Tornado Visualization and Doppler Radar Analysis Project

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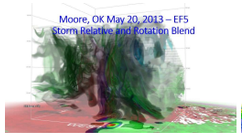
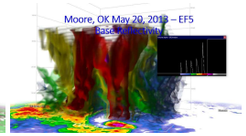
INTRODUCTION

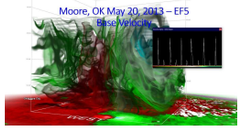
Tornadoes play a significant role in the weather of the United States and the Tornado Visualization and Doppler Radar Analysis Project accumulated 10 years of field research on tornado events. The project documents tornado formation using 3D analysis utilizing the existing Doppler Radar data which is available in the field in near real time and post event analysis from the archived Doppler Radar data.

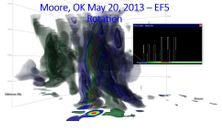
METHODS

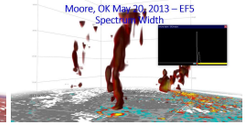
The Doppler Radar data is filtered to allow for specific data images to be created of the Base Reflectivity, Base Velocity, Storm Relative and Normalized Rotation radar scans of a tornadic storm. These images are then blended to see the relationships they have with the other radar images during the specific tornado event time and this information is compared to ground damage observed, photos and videos taken and correlated to the Radar. These images are then put in sequence to better visualize the life cycle of the tornado and the images are put into to motion to see the tornado structure evolution.





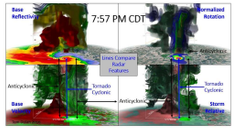


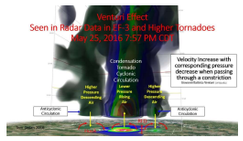


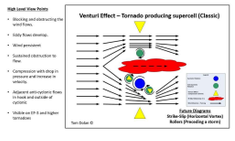


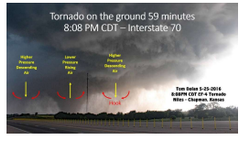
OBJECTIVES

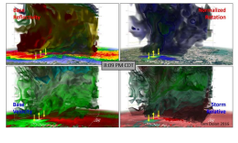
This work assists in seeing where in the storm the tornado is developing as the wind flows are blocked by the developing and mature thunderstorm along with dissipation and cycling. The work from the Doppler Radar Analysis project assists in seeing the role wind flow blocking that develops in the Base Reflectivity plays in the tornado life cycle management. This field work complements the extensive efforts made by the weather research and operations community to better understand these significant tornado weather events.

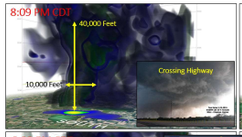


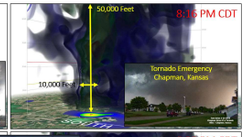


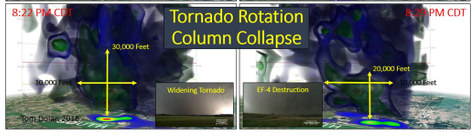






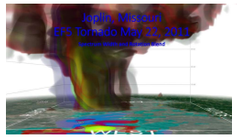


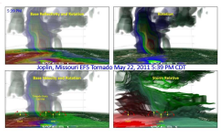


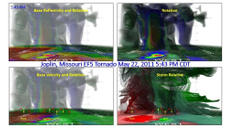


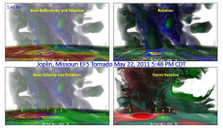
RESULTS

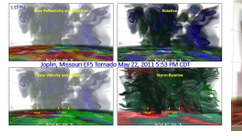
This posters covers the May 25, 2016 26-mile EF-4 Tornado that was field observed from Niles, Kansas through Chapman, Kansas. The tornado intensifies rapidly and traveled east on its path directly towards the Topeka Doppler radar. This is the ideal distance for the 3D analysis work. Damage photos taken following the tornado are used to compare with the 3D radar data and the observed tornado phases. The photos and Doppler radar data are assembled to demonstrate the life cycle morphology of this tornadic event from pre-initiation, intensification, and collapse. This Analysis also includes the Joplin, MO EF-5, El Reno EF-3, Moore, OK EF-5, Greensburg, KS EF-5

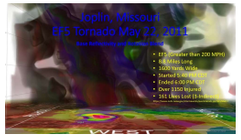


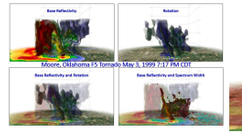


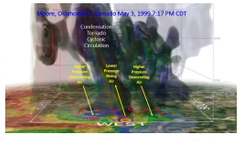


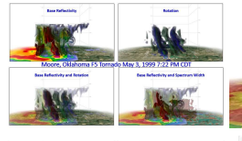


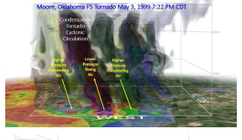


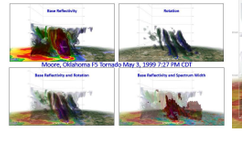


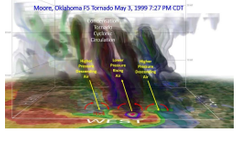


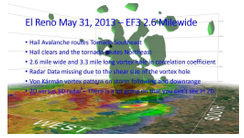


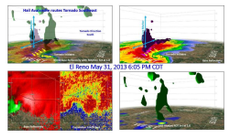


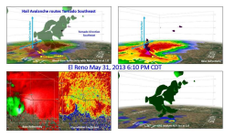


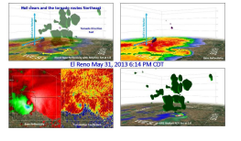


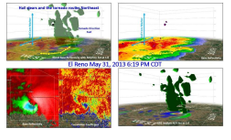


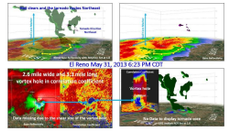


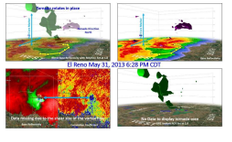












CONCLUSIONS

The techniques used in this Doppler Radar Analysis can be used to monitor tornadic thunderstorms for tornado development. Archive data allows for reconstruction of tornado events to better understand the tornado life. Obstruction of wind going past the blocking effect of higher Base Reflectivity such as 50 dBZ plays a role in tornado formation and cycling as it dissipates.

TOOLS AND DATA SOURCES

GR2Analyst by Gibson Ridge Software, FantaMorph by Abrosoft, Snagit by TechSmith, Weather Data feeds from Allisonhouse.com, NEXRAD archive data from ncdc.noaa.gov, Weather forecast and monitoring and tools from weather.gov and spc.noaa.gov. Yarnell Hill painting by Bruce Willhite and Yarnell Hill Fire photo courtesy of Matt Oss. Photos and Images by Tom Dolan unless otherwise noted.

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