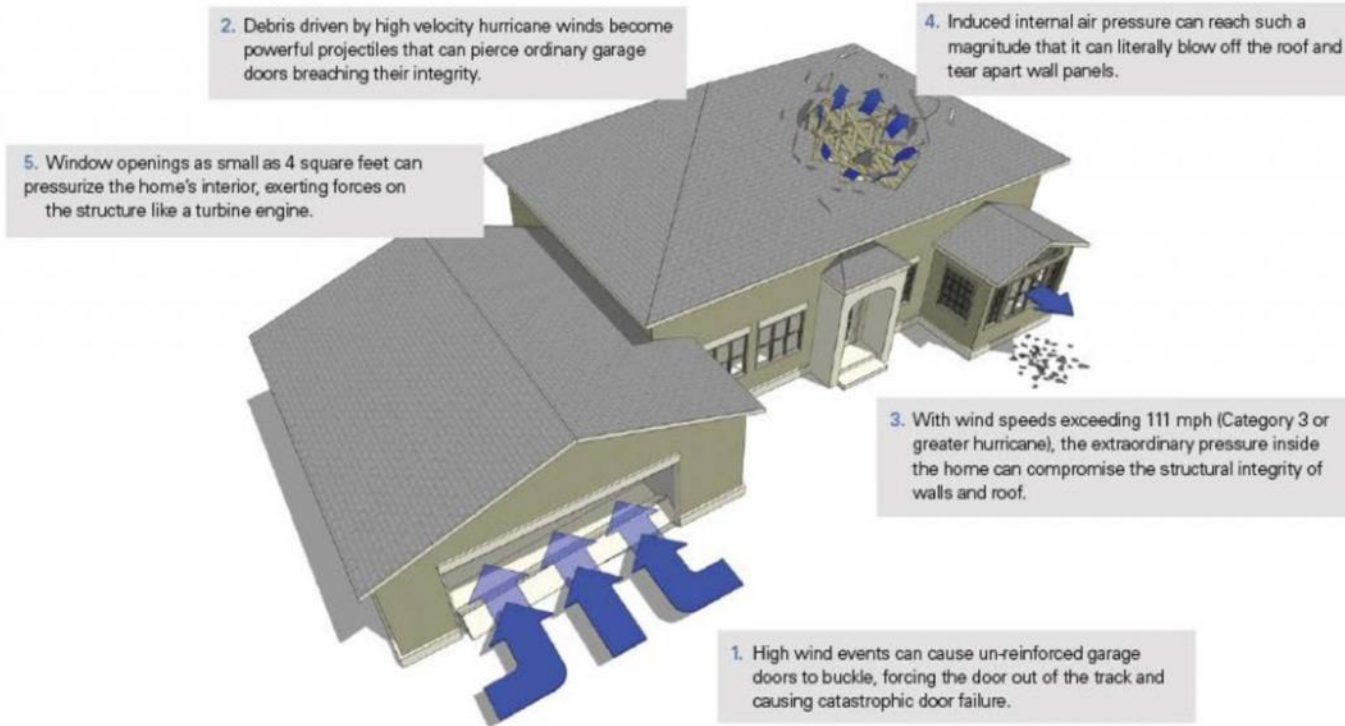


**These come as no surprise**



# Lose the garage door, lose the home.

Insurance analysts know that 80% of residential hurricane damage begins with wind entry into the garage.<sup>1</sup> If the integrity of your home is compromised, it gives wind, rain and blown debris easy access into your home.



<sup>1</sup>Federal Alliance for Safe Homes, 2007 <sup>1</sup>



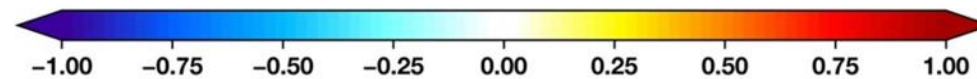
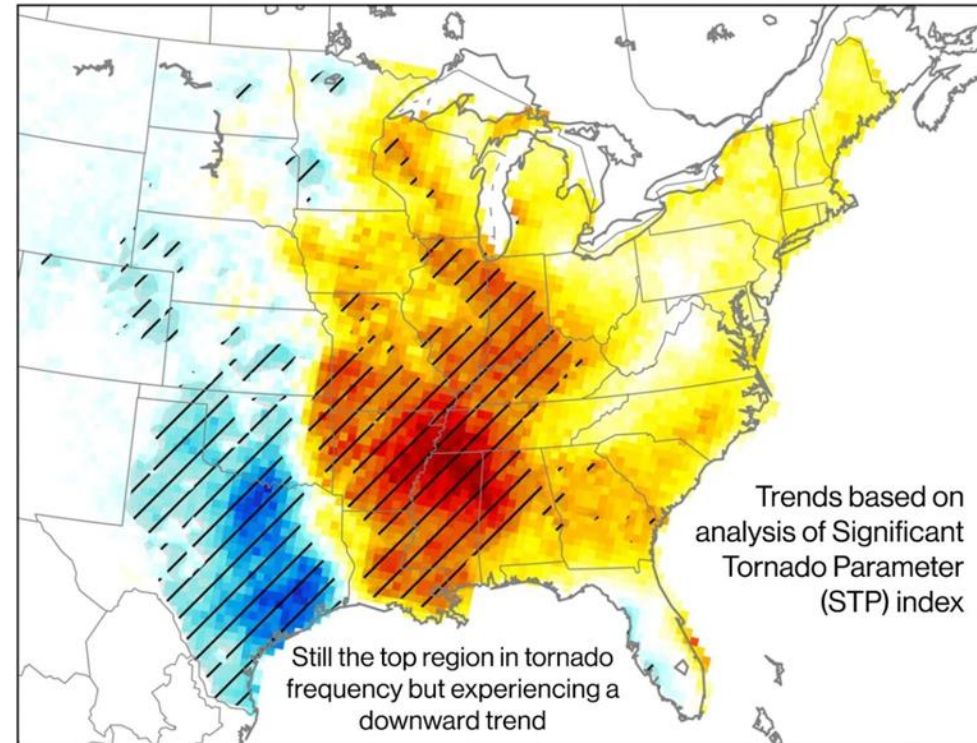


“This is a new  
year. A new  
beginning. And  
things will  
change.”

