

Factual Report – Attachment 1

Information provided by the NWS.

METEOROLOGY

CEN23FA113

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NTSB, AS-30*

- Do we know if there is anyone in the NWS that has experience working with these radar data that might be able to provide some estimations of the low-level wind profile over LIT and how it changed?

Wind Velocity Data~ using KLIT Observation and Base Velocity Data from KLZK					
Time*	KLIT Obs#	0.6 (434ft^)	0.9 (651ft^)	1.3 (931ft^)	1.8 (1303ft^)
1746z	220 18kt	26.2kt SSW	28.2kt SW	27.2kt SW	31.1kt SW
1749z	210 18G25kt	15.5kt SW	24.3kt SW	26.2kt WSW	
1753z	210 19G27kt	23.3kt W			28.2kt WSW
1756z	230 17kt	12.6kt W	17.5kt W	15.5kt W	
1800z	300 28G33kt	19.4kt WNW			10.7kt W
1804z	290 19G25kt	14.6kt WNW	17.5kt WNW	20.4kt WNW	19.4kt WNW
1807z		11.7kt WNW			
1810z	290 16G21kt	15.5kt WNW	17.5kt WNW	18.5kt WNW	19.4kt WNW
1814z	290 14kt	11.7kt WNW	14.6kt WNW		
*Time based on radar scans from KLZK #Only used observations within a minute of the radar scan (included gusts) ^Elevations given by GRAnalyst2 for Beam Height at given Lat/Lon ~Utilizing the single velocity radar bin over the Lat/Lon provided at the time closest to the 0.6 degree scan. A Guide For Interpreting Doppler Velocity Patterns					

The highest wind gust reported in the 5 minute data from KLIT was a 40 knot gust in the 1802z METAR. That gust looks to have occurred earlier (1759z) due based on the remark section from that METAR: RMK AO2 PK WND 30040/1759 WSHFT 1748 RAB00. There is also a Wind Shift (1748z) and Rain Began (1800z) noted within the remarks section.

