SUMMARY OF VORTEX-2 (YEAR 1) DATA: AVAILABILITY AND PROBLEMS

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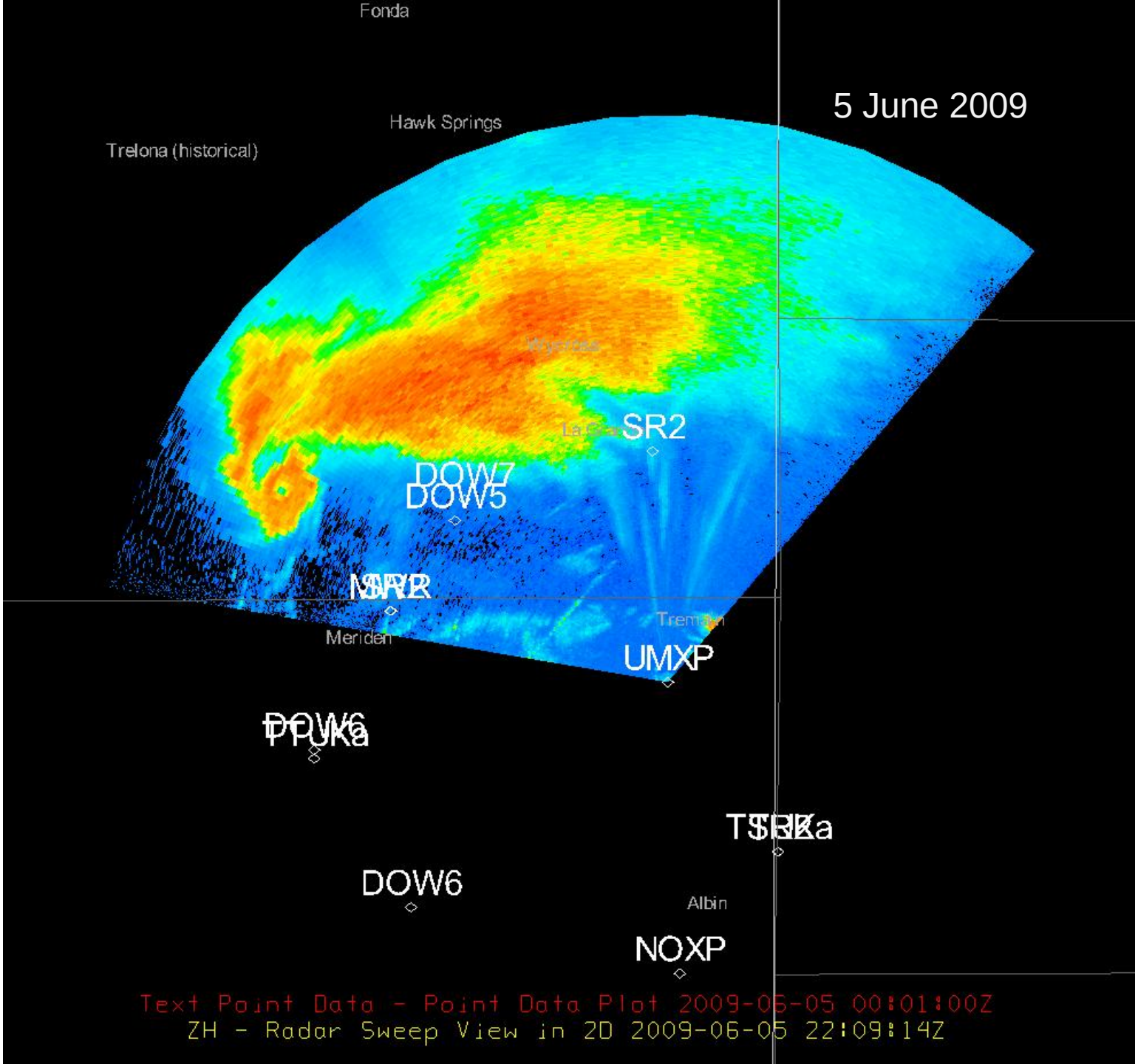
MWR-05XP: Mike French, mfrench@ou.edu

Table. Highlights of Year 1 of VORTEX-2

Date (2009)	X-Pol	W-band	MWR-05XP	Description
8 May	X	X	X	Test; supercell in S Cen OK
12 May	X	NA	X	gust front, multicell in TX Panhandle
13 May	X	NA	X	HP supercell in Cen OK
15 May	X	X	X	squall line in N Cen OK
19 May	X	X	X	multicell, microbursts in NE
20 May	X	X	X	supercell in NE
22 May	X	X	NA	multicells in NE and SD
23 May	X	X	X	multicell line in NE
25 May	X	NA	X	strong multicell in W OK
26 May	X	NA	X	multicell, supercell with anticyclone, gust front, in N Cen TX
29 May	X	X-	X	multicell in NE
31 May	X	X-	X	multicell in IA
1 June	NA	X-	X	multicells in NE
4 June	X	X-	X	supercell/multicell line in WY
5 June	X	X-	X	complete life cycle of tornado in supercell, in WY; supercell in W NE
6 June	X	X-	X	supercells in NE
7 June	X	X-	X	supercell, very large hail, in NW MO
9 June	X	X-	X	supercell in SW KS
10 June	X	X-	X	multicells in SW KS/SE CO
11 June	NA	NA	X	HP supercell in SE CO
13 June	X	X-	X	supercell in TX Panhandle
14 June	NA	NA	NA	supercell in TX Panhandle

5 June 2009

5 June 2009

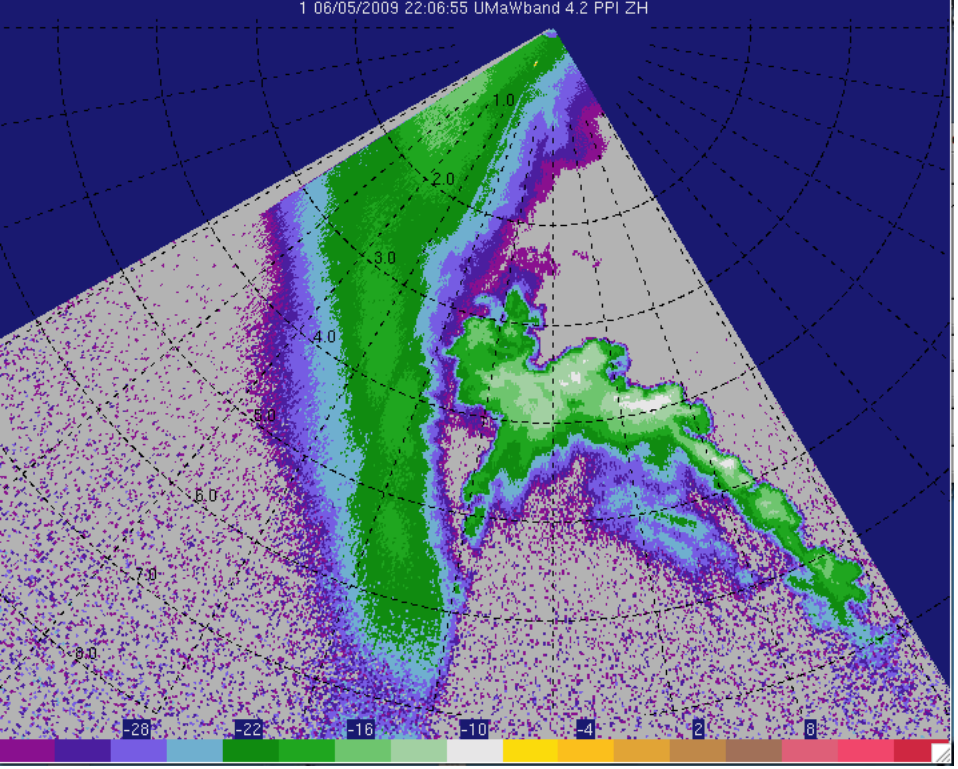

Fonda
5 June 2009
Hawk Springs
Trelona (historical)
SR2
DOW7
DOW5
Meriden
UMXP
DOW6
DOW6
Albin
NOXP
Text Point Data - Point Data Plot 2009-06-05 00:01:00Z
ZH - Radar Sweep View in 2D 2009-06-05 22:09:14Z

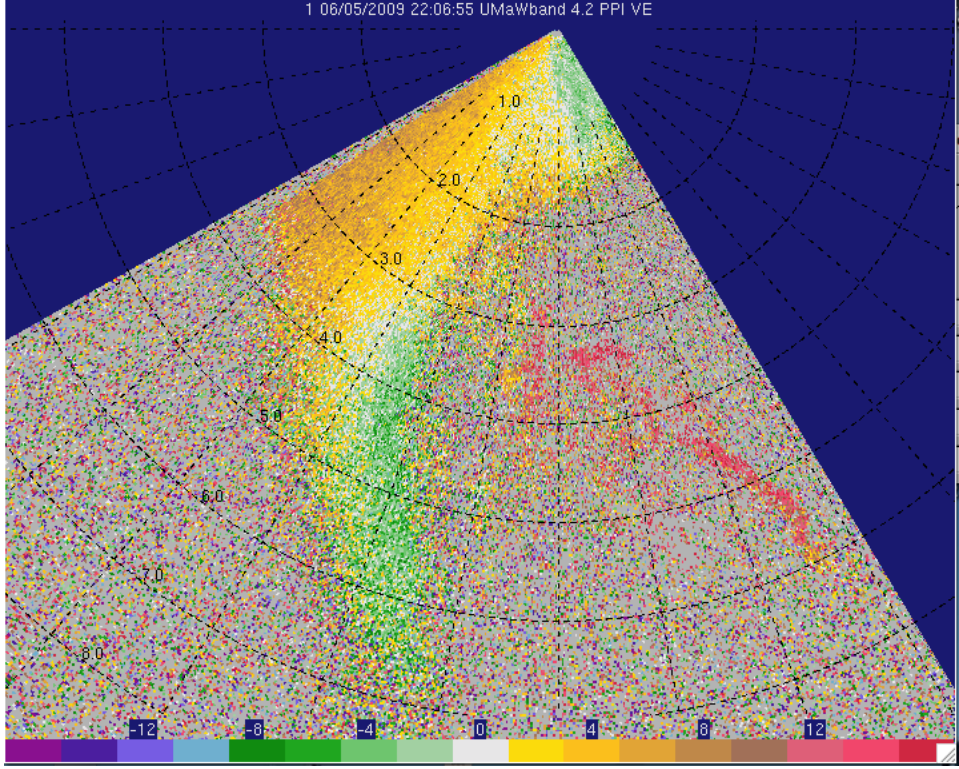
Four deployments today on supercells in extreme eastern Wyoming and western Nebraska (see map - Image 3):

1) Location: 16.5 km E of Meriden, 13 km SSE of LaGrange, 12.4 km N of Albin, WY
Coordinates: 41.527684 N, 104.12266 W
Time: 2208-2259 UTC
Scanning strategy: 2 degrees to 16 degrees every 1 degree every 120 s
Discussion: Owing to inability to find a good deployment spot, we missed tornadogenesis by a few minutes. Note that our SASSI position was NOT updating after we went N of Albin! We finally found a clear deployment spot in a broad valley (so we have partial beam blockage problems on the lowest one or two elevation angles) and scanned through the majority of the tornadoes life (and some time thereafter). Polarimetric data appear to indicate rho_hv half-ring in the mid-levels to the NW of the location of the tornado (at the low-levels) with ~55 m/s inbound winds on the south side (see Image 2 at 14.4 degrees elevation). Note that max unambiguous velocity is approx +/- 40 m/s. Closer to the surface, the tornado is evident by a collocation of a velocity couplet, rho_hv "hole", Zdr "hole", and local minimum in reflectivity factor (ref. Image 5). Note that the screen capture is preliminary -- further processing will remove the streakiness seen in some of the data! The

