



PERiLS: Texas Tech StickNet



Acknowledgements:

Kelcy Brunner

Billy Faletti

Jessie McDonald

Joshua Ostaszewski

Alex Schueth

Christopher Weiss

Texas Tech University

PERiLS Science Meeting – 16 November 2023



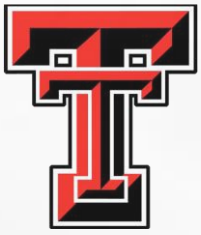
Texas Tech StickNet



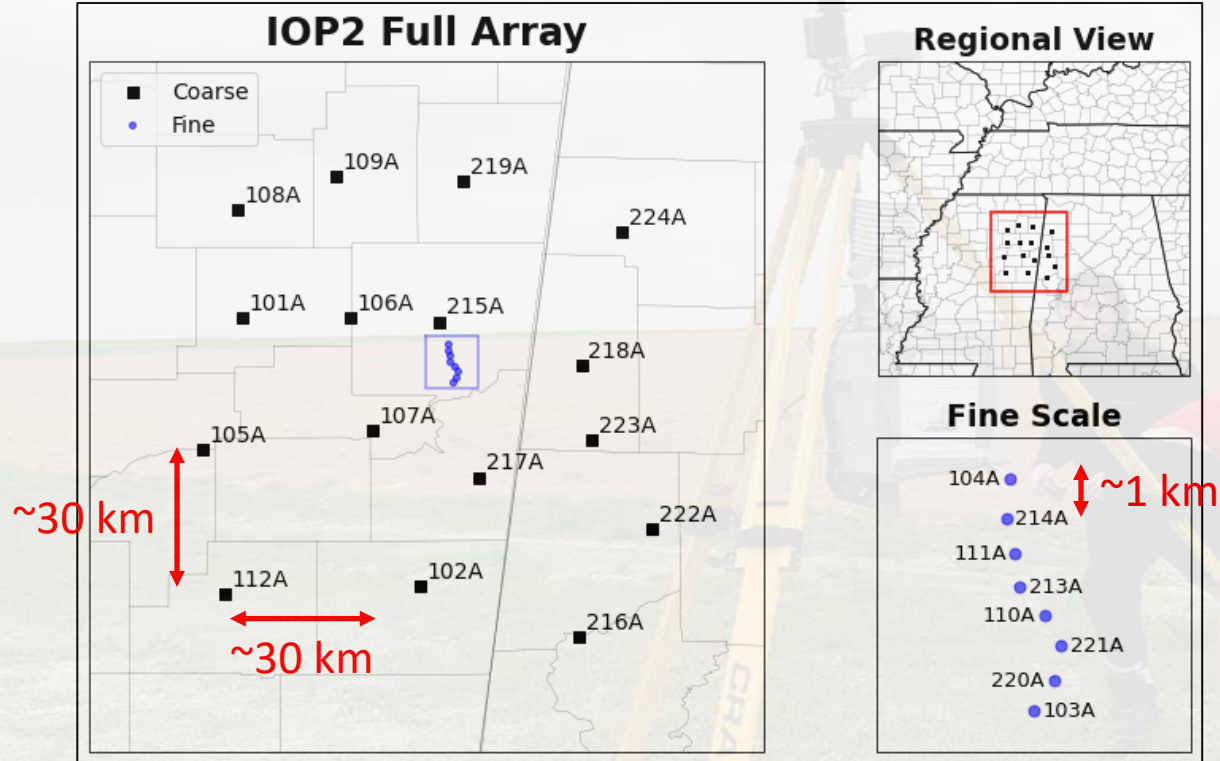
Courtesy: William Faletti

- 24 ruggedized surface weather stations
- High-frequency (10 Hz) sampling of temperature, humidity, pressure and wind
- Rapidly deployable (~2-3 min)
- Two outfitted trailers used to deliver, recharge and download data from StickNet probes





PERiLS Deployment Plan

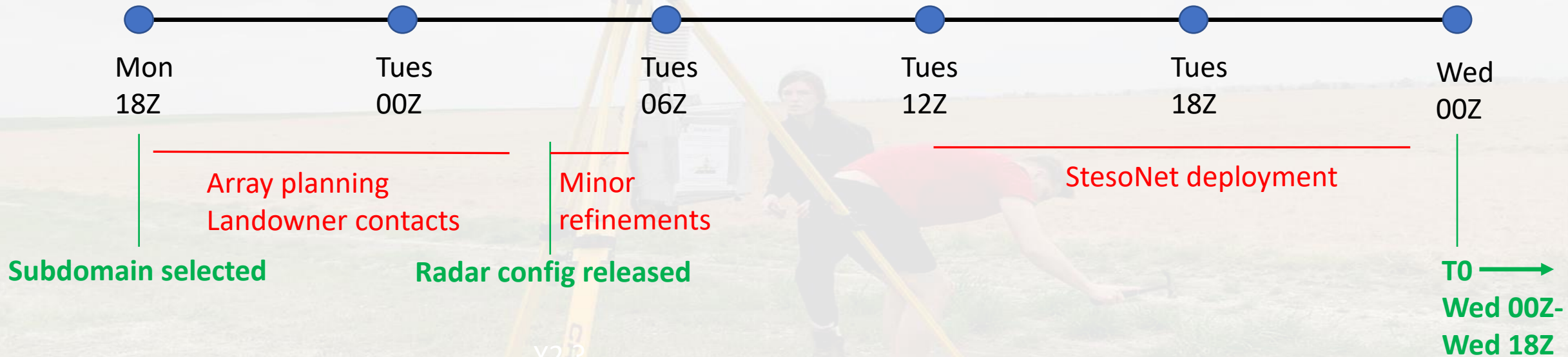


Mass test

- 16 of 24 probes dedicated to a coarse mesoscale array (the “StesoNet”)
 - Pre-scouted (have had contact with over 200 landowners)
 - Deployed the last full period of daylight prior to T₀
- Remaining 8 probes dedicated to a short-fused “fine” array, deployed within 60 min of main QLCS passage
- Mass tests conducted after each IOP