— Taylor Swift

## Tornado Alley and Climate Change

TORNADO ENVIRONMENT FREQUENCY TRENDS



SOURCE: NPJ CLIMATE AND ATMOSPHERIC SCIENCE, GENSINI/BROOKS 2018

abc NEWS

Climate change is contributing to more regions containing favorable conditions for climate change.

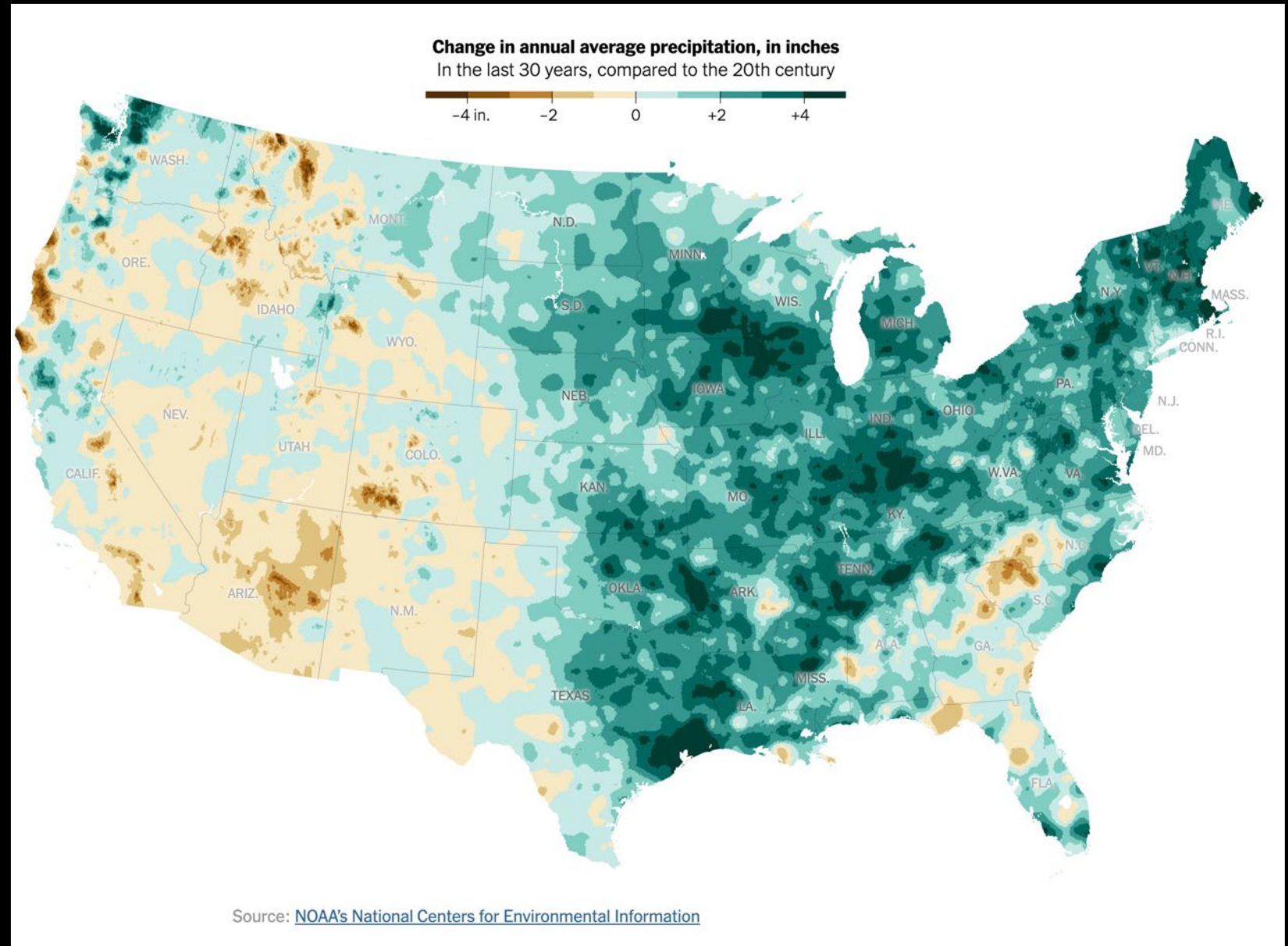
ABC NEWS / NPJ CLIMATE AND ATMOSPHERIC SCIENCE, GENSINI/BROOKS 2018





"All the water  
that will ever be  
is right now."

