

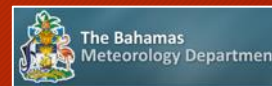
“Ciencia ciudadana en su propio patio trasero”



CoCoRaHS



An international volunteer citizen science precipitation network complementing national and sub-national observational capacities. Daily and real time observations available to support preparedness and response relating to extreme events.



PART ONE



An overview of our network

CoCoRaHS was born in response to the 1997 Fort Collins, Colorado Flood



STORM TOLL

Deaths - 5 confirmed
Injuries - 40
Missing - 16
Rescued - 160

Damages - Tens of millions of dollars at Colorado State University, \$1.5 million to \$2 million to city roads and bridges; \$1 million to city parks and trails; no estimate for private property.

Source: Emergency Officials
All information as of 1 a.m. today

Wednesday

FORT COLLINS
COLORADOAN

City death toll at 5; damage in millions



"I thought I was dead a few times"

FLOOD

pg. 577

CSU's book losses speak volumes



Rainfall breaks 20-year record



July 30th 1997



The flood pointed out:

1. The extreme local variations in rainfall possible from convective storms.
2. The important role individuals can play in measuring, mapping and reporting precipitation.

Distance between A and B = 5 miles (8 km)

A = 14.5 inches (368 mm)
B = 2.0 inches (50.8 mm)

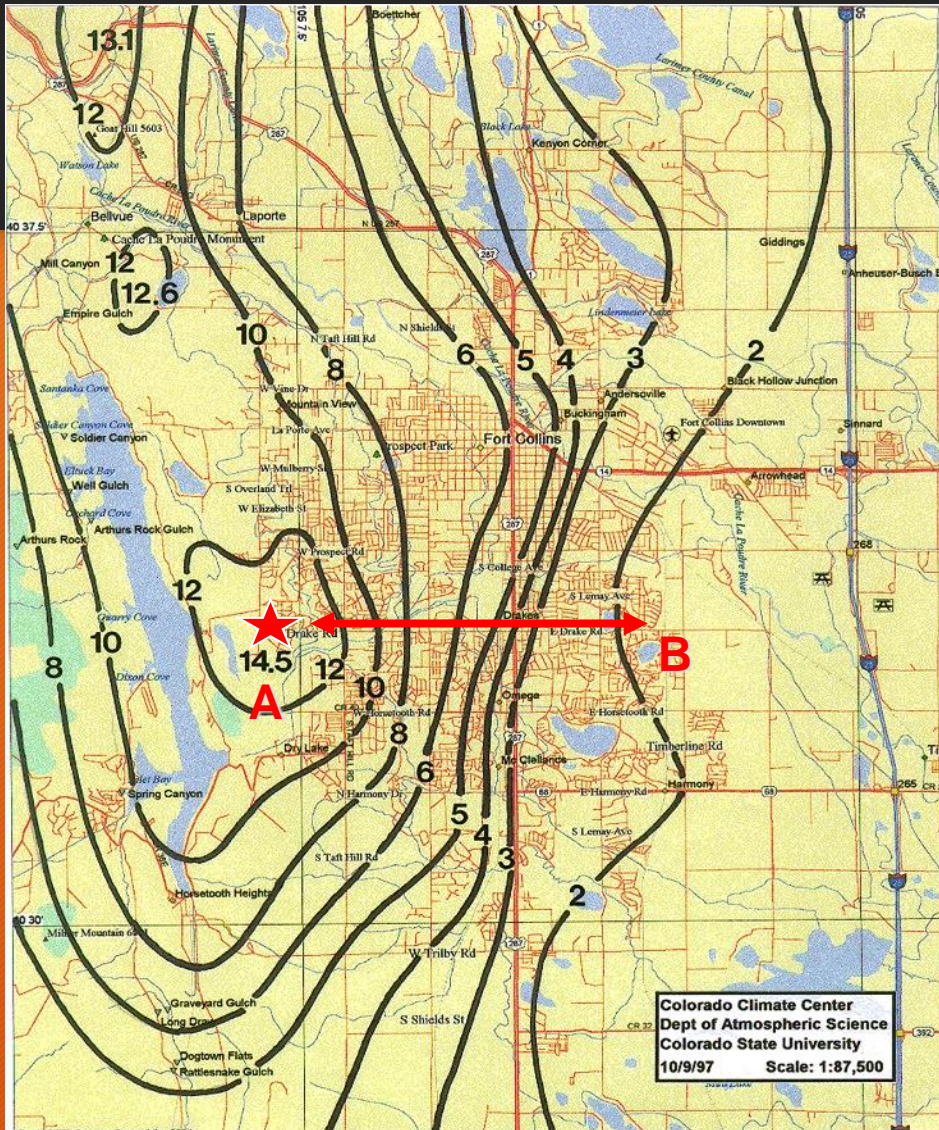


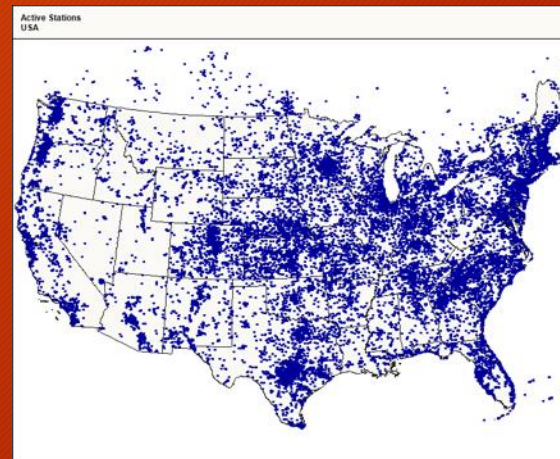
Figure 14. Rainfall (inches) for Fort Collins, Colorado, for 4:00 p.m. MDT July 27, 1997 through 11:00 p.m. MDT for July 28, 1997

1998

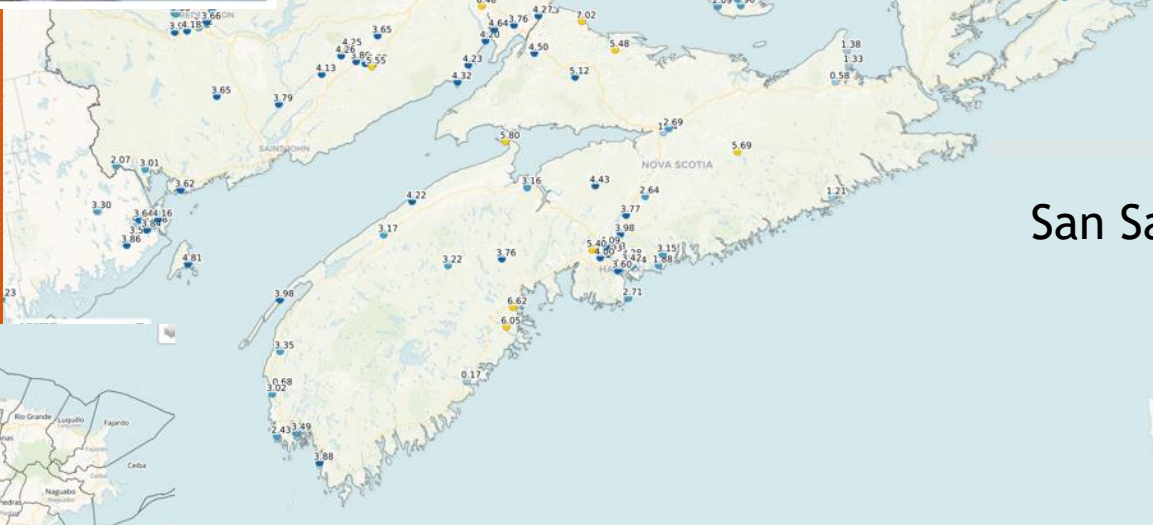


A few dozen volunteers
in Northern Colorado

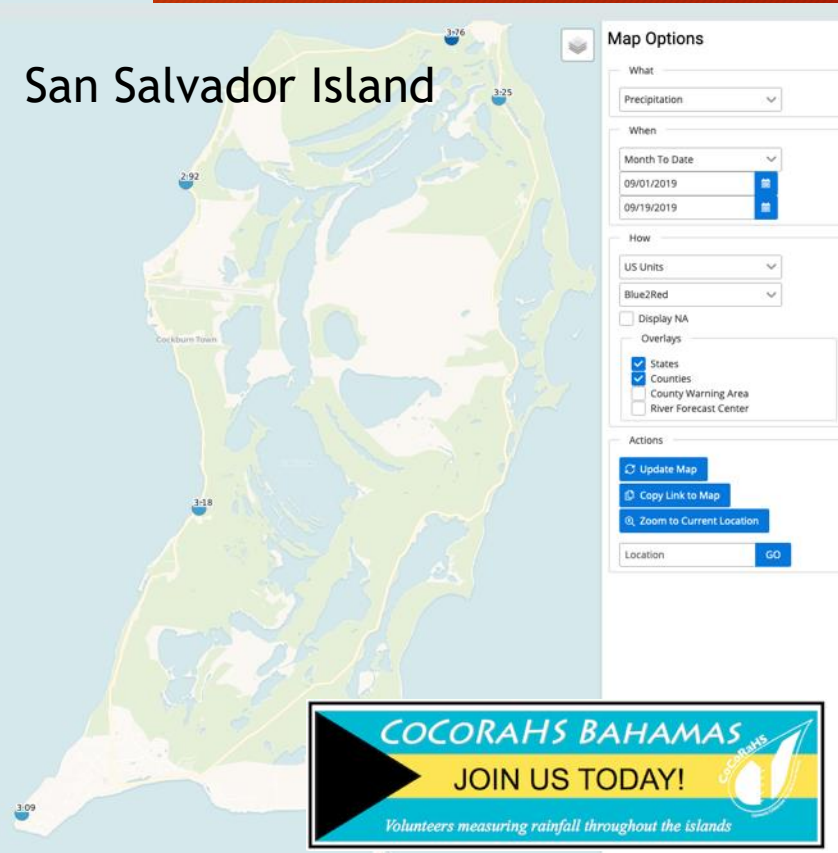
Today

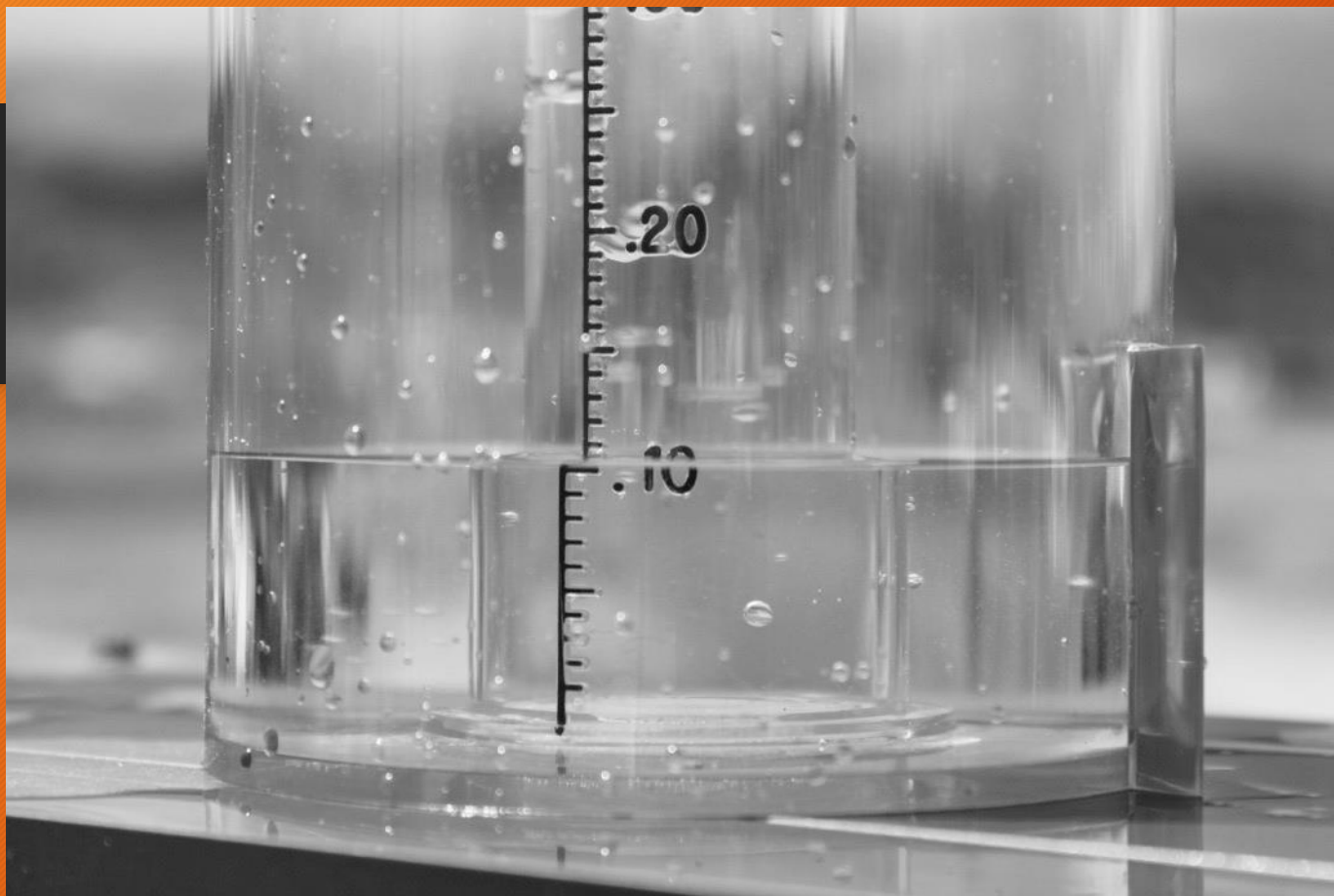


21,000+ volunteers in all
50 states, Canada, Puerto Rico,
the U.S. Virgin Islands and the Bahamas



La *"Isla Del Encanto"* se complace en participar en la creciente red de CoCoRaHS. Los observadores de CoCoRaHS PR proveen información importante acerca de la lluvia, que es utilizada por meteorólogos, hidrólogos, agricultores, los administradores de los recursos de agua, al igual que por tus amigos y vecinos. Este esfuerzo es de gran importancia dada la gran variabilidad en las acumulaciones de lluvia local, fluctuando entre 175 pulgadas en la Sierra de Luquillo y en El Yunque hasta solo unas 25 pulgadas de lluvia en las áreas más áridas del sur de Puerto Rico. ¡Este programa eventualmente se expandirá a las Islas Vírgenes Americanas (USVI, por sus siglas en inglés)! Para información adicional acerca del capítulo de CoCoRaHS PR o USVI, favor de contactar a cualquiera de los coordinadores locales.





