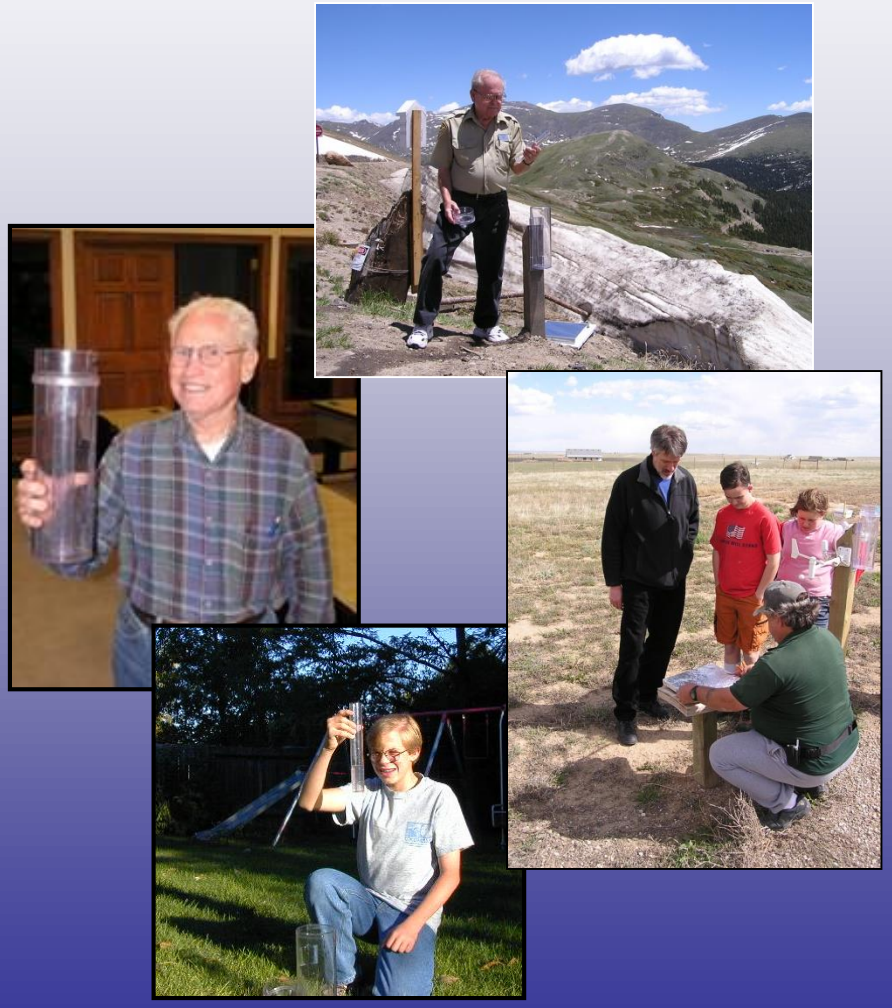

CoCoRaHS
Community Collaborative Rain, Hail & Snow Network

“Because every drop counts!”

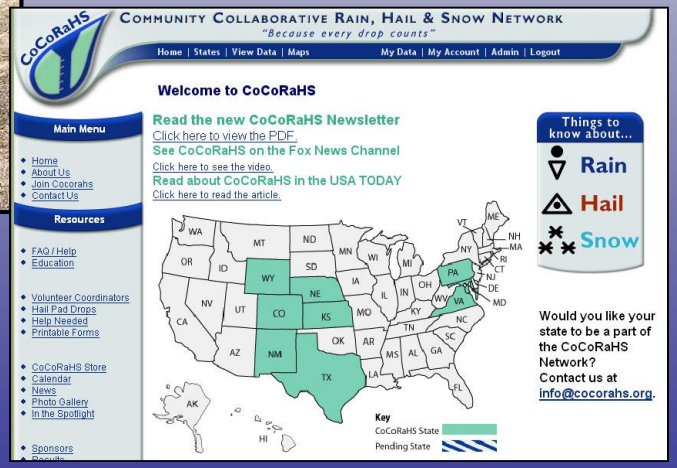
Photo by Henry Reges

What is CoCoRaHS?

CoCoRaHS is a unique, non-profit community based network of volunteers of all ages and backgrounds working together to measure and map precipitation (rain, hail and snow).



“By using low-cost measurement tools, stressing training and education, and utilizing an interactive Web-site, our aim is to provide the highest quality data for natural resource, education and research applications.”



Why CoCoRaHS?

FIVE

five

5

Five Important Reasons

5

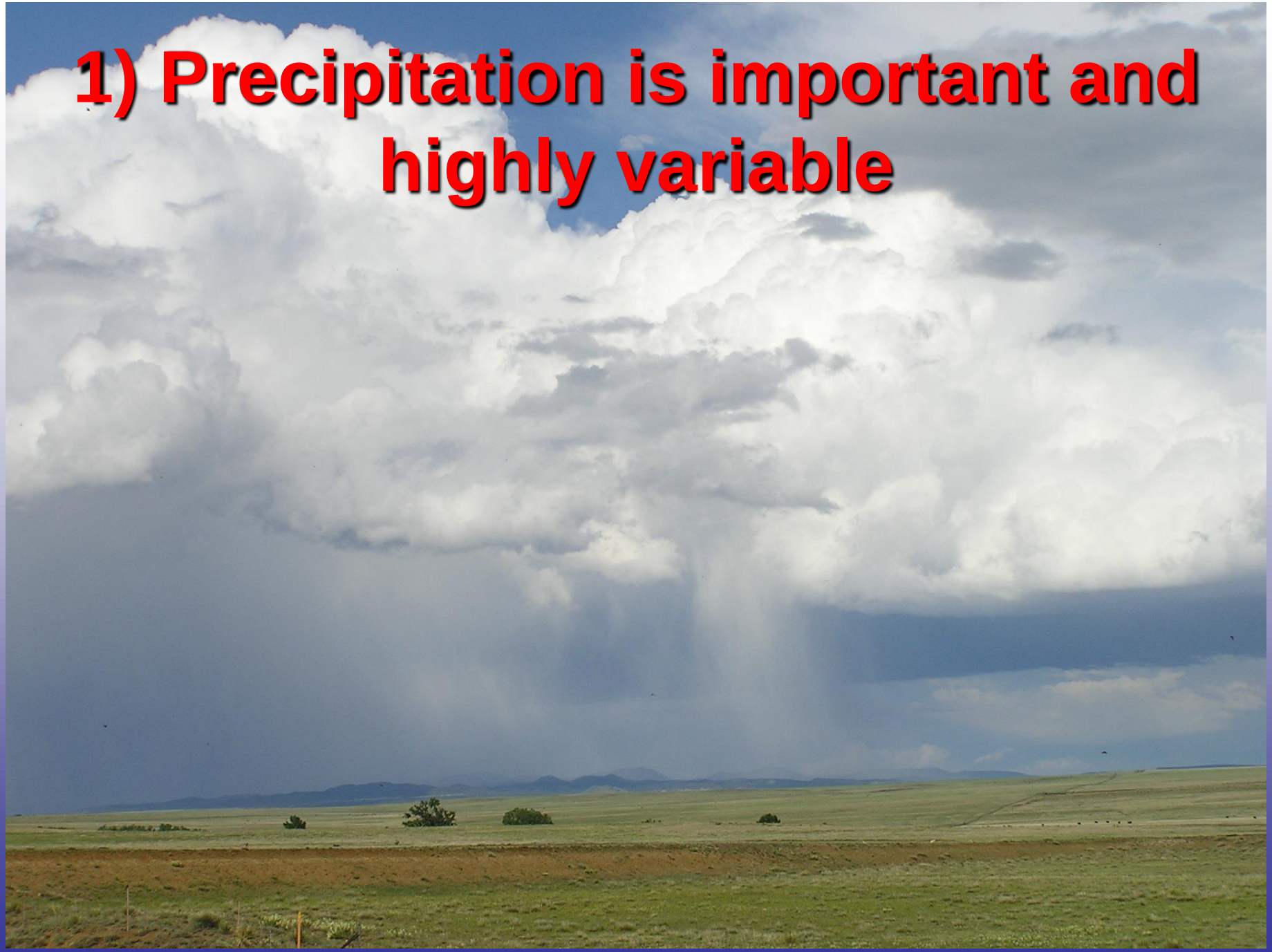
five

FIVE

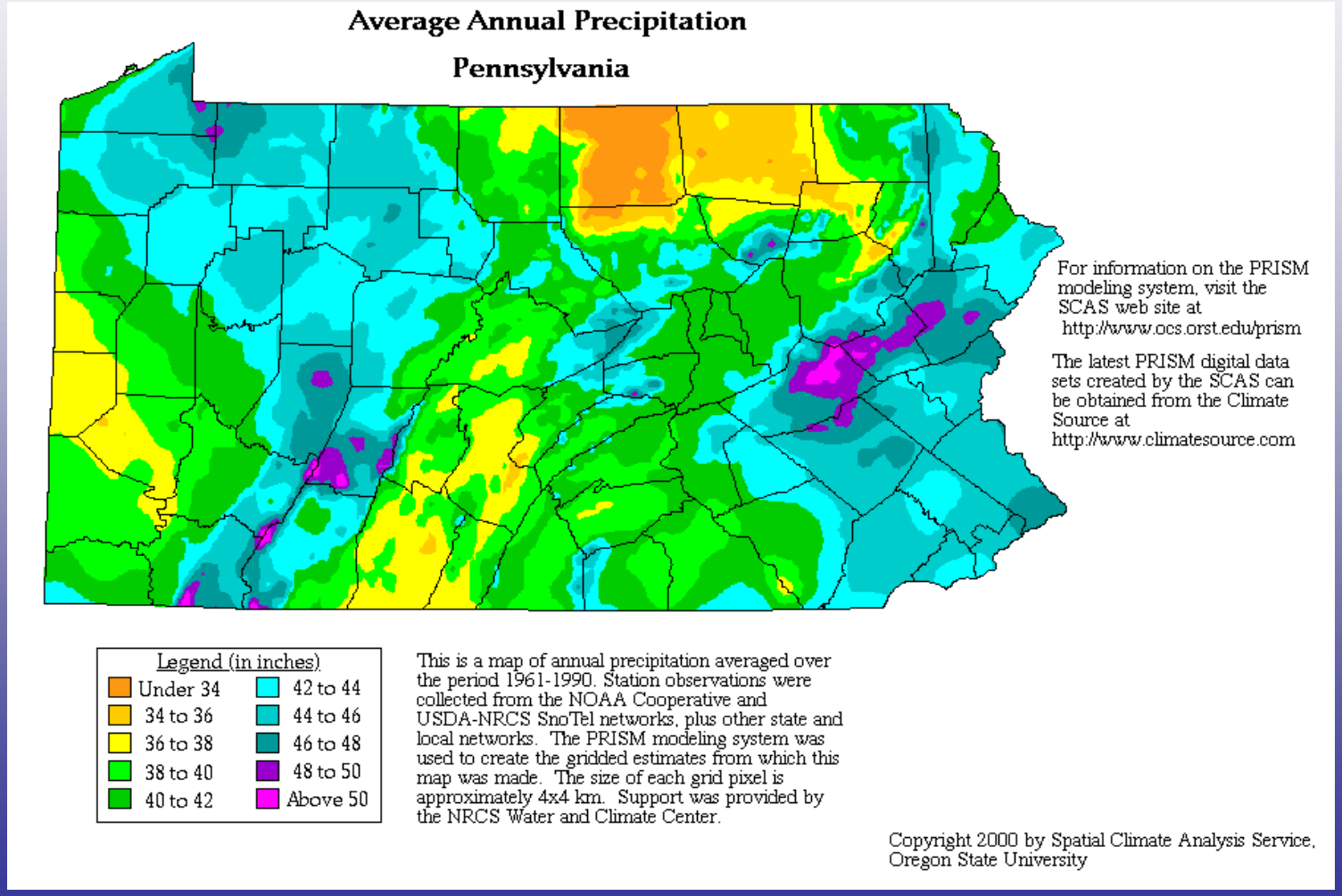
5

5

1) Precipitation is important and highly variable



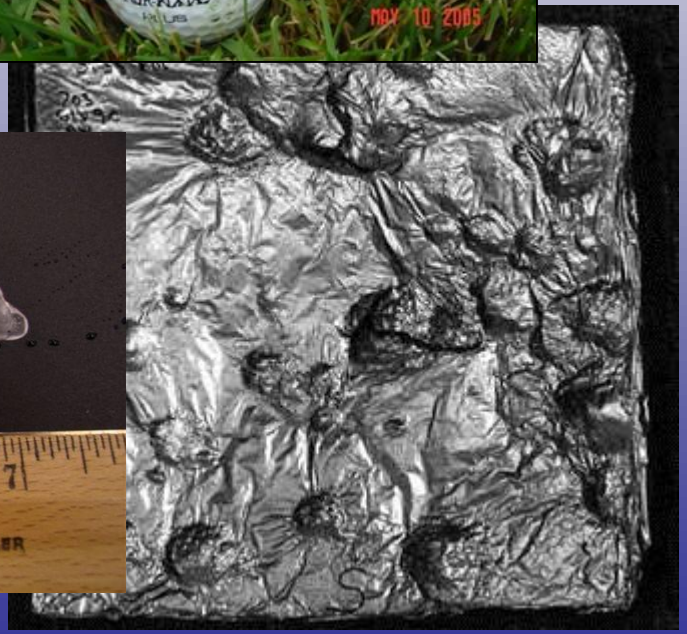
2) Data sources are few and rain gauges are far apart



3) Measurements from many sources are not always accurate (especially snow)

Photo by Henry Reges

4) There is almost no quantitative data being collected about hail

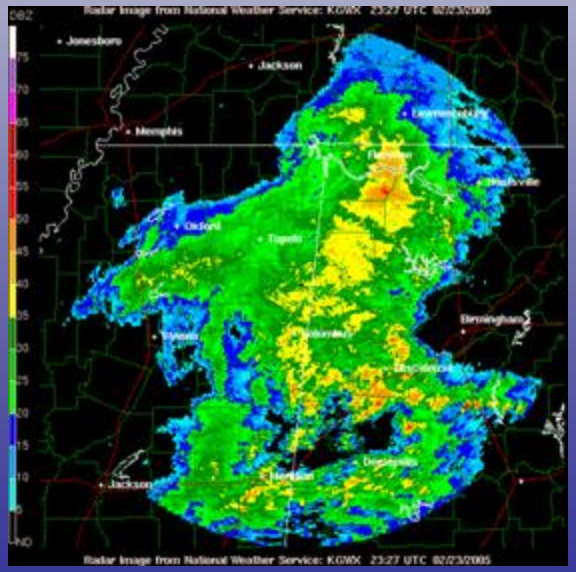


5) Storm reports can save lives

Who uses CoCoRaHS Data?

- National Weather Service
- Other Meteorologists
- Hydrologists
- Emergency Managers
- City Utilities
  - -Water supply
  - -Water conservation
  - -Storm water
- Insurance adjusters
- USDA - Crop production
- Engineers
- Scientists studying storms
- Mosquito control
- Ranchers and Farmers
- Outdoor & Recreation

- Teachers and Students
  - Geoscience education tool
  - Taking measurements
  - Analyzing data
  - Organizing results
  - Conducting research
  - Helping the community



Who Sponsors CoCoRaHS?

The National Science Foundation

Colorado State University

USDA

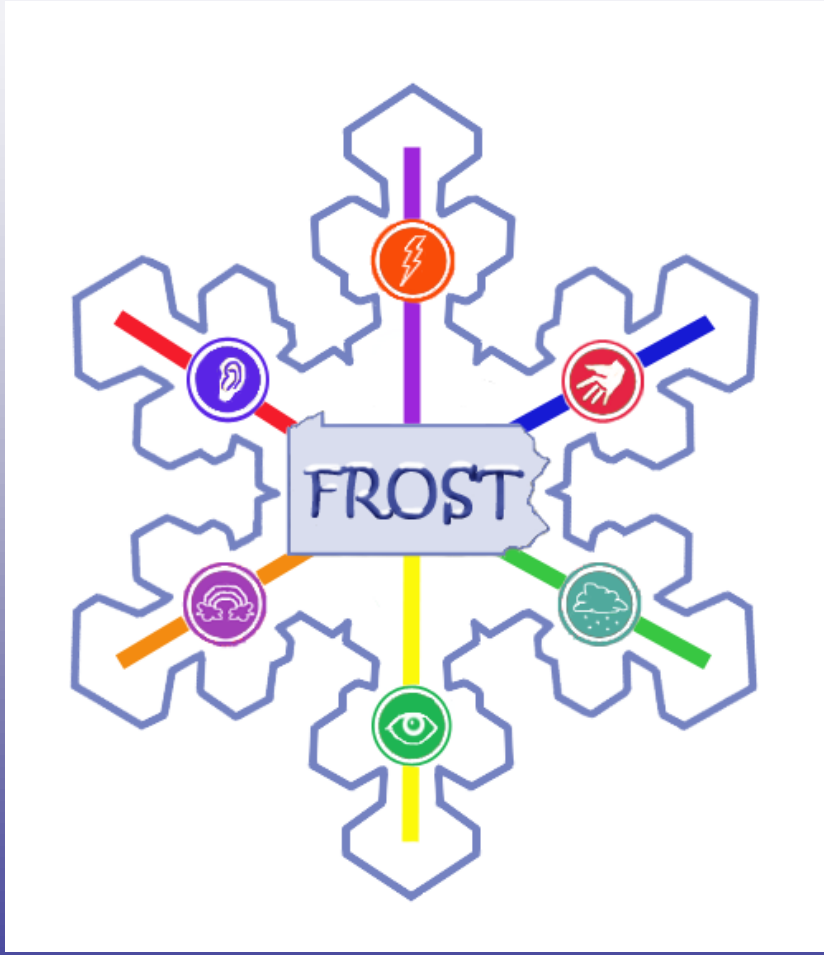
US Bureau of Reclamation

National Weather Service Local Offices

Individual Contributors

As well as many others

What is FROST?



