The Four Seasons
National Weather Service Burlington, VT

VOLUME VIII, ISSUE IV

Winter 2023

Table of Contents

Letter from the Editors

Welcome to the Winter 2022/23 edition of The Four Seasons, a quarterly newsletter issued by the National Weather Service in Burlington, VT. A sampling of what we've been up to in recent months is included in this issue, featuring some of our community outreach, weather support to the World University Games in Lake Placid, and meteorological analysis of extreme winter weather events. To help our operations, we added two meteorologists to our staff, who have already bolstered our team with their contributions. You too can help us by becoming a daily precipitation observer, as we move from collecting snow to measuring rain with the close of winter. As always, thanks for reading!

National Weather Service Burlington Goes to Vermont's Women Can Do Conference
-Jessica Storm

In the first full week of October, two meteorologists from NWS Burlington headed out to Vermont Technical College in Randolph, Vermont, to attend the first in-person Women Can Do career exploration conference in three years. This conference is for high school aged women to explore hands-on STEM (Science, Technology, Engineering, and Math) and trade careers, inspiring them to dream big about their futures.

Forecasters Jessica Neiles and Jessica Storm packed up the car with a large floodplain model they share with the NWS Albany office, and headed off to the conference on a Thursday morning. The 250+ high school students and staff took turns at different sections of the conference, with representatives from Champlain Valley Weatherization, Churchill Landscapes, Vermont Rural Water Association, the NWS, and more in

NWS BTV forecasters Jessica Neiles (left) and Jessica Storm (right) in front the floodplain model.

…Continued from Page 1

the Action Expo portion of the event.

The floodplain model is a simulation of the way a river and areas around it react to rainfall on different surfaces. It's made up of a landscape including the river, some floodplains, which are areas of low-lying ground adjacent to a river subject to flooding, and varying other elevated areas. Students could place houses, trees, and even make clay dams across the landscape presented. Then, the forecasters would have three different surfaces to "rain" on: wetlands (sponges meant to recreate a marshy environment), a parking lot (flat, non porous surface with toy cars parked), and a water retention pond (a bowl-like structure meant to capture the water and release it slowly). Students could see if the houses they placed on the model would be flooded, depending on where the water rises.

Students interacting with the floodplain model during the conference.

Women were only 27% of STEM workers as of 2021, according to the United States Census Bureau. As of 2014, 15% of employed meteorologists in the National Weather Service were women, according to NWS Sterling's Heather Sheffield, and only 12% of lead forecasters were women. One of the reasons this is occurring is likely due to the lack of representation of women in the industry, which is what Women Can Do works on increasing. By having women present interesting STEM topics and activities at this conference, they are encouraging young women to become engaged in fields where they are underrepresented.

The Women Can Do conference was a wonderful success as students engaged with science on a personal level, identifying rivers and floodplains in their own lives. Young women from different high schools chatted with meteorologists about rivers in their hometowns across Vermont and the importance of wetlands, floodplains, and retention ponds.

NWS Albany and Burlington Provide Decision Support Services to NY State for the FISU World University Games
- Scott Whittier

At the request of New York State Department of Homeland Security and Emergency Services (DHSES) and New York State Police (NYSP), NWS Albany and NWS Burlington provided joint Impact-based Decision Support Services (IDSS) to assist with public safety operations for the 2023 FISU World University Games (WUG2023). The event was extremely important to the state of New York, which had recently invested nearly $500M for infrastructure improvements to the Lake Placid Olympic Venues (1932/1980) in order to host the WUG and future events.

The WUG2023 were held from January 11 to January 23 in various locations across upstate New York. The jurisdictional territory encompassed portions of NWS Burlington and NWS Albany's County Warning Areas (CWA). NWS Burlington and Albany worked as a team to develop and execute a plan that would provide timely, accurate decision support via remote and on-site services as well as provide a great training opportunity for forecasters to provide on-site decision support for future deployments.

NWS BTV Warning Coordination Meteorologist (WCM) Scott Whittier giving an Operational Brief

Remote support was provided by NWS Burlington to public safety officials that included a general overview of the entire venue, specific regional forecasts, and threat matrices for specific sites. In order to provide updated weather information to key decision makers, WFO Burlington and Albany used new NWS IDSS tools in the process: GraphiDSS (to create localized maps/overlays centered across the operational area) and prototype IDSS Threat matrix (allowing creation of grids outside a CWA domain and in little as 3-5 seconds).

