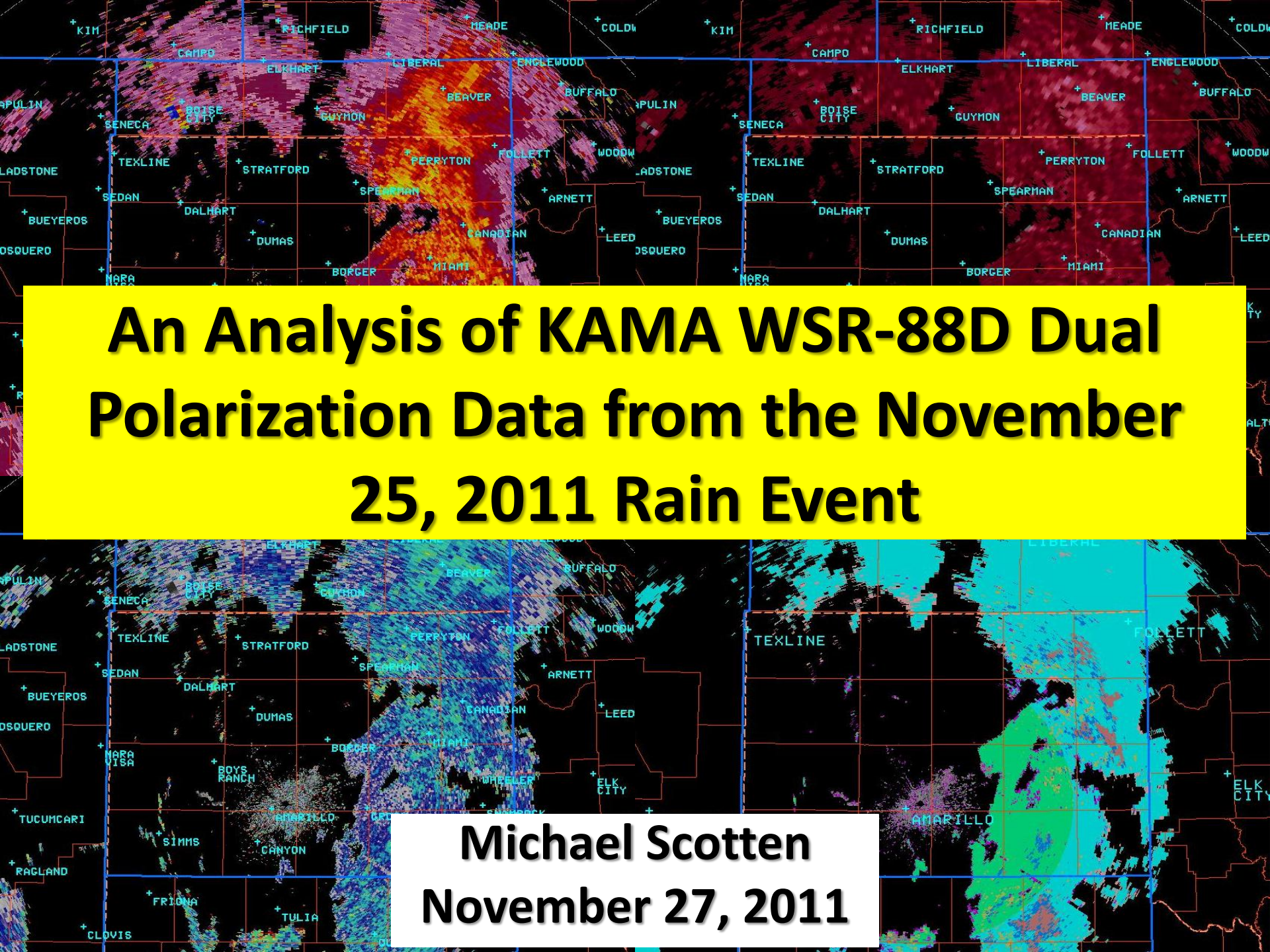


An Analysis of KAMA WSR-88D Dual Polarization Data from the November 25, 2011 Rain Event

Michael Scotten

November 27, 2011

Purpose of This Presentation

- **Determine how some of the new dual polarization radar products performed during a rain event across the Panhandles.**

- **Share knowledge and teach others on how to use dual polarization data for future events.**

What Happened?

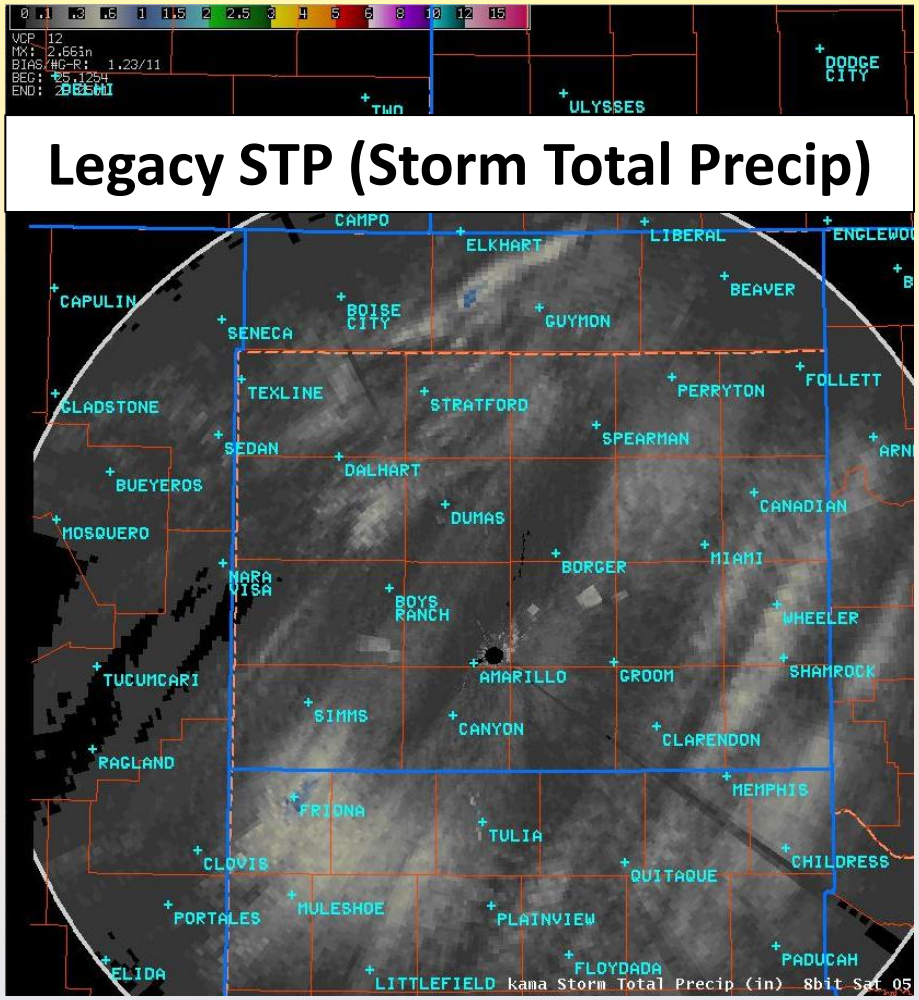
- A low pressure system moved through the Panhandles bringing a round of showers during the late morning and afternoon hours on Friday, November 25, and then showers and thunderstorms during the evening hours.

- Rainfall amounts were generally light and less than 0.10” except over the Oklahoma Panhandle where they were up to 0.50”.

