Data to support climate risk management in Minnesota

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Change is here.

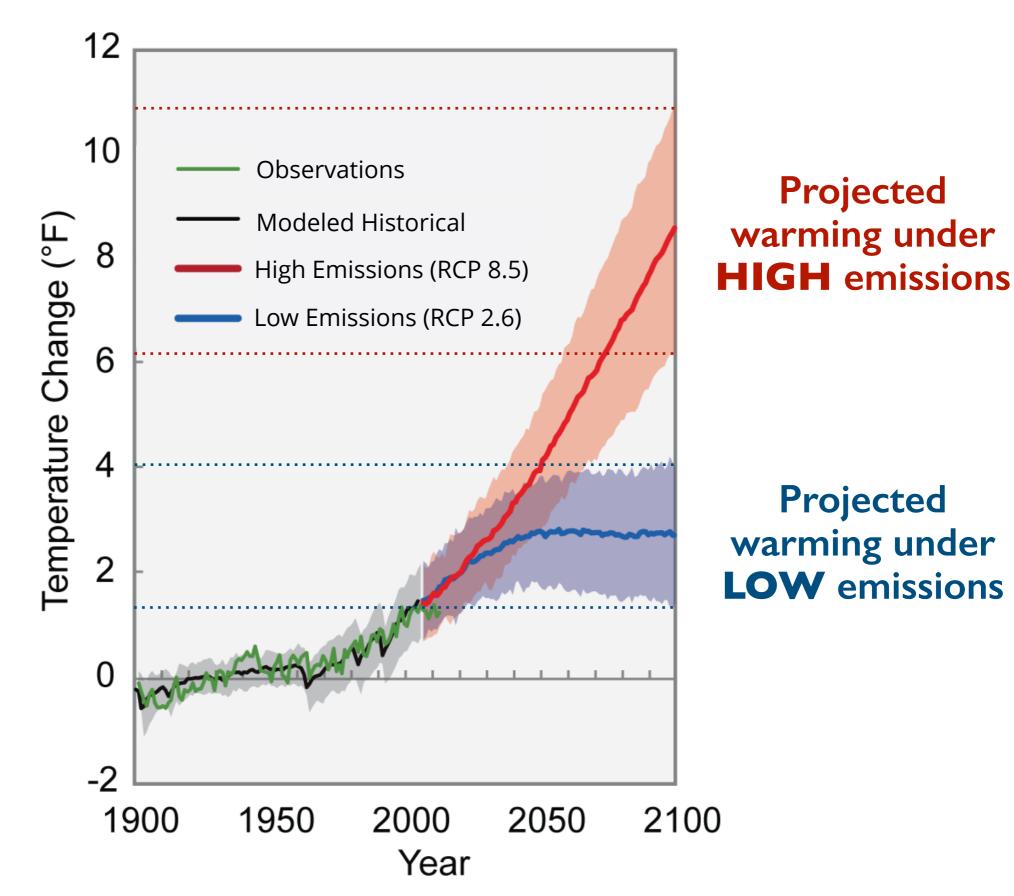


Average global temperature has increased over 2.0°F since the 1880's.