CoCoRaHS' s goal is to provide:

*High Quality Precipitation Data
and
Educational Resources and Outreach*



Today's citizen weather observer
can play a valuable role with
supplemental observations



Rainfall data

CoCoRaHS provides daily precipitation measurements and real-time observations when conditions warrant



Snowfall data

CoCoRaHS Volunteers measure both snowfall depth (new and accumulated) as well as the water content of the snow (SWE)



Hail data

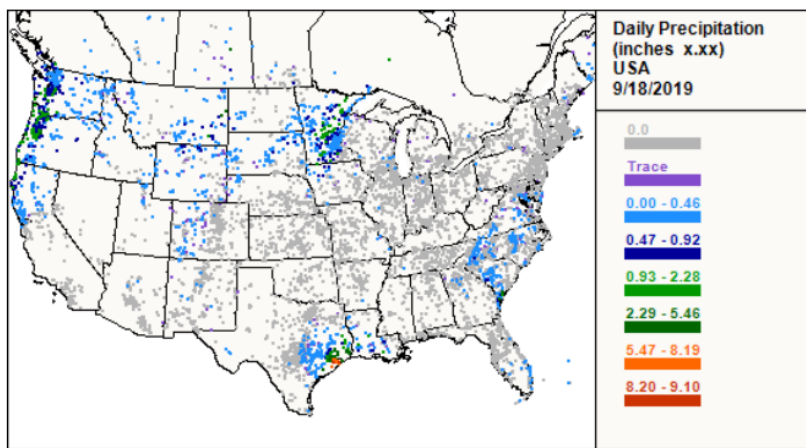
CoCoRaHS observers report hail and reports are available daily and in real time to the public.

- Main Menu
- [Home](#)
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 - [Videos](#)
 - [Condition Monitoring](#)
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 - [Soil Moisture](#)
- [Volunteer Coordinators](#)
 - [Hail Pad Distribution/Drop-off](#)
 - [Help Needed](#)
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 - [Web Groups](#)
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 - [Master Gardener Guide](#)
 - [State Climate Series](#)
 - [March Madness](#)
 - [WxTalk Webinars](#)
- [Sponsors](#)
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 - [CoCoRaHS Store](#)

Who uses CoCoRaHS Observations?

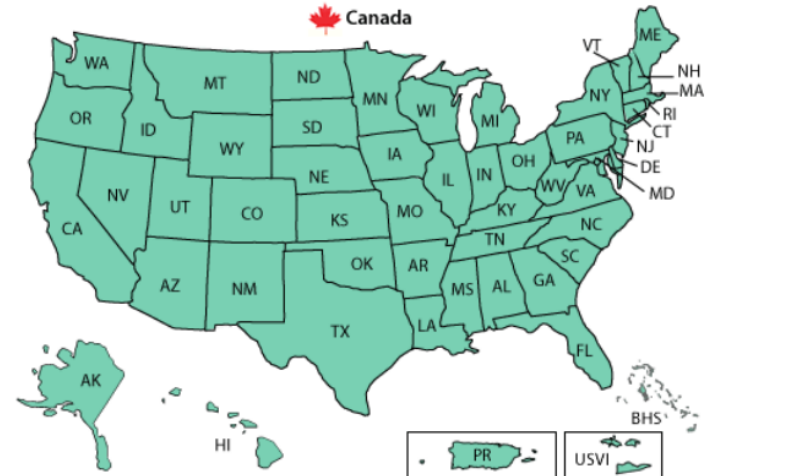
Reports received today 9/18/2019 as of 4:08 PM EDT

Daily	Multi-day	SigWx	Hail	Condition	ET
9,220	115	0	0	23	118




Daily Precipitation
(inches x.xx)
USA
9/18/2019

0.0
Trace
0.00 - 0.46
0.47 - 0.92
0.93 - 2.28
2.29 - 5.46
5.47 - 8.19
8.20 - 9.10





JOIN
CoCoRaHS



TRAINING
SLIDE-SHOWS

Training Animations

Things to know about...


Rain


Hail


Snow

Download on the
App Store

ANDROID APP ON
Google Play

CoCoRaHS
WxTalk
Webinar Series

Purchase an official
CoCoRaHS 4" Rain Gauge
"The official CoCoRaHS
Rain Gauge supplier"

Daily Precipitation (inches x.xx), for the 24 hour period ending ~7:00 am

USA 9/16/2019

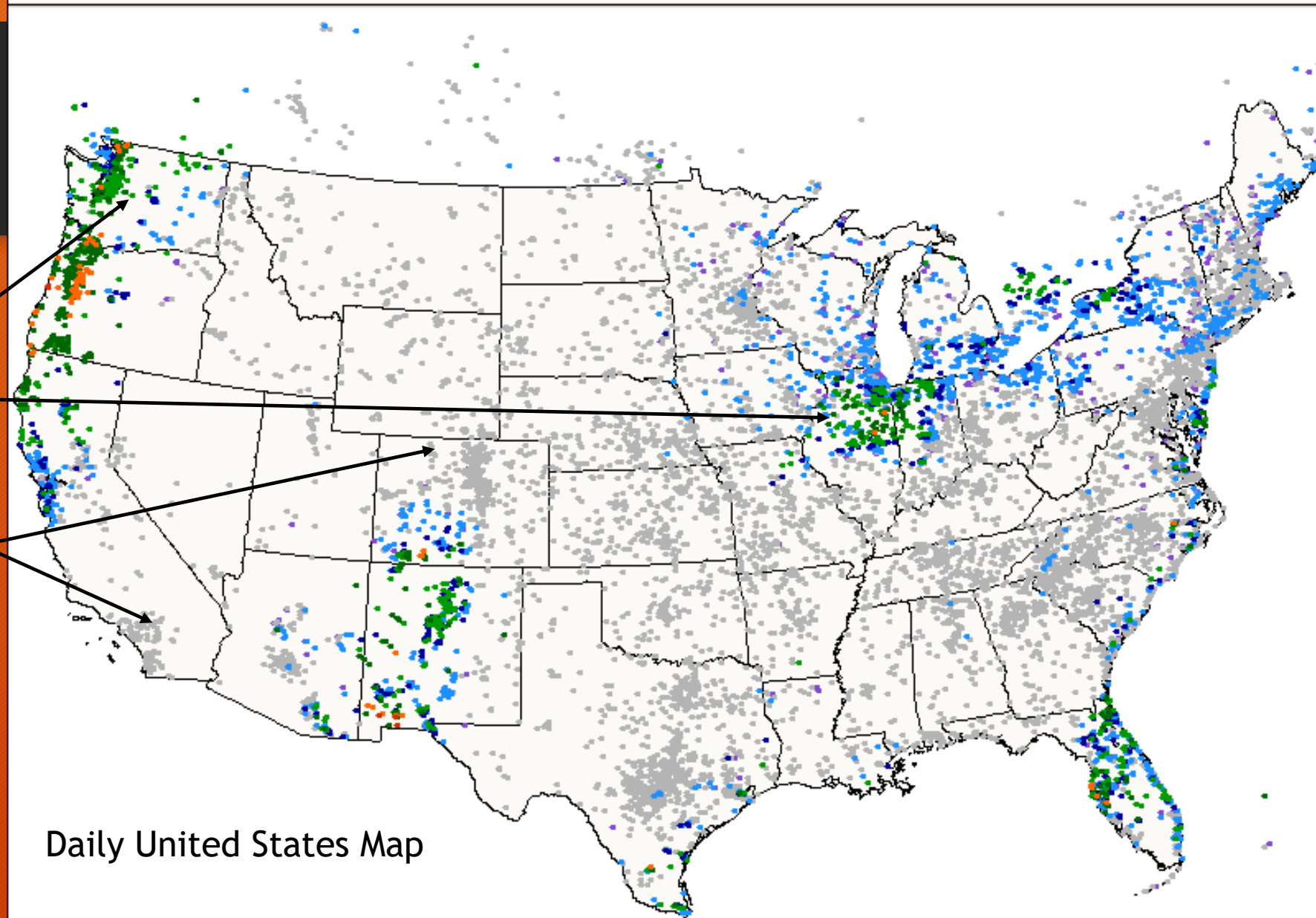
0.0 Trace 0.01 - 0.09 0.10 - 0.18 0.19 - 0.45 0.46 - 1.08 1.09 - 1.62 1.63 - 1.81

Observers reporting where
precipitation fell

. . . and where it did not

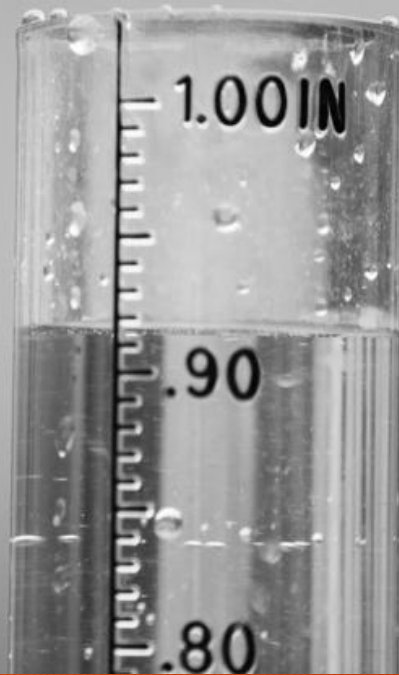
Daily United States Map

A dense network of observers across the country



Simple, easy-to-handle low cost equipment

Cost approximately
\$33.00 (U.S.)



Gauge measures to 0.01" (0.2mm),
holds 11.30" (260 mm) of precipitation.

The 4" (10.2 cm) diameter
high capacity plastic rain gauge



Everyone uses the same rain gauge for consistency of observations.

Each station is given a name name and location

TX-HAR-213



Tucson 3.5SW



Volunteer observers of all ages take a simple daily measurement at their location.



On-line training is provided



How to Measure Extreme Rainfall
CoCoRaHS HQ

Volunteers observe daily at
~7:00 AM local time for uniformity



Observations can be recorded in millimeters or inches

We provide easy to use entry forms for reporting daily observations



The CoCoRaHS App

Logout Precip Report Details

CoCoRaHS **CO-LR-610**
Fort Collins 3.5 SW
US Units (in)
Precipitation Report

Observation Date 2019-09-18
Observation Time 07:00
Rain/Melted Snow 0.00

Trace Precip More Details

Cancel Submit

Report Multi-Day Report History Multi-Day History Other

My Data Entry : Daily Precipitation Report Form

For observations spanning more than 24 hours, please use the [multiple day accumulation report](#).

Precipitation Report Form

Submit Reset

Station Number : CO-LR-610

Station Name : Fort Collins 3.5 SW

* Denotes Required Field

9/18/2019 *Observation Date

7:00 AM *Observation Time

0.89 in. *Rain and Melted Snow to the nearest hundredth inch that has fallen in the gauge during the past 24 hours, or T for trace, or NA for unknown.

Observation Notes: (This will be available to the public)

Heavy rainfall from 6-9PM. Tree limbs down. Minor street flooding.

New Snowfall

NA in. Accumulation of new snow in inches to the nearest tenth














NA in. Melted value from core to the nearest hundredth

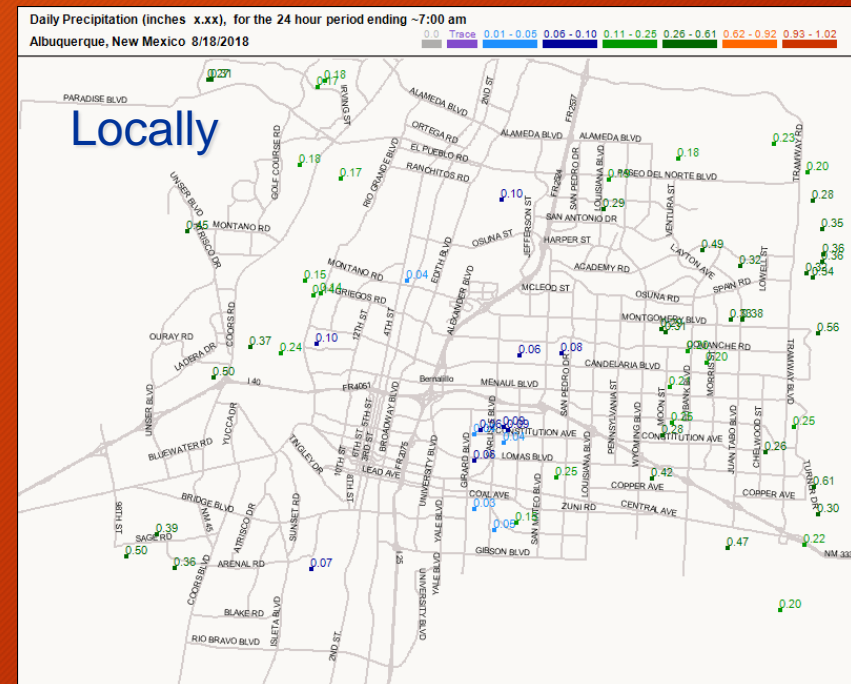
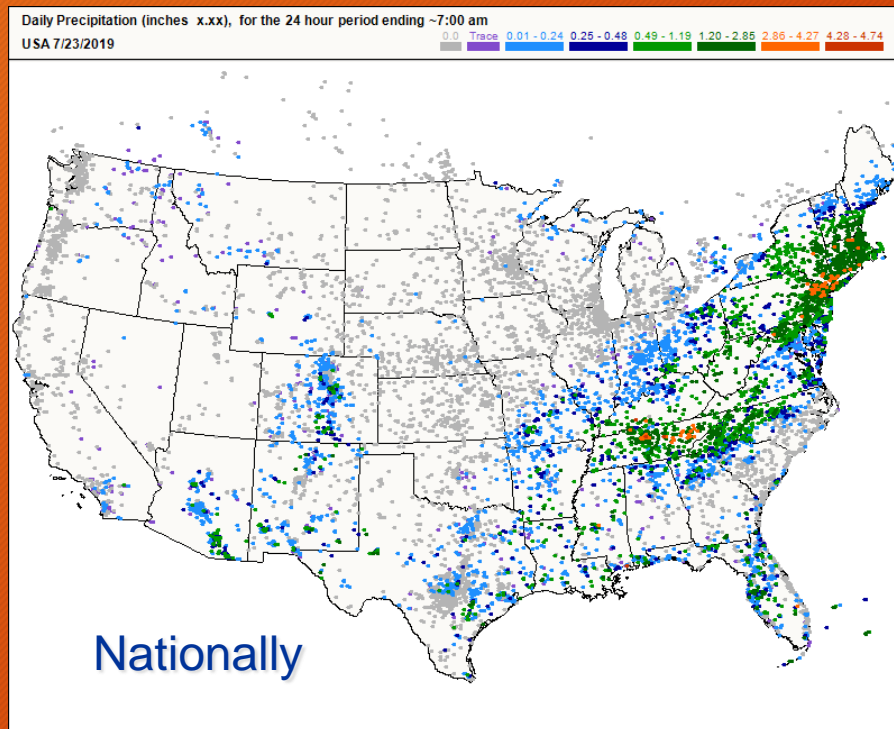
Total Snow and Ice on Ground at Observation Time

