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New York State Mesonet Profiler Network Data

The data described here are created by New York State Mesonet at University at Albany.
In the event that the data are used for any form of publications, please use the following statement in the acknowledgement:

"This research is made possible by the New York State (NYS) Mesonet. Original funding for the NYS Mesonet was provided by Federal Emergency Management Agency grant FEMA-4085-DR-NY, with the continued support of the NYS Division of Homeland Security & Emergency Services; the state of New York; the Research Foundation for the State University of New York (SUNY); the University at Albany, SUNY; the Atmospheric Sciences Research Center (ASRC) at SUNY Albany; and the Department of Atmospheric and Environmental Sciences (DAES) at SUNY Albany."

1. Introduction

The New York State (NYS) Mesonet (http://nysmesonet.org) is a new advanced, statewide weather station network that provides unprecedented weather information across the state. This network is the first of its kind in New York. Unique in the world is a subset of 17 stations known as the Profiler Network (see map below). Site metadata including latitude, longitude, elevation, county, commissioned date are listed in Appendix A with additional information provided at: http://nysmesonet.org/about/sites#network

2. Instrumentation

The 17 station Profiler Network sites are equipped with sensors for measuring vertical profiles of wind, temperature, and moisture. These sensors include a LiDAR, microwave radiometer, and environmental sky imaging radiometer (eSIR).

Every Profiler station consists of two deployment suites: (1) A Standard Site installed at ground level; and (2) A Profiler Site installed on a nearby rooftop, or as in the case at Albany, at the local airport. Most Profiler sites are deployed within 0.5 km of a Standard site. Profiler site sensors are connected directly to utility power and Ethernet. This ensures that the high volume of data at each Profiler site can be accessed in real-time. Some processing of the Profiler data is done at the site before transmission to UAlbany.