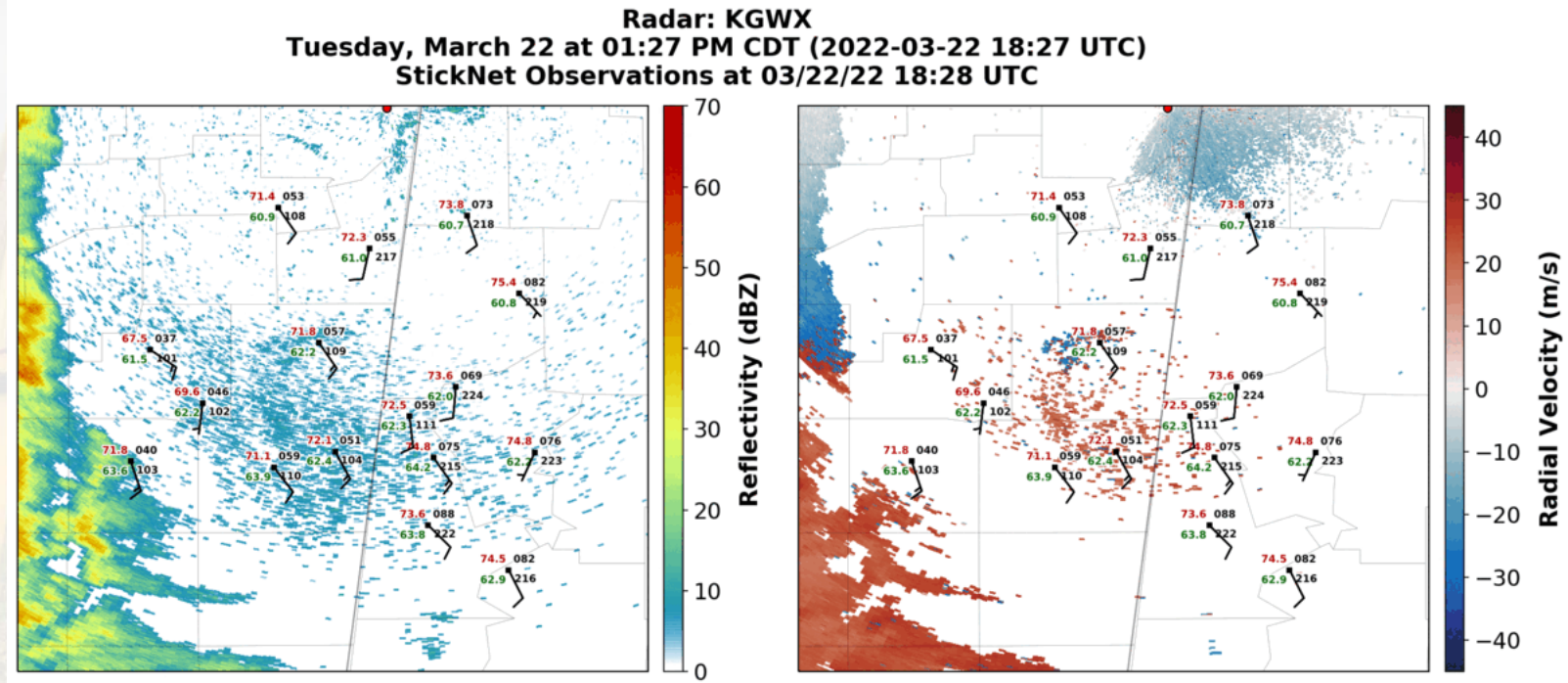
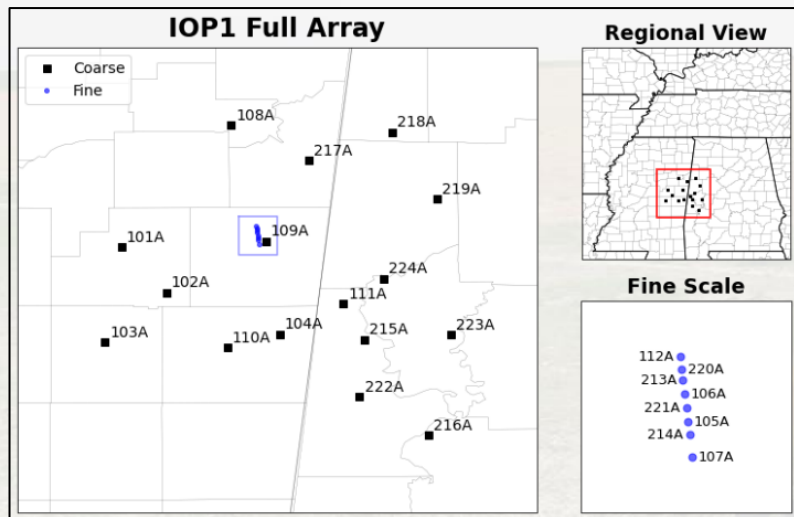


PERiLS Deployment Timeline





PERiLS Year 1 Deployment Summary – IOP 1

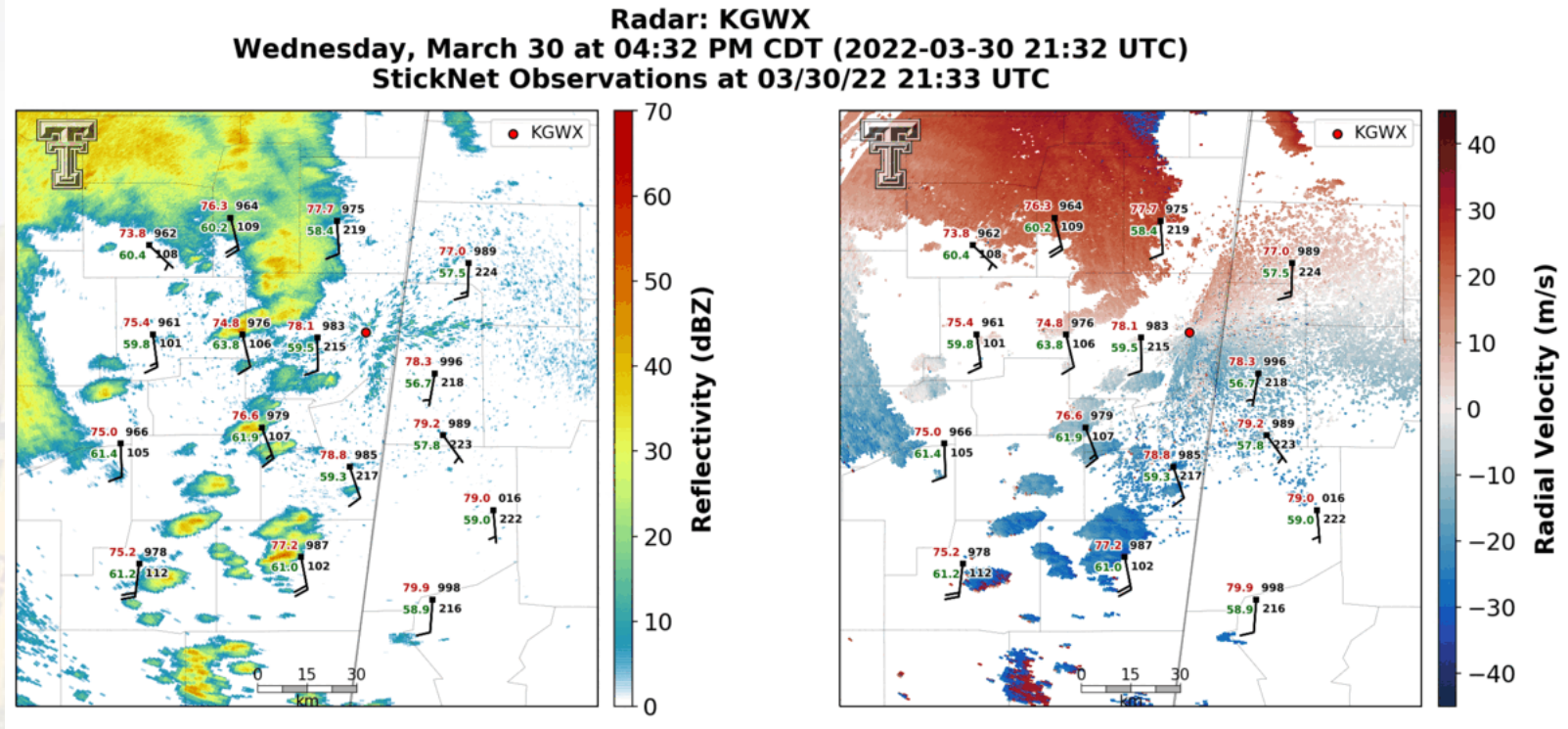
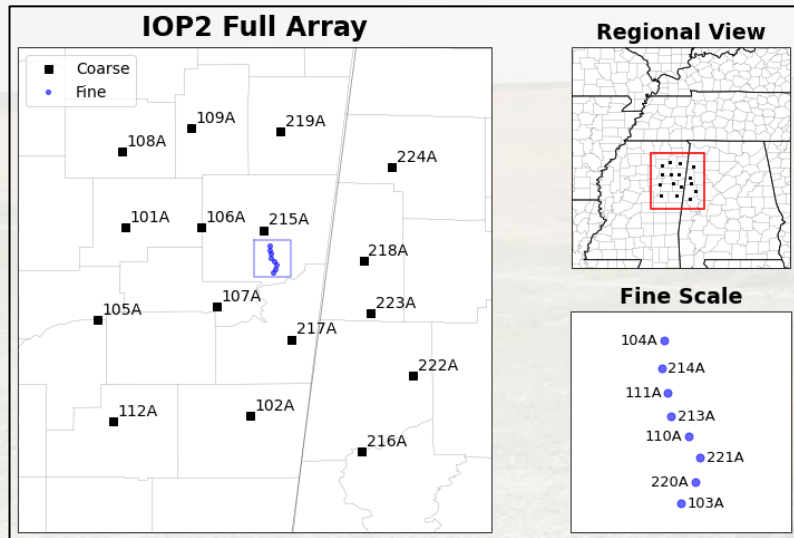