On-site support was held at the Public Safety Operations Center (PSOC) at the NYSP Barracks. In addition to the PSOC, there were three Regional Operation Centers (ROC) staffed by NYSP and other local/state agencies. IDSS started on January 6 with one operational period, which was used to set up logistics and collaboration with the NYSP and DHSES and further established operational plans for the event. From January 11 through January 23, two operational shifts were maintained by all parties, including the NWS. One operational shift had a forecaster from NWS Burlington and the other from NWS Albany. A stand-up morning brief was held daily at the PSOC, which was also streamed to the ROCs and other supporting agencies. Besides participating in the daily brief as part of the "Command Staff", forecasters provided a continuous weather watch, which included support to the NYSP Aviation Unit consisting of three helicopters and numerous drones. Finally, deployed staff supplied short briefs as input into two daily Incident Action Plan (IAPs) reports.

*NWS BTV Lead Forecaster, Maureen Hastings, giving an Operational Brief at the PSOC*

NWS received numerous accolades (one-on-one and during the actual observational briefs) over the course of this deployment from the Incident Commander, Planning Section Chief, NYSP Air Operations Major as well as from NY DHSES and others. This deployment not only solidified existing partnerships with NY DHSES, but established new ties with NYSP and other state agencies, likely setting the stage for additional successful IDSS opportunities in the future.

## Mansfield Cooperative School Visit 2/15/23
-Rodney Chai

We had a very successful school visit from 10 middle school science students from Mansfield Cooperative School and their Director, Jessie Blake on Feb 15. It turned out to be the first on-site school visit since the pandemic started. It was a tremendous success. We started with a general discussion of the NWS, the responsibilities of a WFO and examples of interesting weather. We had a tour of the operations area, equipment room and the rooftop. Finally, we ended with a discussion of weather and climate and tying back to the NWS mission as requested by Jessie since the students are covering climate topics in their class right now.

The students are all highly intelligent and inquisitive. I must have answered over 80 questions! They ended up staying for nearly two hours, and were thoroughly satisfied with the visit. I mentioned that this would hopefully be the start of a long-term collaboration and we are always here as a resource for them. We certainly have potential meteorologists amongst the students, so I am excited to see how they develop!
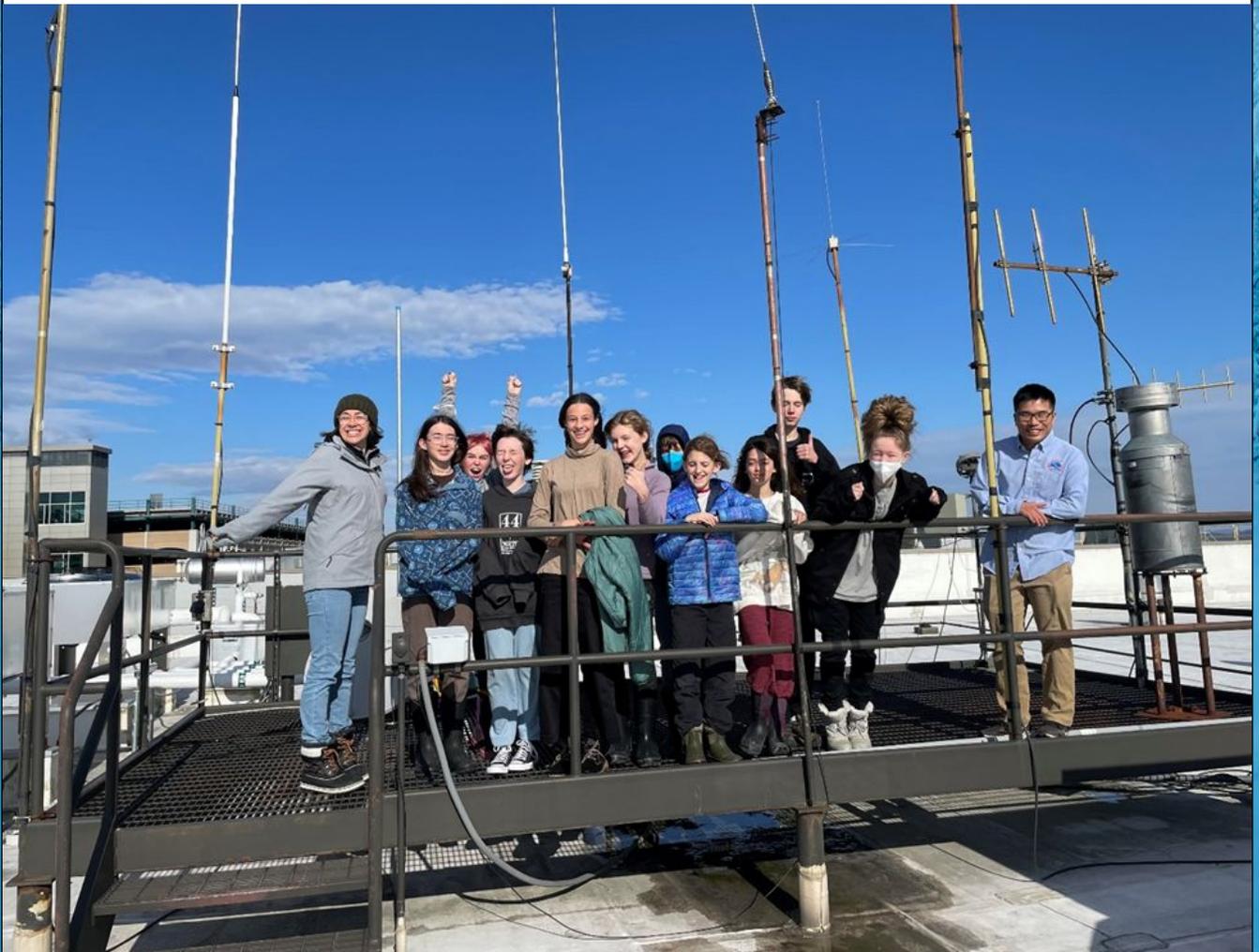
December 23-25 Multi Hazard Winter Storm
-Rodney Chai, Robert Haynes, and Brooke Taber