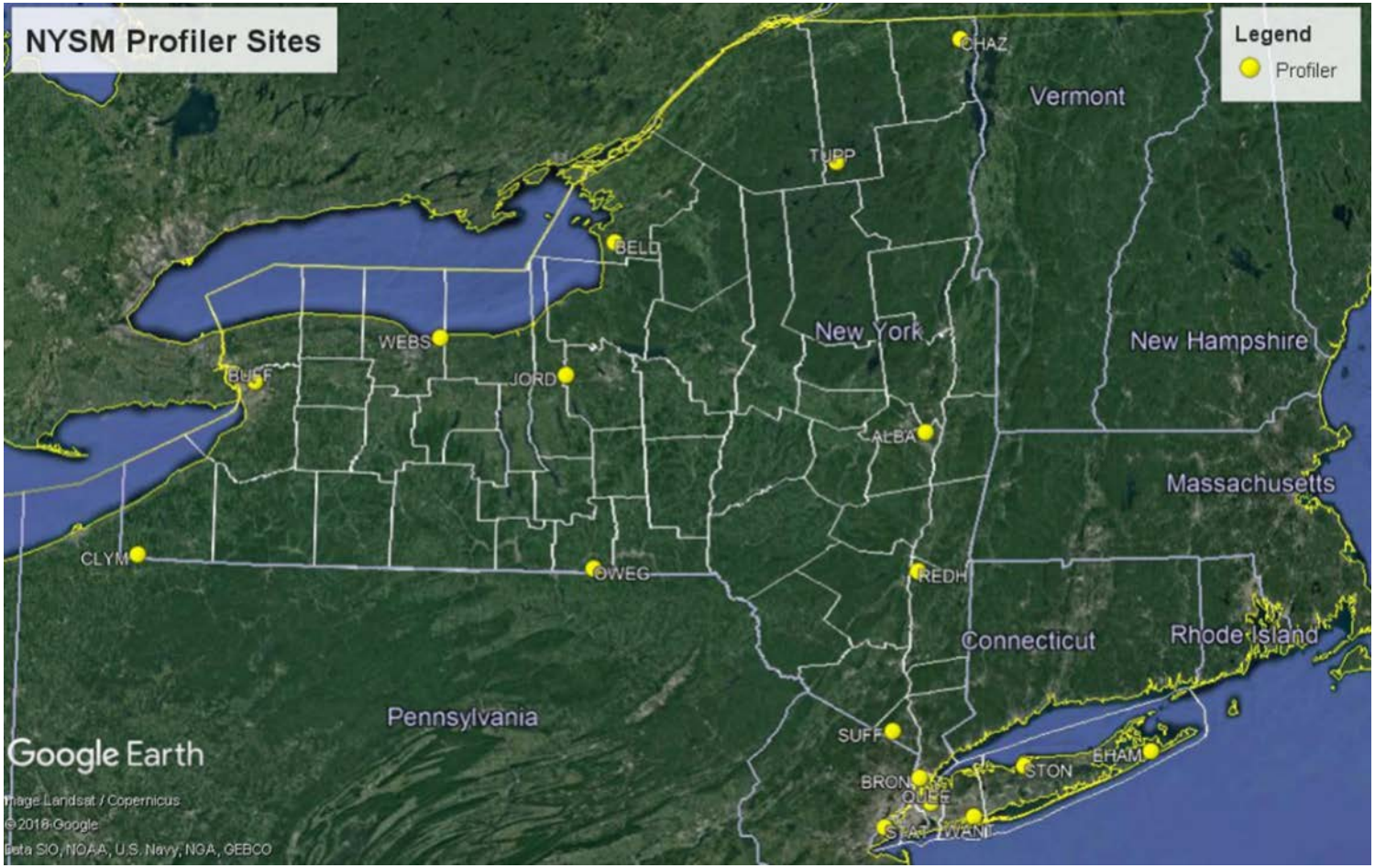

Fig. 1: Network of 17 Profiler stations, each equipped with a LiDAR, microwave radiometer and environmental sky imager radiometer (eSIR).

A **LiDAR (Light Detection and Ranging)** is an active remote sensor that uses an eye-safe laser as an emitter. The LiDAR emits short pulses of light into the atmosphere. The emitted radiation intercepts atmospheric particles and molecules along the line of sight. A portion of that radiation is scattered backward and collected by the LiDAR reception system. The optical signal is then translated into a voltage over time and distance by multiplication of the speed of light. An accurate range dependent profile of backscattered light is obtained by calibrating the optical signal. This allows the acquisition of the u, v, and w components of the wind at user-defined distances (range gates) permitting real-time observations of radial wind speed and other parameters such as signal-to-noise ratio and wind speed standard deviation. Raw data includes a time stamp; u, v, and w wind components; the signal-to-noise ratio (SNR); the spectral bandwidth; backscatter; and raw signals. Derived products may include boundary layer height, turbulence kinetic energy and aerosol loading.

The LiDAR selected for the NYS Mesonet is the Leosphere scanning Doppler Windcube 100S. The sensor weighs 232 kg (511 lbs), and measures approximately 1008 x 814 x 1365 mm (3.3' x 2.7' x 4.5') (L x W x H). The LiDARs are maintained in collaboration with Renewable NRG Systems and Vaisala.

The LiDAR has a vertical range up to 7 km AGL with a vertical resolution of 25-50 m and a temporal resolution of 1 s. The LiDAR radial wind speed accuracy is approximately 0.1 m/s with a range of 0 to 60 m/s; the sensor wind direction accuracy is about 2º. The sensor can operate in temperatures from -30° C to +45° C. All data are averaged over 5-min periods. Averaged data are displayed in real-time, whereas 1 s data are available only after manual download of the data from the sites.

In general, the LiDAR is set to collect data using the Doppler Beam Swinging (DBS) scan mode. The DBS mode consists of a collection of five scans, including scans at 75º above the horizon in each cardinal direction (N, E, S, W), and nadir. These scans are combined to reconstruct the three-dimensional wind field.

