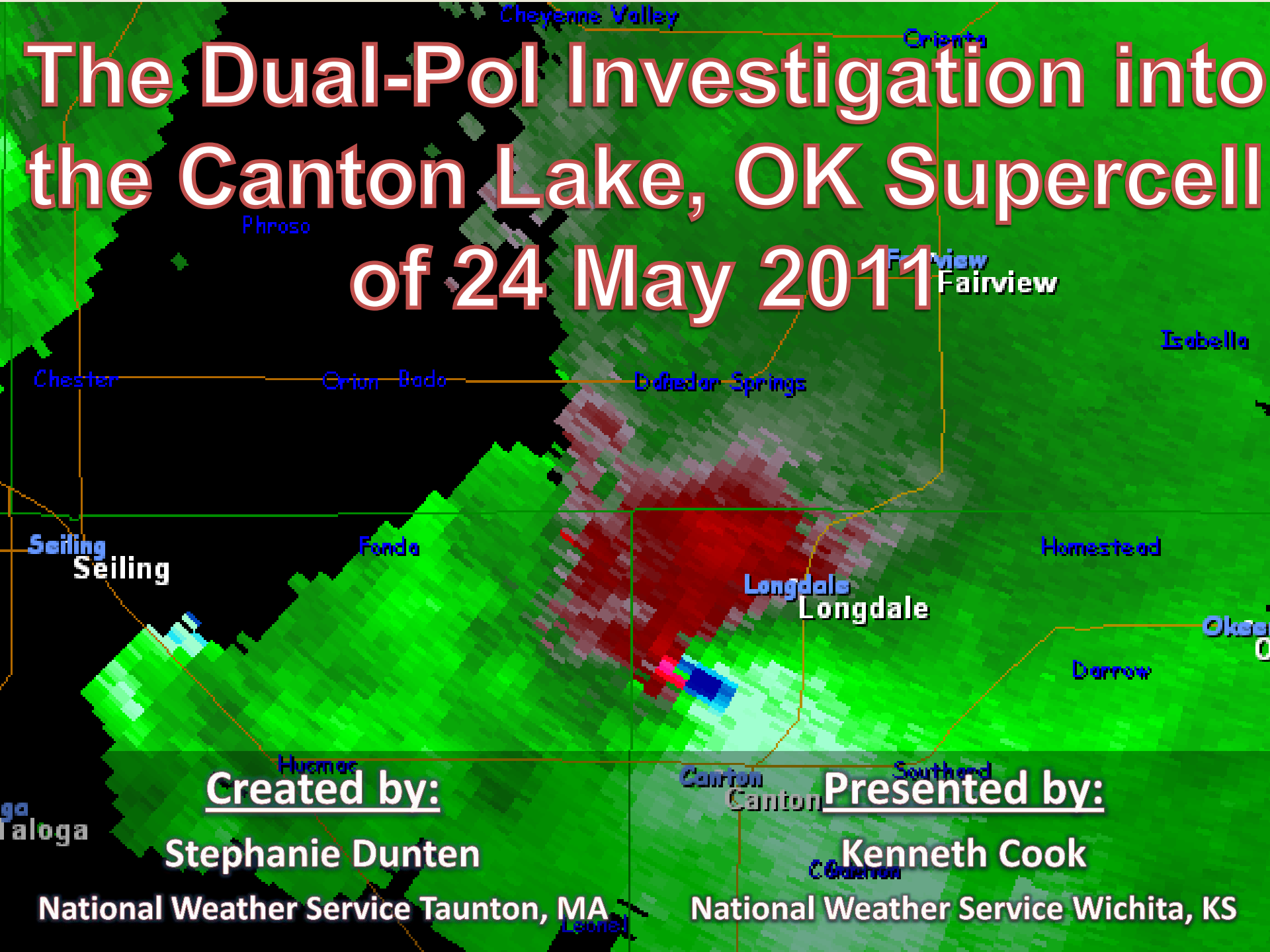

The Dual-Pol Investigation into the Canton Lake, OK Supercell of 24 May 2011

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National Weather Service Taunton, MA

Presented by:

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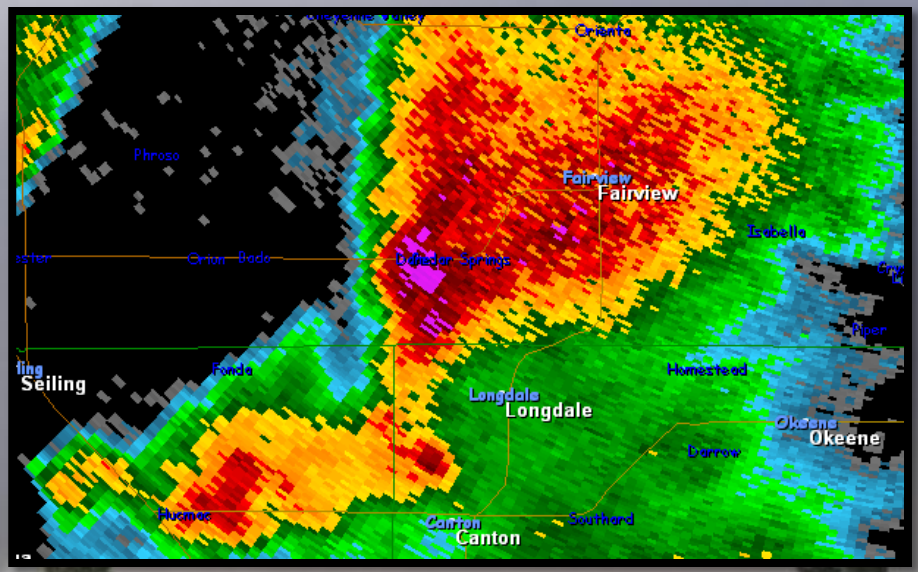
National Weather Service Wichita, KS

Outline

- Environment
- Storm Track
- Legacy Radar Data
  - Classic Hook Echo
  - Velocity Couplet
- Dual-Pol Radar Data
  - Updraft Column
  - Debris Ball
  - Hail Spikes



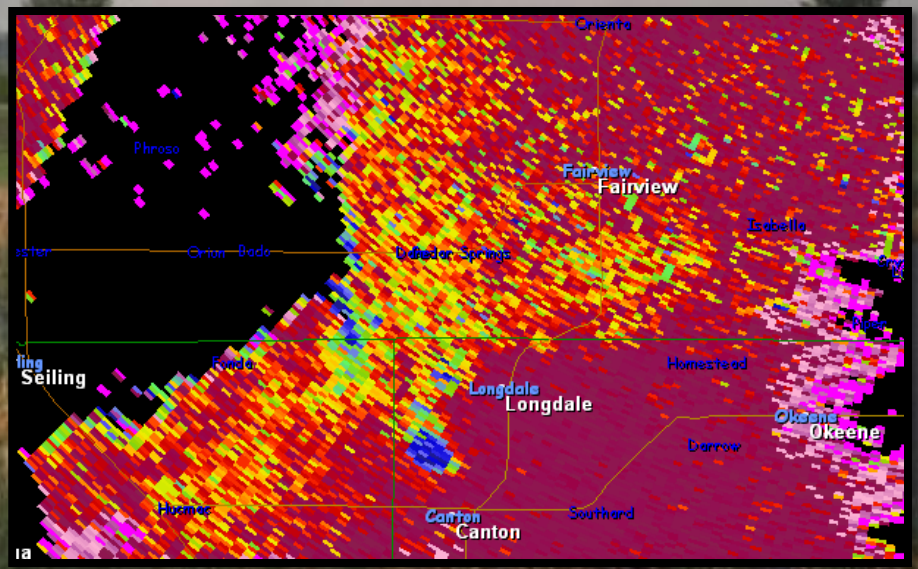
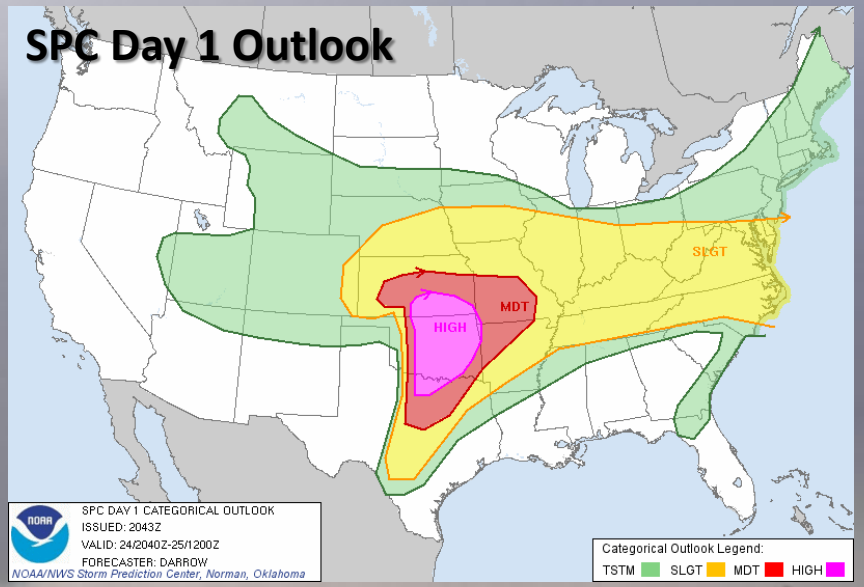


Image provided courtesy of Paul Knightly

Environment

- High Risk Day over OK
- Dry line Set up
- Strong Forcing Aloft
- MU Cape 4000 J/kg
- Dry Adiabatic Lapse Rates
- Mid 60-70 Dewpoints



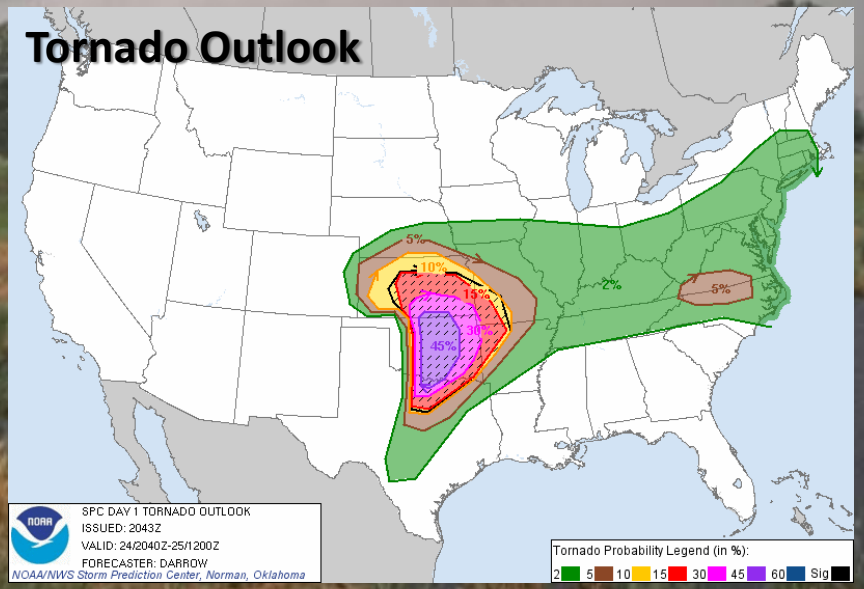
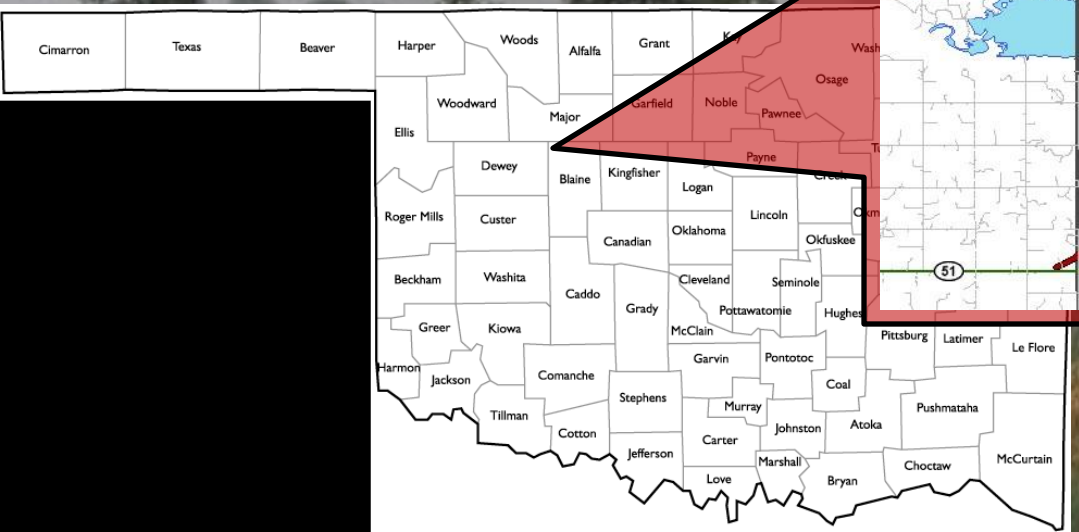
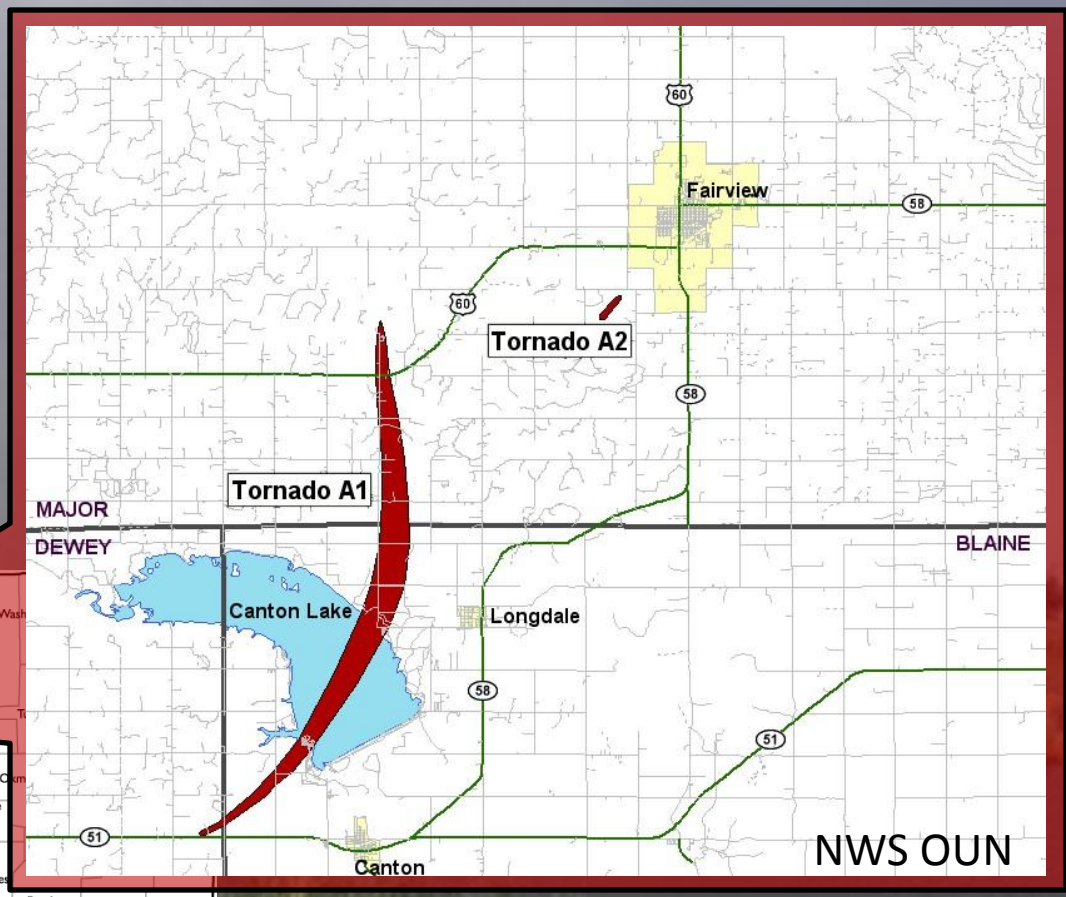