• UMass X-Pol log

25 May 2009 west of Altus, OK; Pei looks on in horror!

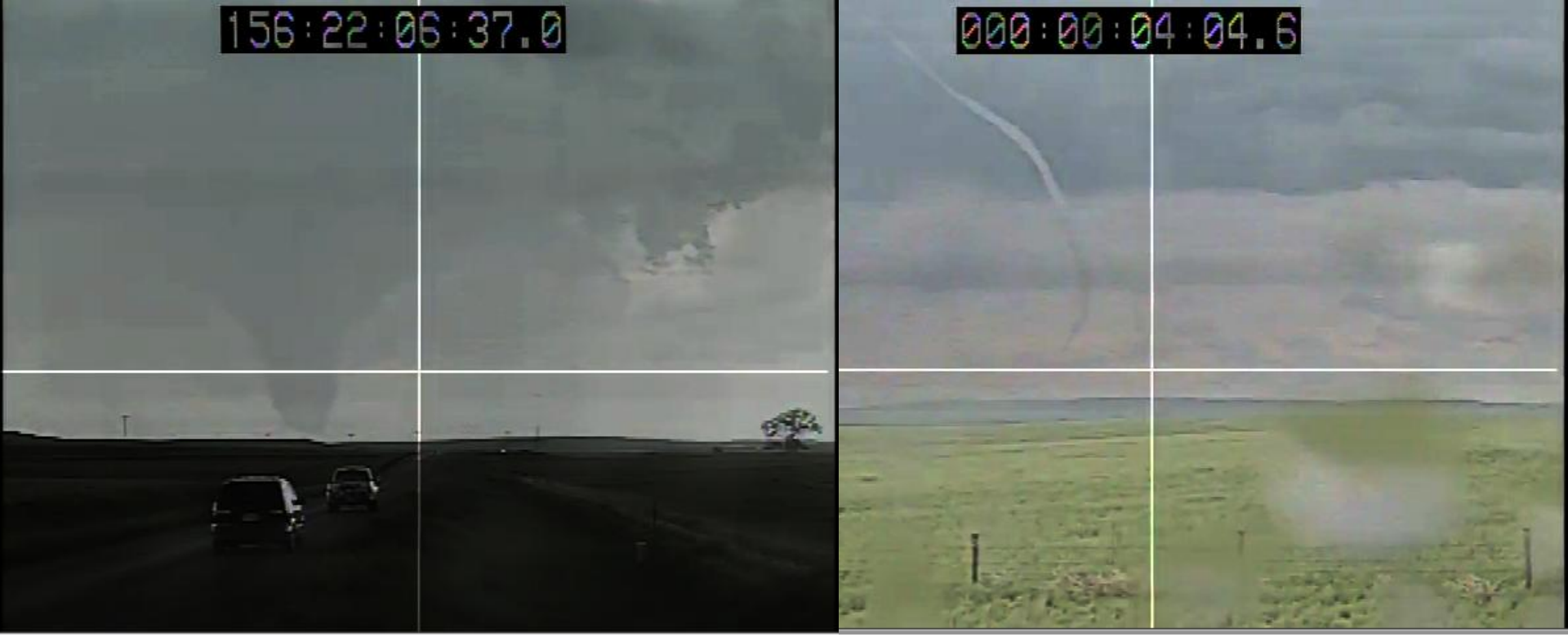




Z

V

5 June 2009
UMass W-band radar
Sensitivity way down



BORESIGHTED VIDEO FRAME GRABS FROM CAMERA ON UMASS W-BAND RADAR (CLOCK NOT SET TO REAL TIME ON DEPLOYMENT SHOWN ON RIGHT)

Deployment #2: 8.8 mi W of LaGrange, WY or 7.6 mi N of Meriden, WY on CR-242. End of driveway, by mailbox.

Time: 2200 - 2208 UTC

Lat/lon: 41.654725 N, 104.309122 W

- UMass W-band radar log

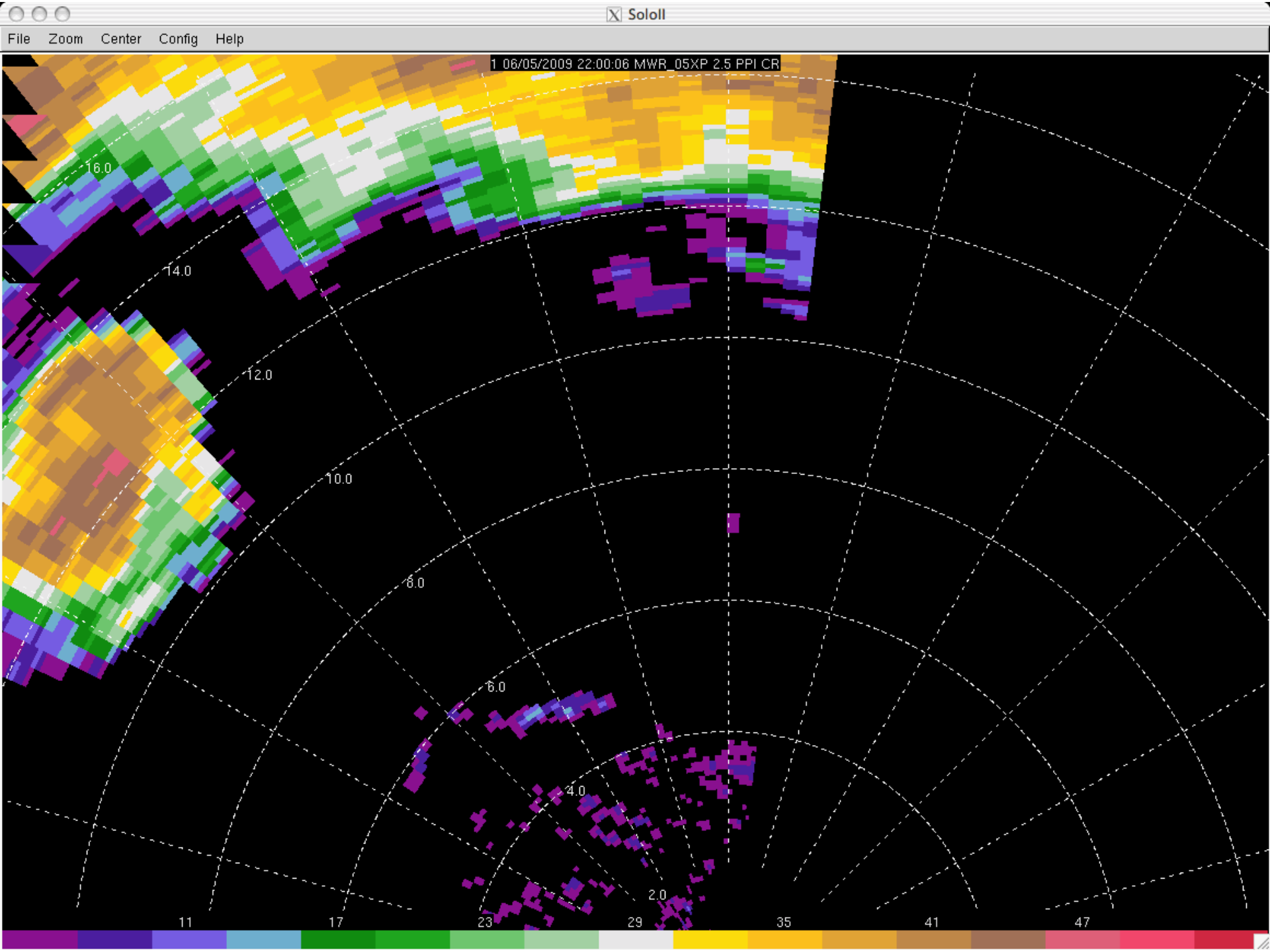
Truck Level?: Y

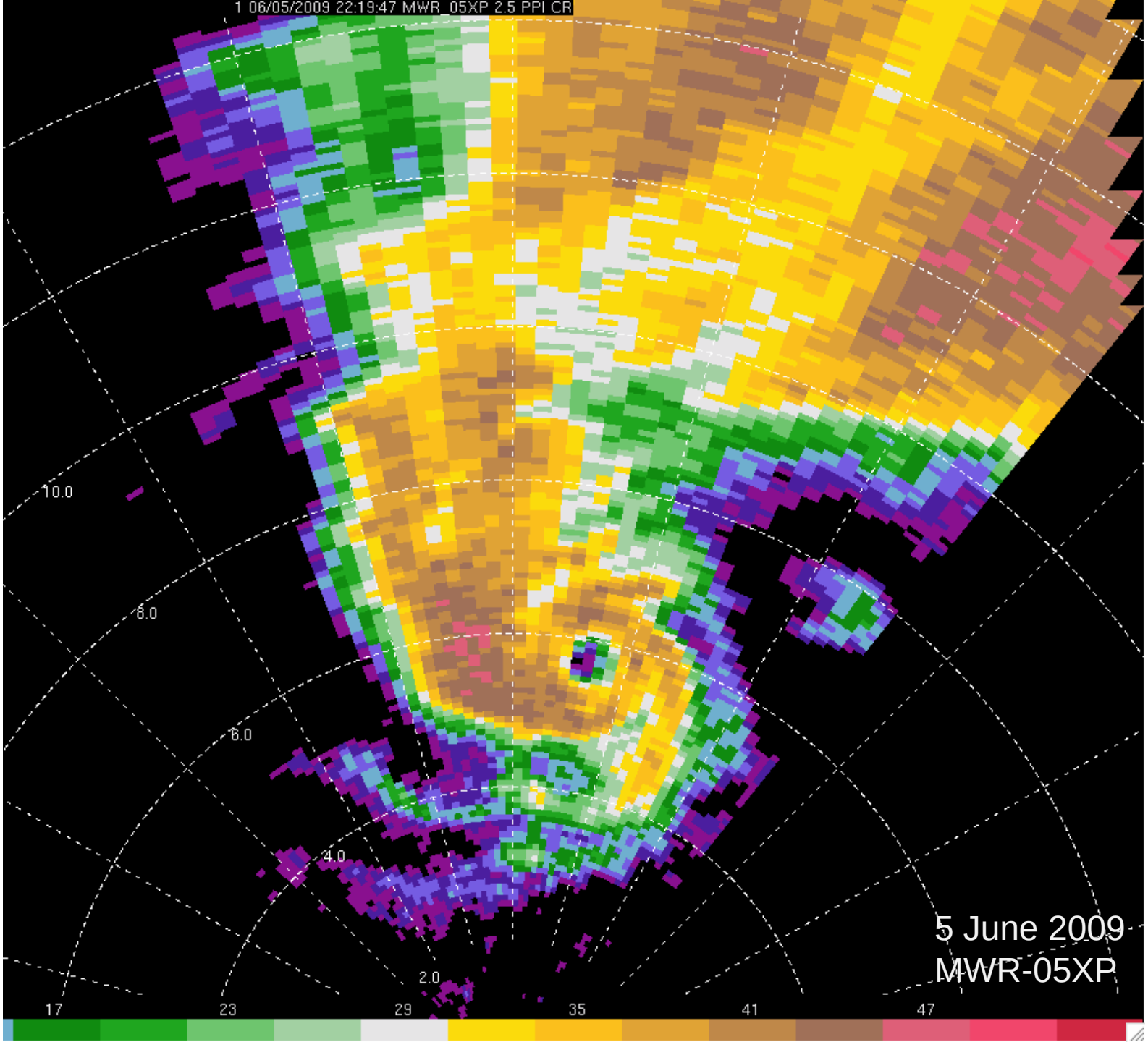
Truck was facing: ENE? (Not sure, but was parallel to road at that point. Check heading in data.)

