Community Collaborative Rain, Hail & Snow Network

Southern New England

January 2016

Happy New Year! If you enjoyed measuring and reporting during 2015, it will be one day better in 2016 with Leap Day occurring on February 29.

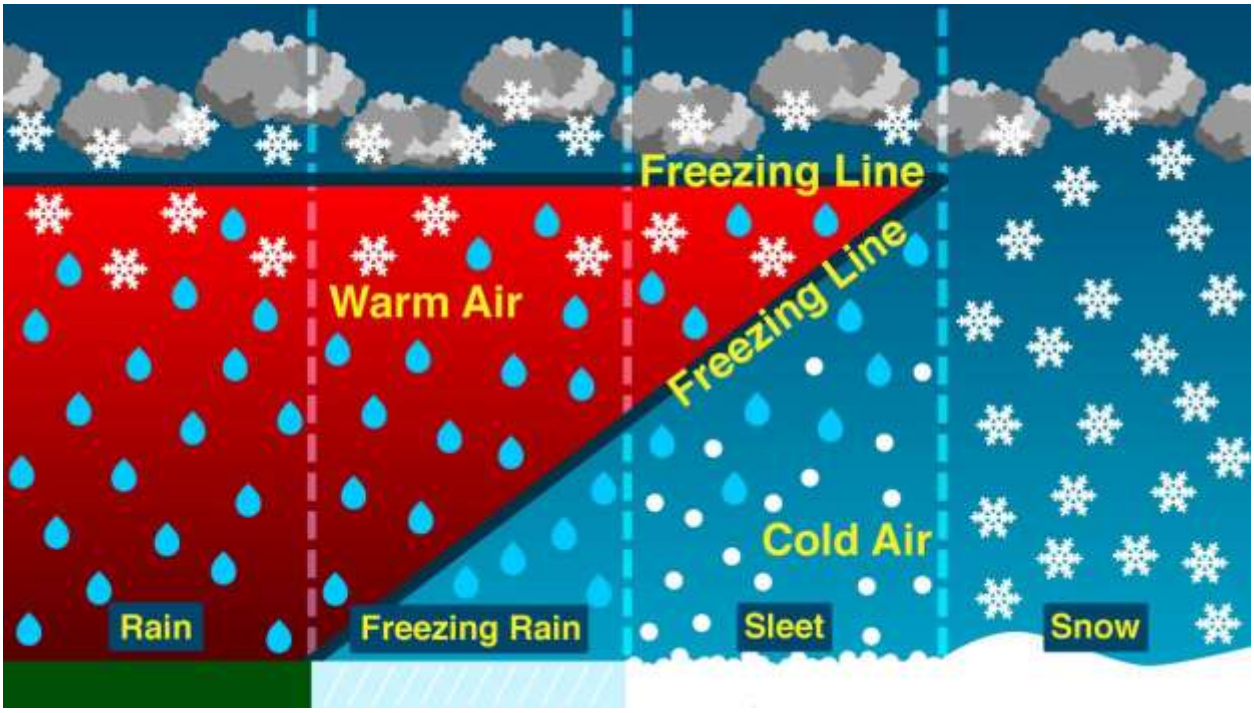
With the record warmth of December, it did not seem that it was ever going to snow. The snowflake graphic has arrived, heralding the first measurable snow, sleet & freezing rain event that occurred late on December 28th into the 29th.

Welcome to new observers from New London, Worcester and New Haven counties who have signed up in December. We hope you order and install your rain gauge, view the training materials, and start reporting soon. If we are going to measure and report precipitation in this area, we ought to know well what the precipitation is that winter brings us.

Winter Precipitation

We seem to get it all during the winter and for many reasons. Cold air to the north, changes in wind directions, all of the various coastal bodies of water, and if that wasn't enough, changes in elevation inland.

The battle of below freezing air and above freezing air causes our different winter precipitations types. Warm air is less dense than cold air, so it will rise above cold air. The obvious source of warm air would be winds from the southerly direction. During the winter months, another source of warmer air is winds from the various coastal bodies of water.



One graphic should save a thousand words, so look it over. Rain occurs when the air is above freezing. Snow occurs when the air is below freezing. Freezing Rain is rain that freezes on contact and can occur even closer to surface than what is represented in this graphic, if the warm air is slow to warm everything. You may notice that your rain gauge is not icy, but the ground surface is.

We seem to get it all during the winter months, but one precipitation type that is often mistaken is hail and sleet. Hail comes from convective thunderstorms when rainfall gets forced upward to where it is below freezing, then it falls again, it may be forced upward again, repeats until the weight of the hail stone overtakes the updraft and it falls to the surface. Sleet comes from rain that freezes as it falls. Sleet is the more common occurrence in the winter months, not hail.

Footnote: One of our observers made a comment from the December 28-29 freezing rain/sleet/snow event, recommending the use of petroleum jelly (Vaseline) on the gauge bracket to keep the gauge from being stuck to the gauge bracket when freezing rain occurs. Great tip!

Detail and Summary for December 2015

After the dry month of November, December saw a return of more normal 4" precipitation totals from the area stations. Very few stations experienced less than 4" precipitation, and some stations experienced 5" and 6" totals. Compare your totals to a nearby NWS Climate site.

From the National Weather Service (NWS) Climate sites for Dec 2015. An extra effort was given to squeeze in snowfall data.

Location	Station ID	Dec 2015 Precip	Dec departure from normal	Oct-Nov-Dec Precip	3 month departure from normal	July-Dec Precip	6 month departure from normal	Dec 2015 Snowfall	Dec snowfall departure from normal
Pittsfield MA	PSF	3.68''	0.68''	8.82''	-2.82''	21.36''	-2.48''	not given	not given
Bridgeport CT	BDR	4.94''	1.61''	8.76''	-1.60''	16.02''	-5.24''	0.7''	-4.4''
Hartford CT	BDL	4.25''	0.81''	9.03''	-2.67''	18.96''	-4.73''	1.0''	-6.4''
Worcester MA	ORH	4.65''	0.83''	9.47''	-3.31''	19.69''	-4.96''	1.4''	-13.0''
Providence RI	PVD	4.80''	0.58''	10.22''	-2.44''	18.53''	-4.94''	0.6''	-8.1''
Boston MA	BOS	4.28''	0.50''	8.09''	-3.62''	16.30''	-5.63''	0.8''	-8.1''

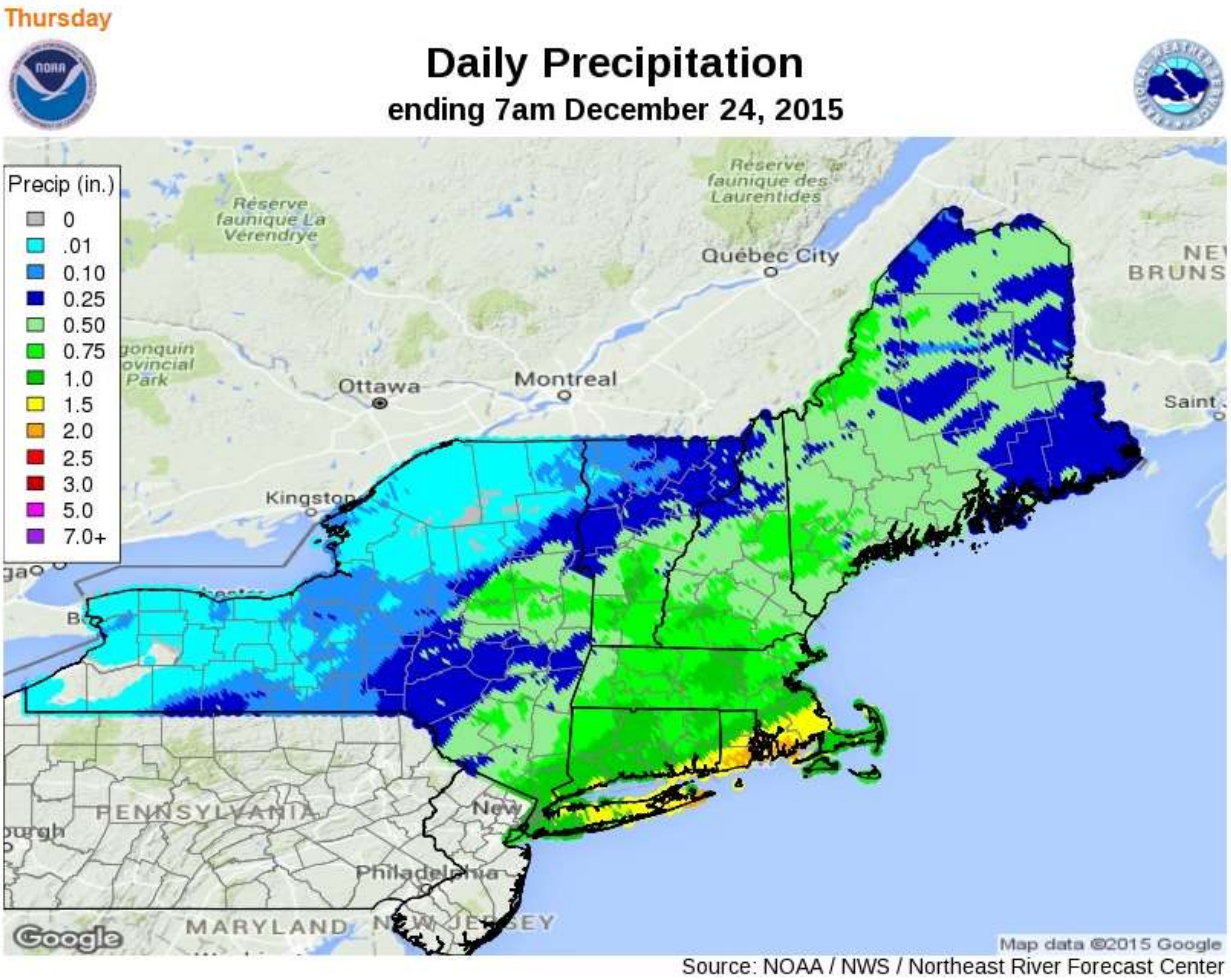
The first two weeks of December was largely dry. The last two weeks of December saw a wet pattern along with record warm temperatures. An overnight rain from the 14th-15th. Another overnight rain event from the 23rd-24th which you will see more of on the next page. And our first snow/sleet/freezing rain event on the 28th into the 29th.