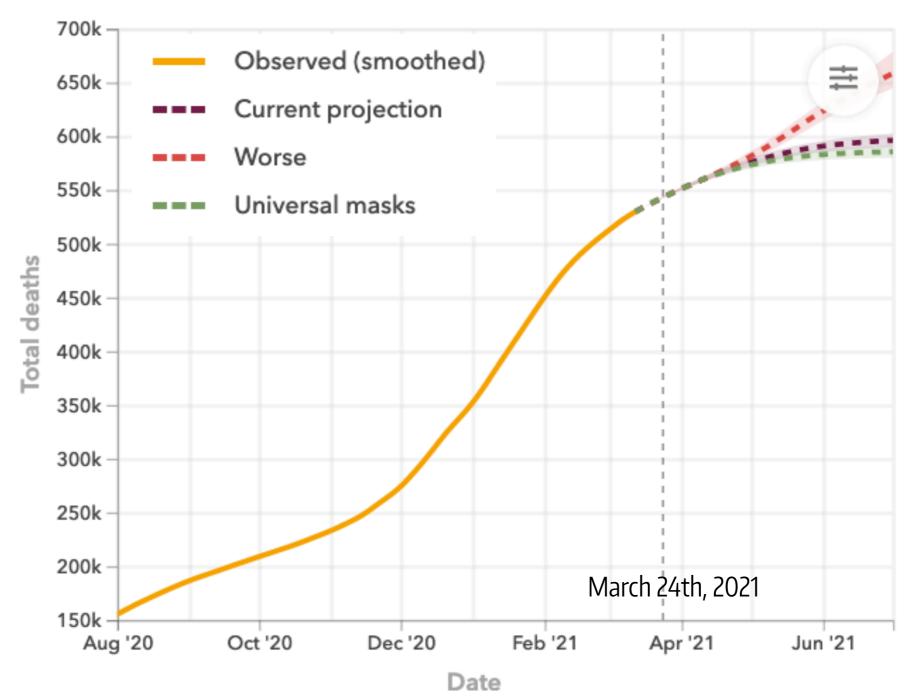
Minnesota's average annual temperature has increased by nearly 3°F since 1895.

What does the future hold?



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 <u>range of possible futures</u> we should plan for.