Image provided courtesy of Paul Knightly

Storm Track

- Tornado 1
  - EF-3
  - 13 mile track
  - Width ½ mile
  - 23 minutes
  - 1 death, 2 injuries



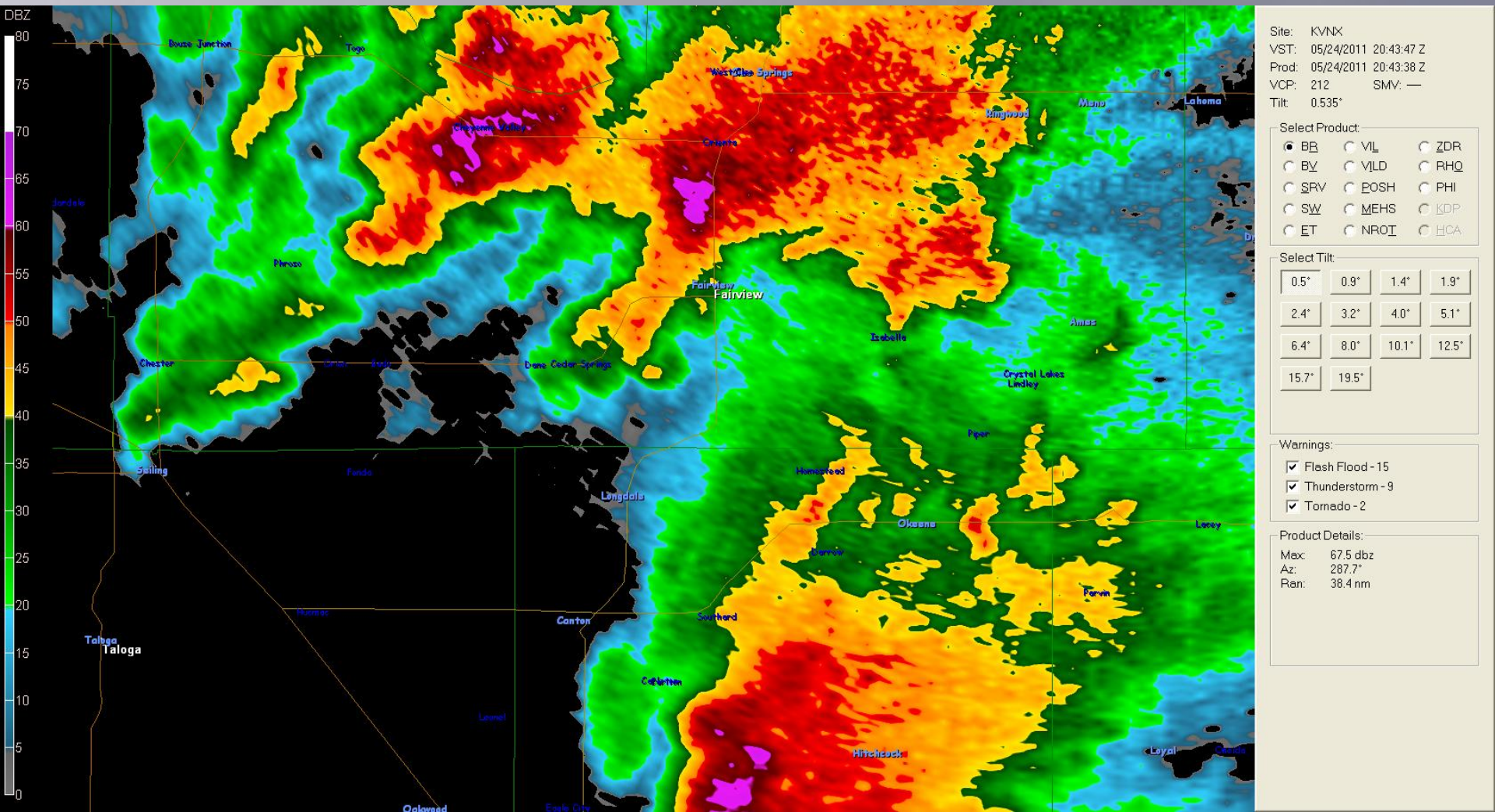


Legacy Products KVNX

Image provided courtesy of Paul Knightly

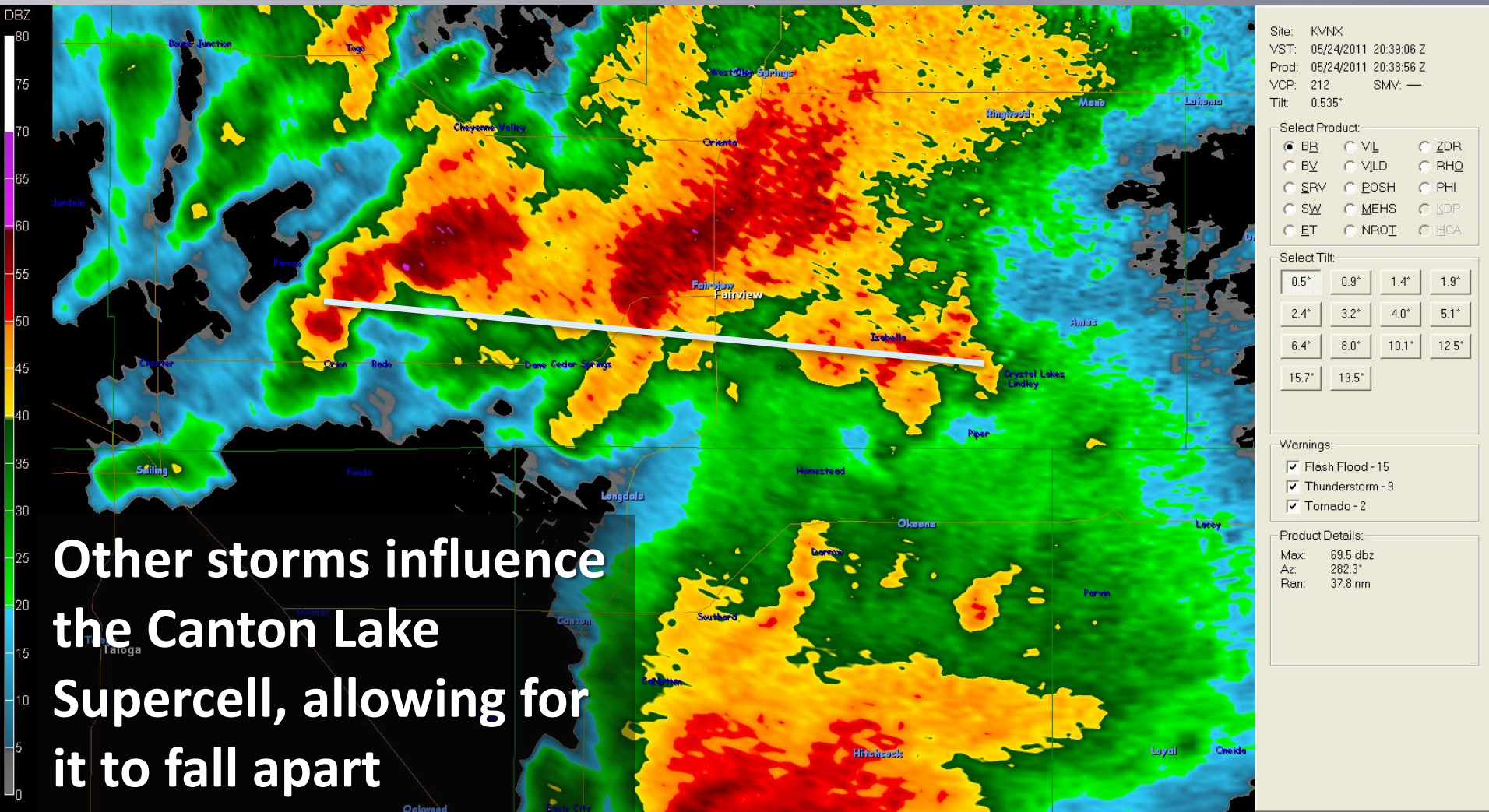
Legacy Products KVNX

Hook Echo



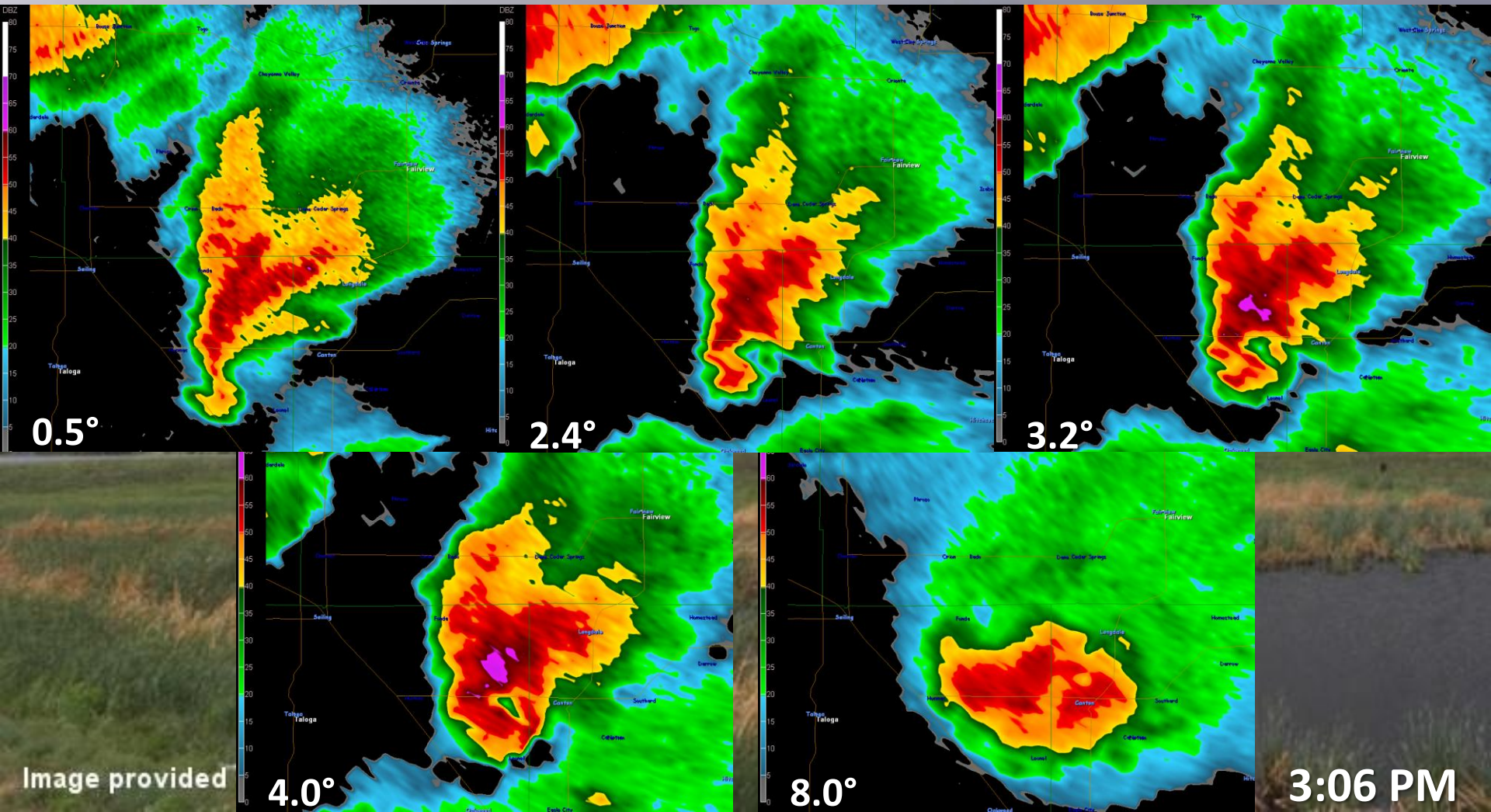
Legacy Products KVNX

Hook Echo



