

# Data to support climate risk management in Minnesota

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# Change is here.

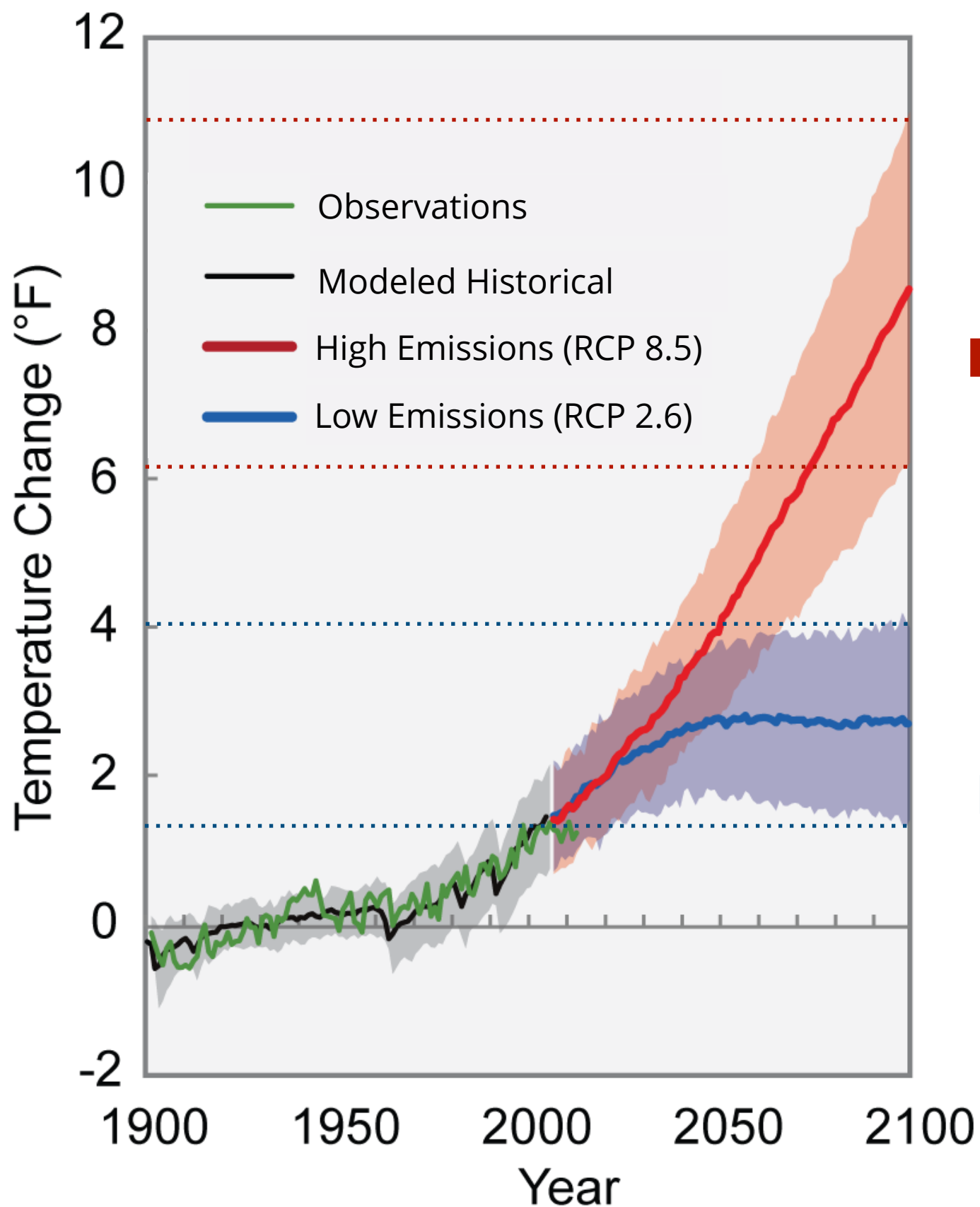


**Average global temperature has increased over 2.0°F since the 1880's.**



**Minnesota's average annual temperature has increased by nearly 3°F since 1895.**

# What does the future hold?

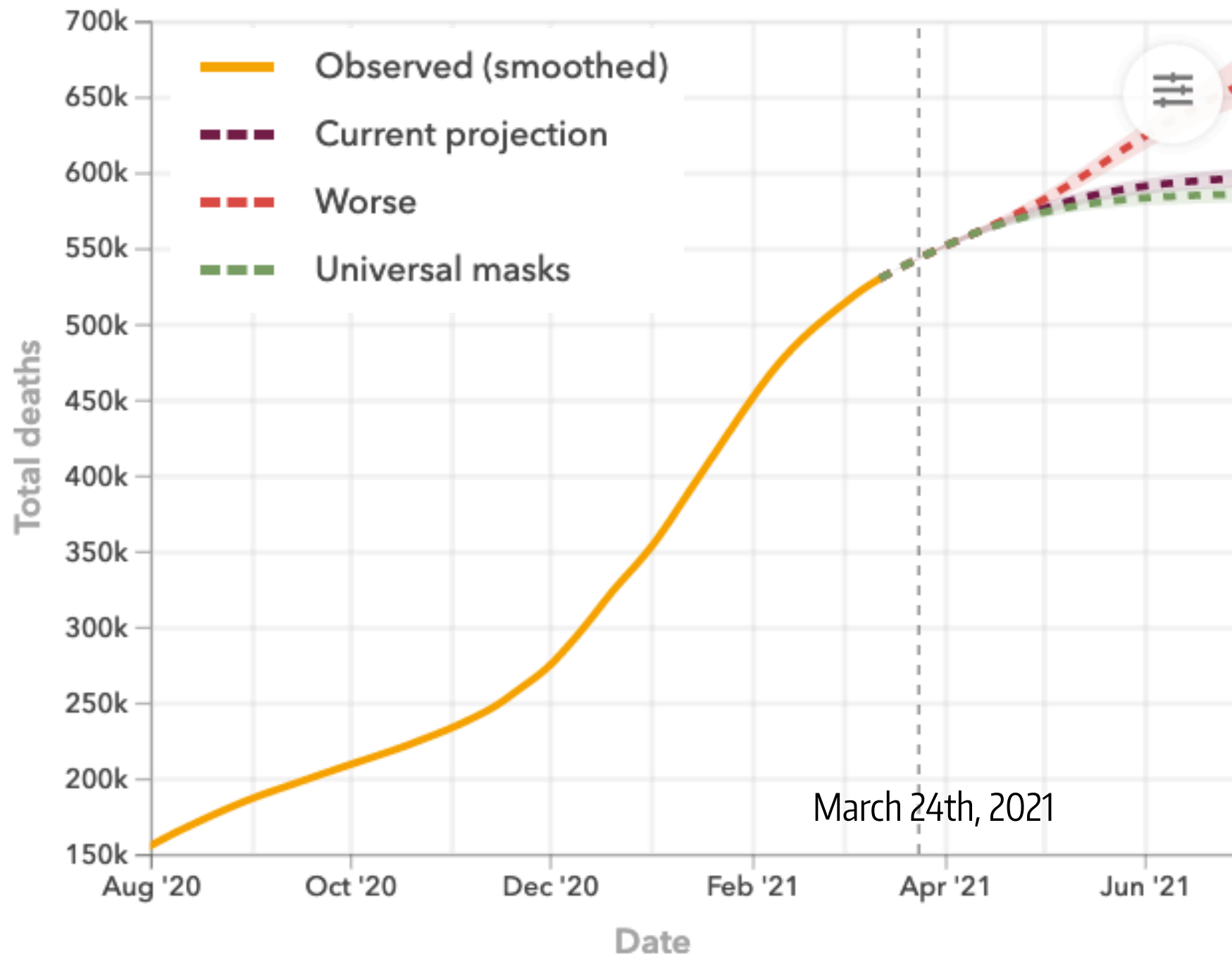


Projected  
warming under  
**HIGH** emissions

Projected  
warming under  
**LOW** emissions

# Models are widely used to inform a range of our decisions.

## Observed and projected total deaths in the U.S. related to COVID-19





# Climate-related data are already embedded in a range of our decisions.



The type and scale of the decision, in both **time** and **space**, influence the type of information we need.

# Planning for the future requires understanding the range of possible futures we should plan for.

When it comes to climate, our state lacks **accessible, accurate** and **precise** projections that capture well our specific climate risks.



