



A Climatology and Characteristics of Midwest Heavy Snowfall Events

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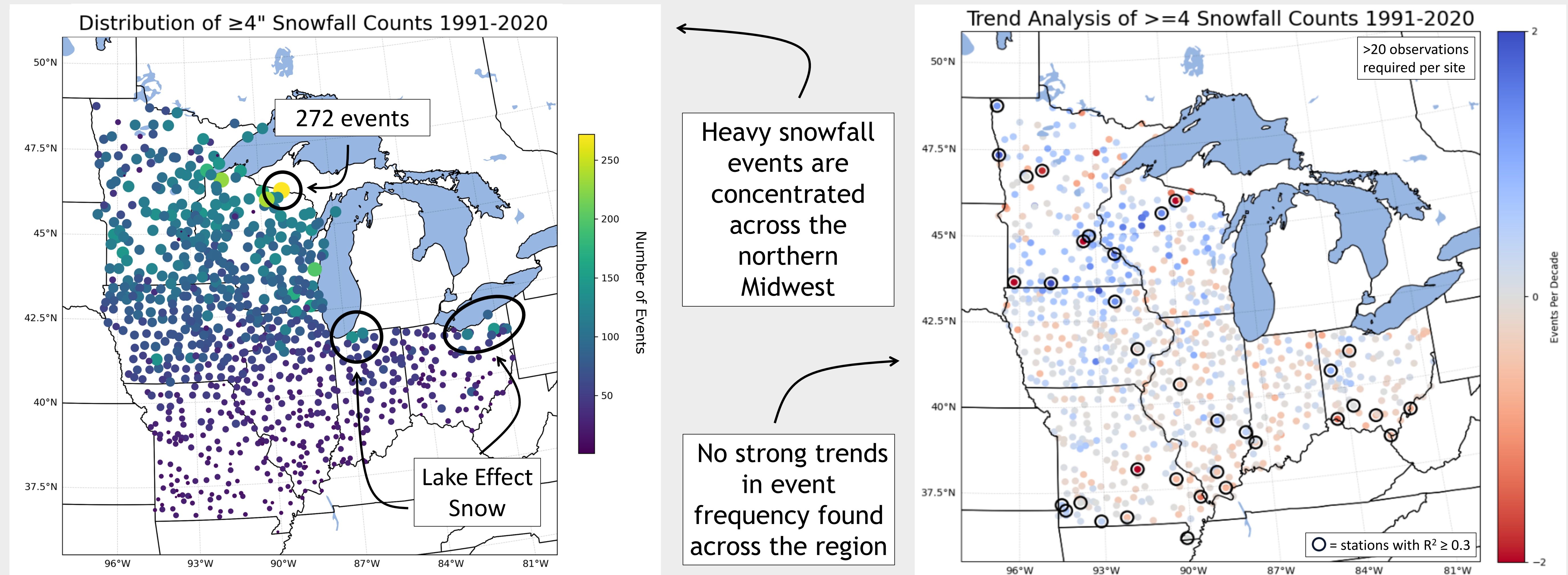
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Introduction

- Storms producing heavy snowfall are often high impact events across the U.S. (Black and Mote 2015)
- Many heavy snowfall studies and climatologies to-date are focused on the Northeast U.S. (Novak et al. 2004, 2008, 2010; Kenyon 2013; Ganetis et al. 2018)
- Research on Midwest heavy snowfall climatologies and banded snowfall events, however, remain limited
 - Baxter and Schumacher (2017) provide of one the only Midwest-centric snowband climatology, albeit only spanning a five-year period between 2006-2011
- Here, we provide a climatology of observed Midwest heavy snow events and assess 30-year trends

Heavy Snowfall Event Distribution & Trends



Data & Methods

- NWS 24-h COOP snowfall observations of $\geq 4''$ in 7 Midwest states (828 stations) for 1991-2020
 - In total, we found 49,506 heavy snowfall observations spanning 2645 unique dates
- Using the nearest radar site for each event (Fig. 1) and a feature-detection radar function available within the Python ARM Radar Toolkit (Fig. 2), we created animated radar loops to identify possible banded features
- Events are subjectively categorized as Banded, Non-banded, or Mixed (Fig. 2)

