

Community Collaborative **RA**in, **H**ail and **S**now network

CoCoRaHS

<http://ny.cocorahs.org>

An observer's guide to measuring and reporting precipitation data!

Equipment

Each volunteer participating in CoCoRaHS is equipped with:

- A clear plastic 4 inch rain gauge and mounting bracket

Locating and Installing the Equipment

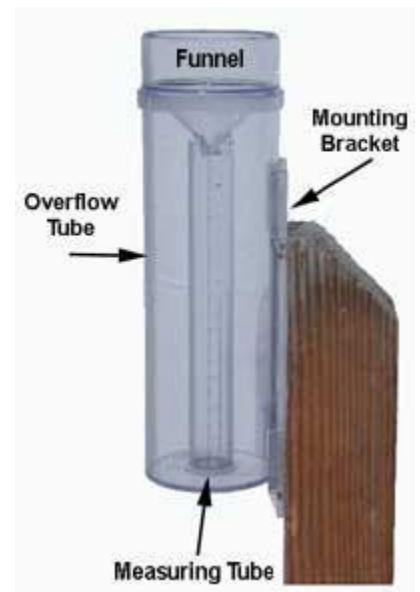
Rain Gauge:

When installing the gauge it is important to consider its location carefully. The gauge should be placed in an area that is protected from strong winds, but is not bothered by obstacles that could either block precipitation from reaching the gauge or could cause the precipitation to splash into the gauge. For example, an ideal location would be a small open meadow, surrounded by forest, or an open back yard not too close to buildings or trees.

The gauge should be installed 2-5 feet above the ground and mounted on the

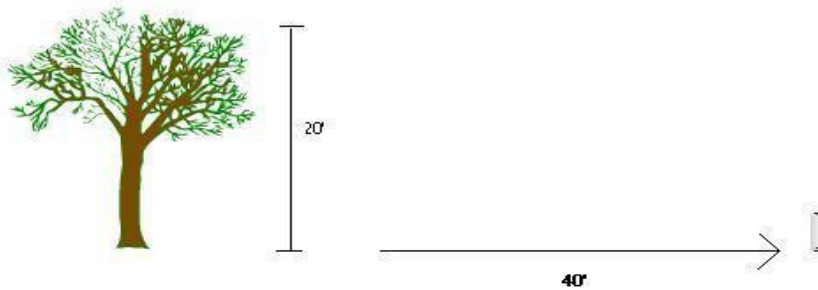
side of a post. The mounting post should have a rounded, pointed, or slanted top to avoid upward splash towards the gauge. The gauge should be installed at a reasonable

distance away from obstacles like buildings or trees. As a rule of thumb, if a tree is 40 ft. tall, the gauge should be placed at least 80 ft. downwind from it. This will help avoid potential blockage of the gauge. It is not always possible to find the perfect location. If in doubt, do your best!



Things to remember when mounting your rain gauge

- Avoid large obstacles that could block precipitation
- Avoid mounting the rain gauge where sprinklers or other sources of artificial precipitation could affect the gauge.
- Make sure the top of the rain gauge is level.
- Mount the rain gauge so that heavy rain could not splash into the gauge.
- Mount the rain gauge in an area protected from strong wind, if possible.
- The perfect location will be nearly impossible to find, so do your best.



The gauge should be twice as far away from an object as that object is tall. In this picture, the tree is 20 feet tall, so the gauge is 40 feet away.

How to read your rain gauge

It is important to be as accurate as possible when reading your gauge. Scientists, engineers, and other professionals may use your data. The rain gauge is composed of four parts: a funnel, a measuring tube, an overflow tube (or cylinder) and a mounting bracket. The funnel directs the precipitation into the measuring tube and magnifies it by a factor of 10. This allows observers to report rainfall to the nearest 0.01" (one hundredth of an inch). The measuring tube, when full, will hold one inch of actual rainfall. When it rains more than one inch, the excess water will collect in the overflow tube.

Reading the rain gauge is a very easy thing to do, but it also easy to make a simple mistake. Here are several situations that could come up with your rain gauge, and how you should deal with these situations.

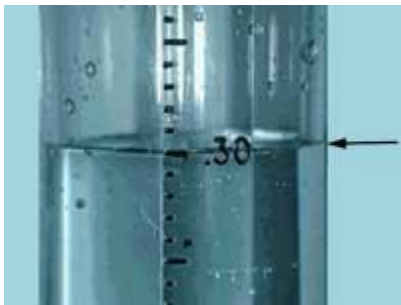
1. The surface of the water in the gauge looks curved! How do I know the right way to read it?

As water fills up the measuring tube, a curved surface may form, which is called a *meniscus*. The meniscus is formed by the surface tension of a liquid in contact with the sides of the tube. **Always** read the bottom of the meniscus when you take your measurement.



