

Spatial Patterns in Lightning Flashes Centered on Tornadoes

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Overview

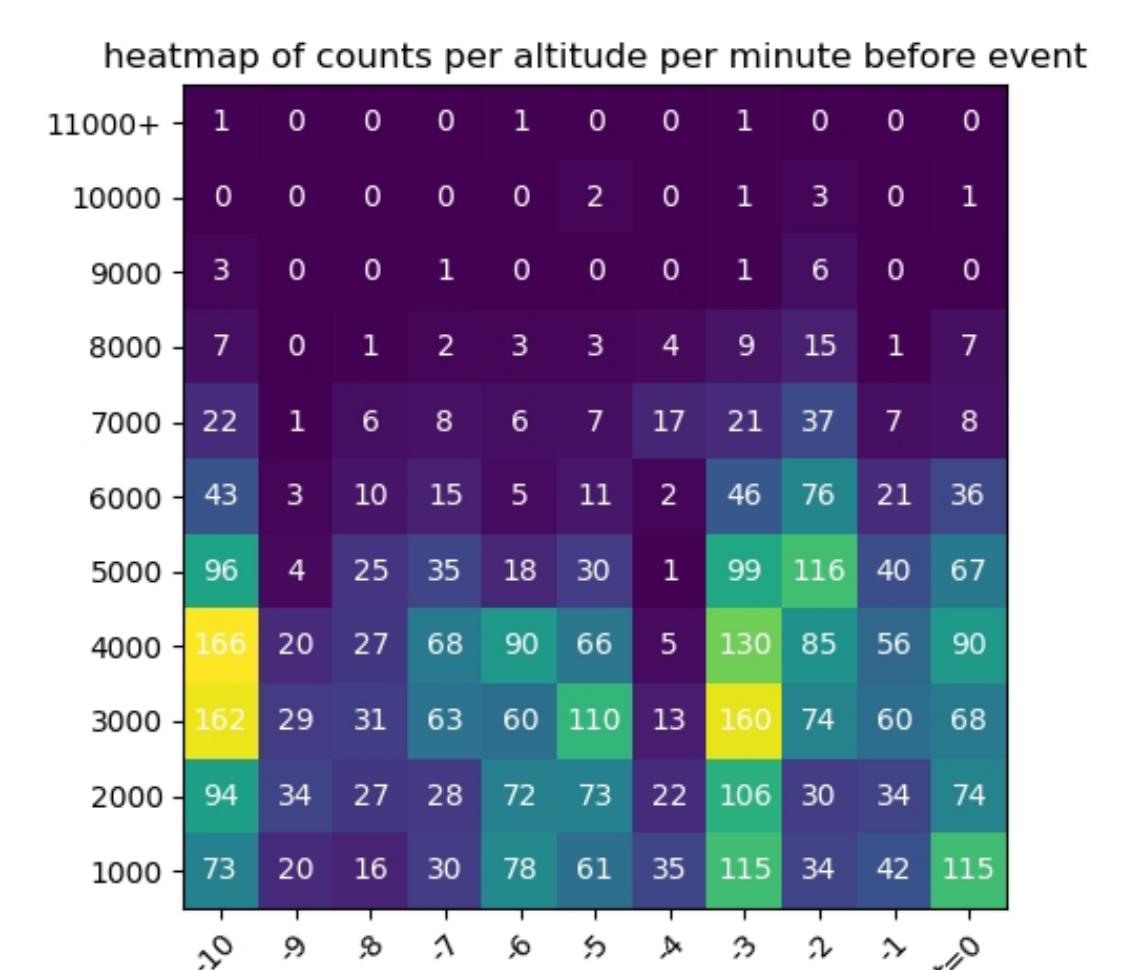
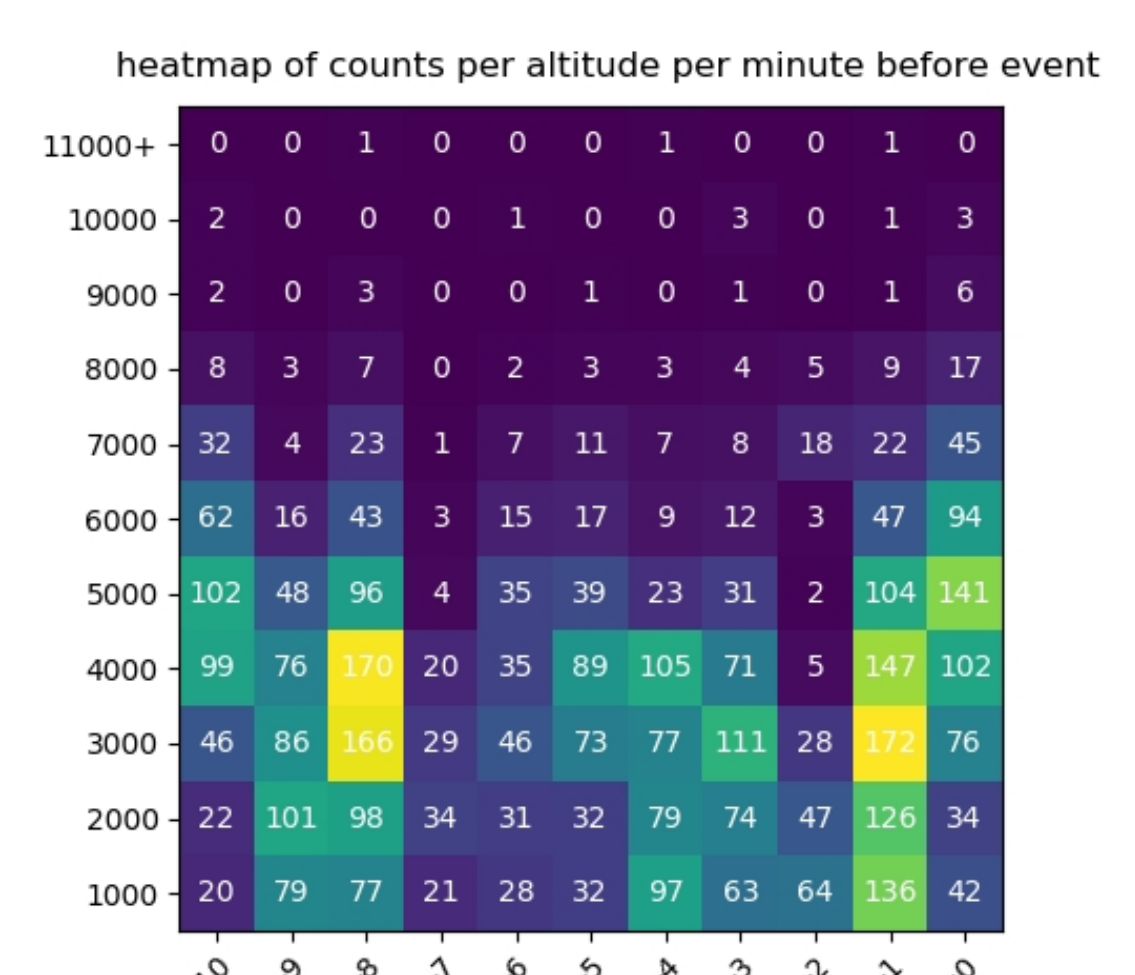
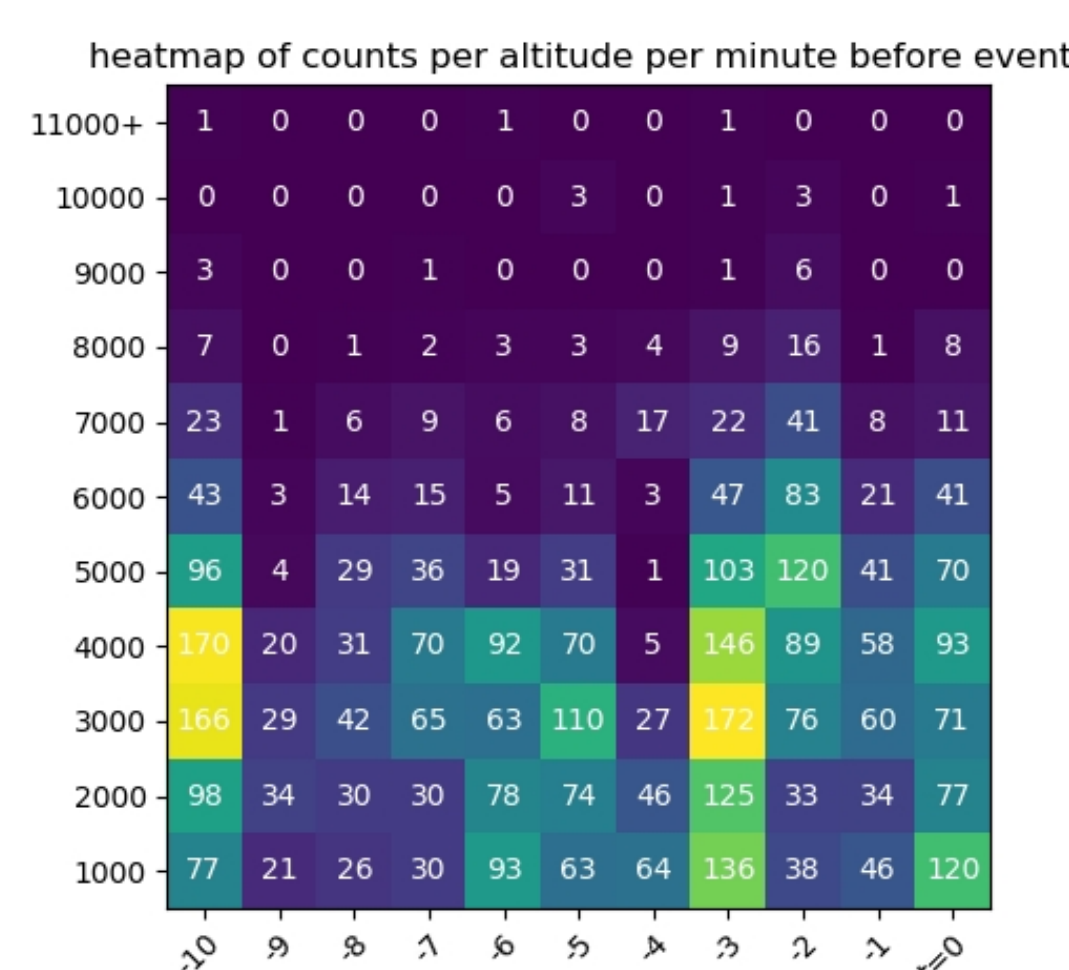
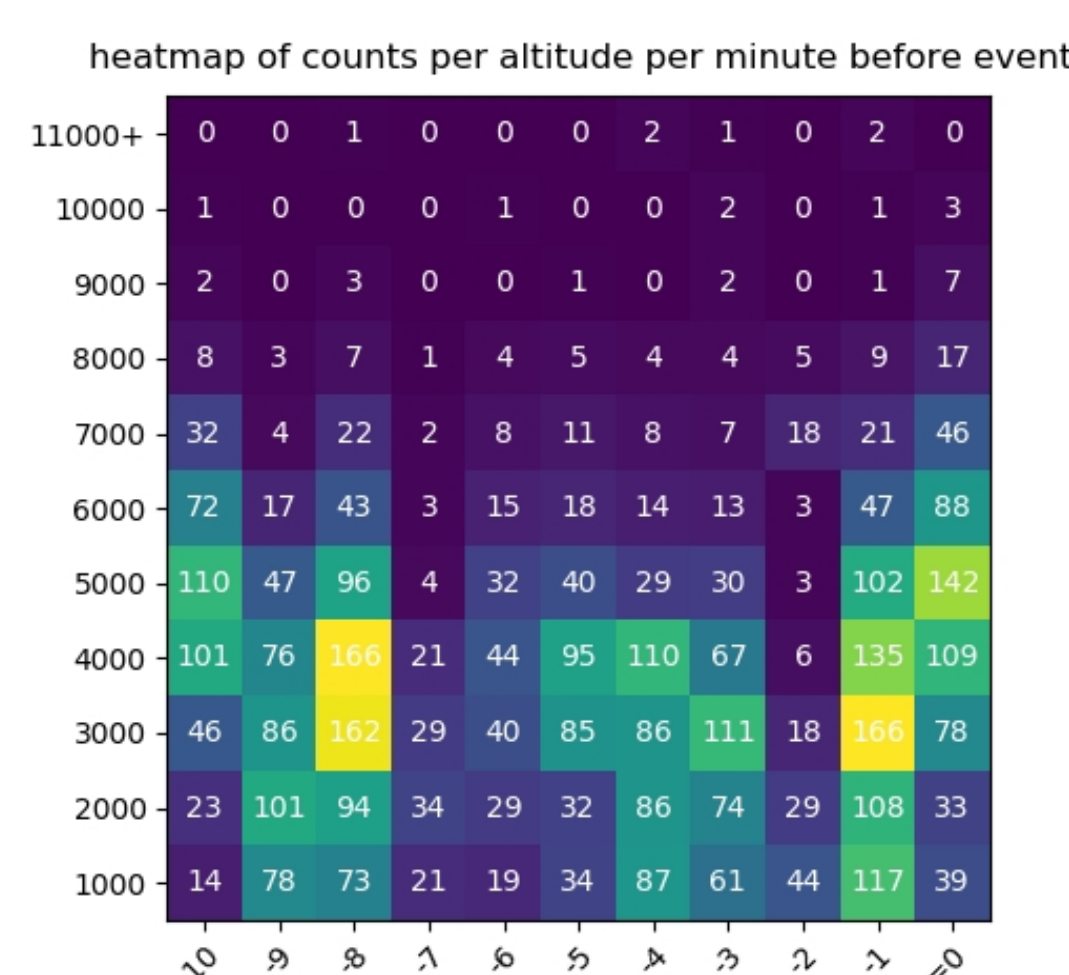
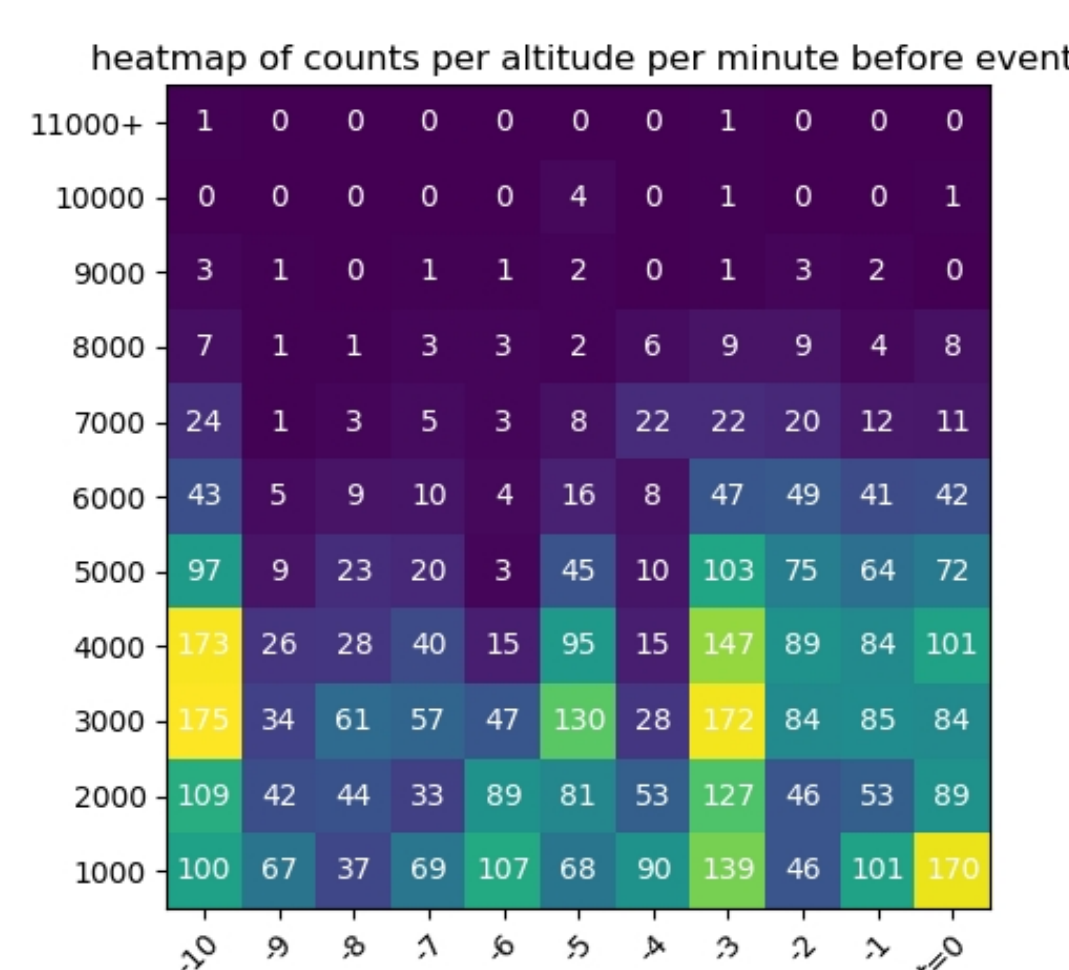
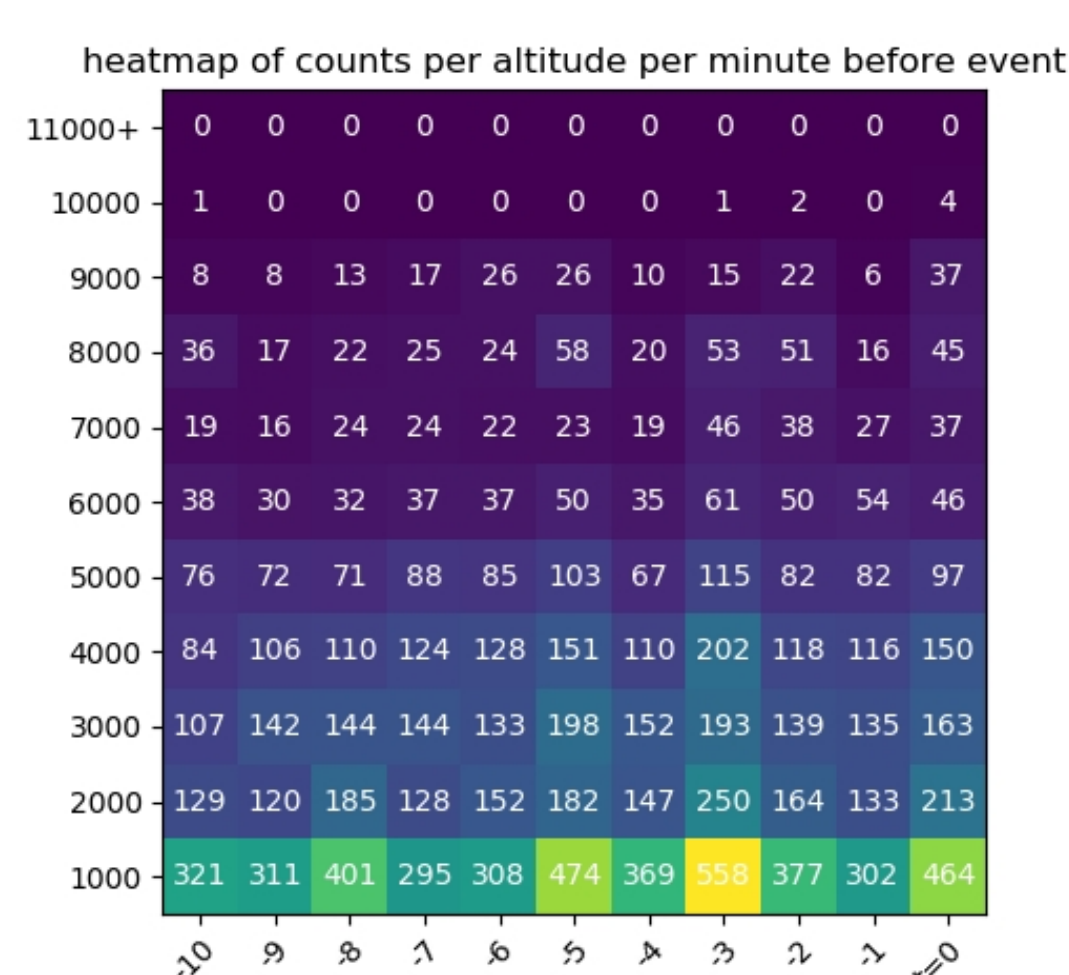
This project investigated the spatial relationships between lightning flashes and tornado touchdowns. A large database of flash data from the LMA was searched for events occurring up to ten minutes before the touchdown and compiled into a heat map to show the differences. The project was run in order to see if there was a 3-D pattern that arose when lightning flashes occurred in the area around a tornado.

Key Findings

This study found that lightning flashes generally tend to present an upward trend in the ten minutes before a tornado touchdown. At long range, shown below, there are clearly-defined patterns, however, when the range was reduced, the number of flashes per minute became so low as to average out at nearly zero. As well, there was generally found to be a slight dip in flash rate, relative to the average at the time, during the time of the tornado itself.

Significance

This study validates the findings of a study introduced by D. I. Knapp in 1994 which concluded that violent weather events experience a gradual increase in flashes in the hour before touchdown, and that the dip can be used to identify tornados before they occur.



References

1. Knapp, D. I., 1994: Using cloud-to-ground lightning data to identify tornadic thunderstorm signatures and nowcast severe weather. *Natl. Wea. Dig.*, 19, 35-42

Acknowledgements

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