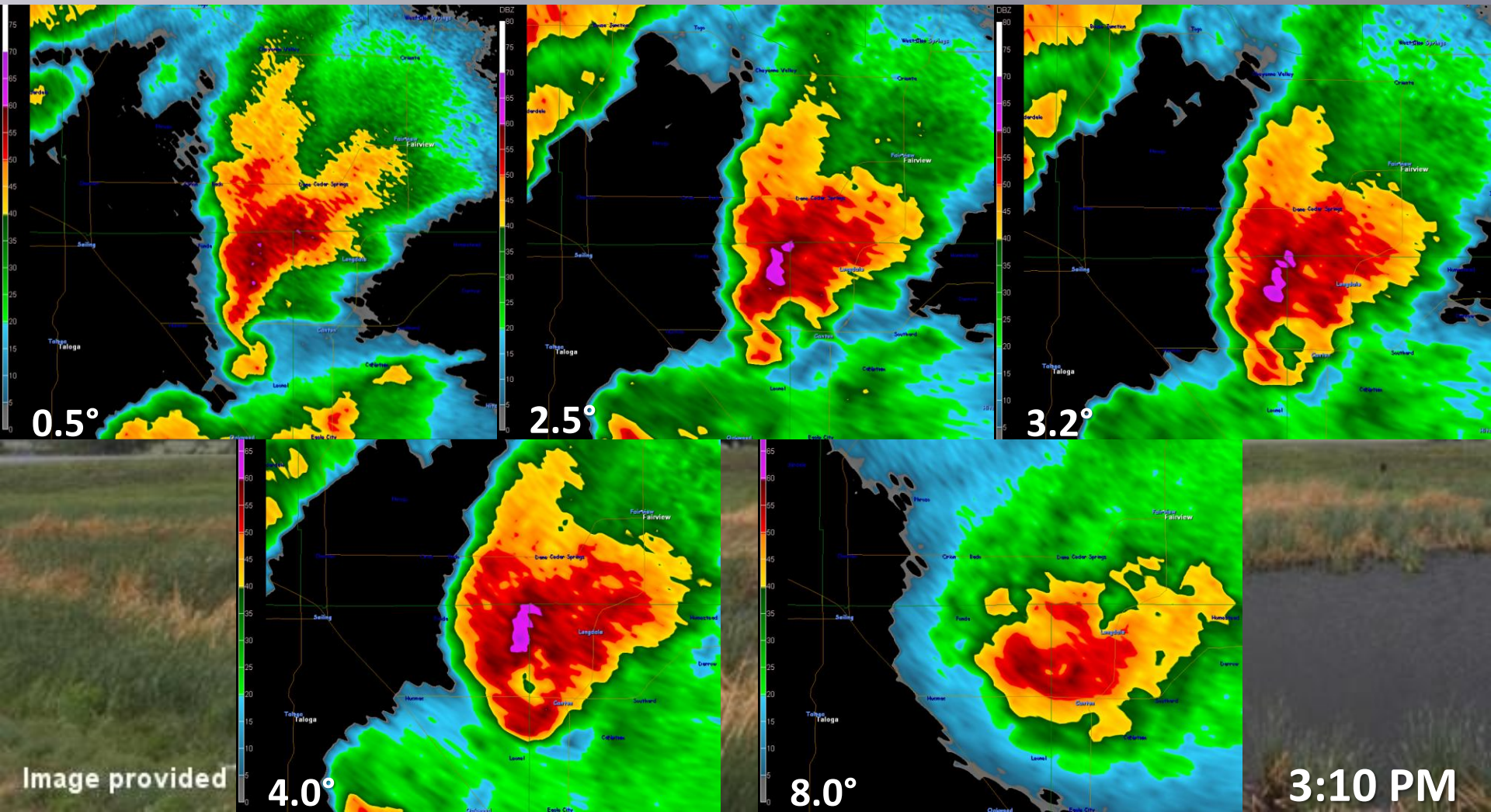
Legacy Products KVNX

More Reflectivity



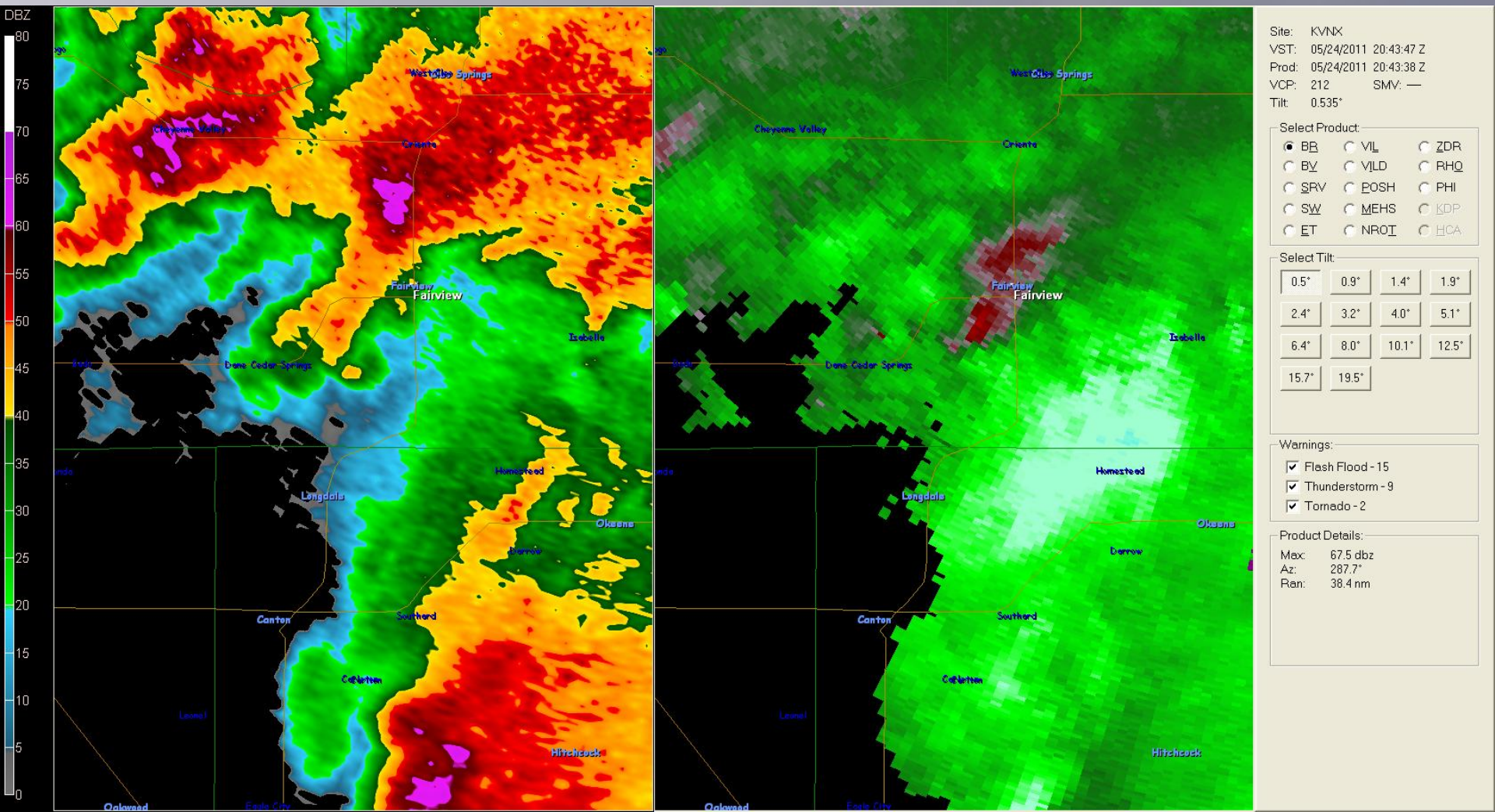
Legacy Products KVNX

More Reflectivity



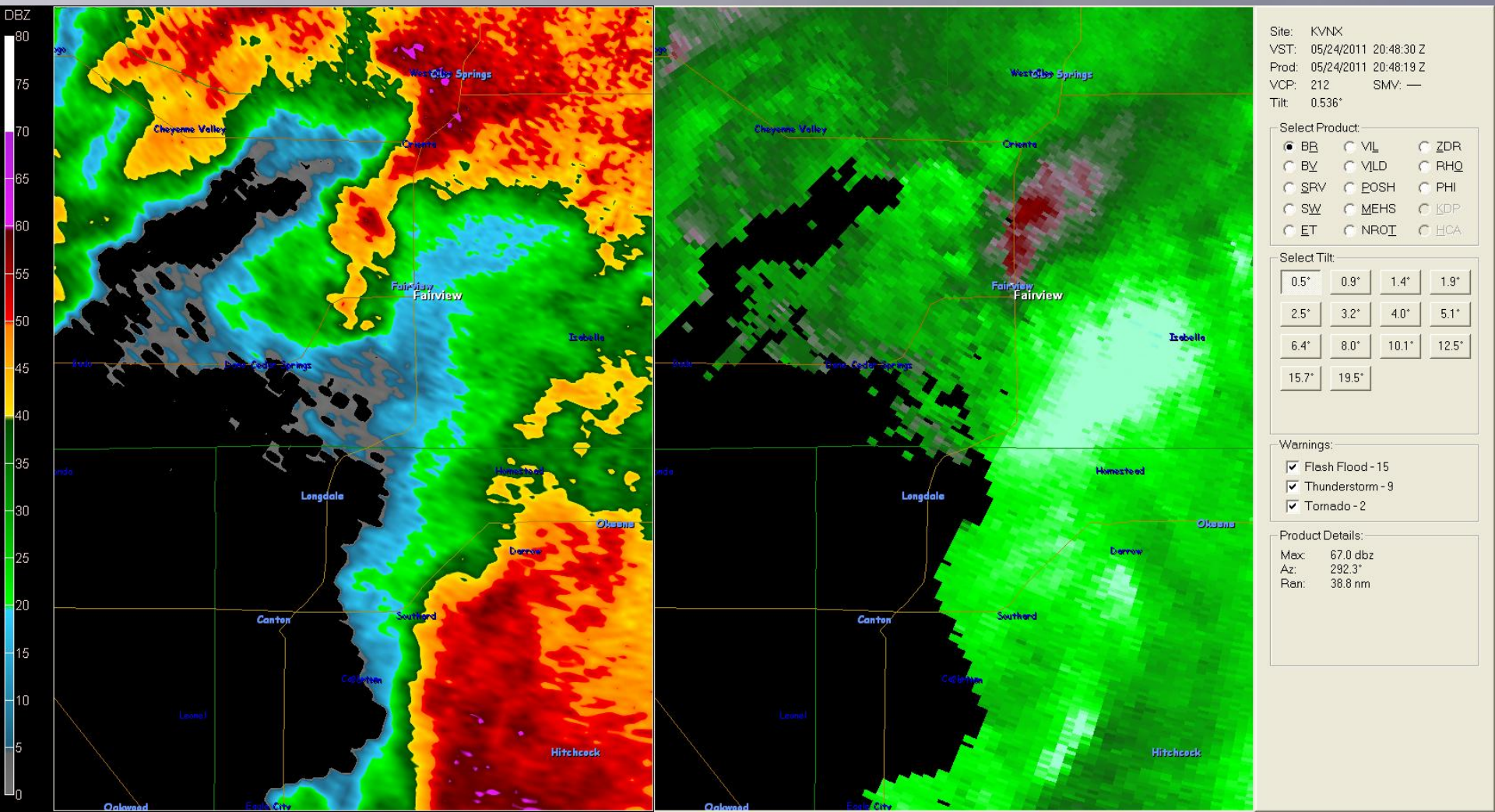
Legacy Products KVNX

Velocity Couplet



Legacy Products KVNX

Velocity Couplet

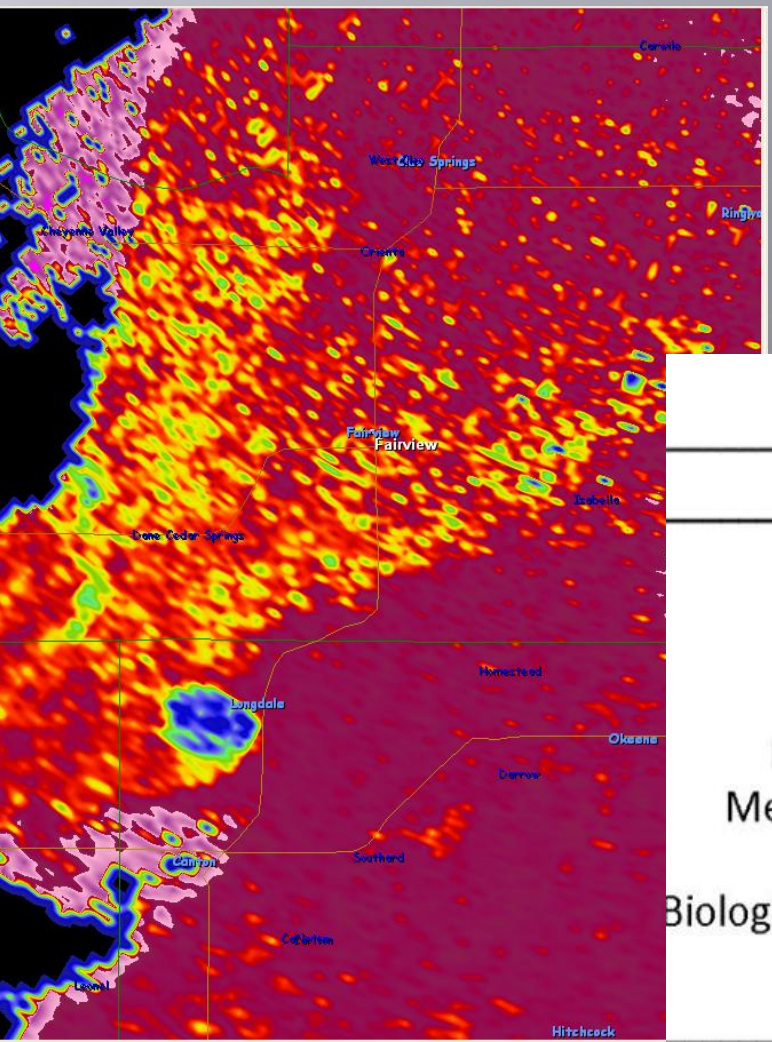


Dual-Pol Products KVNX

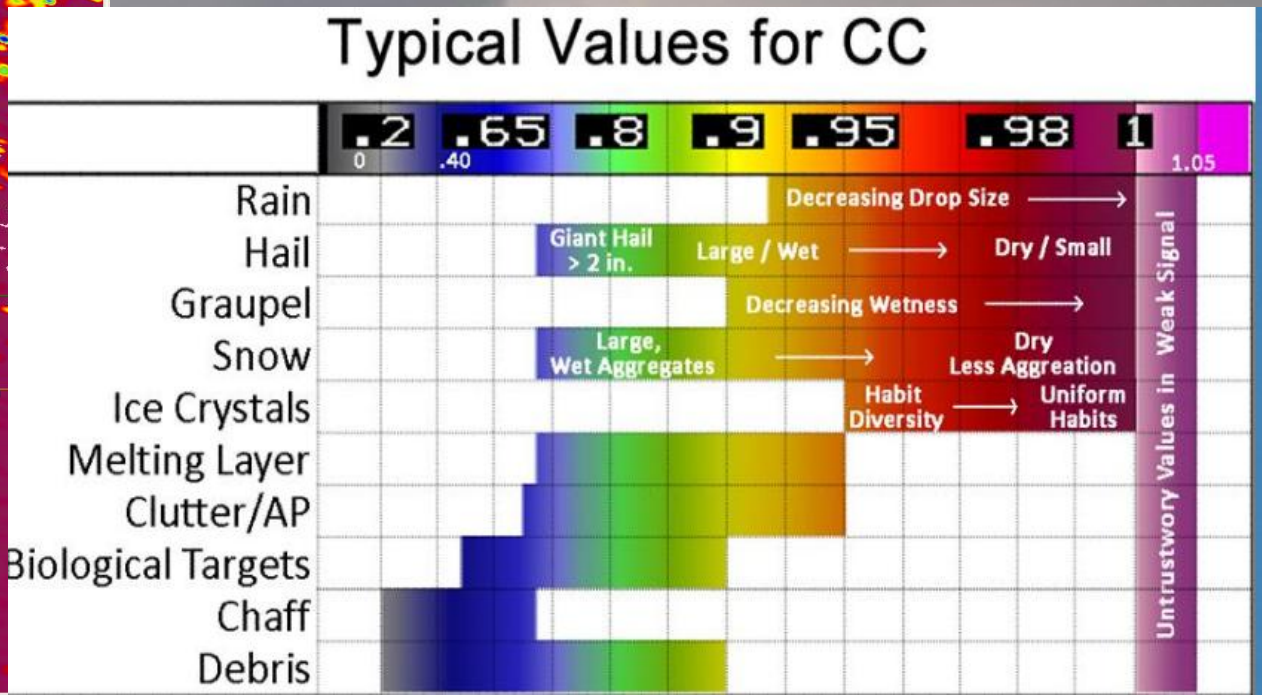
Image provided courtesy of Paul Knightly

