

1. Introduction

- Forecasting severe weather is important for the safety of the general public, stability indices are used to understand severe weather
- There are limited studies about these parameters in New England
- A 5-year climatology performed in the Gray, ME domain, concluded that convective weather was associated with Southwest flow (Lowery et al., 2008)
- Research Goals:
- Update Evan Lowrey's 2008 thesis on convective upper-level flows over Northern New England
- Investigate a possible association between sounding parameters and severe weather in Northern New England • Investigate the influence of morning inversions and sea
- breeze on KGYX pre-storm convective environment reports

2. Methodology

- Iowa State Mesonet METAR reports for 21 ASOS/AWOS stations were utilized to identify thunderstorm days for 2011 to 2016 if the METAR contained LTG, LTG DSNT, or TS
- Severe weather reports from the Storm Prediction Center (SPC) were used to identify severe and non-severe weather days
- Used Gray, ME radiosonde data from the University of Wyoming to collect sounding parameters
- Used RUC/RAP model analysis soundings from 42N, 72W to examine inland convective environment
- A sample of 24 were collected where KGYX SBCAPE date and value was collected for 00z if it was close to or equal to 0 J/Kg. The resulting date was used to collect SBCAPE data from 42°N, 72° W at 18z.



Figure 2: Location of model soundings – Worcester, MA (~ 42N, 72W)

Sounding Parameters Associated With Severe and Non-Severe Thunderstorm Days in Northern New England

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• Southeast and East flows only occurred on non-severe days

Stability Parameters



me	0's Frequency	Percentage	Total Samples
Z	136	38%	358
Z	142	52.20%	272
otal	278		

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• A two-tailed t-test was performed for all wind shear layers and showed that average shear between severe and non-severe days were not statistically significant

Figure 6: Mean Surface-based Convective Available Potential Energy (SBCAPE), mean surface-based Convective Inhibition (SBCIN), and most-unstable Convective Available Potential Energy (MUCAPE) in J/kg on severe days (Blue) compared to non-severe days (Purple)

• Surface-based CAPE values and CIN values doubled between severe days and non-severe days

• The median for surface-based CIN and CAPE was 0 J/Kg • Both SBCAPE and SBCIN are statistically different (95% confidence) on both severe and non-severe days



Figure 8: Frequency of CAPE values (J/Kg) on severe days at 00z without zeros

- KGYX 00z soundings contained a significant amount of 0 J/kg SBCAPE values on severe days
- When 0 values were removed, most of the severe days have SBCAPE values less than 1000 J/kg with a maximum value of about 2600 J/kg

- Southwest and West upper-level flow directions were dominant on both severe and non-severe days
- No significant difference in wind shear values between severe and non-severe thunderstorm days

- inversions







Figure 10: Comparison of reported SBCAPE values in J/Kg between Worcester, MA values (blue) and the KGYX reported values in Gray, ME (orange)

- Worcester, MA reported significantly different values of SBCAPE than what was reported by KGYX
- Worcester, MA reported a median SBCAPE of 720 J/Kg while KGYX had a median of 0 J/Kg

4. Conclusions

- Severe weather in northern New England can happen at any amount of wind shear
- KGYX is not representative of the convective weather
- around northern New England
- \circ 00z data is indicative of sea breeze influence and morning inversions

5. Future Work

- Look at the soundings for the selected KGYX dates to look for
- Find the specific limitations of the KGYX station by looking at surrounding SBCAPE reports
- Compare conclusions with Jamie-Lyn's conclusions about storm morphologies in northern New England

6. References

•Lowery E. M, 2008: Using the WSR-88D Storm Structure Product to Develop a Climatology of Northern New England Thunderstorms as a Function of Large-Scale Flow, M.S thesis, Dept. of Chemical, Earth, Atmospheric, and Physical Sciences, Plymouth State University, 136 pp.

•Wasula, C.W., L. F. Bosart, K. D. LaPenta, 2002: The Influence of Terrain on the Severe Weather Distribution across Interior Eastern New York and Western New England. Wea. and Forecasting, 17 Issue 6, 1277-1289.

7. Acknowledgements

• This research was done as part of the 2023 NEPARS REU summer research program. Funding was provided from the National Science Foundation with AGS-1947706. • Further support provided by Plymouth State University and Hobart & William Smith Colleges



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