



Data User Guide

New York State Mesonet IMPACTS

Introduction

The New York State Mesonet IMPACTS dataset is a browse-only dataset and consists of temperature, wind, wind direction, mean sea level pressure, precipitation, and snow depth measurements, as well as profiler Doppler LiDAR and Microwave Radiometer (MWR) measurements from the New York State Mesonet network during the Investigation of Microphysics and Precipitation for Atlantic Coast-Threatening Snowstorms (IMPACTS) field campaign, a three-year sequence of winter season deployments conducted to study snowstorms over the U.S. Atlantic coast. IMPACTS aimed to (1) Provide observations critical to understanding the mechanisms of snowband formation, organization, and evolution; (2) Examine how the microphysical characteristics and likely growth mechanisms of snow particles vary across snowbands; and (3) Improve snowfall remote sensing interpretation and modeling to significantly advance prediction capabilities. The Mesonet network consists of ground weather stations, LiDAR profilers, and microwave radiometer (MWR) profilers. These browse files are available from January 3 through March 1, 2020 in PNG format.

Notice:

It should be noted that the NY Mesonet IMPACTS data are password protected and available via an NCAR server at <https://data.eol.ucar.edu/dataset/list?project=602&children=project>, as well as, available at <https://doi.org/10.26023/Z4ZB-4QWD-3X05> (standard data) and <https://doi.org/10.26023/AEQQ-1VH5-0B13> (profiler data). Also, the citation shown below is for the browse-only dataset from the GHRC DAAC and not for the password-protected raw data.

Citation

Brodzik, Stacy. 2020. New York State Mesonet IMPACTS [indicate subset used]. Dataset available online from the NASA Global Hydrology Resource Center DAAC, Huntsville, Alabama, U.S.A. doi: <http://dx.doi.org/10.5067/IMPACTS/INS/DATA101>

Keywords:

NASA, GHRC, IMPACTS, New York, Mesonet, temperature, wind, wind direction, mean sea level pressure, precipitation, snow depth, LiDAR, MWR, microwave, radiometer

Campaign

The Investigation of Microphysics and Precipitation for Atlantic Coast-Threatening Snowstorms (IMPACTS), funded by NASA's Earth Venture program, is the first comprehensive study of East Coast snowstorms in 30 years. IMPACTS will fly a complementary suite of remote sensing and in-situ instruments for three 6-week deployments (2020-2022) on NASA's ER-2 high-altitude aircraft and P-3 cloud-sampling aircraft. The first deployment began on January 17, 2020 and ended on March 1, 2020. IMPACTS samples U.S. East Coast winter storms using advanced radar, LiDAR, and microwave radiometer remote sensing instruments on the ER-2 and state-of-the-art microphysics probes and dropsonde capabilities on the P-3, augmented by ground-based radar and rawinsonde data, multiple NASA and NOAA satellites (including GPM, GOES-16, and other polar orbiting satellite systems), and computer simulations. IMPACTS addressed three specific objectives: (1) Provide observations critical to understanding the mechanisms of snowband formation, organization, and evolution; (2) Examine how the microphysical characteristics and likely growth mechanisms of snow particles vary across snowbands; and (3) Improve snowfall remote sensing interpretation and modeling to significantly advance prediction capabilities. More information is available from [NASA's Earth Science Project Office's IMPACTS field campaign webpage](#).