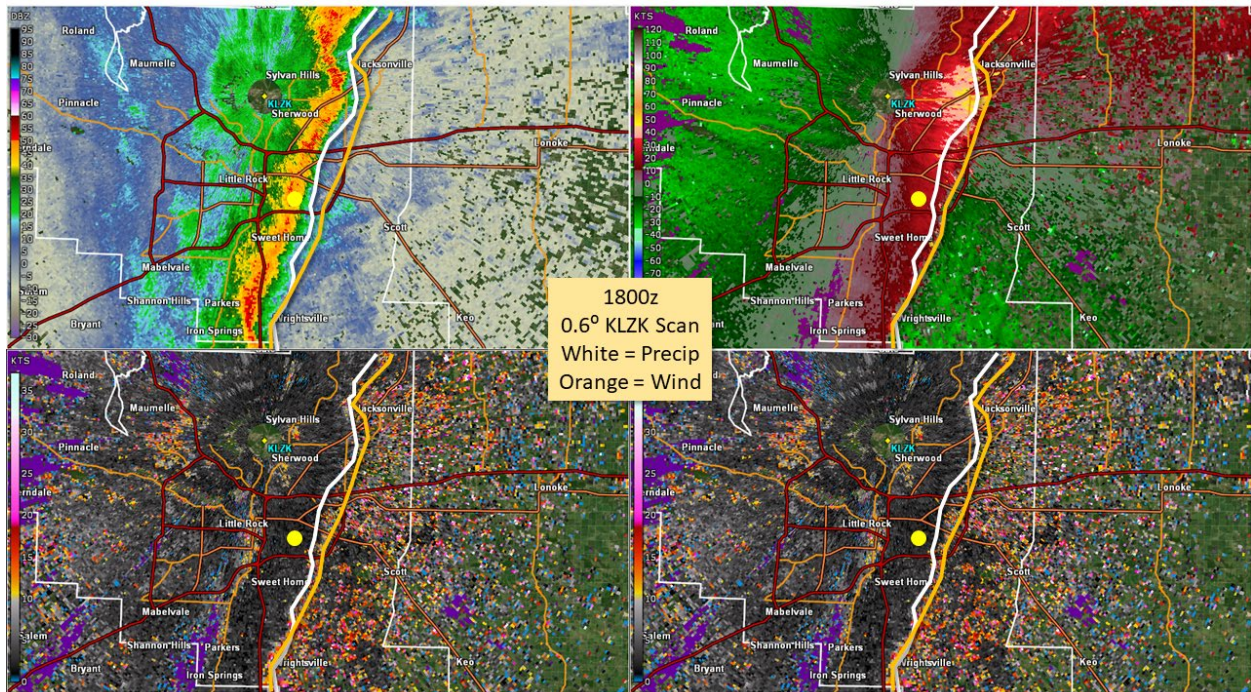
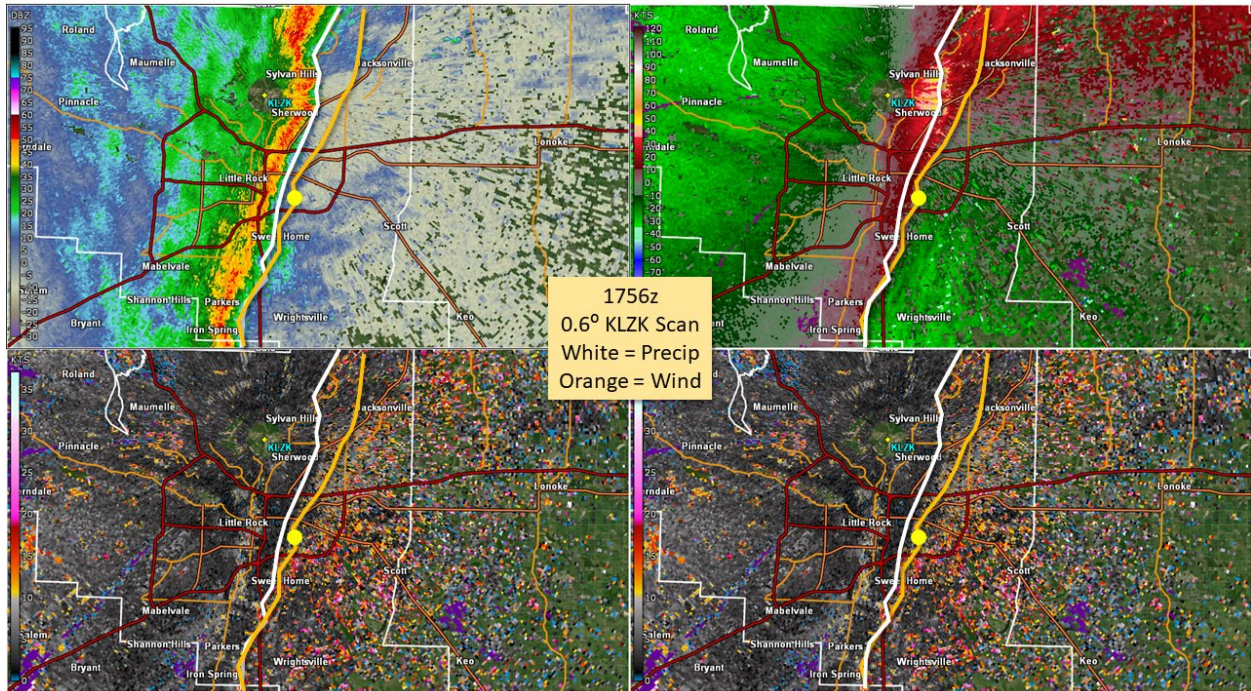
- Is there any way to determine if the wind shift (from background to frontal) was leading the heavy rain or if the two were at the same location? In other words, they want to know if an observer at 500 or 1000 feet AGL would have felt the wind shift from southerly to westerly prior to experiencing rain. Can that be determined from the radar data?

