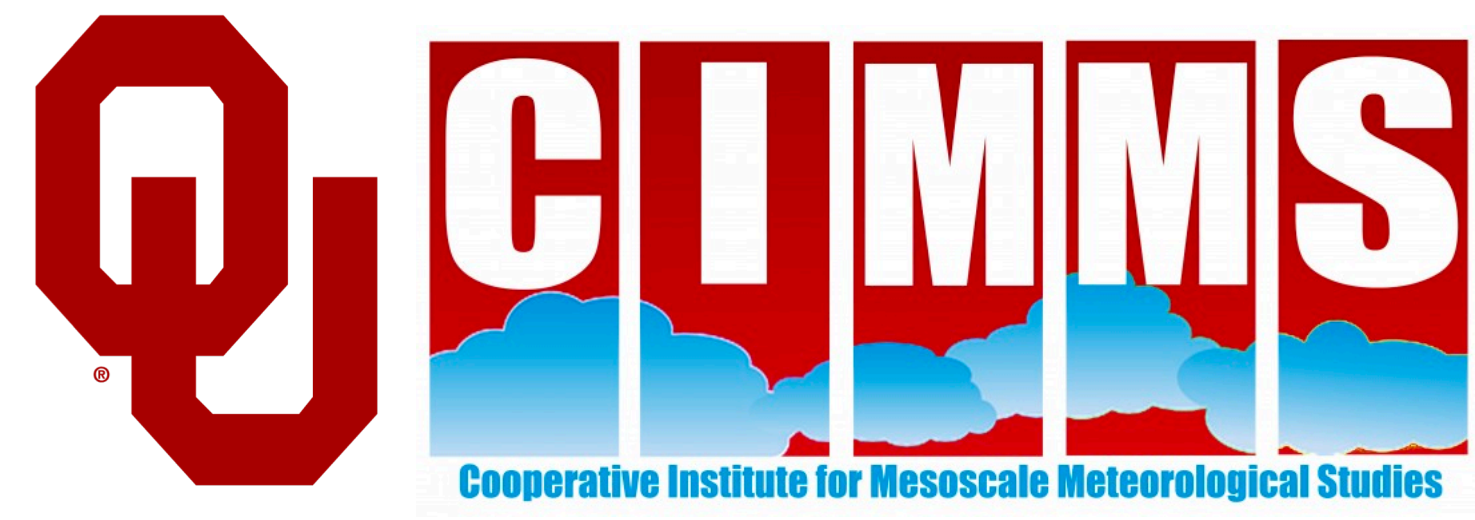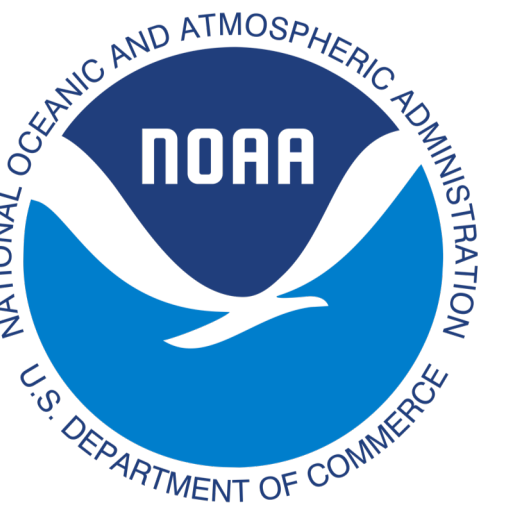# Using the MYRORSS Database to Create a Rotating Storms Climatology
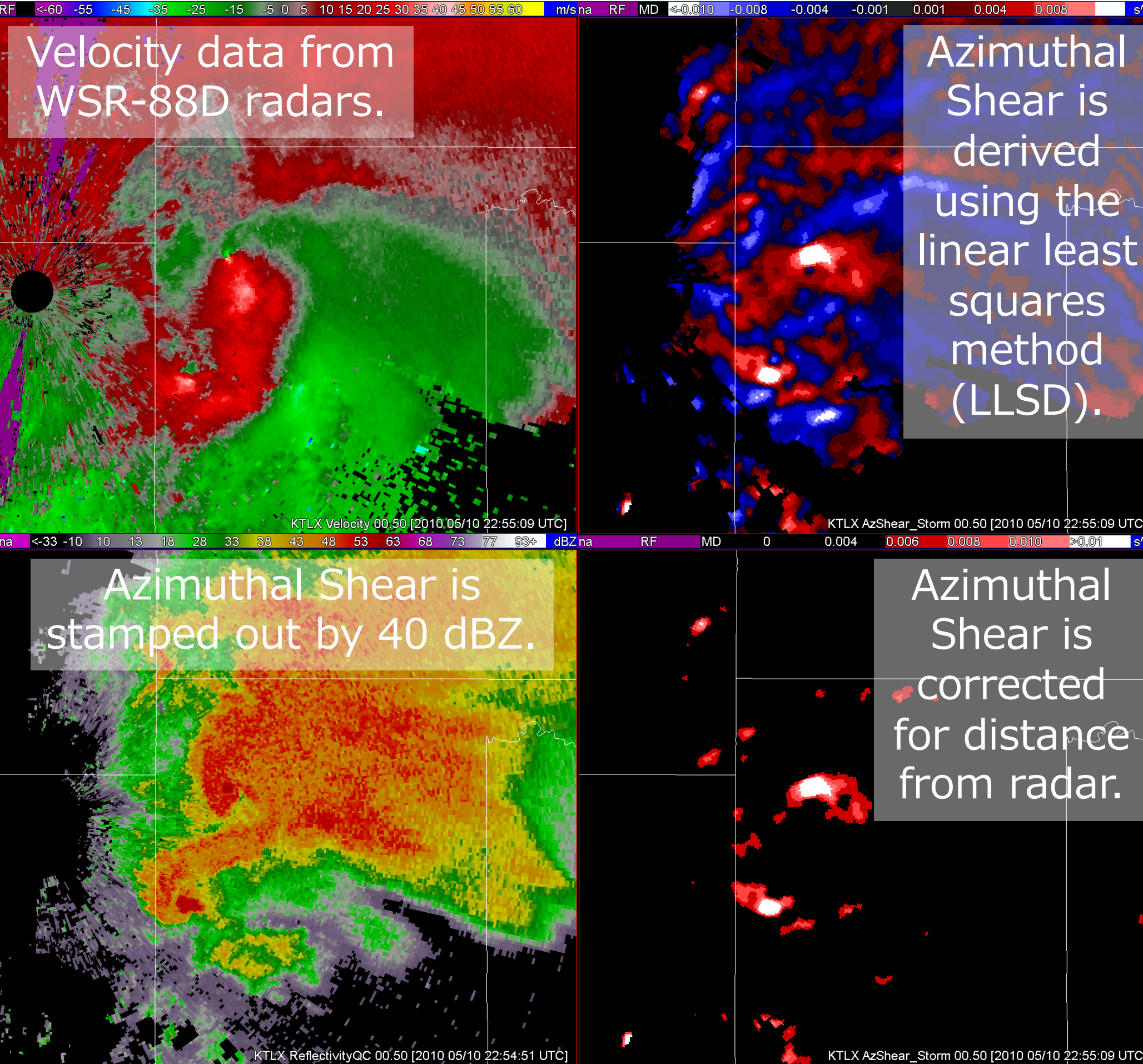
Kendell T. LaRoche, Skylar S. Williams, Kiel L. Ortega, Anthony E. Reinhart,
Matthew C. Mahalik, Brandon R. Smith, and Travis M. Smith
OU/CIMMS & NOAA/OAR/NSSL

