



Managed and Operated by  
Consolidated Nuclear Security, LLC

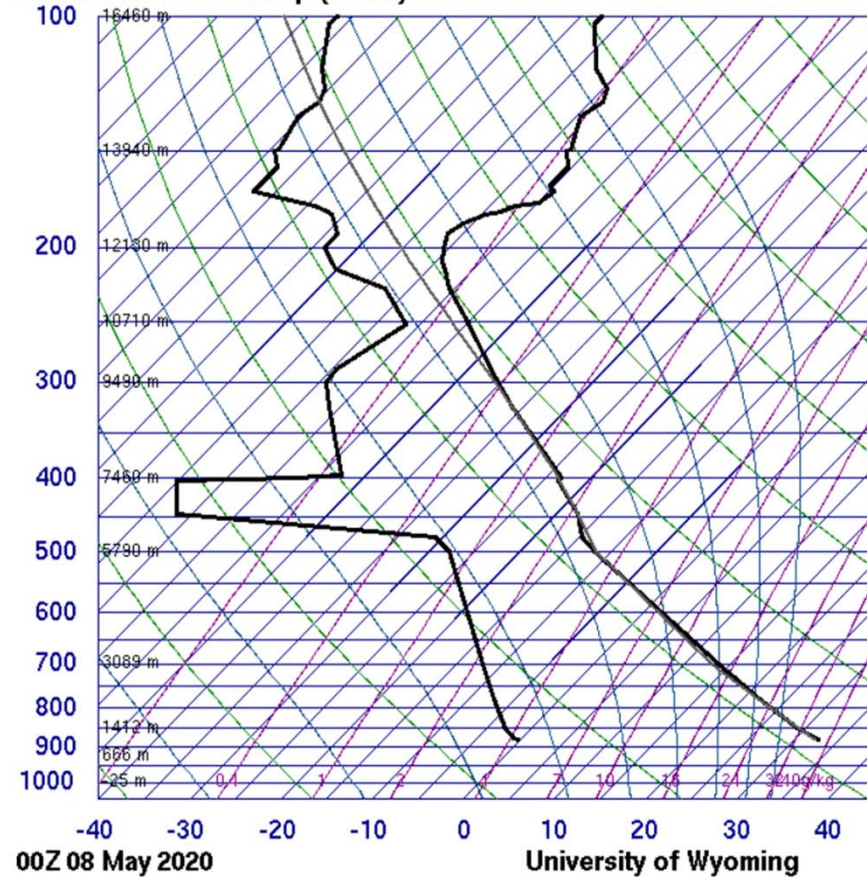
**For NWSFO Amarillo**  
**May 7, 2020 – Elevated, Short-Lived,**  
**Lightning Producing Storm Near Pantex**

**Steve Kersh**

*Meteorologist – Electromagnetics Group, Facility  
Engineering*

August 20, 2020

# Meteorological Setup for May 7, 2020

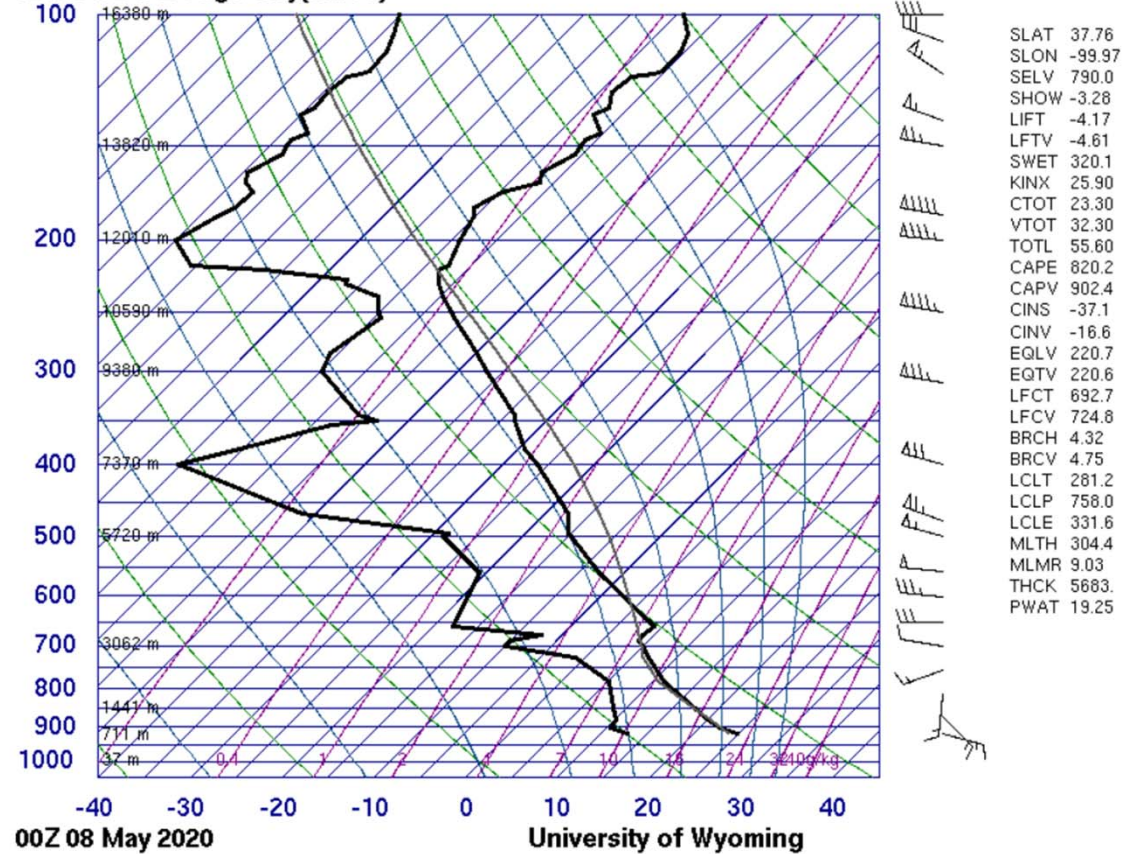


SLAT	35.23
SLON	-101.70
SELV	1099.
SHOW	0.16
LIFT	-0.09
LFTV	-0.46
SWET	62.99
KINX	12.10
CTOT	8.90
VTOT	40.90
TOTL	49.80
CAPE	18.51
CAPV	44.23
CINS	-135.
CINV	-90.7
EQLV	317.9
EQTV	315.1
LFCT	500.8
LCFV	508.2
BRCH	0.17
BRCV	0.41
LCLT	264.6
LCLP	532.2
MLTE	329.3
MLTH	316.8
MLMR	3.81
THCK	5815.
PWAT	8.96



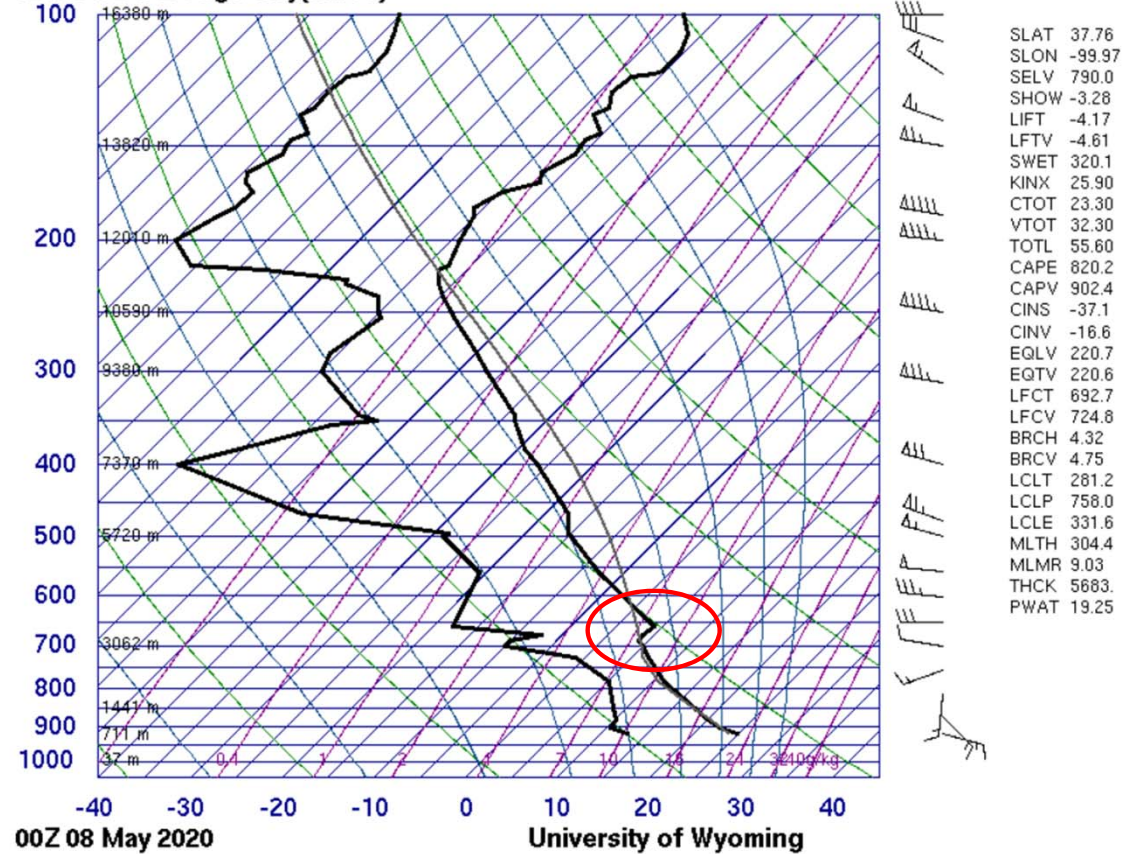
# Meteorological Setup for May 7, 2020

72451 DDC Dodge City(Awos)



# Meteorological Setup for May 7, 2020

72451 DDC Dodge City(Awos)



# Meteorological Setup for May 7, 2020

## 72363 AMA Amarillo Arpt(Awos) Observations at 00Z 08 May 2020

PRES hPa	HGHT m	TEMP C	DWPT C	RELH %	MIXR g/kg	DRCT deg	SKNT knot	THTA K	THTE K	THTV K
1000.0	-25									
925.0	666									
881.0	1099	32.8	-0.2	12	4.30	155	3	317.2	331.4	318.1
877.0	1139	32.2	-0.8	12	4.13	147	3	317.0	330.6	317.8
850.0	1412	29.2	-2.8	12	3.68	90	3	316.7	328.9	317.4
810.5	1829	25.3	-5.1	13	3.23	175	5	316.9	327.7	317.5
782.8	2134	22.4	-6.8	14	2.94	215	13	317.0	326.8	317.6
777.0	2199	21.8	-7.2	14	2.88	217	14	317.0	326.7	317.6
755.5	2438	19.6	-8.5	14	2.67	225	16	317.2	326.2	317.7
729.0	2743	16.9	-10.3	15	2.42	250	23	317.5	325.7	317.9
700.0	3089	13.8	-12.2	15	2.15	240	27	317.7	325.1	318.1
652.1	3658	8.4	-15.5	17	1.77	240	34	318.2	324.3	318.5
604.5	4267	2.7	-19.0	19	1.42	250	39	318.5	323.5	318.8
560.2	4877	-3.1	-22.5	21	1.13	260	39	318.7	322.7	318.9
500.0	5790	-11.7	-27.7	25	0.79	275	41	318.7	321.6	318.9
480.3	6096	-14.5	-30.5	24	0.63	275	42	318.9	321.2	319.1
479.0	6117	-14.7	-30.7	24	0.62	275	42	318.9	321.2	319.1
447.0	6638	-17.5	-61.5	1	0.02	282	51	321.8	321.9	321.8
407.9	7315	-22.6	-64.8	1	0.02	290	62	323.7	323.8	323.7
403.0	7405	-23.3	-65.3	1	0.01	290	62	323.9	324.0	323.9
400.0	7460	-23.3	-52.3	5	0.08	290	62	324.6	324.9	324.6
397.0	7515	-23.7	-47.7	9	0.13	290	62	324.8	325.3	324.8
391.2	7620	-24.6	-48.3	9	0.12	290	61	325.0	325.5	325.0
323.0	8982	-36.3	-56.3	11	0.06	286	65	327.1	327.4	327.1
315.5	9144	-37.6	-57.2	11	0.05	285	65	327.6	327.8	327.6
300.0	9490	-40.3	-59.3	11	0.04	285	67	328.4	328.6	328.5
289.0	9744	-42.5	-59.5	14	0.04	284	69	328.8	329.0	328.9
252.0	10658	-49.7	-56.7	44	0.07	280	76	331.3	331.6	331.3
250.0	10710	-50.1	-57.1	43	0.07	280	76	331.4	331.7	331.5
226.0	11361	-55.7	-62.7	41	0.04	285	75	332.6	332.8	332.6
214.0	11707	-58.1	-70.1	20	0.01	287	75	334.1	334.1	334.1
209.0	11855	-59.3	-71.3	20	0.01	288	74	334.5	334.5	334.5
200.0	12130	-60.7	-73.7	17	0.01	290	74	336.5	336.5	336.5
192.0	12383	-61.7	-73.7	19	0.01	295	80	338.8	338.9	338.8
186.0	12579	-61.1	-75.1	14	0.01	292	82	342.9	342.9	342.9
181.0	12748	-59.5	-76.5	9	0.01	290	84	348.2	348.2	348.2
180.0	12783	-58.1	-77.1	7	0.01	290	84	351.0	351.0	351.0
179.4	12802	-57.9	-77.5	7	0.01	290	84	351.6	351.6	351.6
177.0	12889	-57.1	-79.1	5	0.00	289	81	354.3	354.4	354.3
175.0	12961	-54.9	-80.9	3	0.00	289	79	359.1	359.1	359.1
169.0	13183	-54.5	-87.5	1	0.00	287	71	363.4	363.4	363.4
166.0	13297	-55.5	-87.5	1	0.00	286	68	363.6	363.6	363.6



