The Relationship Between Wind Speeds, Warning Tags, and the Distance to the Maximum Damage Point and EF Ratings of Tornadoes

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Tornadoes have various wind speeds throughout their life cycles and are usually warned by the National Weather Service to protect life and property. I analyzed data on select tornadoes (2011- 2023) to investigate the relationship between the measured wind speeds and their maximum Enhanced Fujita (EF) rating, as well as if impact-based warning tags have a correlation with the EF rating. I also studied the distance from the beginning of the tornado path to the point in the Damage Assessment Toolkit (DAT) database with the highest rating and the time it took to reach that point. For the tornadoes and warnings in this study, there were few warning tags that were properly assigned to match the EF ratings and wind speeds that they are associated with. When examining the wind speeds from the DAT and the maximum EF rating, it was shown that the distribution of wind speeds increased as the EF ratings increased. The distance it took the tornado to reach its maximum EF rating was studied, and the distance tended to increase with the EF rating, except for EF4 tornadoes. This also occurred with time to the maximum damage point. The distributions of wind speeds and the distance and time to the maximum intensity help to show the life cycle of tornadoes and how the wind speeds/intensity change. Also, the lack of correlation between the warning tags and EF rating helps to support the need for new tools to help forecasters predict tornado impact in real time.

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