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Readme for New York State Mesonet Standard Network Data

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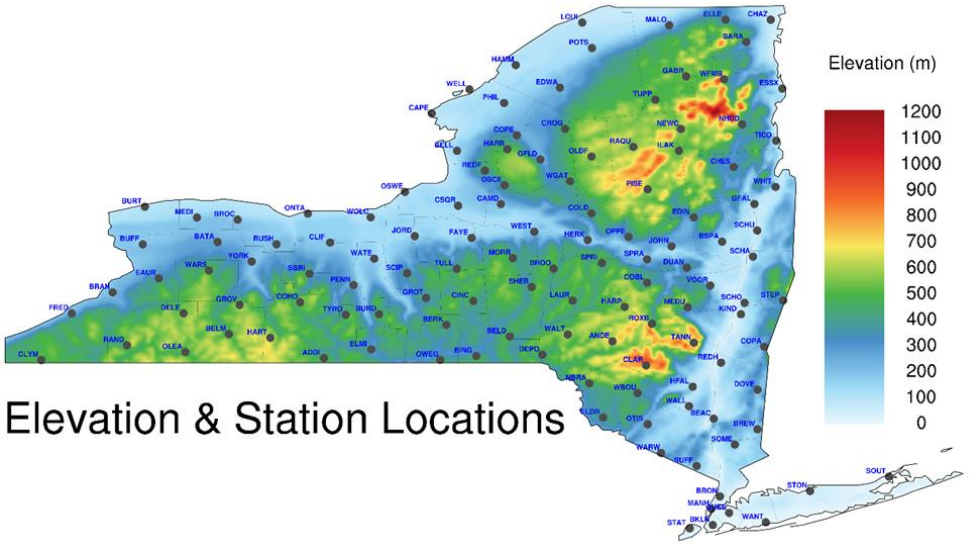
1. Introduction

The New York State (NYS) Mesonet 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 and consists of 126 standard surface weather stations across the state with an average spacing of 19 miles (see map below). The site metadata including latitude, longitude, climate division, commissioned date and related information can be obtained at:
http://nysmesonet.org/about/sites.



Each of the Mesonet's 126 weather stations collects observations of surface temperature, relative humidity, wind speed and direction, precipitation, solar radiation, atmospheric pressure, snow depth, and soil moisture and temperature at three depths (5, 25, and 50 cm). Each site is also outfitted with a camera that collects still images.

While sensors sample data at relatively high frequencies (every 3 to 60 seconds, typically), averages of observations are calculated over 5-minute periods. The 5-min averaged data are collected from across the network at the University at Albany, where the data are quality controlled, organized into a given file format, and then archived and disseminated to users. Several data formats are used, including CSV and NetCDF. The list of variables archived and their units are listed in the table below. A series of various quality control tests are applied to the data (e.g., range tests, spatial tests, temporal tests, etc.), and all bad data 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 (generally -996), and CSV files use an empty field to indicate missing data.

2. Data format

The 5-min data for all variables at all 126 stations can be provided in two data formats, CSV (common delimited values) and NetCDF. 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 5-min data for that day and that month at all stations. For each day, there are 288 data points for the 5-min data. The data value at Minute 05 means the average of data from 00 min to 05 min. Note that "wmax_prop", "wmax_sonic", "precip_max_intensity" are the maximum value of last 5 minutes, and "precip" and "precip_total" are accumulated values (not average). For NetCDF file, the name convention is yyyymmdd.nc, where yyyy is 4-digit year, mm for numeric month, dd for date. 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. If you request the data from our website, the variables, stations, temporal resolution and data format would be different and are based on your requests.

3. 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) Sometimes there might be sensor and/or system failure, so the data were not available for a period of time. Please check the data availability before you analyze them.
3) Please remember to exclude missing data values in your calculation.
4) It is known that the pyranometer (measuring solar radiation) at 15 sites is shadowed by trees, mountains or other objects. As a result, the solar radiation measurements are biased low during the shadow period. Those 15 sites are given in the list on Page 5 and explained in detail. Please exercise caution when using the solar radiation data at those sites.
5) Prior to spring 2018, most pyranometers had some shadows on them during the morning hours, caused by the placement of solar panels to their south. Thus, a majority of sites will have artificial shadowing of the pyranometer during the early morning hours; this problem is most prominent during the winter months with the lower solar angle. This issue was fixed in Spring 2018, as all pyranometers were raised to 2.8 m, a height above the solar panel shadows.
6) The snow boards underneath the snow depth sensors (SR50A) were removed during warm months (around May to October) during 2018. As a result, the snow depth data were very noisy since the signals are interfered by grass, vegetation and other things underneath and should not be used. Snow boards will remain on the ground moving forward.