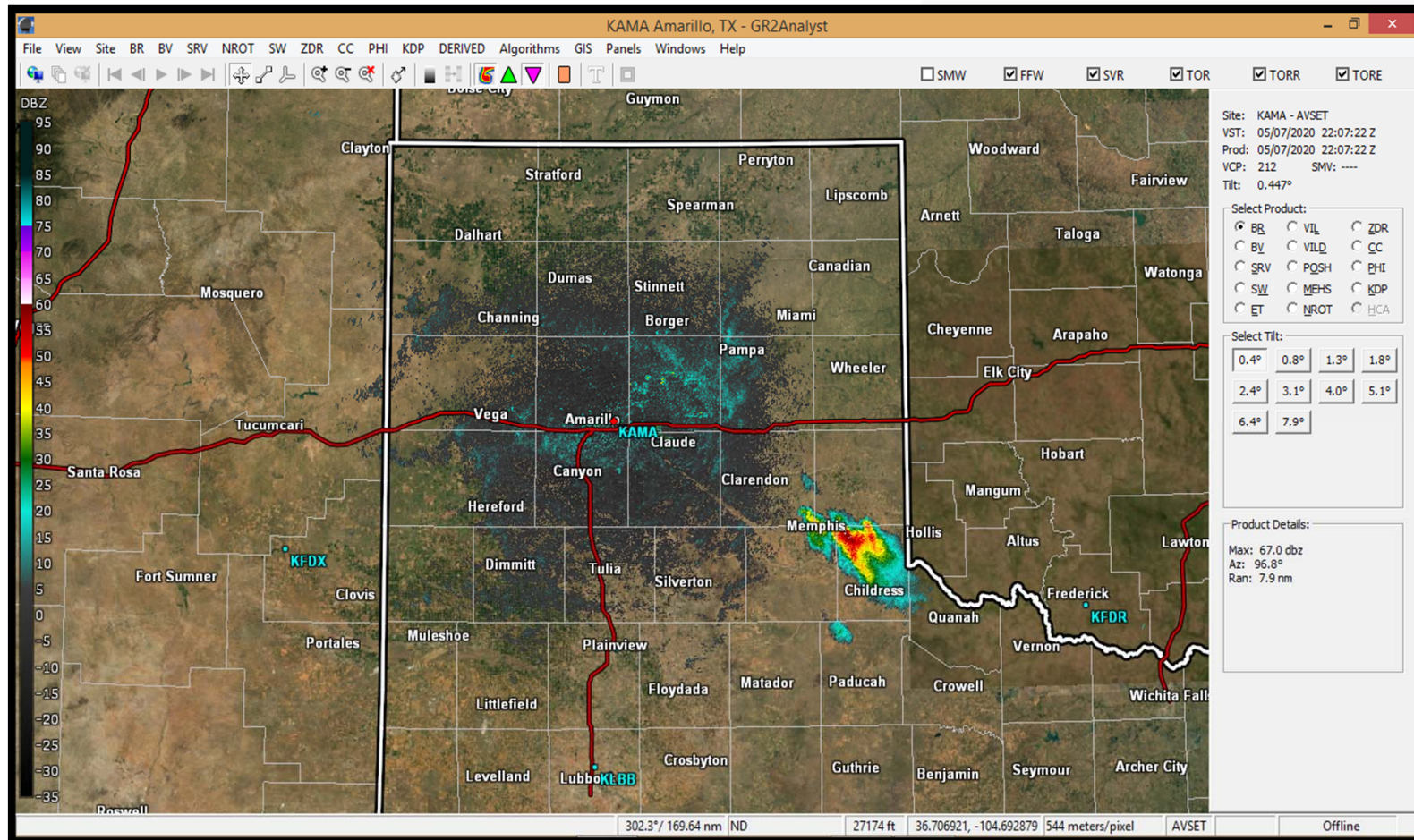
# Meteorological Setup for May 7, 2020

72363 AMA Amarillo Arpt(Awos) Observations at 00Z 08 May 2020

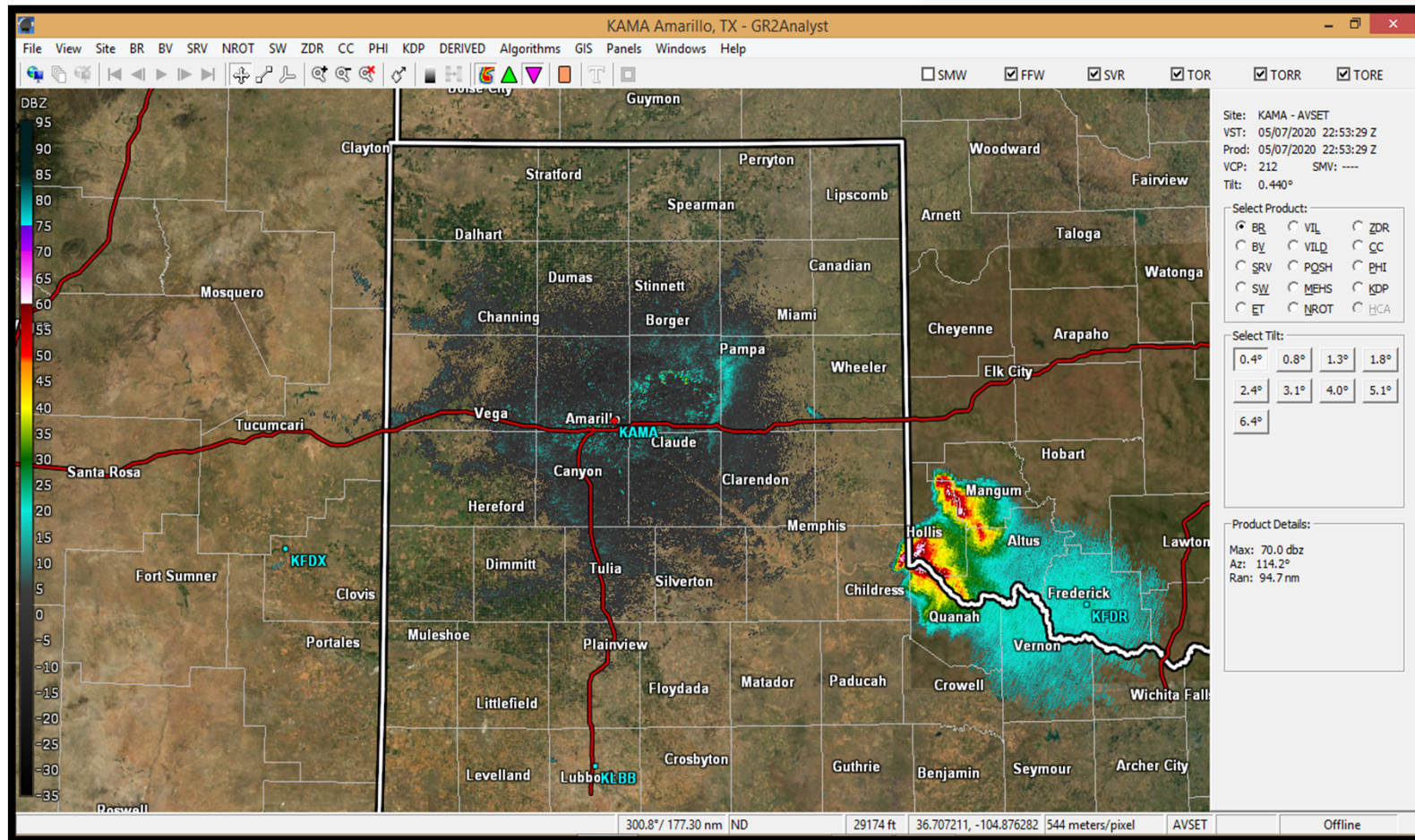
PRES hPa	HGHT m	TEMP C	DWPT C	RELH %	MIXR g/kg	DRCT deg	SKNT knot	THTA K	THTE K	THTV K
1000.0	-25									
925.0	666									
881.0	1099	32.8	-0.2	12	4.30	155	3	317.2	331.4	318.1
877.0	1139	32.2	-0.8	12	4.13	147	3	317.0	330.6	317.8
850.0	1412	29.2	-2.8	12	3.68	90	3	316.7	328.9	317.4
810.5	1829	25.3	-5.1	13	3.23	175	5	316.9	327.7	317.5
782.8	2134	22.4	-6.8	14	2.94	215	13	317.0	326.8	317.6
777.0	2199	21.8	-7.2	14	2.88	217	14	317.0	326.7	317.6
755.5	2438	19.6	-8.5	14	2.67	225	16	317.2	326.2	317.7
729.0	2743	16.9	-10.3	15	2.42	250	23	317.5	325.7	317.9
700.0	3089	13.8	-12.2	15	2.15	240	27	317.7	325.1	318.1
652.1	3658	8.4	-15.5	17	1.77	240	34	318.2	324.3	318.5
604.5	4267	2.7	-19.0	19	1.42	250	39	318.5	323.5	318.8
560.2	4877	-3.1	-22.5	21	1.13	260	39	318.7	322.7	318.9
500.0	5790	-11.7	-27.7	25	0.79	275	41	318.7	321.6	318.9
480.3	6096	-14.5	-30.5	24	0.63	275	42	318.9	321.2	319.1
479.0	6117	-14.7	-30.7	24	0.62	275	42	318.9	321.2	319.1
447.0	6638	-17.5	-61.5	1	0.02	282	51	321.8	321.9	321.8
407.9	7315	-22.6	-64.8	1	0.02	290	62	323.7	323.8	323.7
403.0	7405	-23.3	-65.3	1	0.01	290	62	323.9	324.0	323.9
400.0	7460	-23.3	-52.3	5	0.08	290	62	324.6	324.9	324.6
397.0	7515	-23.7	-47.7	9	0.13	290	62	324.8	325.3	324.8
391.2	7620	-24.6	-48.3	9	0.12	290	61	325.0	325.5	325.0
323.0	8982	-36.3	-56.3	11	0.06	286	65	327.1	327.4	327.1
315.5	9144	-37.6	-57.2	11	0.05	285	65	327.6	327.8	327.6
300.0	9490	-40.3	-59.3	11	0.04	285	67	328.4	328.6	328.5
289.0	9744	-42.5	-59.5	14	0.04	284	69	328.8	329.0	328.9
252.0	10658	-49.7	-56.7	44	0.07	280	76	331.3	331.6	331.3
250.0	10710	-50.1	-57.1	43	0.07	280	76	331.4	331.7	331.5
226.0	11361	-55.7	-62.7	41	0.04	285	75	332.6	332.8	332.6
214.0	11707	-58.1	-70.1	20	0.01	287	75	334.1	334.1	334.1
209.0	11855	-59.3	-71.3	20	0.01	288	74	334.5	334.5	334.5
200.0	12130	-60.7	-73.7	17	0.01	290	74	336.5	336.5	336.5
192.0	12383	-61.7	-73.7	19	0.01	295	80	338.8	338.9	338.8
186.0	12579	-61.1	-75.1	14	0.01	292	82	342.9	342.9	342.9
181.0	12748	-59.5	-76.5	9	0.01	290	84	348.2	348.2	348.2
180.0	12783	-58.1	-77.1	7	0.01	290	84	351.0	351.0	351.0
179.4	12802	-57.9	-77.5	7	0.01	290	84	351.6	351.6	351.6
177.0	12889	-57.1	-79.1	5	0.00	289	81	354.3	354.4	354.3
175.0	12961	-54.9	-80.9	3	0.00	289	79	359.1	359.1	359.1
169.0	13183	-54.5	-87.5	1	0.00	287	71	363.4	363.4	363.4
166.0	13297	-55.5	-87.5	1	0.00	286	68	363.6	363.6	363.6



