

SUMMER 2026 | VOL. 67 NO. 2

WINDswept

The Bulletin of the Nonprofit Mount Washington Observatory

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FEATURES

- 24 On the Edge: Living and Learning
in the Alpine Zone
By Matt Morris, on behalf of the AMC
- 28 A Closer Look at New Hampshire's
First Ground-Based Scanning Technology
By Ellen Estabrook

NEWS

- 8 Statewide Forecasts from the Top of New
England Now Broadcast throughout
New Hampshire and Vermont
- Lesley-Ann L. Dupigny-Giroux Presented
with AAAS Mani L. Bhaumik Award

WEATHER

- 9 Summary and Chart
- 13 Weather 101: Lunar Halos

Mount Washington Observatory[®] is a private, nonprofit, member-supported institution with a mission to advance understanding of the natural systems that create Earth's weather and climate. It serves this mission by maintaining a weather station on the summit of Mount Washington, performing weather and climate research, conducting innovative science education programs, and interpreting the heritage of the Mount Washington region.

Membership in the Observatory is open to all. Members who donate at least \$60/year or \$5/month receive: Tours of our famous mountaintop weather station (generally mid-May through mid-October); a one-year subscription to *Windswept™: The Bulletin of the Mount Washington Observatory*; meteo-

rology and climate research news from the summit of Mount Washington, straight to your inbox; free admission to *Extreme Mount Washington™* museum; advanced notice of special events; a 15% discount on all purchases in our museum and online shop; and free admission to more than 300 science centers through the ASTC Passport Program (restrictions apply, please see the ASTC website for details).

Members will receive the three issues of *Windswept* for the year following the quarter in which they join. Please make checks payable to the Mount Washington Observatory and send to: Mount Washington Observatory, PO Box 2310, North Conway, NH 03860-2310, or join at mountwashington.org.

DEPARTMENTS

- 4 In My View
- 5 Above the Clouds
- 7 News from Nimbus
- 15 Summit and Weather Operations
- 17 Research Views
- 20 On Technology
- 32 Education
- 34 News From Our Partners
- 39 From the OBS Archive
- 40 Volunteer Community News
- 42 Supporter Spotlight
- 43 Member Milestones Story: 10 years
- 44 Member Milestones
- 45 Upcoming Events
- 46 In-Kind Sponsors, Tributes
& Memorial Gifts
- 47 Corporate Support
- 48 Green Flash

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Peak Seek the Peak Season

BY ELLEN ESTABROOK, WINDSWEPT EDITOR



Ellen Estabrook

By the time this edition of Windswept arrives in your mailbox (or inbox), we'll be just a few weeks away from our 26th annual Seek the Peak, one of the Observatory's signature fundraising events. The excitement and anticipation of this gathering is palpable as staff, volunteers, trustees, families, friends, and curious community members all come together in support of New Hampshire's iconic mountaintop institution and its mission. The energy of the summit's Sherman Adams Visitor Center, buzzing with summer visitors, is matched on the trails as new traditions are shaped by memorable experiences in the White Mountains.

You'll find more information about the event enclosed, as well as a spotlight of longtime friends of the Observatory and Seek the Peak supporters Sandy and Joan Kurtz (pg.42), who are among the trailblazers who have paved the way for this memorable event. We'll also cover two key initiatives tracking ecological and meteorological data on Mount Washington. In *On the Edge: Living and Learning in the Alpine Zone*, the Appalachian Mountain Club's research

team shares about their work analyzing and caring for these "islands in the sky," as well as citizen science initiatives for recreationists who want to contribute to research on their higher summits hikes.

A Closer Look at New Hampshire's First Ground-Based Scanning Technology (pg. 28) will dive deeper into the Observatory's recent installment of a Vaisala WindCube 200S Light Detection and Ranging Unit (LiDAR), and explore implications for research as our team prepares to take the wind map data online. You'll hear from Weather Operations Director Jay Broccolo, who leads the Vaisala project in collaboration with our research and technology teams, as we highlight the science behind the scanning technology.

Whether you join us for our summer fundraiser or support the Observatory at other times of the year from afar, your **support of science and dedication to innovation** make this critical research on and around Mount Washington possible. To that end, we celebrate *you* this Seek the Peak season!

See you on the trails.

Growing Our Impact As Spring Turns to Summer

BY **DREW BUSH**, EXECUTIVE DIRECTOR



Drew Bush

After an epic winter, the Mt. Washington Auto Road plowed out their side of the mountain at, perhaps, the earliest date yet during my time here with the Observatory. As I'm writing these words, they've begun letting visitors drive up half way in early April.

For us, the warm weather ahead will bring renewed focus and important changes to our research and forecasting. Already, our team is hard at work on a revamp of how we communicate our Higher Summits Forecast, Statewide Forecasts, and Recreational Forecasts informed by research conducted in partnership with representatives of our many stakeholder communities and faculty at Northeastern University's Roux Institute. The biggest thing you might notice will be a reorganization on our website along with clearer wording and graphics.

Just last week, we also broke ground on a brand new sound studio for our radio and television work that will be home to our weather operations in Mount Washington Valley. This work will really kick off when we hire interns for our new Broadcast Meteorology Internship in June, but you can expect to see quite a change. Our team has been meeting with a task force of professional broadcast meteorologists

You can expect a Higher Summits Forecast for all those who travel to recreate in the White Mountains, streamable videos, and a more polished presentation in all we do.

who will advise our interns as we launch new text, audio, and video products in partnership with media outlets throughout New England. You can expect a Higher Summits Forecast for all those who travel to recreate in the White Mountains, streamable videos, and a more polished presentation in all we do.

Our work on the second annual White Mountains Almanac already began in January with the arrival of our joint interns shared with the Appalachian Mountain Club and Hubbard Brook Ecosystem Study. We're excited to take another hard look at the human relationship to the weather and climate of

our region, with new topics already in the works to highlight each month of the year. This work continues apace even as we pursue new research into how we can improve weather prediction with AI and upgrades to numerical weather models, international and domestic instrument/product testing, the measurements of snow on our beloved mountain, and understandings of how Arctic Amplification is impacting our weather. We are also actively pursuing support to enhance training opportunities for undergraduate and graduate university students.

