

Data to support climate risk management in Minnesota

Dr. Heidi Roop

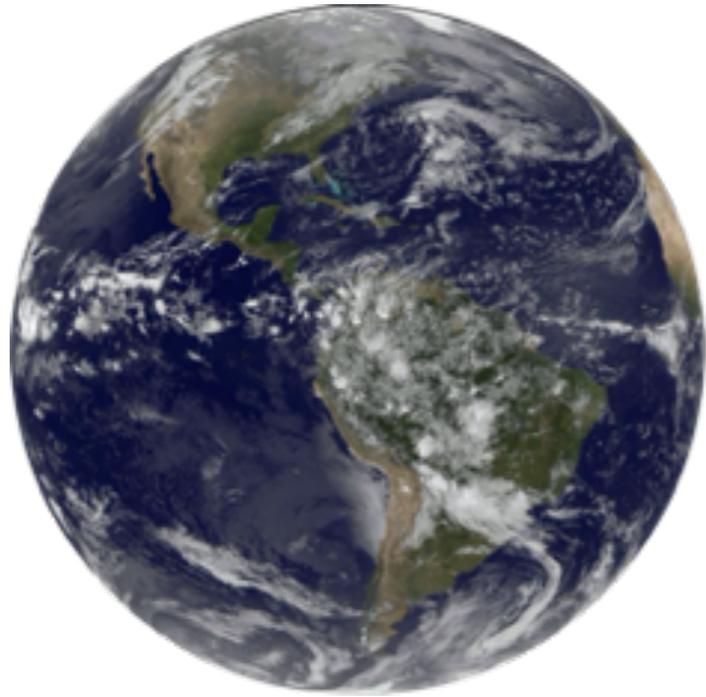
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Change is here.

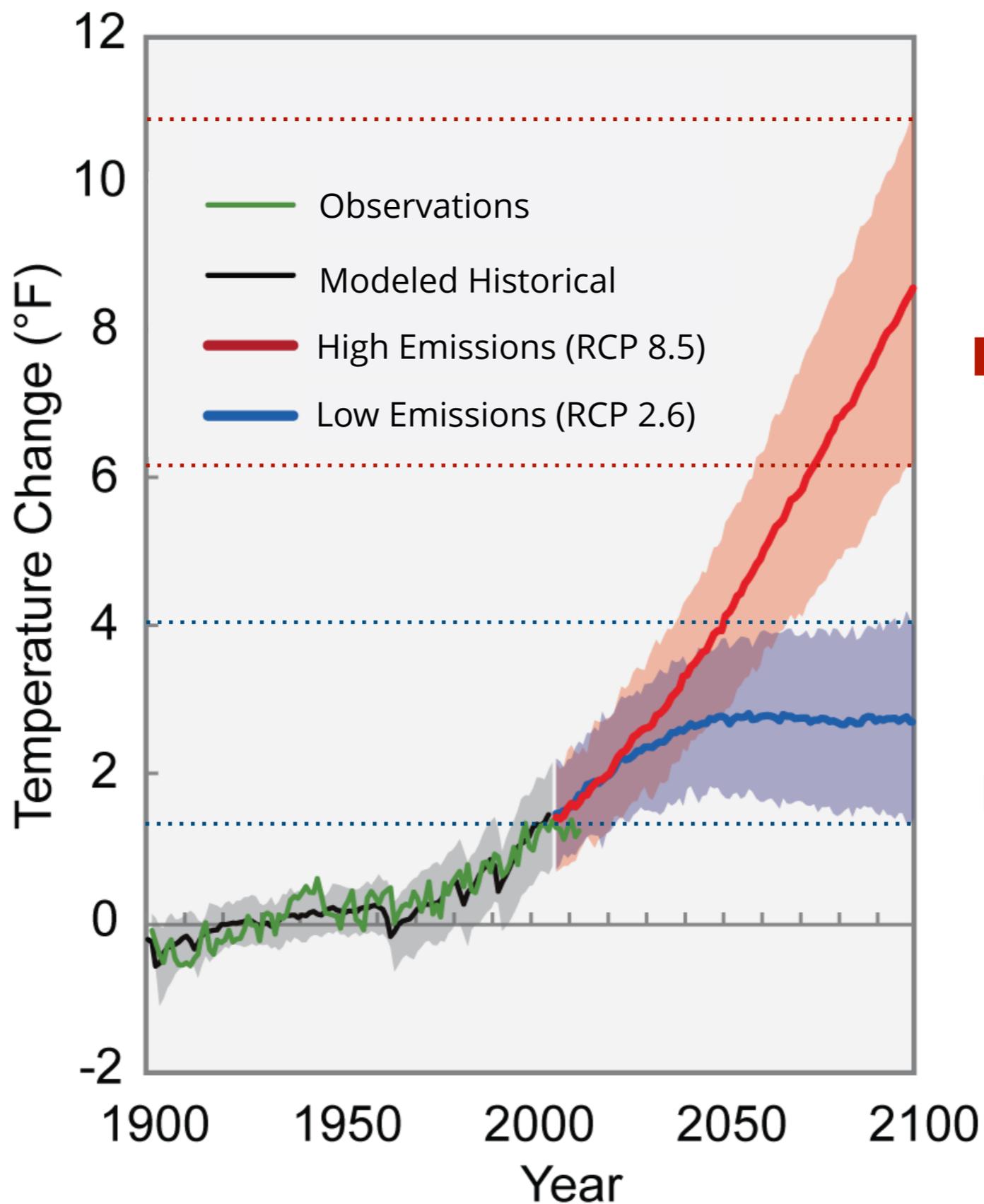


Average global temperature has increased over 2.0°F since the 1880's.