## KAMA 88-D – BR Scan – 17:07

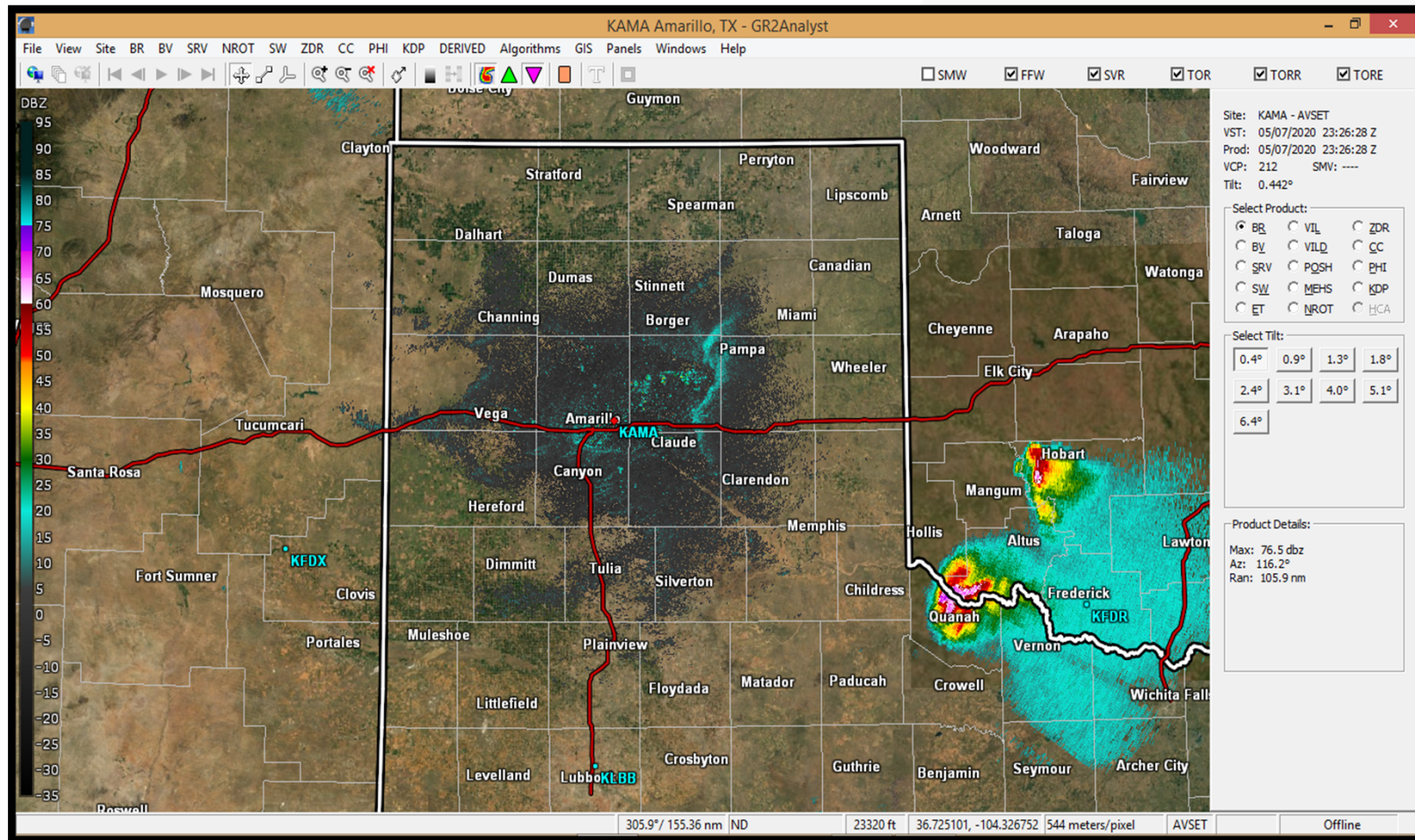


## KAMA 88-D – BR Scan – 17:53



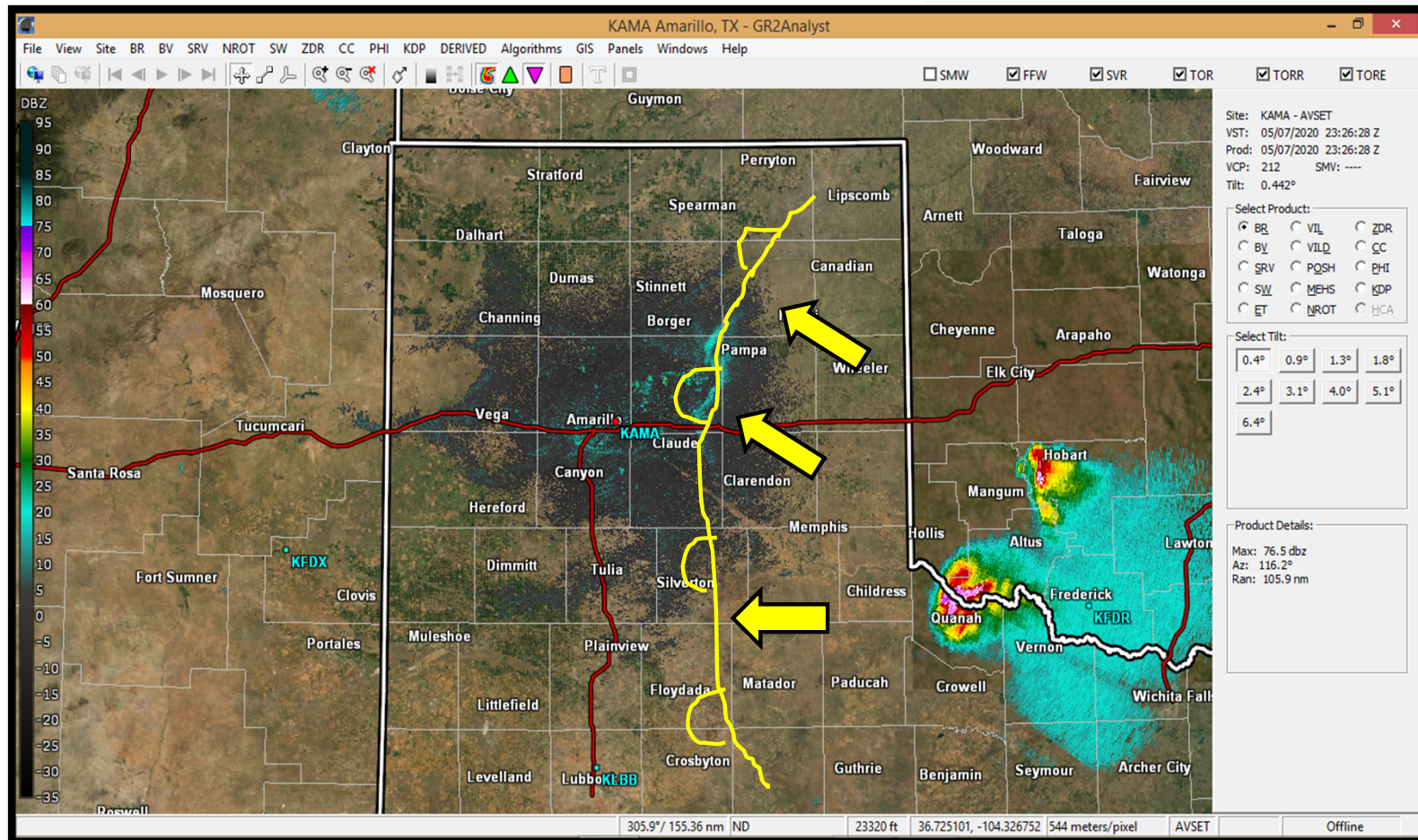


# KAMA 88-D – BR Scan – 18:26



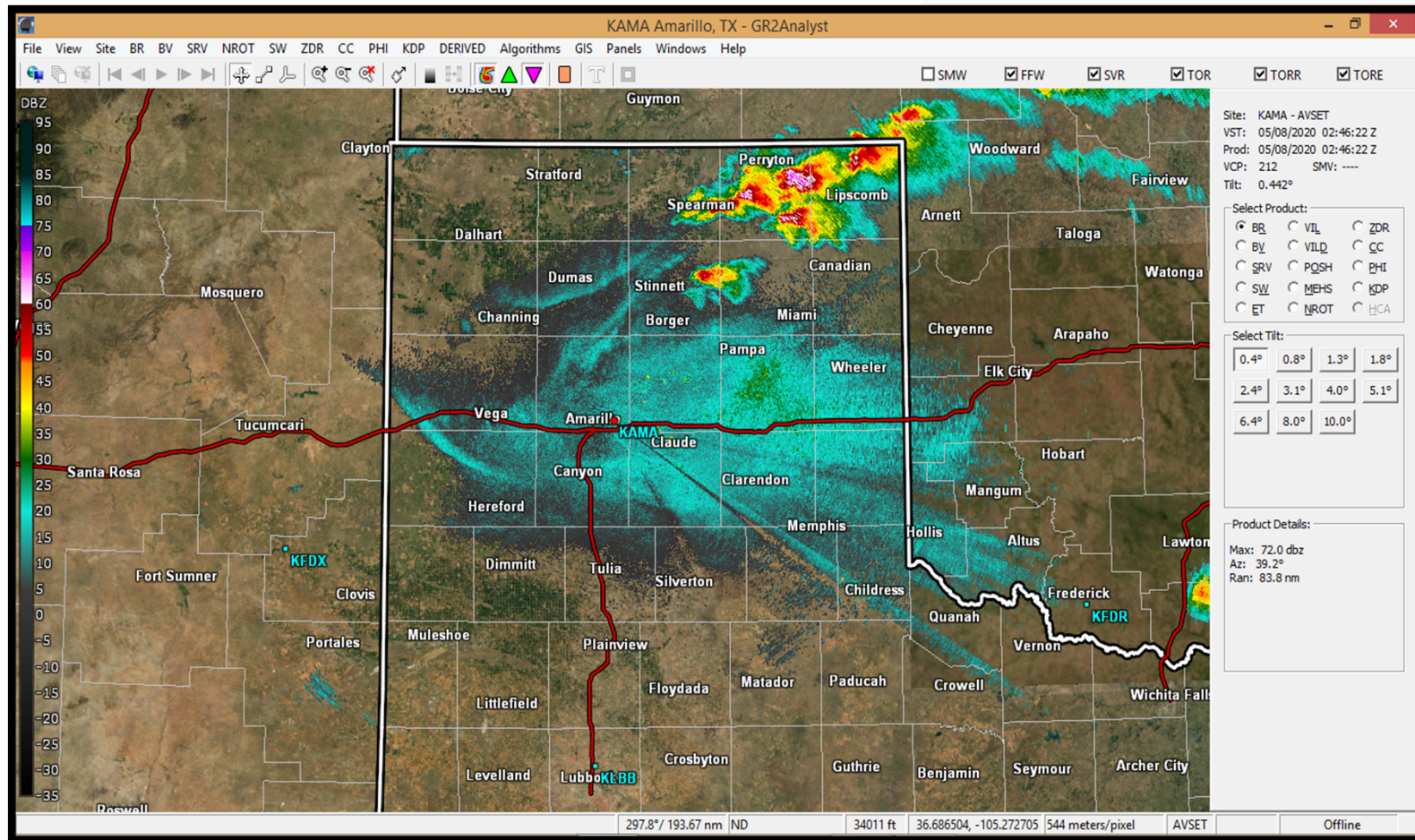


# KAMA 88-D – BR Scan – 18:26



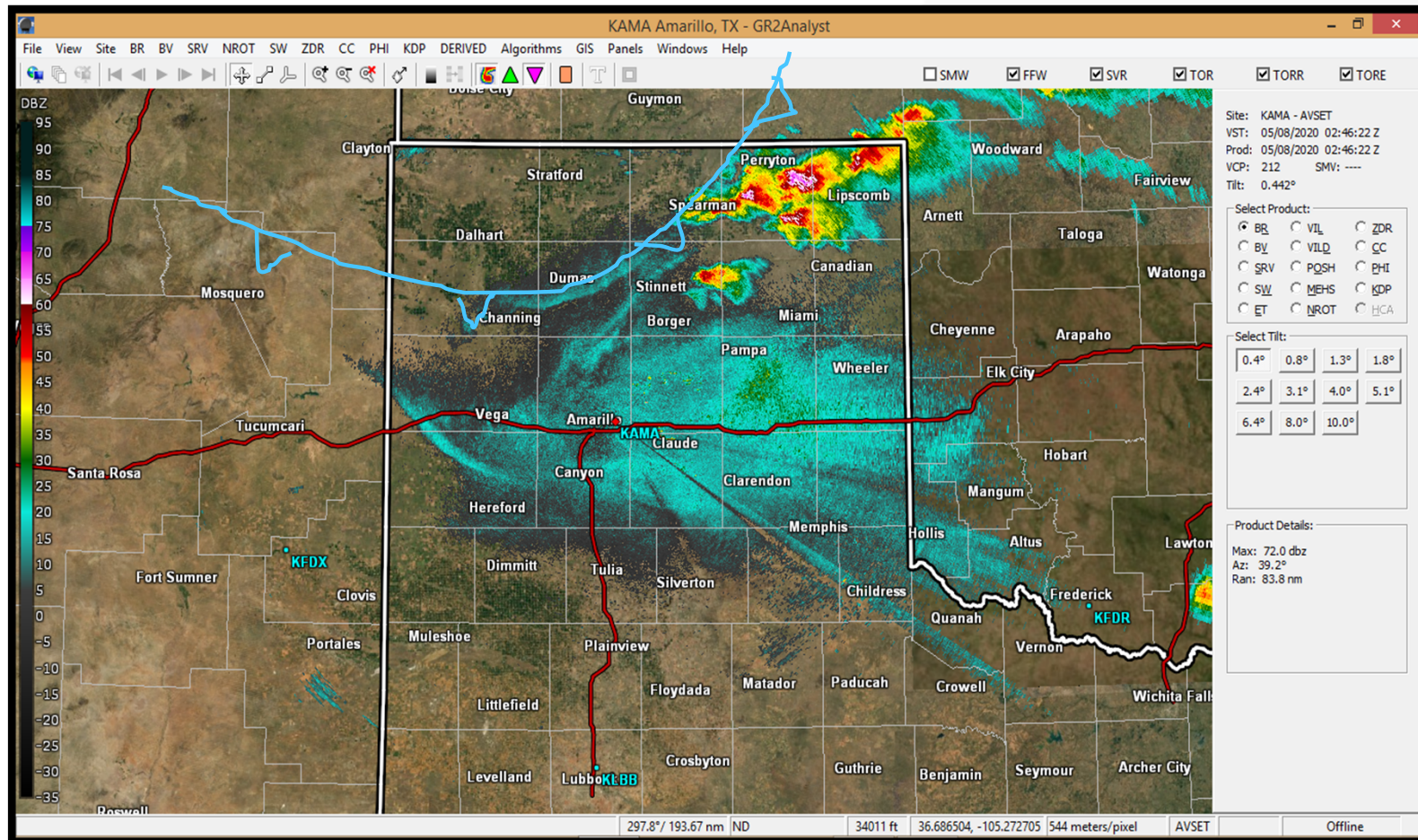


# KAMA 88-D – BR Scan – 21:46



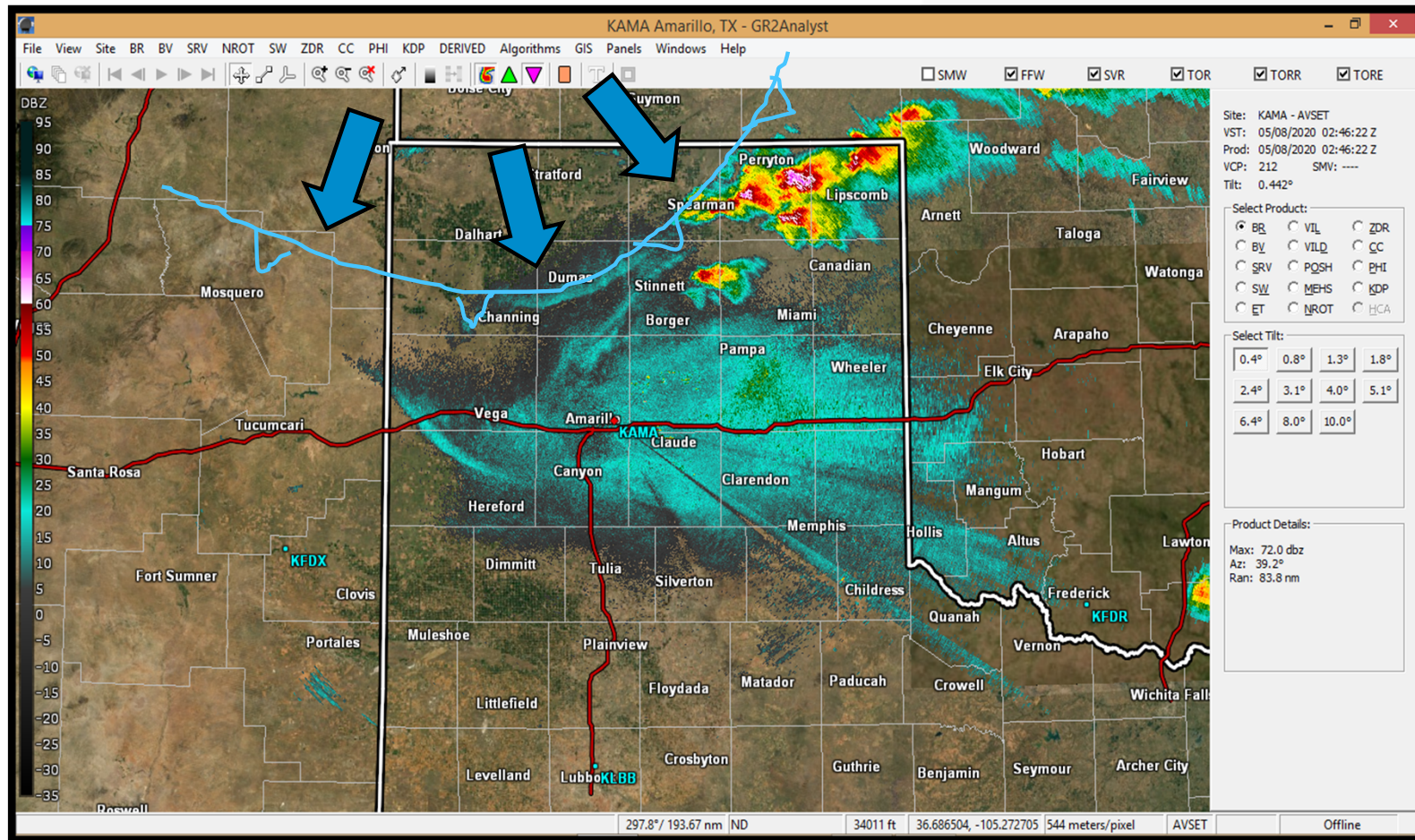


KAMA 88-D – BR Scan – 21:46



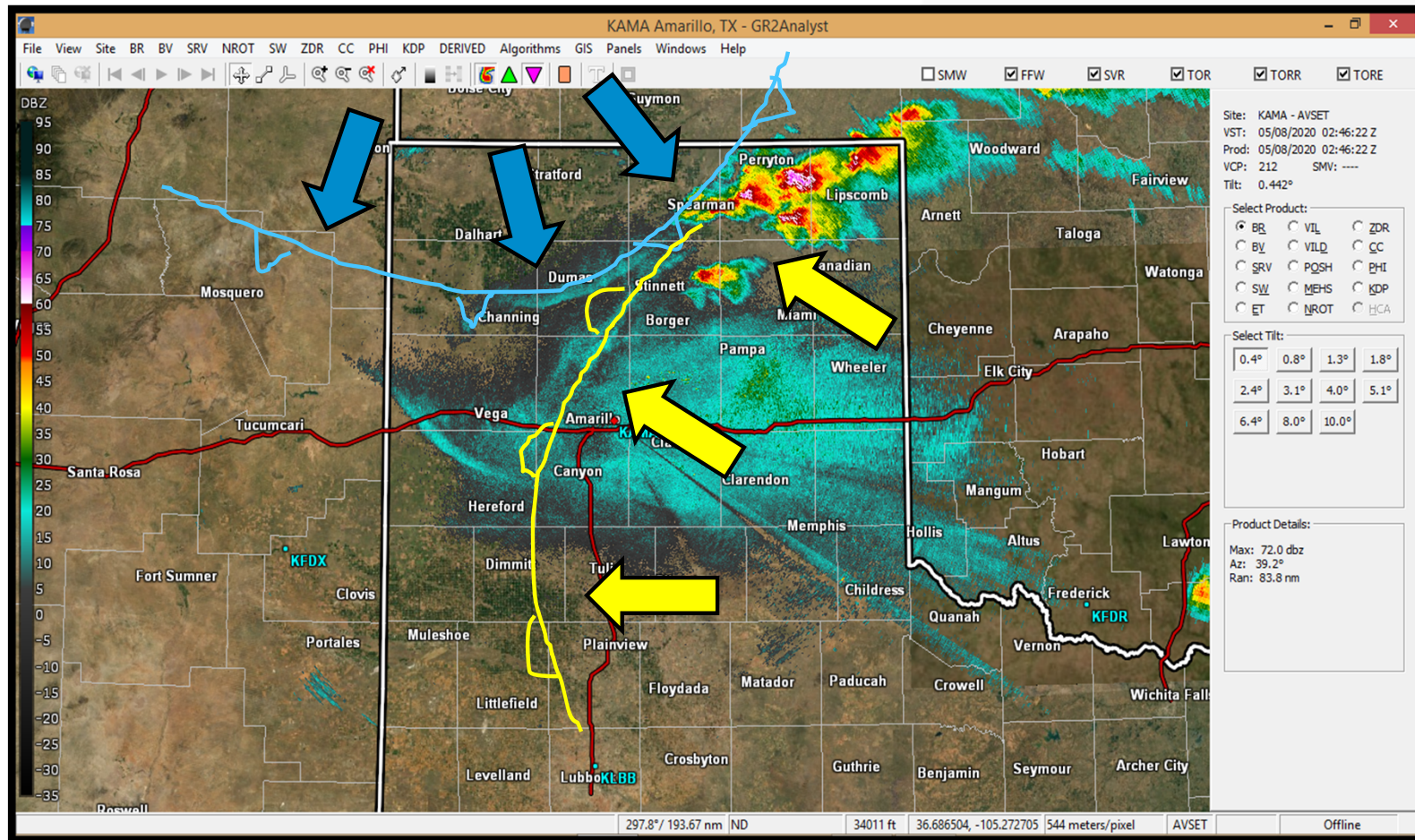


## KAMA 88-D – BR Scan – 21:46



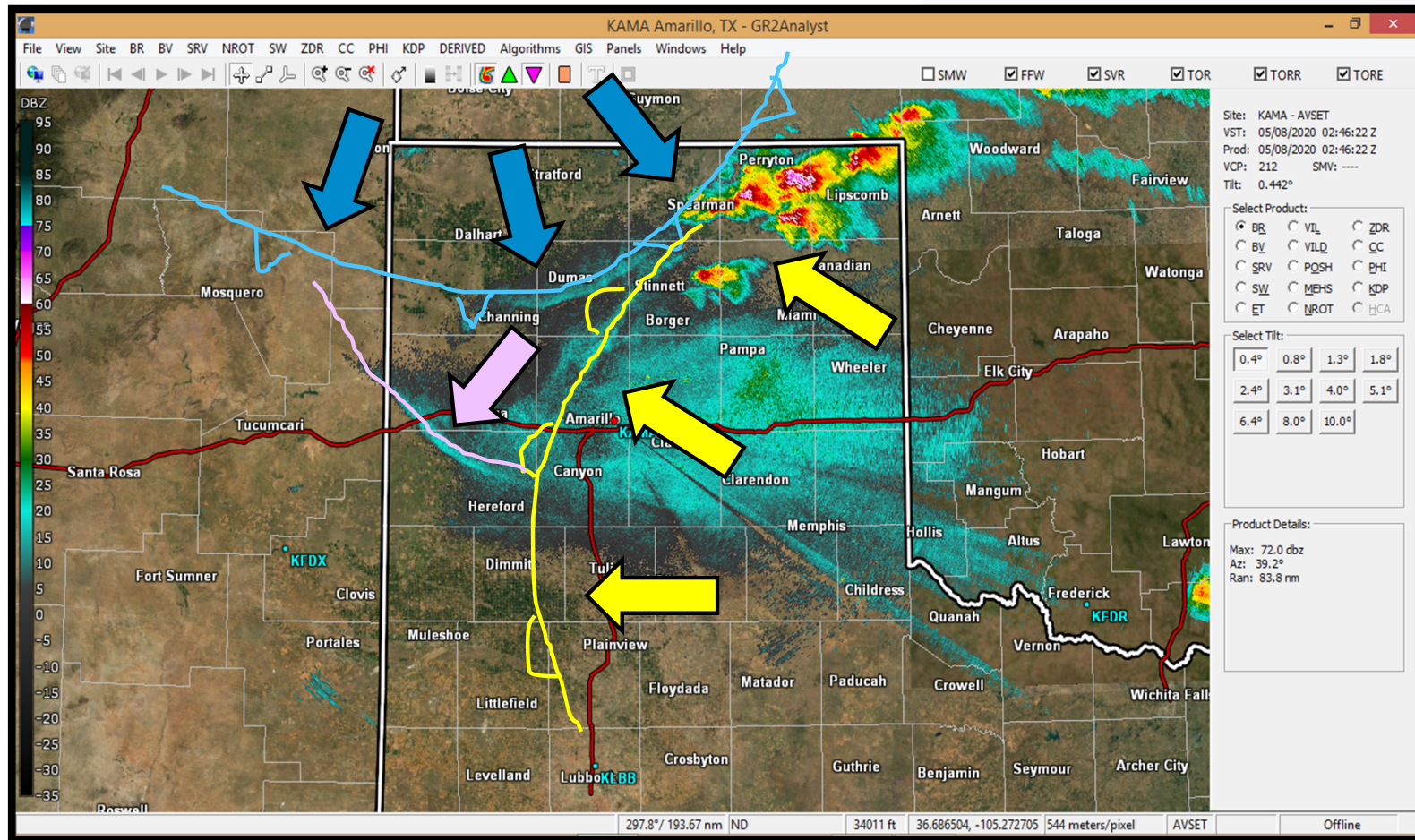


## KAMA 88-D – BR Scan – 21:46



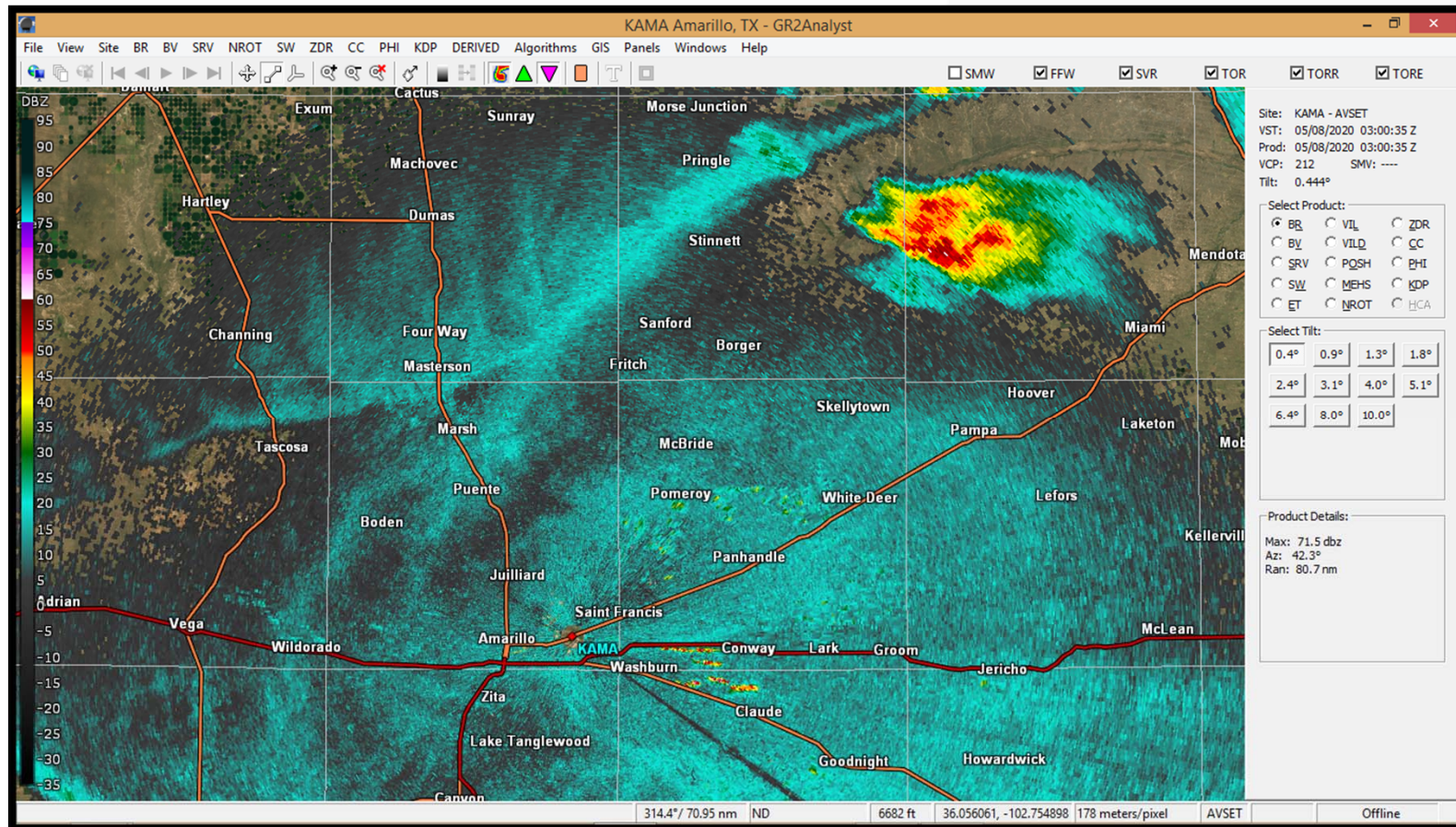


## KAMA 88-D – BR Scan – 21:46



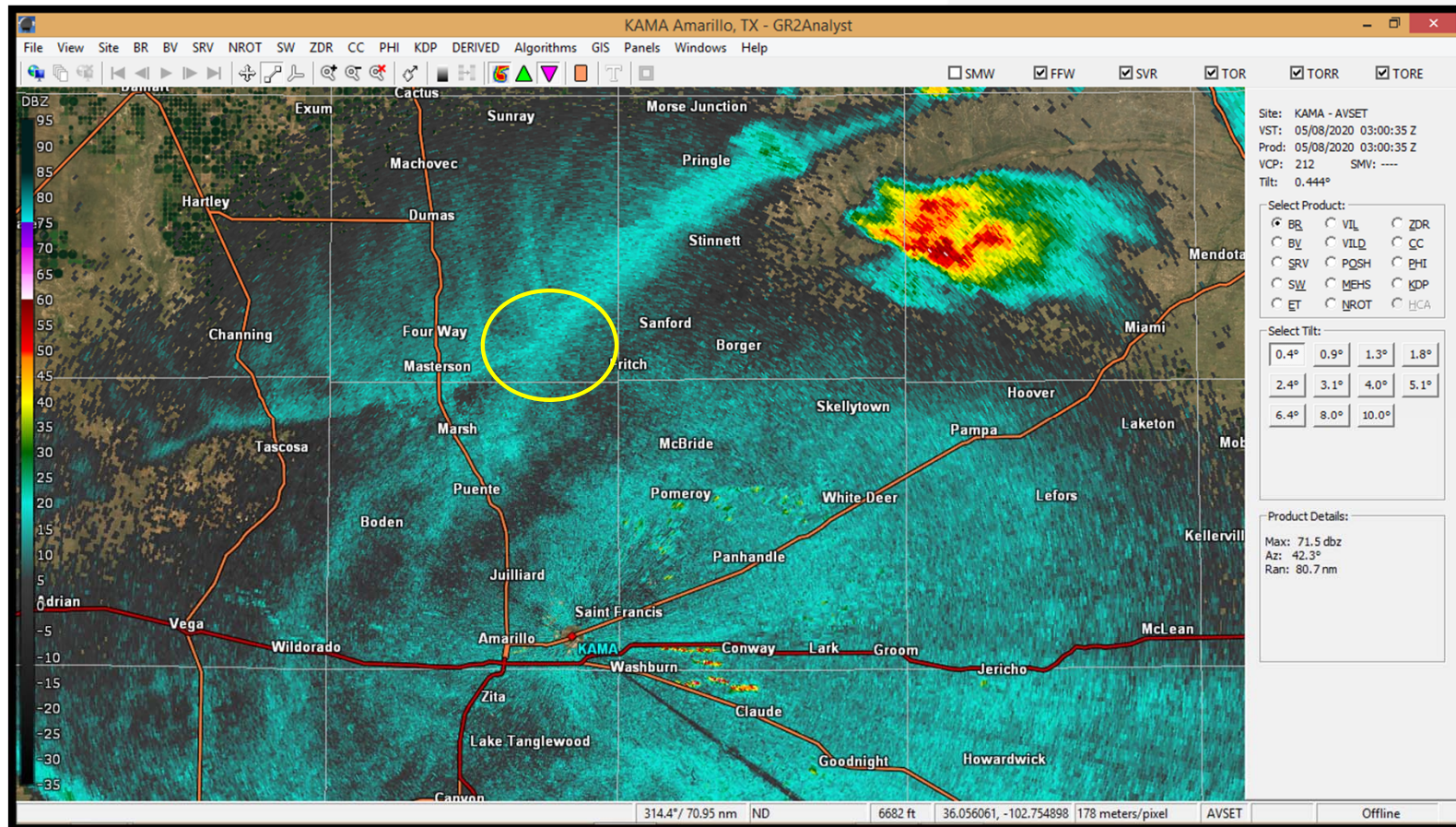


# KAMA 88-D – BR Scan – 22:00



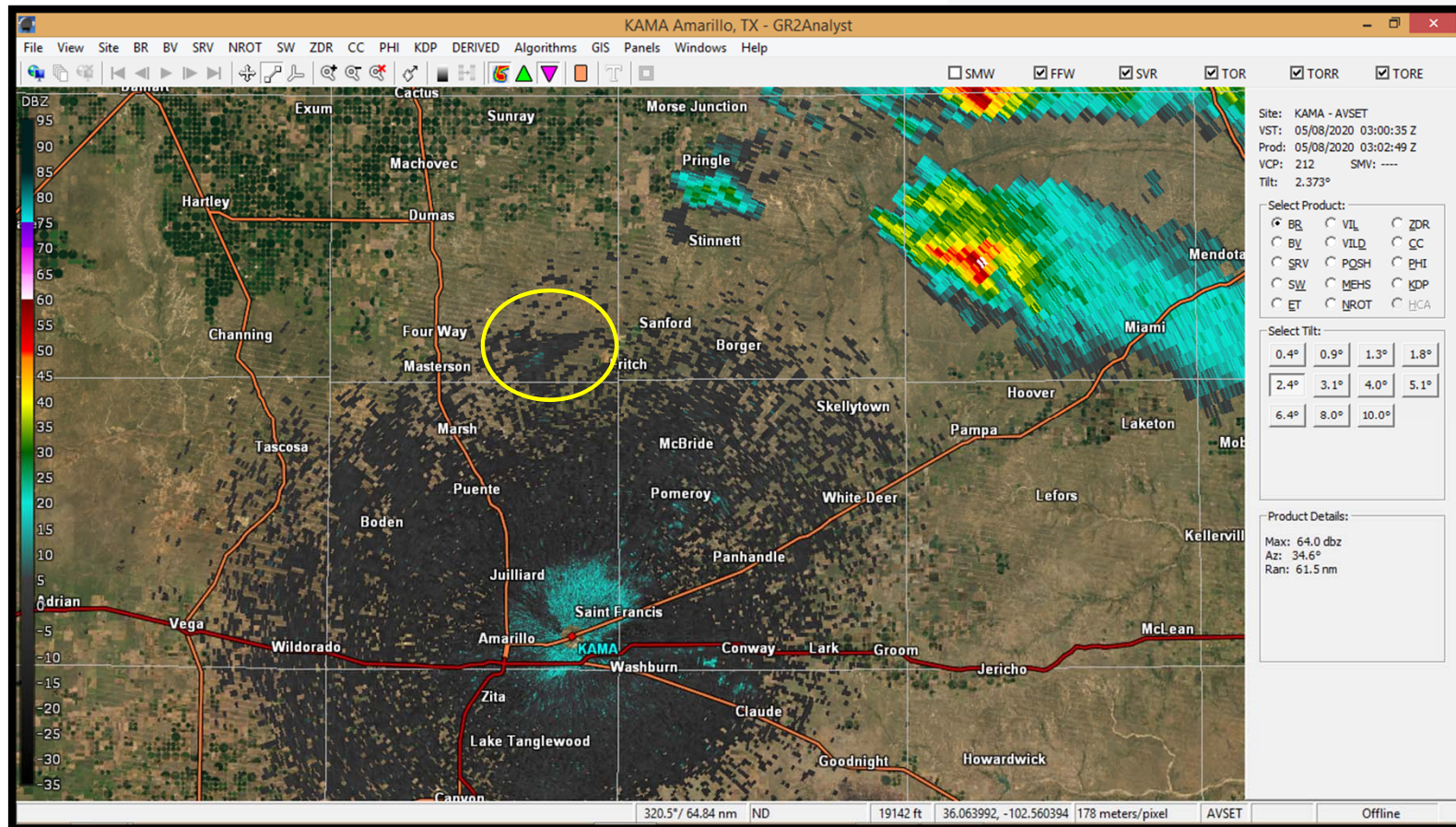


# KAMA 88-D – BR Scan – 22:00



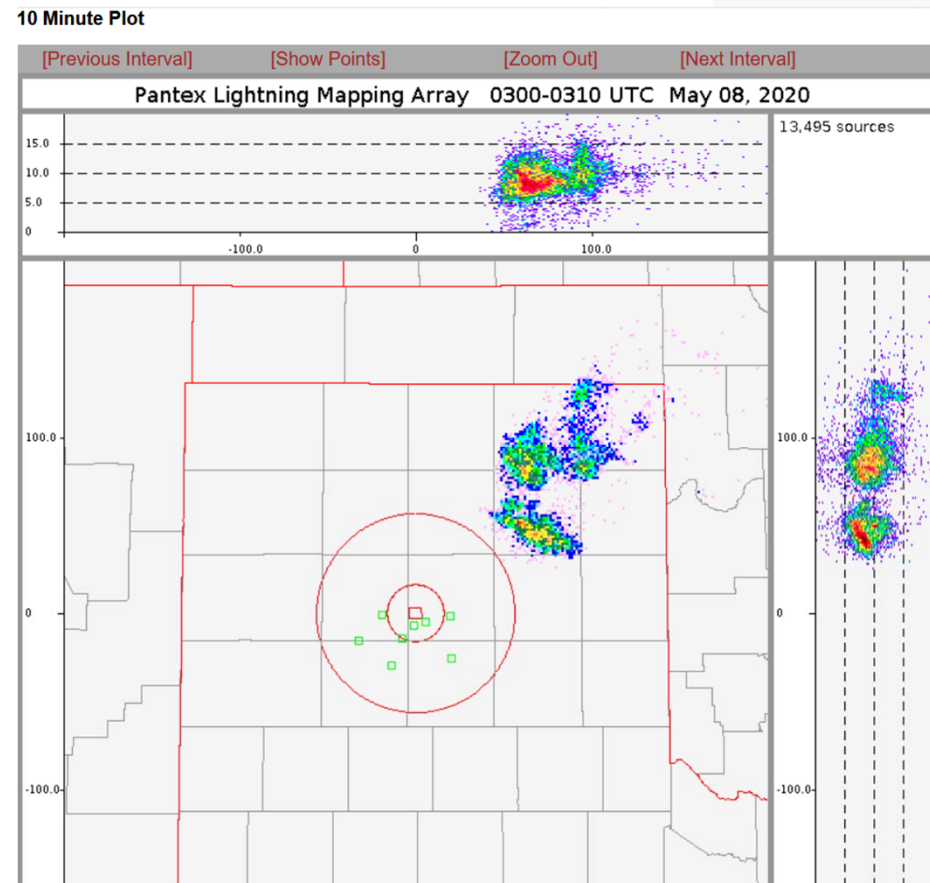


## KAMA 88-D – BR Scan (2.4 Degree Tilt) – 22:00

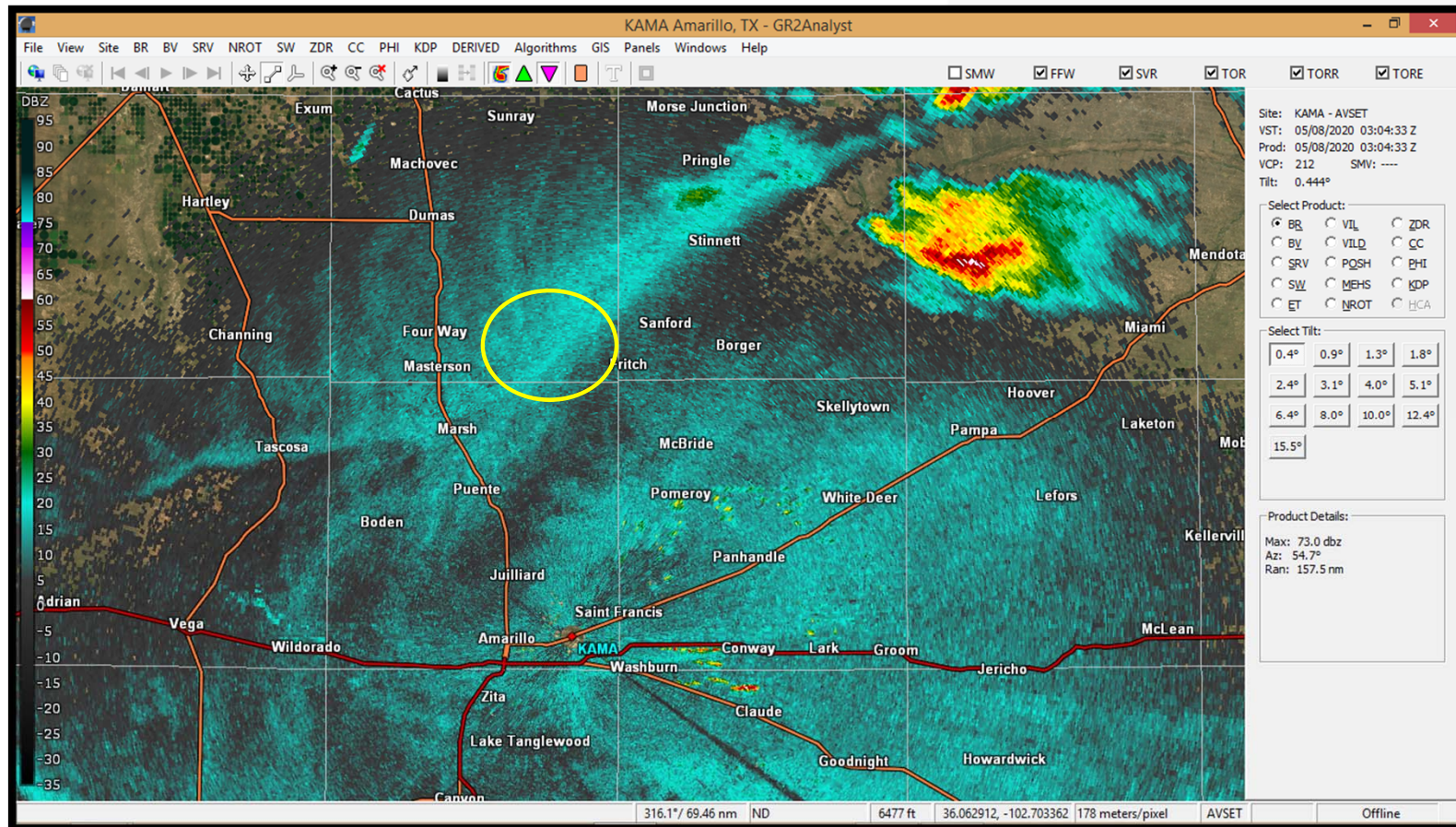




## Pantex LMA (Lightning Mapping Array) – 0300-0310

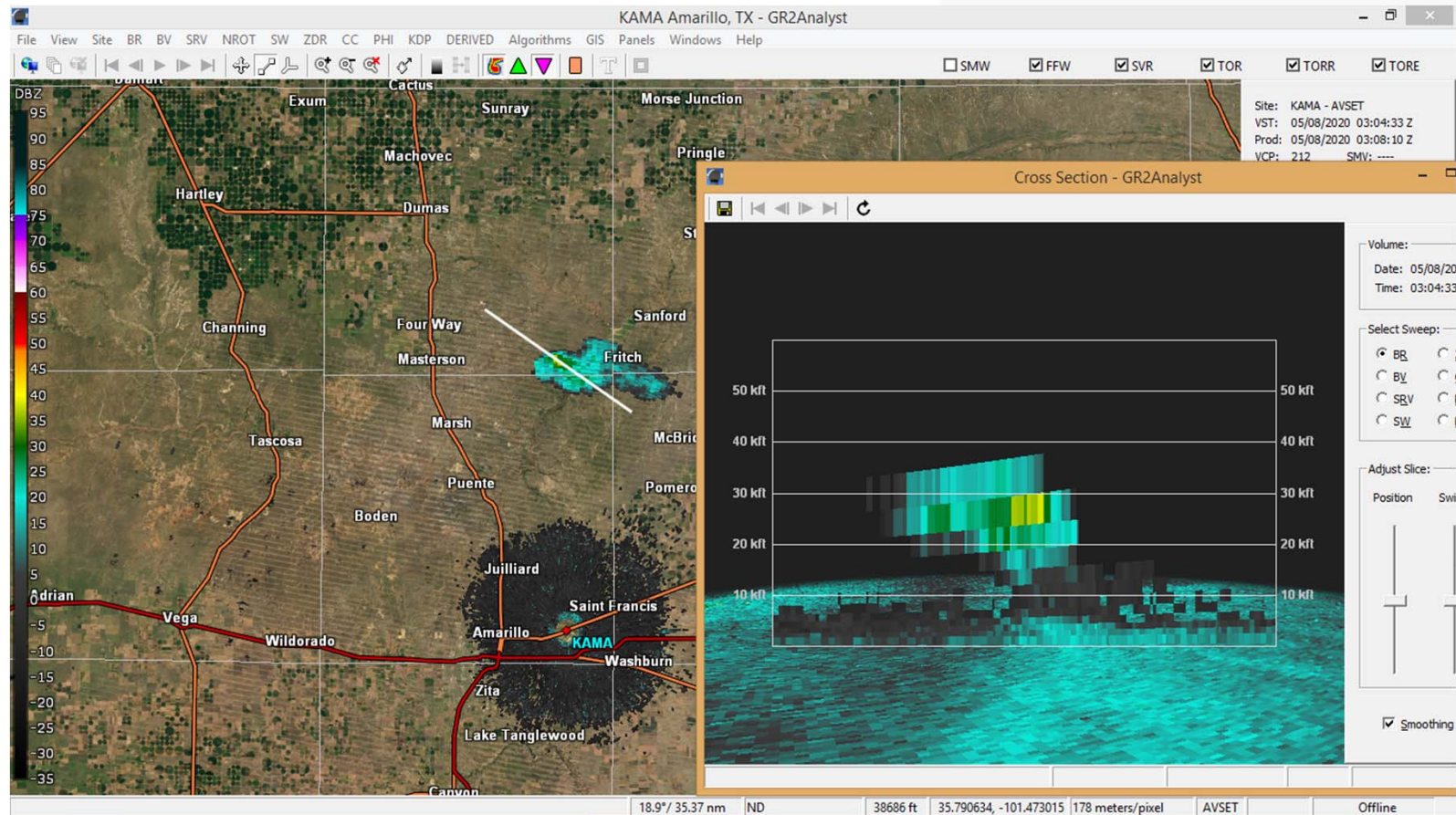


# KAMA 88-D – BR Scan – 22:04





## KAMA 88-D – Cross Section Scan– 22:04



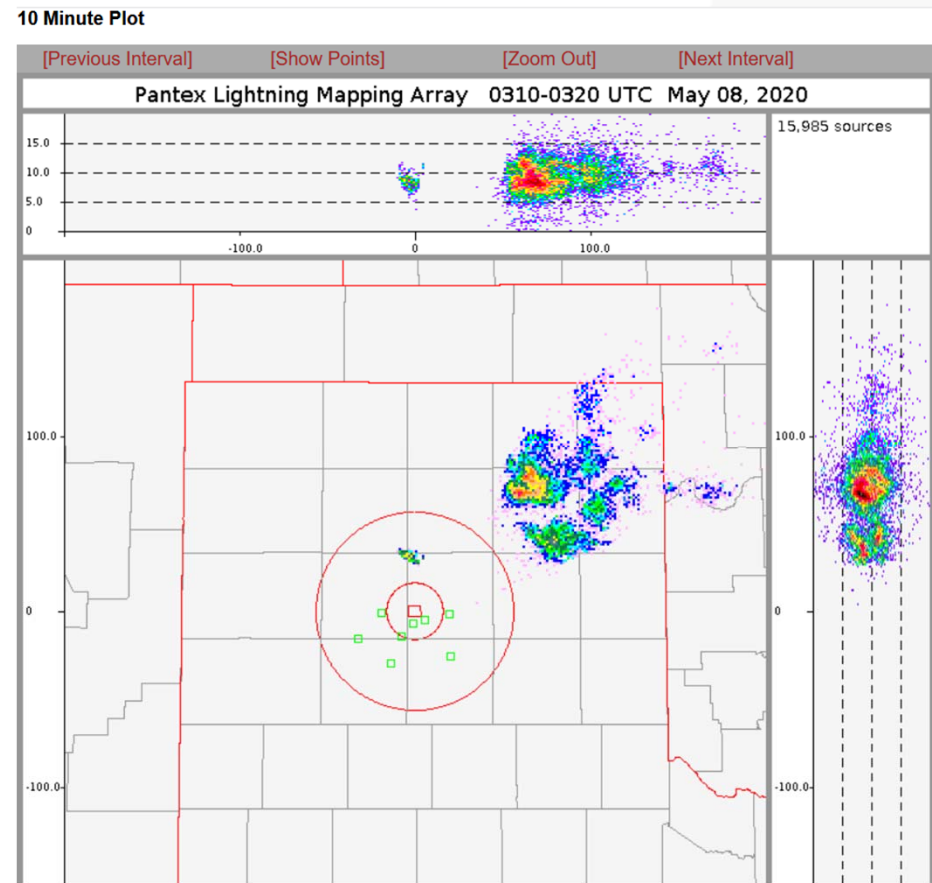
# KAMA 5/8 00z RAOB Raw Data

## 72363 AMA Amarillo Arpt(Awos) Observations at 00Z 08 May 2020

PRES	HGHT	TEMP	DWPT	RELH	MIXR	DRCT	SKNT	THTA	THTE	THTV
hPa	m	C	C	%	g/kg	deg	knot	K	K	K
1000.0	-25									
925.0	666									
881.0	1099	32.8	-0.2	12	4.30	155	3	317.2	331.4	318.1
877.0	1139	32.2	-0.8	12	4.13	147	3	317.0	330.6	317.8
850.0	1412	29.2	-2.8	12	3.68	90	3	316.7	328.9	317.4
810.5	1829	25.3	-5.1	13	3.23	175	5	316.9	327.7	317.5
782.8	2134	22.4	-6.8	14	2.94	215	13	317.0	326.8	317.6
777.0	2199	21.8	-7.2	14	2.88	217	14	317.0	326.7	317.6
755.5	2438	19.6	-8.5	14	2.67	225	16	317.2	326.2	317.7
729.0	2743	16.9	-10.3	15	2.42	250	23	317.5	325.7	317.9