A **microwave radiometer** (MWR) is an active remote sensor designed to retrieve real-time estimates of temperature, humidity, and cloud profiles in the lower atmosphere. The sensor uses a microwave transmitter to monitor the microwave emissions from specific temperature- and moisture-sensitive spectra within the atmospheric column. A retrieval technique is used to convert the received microwave values into estimated vertical thermodynamic profiles. An accurate range dependent profile is obtained through careful calibration of the microwave signal. The microwave radiometer provides output for estimating the temperature and humidity profiles, total liquid water path (LWP), and cloud liquid water content.
The microwave radiometer selected for the NYS Mesonet is the Radiometrics' MP-3000A. It provides temperature and moisture profiles up to 10 km with a radiometric accuracy of < 0.3 K. The antenna beam resolution is < 2.5° for the temperature profile and < 7.5° for the humidity profile. Profiles are generated every 10 sec. The radiometer operates in a range between -40° C and +45° C, with a total power consumption of < 500 W. The data collected and archived include: (i) Level 0 – raw data; (ii) Level 1 – meteorological sensor data and brightness temperature; (iii) Level 2 – Temperature, water vapor, liquid water, RH profiles and column integrated vapor and liquid; and (iv) Calibration data.

Vertical profiles are generated from averages of observations calculated over 10-minute periods. The 10-min averaged data are collected from across the network and transmitted to the University at Albany, where the data are quality controlled, organized into a given file format, and then archived and disseminated to users. The list of variables archived and their units are described in Section 3 below. Quality control flags provided by the vendor are applied to the data in real-time, and all bad data identified by these flags are quality controlled out, meaning that these data are not given out to users. As placeholders for bad/missing data, netCDF files use the FillValue attribute "NaN".

Note that MWR sensors require regular calibration. The K-band is calibrated using a "tip calibration", which is done approximately every 2 weeks and is applied remotely. The V-band is calibrated using a liquid nitrogen calibration. This must be done on site, and so is completed about once every 6 months, and more frequently when possible. The dates of sensor calibrations are listed in Appendices C and D. During sensor calibration, the MWR data are not collected.

An **environmental Sky Imaging Radiometer (eSIR)** is a sensor that measures the sun's direct radiance by tracking the path of the sun throughout the day. The measurement collected at the earth's surface can provide a measure of the atmospheric properties and optical depth, when compared against the theoretical top-of-the-atmosphere estimate. Output from the sun photometer includes fish-eye sky photographs and narrowband spectral direct and diffuse radiation. Each sun photometer has been built in-house by research scientists in the New York State Mesonet and Atmospheric Sciences Research Center (ASRC).

The temporal and spatial resolutions of the three Profiler Network sensors are as follows:

LiDAR:
- Vertical resolution: 25 m from 100 m to 1000 m; 50 m from 1000 m to 7000 m
- Time resolution: ~20-second increments for a full DBS scan, but this is variable depending on dwell time, wipes, lubrication, etc. Ten minute averages are provided.

MWR:
- Vertical resolution: 50 m from 0 m to 500 m; 100 m from 500 m to 2000 m; and 250 m from 2000 m to 10000m
- Time resolution: The native time resolution is ~2 minutes, 35 seconds. Ten minute averages are provided.

eSIR:
- Time resolution: Photo images and radiation data are collected every five minutes during daylight hours.

3. Data format

Profiler data are provided in NetCDF format. A list of Profiler data variables are listed in Appendix B. The short names of variables are used in the data and are explained in the table below. All files are organized according to date, i.e. each file contains all data for that day and that month at one station. These files do not include any data averaging.

For the LiDAR NetCDF files, the name convention is yyyymmdd.nc, where yyyy is 4-digit year, mm for numeric month, dd for date. For the MWR NetCDF files, the name convention is yyyymmdd_lv2_PROF_[station ID], where the date convention is the same, lv2 is the Level 2 MWR data, and PROF_[station ID] is the station. The date is specified as UTC (Coordinated Universal Time), not LST (local solar time). Eastern Standard Time (EST) is 5 hours behind UTC, and Eastern Daylight Time (EDT) is 4 hours behind UTC. The NetCDF file is self-explanatory.

4. Special notes on the data:

1) Before you select sites, please refer to the commission date in the metadata online when the sites were installed to make sure that there are enough data to do what you want to do.
2) Sensor and/or system failures are not uncommon as the Profiler equipment are sensitive to a variety of environmental factors. Data gaps may be due to sensor failures; calibration errors; power failures; and/or communication failures. Please check the data availability as listed in Appendices E and F.
3) Please remember to exclude missing data values in your calculations.