Dual-Pol Products KVNX

Correlation Coefficient

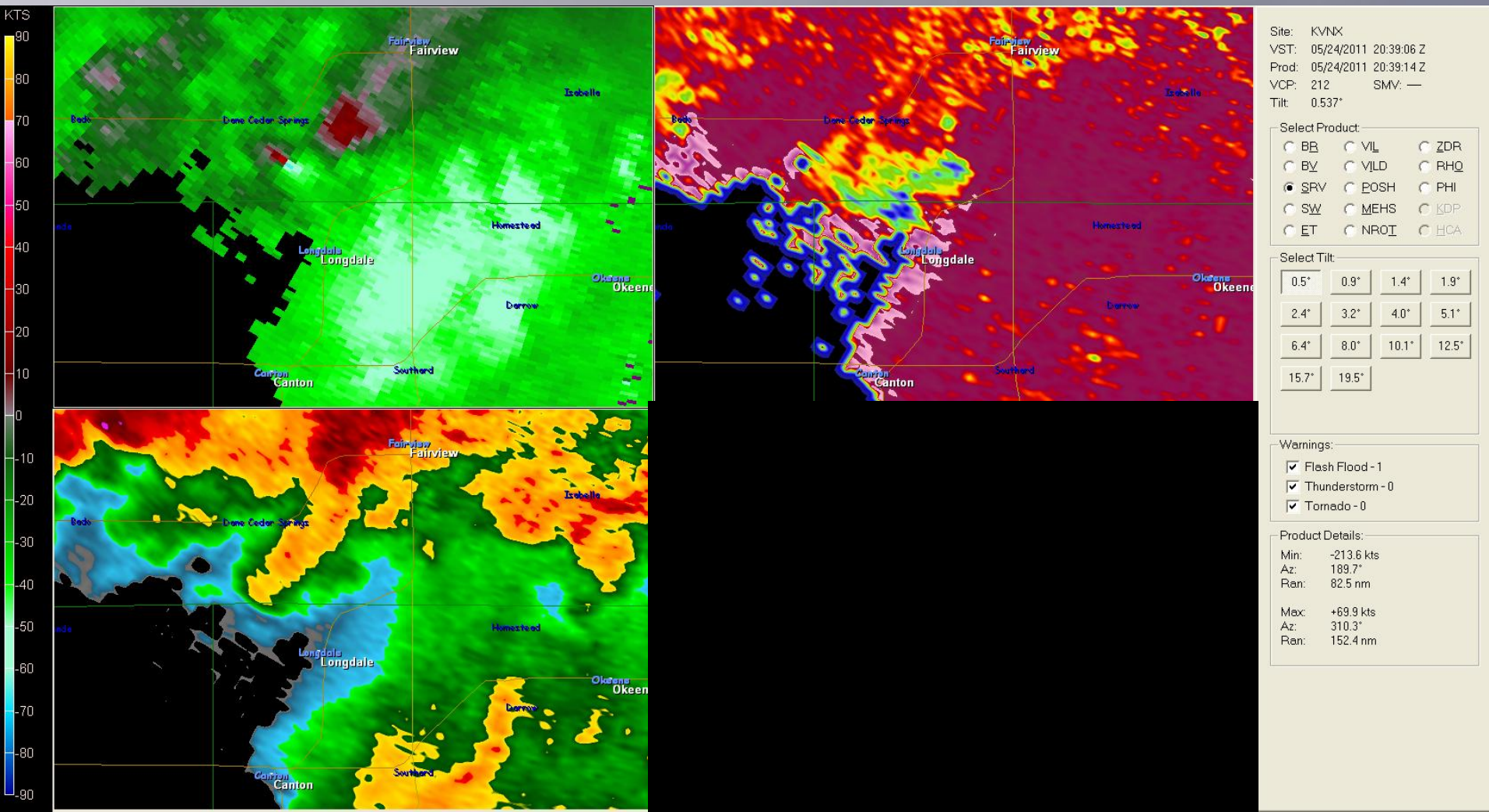


- Measure of how similarly the horizontally & vertically polarized pulses are behaving within a pulse vol.
- Great at discriminating non vs met echoes



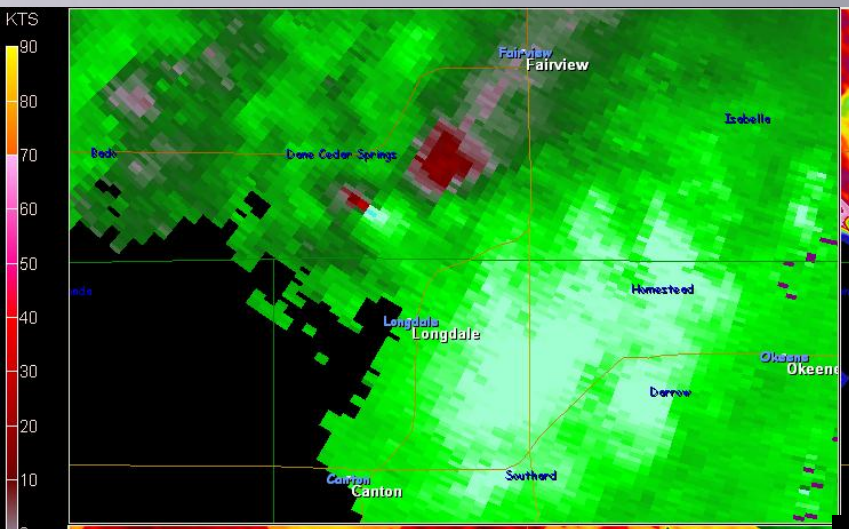
Dual-Pol Products KVNX

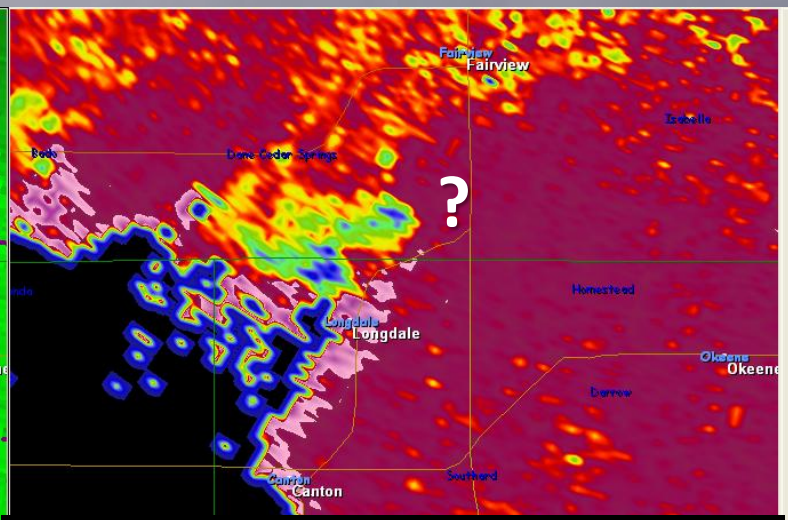
Correlation Coefficient – Debris Signature Surface