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





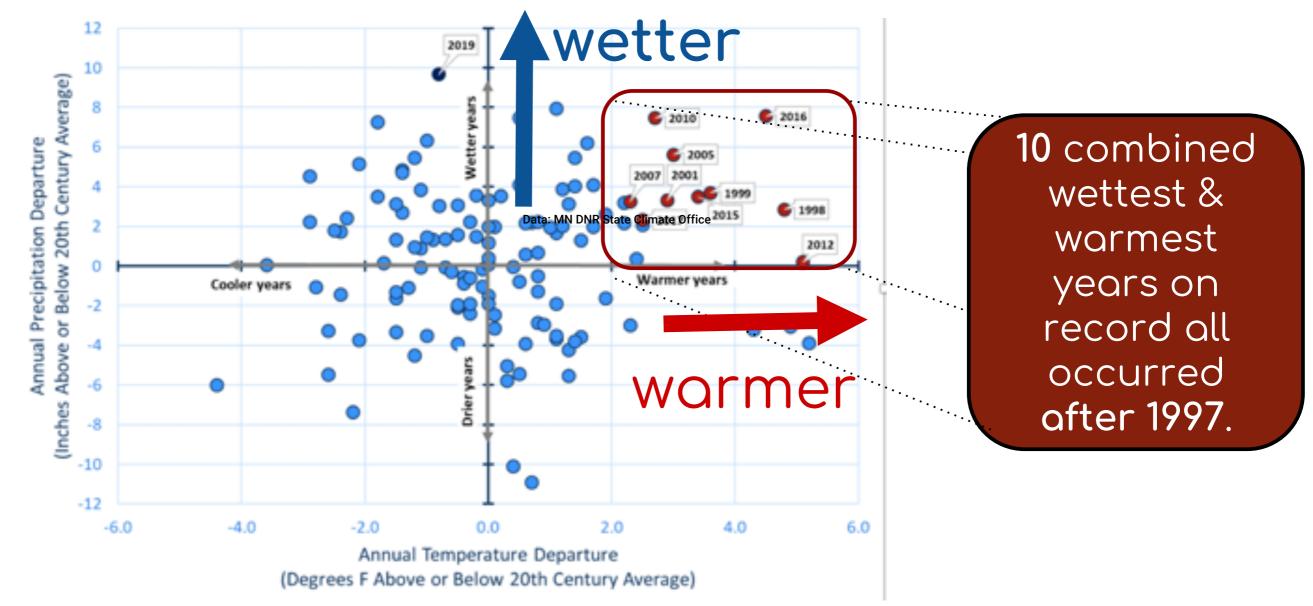
High Accuracy Low Precision



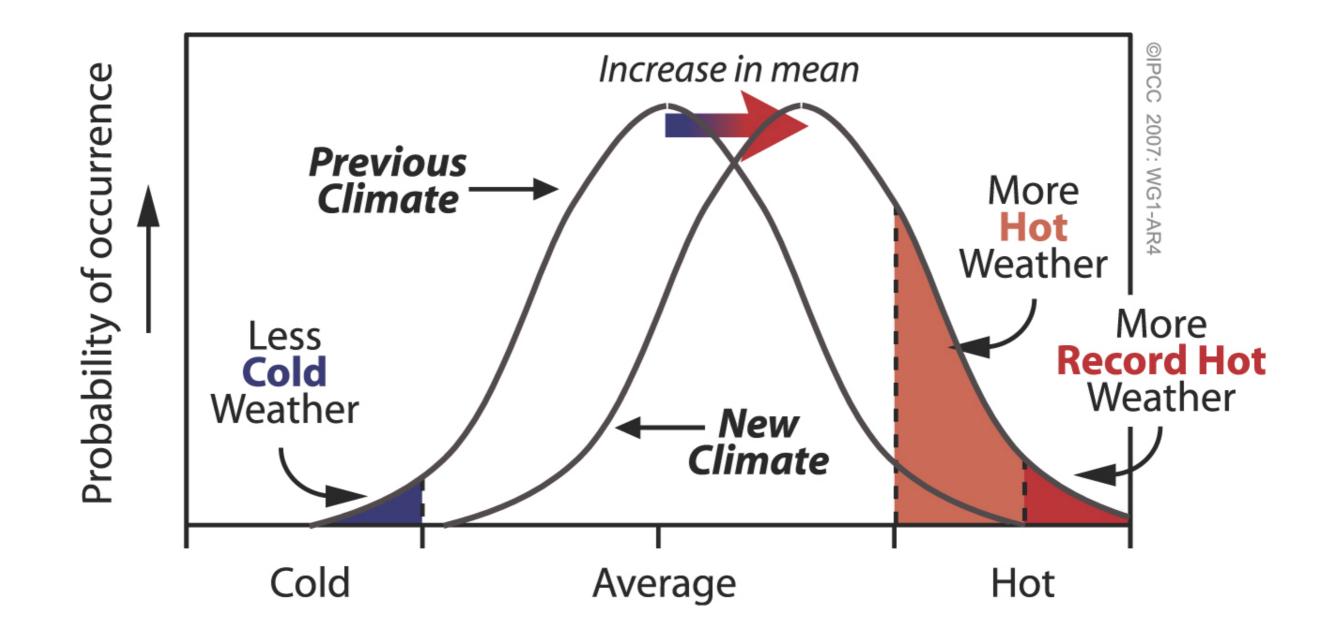


Past climate is no longer the best predictor of our future climate.

Minnesota is getting warmer & wetter



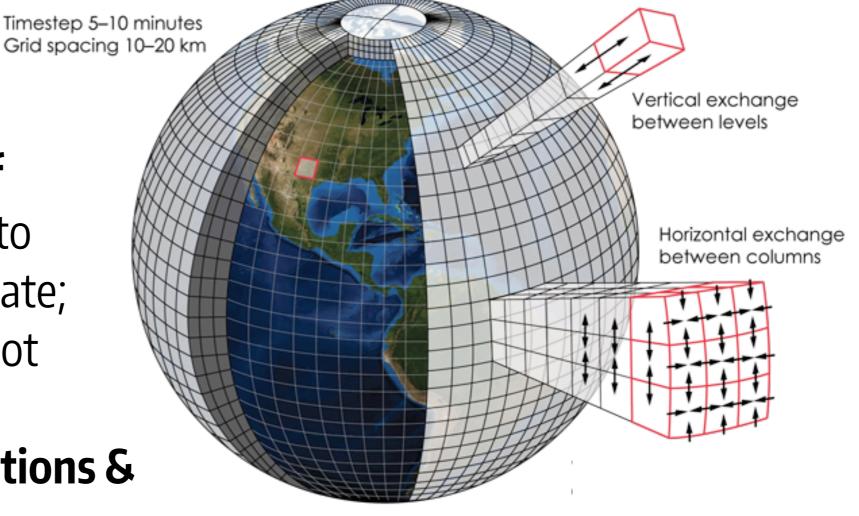
Climate change induces a shift in means and extremes