Of course, these changes also extend to our signature hiking event of the year, our 26th Annual Seek the Peak. We're thrilled to return this event to Wildcat Mountain Resort on Saturday, July 18,

2026, where participants can ride the chairlift for epic views, enjoy a BBQ feast, listen to live music, have a drink in our beer garden with Tuckerman Brewing, and gather with hiking friends to share the summer. This new venue will also do away with the long tables of sponsors you might recall in favor of meaningful opportunities to connect with a variety of organizations that will provide fun family activities.

If you've never hiked before, we hope you will join us. If you've hiked for many years, we look forward to welcoming you during the heat of this summer. And, if you don't feel like hiking but want to come celebrate, please don't hesitate to sign up to join us for a memorable evening.

ALT: 6288'
TEMP: -1°
WIND: 150 MPH
WIND CHILL: -46°



**WOOL FOR THE
WORLD'S WORST
WEATHER**

Summer is the Most Purrfect Time of the Year

TRANSLATED BY **MADELYNN SMITH, NIGHT OBSERVER**

Hello from your favorite four-legged resident of

Meowt Wash-ington! I am paws-ively excited that summer has returned. Don't get me wrong, snow is purr-ty cool and all. And the furr-ezing weather leads to the weather observers staying

inside a bit more, which means I have more opportunities to crawl in their laps. But summer is my fav-fur-ite time of year because I love to get outside, and it's not as fun to walk around when it's cold and windy. The Observatory tower gets warmer too, so I like to paw up-stairs and bother- I mean spend quality time with the observers up in the weath-er room. They're my best furr-iends.

Summer also means that the summit of the meowtain is open to the public again! I've got to listen to our summer interns give some absolutely claw-some tours of the observatory. They talk about ane-meow-meters and the purr-cipitation can, how winds flow over the Purr-residential Range using



the to-paw-graphy map and why we have some of the most fur-midable weather on the planet. I like our interns a lot. They made Mice Krispy Treats the other night. Very tasty. Summer is also the greatest because that means Seek the Peak is hap-pening soon! It's being hosted at Wildcat Meowtain

this year, which is such a cat-tastic name for a meowtain by the way. A big paw high-five to all the cool cat people who have donated to my Seek the Peak fundraising page—last year, I was top fundraiser for the event, and this year, I'm in the running again! (I'm the only cat signed up for this event, so I deserve a treat either way).

I think purr-haps the best part of summer is watching the sunsets outside. They're always so meow-gical, I lit-ter-ally never get tired of seeing them. In fact, I'm gonna go cat-ch the one that's happening right this meow-ment! That's all fur meow! Hope you have a claw-some summer!



Statewide Forecasts from the Top of New England Now Broadcast throughout New Hampshire and Vermont

In early 2025, Mount Washington Observatory (MWOBS) expanded its forecasting coverage area beyond the White Mountains to reach across all of New Hampshire and Vermont. Radio and digital media partners including New Hampshire Public Radio (NHPR), Radio Vermont Group (RVG), and Conway Broadcasting now carry daily statewide, weekly recreational, and seasonal forecasts produced by MWOBS meteorologists. These products help residents and visitors plan their daily commutes and outdoor recreational

activities. Businesses and other organizations across the two states also benefit from practical, actionable information and a broader understanding of weather patterns.

A Summer 2026 Broadcast Meteorology internship program will support this growth, offering two early-career professionals a unique opportunity and applied experience in operational forecasting, broadcast weather communication, public weather messaging, and media production.

Lesley-Ann L. Dupigny-Giroux Presented with AAAS Mani L. Bhaumik Award

Mount Washington Observatory Trustee Lesley-Ann L. Dupigny-Giroux, who works as the Vermont State Climatologist and as a professor of climatology at the University of Vermont, is the recipient of the American Association for the Advancement of Science's 2026 Mani L. Bhaumik Award for Public Engagement with Science. The award was established in 1987 and endowed in 2019 by quantum physicist Mani L. Bhaumik to focus on "recognizing meaningful dialogue and exchange between the recipient and various publics."

Dupigny-Giroux is known for her inventive teaching for students of all ages and across communities, showing how climatologists, meteorologists, and engineers work together to address climate change.

Her deep and sustained collaborations with farmers, emergency managers, scientists, and educators have been essential in making climate science accessible to a wide range of audiences.

Dupigny-Giroux also was one of the developers of the original national Climate Literacy Guide and helped lead the Weather and Climate Initiative at the University of Vermont, a professional development program for K-12 teachers.



Lesley-Ann L. Dupigny-Giroux. Photo by Sally MacKay, UVM Communications

WINTER/SPRING 2025/26 WEATHER DATA

	DEC	JAN	FEB	MAR
Temperature (°F)				
Average	5.7	1.5	6.9	16.7
Departure	-6.1	-4.3	+1.0	+3.8
Maximum	38	33	27	45
Date(s)	19th, 29th	9th	20th	11th
Minimum	-21	-31	-12	-19
Date(s)	4th	24th	7th	1st/2nd

Precipitation (inches)				
Monthly	5.59	3.15	1.58	5.30
Departure	-1.76	-2.59	-3.87	-1.42
24-hour Maximum	1.23	0.66	0.38	1.08
Date(s)	19th/20th	25th/26th	20th/21st	16th/17th

Snowfall (inches)				
Monthly	47.6	43.0	22.1	28.6
Departure	-0.1	+1.6	-21.2	-17.6
24-hour Maximum	7.8	12.2	6.0	6.7
Date(s)	2nd/3rd	25th/26th	20th/21st	14th
Season Total	129.6	172.6	194.7	223.3
Departure	+25.9	+27.5	+6.3	-11.2

Wind (mph)				
Average	51.8	45.3	33.7	43.7
Departure	+7.8	-0.3	-10.9	+3.9
Peak Gust/Direction	125 W	129 W	105 NW	114 S
Date(s)	20th	9th	15th	17th
Days 73+	24	22	11	21
Days 100+	12	7	1	6

Other				
% Sunshine	33	26	43	30
Clear Days	0	2	4	0
Partly Cloudy Days	10	0	5	4
Cloudy Days	21	29	19	27
Days with Fog	31	30	25	31
Days with Rain	2	3	0	11
Days with Snow	28	29	19	22

*Some fell as hail **Last of several occurrences

Winter/Spring 2025-26 Summary

BY RYAN KNAPP

Winter 2025/2026 was a roller coaster of weather as the summit saw record highs and record lows along with periods of rain and snow. As a result, the snowpack seemed to build and melt on nearly a weekly basis.