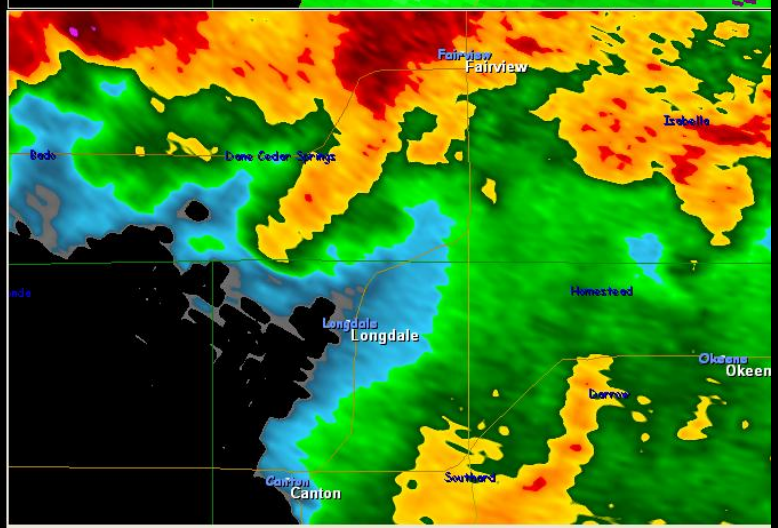


Dual-Pol Products KVNX

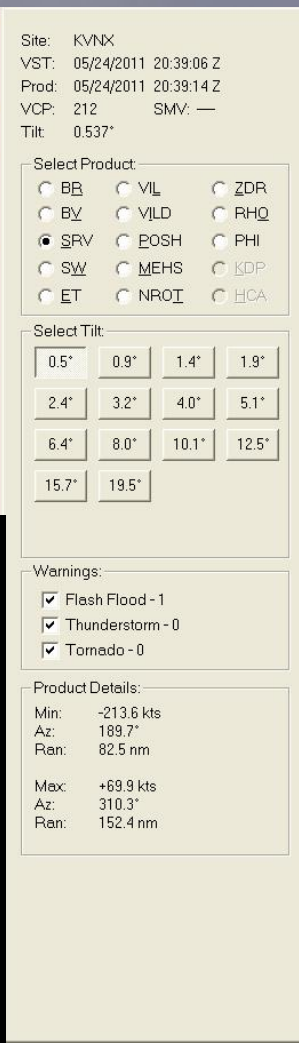
Correlation Coefficient – Debris Signature Surface





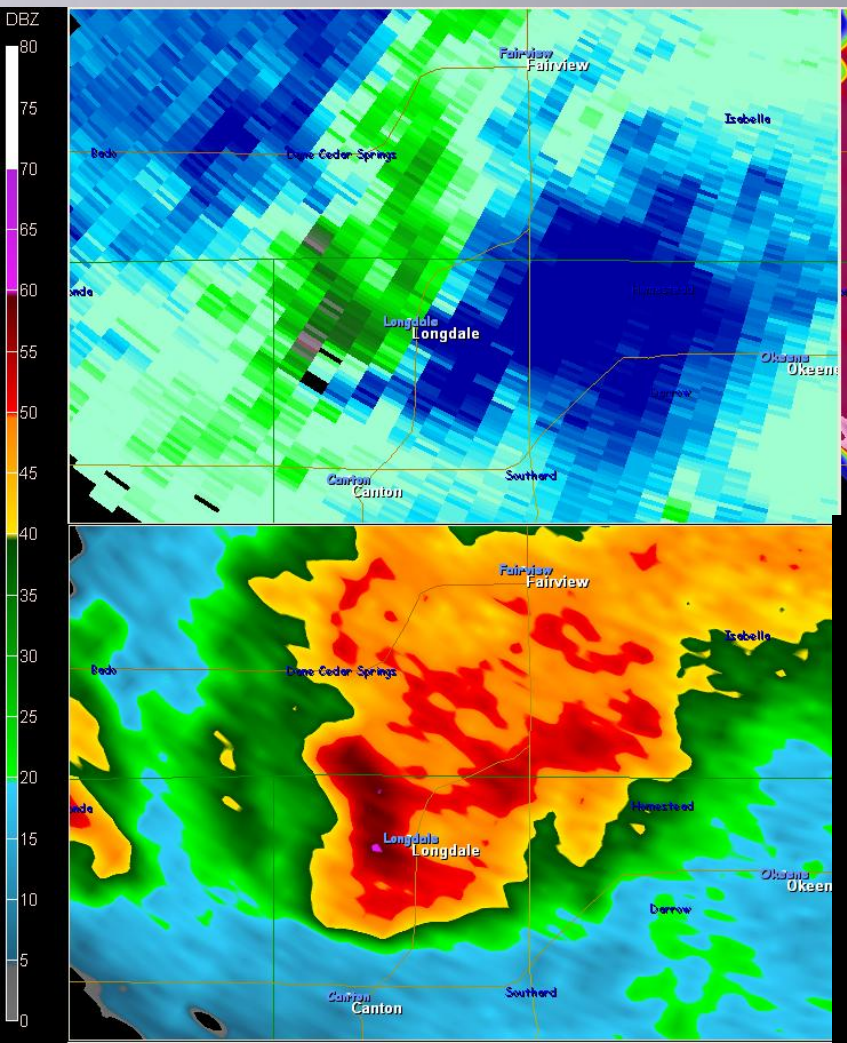


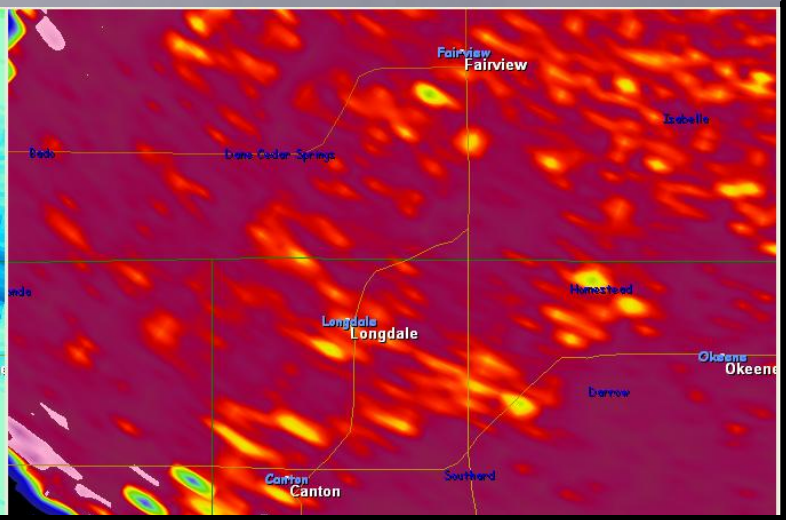
- Debris signature has fizzled out



Dual-Pol Products KVNX

Correlation Coefficient – Debris Signature Aloft



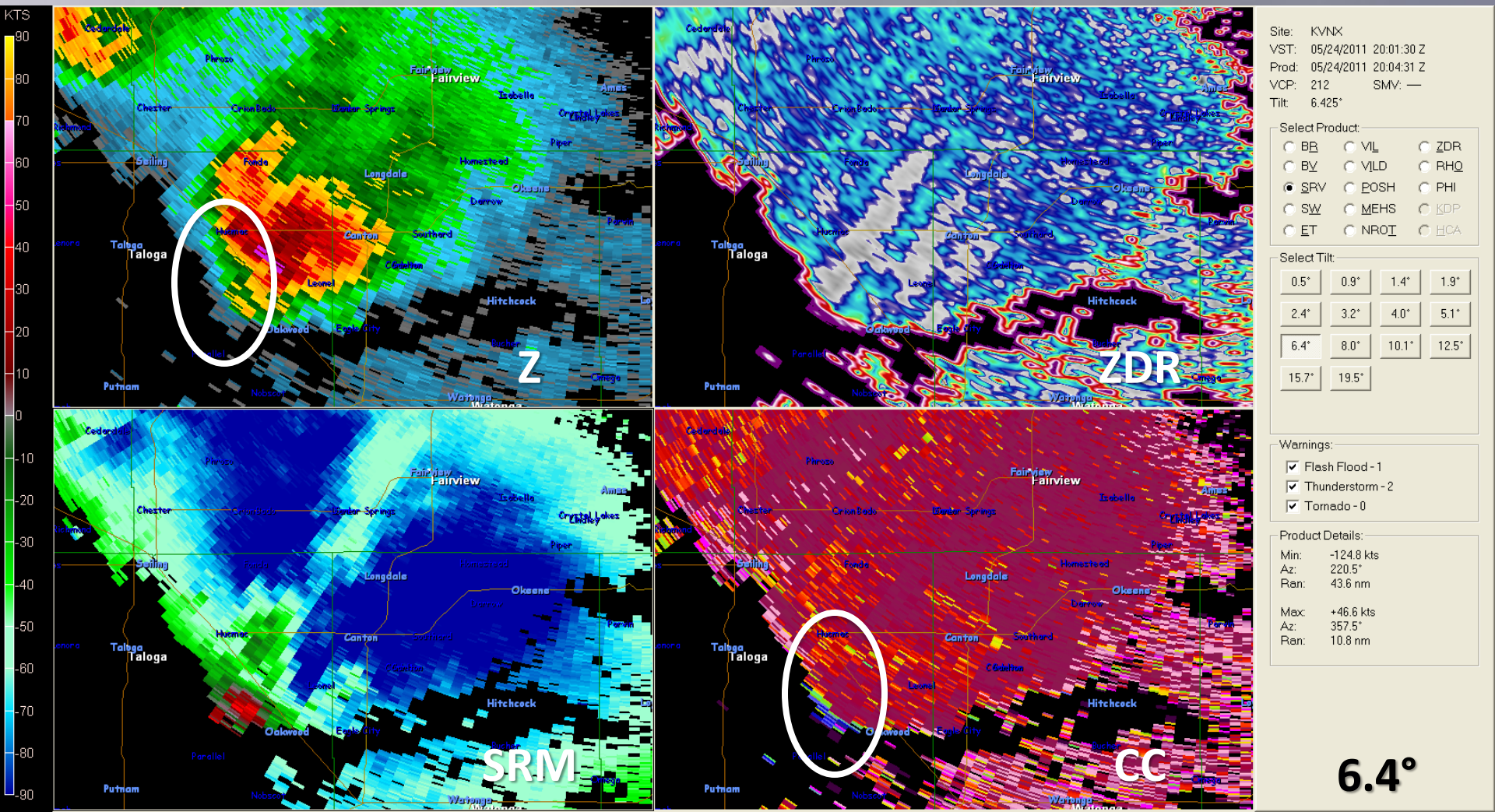


30,000ft

- CC at 6.4°
- Debris signature hardly noticeable, however there is an area of low CC where there is rotation and higher level of reflectivity aloft
- low CC values – less than 0.92