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

What does the future hold?

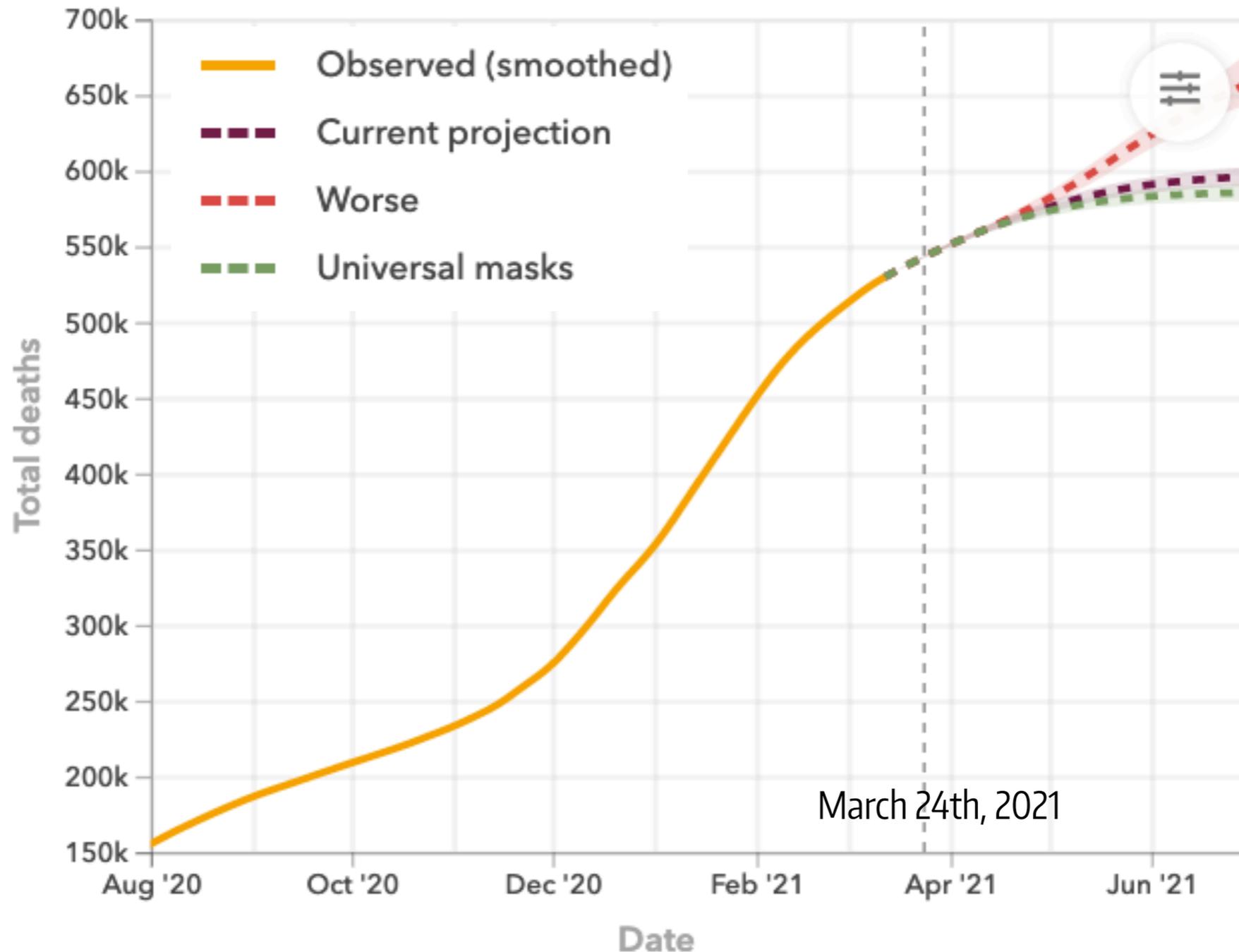


Projected
warming under
HIGH emissions

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