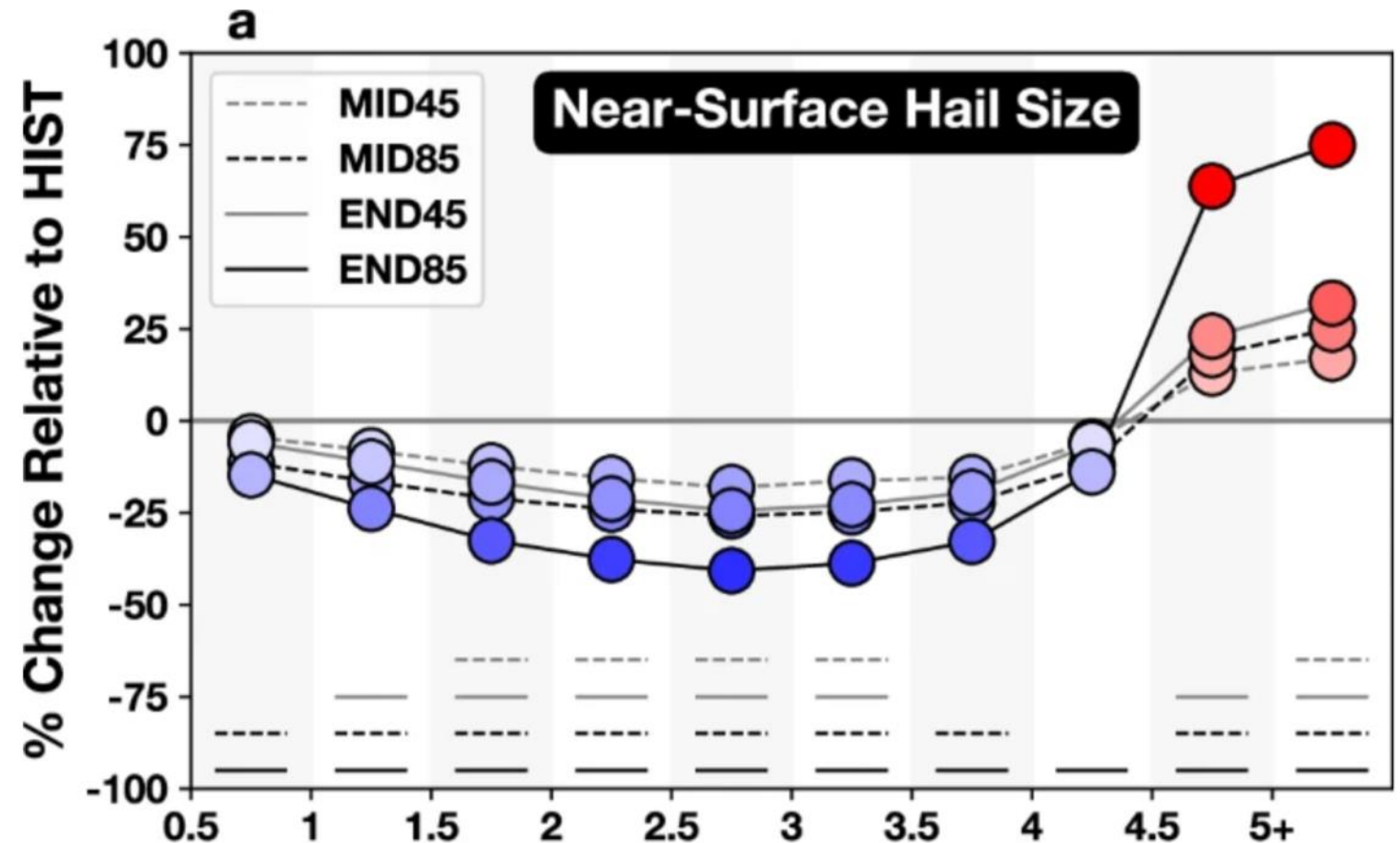
– National  
Geographic



"I grew up in Texas, but that was 20 years ago. Last year, in Fort Worth, they had hail the size of softballs. We're seeing more and more powerful storms, of all types, almost on a biblical level."

-Bill Paxton

Fig. 1: Projected hailstone size changes.



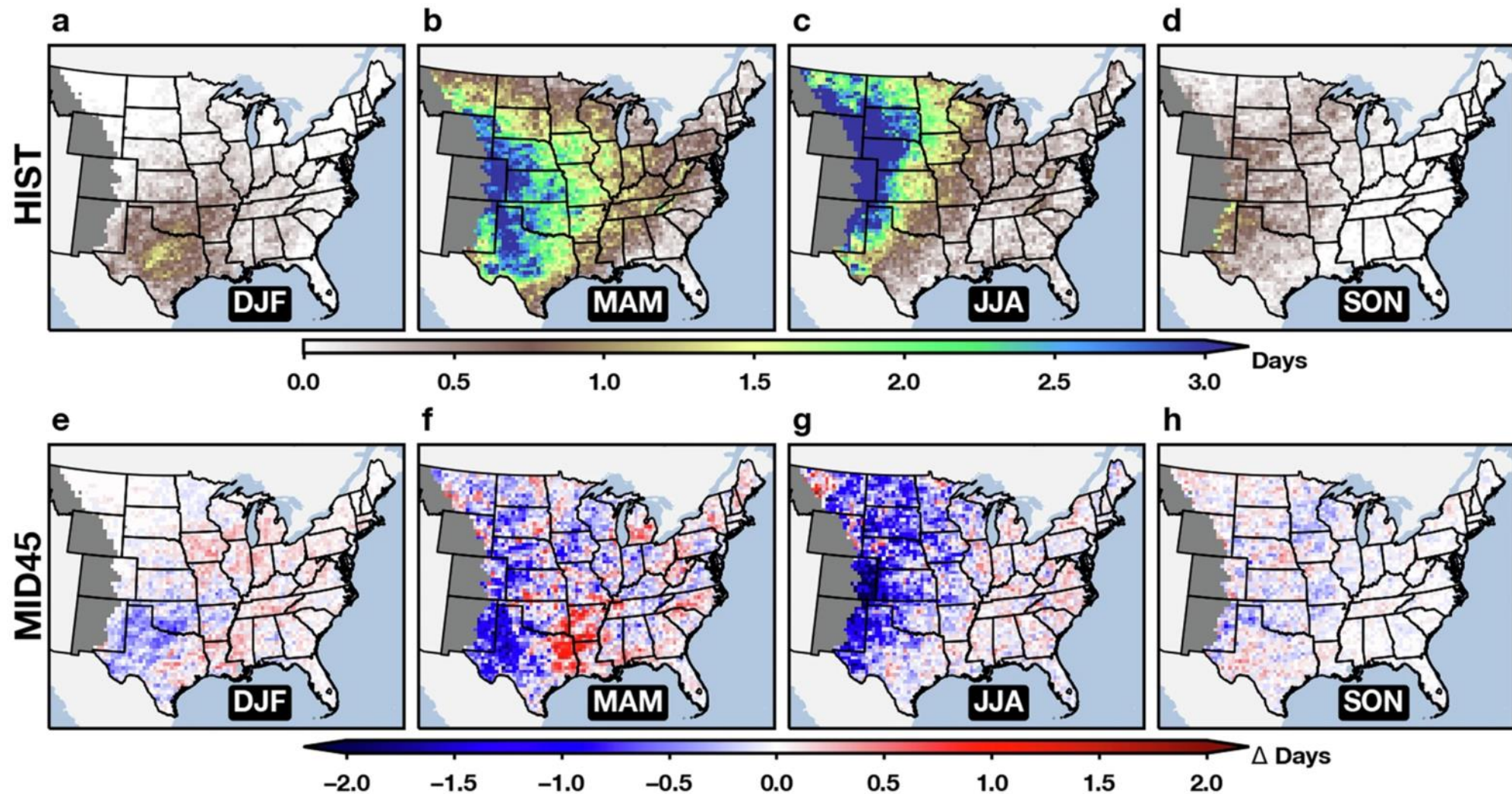
Gensini, et al 2024





**Fig. 3: Projected changes in seasonal mean severe hail days.**

From: [Hailstone size dichotomy in a warming climate](#)



