

# Winter Weather Observations at CoCoRaHS Sites

National Weather Service - Twin Cities



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- ❖ Getting your weather station ready for the winter season
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## Observations

Reported Daily:                      **Precipitation, Snowfall and Snow Depth (even if they are zero)**

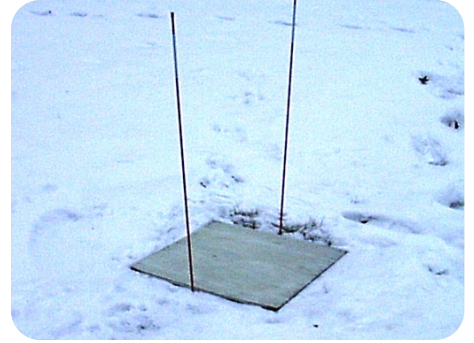
Optional Report in Winter:    **Snow Core on Mondays when 2" or more of snow is on ground**

## Preparing Station for Snow Season

- Remove the inner tube and funnel from the rain gauge when temperatures start to drop below freezing in the fall. This prevents the inner tube from cracking if liquid precipitation freezes in the tube, and allows the snow to fall directly in the outer can so it won't clog up the small opening in the funnel.



- Optional: Place a snowboard (piece of plywood about 12" x 12" in size) outside with a flag next to it. A good location is generally near the rain gauge. Look for a flat location away from where drifts form or where the wind blows the ground clean. Avoid areas where plowed or shoveled snow piles up. Feel free to move the board during the winter if you find a better place to measure snowfall. You can also use an alternate location that was clear of snow at the start of your observation period to measure new snowfall if you don't have a snowboard, or if the snowboard didn't get a good sample of the new snow due to wind.



## Measuring Winter Precipitation

### Types of Winter Precipitation


- Snow
- Ice Pellets/Sleet (frozen raindrops)
- Snow Pellets/Graupel (snowflakes coated by super cooled water droplets)
- Freezing Rain (rain that freezes on impact)
- Rain

All forms of precipitation that fall into the rain gauge during the past 24 hours are measured. The contents of the rain gauge are melted down, and the liquid value is reported as precipitation.

**Is it SLEET or GRAUPEL?**



**Sleet**  
*Liquid precipitation that freezes before reaching the ground.*



**Graupel**  
*Snowflake that collects supercooled water droplets on its surface.*

*National Weather Service Missoula*

## How to Melt Winter Precipitation in Rain Gauge

If no precipitation is falling at the observation time, take the rain gauge inside to melt down the contents by one of these three methods:

- Wait for the precipitation in the gauge to melt (may take a while), then pour the melted precipitation into the funnel and inner tube for measurement.
- Or pour a measured amount of hot water into the gauge and stir. Subtract the measured amount of hot water from your final liquid measurement.
- Or set the rain gauge in a bath of hot water to help speed up the melting process, then pour the melted precipitation into the funnel and inner tube for measurement.



If precipitation is falling at the observation time:

- Take a bucket, trash can, or other container out to the rain gauge.
- Dump the precipitation from the rain gauge into the container.
- Return the rain gauge to the stand.
- Take the container inside so the precipitation can be melted down and measured, using one of the 3 methods mentioned in the section above.

## Tips for Measuring Winter Precipitation during Windy Conditions

Snowfall may blow across the top of the rain gauge and not be collected in the outer rain gauge can when it's windy. If this happens, or if the amount of winter precipitation that you have melted down looks too low, you have two options:

- Precipitation can't be estimated. Report the precipitation as NA (for not available) if you believe the melted value isn't representative. This is the only option unless the precipitation was only snow during the past 24 hours. If you report the precipitation as missing, mention the original measurement in remarks.
- If pure snow falls, you can take a "biscuit" of the new snowfall on the snowboard (or other representative location) using the rain gauge to gather a new snow sample to melt down for the liquid precipitation value. See the instructions in the snow core section later in this guide for an example. Simply amend the instructions to take the



biscuit in a spot which only includes snow that has fallen in the past 24 hours, and report the value to the hundredth of an inch.