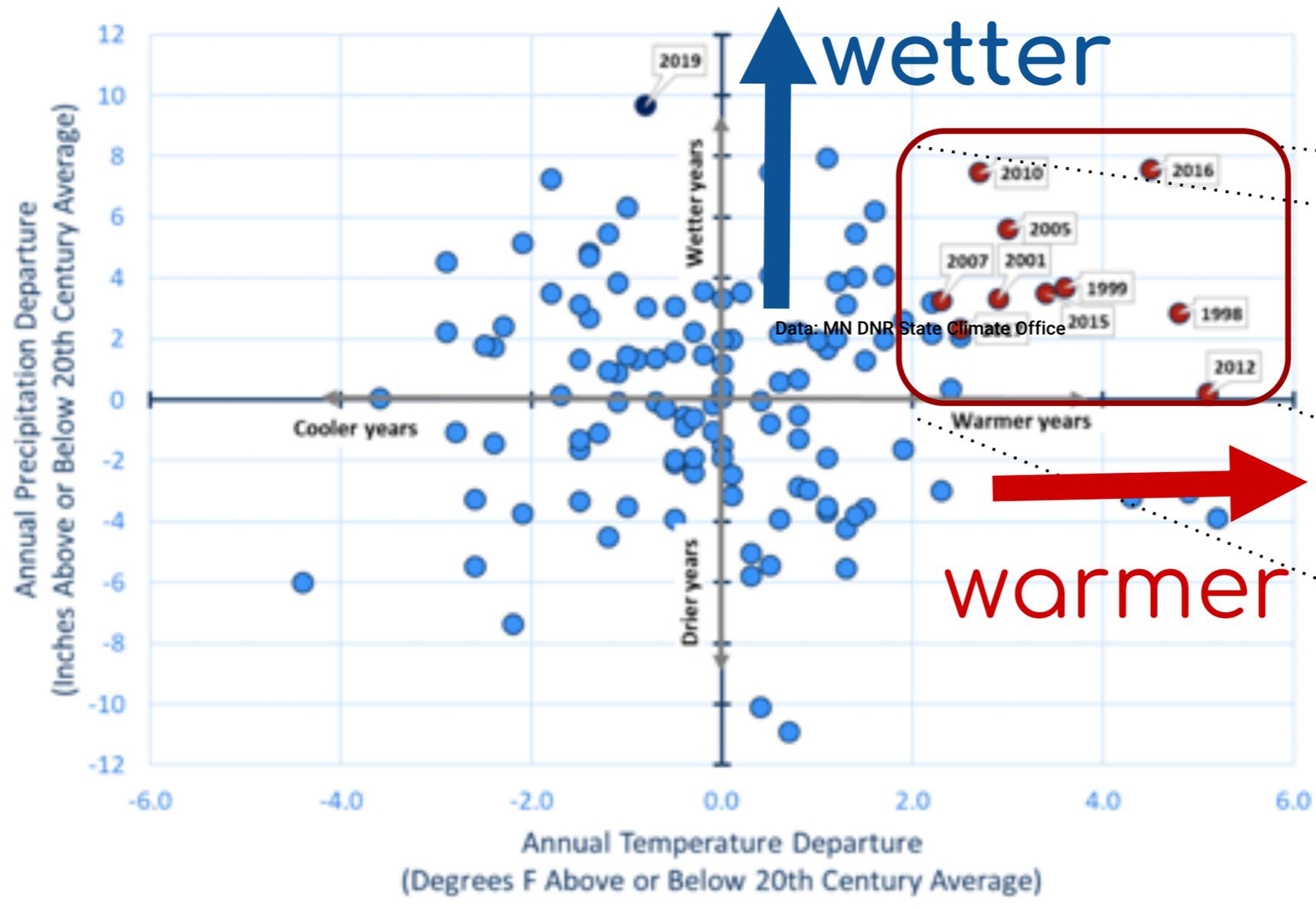
Low Accuracy
High Precision



High Accuracy
High Precision

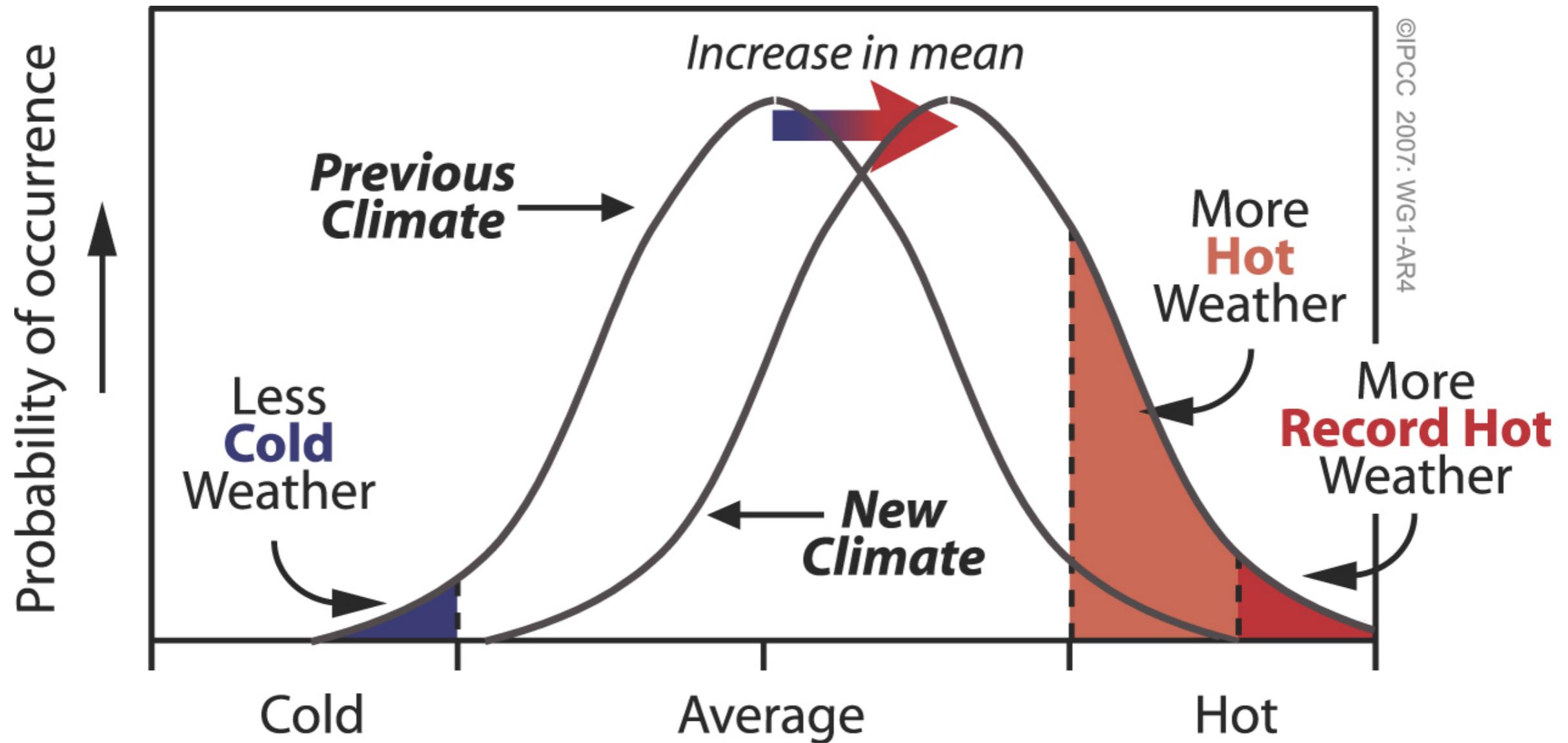
Past climate is no longer the best predictor of our future climate.