Low Accuracy  
Low Precision



High Accuracy  
Low Precision



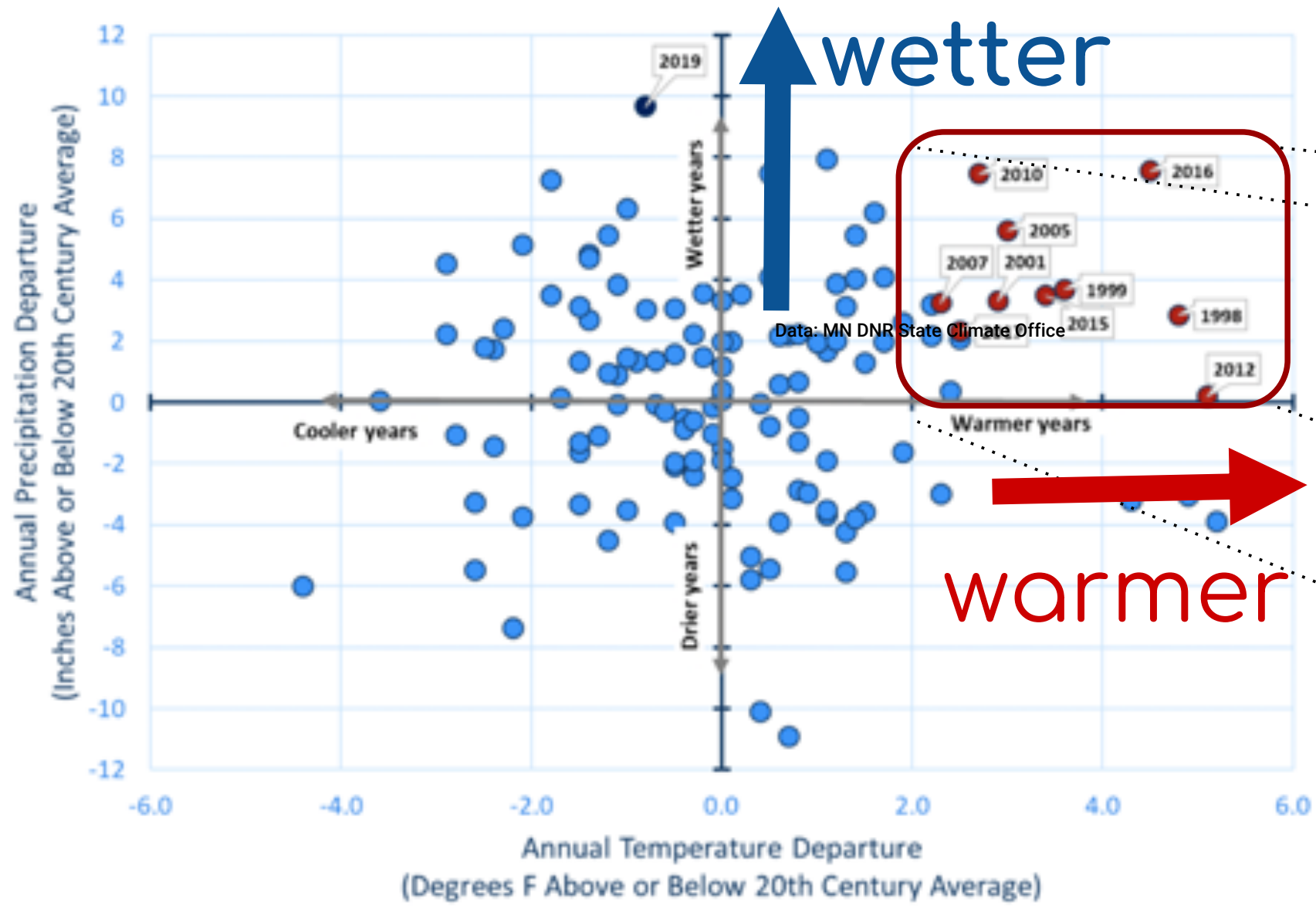
Low Accuracy  
High Precision



**High Accuracy**  
**High Precision**

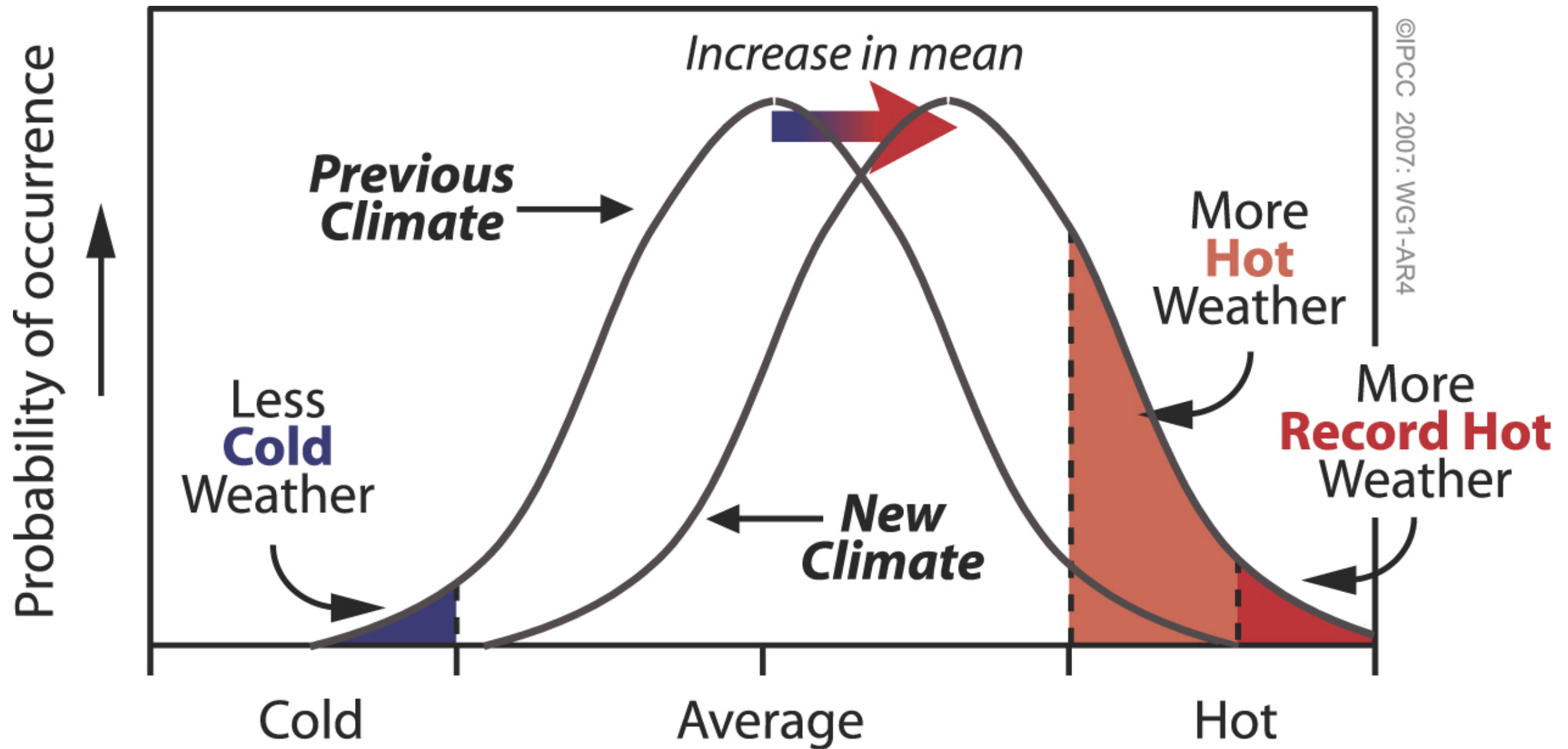
# Past climate is no longer the best predictor of our future climate.

