Analyzing the Accuracy of the National Weather Service Central Region Tornado Events in Storm Data and Developing Techniques for Database Improvements

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Introduction

- The NWS Central Region Tornado Warning Improvement Project (TWIP) Team examined unwarned tornado events from 2014-2015
- The Objective - Use the results to identify any training needs, minimizing unwarned events in the future and improving warning operations
- During the review, numerous errors were discovered
- As a follow up, all of the NWS Central Region tornadoes in Storm Data were quality controlled.

2014-15 Unwarned Tornado Storm Data Review

- 461 events quality controlled with 65 total errors identified or 14%
- 29 Tornadoes (6.3%) were actually WARNED!
  - Impacts POD, FAR and CSI
- 36 more Tornadoes had incorrect time and/or placement errors.
- Time errors were often 1-2 hrs. Likely due to Storm Data Entered in LST. Option for UTC soon.
- Numerous events with a TDS prior to Storm Data start time. At times, TDSs noted with no Storm Data Entry

2018 NWS CR Tornado Storm Data Review

- 508 events quality controlled with 73 total errors identified or 14%
- 9 unwarned tornadoes were actually warned
- 2 of 9 NWS CR EF-3 tornadoes contained errors.
- Time errors were often 1 hr. Likely due to Storm Data entered in LST. Option for UTC soon.
- Placement errors using spotter location. Results in tornado placement off 5-8 miles at times.
- 28 events with a TDS prior to Storm Data start time. A few TDSs noted with no Storm Data Entry.

Storm Data Time Errors

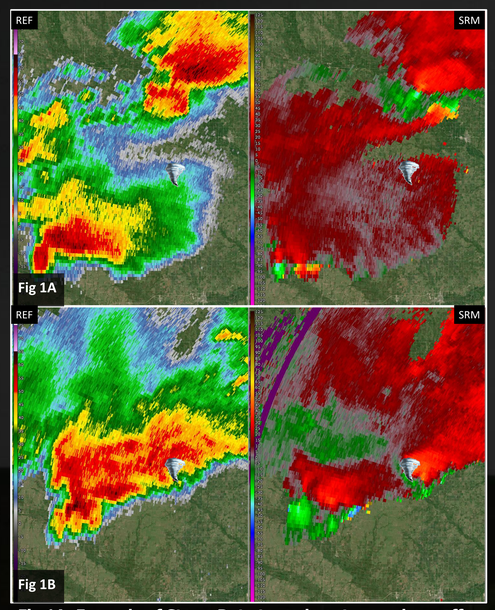


Fig 1A: Example of Storm Data tornado entry one hour off.
Fig 1B: Same example as Fig 1A but at the correct time. These errors often result in an "unwarned" tornado and a tornado warning that is not verified, resulting in negative impacts to NWS verification statistics.

Storm Data Placement Errors

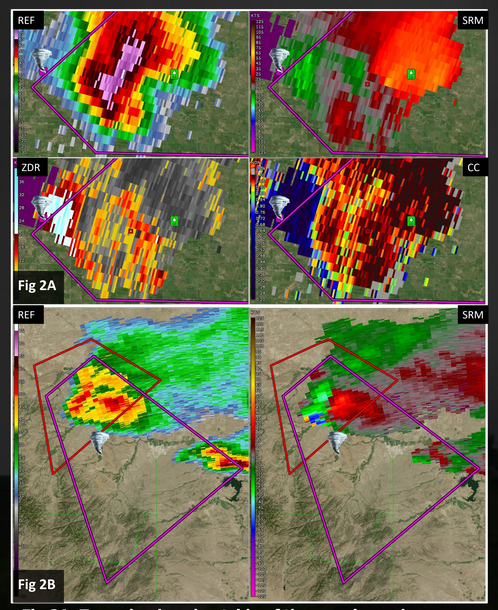


Fig 2A: Tornado placed outside of the warning polygon, therefore becomes a missed event.
Fig 2B – Tornado placement is within a polygon but lead time is lost since it was ongoing further northwest within the first polygon. This would extending warning lead time.