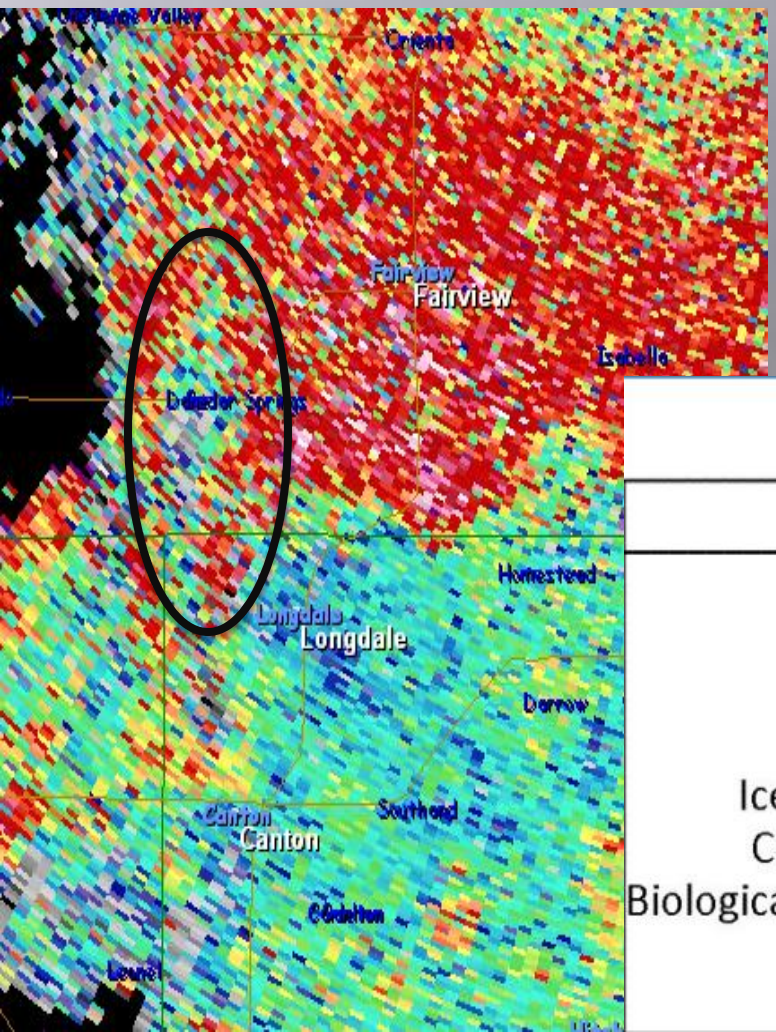
Dual-Pol Products KVNX

Correlation Coefficient – Hail Spikes

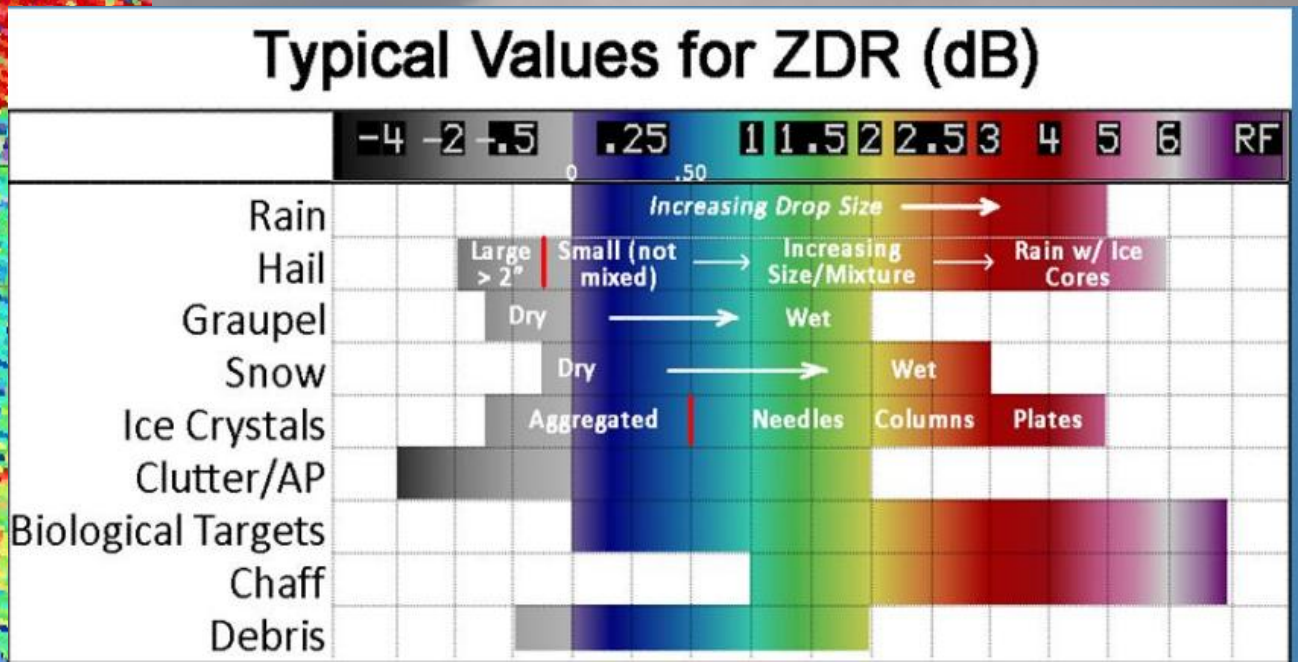


Dual-Pol Products KVNX

Differential Reflectivity

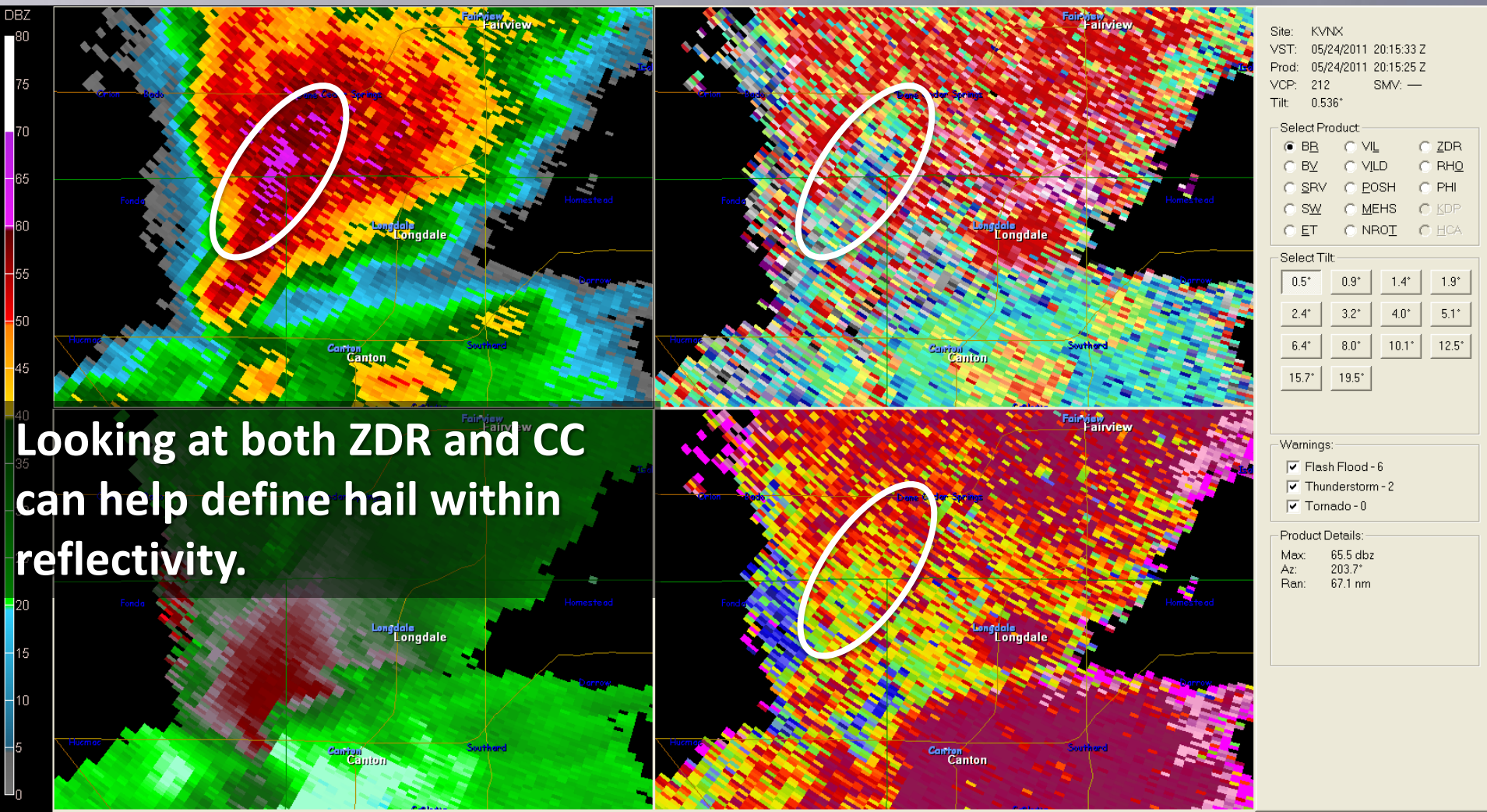


- Diff between the Horizontal & Vertical reflectivity factor
- Good indicator of mean drop size diameter echoes