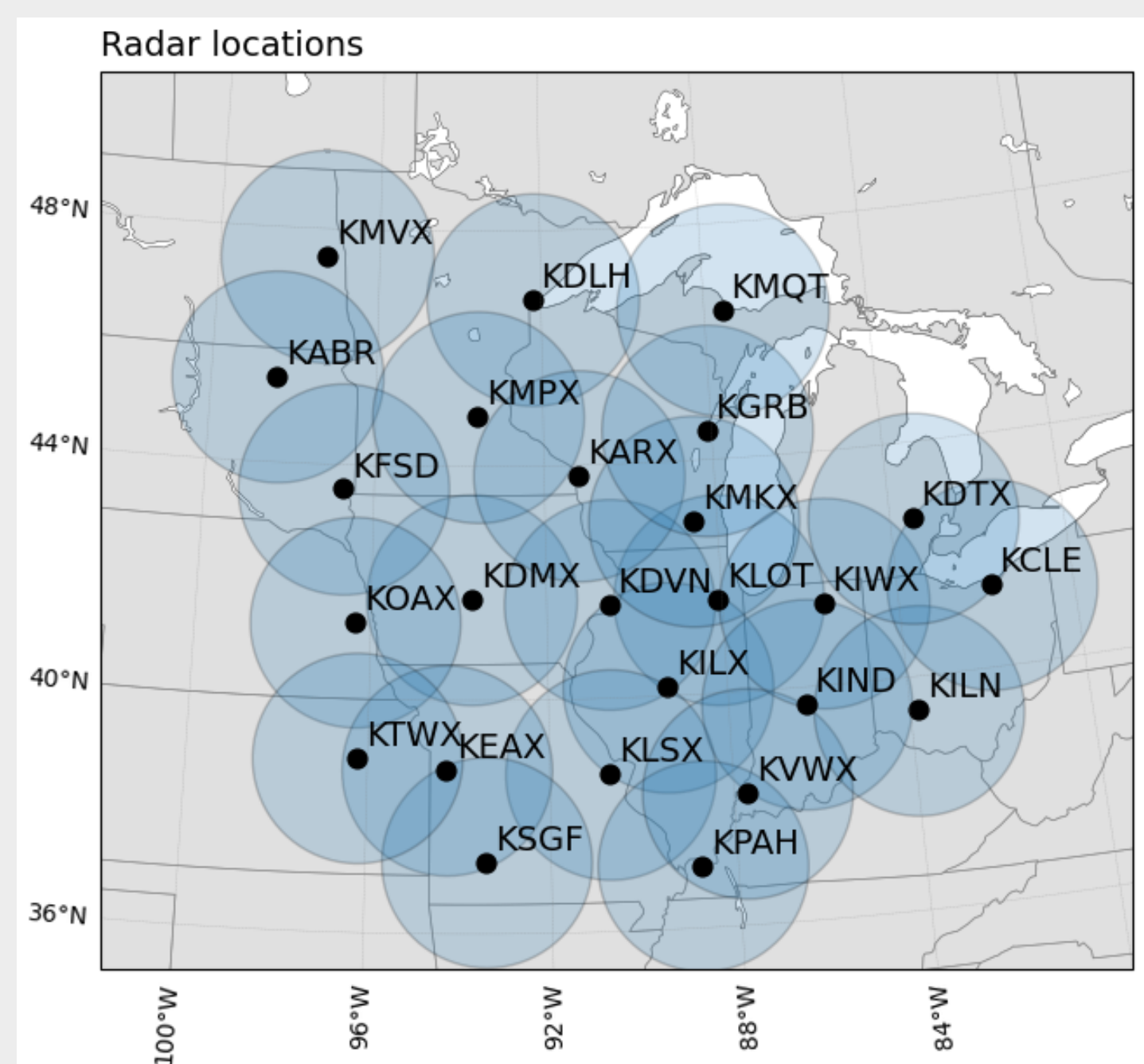
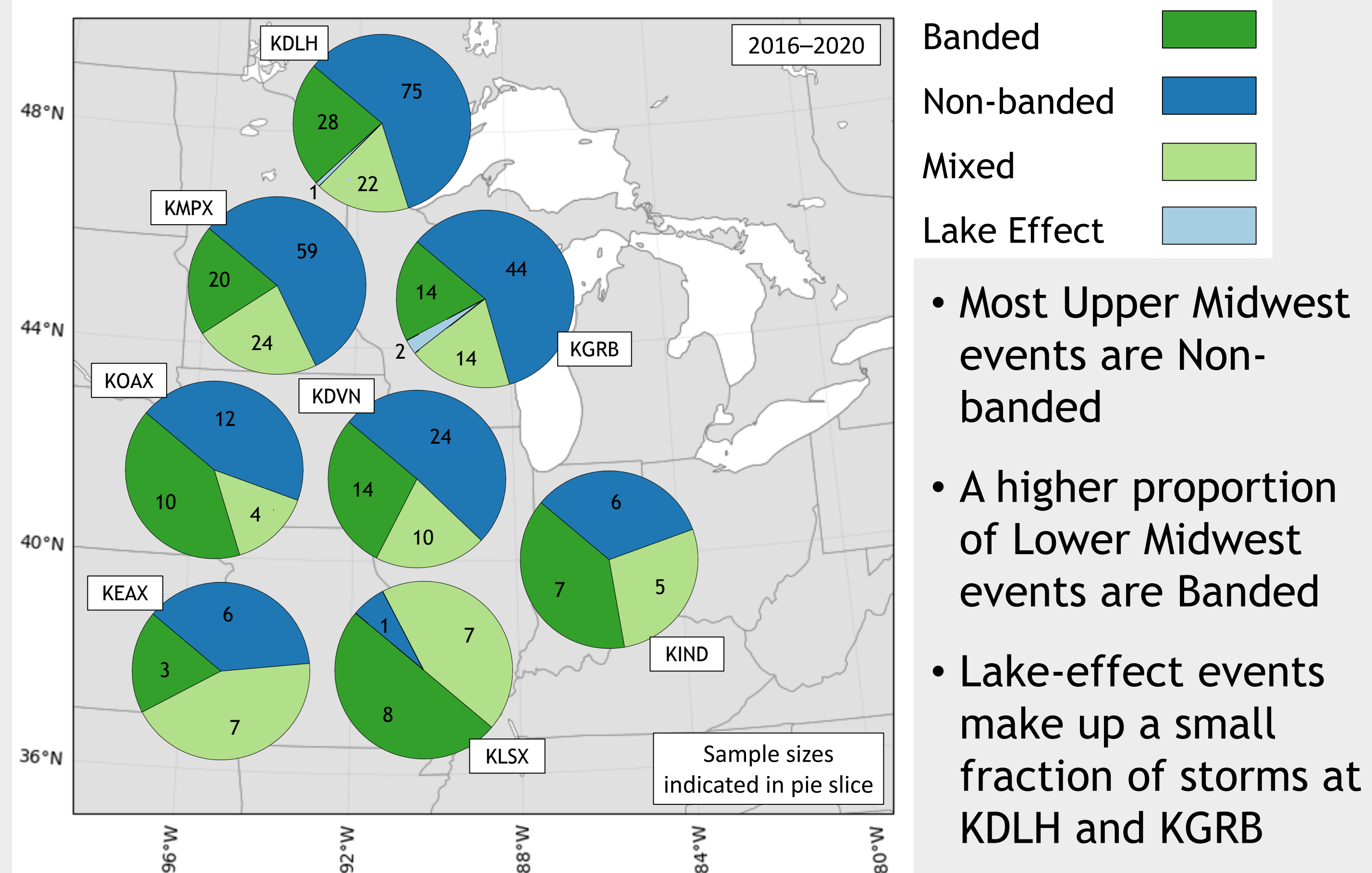