## Minnesota is getting warmer & wetter



10 combined wettest & warmest years on record all occurred after 1997.

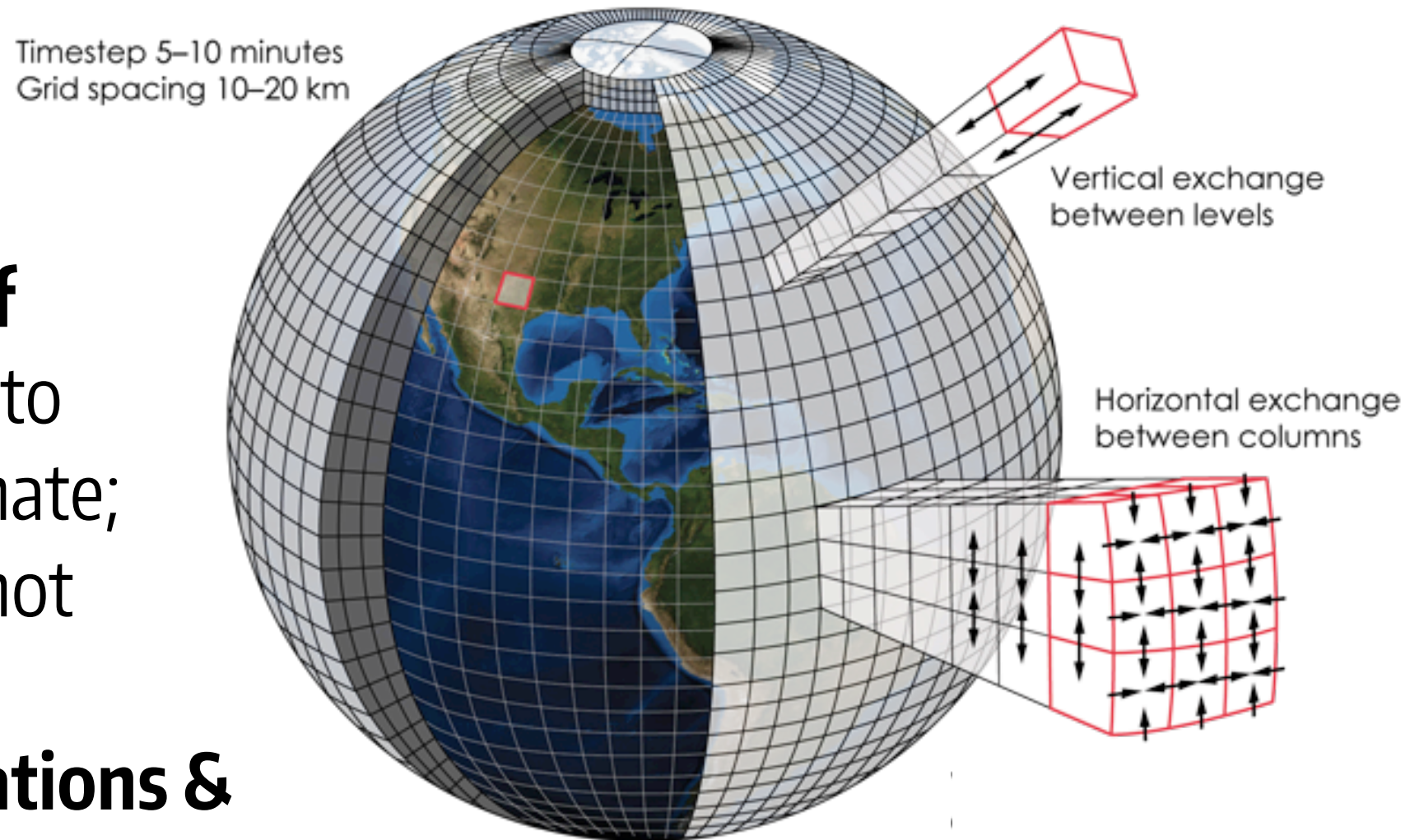
# Climate change induces a shift in means *and* extremes