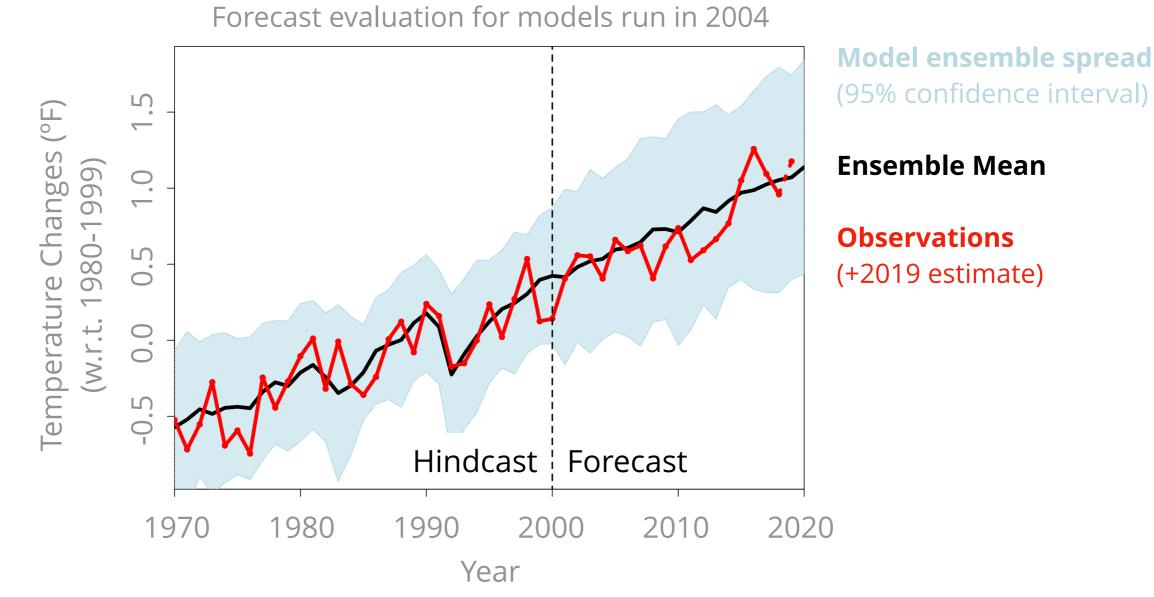
Climate models provide critical information about our future climate.

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?