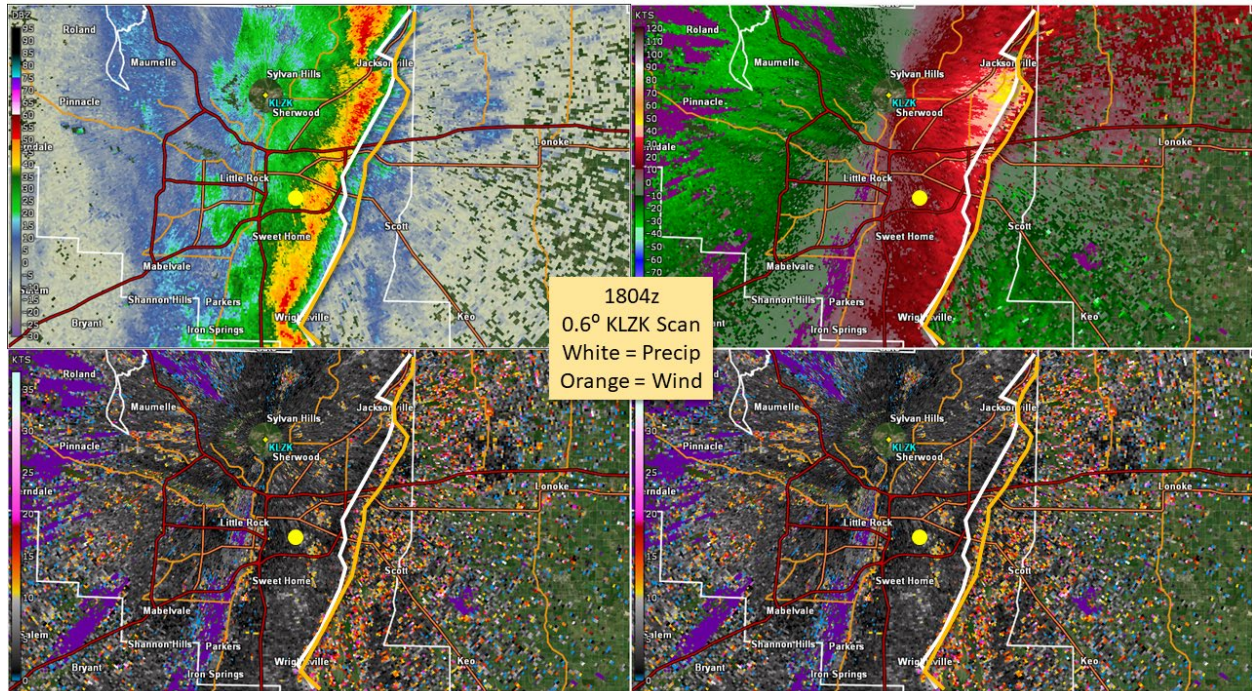
Note: Per [NWS Training](#) Spectrum Width can be used to identify important meteorological boundaries like gust fronts and outflow boundaries.

Summary: While in many cases thunderstorm outflows can outrun the precipitation in various squall line/QLCS situations and multi-cell thunderstorm events, in this case based on the radar data a strong outflow had not yet developed and the wind shift associated with the squall line was fairly close or coincident with the precipitation.

Imagery for 0.6 Degree Scan (Roughly 434 feet)