2. What do the numbers mean on the side of the tube, and how do I know the right way to read them?

The measuring tube is designed to magnify the rain water. This allows for more precise readings. Remember that when the tube is full, it will hold one inch of water. The measuring tube is divided, marked, and labeled in smaller increments of tenths and hundredths. Imagine that gauge is equivalent to the dollar, but instead of having one paper dollar, you have ten dimes or one hundred pennies. The smallest line on the tube would be equal to one penny. We would write in our checkbooks that we have 0.01 dollars, and when you record rainfall you would write 0.01 inches, which means one hundredth of an inch. The longer lines on the tube would be like a dime. We record a dime in our checkbook as 0.10 dollars. When recording rainfall that has reached this line, we would record it in the same way, 0.10 inches, which is one tenth of an inch. One tenth of an inch could also be referred to as ten hundredths of an inch.



In this picture, we see an illustration of the calibrated measurement tube in the rain gauge that contains three tenths (thirty hundredths) of an inch. 0.30 inches

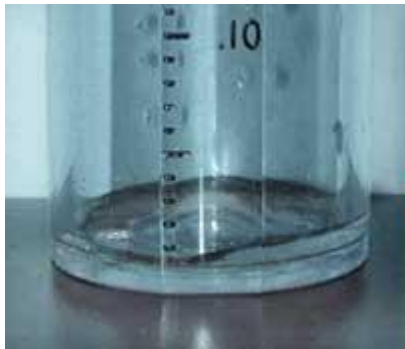
The most common error that observers make is to confuse tenths and hundredths. If you are careful, you can avoid this mistake.

3. What if there is a measurement on the middle line, between 0.30 and 0.40?

This would be equivalent to saying that you have three dimes and five pennies. You would record this measurement as 0.35 inches of rain (thirty-five hundredths). There are nine smaller lines (hundredth marks) between each large line (tenths marks). This means that you will never have a measurement like 0.599 inches, for this measurement should be recorded as 0.60 inches. Always remember that the greatest number of decimal places you can have is two. Please **do not** use a household ruler to measure the tube. A normal ruler is not calibrated like the tube and will not give accurate measurements.

4. I know that some rain fell, but there is nothing (or just a tiny bit that is below the 0.01 line) in my gauge. What do I report?

We call this a trace of rain. This should be reported as “T” in your reports. Even if a few drops fall that don’t even dampen the gauge, you should still report a trace.



There is only a small amount in this gauge, less than 0.01 inches. This is called a **TRACE** and is reported as “T”

5. What if there is no precipitation to report?

Just record 0.00 inches. Especially on days when there are scattered thunderstorms in the area. It is just as important to know where it **didn’t** rain as it is to know how much it rained where it did.

6. What do I do if the inside measuring tube is full?

We can determine that more than one inch of rain has fallen by simply observing that the inside measuring tube is full and the additional water has spilled out into the larger overflow cylinder. Remember that the measuring tube will only hold one inch of water. Follow these two steps when measuring rainfall greater than one inch.

Step 1. You will first need to read the precipitation in the measuring tube, record it, and empty the water in the measuring tube. ***Do not empty out the water that has collected in the larger cylinder.***

Step 2. You will need to carefully pour the remaining water from the larger cylinder into the measuring tube, record it, and add up the totals. If more than 2.00 inches of rain has fallen, you will have to repeat this step several times. The easiest way of doing this is by pouring the water into the measuring tube a little bit at a time. You do not have to fill the

tube all the way to the one inch mark each time. Rather, fill the tube half or three-quarters of the way, record it, and add up the totals. ***Be careful not to spill any of the precipitation.*** When in doubt, place a bucket or other large container under the gauge as you pour, so that you can collect the water if you do happen to spill. Make sure you write down each rainfall quantity and add up the total. If you don't write it down immediately, you could forget.

7. Do I report dew that has collected in my rain gauge?

On damp, dewy spring and summer mornings, it is possible that a few drops of moisture could collect in your rain gauge. It is very important that you **do not** report this as precipitation. If the only precipitation in your gauge is from dew or fog, report **0.00**. You may add a remark about the dew if you would like.

8. Should I keep a written record of my precipitation data?

It is very helpful to keep a written record of your data. This gives you a permanent record and gives us a backup in case we have computer problems. This is also important if we find that your data has been entered incorrectly into the website. It might happen that someone spots an erroneous report for your station. If so, someone could contact you to discuss it with you. Keep your written records handy. Please do not be offended, we are simply trying to keep the best quality data we possibly can.

9. What if I leave for the weekend or vacation, and when I come back there is precipitation in the gauge?

If you are gone for a few days and return to find precipitation in your gauge, please report this amount, but report it as an accumulated total. This is done using a "**Multi Day Precip Report**". Specify the period of days the moisture accumulated. This is very helpful to us. If you think that you know approximately when it fell, make a note of it.