A powerful storm system brought high winds, a flash freeze/snow burst and heavy lake effect snow with blizzard conditions to the region between 23-25 December 2022. This included the second highest wind gust on record at the Burlington International Airport (BTV) at 71 mph, and widespread 60-70 mph gusts along with numerous power outages and tree damage. Tragically, there was also a storm-related fatality from a falling tree in Castleton. Lightning was also reported near Springfield, Vermont, and portions of northern New York due to the vigorous dynamics of the system with severe weather reported across southern New England. Temperatures rose well into the 50s before plummeting by 30 degrees in a few hours leading to a widespread flash freeze and hazardous travel during the evening of December 23rd and into the day on December 24th. A secondary low pressure system developed along the frontal boundary and brought brief near-blizzard like conditions on the evening of December 23rd, with a widespread 3 to 6 inches of fluffy snow, that ensured a White Christmas for the region after the antecedent snowpack vanished earlier in the day. As the primary low pressure exited, persistent southwest flow developed and due to the sharp temperature difference between 925mb and Great Lake temperatures, the stage was set for a long duration heavy lake effect snow event for St Lawrence County that brought 2 to 3 feet of snow through Christmas Day along with blizzard conditions. Finally, the combination of snow melt and rainfall produced sharp rises on waterways with several rivers reaching minor flood stage on December 23rd into the 24th. The arctic air also resulted in an isolated ice jam event on the Raquette River in Pierrepont, New York, necessitating the evacuation of several homes.