4) When using the MWR data, please note the time since last calibration (Appendices C and D). The sensor may drift out of calibration with time. TIP calibrations are done as often as every 2 weeks, whereas LN2 calibrations are done every 4 to 6 months.
5) Although some QA/QC procedures are applied to the data to flag erroneous data, there might still be some undetected errors. Please make your own judgement on questionable data.

APPENDIX A: SITE INFORMATION

STID	NAME	LAT (DEG)	LON (DEG)	ELEVATION	COUNTY	COMMISSION DATE
PROF_ALBA	Albany	42.75175	-73.81128	83.07	Albany	2017-09-01 00:00:00 UTC
PROF_BELL	Belleville	43.78823	-76.11765	152.1	Jefferson	2017-03-03 00:00:00 UTC
PROF_BRON	Bronx	40.872481	-73.893522	59.31	Bronx	2017-09-12 22:00:00 UTC
PROF_BUFF	Buffalo	42.99359	-78.79461	185.39	Erie	2017-03-29 20:00:00 UTC
PROF_CHAZ	Chazy	44.889	-73.46634	74.29	Clinton	2017-03-02 16:30:00 UTC
PROF_CLYM	Clymer	42.02143	-79.62746	457.45	Chautauqua	2017-03-22 23:00:00 UTC
PROF_EHAM	East Hampton	40.970394	-72.20094	22.97	Suffolk	2017-04-27 19:00:00 UTC
PROF_JORD	Jordan	43.068747	-76.469993	129.46	Onondaga	2016-11-21 17:57:00 UTC
PROF_OWEG	Owego	42.024938	-76.253072	464.45	Tioga	2017-05-02 14:00:00 UTC
PROF_QUEE	Queens	40.734335	-73.815856	52.89	Queens	2017-06-09 19:00:00 UTC
PROF_REDH	Red Hook	41.99983	-73.88412	72.85	Dutchess	2017-04-17 20:17:43 UTC
PROF_STAT	Staten Island	40.604014	-74.148499	34.43	Richmond	2017-06-08 20:35:07 UTC
PROF_STON	Stony Brook	40.919579	-73.133284	55.1	Suffolk	2018-04-12 22:00:00 UTC
PROF_SUFF	Suffern	41.133034	-74.085979	191.87	Rockland	2017-02-25 02:15:00 UTC

PROF_TUPP	Tupper Lake	44.224256	-74.441052	525.2	Franklin	2017-01-30 21:00:00 UTC
PROF_WANT	Wantagh	40.65025	-73.5054	18.25	Nassau	2017-04-26 21:00:00 UTC
PROF_WEBS	Webster	43.2601	-77.41238	95.6	Monroe	2017-03-23 17:00:00 UTC

APPENDIX B: VARIABLE LIST

LiDAR Variables

- **Environmental**

Short_name	Long_name	Units
disk_occupation	disk occupation	%
disk_occupation_samples	number of samples for disk occupation statistics	N/A
gps_lat	GPS latitude	degrees north
gps_lat_samples	number of samples for gps lat statistics	N/A
gps_lon	GPS longitude	degrees east
gps_lon_samples	number of samples for gps lon statistics	N/A
internal_dew_point	internal dew point	℃
internal_dew_point_samples	number of samples for internal dew point statistics	N/A
internal_relative_humidity	internal relative humidity	%
internal_relative_humidity_samples	number of samples for internal relative humidity statistics	N/A
internal_temperature	internal temperature	℃
internal_temperature_samples	number of samples for internal temperature statistics	N/A
pitch	pitch angle	degrees
pitch_samples	number of samples for pitch statistics	N/A
roll	roll angle	degrees
roll_samples	number of samples for roll statistics	N/A
stat	statistic performed over interval	N/A
time	time	milliseconds since start of day

