

The Catch

COCORAHS – SNOW AND ICE, NOT SO NICE

FORT COLLINS, CO — Wednesday, December 9, 2009

Dear CoCoRaHS members and friends

A special winter welcome to all the CoCoRaHS newcomers. Many new volunteers have signed up since Thanksgiving, especially from Maine and Minnesota. Welcome aboard!

It is cold tonight here in northern Colorado -- minus 5 Fahrenheit (-20 C) and falling. This could be our coldest night of the winter. The snow today was less than expected. That's OK. I've already had enough practice measuring -- 46" already in the past 2 months. That's the most we've ever had this early in the season in the 121 years that we've been measuring at our official NWS Cooperative station here. The storm has moved out of Colorado and now many of you will get your first chance to measure snow this winter. I don't envy what some of you in the upper Midwest will be waking up to. Good luck with your measurements. Blizzards are tough to measure.

Winter has been arriving oddly this year. There has already been snow in Las Cruces, NM, Houston, TX and much of Louisiana. Even Sacramento, CA had some snow yesterday. Now it's finally headed to the more normal snow hangouts -- Des Moines, Minneapolis, Muskegon, Sault Ste. Marie.

It was great to see the rains in southern CA and Arizona yesterday. Our new corps of volunteers in Arizona sprung into action with nearly 300 precipitation reports across the state. As expected, the variations from place to place were impressive.

Measuring snow and ice -- a quick review (well, not too quick)

As the snow has been flying, so have the questions about how to measure it. Many of you are doing this for the first time (thanks!!). So

it's time for our annual "Snow Measurement Review". The best thing to do first is take a look at the daily precipitation entry form and make sure you know what each item means. Once you have that figured out, then you can confidently measure and report winter precipitation.

Here are a few tips for each of the entries we make on the CoCoRaHS "Daily Precipitation Report Form"

"Rain and Melted Snow"

That is the water content of the precipitation that has fallen in your gauge -- rain, snow, freezing rain, sleet or any combination. You'll need to remove the funnel and inner cylinder if frozen precipitation is expected. Otherwise, the funnel clogs up and the snow spills out (bummer)! Then, you will need to MELT the snow and ice that collected in the gauge so you can pour that water and measure the content in the inner cylinder (just like rain). A quick way is to add a measured amount of warm water to melt the snow -- AND REMEMBER to subtract that amount from the total to get the correct reading. Some people use their microwave -- but I've seen a few melted gauges. They're ugly.

Another way to measure is to WEIGH your rain gauge outer cylinder. Weighing is much quicker and easier -- if you happen to have a good kitchen or laboratory scales. We describe that method in a message sent last year http://www.cocorahs.org/Media/docs/TheCatch_2008-12-30.pdf

There are situations where your gauge will not catch and accurately measure the moisture from snow. Wind driven snow (traveling nearly horizontally) may deflect around and over your gauge and not land inside. If you feel that your gauge measurement is not accurate, mention this in your observation notes. Then take a core sample as described below and use that value instead for your daily precipitation amount.

"Observation Notes"

Measuring snow can be tough, but if you can describe briefly the weather conditions you've observed it will help us interpret your data. If your snow observation is problematic, just describe it in your notes. Here is an example from an observer in South Dakota last year: "/Bad blizzard in progress. Emptied gauge at noon on Wednesday before precipitation turned to snow, had 0.27" then. Got all our pickups stuck. Power out and on generators. Snow depth an estimate only. Drifts are so variable it's hard to know what is average."/ So while this observer may not have made a precise measurement, we had a good idea of what was going on. Here's another from eastern Colorado /"This is one of the only times we

have had no wind, yet, and could get a really good measurement." ***Your remarks are worth a lot. Don't hold back.***

"Depth of new snow in inches to the nearest tenth"

If possible, have a snow measurement surface planned ahead of time in an area of your yard where the snow typically lands and stays reasonably level. Having a white board or white plastic surface (called a snow measurement board) in a representative area makes it easier to measure the accumulation of new snow to the nearest 0.1". Mark the spot with a flag or pole so you don't lose it when it snows.

The "Depth of new snow" is the amount of snow and/or ice pellets (sleet) that fell and accumulated during the past 24 hours. Remember to report the maximum accumulation of new snow that was observed prior to melting, settling or redistribution by the wind. That may require doing a quick measurement during or immediately after the snow ends and not waiting until the next morning. The snow might melt or settle overnight. But wait until your scheduled observation time to report. If all the snow melts as it hits the ground and never accumulates, then report T (for "trace"). If it snowed but you did not have the chance to measure it, then please type in NA (for "not available") and add appropriate explanation in the "Observation notes" section.

