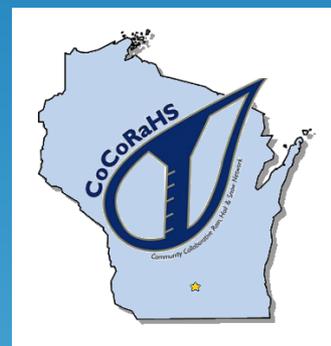


Winter Weather Observations at CoCoRaHS Stations



**Michelle Margraf – Observing Program Leader
& Diane Cooper – Service Hydrologist**

National Weather Service – Chanhassen, Minnesota

Presentation Outline



- ❖ Getting your station **ready for winter**
- ❖ **How to measure freezing and frozen precipitation**
- ❖ **How to record** precipitation, new snowfall, depth of snow, and snow cores **on the CoCoRaHS website**
- ❖ **When to report & how your data are used**

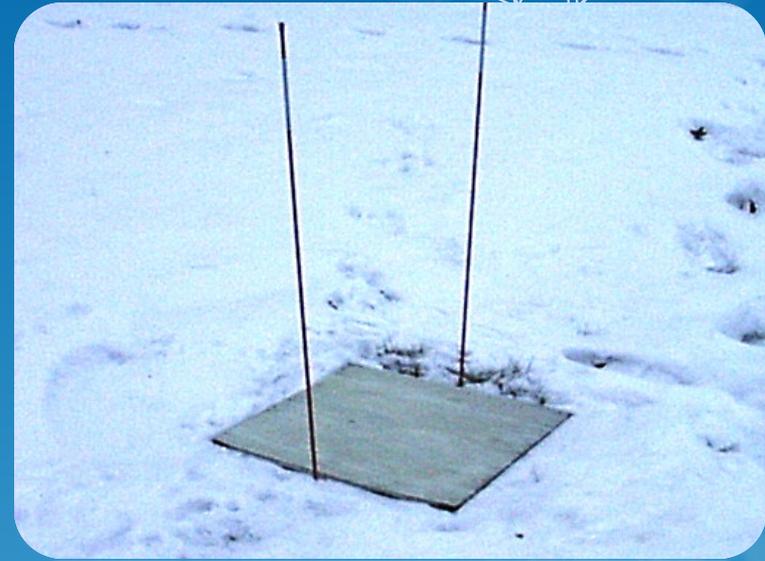
Getting Ready for the Winter Season

- ❖ **Remove the inner tube and funnel from the rain gauge**
- ❖ **Optional: Place a snowboard outside, with a flag or stake next to it**



How to Make a Snowboard

- ❖ Plywood board at least 16" x 16"
- ❖ Painted white
- ❖ Need flag or stake nearby to find board in snow



Why use a snowboard?

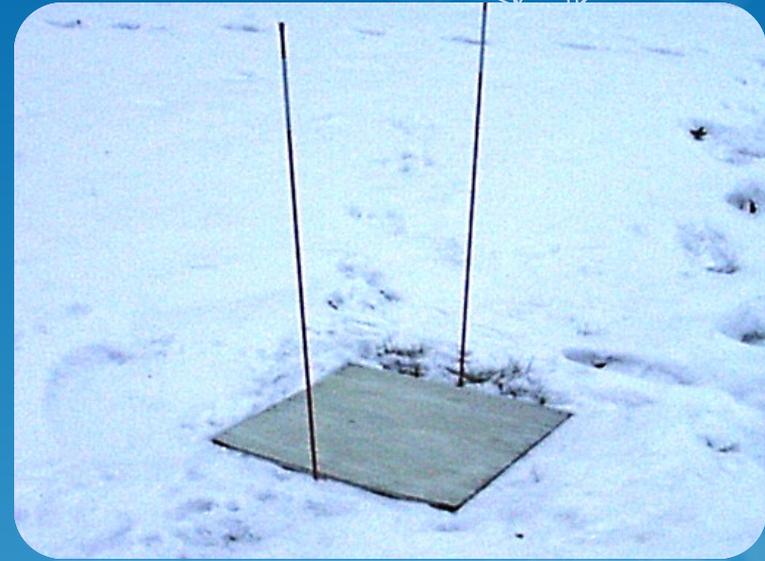
-Helps us tell the difference between old and new snow

Snowboard is not required! Other options for snowfall measurements will be discussed.