A rainy pattern increases the daily reports. Look on the next page at few high points established with Daily Reports, Comments, and the mix between zero and non-zero reports. Well done.

One area that we can improve upon is looking back at your station data for missing reports. Monthly Zeros can be used to fill in days that you know had no precipitation. Multi-Day Accumulation can be used to fill in consecutive days of missing reports where you have an accumulation to report. Be careful with the First and Empty dates on the Multi-Day Accumulation report. This can cause a missing day to occur.

From your reports for December 2015

Observers reporting	166
Reported all 31 days	62
Completed by Multi-Day Reports	11
Missing 1 or 2 reports	34
Daily Reports	4075
Zero Reports	1917
Non-Zero Reports	2158
Comments	666
Multi-Day Reports	85
Highest Daily Snowfall Report	4.0″ from Fitchburg MA (MA-WR-8) reported on 12/30.
Highest Daily Report	2.52″ from Kingston RI (RI-WS-14) reported on 12/24. Honorable mention to all of the Rhode Island, Bristol and Plymouth stations that reported over 2″ also on 12/24. On the map below, from our River Forecast Center, the yellow-orange stripe is yours!



Source: NOAA / NWS / Northeast River Forecast Center

All 73 stations with complete precip data for December appear here.

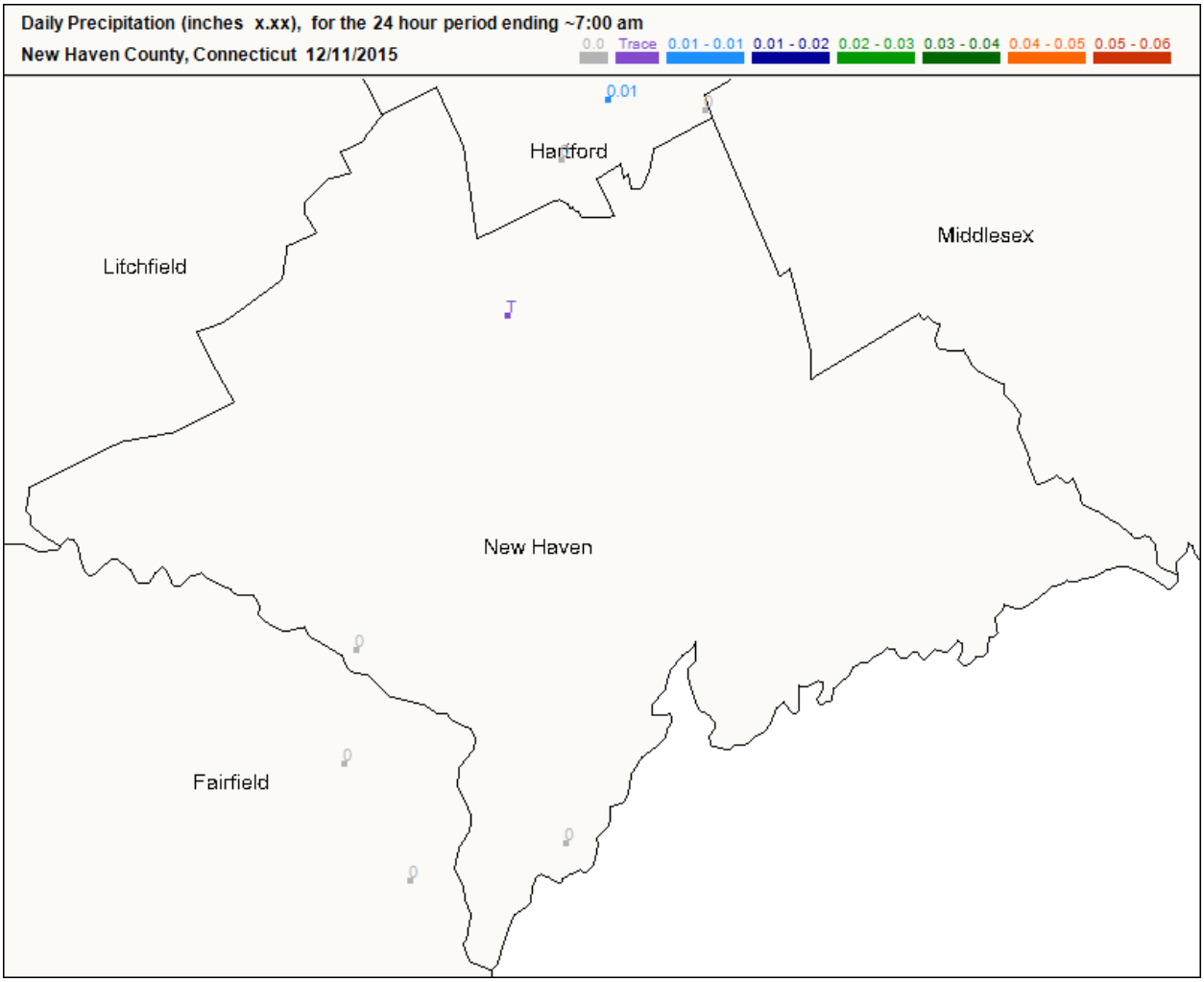
Station	Location	Precip	Snowfall	County & State
MA-BE-4	Becket 5.6 SSW	4.10''	1.5''	Berkshire MA
CT-LT-9	New Hartford Center 3.2 SW	4.68''	2.4''	Litchfield CT
CT-FR-9	Brookfield 3.3 SSE	4.04''	0.7''	Fairfield CT
CT-FR-23	Shelton 1.3 W	4.78''	0.7''	Fairfield CT
CT-NH-14	Prospect 1.9 ENE	4.79''	1.0''	New Haven CT
MA-FR-10	Conway 0.9 SW	5.13''	2.0''	Franklin MA
MA-FR-12	Sunderland 1.3 SE	4.81''	0.0''	Franklin MA
MA-HS-14	Plainfield 2.4 ESE	4.90''	1.0''	Hampshire MA
MA-HS-2	Westhampton 1.8 SW	5.11''	1.9''	Hampshire MA
MA-HS-10	Northampton 1.6 NE	4.79''	1.5''	Hampshire MA
MA-HD-13	Springfield 4.1 W	3.55''	0.0''	Hampden MA
CT-HR-24	Collinsville 0.9 NW	4.41''	1.4''	Hartford CT
CT-HR-15	Southington 3.0 E	4.51''	1.5''	Hartford CT
CT-HR-8	North Granby 1.3 ENE	4.51''	1.1''	Hartford CT
CT-HR-9	West Hartford 2.7 NNW	4.52''	1.2''	Hartford CT
CT-HR-18	Berlin 2.4 SSE	4.58''	0.0''	Hartford CT
CT-HR-11	West Hartford 2.7 SSE	4.16''	1.1''	Hartford CT
CT-HR-6	Wethersfield 1.2 WSW	4.00''	1.0''	Hartford CT
CT-HR-5	Enfield 1.5 SE	4.15''	1.0''	Hartford CT
CT-TL-2	Staffordville 0.4 NNW	4.55''	1.0''	Tolland CT
CT-MD-2	Portland 0.9 S	4.04''	0.0''	Middlesex CT
CT-MD-5	Westbrook Center 1.1 N	5.00''	0.0''	Middlesex CT
MA-WR-13	Leominster 1.5 S	4.88''	2.0''	Worcester MA
MA-WR-28	Berlin 1.3 WSW	4.84''	1.4''	Worcester MA
MA-WR-1	Milford 2.3 NNW	4.42''	0.9''	Worcester MA
CT-WN-8	Moosup 1.7 NE	3.77''	0.5''	Windham CT
CT-WN-4	East Killingly 1.3 SW	3.95''	1.0''	Windham CT
CT-NL-5	Oakdale 2.6 WNW	5.44''	0.0''	New London CT
RI-PR-32	Providence 2.3 NE	4.43''	0.5''	Providence RI
RI-NW-4	Middletown 1.1 SW	5.01''	0.0''	Newport RI
RI-NW-11	Tiverton 0.8 SSW	5.35''	0.5''	Newport RI
MA-BR-23	Attleboro 0.9 ENE	4.16''	0.7''	Bristol MA
MA-BR-2	Rehoboth 2.1 N	4.70''	0.8''	Bristol MA
MA-BR-3	Norton 1.8 NNE	4.36''	0.6''	Bristol MA
MA-BR-8	Dighton 1.1 WSW	5.46''	0.8''	Bristol MA
MA-BR-14	Dartmouth 2.5 SSW	5.79''	0.0''	Bristol MA
MA-MD-47	West Townsend 0.5 W	4.71''	3.3''	Middlesex MA
MA-MD-12	Acton 1.3 SW	4.86''	2.0''	Middlesex MA
MA-MD-55	Holliston 0.7 W	4.21''	1.1''	Middlesex MA

