Freezing Rain in the Great Lakes Region:
Continuing work on a regional climatology

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BACKGROUND

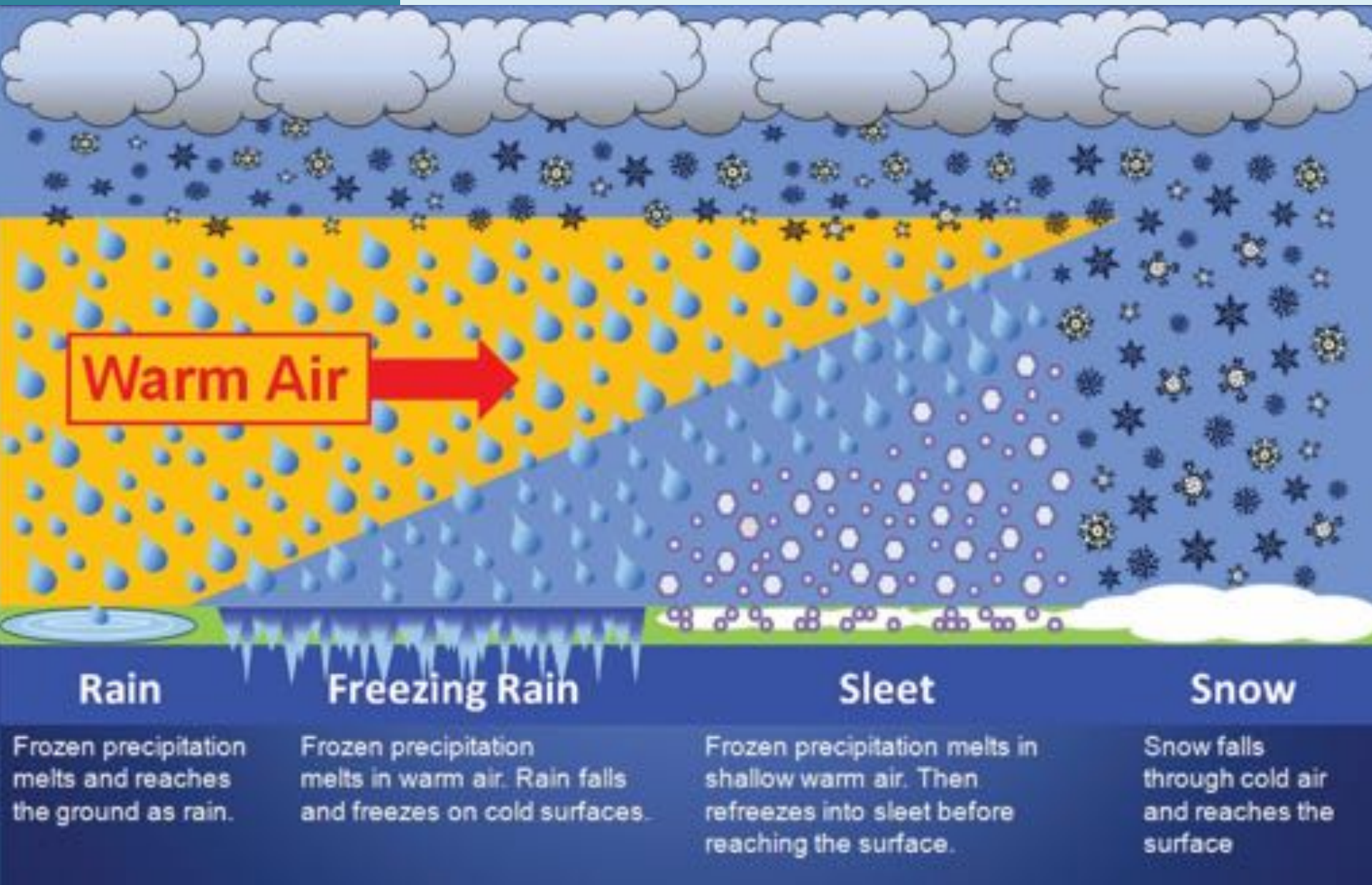
What's freezing rain and why should we care?