700.0	3089	13.8	-12.2	15	2.15	240	27	317.7	325.1	318.1
652.1	3658	8.4	-15.5	17	1.77	240	34	318.2	324.3	318.5
604.5	4267	2.7	-19.0	19	1.42	250	39	318.5	323.5	318.8
560.2	4877	-3.1	-22.5	21	1.13	260	39	318.7	322.7	318.9
500.0	5790	-11.7	-27.7	25	0.79	275	41	318.7	321.6	318.9
480.3	6096	-14.5	-30.5	24	0.63	275	42	318.9	321.2	319.1
479.0	6117	-14.7	-30.7	24	0.62	275	42	318.9	321.2	319.1
447.0	6638	-17.5	-61.5	1	0.02	282	51	321.8	321.9	321.8
407.9	7315	-22.6	-64.8	1	0.02	290	62	323.7	323.8	323.7
403.0	7405	-23.3	-65.3	1	0.01	290	62	323.9	324.0	323.9
400.0	7460	-23.3	-52.3	5	0.08	290	62	324.6	324.9	324.6
397.0	7515	-23.7	-47.7	9	0.13	290	62	324.8	325.3	324.8
391.2	7620	-24.6	-48.3	9	0.12	290	61	325.0	325.5	325.0
323.0	8982	-36.3	-56.3	11	0.06	286	65	327.1	327.4	327.1
315.5	9144	-37.6	-57.2	11	0.05	285	65	327.6	327.8	327.6
300.0	9490	-40.3	-59.3	11	0.04	285	67	328.4	328.6	328.5
289.0	9744	-42.5	-59.5	14	0.04	284	69	328.8	329.0	328.9
252.0	10658	-49.7	-56.7	44	0.07	280	76	331.3	331.6	331.3
250.0	10710	-50.1	-57.1	43	0.07	280	76	331.4	331.7	331.5
226.0	11361	-55.7	-62.7	41	0.04	285	75	332.6	332.8	332.6
214.0	11707	-58.1	-70.1	20	0.01	287	75	334.1	334.1	334.1
209.0	11855	-59.3	-71.3	20	0.01	288	74	334.5	334.5	334.5
200.0	12130	-60.7	-73.7	17	0.01	290	74	336.5	336.5	336.5
192.0	12383	-61.7	-73.7	19	0.01	295	80	338.8	338.9	338.8
186.0	12579	-61.1	-75.1	14	0.01	292	82	342.9	342.9	342.9
181.0	12748	-59.5	-76.5	9	0.01	290	84	348.2	348.2	348.2
180.0	12783	-58.1	-77.1	7	0.01	290	84	351.0	351.0	351.0
179.4	12802	-57.9	-77.5	7	0.01	290	84	351.6	351.6	351.6
177.0	12889	-57.1	-79.1	5	0.00	289	81	354.3	354.4	354.3
175.0	12961	-54.9	-80.9	3	0.00	289	79	359.1	359.1	359.1
169.0	13183	-54.5	-87.5	1	0.00	287	71	363.4	363.4	363.4
166.0	13297	-55.5	-87.5	1	0.00	286	68	363.6	363.6	363.6