December 2025

A cold front on the 1st brought snow and graupel. A coastal low on the 2nd/3rd provided fog and snow. Summits briefly cleared on the 4th, then an arctic cold front brought fog, snow, winds, and cold. Temperatures fell to 21F below, tying the daily record low first set in 1976 and equaled in 1989. High pressure provided clearing and calming conditions on the 5th. A warm front on the 6th returned seasonal temperatures, fog, and snow. A Clipper on the 7th provided additional snow. High pressure on the 8th brought clearing and subzero conditions. A warm front on the 9th returned fog, snow, and seasonal temperatures. A low passed on the 10th and dragged a cold front through overnight into the

11th, with subzero temperatures returning. The low stalled to our SW and winds increased through the 12th. Light snow continued until the evening. High pressure cleared summits on the 13th before another Clipper returned fog and snow overnight into the 14th. Subzero temperatures followed on the 15th. The low deepened offshore, driving winds up and providing upslope snow.

The 16th saw clearing early, then a warm front returned fog and snow overnight. A cold front on the 17th brought continued fog, snow, and high winds. A high on the 18th provided clearing and decreasing winds. Temperatures rose to 38F on the 19th, tying the daily record high originally set in 1976. The warmth resulted in sleet, freezing rain, and rain. A cold front returned snow overnight into the 20th, then high pressure provided clearing late on the 20th. A Clipper on the 21st returned fog, snow, subzero temperatures, and high winds. An upper-level trough continued cold, snow, and winds on the 22nd. Another Clipper passed on the 23rd, and a Norlun Trough developed on its backside on the 24th. A cold front on the 25th brought additional snow, subzero temperatures, and high winds. A high resulted in clearing on

the 26th. A low passed to the SW early on the 27th, then high pressure rebuilt. A low from the Ohio Valley on the 29th raised temperatures to 40F, delivered moderate rain, which reduced our snowpack from 12 inches to 3 inches by the 30th, and left lots of ice as waterlogged snow froze. High pressure on the 31st returned mild temperatures and clearing.

January 2026

A surface low passed on the 1st, providing freezing drizzle and snow. The low deepened over the Canadian Maritimes on the 2nd, resulting in gusts reaching 142 mph; snow and blowing snow were common. A Greenland High caused the low to stall on the 3rd/4th, keeping summits foggy, snowy, and windy. A Canadian High provided a brief break on the 4th, then a low passed overnight and eventually got enveloped by the stalled low to our NE. The low finally departed on the 5th, and a weak ridge briefly provided clearing in the afternoon through early on the 6th. A low returned fog and light snow overnight and into the 7th. A ridge built on the 8th, then slid east on the 9th as a cold front passed overnight into the 10th. A low to the north on the 11th provided a wintry mix. A coastal low returned snow overnight into the 12th with high winds on its backside. A high on the 13th provided clearing. A Clipper stalled to our west overnight into the 14th, returning fog and snow. A secondary low tracked northeast on the 14th/15th, providing additional fog and snow.

A ridge provided clearing on the 16th, then a Clipper returned fog and snow by

the 17th. A ridge on the 18th was short-lived as a coastal low passed overnight into the 19th. A cold front passed overnight into the 20th, providing fog, snow, and subzero temperatures. Clearing briefly returned on the 21st, then a warm front returned fog and snow overnight. A cold front late on the 22nd provided additional snow, subzero temperatures, and high winds. An Arctic cold front provided a reinforcing shot of cold, dropping to 31F below by the 24th, as snowy and windy conditions continued on the 23rd/24th. A coastal low on the 25th/26th brought 15 inches of snow to the summit, with relatively light winds. A trough over the eastern half of the lower 48 kept summits in the fog with light snow as temperatures remained subzero (F) for the 27th-30th. A Canadian high on the 30th/31st allowed for clearing skies, low winds, an undercast, and temperatures rising to just above 0F.

February 2026

High pressure started the month with fair skies and seasonal temperatures. Summit fog returned late on the 3rd, and snow returned on the 4th from a weak upper-level low. High pressure cleared summits late on the 4th. A weak short-wave early on the 5th provided morning fog before clearing as high pressure rebuilt. Clouds returned on the 6th with summit fog and snow returning overnight and continuing through the 8th as a low passed. A high provided clearing the evening of the 8th with fair skies continuing into the 9th. A Clipper returned fog and snow on the 10th, and a trailing upper-level trough continued

snow for the 11th/12th. A ridge late on the 12th, provided fair weather for the 13th. A Clipper returned fog and snow on the 14th. Snow tapered, and fog cleared on the 15th as high pressure crested overhead.

A warm front on the 16th returned fog and snow, with continued fog/snow on the 17th as a cold front swept through. Snow tapered on the 18th and cleared by the afternoon, with fair weather lingering into the 19th as high pressure crested over the region. A low from the west and a coastal low squeezed the state, bringing fog and moderate snow on the 20th/21st. High pressure provided clearing late on the 21st and into the 22nd. A Nor'easter impacted the region on the 23rd, but the summit only saw 2.4 inches of snow. High pressure returned on the 24th. A low from the west lifted a warm front across the region on the 25th, and a cold front passed on the 26th. A Clipper passed on the 27th with a trailing cold front passing on the 28th.

March 2026

High pressure on the 1st shifted offshore as an arctic cold front swept through. A Canadian high provided subzero temperatures and clearing on the 2nd. A low traversed southern New England on the 3rd and returned fog and snow which lingered into the 4th. High pressure provided clearing for the 5th/6th. A coastal low provided sleet, snow, and drizzle on the 7th. Temperatures rose to 44F on the 7th (new daily record high), resulting in rain and high winds as a low passed to our north. The 8th saw 41F (tying the

daily record high), rain, and high winds before a cold front dropped temperatures. Clearing returned on the 9th, with a Bermuda high and a strong return flow, which boosted temperatures. This resulted in new daily record highs of 42F on the 10th, 45F on the 11th, and 44F on the 12th. A cold front brought rain on the 11th/12th, with snow returning late on the 12th as temperatures dropped by nearly 50F behind the front. A Clipper on the 13th/14th provided snow and high winds. A high on the 15th provided clearing before a warm front returned snow overnight.

