

Equipping cities with climate change data for stormwater management

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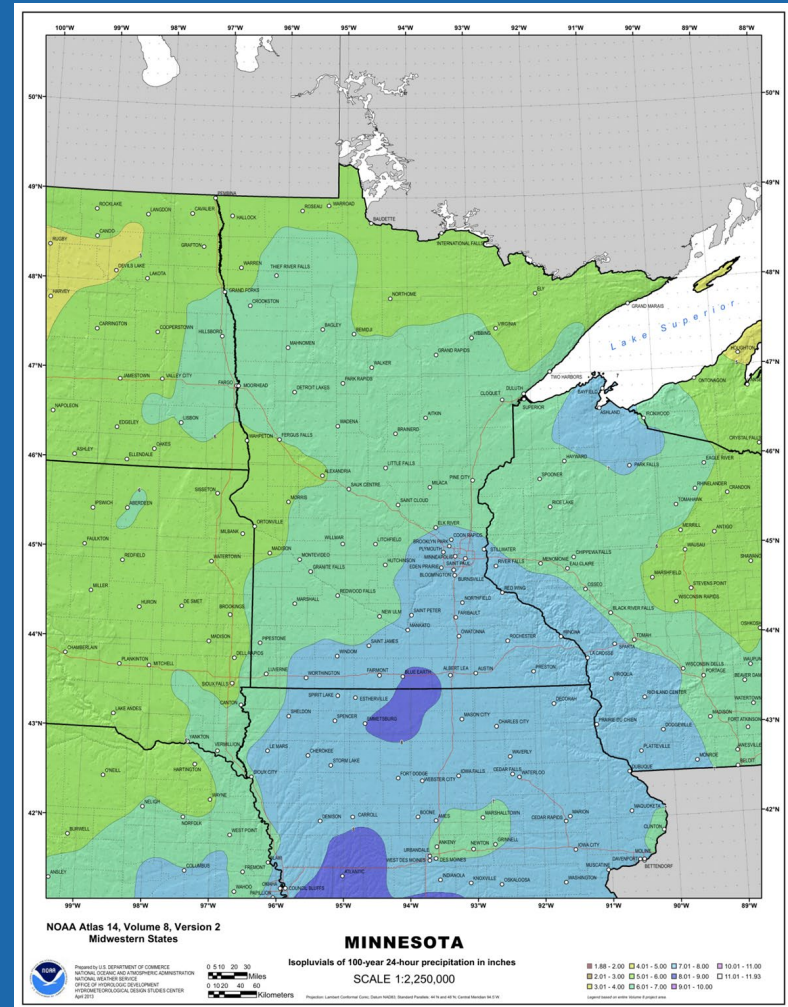
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Background and objectives

NOAA Atlas 14 is an accepted standard in planning for extreme events - but it assumes climate stationarity in its underlying methods.

We utilize an ensemble of climate projections to replicate NOAA methods, and provide usable information to represent 21st-century changes.

These projections are downscaled from global models to better represent heterogeneity within Minnesota.



Downscaled climate projections

8 GCMs, 4 scenarios:

Historical (1980-1999)

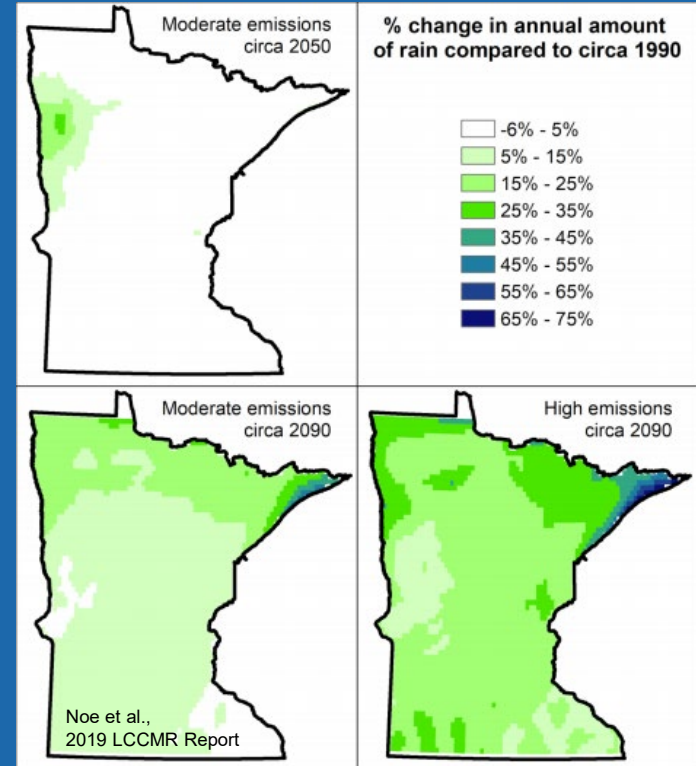
Mid-century (2040-2059), moderate emissions

End-century (2080-2099), moderate emissions

End-century (2080-2099), high emissions

Dynamical downscaling provides an advantage over statistical downscaling in representing storm events.

Precipitation outputs are bias corrected to match observational monthly means in the historical scenario.



Statistical methods

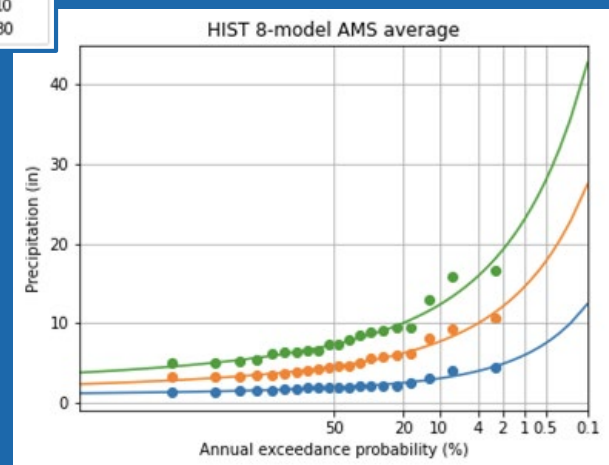
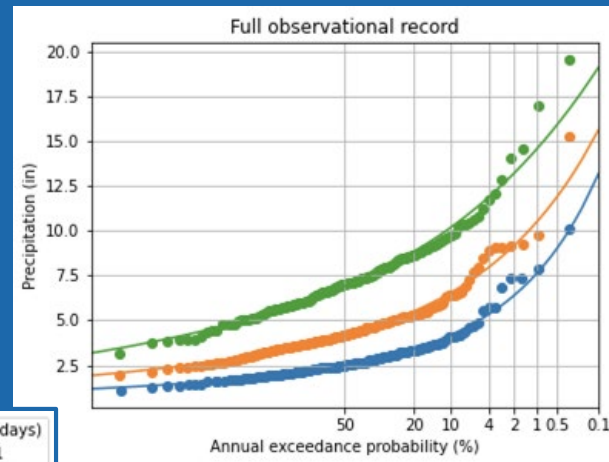
Each model-scenario combination produces a set of 20-year annual maximum series, which are fitted to GEV probability distributions.

Challenges: Shorter time series

Impacts of ensemble averaging at different stages

Inherent station-gridcell differences

Less concern over spatial interpolation or data cleanup than with observational records.



Next steps

Collaborate with the Nature Conservancy on pilot projects in Alexandria and other pilot cities:
can we meet an unmet demand for climate information to aid planning?

Expand these calculations across the entire model grid, and apply spatial aggregation as appropriate, to produce a more comprehensive statewide resource.