MA-MD-51	Maynard 0.7 ESE	4.96''	0.0''	Middlesex MA
MA-MD-42	Holliston 0.8 S	4.40''	0.7''	Middlesex MA
MA-MD-52	Lexington 0.6 SW	4.65''	1.5''	Middlesex MA
MA-MD-45	Wilmington 1.5 NE	4.04''	3.0''	Middlesex MA
MA-MD-7	Winchester 0.7 SE	4.55''	1.4''	Middlesex MA
MA-ES-3	Haverhill 3.6 WNW	5.28''	3.0''	Essex MA
MA-ES-20	Haverhill 0.7 N	4.89''	3.5''	Essex MA
MA-ES-4	Groveland 0.5 WSW	4.55''	3.2''	Essex MA
MA-ES-12	Boxford 2.4 S	4.52''	2.3''	Essex MA
MA-ES-1	Salisbury 3.7 NW	5.18''	2.0''	Essex MA
MA-ES-8	Marblehead 0.8 SW	4.55''	1.5''	Essex MA
MA-SF-10	Chelsea 0.8 N	4.58''	1.2''	Suffolk MA
MA-SF-2	Winthrop 0.2 N	4.79''	0.9''	Suffolk MA
MA-NF-16	Bellingham 4.7 S	3.94''	0.0''	Norfolk MA
MA-NF-11	Millis 2.0 SW	3.75''	1.0''	Norfolk MA
MA-NF-1	Norwood 1.3 NW	4.22''	0.9''	Norfolk MA
MA-NF-5	Weymouth 0.5 NW	4.57''	1.0''	Norfolk MA
MA-PL-12	East Bridgewater 1.7 WNW	4.52''	1.0''	Plymouth MA
MA-PL-15	Abington 1.2 NNE	3.60''	1.0''	Plymouth MA
MA-PL-6	Middleborough 5.5 E	6.06''	0.5''	Plymouth MA
MA-PL-18	Pembroke 1.7 ENE	4.71''	0.8''	Plymouth MA
MA-BA-14	North Falmouth 0.5 ENE	5.76''	0.5''	Barnstable MA
MA-BA-19	East Falmouth 0.7 NW	6.06''	0.0''	Barnstable MA
MA-BA-3	Falmouth 3.0 E	5.31''	0.1''	Barnstable MA
MA-BA-11	East Falmouth 1.4 ESE	5.60''	0.0''	Barnstable MA
MA-BA-18	Waquoit 0.6 SSW	5.95''	0.1''	Barnstable MA
MA-BA-47	Mashpee 2.4 WSW	6.32''	0.0''	Barnstable MA
MA-BA-45	Sandwich 0.9 NNE	5.67''	0.0''	Barnstable MA
MA-BA-1	Yarmouth 2.3 SSE	6.33''	0.2''	Barnstable MA
MA-BA-33	Brewster 1.5 ESE	6.11''	0.0''	Barnstable MA
MA-BA-27	Wellfleet 0.7 NW	5.03''	0.5''	Barnstable MA
MA-BA-30	Eastham 0.6 SW	5.53''	0.0''	Barnstable MA
MA-DK-5	West Tisbury 2.9 N	6.20''	0.0''	Dukes MA
MA-DK-2	Vineyard Haven 0.8 WSW	5.62''	0.0''	Dukes MA

To the several stations that reported Multi-Day Accumulations overlapping the beginning or ending of December, because of the holidays: Your totals were excluded because of the precip events we had at the end of November and December, but your efforts are appreciated and will help complete your station data when looking at a longer timeframe than just this one month of December.

Map of the Month – New Haven CT

Bordering to the west runs the Housatonic River along with hydroelectric plants at Shepaug and Stevenson Dams. The Naugatuck River starts from north of Waterbury and ends on the Housatonic in Derby. The Quinnipiac River starts north of Meriden and Cheshire and ends in New Haven.



New Haven County is a county of extremes.

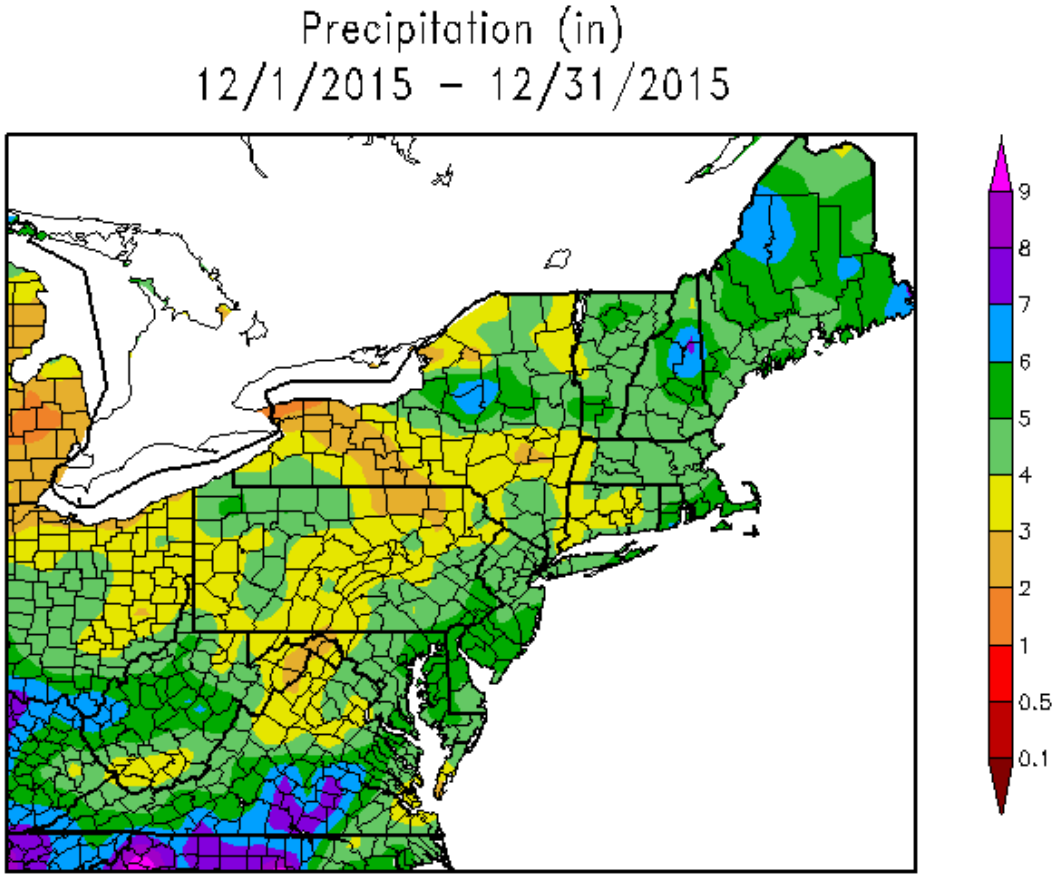
Extremes in topography with Sleeping Giant State Park rising 700 ft, just 10 miles north of New Haven's harbor, a vehicle tunnel on the Wilbur Cross Parkway even closer to the shoreline, and Castle Craig stands at nearly 1000 ft above sea level at the northern edge of the county in Meriden.

Extremes in population among the cities of New Haven, Waterbury, Meriden, Milford and West Haven and the small towns of Beacon Falls, Middlebury, Woodbridge and Bethany.