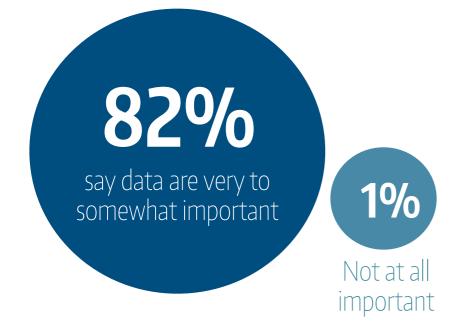


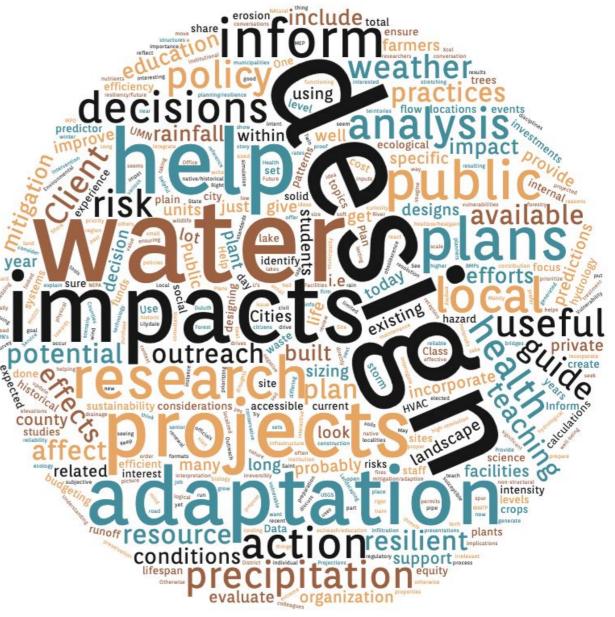
IPCC model projections from 2004 **compare well** with observed temperature change from 2004-2019

NASA: https://climate.nasa.gov/news/2943/study-confirms-climate-models-are-getting-future-warming-projections-right/

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.



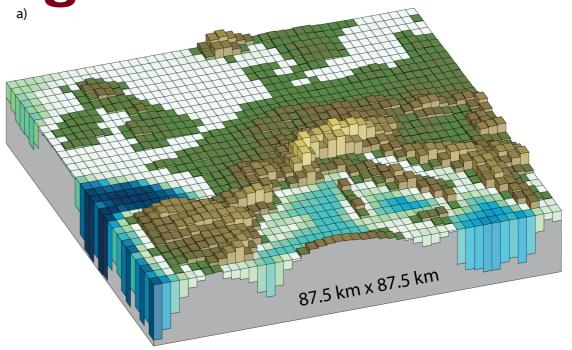


...at a scale and for variables that are useful for decision-making.

b)