Temperatures rose behind the front, reaching 43F on the 16th/17th, causing snow to transition to rain. After nearly an inch of rain, snow returned as a cold front passed, dropping temperatures by more than 50F. Upslope snow lingered into the 18th and then tapered. A Clipper on the 19th, and a secondary Clipper on the 20th provided additional light snow. Upslope flow on the 21st kept the summit in the clouds. A Clipper on the 22nd provided snow, sleet, and graupel. An upper-level trough and coastal low continued snow for the 23rd/24th. A cold front passed overnight and into the 25th. A Clipper followed for the 25th/26th. A warm front swung northward late on the 26th, providing a wintry mix that lingered into the 27th. A cold front on the 27th returned subzero temperatures and snow. Upslope snow lingered into the 28th. Clearing early on the 29th gave way to fog and snow by the afternoon. A cold front provided snow early on the 30th. A warm front lifted north, resulting in freezing rain late on the 30th, then transitioned to rain on the 31st as the front stalled to our north.

Lunar Halos

BY BAILEY NORDIN

As the newest Observer on Mount Washington and a new arrival to the world of meteorology in general, I tend to assume that any atmospheric phenomena I've heard of must also be common knowledge to every Tom, Dick, and Harry. Imagine my surprise when, sitting around a campfire with a few friends on a recent off week, I pointed out a lunar halo only to be met with a chorus of confusion and blank stares. As I excitedly explained the

possible causes and implications of such a display, I thought back to the lunar halo that had framed the moon over the Observatory on my very first shift on the rock pile — how many questions I'd had about it and how comparatively little I'd known at the time. I decided a contribution on the causes and significance of these under-appreciated nighttime phenomena was in order.

For sailors, explorers, and outdoor enthusiasts, the saying *"a ring around the moon means rain soon"* has been tossed around for generations as an explanation for and acknowledgment of what these lunar halos might suggest. While that phrase is mostly true — moonlight



A lunar halo over the observation tower in January of this year (right), along with the one we observed in April above a campfire in Norwich, Vermont.

refracting off of ice crystals in high altitude cirrus clouds produces the visual effect of a ring around the moon — it is not strictly true that lunar halos *always* herald the arrival of rain, or even that they always mean cold weather. The lunar halo we saw around the campfire at my home in Vermont appeared the night before temperatures climbed over 60 degrees!

The phenomenon we were observing that night is actually the lunar specific form of something called a 22-degree halo, which is visible to a viewer on the ground when light from the sun or moon is refracted and reflected off of ice crystals in cirrus and cirrostratus clouds and the light becomes bent 22 degrees from its original direction. This angle is so unique because it is the result of ice being bent both as it enters and as it exits each ice crystal, and means that the resulting ring, which forms with a 22-degree radius, will appear different from different angles as the position of high-level clouds and the viewer change, possibly even disappearing entirely.

Maybe in part because of this ethereal nature, lunar halos in particular have long evoked a sense of uneasiness and impending bad weather in popular culture around sailing and spending time outdoors. A significant number of high-level cirrus clouds can indeed indicate the approach of a frontal system, and the necessity of ice crystals to create these rings also means they are often associated with some of the more serious winter storms. As in the case of our halo over Vermont this past week,

however, high, isolated sheets of cirrus clouds can also occur with a more stable weather patterns. Perhaps the severity of what these halos may represent as well as the uncertainty is part of what has given them their eerie, alluring place in popular culture and legend, as referenced in this 1842 poem by Henry Wadsworth Longfellow about a shipwreck on a winter voyage.

*“Last night, the moon had a golden ring,
And to-night no moon we see!”
The skipper, he blew a whiff from his pipe,
And a scornful laugh laughed he.*

*Colder and louder blew the wind,
A gale from the Northeast,
The snow fell hissing in the brine,
And the billows frothed like yeast.*

*Down came the storm, and smote amain
The vessel in its strength;
She shuddered and paused, like a
frighted steed,
Then leaped her cable's length.*

*“Come hither! come hither! my little
daughter,
And do not tremble so;
For I can weather the roughest gale
That ever wind did blow.”*

— from *The Wreck of the Hesperus* by
Henry Wadsworth Longfellow

Winter Wear and Tear on the Summit

BY **MIKE CARMON**

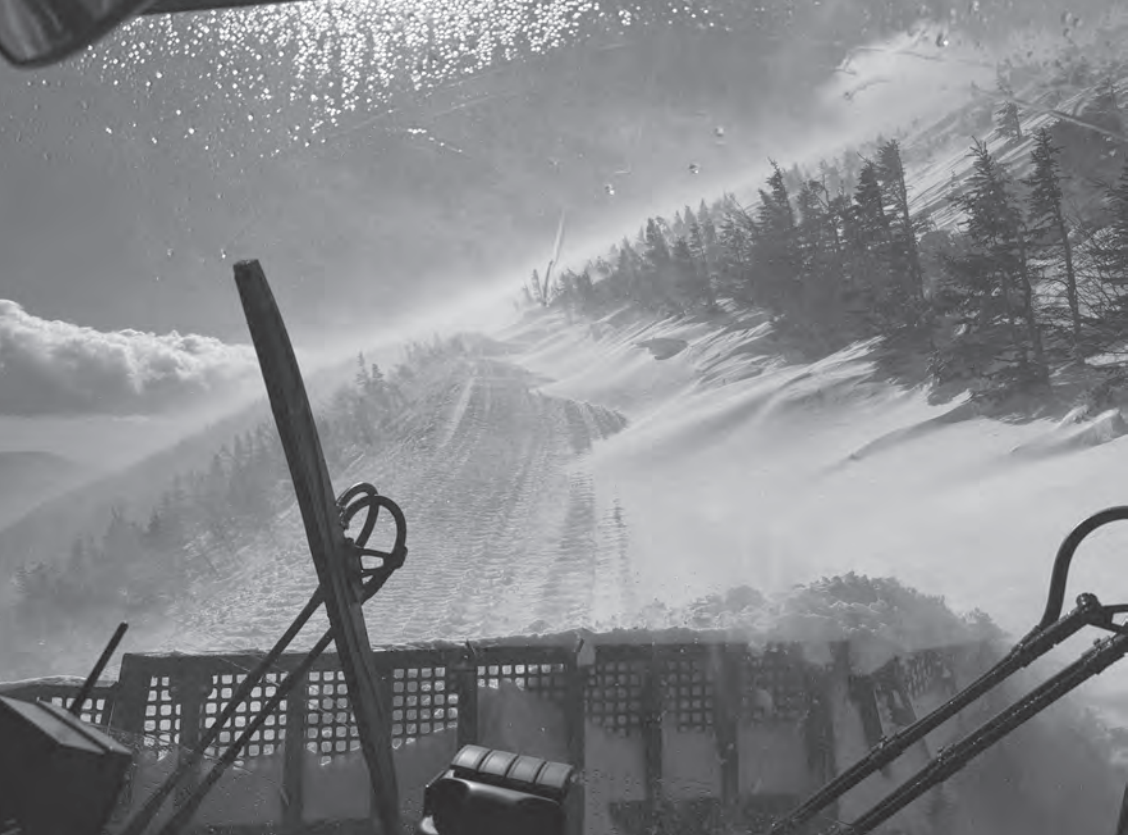
When winter sets in across New England, we all strap in for a bumpy ride. This translates quite literally to life and work at the summit weather station, as transportation, maintenance, and weather operations all accumulate additional challenges through the snowy, icy season. The twists and turns of your classic New England winter are magnified at a mountaintop location. For example, a common refrain among the weather operations staff is that a 25-mph wind gust at the mountain's base (a decent breeze for any typical valley-dweller) will translate to a 100-mph wind as it passes over the summit due to the blend of topographic effects and atmospheric dynamics.