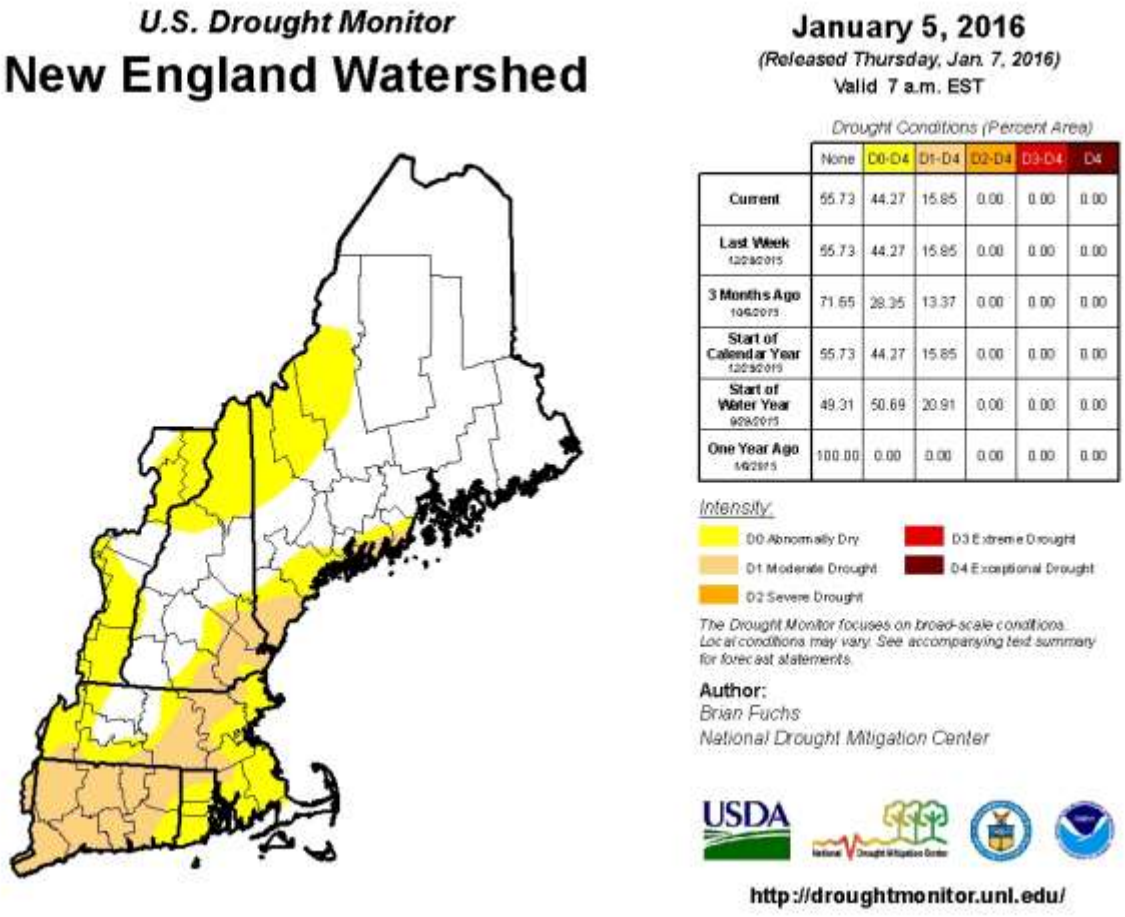
Extremes in precipitation occur in New Haven County. During the Blizzard of 2013 that occurred Feburary 7-8, while most of our area experienced 1'-2' of snow, Hamden CT topped them all by recording 40" of snow. In Prospect CT, our own CoCoRaHS observer CT-NH-14 is capturing extremes during these past 4 years, recording at least 11 days of more than 2" rainfall and 13 months with less than 3" total precipitation.

Capturing extremes in precipitation is our network's strength. For a county with a population of 850,000, we need more observers than what we have on this map. An extremely high number of observers in New Haven County would fit in well with all of the other extremes.

From the Climate Center for December 2015. At last! More green than gold, meaning more than 4" of precipitation. And a darker green stripe for those Rhode Island, Bristol and Plymouth observers from December 24.



From the Drought Monitor. And more about our drought situation.



For a viewing explanation on the Drought Monitor, the CoCoRaHS animated video is on YouTube.

Parts of Massachusetts and Rhode Island are within the D1 boundary, as well as most of Connecticut. The reason for emphasizing New London County in last month's newsletter, New Haven County in this month's newsletter, and generally all of Southern Connecticut is because of the drought status and the need for more observers providing a more detailed representation of the Southern Connecticut area.

This is one of the last sections added to this newsletter, so it may not be as complete as other parts are, but it is based upon a recent event and we want to emphasize this recent event to all of you, regardless of your drought situation.

It is a little hard to believe that we are in the drought conditions that are displayed considering the snowfall we had during last year from late January to early March. One reason why our snowfall reports are so valued is that other sources of precipitation reports are not as accurate as ours. Particularly the Automated Surface Observeration Stations (ASOS) at the area airports. The ASOS at area airports have tipping gauges, and when snow comes, the tipping gauges that are somewhat accurate when the rain comes do not tip accurately when the snow comes.

In this first week in January, the service hydrologist at the Taunton MA forecast office received a message from a water resources member of the State of Connecticut asking why Connecticut has been in drought conditions for the past few years. It turns out that one of the primary sources of precipitation reports being used comes from the tipping gauges from the area airports' ASOS.

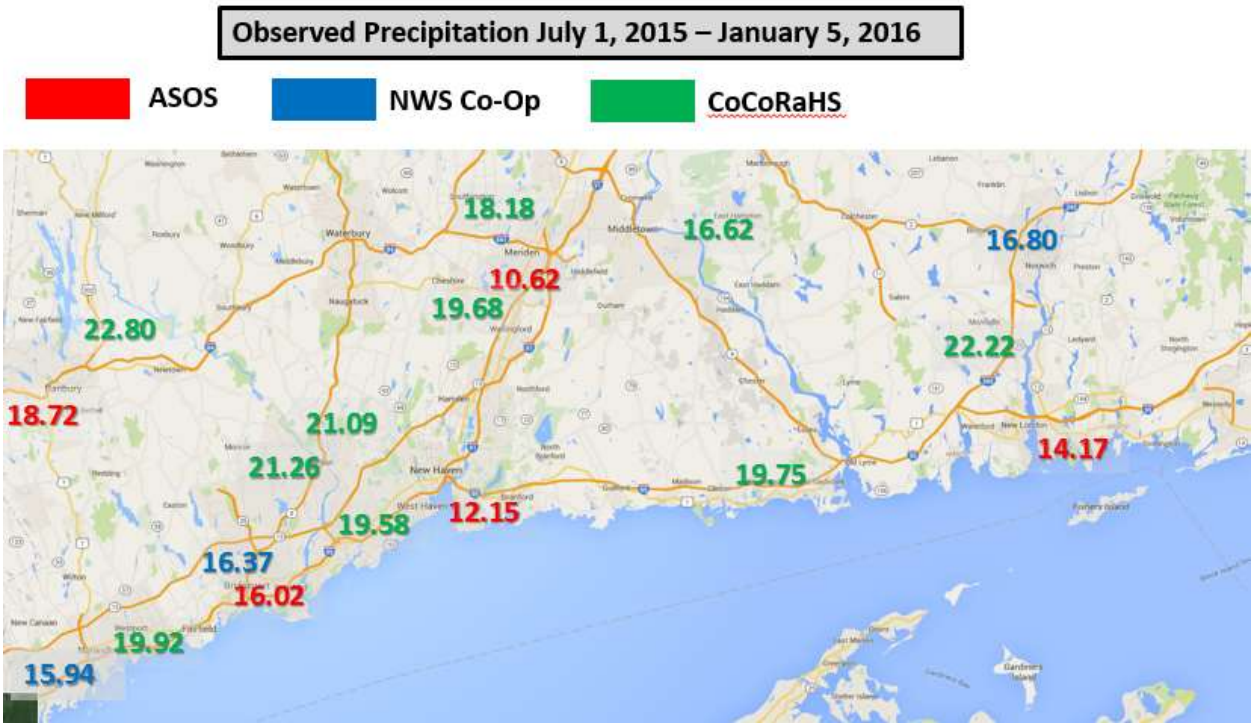
While others work out getting a better look at our drought situation, the message to all of you is this: All of your reports are valued. We understand if you are not able to make reports, especially with the conditions that winter brings. When you are able to make reports, the more complete those reports are, the fewer missing days not covered by multi-day reports, the more valuable your station data becomes, the more that it helps many others to understand what is occuring around us, regardless if it is wet, dry, deep snow, no snow, or just normal. Your locale may become an area of focus in the months to come.

Catchy phrases come in newsletters like "Be a hero. Report your zeros". "Strive for 365". "Make a deposit" "Make a withdrawal" Water Year recognitions are given. Newsletters are written with statistics about your reports and other features. Messages from Coordinators are sent. All of this is done to show you that the more reports you make, the more observers that we have in this network, the more complete your station data is, the more all of our efforts multiply in value.

The chart below was put together very quickly. For those stations that appear on this chart with a green number, we thank you for your station data, and for keeping it as complete as possible.