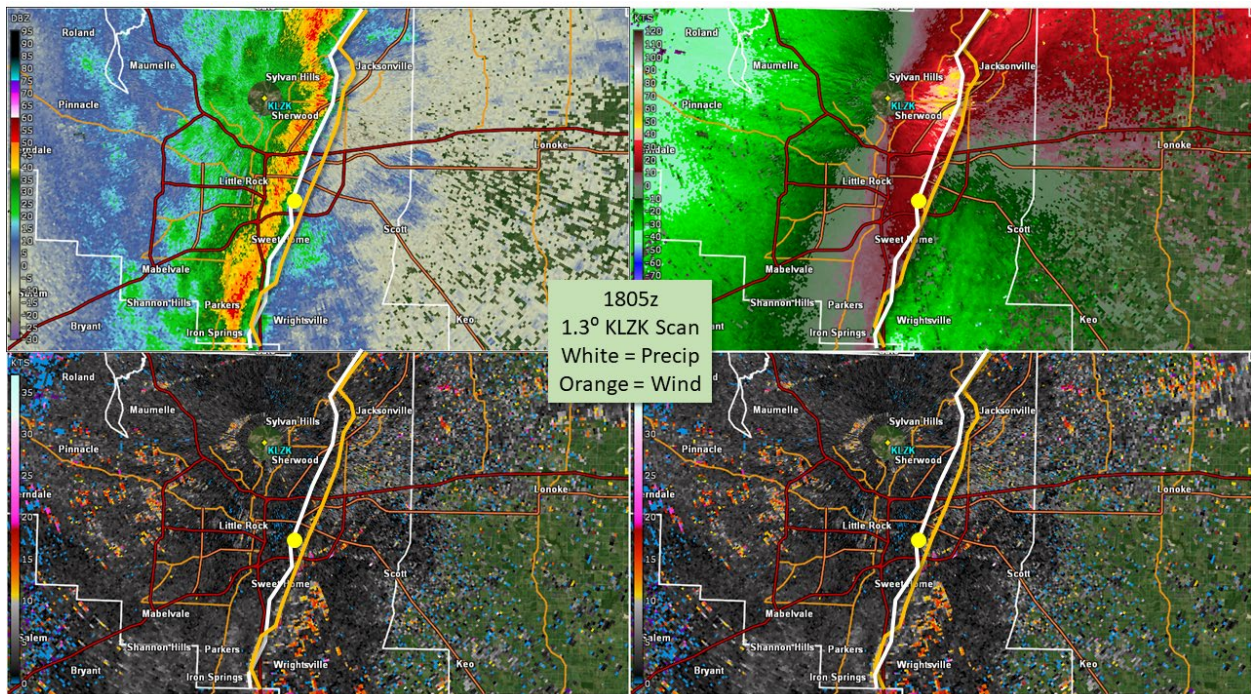
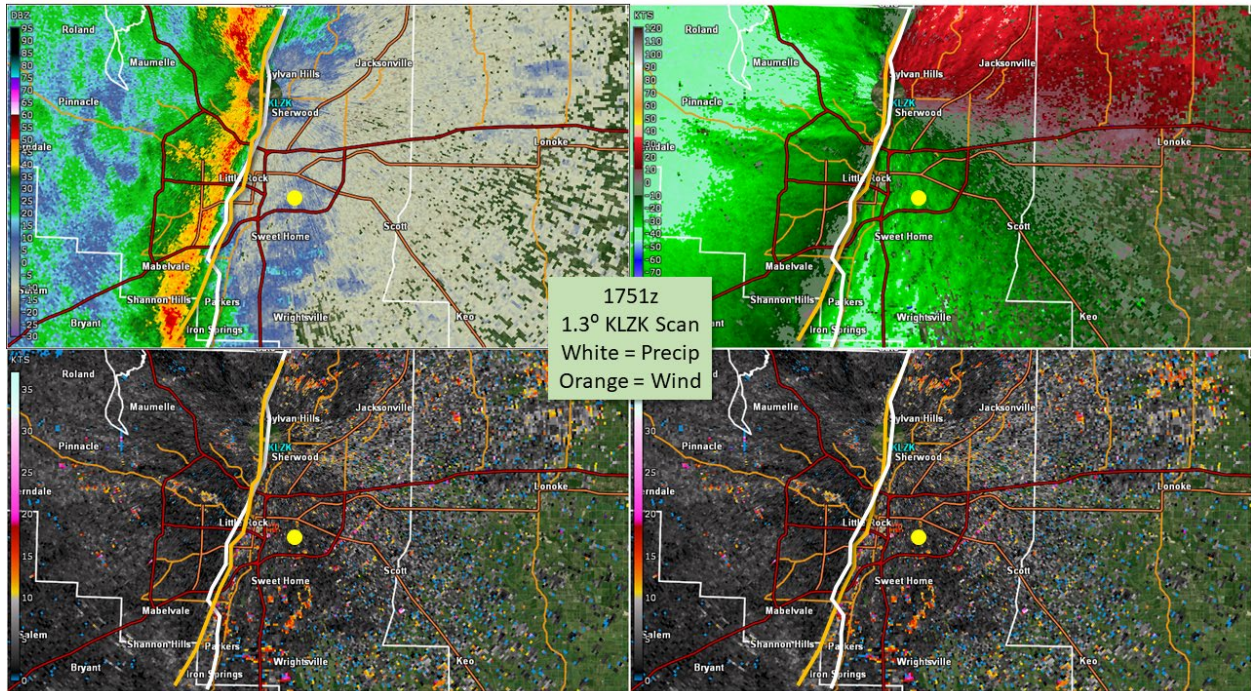
Based on the trio of images below which look at Base Reflectivity, Base Velocity, and Spectrum Width from KLZK for the time step before, the time step during, and the time step after the line/wind shift impacted the KLIT airport (yellow circle) it appears that close to the surface the wind shift (orange line) and the precipitation (white line) were fairly close to one another throughout the period. At the airport, the wind shift is slightly out ahead of the rain, but not by much. The wind shift does outrun the precipitation gradient north of the airport, but this makes sense as the portion of that line is bowing leading to increasing winds.