Data

- Multi-Year Reanalysis of Remotely Sensed Storms (MYRORSS) combines WSR-88D radar data with RUC/RAP model analyses and produces products on the Multi-Radar Multi-Sensor (MRMS) grids

- MYRORSS creates two composite Azimuthal Shear (AzShear) layers (0-3 AGL and 3-6 AGL) from the corrected AzShear.

Velocity data from WSR-88D radars.
Azimuthal Shear is derived using the linear least squares method (LLSD).
Azimuthal Shear is stamped out by 40 dBZ.
Azimuthal Shear is corrected for distance from radar.

- Updates to the LLSD algorithm in 2017 requires reprocessing of the MYRORSS AzShear products which is currently underway.
- Each daily accumulation is examined manually for errors.
- Poor dealiasing of velocity can lead to erroneous data within the AzShear fields.

Example of dealiasing causing errors in AzShear.
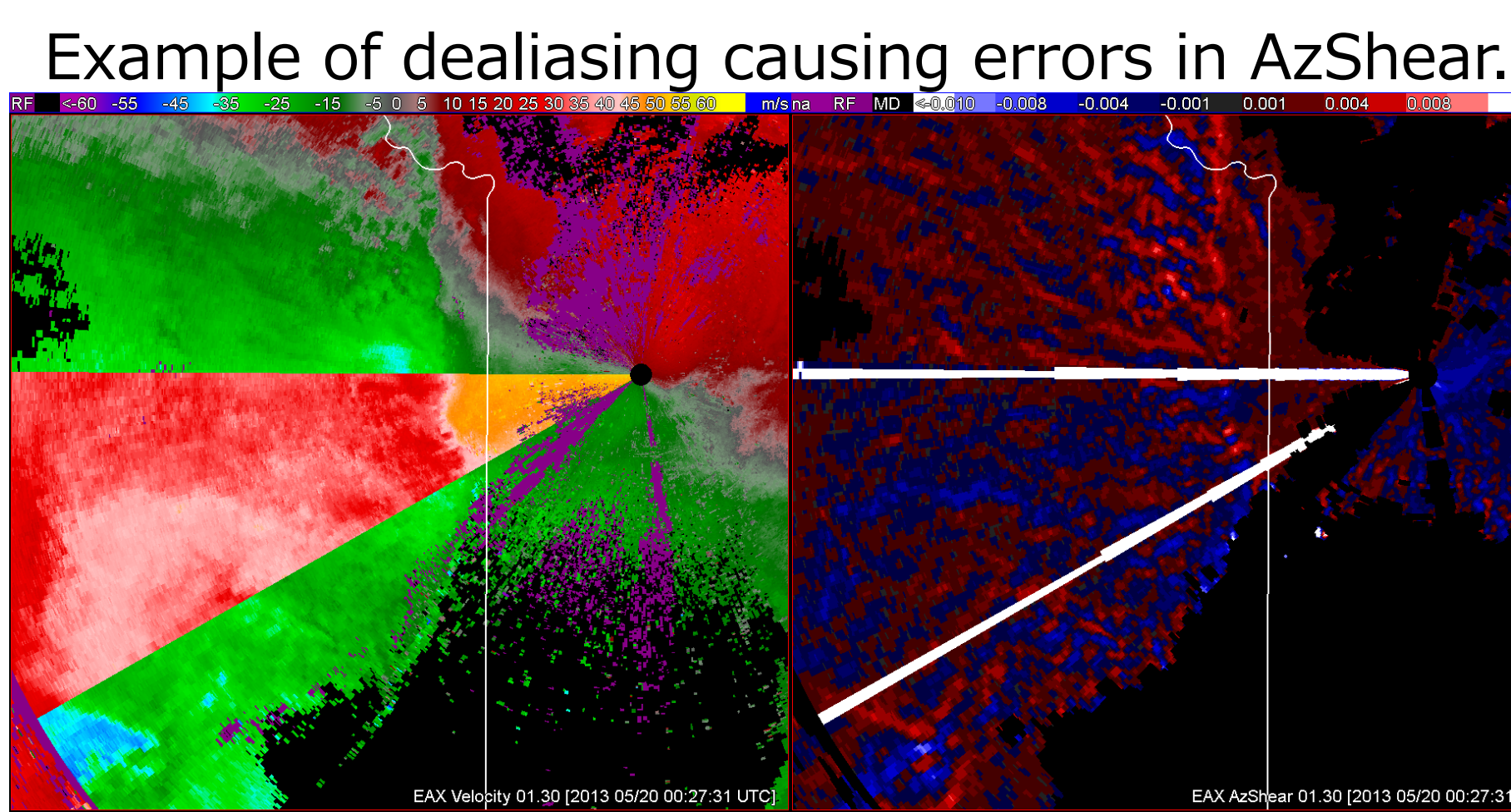
MHT Settings

