TEXAS TECH UNIVERSITY STICKNET DOCUMENTATION FOR THE MESO18-19 DEPLOYMENT

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1.0 DATA SET OVERVIEW

This document provides information concerning the Texas Tech University StickNet probe data sampling details and data structure from the Vortex SE Meso18-19 field campaign. Primarily, the details concern the array of 24 stationary probes deployed throughout the project in a mesonetwork from the end of November 2018 through April 2019. The mesonetwork was deployed across southern TN and northern Alabama.

GEOGRAPHICAL LOCATIONS

| Probe ID	Latitude	Longitude	Elevation (m)	Compass Heading (deg; GPS obtained)
0101A	35.304500	-87.518500	317	180
0102A	34.215100	-87.161700	240	160
0103A	34.855300	-86.001600	516	190
0104A	35.323700	-86.634900	229	183
0105A	34.930900	-86.976400	254	177
0106A	34.725500	-87.462400	176	210
0107A	34.295700	-87.587000	285	157
0108A	35.371800	-86.099800	324	182
0109A	34.622400	-86.080000	195	182
0110A	34.617500	-87.101400	187	176
0111A	35.038000	-87.471900	235	225
0112A	35.339100	-87.032400	224	181
0213A	34.843720	-87.274860	213	182
0214A	34.479486	-87.308636	196	180
0215A	34.163200	-86.334100	279	183
0216A	33.936120	-86.608950	154	215
0217A	34.457073	-86.920159	213	181
0218A	34.207560	-86.802280	246	170
0219A	34.901334	-86.538512	234	176
0220A	34.727760	-86.792770	219	182
0221A	33.913930	-87.530571	240	185
0222A	33.837760	-86.201200	179	183
0223A	33.823410	-87.069730	93	175
0224A	34.550250	-86.558090	174	177

2.0 INSTRUMENT DESCRIPTION

The StickNet is an approximately 2-m tall observing station that records temperature, relative humidity, pressure, wind direction, and wind speed (Weiss and Shroeder 2008). They have been used in many field campaigns to document thermodynamic data in the presence of convection (Skinner et al. 2011, Weiss et al. 2015, Klees et al. 2016). During Meso18-19, the StickNets were connected to a solar panel, allowing them to gather data for extended periods of time unattended.

STICKNET INSTRUMENT SPECIFICATIONS

Instrument	Model	Accuracy
Wind	R.M. Young 05103V	WS $\pm$ 1 m s^{-1} WD $\pm$ 3 deg
T/RH	R.M. Young 41382 **OR** Campbell Scientific HMP45C	T $\pm$ 0.3 C RH $\pm$ 2%