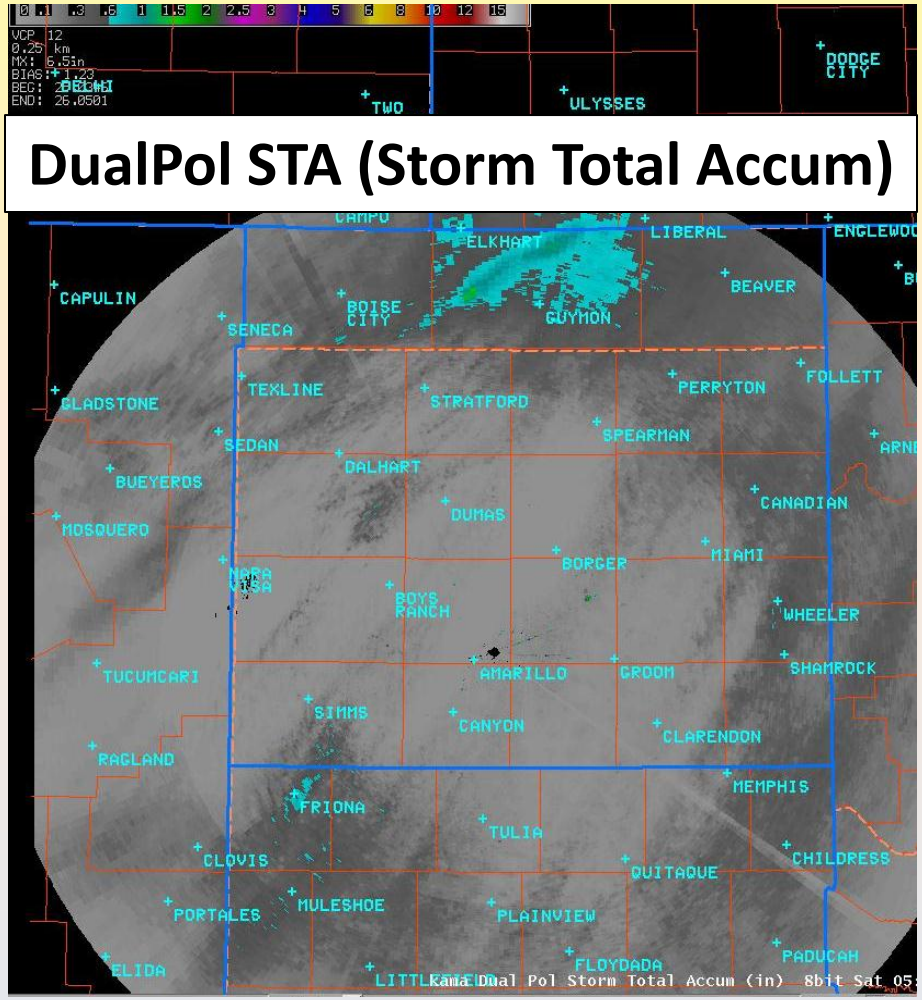
Case 1: Determine How the DualPol STA (Storm Total Accumulation) and Legacy STP (Storm Total Precipitation) Accumulations Compared to Actual Precipitation Amounts Between 6 am and 11 pm CST on November 25, 2011

Precipitation Algorithm Comparison 12z November 25 - 05z November 26

Legacy STP (Storm Total Precip)



DualPol STA (Storm Total Accum)



DualPol STA filtered nearby wind farms much better than the Legacy STP.

Tables at Given Locations Comparing Actual Precipitation Amounts with KAMA WSR-88D Estimates 12z November 25 - 05z November 26

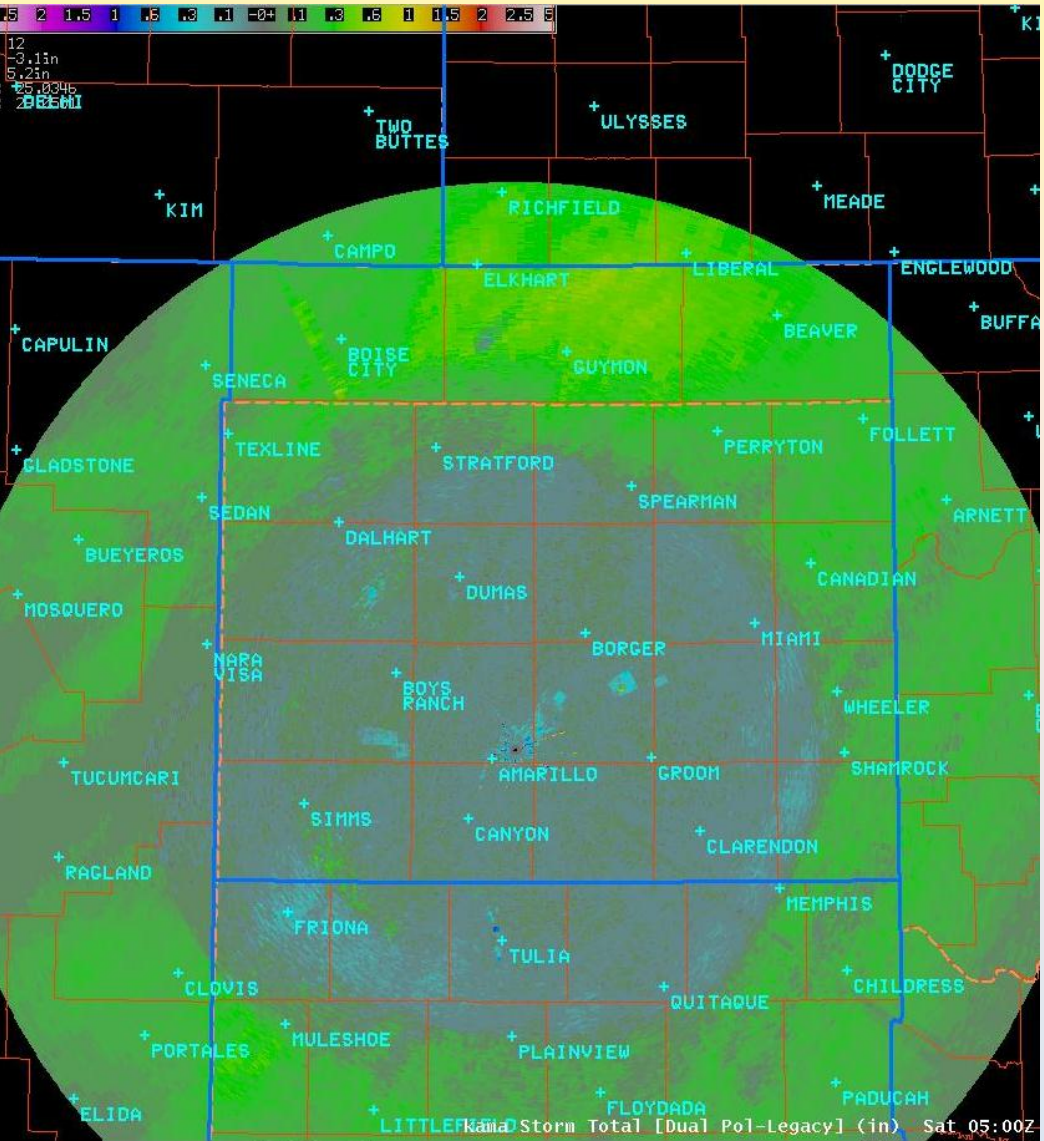
Location/ Distance from KAMA	Actual Ob	Legacy STP	DP STA
Borger (37 nm)	0.01”	0.04”	0.03”
Dumas (46 nm)	0.02”	0.04”	0.06”
Pampa (47 nm)	0.06”	0.10”	0.10”
McLean (62 nm)	0.07”	0.16”	0.27”
Bootleg (68 nm)	0.04”	0.12”	0.13”
Dalhart (73 nm)	0.02”	0.06”	0.06”
Wheeler (82 nm)	0.19”	0.28”	0.33”

Location/ Distance from KAMA	Actual Ob	Legacy STP	DP STA
Shamrock (83 nm)	0.08”	0.26”	0.44”
Canadian (87 nm)	0.01”	0.14”	0.36”
Perryton (98 nm)	0.09”	0.12”	0.33”
Guymon (102 nm)	0.08”	0.16”	0.53”
Boise City (113 nm)	0.32”	0.02”	0.27”
Hooker (116 nm)	0.38”	0.12”	0.72”
Beaver (128 nm)	0.19”	0.02”	0.44”

Yellow means the radar estimate was off 0.10 to 0.24”.
Red means that the radar estimate was off 0.25” or more.

Amarillo (KAMA) could not be used since this location is in the cone of silence.

DSD (Unbiased DualPol Minus Legacy Precipitation Accumulation)



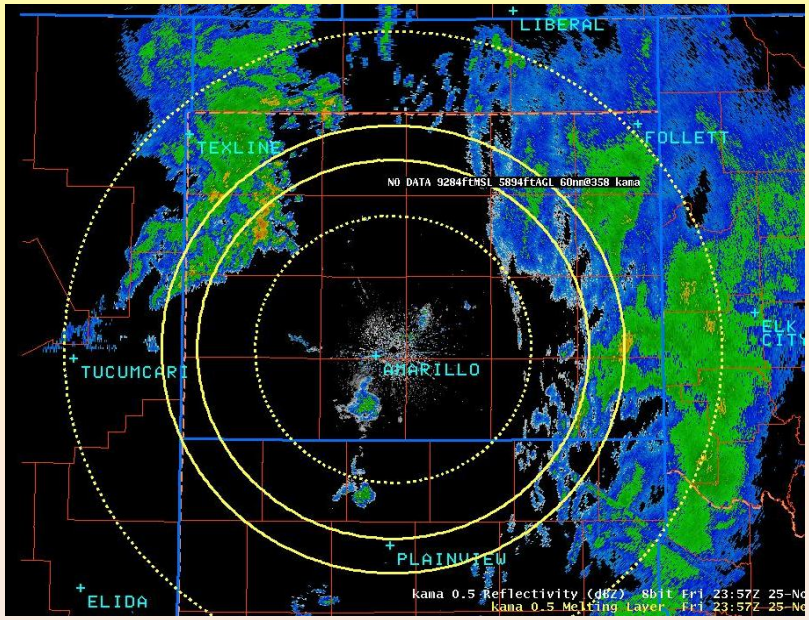
- The green values 80 nm or greater from KAMA WSR-88D indicated that the DualPol STA was 0.10-0.80” higher than the Legacy STP.
- The biggest differences were over the Oklahoma Panhandle where heavier precipitation occurred.