- Non-rotating
- QLCS mesovortex
- Supercell mesocyclone
- QLCS with nearby supercell mesocyclone
- QLCS MV with history of supercell MC

Storm Mode	IOP1	IOP2	IOP3	IOP4	TOTAL
Linear: NR	1	0	5	6	12
Linear: MV	3	22	11	16	52
MC	6	0	1	0	7
Mixed	16	0	2	0	18
Hybrid	4	2	3	0	9



PERiLS Year 1 Deployment Summary – IOP 2

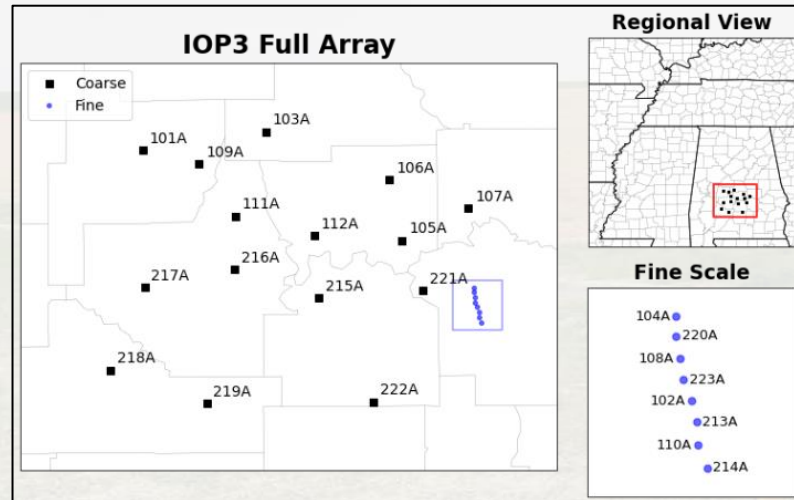


Non-rotating
 QLCS mesovortex
 Supercell mesocyclone
 QLCS with nearby supercell mesocyclone
 QLCS MV with history of supercell MC

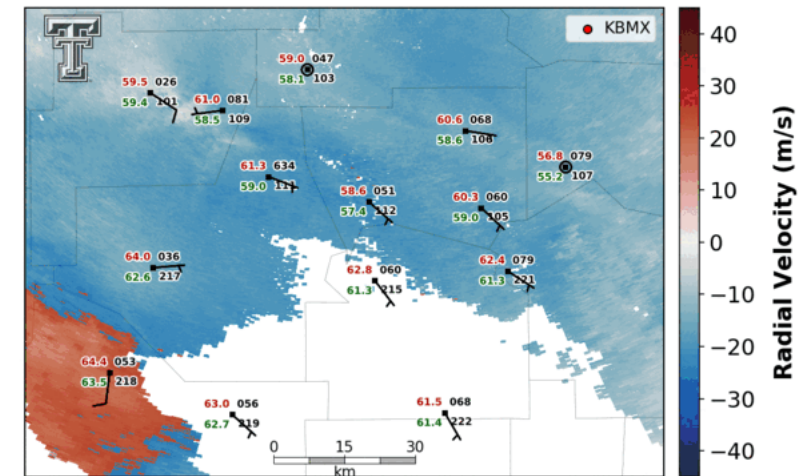
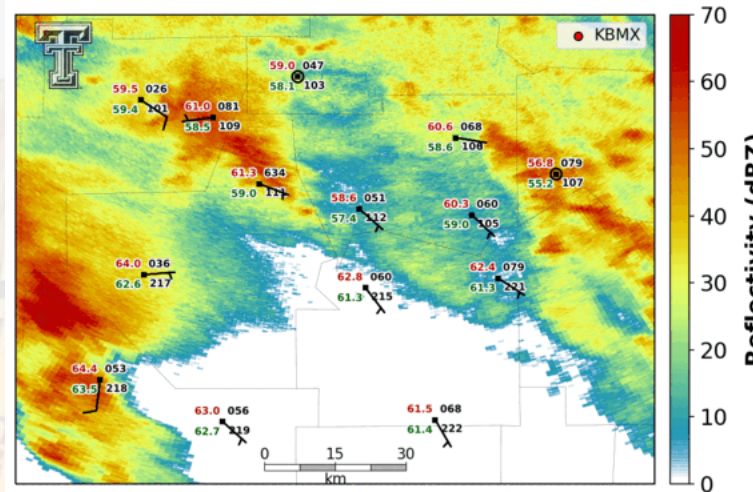
Storm Mode	IOP1	IOP2	IOP3	IOP4	TOTAL
Linear: NR	1	0	5	6	12
Linear: MV	3	22	11	16	52
MC	6	0	1	0	7
Mixed	16	0	2	0	18
Hybrid	4	2	3	0	9



PERiLS Year 1 Deployment Summary – IOP 3



Radar: KBMX
Tuesday, April 05 at 06:00 AM CDT (2022-04-05 11:00 UTC)
StickNet Observations at 04/05/22 11:01 UTC