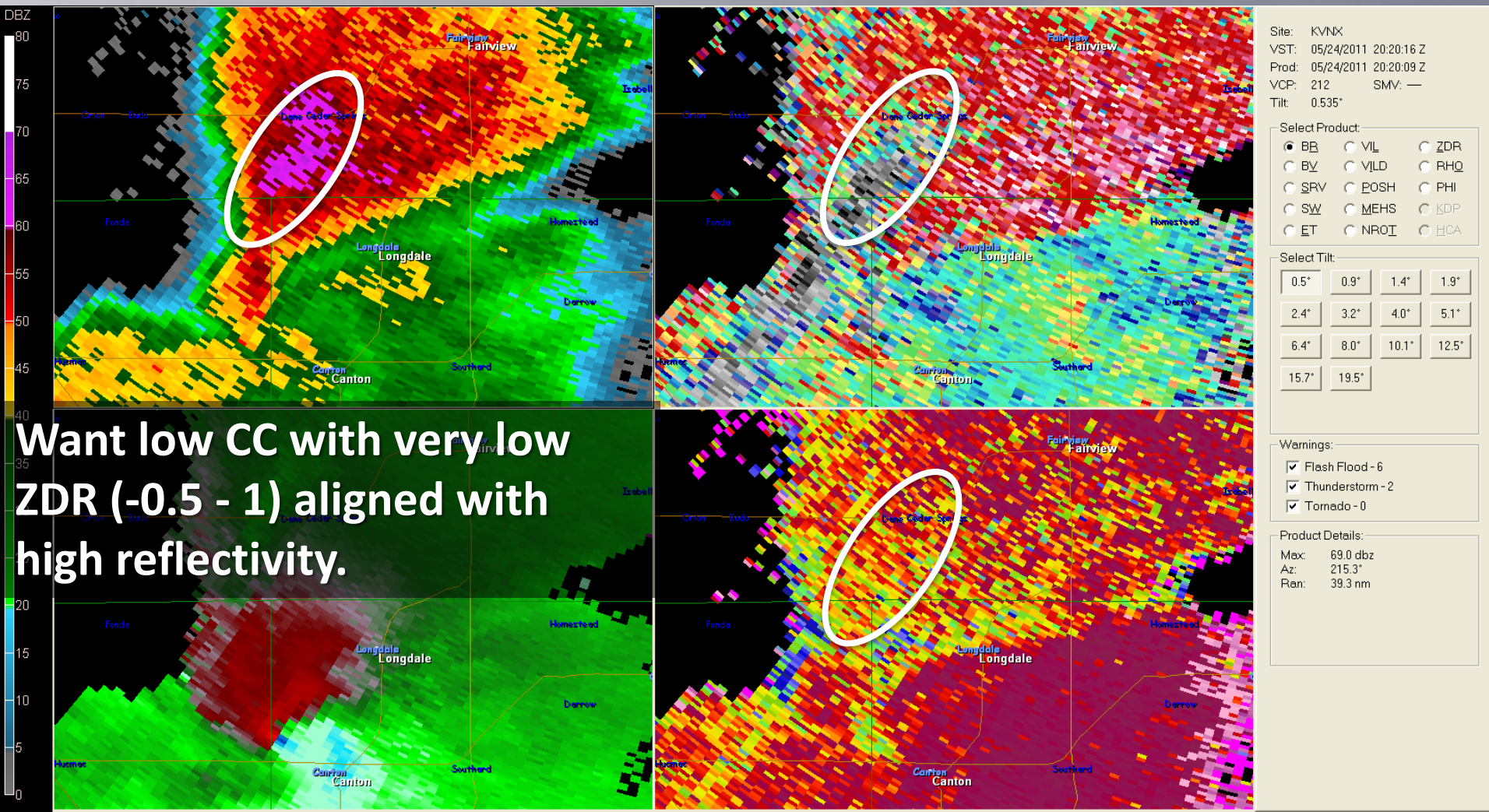
Dual-Pol Products KVNX

Differential Reflectivity – Hail Signature



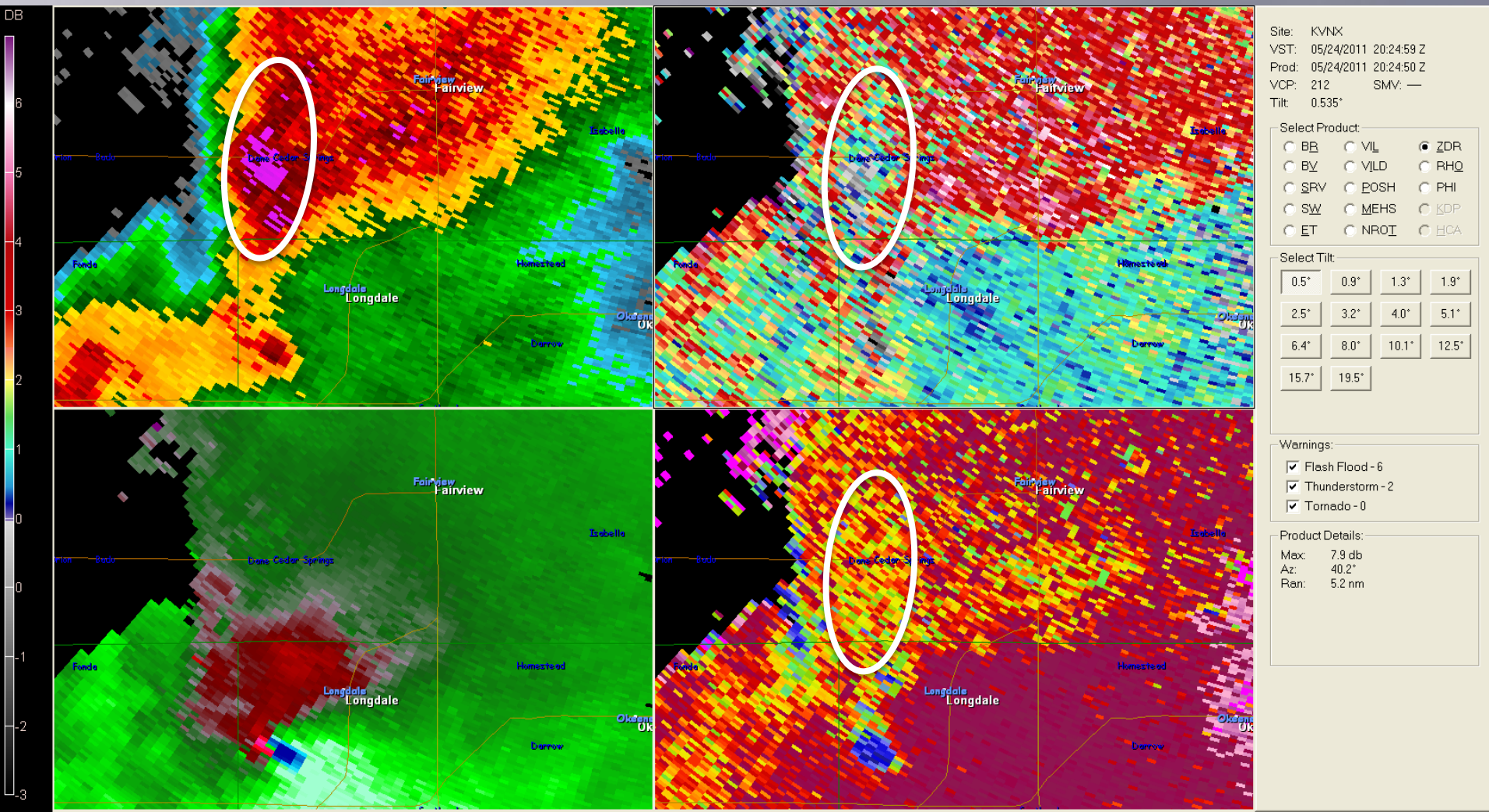
Dual-Pol Products KVNX

Differential Reflectivity – Hail Signature



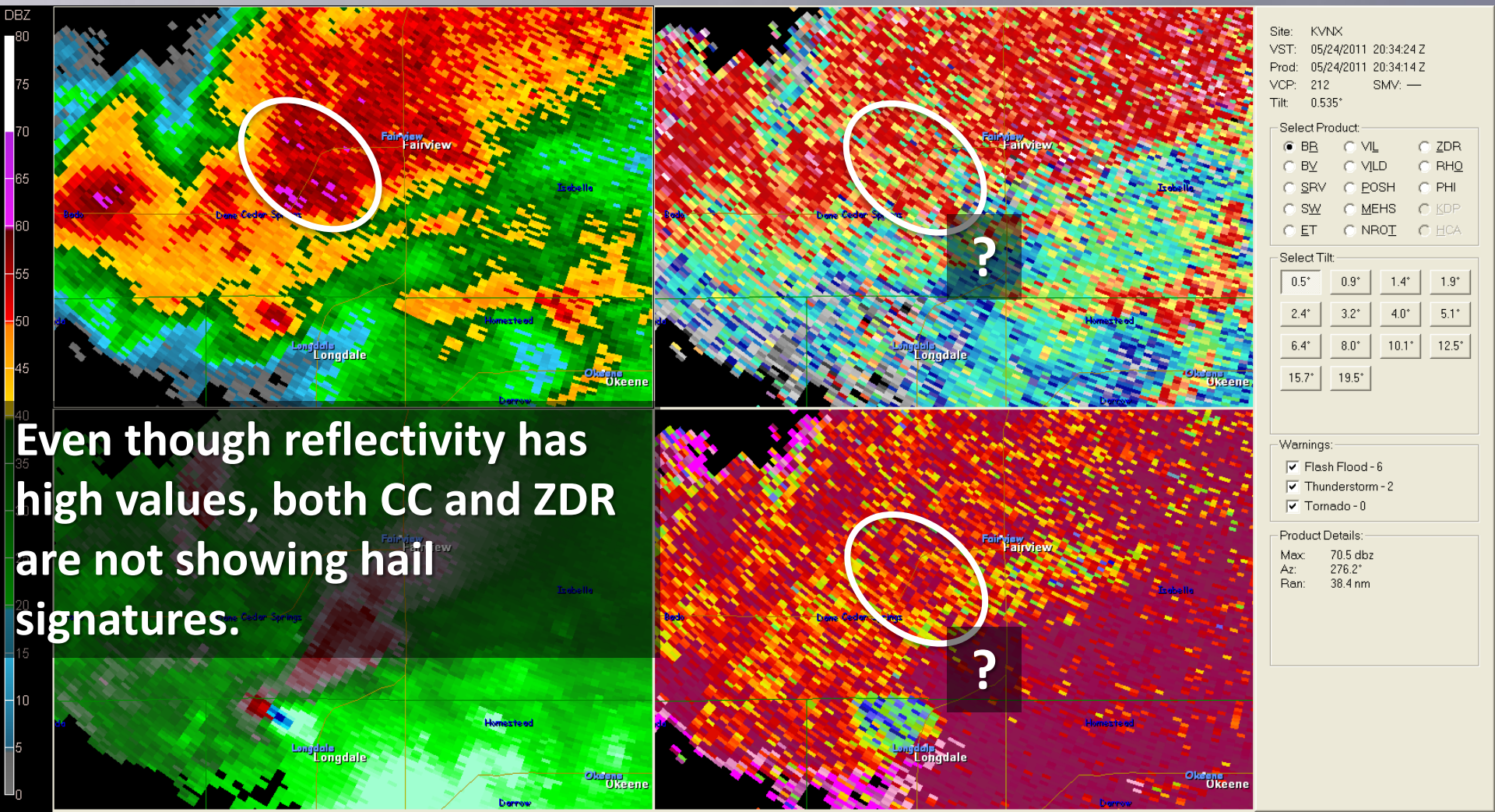
Dual-Pol Products KVNX

Differential Reflectivity – Hail Signature



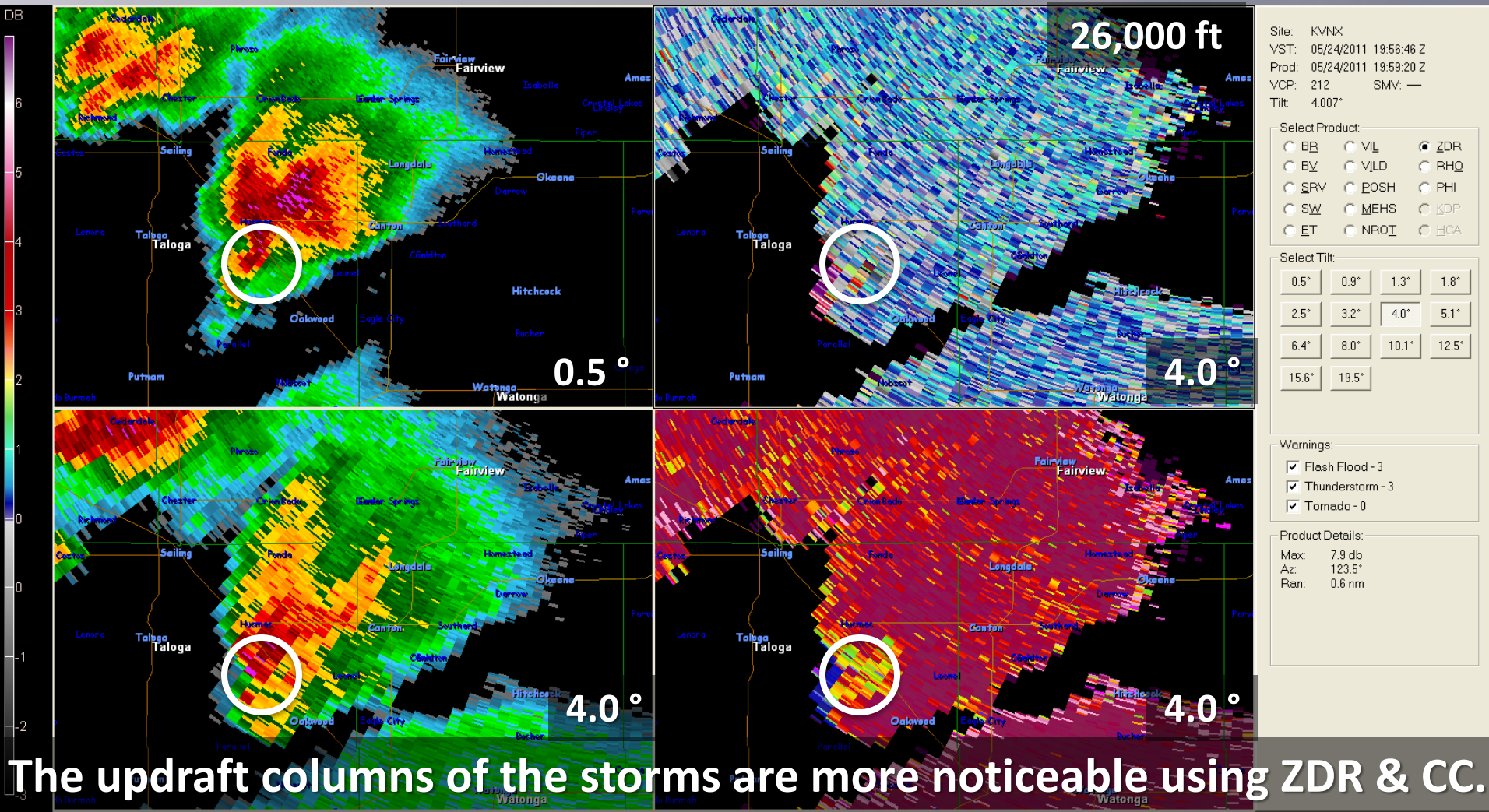
Dual-Pol Products KVNX

Differential Reflectivity – Hail Signature



Dual-Pol Products KVNX

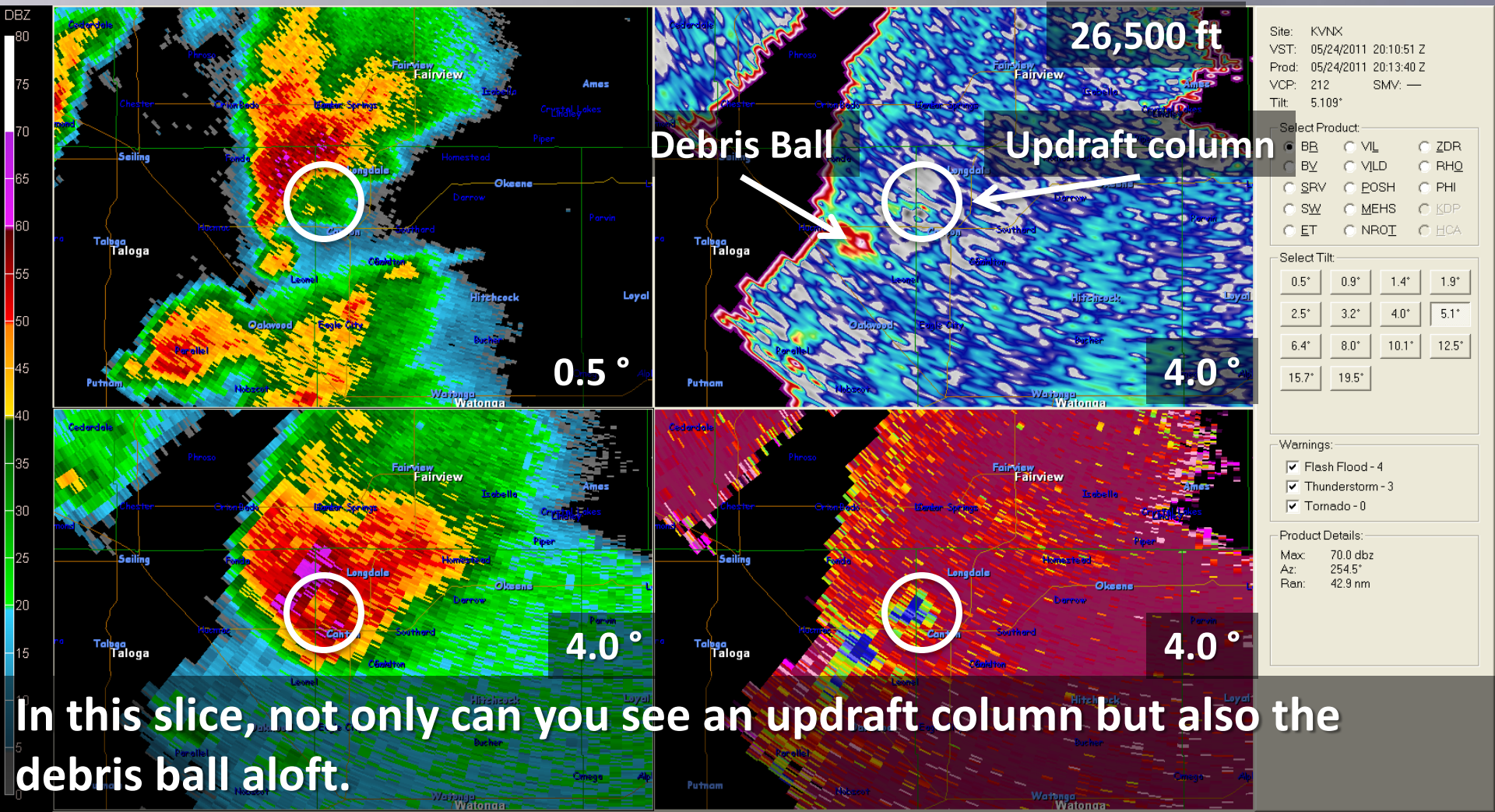
Differential Reflectivity – Updraft Column



The updraft columns of the storms are more noticeable using ZDR & CC.