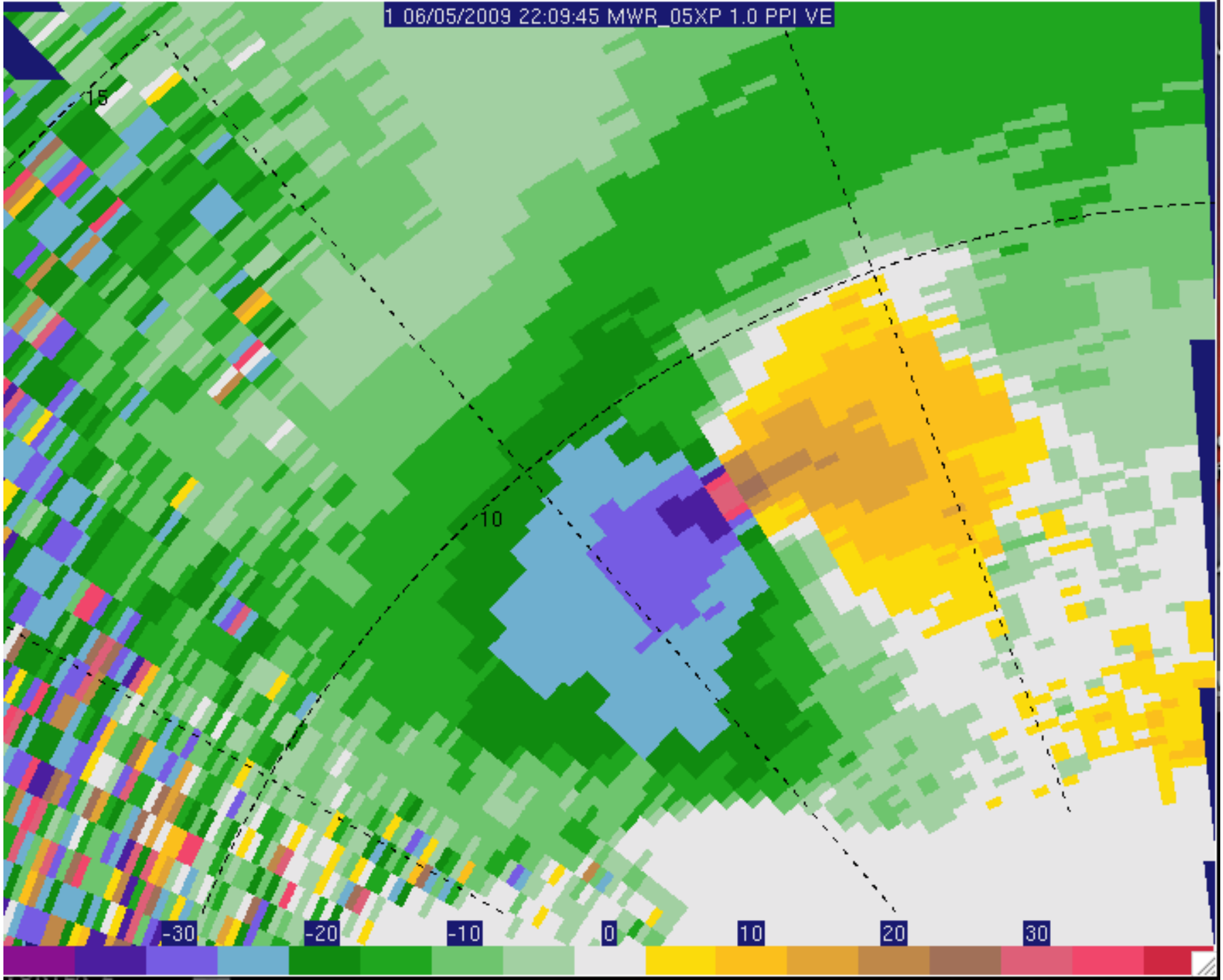
Pulse length: 200 ns

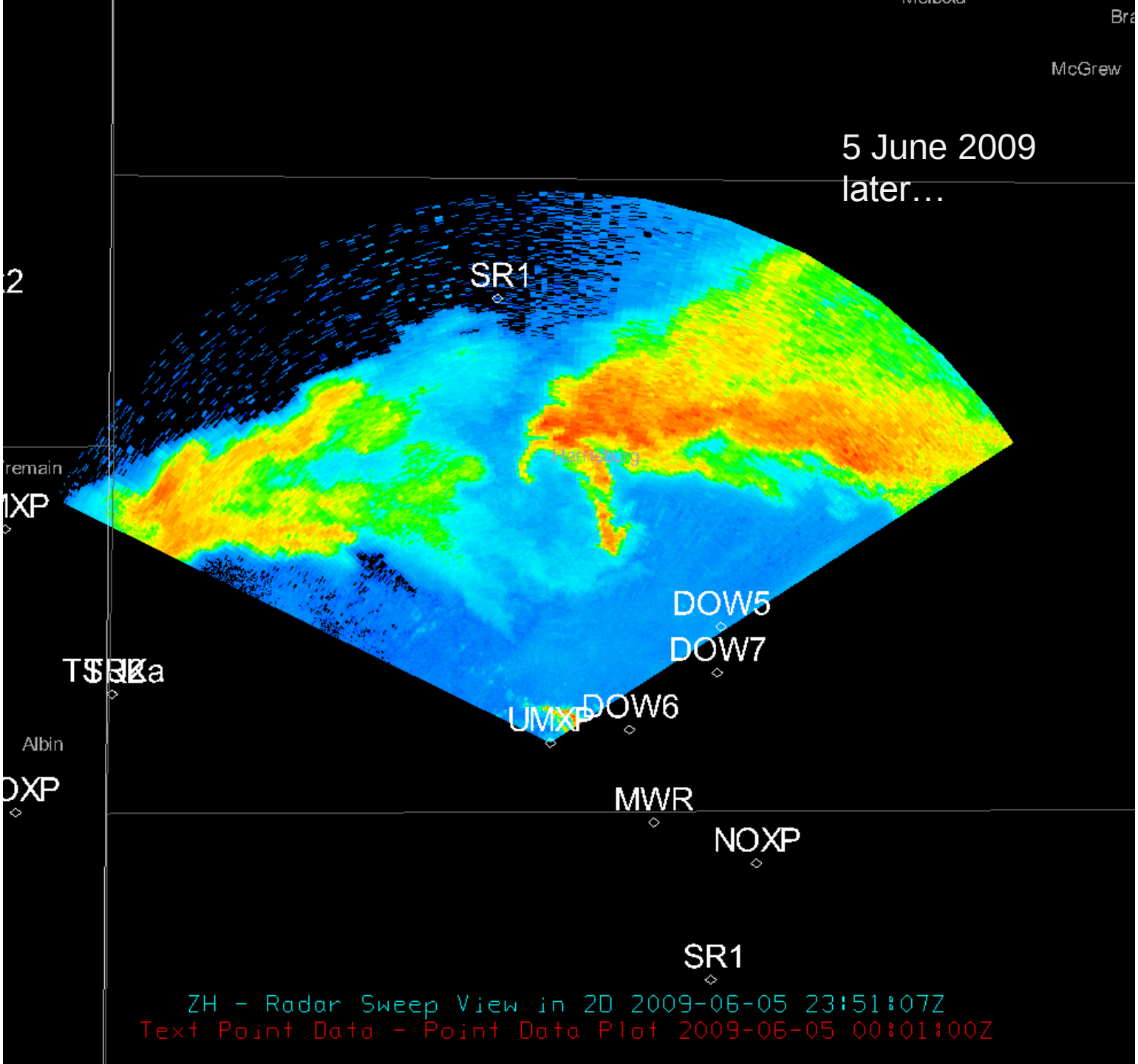
Conditions: Several PPIs collected in tornado to our W. Elevation angle 4.2 degrees. Well-developed wall-cloud was observed as computer was booting, full condensation funnel formed by the time radar was operational. Tornado was shrouded in rain that became heavier and eventually transitioned to hail. Deployment abandoned at 2208 due to nickel-sized hail, which grew to golf-ball size as we evacuated to the E toward LaGrange, then south on U.S. Hwy. 85. Unfortunately, boresighted video for this deployment was accidentally erased due to loss of power to the video recorder. =(

Deployment #3: about 3.5 mi NE of Meridian, WY on U.S. Hwy. 85

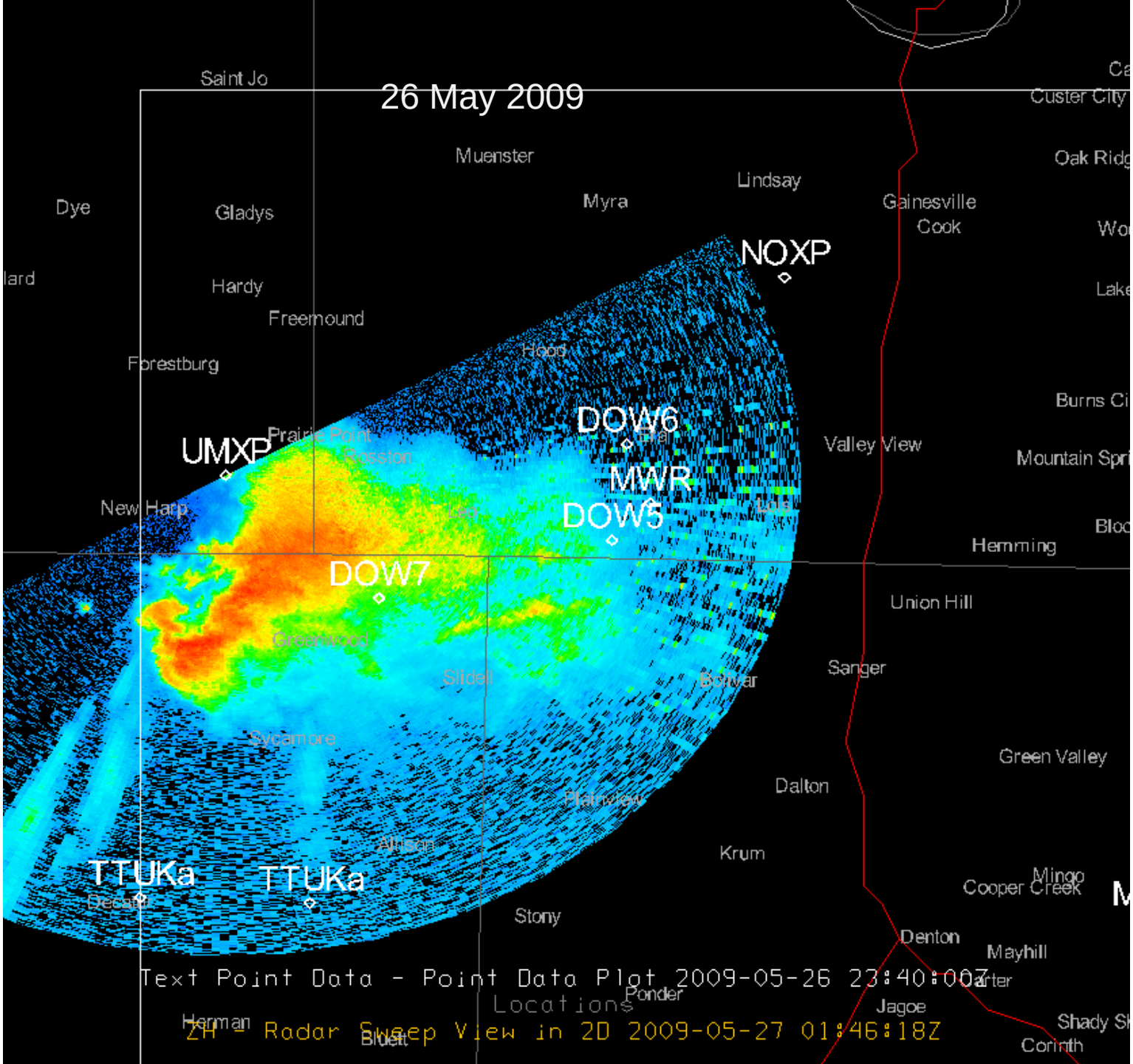

Sololl
File
Zoom
Center
Config
Help
1 06/05/2009 22:00:06 MWR_05XP 2.5 PPI CR
16.0
14.0
12.0
10.0
8.0
6.0
4.0
2.0
11
17
23
29
35
41
47