## Measuring Snowfall

- Using a snowboard (if available) makes it easier to determine the difference between newly fallen snow and old snow, because it is wiped clean after each daily measurement.
- Measure the snowfall to the nearest tenth of an inch. If you are using a ruler or yardstick that measures to the quarter of an inch, use this chart to convert the measurement to the tenth of an inch:

<https://www.weather.gov/media/mpx/Coop/SnowfallConversionChart.pdf>

- After the observation is done, wipe the snowboard (or alternate measuring location) clean. If frozen precipitation is on the snowboard (like ice), you can turn it over and use the other side if precipitation is still occurring, or take it inside to thaw if the precipitation has ended, then return it outside when done.
- Make sure not to report 0 for snowfall if it snowed. Zero means that it didn't snow. Flurries count as a trace of snowfall (and precipitation.)



### Tips for Measuring Snowfall during Challenging Conditions

**What if the snowboard or alternate snow measuring location was blown clean by the wind?**

Is there another location on your property (i.e. a driveway, sidewalk, deck, picnic table) you can use to measure/estimate the new snowfall? If not, leave the new snowfall as NA (for



not available) and mention in remarks why a snowfall measurement isn't available. Don't use a 10 to 1 precipitation to snowfall ratio to estimate the snowfall, because it's rarely accurate. Liquid to snowfall ratios vary anywhere from 13 to 1 to 40 to 1 in Minnesota and Wisconsin, depending on the type of weather system.

### **What if it snowed, but nothing accumulated?**

If the snow melted as it hit the ground (common when the ground is warm in the fall and spring), report a T (for trace) for new snowfall. Even if the flurries don't reach the ground, they are still counted. They should be entered as a trace for both precipitation and snowfall.



### **What if the snow melted before I could measure it?**

Do you know how much snow accumulated before it started to melt?

- If so, report the maximum depth of new snow on your board (or alternate measuring location) during the past 24 hours as your new snowfall.
- If not, report NA (not available) for new snowfall. Mention in remarks that the snowfall melted before it could be measured.

## **Measuring Snow Depth**

Best locations to measure snow depth (i.e. total snow on the ground):

- Relatively flat area not subject to drifts from buildings, fences, or plowing/shoveling
- An area that collects a representative amount of snow through the winter. Stay away from areas that routinely have the highest or lowest amounts.
- Areas near the rain gauge are generally good spots to take snow depth measurements.

Measure the total snow on the ground in 4-6 locations. Average the measurements together to get the final snow depth value, reported to the nearest inch.



Example:

5" + 3" + 8" + 10" + 6" + 7" = 6.5" average. Would be reported as 7" snow depth.

### **What if there are bare spots?**

If the bare spots cover less than 50% of the snow depth measuring area, average measurements from the bare spots (0" snow depth) in with measurements from areas that have snow, and report the average value as your snow depth.

If the bare spots cover more than 50% of area, regardless of how deep the snow is in the rest of the snow measuring area, report a T (for trace) for snow depth.

Don't report 0 snow depth until all but the man-made piles of snow are gone.



## **Optional Observation - Snow Core**

A snow core is the amount of water that is contained in the snow pack. It's used to determine risk of flooding when the snow melts in the spring. This optional measurement is taken once a week on Monday when 2 or more inches of snow is on the ground.

### **How to take a snow core measurement**

The rain gauge is turned upside down and pressed down to the ground in the snow pack in a location that is equal to the reported snow depth. It is sometimes referred to as taking a "biscuit" of the snow pack.

If the snow is deeper than the rain gauge, go as far down as you can in the snow until the gauge is full. Then put a flat object like a spatula or clipboard over the opening on the rain gauge to keep the snow in the gauge while it is upside down. Next, dump the snow in the rain gauge into a bucket or trash can, then push the empty rain gauge back into the snow at the same location and collect the remainder of the snow down to the ground. Put the additional snow sample into the bucket or trash can with the first sample you collected.

The following images show how the rain gauge is used to gather the snow core sample.