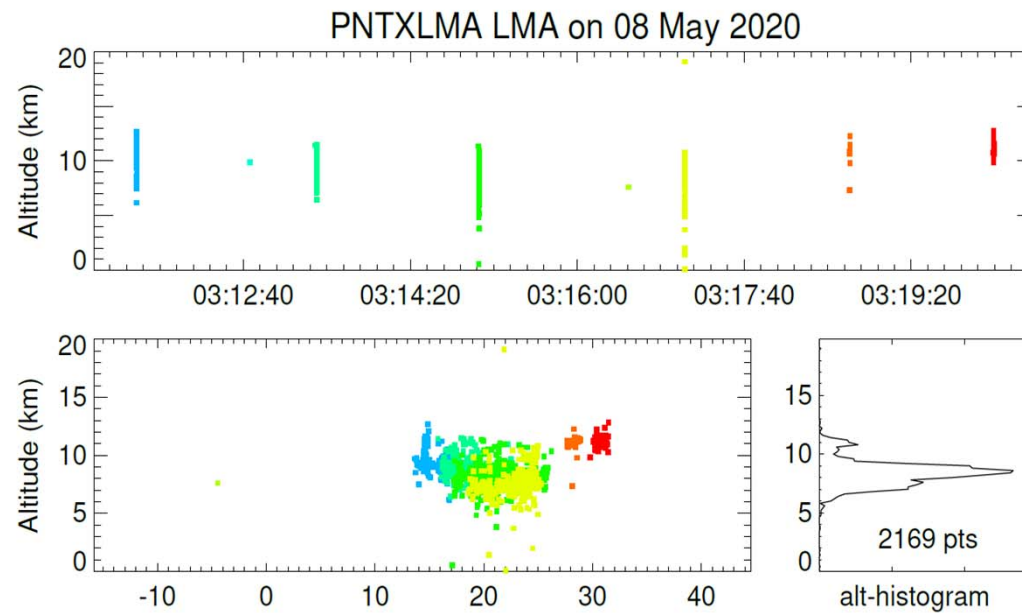


## Pantex LMA (Lightning Mapping Array) – 0310-0320



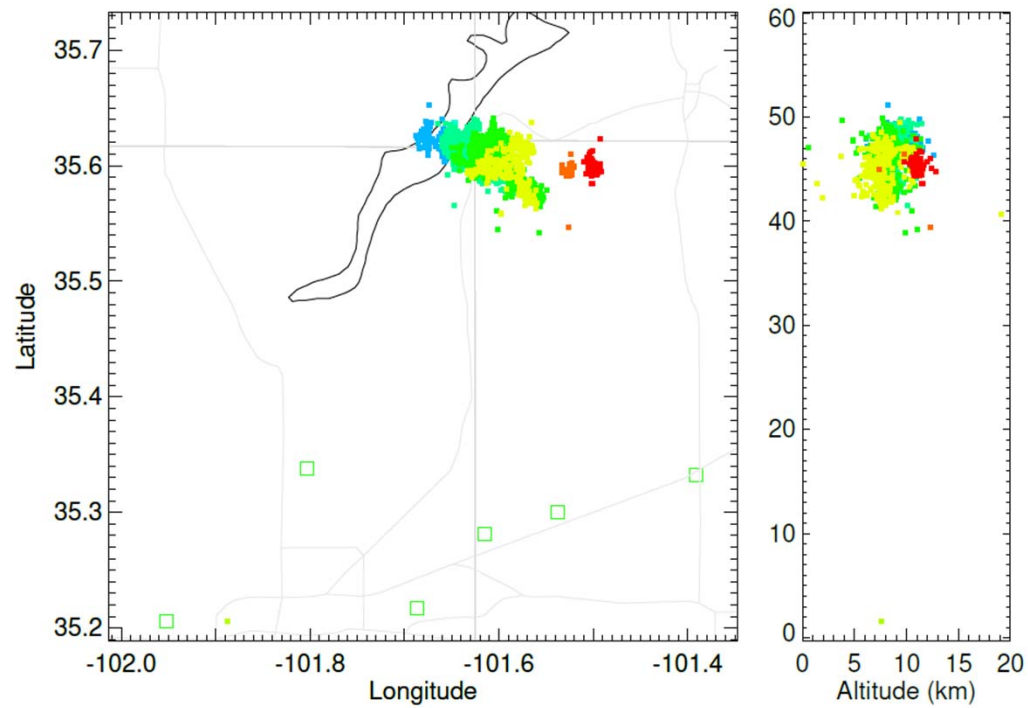
## Pantex LMA (Lightning Mapping Array) – 0310-0320

