# Introduction

### **Region Selection**

- account for 86% of the nation's total snowstorm losses (1).

### What is a Blizzard?

- The NWS defines a blizzard as having 3+ hours of:
- change
- Snowfall's response involves two external forcings:
- Increases in precipitation, implying more snowfall.
- snow fraction (3).
- frequent or intense



- into account human perception of snowfall
- Analyze change in blizzard frequency with CO<sub>2</sub> doubling
- individual variables (snowfall, winds)

- 4. O'Gorman, P. A. (2014). Contrasting responses of mean and extreme

# **Assessing East Coast Blizzards under Climate Change**

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Snowfall patterns Figure FLOR 1990 **CM2.5** using Control Atmosphere. A. Mean snowfall patterns on the East Coast. Note that FLOR captures orographic influences on snowfall as well as finer spatial resolution processes, such as lake-effect snow in New York and Ontario. B. The 99.8<sup>th</sup> percentile of two-day snowfall. This is the threshold this study's blizzard in used definition with the exception of cases where this threshold was below .5cm. Note: to estimate snow depth in inches from liquid multiply liquid equivalent, equivalent by 4.

patterns after CO<sub>2</sub> doubling. A. The difference between annual snowfall in the control run and the experiment (700ppm) run. All areas experience decreases with  $CO_2$  doubling. B. The change in the number of unique two-day periods with snowfall meeting or

exceeding the control's 99.8<sup>th</sup>

decreases with increased  $CO_2$ .

percentile.

Red

signifies



- excluded.
- increases
- precipitation
- definition
- and snow cleanup

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### **Regional Response of Blizzards**

Percent Change in Blizzard Frequency with Double CO<sub>2</sub>

-100-80 -60 -40 -20 0 20 40 60 80 100 120 140 160 180 20 Percent Change in Blizzard Frequency with Double CO<sub>2</sub>

Figure 4: The percent change in the number of blizzards after **CO<sub>2</sub> doubling.** Blizzard counts reflect only unique blizzard instances and include no overlapping days. Areas where there were too few blizzards to provide meaningful statistics were

### Conclusions

Mean snowfall decreases in this region with  $CO_2$  doubling, which is consistent with previous studies

Extreme snowfall's response to CO<sub>2</sub> doubling is muted compared to mean snowfall, with some areas experiencing

Blizzards tend to decrease in the South and coastal areas where temperature forcing may outweigh increases in

Blizzard frequency, according to this study's definition, increases in high latitudes and high altitudes (Appalachians)

Blizzard response to climate change depends on blizzard

• Important for climate adaptation: infrastructure, urban planning,

# **Future Work**

Results are preliminary, continuing work for senior thesis Use gridded observational data to validate wind speed threshold appropriate to model's spatial and temporal resolution Analyze individual components of blizzards to determine what causes changes in blizzard frequency

# Acknowledgements