In actuality, this calculation rarely plays out so neat and tidy. But the spirit of that heuristic is very often true: all matters being equal, the weather only gets more severe with increases in elevation. We had plenty of rescheduled trips and abbreviated shift change days to prove that this winter. Even with the battening down of the hatches, the cracks still tend to show themselves during the winter months. And many said cracks need to wait for attention until more placid weather takes hold again. By cold season's

end, we generally have a queue of maintenance tasks lined up to keep us busy throughout the summer months.

Many, many winter seasons of tower de-icing led to some literal cracks showing in our critical parapet ring earlier this summer. While a temporary fix was placed on the ring to ride out the winter and its plentiful freeze/thaw cycles, a more in-depth repair is coming this summer. Nearly all of our summit wind instrumentation is anchored to this ring, making it a curiously critical component of summit operations. These various sensors all had their fair share of wear-and-tear this winter too. Our RM young lost a tail, and one of our mechanical wind vanes had occasional misalignment issues.

Redundancy is key in an extreme weather environment renowned for continuous data flow, and luckily backup instrumentation proved reliable through instrumentation repairs. Elsewhere, our stalwart sling psychrometer suffered a freak break and one of our precipitation cans sprung a small leak. Luckily, some quick-thinking by our well-trained staff (along with support from valley staff) keeps high-quality data flowing



A view from the snowcat during a mid-winter shift change day on the 5-mile section of the Mt. Washington Auto road.

through these bumps in the road. I'm happy to report repairs to the primary instruments were accomplished efficiently and repairs to the primary instruments were accomplished efficiently and the instruments returned to the summit expediently.

Alpine winter weather can take its toll on our most valuable summit resource: our hardy summit staff. Even the most seasoned observers are not immune to this. Luckily, observers, myself, and even summit interns stepped in at various points this winter to support an observer out sick or in need of additional recovery time. The team spirit is very much alive and well

among the summit crew. While the summit of Mount Washington is an excellent place to experience much, the remnants of a lingering flu or a stomach bug are near the bottom of anyone's summit bucket list. Observers stepped in many times to cover shifts, work longer and/or off-hours, or extend their shifts by a few days to support their co-workers.

With the summit team calling the weather station home every other week, we are always striving for upgrades. We've had several summit volunteers provide valuable suggestions to spruce up the living quarters, which will include (among other items) some

reorganization, as well as furniture replacements and rearrangements. Our second-annual deep-spring-clean of the summit living quarters brings a group of dedicated volunteers up for a night to dive deep on some of the more involved cleaning tasks.

Spring also means a different sort of clean-up for us on the Mount Washington Auto Road. And while the Auto Road staff govern that effort, our transportation staff supports as needed through the inevitable melt-outs and re-freezes of March and April. A near-

70-degree (F) day in the valleys in mid-March translated to record-breaking mid-40s (F) at the summit station. This brought some necessary shifts in above-treeline roadwork through that time period. While enough snow lingered to remain in the snow tractor, pervasive runoff and uneven melting takes its toll on the well-kempt snowy road during such an event. Icy conditions (sans snow) tend to harbor some of the trickiest road conditions to navigate, but it's generally the first harbinger of the inevitable return of summer tranquility.

RESEARCH VIEWS

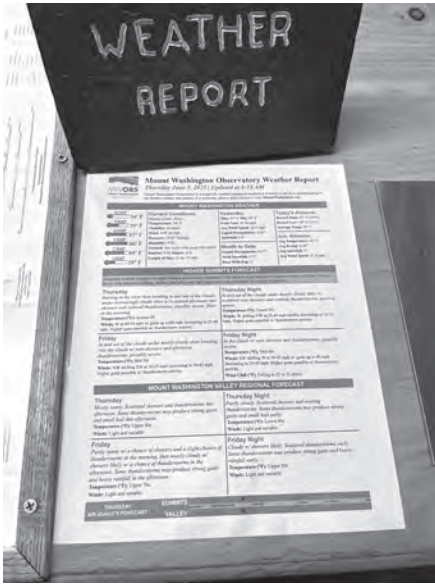
From the Summit to Paper: A Season of Research at MWOBS

BY JAY BROCCOLO

It has been an active few months on the research and instrumentation front at Mount Washington Observatory. Our weather operations continue to advance with ongoing product testing and an expanding suite of observational capabilities across the region through our Mesonet system. The Mount Washington Regional Mesonet has grown considerably, with new stations coming online across the White Mountains and our formal participation in the National Mesonet Program connecting our network to a nationwide surface observation infrastructure and

making our data public. On the snow monitoring side, we are actively working with partners at UNH, UMaine, UVM, and the AMC toward a collaborative regional snow monitoring effort, an exciting direction that speaks to the growing appetite for coordinated mountain weather and climate observations across New England.