- AzShear can be noisy due to gust fronts from storms passing near the radar and overwhelming the signal.
- Using different multi-hypothesis tracking (MHT) settings, an attempt to show only rotation tracks was made.
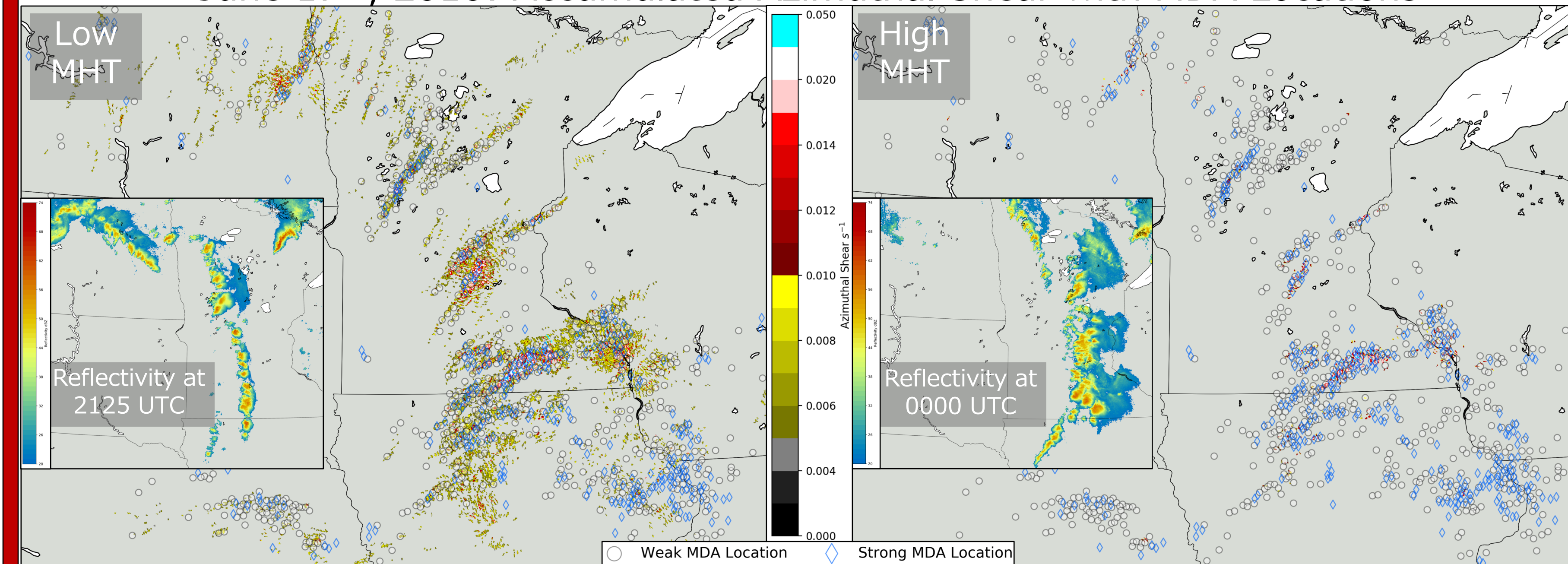
May 10th, 2010 12 UTC – May 11th, 2010 12 UTC