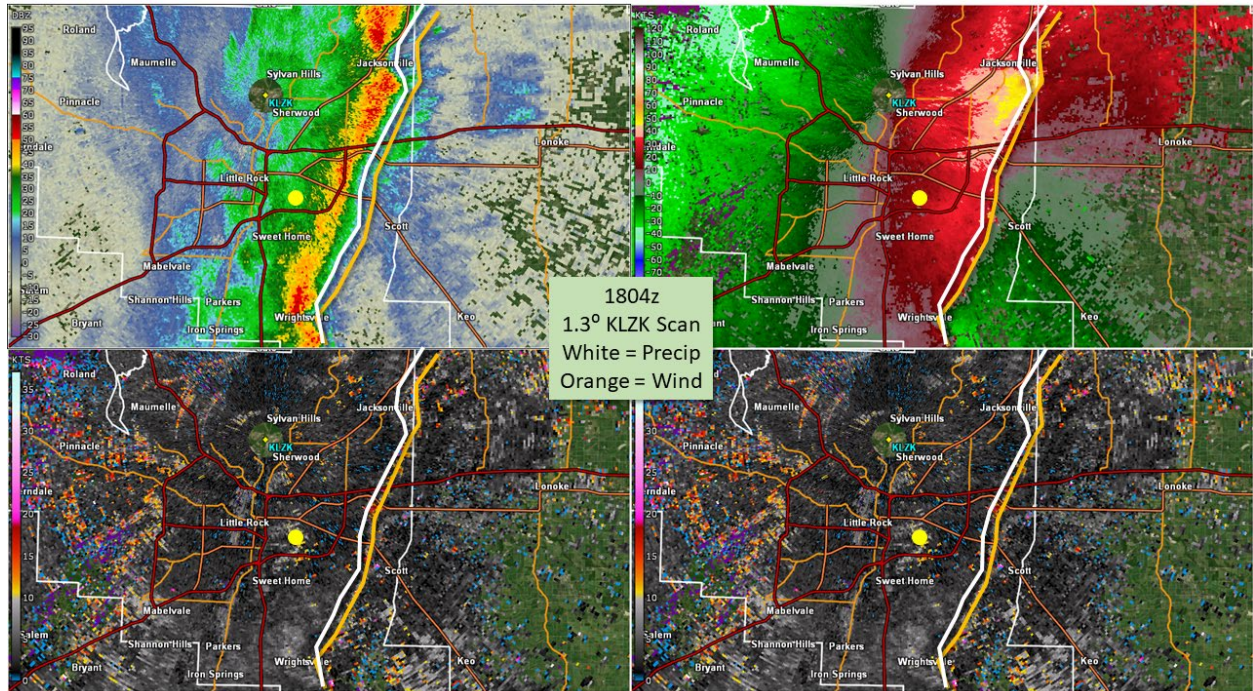




Imagery for 1.3 Degree Scan (Roughly 931 feet)

Looking aloft at Base Reflectivity, Base Velocity, and Spectrum Width from KLZK for the time step before, the time step during, and the time step after the line/wind shift impacted the KLIT airport (yellow circle) it appears that close to 1000 feet the wind shift (orange line) and the precipitation (white line) were also very close to one another. Similar to the surface, aloft the wind does begin to outrun the precipitation gradient north of the airport near the radar and is just ahead of the precipitation at the airport. Again though these are fairly close to one another.





Archived Radar Data was obtained from [Amazon Web Services NOAA Level 2 Archive](#) and analyzed using GR2Analyst. The first data file utilized has a timestamp of 1736, with the last being 1844z. Analysis was performed by Aaron Treadway, NWS Severe Program Coordinator and former NWS Forecaster for 10 years where he was radar focal point and warning forecaster.