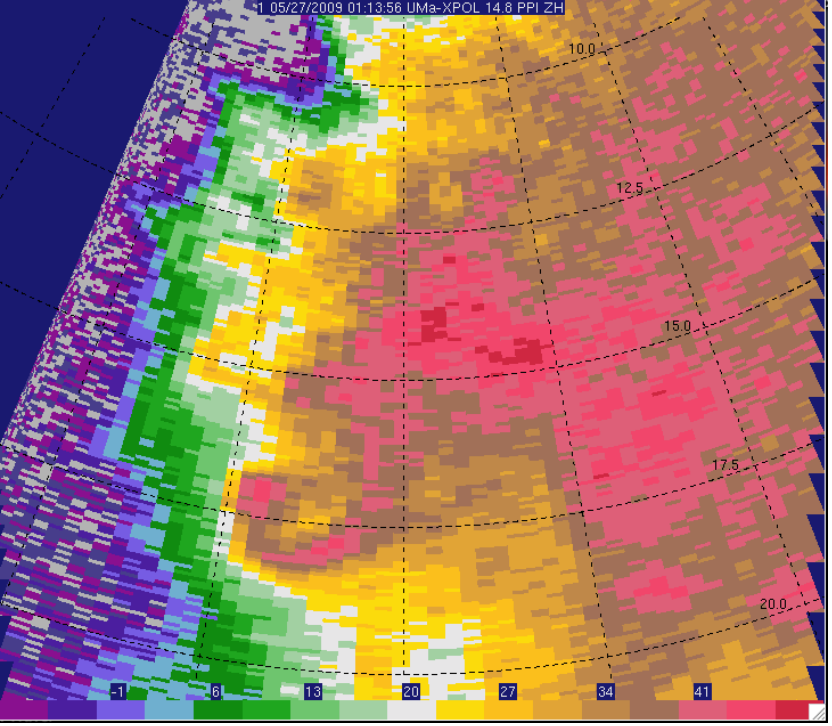

1 06/05/2009 22:19:47 MWR_05XP 2.5 PPI CR
10.0
8.0
6.0
4.0
2.0
17
23
29
35
41
47
5 June 2009
MWR-05XP

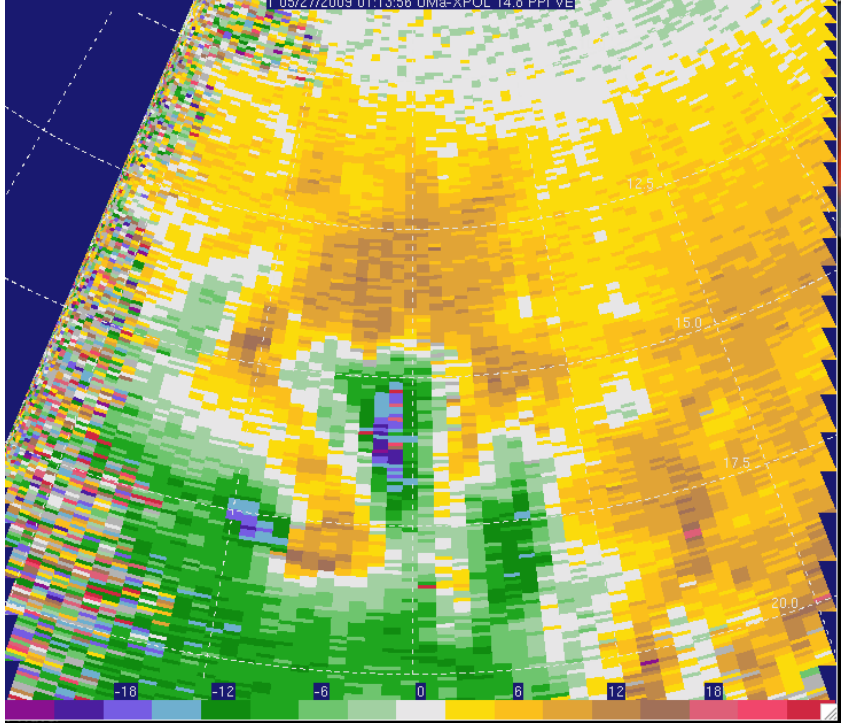

1 06/05/2009 22:09:45 MWR_05XP 1.0 PPI VE
15
10
-30
-20
-10
0
10
20
30


McGrew
5 June 2009
later…
SR1
DOW5
DOW7
DOW6
UMXP
MWR
NOXP
SR1
ZH - Radar Sweep View in 2D 2009-06-05 23:51:07Z
Text Point Data - Point Data Plot 2009-06-05 00:01:00Z

26 MAY 2009, N TX

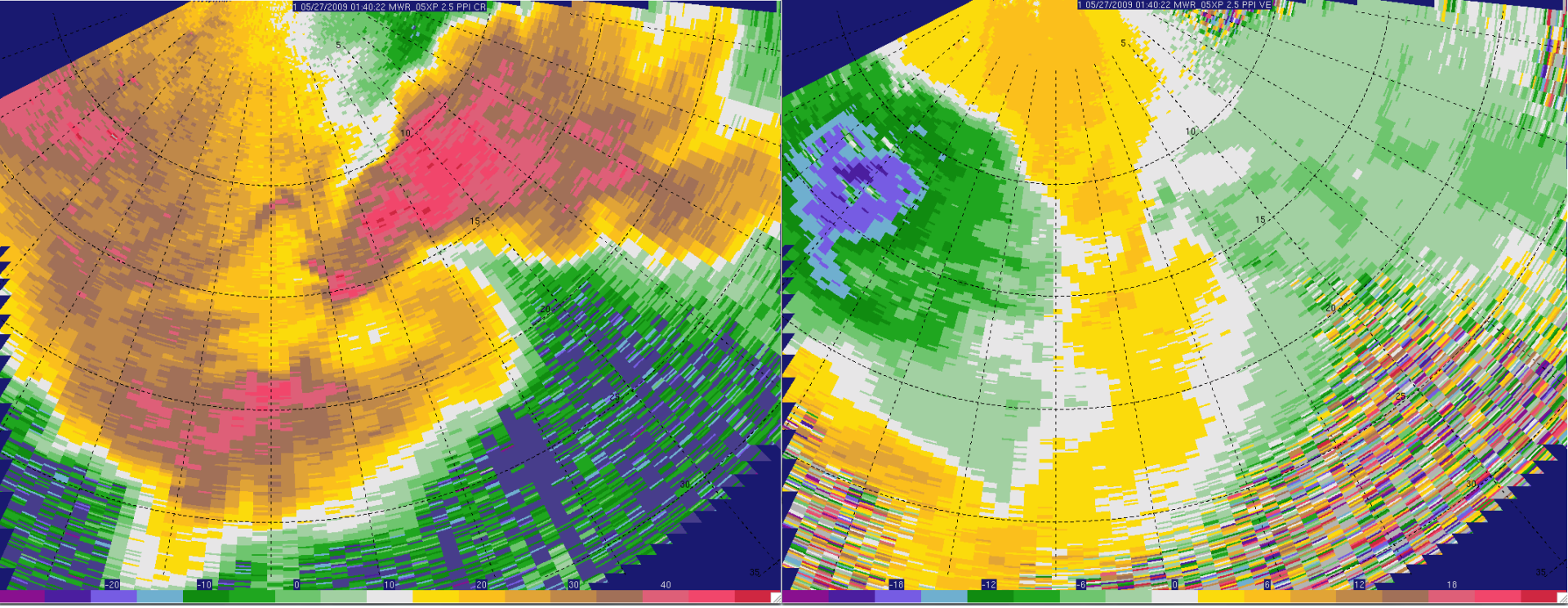

26 May 2009
Saint Jo
Muenster
Lindsay
Myra
Dye
Gladys
Gainesville
Cook
NOXP
Hardy
Freemound
Forestburg
Hood
DOW6
UMXP
Prairie Point
Rosston
Valley View
MWR
DOW5
New Harp
Hemming
DOW7
Union Hill
Greenwood
Slidell
Sanger
Sycamore
Green Valley
Dalton
Krum
TTUKa
TTUKa
Cooper Creek
Stony
Denton
Mayhill
Text Point Data - Point Data Plot 2009-05-26 23:40:00Z
Locations
Ponder
Jagoe
Herman
ZH - Radar Sweep View in 2D 2009-05-27 01:46:18Z
Corinth