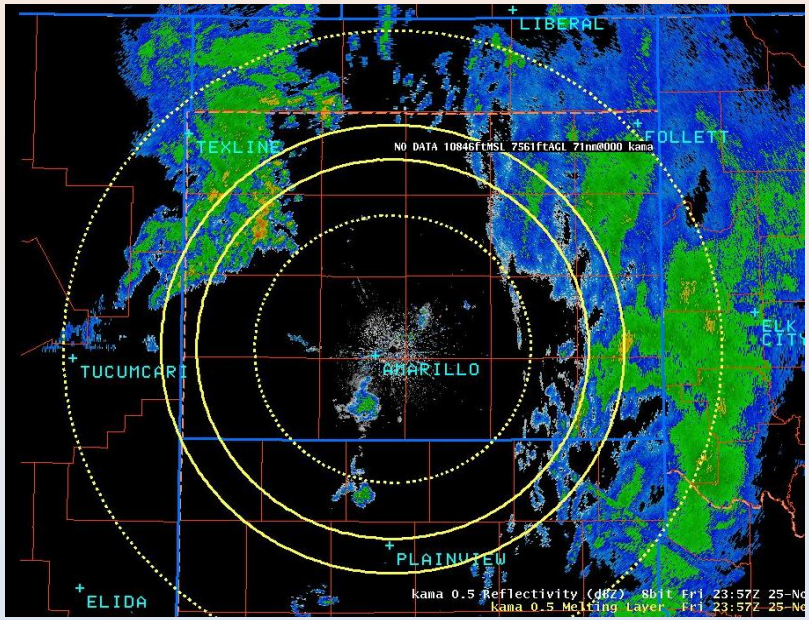
Results

- DualPol STA had a higher amount of error compared to the Legacy STP during this light precipitation event.
- Both DualPol STA and Legacy STP did a fine job with light precipitation estimates close to the radar (within 65 nm).
- DualPol STA overestimated precipitation accumulations 80 nm and greater from KAMA, maybe a result of accumulating virga or bright banding from melting snow.
- DualPol STA did a much better job filtering spurious precipitation amounts from nearby wind farms than the Legacy STP.

Case 2: Determine How the DualPol Melting Layer Algorithm Performed near KAMA at 00z November 26, 2011

Melting Layer Algorithm

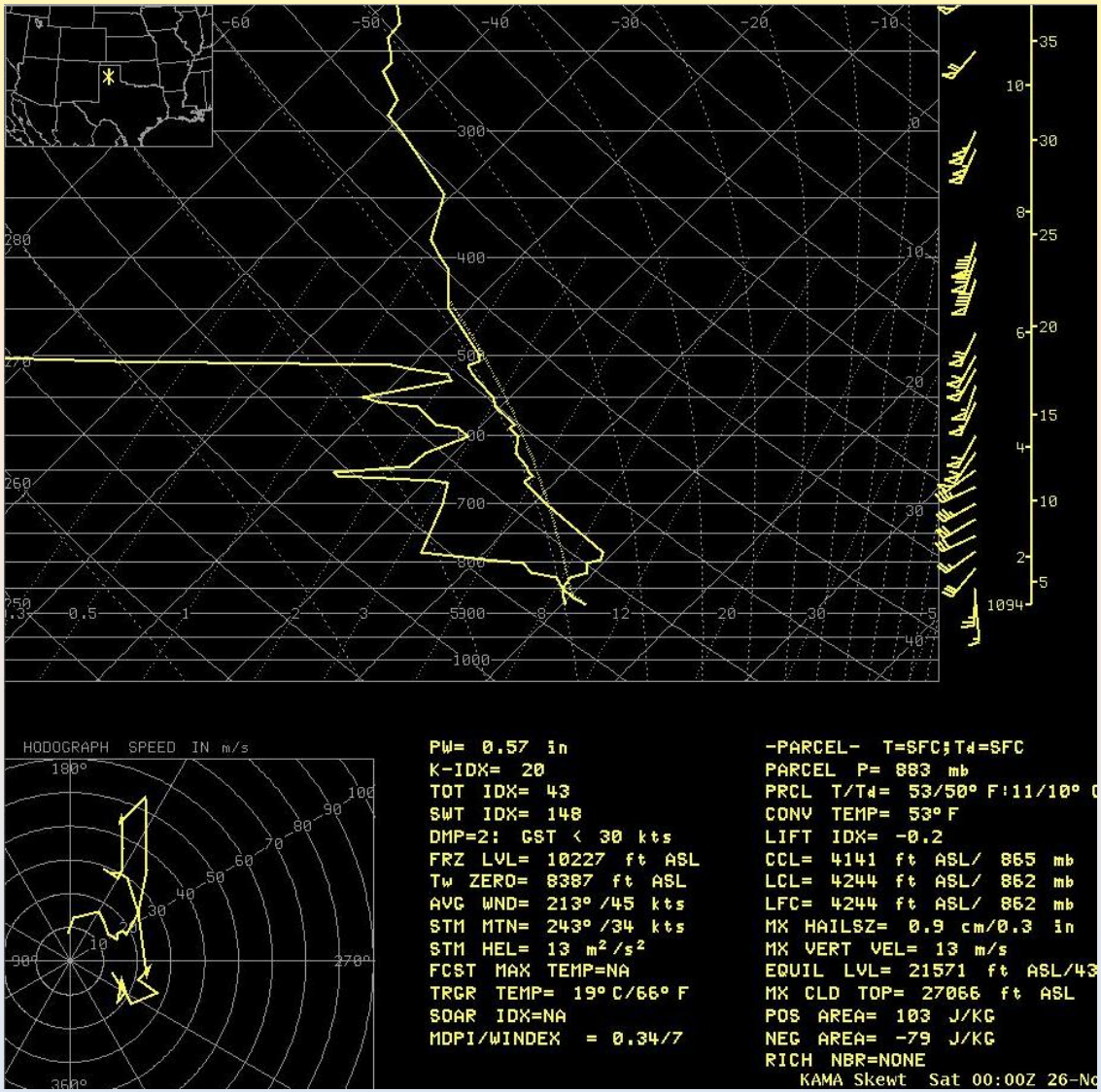




- The two inner solid lines were at 9284 ft MSL and 10846 ft MSL at 00z November 26.

- The average Melting Layer was estimated to be at 10065 ft MSL.

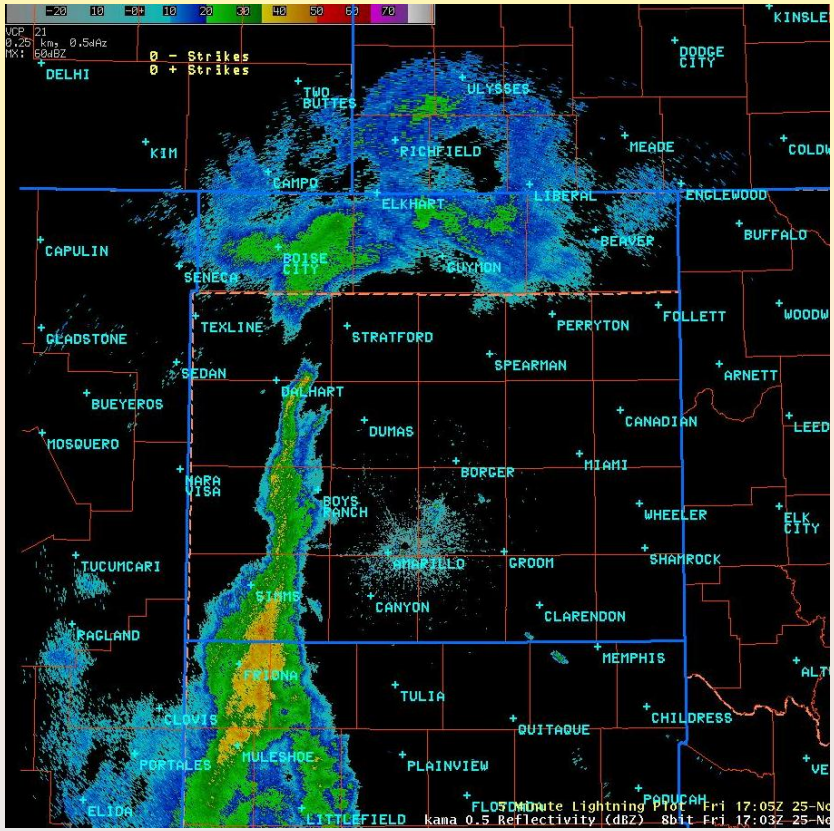
Comparing Melting Layer Algorithm to 00z November 26 KAMA RAOB