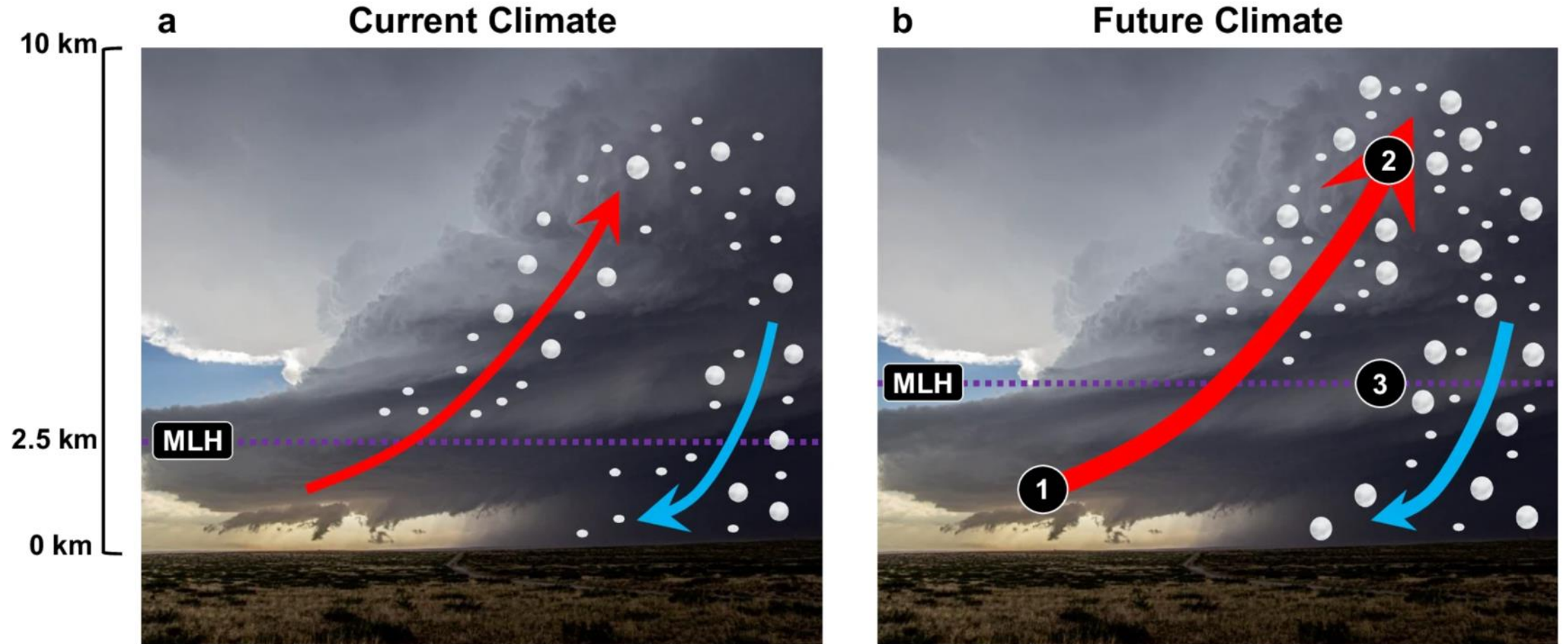
Gensini, et al 2024





## Fig. 6: Hailstorm changes.

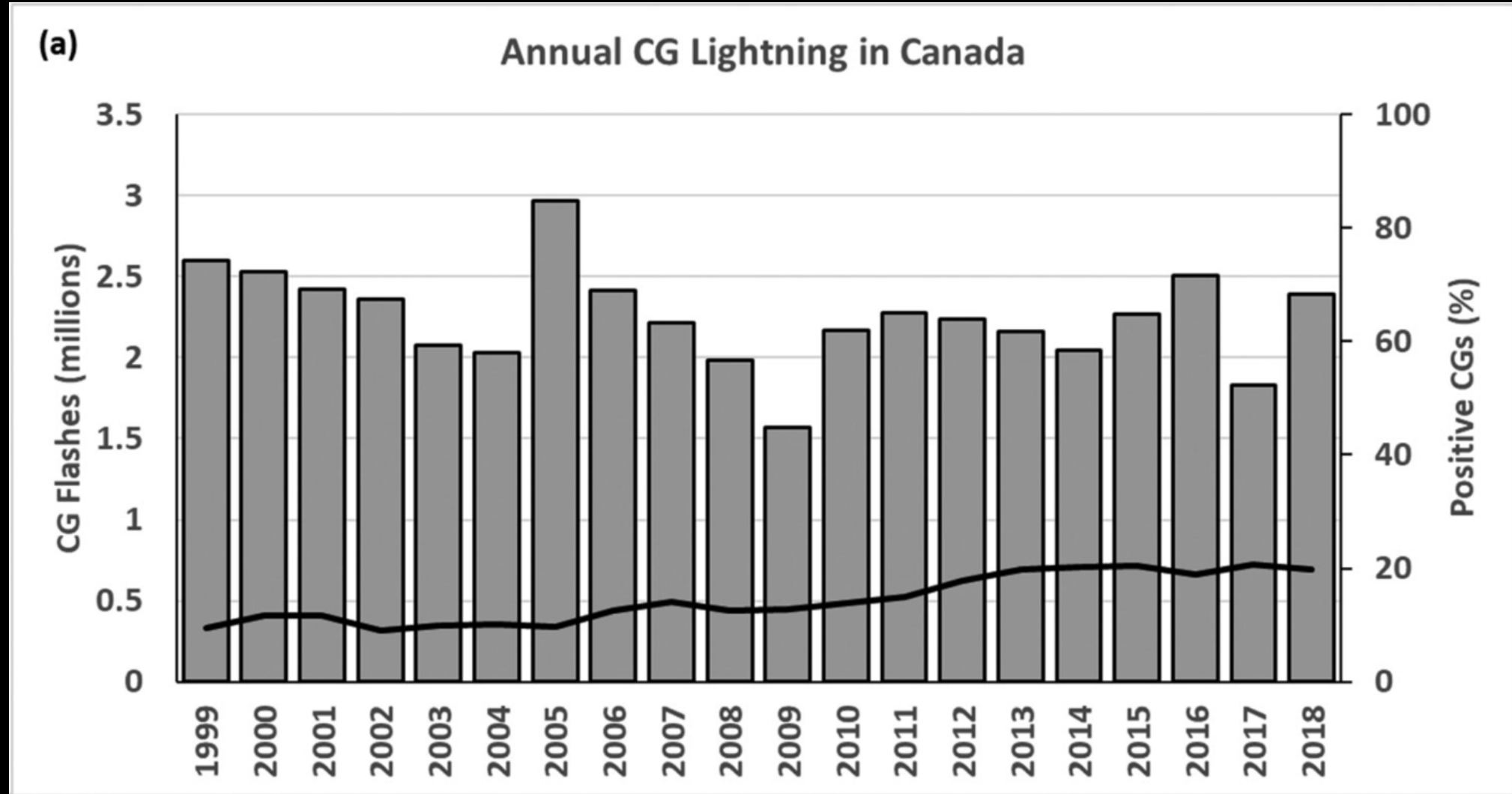
From: [Hailstone size dichotomy in a warming climate](#)