- **Radial**

Short_name	Long_name	Units	Variable Status
azimuth	azimuth angle	degree	From LiDAR
cnr	carrier to noise ratio	dB	From LiDAR
confidence	confidence index	percent	From LiDAR
direction	wind from direction	degree	Calculated by NYSM
drws	dispersion radial wind speed	m/s	From LiDAR
elevation	elevation angle	degree	From LiDAR
error	mean error	N/A	From LiDAR
los	line of sight index	N/A	From LiDAR
range	height	m	From LiDAR
reconstruction_status	status for reconstructed wind data	N/A	Calculated by NYSM
rws	radial wind speed	m/s	From LiDAR
sequence	sequence ID	N/A	From LiDAR
status	status	N/A	From LiDAR
time	time	milliseconds since start of day	From LiDAR
u	eastward wind	m/s	Calculated by NYSM
v	northward wind	m/s	Calculated by NYSM
velocity	wind speed	m/s	Calculated by NYSM
w	upward air velocity	m/s	Calculated by NYSM

NOTE: Each LiDAR configuration and scanning scenario gets its own radial NetCDF group. When using this data, the user should read each group's attributes to determine what the data represents. The group ID is subject to change over time, and multiple groups may exist in some instances.

Microwave Radiometer

- **Coordinates**

Short_name	Long_name	Units
lv2_processor	level 2 processor, indicating data angle	N/A
range	height above the surface	m
surface_pressure	air pressure at radiometer level	mbar
surface_qc	quality flag for surface observations	N/A
surface_relative_humidity	relative humidity at radiometer level	%
surface_temperature	air temperature at radiometer level	K
time_integrated	time values used for integrated measurements	milliseconds since start of day
time_surface	time values used for surface measurements	milliseconds since start of day
time_vertical	time values used for vertical profile measurements	milliseconds since start of day

- **Variables**

Short_name	Long_name	Units	Coordinates Used
cloud_base	cloud base height	km	time_integrated, lv2_processor
integrated_liquid	integrated liquid	mm	time_integrated, lv2_processor
integrated_qc	quality flag for integrated quantities	N/A	time_integrated, lv2_processor
integrated_vapor	integrated vapor	cm	time_integrated, lv2_processor
ir_temperature	infrared temperature observed from sky	K	time_surface
liquid	liquid vertical profile	g/m^3	time_vertical, lv2_processor, range
liquid_qc	quality flag for liquid	N/A	time_vertical, lv2_processor
rain_flag	raining indicator	N/A	time_surface
relative_humidity	relative humidity vertical profile	%	time_vertical, lv2_processor, range
relative_humidity_qc	quality flag for relative humidity	N/A	time_vertical, lv2_processor
temperature	air temperature vertical profile	K	time_vertical, lv2_processor, range

temperature_qc	quality flag for temperature	N/A	time_vertical, lv2_processor
vapor_density	vapor density vertical profile	g/m^3	time_vertical, lv2_processor, range
vapor_density_qc	quality flag for vapor density	N/A	time_vertical, lv2_processor

APPENDIX C: LIQUID NITROGEN CALIBRATIONS FOR MICROWAVE RADIOMETER

ALBA	BELL	BRON	BUFF	CLYM	CHAZ	EHAM	JORD	OWEG	QUEE	REDH	STAT
6/6/2016	7/21/2016	3/3/2017	2/22/2017	9/13/2016	6/6/2016	9/15/2016	2/13/2018	7/21/2016	2/22/2017	8/25/2016	3/20/2017
2/22/2017	12/2/2016	3/8/2018	3/21/2018	11/2/2016	3/21/2018	11/2/2016	1/15/2019	12/6/2016	1/10/2018	11/17/2016	12/15/2017
9/26/2017	4/24/2018	12/20/2018	12/5/2018	9/27/2018	3/13/2019	1/25/2018	7/3/2019 (failed)	2/12/2018	4/10/2019	12/20/2017	6/20/2018
2/28/2018	10/26/2018	8/9/2019	6/12/2019	4/4/2019	8/12/2019	7/19/2018	7/15/2019	10/12/2018	11/20/19	7/11/2018	12/19/2018
10/16/2018	6/6/2019	3/11/2020		10/9/2019		4/24/2019	1/23/2020	4/17/2019		10/31/2018	
4/29/2019	12/12/2019					8/20/2019		2/12/2020		5/28/19 (Factory)	
10/7/2019 (failed)										11/25/19	
11/21/2019											

