Exploring MRMS Merger Options for Polarimetric Moments and Doppler Wind-Derived Products

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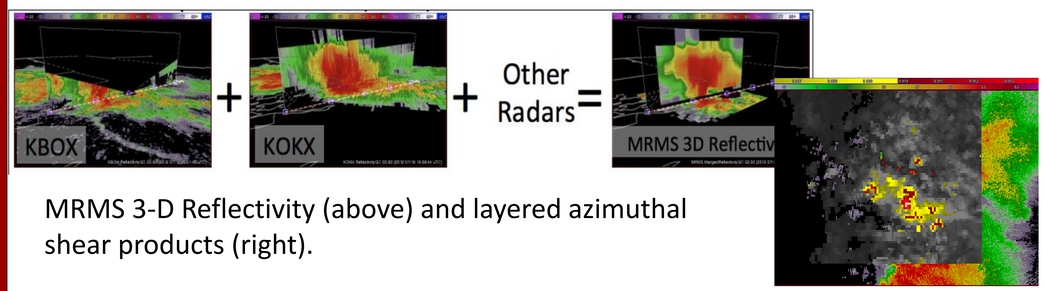
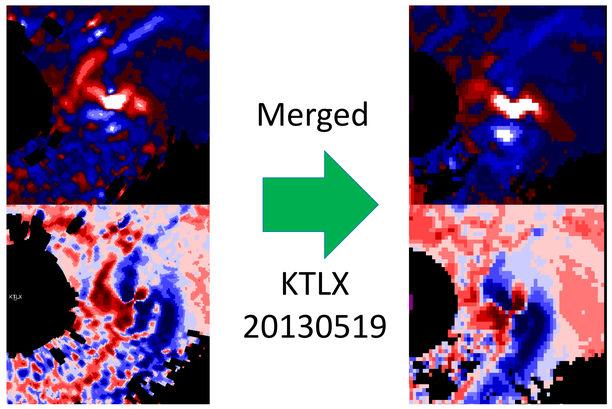
BACKGROUND

Currently, the operational Multi-Radar, Multi-Sensor (MRMS) system produces a three-dimensional reflectivity grid as the base for derived products as well as two azimuthal shear products flattened onto two 3-km layers prior to merging. Merging of polarimetric moments and azimuthal shear (Azshear) and divergence (DivShear) products to a three-dimensional grid would enhance the MRMS system and provide additional inputs for future algorithms and MRMS reanalysis efforts.

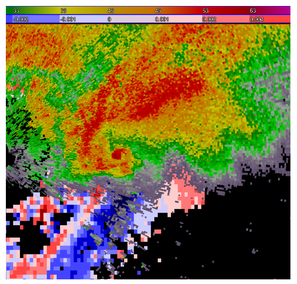


MRMS 3-D Reflectivity (above) and layered azimuthal shear products (right).

MERGER AND PRODUCT ARTIFACTS



Generally, divergence (blue) is a math artifact except for rear-flank gust fronts as shown below



In areas of strong AzShear (top) and DivShear (bottom), the signatures produce a tri-pole artifact for AzShear and a quad-pole artifact for DivShear as a result of the algorithm's math.

Storms far from any single radar produce very elongated signature blocks, especially for the "maximum" method.

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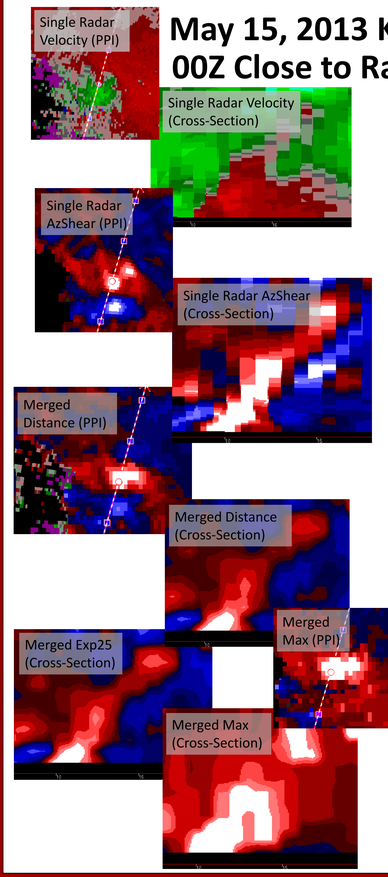
CASE STUDY EXAMPLES