- Ice storms are characterized by freezing rain (FZRA)
  - deadly
  - expensive
- Events very rare, very quick: ~4-20 hourly reports/year
  - Temporal/climate signal difficult to coax out
- Regional research is outdated

YouTube user: The Hacksmith; Thomson Higher Education

BACKGROUND

Dynamics of FZRA formation



PROJECT OVERVIEW

Previous work

- Cortinas 2000 was most recent Great Lakes FZRA climatology
  - Spanned 15 years (1976 – 1990)
  - Analyzed spatial/temporal trends and meteorological conditions
- Ben Mallernee & B.J. started work on FZRA climatology project in Winter 2015
  - Focused on Michigan and Illinois observations
  - Filtered ASOS station records down to hourly events
  - Quality controlled for observation frequency

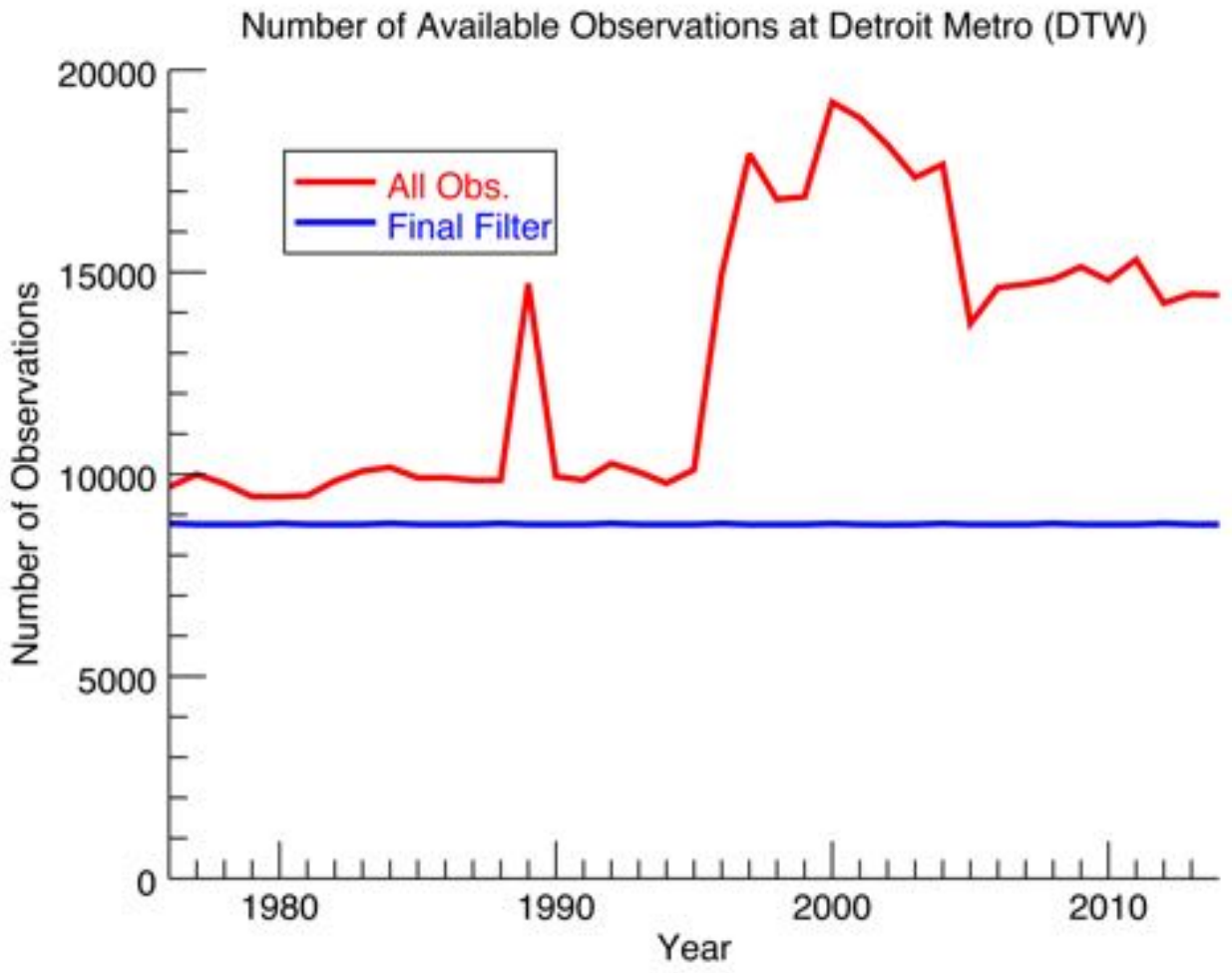
METHODS

This semester

- Further filtered down to as consistent of an hourly time step as possible
- Expanded to other states
  - List states and spatial domain and num. sites
- Specific goal: update Cortinas climatology
  - Spatial distribution and trends
  - Hourly and seasonal frequency
  - Temporal trends

