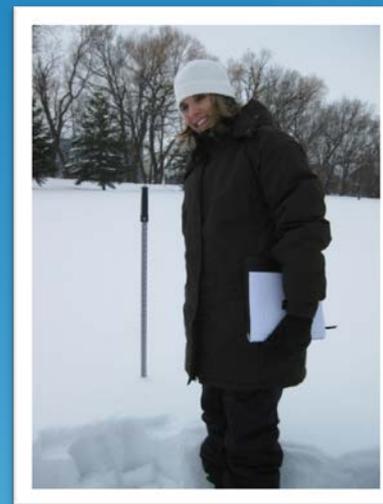


Winter Weather Observations at CoCoRaHS Stations



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

National Weather Service – Chanhassen, Minnesota

Presentation Outline



- ❖ Getting your station **ready for winter** weather observations
- ❖ **How to measure freezing and frozen precipitation**
- ❖ How to record precipitation, snowfall, snow depth, and snow core **measurements on the CoCoRaHS website**
- ❖ **When to report & how your data are used**
- ❖ **Resources** available for CoCoRaHS observers

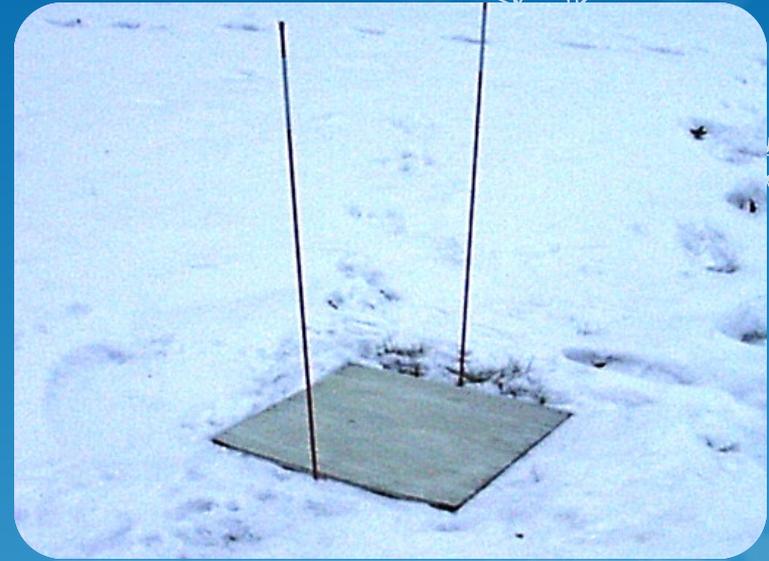
Getting Ready for the Winter Season

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



How to Make a Snowboard

- ❖ Plywood board about 2 x 3 feet
- ❖ 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 snow measuring will be discussed.

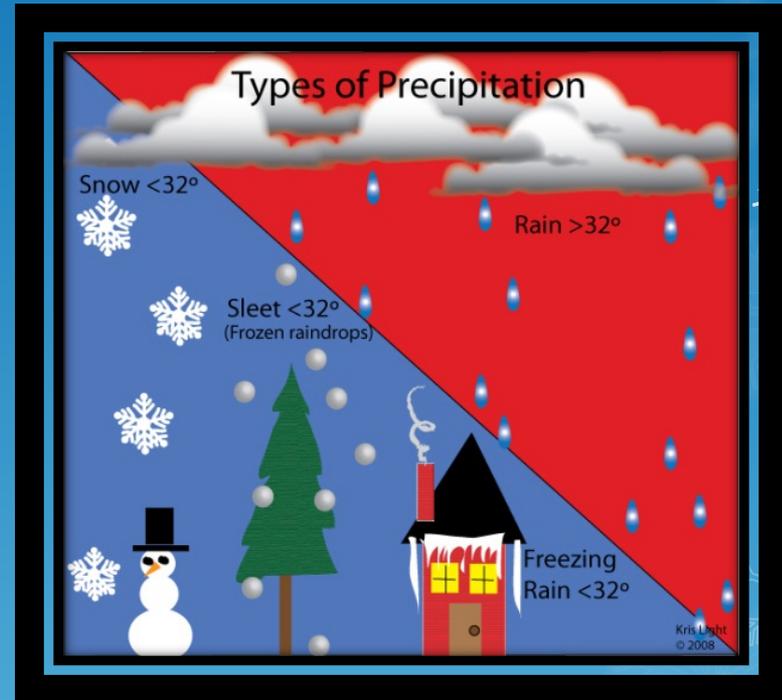
Where to put the snowboard?

- ❖ Near the rain gage - generally good
- ❖ What to look for:
 - ❖ Flat location
 - ❖ Away from areas with drifts/snow piles
 - ❖ Away from areas where the wind blows the ground clean of snow
 - ❖ Move the snowboard if needed during the winter if you discover a better place to measure new snowfall.