May 15, 2013 KFWS 00Z Close to Radar

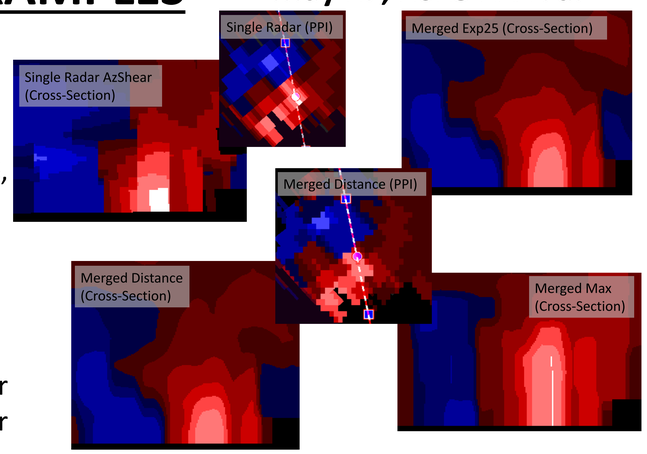
Merger Methods Tested:

- Normal (Distance Weighted)
- Exponential Distance at 25, 50, 75, and 100 options
- Magnitude Maximum

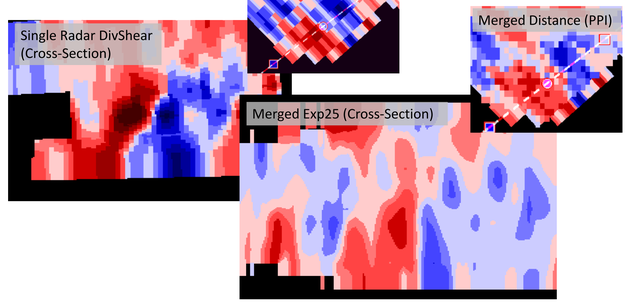
Results:

- All methods (except for maximum) reduces AzShear values from the single radar
- Exponential at 25 retains mesocyclone the best while cleaning near-radar noise without new large artifacts
- Maximum removes negative math artifacts the most effectively yet introduces messy unreal artifacts

May 17, 2013 22Z Far



June 12, 2013 00Z Mid-Range



DUAL-POL RESOLUTION CASE STUDY

Resolutions Processed:

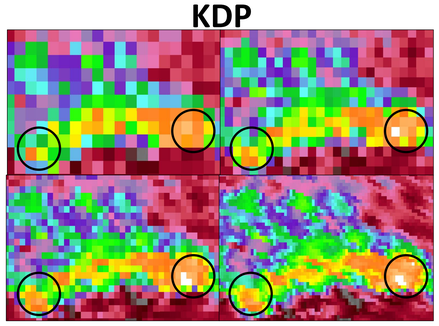
- Resolutions are radar/merger grid spacings in degrees
- 0.01, 0.0075, 0.005, and 0.0025 deg grids were tested
- Essentially, a factor down creates 4 new gates from one

Results:

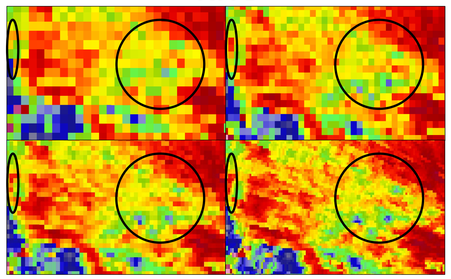
- Increasing resolution from 0.01 to 0.005 has most change
- 0.005 to 0.0025 stretches values along radial in a gradient
- 0.0025 res could yield real values if close enough to radar

Case: 00Z on May 16, 2013 at KFWS

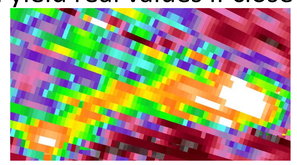
KDP



RHO



KDP Single



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