Raw Data
Low MHT
High MHT
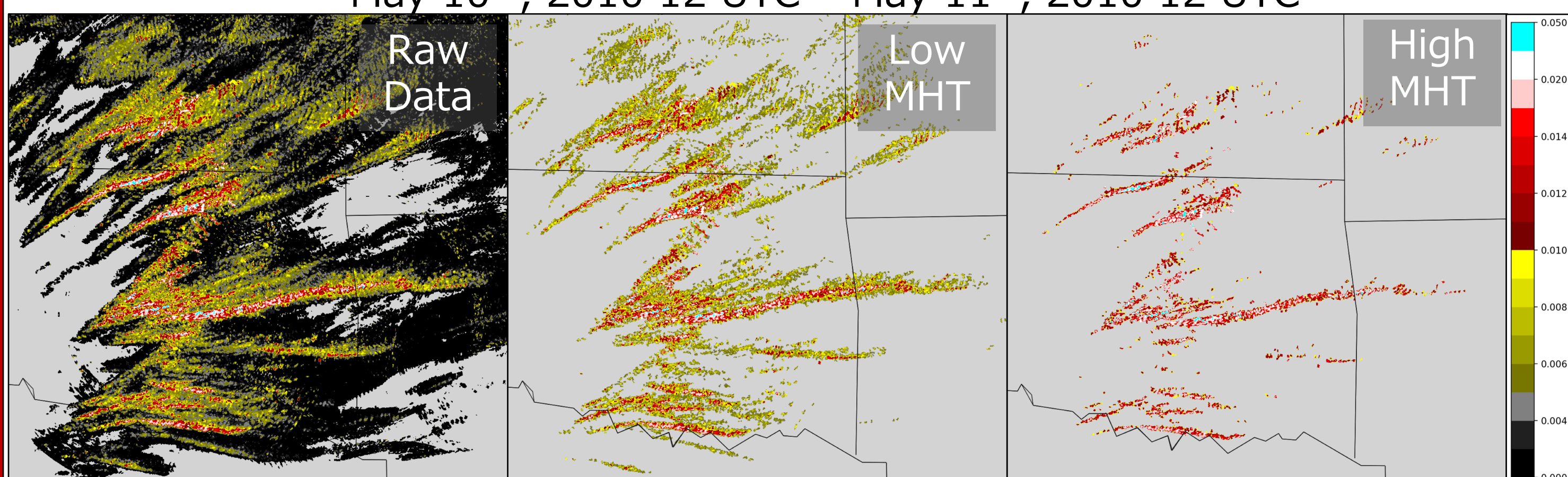
Low (High) MHT settings: Min. value of 0.004 s⁻¹ (0.008 s⁻¹) clusters of 18 pixels large with a max. value of at least 0.005 s⁻¹ (0.01 s⁻¹).

Case Study Examples

Mid-level AzShear was combined with mesocyclone locations identified by the Digital Mesocyclone Detection Algorithm (MDA). Using the Mesocyclone Strength Index (MSI) within the MDA, strong (> 3600) and weak (< 3600) mesocyclones are identified.

June 17th, 2010: Accumulated Azimuthal Shear with MDA Locations

Low MHT — Reflectivity at 2125 UTC
High MHT — Reflectivity at 0000 UTC
Weak MDA Location   Strong MDA Location

On the large scale, MDA points line up well with AzShear. The AzShear with high MHT settings line up more with strong MDA points while AzShear with low MHT settings line up with weaker points.

April 14th, 2011: Accumulated Azimuthal Shear with MDA Locations


Low MHT
High MHT
Strong MDA Location
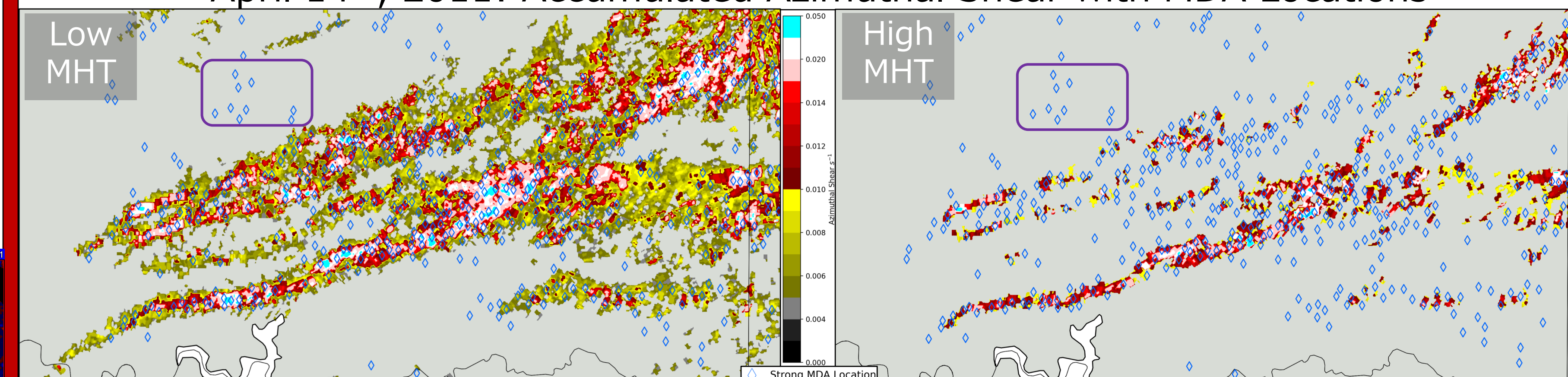
Zooming in on individual rotation tracks, there is noise with the MDA points. Strong and weak MDA points are sometimes not associated with any AzShear (purple box). However, strong MDA points do tend to be associated with higher AzShear.