Richards Michael

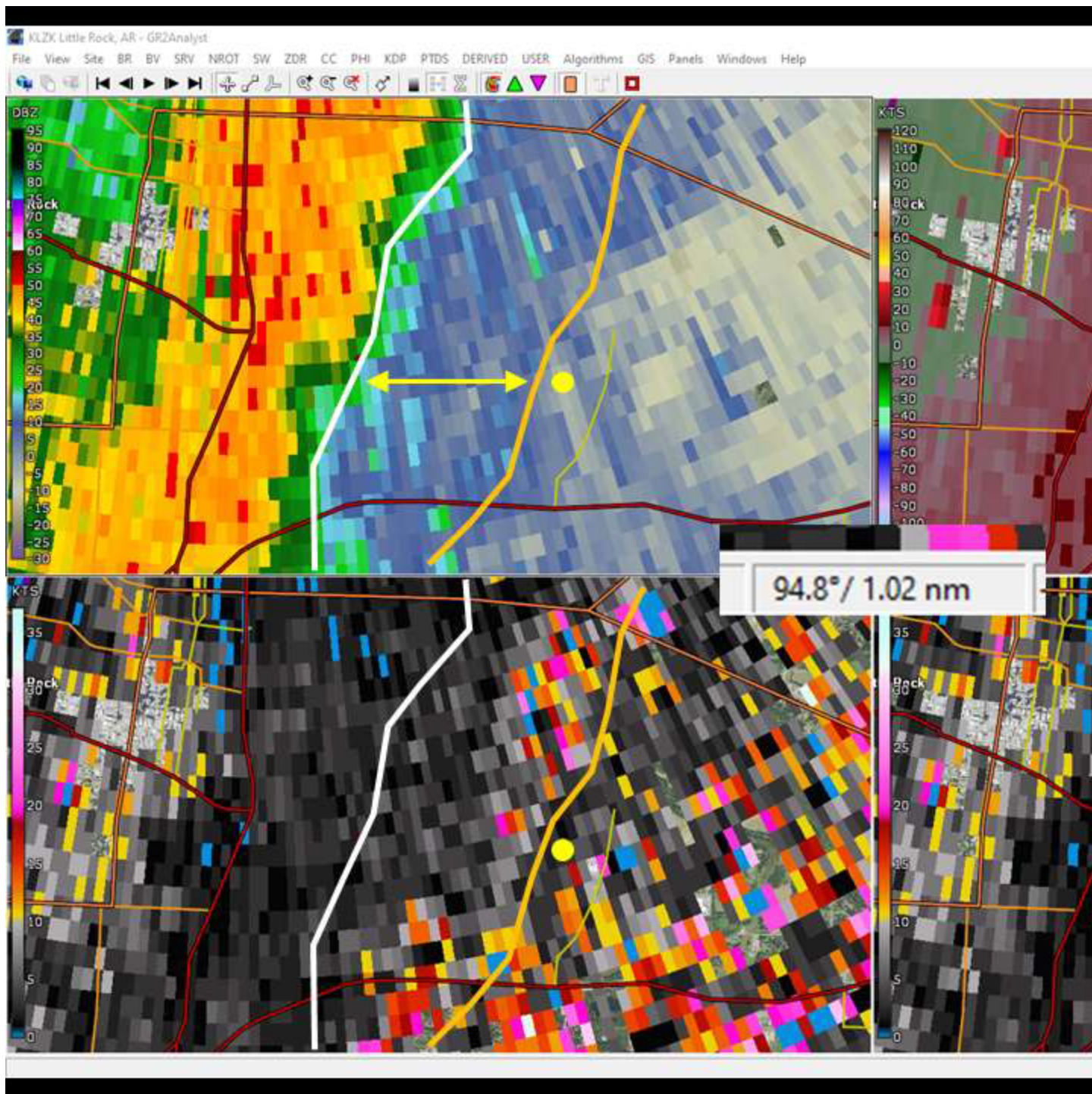
From: Lora J. Wilson - NWS Federal <[REDACTED]@noaa.gov>
Sent: Friday, March 17, 2023 9:03 AM
To: Richards Michael <[REDACTED]@ntsb.gov>
Subject: Re: request for wind profile

[CAUTION] This email originated from outside of the organization. Do not click any links or open attachments unless you recognize the sender and know the content is safe.