### Pantex LMA Full Re-Processed Data

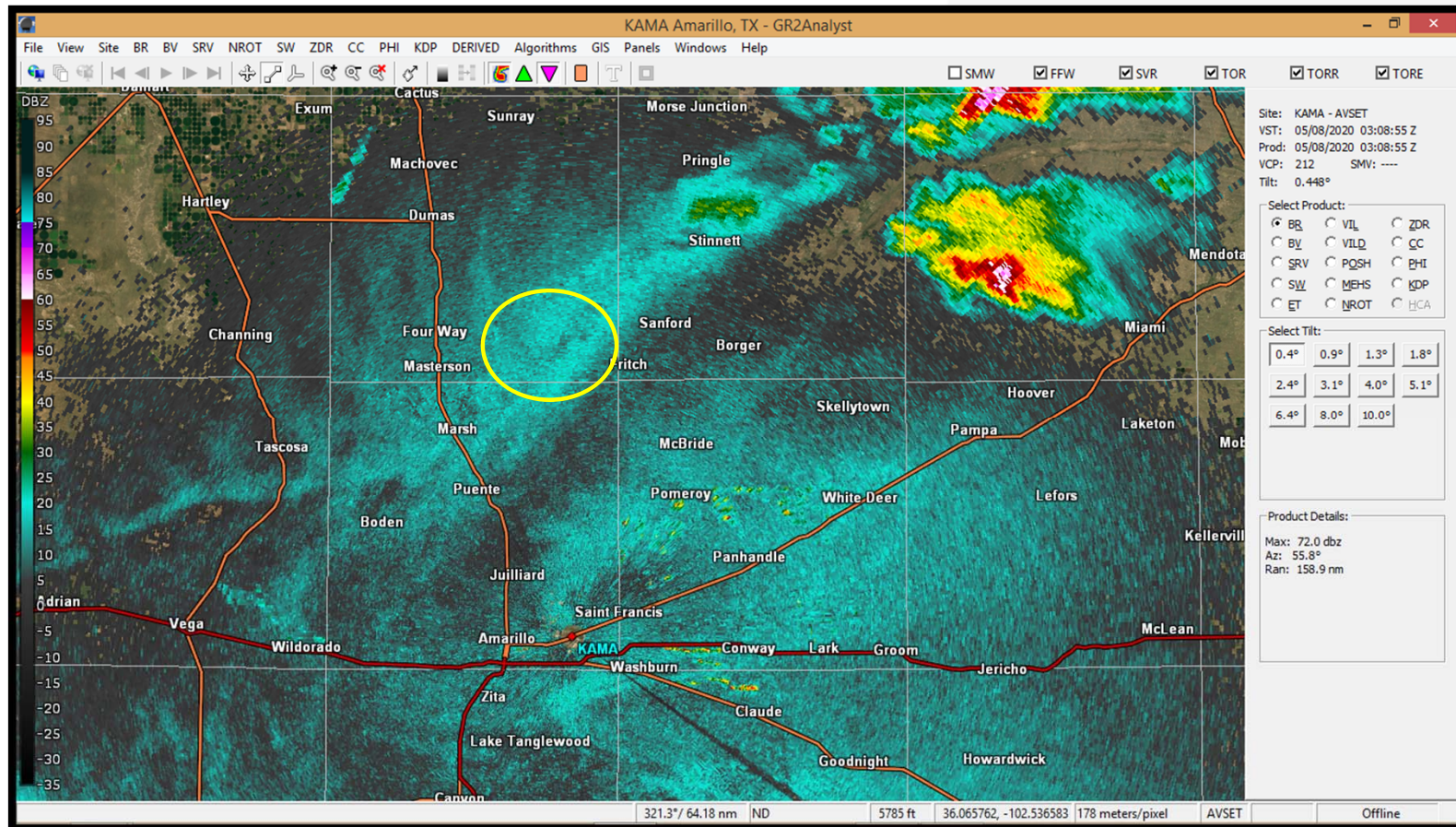




## Pantex LMA (Lightning Mapping Array) – 0310-0320

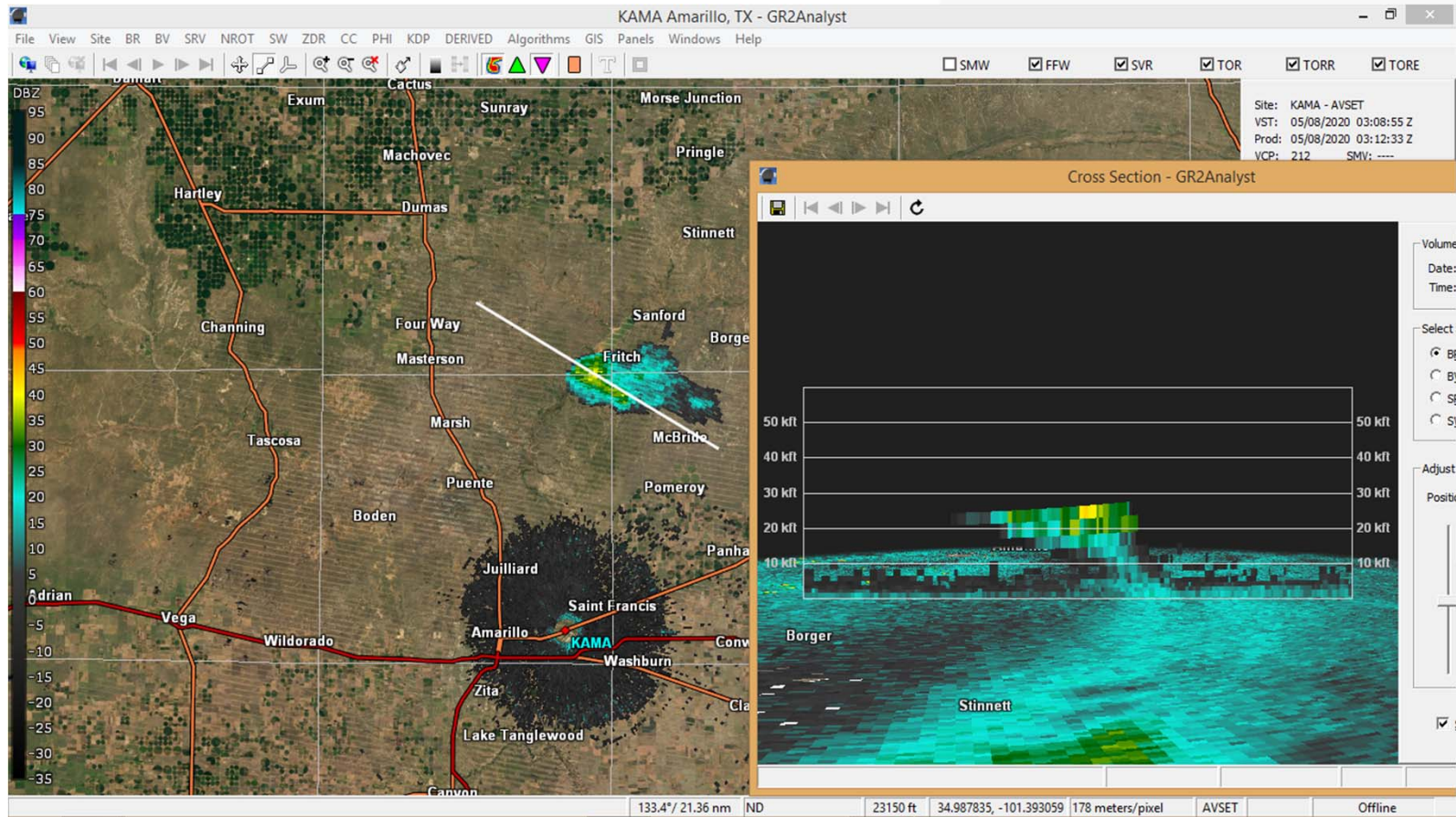


## KAMA 88-D – BR Scan– 22:08

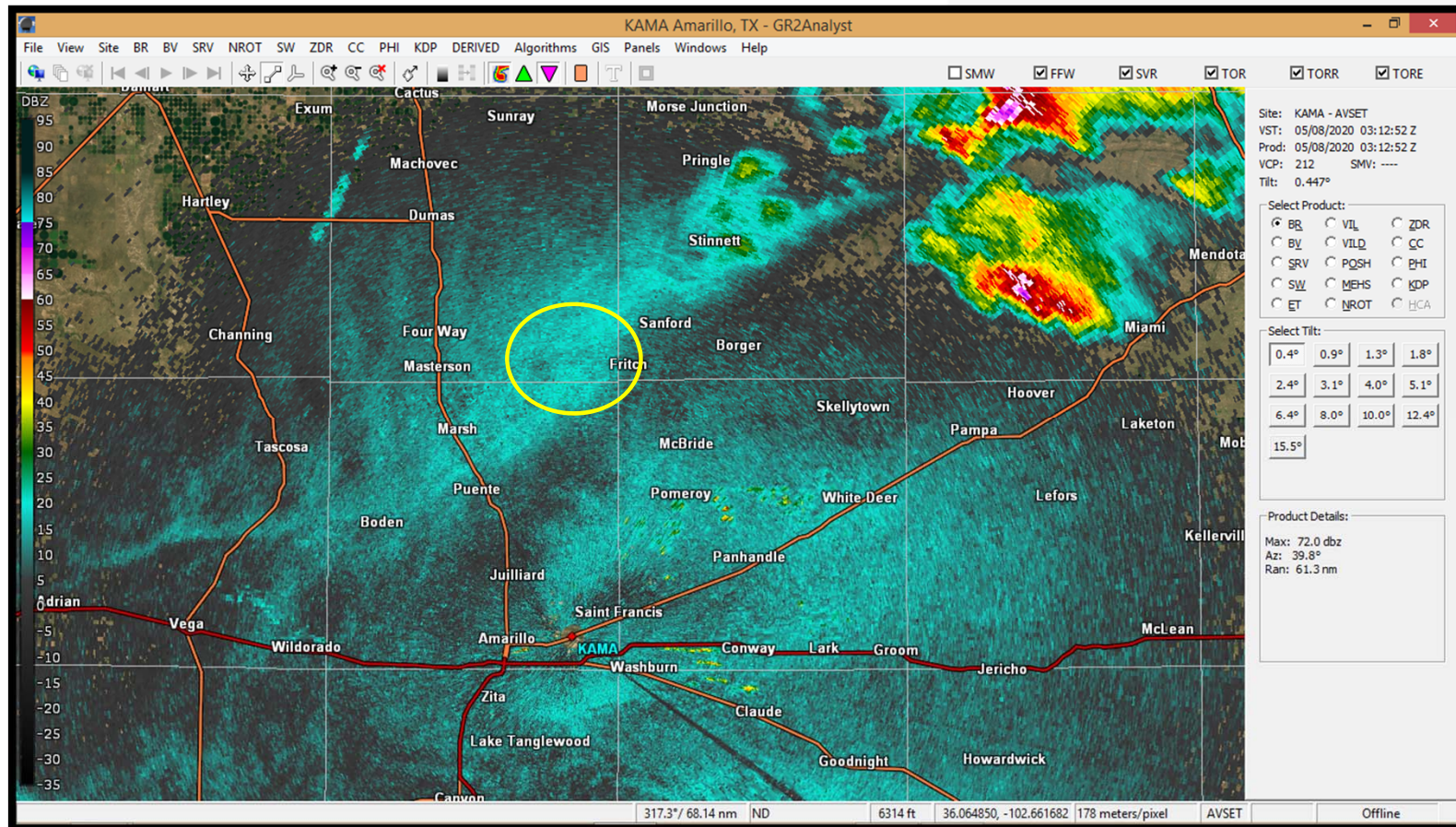




## KAMA 88-D – BR Scan (Cross-Section Scan) – 22:08

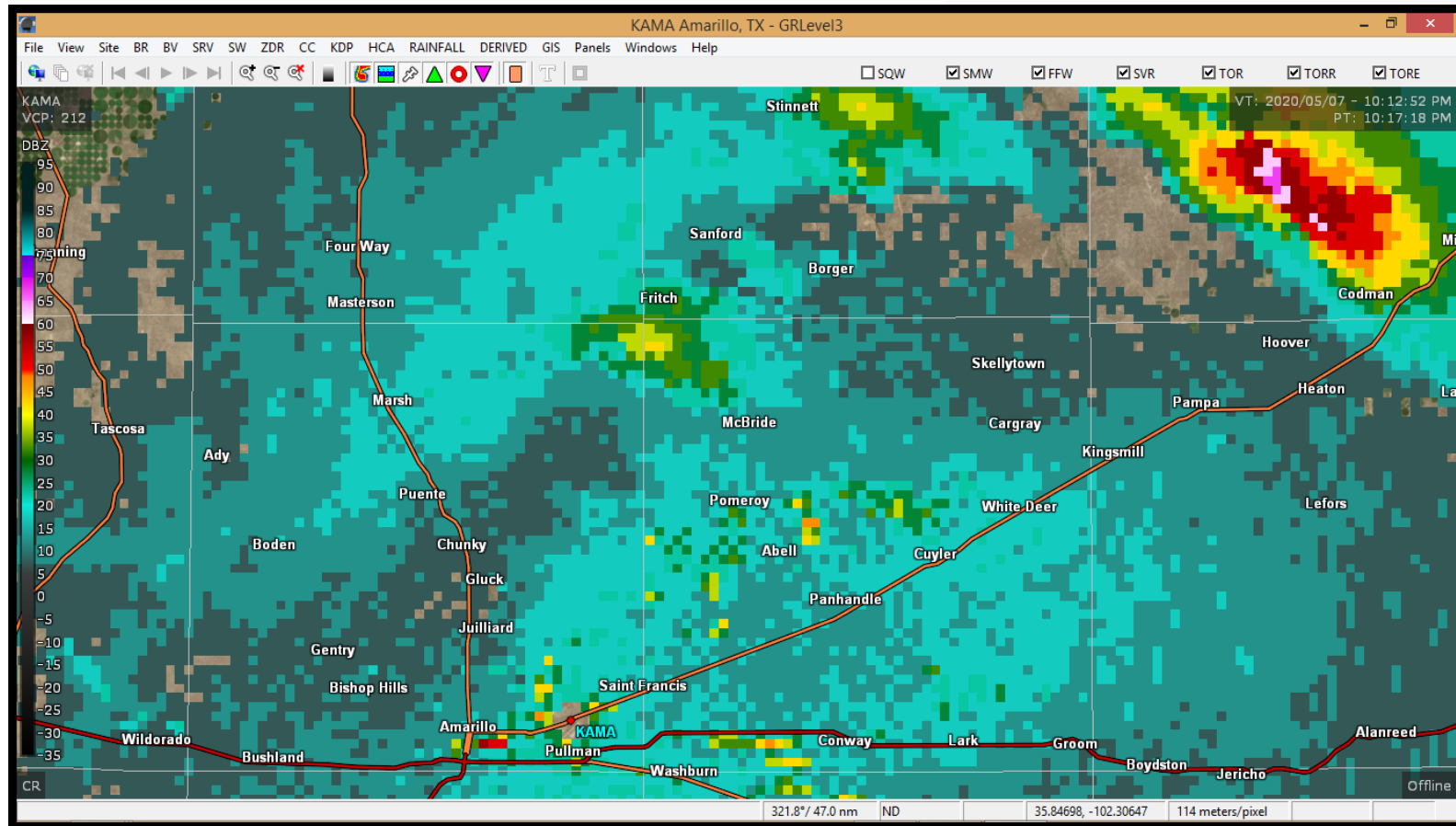


# KAMA 88-D – BR Scan – 22:12

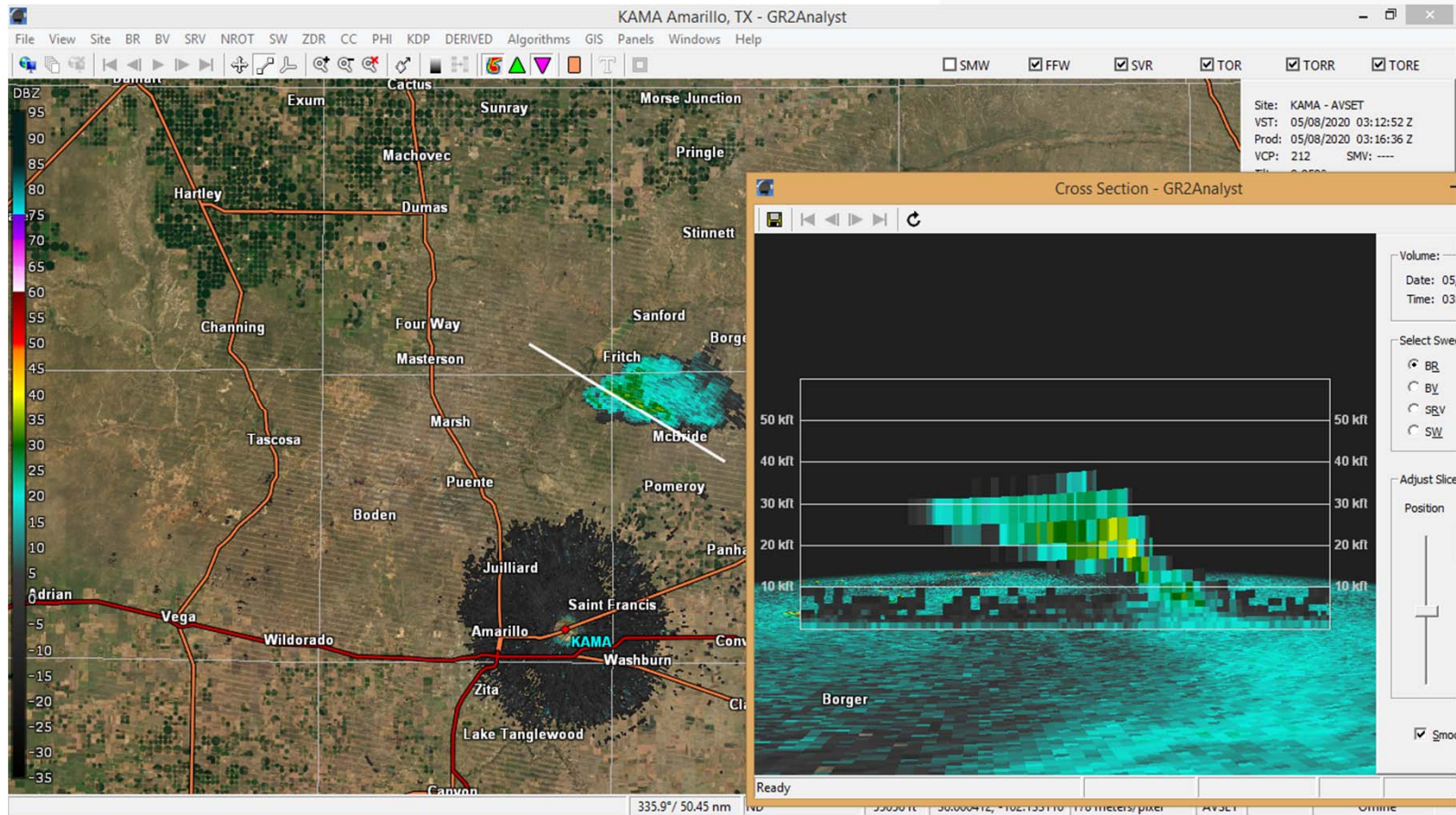




## KAMA 88-D – CR Scan– 22:12

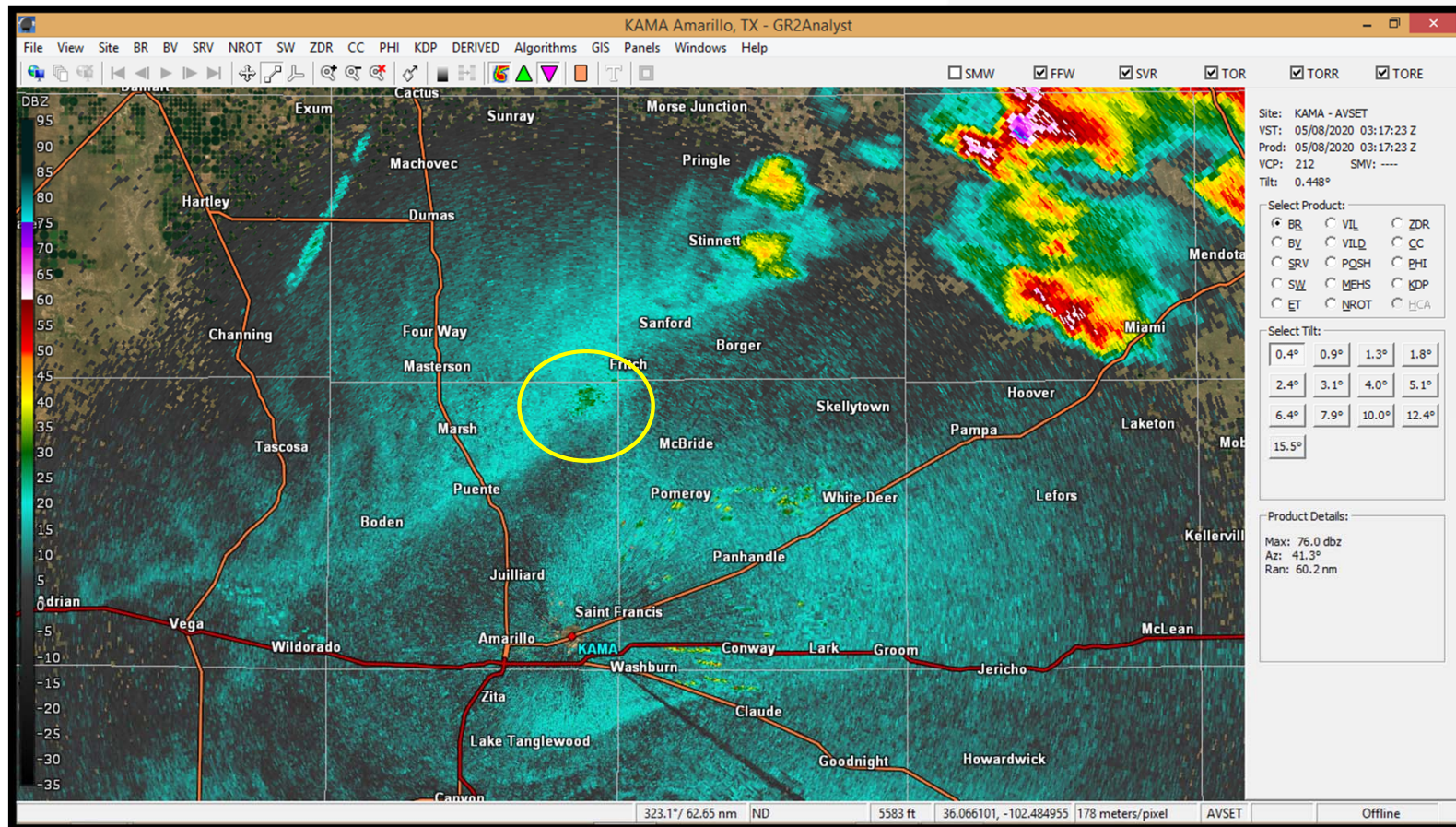


## KAMA 88-D – BR Scan (10 Degree Tilt) – 22:12

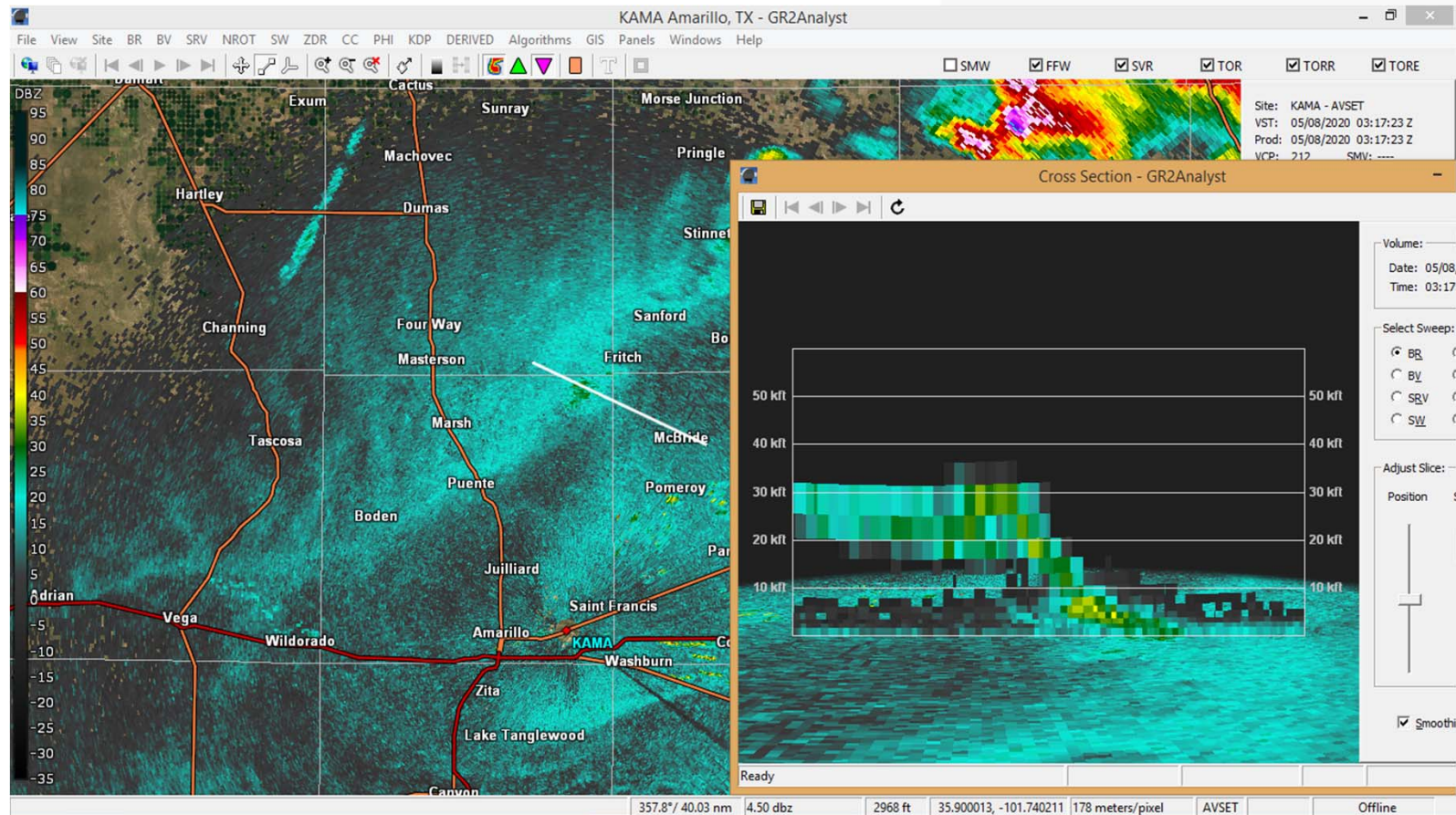




# KAMA 88-D – BR Scan– 22:17



## KAMA 88-D – Cross Section Scan– 22:17





## First Intra-Cloud (CC) Strike Occurs At 22:17

### Lightning Event List

Date/Time	Latitude	Longitude	Amps	Distance	Bearing (°)
May 7, 2020 10:17:04 PM CDT	35.5960	-101.5891	-4699 amps	18.7792 miles	357.9934

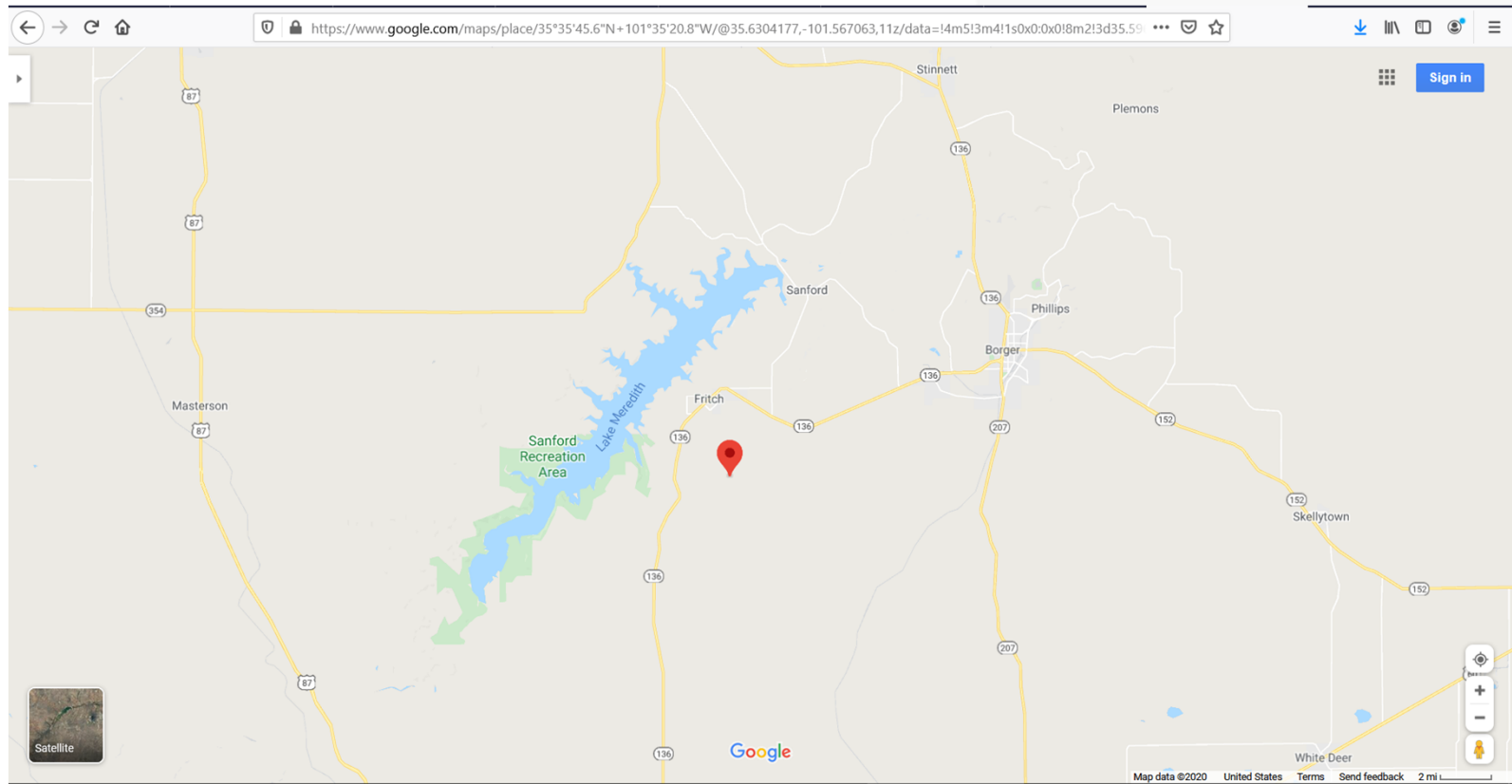
## First Cloud-To-Ground (CC) Strike Occurs At 22:17

### Lightning Event List

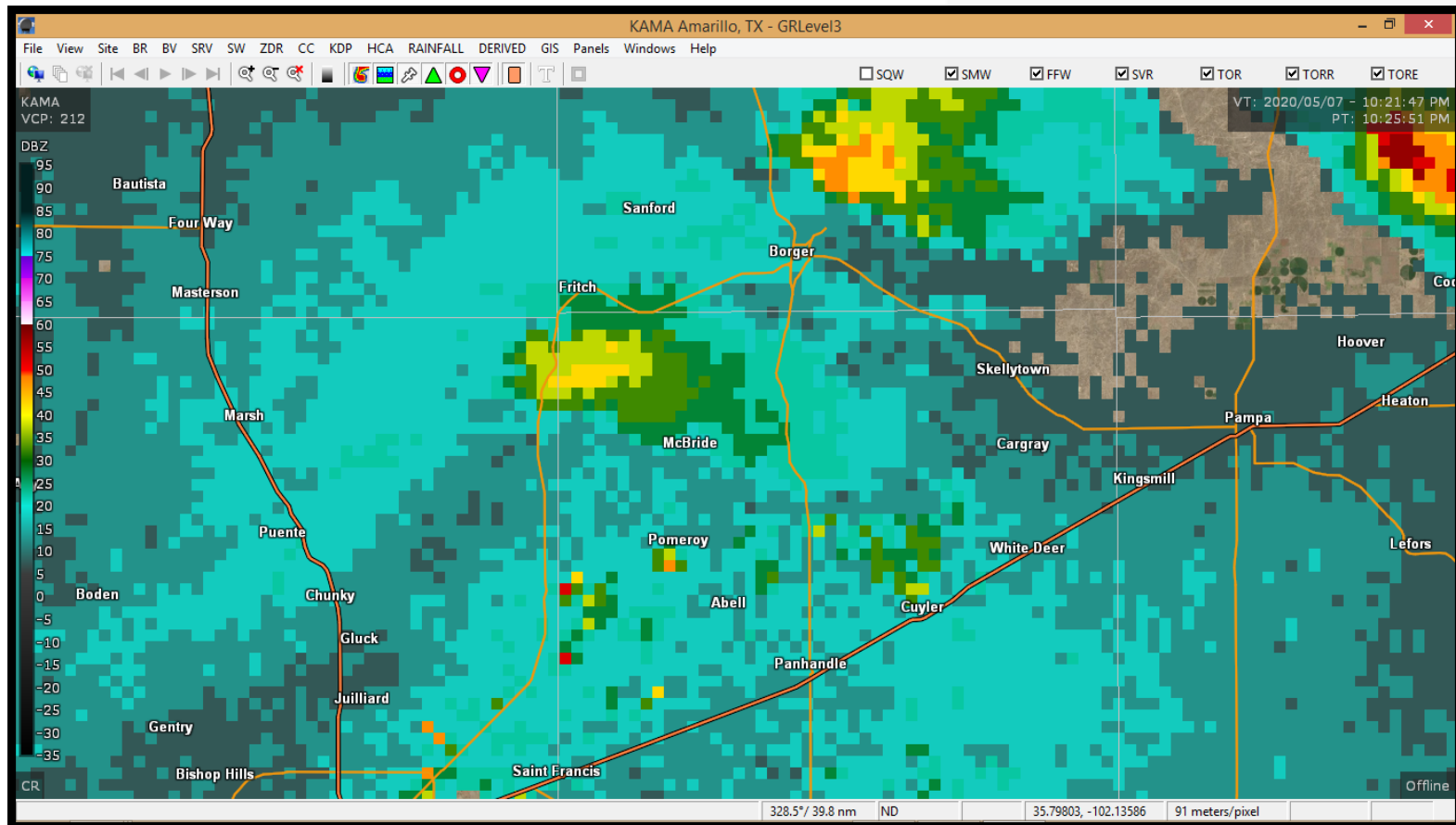
Date/Time	Latitude	Longitude	Amps	Distance	Bearing (°)
May 7, 2020 10:17:04 PM CDT	35.6093	-101.5740	-4828 amps	19.6829 miles	0.5589