ASOS was explained earlier. NWS Co-Op is short for National Weather Service Cooperative Observers, a nationwide network established since 1890 with 8700 volunteers measuring temperature and precipitation. Co-Op observers use a 8" diameter rain gauge.

Take a close look at the past 6 months of precipitation in Southern CT in the chart below. No large precipitation events in this area during the first few days of January. Just the one small snow/sleet/freezing rain event December 28-29. From last month's newsletter with the PRISM information about "Average Precipitation", do you remember the simple guideline to use? That guideline would make average precipitation to be roughly 24"-26" for 6 months.



Natural variability? Or have we learned something about the sources of precipitation reports? Have we learned something more about the value of our network? We always need more observers and more reports to fill in the gaps.

#TBT – Throw Back Thursday

While researching for the article included on NOHRSC, a throw back of a newsletter attachment was found, written by Joe DelliCarpini, from October 2012 weeks before Hurricane Sandy affected our area.

We want to recognize and give thanks to the 74 observers who were listed in this throw back newsletter of October 2012 and reported this month of December 2015.

Station	Location	County State
MA-BE-3	Stockbridge .2 NNE	Berkshire MA
MA-BE-4	Becket 5.6 SSW	Berkshire MA
CT-LT-7	Litchfield 2.3 NNE	Litchfield CT
CT-FR-3	New Canaan 1.9 ENE	Fairfield CT
CT-FR-9	Brookfield 3.3 SSE	Fairfield CT
CT-FR-20	Westport 2.5 ENE	Fairfield CT
CT-NH-15	Seymour 3.6 SW	New Haven CT
CT-NH-14	Prospect 1.9 ENE	New Haven CT
MA-HS-2	Westhampton 1.8 SW	Hampshire MA
MA-HD-7	Springfield 0.5 ESE	Hampden MA
MA-HD-9	Wilbraham 2.1 SSW	Hampden MA
CT-HR-8	North Granby 1.3 ENE	Hartford CT
CT-HR-9	West Hartford 2.7 NNW	Hartford CT
CT-HR-6	Wethersfield 1.2 WSW	Hartford CT
CT-HR-5	Enfield 1.5 SE	Hartford CT
CT-HR-7	Central Manchester 2.7 SW	Hartford CT
CT-TL-2	Staffordville 0.4 NNW	Tolland CT
CT-MD-2	Portland 0.9 S	Middlesex CT
CT-MD-5	Westbrook Center 1.1 N	Middlesex CT
MA-WR-6	Southbridge 0.6 E	Worcester MA
MA-WR-8	Fitchburg 1.6 SSW	Worcester MA
MA-WR-13	Leominster 1.5 S	Worcester MA
MA-WR-18	Northborough 0.6 SSE	Worcester MA
MA-WR-1	Milford 2.3 NNW	Worcester MA
CT-WN-3	Pomfret Center 4.9 SW	Windham CT
CT-WN-2	North Grosvenor Dale 1.7 SSE	Windham CT
CT-WN-4	East Killingly 1.3 SW	Windham CT
CT-NL-5	Oakdale 2.6 WNW	New London CT
RI-PR-20	West Glocester 3.4 SE	Providence RI
RI-PR-17	Cranston 4.1 E	Providence RI
RI-WS-1	Hope Valley 3.7 S	Washington RI
RI-WS-14	Kingston 5.5 W	Washington RI

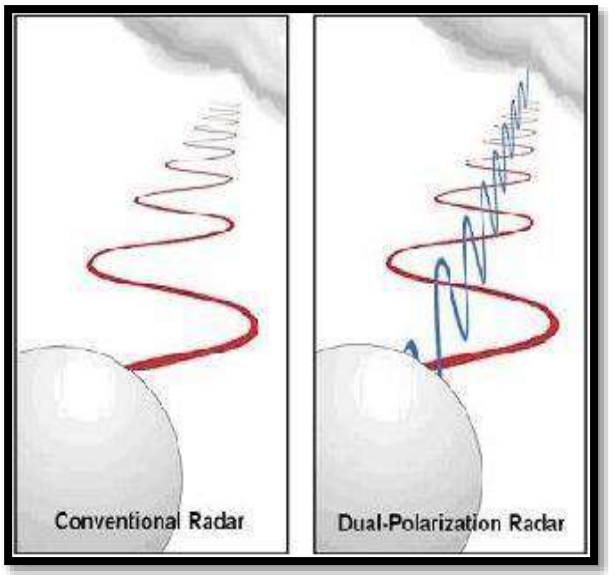
RI-KN-2	East Greenwich 2.3 ESE	Kent RI
RI-NW-4	Middletown 1.1 SW	Newport RI
RI-NW-5	Little Compton 1.7 NW	Newport RI
RI-NW-7	Little Compton 0.6 E	Newport RI
MA-BR-2	Rehoboth 2.1 N	Bristol MA
MA-BR-3	Norton 1.8 NNE	Bristol MA
MA-BR-8	Dighton 1.1 WSW	Bristol MA
MA-BR-9	Taunton 2.6 NW	Bristol MA
MA-MD-25	Ayer 0.1 SW	Middlesex MA
MA-MD-12	Acton 1.3 SW	Middlesex MA
MA-MD-7	Winchester 0.7 SE	Middlesex MA
MA-MD-11	Cambridge 0.9 NNW	Middlesex MA
MA-ES-10	Andover 1.5 W	Essex MA
MA-ES-3	Haverhill 3.6 WNW	Essex MA
MA-ES-4	Groveland 0.5 WSW	Essex MA
MA-ES-12	Boxford 2.4 S	Essex MA
MA-ES-1	Salisbury 3.7 NW	Essex MA
MA-ES-2	Beverly 2.8 NW	Essex MA
MA-ES-8	Marblehead 0.8 SW	Essex MA
MA-SF-4	Brighton 0.5 W	Suffolk MA
MA-SF-1	Boston 0.5 WSW	Suffolk MA
MA-SF-2	Winthrop 0.2 N	Suffolk MA
MA-NF-3	Franklin 0.7 NE	Norfolk MA
MA-NF-1	Norwood 1.3 NW	Norfolk MA
MA-NF-5	Weymouth 0.5 NW	Norfolk MA
MA-PL-6	Middleborough 5.5 E	Plymouth MA
MA-PL-5	Kingston 3.3 WNW	Plymouth MA
MA-BA-8	Falmouth 1.8 WSW	Barnstable MA
MA-BA-14	North Falmouth 0.5 ENE	Barnstable MA
MA-BA-13	Falmouth 0.6 NNW	Barnstable MA
MA-BA-17	East Falmouth 1.2 WNW	Barnstable MA
MA-BA-19	East Falmouth 0.7 NW	Barnstable MA
MA-BA-3	Falmouth 3.0 E	Barnstable MA
MA-BA-11	East Falmouth 1.4 ESE	Barnstable MA
MA-BA-18	Waquoit 0.6 SSW	Barnstable MA
MA-BA-10	East Sandwich 2.3 SE	Barnstable MA
MA-BA-22	Yarmouth 0.9 NNW	Barnstable MA
MA-BA-1	Yarmouth 2.3 SSE	Barnstable MA
MA-BA-12	Orleans 1.1 E	Barnstable MA
MA-DK-5	West Tisbury 2.9 N	Dukes MA
MA-DK-2	Vineyard Haven 0.8 WSW	Dukes MA
MA-DK-4	Edgartown 2.6 NW	Dukes MA

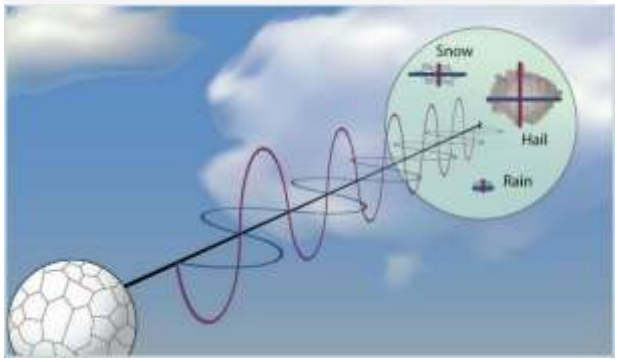
What is "Dual-Pol" and How Can CoCoRaHS Observations Help Forecasters?

By Joe DelliCarpini – Science & Operations Officer, NWS Taunton MA

During the first half of Year 2012, all of our area Doppler weather radars were upgraded with dual-polarization (dual-pol) technology as part of a nationwide implementation. This upgrade is part of the NWS vision to build a Weather Ready Nation to better protect lives and property from adverse weather.

So what exactly is Dual-Pol? Before the upgrade (left half image), Doppler radars transmitted and received pulses of radio waves in a horizontal orientation. As a result, the radar only measured the horizontal dimensions of targets (e.g. cloud and precipitation droplets). Dual-Pol radars (right half image) transmit and receive pulses in both a horizontal and vertical orientation. Therefore, the radar measures both the horizontal and vertical dimensions of targets. Since the radar receives energy from horizontal and vertical pulses, we can obtain better estimates of the size, shape, and variety of targets.