Where to put the snowboard

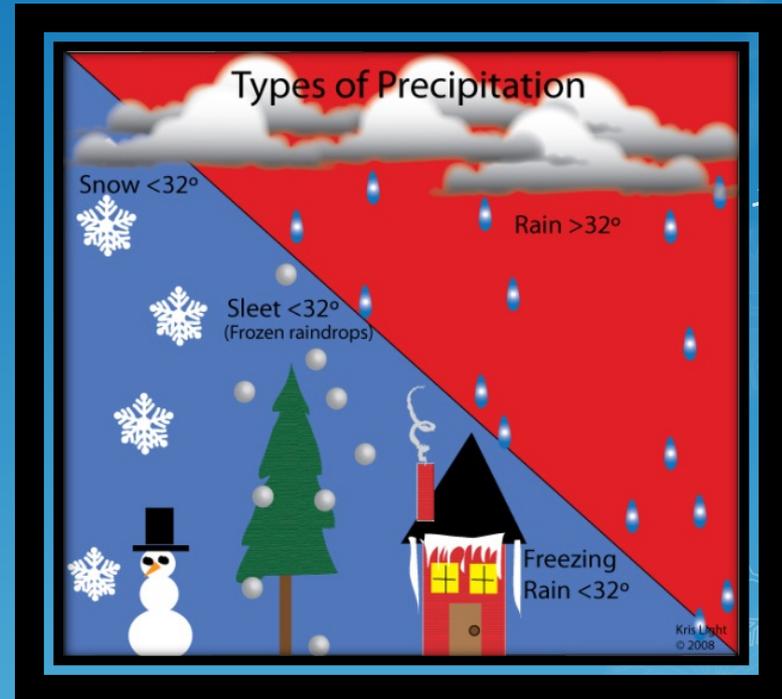
- ❖ Near the rain gage - generally good
- ❖ What to look for:
 - ❖ Flat location
 - ❖ Away from areas where drifts form
 - ❖ Away from areas where the wind blows the ground clean of snow
 - ❖ Away from areas where plowed snow piles up

Move the snowboard if you discover a better place to measure snowfall. May want to attach flag to board.



Measuring Winter Precipitation

- ❖ Types of precipitation
 - ❖ **Snow**
 - ❖ **Sleet (Ice Pellets)**
 - ❖ **Freezing Rain/Ice**
 - ❖ **Rain**



All forms of precipitation that fall into the rain gauge during the past 24 hours are melted down.

The liquid value is reported as precipitation.

Options for Melting Precipitation

- ❖ If NO is precipitation falling:
 - ❖ Take the rain gauge inside, and:
 - ❖ **Wait for the precipitation in the gauge to melt** (may take a while), then pour the liquid into the funnel and inner tube for measurement. (i.e. 0.08" or 0.54")
 - ❖ **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.**

Do not put rain gauge in microwave!



Options for Melting Precipitation



- ❖ If precipitation IS falling at observation time:
 - ❖ Take a bucket, trash can, or other container out to the rain gauge
 - ❖ **Dump the precipitation from the gauge into the container**
 - ❖ Return the gauge back to the stand
 - ❖ **Take the bucket inside so the precipitation can be melted down and measured.**



Q: What if snow accumulates on the top of my gauge?

A: Take a spatula, or other flat object, and push straight down on the gauge to force the snow directly over the opening into the gauge.

In the extreme case pictured at right, you will want to take a "snowfall core", since the gauge didn't appear to capture a good sample of the fallen snow.



Q: There's ice in the rain gauge, and I can't take it inside to melt because precipitation is falling!



- ❖ A: Leave the rain gauge outside so it captures the current precipitation.
- ❖ Enter missing for today's precipitation. Mention in remarks why precip report is missing. Report snowfall and snow depth as normal.
- ❖ The next day, measure the precipitation at your normal observation time (if the ice has melted), and report the amount as a 2-day precipitation total.

Q: The precipitation didn't fall into my rain gauge due to gusty winds...or my precipitation value looks really low!



