

Understanding Changes in “Big Snow” Events in Eastern North America

Exploring snowfall

Using a 50-member regional climate model ensemble (1955-2099) from the ClimEx project, we explore the statistics of highly impactful snowfall in Eastern North America in a warming climate and address where and when we might be able to detect and expect significant changes in event impact and frequency over time.

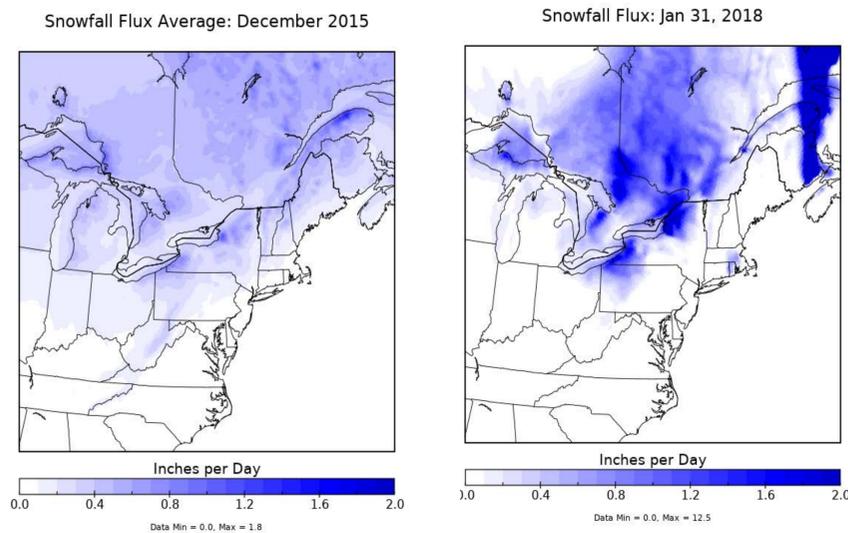


Figure 1. Example of average monthly snowfall across all 50 model simulations (left) and example of daily snowfall from a single model simulation (right)

95th percentile snowfall

The largest 95th percentile snowfalls are along the coastline, and not in the North where the most snow falls overall. The 95th percentile daily snowfall increases in some parts of the northeast, and in high-elevation regions of Virginia and North Carolina.

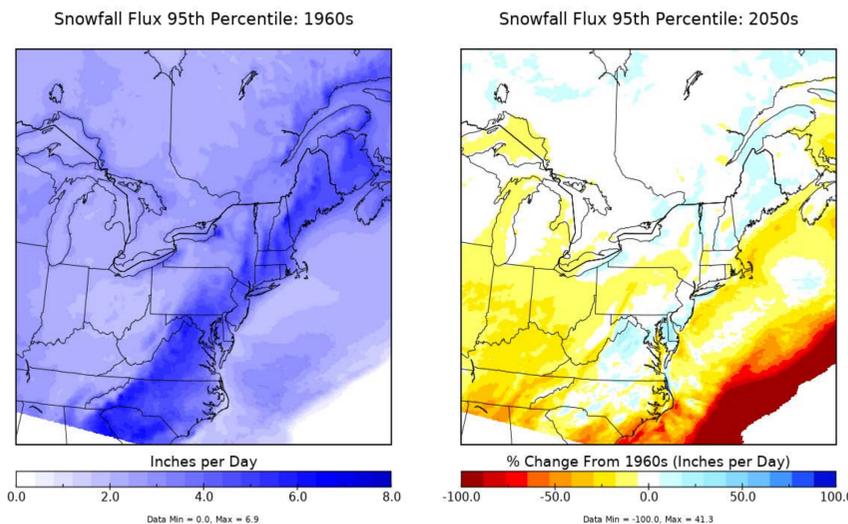


Figure 2. Predicted 95th percentile snowfall for the 1960s (left) and projected percent change in 95th percentile snowfall in the 2050s relative to the 1960s (right)

Changes in “Big Snow” events

For a given decade, we define a “big snow” event to be a day of snow that had over 1% of that decade’s snowfall (10% of the annual average). Over time, the northern US is projected to receive more big snow events, especially in some parts in New England as well as in lake effect regions such as upstate New York and Michigan.