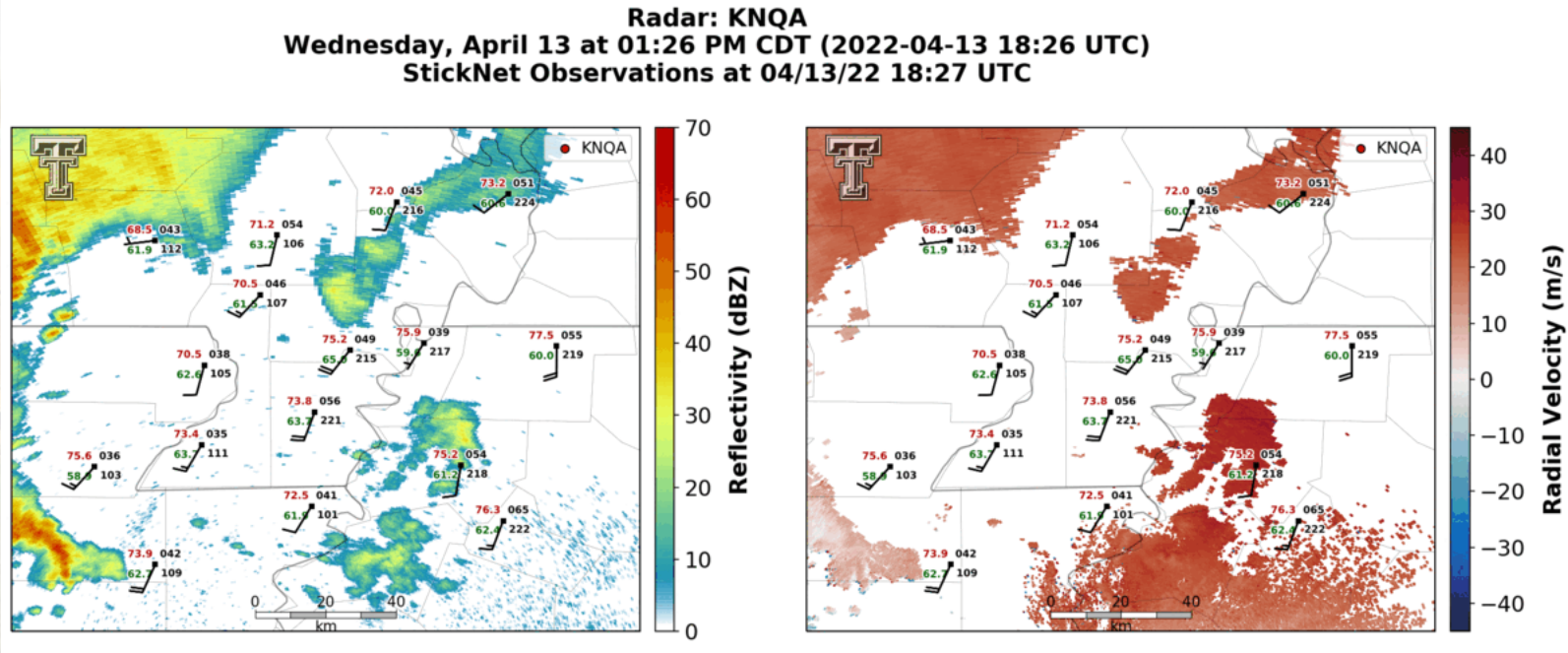
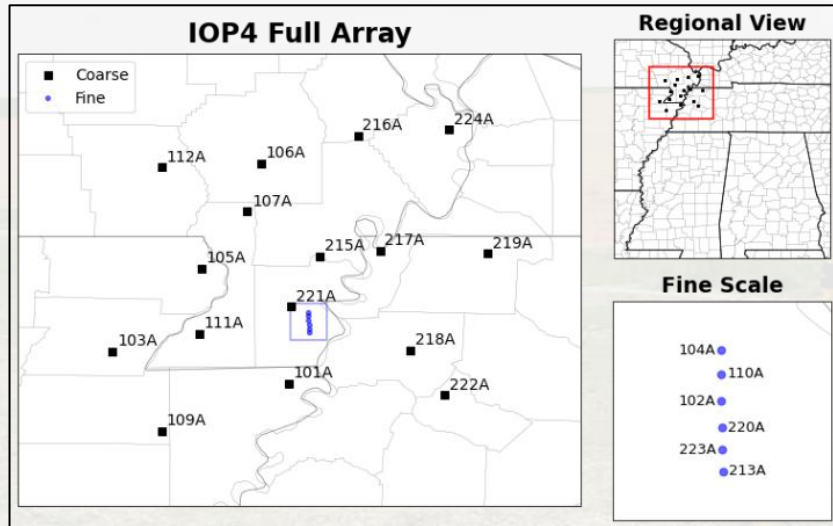


- Non-rotating
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- Supercell mesocyclone
- QLCS with nearby supercell mesocyclone
- QLCS MV with history of supercell MC

Storm Mode	IOP1	IOP2	IOP3	IOP4	TOTAL
Linear: NR	1	0	5	6	12
Linear: MV	3	22	11	16	52
MC	6	0	1	0	7
Mixed	16	0	2	0	18
Hybrid	4	2	3	0	9



PERiLS Year 1 Deployment Summary – IOP 4

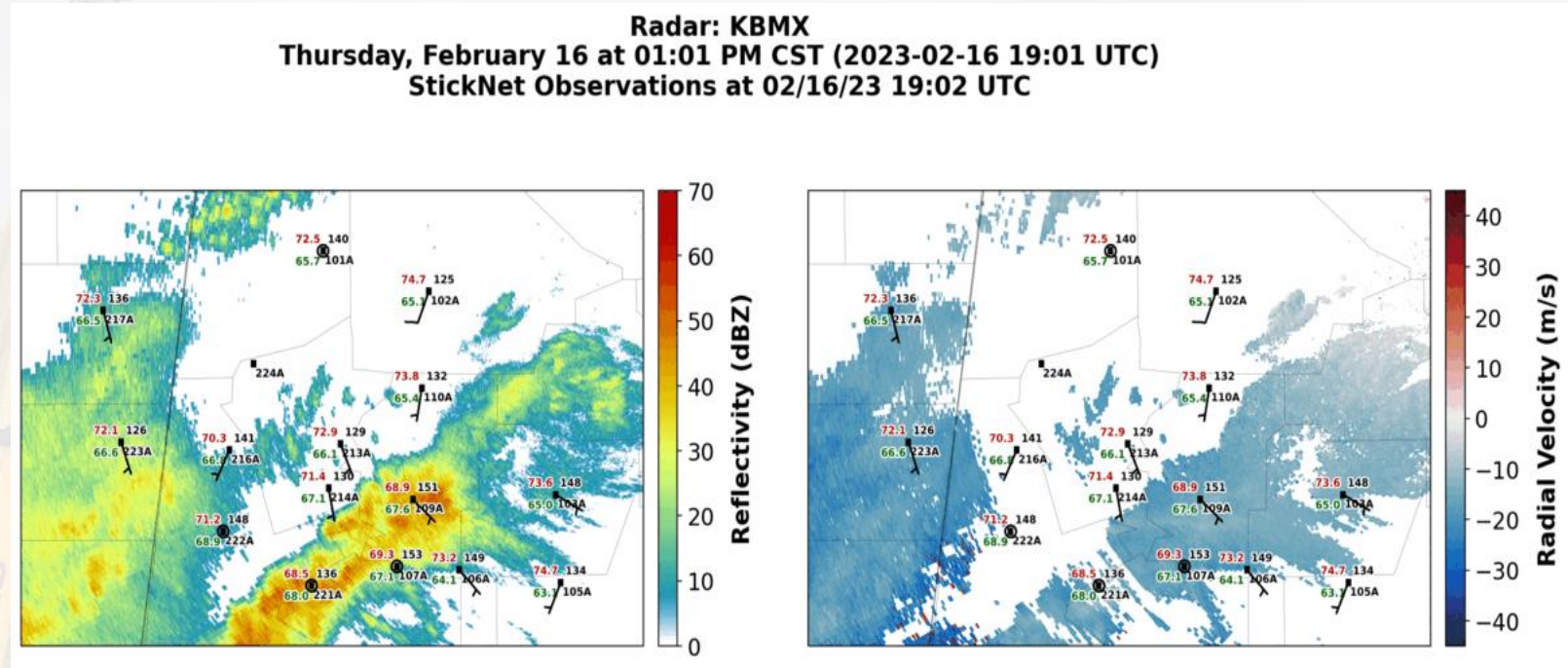
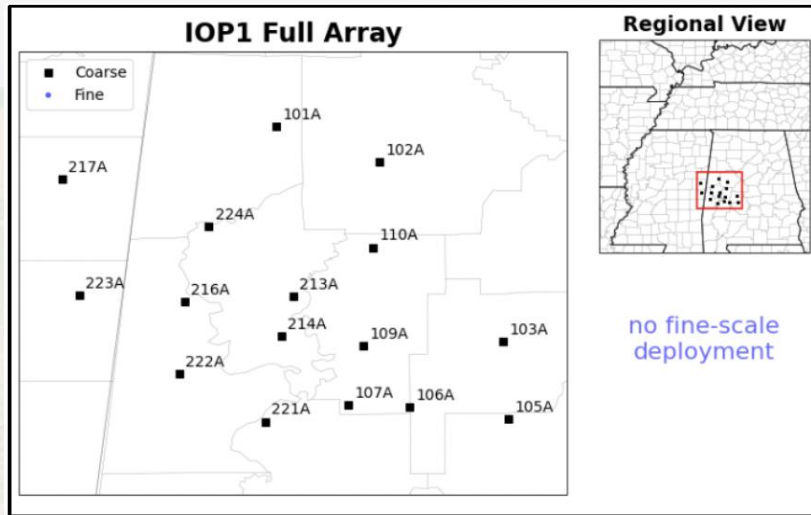