There are several benefits of the Dual-Pol radar. First, it improves accuracy of precipitation estimates, leading to better flash flood detection. Next, it has the ability to discern between heavy rain, hail, snow, and sleet. It also improves identification of non-meteorological echoes (e.g. ground clutter, birds, and even tornado debris). Lastly, it helps in the detection of

aircraft icing conditions by having the ability to identify the location of the melting layer (e.g. bright band).

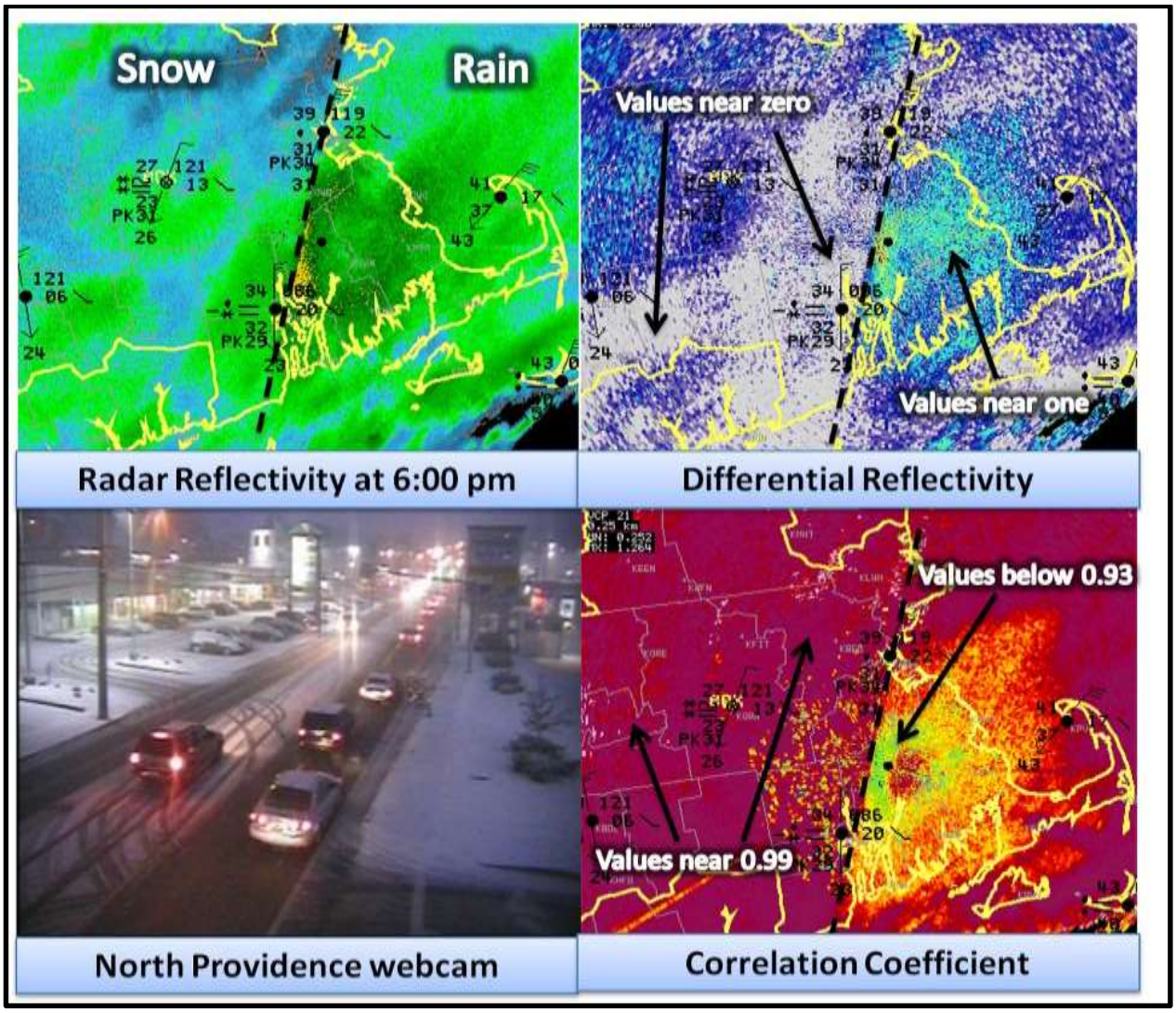
Keep in mind radar is used as a tool by forecasters. Dual-Pol does not improve Tornado Warning lead times, is not able to provide exact precipitation type on the ground, or measure rainfall amounts. That's why forecasters rely on your daily CoCoRaHS rainfall reports and Significant Weather Reports to verify what they see on the radar. Your reports are a critical piece of information!

There are several new radar products with the upgrade to Dual-Pol which help forecasters determine the size, shape, and variability of targets. These include Differential Reflectivity (ZDR), Correlation Coefficient (CC), and Specific Differential Phase (KDP).

At NWS Taunton, we have put the Dual-Pol radar into excellent use over the past 4 years. It helps us determine the location of the rain/snow line in winter storms, finds hail cores within thunderstorms, detects debris lofted from tornadoes (Revere MA in August 2014), and even detects smoke from large fires.

So how does it help in winter? Here's an example of how Dual-Pol is used to help determine precipitation type. On November 8, 2012 a coastal storm brought early season snows to much of interior southern New England and rain to the coast. During the afternoon and evening, a coastal front set up across Rhode Island and eastern Massachusetts. Snow fell to the west of the front where temperatures were in the 30s, while to the east it was raining as temperatures held in the 40s.

The images below show dual-pol radar products at 6pm on November 8th along with a webcam image from North Providence RI at the same time. Reflectivity (upper left) shows where precipitation is falling, ZDR (Differential Reflectivity, upper right) is a measure of drop size, and CC (Correlation Coefficient, lower right) is a measure of drop size uniformity.



The rain-snow line is clearly evident on the images just to the northwest of the radar (dark circle) where the coastal front was located. Note the difference in ZDR (values near zero indicate snow and values near 1 indicate rain) and CC (higher values indicate snow and lower values show where rain or mixed rain and snow are present). You can see snow is falling in North Providence which is located in the colder air to the west of the coastal front.

By using these dual-pol products, forecasters were able to accurately track the slow southward progress of the rain-snow line that evening, which helped forecasters provide effective short term forecasts.

Who looks at CoCoRaHS data? The National Operational Hydrologic Remote Sensing Center (NOHRSC) does too!

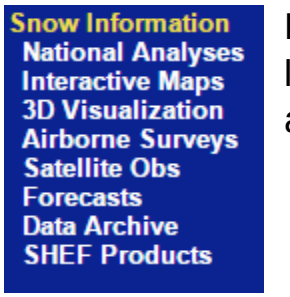
Snowfall. It provokes many different thoughts from play and recreation to cancelled travel and personal injury. Snowfall is also a form of precipitation that does not melt and runoff immediately. When snow accumulates and melts at a later time, the runoff can replenish lakes and reservoirs for the summer, but can also cause serious flooding.

Across North America, the National Operational Hydrologic Remote Sensing Center (NOHRSC) pronounced "no-risk") observes and forecasts snow conditions from its office in Chanhassen MN, near Minneapolis. By satellite, they are able to see which areas have snow cover and which do not. By aircraft, flying over certain tracks of land in the summer with no snow cover, and then by flying over those same tracks of land with snow cover, sensors in the rear of the aircraft are able to sense the depth of snow in the ground by what small elements are being radiated from the surface.

By surface reports, that's where our network comes in. Over 25% of last month's snow observations came from CoCoRaHS. Our low cost rulers and gauges have a high value impact. Snow depth reports are valuable inputs to our own North East River Forecast Center (NERFC) in Taunton MA and NOHRSC as they have their weekly telephone calls during the snow season. Wait until you see how they display our reports!

Pick up a brochure before we travel. Here's their brochure.
http://www.nohrsc.noaa.gov/technology/pdf/NOHRSC_Summary.pdf

On to the websites.

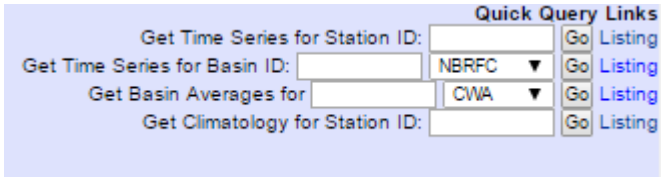


First stop: Home page. http://www.nohrsc.noaa.gov The links on the left, most of them we are about to go through, one at a time.

Next stop: National Snow Analysis. http://www.nohrsc.noaa.gov/nsa/ 9 different maps for ways of looking at snow. Scroll down toward the bottom to see the "Top 10" Snow Reports.