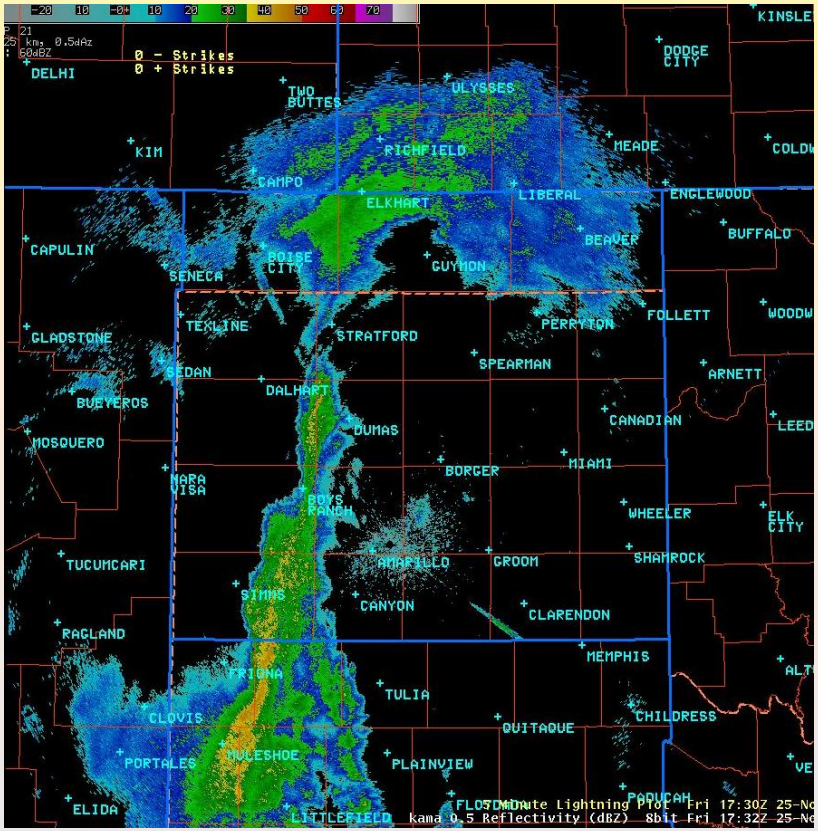


- The average Melting Layer estimated at 10065 ft MSL was quite accurate with the 00z KAMA RAOB depicting a Freezing Level of 10227 ft MSL.

Case 3: Use the DualPol-Flipchart to Determine Precipitation Type over the Southwest Texas Panhandle 1703-1732z November 25

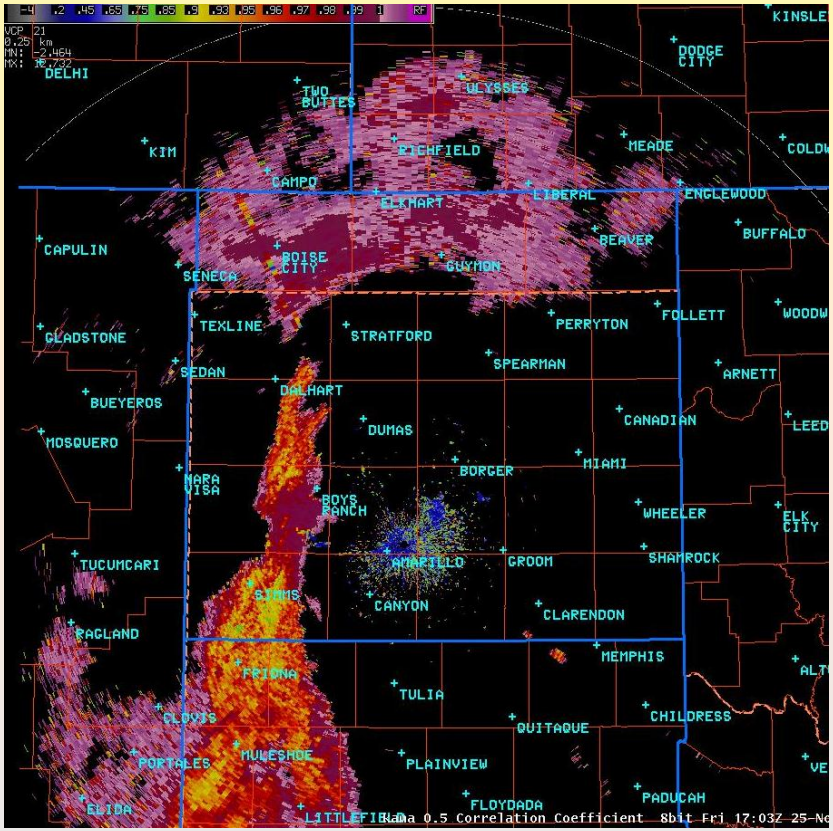
0.5 Degree Reflectivity at 1703 and 1732z November 25

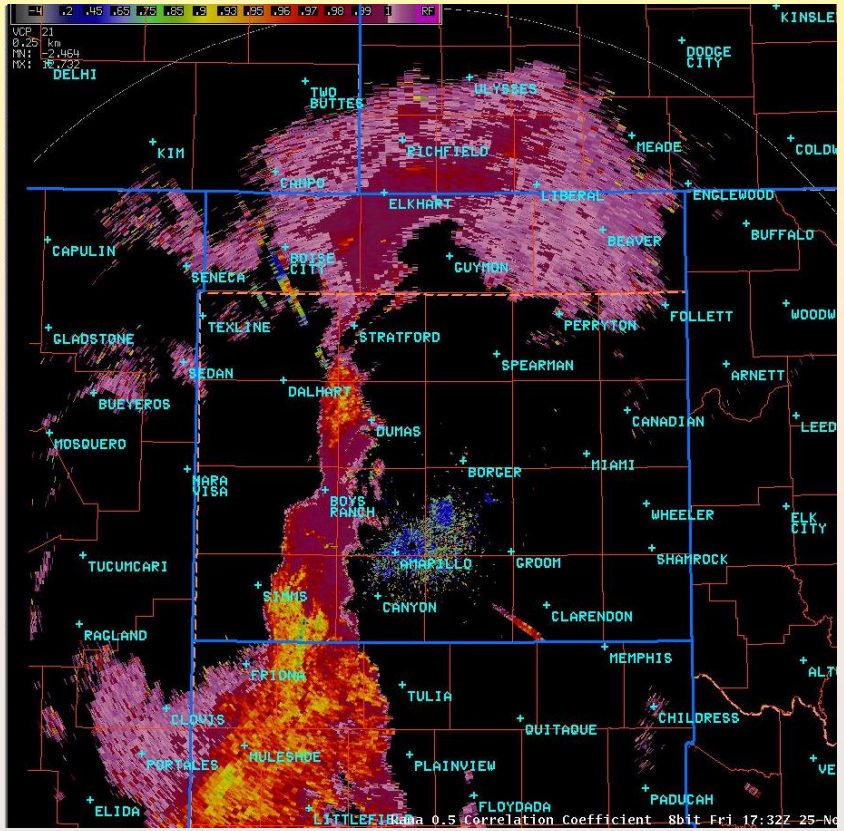




A band of precipitation extended over the west Texas Panhandle with enhanced reflectivities of 35-45 dBZ near Hereford.