- Started through a collaboration with Colorado State and CoCoRaHS
- FROST is Pennsylvania's version of CoCoRaHS
- We want to collect data on Frost, Rain, Optics, Snow, and Thunder

Photo by Henny Reges

Things we need from you before you can participate as an observer

Photo by Henry Reges

A completed application form

(on-line or paper)

Your Location

Your commitment

Your commitment to collect accurate scientific data

Your willingness to receive CoCoRaHS e-mails

Please make sure that CoCoRaHS e-mails are not blocked from reaching you by your spam blocking software.

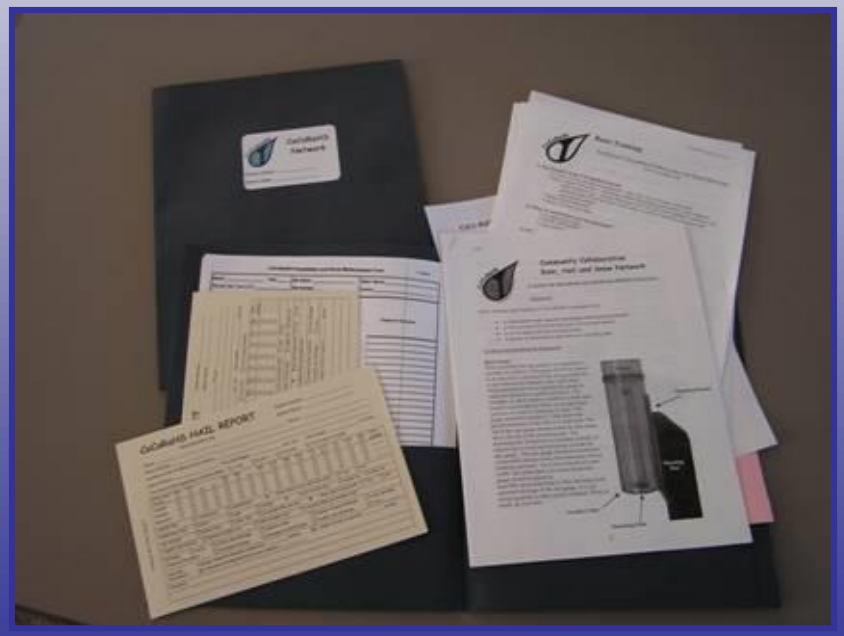
It's important that we contact you from time to time to let you know about things happening with CoCoRaHS.

coco@anvil.atmos.colostate.edu
info@cocorahs.org

nolan@ccc.atmos.colostate.edu
cocorahsqc@msn.com

Things you will need before you can participate as an observer

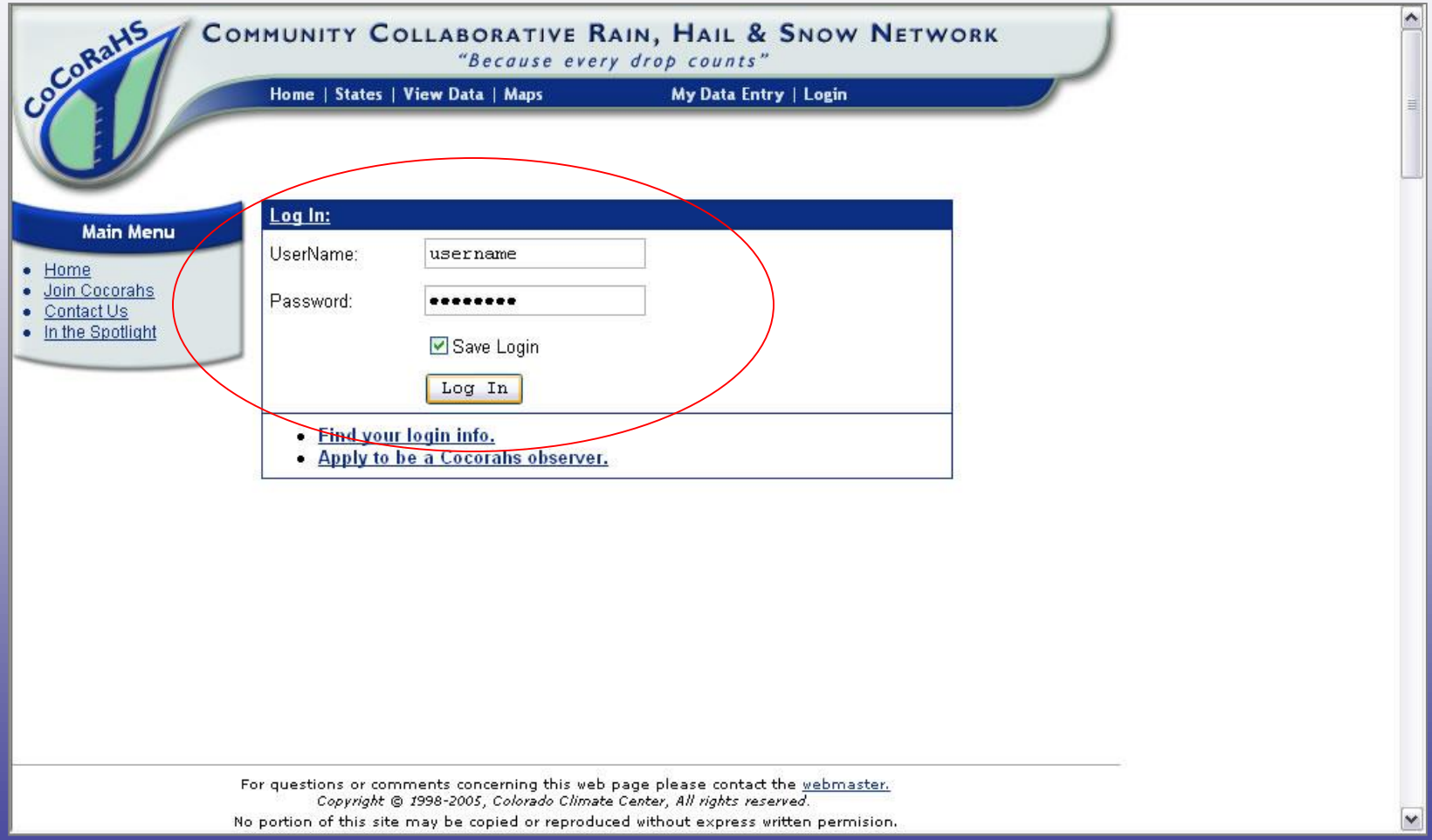
A sincere desire to help study and learn about storms



A training packet
(will be mailed to you)

A unique station number and a station name (we will assign you one)

A login ID and password to enter data



A 4 inch rain gauge installed in a good place

The ability to gather accurate data and transmit it in a timely fashion

(telephone or internet capabilities)

Setting up your Equipment

Location! Location! Location!

Photo by Henry Reges

It's the key to good data

Placement of your rain gauge

Photo by Henry Reges

Places not to place your gauge

The #1, all time worst place to put you rain gauge is to leave it in the box it came in !

Using your gauge to hold up your gutter downspout is not a wise choice either.

You'll want to avoid placing it under trees as well

Avoid placing it near or under any structure

Although convenient, the deck is still too close to the house

Also avoid placing it near:

–Sprinklers

–Animals (dogs, birds, etc.)

–Steep slopes

and . . . .

Photo by G. Pearson

Mountain Lions?

. . . anything that would artificially increase or decrease your gauge catch

This can cause updrafting during strong winds, which may reduce your gauge catch

Ideal placement of your gauge

Photo by M. Suedukum

Distance from obstacles

- In open areas strive to be twice as far from obstacles as they are high.
- In developed areas strive to be as far from obstacles as they are high.

Distance between Trees

Ideally, place your gauge equidistant from the nearest trees

Height above the ground

- In open areas place the gauge top approx. 2 feet off the ground.

***To improve gauge catch by**
reducing wind speed

- In developed areas place the gauge top approx. 5 feet off the ground.

***To improve gauge catch by**
reducing the impact of nearby obstacles

Make sure your gauge is level

Be sure to bevel the top of the post

This will help reduce precipitation splashing into the gauge

Snow board placement

Most times you can place your snow board in the same location as your hail pad. You can even use your hail pad holder as your snow board.

You will want to pay attention to snow accumulation patterns after the first few snows and then modify your location as needed

Now we are ready to measure some precipitation!


FROST

Frost

-Photo © http://www.ian-barton.com/photoblog/archives/000099.html

When observing frost, estimate how much of the surface is covered.

Photo by H. Reges

Reading your Rain Gauge

When should we read our gauges?

Reading your rain gauge

- Reading the rain gauge is easy but accuracy & consistency are important

- Here are the most common situations you may encounter when reading your gauge.

Your most common observation

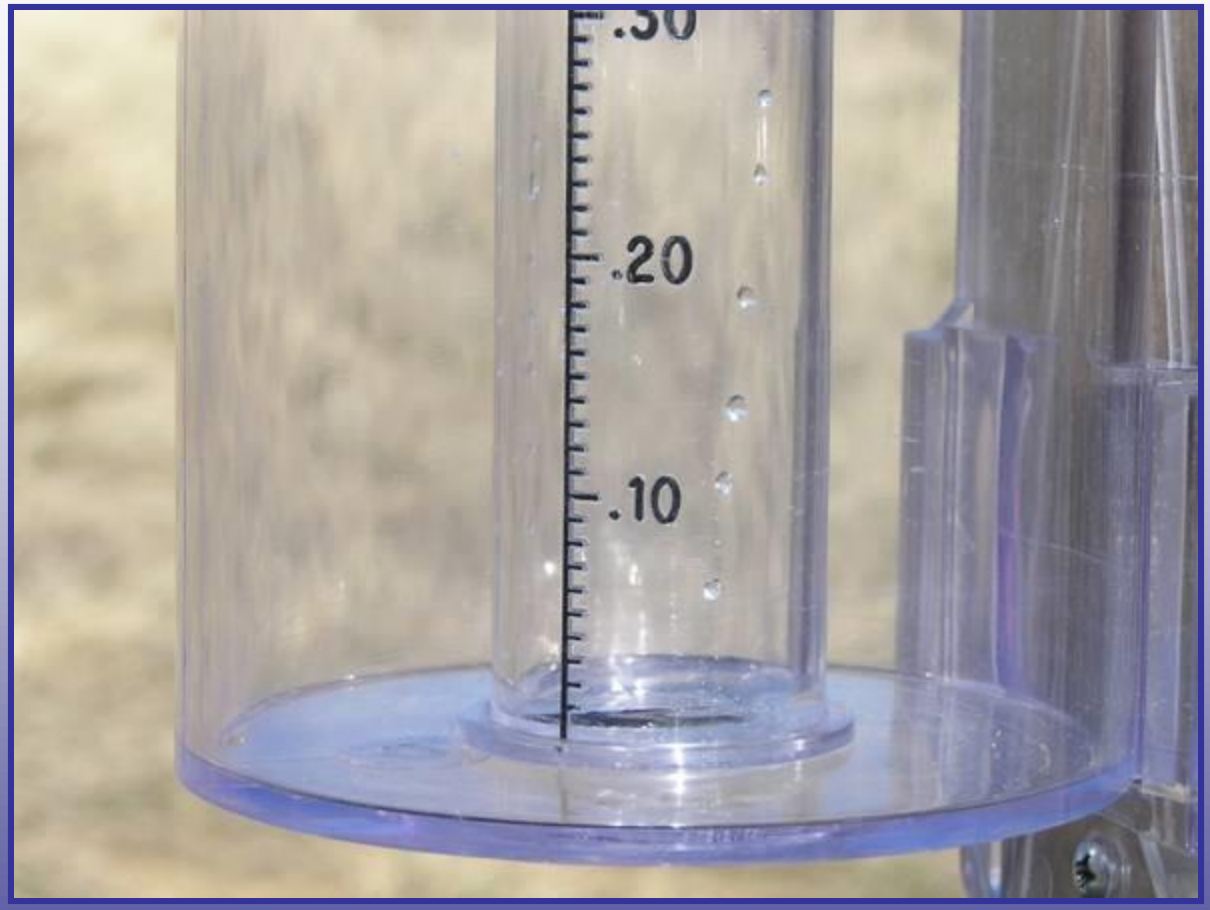
. . . will be zero, (0.00), nada, naught, nothing

It is important for the network to know that it did NOT rain. Please report zeros.

0.00

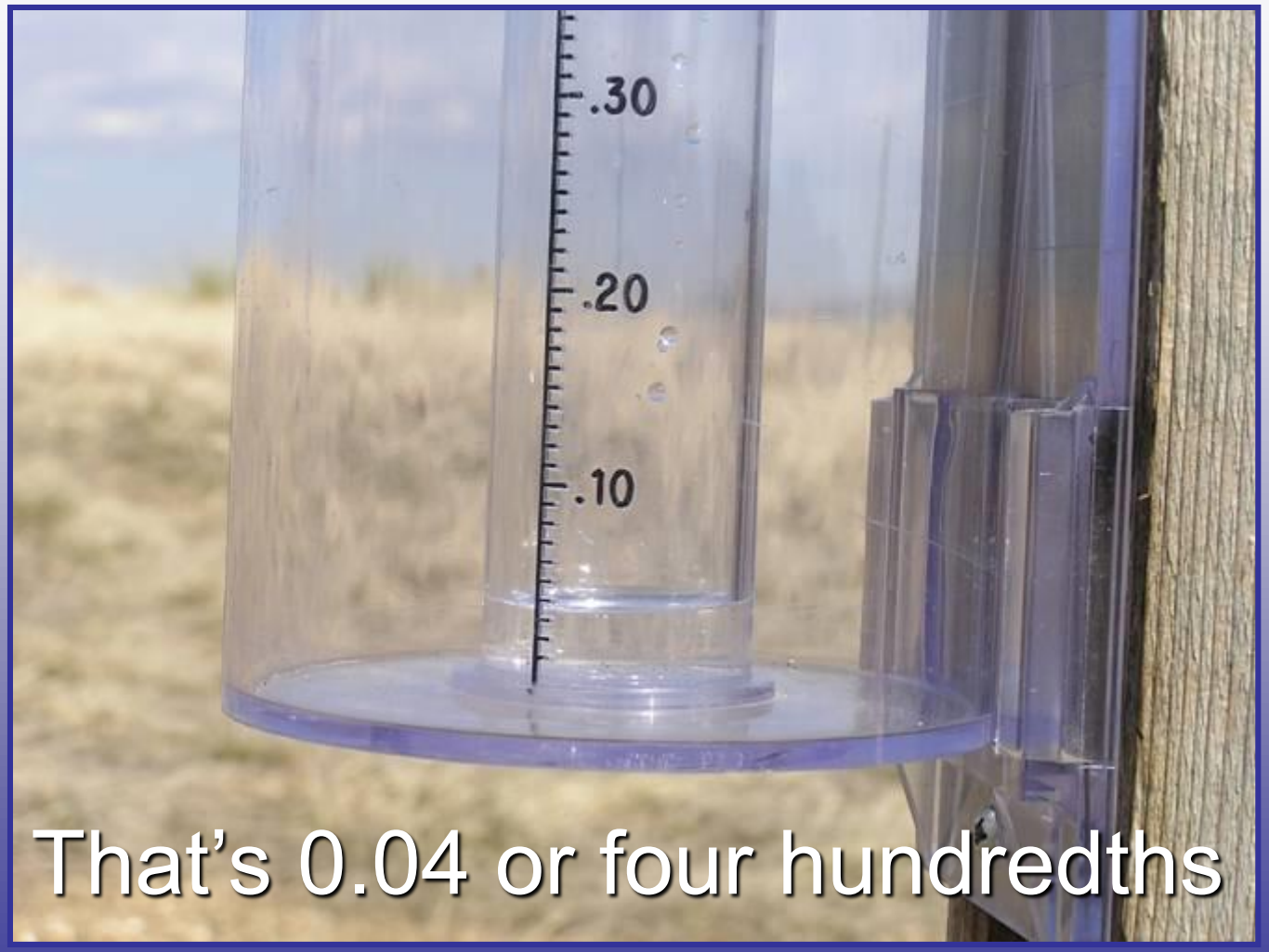
Trace “T”

T



When only a drop or two wet the gauge record a “T” for Trace

Between “T” and “one tenth” of an inch



The surface of the water in the gauge looks curved. How do I know where to read?

As water fills up the measuring tube, a curved surface is formed called a **meniscus**. This 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 the making your daily rain measurements.