## Location of First CC/CG Strike at 22:17

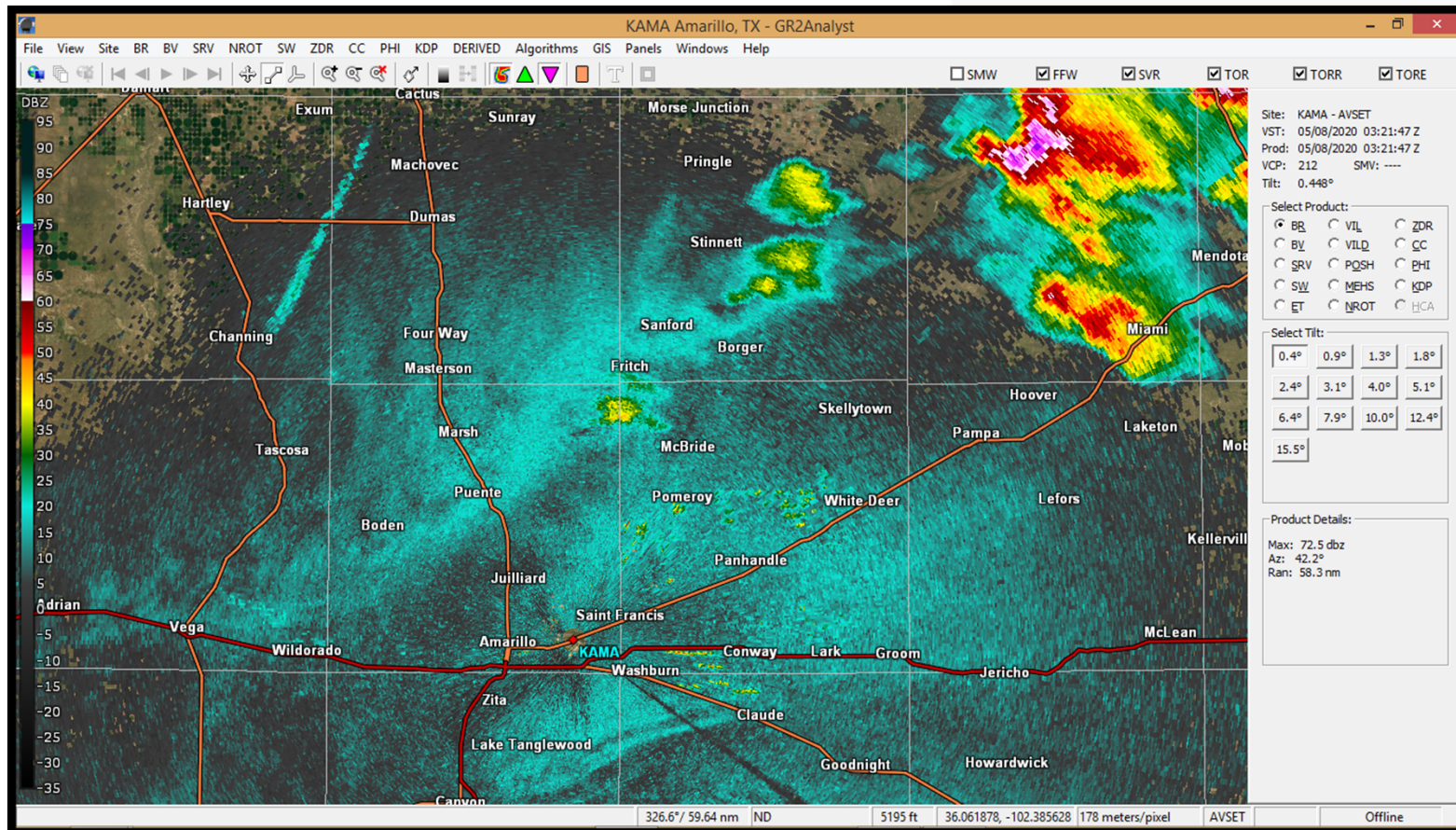


## KAMA 88-D – CR Scan– 22:21



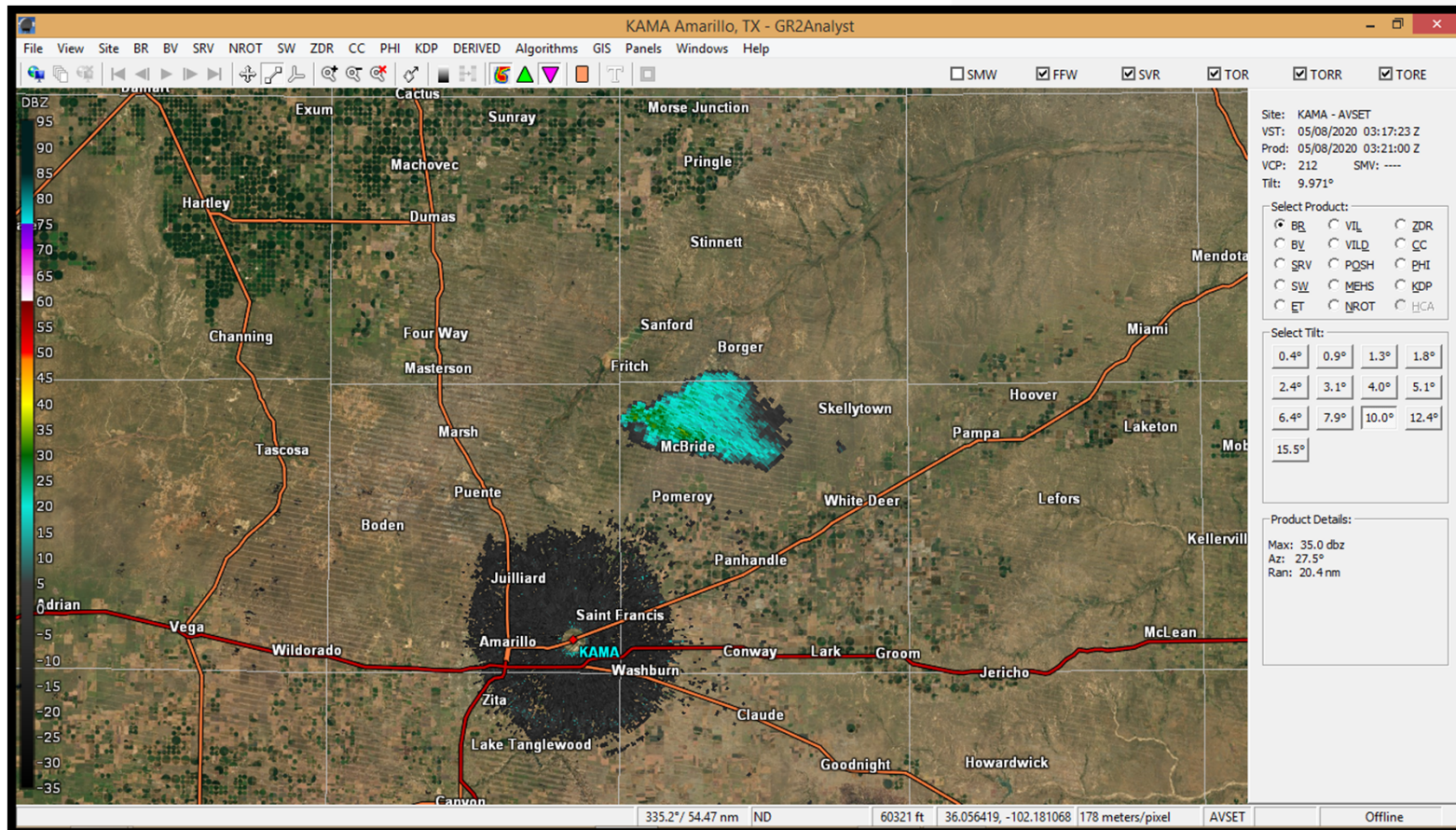


# KAMA 88-D – BR Scan– 22:21



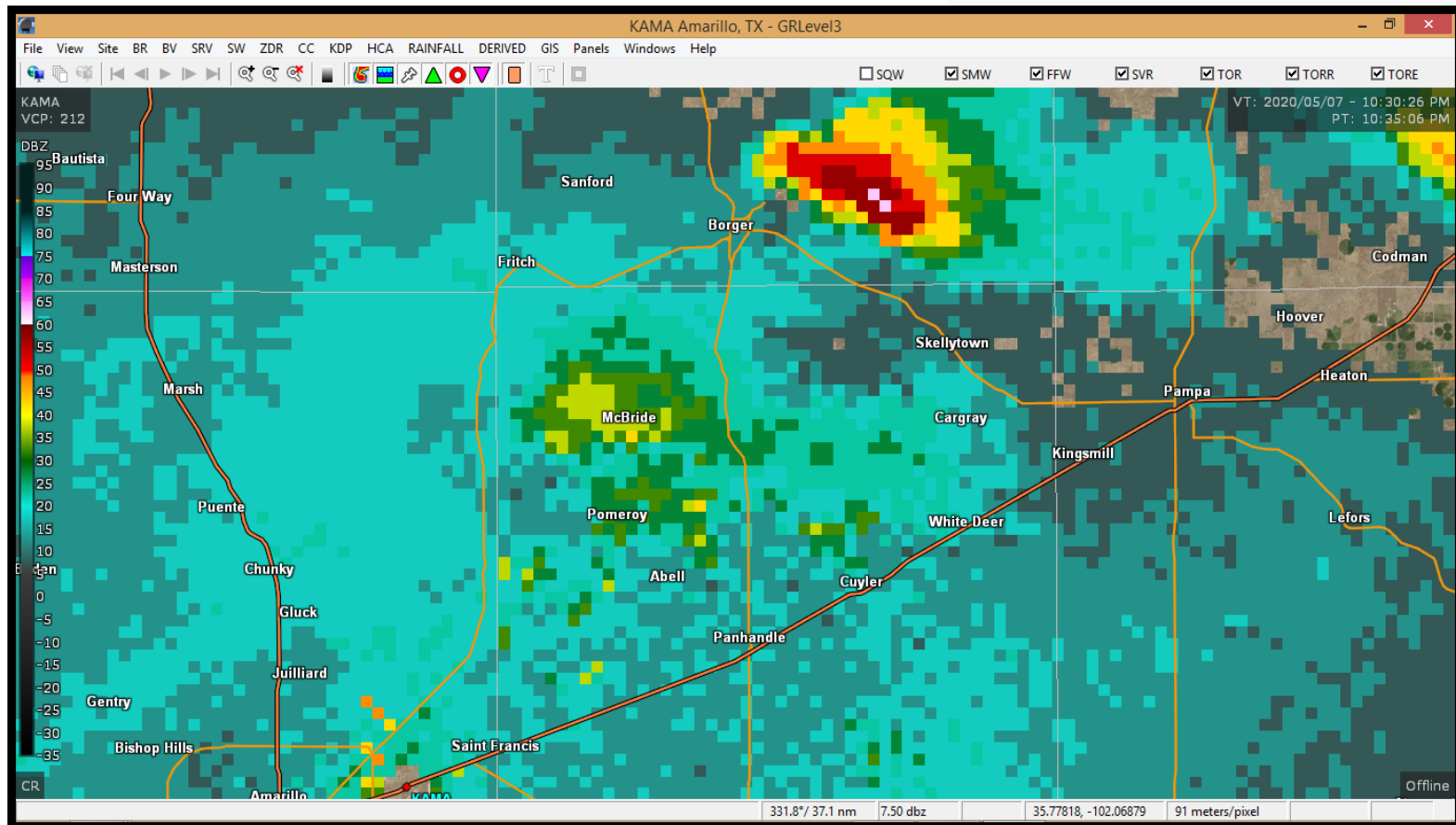


# KAMA 88-D – BR Scan (10 Degree Tilt) – 22:21

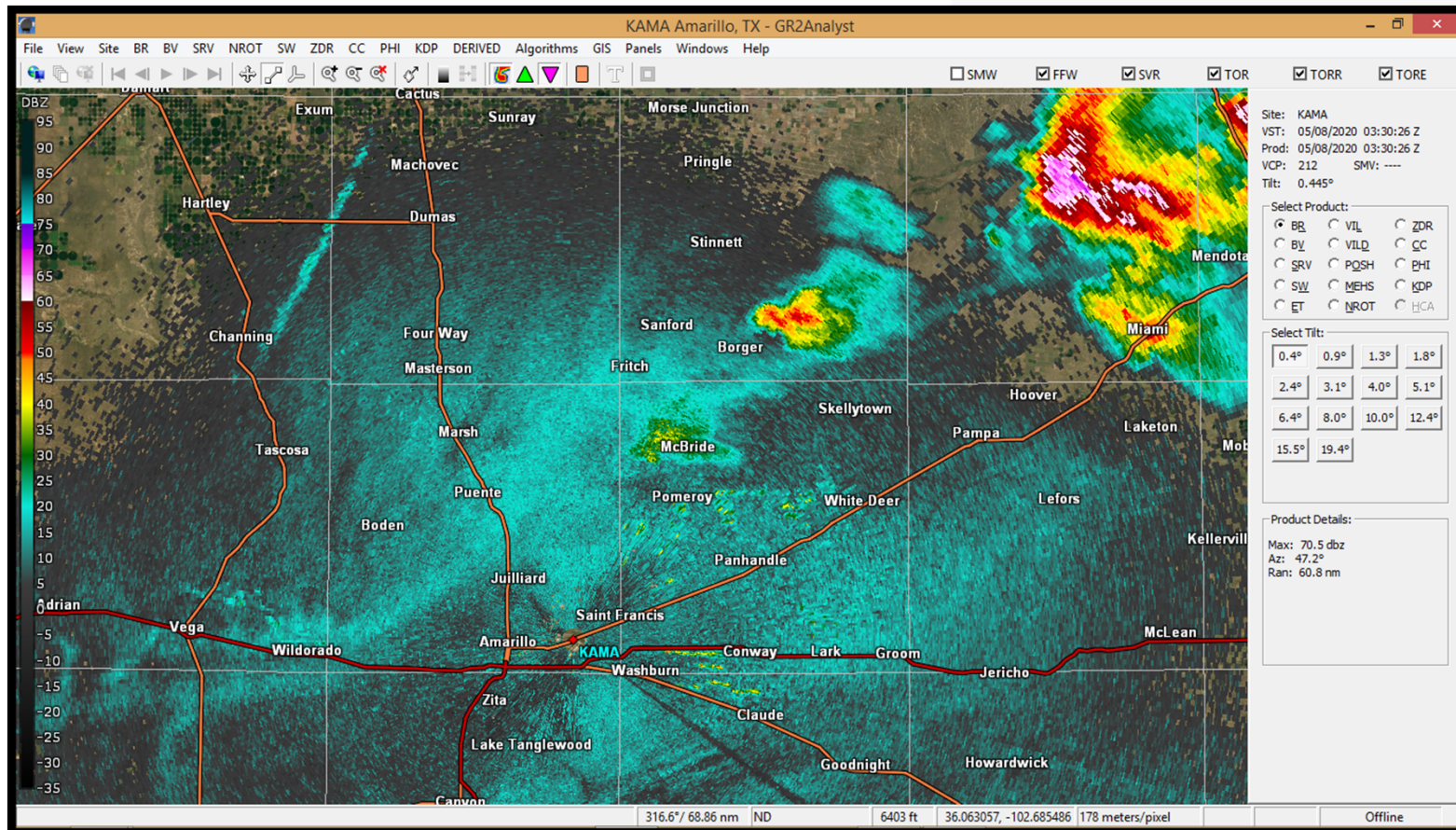




## KAMA 88-D – CR Scan – 22:30

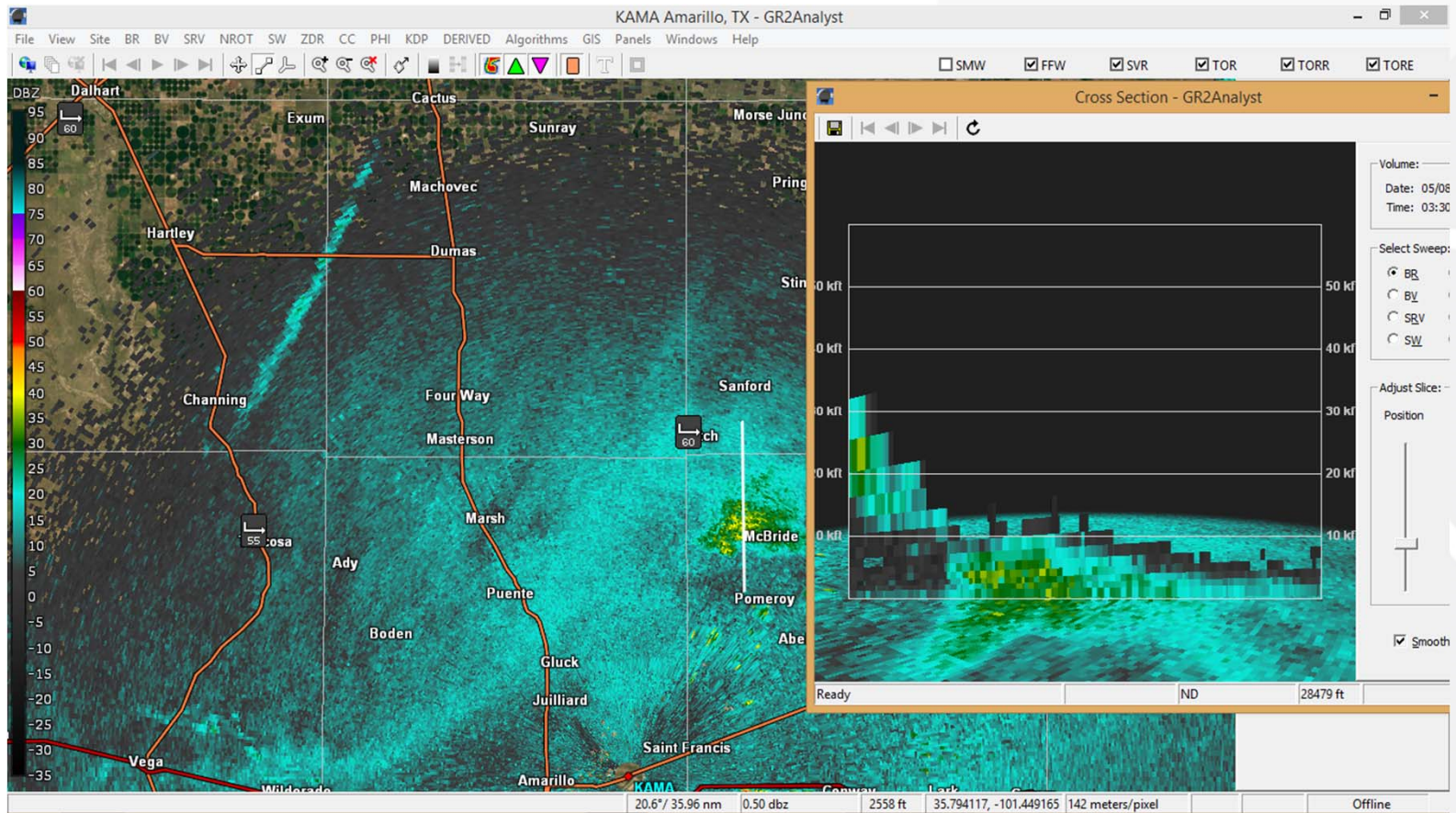


## KAMA 88-D – BR Scan – 22:30

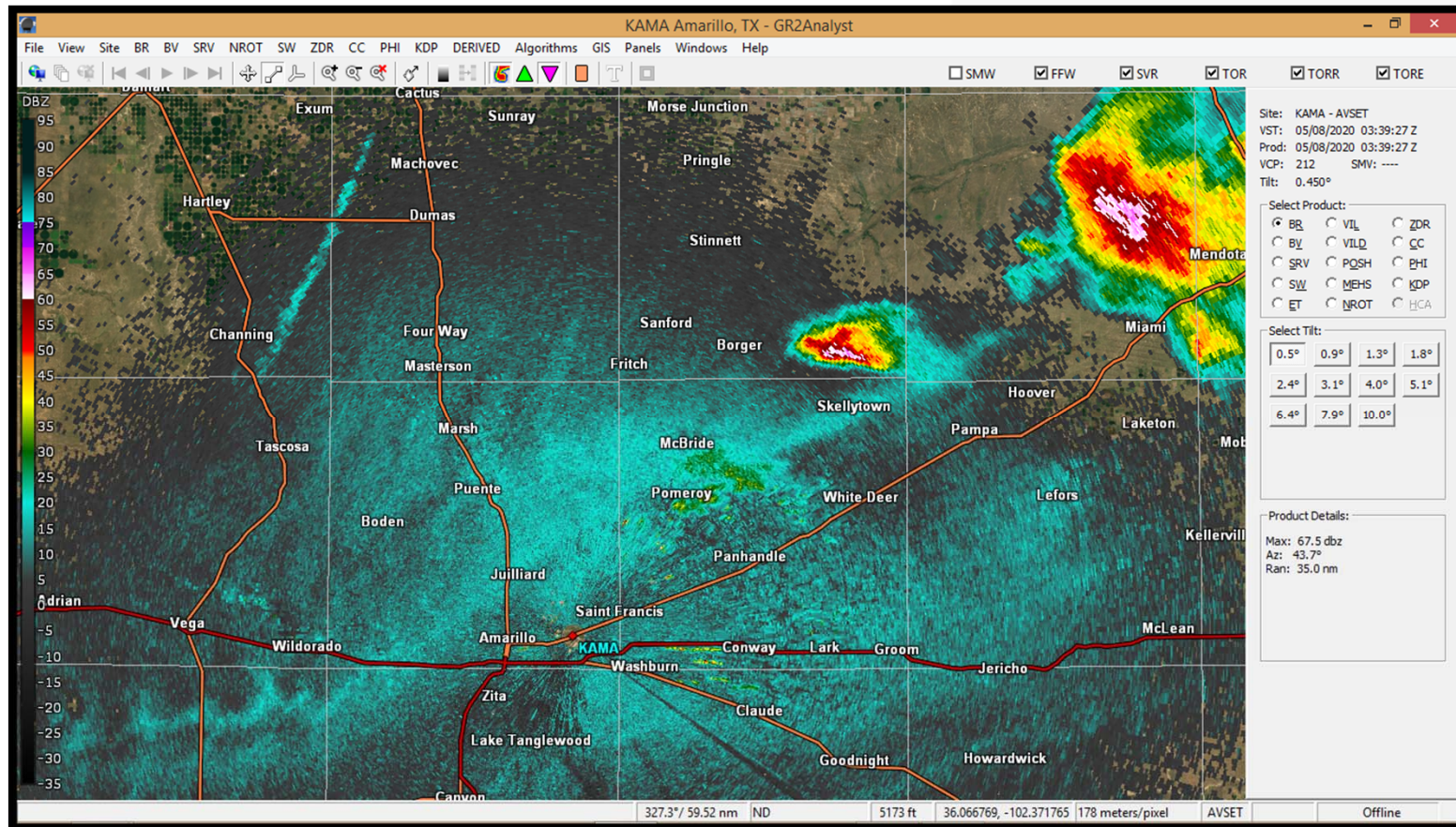




## KAMA 88-D – Cross-Section Scan – 22:30

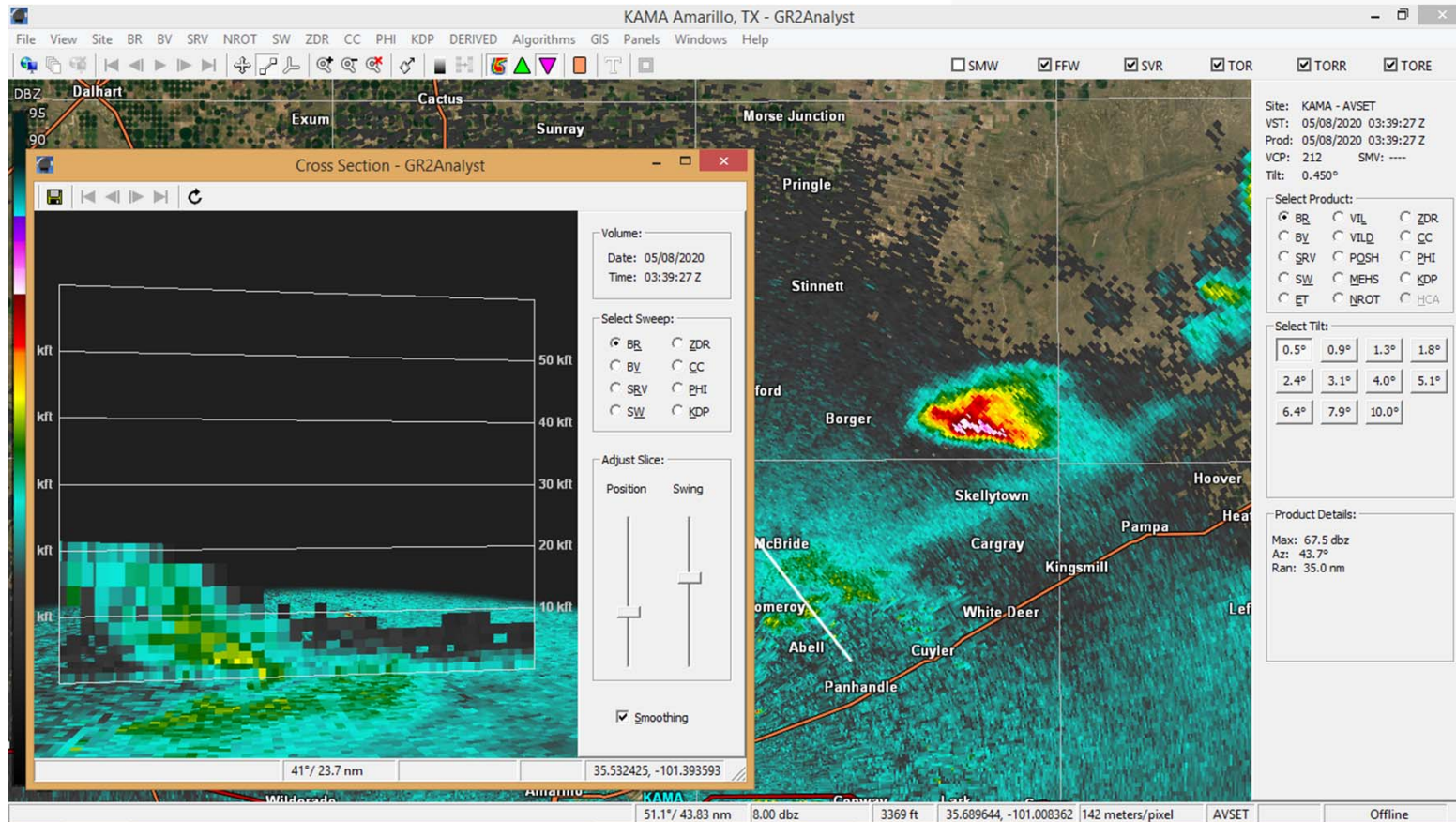


# KAMA 88-D – BR Scan – 22:39

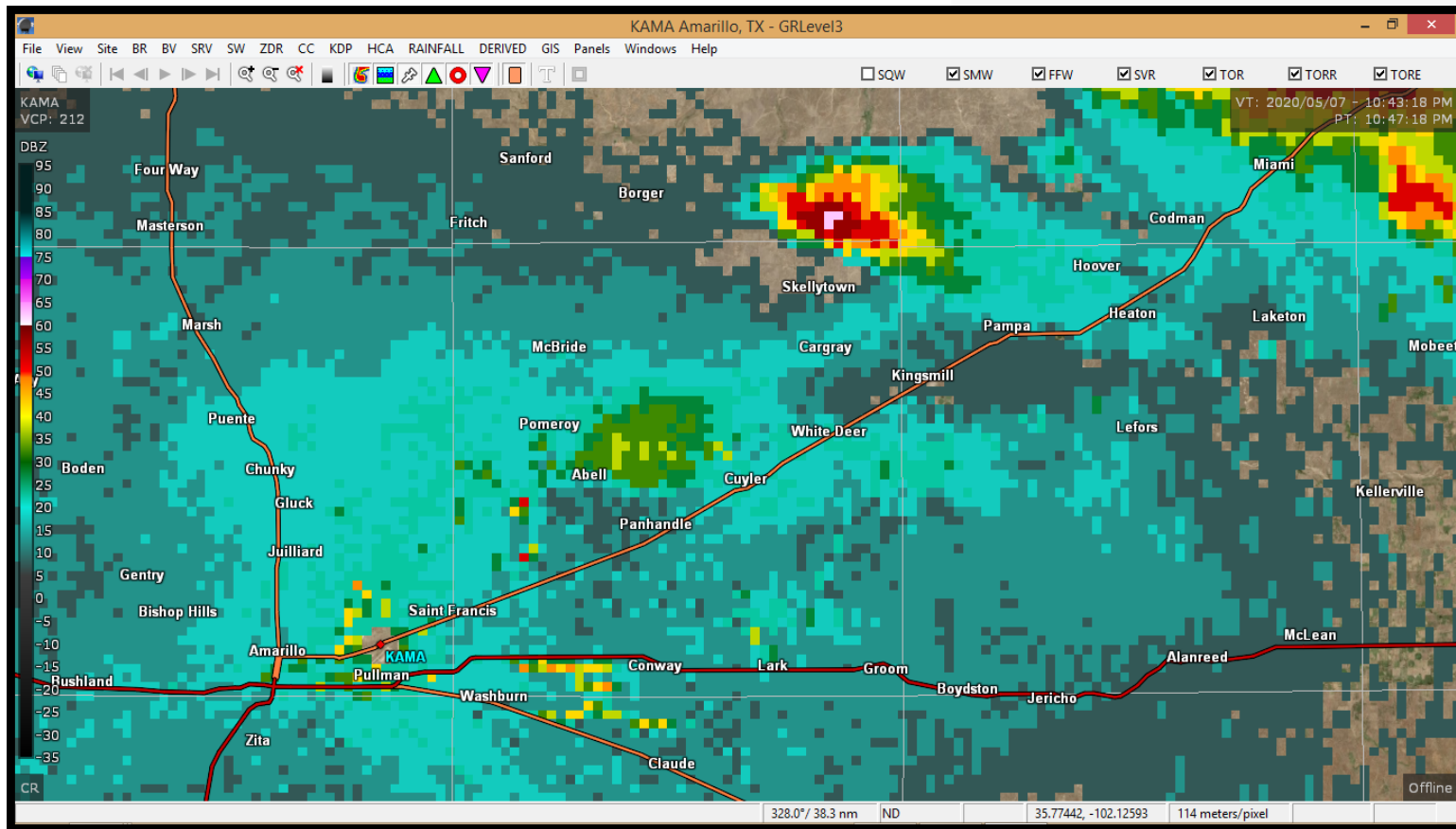




## KAMA 88-D – Cross-Section Scan – 22:39

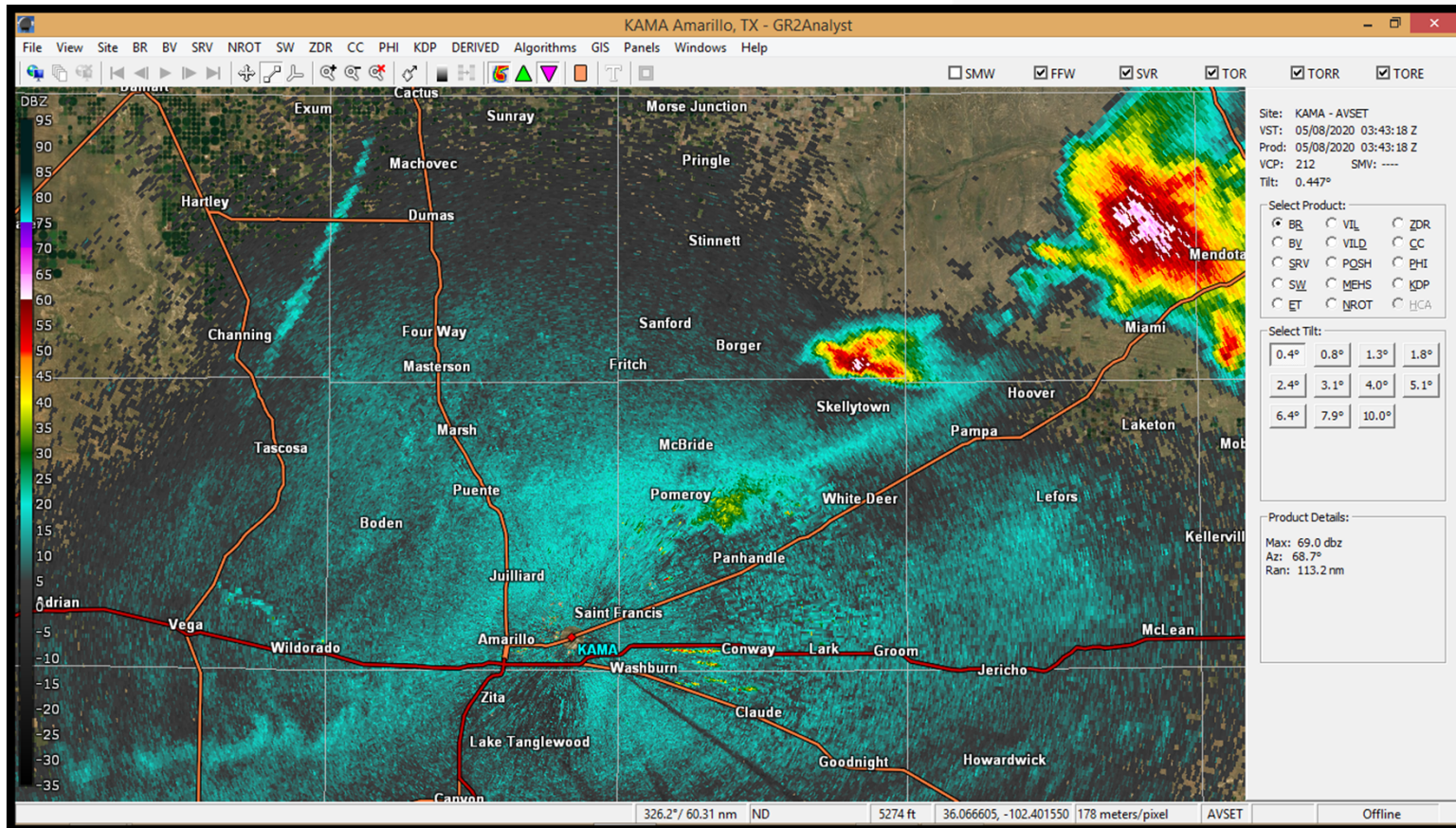


## KAMA 88-D – CR Scan – 22:43

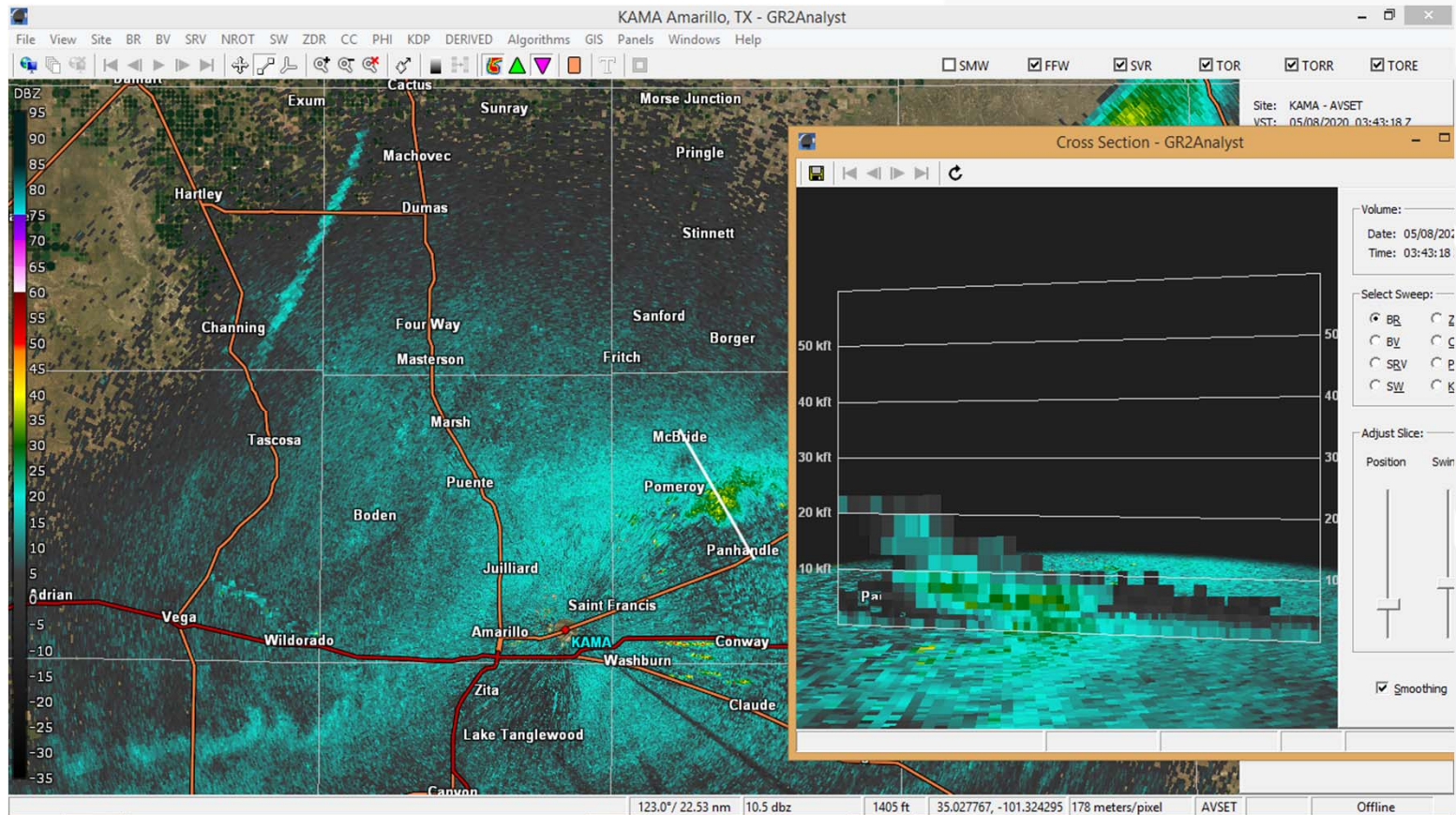




# KAMA 88-D – BR Scan – 22:43



## KAMA 88-D – Cross-Section Scan – 22:43





## Lessons Learned / Summary Of 5/7/20 Storm

1. The storm developed along multiple surface boundaries, but was “elevated” in nature

## Lessons Learned / Summary Of 5/7/20 Storm

1. The storm developed along multiple surface boundaries, but was “elevated” in nature
2. The storm appears to have reached a 35-40 dbz threshold around 22:04.



## Lessons Learned / Summary Of 5/7/20 Storm

1. The storm developed along multiple surface boundaries, but was “elevated” in nature
2. The storm appears to have reached a 35-40 dbz threshold around 22:04.
3. Pantex’s LMA detects “flash densities” at 22:11, or 7 minutes later.

## Lessons Learned / Summary Of 5/7/20 Storm

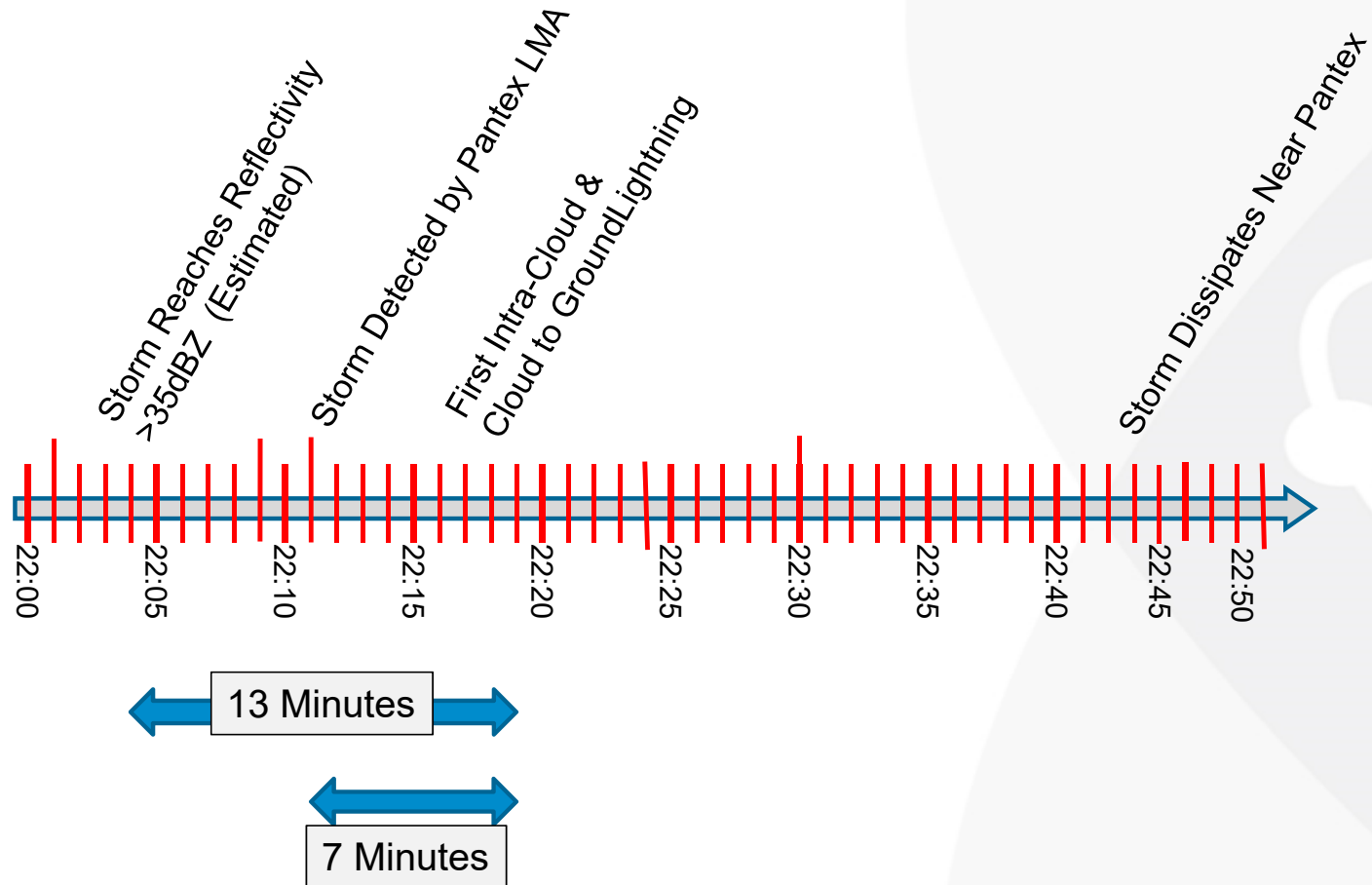
1. The storm developed along multiple surface boundaries, but was “elevated” in nature.