# Climate models provide critical information about our future climate.

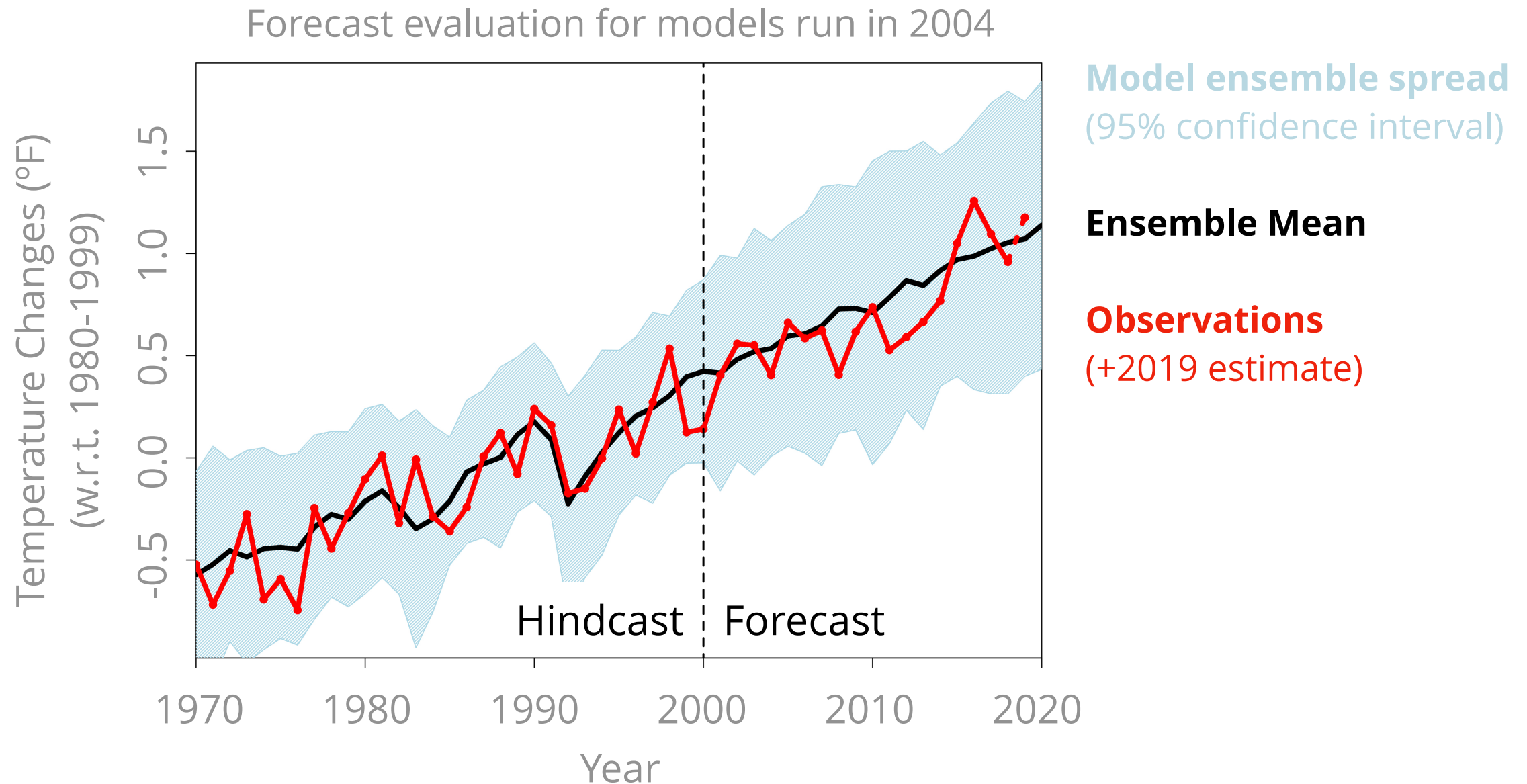
## Climate Models

- Are the **best source of information** we have to understand future climate;
- Provide **projections**, not predictions;
- Have important **limitations & uncertainty**.





# How reliable have climate model projections been?



IPCC model projections from 2004 **compare well** with observed temperature change from 2004-2019

# There is a cross-sectoral call for these data to be generated for Minnesota...

Preliminary state-collected survey data show broad support for generating these data and highlight opportunities for direct application & use.