Z V

ANTICYCLONIC HOOK
ON 26 MAY 2009
UMASS X-POL

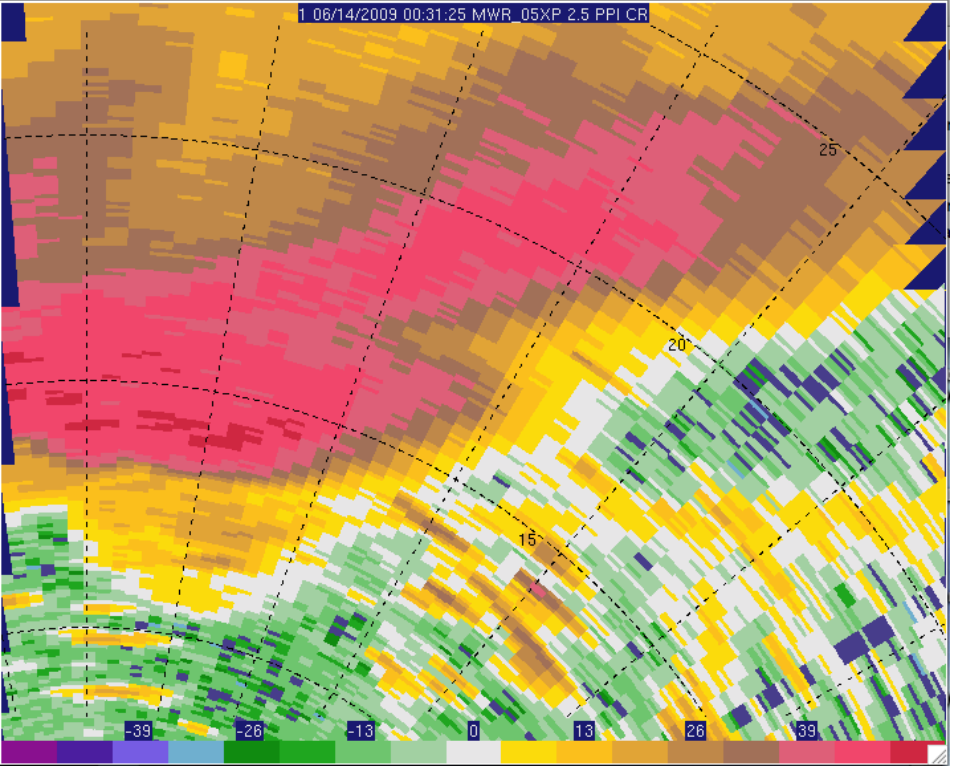


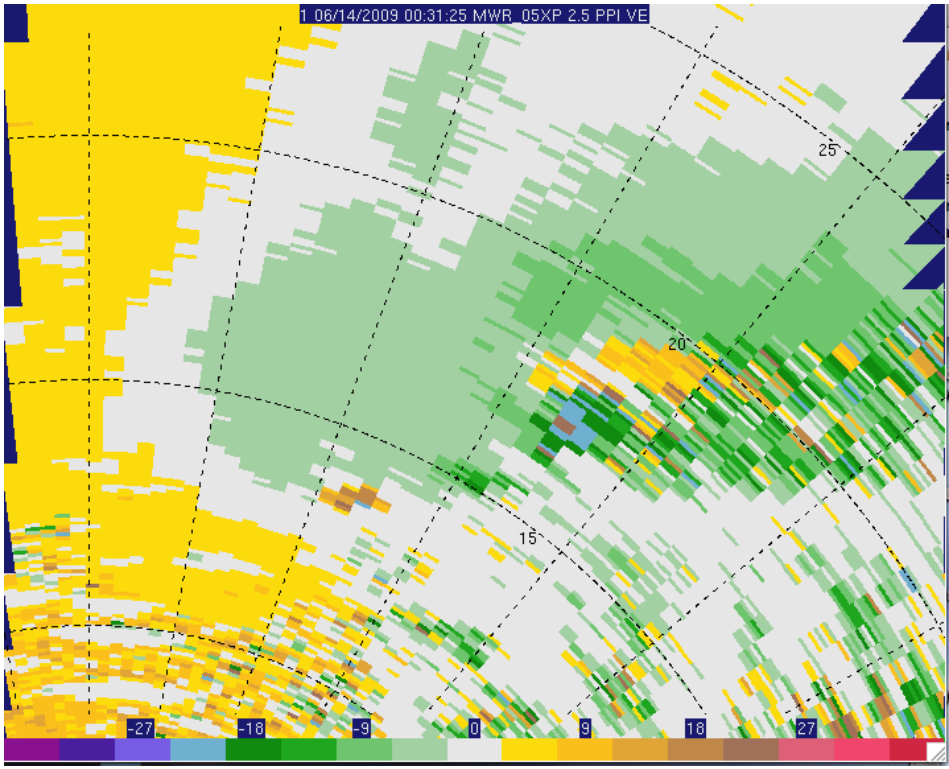
Z V

APPROACHING GUST FRONT AND
DEVELOPING SUPERCELL ON 26 MAY 2009
MWR-05XP

13 JUNE 2009, PANTEX PLANT © H. Bluestein

ENCOUNTER (OF THE 1st KIND) WITH PANTEX GUARDS

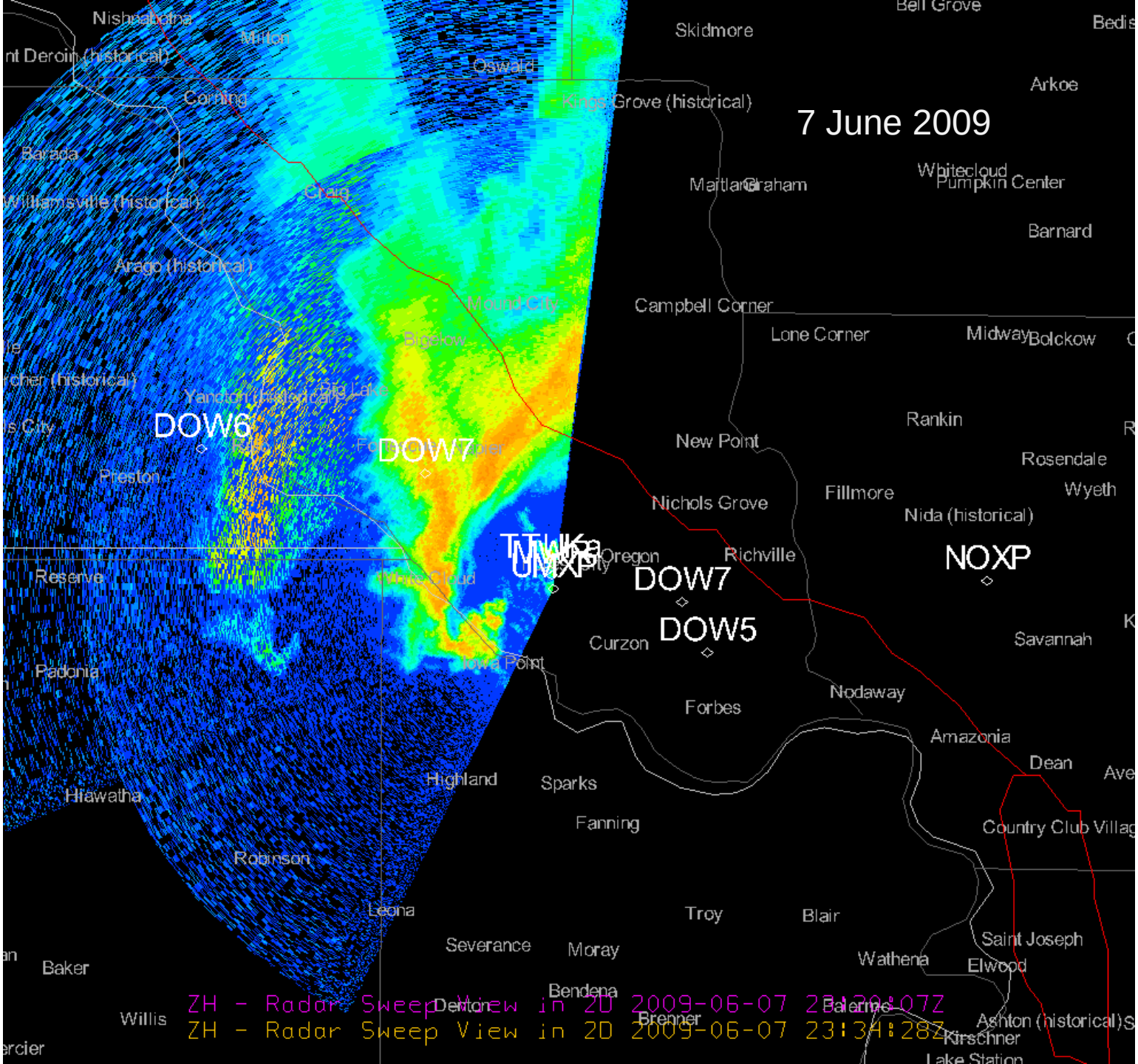


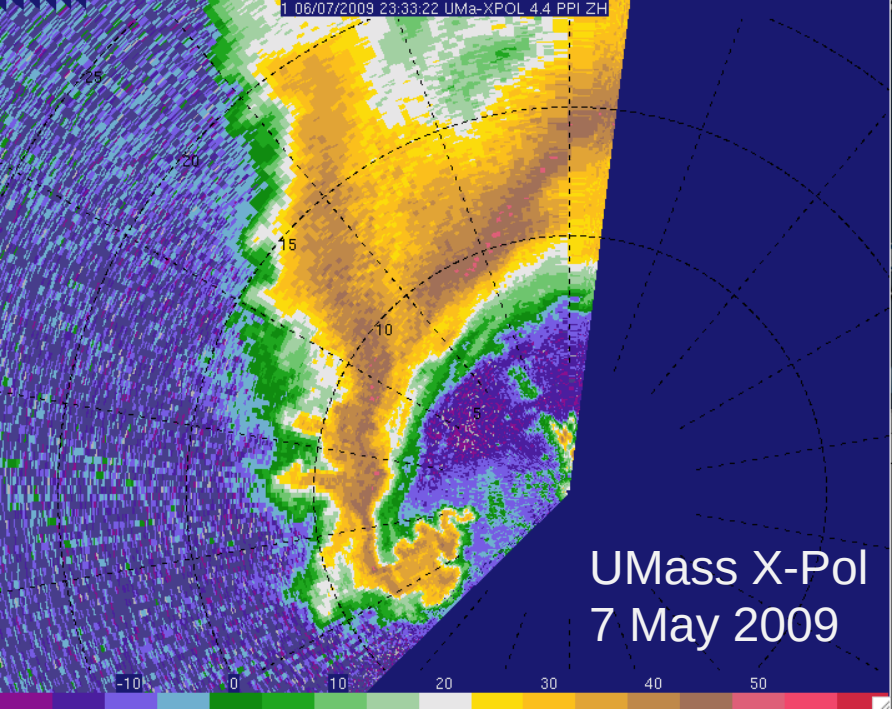


Z V

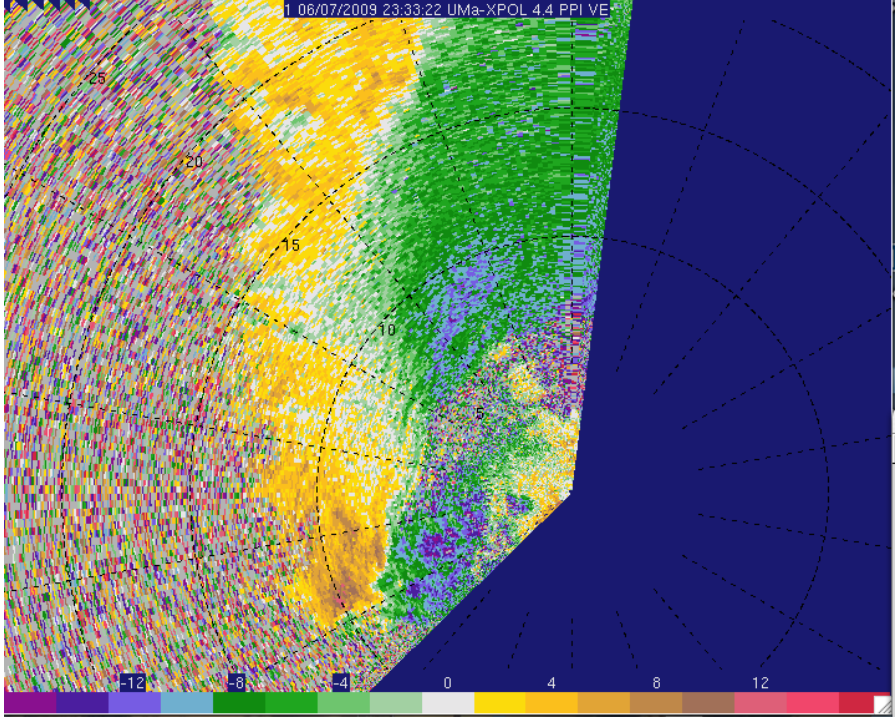
ABORTIVE ATTEMPT TO PRODUCE LOW-LEVEL MESOCYCLONE ON 13 JUNE 2009
MWR-05XP

APPROACHING SUPERCELL WITH LARGE HAIL IN NW MISSOURI ON 7 JUNE 2009

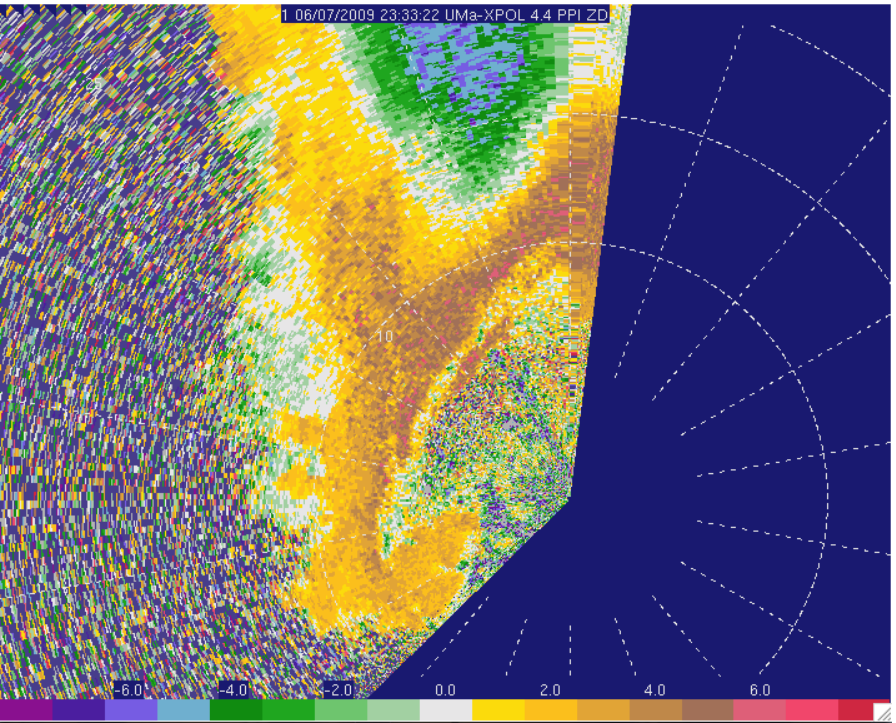

7 June 2009
DOW6
DOW7
DOW7
DOW5
NOXP
ZH - Radar Sweep View in 2D 2009-06-07 23:30:07Z
ZH - Radar Sweep View in 2D 2009-06-07 23:34:28Z
Skidmore
Oswald
Kings Grove (historical)
Arkoe
Corning
Barada
Craig
Maitland
Graham
Whitecloud
Pumpkin Center
Barnard
Arago (historical)
Mound City
Campbell Corner
Bigelow
Lone Corner
Midway
Bolckow
Rankin
New Point
Rosendale
Wyeth
Fillmore
Nida (historical)
Nichols Grove
Richville
Oregon
Preston
Reserve
Curzon
Savannah
Iowa Point
Nodaway
Forbes
Amazonia
Dean
Padonia
Highland
Sparks
Hiawatha
Fanning
Country Club Villag
Robinson
Leona
Troy
Blair
Severance
Moray
Saint Joseph
Wathena
Elwood
Baker
Bendena
Willis
Denton
Brenner
Ashton (historical)
Kirschner
Lake Station


1 06/07/2009 23:33:22 UMa-XPOL 4.4 PPI ZH
UMass X-Pol
7 May 2009
-10
0
10
20
30
40
50