Measuring Winter Precipitation

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



All forms of precipitation that fall into the rain gage 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 gage inside, and:
 - ❖ **Wait for the precipitation in the gage 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 gage and stir.** Subtract the measured amount of hot water from your final liquid measurement.
 - ❖ **Or set the rain gage in a bath of hot water.**

Do not put rain gage in microwave!



Options for Melting Precipitation



❖ If precipitation IS falling:

- ❖ Take a bucket, trash can, or other container out to the rain gage
- ❖ Dump the precipitation from the gage into the container
- ❖ Return the gage to the stand
- ❖ Take the bucket inside so the precipitation can be melted down and measured.



Help! There's ice in the rain gage, and I can't take it inside because precipitation is falling.

- ❖ Leave the rain gage outside so it will capture the ongoing precipitation.
 - ❖ When the precipitation ends, take the gage inside.
 - ❖ Or wait until temperatures rise above freezing, and you can dump all of the precipitation from the gage into a bucket to take inside for measurement.

Reporting Delayed Data:

-If it's close to your observation time (within an hour), you can report the precip total with today's observation.

-If not, write down the precip you measured with the delayed observation, then add it to what you measure at your next observation time, and report it as a 2-day total.

Can also report delayed total as "Significant Weather Report".

Help! The precipitation didn't fall into my rain gage due to gusty winds, etc.

- ❖ Precipitation can't be estimated, so don't report precipitation that day if a rain gage measurement is not available.
- ❖ However, **you can report a snowfall core** (i.e. amount of water in the new snowfall), if the precipitation was all snow.
 - ❖ Take a "biscuit" of the snowfall on the snowboard (or another spot where snowfall was measured) using the rain gage. Melt the snow in the rain gage, measure the liquid, and **report the measurement as "melted value of core."**
 - ❖ More info to come on snow cores!



Measuring New Snowfall with a Snowboard

- ❖ Use ruler 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 after daily measurement**, 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!**

Help! My snowboard was wiped clean by the wind!

- ❖ **Snowfall is the only element that can be estimated. It's important to note in remarks when snowfall is estimated.**
- ❖ Is there another location (i.e. a driveway, sidewalk, picnic table, etc.) you can use to measure/estimate the new snowfall?
- ❖ If you have a precipitation amount, you can contact Michelle to help you determine a snowfall estimate, based on liquid/snowfall ratios from surrounding sites. (Snowfall to precip ratio is NEVER 10 to 1, and varies with each event.)
- ❖ You can also choose to not report snowfall that day.

Don't report zero for snowfall if it snowed! Reporting zero means that it didn't snow. If snowfall report not available, leave it as "NA".

Help! 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 during the past 24 hours as your new snowfall.
- ❖ **If you're not sure, and the snow melted before your observation time, leave the snowfall report as "NA" (i.e. not available).** Mention in remarks that the snow melted before it could be measured.

Don't report zero for snowfall if it snowed! Zero means it didn't snow.

What if it snowed, but it didn't accumulate on the ground?

- ❖ 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 snowfall.**



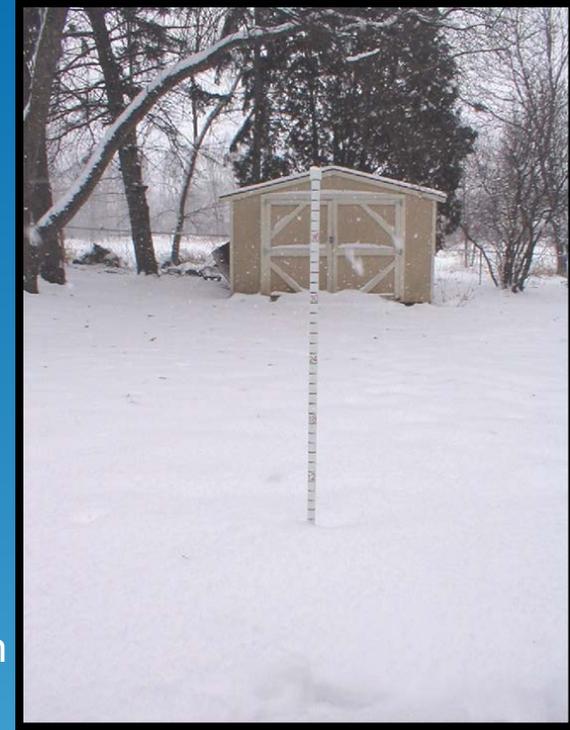
The wind blew snow on my snowboard. Does that count?



- ❖ 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, disregard the snow on the board, wipe the board clean, and report zero for snowfall.
- ❖ You can report blowing and drifting snow in remarks.