Minnesota is getting warmer & wetter



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

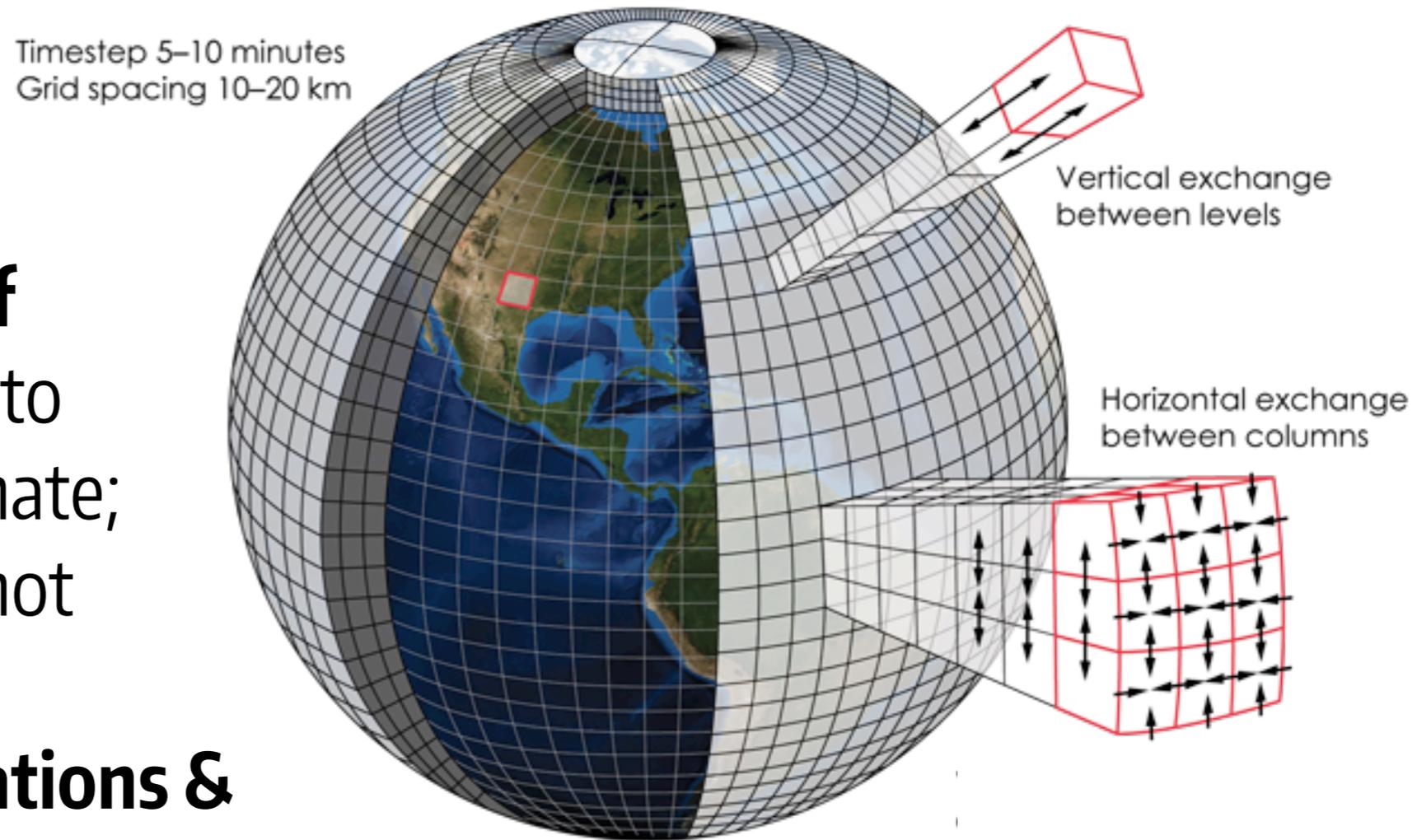
Climate change induces a shift in means *and* extremes