STON	SUFF	TUPP	WANT	WEBS
2/14/2018	9/2/2016	9/13/2016	7/28/2016	7/21/2016
1/16/2019	11/8/2016	4/23/2018	12/6/2016	11/17/2016
4/25/2019	1/10/2018	2/28/2019	1/24/2018	4/2/2018
7/24/2019	6/12/2018	10/10/2019	3/27/2018	11/29/2018
2/20/2020	1/9/2019		1/17/2019	6/11/2019
	6/27/2019		7/24/2019	6/27/2019 (factory)
	1/29/2020		2/14/2019	

APPENDIX D: TIP CALIBRATION Dates FOR MICROWAVE RADIOMETER

PROF_ALBA	PROF_BELL	PROF_BRON	PROF_BUFF	PROFF_CHAZ	PROF_CLYM	PROF_EHAM	PROF_JORD	PROF_OWEG
1/26/2018	3/6/2017	7/18/2018	11/8/2017	5/7/2018	4/11/2017	10/1/2017	12/13/2016	10/3/2017
5/31/2018	3/20/2017	4/5/2019	12/1/2017	6/1/2018	10/2/2017	10/18/2017	1/2/2017	10/20/2017
6/13/2018	10/11/2017	5/17/2019	12/16/2017	6/13/2018	10/20/2017	11/7/2017	1/3/2017	11/8/2017
6/27/2018	11/30/2017	6/7/2019	1/4/2018	6/29/2018	4/23/2018	11/30/2017	9/17/2017	12/1/2017
1/5/2019	12/18/2017	7/14/2019	2/12/2018	9/24/2019	5/7/2018	12/17/2017	10/2/2017	12/19/2017
1/18/2019	1/3/2018	9/11/2019	3/19/2018	12/9/2018	6/1/2018	1/4/2018	10/18/2017	1/4/2018
2/6/2019	2/13/2018	11/18/2019	4/9/2018	1/25/2019	6/13/2018	4/8/2018	1/3/2018	3/19/2018
3/14/2019	4/23/2018	12/10/2019	4/23/2018	2/25/2019	6/29/2018	4/23/2018	3/22/2018	4/9/2018
4/6/2019	5/7/2018	1/22/2020	5/7/2018	3/17/2019	1/25/2019	5/7/2018	4/23/2018	4/23/2018
5/19/2019	6/1/2018	2/4/2020	6/1/2018	4/10/2019	3/18/2019	5/31/2018	6/1/2018	6/1/2018
6/7/2019	1/4/2019		6/13/2018	5/18/2019	4/11/2019	6/15/2018	6/13/2018	6/13/2018
7/13/2019	1/14/2019		6/29/2018	6/7/2019	5/21/2019	6/29/2018	6/28/2018	6/29/2018
9/17/2019	3/13/2019		1/4/2019	7/14/2019	6/21/2019	1/4/2019	1/5/2019	1/8/2019
11/18/2019	3/28/2019		1/22/2019	9/22/2019	11/18/2019	1/25/2019	1/24/2019	1/25/2019
12/9/2019	5/18/2019		5/19/2019	11/18/2019	12/9/2019	2/3/2019	2/23/2019	2/26/2019
1/6/2020	6/7/2019		6/8/2019	12/9/2019	1/6/2020	3/13/2019	4/6/2019	4/9/2019
1/22/2020	7/15/2019		6/21/2019	1/6/2020	1/22/2020	3/28/2019	5/18/2019	4/12/2019
2/4/2020	9/17/2019		7/17/2019	1/22/2020	2/4/2020	6/7/2019	6/7/2019	6/21/2019
	11/18/2019			2/4/2020		7/9/2019	7/13/2019	7/18/2019
	12/9/2019					9/19/2019	9/18/2019	9/25/2019
	1/6/2020					11/18/2019	11/18/2019	11/18/2019
	1/22/2020					12/9/2019	12/9/2019	12/10/2019
	2/4/2020					1/6/2020	1/6/2020	1/6/2020
						1/22/2020	1/10/2020	1/24/2020
						1/24/2020	1/22/2020	
						2/4/2020	2/4/2020	