A nice soaking rain

This is “one half” inch it’s . . . NOT 5.0, nor 0.05, but 0.50
(kind of like 50 cents out of a dollar)

A good rain

The inner tube holds 1.00 inches

DECIMALS

Getting the decimal point correct is ESSENTIAL

There is a large water difference between **0.90** and **9.00 inches**

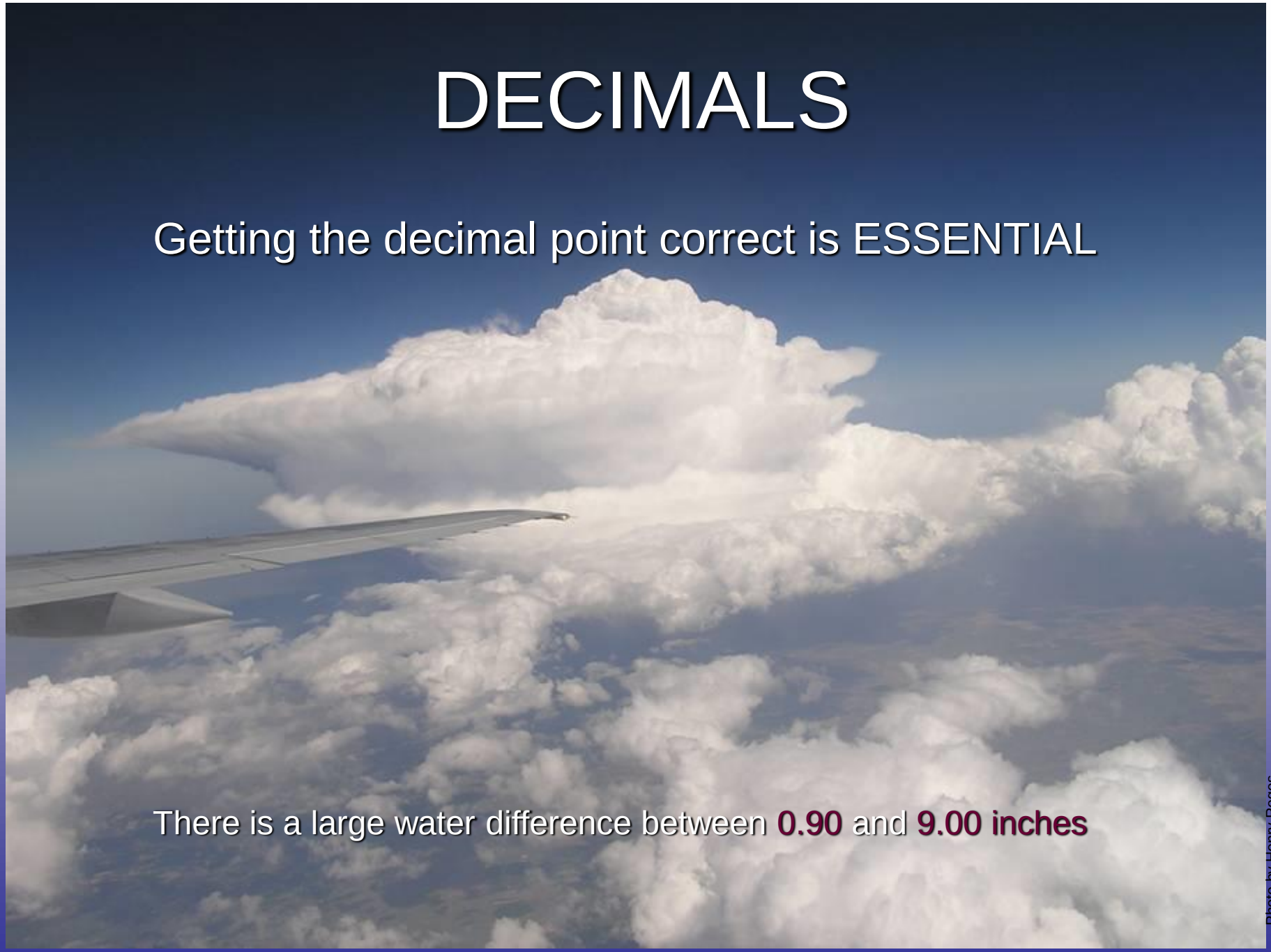


Photo by Henry Reges

Water! Water! Everywhere!

When more than an inch of rain falls the precipitation will overflow into the outer cylinder. The whole gauge has a capacity to hold 11 inches.

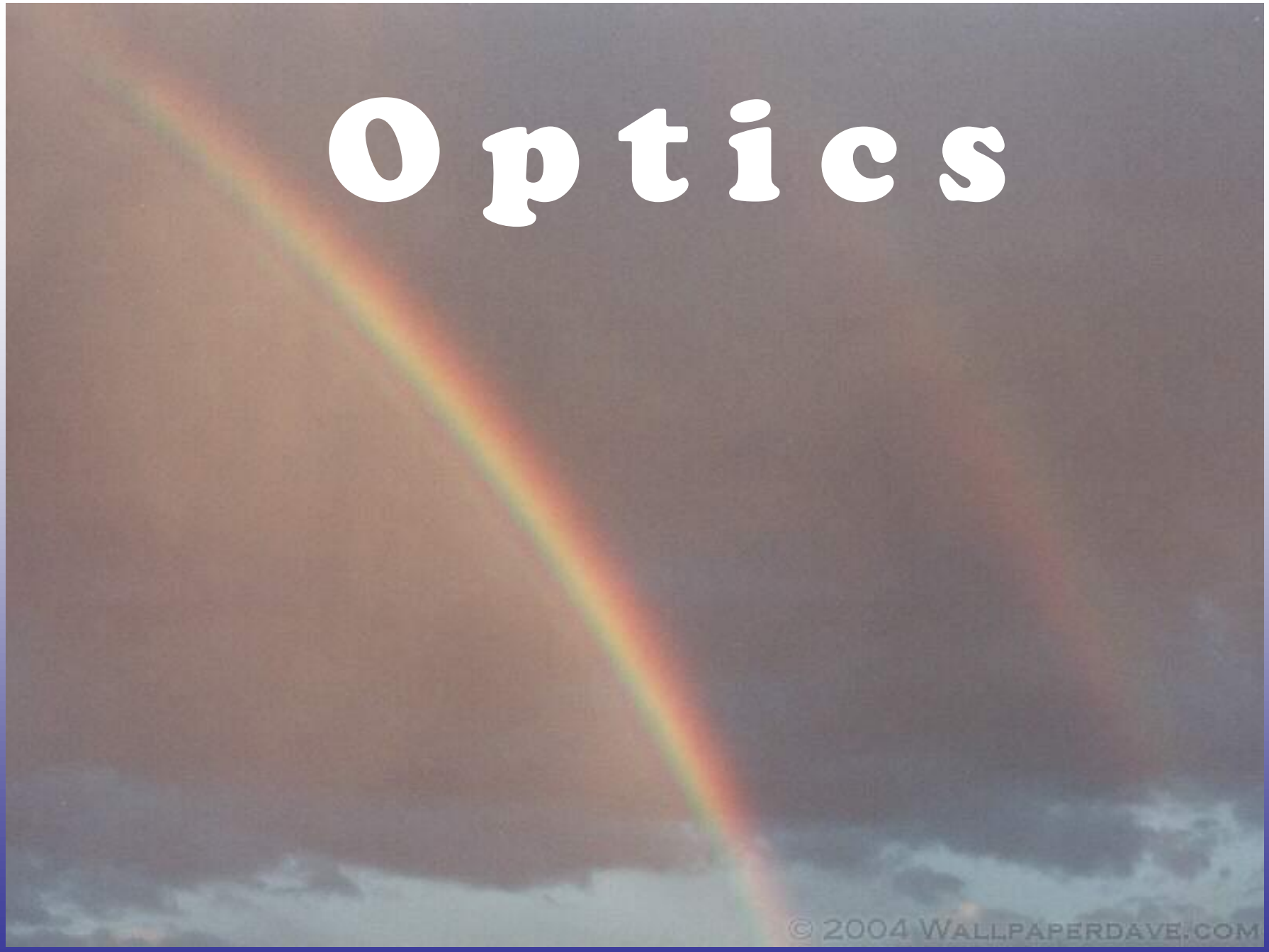
To measure this amount . . .

Pour out the first inch from the inner tube

Now pour the remaining water into the funnel & measure using the inner tube.

Continue until all of the water has been measured. Make sure you keep track of your amounts along the way.

Optics



Optics

Corona, 22° Halo, Sundog, Rainbow

Photos © http://www.sundog.clara.co.uk/atoptics/phenom.htm

Observing Optics

- Please remember to:
  - NEVER look directly at the sun! This can cause eye damage and even blindness.
  - Note the time and location if possible
  - We welcome pictures!

Atmospheric Optics is a great site that explains each type of optical phenomenon


SNOW
Let's look at how we measure our winter weather

If snow is anticipated . . .

Remove the funnel and inner tube, otherwise snow will clog the funnel

Snow in your gauge

If you live in a protected area many times you will have an accumulation of snow on the rim of your gauge

How do I know what to measure and what not to??

Take your snow swatter and tap gently on the rim of the gauge

What falls in gauge we measure

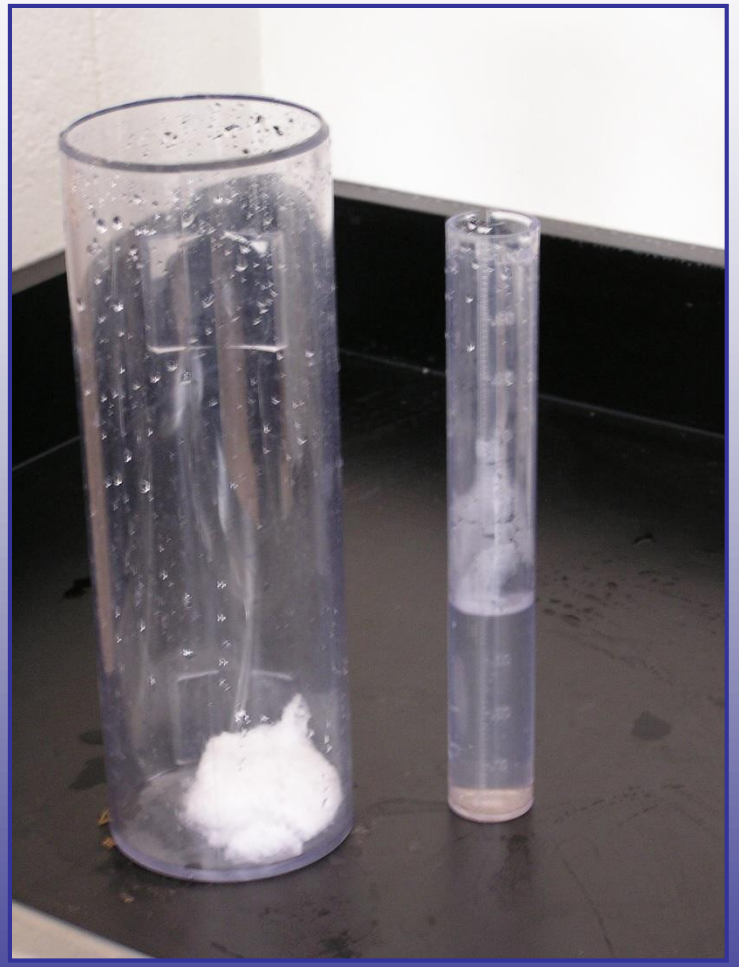
We will disregard the snow that lands outside the gauge.

Go ahead and clear away the snow from the gauge

Now you are ready to melt what's in your gauge

Melting snowfall

Add some warm water to the inner cylinder



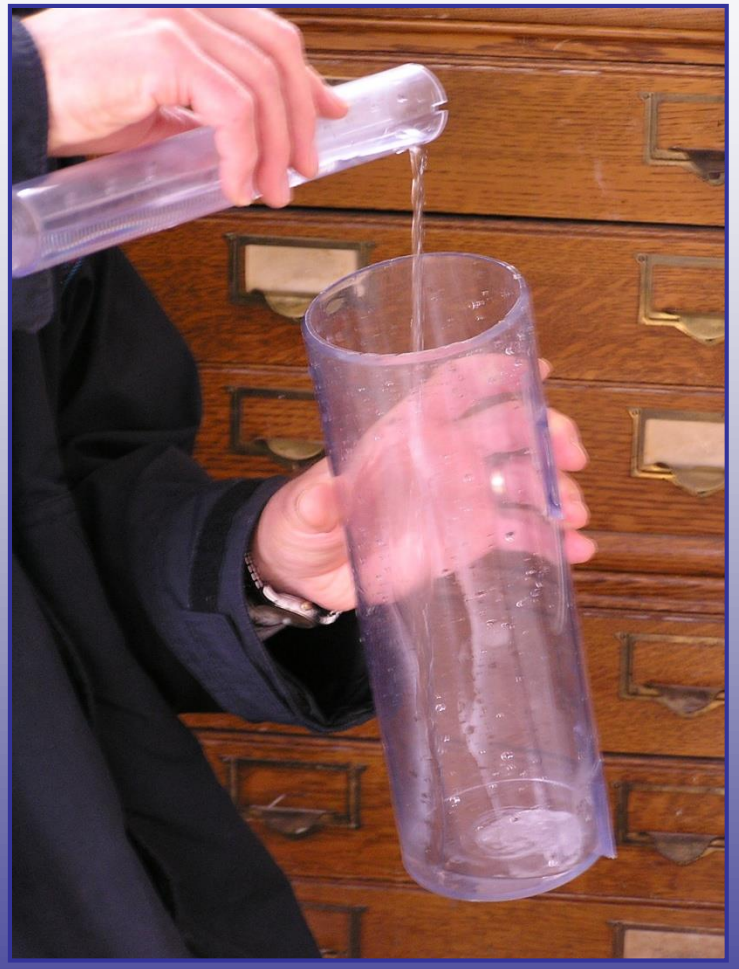
Notice that you have two cylinders

Carefully measure your tap water before adding to outer cylinder

Be sure to measure to nearest hundredth of an inch

Add warm water to the snowfall sample

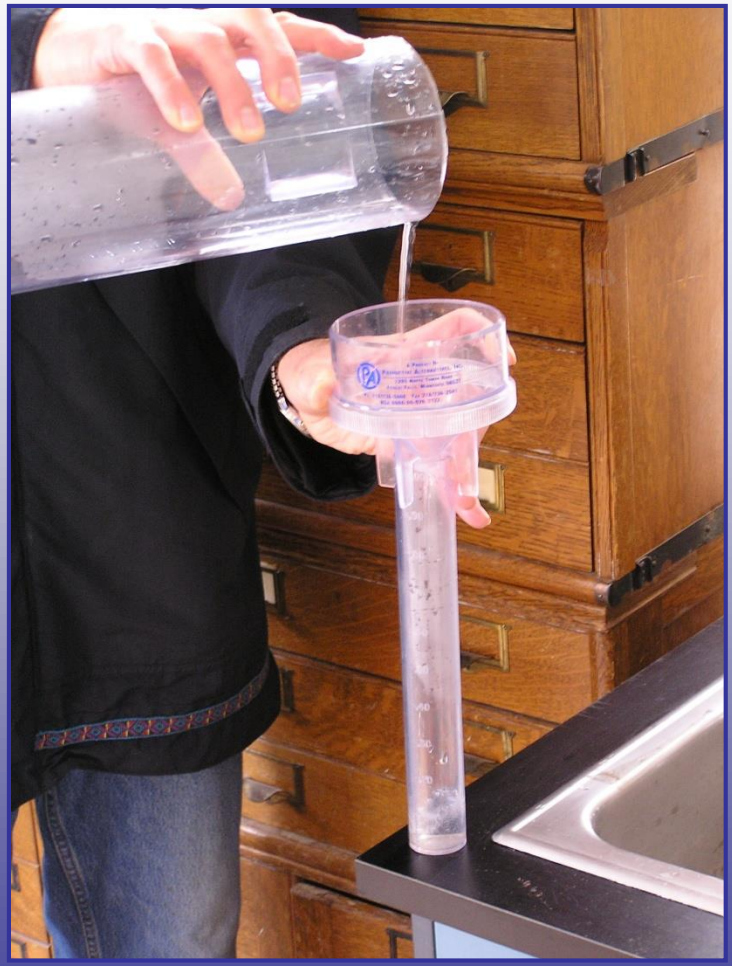
Pour water directly into sample



Allow sample to completely melt

Measure the liquefied snowfall sample

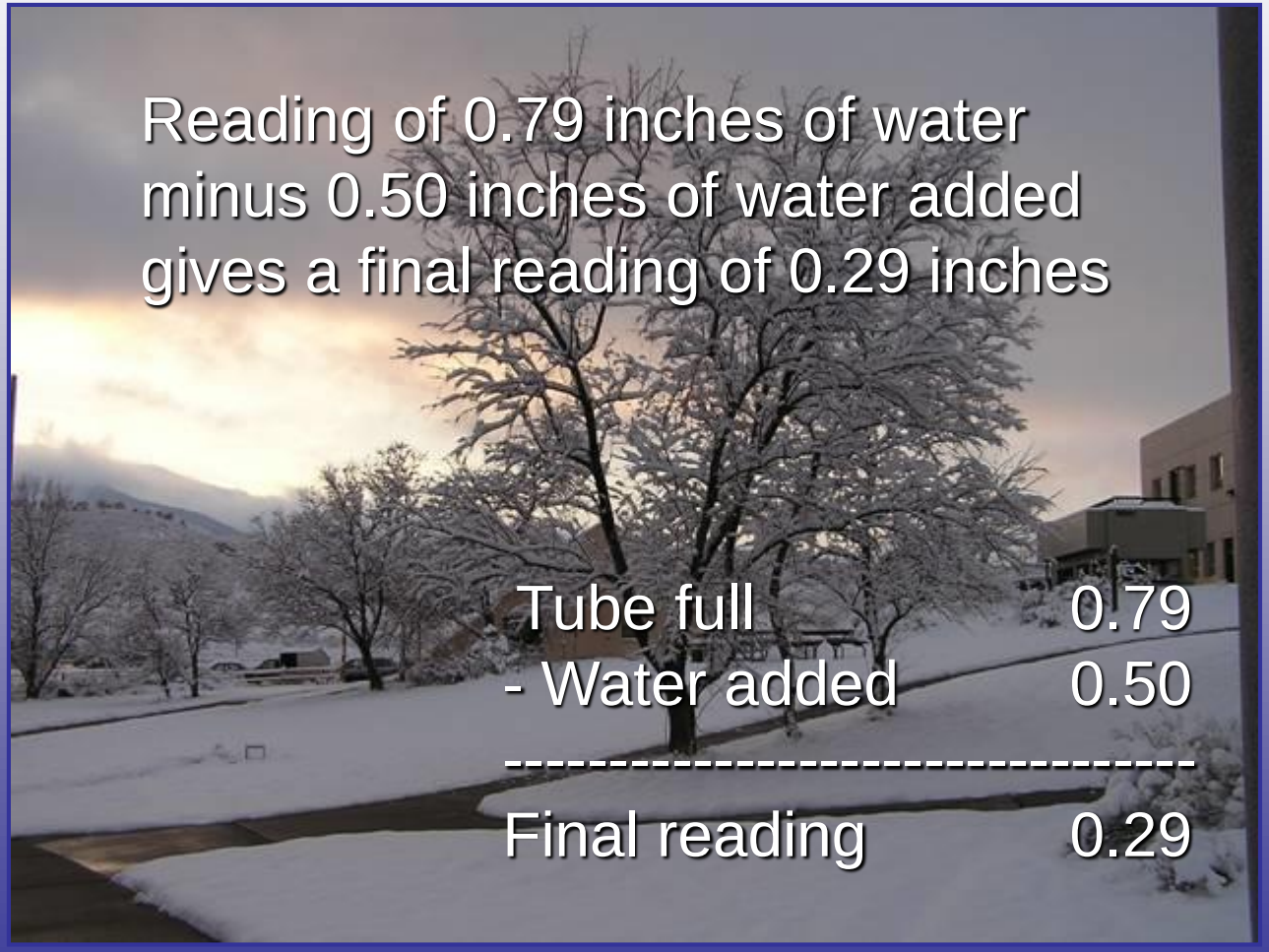
Pour snow sample into smaller tube



Remember “Every drop counts!”