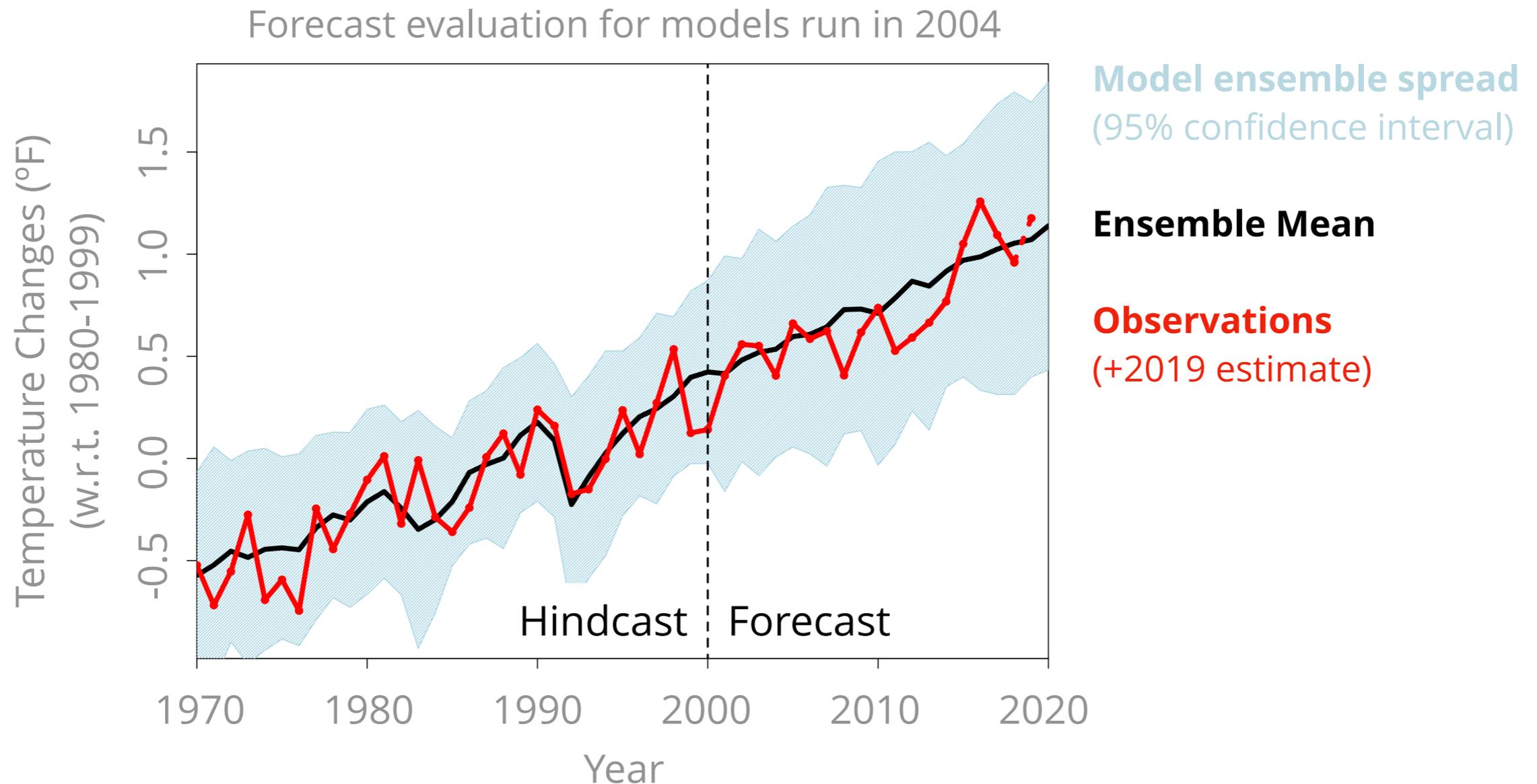
Climate models provide critical information about our future climate.