Measuring Snow Depth

- ❖ Best locations to measure snow depth
 - ❖ 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 snow depth in 4-6 locations.
Average the measurements together to get the
total snow depth (reported to the nearest half
inch).**

Example:

**$5'' + 3'' + 8'' + 10'' + 6'' + 7'' = 6.5''$
total snow depth**



- ❖ If the bare spots cover less than 50% of your normal snow depth measuring 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 the snow depth measuring 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 Cores

- ❖ **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) when 2 or more inches of snow is on the ground**
 - ❖ Rain gage is turned upside down and pressed down into snowpack in a location equal to the total snow depth.
 - ❖ Snow collected in rain gage is taken inside, melted down, and the liquid amount is reported as the “melted value from core” to the nearest hundredth of an inch (i.e. 0.82”)



What if there is ice in the snowpack?

- ❖ Try to include the ice layer in the sample, if possible
- ❖ If ice cannot be included, mention that in remarks.
- ❖ Tell us how thick the ice layer is, and where it is in the snowpack (top, middle, bottom)
- ❖ Endless kudos if you can **send a picture of the ice layer to Michelle** via e-mail. A picture is definitely worth a 1000 words!



Additional 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 grass in your snow core, you know you have a good sample (i.e. reached the ground)



How to Report Winter Measurements on CoCoRaHS Website

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

Home | States | View Data | Maps | My Data Entry | Login

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Recording Daily Precipitation

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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** ?

* **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 Snow Depth

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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](#)
- [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](#)

Reporting "Snowfall Core" (amount of water in the new snowfall)



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My Data Entry : Daily Precipitation Report Form

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- [Significant Weather](#)
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- [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

.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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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
- Drought Impact Report

List/Edit My Reports

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



Adding Remarks



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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

.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.

Submit your report



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My Data Entry : Daily Precipitation Report Form

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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

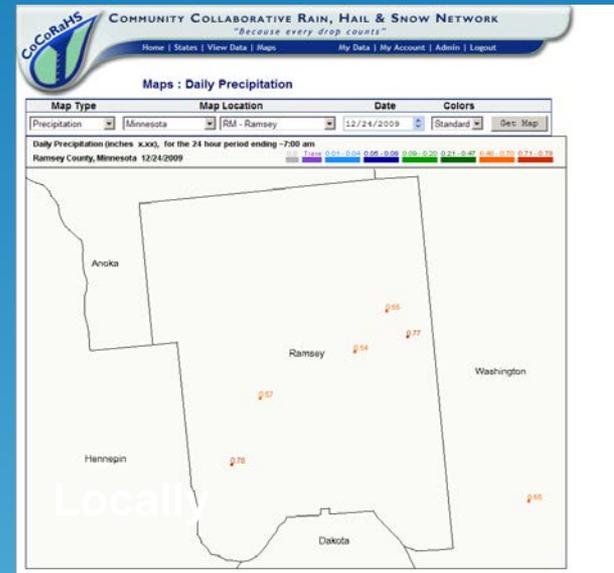
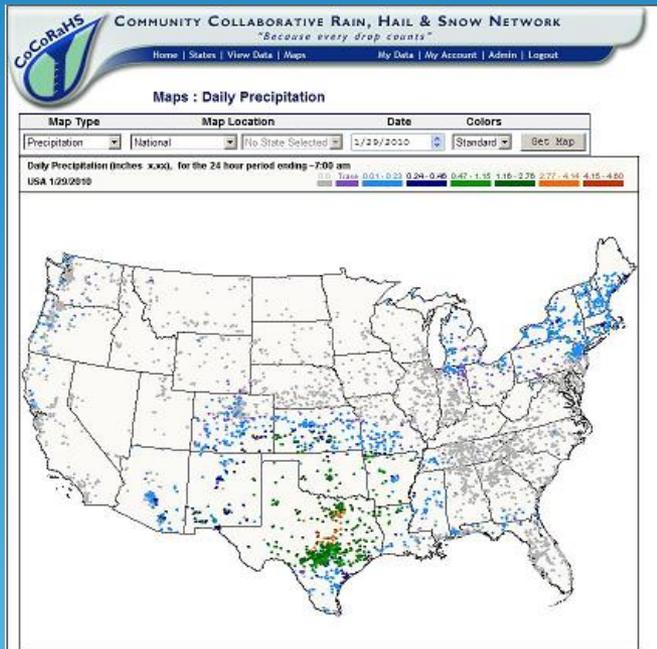
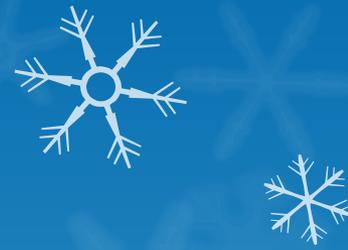
17 Depth of total snow and ice (new and old) in inches to the nearest half inch ?

NA Melted value from core to the nearest hundredth ?