**82%**  
say data are very to somewhat important

**1%**  
Not at all important





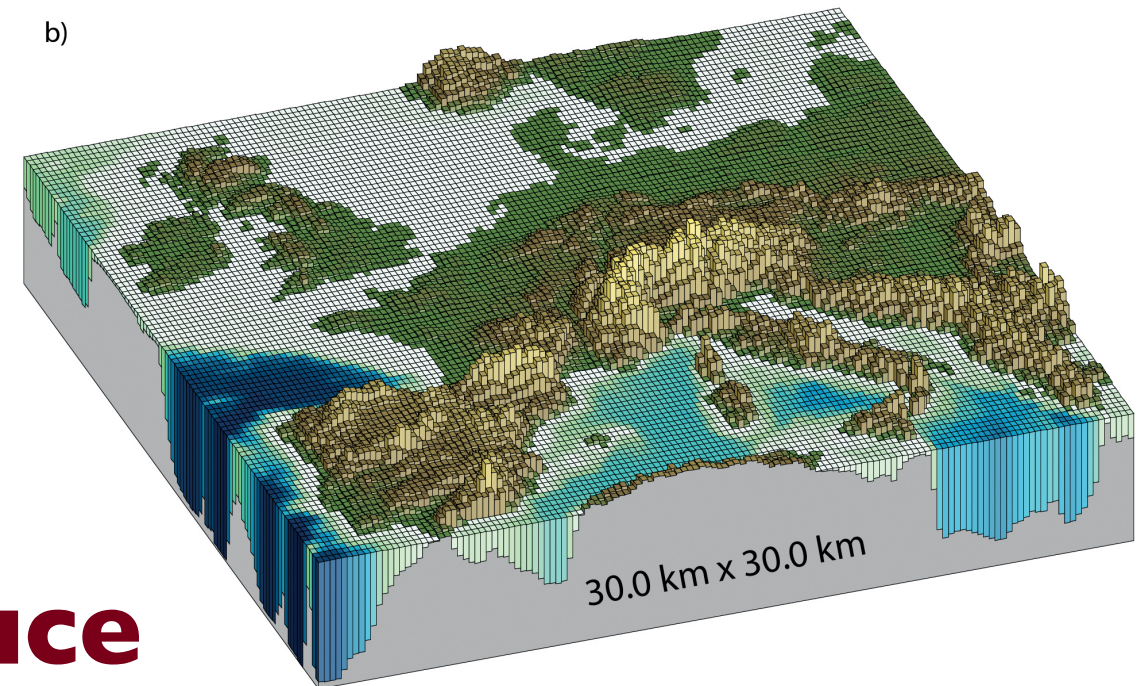
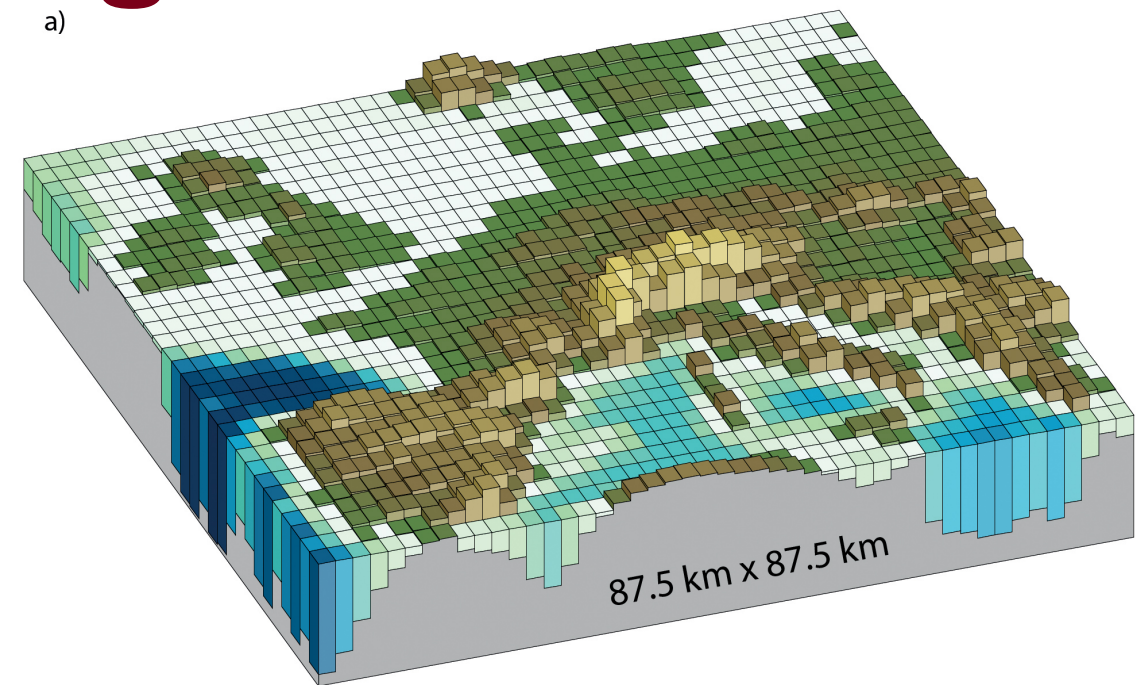
**...at a scale and for variables that are useful for decision-making.**

