Creating a Climatological Database of Three-Dimensional Radar Mosaics with Derived Severe Weather Products: Progress, Challenges, and Moving Forward

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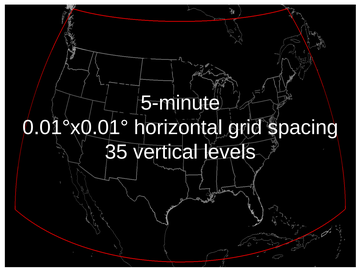
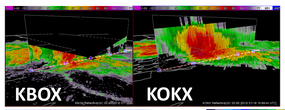
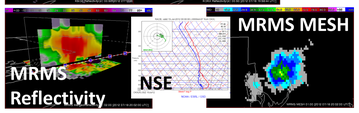
OU / CIMMS & NOAA / OAR / NSSL

MYRORSS





\+ other nearby radars



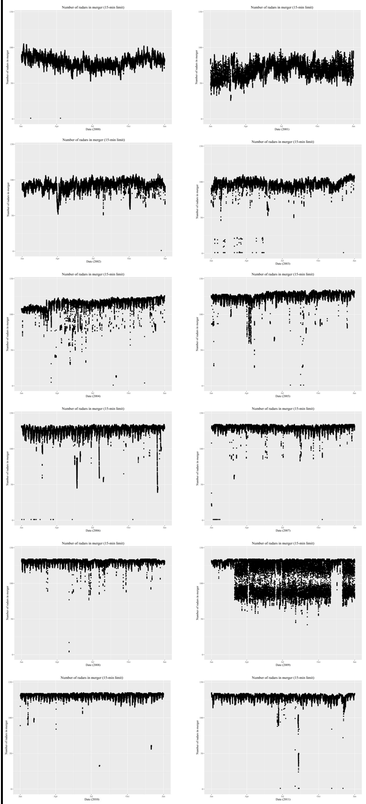
Multi-Year Reanalysis Of Remotely Sensed Storms

- Reflectivity and reflectivity-derived products complete for years 2000-2011
- Quality control of MESH products completed
  - Currently continuing QC for echo top products
- Currently processing azimuthal shear
  - Anticipated Mar 2018 completion

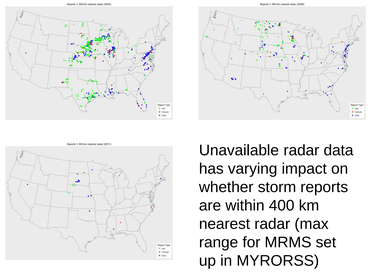
Processing Timeline

- September 2012
  - Began production processing
- July 2015
  - Finished production processing
  - Began intensive QC effort using MESH as basis
- 2016-2017
  - Recoded dealiasing and azimuthal shear algorithms
    - Dealasing in-line with operational WSR-88D dealising
      - 2DVDA (Jing and Weiner)
      - MPDA (Conway et al.)
    - Linear-least squares derivatives technique for azimuthal shear caluclations
      - Smith and Elmore, Mahalik et al.
- April 2017
  - Finished MESH-based QC
- August 2017
  - Began reprocessing for azimuthal shear products, 1998-2011

88D Archive Completeness

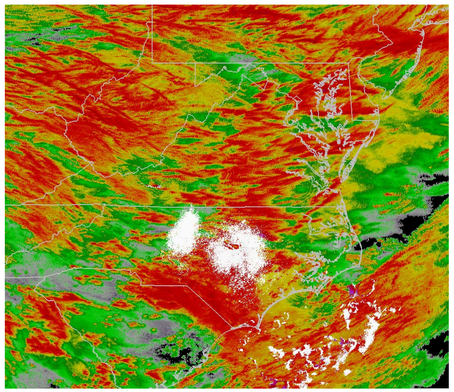


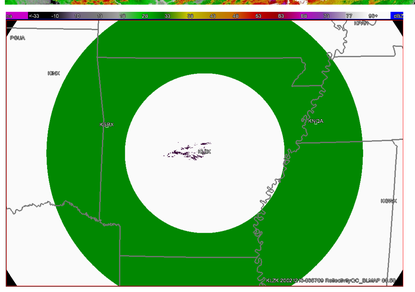
- Number of radars in each MRMS volume within MYRORSS greatly varies each day
- Some years are missing significant amounts of data
- Later years better as archiving and communications improved