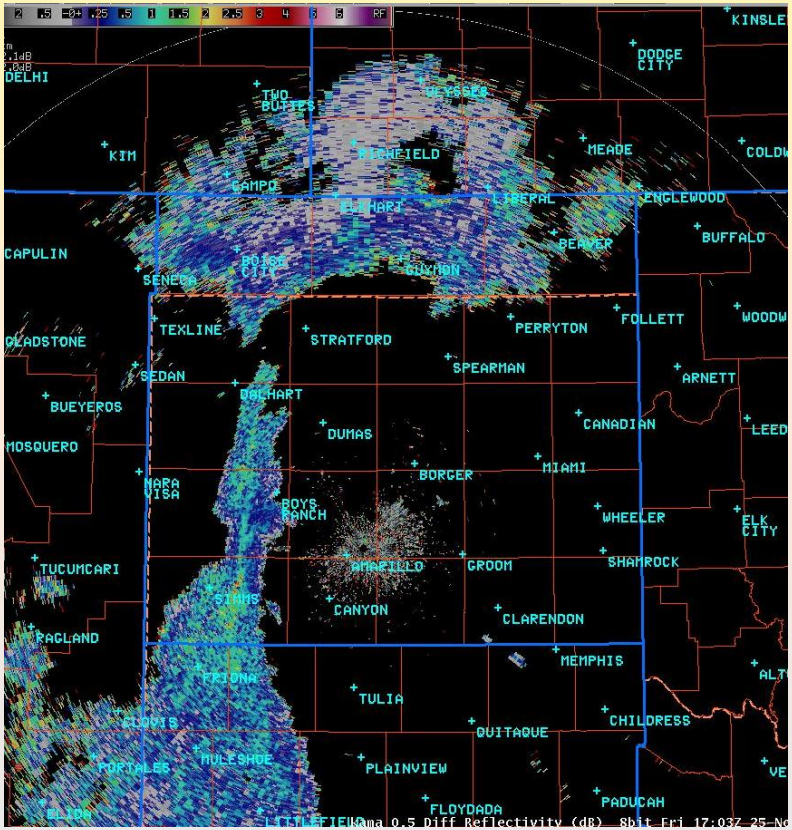
0.5 Degree CC (Correlation Coefficient) at 1703 and 1732z November 25

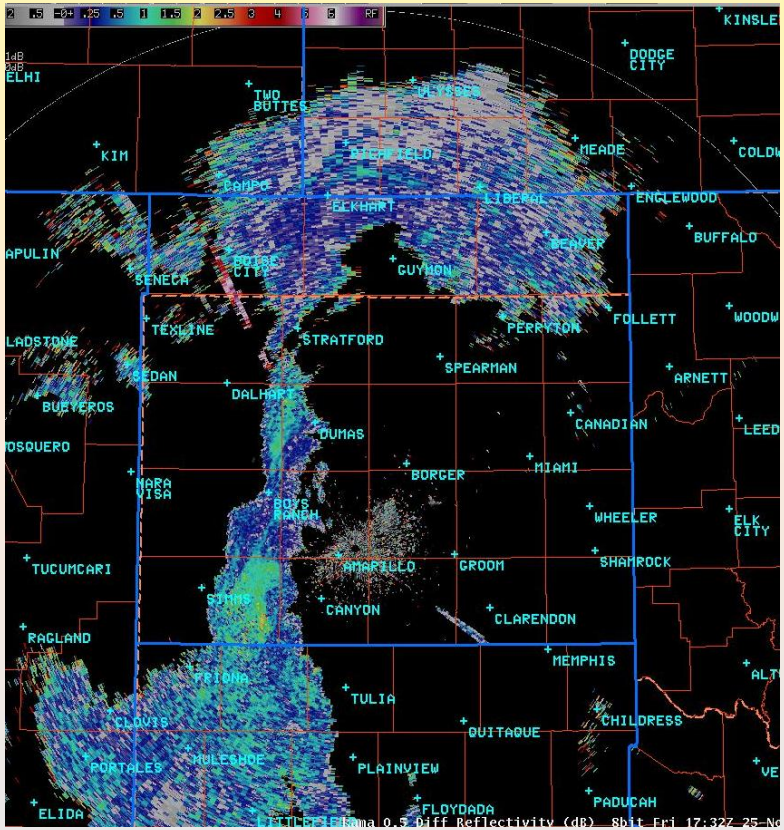




The band of precipitation over the west and southwest Texas Panhandle had low CC values 0.85 to 0.95.

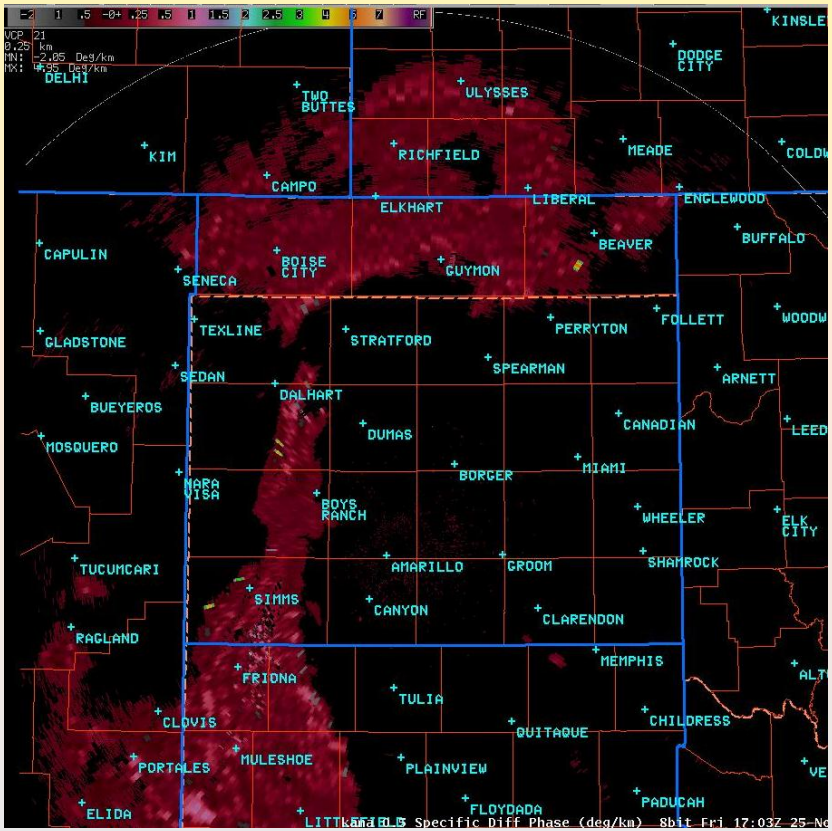
0.5 Degree ZDR (Differential Reflectivity) at 1703 and 1732z November 25

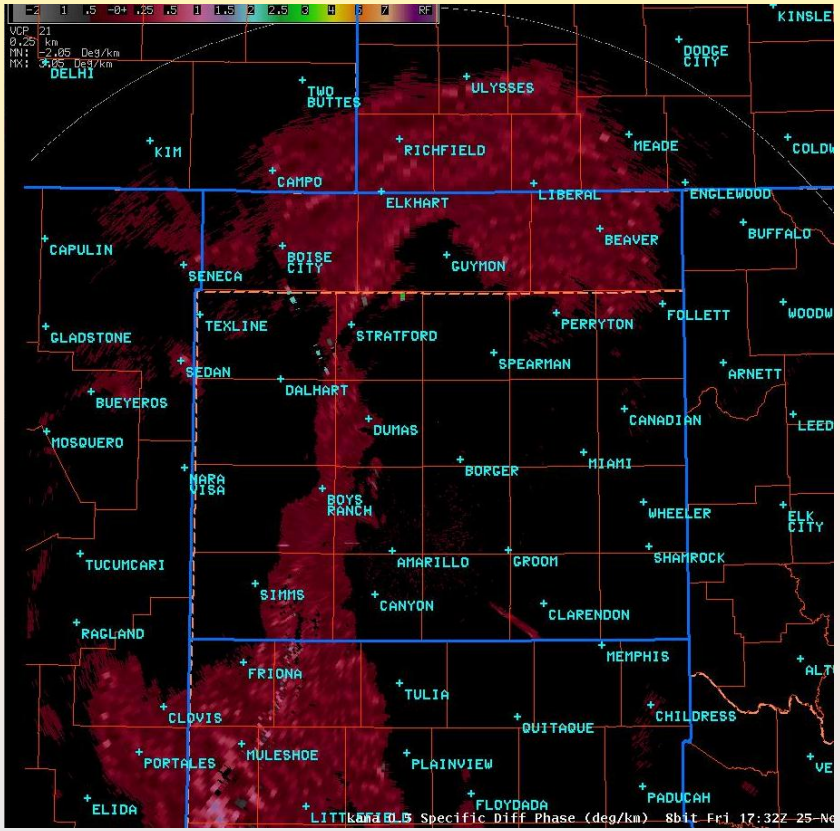




The band of precipitation over the west and southwest Texas Panhandle had moderate ZDR values of 0.5 to 2 dB.

