A Radar-Based Hail Climatology of the CONUS (2000-2011)

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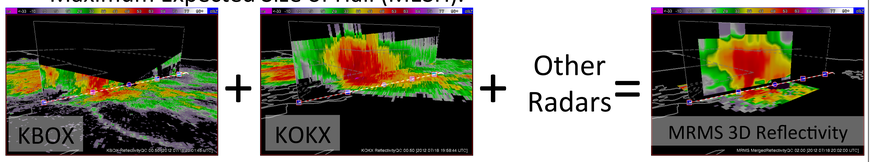
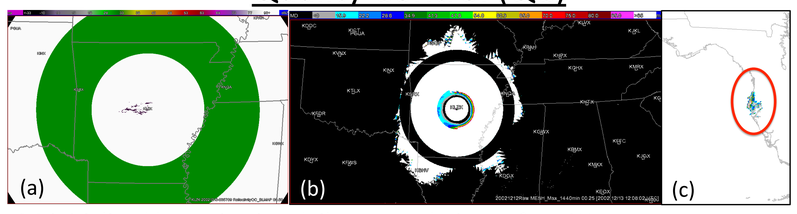
Methodology

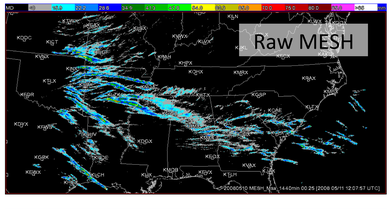
- Uses data from Multi-Year Reanalysis of Remotely Sensed Storms (MYRORSS) for the years 2000-2004, 2006, 2008, 2010.
- MYRORSS data combines WSR-88D radar data with RUC/RAP model analyses and produces Multi-Radar Multi-Sensor (MRMS) grids, such as Maximum Expected Size of Hail (MESH).



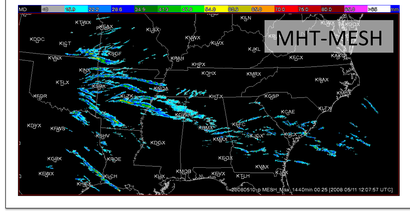
Quality Control (QC)

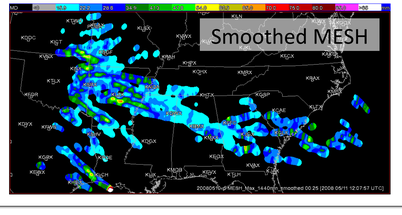


- QC initialized by reviewing daily accumulations of MESH
- Errors in individual WSR-88D reflectivity data **(a)** result in errors in daily accumulation of MESH **(b)**.
- Large areas and large values of incorrect MESH **(c)** due to radar ducting and coastline interactions. The most common QC problem.

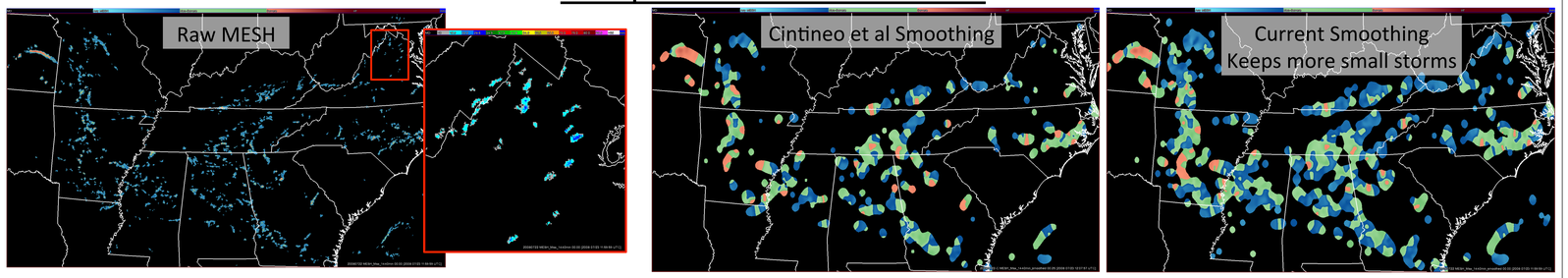


A multi-hypothesis tracking (MHT) algorithm was used to QC the daily tracks. The MHT used MESH values of at least 7mm and clusters 10 pixels large with maximum MESH values at least 10 mm, with clusters needing at least 3 time steps of association. Three iterations of a 90th and 25th percentile filter were run, finished by a Gaussian filter run on a 51x51 km neighborhood