A: Precipitation **cannot** be estimated, so there are two options:

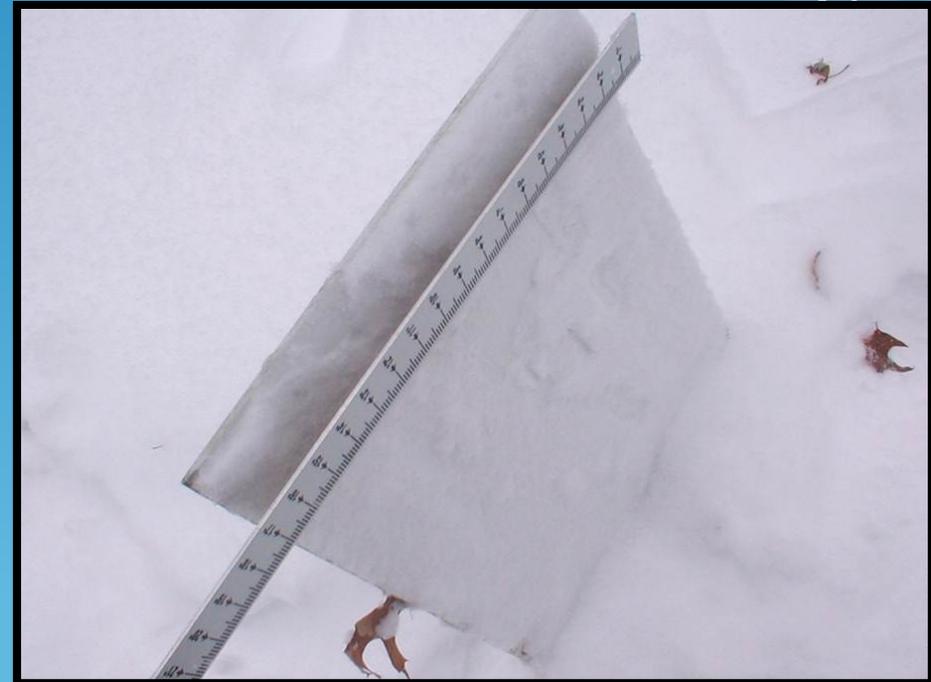
1. **Leave the precipitation as N/A for not available** (the only option, unless the precipitation was pure snow)
2. **Take a "biscuit" of the new snowfall** on the snowboard (or other location) using the rain gauge. Melt the snow down, measure the liquid, then report it as the melted value from core under new snowfall.

Measuring New Snowfall with a Snowboard

- ❖ Use ruler or yardstick to **determine snowfall to nearest tenth of an inch** (i.e. 0.4" or 5.3")

$1/16$ & $1/8 =$	0.1
$3/16 =$	0.2
$1/4$ & $5/16 =$	0.3
$3/8$ & $7/16 =$	0.4
$1/2 =$	0.5
$9/16$ & $5/8 =$	0.6
$11/16 =$	0.7
$3/4$ & $13/16 =$	0.8
$7/8$ & $15/16 =$	0.9

- ❖ **Wipe snowboard clean**, and place it on top of existing snow (i.e. level with surrounding snow) to reset board for next day
- ❖ Can flip board over, or take it inside (during dry weather), to remove frozen precipitation



Measuring New Snowfall

Other Methods



- ❖ Sidewalk, driveway, picnic table that was clear of snow at start of 24 hour period, and remained undisturbed.
- ❖ Other options: back of pickup truck, hood of car, top of dumpster, dock, other relatively flat surface.
- ❖ As last resort (windy events, no other options), can use difference between yesterday's total depth of snow and today's depth to calculate a new snowfall estimate.
 - ❖ Example: Yesterday total depth was 5.0" and today's was 8.0", so new snowfall estimate = 3.0". Make sure to mention in remarks that the snowfall was estimated.
- ❖ Do not use grassy areas to measure new snowfall– you will get the depth of the grass + the depth of the snow!

Don't report zero if it snowed! If a snowfall report is not available, leave it as "NA".

Q: The snow melted before I could measure it. What should I record?



- ❖ A: Did you notice how much snow fell before it started to melt? If so, report the maximum depth of new snowfall during the past 24 hours as your new snowfall.
- ❖ If you're not sure how much fell, and the new snow melted before your observation, leave the snowfall as "NA" (not available). Mention in remarks that the snow melted before it could be measured.

Don't report zero if it snowed! If a snowfall report is not available, leave it as "NA".

Q: What if it snowed, but nothing accumulated on the ground?