April 15th, 2011: Accumulated Azimuthal Shear with MDA Locations

Low MHT
High MHT
Weak MDA Location   Strong MDA Location
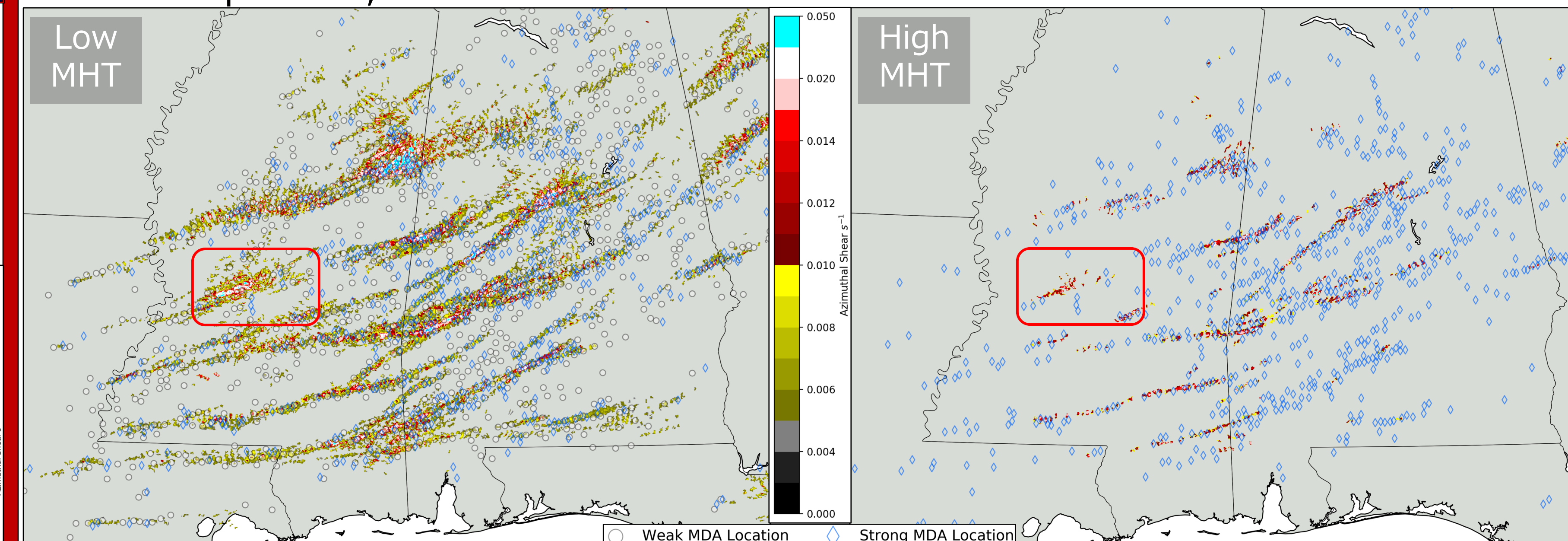
While overall MDA points and AzShear match, there are issues with erroneous data within the AzShear field. Noise near the radar is common (red box) and this noisy AzShear does not have mesocyclone identifications associated with it.