"Melted value from core to the nearest hundredth"

This is a helpful but optional field. If you are concerned that the amount of moisture in the gauge was too low due to wind or other factors reducing your gauge catch, then collect a core sample of the new snow from a representative location where the snow accumulated relatively uniformly. Melt (or weigh) the sample to measure the water content. It is fascinating to see that the moisture collected from the core measurement can differ from what was in your gauge -- and sometimes by a lot.

"Depth of total snow in inches to the nearest half inch"

The total depth of snow is how much is still on the ground at your scheduled daily observation time. This can be new snow, old snow, or a combination of both. For example, if there was an inch of old snow on the ground yesterday, then it snowed 3" new, but that snow settled to just 2" by your regular observation, then your total depth would be 3". Keep in mind that your total depth will likely be different than your New Snow unless new snow has just fallen on previously bare ground. If the snow depth is uneven (and it often is) then take an average of several measurements, or find a measurement location that is representative of the average snow depth in your area. For example, if your front yard and back yard are the same size, and the average depth in your front yard is 2" but in the back yard is 6", then report 4" for your total depth.

REMEMBER, our computer automatically enters NA for your total snow depth. So if there is any snow on the ground be sure to type in the amount to the nearest half-inch (or whole inch if that's easier). If there is some snow remaining on the ground, but more than half the ground is bare, then type in T.

"Melted value from core to the nearest hundredth"

This last data entry field is optional but very useful, especially to hydrologists and structural engineers. It is the water content of the total snow (the sum of both the new and any remaining old snow) on the ground at your scheduled time of observation. This is the amount of water that would soak into the ground or run off into streams and rivers if it were to melt. Take a core sample of the "total snow" in a representative location, and either melt it or weigh it to obtain the water content.

For more information about measuring snow?

For more thorough instructions and explanations go the CoCoRaHS website: www.cocorahs.org and you will find a training video, a slide show and written instructions to help you. If you need additional help, then please contact your CoCoRaHS local coordinator and ask. Please make use of the CoCoRaHS website to view maps and reports of recent and past snow events so that you can see all the great data that you and our other volunteers are helping to collect. We can all learn a lot by examining our data and comparing to others in our areas.

Some frequently asked questions about measuring snow:

Measuring snow is tricky, especially if it's melting or being blown around by the wind. Don't be frustrated, perfect measurements may be impossible. But use your head, check your data, and you'll do very well. Here are some common questions we get?

What do I report for my new snow amount when the snow has been melting or settling?

If there is only 2" of new snow left when you do your 7 AM measurement, but you know there was closer to 4" there yesterday before the melting and settling began, then report 4.0" for your new snow amount. For the total depth of snow on ground, report what you measure at 7 AM -- in this case, 2.0" (assuming the ground had previously been bare)

What if I get freezing rain? How do we measure that?

Freezing rain is precipitation that falls as rain but then immediately freezes on contact with the ground and/or elevated surfaces. The frozen moisture is called "glaze". Report freezing rain just like rain -- it is NOT SNOW. But you'll need to melt the ice to get an accurate reading. Be very careful on the ice.

It is very, very useful to report the thickness of the ice that accumulates on branches or wires. This is called "ice accretion" or "coating". An elevated aluminum strip could be used for measuring freezing rain accretion. Use your measuring stick to measure the vertical depth of ice accretion on the surface of the aluminum strip. If a metal strip is not available, other common metal surfaces can be used such as metal mailboxes, metal fences, and metal railings. Measure the vertical depth of accretion atop whichever horizontal surface(s) you use. Exposed tree branches will suffice, but remember to measure the ice accretion, or vertical depth of the ice from the edge of the branch outward. If one side of the branch has a greater thickness of ice than another side, simply take an average. Once you have taken measurements from five or so different surfaces, take an average of all of your measurements, and report it in tenths of an inch. Enter that amount in the "Comments" section of your report since we don't yet have a separate location to enter ice accretion. This type of quantitative information about ice buildup historically has not been measured at most weather stations. It is extremely useful data for a wide variety of applications.

What if we receive rain and snow on the same day? Then what?

Mixed or changing precipitation types are common in some parts of the country. Report both the rain and the water content of snow that landed in your gauge as your daily precipitation amount. Then measure the amount of new snow that accumulated (prior to melting) and report that as your daily snowfall amount. If you can, take a core sample of the snow to get a water content of snow. Then you can infer how much fell as rain and how much fell as snow.