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

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

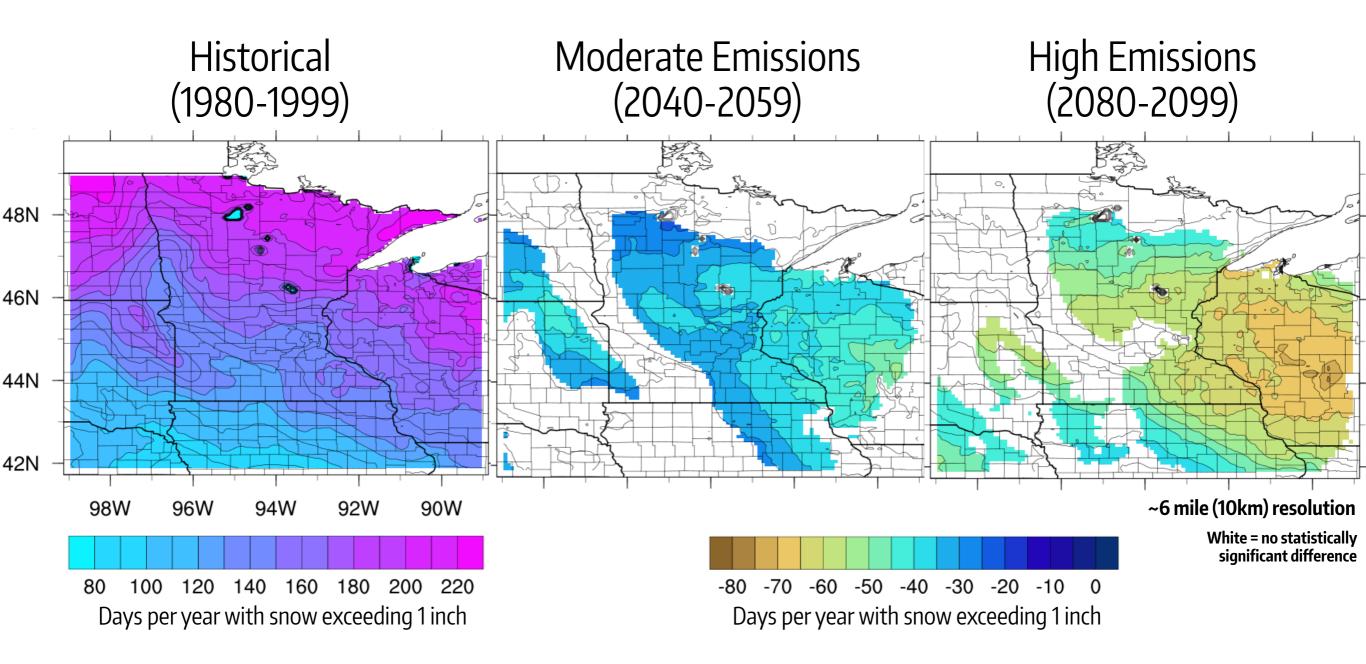


30.0 km x 30.0 km

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)

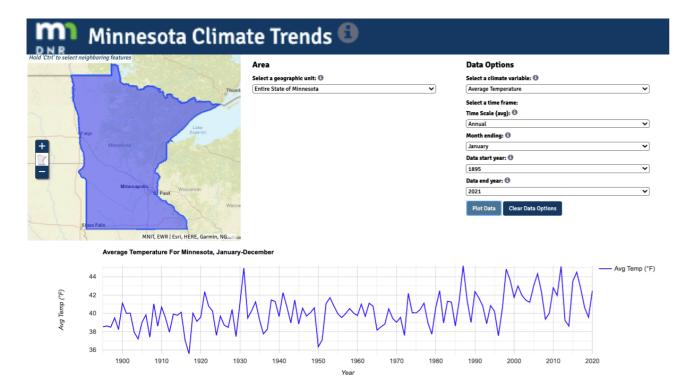
Example: Local projections of change in the number of days with snow exceeding one inch



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

Select a location to view localized relative sea level rise (RSLR) projections. Select County (optional) Select WRIA (optional) 🥹 Select likelihood(s) 0 0.1% ✓ 1% 5% 10% 17% √ 50% 83% 90% 95% √ 99% Select greenhouse gas

Select greenhouse g scenario(s) @ High (RCP 8.5) Low (RCP 4.5)

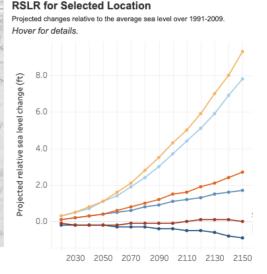
> CLIMATE IMPACTS GROUP

Click for full SLR repor

Data Estimated for **47.1°, -124.2°** County: Grays Harbor WRIA: 21, Queets - Quinault

Vertical land movement estimate and uncertainty (1 standard deviation) for this location 0.5 ± 0.3 feet/century (negative values represent land level fall, or subsidence). This number is factored into these RSLR projections.

If there is a **subduction zone earthquake** this area may be subject to an additional land level change of <u>-2.4 feet to -4.7 feet</u> which is NOT factored into these RSLR projections. Coastal subsidence during a subduction zone earthquake would have the effect of RAISING local relative sea level.



RSLR Projections (in feet) Shown Above

	High (RCP 8.5)			Low (RCP 4.5)		
Year	1%	50%	99%	1%	50%	99%
2020	0.3	0.1	-0.1	0.3	0.1	-0.2
2030	0.5	0.2	-0.2	0.5	0.2	-0.2
2040	0.8	0.3	-0.2	0.7	0.3	-0.2
2050	1.1	0.4	-0.2	1.1	0.4	-0.2
2060	1.6	0.6	-0.2	1.4	0.5	-0.3
2070	2.1	0.8	-0.1	1.9	0.6	-0.3
2080	2.8	1.0	-0.1	2.4	0.8	-0.3
2090	3.5	1.2	-0.1	3.0	0.9	-0.4
2100	4.3	1.5	-0.1	3.7	1.1	-0.4
2110	5.0	1.6	0.0	4.4	1.2	-0.5
2120	5.9	1.9	0.1	5.1	1.3	-0.5
2130	7.0	2.1	0.1	5.9	1.5	-0.6
2140	8.0	2.4	0.1	6.9	1.6	-0.8
2150	9.3	2.7	0.0	7.8	1.7	-0.9

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



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