- Non-rotating
- QLCS mesovortex
- Supercell mesocyclone
- QLCS with nearby supercell mesocyclone
- QLCS MV with history of supercell MC

Storm Mode	IOP1	IOP2	IOP3	IOP4	TOTAL
Linear: NR	1	0	5	6	12
Linear: MV	3	22	11	16	52
MC	6	0	1	0	7
Mixed	16	0	2	0	18
Hybrid	4	2	3	0	9



PERiLS Year 2 Deployment Summary – IOP 1

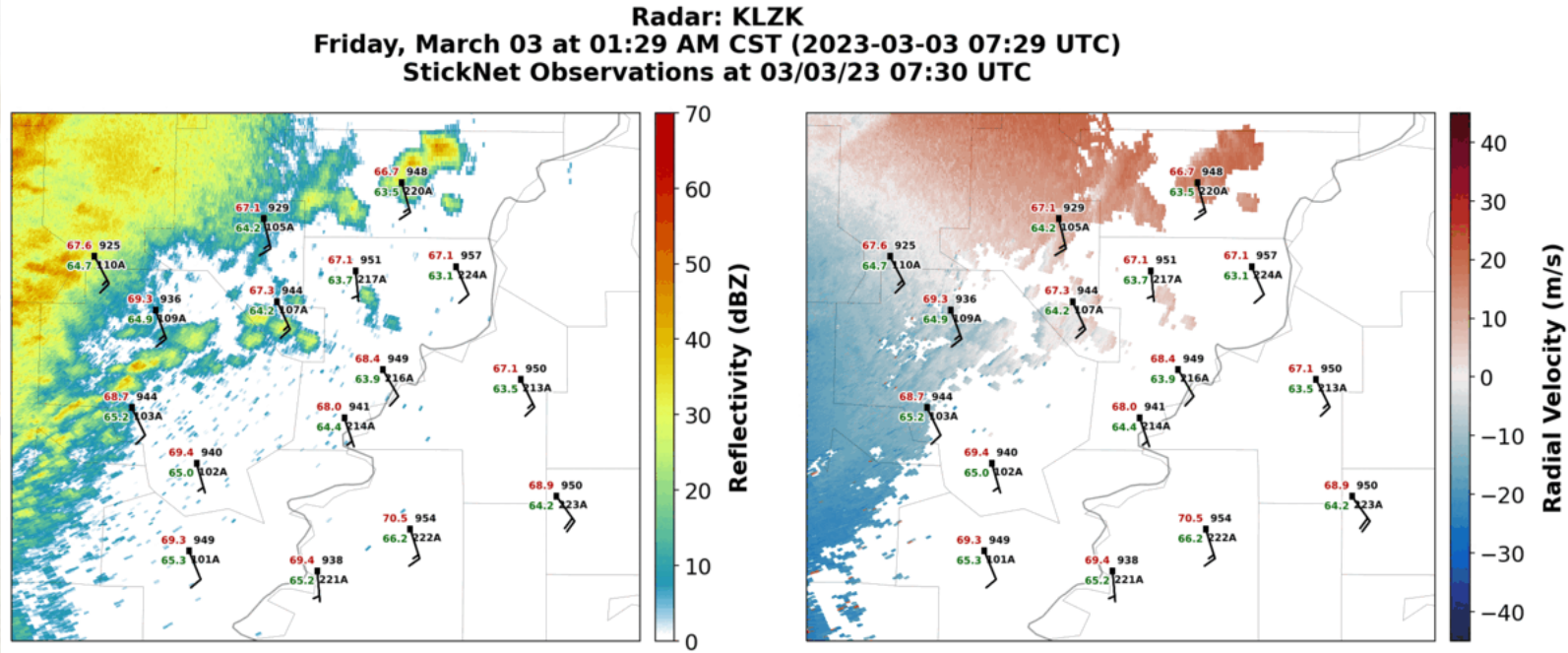
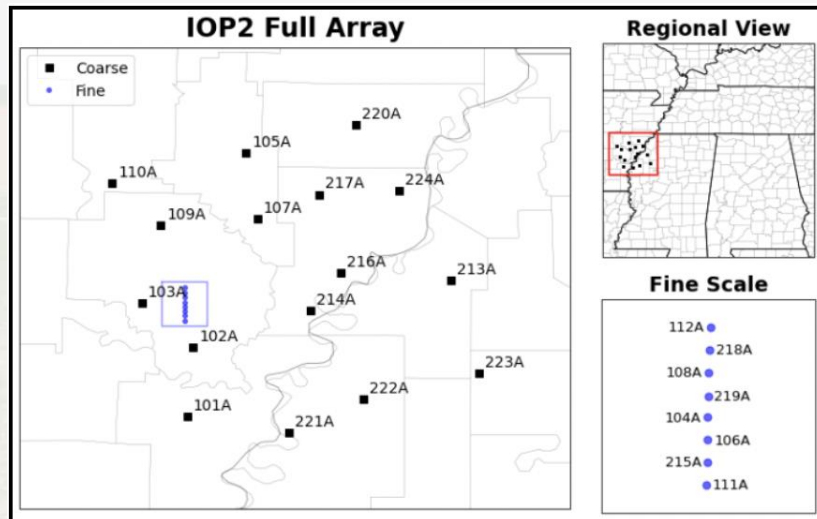


- Non-rotating
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- Supercell mesocyclone
- QLCS with nearby supercell mesocyclone
- QLCS MV with history of supercell MC

Storm Mode	IOP1	IOP2	IOP3	IOP4	IOP5	TOTAL
Linear: NR	0	11	0	0	0	11
Linear: MV	0	4	0	0	20	24
MC	0	17	26	28	0	71
Mixed	0	0	0	0	0	0
Hybrid	0	0	0	0	4	4