0.5 Degree KDP (Specific Differential Phase) at 1703 and 1732z November 25



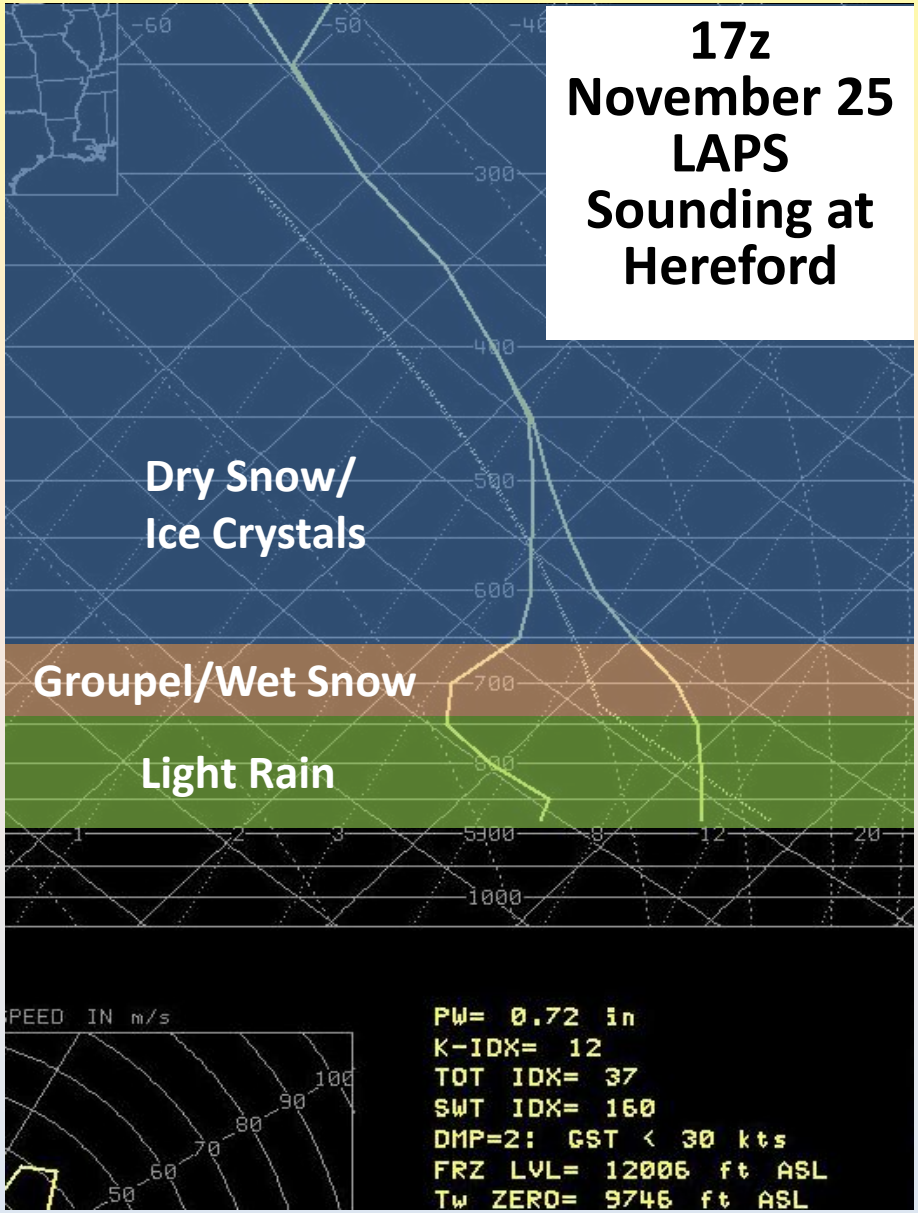


The band of precipitation over the west and southwest Texas Panhandle had low KDP values 0 to 1 deg/km.

Result – Groupel/Wet Snow Mix

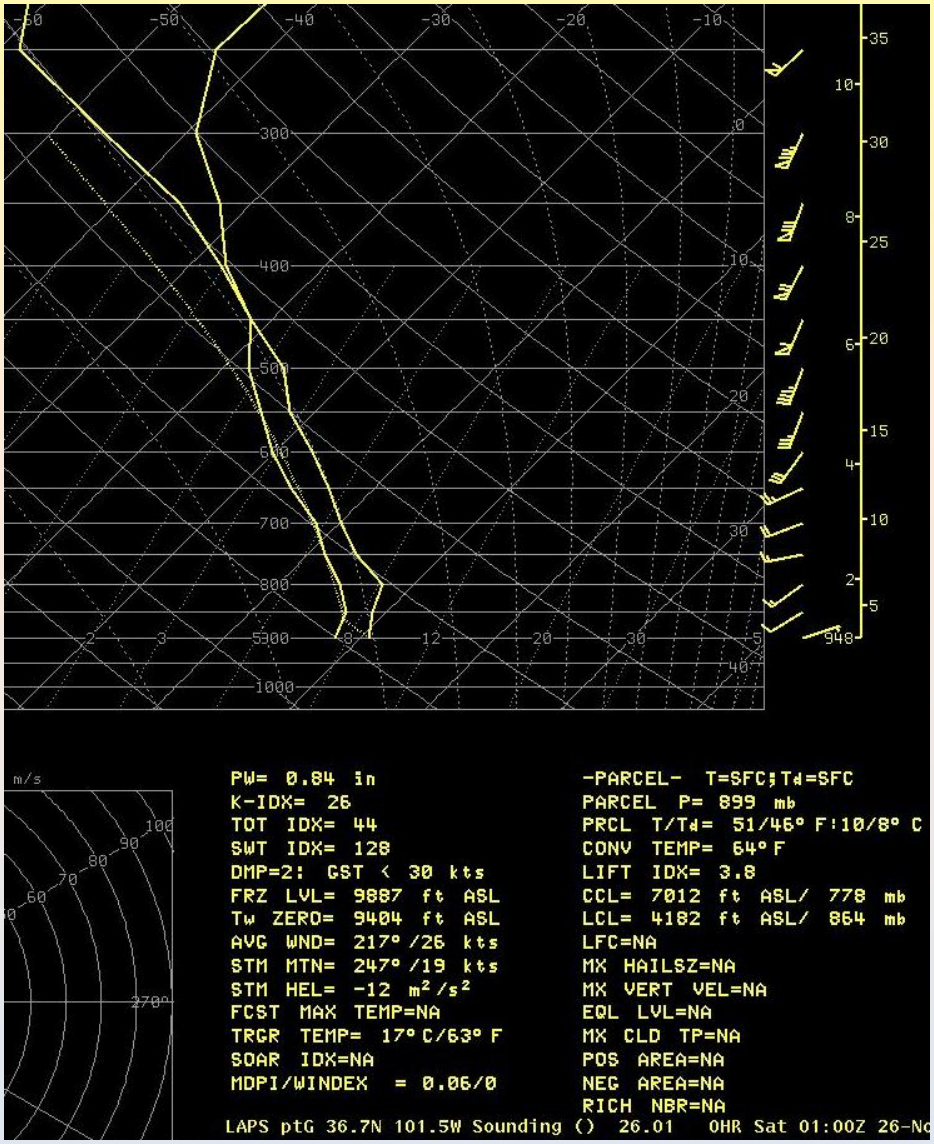
- Precipitation detected at 0.5 degrees from KAMA over the southwest Texas Panhandle was a likely groupel and wet snow mix 7000-8500 ft MSL (3000-4500 ft AGL).

- However, the result at the ground was light rain due to much warmer air near the surface with surface temperatures in the upper 40s to mid 50s which melted any groupel and wet snow.