Carefully read to the nearest one hundredth of an inch

Remember to subtract the amount of warm water that you've added to the tube



The gauge may not always give an accurate measure of snow water content

It may be necessary to take a snow core sample

Shovel your way out the door

Find a representative location

The spot should have not drifted, melted, or blown clear

Steps to cutting a sample

Place gauge upside down into snow

Push down on gauge

Clear the area around gauge

Capture the core

Slide snowswatter under gauge

Make sure gauge is over swatter

Core has been captured

Slowly lift gauge and snowswatter

Ok, now carefully get ready to flip gauge

Flip gauge

Now carefully bring the sample inside to melt

Snow Cores in deeper snow

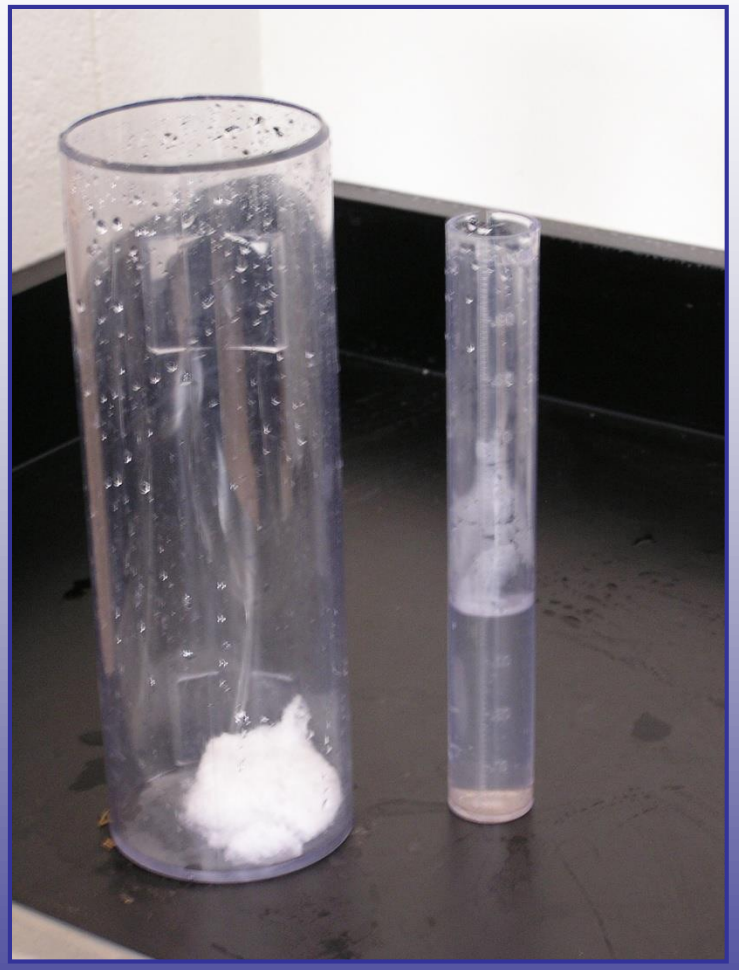
Again, capture a sample

In wetter snow, the core will come out as one piece

Again, you are now ready to melt the sample

Melting your snow core sample

Add some warm water to the inner cylinder



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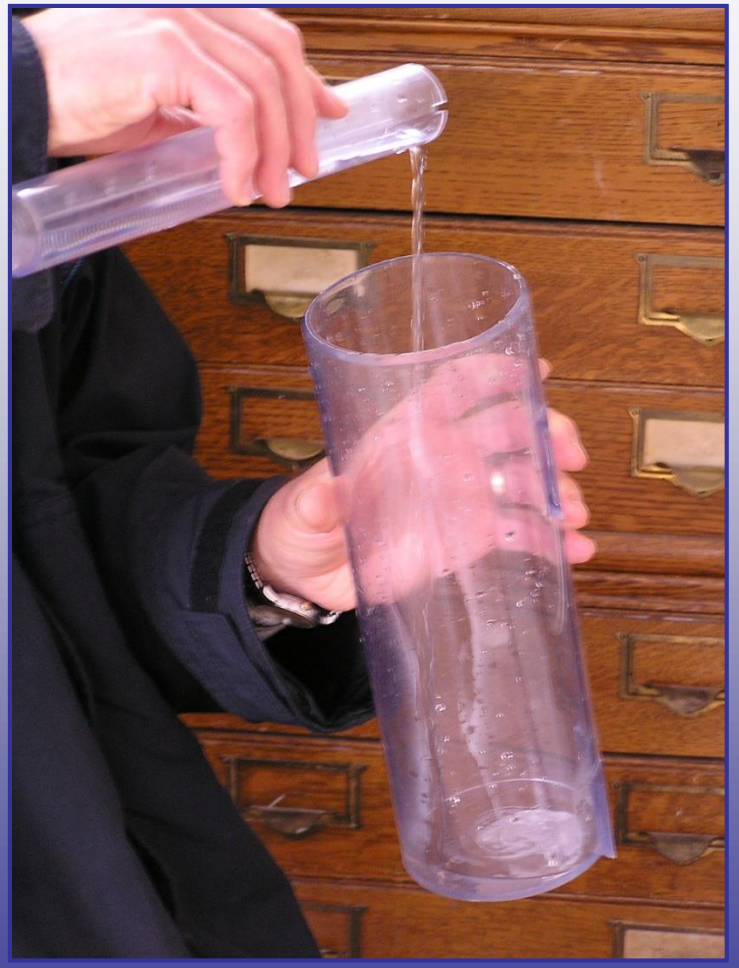
Be sure to measure to nearest hundredth of an inch

Add warm water to core sample

Pour water directly into sample



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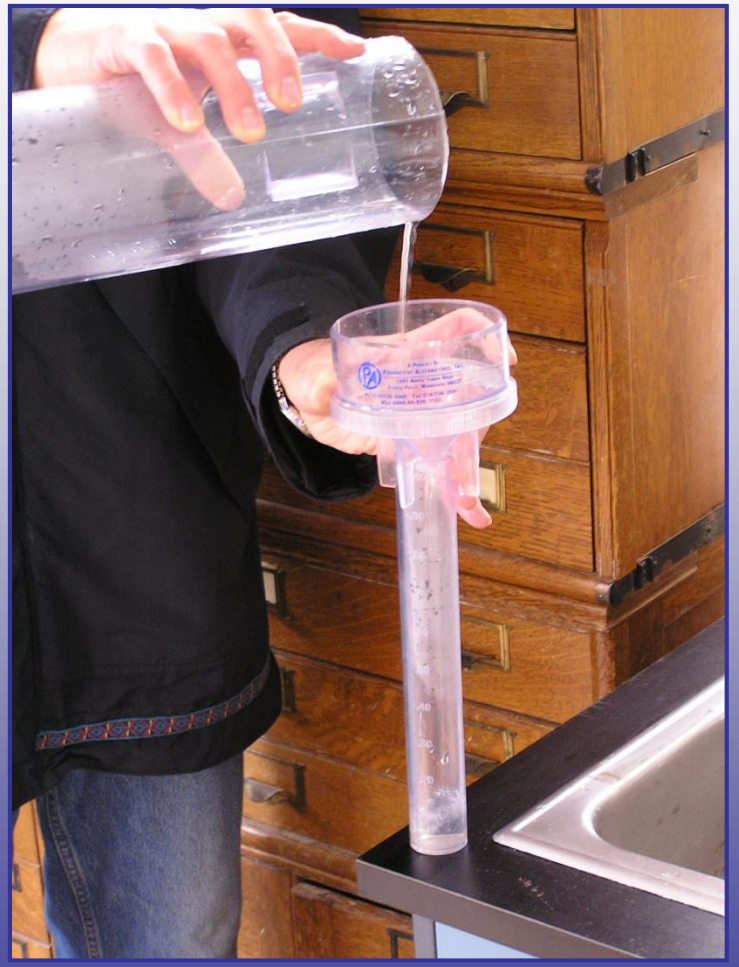

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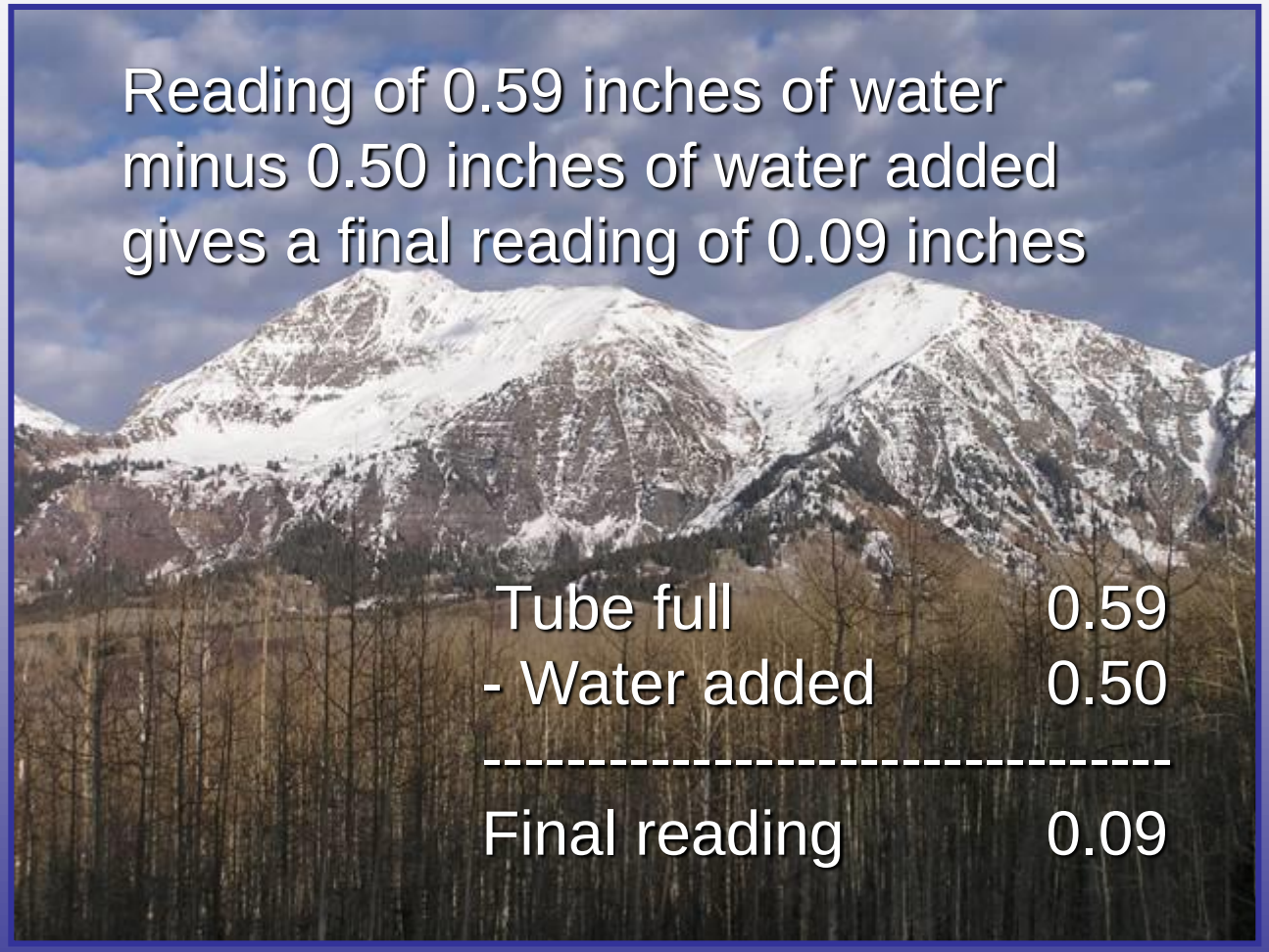
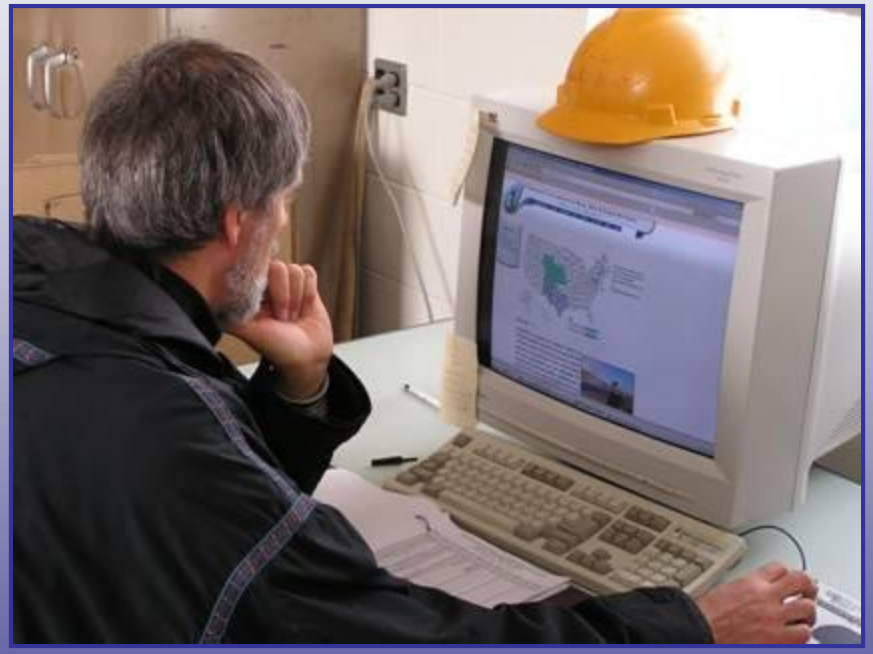
Again, remember to subtract the amount of warm water that you've added to the tube



Record your measurement

Enter you data on your precip sheet . . .



