Reanalysis of Tornado Damage using ArcGIS, Satellite Imagery, and High Resolution "Gray Sky" Imagery

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Introduction

- Event took place on January 12th, 2023 around 21 UTC in Spaulding County, GA
- Complex QLCS tornado with multiple distinct tornadoes in the “comma head” portion of the QLCS
- NWS still unsure of how many tornadoes there were in Spaulding County and what their tracks were
- Accurate analysis is important for those directly affected by the tornado as well as research community
- Storm surveying was done in the days following the event, and later on, radar was used to determine more about the paths

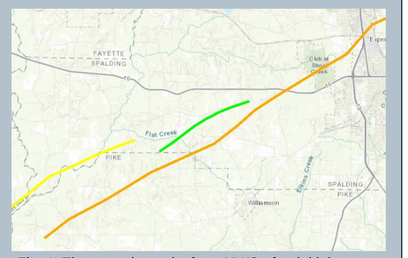


Fig. 1: The tornado tracks from NWS after initial on-foot storm surveys

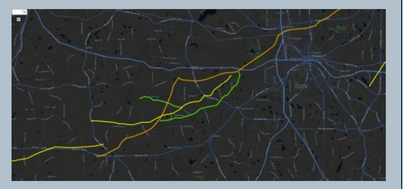


Fig. 2: The tornado tracks from NWS after a project using radar to try to refine the initial tracks

Data and Methods

Data:

- Sentinel-2 Satellite Imagery
  - Normalized difference moisture index, used to determine vegetation water content
  - EO Browser- Sentinel Hub
- Geospatial Insurance Consortium high resolution “gray sky” imagery
  - Request for them to capture this imagery

Methods:

1. Use pins to quickly indicate where areas of undocumented damage was found
2. Go back to those pins and indicate areas of damage with polygons and add notes
   - What type of damage, ex: uprooted trees, snapped trees, roof damage on house
   - What direction the trees are falling in
   - Size of the area of damage, using the measure tool
3. Also indicate areas of no damage that was previously documented and add quick note that little or no damage was found



Fig. 3: An image of the Sentinel-2 satellite in space

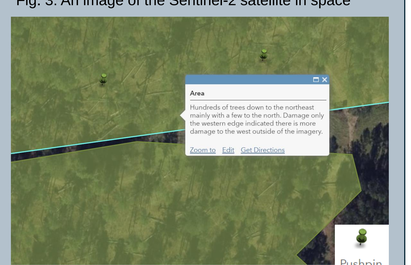


Fig. 4: An image of an example of where we marked an area of damage and put a comment on it



Fig. 5: An image of an example of where we marked an area of no damage that was previously marked as part of the path

Results

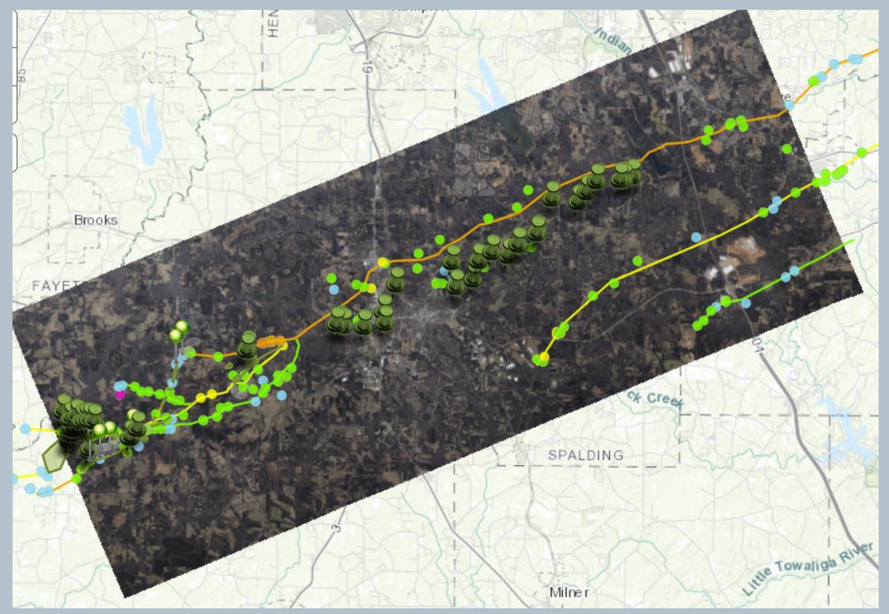


Fig. 6: A screenshot from ArcGIS of the entire area which shows the work done so far on this project. The colored lines are the old tracks and the green pushpins, thumbtacks, and polygons are work we added.

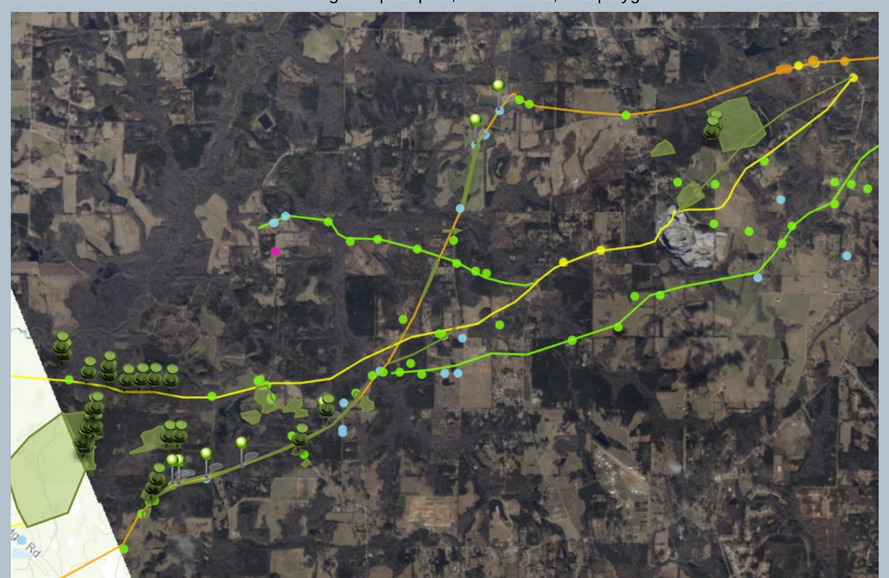


Fig. 7: A screenshot from ArcGIS zoomed in on the western part of the figure 6. This region was the most complicated.

- In total, we documented ~15 areas (polygons) and ~50 points of new damage that previously was not documented
- One of the most notable finds was a 2.12-mile-long part of the originally documented tornado track that had no damage along it

Conclusions

- This was a VERY large event that covered the entire county. There are still areas of damage to document.
- Need to continue to find points of undocumented damage and points with no damage that were previously documented
- At some point, figure out an improved picture of the tornado tracks
- Idea: Areas we are missing aerial imagery, we can try and use other Sentinel-2 data to get an idea of what happened
- End goal: Hopefully, once the track is refined, it can be put on the Damage Assessment Toolkit (DAT) for the public to be able to see

References

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NWS Atlanta [@NWSAtlanta], 2023: After much radar and satellite analysis, we finally have an update to what happened on January 12th, southwest of Griffin, GA! To start off, here is what we originally thought happened after our first guess with ground surveys and radar interpretation in the first week after. 📋 https://t.co/EP76nEkvkq. *Twitter*,. https://x.com/NWSAtlanta/status/1628897682885341185 (Accessed January 9, 2025).
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