NA in. Depth of total snow and ice (new and old) in inches to the nearest half inch

NA in. Melted value from core to the nearest hundredth

On-line form

Date	Time	Station Number	Station Name	Total Precip in. ▲	New Snow in.  	Total Snow in.  	State	County	View	 Maps
7/23/2019	12:45 PM	ME-HN-26	Brooklin 2.8 SE	0.28	NA NA	NA NA	ME	Hancock		Classic New
7/23/2019	7:30 AM	ME-HN-3	Southwest Harbor 2.6 SE	0.21	NA NA	NA NA	ME	Hancock		Classic New
7/23/2019	5:30 AM	ME-HN-58	Sullivan 2.4 SSE	0.14	NA NA	NA NA	ME	Hancock		Classic New
7/23/2019	8:15 AM	ME-HN-56	Surry 2.5 SSE	0.13	NA NA	NA NA	ME	Hancock		Classic New
7/23/2019	9:17 AM	ME-HN-12	Blue Hill 0.1 WSW	0.13	NA NA	NA NA	ME	Hancock		Classic New
7/23/2019	9:00 AM	ME-HN-2	East Surry	0.12	0.0 NA	0.0 NA	ME	Hancock		Classic New
7/23/2019	1:00 PM	ME-HN-21	Ellsworth 4.6 NNE	0.11	NA NA	NA NA	ME	Hancock		Classic New
7/23/2019	8:00 AM	ME-HN-7	Ellsworth 7.4 NW	0.09	NA NA	NA NA	ME	Hancock		Classic New

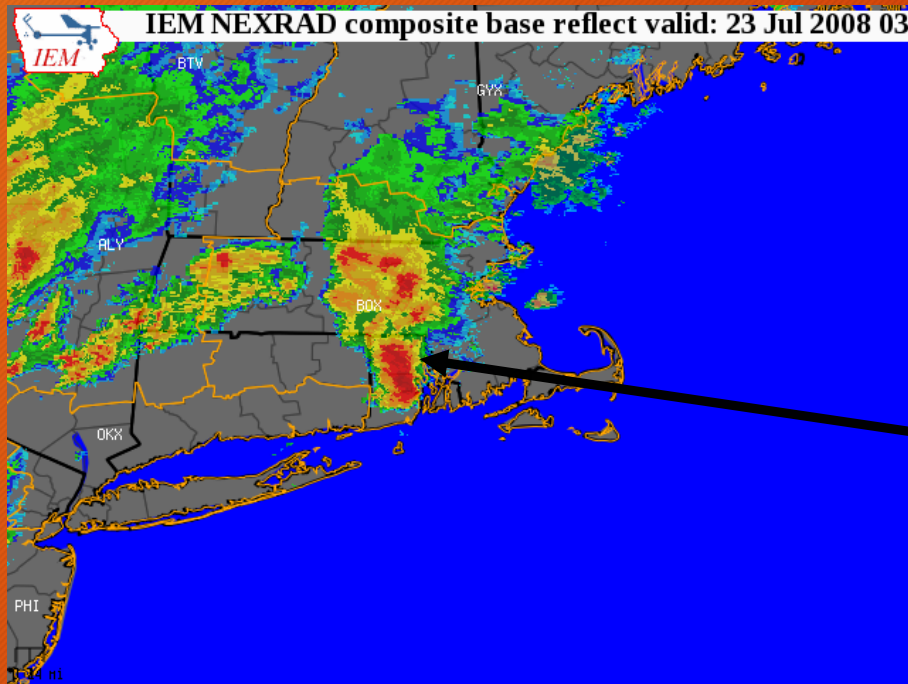


Volunteer's observations are immediately available in **map** and **table** form for the public to view.

“REAL TIME” CoCoRaHS Significant Weather Reports

Advanced warning to the National Weather Service regarding potential flash flooding

Sends an alarm to NWS AWIPS workstation



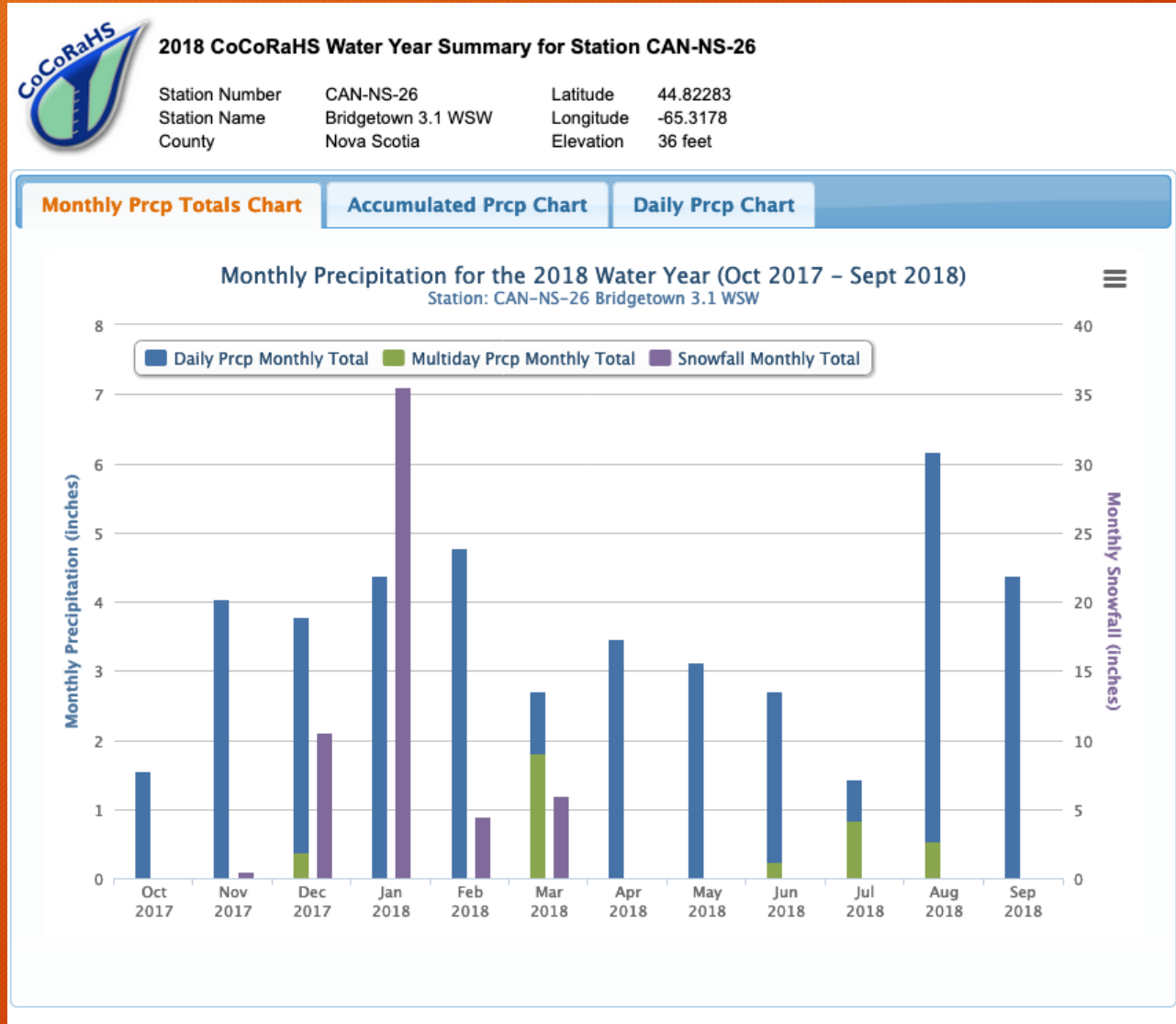
View Data : View Significant Weather Report

Significant Weather Report

Station Number:	RI-WS-1
Station Name:	Hope Valley 3.7 S
Date:	7/23/2008 3:15 PM
Submitted	7/23/2008 3:23 PM
Notes:	
Taken at Registered Location:	True
Precip Duration Minutes:	15
New Precip Amount:	1.00
Total Precip Amount:	NA
New Snow Depth:	NA
Total Snow Depth:	NA
Flooding:	No

July 23, 2008 - A CoCoRaHS observer in Hope Valley, RI provided an intense rainfall report which **led to the issuance of a timely Flash Flood Warning**. Life threatening urban flooding was reported in Warwick and Providence at the start of the evening rush hour, where several cars were stranded in more than 2 feet of water, requiring people to be rescued. Lead time would have been much less without the CoCoRaHS report. - Joe Dellicarpini, NWS Taunton, MA

Volunteers data are permanently archived and available in a variety of summary reports

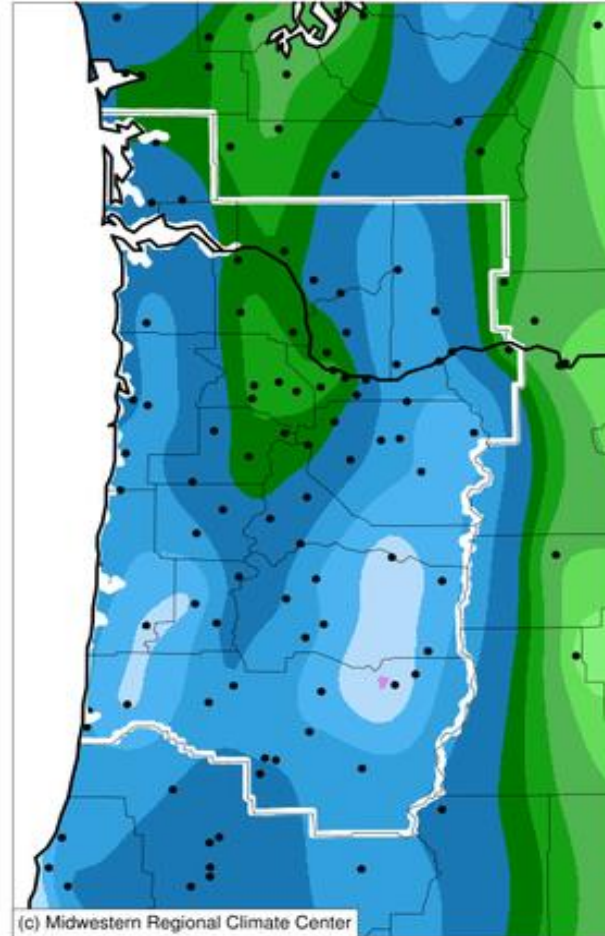


In the U.S. CoCoRaHS data is archived daily in NOAA/NCEI's **GHCN-D** (Global Historical Climate Network)

CoCoRaHS
helps provide
a finer mesh
of data by
supplementing
other
precipitation
networks

Accumulated Precipitation (in)

April 01, 2019 to April 30, 2019



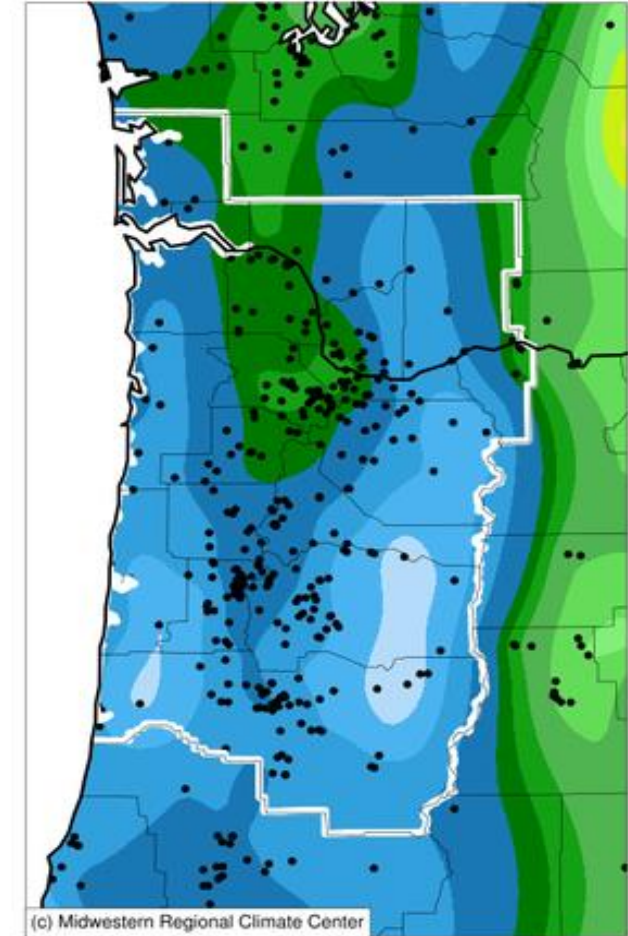
0.01 0.1 0.5 1 1.5 2 3 4 5 7.5 10 12.5 15

Stations from the following networks used: COOP, FAA,
Midwestern Regional Climate Center
cli-MATE: MRCC Application Tools Environment
Generated at: 5/30/2019 9:23:45 PM CDT

Without CoCoRaHS data

Accumulated Precipitation (in)

April 01, 2019 to April 30, 2019



0.01 0.1 0.5 1 1.5 2 3 4 5 7.5 10 12.5 15

Stations from the following networks used: COOP, FAA, CoCoRaHS,
Midwestern Regional Climate Center
cli-MATE: MRCC Application Tools Environment
Generated at: 5/30/2019 9:24:17 PM CDT

With CoCoRaHS data

PART TWO



Volunteer Engagement

Recruiting

It is important to recruit new volunteers as the months and years move along. There are most certainly data gaps on all of our maps that we would love to have precipitation observations from.





DATA ON THE WEB

Volunteers submit their observations using the CoCoRaHS website, or apps. Observations are immediately available to the public via maps and data archive tools, and to data users via the CoCoRaHS Web API. Data users such as scientists, resource managers, decision makers and others have come to rely on the high density, high quality measurements provided by CoCoRaHS observers.

CoCoRaHS is EDUCATIONAL.

CoCoRaHS offers learning opportunities too. In addition to training materials, newsletters and the "Measure of the Day," members also enjoy opportunities to attend Webinars featuring reports in weather, climate, and other pertinent disciplines. CoCoRaHS offers intensive resources for K-12 students. Students get to collect and submit real scientific data – all while meeting local and National standards in science, math, geography and more!

JOIN CoCoRaHS TODAY!