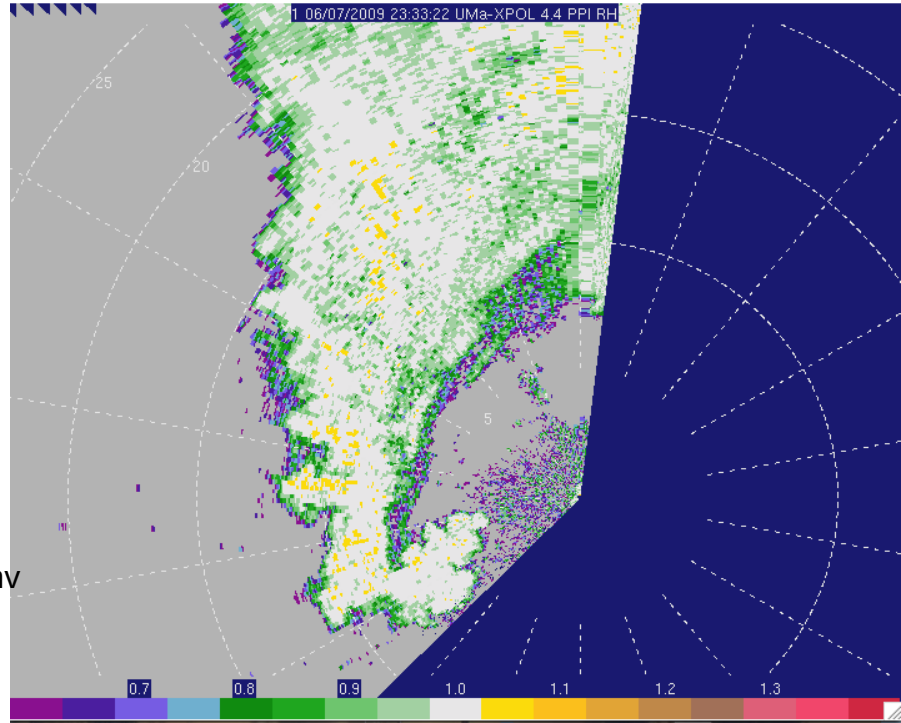
Z


1 06/07/2009 23:33:22 UMa-XPOL 4.4 PPI VE
-12
-8
-4
0
4
8
12

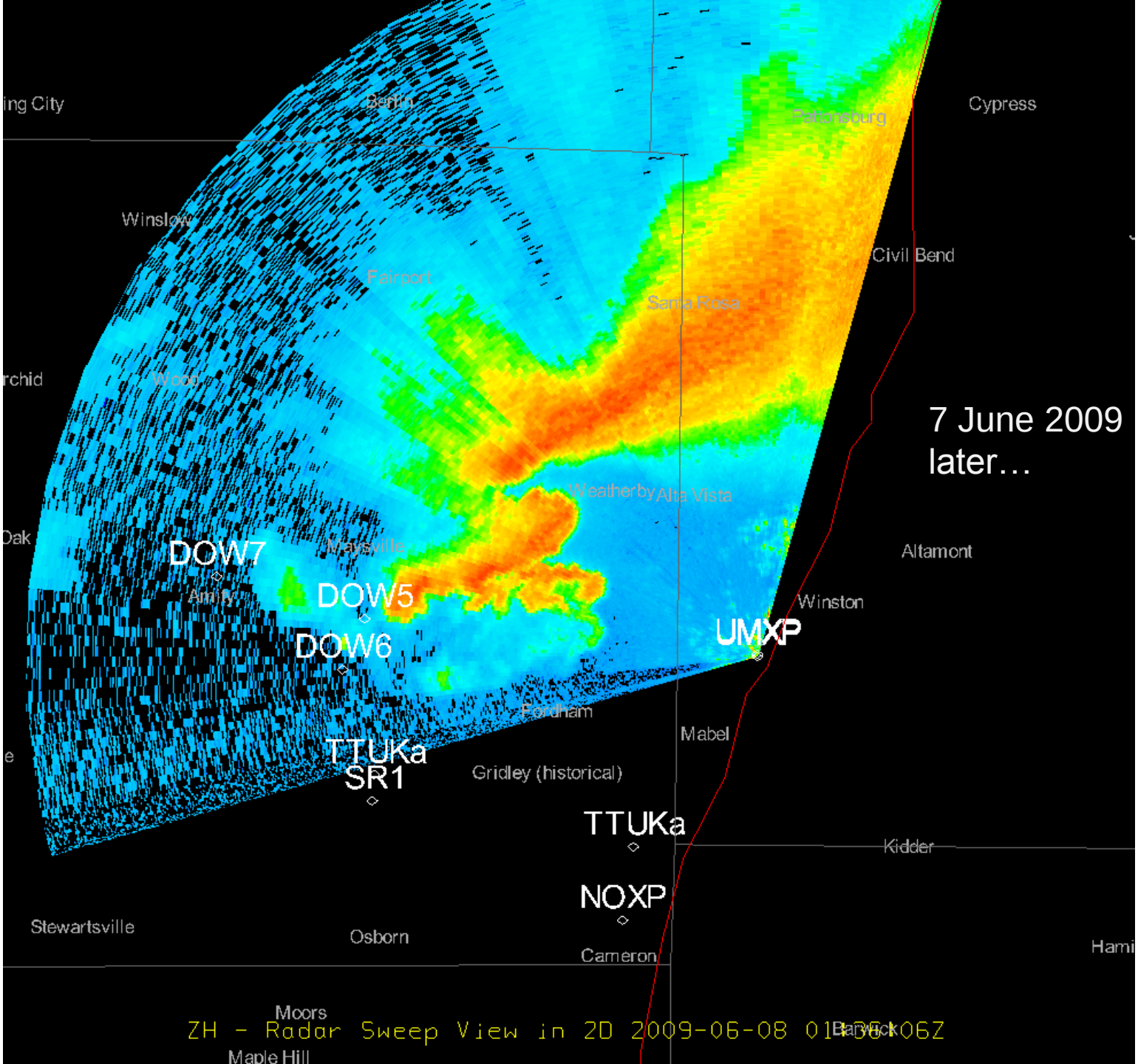
V


1 06/07/2009 23:33:22 UMa-XPOL 4.4 PPI ZD
-6.0
-4.0
-2.0
0.0
2.0
4.0
6.0

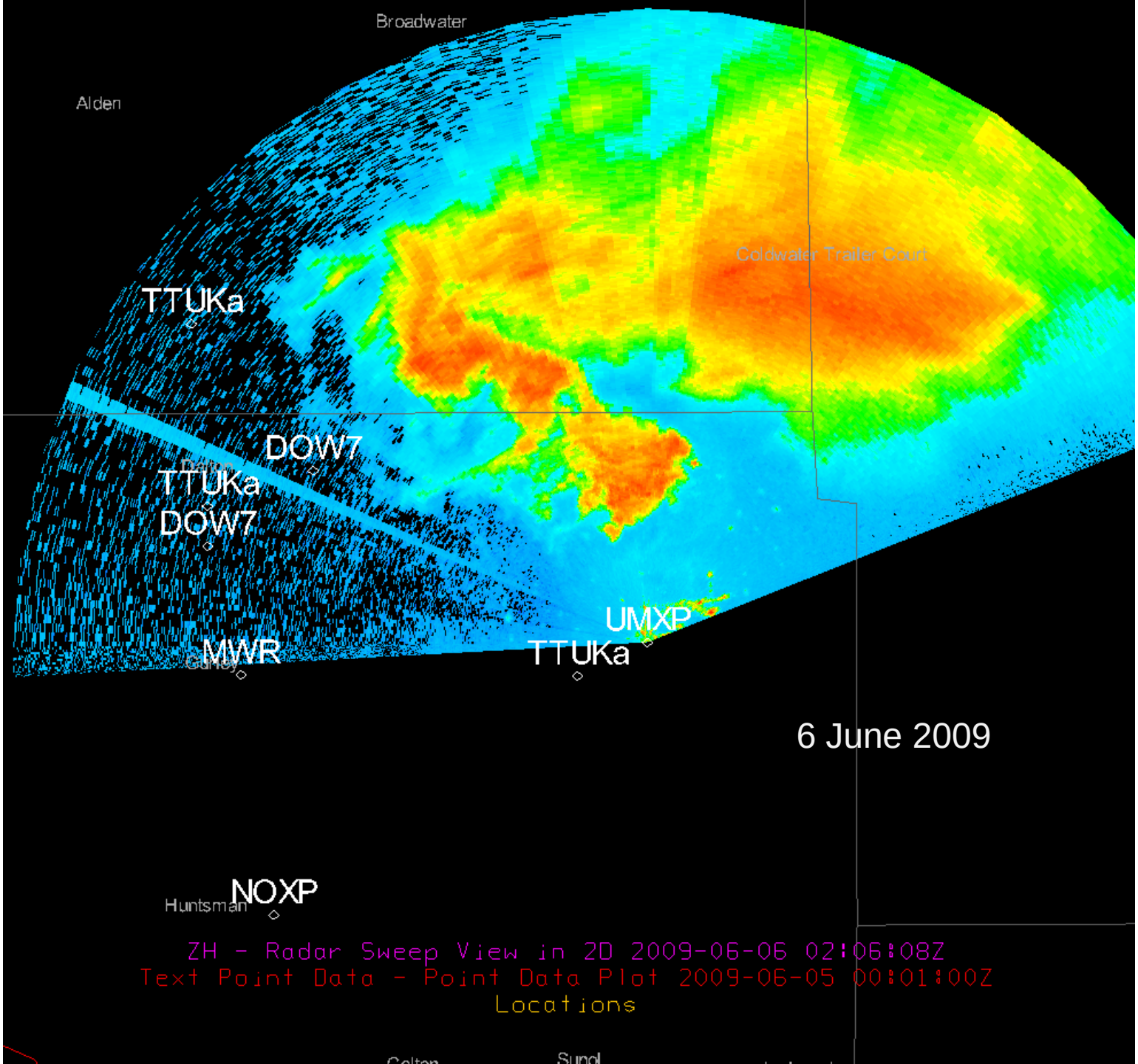
Zdr


1 06/07/2009 23:33:22 UMa-XPOL 4.4 PPI RH
0.7
0.8
0.9
1.0
1.1
1.2
1.3