Yearly Accumulation - 2011

Low MHT
High MHT
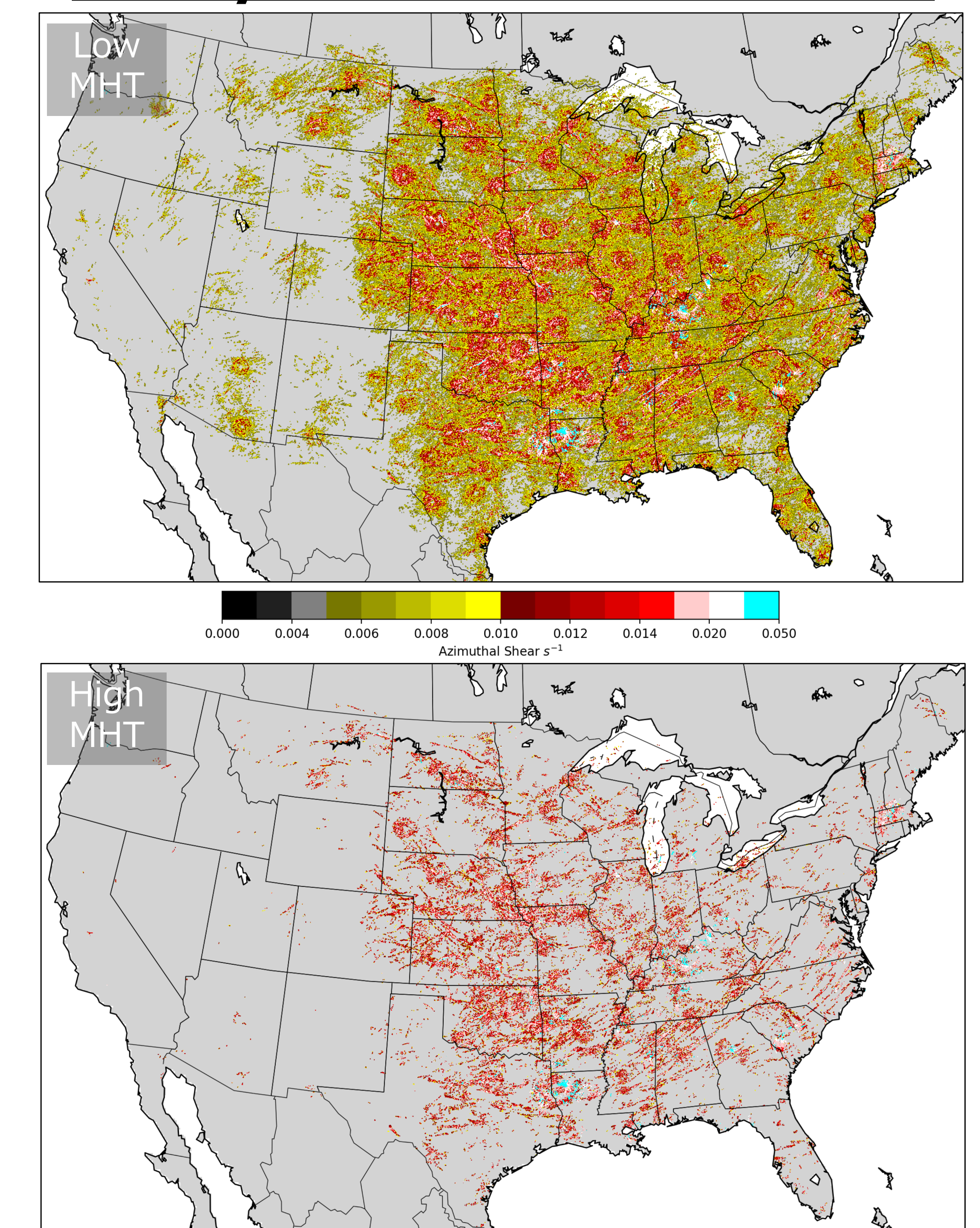
- Radar "blooms" occur due to better AzShear coverage closer to the radars.
- Higher MHT settings allow for rotation tracks to be separated from gust fronts but still have high signal close to radars.

Future Work

- Process and quality control AzShear products for MYRORSS during 1998-2008
- Continue to fine-tune MHT settings to properly identify rotation tracks
- Examine the aspect ratios of the linear features as an additional quality control method
- Investigating ways to reduce false high AzShear.

Acknowledgements