Time/Placement Mismatch Errors

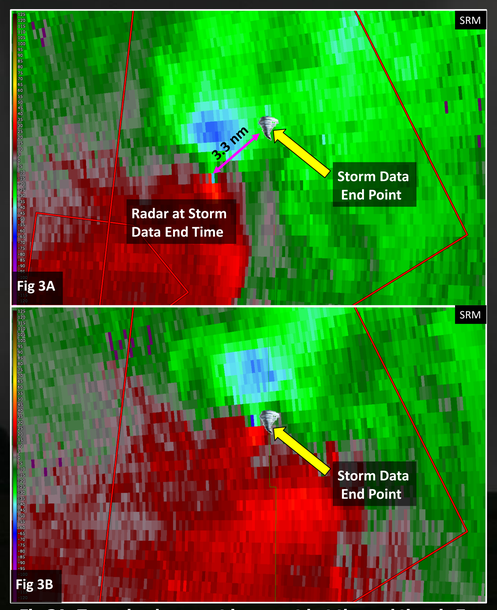


Fig 3A: Tornado placement is correct but the end time is 7 minutes too early, reducing lead time.
Fig 3B – Correct Tornado end time which will add additional lead time for the event

TDS Prior to Start Time

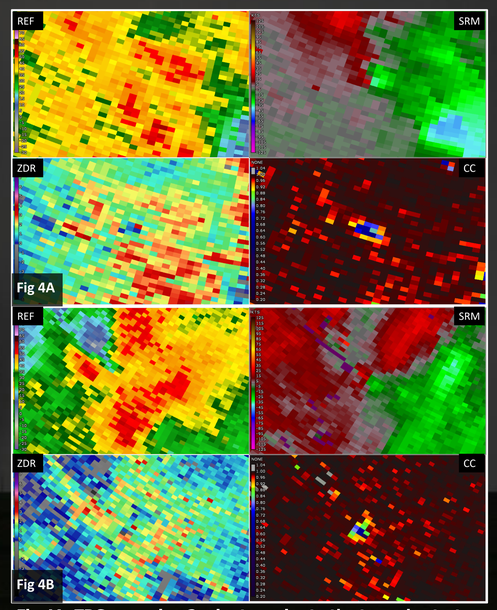


Fig 4A: TDS occurring 2 minutes prior to the tornado start time in Storm Data.
Fig 4B: TDS occurring 7 minutes prior to the tornado start time in Storm Data. Both examples result in tornado tracks that are too short.

Other Storm Data Entry Errors

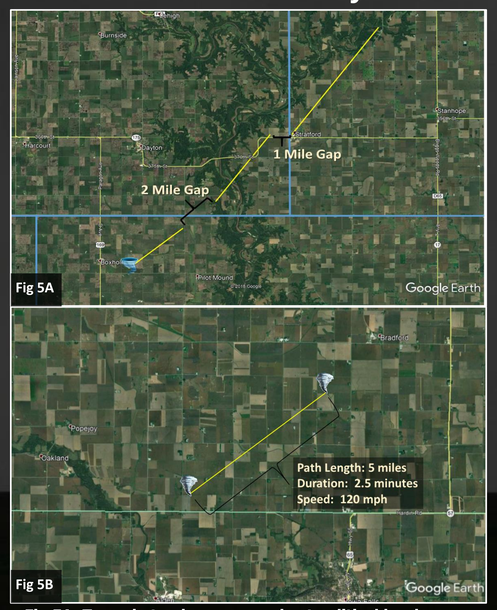
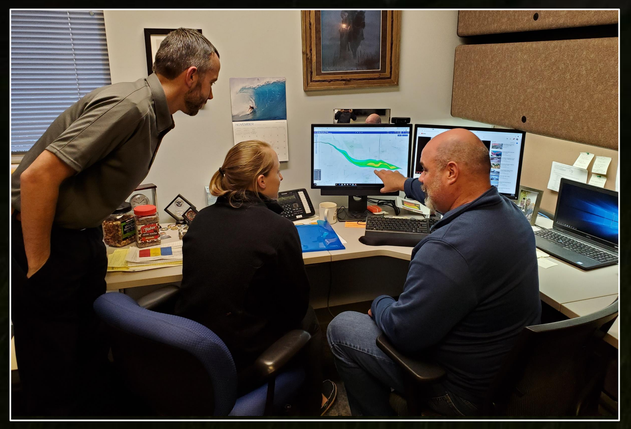


Fig 5A: Tornado track gap example at political borders.
Fig 5B: Storm motion errors. These are most noticeable in Storm Date when tornadoes cover too large of a distance in a short period of time, yielding unrealistic storm motions.

Storm Data Entry Best Practices



- **Team/Group Concept**
  - Vetting
    - Team work can help determine questionable events ensure data quality
  - Workload Allocation
    - Have one team member dedicated to quality control the tornado data, while other team members quality control other severe weather reports.
  - Accountability
    - Team members hold each other accountable and should be open to questions regarding Storm Data entries.

- **Use All Available Tools**