North Country Storm Maximum Wind Gusts - December 22-23, 2022
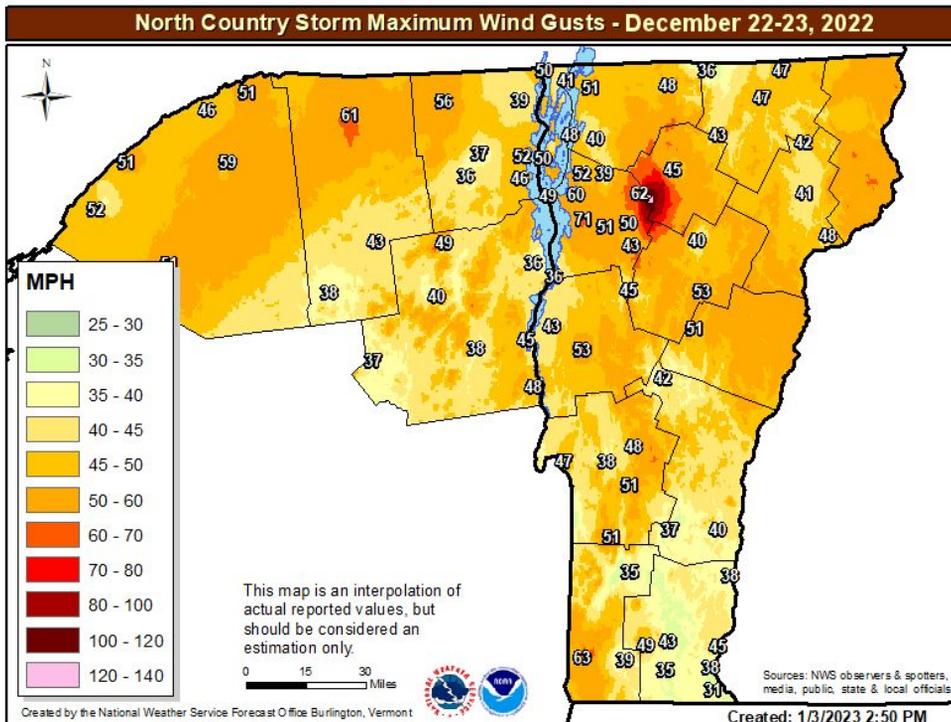
For the full story, check out our meteorological deep dive into this storm here!

February 3-4 2023 Arctic Outbreak
-Rodney Chai

A strong, but short-lived, arctic outbreak occurred from February 3rd into Saturday, February 4th. The combination of temperatures below zero and strong north to northwest winds resulted in wind chill values at -30 to -50 below zero across the region, with locally colder readings over higher terrain. Such cold had not been observed in over 20 years, and is impressive relative to the exceptional warmth of the winter and the arctic outbreak's short duration.

1) Model data:

Using the operational GFS initialized 00Z Jan 31st, valid 7 PM Friday, the closest matches to the pattern (before the core of the cold is over us) supports a 50 to 80% chance of wind chills below -30F!
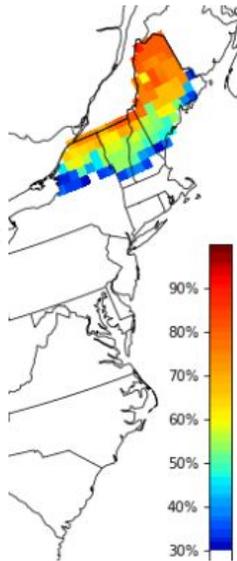
2) Communication:

We used the Forecast Sampler tool to communicate the timing and magnitude of the potential cold, using a preset list of towns/cities that the user can add or delete as preferred. While this is a rather quick-hitting shot of cold and one that has recent precedence, the hitherto anomalously mild winter means this will come as a shock to many across the region, heightening the need to get out the message more aggressively than usual.

One of the key early 'wins' with our proactive messaging has been the postponement and eventually making the 28th annual Penguin Plunge remote given the dangerously cold conditions to participants and spectators. In addition, widespread school closures took place due to the dangerously cold conditions, which we issued Wind Chill Warnings for -30 to -50F wind chill values.

Minimum Wind Chill Forecast (F)