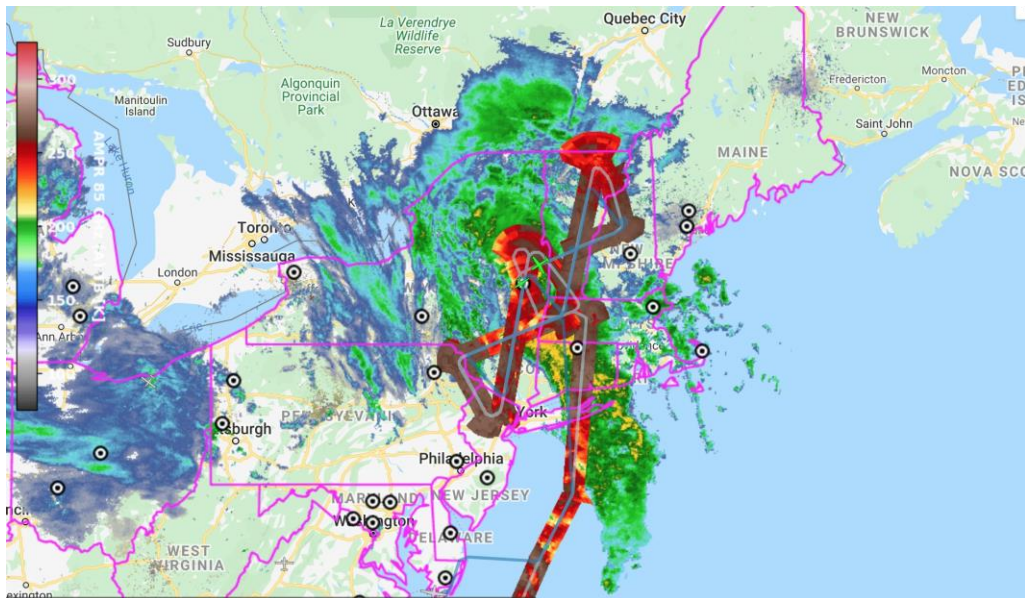


Figure 1: IMPACTS field campaign operations on January 25, 2020 with plots of ER-2 and P-3 flight tracks in addition to ground radar sites and radar reflectivity over the region (Image source: Dr. Timothy Lang, NASA MSFC)

Instrument Description

The New York State Mesonet is a world-class network of environmental monitoring stations. The ground network is composed of a series of sensors including a Lufft V200A Ultrasonic Wind Sensor and RM Young 05108 Wind Monitor for measuring wind speed and wind direction, an RM Young 41342 Young Platinum Temperature Probe for measuring temperature, an OTT Pluvio for measuring precipitation, and a Vaisala PTB330 for measuring pressure. More information about the New York State Mesonet is available on the [NYS Sensor Information Page](#).

The Lufft V200A Ultrasonic Wind Sensor is a sea water-resistant wind meter measuring the wind speed and wind direction. The measurement setup includes two measurement sections, arranged at a 90 degree angle, with two ultrasonic transceivers each. The measurement sections are activated in turn and the time of flight of the ultrasonic pulses between the respective transmitter and receiver is measured. Within one measurement cycle each of the ultrasonic heads will work one as transmitter and once as receiver. The orthogonal arrangement of the measurement sections allows to evaluate the North-South and East-West components of the air flow. More information about the Lufft V200A Ultrasound Wind Sensor can be found in the [sensor's user manual](#).

The RM Young 05108 Wind Monitor offers calibrated voltage outputs for wind speed and direction. This sensor can measure winds up to 100 m/s with an accuracy of +/- 0.3 m/s, and it can measure the wind direction from 0-360 degrees with an accuracy of +/- 3 degrees. More information about the RM Young 05108 Wind Monitor can be found in the [sensor's information sheet](#).



Figure 2: Image of the RM Young 05108 Wind Sensor
(Image credit: [Young](#))

The RM Young 41342 Young Platinum Temperature Probe offers temperature-only measurement. This instrument can measure temperature readings from -50 degrees C to 50 degrees C with an accuracy of +/- 0.3 degrees C. The probe takes temperature readings every 42 seconds. More information about the 41342 Young Platinum Temperature Probe is available on the [instrument's information page](#) and the [instruction sheet](#).



Figure 3: Image of the RM Young 41342 Platinum Temperature Probe
(Image credit: [Young](#))

The Pluvio² is a weighing precipitation gauge produced by OTT Hydromet in Kempten, Germany that continuously monitors liquid, solid, and mixed precipitation accumulation. To provide the best possible data, the load cell and sensor electronics are hermetically sealed against the environment. The Pluvio² model 400 (Pluvio400) instrument has a 400 cm² opening for precipitation collection and can reliably measure in all weather conditions even for small amounts of precipitation. The minimal threshold is 0.1 mm/min and data report in 1 minute intervals. Rainfall intensity does not affect the instrument's measurement accuracy. Precipitation values are reported in millimeter per minute (mm/min) and millimeter per hour (mm/hr). More information about the Pluvio400 gauge can be found at the [OTT webpage](#). More information about the accuracy of the Pluvio400 gauge can be found at [Nemeth, 2008](#) and [Tumbusch, 2003](#).