STICKNET WITH LABELED COMPONENTS
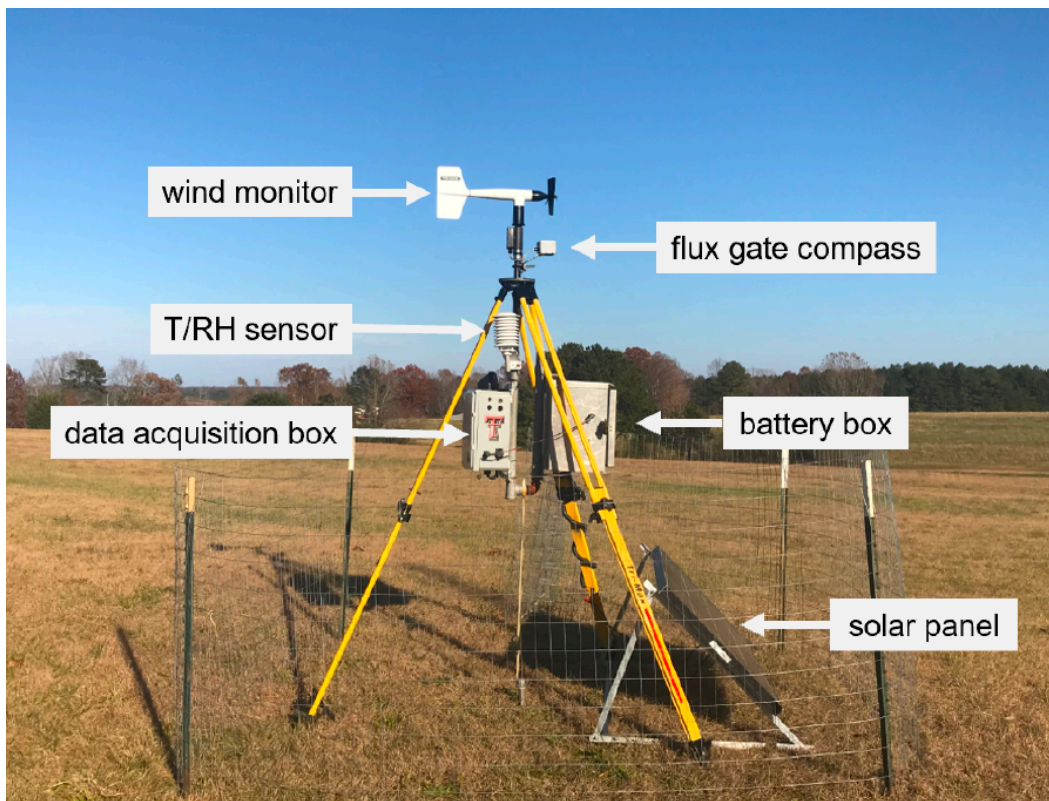
3.0 DATA COLLECTION AND PROCESSING

All data have been run through an objective QC algorithm. Two flags have been appended to the end of each data string:
  ⇒ a thermodynamic flag (tflag) for potentially erroneous values of T, RH, and/or P
  ⇒ a kinematic flag (wflag) for potentially erroneous values of WS and/or WD

Each data file contains StickNet data for one day for a single probe. The sampling rate is 10 Hz.

Bias correction was applied for all data where appropriate. Biases were determined with mass tests before (pre) and after (post) the project. The biases in the table below were subtracted from the corresponding StickNet data. An "X" means the bias information is missing. Due to a sensor change on Feb 4, 0219A has two different biases, one for the new sensor and one for the old.

MESO18-19 STICKNET BIASES

Probe ID	T	P	RH	Mass Test Used
0101A	0.00	0.00	-0.50	post
0102A	0.00	-2.00	0.00	pre
0103A	0.00	0.75	0.00	pre
0104A	X	X	-1.25	post
0105A	-0.50	0.50	-1.00	pre
0106A	0.00	2.50	0.00	pre
0107A	0.00	X	0.00	post
0108A	0.00	1.00	0.00	post
0109A	0.00	0.00	0.00	post
0110A	0.00	0.00	0.50	post
0111A	0.00	-1.25	0.75	post
0112A	0.00	-0.75	-0.50	post
0213A	0.00	-3.00	-1.75	post
0214A	0.00	-0.50	0.50	post
0215A	0.00	0.50	-0.50	post
0216A	0.00	0.50	0.50	post
0217A	-0.50	-1.00	0.00	post
0218A	0.00	0.00	0.50	post
0219A < 2/4	-0.50	0.00	0.50	pre
0219A > 2/4	-0.50	3.00	0.50	post
0220A	0.00	0.00	0.00	post
0221A	0.50	0.00	1.75	post
0222A	0.00	4.75	1.50	post
0223A	0.00	-0.75	-1.00	post
0224A	0.00	0.00	0.00	post

4.0 DATA FORMAT

⇒ FILENAME

Each file name depicts the probe ID and the day of record.

Sample: 0102A_20190401.csv
    Probe: 0102A
    Date: April 1, 2019

⇒ DATA

The following units represent the data collected:

Time: YYYY-MM-DD HH:mm:ss.s UTC, YYYY - year; MM - month; DD - day; HH - hour; mm - minute; ss - second; s - tenth of second
Temperature: C
Relative Humidity: %
Barometric Station Pressure: hPa
Wind Speed: m s^{-1}
Wind Direction: deg
Voltage: V

Sample: 2019-04-01 23:25:57.500,12.0,41.8,984.9,0.3,170.4,10.7,0,0,0216
    Time: 2016-02-27 23:25:57.500
    T: 12.0 C
    RH: 41.8 %
    P: 984.9 hPa
    windsp: 0.3 m/s
    winddir: 170.4 deg
    batt: 10.7 V
    tflag: 0, Thermo data passed QC
    wflag: 0, Wind data passed QC
    ID: 0216(A)