	2/2 Thu				2/3 Fri				2/4 Sat				2/5 Sun				Minimum
	12am	6am	12pm	6pm	12am	6am	12pm	6pm	12am	6am	12pm	6pm	12am	6am	12pm	6pm	
Burlington	3	4	14	16	-11	-26	-30	-35	-39	-41	-25	-13	-8	-4	14	20	-41
Cambridge	4	4	14	15	-11	-30	-34	-39	-42	-42	-32	-17	-9	-1	16	22	-42
Jericho	4	4	14	15	-10	-29	-33	-37	-40	-41	-27	-15	-8	-1	15	22	-41
Lake Placid	0	0	11	7	-18	-33	-39	-44	-46	-46	-30	-17	-8	0	14	15	-46
Malone	2	5	13	7	-21	-34	-36	-37	-40	-41	-30	-19	-6	2	16	19	-41
Massena	3	6	15	6	-20	-28	-31	-35	-37	-39	-26	-16	-7	4	16	18	-39
Middlebury	4	4	16	15	-5	-23	-27	-33	-37	-41	-24	-8	-3	1	16	23	-41
Milton	3	4	14	15	-11	-29	-33	-36	-40	-42	-29	-15	-10	-3	13	20	-42
Montpelier	4	3	19	15	-7	-28	-31	-39	-43	-44	-27	-12	-9	-1	16	22	-44
Mount Mansfield	-14	-14	-7	-4	-26	-47	-57	-58	-62	-65	-54	-41	-32	-23	-4	4	-65
Mount Marcy	-18	-18	-13	-13	-34	-48	-58	-61	-63	-64	-47	-36	-30	-22	-6	2	-64
Newport	3	2	13	14	-8	-31	-37	-40	-44	-46	-34	-18	-11	-7	10	19	-46
Plattsburgh	4	3	18	16	-12	-28	-30	-35	-39	-41	-25	-12	-9	-3	15	22	-41
Rutland	6	5	19	15	0	-21	-26	-35	-37	-40	-26	-10	-3	4	18	22	-40
Saint Albans	4	3	13	13	-13	-33	-35	-38	-42	-43	-33	-18	-11	-4	10	19	-43
Saint Johnsbury	2	1	13	14	-5	-30	-36	-41	-45	-46	-31	-17	-11	-7	10	19	-46
Springfield	4	4	19	16	5	-19	-26	-35	-40	-41	-24	-9	-1	3	15	22	-41
Stowe	3	1	14	15	-8	-30	-34	-39	-42	-43	-30	-16	-10	-1	14	21	-43
Waterbury	3	4	17	15	-7	-27	-32	-37	-41	-43	-28	-14	-9	0	16	21	-43
Williston	3	3	14	14	-9	-27	-32	-36	-40	-42	-28	-14	-8	0	15	21	-42

*Table values in °F
**Created: 4 pm EST Tue 1/31/2023
***Values are minimums over the period beginning at the time shown.

Don't see your city? Check out *weather.gov/forecastpoints*

Forecast valid time: 3:28 pm, Jan 31st 2023

Thanks for the conversation today. I have spoken with the organizers and leadership at SOV and they have decided to cancel the in-person event, based on all of our concerns. They are very appreciative of our input and the information you were able to provide.

Communication from Burlington Fire Chief to NWS Burlington on January 30th, 2023

2023 Penguin Plunge cancels outdoor event, goes remote

About 800 Vermonters took the plunge into Lake Champlain Saturday to raise funds for Special Olympics Vermont (WCAX)
By WCAX News Team
Published: Jan. 30, 2023 at 8:50 PM EST

Colchester School District
2m · 🌐

The US National Weather Service Burlington VT has issued a Wind Chill Warning that states the real-feel temperature will be as low as 30-45 degrees below zero. They advise that the dangerously cold wind chills could cause frostbite on exposed skin in as little as 10 minutes. We have safety concerns for our students that walk or bike to school. We also worry that our buses will experience mechanical issues causing them to be late for their routes and leave students and families waiting outside. Vermont Emergency Management has shelters open and we encourage families in need of assistance to dial 2-1-1 to be connected to immediate services.

Take care of your family, pets and neighbors!

#wearecolchester

It's cold outside, even for Vermonters!

NO SCHOOL

Friday, February 3, 2023

Wind Chill Warning:
30-45 degrees below zero

3) What Happened:
Comparing apples to apples, the lowest hourly observation for wind chills at BTV was -42.0 F on February 3rd. This would make the reading on February 3rd the 8th coldest value; the last time similar values were reached was in 1993.