Next stop: Interactive Snow Analysis

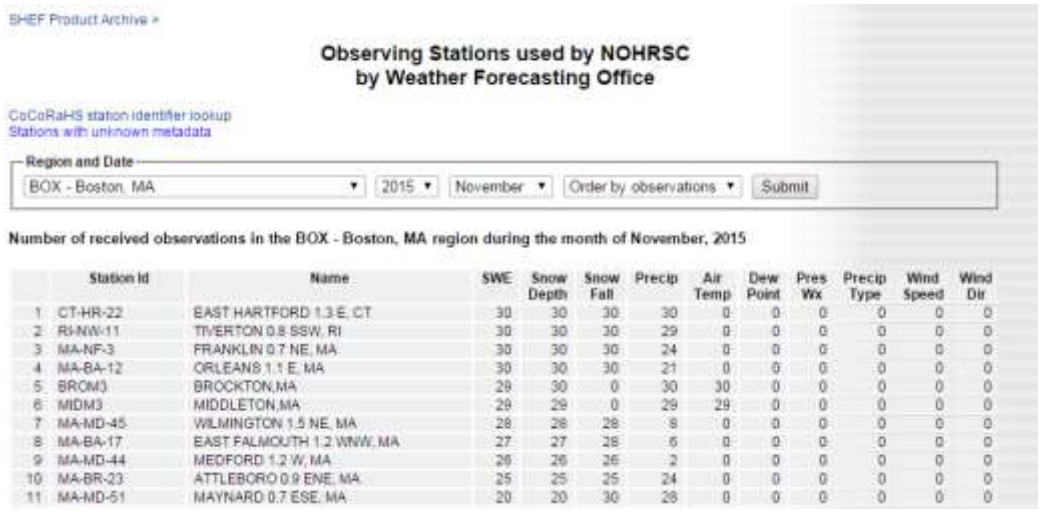
http://www.nohrsc.noaa.gov/interactive/html/map.html You can easily spend a long winter's night here. A few items to point out. On the map, your mouse can zoom into a section by holding down on the left side of the mouse and drawing a red box with the mouse, releasing the left side of the mouse when finished drawing a red box. In the upper right corner, your CoCoRaHS Station ID will work. If you've been an observer for a few years, enter a Station ID without the dashes (MASF02). If you are new to CoCoRaHS, enter a station ID with the dashes (RI-NW-11). As you see the graphs, the default unit of measure is "Metric Units". Select "English Units" from the drop down box, if you wish.



A quick mention of "3D Visualizations" and "Forecasts" If you have Google Earth installed on your workstation, selecting these options give you the ability to download a .kmz file formatted to be opened within Google Earth.

Next stop: Satellite Obs. Very simple. Links provided for the Continental US, Alaska and the Northern Hemisphere. Latest Map to maps 5 days ago. White is for snow. Yellow is for ice.

Next stop: SHEF Products. SHEF stands for Standard Hydrologic Exchange Format. Your reports! Try this with "Observations by WFO". Select your weather forecast office (WFO) ALY – Albany, BOX – Boston, OKX – for Southern CT. Select a year and month. CoCoRaHS station identifier lookup works. Select it. Select a state. Your CoCoRaHS station is a Station SHEF ID. Scroll down to find a CoCoRaHS station. Select a CoCoRaHS station and look at the graphs. The default is "Metric Units". Select "English Units", if you wish.



SHEF Product Archive »

Observing Stations used by NOHRSC by Weather Forecasting Office

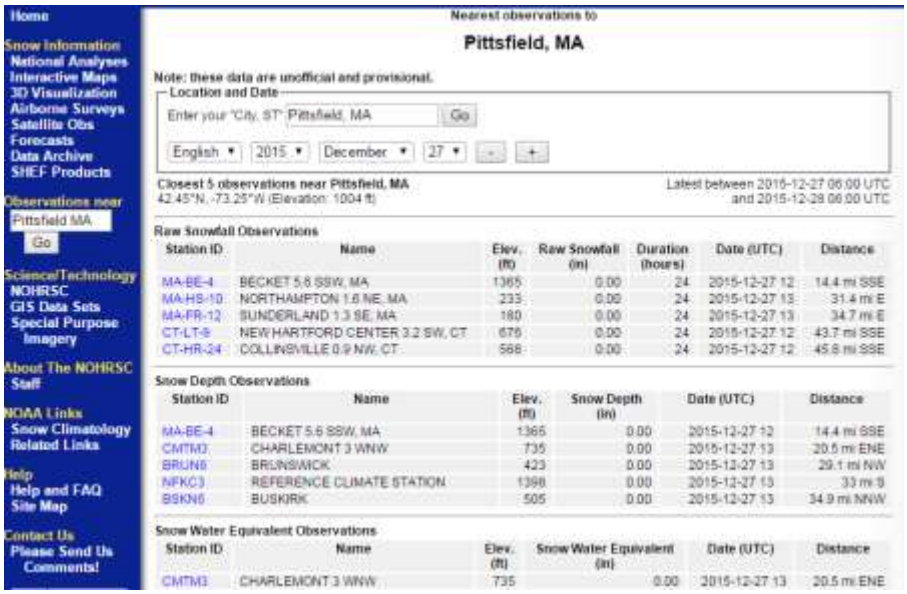
CoCoRaHS station identifier lookup
Stations with unknown metadata

Region and Date: BOX - Boston, MA | 2015 | November | Order by observations | Submit

Number of received observations in the BOX - Boston, MA region during the month of November, 2015

	Station Id	Name	SWE	Snow Depth	Snow Fall	Precip	Air Temp	Dew Point	Pres Wx	Precip Type	Wind Speed	Wind Dir
1	CT-HR-22	EAST HARTFORD 1.3 E, CT	30	30	30	30	0	0	0	0	0	0
2	RI-NW-11	TIVERTON 0.8 SSW, RI	30	30	30	29	0	0	0	0	0	0
3	MA-NF-3	FRANKLIN 0.7 NE, MA	30	30	30	24	0	0	0	0	0	0
4	MA-BA-12	ORLEANS 1.1 E, MA	30	30	30	21	0	0	0	0	0	0
5	BROM3	BROCKTON,MA	29	30	0	30	30	0	0	0	0	0
6	MIDM3	MIDDLETON,MA	29	29	0	29	29	0	0	0	0	0
7	MA-MD-45	WILMINGTON 1.5 NE, MA	28	28	28	8	0	0	0	0	0	0
8	MA-BA-17	EAST FALMOUTH 1.2 WNW, MA	27	27	28	6	0	0	0	0	0	0
9	MA-MD-44	MEDFORD 1.2 W, MA	26	26	26	2	0	0	0	0	0	0
10	MA-BR-23	ATTLEBORO 0.9 ENE, MA	25	25	25	24	0	0	0	0	0	0
11	MA-MD-51	MAYNARD 0.7 ESE, MA	20	20	30	28	0	0	0	0	0	0

Observations near. Enter a city and state. Pittsfield MA is displayed here. It's all there! NOHRSC gets your CoCoRaHS reports. Look at the stations listed here that reported zero for "New Snow" and "Snow Depth". NWS Cooperative Observers are listed with CoCoRaHS stations.



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Nearest observations to
Pittsfield, MA

Note: these data are unofficial and provisional.

Location and Date
Enter your "City, ST" Pittsfield, MA | Go
English | 2015 | December | 27 | - | +

Closest 5 observations near Pittsfield, MA
42.45°N, -73.25°W (Elevation: 1004 ft)
Latest between 2015-12-27 06:00 UTC and 2015-12-28 06:00 UTC

Raw Snowfall Observations

Station ID	Name	Elev. (ft)	Raw Snowfall (in)	Duration (hours)	Date (UTC)	Distance
MA-BE-4	BECKET 5.6 SSW, MA	1365	0.00	24	2015-12-27 12	14.4 mi SSE
MA-HS-10	NORTHAMPTON 1.6 NE, MA	233	0.00	24	2015-12-27 13	31.4 mi E
MA-FR-12	SUNDERLAND 1.3 SE, MA	180	0.00	24	2015-12-27 13	34.7 mi E
CT-LT-9	NEW HARTFORD CENTER 3.2 SW, CT	676	0.00	24	2015-12-27 12	43.7 mi SSE
CT-HR-24	COLLINSVILLE 0.9 NW, CT	588	0.00	24	2015-12-27 12	45.8 mi SSE