7) Although a lot of QA/QC procedures (both automated and manual ones) are applied to the data to flag erroneous data, there might still be some undetected errors. Please make your own judgement on questionable data.

Short_name	Long_name	Units	Min	Max
tair	air temperature at 2 meters	degC	-30	50
ta9m	air temperature at 9 meters	degC	-30	50
tslo	slow-response air temperature at 2 meters	degC	-30	50
relh	relative humidity at 2 meters	%	3	103
srad	solar radiation	W/m^2	-0.4	1500
pres	station pressure	mbar	800	1050
wspd_sonic	wind speed at 10 meters, measured by sonic anemometer	m/s	0	40
wmax_sonic	wind speed maximum at 10 meters, measured by sonic anemometer	m/s	0	60
wssd_sonic	wind speed standard deviation at 10 meters, measured by sonic anemometer	m/s	0	10
wdir_sonic	wind direction at 10 meters, measured by sonic anemometer	degree	0	360
wdsd_sonic	wind direction standard deviation at 10 meters, measured by sonic anemometer	degree	0	81
wspd_prop	wind speed at 10 meters, measured by wind monitor	m/s	0	40
wmax_prop	wind speed maximum at 10 meters, measured by wind monitor	m/s	0	60
wssd_prop	wind speed standard deviation at 10 meters, measured by wind monitor	m/s	0	10
wdir_prop	wind direction at 10 meters, measured by wind monitor	degree	0	360
wdsd_prop	wind direction standard deviation at 10 meters, measured by wind monitor	degree	0	81
wspd_merge	wind speed at 10 meters, using preferred* instrument	m/s	0	40
wmax_merge	wind speed at 10 meters, using preferred* instrument	m/s	0	60
wssd_merge	wind speed at 10 meters, using preferred* instrument	m/s	0	10
wdir_merge	wind speed at 10 meters, using preferred* instrument	degree	0	360
wdsd_merge	wind speed at 10 meters, using preferred* instrument	degree	0	81
precip	Precipitation accumulated since 00 UTC	mm	0	500
precip_total	Precipitation running total with occasional resets to 0 mm.	mm	0	5000
precip_max_intensity	maximum 1-minute precipitation intensity	mm/min	0	40

ts05	soil temperature at 5 cm	degC	-20	55
ts25	soil temperature at 25 cm	degC	-20	55
ts50	soil temperature at 50 cm	degC	-20	55
sm05	soil moisture, water fraction by volume, at 5 cm	m^3/m^3	0	0.7
sm25	soil moisture, water fraction by volume, at 25 cm	m^3/m^3	0	0.7
sm50	soil moisture, water fraction by volume, at 50 cm	m^3/m^3	0	0.7
snow_depth	snow depth	m		

*** wind _merge columns use:**

Prior to March 1, 2018: _prop if data is available, otherwise _sonic
Starting March 1, 2018: _sonic if data is available, otherwise _prop

Sites with Consistent shadow issues caused by trees:

1. Claryville (CLAR) - class 4 - morning - trees to the East
2. Croghan (CROG) - class 5 - morning and evening - trees surrounding
3. Duanesburg (DUAN) - class 4 - morning - trees surrounding
4. Eldred (ELDR) - class 5 - morning and evening - trees surrounding
5. High Falls (HFAL) - class 4 - morning and evening - trees surrounding
6. North Branch (NBRA) - class 4 - evening - mountain shading
7. North Hudson (NHUD) - class 5 - morning - trees to the South
8. Osceola (OSCE) - class 5 - evening - trees and building to South and West
9. Piseco (PISE) - class 4 - morning - trees to the North, East, and South
10. Raquette Lake (RAQU) - class 5 - morning and evening - trees surrounding
11. Suffern (SUFF) - class 4 - morning - trees to the East and South
12. Tannersville (TANN) - class 5 - morning - trees surrounding
13. Tupper Lake (TUPP) - class 4 - morning - trees to the North, East, and South
14. Whiteface Mountain Base (WFMB) - class 5 - evening - trees surrounding, building to the South
15. Woodgate (WGAT) - class 4 - evening - trees to the South, West, and North