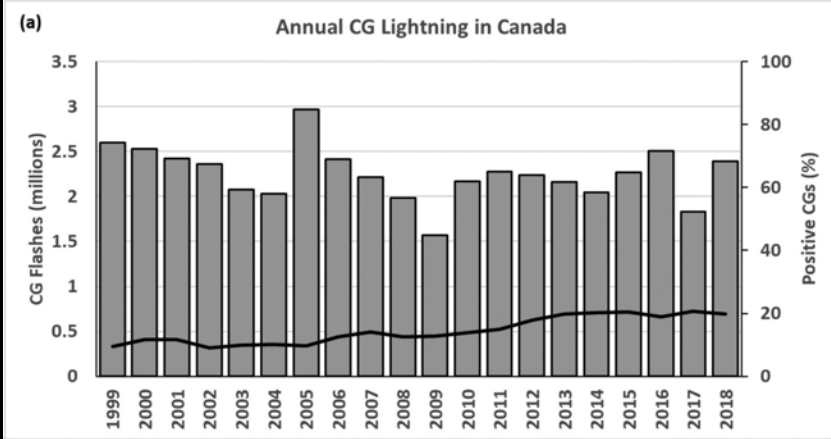
Gensini, et al 2024



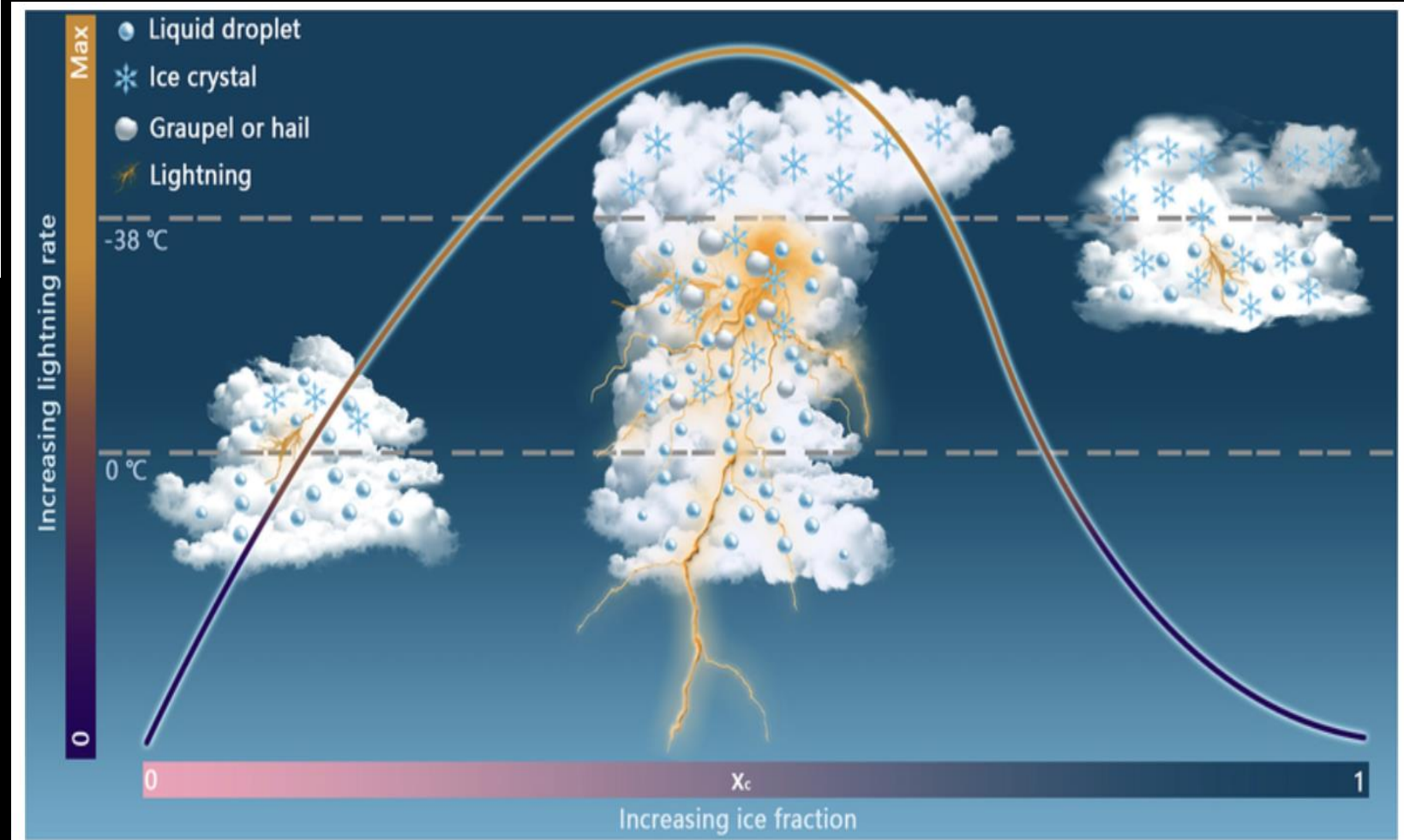
# These are for Canada, but early analysis suggests US too



# LIGHTNING 101




The same thermodynamics conducive for larger hailstones also yield more positive polarity lightning strikes