Figure 4: Image of the OTT Pluvio instrument
(Image credit: [OTT](#))

The Vaisala Digital Barometer PTB330 offers high measurement accuracy, as well as operates over a wide temperature range and performs reliably even in highly demanding applications. The barometer is equipped with a barbed pressure fitting which is ideal for 3-4mm internal diameter tubing. More information about the barometer is available in the [instrument's user guide](#).



Figure 5: Image of the Vaisala Digital Barometer PTB330
(Image credit: [Vaisala](#))

These instruments were located at 20 different weather station sites. Table 1 lists the locations of these sites.

Table 1: Weather station sites

Site abbreviation	Site Name	Latitude	Longitude	Elevation (m)
ande	Andes	42.182	-74.801	518.282
bing	Binghamton	42.058	-75.951	534.436
brew	Brewster	41.440	-73.576	185.349
broc	Brockport	43.208	-77.966	171.602
buff	Buffalo	43.000	-78.767	179.588
elmi	Elmira	42.113	-76.837	332.445
fred	Fredonia	42.418	-79.367	238.750
gfld	Glenfield	43.717	-75.409	255.514
gfal	Glens Falls	43.341	-73.602	98.664
ilak	Indian Lake	43.791	-74.240	494.172
malo	Malone	44.853	-74.329	236.220
nhud	North Hudson	44.013	-73.705	298.978
oswe	Oswego	43.443	-76.553	93.726
pots	Potsdam	44.657	-74.974	128.687
redf	Redfield	43.622	-75.878	380.390
sara	Saranac	44.708	-73.671	313.731
stat	Staten Island	40.604	-74.149	33.100
ston	Stony Brook	40.919	-73.132	43.922

wate	Waterloo	42.880	-76.813	145.755
west	Westmoreland	43.107	-75.462	199.614

Profiler data from the Leosphere WindCube WLS-100 series Doppler LiDAR and the Radiometrics MP-3000A Microwave Radiometer instruments. More information about the profiler network is available at the [NYS Sensor Information Page](#).

The Leosphere WindCube WLS-10 series Doppler LiDAR uses a vertically-pointing eye-safe laser to estimate wind velocities in the vertical. The LiDAR instrument measures the speed and direction of aerosols moving towards and away from the beam, and the reflected energy is analyzed to determine 3-D wind speed and direction. More information about this instrument is available on the [Leosphere website](#).



Figure 6: Image of the Leosphere WindCube WLS-10 Series Doppler LiDAR
(Image credit: [Leosphere](#))

The Radiometrics MP-3000A Microwave Radiometer is a passive instrument that measures the downwelling microwave radiation to estimate vertical profiles of temperature and liquid up to 10 km above ground level. More information about this instrument is available on the [Radiometrics website](#).



Figure 7: Radiometrics MP-3000A Microwave Radiometer
(Image credit: [Radiometrics](#))

These profiler instruments were located at 17 different sites. Table 2 lists the locations of these sites.

Table 2: Profiler sites

Site abbreviation	Site Name	Latitude	Longitude	Elevation (m)
alba	Albany	42.752	-73.811	83.070
bell	Belleville	43.788	-76.118	152.100
bron	Bronx	40.873	-73.894	59.310
buff	Buffalo	42.994	-78.795	185.390
chaz	Chazy	44.889	-73.466	74.290
clym	Clymer	42.021	-79.628	457.450
eham	East Hampton	40.970	-72.201	22.970
jord	Jordan	43.069	-76.470	129.460
oweg	Owego	42.025	-76.253	464.450
quee	Queens	40.734	-73.816	52.890
redh	Red Hook	42.000	-73.884	72.850
stat	Staten Island	40.604	-74.149	34.430
ston	Stony Brook	40.920	-73.133	55.100
suff	Suffern	41.133	-74.086	191.870
tupp	Tupper Lake	44.224	-74.441	525.200
want	Wantagh	40.650	-73.505	18.250
webs	Webster	43.260	-77.412	95.600

Investigators

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Data Characteristics

The New York State Mesonet IMPACTS data are available in PNG format at a Level 3 data processing level. More information about the NASA data processing levels are available on the [EOSDIS Data Processing Levels webpage](#). The characteristics of this dataset are listed in Table 3 below.