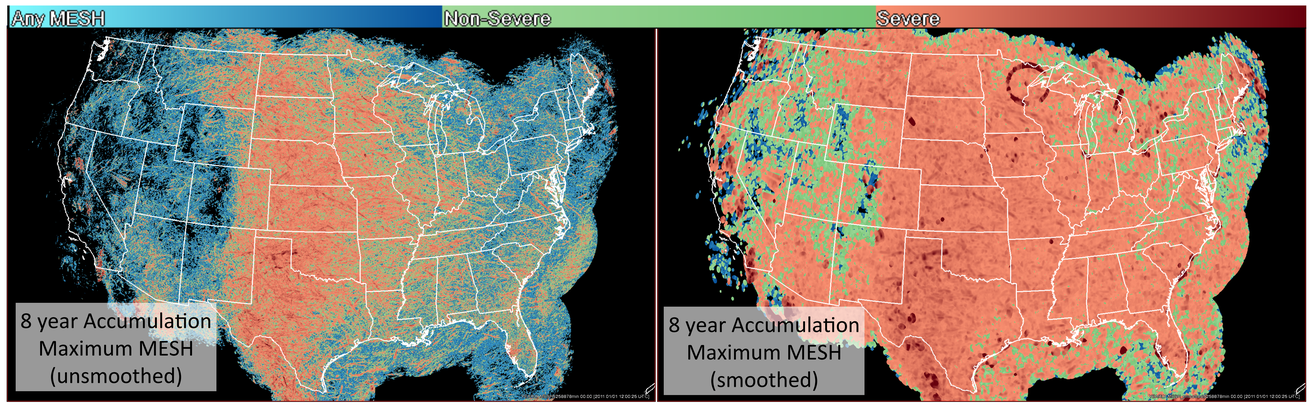




Comparison with Past Work



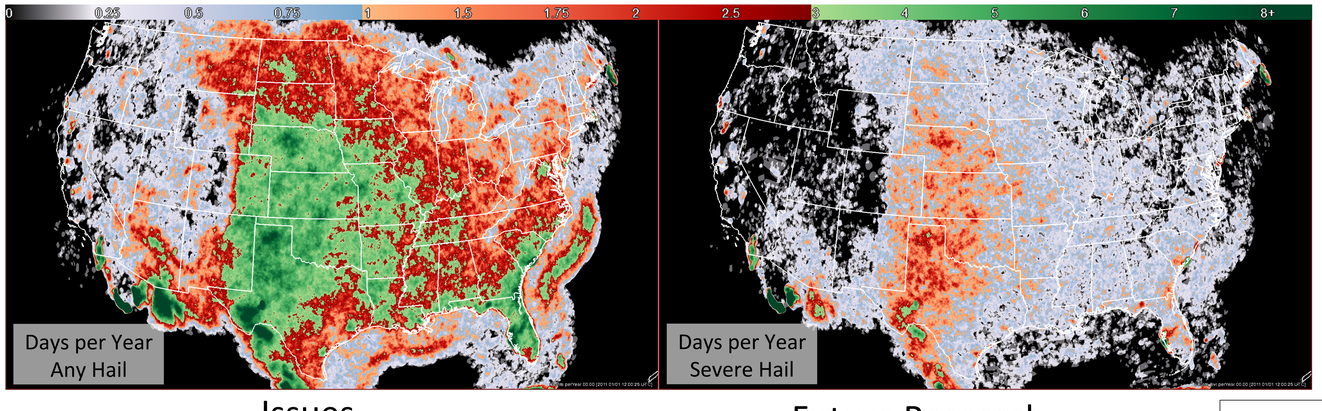
Results



MESH thresholds:

- Any hail: 19 mm
- Severe (25+ mm) hail: 28 mm

- Small radar artifacts can cause obvious errors in climatology of maximum hail size
- Most of the CONUS has possibility of severe hail



- Persistent quality control problems (e.g., coastal areas) inflate hail days per year climatology
- The larger dataset agrees with Cintineo et al. with the primary hail region each year being a triangular region running from SW TX through the Central Plains

Issues

- There are radar issues that are causing high, incorrect MESH values, particularly along coastal areas
- Radar spikes and rings are prevalent during ongoing convection

Future Research

- Finish remaining years in 2000-2011 data set
- Further QC current and remaining years
- Manually remove further erroneous MESH areas

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