# REVISITING OUR UNDERSTANDING



## Negative Lightning

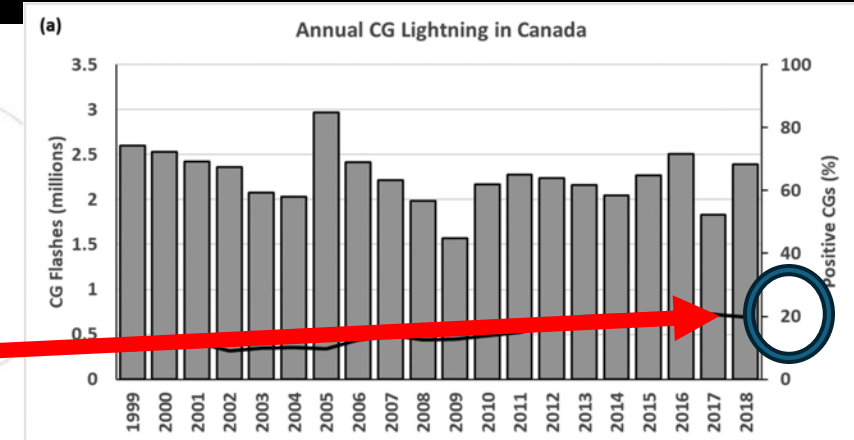
Makes up 90-95% of strikes, originates from lower storm clouds, shorter duration and distance.



## Positive Lightning

Less than 5% of strikes, originates from upper storm clouds, stronger, lasts longer, and can strike miles away from the storm.

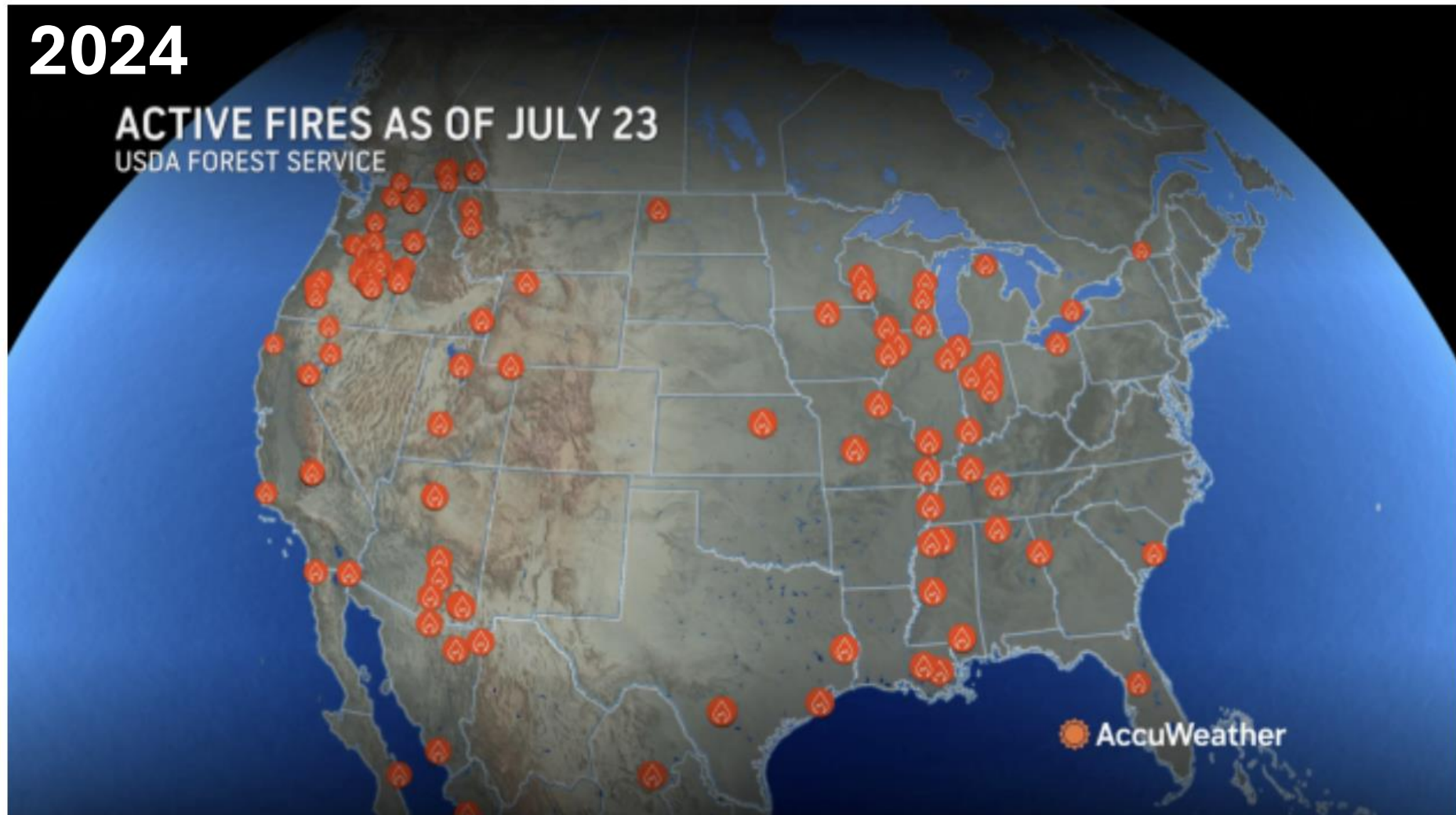
Insurance Claim Recovery Support  
<https://www.insuranceclaimrecovery.com>