Figure 1. Midwest radar locations used for snowband detection

Distribution of Banded vs. Mixed vs. Non-Banded Events



Key Results & Future Work

- The occurrence of heavy snowfall events ($\geq 4''$ in 24 h) across the Midwest decreases from north to south
- There are no apparent trends in event frequency from 1991-2020
- Lower Midwest stations observed a higher proportion of Banded snow
- Previous work indicates that precipitation bands in radar reflectivity are more frequent in NW and NE quadrants of winter cyclones
 - Future work will analyze cyclone tracks relative to the geographic distributions of snow event count and whether bands occurred

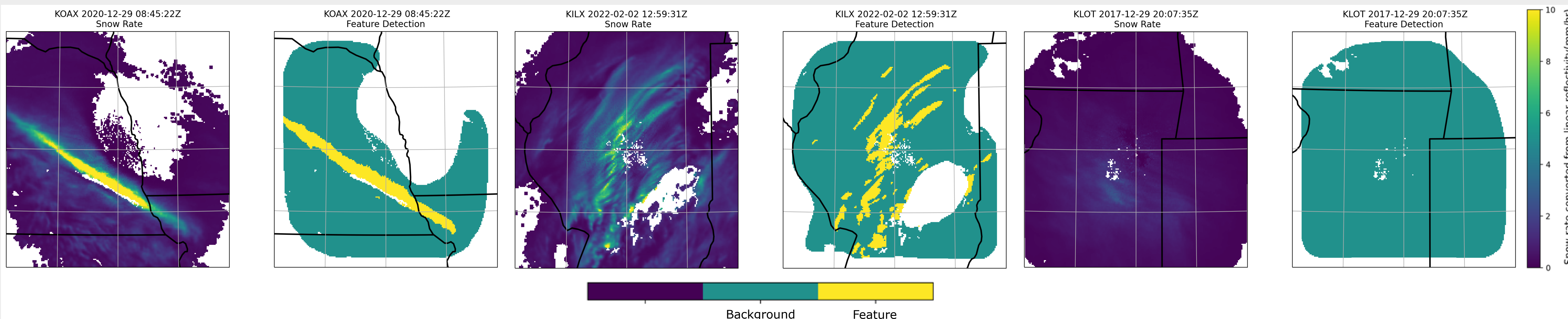


Figure 2. Feature detection technique for snowband detection on radar: Examples of Banded (left), Mixed (middle), and Non-banded (right) heavy snowfall events

Select References & Acknowledgments

Baxter & Schumacher:
<https://doi.org/10.1175/WAF-D-16-0154.1>

Tomkins, Yuter, Miller, & Allen:
<https://doi.org/10.5194/amt-15-5515-2022>

Helmus & Collis:
<https://doi.org/10.5334/jors.119>

Warren is supported by the NWS Pathways Program

Tomkins & Yuter supported by NASA 80NSSC19K0354 and NSF AGS-1905736

Odie, Ben's cat