## Snow Core Steps – Taking Sample of Snowpack Using Rain Gauge



The snow core sample is taken inside, melted down, and the liquid amount is reported as the “**melted value of core to the nearest hundredth**” (i.e. 1.32”), in the box just below where the snow depth is reported.

### Tips for Taking Snow Core

- Try to avoid areas that were sampled before, if possible. The snow density in a previously sampled spot will not be representative of the overall snowpack.
- If you see an ice layer in the snow core, note the thickness and where it is in the snow pack (top, middle, or bottom) in remarks.
- If you see grass in your snow core, you know you have a good sample (i.e. reached the ground)
- If ice is at the bottom of the snow pack, and you can't include it in your measurement, note in remarks how thick the ice layer was below the snow.



# Reporting Precipitation, New Snowfall, Snow Depth, Snow Core

Here's how to report your daily weather observations during the snow season via the CoCoRaHS website.

**Precipitation Report Form** Submit Data Reset

Station Number :  
Station Name :

\* Denotes Required Field

12/19/2011 \*Observation Date ?  
7:00 AM \*Observation Time ?

\*Rain and Melted Snow to the nearest hundredth inch that has fallen in the gauge during the past 24 hours ?

Yes  No Report was taken at registered location?

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

**New Snowfall**

Accumulation of new snow in inches to the nearest tenth ?  
 Melted value from core to the nearest hundredth ?

**Total Snow and Ice on Ground at Observation Time**

Depth of total snow and ice (new and old) in inches to the nearest half inch ?  
 Melted value from core to the nearest hundredth ?

- ◆ **Water Equivalent of New Snow:** Melt the amount of *new* snow that fell in your gauge during the last 24 hours. Measure the amount of liquid to the nearest hundredth of an inch (such as 0.38”).
- ◆ **New Snowfall:** Measure the depth of *new* snow to the nearest tenth of an inch (such as 4.7”) on your snow board.
- ◆ **Melted new snowfall snow core (use if it is windy):**
  - ⇒ Place your gauge upside down on your snow board, firmly push down and “cut a biscuit”.
  - ⇒ Carefully turn the gauge right side up trying not to let any snow spill.
  - ⇒ Be sure to clear the snow off your snow board and place it back on the ground.
  - ⇒ Take the gauge inside and allow the snow to melt. Measure the amount of liquid to the nearest hundredth of an inch (such as 0.38”).
- ◆ **Total Snow and Ice on the Ground (Snow Depth):** Measure the depth of *total* snow to the nearest half an inch (such as 5.5”) on the ground. You may need to take several measurements and average them to get your total depth of snow.
- ◆ **Snow Water Equivalent of Total Snow and Ice on the Ground (Mondays):**
  - ⇒ Place your gauge upside down on the ground, firmly push down and “cut a biscuit”.
  - ⇒ Carefully turn the gauge right side up trying not to let any snow spill.
  - ⇒ Take the gauge inside and allow the snow to melt. Measure the amount of liquid to the nearest hundredth of an inch (such as 0.38”).



Here's how to enter your daily weather observation using the CoCoRaHS app:

CoCoRaHS Observer

**Precipitation Report**  
IL-CP-1  
Homer 2.0 N

Observation Date: 2016-01-14

Observation Time: 07:00

Rain/Melted Snow (in): 0.00

Trace Precip

Metric Units

[Click To Specify Snow & Flooding Info](#)

optional notes

Submit

CoCoRaHS Observer

**New Snow**

Accumulation (in.): NA

Trace

Melted Core (in.): NA

Trace

**Total Snow & Ice**

Depth Total (in.): NA

Trace

Melted Core (in.): NA

Trace

**Flooding Info**

No flooding occurred

RETURN

To enter snowfall and snow depth information during the winter season, click on the words, "Click to Specify Snow & Flooding Info", below the rain/melted snow entry box. That will open an additional page to enter snow measurements. **Make sure NOT to enter snowfall in the 'rain/melted snow' box.** That box is for the precipitation amount.