# 2024

## ACTIVE FIRES AS OF JULY 23

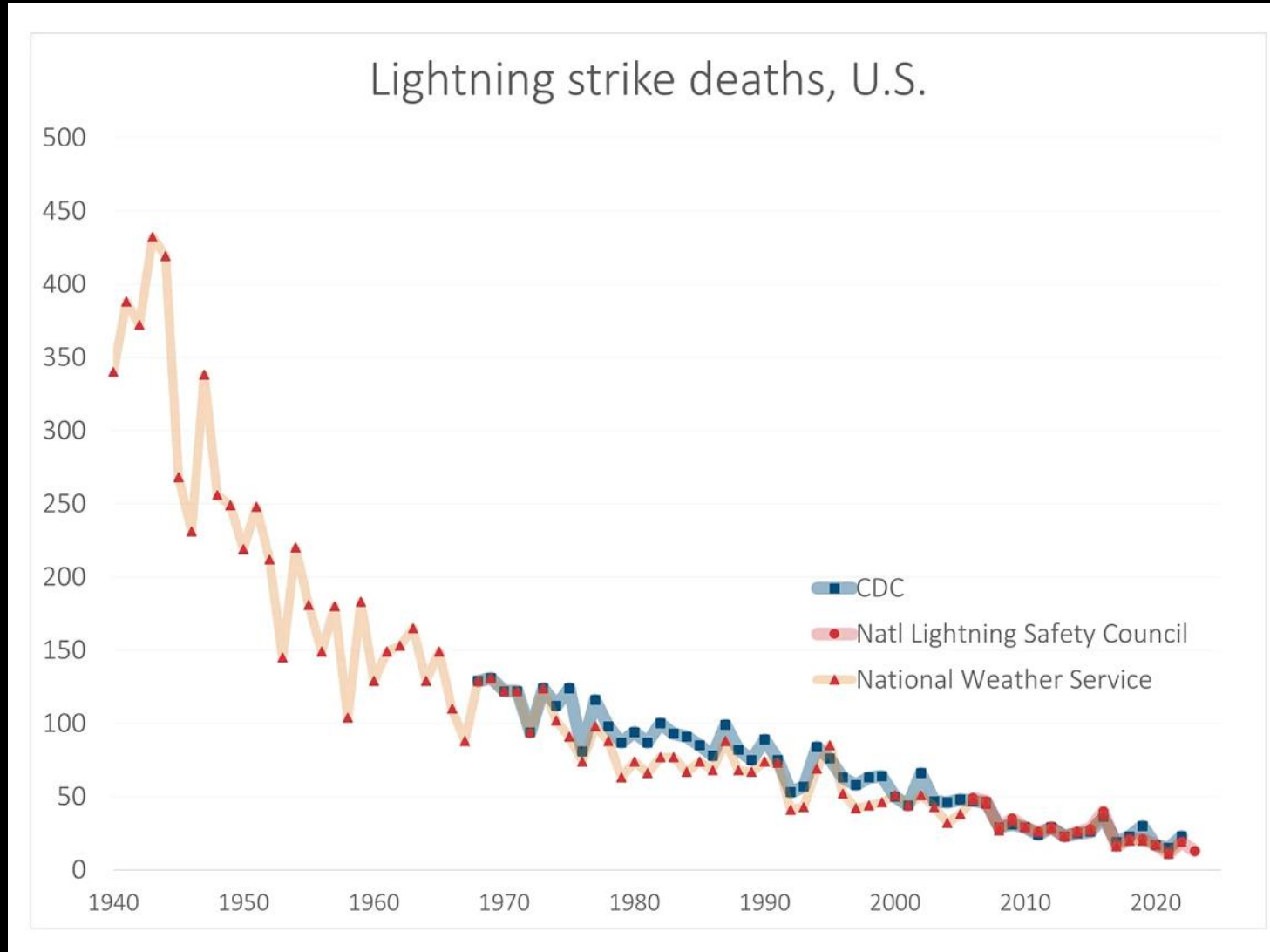
USDA FOREST SERVICE



Wildfires burning across the United States as of Tuesday morning. The map does not show fires burning in Canada. (AccuWeather)



# Proactive Policies Work!





But, we could see an increase in lightning-induced house fires going forward.



KVUE  
lightning strikes ...



WRIC  
Chesterfield homes struck by lightni...



YouTube  
Frisco home catches fire after ...



Star Local Media  
Lightning strikes cause two home fir...



Reddit  
Lighting strike to a house in Denton ...



Sky News  
struck by lightning | UK News ...



WRAL.com  
Raleigh homes damaged by fire cause...



ITVX  
after lightning strike ...



CBS 17  
3 Raleigh families getting help after ...



Click2Houston  
overnight house fire in The Woodlands



WRTV  
Lightning strike starts residence fire ...



First Coast News  
Lightning strikes Jacksonville home ...



Walker County, GA  
Walker County House Fire ...











DISCLAIMER: Please remember that past performance may not be indicative of future results. Different types of investments involve varying degrees of risk, and there can be no assurance regarding the future performance of any specific investment or investment strategy.







# Humpty Dumpty

**First appearance as an egg was in “Through the Looking Glass and What Alice Found There.”**

**- Lewis Carroll, 1871**



**Humpty Dumpty – Legend has it was a large cannon used in the English Civil War, specifically in the 1648 Siege of Colchester. The "great fall" occurred when unstable ground under the castle wall collapsed due to 12 weeks of rain and unusually cold weather during the summer of 1648. You know the rest...**







What is your  
Humpty Dumpty





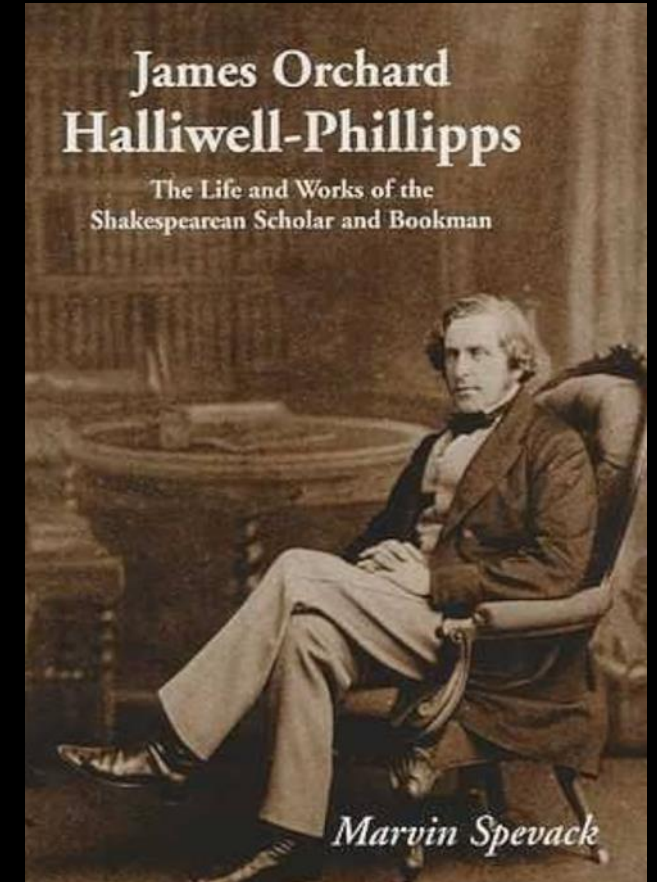
# Night of the Big Wind” (6 January 1839)