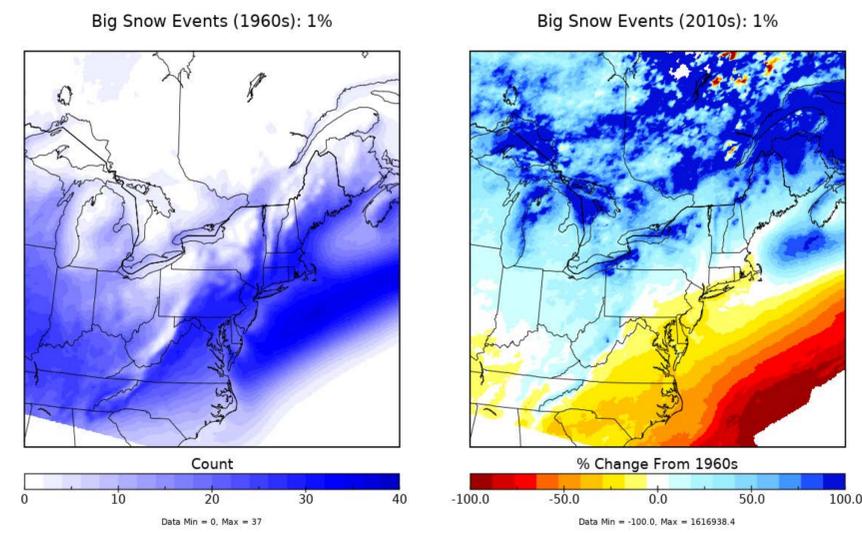


Figure 3. Projected number of big snow events in the 1960s (left) and projected percent change in number of big snow events in the 2010s relative to the 1960s (right)

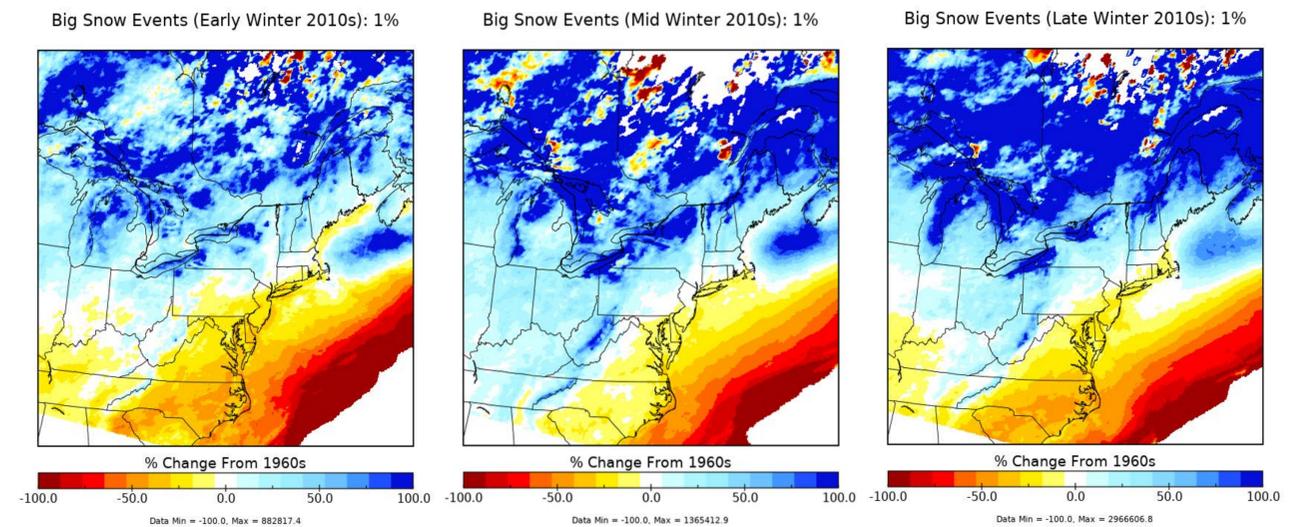


Figure 4. Projected percent change in number of big snow events in the 2010s relative to the 1960s in November/December (left), January (middle), and February/March (right)

Conclusions

Despite a warming climate, we still expect big impact snowfalls to persist for many in decades, and in some regions may actually increase. The mechanism is associated with higher humidity warm air masses interacting with Arctic cold air outbreaks to produce higher intensity snowfall, even as total snowfall decreases in most areas. Further work will focus on characterizing these changes more carefully and calibrating the model simulations to direct observations over the last few decades.

Acknowledgments

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References

The ClimEx Project. <http://www.climex-project.org/>