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



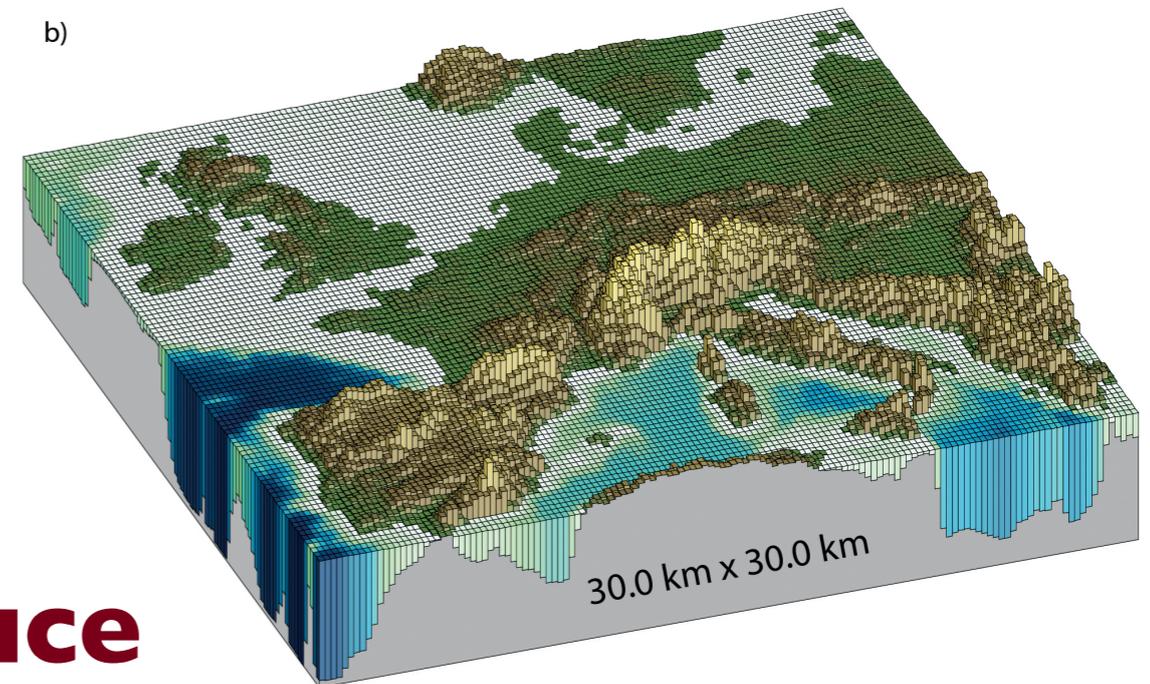
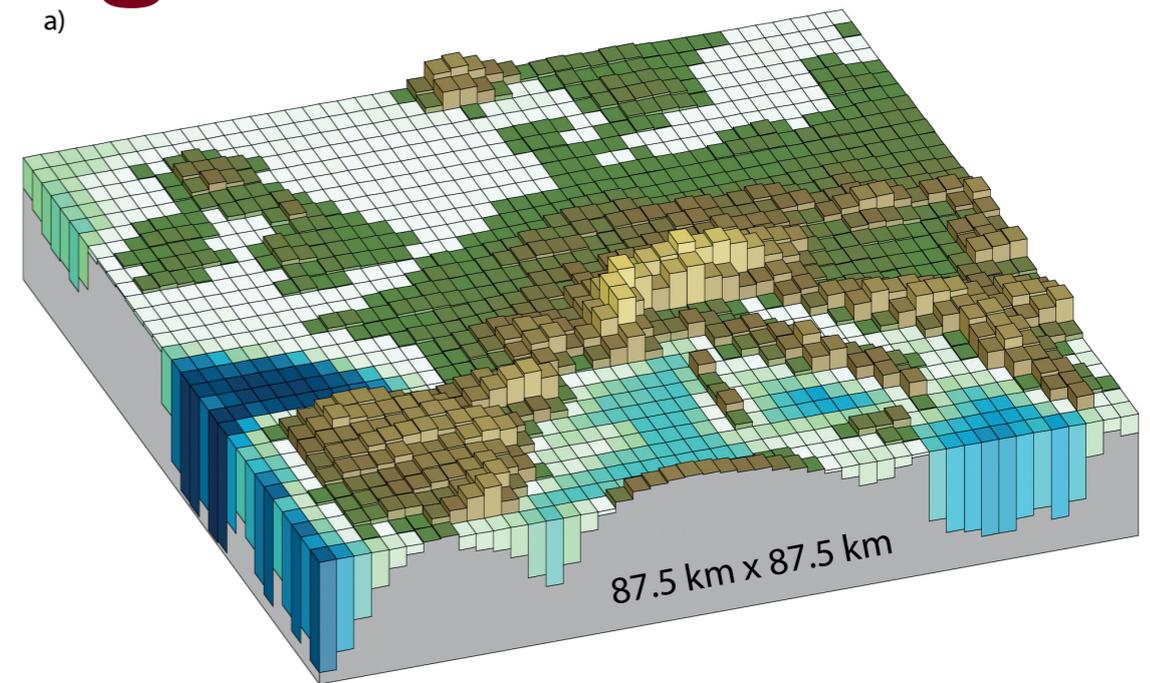
...at a scale and for variables that are useful for decision-making.