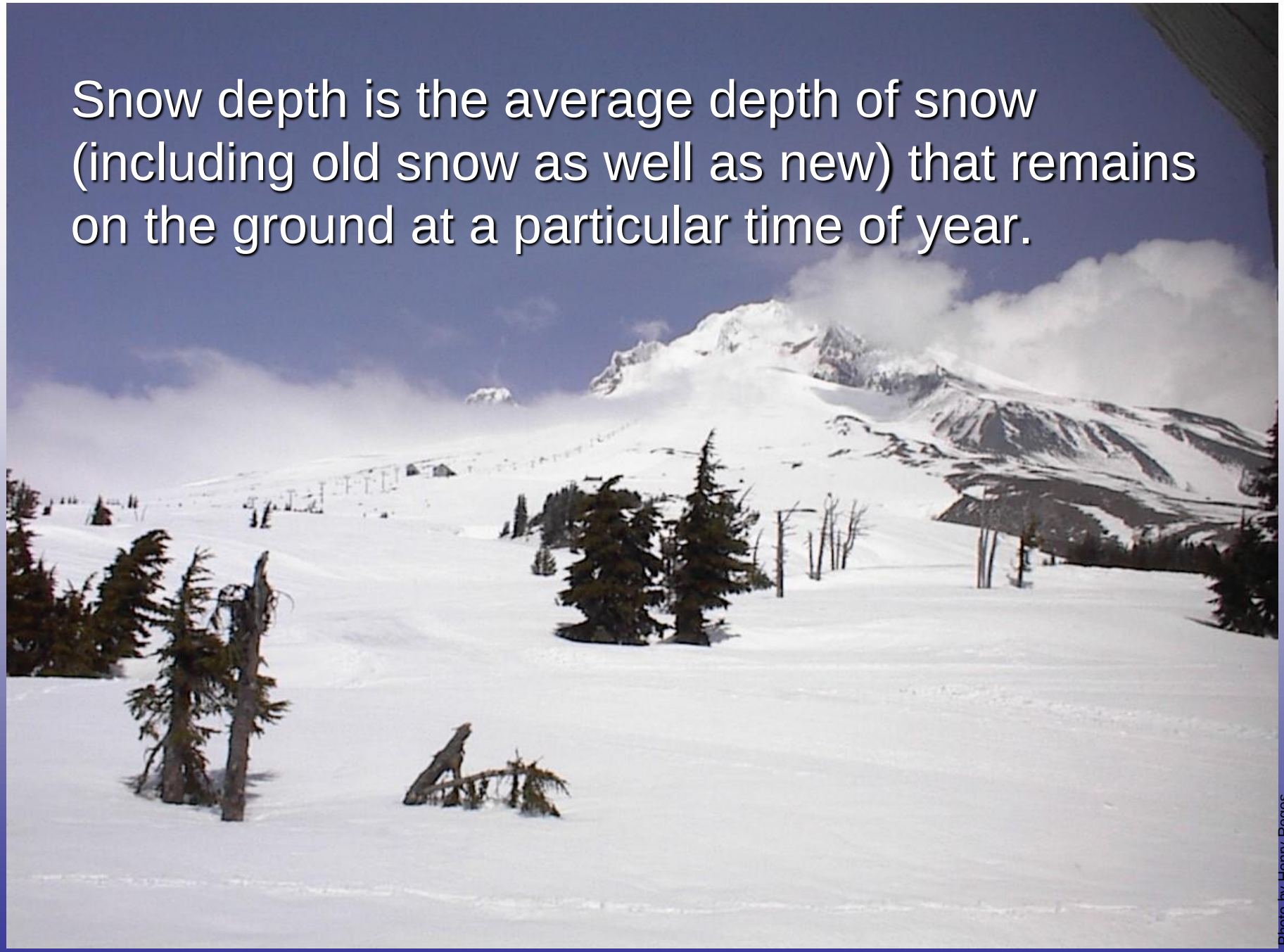
or using the CocoRaHS Web site
www.cocorahs.org

We also measure & report snowfall & total depth of snow on the ground

Photo by Nancy Reges

Snowfall

Snowfall is the accumulation of new snow and ice in the past 24 hours prior to melting or settling


Snow depth is the average depth of snow (including old snow as well as new) that remains on the ground at a particular time of year.
Photo by Henry Reges

Where to measure new snowfall

Measure newly fallen snow your snowboard if the snow has fallen and accumulated uniformly.

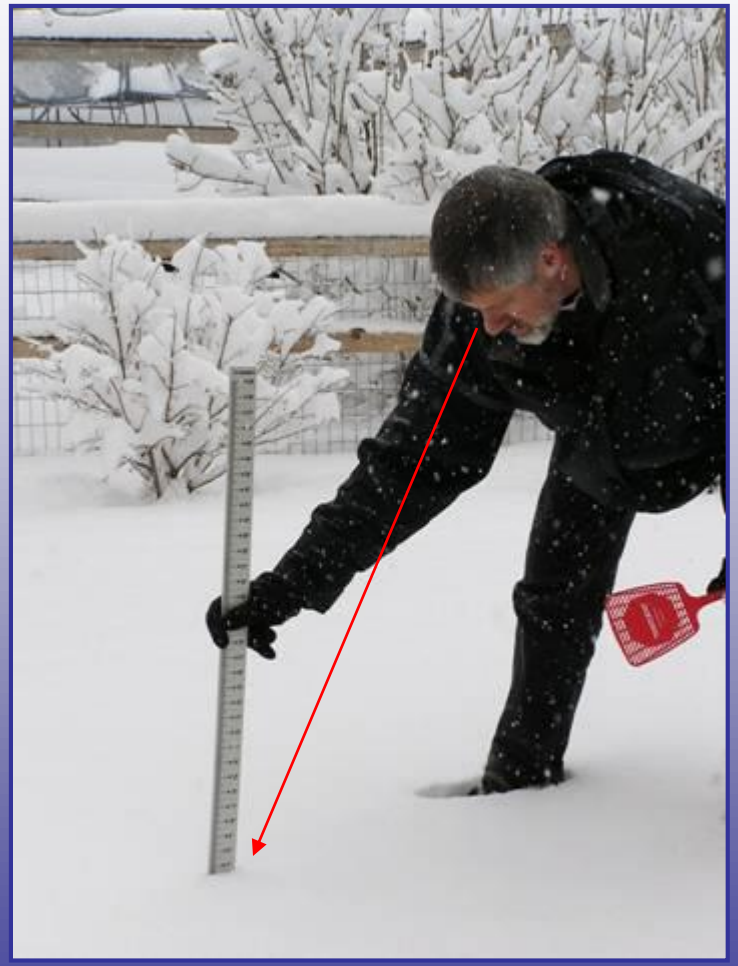
Snow measured under a tree

Notice that only 3.0 inches of snow has accumulated here

Snow measured in the open

Where as, 6.5 inches has fallen in the open

Angle of Measurement



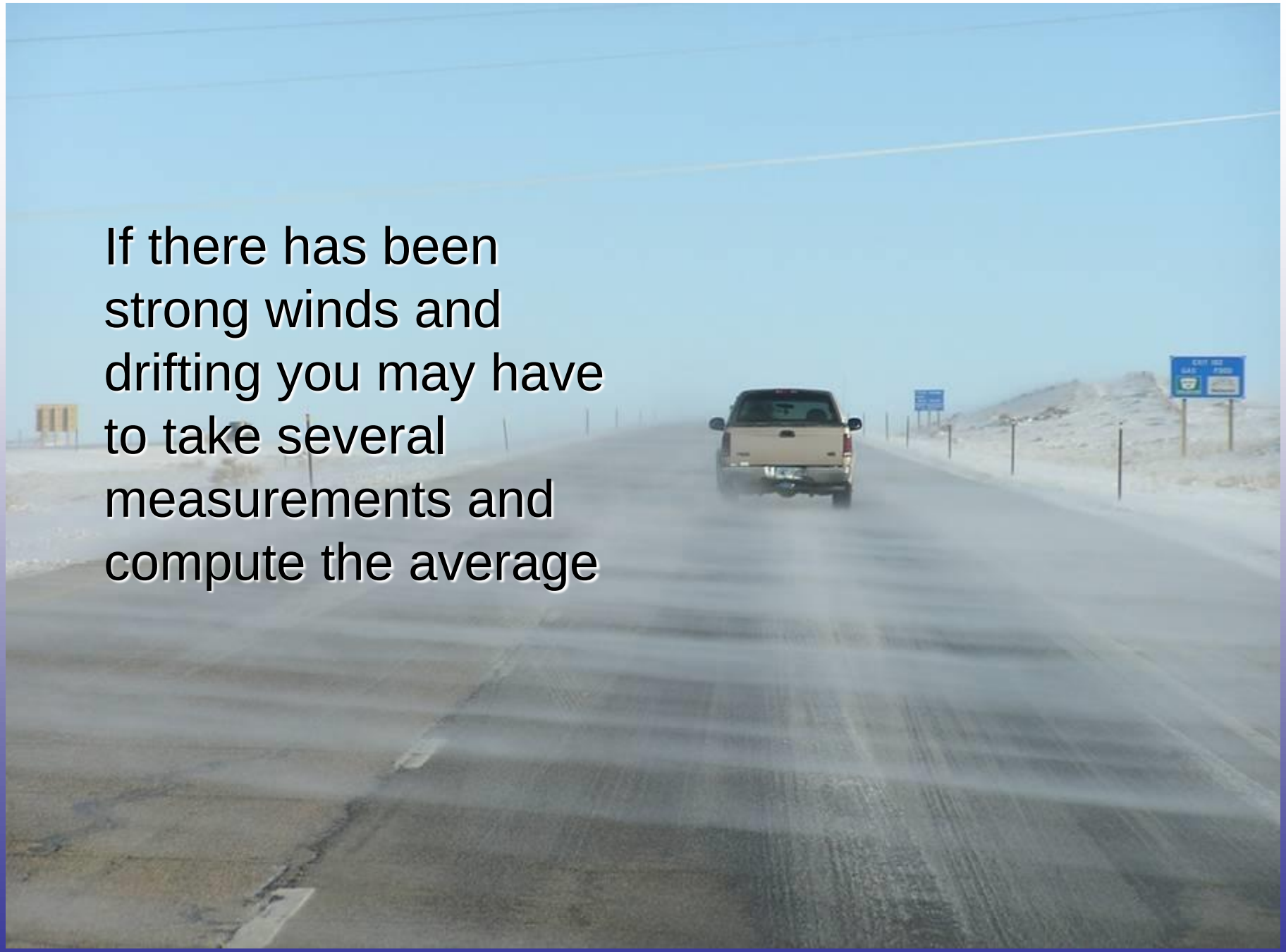
Measure at eye level, as angle will give you an inaccurate measurement

Replace the Board

After you have measured the snow on your board, clean it off and replace it on top of the newly fallen snow. Now you are ready for the next snowstorm.

Mark the Spot

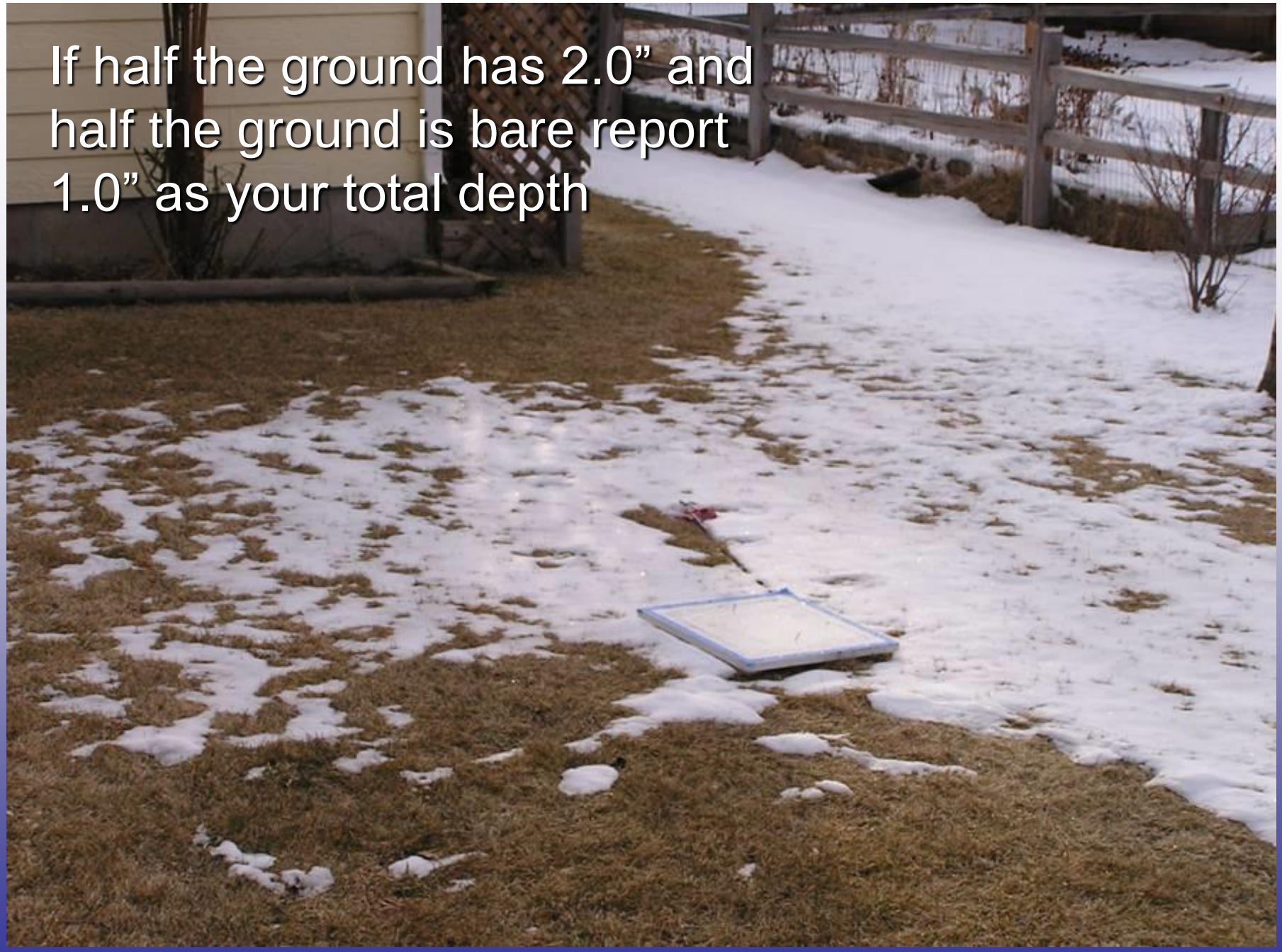
You will want to use a pole to mark your board so you can find it again after the next storm



If there has been strong winds and drifting you may have to take several measurements and compute the average

Reporting snow on the ground

On some days snow will only partially cover the ground. To record this take an average of both covered and bare areas.


If half the ground has 2.0” and
half the ground is bare report
1.0” as your total depth

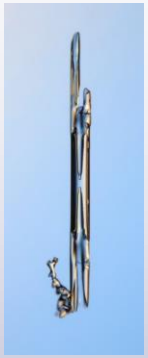

If more than half the ground is bare report “T” (trace) and mention the range of depths in your comments.

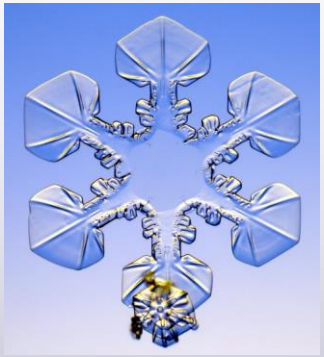
How to Observe Snowflakes

Have a magnifying glass handy

It may help to observe snowflakes on a cold, dark background, like black construction paper.

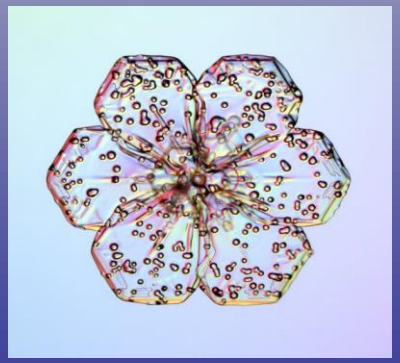
Identifying Snowflake Shapes





SnowCrystals.com

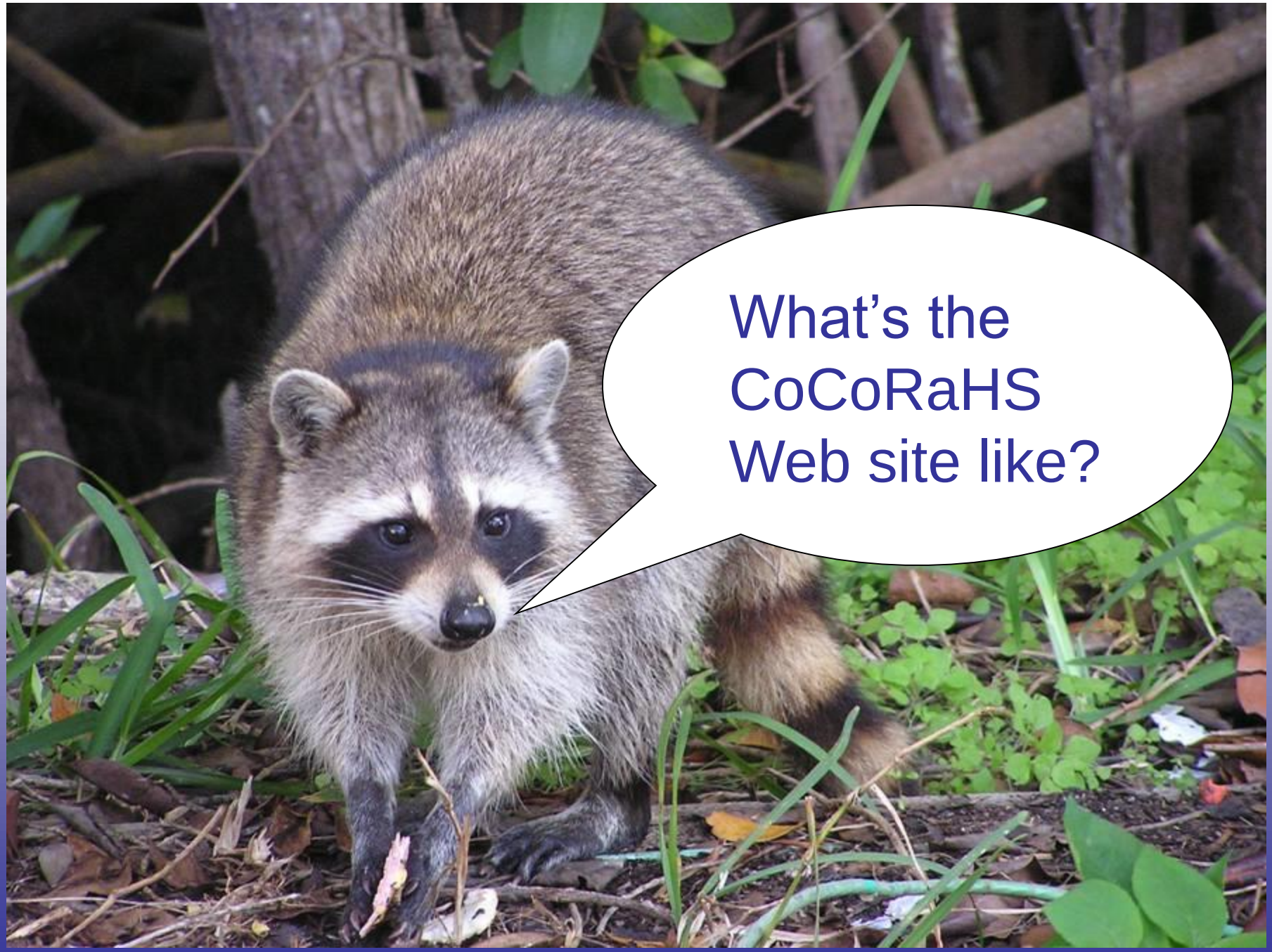
is a useful guide for identifying the shape of snowflakes



Thunder

One thunder clap includes all sounds that occur within 5 seconds.