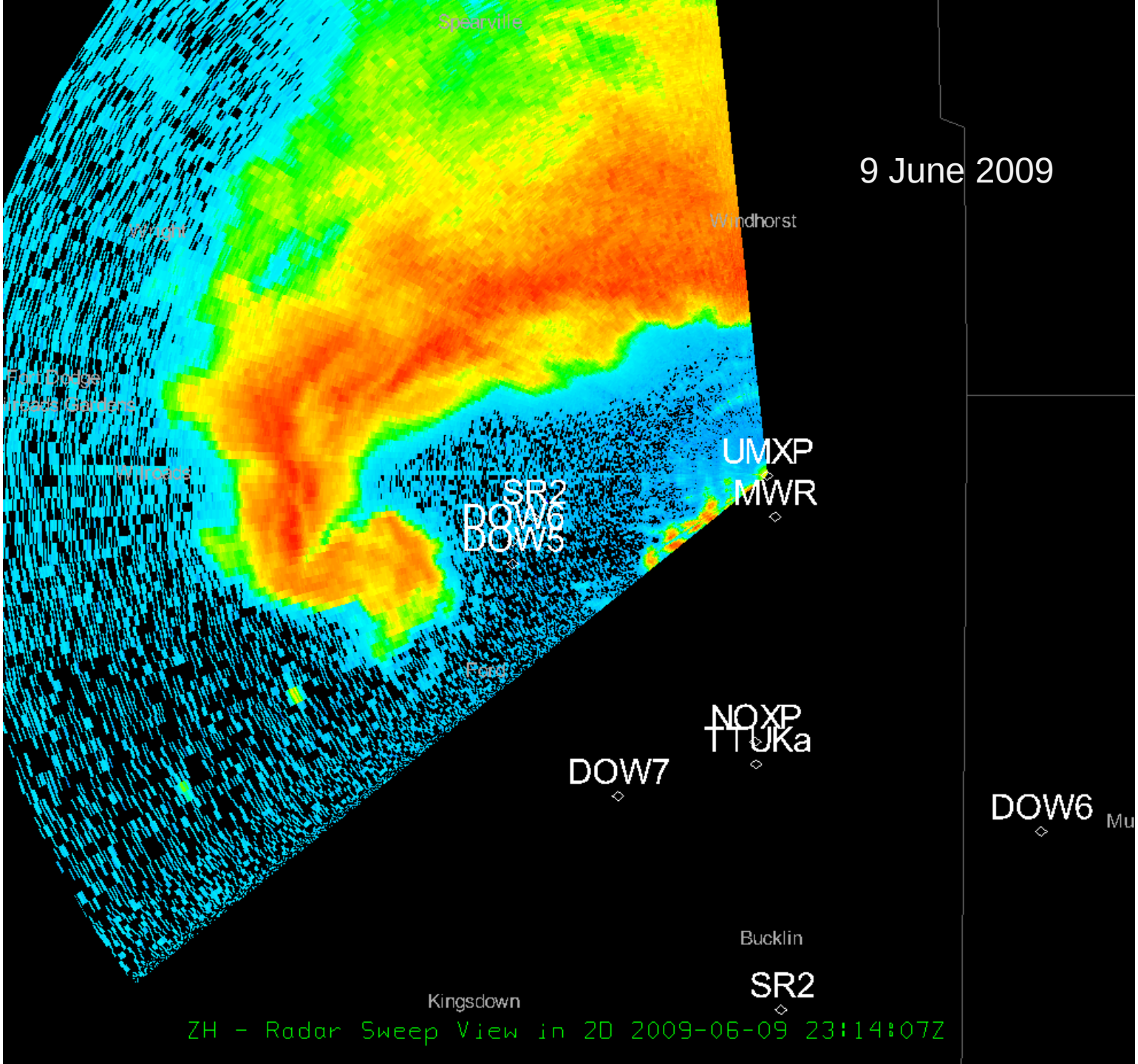
ρ_{hv}

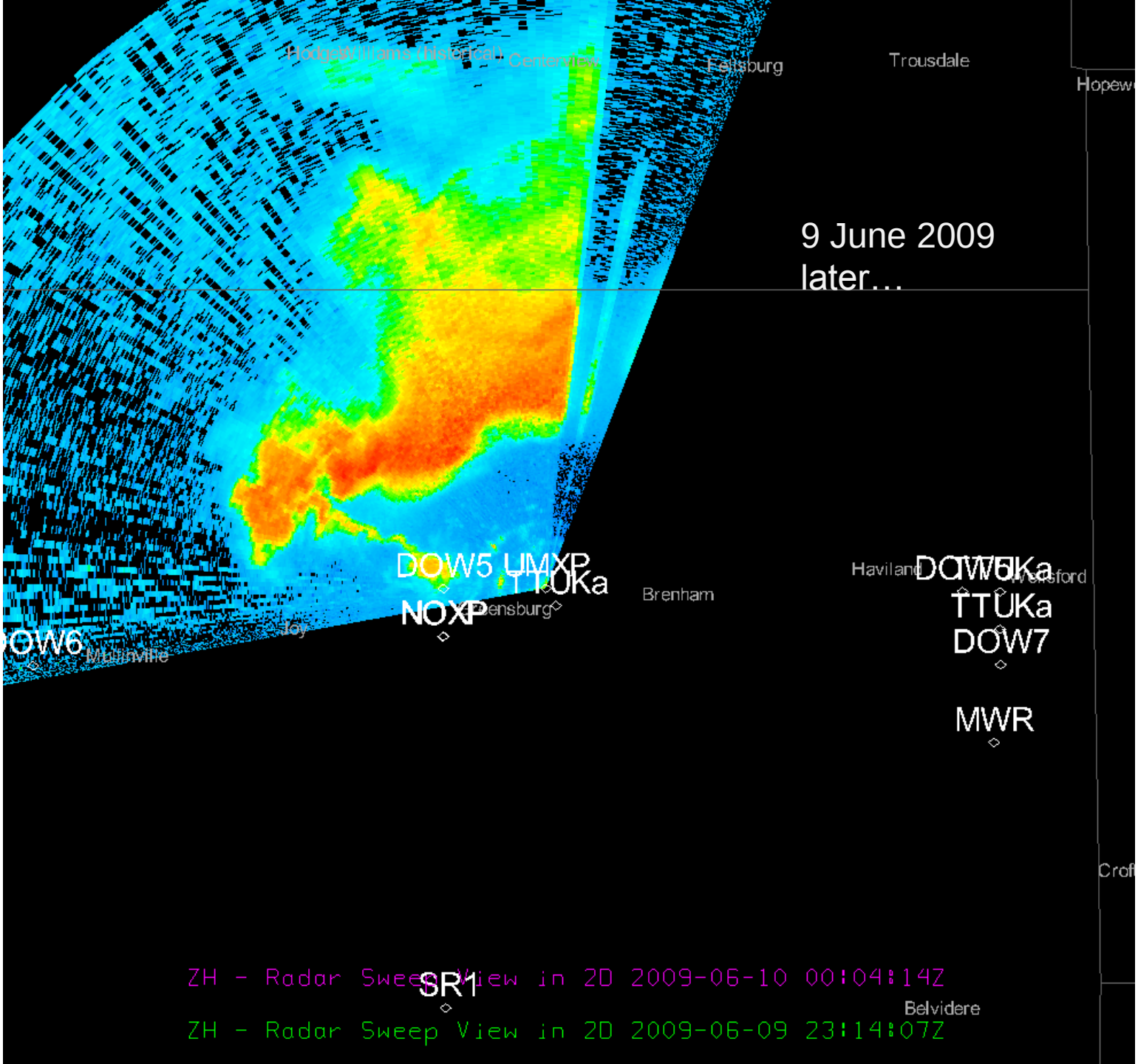

7 June 2009
later…
DOW7
DOW5
DOW6
UMXP
TTUKa
SR1
TTUKa
NOXP
Winslow
Civil Bend
Cypress
Altamont
Winston
Mabel
Gridley (historical)
Stewartsville
Osborn
Cameron
Kidder
Moors
Maple Hill
Fairport
Santa Rosa
Weatherby
Alta Vista
Fordham
ZH - Radar Sweep View in 2D 2009-06-08 01:36:06Z