Here ya go... (NOTE: I can add you to the Google Drive doc if you want so that you can see it there with its changes. Just let me know)

To address the follow up questions (also put these at the end of the Google Doc):

1. Yes, per the GR2Analyst User Guide the value that I was using was the Beam Center Height for the given Lat/Lon.
2. Utilizing the feature in GR2Analyst where it can take the distance from the home marker at 1756z the wind shift was roughly anywhere between 1 nm and 1.10 nm out ahead of the 25dBz and greater precipitation in the vicinity of the given Lat/Lon based on data from the KLZK radar.

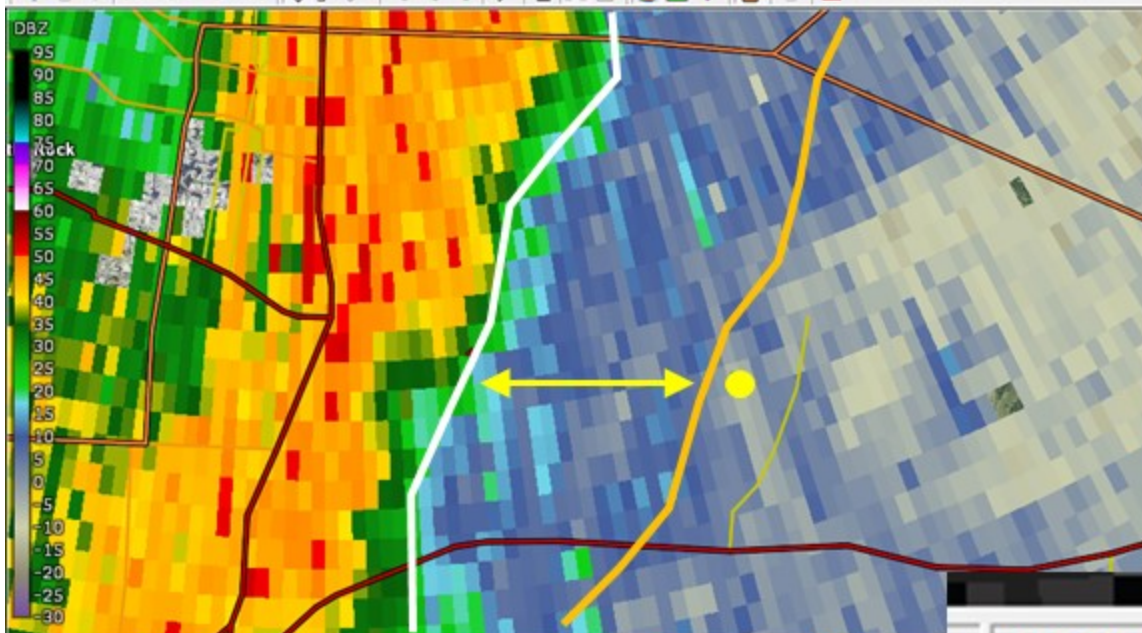


Let me know if they have any further questions!

Lora



☒ SQW ☒ SVR ☒ TOR



Site: KLZK - SAILS_1
VST: 2023/02/22 17:56:39 Z
Prod: 2023/02/22 17:56:39 Z
VCP: 215 SMV: ---
Tilt: 0.572°