Dual-Pol Products KVNX

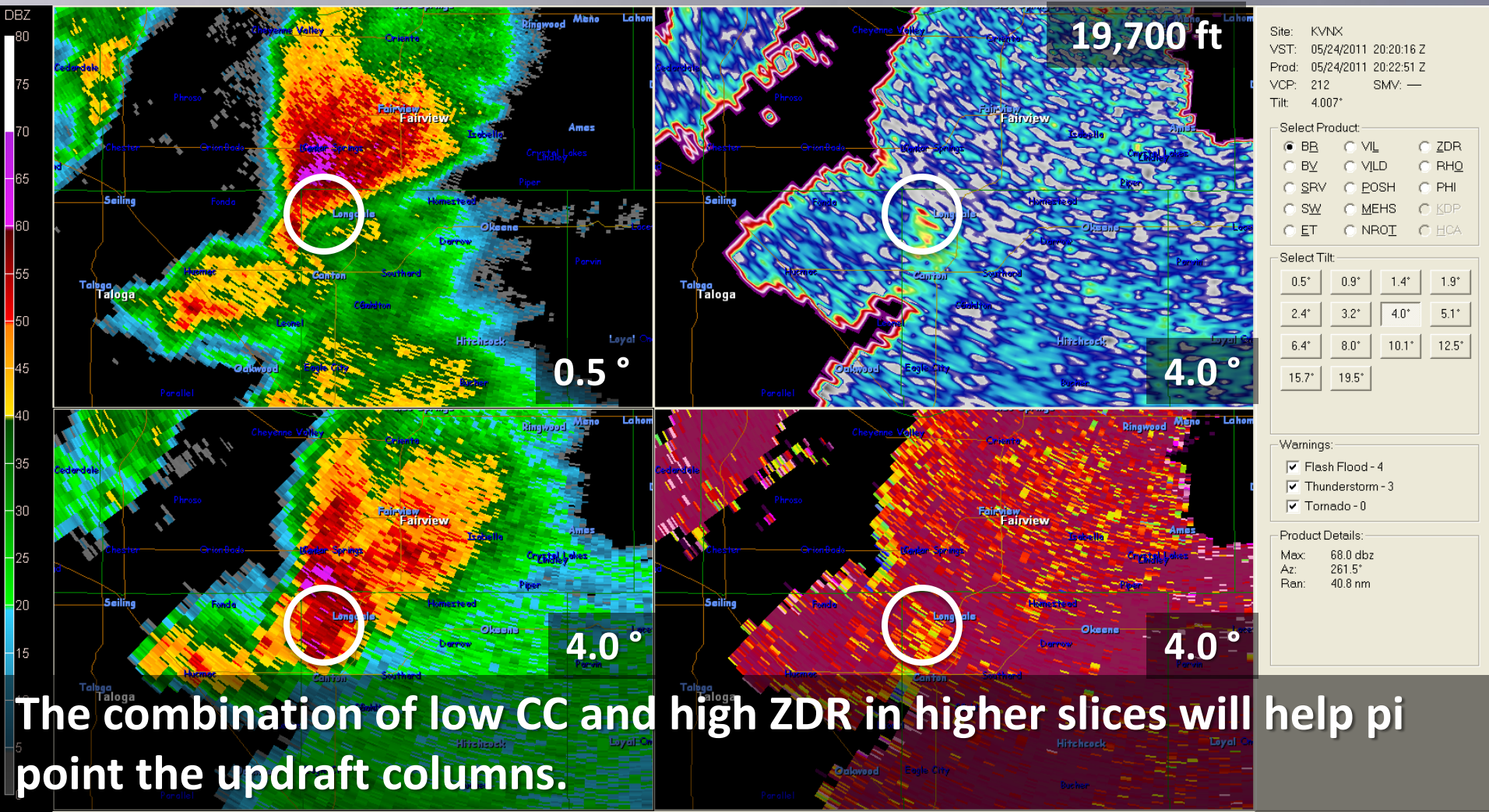
Differential Reflectivity – Updraft Column



In this slice, not only can you see an updraft column but also the debris ball aloft.

Dual-Pol Products KVNX

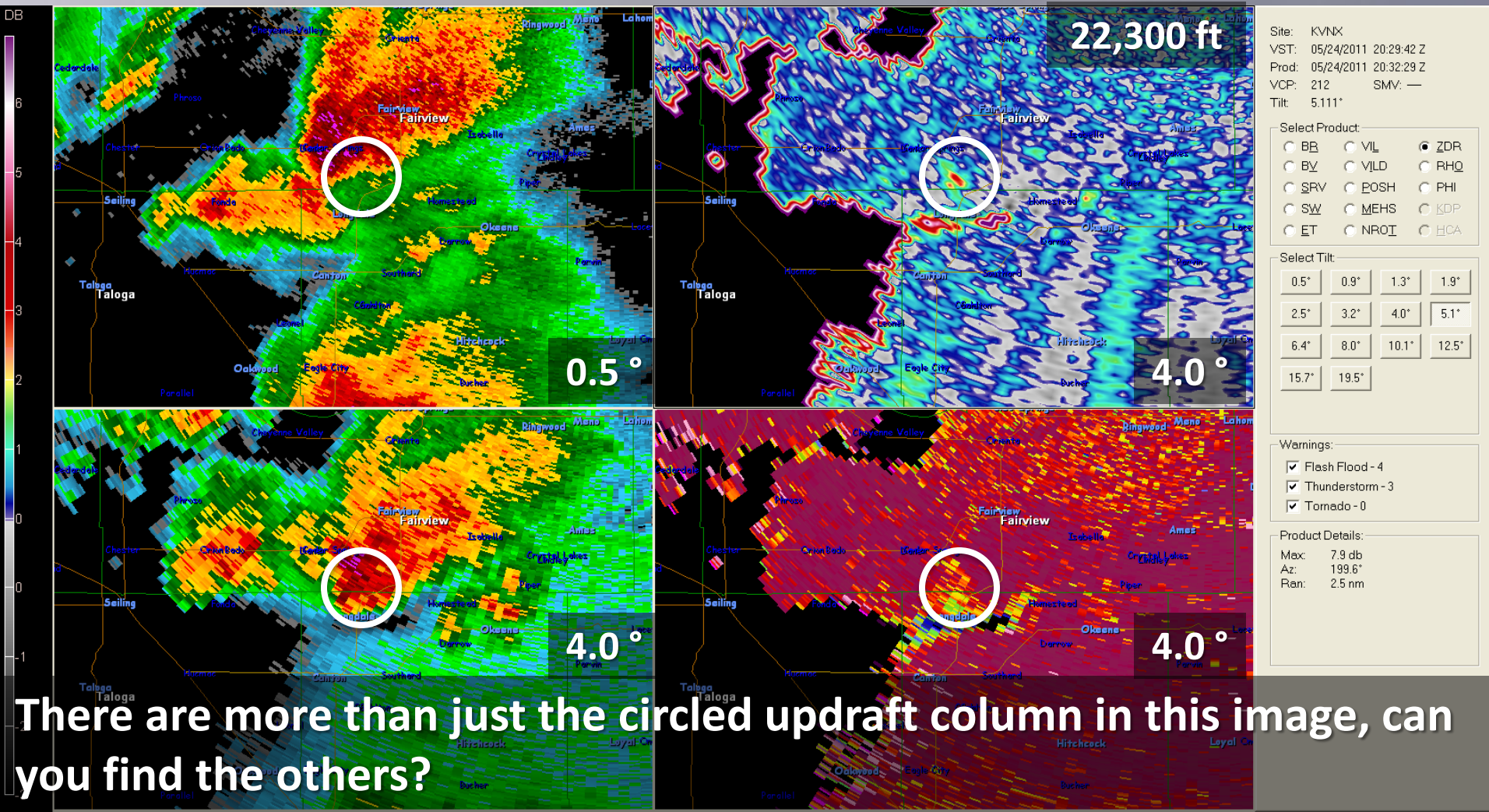
Differential Reflectivity – Updraft Column



The combination of low CC and high ZDR in higher slices will help pi point the updraft columns.

Dual-Pol Products KVNX

Differential Reflectivity – Updraft Column



There are more than just the circled updraft column in this image, can you find the others?

Wrap-Up

- Given the environment, the Canton Supercell could have lasted longer, but surrounding cells and outflow caused the storm to lose its structure.
- Using the dual-pol products, can enhances the warning decision operators confidence in hail size and location, tornadic debris, and updraft column.
- Forecasters should try to incorporate but not rely solely on the dual-pol products, as there are still errors in some of the data.
- There is still more to be learn and discover about dual-pol, as we only discussed 2 parameters.

Image provided courtesy of Paul Knightly

Thanks

- Ken Cook for giving this presentation.
- NWS Wichita for the data and guidance.
- NWS OUN for the detail information on the tornado.
- WDTB for Dual-Pol graphics.

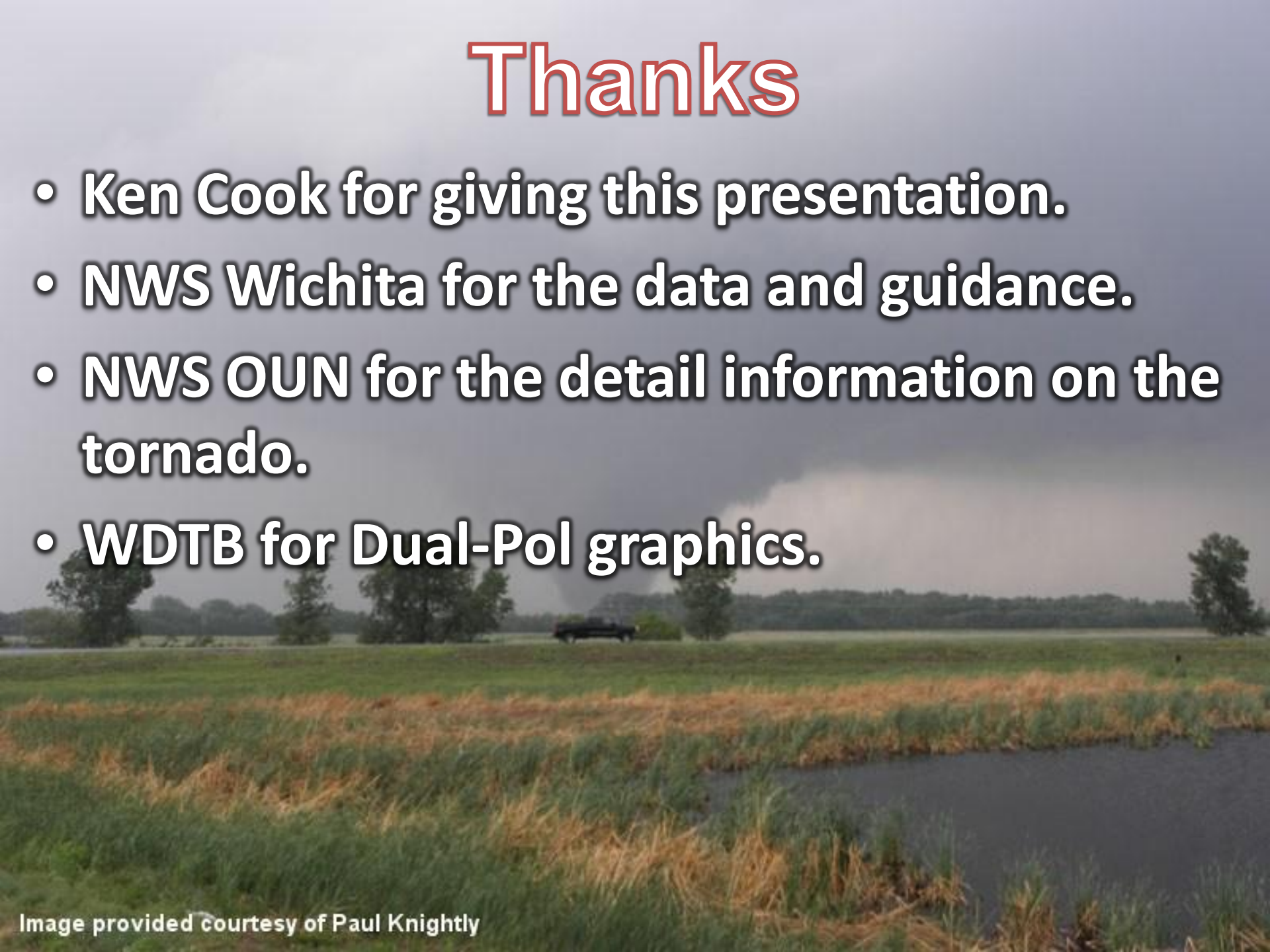


Image provided courtesy of Paul Knightly

Questions?

Image provided courtesy of Paul Knightly