PERiLS Year 2 Deployment Summary – IOP 2

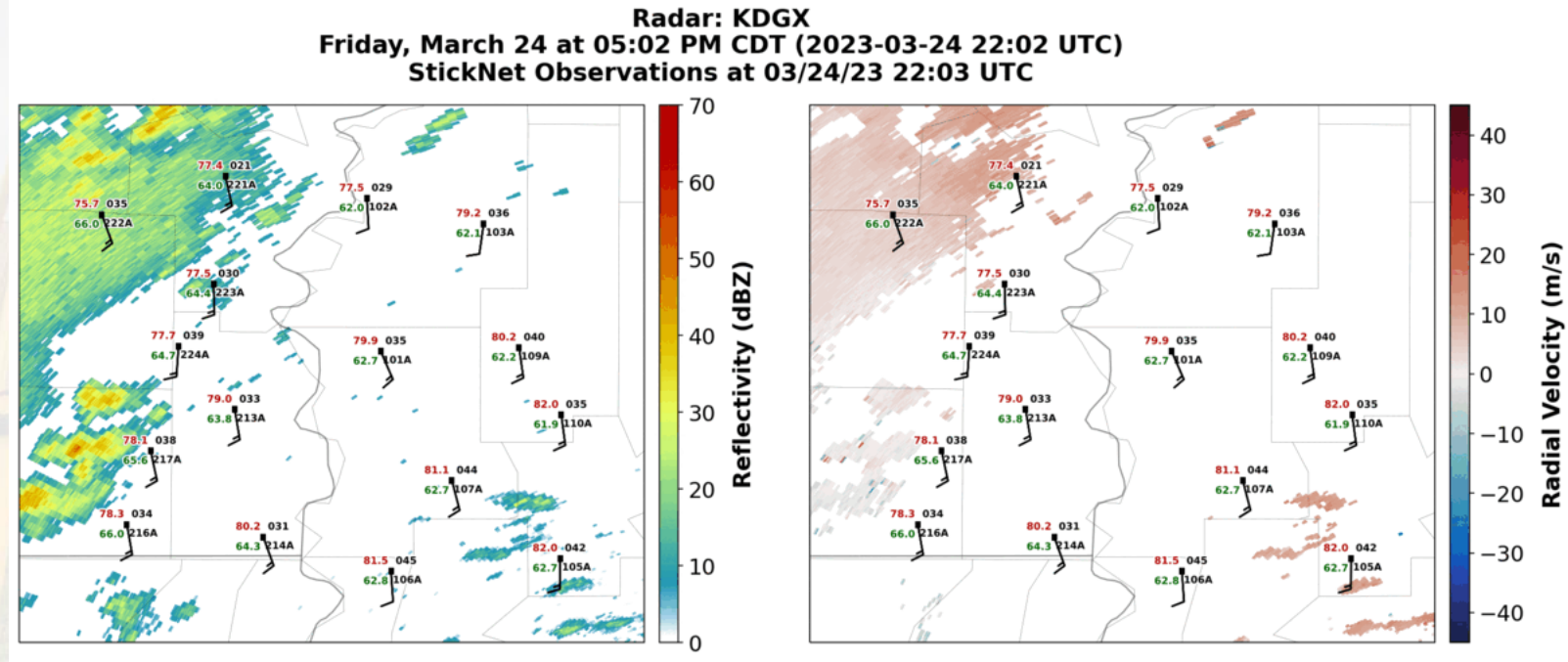
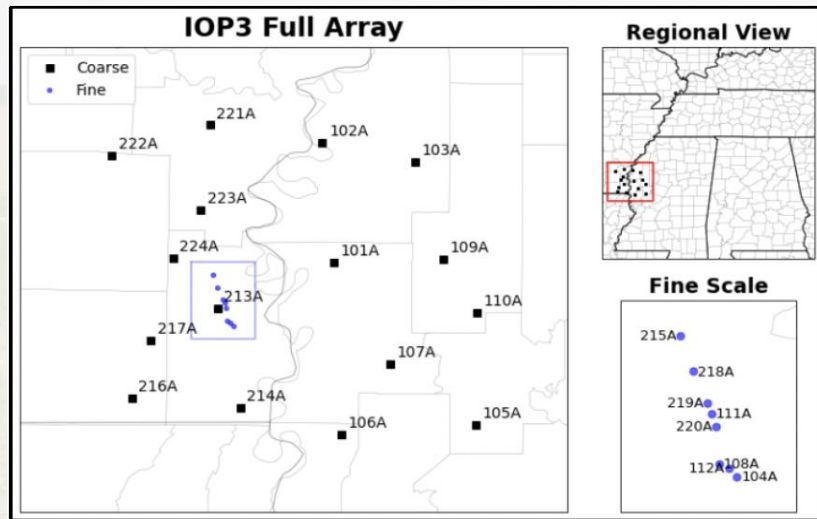


- Non-rotating
- QLCS mesovortex
- Supercell mesocyclone
- QLCS with nearby supercell mesocyclone
- QLCS MV with history of supercell MC

Storm Mode	IOP1	IOP2	IOP3	IOP4	IOP5	TOTAL
Linear: NR	0	11	0	0	0	11
Linear: MV	0	4	0	0	20	24
MC	0	17	26	28	0	71
Mixed	0	0	0	0	0	0
Hybrid	0	0	0	0	4	4



PERiLS Year 2 Deployment Summary – IOP 3

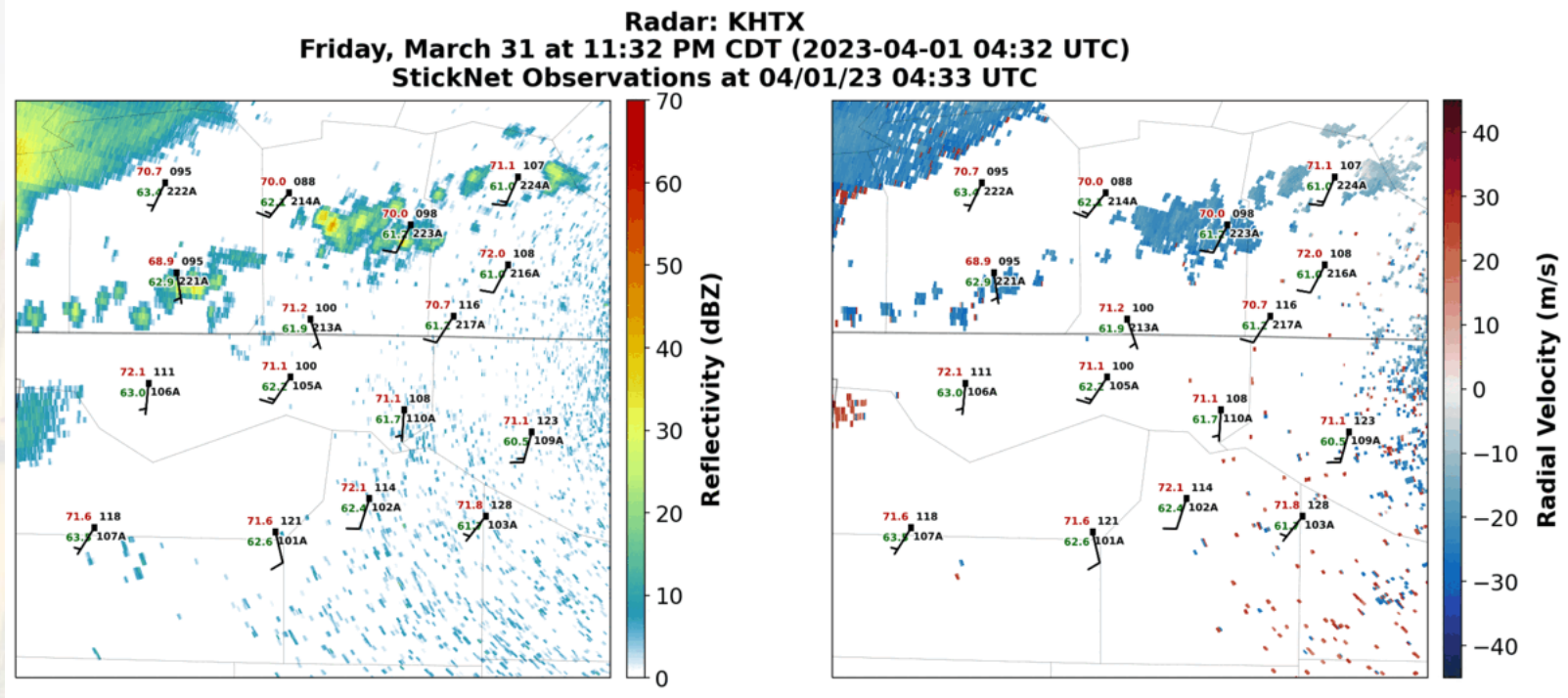
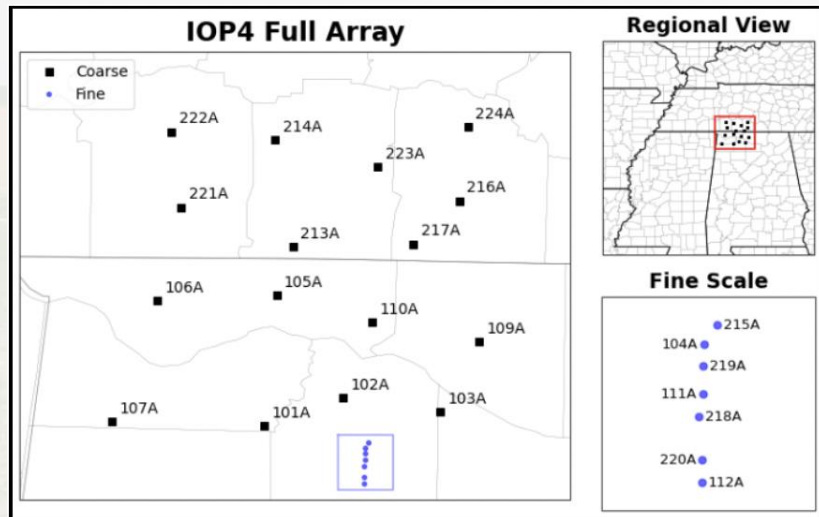