Snow Depth Observations

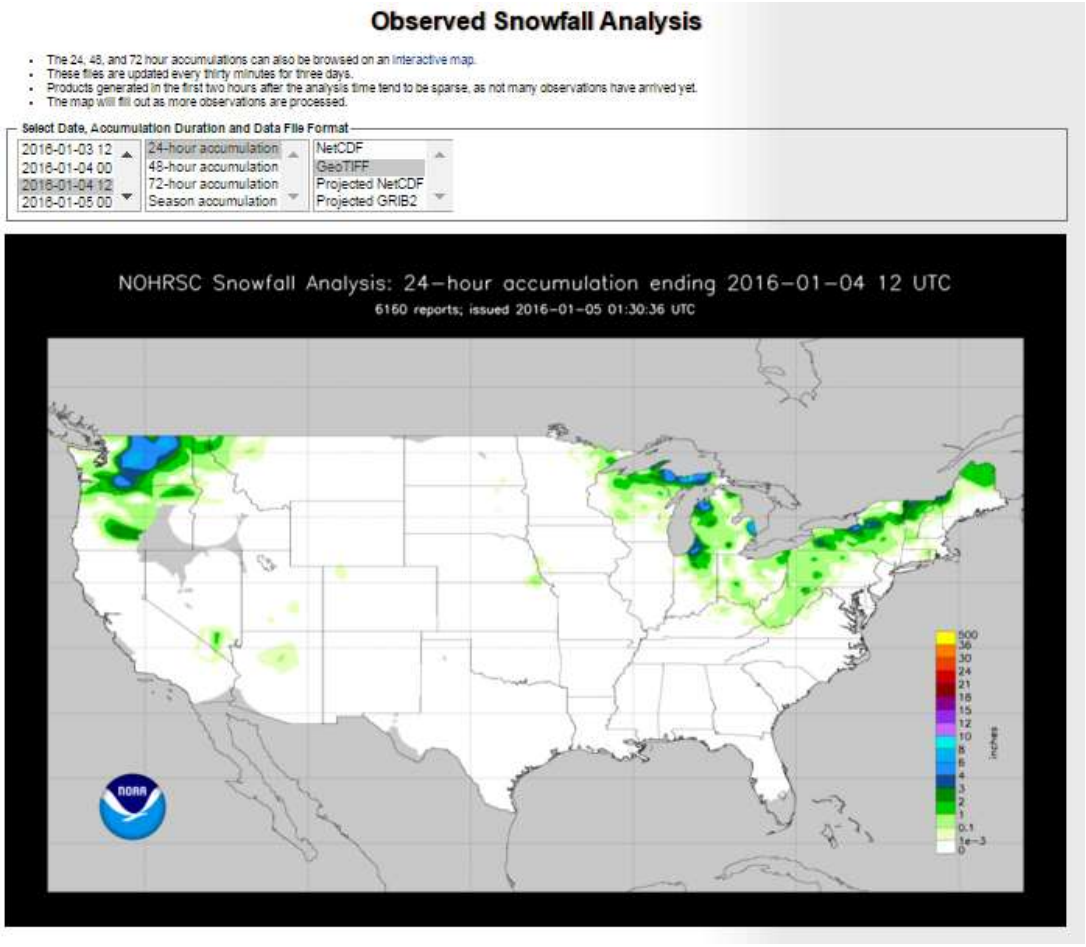
Station ID	Name	Elev. (ft)	Snow Depth (in)	Date (UTC)	Distance
MA-BE-4	BECKET 5.6 SSW, MA	1365	0.00	2015-12-27 12	14.4 mi SSE
CMTM3	CHARLEMONT 3 WNW	735	0.00	2015-12-27 13	20.5 mi ENE
BRUN6	BRUNSWICK	423	0.00	2015-12-27 13	29.1 mi NW
NFKC3	REFERENCE CLIMATE STATION	1398	0.00	2015-12-27 13	33 mi S
BSKN6	BUSKIRK	505	0.00	2015-12-27 13	34.9 mi NNW

Snow Water Equivalent Observations

Station ID	Name	Elev. (ft)	Snow Water Equivalent (in)	Date (UTC)	Distance
CMTM3	CHARLEMONT 3 WNW	735	0.00	2015-12-27 13	20.5 mi ENE

You can use this screen as a "time machine" back to Year 2003 if you want to select a date from a previous year, month and day.

An experimental product http://www.nohrsc.noaa.gov/snowfall Use the scroll bars in the left box to change the date. Use the scroll bar in the center box to change the timeframe. The “Season Accumulation” map will be a good map to look at as the season goes on. The scroll bar on the right box is about file formats to export data.



From the NOHRSC office to all of you in CoCoRaHS. Take your measurements if you can do so safely and if you are able to do so. Take no risks for NOHRSC.

- SWE Mondays. Snow Water Equivalent. Pronounced “swee” The melted core of your snow depth. It was the first thing mentioned when talking with a staff member of NOHRSC about CoCoRaHS. In the upcoming month, you will probably see a “Message of the Day” after you submit your Daily Report about our SWE Monday custom during the winter months. For Monday morning: If you have a snow

cover, measure the depth, take a core sample of a representative area, melt and measure the amount of liquid in that core sample and report the depth and melted core sample under the "Total Snow and Ice on Ground at Observation Time" section of your Daily Report. Measure and report the depth on the remaining days of the week that you have a snow cover, however, leave "NA" for melted core. It is too much work, and will cut too many cores in your field of snow, to measure the melted core 7 days a week.

Rather than type "Total Snow and Ice on Ground at Observation Time" depth and melted core again, snow depth and SWE will be mentioned instead.

- False zeros. Please! Do **NOT** report zero for snow depth or SWE when you have snow cover outside. This is a **BIG** problem for NOHRSC to deal with in their models as they are trying to build computer algorithms to exclude false zeros, looking at neighboring reporting stations, and interacting with River Forecast Centers. If you liked the Trix cereal analogy used by our NERFC, the analogy here is false zero reports make a map look like Clearasil on prom night. Our low cost rulers and gauges can be of high value by accurately reporting snow depth every day and SWE on Mondays. If you cannot take a measurement, leave the "NA" in the snow section of your Daily Report. "NA" is better than a false zero.

- True zeros. If you have received no new snow, report a zero for "New Snowfall", depth and melted core. If you have no snow cover, report a zero for snow depth and SWE, even if it is not Monday. Why? Something about being a hero by reporting a zero? Not this time. Your zero report can help NOHRSC most accurately determine where the snow line is. Our training slide show on snow measuring says there are no zeros like snow zeros. NOHRSC would agree.

- NOHRSC is changing their name to the National Water Center (Chanhassen). Their new site will be http://water.noaa.gov Along with the new website, this 4 minute YouTube video explains much of what the change is about.

Who looks at CoCoRaHS data? You do! See the value in your own reports. River Forecast Centers do! The hydrologists that forecast river flows look at your precipitation reports during their morning data gathering phase. Now, we add one more to the list: NOHRSC does too! They not only look at your reports. They display them on their site!!

Enjoy and learn from their website during these winter months.

Wrap Up

According to Old Farmer's Almanac, January is named after the two faced Roman god, Janus. Our weather during January can be two faced as well. We have seen some of that in this first week of January. Our own rain gauges may have two different appearances during January, one with and one without the funnel and inner cylinder.

Should one of those two faces of January weather appear with a snow cover, if you can do so safely and are able to do so, snow depth becomes a valuable daily measurement, and measuring SWE for Monday morning also becomes a valuable weekly measurement. Please be accurate with the placement of the decimal point! If the other face of January appears with no snow cover, oh, how valuable those snow zeros really are. We have another valued customer in Chanhassen MN.

Before the next newsletter comes out, a groundhog will appear from its burrow and will prognosticate winter's future. In the meantime, take notice of the slightly longer daylight each day.

Thank you for all that you do for CoCoRaHS, whether in the past, present and in the days to come.

From the Editor

This section boxed in blue below I had typed months ago and was going to include it sometime during these winter months. Now seems as good a time as any to include it. Being asked to serve as State Coordinator for Connecticut is completely unexpected and I am honored to be chosen.

I was asked by Headquarters to prepare a brief biography to be included on the message to new observers, and that was a unique task. You all are again finding out that I don't do "brief" very well, and in this venue, it's about the volunteer efforts of other observers, not about me. A longer and different version of my biography is included below.

Over these past few months of preparing newsletters, I have seen numbers on top of numbers and numbers of numbers. What I'm looking forward most about the role of Connecticut State Coordinator is putting the community and the collaborative in the network with all of you.

About the Editor: Matt Spies joined CoCoRaHS when it was introduced to Connecticut in June 2009. At first, there was a certain childlike giddiness into "What color dot did I get?" when looking at the map after submitting a report. That response has been replaced by the awe of seeing thousands of colored dots on the national map each day.

Each year, there has been more to experience and learn. Water Year Summaries appear, newsletters from Nolan provide appreciation of the efforts of many others along with the farm reports that come with a few laughs, more details with snow measuring, seeing extremes and variability with precipitation, all of the consumers that use our stations' data, YouTube videos, Facebook posts, the Blog, the value of zeros, reporting with a mobile app, seeing CoCoRaHS expand through all 50 states and beyond to Canada, Puerto Rico, the Virgin Islands, the White House. The Bahamas are next.

Turning data into information using computers has been a lifelong occupation. Volunteering has been a lifelong vocation. Weather has been a lifelong interest. Creating this newsletter allows all three to occur. The intent of the newsletter is to pass on information, make it relevant to our calendar, recent to past events, and to do so with the appreciation of your volunteer efforts.

CoCoRaHS is a unique citizen-science project where volunteer participation multiplies with each observer making each report and bringing it all together with the internet. Enjoy it. Learn from it. Spread the word.