CoCoRaHS is a practical, enjoyable and useful activity. If you have an interest in weather and would like to help your local community as well as education and others interested in precipitation, then CoCoRaHS is for you. It only takes a few minutes a day and gives you the chance to participate in real scientific research. You'll be amazed at what you learn as you become more aware of the variable weather that impacts you, your neighbors, your state and our entire country.

Thanks

CoCoRaHS is supported by many sponsors and volunteers. To view a full list please visit the CoCoRaHS Web page.

FOR MORE INFORMATION CONTACT:

www.cocorahs.org



CoCoRaHS March Madness 2019

March 1–31, 2019

How many new volunteers can you recruit in your state?



Show Her The National Weather Service With Data By Being A Backyard Weather Observer

By RHESALZEBETTER • JUN 27, 2017



CoCoRaHS is the Community Collaborative Rain, Hail and Snow Network, a citizen science project aimed at measuring and recording precipitation.

CREDIT: MARIAN RUSSELL

Listen

3:29



Wednesday, December 19, 2007
Last modified Monday, December 11, 2007 9:38 PM PST

Rain doesn't fall the same on all

By KYLE ODEGARD
Gazette-Times reporter

Corvallis resident Len Maki is among 352 Oregonians who keep detailed records for the Community Collaborative Rain, Hail and Snow Network.

Len Maki always has been fascinated by weather. Since he moved to Corvallis in 2000, he's kept detailed rain records from his house near Martin Luther King Jr. Park.

CASEY CAMPBELL/Gazette-Times
Len Maki shows the rain gauge that hangs off his back porch that he uses to measure rainfall, which he reports online.

"It's more curious than anything else," said the 70-year-old retired nuclear engineer. "We have amazing differences in precipitation here."

So far in December, the gauge hanging off Maki's back porch has recorded about 6.5 inches of precipitation. The National Weather Service monitoring station at the Hyattsville Research Farm, about 10 miles away, gathered only 4.33 inches, said George Taylor, who manages the Oregon Climate Service at Oregon State University.

"You don't have to be very far from the hills to have the rain (total) drop off," Maki said.

Less than a month ago, he joined a network of weather buffs who will pinpoint the variations in Oregon rainfall. At 7 every morning, Maki heads outside to check the precipitation gauge. He then reports his data online.

"We're up to 352 people, which is pretty cool," Taylor said. "The Oregon Climate Service at OSU is coordinating the statewide project, which includes 14 volunteers in Benton County. About 110 are signed up in Lane County alone."

The effort in Oregon is part of the "Community Collaborative Rain, Hail and Snow Network," which now is in 26 states. Washington and California will start similar projects in 2008.

Taylor said that other states "can't believe how quickly people are signing up in Oregon. I can't believe it, either."

Precipitation maps created by the project could help ranchers and farmers, engineers, meteorologists, hydrologists, outdoor enthusiasts and more, he said.

"There are a number of administrative rules — in some cases requirements — that are based on the amount of precipitation that falls. There are also strategies that growers use that are dependent on a certain amount of rain. From an agricultural standpoint, it's very important," Taylor said.

Before, there weren't enough recording stations to create an accurate map. "In a state like Oregon, with dramatically different land features and proximity to the ocean, this is especially problematic," Taylor said.

Weather researchers also are excited about using the rain, hail and snow network to learn more about huge weather events, such as the recent storms and flooding that hit northwest Oregon earlier this month.

Oregon has 250 weather stations administered by the National Weather Service. With the volunteers, that's more than doubled.

"Not everybody will be as dedicated as Len Maki, but we'll take what we can get," Taylor said.

Those interested in becoming volunteers should contact Taylor at taylor@oregonclimate.edu or Casey Maki maki@oregonclimate.edu. The Oregon Climate Service also can be reached at 737-5705.

For more information on the project, see www.cocorahs.org.

Kyle Odegard covers Corvallis, Clatsop County, and the surrounding area for the Corvallis Gazette-Times. He can be contacted at kyle.odegard@times.com or 738-8922.

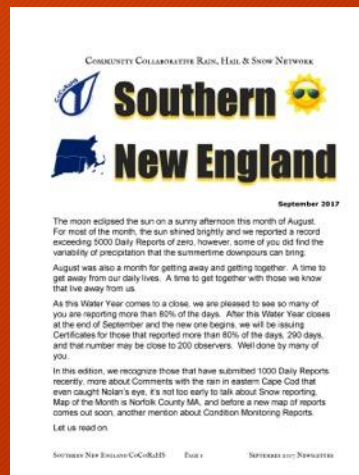
Retaining observers

The longer observers participate, the more value of their data to the long term climate record for their location.



Ideas to help retain observers for the long run:

- Observer recognition - certificates
- Headquarters support
- Local emails - letting them know they matter
- Letting observers know their data is used



Observers may leave due to:

- Illness
- Relocation
- Loss of interest
- Broken equipment
- Lack of support (in some cases)

CoCoRaHS believes that volunteerism is a two way street . . .

We feel that it is really important to engage with our volunteers and give something back in return for their observations.

There are many opportunities for an observer to become more involved than just taking measurements. By doing so they learn more about their climate and weather in general.

CoCoRaHS WxTalk Webinar Series



Today's Guest: *Karen Kosiba*

"Into the wind...Oh, the places mobile radars will go!"



The Water Cycle

Training Animations • 16 / 19

CoCoRaHS



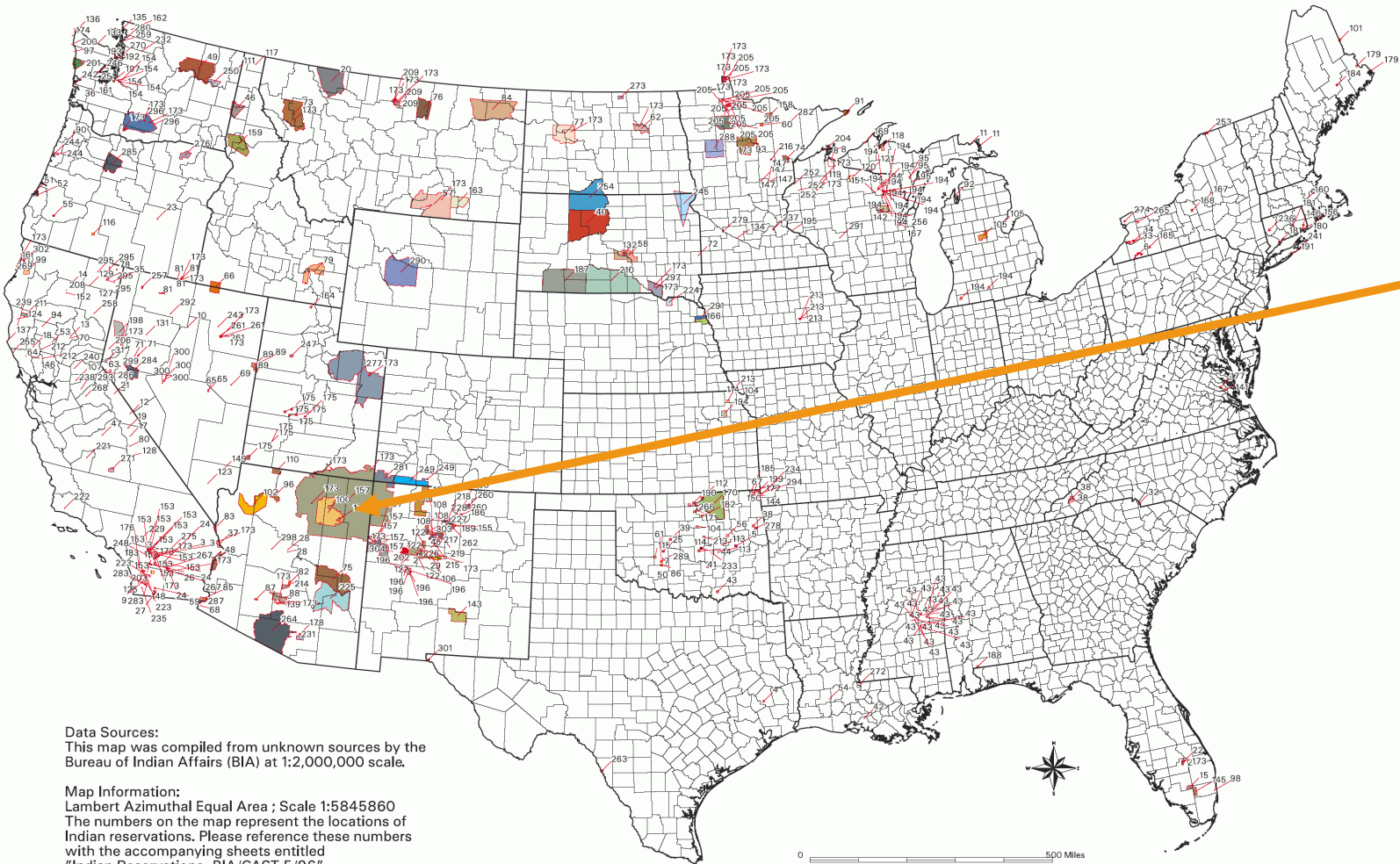
GUIDE



Climate Resources
for Master Gardeners



Indian Reservations in the Continental United States



PART THREE



Coordination/Educational Outreach

Coordination

CoCoRaHS has over 250 State and Regional Volunteer Coordinators to oversee the network in their area. Each coordinator is responsible for recruiting and retaining observers in their area, as well as other duties. We even have coordinators on the county level in some states.



Many coordinators come from the fields of meteorology, hydrology, academia, etc. But others are just interested citizens who have come to embrace the network and want to take a role in overseeing their area.

Matt Spies, Connecticut State Coordinator

- Matt will share with us what it's like being a non-meteorological volunteer being responsible to coordinate CoCoRaHS in his state.
- Matt also gives of his time to help educate young people about precipitation and will show you an example from Nantucket.

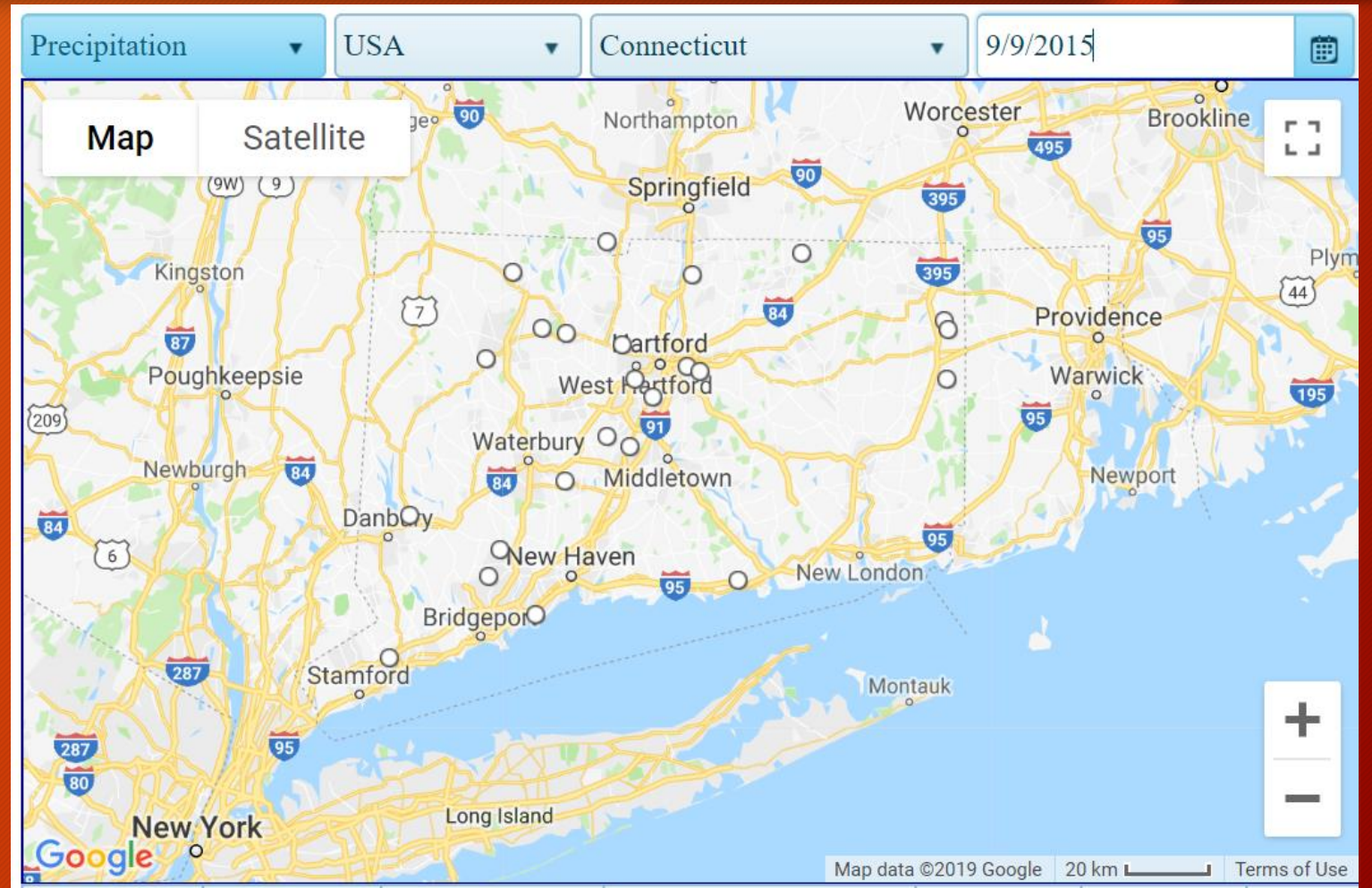


Started in Year 2009 as an observer CT-FR-9



Time to make a change

- September 9, 2015
- 24 reports of 0 (zero)



We are going to do better



Community Collaborative Rain, Hail & Snow Network

September 2019

We begin National Rain Gauge Week. It is our network's time to shine, and to shine with reports of precipitation and zeros alike. Our quest is to submit 15,000 Daily Reports in a day, and to do that, we need everyone to report.

With this National Rain Gauge Week, it would be quite the accomplishment to break 10,000 Daily Reports in a 30-day month of September. Another record to break is our single day total of 366 Daily Reports.

Rhode Island broke its single month reporting record, and they led our growth to another month over 10,000 Daily Reports for the month. Rhode Island reported a staggering, a very high, 27.2 Daily Reports per Reporting Observer, putting their reporting effort higher than Delaware.


Our last set of Water Balance Charts are included. We thank our ET observers for the great work they have done this growing season.

Grand List, Observer Tips, Condition Monitoring Reports, and more.