Against this backdrop of ongoing observational work, the science group has had a busy spring. We spotlight three winter intern research projects here that wrapped up in April and



Fliers, printed daily and available at the Mount Washington Observatory showing both current conditions as well as the higher summit forecast, are a subject of the team's EuroVis research paper.

early May, each tackling a different dimension of weather, climate, and snow science in our region. We also share exciting news about a recently accepted scientific paper co-authored by Observatory staff, a first foray into the world of data visualization research that speaks directly to how we communicate hazardous conditions to the public.

Winter Intern Research: Three Projects, One Mountain

Each winter, MWOBs hosts interns who bring fresh energy and new questions to our data-rich environment. This season's cohort produced three strong independent projects, all rooted in the Observatory's unique observational assets.

Ryan Tanski investigated weak-layer formation in the Mount Washington Avalanche Center forecast area using physics-based snowpack modeling. Using meteorological forcing data from the Hermit Lake station and manual snow pit observations as both initialization criteria and validation, Ryan applied the SNOWPACK 1D model to simulate snowpack evolution and identify conditions favorable for avalanche-producing weak layers, faceted crystals, depth hoar, and surface hoar among them. His work lays the groundwork for testing whether physics-based modeling can meaningfully augment the MWAC forecasting process, with future directions including the implementation of Alpine3D and a potential wind-mapping campaign across neighboring ravines using the MWOBs mesonet network.

Ryan Steinke turned his attention to a question with deep roots in New England's cultural identity: how has climate change already reshaped the maple sugaring season? Drawing on 128 years of temperature records from St. Johnsbury, Vermont, Ryan applied a temperature-threshold approach to define "sugaring days" and track how their timing and character have shifted over more than a century. His results confirmed what many producers have long suspected—the median sugaring day has shifted roughly seven days earlier across the full period of record, consistent with broader regional warming trends. Notably, the total number of sugaring days per season has remained relatively stable, even as

the season migrates earlier in the year and the average diurnal temperature range shows a modest but statistically significant decline.

Anna Trujillo developed a novel Backcountry Ski Index (BCSI) tailored specifically to Tuckerman Ravine, filling a gap left by existing ski climate indices that were designed around resort operations. Anna's index integrates snow depth, new snowfall quality and decay, snow density, temperature, wind, sky cover, and, crucially, avalanche danger, combining them into a single daily score ranging from 0 to 1. Applied to six seasons of data from Hermit Lake (2018-2025), the BCSI reveals a statistically significant downward trend in mean seasonal ski quality, consistent with broader climate projections for mountain snow sports. Validation against MWAC snow ranger observations from the 2025-2026 season showed meaningful correlation with observed snow surface quality, with spring corn snow conditions identified as an area for further refinement.

EuroVis 2026: Visualizing Hazard, Communicating Risk

In other research news, a paper authored by Dr. Michael Correll of Northeastern University and co-authored by Observatory staff, myself and our Executive Director, Dr. Drew Bush has been accepted to EuroVis 2026, a leading international conference in data visualization. The paper, titled "The Worst Weather In America: Augmenting the Information Design of Extreme Cold Weather Forecasts", grew out of a participatory workshop that brought

together stakeholders from across the White Mountains region including representatives from NH Fish & Game, the US Forest Service, search and rescue organizations, and the hospitality and recreation industries, to examine how the Higher Summits Forecast communicates hazard to visitors.

The central finding is both intuitive and important: augmenting the current text-heavy forecast with color-coded visual hazard icons, derived from established scales like the Beaufort Scale and NWS wind chill chart, measurably increases users' perceived risk of mountain activities, without appearing to suppress engagement with the underlying forecast text. In a crowd-sourced study of 128 participants, those shown icon-augmented forecasts rated mountain activities as significantly riskier than those shown the text-only baseline.

The work raises real questions that go beyond design aesthetics. At a mountain that sees hundreds of thousands of visitors annually and averages a couple of fatalities per year, how we present forecast information is a life-safety issue. The paper frames this through the lens of visualization ethics, arguing that designers working in high-stakes domains should favor conservative, evidence-based interventions, translating information clearly without veering into prescription. It's a balance our forecasting team navigates every day, and we're proud to see that work reflected in the peer-reviewed literature.

Measuring Cosmic Rays with the Help of Wax?

BY COLBY MORRIS

A few weeks ago, I was given a technical assignment, one I have been tasked with many times as an IT professional in an ever-evolving field.

My assignment?

To turn something off and back on again...

That “something” was located at the top of Mount Washington, inside a small building on the summit deck called the Cosmo Shack. I’ve worked at the Mount Washington Observatory for about a year now, and in that time, I have only walked past the small, shed-like building on the summit.



From the outside, it never looked like much. It was just a small, wooden-shingled shack with a slanted roof and a simple door. It sat quietly beside the Observatory tower, which bristled with weather instruments, satellite equipment, radio dishes, and other research tools. Next to all of that, the Cosmo Shack looked almost too ordinary.

That is, until I learned what was happening inside.

The Cosmo Shack is home to a neutron monitor, an instrument used to measure the intensity of cosmic rays from space. Suddenly, this ordinary little building felt a lot less ordinary. If a building is helping measure particles from space, you expect the inside to look like something from a science fiction movie.

Then I opened the door and saw it.

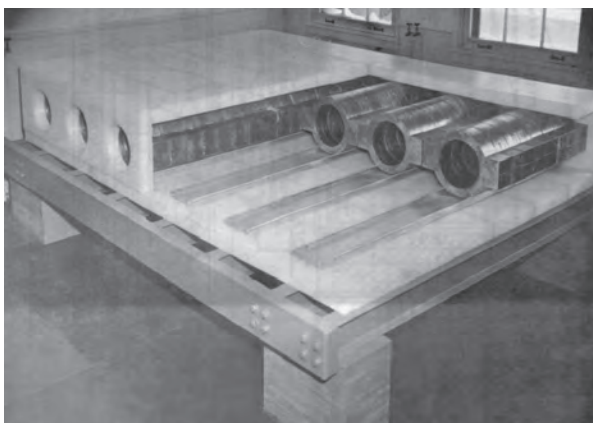
Blocks of wax?

