A Detailed Climatology of Central North Carolina Tornadoes

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Motivation

- Experience shows that the occurrence, frequency, and intensity of tornadoes varies across North Carolina (NC).
- A better understanding of the occurrence, distribution, and impact of tornadoes should lead to improved preparedness activities as well as better watches and warnings.

Methodology

- Gathered tornado events from 1950-2014 from the Storm Prediction Center (Schaefer and Edwards, 1999) and the National Centers for Environmental Information.
- Quality controlled the data for errors, inconsistencies and missed events.
- Categorized events based on the time of day the tornado occurred (following Ashley et al. 2008):
  - Day – anytime between sunrise and sunset LST
  - Evening - anytime between sunset and midnight LST
  - Overnight – anytime between midnight LST and sunrise
- Any tornado that occurred in the evening or overnight was considered nocturnal.
- A significant or strong tornado was an event rated as EF2 or greater.
- Utilized ArcMap 10.3 for spatial analysis of data
- Also used Excel, GR2Analyst, and Hurrevac.

North Carolina Tornadoes

- 1,247 tornadoes and 515 tornado days were observed across NC from 1950-2014.
- Tornado density is greatest in the Coastal Plain & Sandhills with a secondary max in the Western Piedmont.
- The number of tornadoes observed has increased significantly in recent decades. This is known as tornado inflation which likely results from improved observations and communication.

Significant Tornadoes

- Significant tornadoes most frequently occur in the Sandhills and Coastal plain of eastern NC.
- While significant tornadoes account for only 19.6% of all NC tornadoes, they are responsible for 96.9% of all tornado related fatalities.
- The number of significant tornadoes has remained steady while non-significant tornadoes has tripled.

Conclusions

- The Coastal Plain and Sandhills of eastern NC experience the greatest number and the strongest tornadoes with a secondary frequency maximum across the Western Piedmont.
- The fatality risks associated with tornadoes in NC are disproportionately large from significant and nocturnal tornadoes and during the months of March, April, and November.
- Communicate results with emergency managers and the public to improve tornado preparedness.
- Add synoptic and mesoscale patterns and parameters associated with each tornado to categorize events further (high shear low CAPE, EML, etc.)
- Examine radar data to categorize tornadoes by convective mode.

Future Work

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Selected References


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