Top 10 Daily Wind Chills* (1947-)		
Rank	Temperature (°F)	Date(s)
1	-49.7	1/15/1957
2	-48.5	1/4/1981
3	-46.6	1/27/1994
4	-45.4	1/16/1994
5	-45	12/25/1980
6	-44.1	1/26/1994
7	-43.8	2/12/1979
8	-41.8	1/18/1974
9	-41.5	1/3/1981
10	-41.3	2/7/1993
*Observations are based off Hourly Observations only		

There were also numerous reports and photographs of steam devils over Lake Champlain, with quite a few of them captured by our own forecasters!
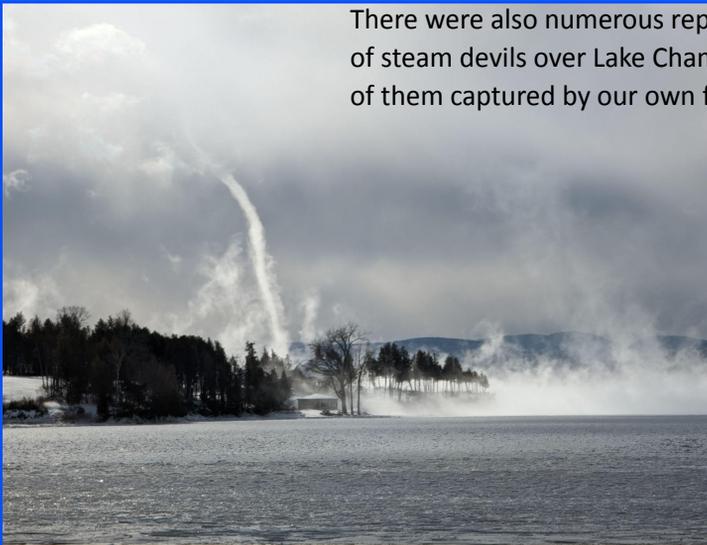
We're Looking for Weather Observers!
-Seth Kutikoff

Do you have an interest in weather or the environment? The Community Collaborative Rain, Hail and Snow Network (CoCoRaHS) needs you! Everyone can participate, both young, old, and in-between. The only requirements are an enthusiasm for watching and reporting weather conditions and a desire to learn more about how weather can affect and impact our lives.

We're looking for dedicated observers in Vermont and northern New York to help us fill data sparse areas! (Our Canadian friends can also sign up as well!) The CoCoRaHS website is organized by state and country, so you can get all the information you need to get started at the links below.
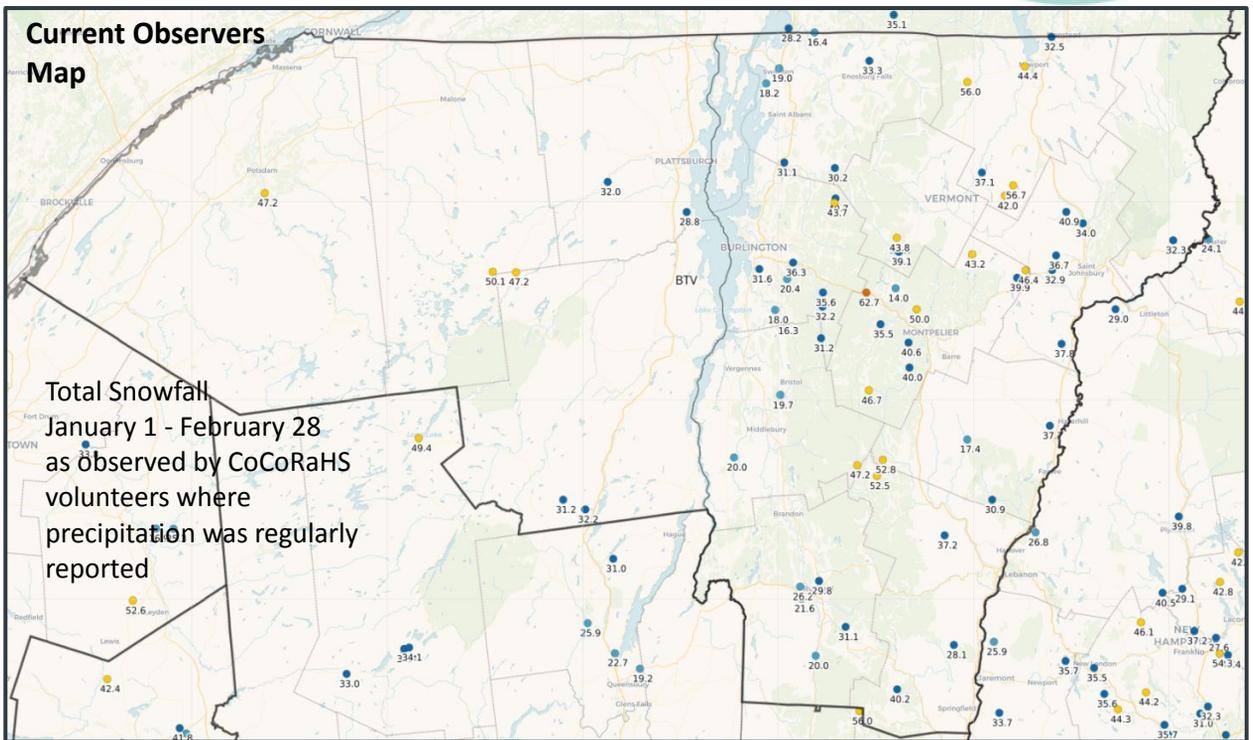
Are you all in?