Table 3: Data Characteristics

Characteristic	Description
Platform	Ground Station/Mesonet Network
Instrument	Wind profiler, thermometer, pluviometer, barometer, LiDAR, microwave radiometer
Spatial Coverage	N: 44.906, S: 40.594, E: -72.191, W: -79.638 (U.S. Atlantic Coast)
Spatial Resolution	2 m
Temporal Coverage	January 3, 2020 - March 1, 2020
Temporal Resolution	Daily
Sampling Frequency	Ground weather station: 5 minutes MWR: 10 minutes LiDAR: 10 minutes
Parameter	temperature, liquid water content, dew point temperature, pressure, relative humidity, snow depth, potential temperature, horizontal and vertical wind velocities, precipitation, cloud height, carrier-to-noise ratio, and integrated moisture measurements
Version	1
Processing Level	3

File Naming Convention

The New York State Mesonet IMPACTS browse files are available in PNG format. The browse files are named using the following convention:

Data files: IMPACTS_nys_<product>_YYYYMMDD_hhmm_<site>.png

Table 4: File naming convention variables

Variable	Description
<product>	ground_timeseries, lidar_cnr, lidar_horz_wspd, lidar_vert_wspd, mwr_cloud, mwr_timeseries
YYYY	Four-digit year
MM	Two-digit month
DD	Two-digit day
hh	Two-digit hour in UTC

mm	Two-digit minute in UTC
<site>	Site name
.png	Portable Network Graphics (PNG) format

Data Format and Parameters

These data files are in PNG format showing temperature, dew point temperature, potential temperature, snow depth, pressure, liquid water content, relative humidity, horizontal and vertical wind velocities, precipitation, cloud height, carrier-to-noise ratio, and integrated moisture measurements. 'Ground_timeseries' product data files consist of temperature in degrees C, dew point temperature in degrees C, wind speed in kt, wind direction in degrees, pressure in hPa, precipitation in mm, and snow depth measurements in mm over time at the surface. 'Lidar_cnr' product data files consist of LiDAR Carrier-to-Noise Ratio (CNR) measurements in dB at different heights over time. 'Lidar_horz_wspd' product data files consist of horizontal wind velocity measurements in kts at different heights over time. 'Lidar_vert_wspd' product data files consist of vertical wind velocity measurements in m/s at different heights over time. 'Mwr_cloud' product data files consist of cloud base in km, integrated vapor in cm, integrated liquid in mm, and rain flag measurements over time. 'Mwr_timeseries' product data files consist of temperature in degrees C, potential temperature in K, liquid water content in g/m³, and relative humidity in % measurements at different heights over time.

Software

These browse files are available in PNG format, so no software is required to view.

Known Issues or Missing Data

There are no known issues or missing data.

References

Brotzge, Jerald A., J. Wang, C. D. Thorncroft, E. Joseph, et al. (2020). A Technical Overview of the New York State Mesonet Standard Network, *Journal of Atmospheric and Oceanic Technology*, 37(10), 1827-1845. <https://doi.org/10.1175/JTECH-D-19-0220.1>

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Tumbusch, M. L. (2003). Evaluation of OTT PLUVIO Precipitation Gage versus Belfort Universal Precipitation Gage 5-780 for the National Atmospheric Deposition Program. Water-Resources Investigations Report 03-4167.

<https://pubs.usgs.gov/wri/wrir034167/wrir034167.pdf>

Related Data

All other dataset collected as part of the IMPACTS campaign are considered related and can be located by searching the term "IMPACTS" in the GHRC [HyDRO2.0](#) search tool.

Contact Information

To order these data or for further information, please contact:

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