If a data point does not pass the QC algorithm, the corresponding flag (tflag or wflag) is set to 1, otherwise it is set to 0.
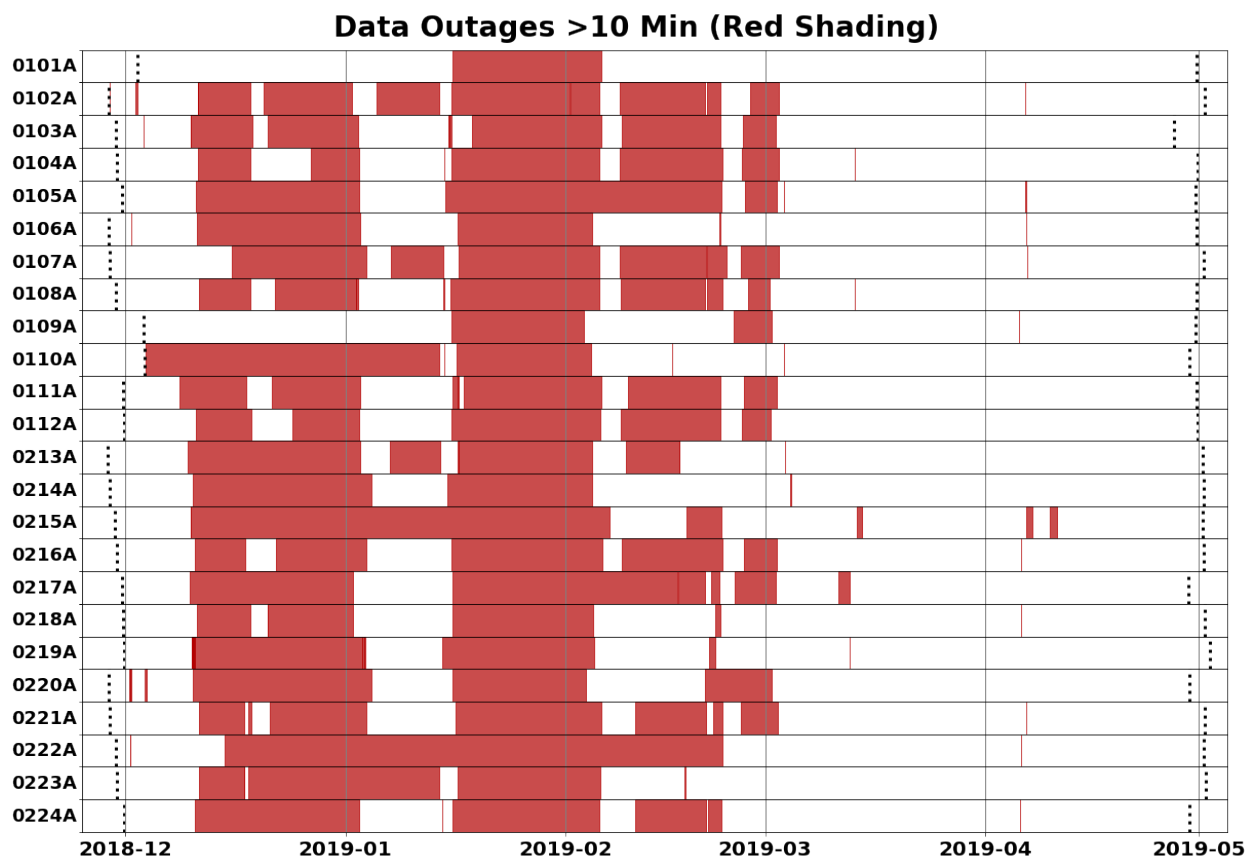
5.0 DATA REMARKS

Data gaps exist within daily files when stations were turned off for troubleshooting, power was lost, or data were severely corrupted. From approximately 20190115 to 20190205, no data were collected due to the government shutdown.

A full 24-hour data file is approximately 55 MB in size.

Please refer to the following figure for data outages. Red shading show periods where data collection was interrupted. The dotted, vertical, black lines denote the beginning and end of data collection for each StickNet.

Data Outages >10 Min (Red Shading)

5.0 DATA REMARKS CONTINUED

⇒ Important information affecting StickNet data

ID	Date (if applicable)	Comment
0105A	20181216	Station relocated 25 yards to south.
0217A	201903XX	Water intrusion issues. During precipitation, temperature could decrease well below 0 C, and RH exceeds 100%
0219A	20190204	T/RH sensor replaced. Previous sensor was showing a cool/dry bias that was not corrected in bias corrections.
0222A	20190218-22	T/RH sensor 20 C too hot.
0223A		By end of project, one of the legs had sunk down, causing ~4 deg tilt towards the north. Effect on wind measurements likely minimal.

6.0 REFERENCES

Klees, A.M., Y.P. Richardson, P.M. Markowski, C. Weiss, J.M. Wurman, and K.K. Kosiba, 2016: Comparison of the Tornadic and Nontornadic Supercells Intercepted by VORTEX2 on 10 June 2010. *Mon. Wea. Rev.,* **144**, 3201–3231, https://doi.org/10.1175/MWR-D-15-0345.1

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