How to report your precipitation data to CoCoRaHS

It is important to the CoCoRaHS network that you promptly and accurately report the precipitation data that you have collected. CoCoRaHS scientists, sponsors, and collaborators are most interested in **daily rainfall data** and **daily hail reports**. These reports will be mapped, displayed, and promptly put into use. In addition, reports of **intense rainfall** are extremely helpful in determining locations of potential flooding. Your data will be used by professionals in the fields of science, agriculture, public safety, and water resource management, to name a few. **Your data is important!**

When do I report my readings?

You are encouraged to watch your gauge any time that it is raining. However, to stay consistent in collecting the data, you are encouraged to take daily measurements of 24-hour total precipitation and report the data as close to 7:00 AM as possible each morning. 7:00 AM has been chosen because it is usually not raining at this time in the summer

months and most people are still at home. We understand that 7:00 AM will not always be possible for you, and it just won't work for everyone. But the closer we are to having everyone report at the same time, the more consistent our maps and analyses will be. This becomes especially important if it is raining at the time that you report the data. Always record the time when you did take your measurement so we know for sure.

Reporting “Intense Rainfall”

During events with heavy rainfall, “Intense Rain” reports can be submitted as part of the precipitation data. The “Intense Rain” report data are used informally in projecting potential flooding in an area. Intense rain, for the purpose of this project, is defined by at least 0.30 inches of rain in an hour or less. However, we encourage you to report intense rainfall any time you believe the rain is falling hard enough to create problems. Please know that reports entered into the CoCoRaHS website may not reach the National Weather Service in time to help them issue flash flood warnings. So if dangerous flooding conditions are occurring, please first report them to the local National Weather Service office or law enforcement or emergency managers.

Transmitting your reports

The primary method of transmitting reports will be done through the internet directly into the CoCoRaHS computer system. To report data, follow the instructions given on the CoCoRaHS website, <http://ky.cocorahs.org>. When you reach the CoCoRaHS website, run your mouse cursor over **My Data** in the top bar, and then a drop down menu will appear. Move your cursor over **Enter My Data** and select the type of report you wish to enter. Then follow the instructions and fill out the appropriate data form. When you are done, check your entry for accuracy and then click “**submit**”. Your report will immediately go to CoCoRaHS and it will appear in the data reports. Data will also appear on rain or hail maps, which are updated hourly.

For our volunteers without internet access, the most likely way that we will ask you to enter your data is to call a predetermined volunteer or coordinator with internet access. They will take your report and submit it through their internet connection. It is important to make sure that you specify the time, date, location, and all the information that relates to your observation.

Hail Reporting

One of the goals of CoCoRaHS is the study of hail storm characteristics. You may hear the mention of “Hail Pads” from time to time. These are Styrofoam blocks, covered in aluminum foil. When hail falls on the pads, it will create numerous dents. These dents can then be measured and studied to learn more about the type and size of hail that falls from thunderstorms. These hail pads have been in use for years in Colorado, with great success. The results from the pads have been very valuable to researchers.

Here in Kansas, we currently have not begun using the hail pad system. In the future, when we have set up a large and dedicated network, we may implement these hail pads for observers.

For the current time, reporting of hail is optional, but is strongly encouraged. On the CoCoRaHS website, one of the reporting options is for **Hail Report**. This report form will allow for detailed information to be input to the CoCoRaHS system regarding hail that has fallen. These reports will be transmitted to the CoCoRaHS website, but just as with intense rainfall, these reports may not reach the meteorologists at the National Weather Service in time to issue severe thunderstorm warnings. If you are observing hail of dime size or larger, please first report this by telephone to the National Weather Service, or law enforcement/ emergency managers, and ask them to relay the report to the National Weather Service.

Just remember that when you are observing a hail storm, **observe the hail storm from a safe and secure location**. Do not expose yourself to dangerous hail stones. Your safety is more important to us than collecting data. Wait until the storm is over if you deem it to be unsafe!

Station Maintenance

Please keep your rain gauge in working order by performing some simple maintenance from time to time. To clean your gauge, use a soft bottle brush and mild detergent. **Do not** let water ever freeze inside your gauge. This will cause the plastic to crack. During the summer, make sure that water from sprinkler systems does not enter your gauge. If you have any maintenance questions, please contact your local CoCoRaHS coordinator.

Questions?

If you have any questions or problems, please contact your local CoCoRaHS coordinator. His or her name will be provided to you when you join the project network.

CoCoRaHS is a science education and community-based research opportunity originally developed by the Colorado Climate Center at the Colorado State University. We thank you for participating in the network, and look forward to many years of learning about the fascinating patterns of rain, hail, and snowfall with you!