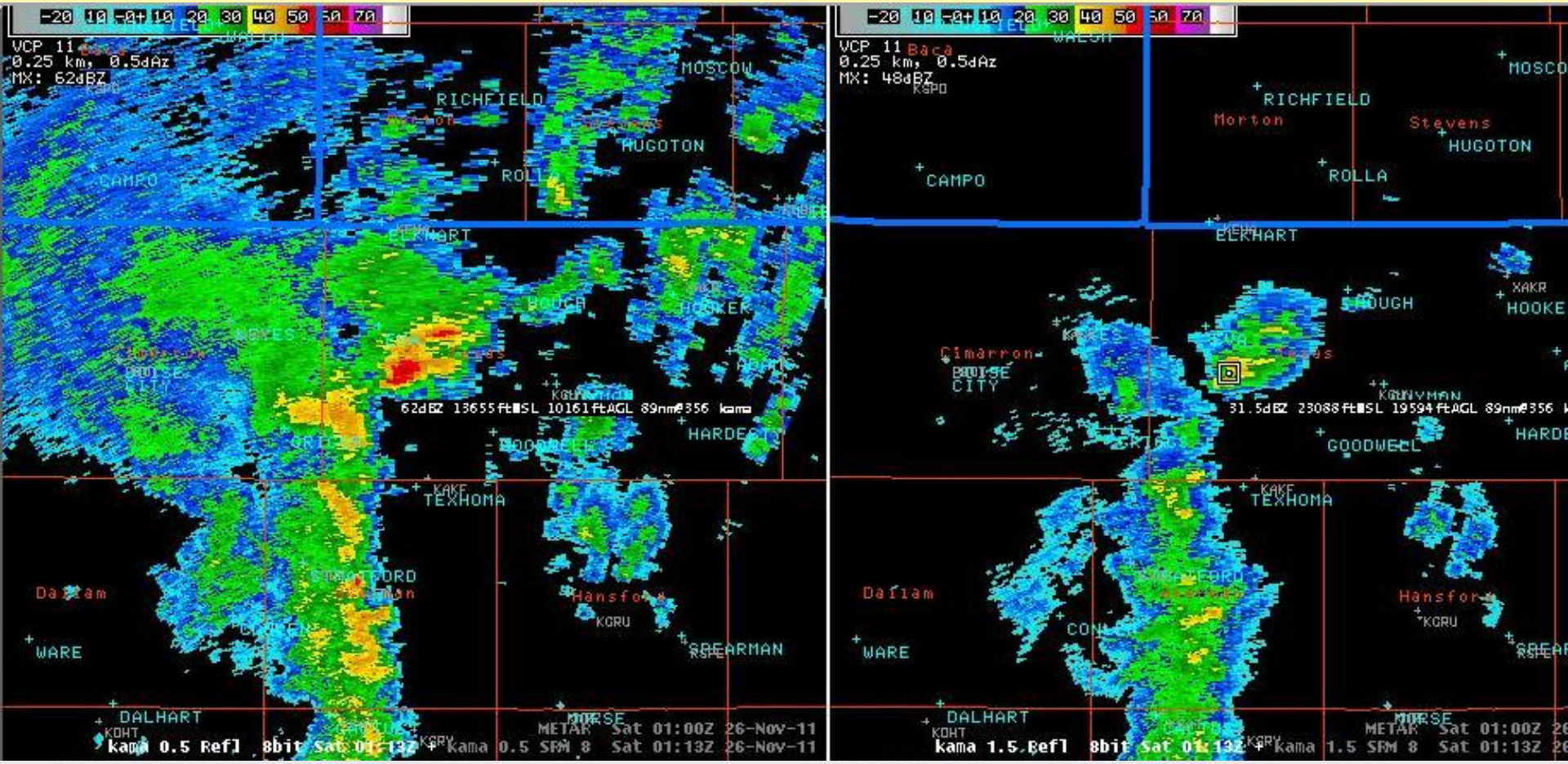
Case 4: Texas County, Oklahoma Thunderstorm at 0113z November 26

01z November 26 LAPS Sounding at KGUY



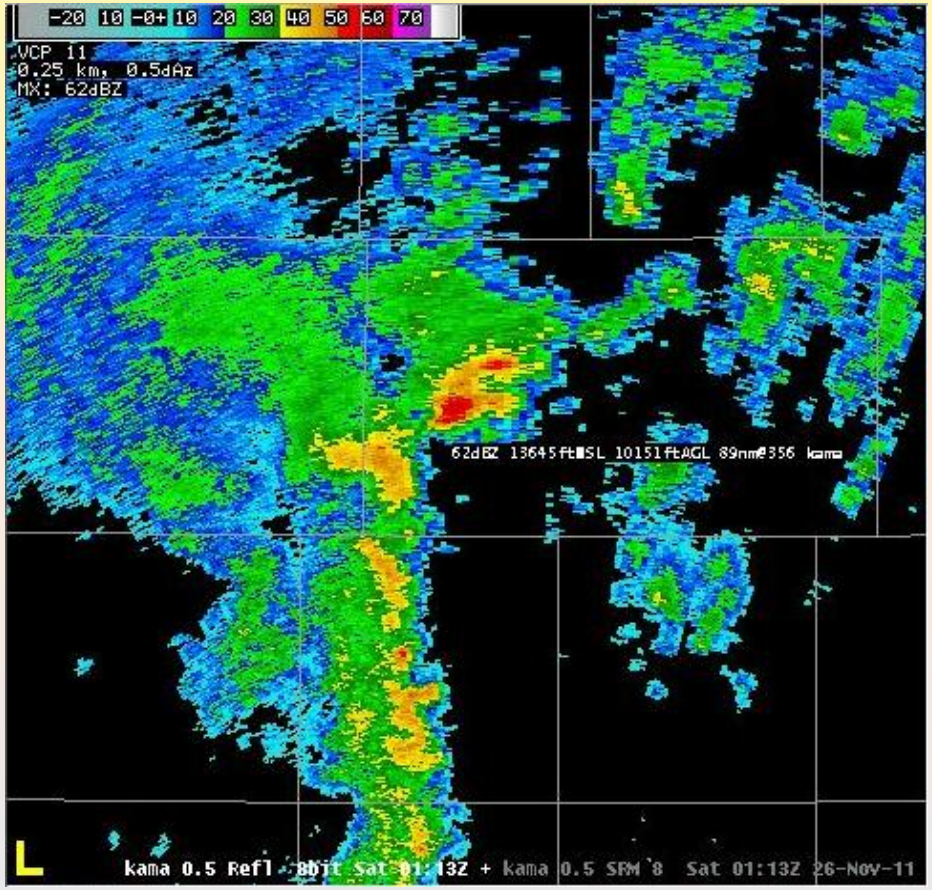
- The sounding showed very little instability, though RUC analysis indicated 100-200 J/kg MUCAPE.
- The freezing level was at 9887 ft MSL; the -10°C level was near 15500 ft MSL; the -20°C level was around 20800 ft MSL.

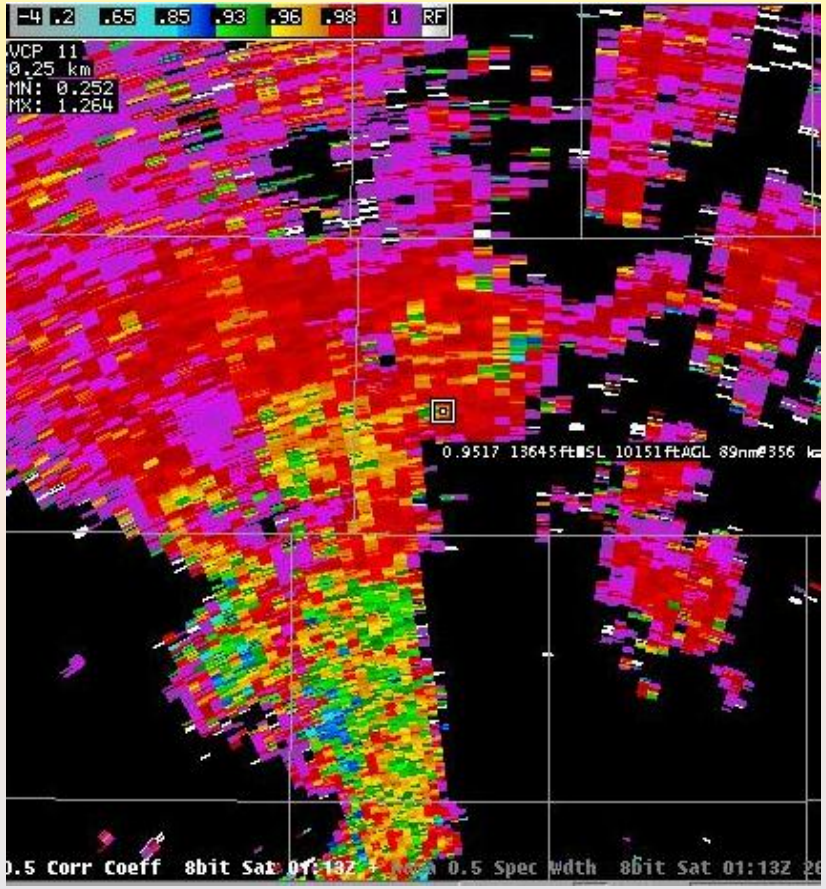
Reflectivity at 0.5 and 1.5 Degrees at 0113z November 26



Enhanced echo in west Texas county had a 62 dBZ core at 13655 ft MSL and a 40 dbz core at 23088 ft MSL, well above the -10°C level. Thus, this echo was a thunderstorm.