Inside, the first thing that caught my eye was not a glowing screen or some futuristic-looking machine. It was blocks of wax, paraffin wax to be exact, along with metal shielding, cables, and electronics. But the wax is not random. It is a key part of how this type of neutron monitor works.

The neutron monitor on Mount Washington is a historic scientific instrument. It first began operating on the summit in 1955, continued running until 2006, and returned to operation in 2014. Today, the project is operated by the University of New Hampshire's Space Science Center, and Mount Washington Observatory describes Cosmo as the longest-running research project on the summit.

The Mount Washington neutron monitoring station, known as MTWS, is a 12-tube IGY neutron monitor. It uses BF₃ gas-filled proportional counter tubes, lead, and paraffin wax. The tubes themselves are hidden within the detector's shielding and moderator material.

That is what makes the inside of the Cosmo Shack so interesting. The most visible parts look surprisingly simple, but each material has a purpose. The lead helps incoming cosmic-ray particles produce additional neutrons. The paraffin wax helps slow those neutrons down so they can be detected and counted.



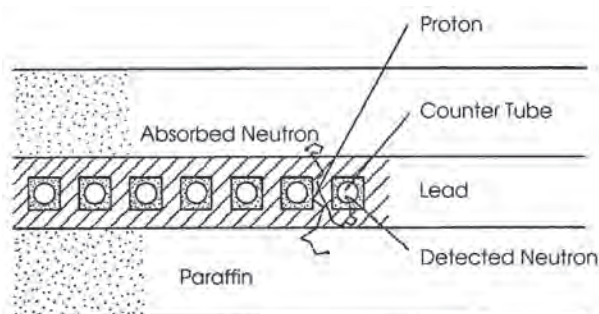
Cosmo is not directly catching cosmic rays like a net. Cosmic rays are high-energy particles from space. When these particles reach Earth, they collide with atoms high in the atmosphere. Those collisions create showers of secondary particles that continue downward toward the surface. Some of those particles eventually reach the summit of Mount Washington, where Cosmo can detect them.

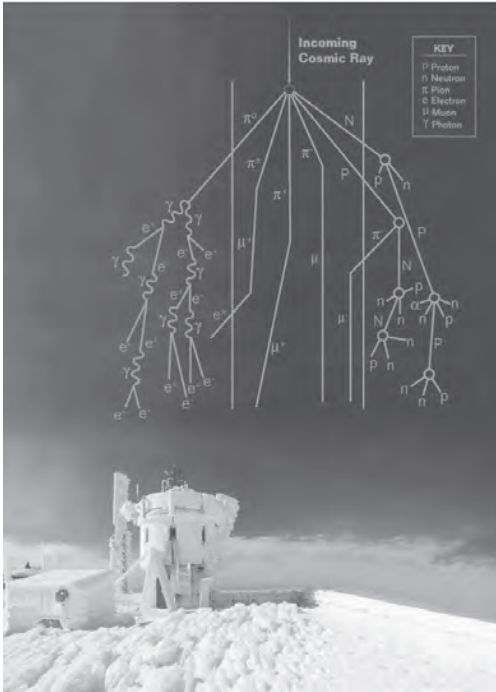
But why at the top of Mount Washington?

Mount Washington's elevation makes it a useful place for this kind of research. At 6,288 feet above sea level, there is less atmosphere above the summit than there is at lower elevations.

With less atmosphere in the way, more of these secondary particles can reach the detector.

The data collected by Cosmo helps scientists understand how cosmic ray intensity changes over time. Some of those changes are con-





nected to the Sun's 11-year solar cycle. Cosmo can also help identify sudden decreases in cosmic ray intensity caused by solar storms.

In that way, the little shack is connected to something much larger than the summit. It is part of a long-term record of how space weather interacts with Earth's atmosphere.

I walked in expecting to restart a piece of equipment.

I walked out with a new appreciation for one of the summit's quietest and longest-running experiments, a small shack on the Rockpile that helps connect Mount Washington to the rest of the universe.

Citations:

https://www.nmdb.eu/public_outreach/en/04_nm/https://indico.cern.ch/event/1474973/contributions/6286976/attachments/3019752/5327338/UNH_NM_electronics_final.pdf

<https://mountwashington.org/research/current-research-projects/monitoring-the-intensity-of-cosmic-rays-from-outer-space/>

<https://www.nmdb.eu/station/mtws/#>

<https://www.swpc.noaa.gov/sites/default/files/images/u97/Mangeard-PierreSimon.pdf>

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On the Edge: Living and Learning in the Alpine Zone

BY **MATT MORRIS**, ON BEHALF OF THE APPALACHIAN MOUNTAIN CLUB



Mountain azaleas, White Mountain National Forest, New Hampshire. Photo by Emily Davenport.

The first time Georgia Murray broke treeline in New Hampshire, she was new to her job as a staff scientist for the Appalachian Mountain Club. But the scene in front of her was *déjà vu*. The earth was rocky, raw and dropped off on all sides. Around the stones was an ankle-high jungle of labrador tea and wild mountain cranberry. The species were the same ones she'd seen at her previous worksite — 4,500 miles away, in the Alaskan Arctic.

"All these things are also in the Arctic, but not in the middle. The Rockies don't have them. So, it was very impressive," said Murray. "In fact, it still takes my breath away every time I go in there."

Twenty-six years later, Murray is a senior scientist and Assistant Director of Research at AMC and a frequent return visitor to what's called the Alpine Zone — the tundra-like landscapes atop New Hampshire's highest mountains. These are places of contrast: low year-round temperatures and



Dr. Jordon Tourville and Braedon Lineman setting up warming chambers in the alpine zone, White Mountain National Forest, New Hampshire. Photo by AMC Staff.

some of the highest wind speeds ever recorded. Sometimes, hikers can see to the Atlantic Ocean, other times, no more than a few feet ahead.

The zone may appear inhospitable, but it's teeming with life. In addition to the shrubs spotted by Murray, there are *diapensia*, *Bigelow* sedges, mountain azaleas and the windblown trees called *krummholz*. The plants cling to rocks for warmth and are mostly pollinated by flower flies instead of bees. They stay alive under sheets of ice and frost, then flower briefly and brightly. Some are so uniquely suited to the White Mountain alpine that they aren't found anywhere else on earth.