Click the speaker symbol to hear examples of thunder claps

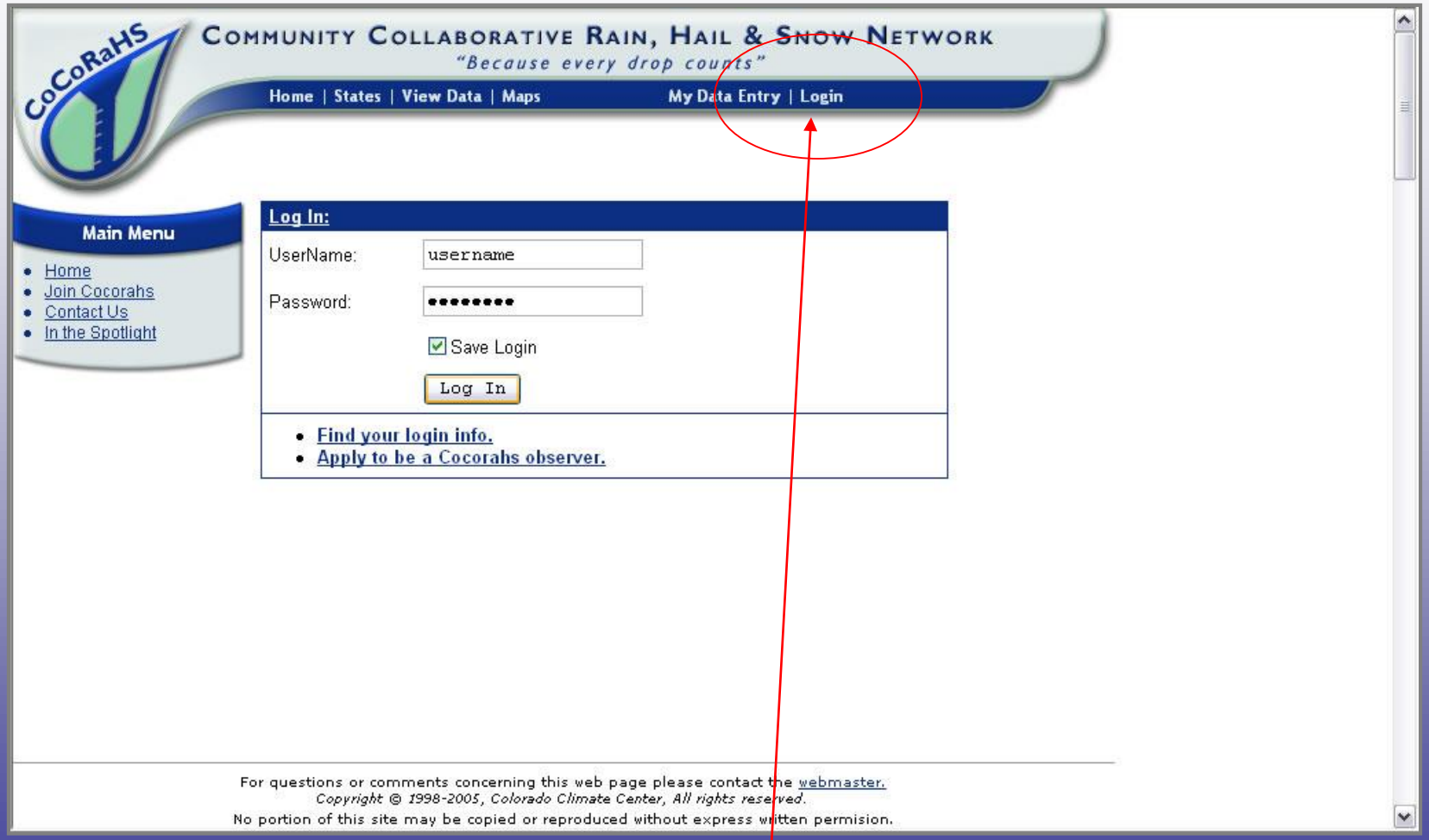

What's the CoCoRaHS Web site like?
Photo by Henry Reges

The CoCoRaHS Web site

www.cocorahs.org

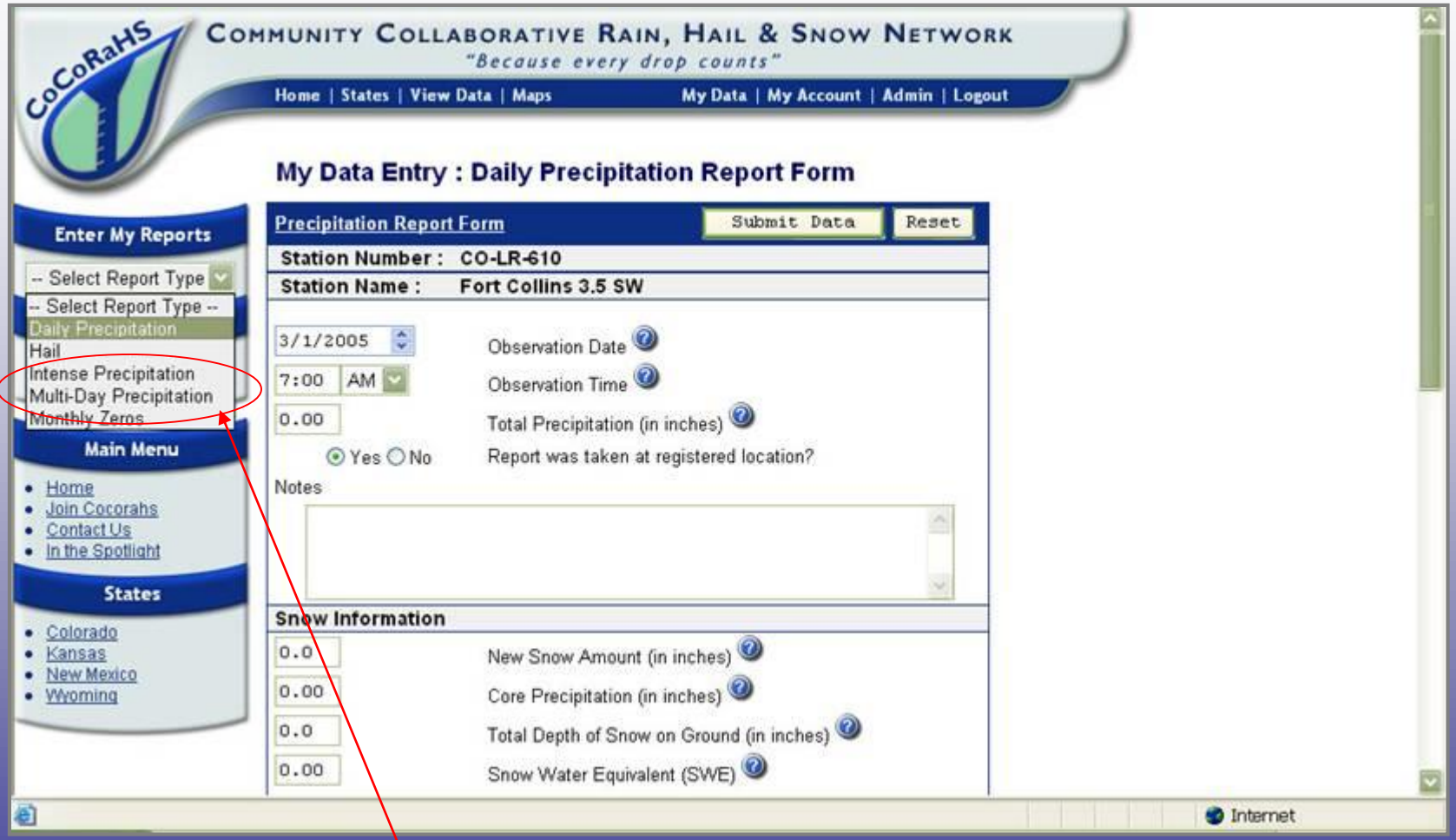
Our Web site is informative and easy to use. Here's how to begin →

Login to CoCoRaHS



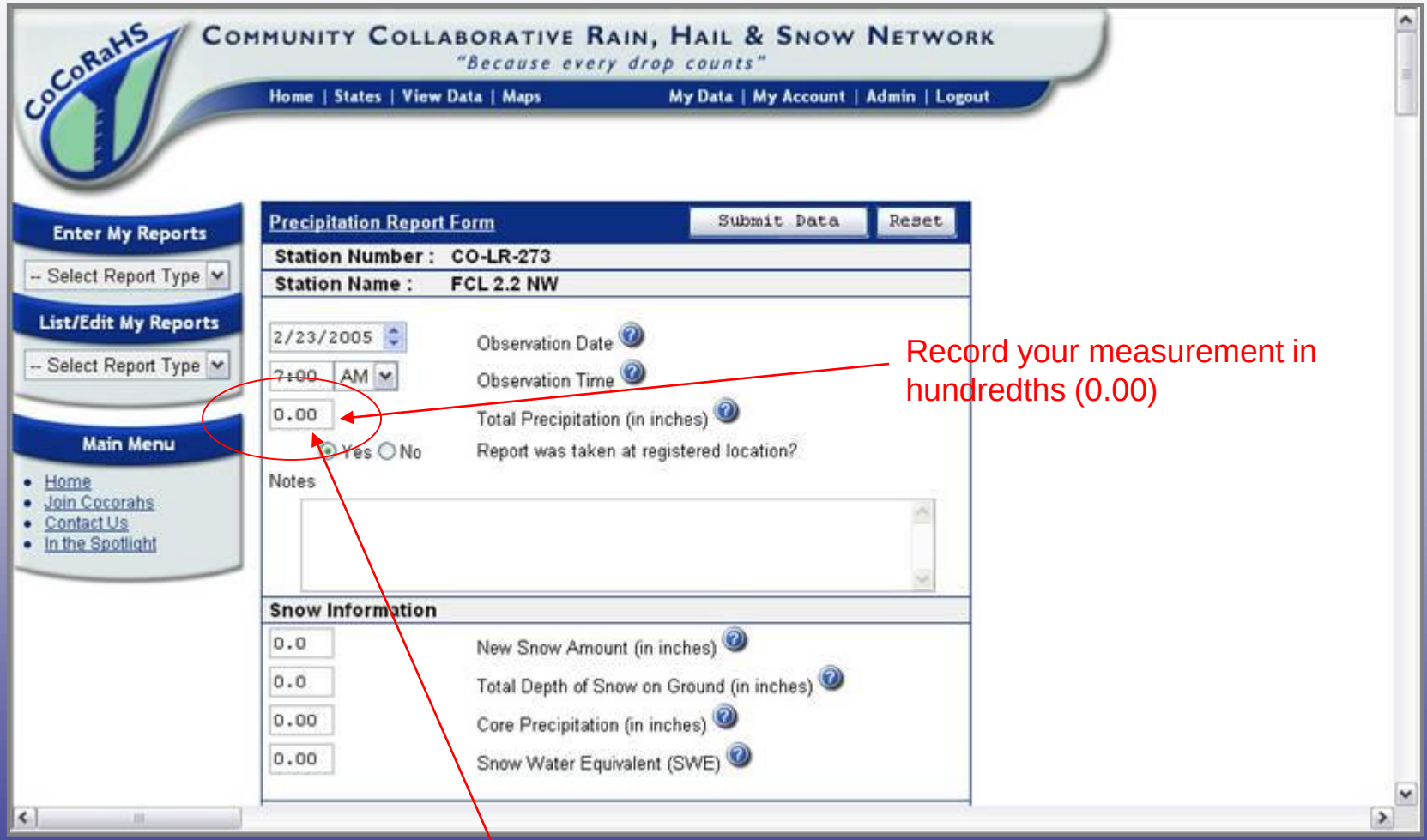
First, Click to Login

Recording your Daily Precipitation



After you login, the screen will automatically take you to the Daily Precip. Report

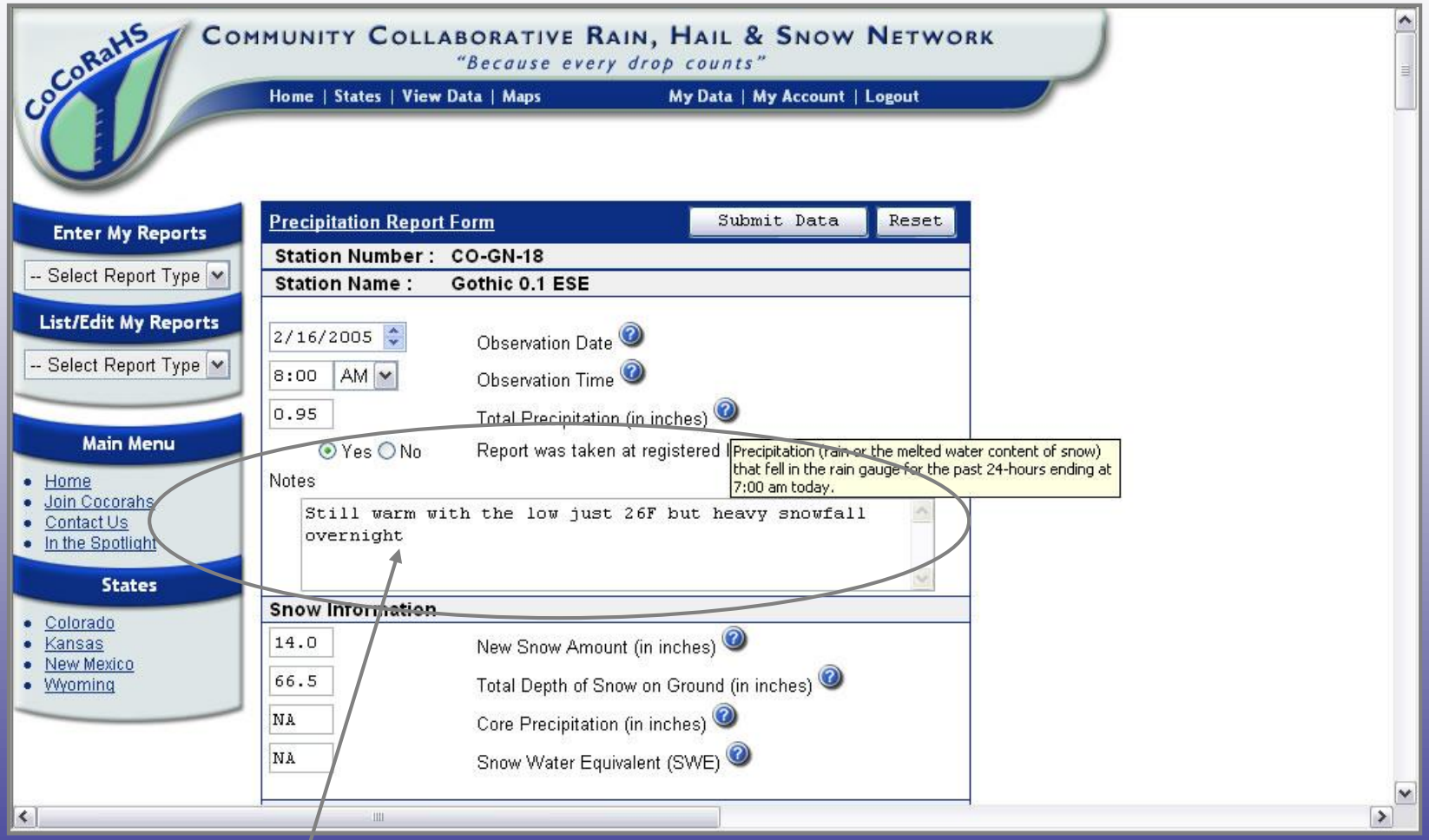
Enter Your Report



Record your measurement in hundredths (0.00)