- ❖ **A: If the snow melted as it hit the ground** (common when the ground is still warm in the fall), report a "T" (trace) for snowfall.
- ❖ Flurries (even if they don't reach the ground) are considered precipitation and snowfall. **Flurries are reported as both a trace of precipitation and a trace of new snowfall.**

Don't report zero if it snowed!

Q: The wind blew snow onto my snowfall measuring spot. Does that count as new snow?

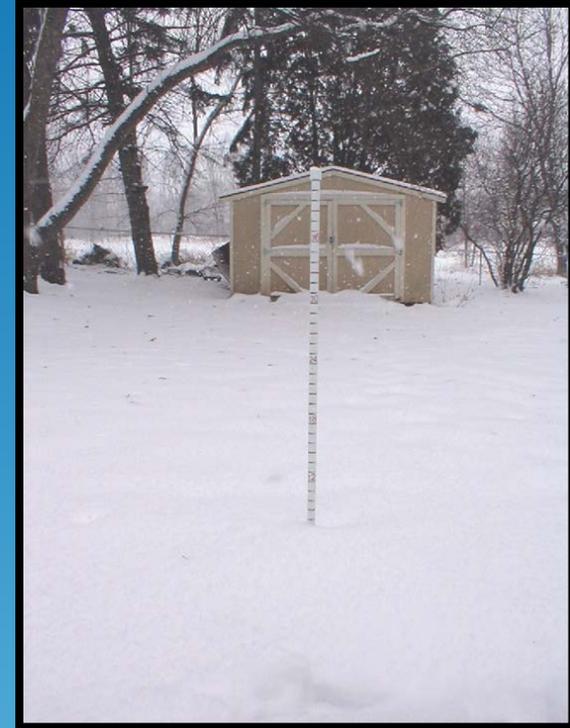


- ❖ A: Blowing and drifting snow **does not** count as new snowfall.
- ❖ If it didn't snow during the past 24 hours, and you find snow on your snowboard (or alternate snowfall measuring spot), disregard the snow, wipe the area clean, and report zero for snowfall.
- ❖ You can report blowing and drifting snow in remarks.

Measuring Total Snow on Ground



- ❖ Best locations to measure:
 - ❖ Relatively flat area that is not subject to drifts caused by buildings, fences, or plowing
 - ❖ An area that shows a representative amount of snow through the winter (i.e. not the highest or lowest depth of snow on your property).
 - ❖ You can move the snow depth sample area through the winter if you see a more representative location develop.



Measure the total depth of snow on the ground in 4-6 locations. Average the measurements together to get the total depth of snow (reported to the nearest half inch).

Example:

$$5'' + 3'' + 8'' + 10'' + 6'' + 7'' = 6.5''$$





- ❖ If the bare spots cover less than 50% of snow depth area, average the bare spots 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 trace for snow depth.
- ❖ Don't report 0 snow depth until all but the man-made piles of snow are gone.

**What if
there
are
bare
spots?**

Extra Credit Observation: *Snow Core*



- ❖ **Snow Core = amount of water in the snow pack**
- ❖ Used to gage risk of flooding when snow melts
- ❖ **Measurement taken once a week on Sunday or Monday**
- ❖ Rain gauge is turned upside down and pressed down into snowpack in spot equal to your total depth of snow.
- ❖ Snow is taken inside, melted down, and the liquid amount is reported as the snow core to the hundredth of an inch.



Tips for Snow Cores



- ❖ 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, where it is in the snow pack (top, middle, bottom), and if there are bubbles 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, tell us in remarks how thick the ice layer was below the snow. We can estimate the water in that layer if we know how thick the ice is.

How to Report Winter Measurements on CoCoRaHS Website

CoCoRaHS COMMUNITY COLLABORATIVE RAIN, HAIL & SNOW NETWORK
"Because every drop counts"

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Recording Daily Precipitation

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My Data Entry : Daily Precipitation Report Form

Enter My New Reports

- Daily Precipitation**
- Hail
- Significant Weather
- Multi-Day Accumulation
- Monthly Zeros
- Drought Impact Report

List/Edit My Reports

- Daily Precipitation
- Hail
- Significant Weather
- Multi-Day Accumulation
- Drought Impact Report

Precipitation Report Form [Submit Data] [Reset]

Station Number : MN-RM-1

Station Name : Maplewood 2.4 NW

* Denotes Required Field

2/10/2010 *Observation Date

7:00 AM *Observation Time

.02 *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)

Deepest snow on the ground since March 2007.