The longest list of over 263 stations awaits. Congratulations to all, including our newest observers that made the list for the first time.


We have more than 400 Reporting Observers now! Let's get into it.






**NWS Boston**
@NWSBoston

With rain and possible flooding on the way, we rely on [@CoCoRaHS](#) to help fill in the gaps with rainfall reports. Want to help? Sign up today, get a rain gauge, & start reporting! The more reports we have, the better the picture of how much rain fell in SNE!

1 Rainfall - Official NWS Forecast
7/2018 08:00 PM - 09/19/2018 08:00 AM EDT




Weather Service
on, MA
11:50 AM EDT


Follow Us:   
weather.gov/Boston


What Is CoCoRaHS?


CoCoRaHS is a grassroots volunteer network of backyard weather observers of all ages and backgrounds working together to measure and map precipitation (rain, hail, and snow) in their local communities.

How to JOIN?

**Register Online**

**View Orientation Video**

**Acquire Rain Gauge**

**Record and Report Observations**

Forecasters' Workstations

This report led to the issuance of a timely Flash Flood Warning in Rhode Island, helping to save lives!

Daily reports are automatically received at NWS offices and are often included in listings of rainfall and snowfall reports.

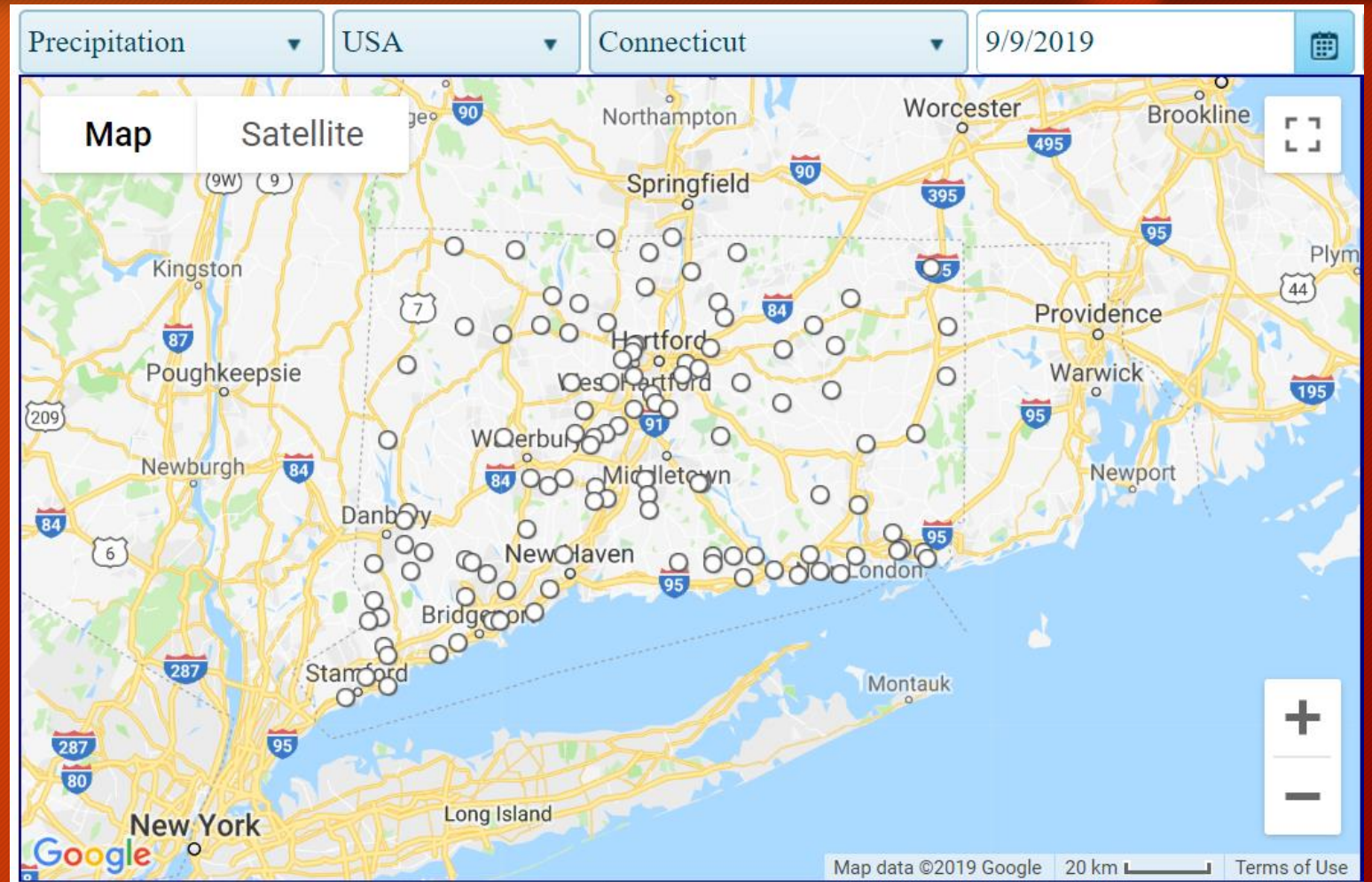
Weekly and monthly precipitation totals are used to help assess drought conditions.

CoCoRaHS is the Community Collaborative Rain, Hail, & Snow Network, a unique, non-profit, community-based network of volunteers of all ages and backgrounds working together to measure and map.



Coordinators create change

- September 9, 2019
- 111 reports of 0 (zero)
- Zeros are obtained by saying “Be a hero. Report your zeros.” repeatedly.



Where do the reports go? Where does the data end up?

- Volunteer observers want to know where and how their efforts are used.

CONNECTICUT

...HARTFORD COUNTY...

1 NNE WEST HARTFORD	3.72	700 AM	8/08	COCORAHS
2 NNE WEST HARTFORD	3.67	700 AM	8/08	COCORAHS
1 W WEST HARTFORD	3.22	700 AM	8/08	COCORAHS
2 SSE EAST HARTFORD	2.90	514 AM	8/08	COCORAHS
1 WSW KENSINGTON	2.62	834 AM	8/08	COCORAHS
2 SSW NEWINGTON	2.59	700 AM	8/08	COCORAHS
5 WSW FARMINGTON	2.32	900 AM	8/08	COCORAHS
3 NNE BRISTOL	2.17	713 AM	8/08	COCORAHS
3 WNW BRISTOL	2.10	700 AM	8/08	COCORAHS
1 ENE NEWINGTON	2.10	700 AM	8/08	COCORAHS
1 E WEATOGUE	1.99	700 AM	8/08	COCORAHS
1 WSW WETHERSFIELD	1.91	900 AM	8/08	COCORAHS
1 E EAST HARTFORD	1.85	630 AM	8/08	COCORAHS
2 SSW WETHERSFIELD	1.81	637 AM	8/08	COCORAHS
3 E SOUTHINGTON	1.72	700 AM	8/08	COCORAHS
3 SW CENTRAL MANCHES	1.64	700 AM	8/08	COCORAHS
HARTFORD-BRAINARD AP	1.63	753 AM	8/08	ASOS
3 W WINDSOR LOCKS	1.63	700 AM	8/08	COCORAHS
3 NNE SUFFIELD DEPOT	1.60	600 AM	8/08	COCORAHS
BRADLEY AP	1.51	757 AM	8/08	ASOS
1 ENE SOUTHINGTON	1.48	700 AM	8/08	COCORAHS
2 SW PLAINVILLE	1.42	600 AM	8/08	COCORAHS
1 N CENTRAL MANCHESTER	1.40	630 AM	8/08	COCORAHS
1 SSE SOUTHINGTON	1.35	700 AM	8/08	COCORAHS
1 E ROCKY HILL	1.23	730 AM	8/08	COCORAHS
1 N NORTH GRANBY	1.00	818 AM	8/08	COCORAHS
4 ENE GLASTONBURY CE	0.98	700 AM	8/08	COCORAHS
2 W CANTON	0.94	900 AM	8/08	COCORAHS
1 NW COLLINSVILLE	0.94	700 AM	8/08	COCORAHS
1 ENE NORTH GRANBY	0.88	600 AM	8/08	COCORAHS
1 NNE SUFFIELD	0.81	700 AM	8/08	COCORAHS
1 SSW NORTH CANTON	0.75	700 AM	8/08	COCORAHS



Top 3 Highest 2018 Precipitation Totals By State Eastern US – As of December 19th



Connecticut		Massachusetts		Pennsylvania	
Moosup CT	72.95"	Kingston MA	72.81"	Hidden Valley PA	85.56"
Madison Center CT	71.40"	Taunton MA	71.10"	Fairfield PA	81.35"
Hampton CT	67.66"	Norton	70.36"	Tamaqua PA	81.10"
Delaware		New Hampshire		Rhode Island	
Smyrna DE	66.09"	Mount Washington NH	88.75"	Cranston RI	68.84"
Laurel DE	63.80"	Pinkham Notch NH	68.51"	Woonsocket RI	65.95"
Dover DE	63.66"	Greenville NH	65.57"	North Foster RI	65.64"
Florida		New Jersey		South Carolina	
Alford FL	100.21"	Mine Hill Township NJ	76.31"	Caesars Head SC	106.27"
De Funiak Springs FL	93.62"	Rockaway NJ	75.35"	Jocassee SC	104.14"
Vernon FL	91.62"	Hardyston Township NJ	74.83"	Table Rock SC	92.76"
Georgia		New York		Vermont	
Germany Valley GA	107.50"	Phonecia NY	70.76"	Peru VT	62.04"
Helen GA	98.56"	Wurtsboro NY	70.20"	Wilmington VT	57.92"
Sautee GA	96.12"	East Jewett NY	67.92"	Jeffersonville VT	51.56"
Maine		North Carolina		Virginia	
West Rockport ME	59.34"	Mount Mitchell NC	131.08"	Montebello VA	93.56"
Eastport ME	58.93"	Jonas Ridge NC	129.18"	Roanoke VA (5.8 mi SW)	83.36"
Kennebunkport ME	57.39"	Lake Toxaway NC	114.12"	Sperryville VA	83.02"
Maryland		Ohio		West Virginia	
Cantonsville MD	81.89"	Hannibal OH	68.41"	Parsons WV	94.40"
Thurmont MD	81.15"	Steubenville OH	67.42"	Snowshoe WV	82.61"
Mechanicsville MD	78.60"	Newport OH	64.15"	Savis WV	77.77"

Recognize volunteer efforts

The “Grand” List

Congratulations to all of these observers from our three states who have recently passed a milestone of 1000 Daily Reports.

3000 Daily Reports

MA-BE-3 Stockbridge .2 NNE

2000 Daily Reports

CT-FR-23 Shelton 1.3 W
MA-BA-36 Harwich 2.6 ENE
MA-NF-11 Millis 2.0 SW

1000 Daily Reports

MA-MD-55 Holliston 0.7 W
MA-NF-19 Foxborough 1.8 SSW
MA-NF-26 Bellingham 2.4 S
MA-HD-20 Wilbraham 3.7 SSW
RI-PR-50 Harrisville 1.2 SSE



**Southern New England
CoCoRaHS**



***For Outstanding Reporting as a
New Observer in Water Year 2018***



Observer Name, Station ID, Location

Accuracy matters. Completeness matters.

Connecticut Precipitation
National Weather Service Offices
Boston/Norton MA, Albany NY, Upton NY
Preliminary Precipitation Data (inches) by County
Precipitation Data Through August 2019

Includes CoCoRaHS data

CT 1 Month August 2019	Rainfall	Departure	Percent	Normal
Litchfield	3.70	-0.69	84	4.39
Hartford	4.49	0.15	103	4.34
Tolland	6.07	2.10	153	3.97
Windham	6.13	1.97	147	4.17
Fairfield	3.62	-0.82	82	4.45
New Haven	3.45	-0.51	87	3.95
Middlesex	3.03	-0.99	75	4.02
New London	5.33	0.86	119	4.47

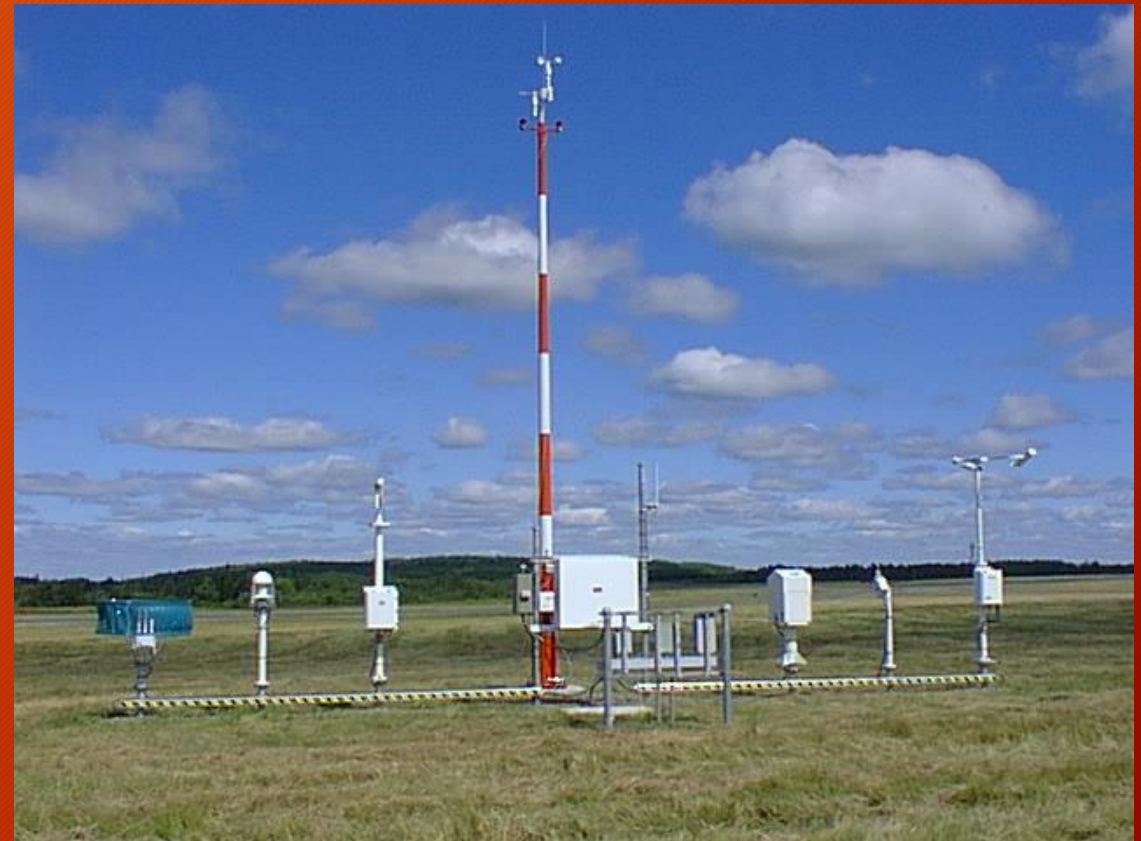
Rhode Island Precipitation
National Weather Service Boston/Norton, MA
Preliminary Precipitation Data (inches) by Drought Region
Past 12 to 36 months ending August 2019

Includes CoCoRaHS Data

RI 1 month August 2019	Rainfall	Departure	Percent	Normal
Northwest	8.07	3.74	186	4.33
Northeast	4.85	0.72	118	4.13
Central West	3.48	-0.55	86	4.02
Central East	2.82	-0.78	78	3.60
Eastern	2.64	-1.16	69	3.80
Southern	3.75	-0.61	86	4.36
New Shoreham	2.35	-2.01	54	4.36

No one lives at the airport

- We compare our totals with those from automated gauges and typically find 10% undercatch from automated gauges.
- Our network does not use automated gauges, and we do not live at the airport!