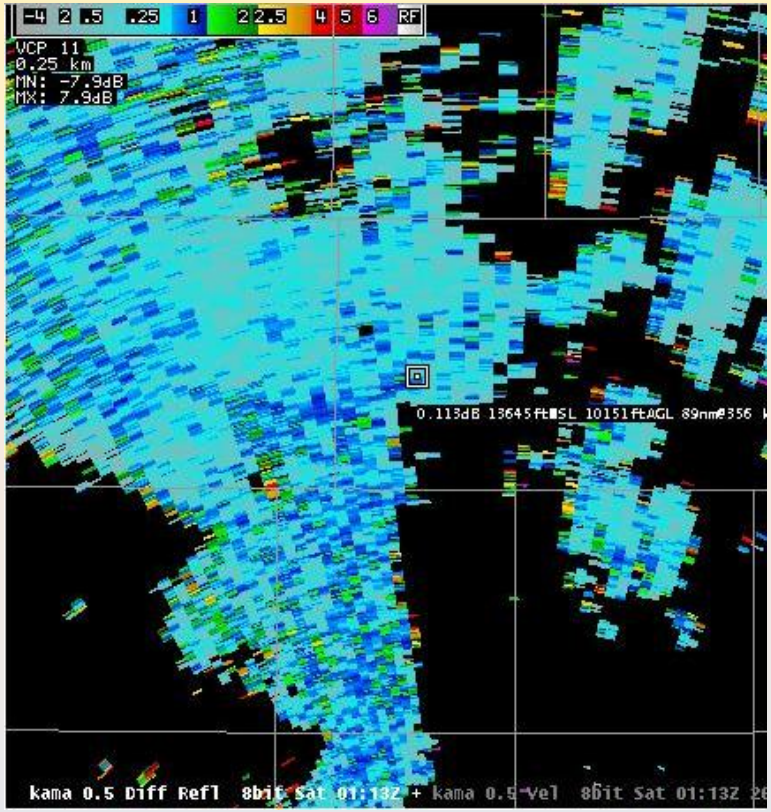
Reflectivity and CC (Correlation Coefficient) at 0.5 Degrees at 0113z November 26

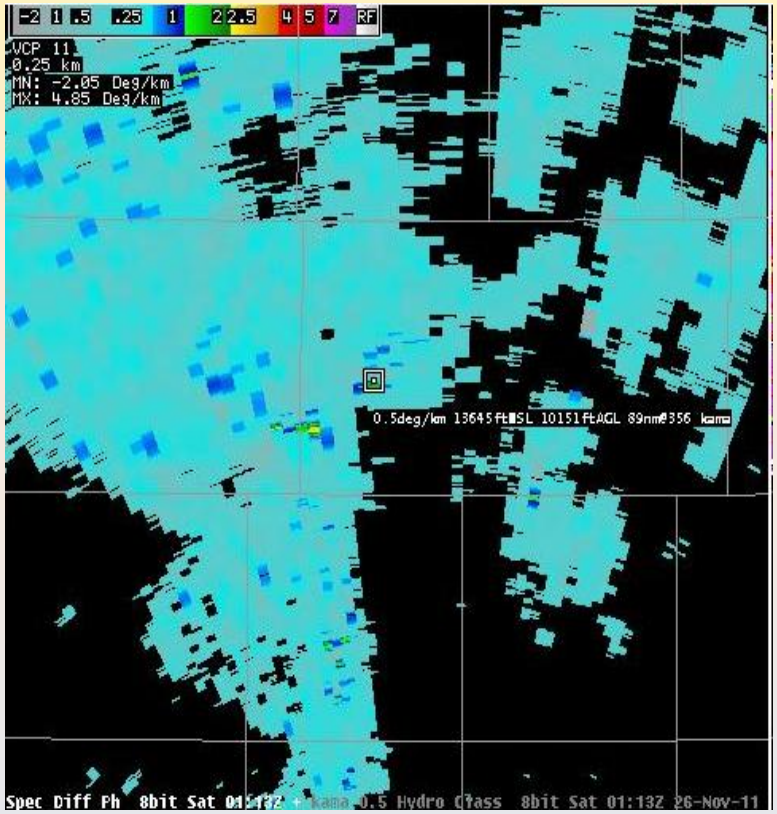




The thunderstorm had fairly high CC values of 0.90 to 0.96 at 13645 ft MSL in addition to the 62 dbz core.

ZDR (Differential Reflectivity) and KDP (Specific Differential Phase) at 0.5 Degrees at 0113z November 26

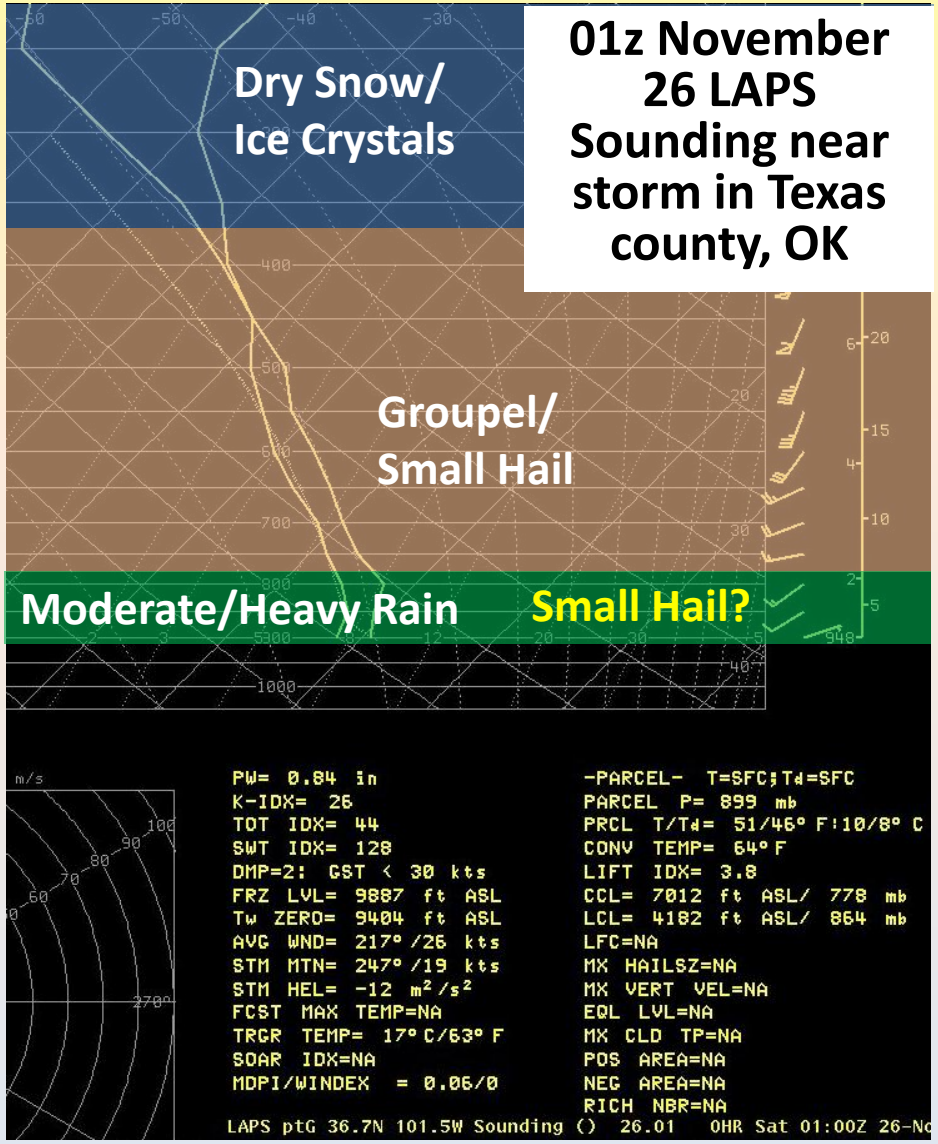




ZDR (around 0.1 dB) and KDP (around 0.5 deg/km) values near the storm were rather low.

Result – Small Dry Frozen Hail or Groupel

- A thunderstorm with dry frozen small hail or groupel was likely occurring at 13600 ft MSL over west Texas county.
- No hail reports were received at the surface as the small hail/groupel likely melted before reaching the ground or the small hail/groupel occurred in a very small rural area with no one to report it.



Conclusions

- **The new DualPol products can be used to improve operations, especially with determining precipitation types.**

- **The DualPol precipitation accumulations may not be more accurate than the legacy precipitation for light precipitation events.**