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

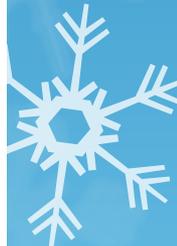
Melted value from core to the nearest hundredth

Duration Information

If a time is unknown or the storm has not ended leave it blank.

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

Reporting Snowfall and Total Snow on Ground



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Home | States | View Data | Maps My Data | My Account | Admin | Logout

My Data Entry : Daily Precipitation Report Form

Precipitation Report Form Submit Data Reset

Station Number : MN-RM-1
Station Name : Maplewood 2.4 NW

* Denotes Required Field

2/10/2010 ***Observation Date** ?
7:00 AM ***Observation Time** ?
.02 ***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) ?
Deepest snow on the ground since March 2007.

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 ?

Duration Information
If a time is unknown or the storm has not ended leave it blank.

Enter My New Reports

- [Daily Precipitation](#)
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- [Significant Weather](#)
- [Multi-Day Accumulation](#)
- [Monthly Zeros](#)
- [Drought Impact Report](#)

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- [Hail](#)
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Reporting "Snowfall Core" (amount of water in the new snowfall)



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- [Significant Weather](#)
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- [Monthly Zeros](#)
- [Drought Impact Report](#)

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- [Hail](#)
- [Significant Weather](#)
- [Multi-Day Accumulation](#)
- [Drought Impact Report](#)

Precipitation Report Form

Submit Data

Reset

Station Number : MN-RM-1

Station Name : Maplewood 2.4 NW

* Denotes Required Field

2/10/2010 *Observation Date ?

7:00 AM *Observation Time ?

.02 *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) ?

Deepest snow on the ground since March 2007.

New Snowfall

.3 Accumulation of new snow in inches to the nearest tenth ?

NA Melted value from core to the nearest hundredth ?

Total Snow and Ice on Ground at Observation Time

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

NA Melted value from core to the nearest hundredth ?

Duration Information

If a time is unknown or the storm has not ended leave it blank.



Reporting "Total Snow Core" (amount of water in snowpack)



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- [Hail](#)
- [Significant Weather](#)
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- [Hail](#)
- [Significant Weather](#)
- [Multi-Day Accumulation](#)
- [Drought Impact Report](#)

Precipitation Report Form

Submit Data

Reset

Station Number : MN-RM-1

Station Name : Maplewood 2.4 NW

* Denotes Required Field

2/10/2010

*Observation Date ?

7:00 AM

*Observation Time ?

.02

*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) ?

Deepest snow on the ground since March 2007.

New Snowfall

.3

Accumulation of new snow in inches to the nearest tenth ?

NA

Melted value from core to the nearest hundredth ?

Total Snow and Ice on Ground at Observation Time

1.7

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

NA

Melted value from core to the nearest hundredth ?

Duration Information

If a time is unknown or the storm has not ended leave it blank.



Adding Remarks



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My Data Entry : Daily Precipitation Report Form

Precipitation Report Form Submit Data Reset

Station Number : MN-RM-1
Station Name : Maplewood 2.4 NW

* Denotes Required Field

2/10/2010 ***Observation Date** ?
7:00 AM ***Observation Time** ?
.02 ***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) ?
Deepest snow on the ground since March 2007.

New Snowfall

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

Total Snow and Ice on Ground at Observation Time

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

Duration Information

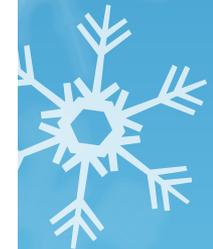
If a time is unknown or the storm has not ended leave it blank.

Enter My New Reports

- [Daily Precipitation](#)
- [Hail](#)
- [Significant Weather](#)
- [Multi-Day Accumulation](#)
- [Monthly Zeros](#)
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Submit your report



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- [Multi-Day Accumulation](#)
- [Drought Impact Report](#)

Precipitation Report Form

Submit Data

Reset

Station Number : MN-RM-1

Station Name : Maplewood 2.4 NW

* Denotes Required Field

2/10/2010 *Observation Date ?

7:00 AM *Observation Time ?

.02 *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) ?

Deepest snow on the ground since March 2007.