METHODS

Filtering hourly observations

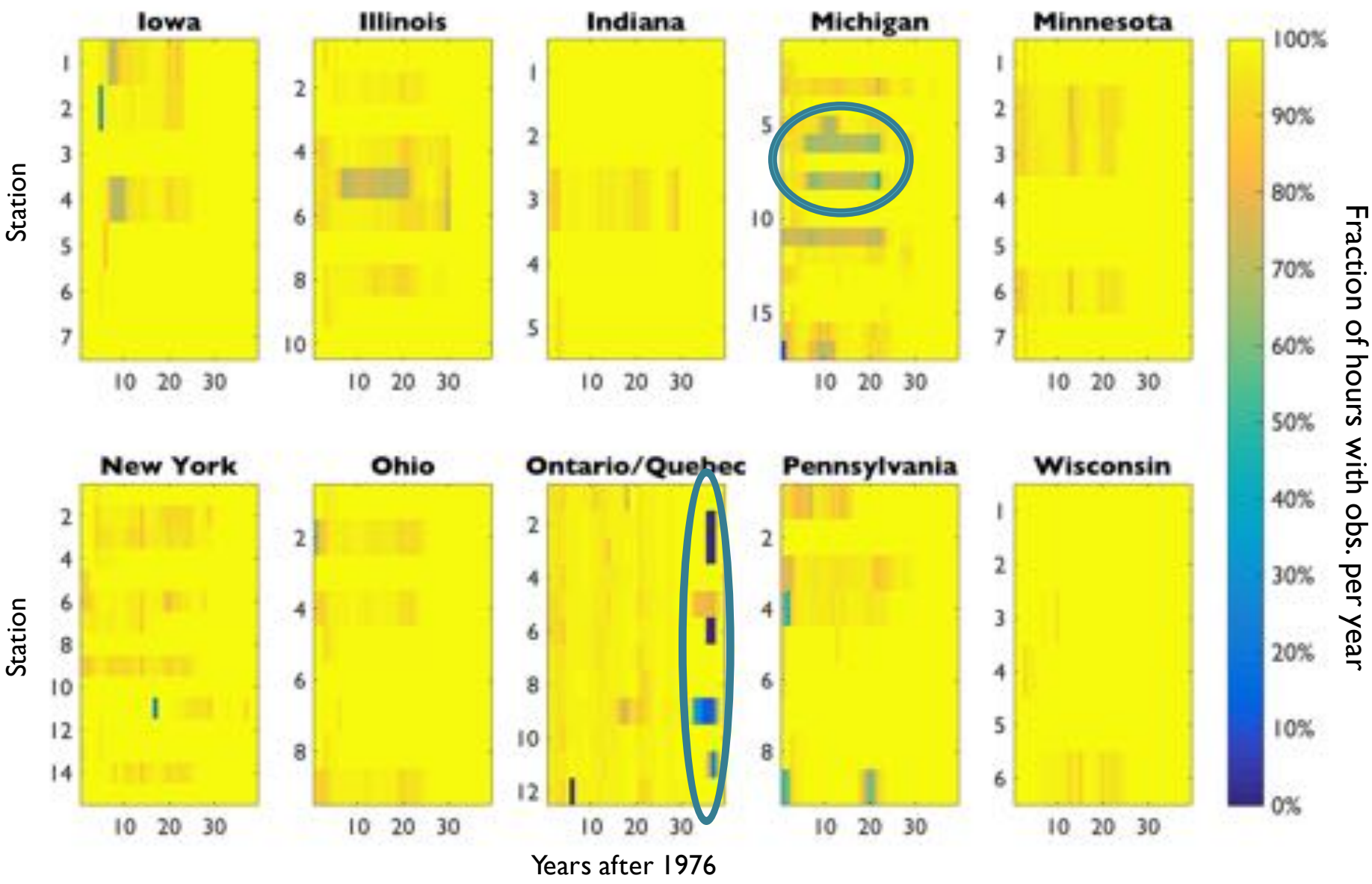


METHODS

Concerns over automated observations

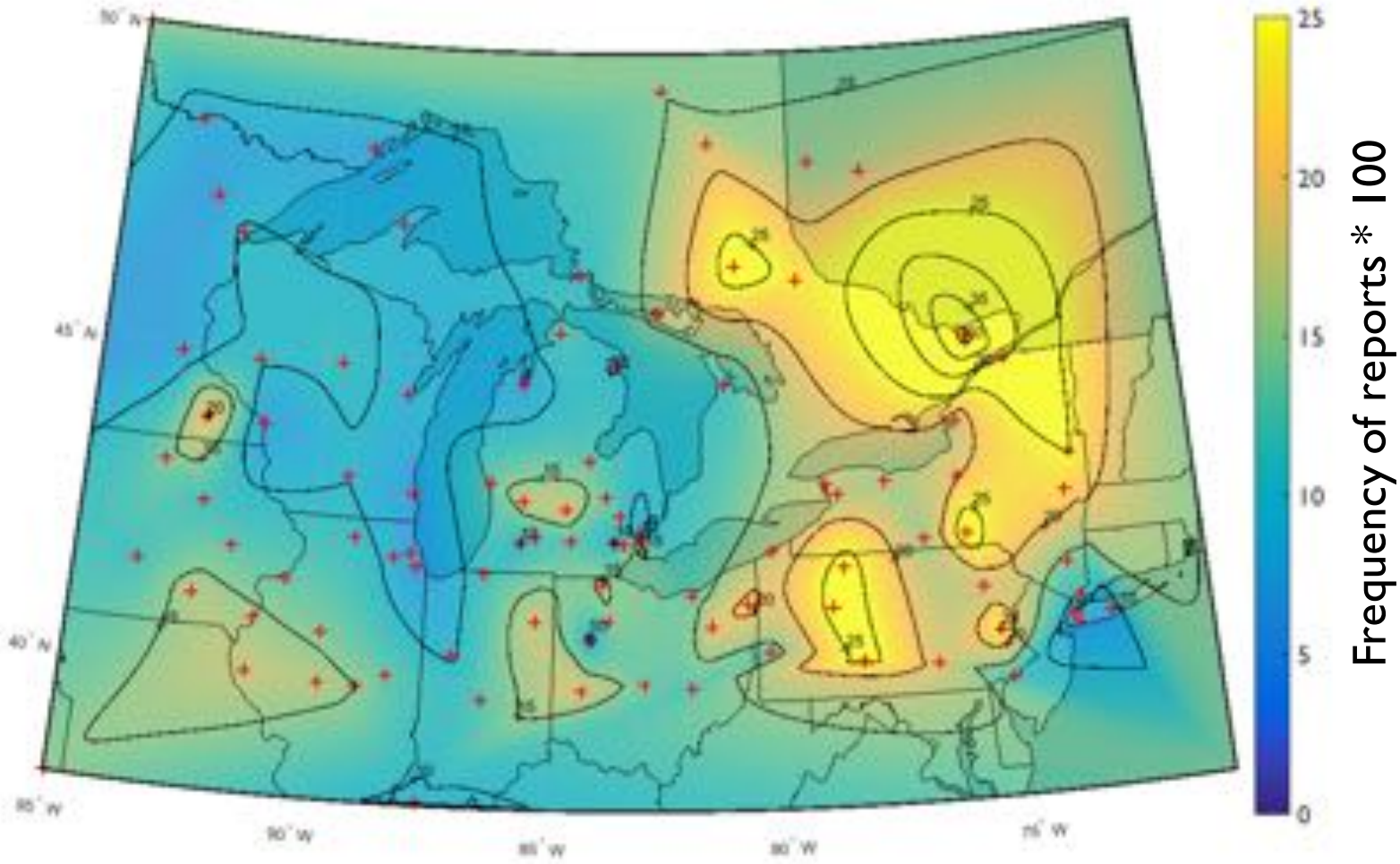
- Transition was made to ASOS in early-mid '90s
- FZRA instruments began operation at all ASOS stations in 2005
  - Sensitive: 0.01 in. min threshold
  - Spike in observations after introduction