54 miles (87 km) = distance from Thief River Falls to Grand Forks

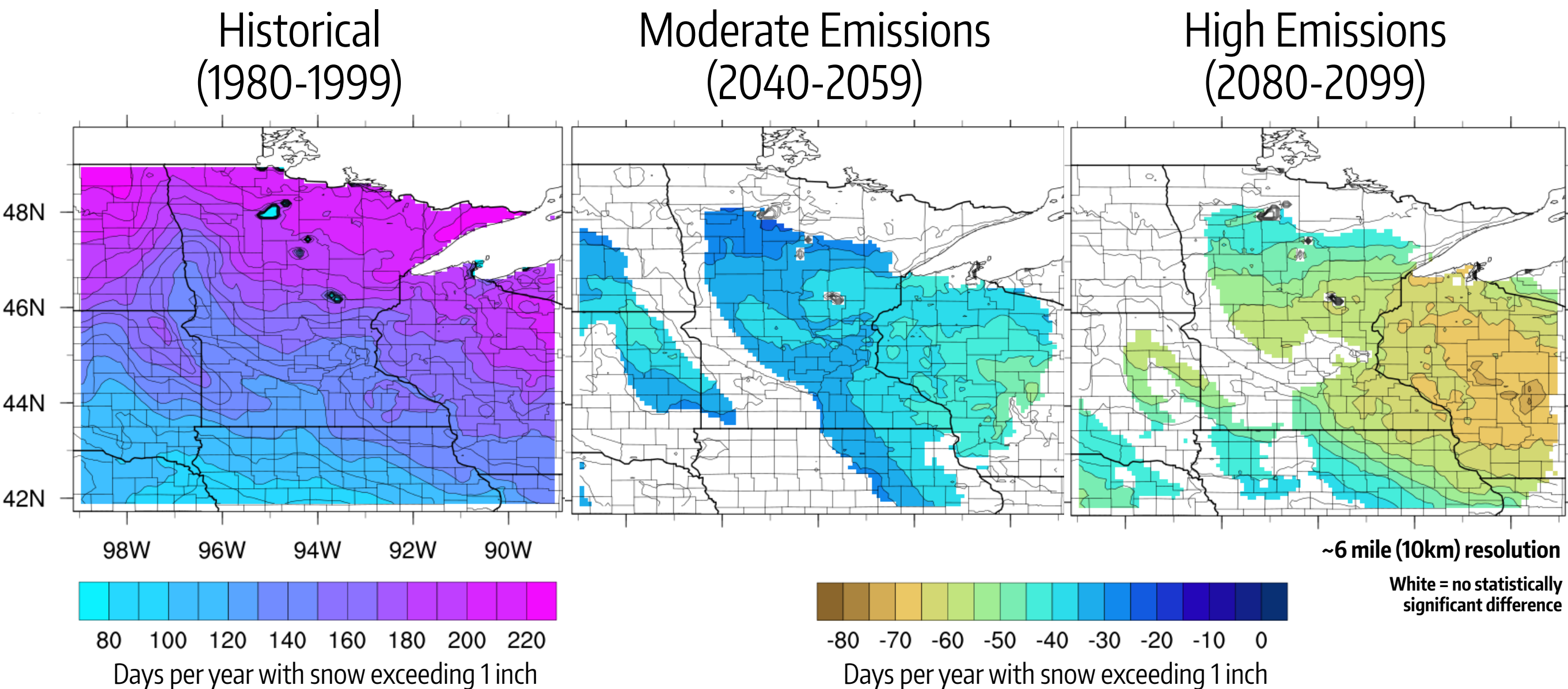
~19 miles (30km) = distance from St Louis Park to Maplewood

**UMN can now produce  
~3 mile resolution simulations**

Less than the distance from the State Capitol to the Minnesota State Fairgrounds (~3.5 miles; 5.5km)