PROF_QUEE	PROF_REDH	PROF_STAT	PROF_STON	PROF_SUFF	PROF_TUPP	PROF_WANT	PROF_WEBS
1/17/2017	9/27/2017	6/1/2018	3/8/2017	2/25/2017	9/2/2016	7/12/2017	10/20/2017
New sensor	10/15/2017	6/13/2018	1/4/2019	10/2/2017	9/6/2017	10/19/2017	4/9/2018
5/7/2018	11/3/2017	12/31/2018	1/23/2019	10/19/2017	10/1/2017	11/7/2019	4/23/2018
5/31/2018	12/5/2017	1/19/2019	2/15/2019	11/4/2017	11/28/2017	11/29/2017	5/7/2018
6/13/2018	4/18/2018	2/23/2019	New sensor	12/1/2017	12/22/2017	12/16/2017	6/1/2018
6/27/2018	5/5/2018	3/20/2019	9/12/2019	12/16/2017	3/16/2018	1/4/2018	6/13/2018
12/5/2018	6/13/2018	5/17/2019	11/18/2019	1/4/2018	5/7/2018	2/12/2018	6/29/2018
1/25/2019	6/28/2018		12/9/2019	2/13/2018	6/1/2018	3/19/2018	1/24/2019
2/22/2019	12/24/2018		1/10/2019	3/16/2018	6/13/2018	4/7/2018	2/26/2019
4/11/2019	New sensor		1/22/2019	4/23/2018	6/29/2018	4/23/2018	4/12/2019
5/21/2019	7/10/2019		2/4/2020	5/7/2018	1/4/2019	5/7/2019	5/23/2019
6/7/2019	9/21/2019			5/31/2018	1/23/2019	5/31/2018	6/11/2019
7/13/2019	11/18/2019			6/13/2018	2/15/2019	1/6/2019	6/21/2019
9/22/2019	12/9/2019			6/27/2018	4/3/2019	1/23/2019	6/27/2019
12/9/2019	1/6/2020			1/8/2019	5/21/2019	2/15/2019	10/1/2019
1/6/2020	1/22/2020			1/19/2019	6/8/2019	4/7/2019	11/18/2019
1/22/2020	2/4/2020			2/15/2019	7/8/2019	5/19/2019	12/9/2019
2/4/2020				4/3/2019	11/18/2019	6/7/2019	1/6/2020
				5/21/2019	12/9/2019	7/13/2019	2/3/2020
				6/8/2019	1/6/2020	9/14/2019	2/4/2020
				7/14/2019	1/22/2020	11/18/2019	
				9/20/2019	2/4/2020	12/9/2019	
				11/18/2019		1/6/2020	
				12/9/2019		1/22/2020	
				1/6/2020		2/4/2020	
				1/22/2020			
				2/4/2020			

APPENDIX E: MAJOR DATA GAPS IN MICROWAVE RADIOMETERY DATA
(updated through April 2020; some data available even during gap periods)

STID	Gap in data (Dates)	Reason
PROF_ALBA	3/15/18 – 05/9/18	Failed k-band TEC; Instrument sent to Radiometrics for repair
PROF_BELL	2/5/19 – 03/7/19	Superblower not active.
PROF_BRON	6/8/18 – 08/3/18 2/5/19 – 3/19/19 *6/14/19 – 6/17/19 & 9/13/19 – 9/16/19 & 10/4/19 – 10/8/19 & 10/11/19 – 10/14/19 & 10/28/19 – 11/5/19*	Failed v-band noise diode Failed laptop hard drive *Laptop Restart, unable to re-establish communication*
PROF_BUFF	9/17/19 – present	Roof repairs at host location.
PROF_CHAZ	3/2/17 – 4/25/18	Communication issues then a failed K-Band
PROF_CLYM	6/22/17 – 6/28/17	Unknown
PROF_EHAM	6/1/17 – 8/31/17 2/8/18 – 2/22/18 6/08/18 – 6/14/18	Communication issues. Communication issues. Failed laptop hard drive
PROF_JORD	6/1/17-8/31/17 9/24/17 – 12/21/17 1/7/18 – 5/7/18	Roof repairs; site taken offline Communication issues Laptop hard drive failure followed by communications issues.
PROF_OWEG	None	
PROF_QUEE	1/1/18 – 3/9/18 4/3/19 – 4/10/19	Failed k-band; IRT problems Laptop problems
PROF_REDH	4/11/17 – 4/14/17 2/22/19 – 6/17/19 8/7/19 – 8/29/19 2/23/20 – 3/3/20	Unhealthy K-band and V-band Failed k-band Laptop unexpected restart; hundereds of restart. Damaged data cable.
PROF_STAT	4/13/19 – present	K-band noise diode failure and Laptop hard drive failure.
PROF_STON	6/1/18 – 6/05/18 10/11/18 – 7/26/19 8/21/19 – 8/27/19 1/22/20 – 1/27/20	Unexpected laptop restart. Failed v-band noise diode Unknown Operator Error
PROF_SUFF	9/1/17 – 9/30/17 12/19/17 – 12/31/17	Unknown Communications issues.
PROF_TUPP	1/27/17 – 7/28/17	Communication issues.