Quality control



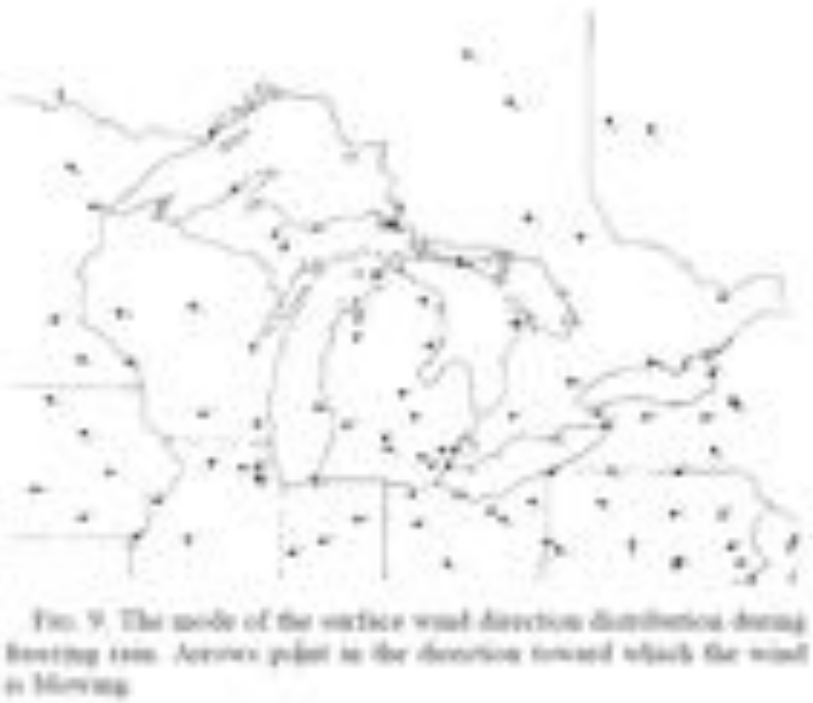
RESULTS

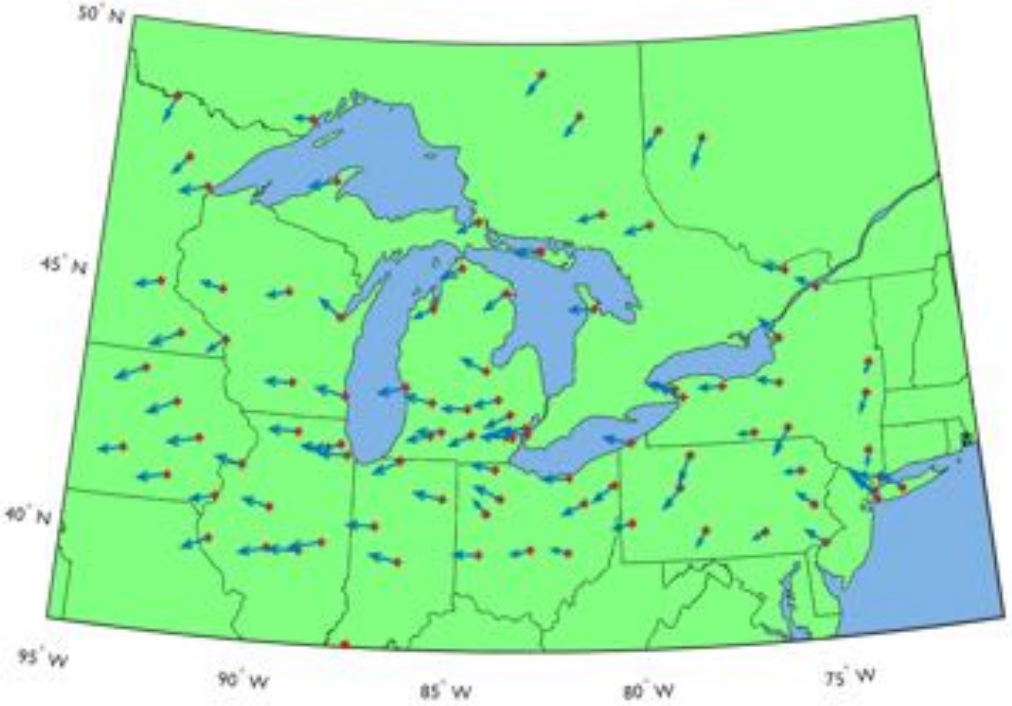
Contour map



RESULTS

Wind during FZRN events

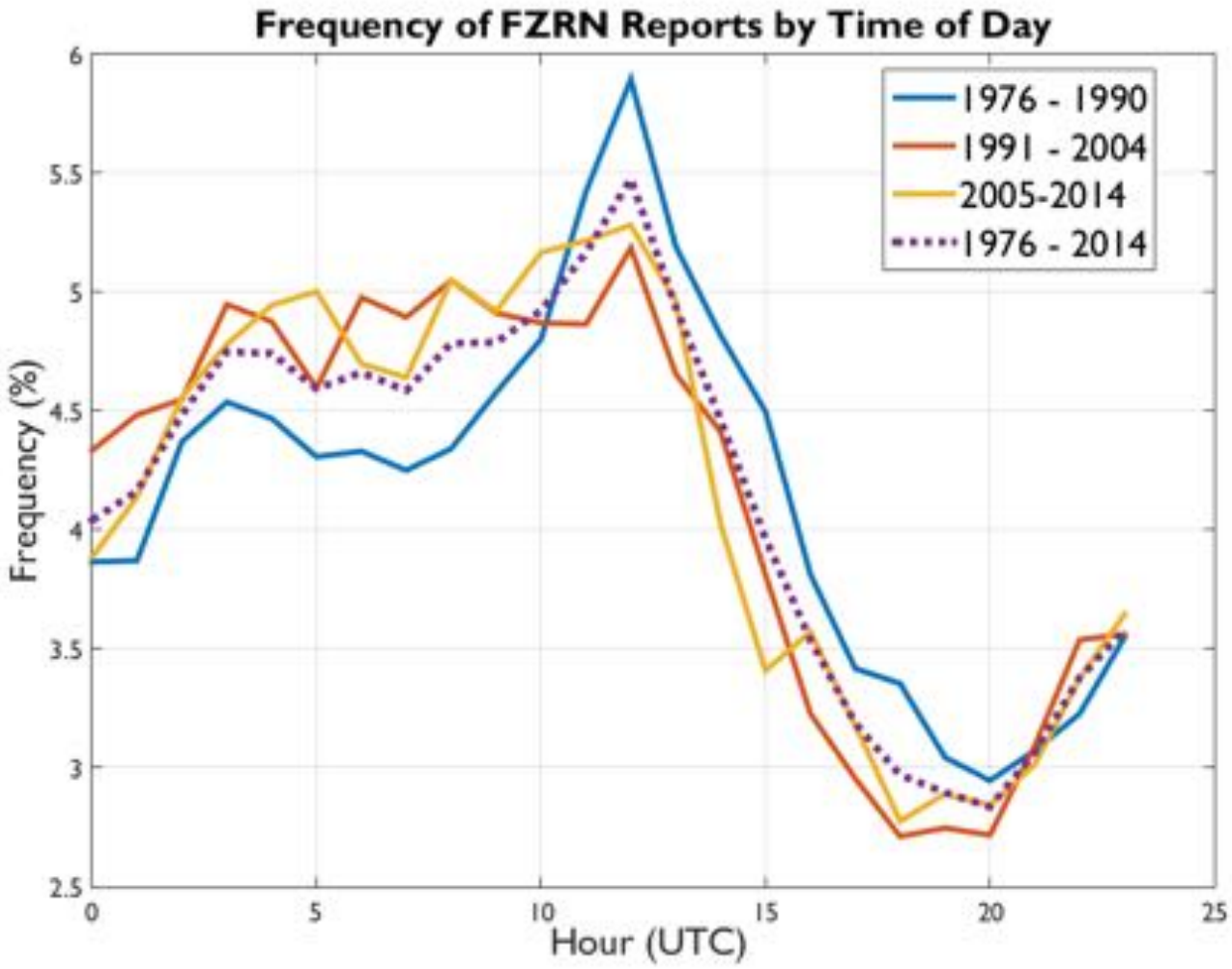




Light easterly winds during most events

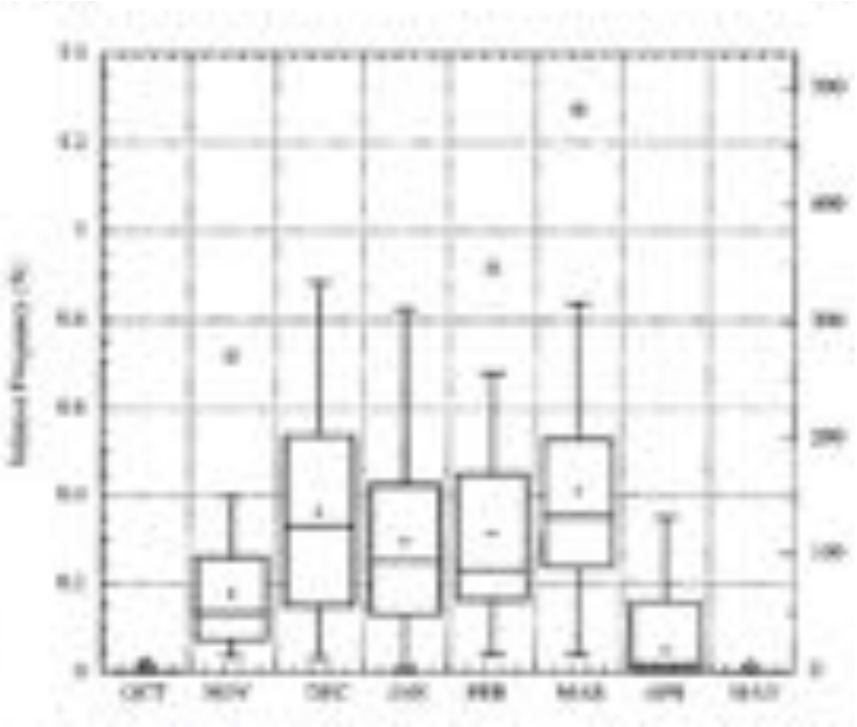
RESULTS