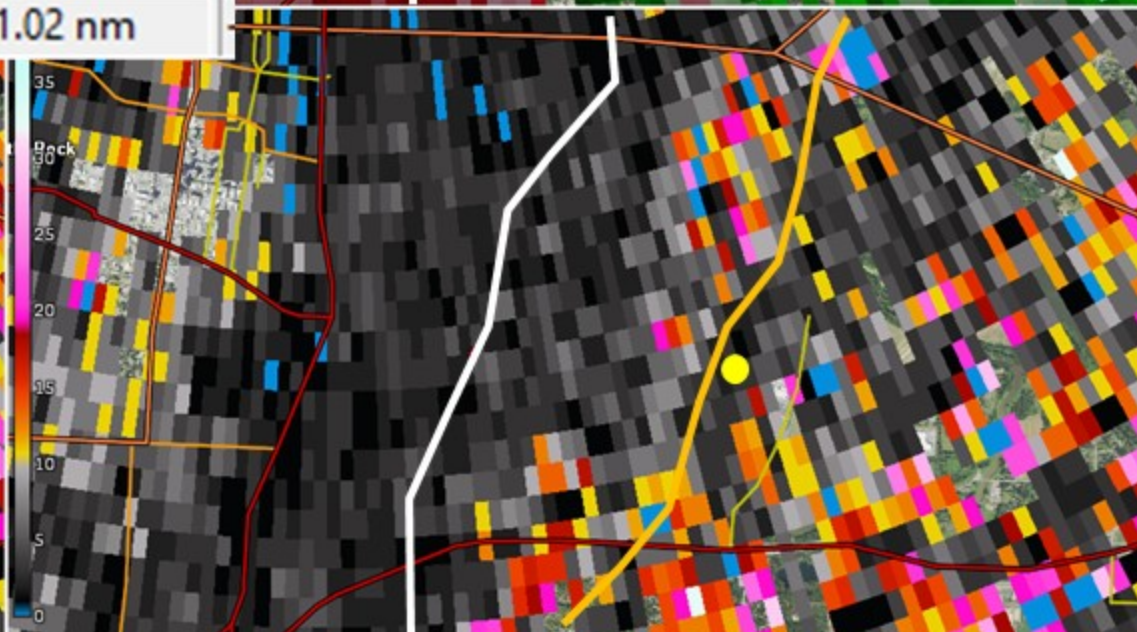
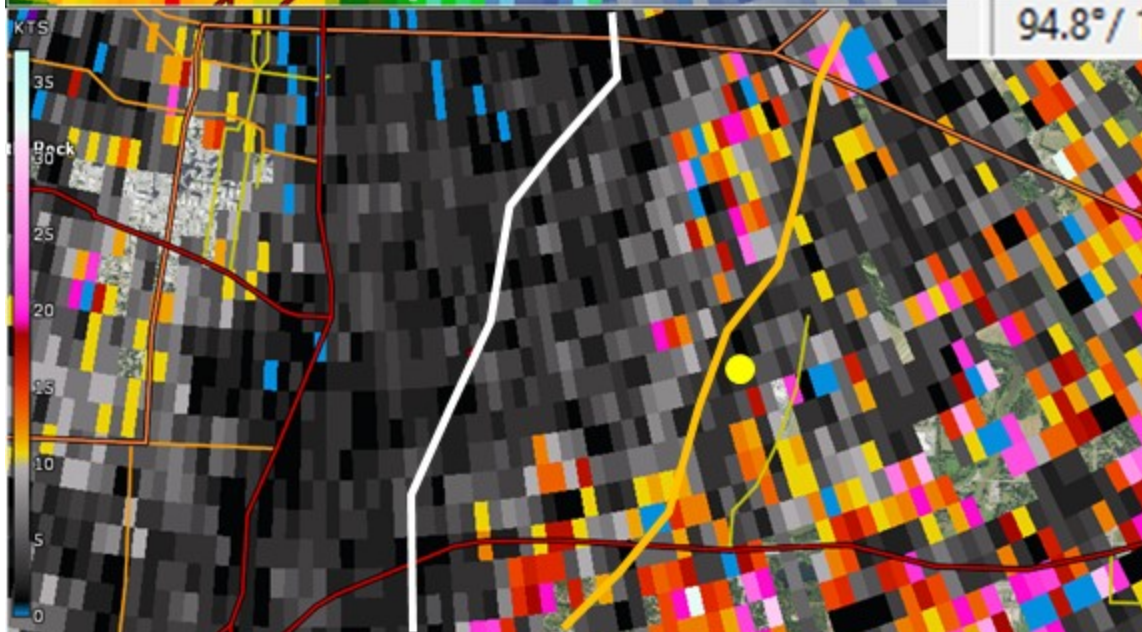
Select Product:
☒ BB ☐ VIL ☐ ZDR
☐ BV ☐ VILQ ☐ CC
☐ SW ☐ PQSH ☐ PHI
☐ SRV ☐ MEHS ☐ KDP
☐ ET ☐ NROT ☐ PTDS

Select Tilt:
0.6° 0.9° 1.3° 1.8°
2.4° 3.1° 4.0° 5.1°
6.4° 8.0° 10.1° 12.0°
14.0° 16.7° 19.5°

Product Details:

Max: 63.0 dbz
Az: 27.3°
Ran: 10.2 nm

94.8° / 1.02 nm



94.8° / 1.02 nm -8.74 kts / 55.2 kts 414 ft 34.729939, -92.227791 11 meters/pixel

SAILS_1 Offline