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

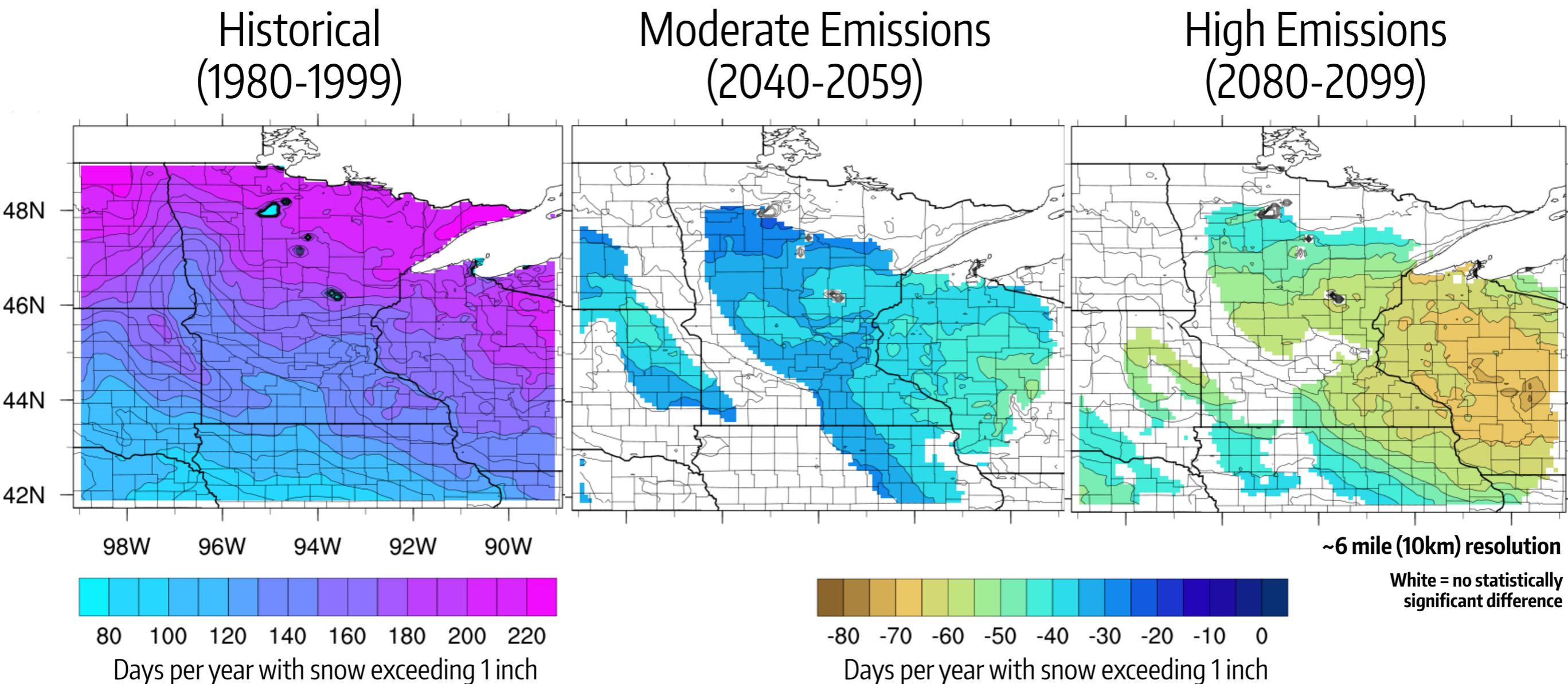
~19 miles (30km) = distance from St Louis Park to Maplewood

**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)



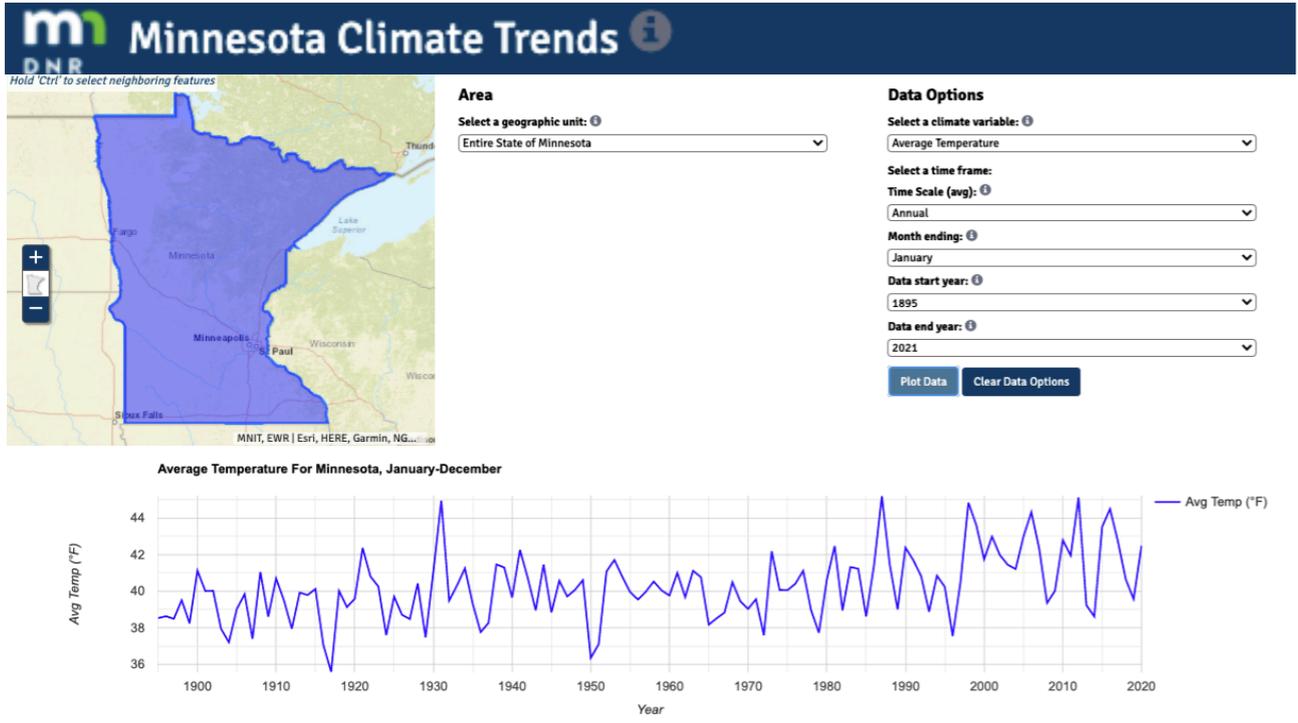
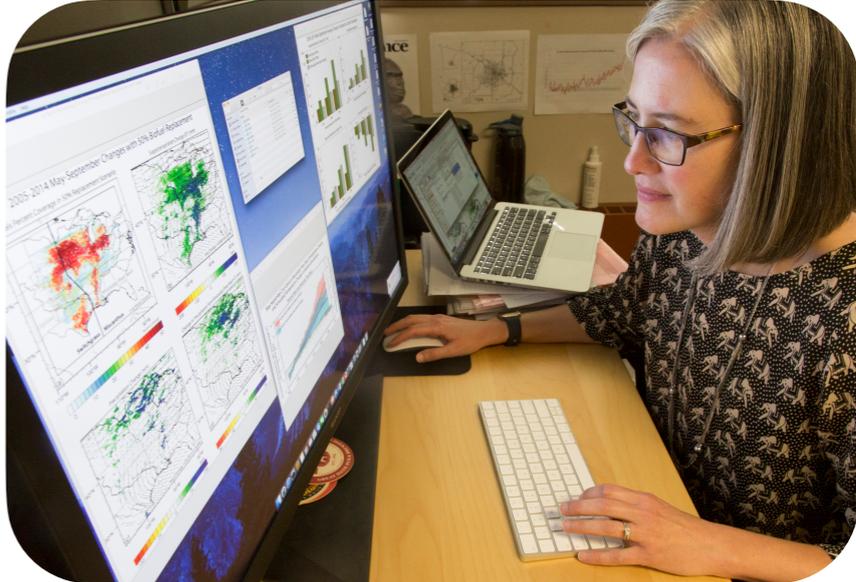
Example: Local projections of change in the number of days with snow exceeding one inch