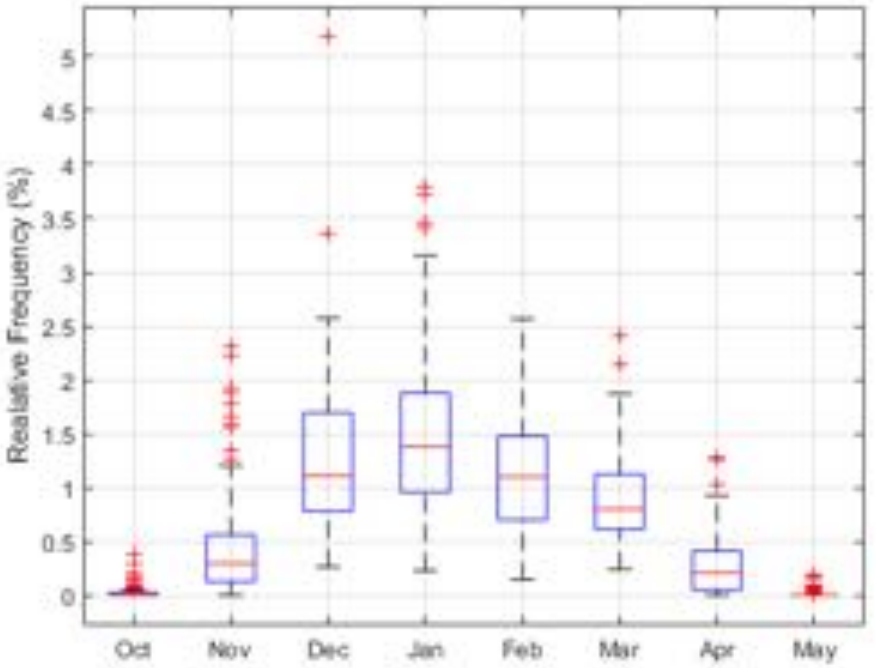
Frequency by hour



RESULTS

Frequency by month





Conclusions

- Thorough filtering and data quality
- Results match well with those reported by Cortinas for 1979-1990 period
- U-shaped overall decadal trend across region
- FZRA
- Caveats:
  - Limited utility
  - Sparsity of observations

CONCLUSIONS

Future Work

- Meteorological analysis
  - Upper air considerations
  - Teleconnections
  - Climate signal?
- Possible partnership with DTE on power system outages & impacts from FZRA
- Other parties have expressed interest in Great Lakes FZRA

Thanks! Questions?