NY residents   **VT residents**   **CA residents**   **Sign up here**

Station Count Rank	New Station Count	Station Count Rank	Per Capita Count	Per Capita Rank ▲	Population in Millions
Minnesota	341	1	59.64	1	5.72
South Dakota	18	9	19.78	2	0.91
Wyoming	9	19	15.48	3	0.58
Tennessee	69	2	9.79	4	7.05
Wisconsin	52	3	8.82	5	5.89
South Carolina	46	4	8.71	6	5.28
North Dakota	5	25	6.42	7	0.78
Vermont	4	27	6.18	8	0.65

*US State Standings as of 3/13 in **March 2023 Sign Up Competition***

Current Observers Map

Total Snowfall January 1 - February 28 as observed by CoCoRaHS volunteers where precipitation was regularly reported

Changes at BTV - Welcome Rodney and Adrianna!

NWS Burlington is excited to welcome Rodney Chai to the BTV family as our newest Lead Forecaster. Rodney started his NWS career at NWS Boston in 2019. At NWS Boston, he was heavily involved in various outreach efforts. He is a huge advocate of knowledge sharing, significantly growing the office's engagement with the public - 8000 people have registered for 100 topical webinars and event reviews in the past two years. Rodney also led efforts to implement improved office services to Spanish speakers, an at-risk population, in southern New England and to increase community engagements. In addition, he was also part of the office's COOP, Culture, Social Media, Hydrology and Climate teams at NWS Boston. Prior to coming to the NWS, Rodney was a civilian meteorologist at the Navy's Fleet Numerical Meteorology and Oceanography Center (FNMOC) in Monterey, CA. He worked in the Climatology Division, where he provided naval units with climate information and seasonal forecasts for their operations.

Rodney received his M.S. in Meteorology from the University of Kansas in 2018, and also holds a B.A. degree in Philosophy and Political Science from Haverford College in Pennsylvania. Growing up in tropical Singapore, Rodney did not get to experience four seasons until his freshman year in college, when it snowed on Halloween. Ever since then, he fell in love with snow and wanted to learn everything he could about winter weather. Rodney's snowy highlights include forecasting for the New England Blizzard in January 2022, chasing a prolific lake-effect snow event in late February 2020 over the Tug Hill Plateau and attending the NASA Snow Measurement School in Colorado. He is also an avid outdoor enthusiast - having climbed Mt Kilimanjaro, Mt Whitney, Half Dome in Yosemite National Park, many 14ers in Colorado, Mt Washington, and has run 5 marathons.

Rodney is excited to join the NWS Burlington team and looks forward to working with everyone.

Welcome Adrianna!

This December, we welcomed our newest forecaster Adrianna Kremer. She is originally from Long Island, NY but moved to western New York after getting her bachelor's degree in meteorology from SUNY Brockport. Adrianna worked a few different jobs after college, but is so excited to get back into meteorology. In her free time, Adrianna enjoys baking, embroidery, and hiking. During the summer, she loves camping in the Adirondacks and is very excited she gets to be close to the mountains now. Adrianna is looking forward to exploring Vermont and so excited to join the NWS BTV team!

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Volume VIII, Issue IV

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We Need Your Storm Reports!

Please report snowfall, flooding, damaging winds, hail, and tornadoes. When doing so, please try, to the best of your ability, to measure snowfall, estimate hail size, and be specific as to what damage occurred and when. We also love pictures!

For reports, please call:
(802) 863-4279
Or visit:
http://www.weather.gov/btv/stormreport

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