New Snowfall

.3 Accumulation of new snow in inches to the nearest tenth ?

NA Melted value from core to the nearest hundredth ?

Total Snow and Ice on Ground at Observation Time

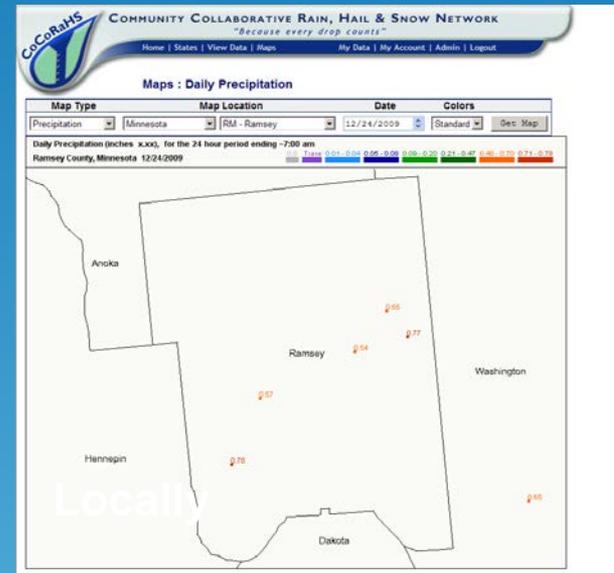
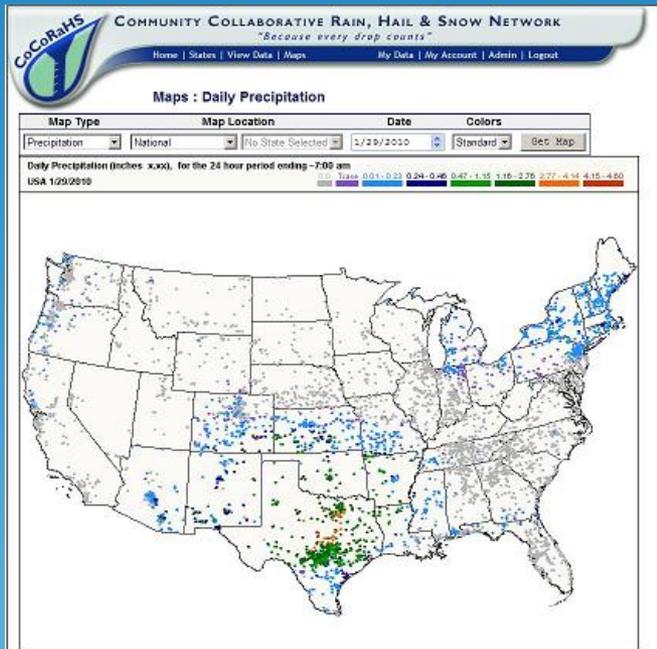
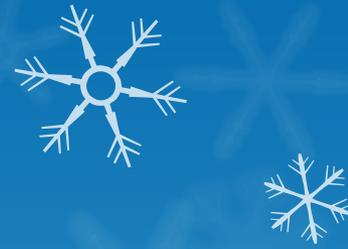
17 Depth of total snow and ice (new and old) in inches to the nearest half inch ?

NA Melted value from core to the nearest hundredth ?

Duration Information

If a time is unknown or the storm has not ended leave it blank.

Your data will appear on CoCoRaHS website within a few minutes. Also transmitted to partner agencies like the National Weather Service, and state and national climate centers.