	8/20/17 – 9/6/17 1/25/18 – 2/2/18 7/22/18 – 08/08/18 12/1/18 – 12/5/18	Communications issues. Laptop died due to power outage; req'd restart Laptop died due to power outage; req'd restart. Laptop died due to power outage; req'd restart.
PROF_WANT	9/23/17 – 10/4/17	Laptop died due to power outage; req'd restart.
PROF_WEBS	2/20/18 – 3/28/18 6/24/19 – 8/7/19 9/16/19 – 9/30/19 3/19/20 – 4/3/20	Failed laptop hard drive, K-Band noise diode failure. LiDAR stopped due to bad data caused by radome buckling. Communications issues.

APPENDIX F: MAJOR DATA GAPS IN DOPPLER WIND LiDAR DATA
(updated through April 2020; some data available even during gap periods)

STID	Gap in data (Dates)	Reason
PROF_ALBA	1/1/18 – 01/9/18 1/30/18 – 2/9/18 2/26/18 – 3/16/18 4/26/18 – 4/27/18 2/8/20 – 2/11/20	LiDAR PC disruptions. LiDAR PC disruptions. LiDAR moved to a new site. LiDAR PC disrptions. Internet disruption at site.
PROF_BELL	6/21/19 – 6/22/19 2/13/20 – Present	Operator Error. Scanner-head failure.
PROF_BRON	N/A	N/A
PROF_BUFF	9/17/19 – present	Roof repairs at host location.
PROF_CHAZ	10/10/19 – 10/21/19	50% Operation due to a lubrication glitch.
PROF_CLYM	8/22/18 – 9/2/18	LiDAR turned off.
PROF_EHAM	1/26/18 – 2/13/18 3/5/18 – 3/22/18	LiDAR PC disruptions. LiDAR PC disruptions.
PROF_JORD	N/A	N/A
PROF_OWEG	N/A	N/A
PROF_QUEE	1/5/19 – 1/10/19 3/19/19 – 4/1/19	LiDAR PC disruptions. LiDAR PC disruptions.
PROF_REDH	11/12/18 – 11/26/18 12/5/18 – 1/25/19 12/24/19 – 12/28/19	LiDAR PC disruptions. LiDAR PC disruptions. Power outage.
PROF_STAT	N/A	N/A
PROF_STON	8/21/19 – 8/25/19 9/8/19 – 10/1/19	LiDAR PC restart required. LiDAR power-supply failure. Replacement required.
PROF_SUFF	7/27/18 – 8/2/18 1/23/19 – present	Unknown Scanner-head failure (repaired Oct ’19) then beam failure.
PROF_TUPP	1/1/18 – 3/6/18 6/1/18 – 2/4/19 9/19/19 – 10/10/19	Communication issues and scanner PC issues. Scanner-head and Scanner-PC failure. Communication issues.
PROF_WANT	3/19/19 – 3/21/19	LiDAR PC restart required.
PROF_WEBS	5/28/18 – 6/19/18 2/28/19 – 3/14/19 3/19/20 – 4/3/20	LiDAR Ethernet switch failure. Scanner-head squeaking due to cold-snap annoyed host. Communication issues.