SUPERCELL IN N NE ON 6 JUNE 2009 © H. Bluestein

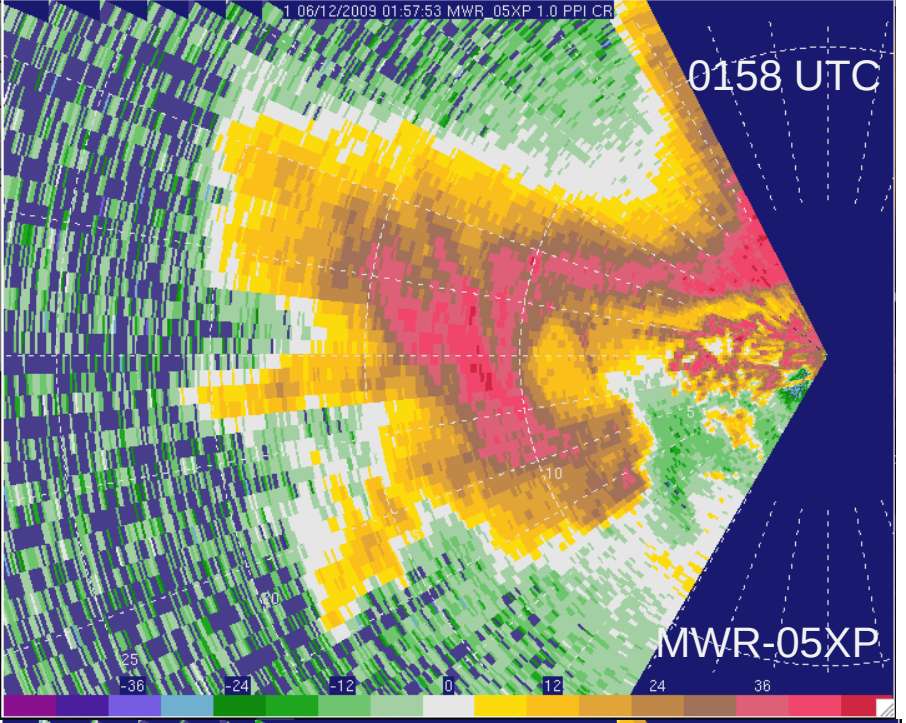

Broadwater
Alden
Coldwater Trailer Court
TTUKa
DOW7
TTUKa
DOW7
MWR
UMXP
TTUKa
6 June 2009
NOXP
Huntsman
ZH - Radar Sweep View in 2D 2009-06-06 02:06:08Z
Text Point Data - Point Data Plot 2009-06-05 00:01:00Z
Locations

DEMISE OF SUPERCELL IN SW KS ON 9 JUNE 2009

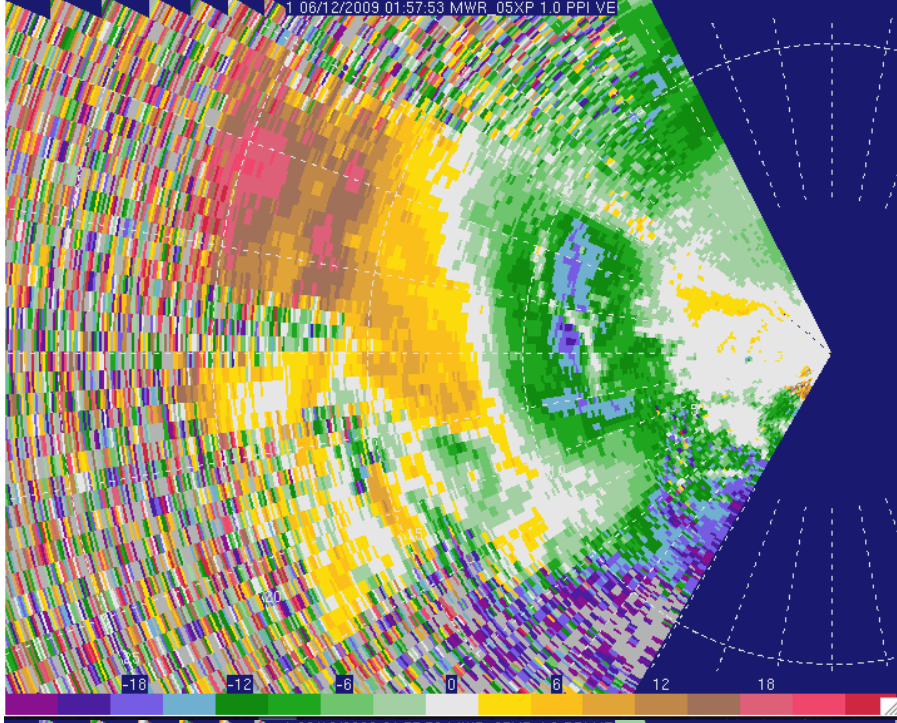

9 June 2009
Spearville
Windhorst
UMXP
MWR
SR2
DOW6
DOW5
NOXP
UKa
DOW7
DOW6
Bucklin
SR2
Kingsdown
ZH - Radar Sweep View in 2D 2009-06-09 23:14:07Z


Hodges/Williams (historical)
Centerville
Trousdale
Hopew
9 June 2009
later…
DOW5 UMXP
TTUKa
NOXP
Brenham
Haviland
DOW6
Wellsford
TTUKa
DOW7
MWR
Crof
SR1
Belvidere
ZH - Radar Sweep View in 2D 2009-06-10 00:04:14Z
ZH - Radar Sweep View in 2D 2009-06-09 23:14:07Z

HP SUPERCELL IN SE CO ON 11 JUNE 2009

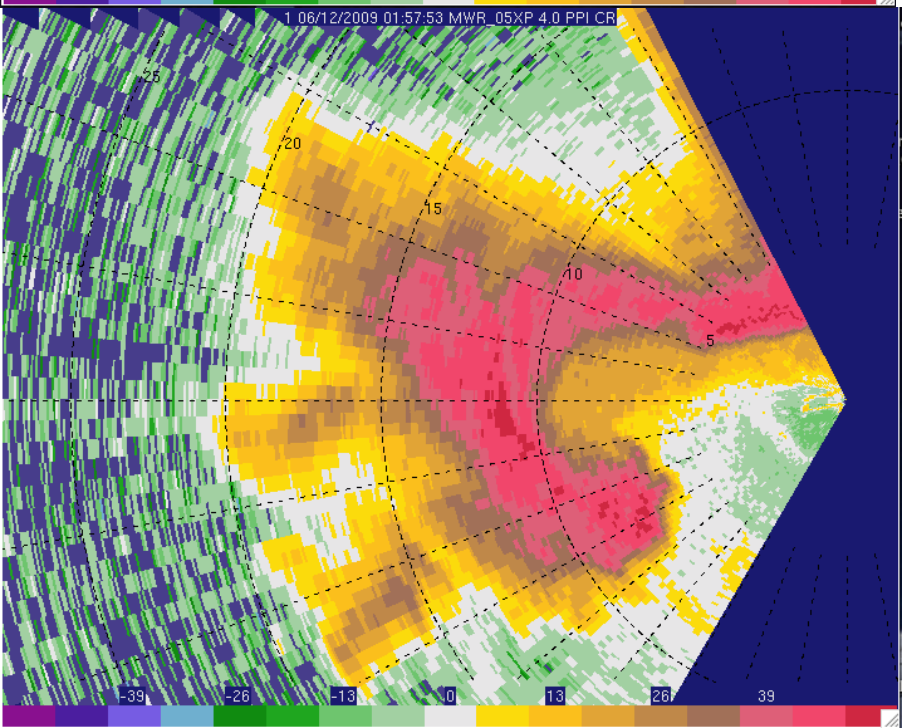

1 06/12/2009 01:57:53 MWR_05XP 1.0 PPI CR
0158 UTC
MWR-05XP

1⁰

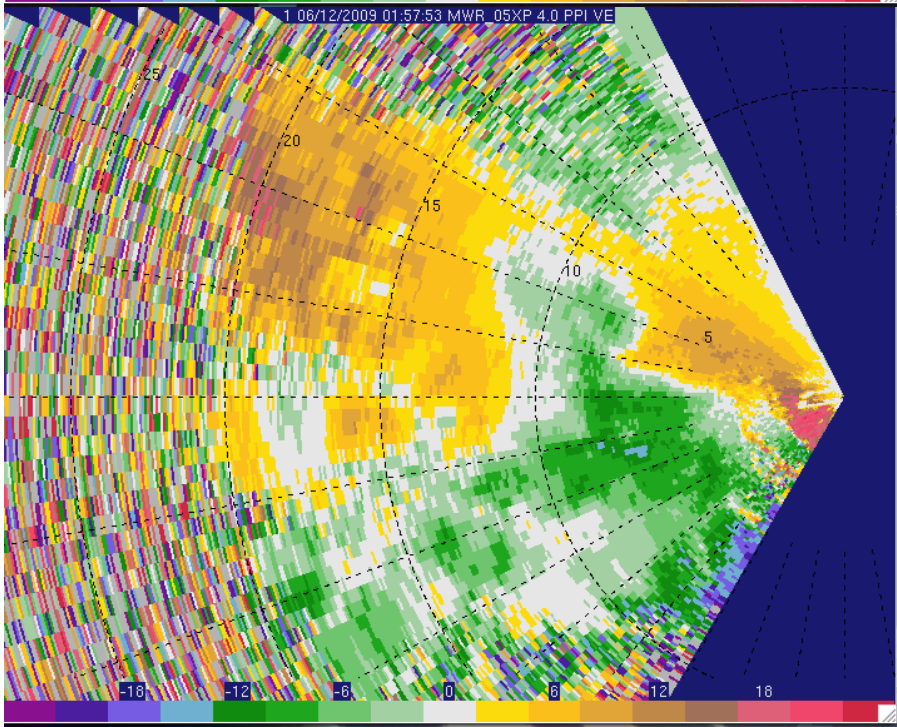

1 06/12/2009 01:57:53 MWR_05XP 1.0 PPI VE

Z

V


1 06/12/2009 01:57:53 MWR_05XP 4.0 PPI CR

4⁰


1 06/12/2009 01:57:53 MWR_05XP 4.0 PPI VE

Z

V

SUMMARY

1.UMass W-band data available now, but sensitivity severely degraded after tow of radar truck on 25 May.

2.UMass X-Pol reflectivity, Doppler velocity, differential reflectivity, and correlation coefficient ready now; coding error of differential phase into UF (and Dorade) needs to be corrected. Being done now.

3. UMass X-Pol data needed to be carefully compared with polarimetric data from NOXP. Power relatively low.

4. MWR reflectivity data reflectivity data ready now; Doppler velocity data being reprocessed because locations of data had software error (variable to ~ 600 m). To date, 5 June, 11 June, and 13 June datasets have been re-processed. Awaiting rest of datasets.

CAVEAT analyist!

PROBLEMS and UPGRADES

1.UMass W-band radar antenna is being replaced.

2.MWR-05XP reflectivity data oscillate slightly in intensity in weak-echo hole of tornado from clockwise to counterclockwise scans. Is this serious?

3.MWR-05XP – lots of data, lots of editing: Alternate PRTs every other scan; easier to unfold velocity data.

4.MWR-05XP had scanning, pulsed Doppler lidar installed this summer; tested in Boulder. Should fill in clear-air data. Range? (probably ~ 5 – 15 km in clear air: unknown in humid, rainy environment) Can distinguish between aerosol motion and hydrometeor motion: Useful for estimating effects of centrifuging in tornadoes? Effects of truck vibrations? (unknown) Scanning patterns for MWR and lidar comp.?

5.MWR-05XP may have non-scanning, pulsed, W-band Doppler radar installed.

6.Supplements from NSF for Year 2 field operations in hand, but funding to Bluestein (OU) and Frasier (UMass) still in question. May affect availability of two UMass radars, but not MWR-05XP.

7.Rapid X-Pol to be tested in 2010