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

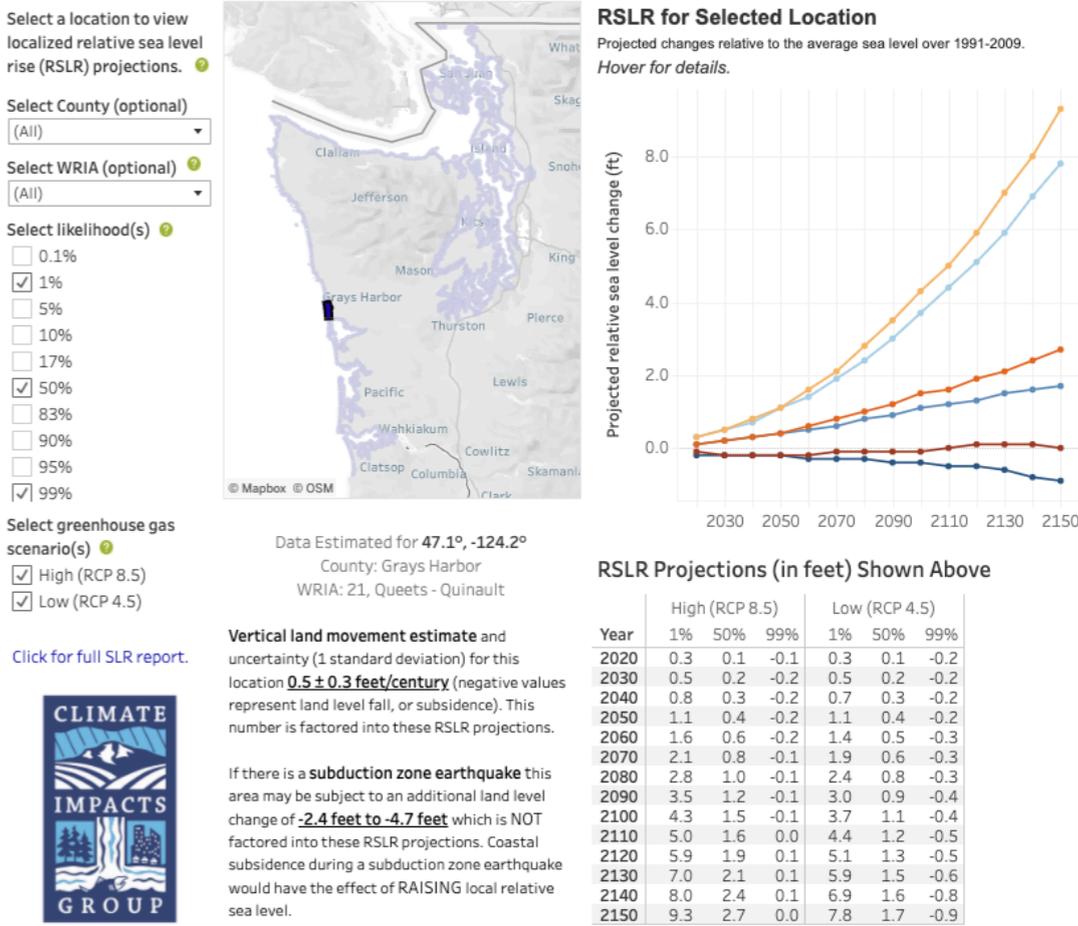
We need more than model output.

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



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

Washington State sea level projection visualization





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



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