2. The storm appears to have reached a 35-40 dbz threshold around 22:04.
3. Pantex’s LMA detects “flash densities” at 22:11, or 7 minutes later.
4. The first intra-cloud (CC) and cloud-to-ground strikes occurred simultaneously at 22:17, just south of Fritch.



## Lessons Learned / Summary Of 5/7/20 Storm

5. We had 13 minutes of lead time between the first time the storm reached 35-40 dbz to the first CC/CG lightning strike.

## Timeline for May 7, 2020 Storm Event





Managed and Operated by  
Consolidated Nuclear Security, LLC

#### Copyright Notice

This document has been authored by Consolidated Nuclear Security, LLC, a contractor of the U.S. Government under contract DE-NA0001942, or a subcontractor thereof. Accordingly, the U.S. Government retains a paid-up, nonexclusive, irrevocable, worldwide license to publish or reproduce the published form of this contribution, prepare derivative works, distribute copies to the public, and perform publicly and display publicly, or allow others to do so, for U. S. Government purposes.

#### Disclaimer

This work of authorship and those incorporated herein were prepared by Consolidated Nuclear Security, LLC (CNS) as accounts of work sponsored by an agency of the United States Government under Contract DE-NA0001942. Neither the United States Government nor any agency thereof, nor CNS, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility to any non-governmental recipient hereof for the accuracy, completeness, use made, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency or contractor thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency or contractor (other than the authors) thereof.