**A popular story suggests that the 1839 storm inspired the Director of the Armagh Observatory in Northern Ireland, the Reverend Romney Robinson, to develop the cup-anemometer, which remains a commonly used wind measuring device today**



# James Halliwell Phillipps also endured the Night of the Big Wind



(1840). *The Connexion of Wales with the early Science of England.*

(1840). *A Few Notes on the History of the Discovery of the Composition of*







**The "Three Little Pigs" was included in The Nursery Rhymes of England by James Halliwell-Phillipps. The story in its arguably best-known form appeared in English Fairy Tales by Joseph Jacobs, first published on June 19, 1890, and crediting Halliwell's 1842 version as his source.**





# The Three Little Pigs



**A ~200-yr old story about  
infrastructure and resilience**

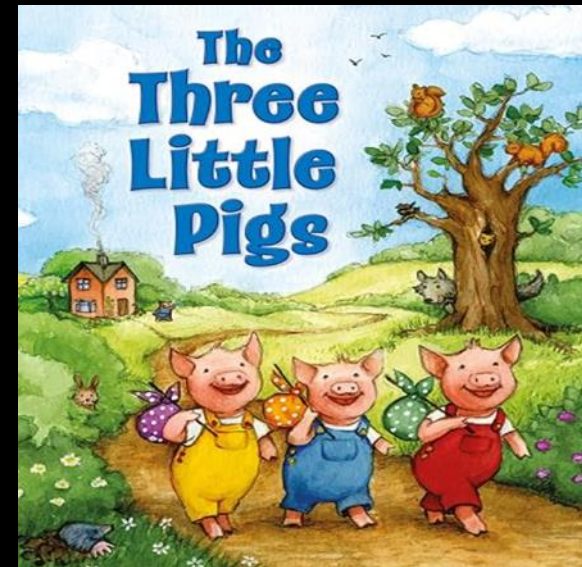
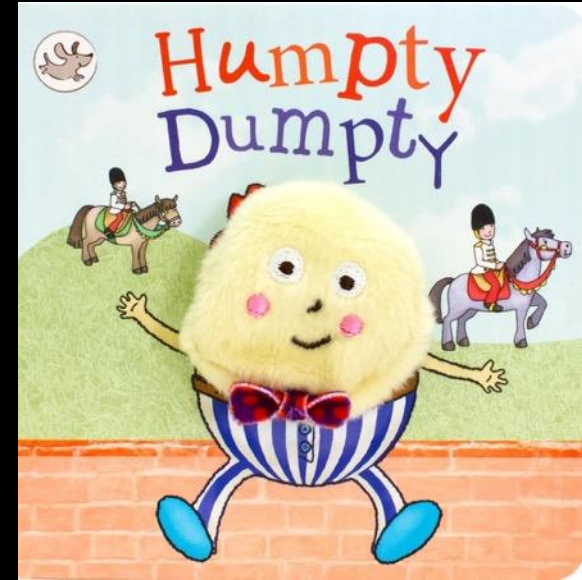


**We are a people with an affinity for creating vulnerable infrastructure.**

**Weather hazards typically “win.”**

**Property damage, injuries and fatalities result.**

**Climate change will expand (hot and cold) the portfolio of weather risk.**



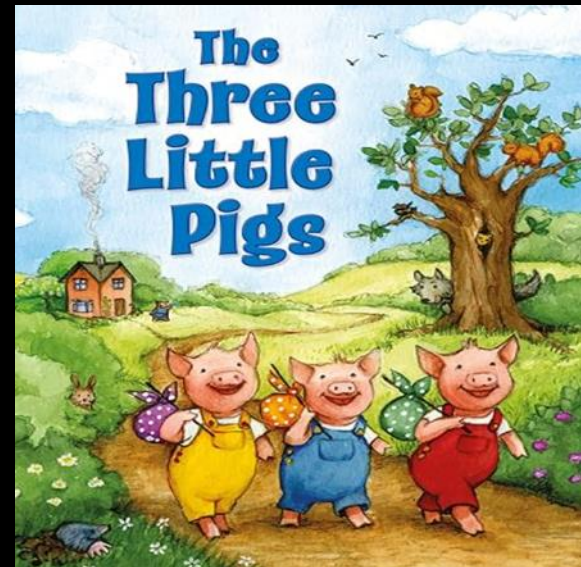
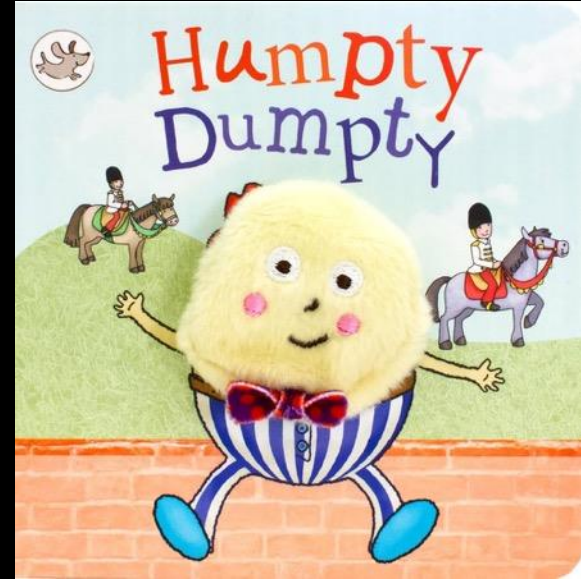


**Your charge:**

**Be more resilient.**

**Mitigate against comprehensive weather hazards.**

**Understand the portfolio of FUTURE weather risk as well as cascading hazards.**





## **Final Thoughts:**

**Smart people learn from their mistakes. Wise people learn from the mistakes of others!**

**Don't wait until after you experience your weather hazard/extreme to initiate your preparation.**



You can't stay in your  
corner of the Forest  
waiting for others to  
come to you.  
You have to go to  
them sometimes.



# THANK YOU

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