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Storm Mode	IOP1	IOP2	IOP3	IOP4	IOP5	TOTAL
Linear: NR	0	11	0	0	0	11
Linear: MV	0	4	0	0	20	24
MC	0	17	26	28	0	71
Mixed	0	0	0	0	0	0
Hybrid	0	0	0	0	4	4



PERiLS Year 2 Deployment Summary – IOP 4

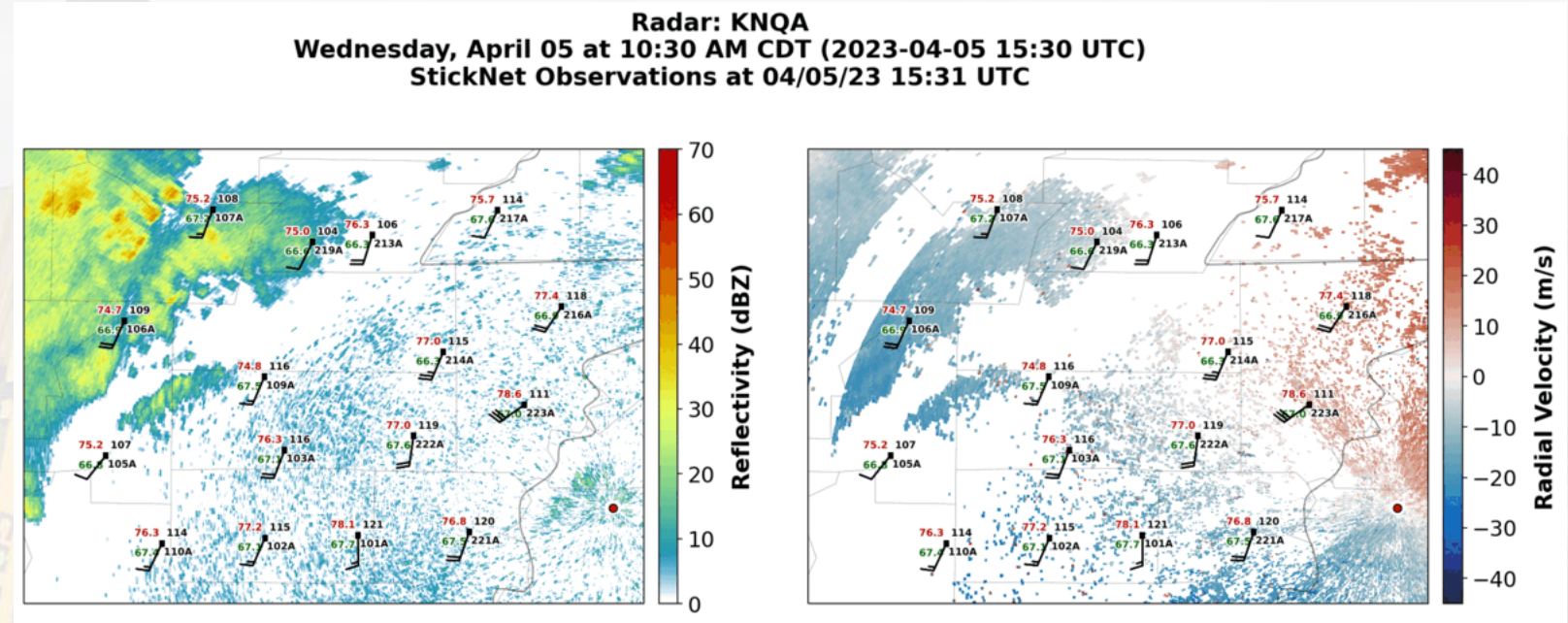
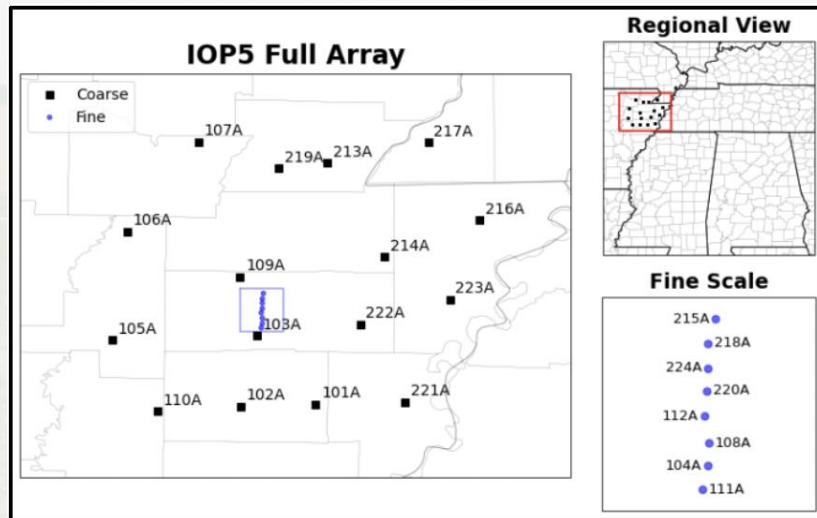


- Non-rotating
- QLCS mesovortex
- Supercell mesocyclone
- QLCS with nearby supercell mesocyclone
- QLCS MV with history of supercell MC

Storm Mode	IOP1	IOP2	IOP3	IOP4	IOP5	TOTAL
Linear: NR	0	11	0	0	0	11
Linear: MV	0	4	0	0	20	24
MC	0	17	26	28	0	71
Mixed	0	0	0	0	0	0
Hybrid	0	0	0	0	4	4