# Example: Local projections of change in the number of days with snow exceeding one inch

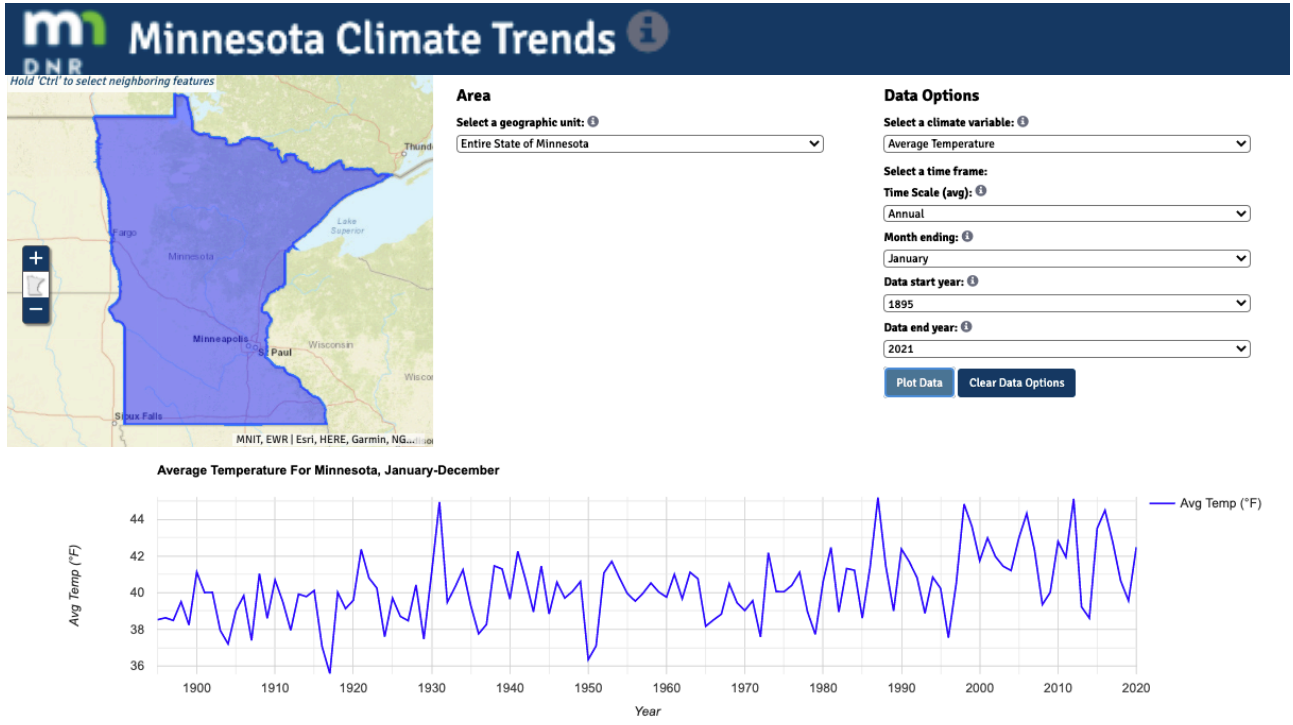


**Light green represents ~60 days per winter with basically no snow cover.**

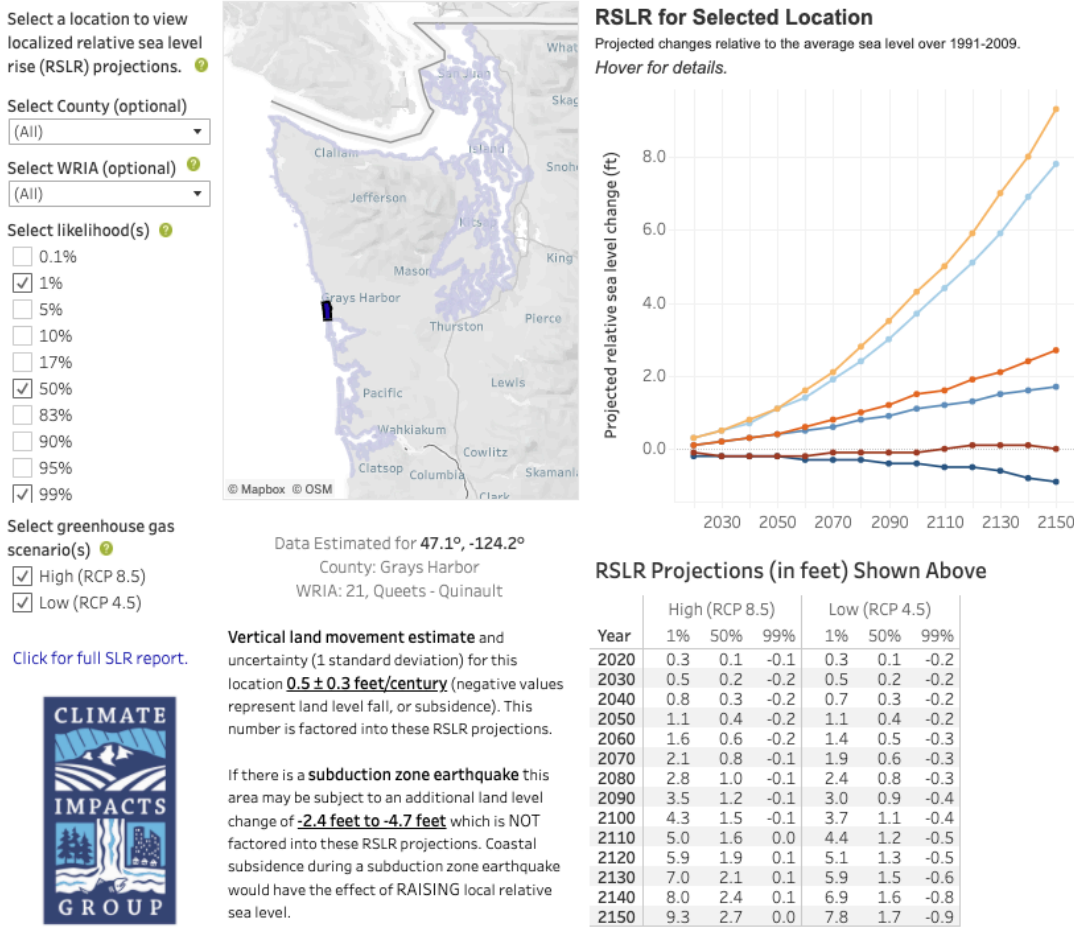


# We need more than model output.

Models are useful tools but only if used appropriately and in context.



## Washington State sea level projection visualization



This bill supports training, technical support, and data sharing needed to access and use these tools.





**This will add critical knowledge and capacity to our State's (climate) risk management toolbox.**



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