Wouldn't it be helpful to have more than one gauge for winter measurements?

Yes indeed. I actually have four outer cylinders to make snow measurement quicker and easier. I keep extra ones indoors. At 7 AM I go out to retrieve my gauge and replace it with a clean, empty cylinder so

I don't have to go out again. I also have two extra cylinders for taking the core sample of fresh snow and the core sample of total snow on the ground. Then I bring them all in together and do all the measurements at the same time. Extra outer cylinders can be ordered online from WeatherYourWay.com for a reasonable price.

I've heard that 10 inches of snow equals 1 inch of water. Is that always true?

A typical wet snow or snow with dense, small crystals will often have between 0.80 and 1.00" of water for every 10 inches of new snow. But the "density" (water content) of snow can vary greatly. It is possible for very dry, fluffy snows to get as little as 0.10 to 0.30" of water from 10" of new snow. Also, in extremely wet snows, values as high as 1.50" to 2.00" of water from 10" of new snow is possible. All you have to do is walk or drive in the snow -- or shovel it -- and you'll immediately have a good idea if the density is high, low or medium. That's why we take separate measurements of the snowfall accumulation and the water content, so we can compute and compare new snow densities. For old snow as it stays on the ground, it gets denser with time as the snow crystals change shape and the air space between crystals decreases.

Can I just measure the snowfall and not worry about the water content?

Some CoCoRaHS volunteers only measure the accumulation of new snow and the total depth of snow on the ground. We really appreciate also knowing the water content, since it can be so variable. If you do report only the snow depth, then remember to type in "NA" ("for not available") for the daily precipitation amount. If you report snow but you just leave the "Daily Precipitation" box blank (0.00") the computer will give you an error and you won't be allowed to report.

Do I have to report if it didn't snow today?

Knowing that it didn't snow is important. Please report your zeros if you can.

If no new snow fell but there is old snow still on the ground, should I report that?

Yes. Snowcover, even old snow, has a huge effect on the climate. Whenever you have old snow on the ground, try to report the average depth and the water content of that snow each day. While it is fascinating watching snow fall and accumulate, it is also very interesting watching it settle, melt and disappear.

What if the wind is so strong that the snow is badly drifted?

Wind-drifted snow is very difficult to measure accurately. Do your best to come up with an average accumulation of new snow -- and then take a core sample at a point with average accumulation to get a water content. Check the numbers to see if they appear reasonable -- and also mention your challenging plight in our "comments"

What if it's too cold, slippery and I just don't feel like going outside?

Well, that happens to the best of us, especially in these dark days of midwinter. The good news is that you're a volunteer. If you don't feel like it or if it's unsafe, don't do it. But if you can take winter measurements, I assure you they are appreciated. Very few weather stations are able to measure snow and ice, so your CoCoRaHS reports are extremely useful.

Finally, don't forget to use the "Significant Weather Report" to send in reports of snow, sleet or freezing rain that you think might be significant to travelers, forecasters and anyone out and about in the winter.

Animal update

Winter is hard. The chores take much longer. Just getting dressed to go outside is an ordeal. But once I'm out, it's wonderful -- the crunch of the cold snow this week has been almost deafening, and the cold fresh snow has seemed whiter than usual. It's also interesting watching the animals and how they respond to the cold and snow. Our Aussie is whining a lot. She wants to go out but her feet freeze up -- a nasty dilemma. She'll just have to stay in the laundry room tonight. Our Great Pyrenees doesn't seem to mind the cold -- but he'll be staying in the laundry room, too. Can't believe how our chickens, geese and horses stay warm in this weather, but they seem to manage. The egg production is down to only about one a day now, though. We could turn on the lights and heater, but that costs too much. The horses run and kick a lot more now than in milder weather. That helps them stay warm, but it makes doing chores a bit more exciting. Cleaning the corral is quick -- can't find the manure.

As for the cats, they always find the warmest places. The barn cats -- normally independent -- huddle together sharing their warmth.

Cold night -- stay warm

Our temperature is now down to -10 F and I must call it a day. Good luck to all of you across the upper Midwest listening to howling winds and swirling snows tonight.

Sincerely,

Nolan
Colorado State University

P.S. Our CoCoRaHS fund raising campaign is coming soon. Stand by. We're just waiting for final approval from the CSU Foundation. Hopefully we can start next week.