PERiLS Year 2 Deployment Summary – IOP 5



- Non-rotating
- QLCS mesovortex
- Supercell mesocyclone
- QLCS with nearby supercell mesocyclone
- QLCS MV with history of supercell MC

Storm Mode	IOP1	IOP2	IOP3	IOP4	IOP5	TOTAL
Linear: NR	0	11	0	0	0	11
Linear: MV	0	4	0	0	20	24
MC	0	17	26	28	0	71
Mixed	0	0	0	0	0	0
Hybrid	0	0	0	0	4	4

Data Quality Control

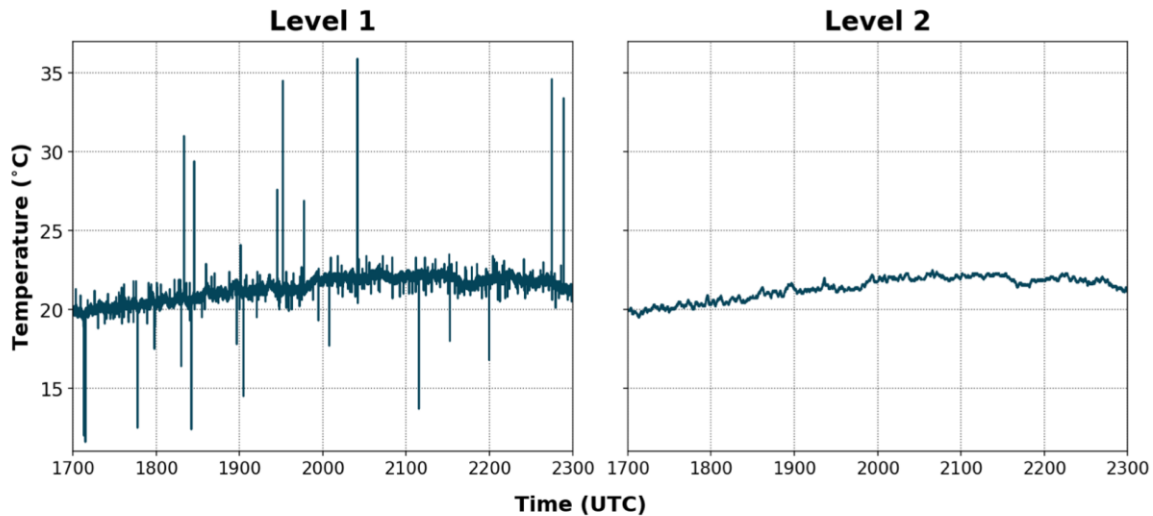
The data are available at 3 different levels:

Level 1: Raw 10-Hz data. The data are run through a QC algorithm (see Section 3.0) to flag potentially erroneous data. No other quality control or processing is done.

Level 2: Processed 1-Hz data. Any data flagged in the QC algorithm are removed. The data are also run through a Fourier transform filter (see Section 3.0) to remove high frequency noise, and the data are averaged to 1 Hz.

Level 3: Level 2 data that has been bias corrected. The biases are determined using mass tests that were done immediately after each IOP deployment (see Section 3.0). ***Recommended for analysis work.***

Below is a 6-hour example time series (101A from IOP1) of Level 1 and Level 2 data. Level 3 is identical to Level 2, but with a scalar offset due to the bias correction.

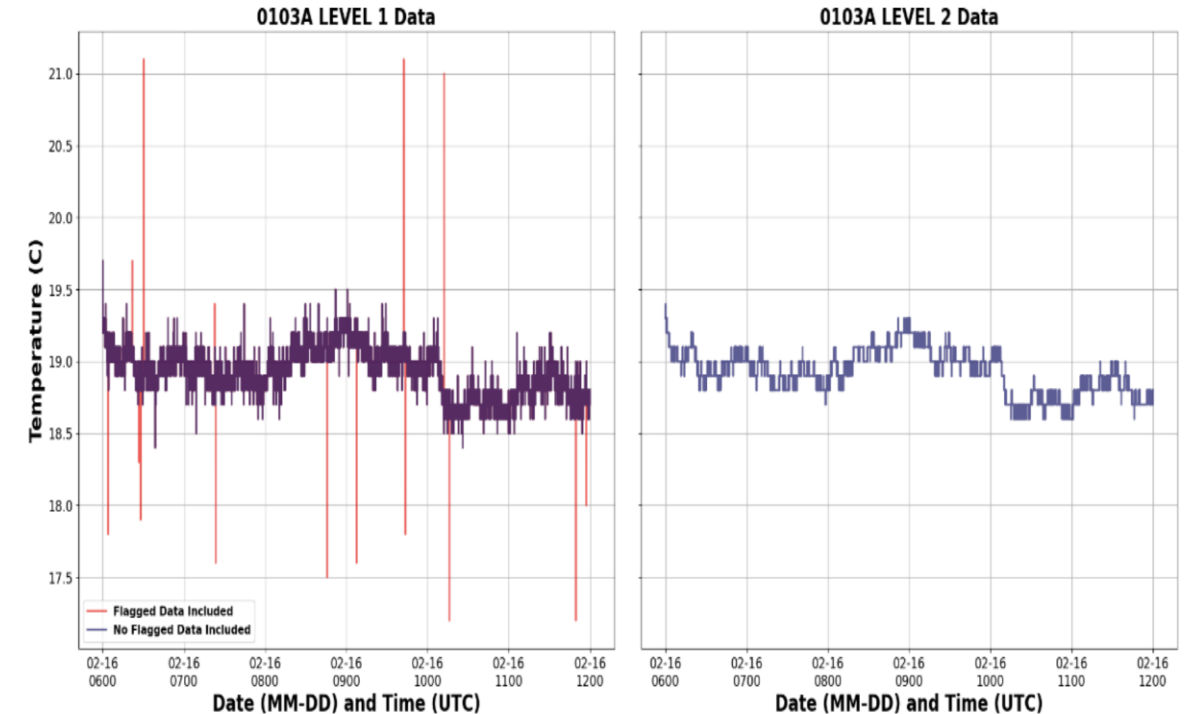


2022

The data are available at two different levels:

Level 1: Raw 10-Hz data. The data are run through a QC algorithm (see Section 3.0) to flag potentially erroneous data. No other quality control or processing is done.

Level 2: Processed 1-Hz data. Level 1 data are averaged to 1-Hz and has been bias corrected. The biases are determined using mass tests that were done immediately after each IOP deployment (see Section 3.0). ***Recommended for analysis work.***



2023



Data Format



DATA FILES:

Each file name depicts the probe ID, IOP number, and data level (see Sections 1.0 and 3.0).

Sample: 0102A_IOP1_level2.csv

Probe: 0102A
IOP: IOP1
Level: Level 2

The data is output in the following order: Time, T, RH, P, WS, and WD. Each file contains a header with this information.

Variable	DATA UNITS Units
Time:	UTC format: YYYY-MM-DD HH:mm:ss (year-month-day hour:minute:second)
Temperature:	°C
Relative Humidity:	%
Barometric Station Pressure:	hPa
Wind Speed:	m s ⁻¹
Wind Direction:	deg

Sample: 2022-03-21 18:13:11, 12.0, 41.8, 984.9, 0.3, 170.4

Time: 3 March 2021, 18:13:11 UTC
T: 12.0 °C
RH: 41.8%
P: 984.9 hPa
WS: 0.3 m s⁻¹
WD: 170.4 deg



Data Availability

- All data from 2022 and 2023 have been uploaded to EOL
- Questions/Issues? Chris.Weiss@ttu.edu