ASOS - Automated Surface Observation System

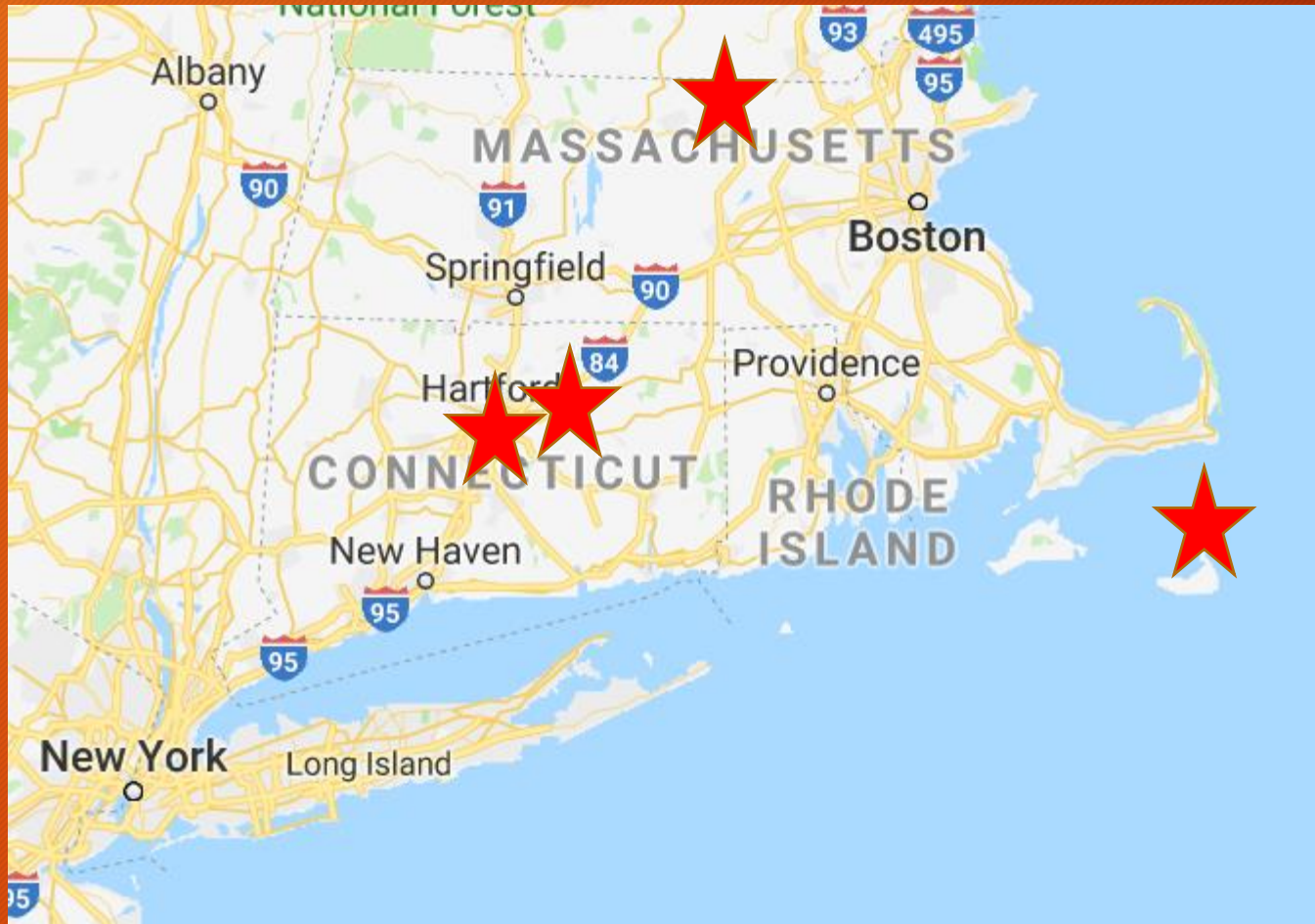
We believe



- One small measurement to make.
- One giant impact that measurement makes upon the millions the depend upon water.



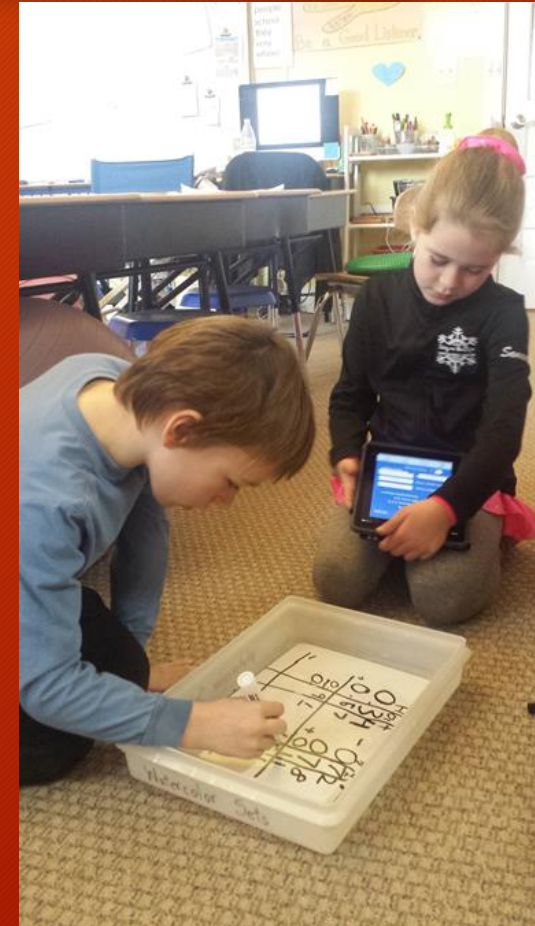
Schools participating in CoCoRaHS in our area



Meet the 7 and 9 year old students from Nantucket Island, Massachusetts, USA

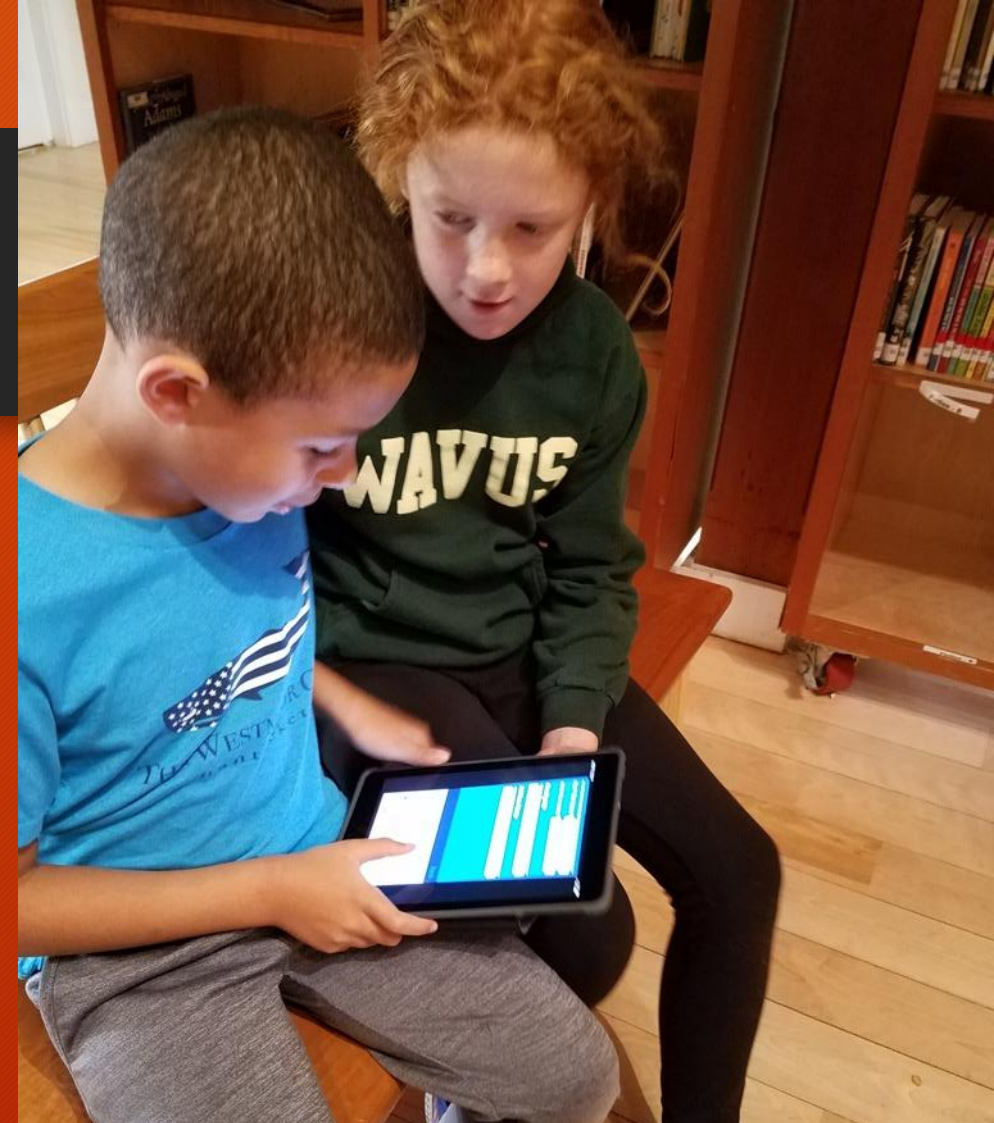


Rain, snow, read a scale, and add decimals



With every report, they write a well written comment

More than the science and the numbers, they learn to construct and type a complete sentence.



4/23/2019

MA-NT-2

Nantucket
2.2 E

0.23

It was raining hard last night, and we thought there was going to be more in the gauge.

[View](#)

The students have many questions

Learning about
the three states
of matter:

Solid

Liquid

Gas



PART FOUR



Quality Control-data/technical aspects - Steve Hilberg

CoCoRaHS QA/QC

- Part of the CoCoRaHS mission
 - *“to provide the highest quality data for natural resource, education and research applications.”*
- The value in CoCoRaHS data is not just quantity (more observations) but quality.
- Errors happen! A QC process is needed to assure data quality is maintained.

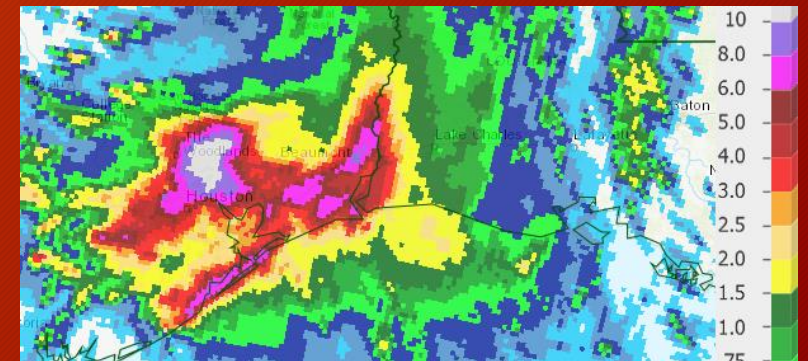
CoCoRaHS QA/QC

- Training and education are a large component of Quality Assurance. Training is a continuous process.
 - Well-trained observers are less prone to errors
- Most errors are reporting errors, not measurement errors!



CoCoRaHS QA/QC

- QC is a mix of automated and manual processes.
 - Error checks are built into the fields on the data input forms
 - We use a web-based tool to help identify potential errors, but this requires manual follow up
 - Also use radar and NOAA multi-sensor precipitation product
 - Volunteer “comment checkers” help identify potential errors



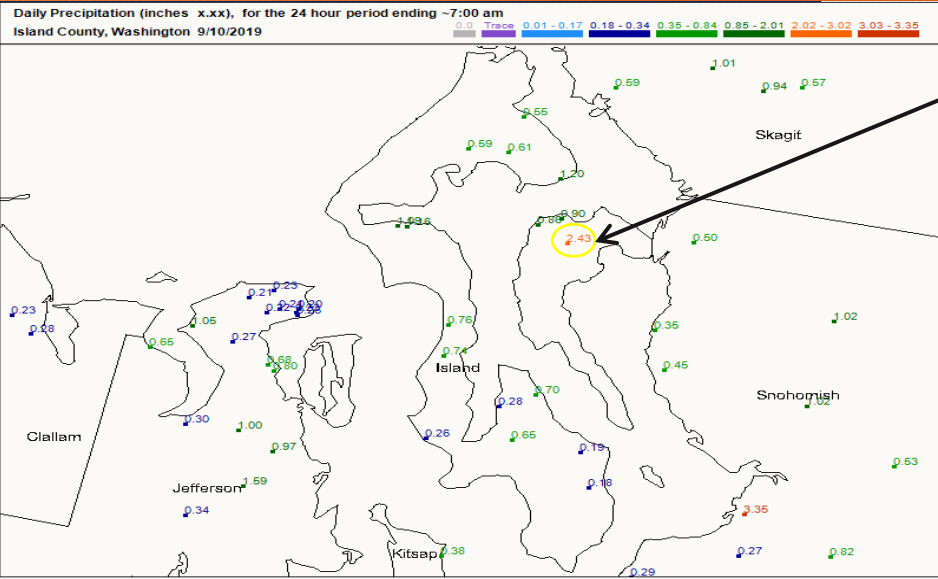
CoCoRaHS QA/QC

- QC tasks are distributed through the CoCoRaHS hierarchy (HQ, state coordinators, regional coordinators, local coordinators)
- Potential errors are logged into a QC ticketing system
- Coordinators are asked to follow up with observations that are flagged.