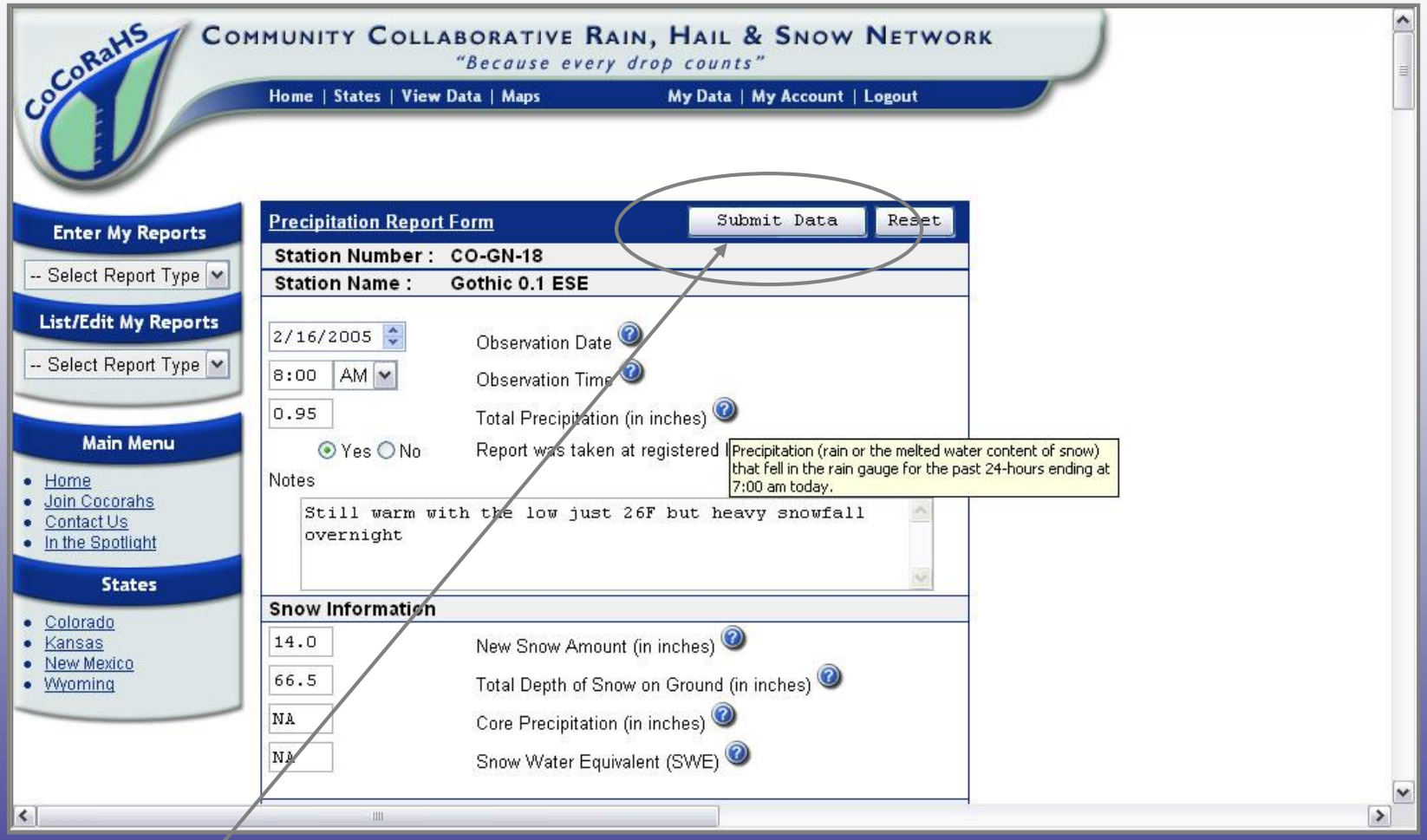
Here you will enter the total precipitation measured in your gauge

Recording Comments



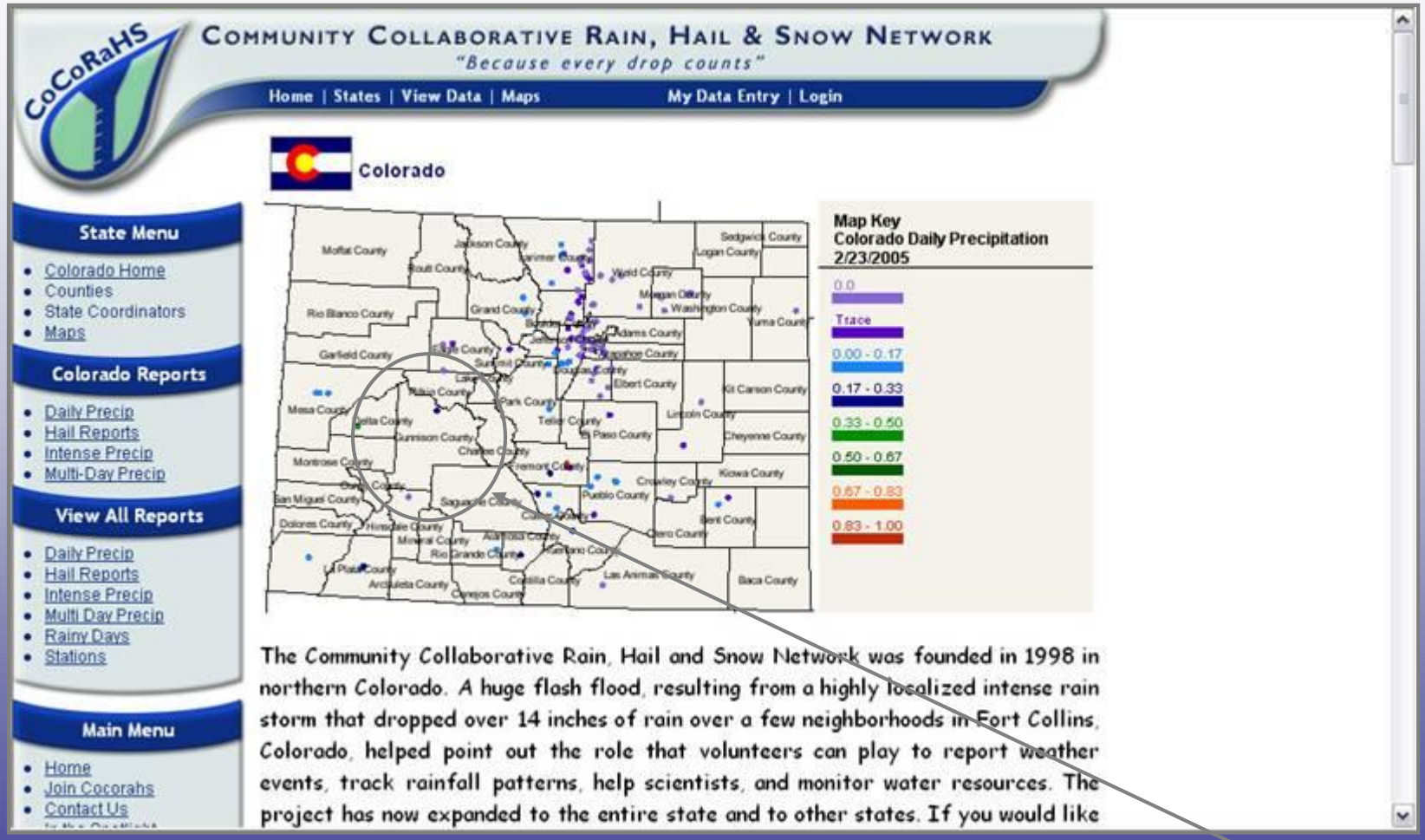
Feel free to enter comments about the day's weather under "notes"

Submit your Report



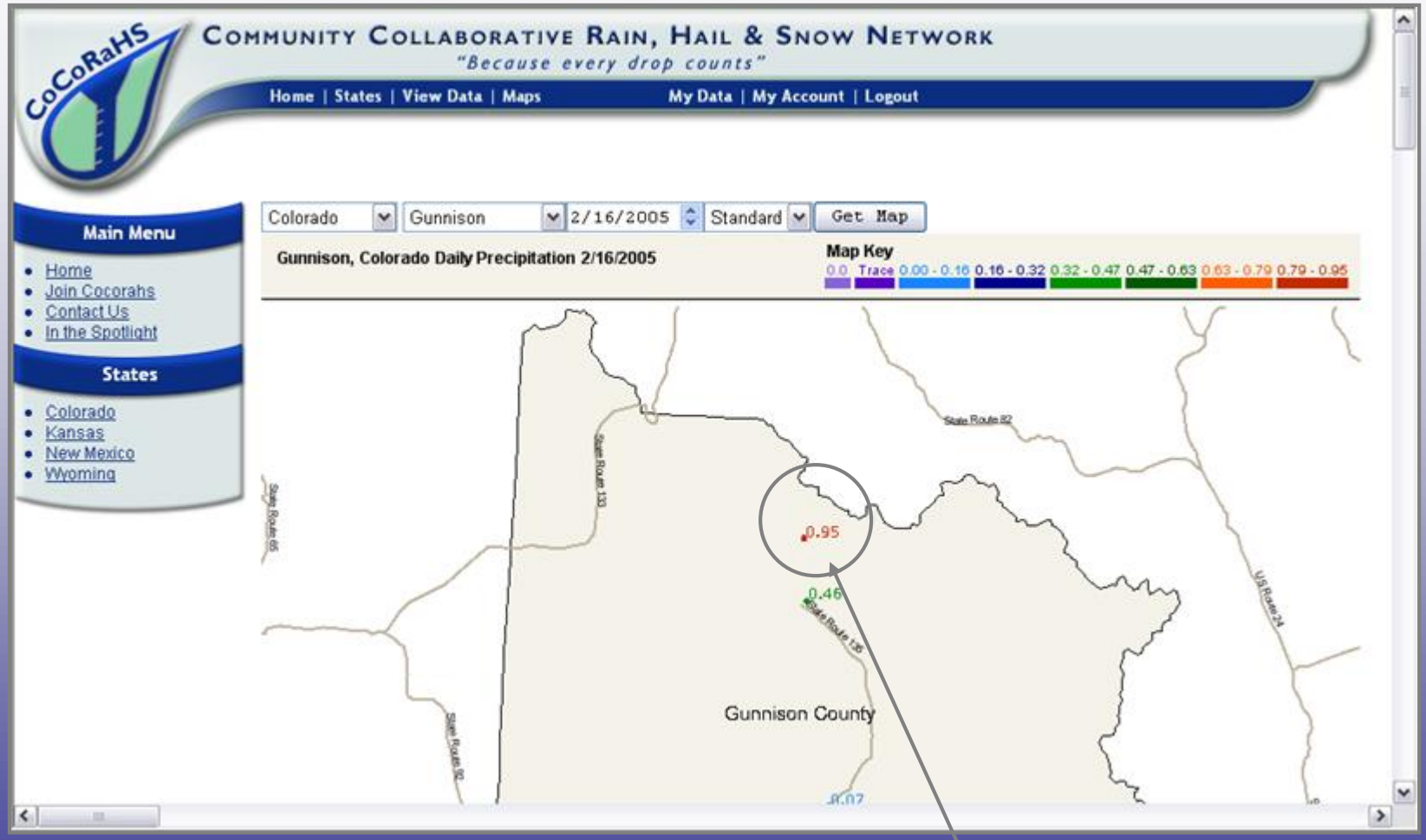
Click “Submit” and your data is recorded on our site

To See Your Report on the Map



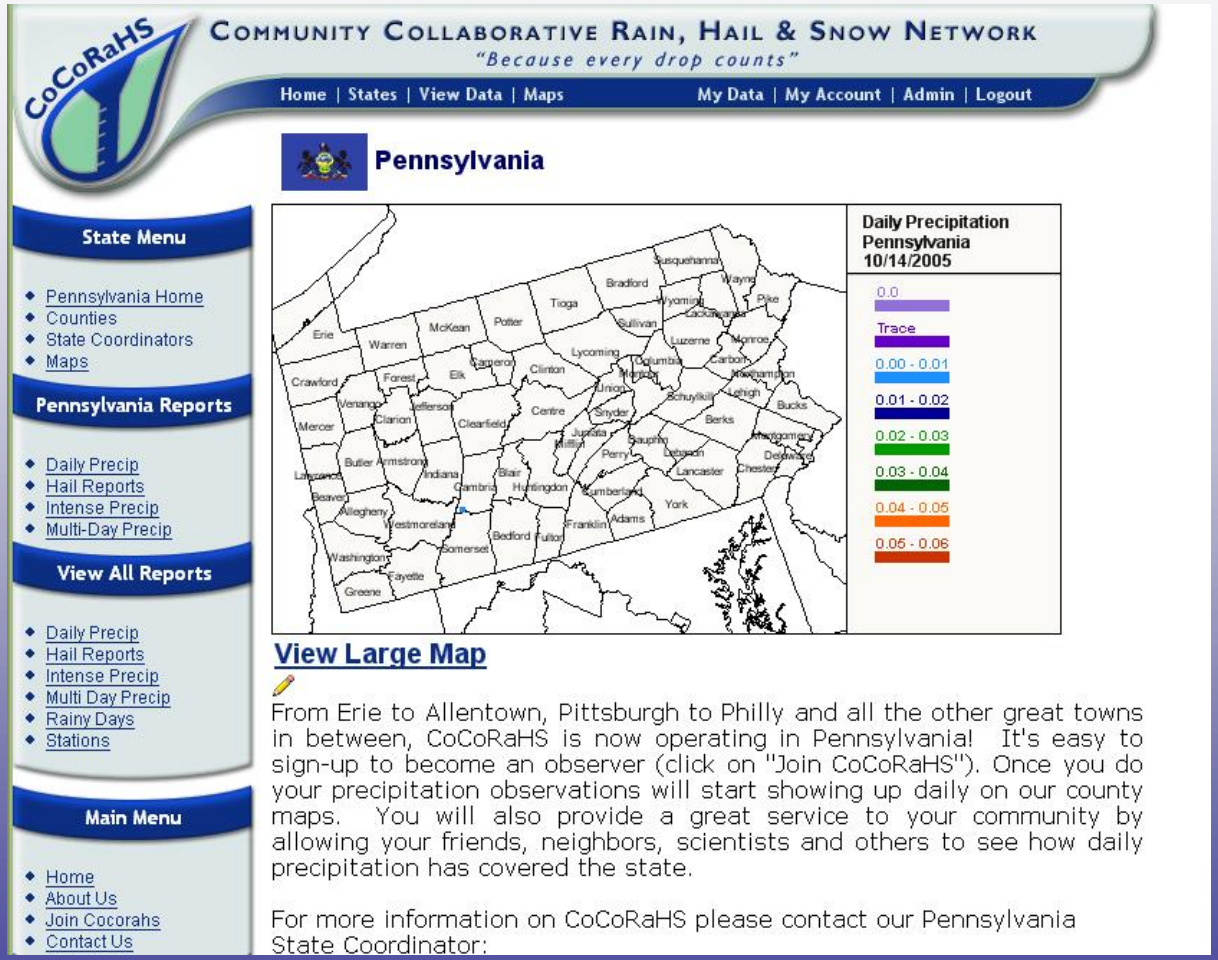
Go to your state page and then click on your county

Your Report on our Daily Map



The amount of precipitation you entered shows up at <u>your</u> location on the map

Pennsylvania State Page



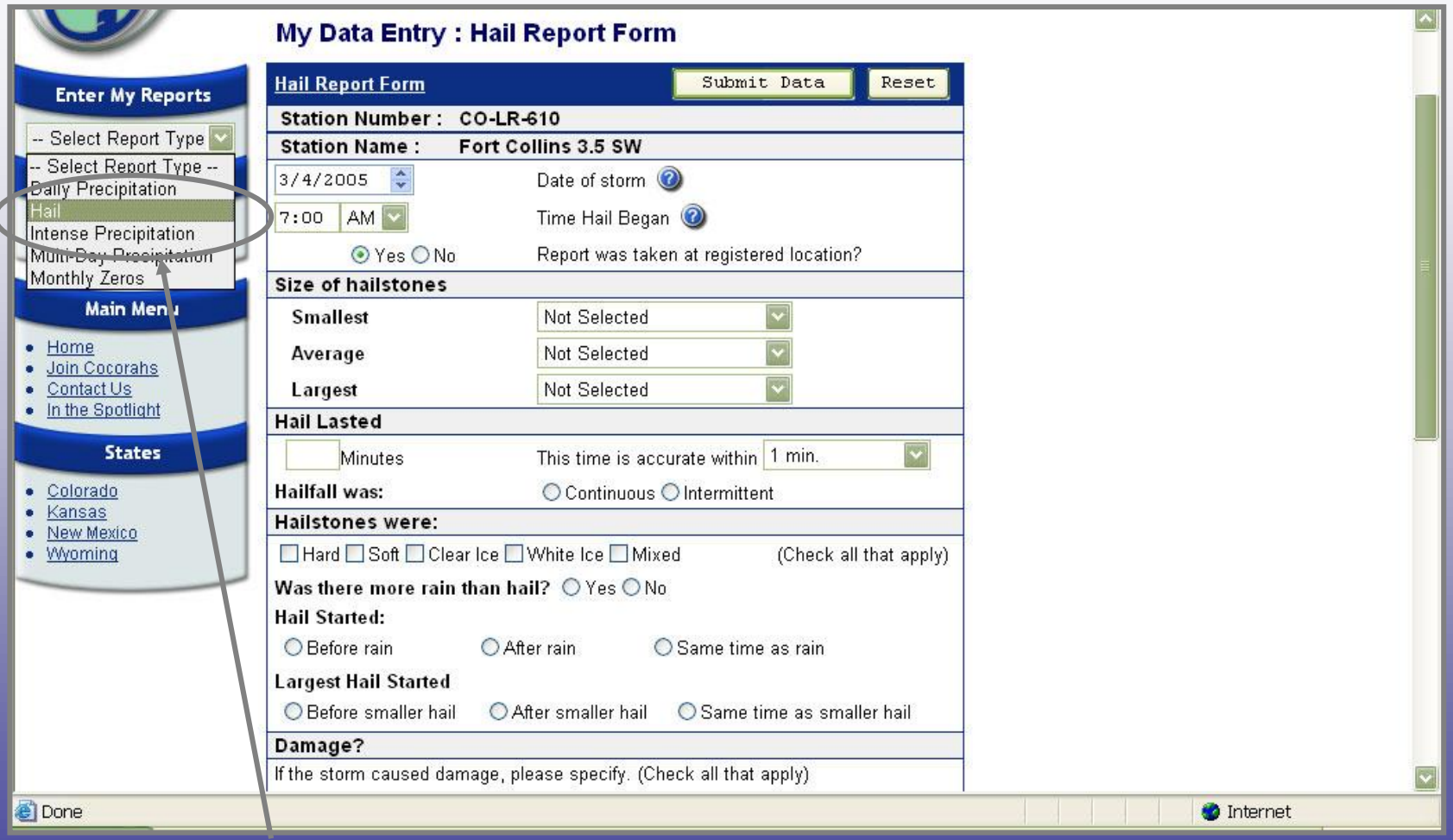
Each CoCoRaHS State has it's own page which is updated daily