Date	Time	Station Number	Station Name	Total Precip. in	New Snow in	Total Snow in	State	County	View
1/26/2010	5:30 AM	MN-RC-1	Montgomery 3.2 ENE	0.12	1.0	18.5	MN	Rice	
1/26/2010	6:00 AM	MN-SH-1	Princeton 3.2 WSW	0.06	1.0	8.0	MN	Sherburne	
1/26/2010	6:30 AM	MN-HN-15	Eden Prairie 0.2 ESE	0.09	1.0	11.0	MN	Hennepin	
1/26/2010	6:30 AM	MN-SE-2	Owatonna 0.8 E	0.05	0.9	13.0	MN	Steele	
1/26/2010	7:00 AM	MN-AA-2	Coon Rapids 1.5 NNW	0.08	2.2	NA	MN	Anoka	
1/26/2010	7:00 AM	MN-CV-1	Carver 0.7 W	0.06	1.0	9.0	MN	Carver	
1/26/2010	7:00 AM	MN-CG-1	Rush City 2.8 NE	0.02	0.2	NA	MN	Chisago	
1/26/2010	7:00 AM	MN-CY-1	Moorhead 2.0 N	0.07	1.2	15.0	MN	Clay	
1/26/2010	7:00 AM	MN-DK-7	Eagan 1.7 W	0.00	0.0	NA	MN	Dakota	
1/26/2010	7:00 AM	MN-HN-6	Long Lake 0.2 WSW	NA	0.9	11.0	MN	Hennepin	
1/26/2010	7:00 AM	MN-HN-14	Minnetrista 1.5 SSE	0.09	NA	NA	MN	Hennepin	
1/26/2010	7:00 AM	MN-LY-2	Marshall 0.6 S	0.08	1.5	18.0	MN	Lyon	
1/26/2010	7:00 AM	MN-OT-1	Dalton 3.0 S	T	T	9.0	MN	Otter Tail	



Multi-Day Precipitation Report



If you are away on vacation or out of town, this is the form to use.

Put the dates that the measurement is covering, and record the precip you found in the gage.

Don't file daily reports for these dates.

The screenshot shows the CoCoRaHS website interface. At the top, the logo and network name are displayed, along with navigation links. The main content area is titled 'Data Entry : Multi-Day Precipitation Report Form'. On the left, a sidebar contains navigation menus for 'Enter New Reports', 'List/Edit Reports', 'Manage Observers', and 'Manage Stations'. The 'Multi-Day Accumulation Form' is the central focus, featuring fields for station information, dates, time, and precipitation measurements. Red circles highlight the date selection fields. A 'Notes' section at the bottom contains the text: 'we were on vacation. last report was June 24.' Buttons for 'Submit Data' and 'Reset' are located at the top right and bottom right of the form area.

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Home | States | View Data | Maps | My Data | My Account | Admin | Logout

Data Entry : Multi-Day Precipitation Report Form

Multiple Day Accumulation Form

Submit Data | Reset

Station Number : IL-GY-5

Station Name : Morris 1.3 SW

6/25/2009 First day of accumulation period. This day should be one day after your last report.

7/2/2009 Date the rain gauge was emptied.

7:00 AM Time the rain gauge was emptied.

Yes No Report was taken at registered location?

0.15 Multi Day Precipitation (in inches)

0.00 Total Depth of Snow on Ground (in inches)

0.00 Core Precipitation (in inches)

Notes

we were on vacation. last report was June 24.

Submit Data | Reset

Significant Weather Report

Enter New Reports

- [Daily Precipitation](#)
- [Hail](#)
- [Significant Weather](#)**
- [Multi-Day Accumulation](#)
- [Monthly Zeros](#)
- [Drought Impact Report](#)

List/Edit Reports

- [Daily Precipitation](#)
- [Hail](#)
- [Hail by Station](#)
- [Significant Weather](#)
- [Multi-Day Accumulation](#)
- [Drought Impact Report](#)

Manage Observers

- [List Observers](#)
- [Add Observer](#)
- [Observer Activity Report](#)

Manage Stations

- [List Stations](#)