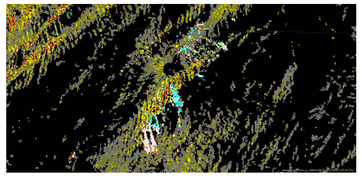
Unavailable radar data has varying impact on whether storm reports are within 400 km nearest radar (max range for MRMS set up in MYRORSS)

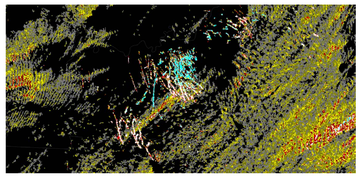
Quality Control, Quality Control, Quality Control



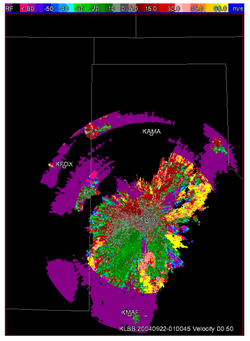


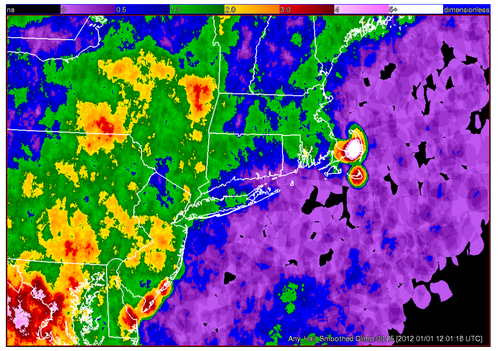
Some egregious errors in reflectivity (generally, values greater than 90 dBZ) are present throughout the database. While many have been identified with MESH QC, may errors like these still exist when only present on lower tilts. (*top left, left)*



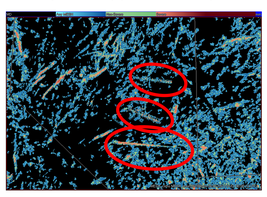


Poor quality velocity data, even after dealiasing, are also present. Solutions range from removing problematic volumes to developing new techniques to remove poor data as the data are accumulated for use. (*left, bottom*)



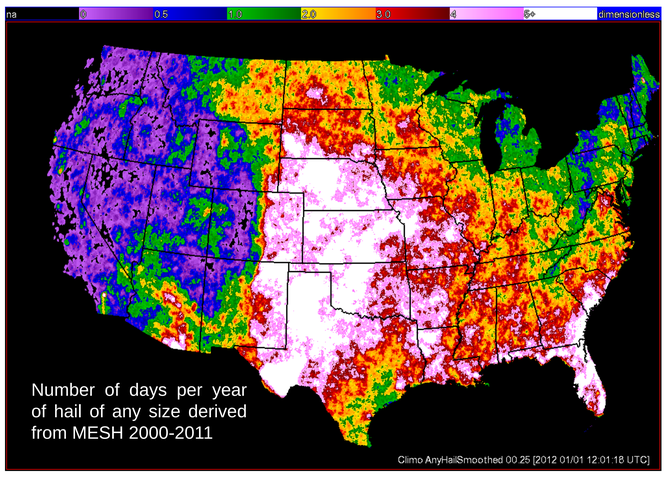


Poor data quality, insufficient quality control, can be seen in climatologies. (*above*) A zoom of the any-sized hail climatology shows problems from poor quality causing a hot-spot to appear on Cape Cod and Nantucket Island.



Chaff spikes over the Great Basin are another consistent feature due to insufficient quality control.

Severe Weather Climatologies



Currently echo tops, MESH, and different reflectivity products (1998-2011) have been compiled for developing climatologies for these products.

Future Work

- Complete azshear processing for 1998-2011
- Complete climatologies for MESH and other reflectivity-based products
- Apply data to new severe weather warning initiatives, especially the development of severe weather probabilities
- Compile more recent data for future processing
- Investigate dual-pol products to include in future processing
- Improve radar quality control methods
- Increase temporal frequency to 1-minute in order to better combine data with lightning observations
- Even timing of products so they occur on the minute (currently occur at least 5 minutes from the previous MRMS volume update)

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