The CoCoRaHS QC Ticketing System

- System has been very useful in identifying
 - Types of errors
 - Frequency and pattern of errors
 - “Problem” observers - consistently making same error
- Caveat
 - Errors are more likely to be discovered where station density is greatest

QC Ticketing Process




Suspect value identified by QC staff or coordinator



QC ticket submitted






Add Ticket
Modify Ticket
View Tickets
QC Home

CoCoRaHS Data QC Tracking

ADD A NEW QC TICKET

This report submitted by:
on: 2019-09-19

Enter applicable values from original report:

Date of precip report: 

Station number: (ST-CO-#)

Precip reported:

Email is automatically sent to regional and state coordinator for that station



From: qc@cocorahs.org ★
Subject: CoCoRaHS QC Ticket Notification - WA
Reply to: Me <hberg@cocorahs.org> ★
To: jmccormick@coconet.org ★
Cc: QC@cocorahs.org ★, QC@cocorahs.org ★

A CoCoRaHS QC ticket has been submitted for Station number WA-GH-47 / Grays Harbor County for observation date of 2019-09-15. The appropriate coordinator should contact the observer to correct/verify the observation.

Station: WA-GH-47
ObsDate: 2019-09-15
Precip Reported: 2.50
New Snow Reported: NA
New Snow Water Eq: NA
Total Snow on Ground: NA
Total Snow Water Eq: NA

Description of possible error and URL: Possible typo based on surrounding observations. Precip set to NA pending followup with observer.
<https://cocorahs.org/Admin/DataEntry/ViewDailyPrecipReport.aspx?DailyPrecipReportID=0bc8a2ec-79b4-42d7-822e-1520e6fcd015>

Common Errors

- False Zeroes
- Typographical/Decimal Errors
- Multi-Day Accumulations Recorded as Daily Reports
- Day Shifts/Incorrect Date
- The probability of an error goes up with the lateness of the report
 - Obs that are entered two or more days after the fact, some as much as a month
 - Requires us to redo QC a week or more prior to present to catch these (and we are still likely missing some)
 - Usually date/day shifting errors

Data Flow and Cyber Infrastructure

CoCoRaHS Data and Data Flow

CoCoRaHS has the challenges represented by “big data”; volume, velocity, variety and veracity, but not at the scale that would justify the complication and expense of big data solutions.

Volume

- 10s of gigabytes of data, not terabytes
- 10s of millions of records, not billions of records

Velocity

- Over 12 thousand observations submitted every day
- Around 25 observations submitted a second during our daily peak times. The concurrent demands on the system present challenges

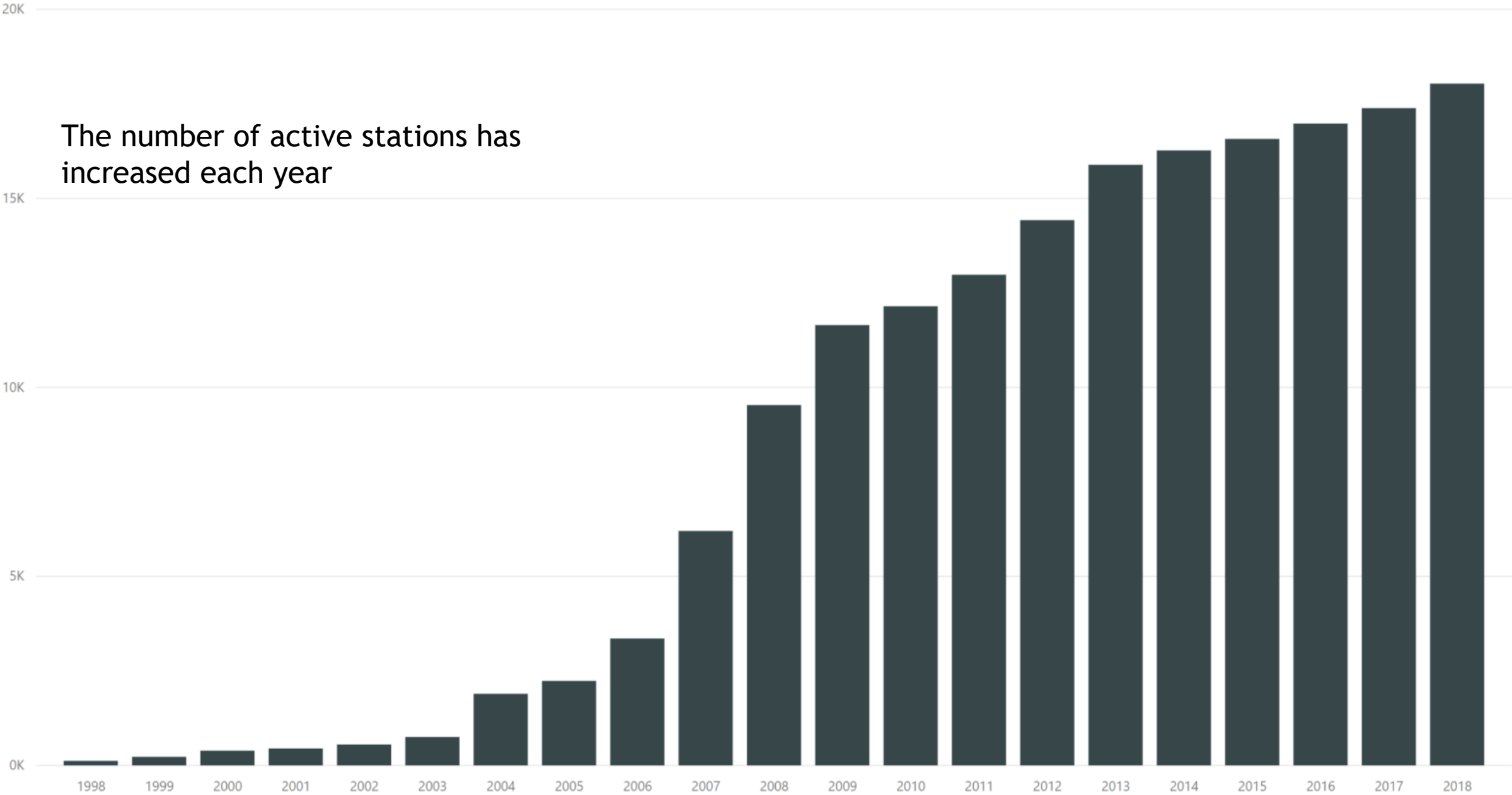
Variety

- 10 different observation protocols to manage, but it is structured data
- Would like to add photo and video upload to relevant observations
- Support for English and French, as well as Imperial and Metric units

Veracity

- QC Processes
- Observer Training
- Standardized processes

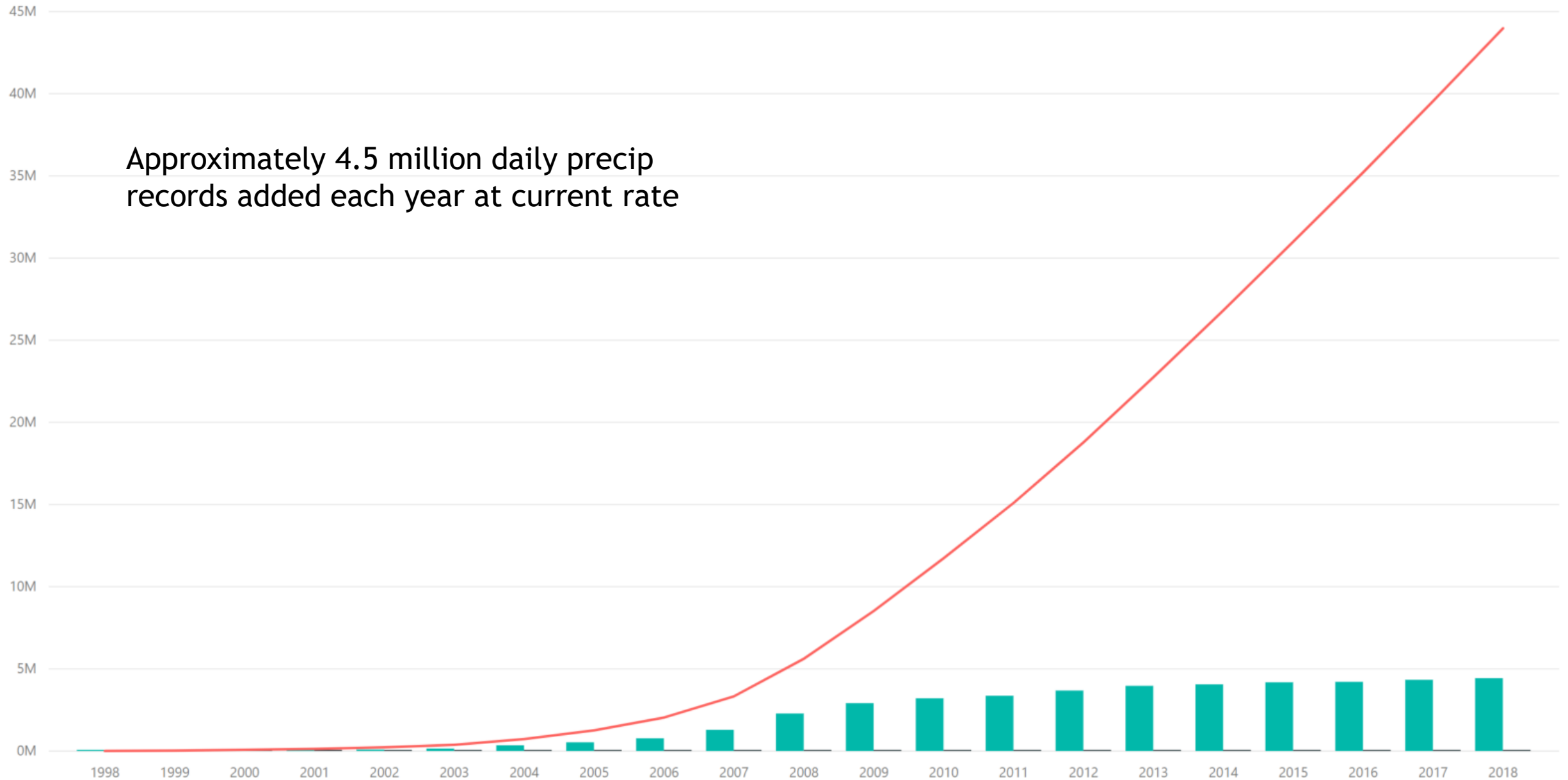
Number of Active Stations by Year



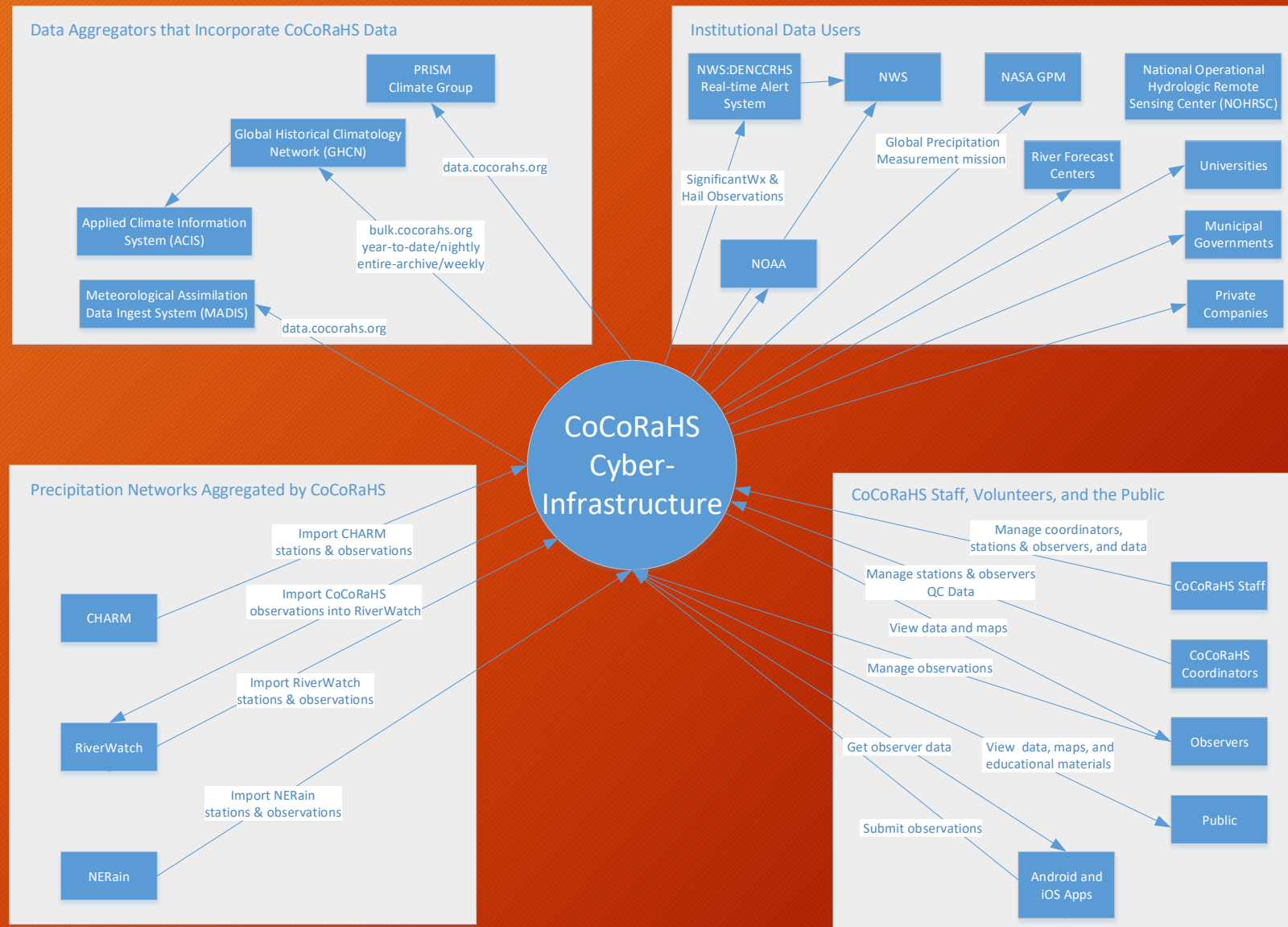
Number of Daily Precip Obs and Active Stations by Month with the Running Daily Precip Archive Count

● Daily Precip Obs Submitted ● Number of Active Stations ● Total Daily Precip Obs Archive

Approximately 4.5 million daily precip records added each year at current rate



CoCoRaHS Cyber-infrastructure Data Flow Context



CoCoRaHS Network and External Service Overview



Microsoft Azure



Storage (Azure):
Hourly Database
Backups



Virtual machine:
legacy.cocorahs.org



Azure SQL Database:
Dev Copy of Primary
DB



Azure Function App:
SciStarter.com Integration



Office 365 Cloud



Outlook



Word



Excel



PowerPoint



OneNote



Access



Publisher



Skype



Exchange



OneDrive



Microsoft Teams



Power BI



Hosting Company



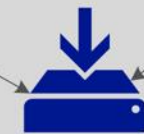
Firewall



Dedicated Server
Primary Database
data.cocorahs.org
api2.cocorahs.org
bulk.cocorahs.org
cartodb.cocorahs.org



Virtual Server
www.cocorahs.org



Backup, local



Social Media Services



Blogspot:
CoCoRaHS Blog



YouTube:
CoCoRaHS Channel



CoCoRaHS HQ Page
CoCoRaHS Group
Local Groups and Pages



Twitter



3rd Party Services



DNS Service



MailChimp

Bulk Email & Newsletter



GoToMeeting

by CITRIX

WxTalk Webinar Series

CARTO

Mapping Services

PART FIVE



Collaborations with other networks/organizations

Lowest Common Denominator

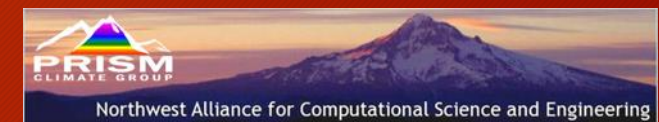
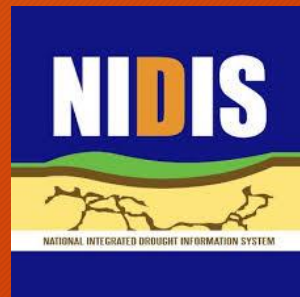
Surprisingly, CoCoRaHS and a simple rain gauge can become a “lowest common denominator” opening all kinds of doors for partnerships and collaborations with many organizations. We strive to supplement and enhance their missions.