Coordinators

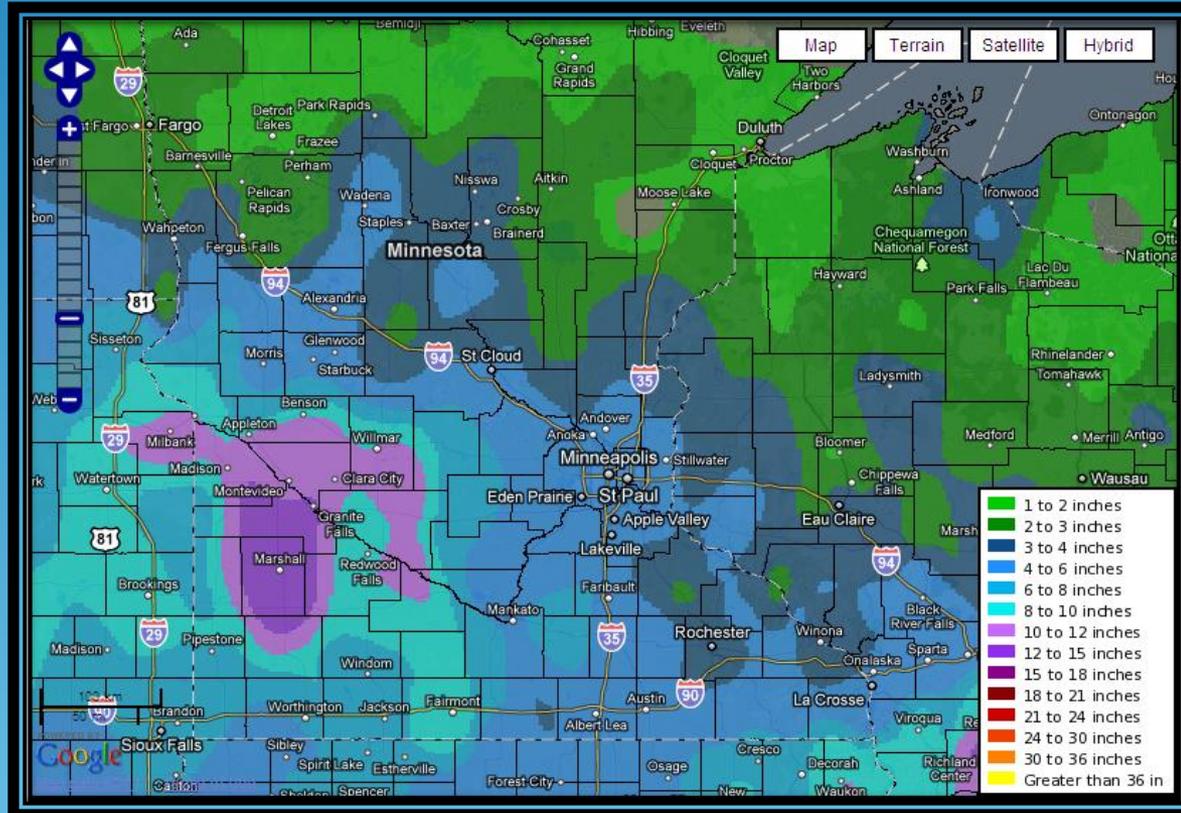
- [State/Regional Coordinator Resources](#)
- [Local Coordinator Resources](#)

Data Entry : Significant Weather Report Form

Significant Weather Report		Submit Data	Reset
Station Number : MN-SC-2			
Station Name : Prior Lake 2.0 W			
* Denotes Required Field			
11/20/2011		*Observation Date	
3:30	PM	*Observation Time	
1800	Minutes	Time duration that the report covers	
 Rain			
0.21	New Rain and Melted Snow that has fallen during the report duration, in inches to the nearest hundredth		
0.21	Total Precipitation, rain and melted snow, since storm began, in inches to the nearest hundredth		
 Snow			
2.0	Depth of New Snow that has fallen during the report duration, in inches to the nearest tenth		
1.5	Total depth of snow and ice on ground at the time of this observation to nearest half inch		
Additional Information			
<input checked="" type="radio"/> Yes <input type="radio"/> No Report was taken at registered location?			
Was There Flooding?			
<input type="radio"/> No			
If Yes, how severe?			
<input type="radio"/> Minor (typical). Street or field flooding.			
<input type="radio"/> Unusual street or field flooding (only see this every few years)			
<input type="radio"/> Severe Flooding			
<input type="radio"/> Extreme (never seen it this bad before)			
Observation Notes (This will be available to the public)			
Updated amount in Prior Lake... we pickup another 0.2" of snowfall from 6 pm to 9 pm last night.			

When to report?

- ❖ Enter your daily weather report on the CoCoRaHS website as close to your observation time as possible.
- ❖ We can't share your data, or use it in maps or weather & river models, until it is transmitted via CoCoRaHS.





Sharing Your Data With Others



- ❖ [NWS Daily Weather Maps](#) (if received by 9:30 AM)
- ❖ [NWS Storm Event Summaries](#)
- ❖ Also appears on CoCoRaHS website maps and tables

You can also send intermediate reports during winter storms via the **“Significant Weather Report”**.

Please report via a **“Significant Weather Report”** any dangerous weather conditions like whiteouts, blowing snow covering roads, ice accumulations, etc. We pass these reports onto law enforcement, and issues warnings or advisories to warn others.