Other Reports

- Hail Report
- Intense Precipitation Report
- Monthly Zeros
- Multi-Day Precipitation Report
- Daily Precipitation Report

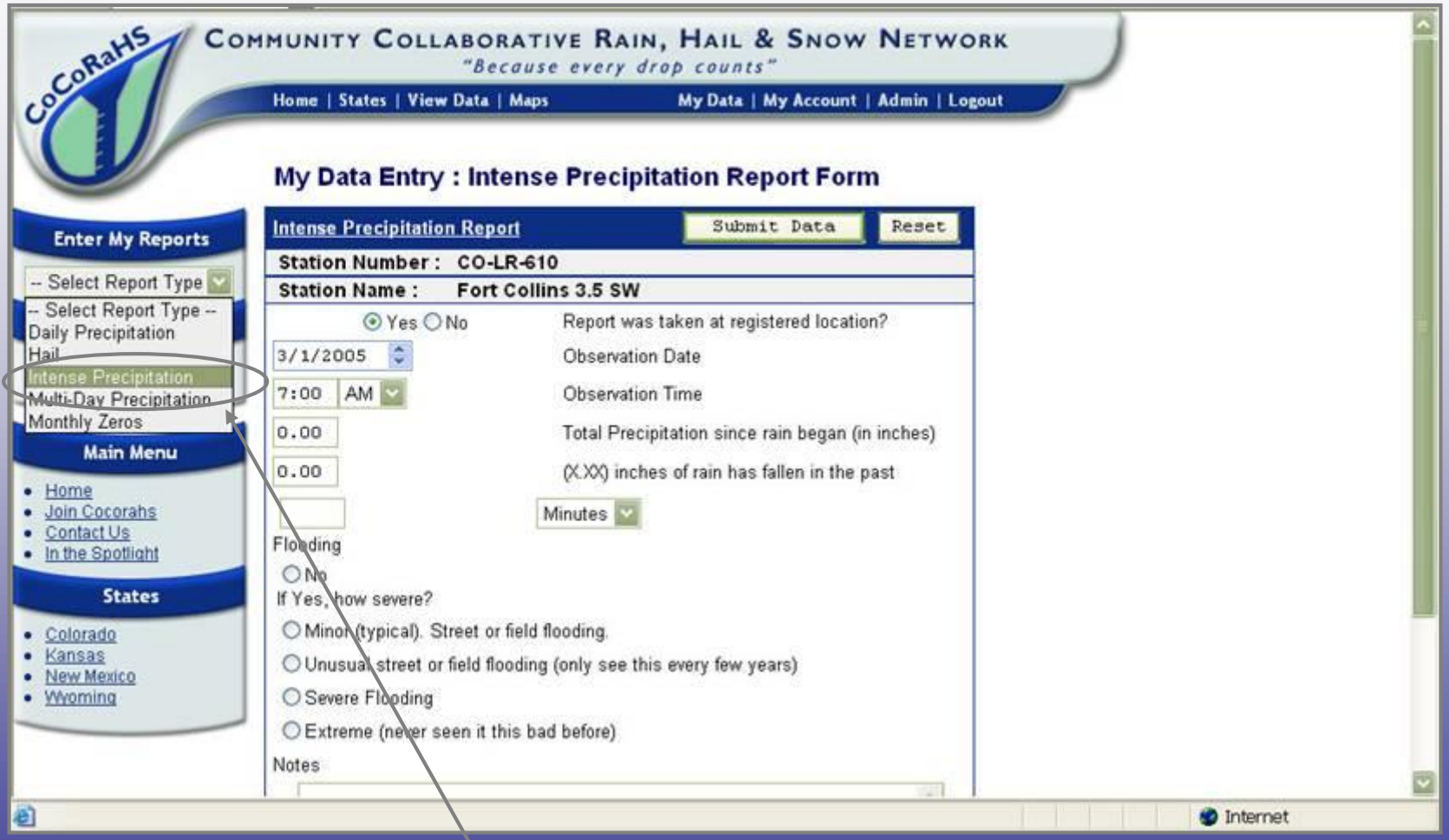
Photo by Henry Reges

Hail Report



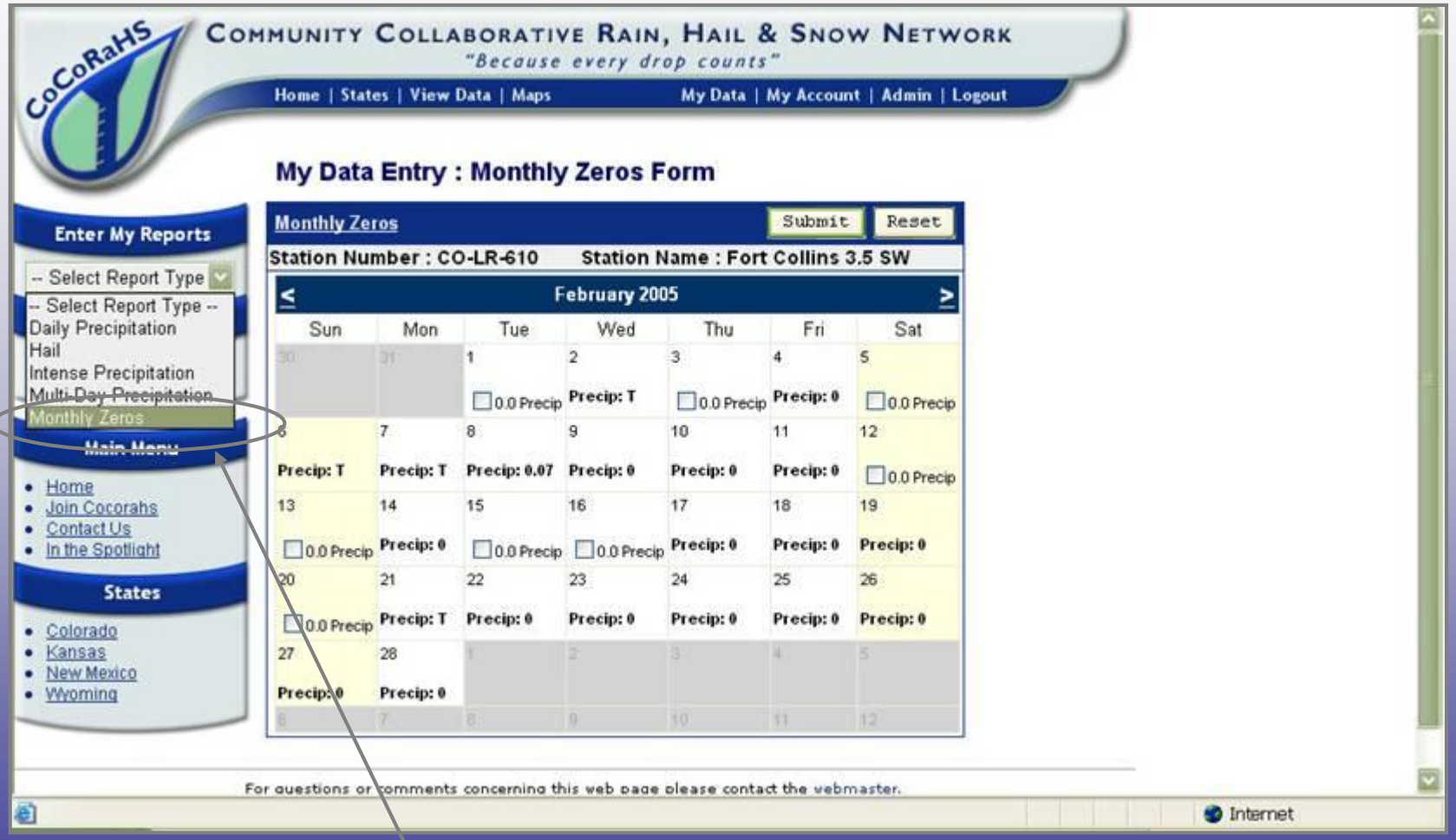
Click here to access a Hail Report

Intense Precipitation Report



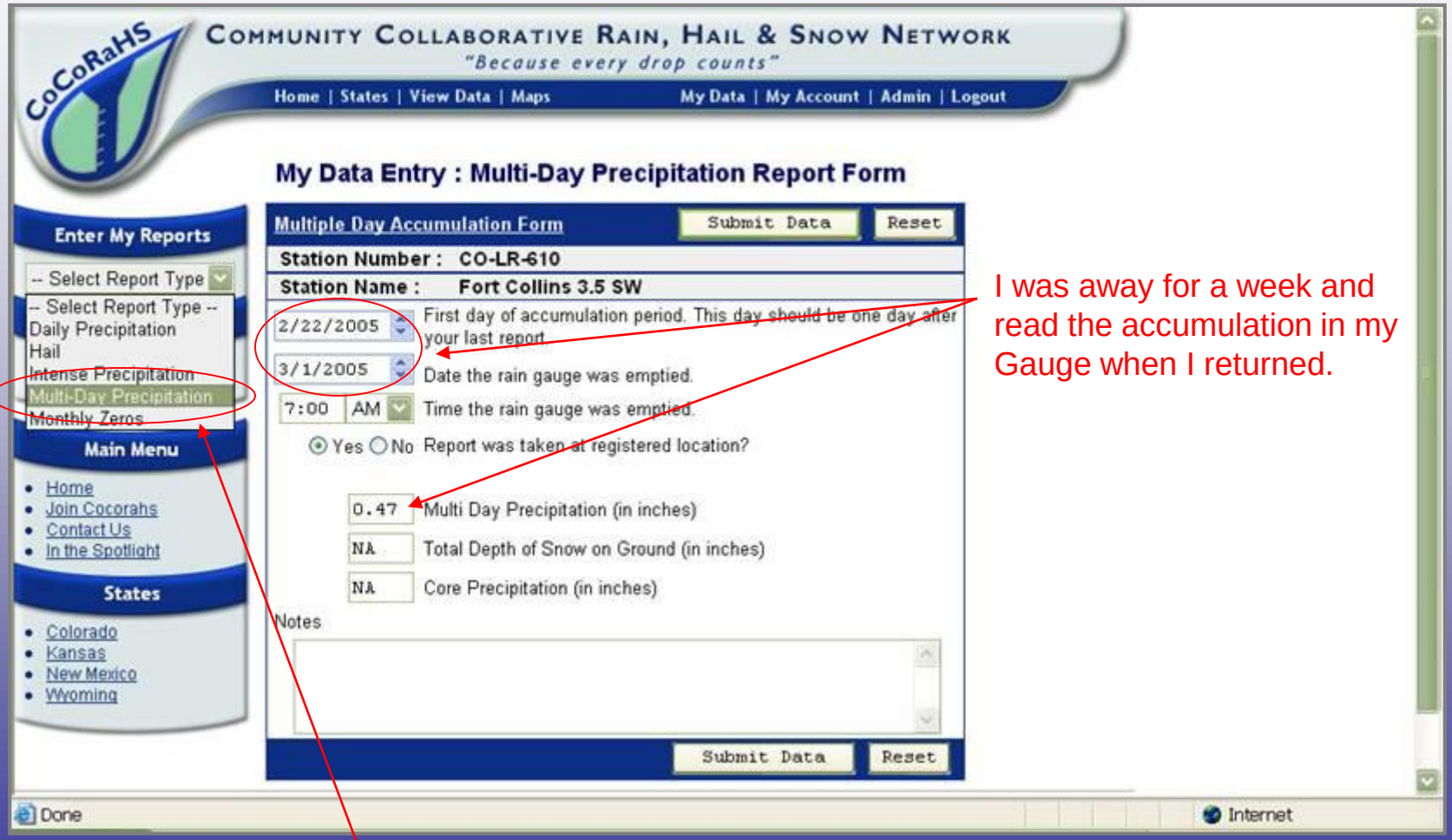
Click here to access the Intense Precipitation Report

Monthly Zeros



You can go back in and enter days of zero precipitation on one “simple to use” page

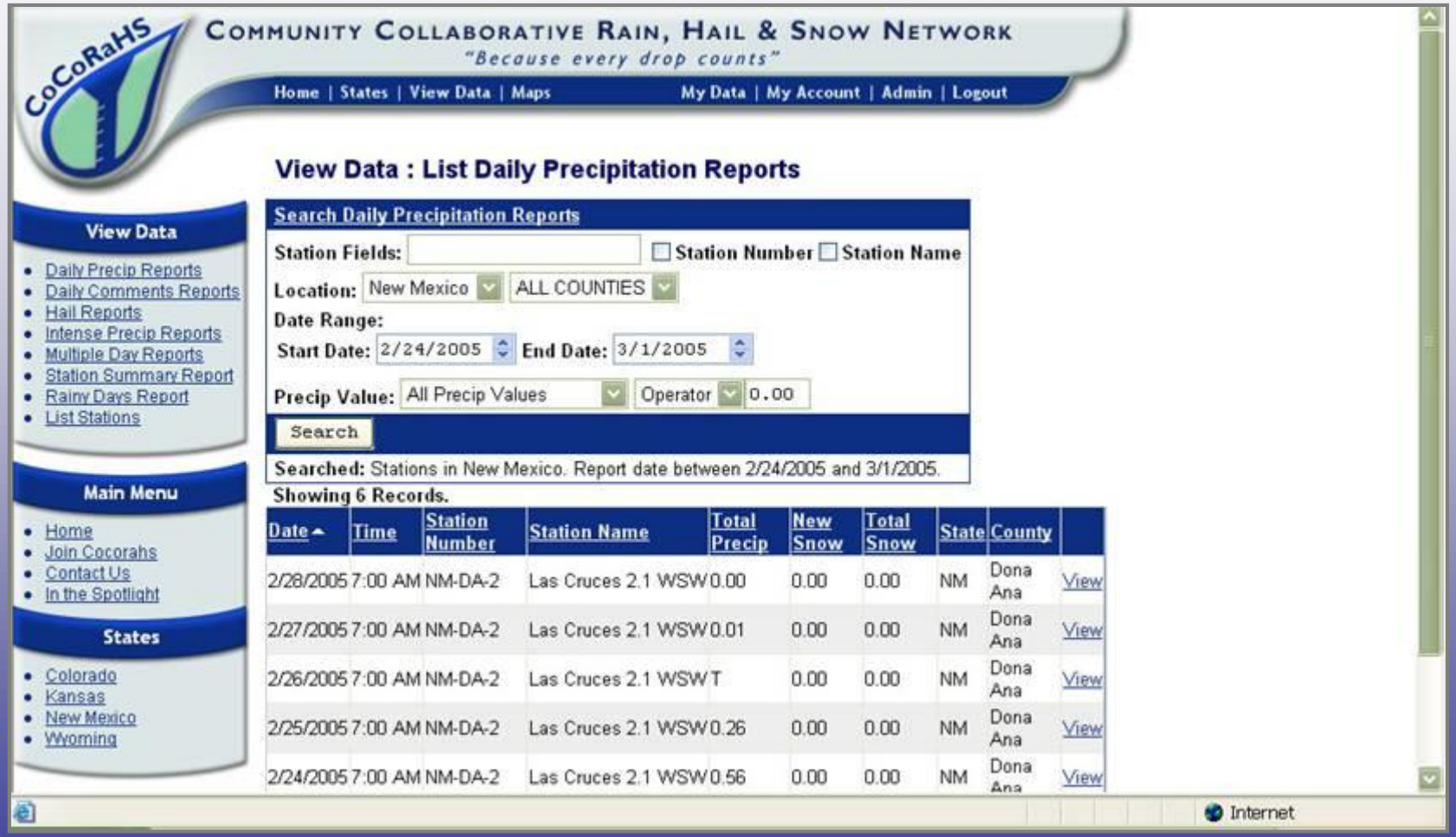
Multi-Day Precipitation



I was away for a week and read the accumulation in my Gauge when I returned.

You can even enter information after you've been away for several days

Daily Precipitation Reports



Frequently Asked Questions

Do I have to be home everyday to participate in CoCoRaHS?

Answer: No. Report when you are able. If you are gone, you may leave your gauge outside and report a multi-day total when you return.

What if I don't have a good place to put my gauge?

Answer: Few people have ideal locations. Do your best. Send sight photos if possible to help interpret results.

Photo by Henry Reges

What if it hails when I'm not at home?

Answer: We still would like your hail pad. Report as much info as you can find out from friends and neighbors.

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

Answer: No. That is not precipitation, but you may note the dew in the comments.

Photo by Henry Reges

How long is my commitment to CoCoRaHS?

Answer: Ideally, at least one season, but the longer you contribute, the more valuable the data become.

Photo by Henry Reges

Thanks for joining us today!

- We hope that after learning about CoCoRaHS and FROST today you will consider joining our ever growing network of volunteers.

- If you are already a FROST Volunteer Observer, thank you for coming out today and for your help in making "*every drop count*!"

Photo by Henry Reges

That’s all folks!

THE END