North American Drought Monitor

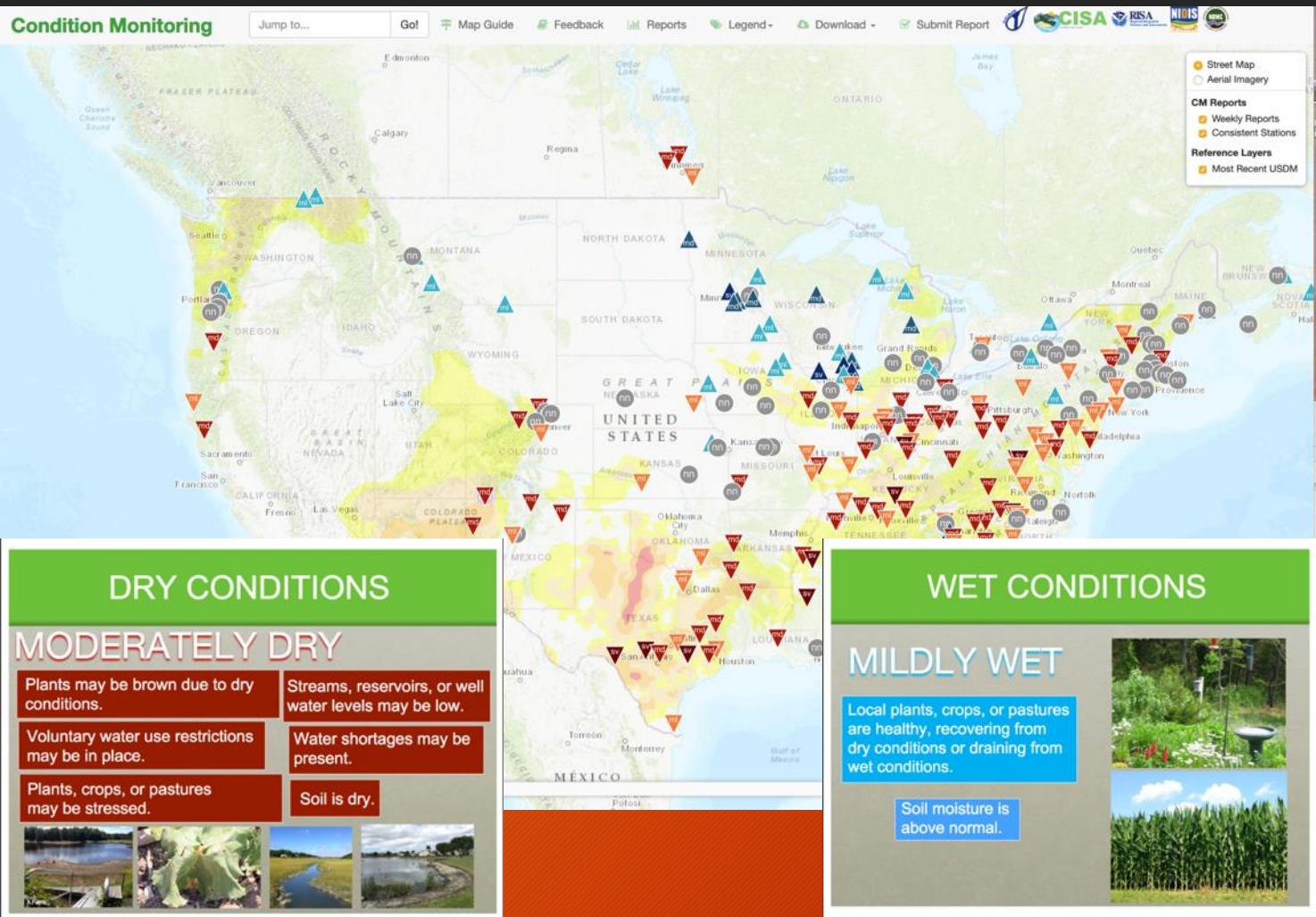


National Operational Hydrologic Remote Sensing Center



Our goal is to help others succeed by providing quality data that they can use in a variety of ways

Condition Reports provide valuable data for drought decision makers



Carencro 3.9 ENE

Station Number	LA-LY-7
Report	Ground is cracking; daily watering required for all pot plants and many shrubs, flowers, etc. Grass is beginning to turn brown in spots.
Condition	Moderately Dry
Date	Sat Sep 14 2019
Summary Data	CoCoRaHS summary data by week for this station.

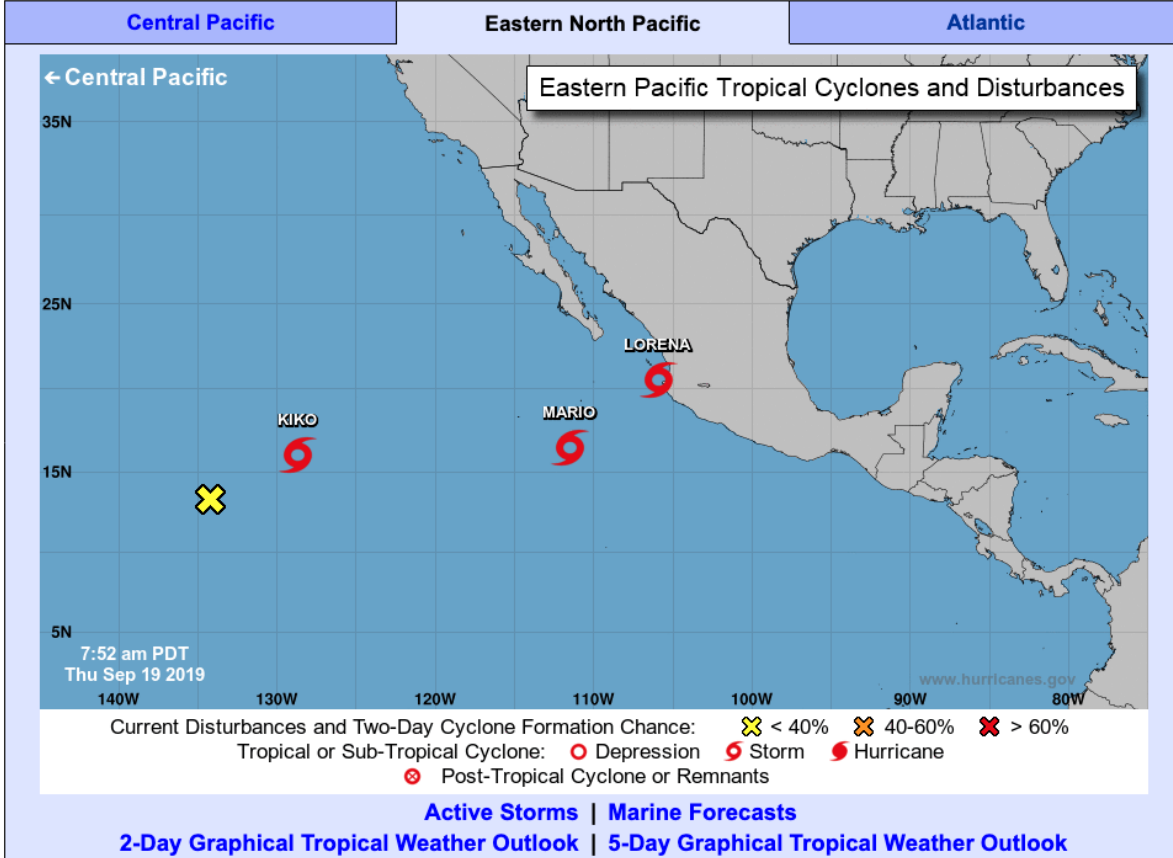
Examples



Top News of the Day... view past news

Last update Thu

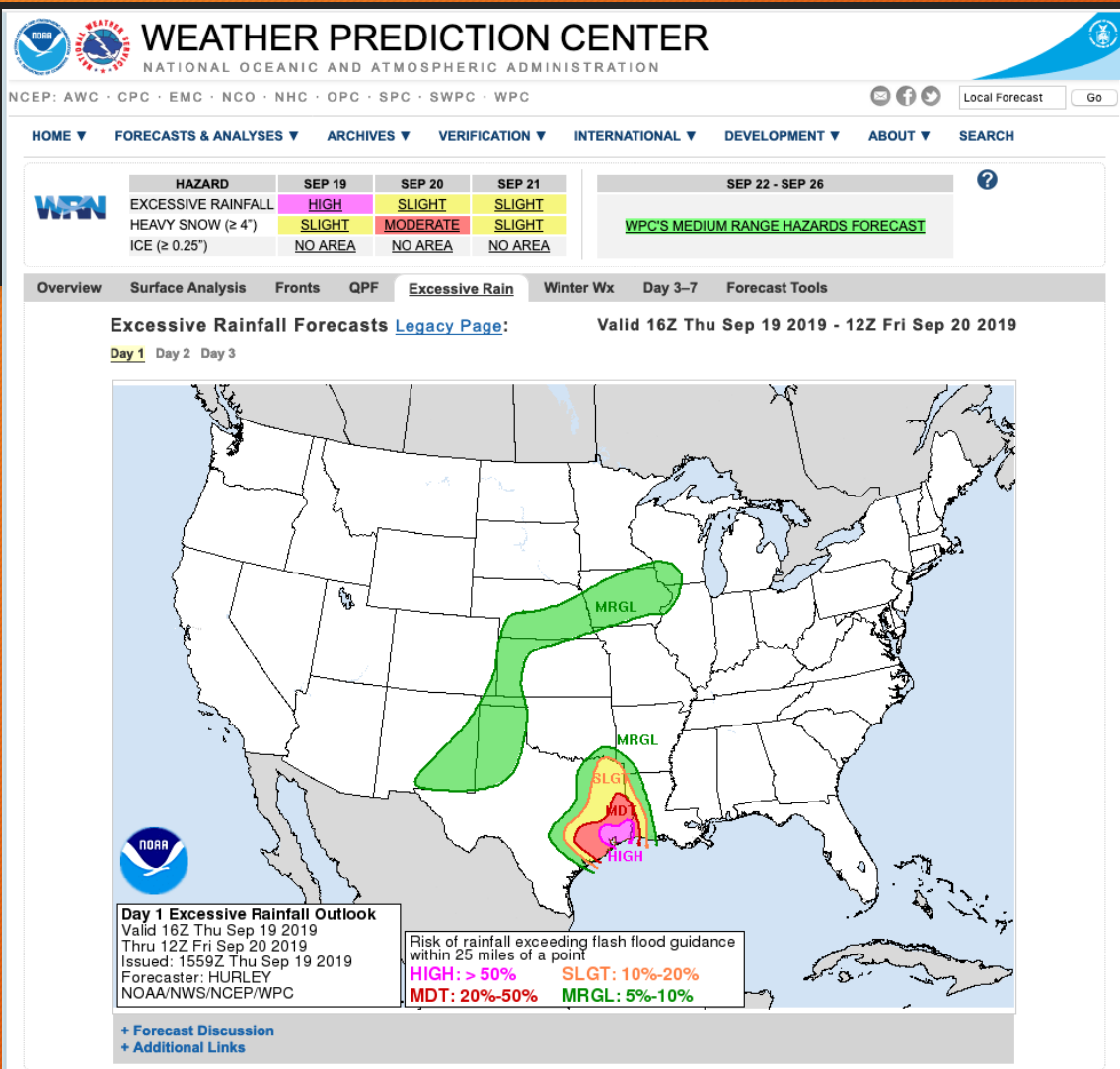
- **NHC issuing advisories for the Atlantic on Hurricane Humberto and Hurricane Jerry**
- **NHC issuing advisories for the Eastern Pacific on TS Kiko, TS Mario and TS Lorena**
- **WPC is issuing advisories on Imelda**
- Key Messages regarding Hurricane Humberto
- Key Messages regarding Hurricane Jerry
- Key Messages regarding Tropical Storm Lorena
- 4 hurricanes in 6 weeks? It happened to one state in 2004. Lessons learned then are valuable reminders today
- Video: What You Should...and Should Not...Do with the NHC Forecast Cone (download available here)



"CoCoRaHS observations play a vital role in the National Hurricane Center's efforts to document tropical cyclone rainfall and impacts in the United States. In at least one case, these observations have led to a new state tropical cyclone rainfall record."

Daniel Brown
Senior Hurricane Specialist/Warning Coordination Meteorologist
NOAA/NWS/National Hurricane Center

Examples



"CoCoRaHS data is invaluable to the forecast process. For example, forecasters at the WPC use CoCoRaHS data to understand what happened between the standard observation sites, which is critical for verify daily forecasts. Further the data are used to identify local extremes in major events, such as hurricanes and blizzards. Notable extremes are reported to key partners, the media, and the public. We are grateful for the community effort to measure precipitation."

David Novak
Director
NOAA/NWS/ Weather Prediction Center

PART SIX



Is yet to come as you hear from our friends across North America now and after lunch.

Thank you for letting us share a small snapshot of our network with you!

For more information visit: www.cocorahs.org

or contact: hreges@atmos.colostate.edu