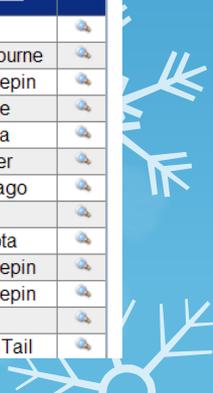
Duration Information

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, and is transmitted to partner agencies like the National Weather Service.



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	Minnetrissa 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 for you.

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

There is no need to file an additional daily report for these dates.

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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

- Enter New Reports
 - Daily Precipitation
 - Hail
 - Significant Weather
 - Multi-Day Accumulation
 - Monthly Zeros
- List/Edit Reports
 - Daily Precipitation
 - Hail
 - Hail by Station
 - Significant Weather
 - Multi-Day Accumulation
- Manage Observers
 - List Observers
 - Add Observer
 - Observer Activity Report
- Manage Stations
 - List Stations



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

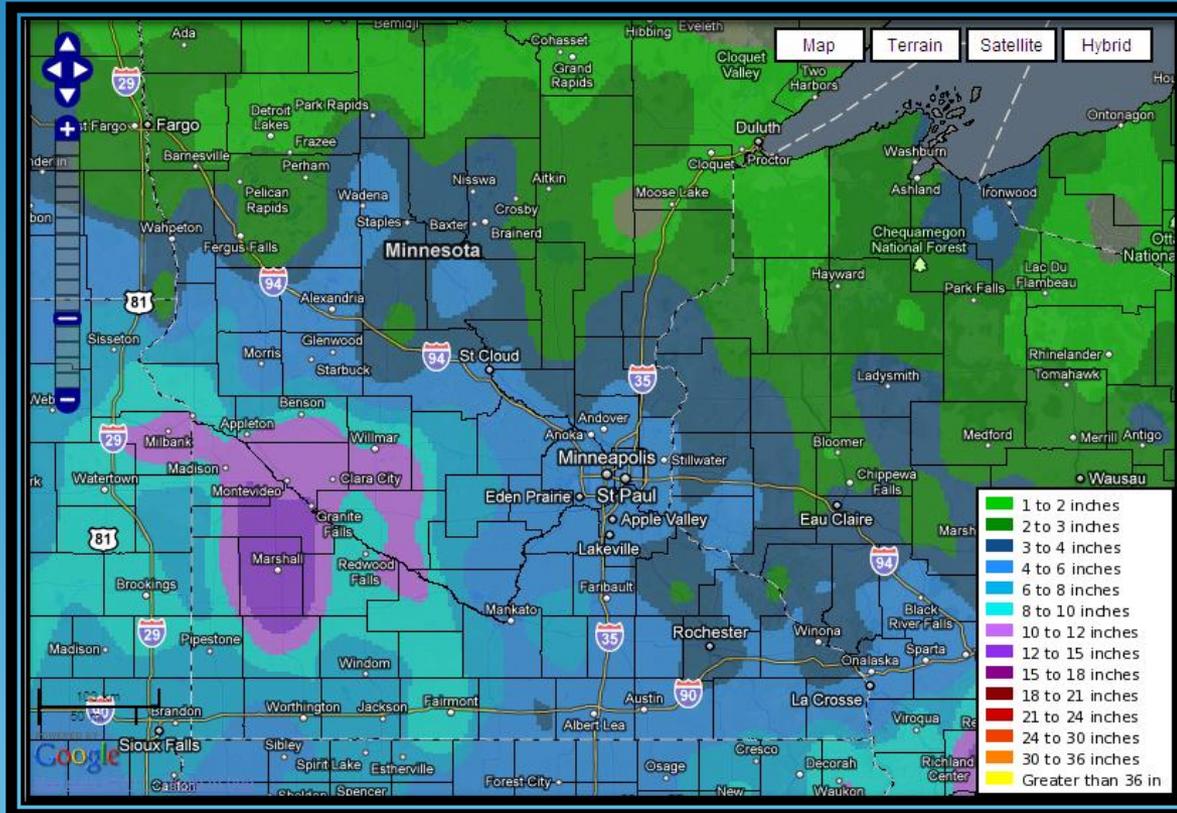
- [State/Regional Coordinator Resources](#)
- [Local Coordinator Resources](#)

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**" (i.e. when you receive new snow amounts like 3", 6", 9", 12", your storm total snowfall, etc).

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.

Winter Weather Observing Resources

- ❖ **CoCoRaHS website (www.cocorahs.org)**

- ❖ ["In Depth Snow Measuring" Slide Show](#)
- ❖ [Frequently Asked Questions](#)
- ❖ ["Measuring Snow" Video](#) (23 minutes long)



- ❖ **Copy of this presentation**

- ❖ Available on NWS website and CoCoRaHS page

- ❖ **Contact Michelle Margraf – Regional CoCoRaHS Coordinator**

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