"These are plants that are kind of on the edge," said Murray's colleague on the AMC research team, Dr. Jordon Tourville. "From an ecological point of view, it shows us what is possible for life to

endure."

Murray and Tourville are just a few of the AMC staff members and volunteers charged with caring for this high mountain flora. While the plants can stand hurricane-force winds, a single boot print from an off-trail hiker can wipe out centuries of growth. For decades, AMC scientists, hut naturalists and Alpine Stewards have worked together to educate the public and keep them on the beaten path. Now, they're tracking another, even greater threat: climate change.

Islands in the Sky

It may sound odd to talk about plants migrating. But, over many generations, that's exactly what they do. As the climate around them changes, so will a species' distribution. In mountain environments, that usually means they'll encroach further upslope — towards



[Left to right] Madelyn Wood, Researcher; Georgia Murray, Senior Scientist; Addy Budliger Research Intern (2025), Grace Horne, 2025 UC Davis PhD candidate, White Mountain National Forest, New Hampshire. Photo by Madelyn Wood.

cooler climates. The plants of the Alpine Zone, however, are already at the top of the mountain.

“They have no place to go as we face a warming planet,” said Murray. “We often call them islands in the sky.”

Given the ecosystem’s relatively small size —about 12 square miles in total in the White Mountains — and abundance of rare plants, learning how to best protect it is a priority for Murray and her entire team. For years, she’s searched for signs of climate impact, attempting to both understand its current predicament and predict its future.

In 2021, Murray and a team of researchers released an analysis of nearly 90 years of weather data from the Mount Washington Observatory. A warming trend was clear. The number of days below freezing on the summit of New

England’s highest mountain had decreased, while average overall temperatures were up.

More recently, Murray and Tourville have been gathering temperature and moisture data from micro-climate stations, tiny sensors set up around the zone. The sensors grant scientists a better understanding of “what temperatures plants are actually experiencing on the ground,” said Tourville.

The team’s findings matter for mountain

environments across the globe. Most high alpine ecosystems, like Murray’s earlier worksite in Alaska, are in remote areas. Few have been monitored by scientists for as long or as consistently as the Alpine Zone in the White Mountains. The Mount Washington Observatory has been recording weather data here since 1932, and community members have made observations in the region for 150 years.

“We are in this place. We have the people,” said Murray. “We’re really positioned well to do this type of long-term monitoring.”

The Messengers

Special sensors and Observatory measurements aren’t the science team’s only source of data. Much of it comes from everyday recreationists, snapping pictures of flowering plants on their

phones. In the past, these citizens scientists had to use paper data sheets and guides to make successful species IDs. Now an app, called iNaturalist, takes care of the details.

Leading the charge are the Alpine Stewards, a cohort of about 40 AMC volunteers who hike across the Alpine Zone, offering safety tips, scientific assistance, and fun facts. They also protect the landscape by keeping hikers on the trail in two of the region's most popular recreation sites: Mount Washington and Franconia Ridge.

"Franconia can see a couple thousand people on a nice Saturday in the summer, all traveling through that Alpine Zone," said Kyra Salancy, AMC's volunteer programs manager. "It's super important to keep folks on the trail, having them walking on durable surfaces like rocks and not trampling the vegetation."

Further afield, stewards work the Alpine Zone on Mount Madison, in the northern Presidential Range, and Mount Pierce, to the south. Salancy added these locations last year, in order to reach hikers of wider variety of abilities. Madison, she says, tends to attract experienced trekkers who "didn't necessarily find [their hike] on social media." Pierce, meanwhile, has a reputation as one of the so-called "easiest" 4,000-foot mountain ascents in New Hampshire.

"Those hikers were eager to soak up information. And the Alpine Stewards thought it was awesome that they were connecting with people early in their 4,000-footer journey," said Salancy.

'I'm Doing Science'

In a plot near AMC Lakes of the Clouds

Hut, on the southwestern flank of Mount Washington, there's a series of miniature greenhouses, set low to the ground. These are open top chambers, or warming chambers. Vegetation in the chambers are exposed to temperatures a few degrees warmer than their peers on the outside, mimicking the effects of climate change. Each is a sneak peek into the future of the Alpine Zone.

Dr. Jordan Tourville put them there last summer as part of a busy field season. For most of the year, Tourville lives in Burlington, Vermont, with his partner and their cat. Come summer, however, he's on the road nearly every day. Some nights he camps, others he spends at AMC Joe Dodge Lodge, in the Mount Washington Valley. About 80% of his days, he estimates, take him above treeline.

Installing the chambers was supposed to be one of those whirlwind days. Tourville and his small team needed to carry the greenhouses, each weighing about 20 pounds, from the Mount Washington Auto Road, down to Lakes of the Clouds. The team expected this would take three trips. Instead, they got it done in one, thanks to the assistance of a group of friendly hikers.

"People got really excited to give back," said Tourville. "There were small children that were like, 'I'm doing science.'"

For Tourville, this is the epitome of life in the Alpine Zone. Harsh conditions have led to some incredible ecosystem adaptations. It also brings out something special in humans: wonder.

Learn more at [outdoors.org](https://www.outdoors.org).

A Closer Look at New Hampshire's First Ground-Based Scanning Technology

BY ELLEN ESTABROOK

On a brisk but sunny morning in early January 2026, a large black box sat in an undisclosed area of Bretton Woods as team members from Mount Washington Observatory, Omni Mount Washington Resort, and Vaisala, a global leader in environmental measurement technology, gathered with anticipation to install a cutting edge, ground-based light detection and ranging unit (LiDAR).

A forklift and a few hours later, the Vaisala WindCube 200S was on and in the beginning stages of programming, marking an exciting era of high-resolution wind and boundary layer analysis across complex terrain—specifically, Mount Washington and its nearby higher summits of New Hampshire's White Mountains.

Mount Washington Observatory's first foray with this technology began some twenty years ago with two collaborative projects. The Mount Washington Icing Sensor Project (MWISP) and GroundWinds partnerships evaluated remote sensing technologies, temporarily ground-truthing for satellite data. Looking back on these projects today offers a full circle moment

for MWOBS Director of Weather Operations Jay Broccolo and the Observatory's research and technology teams, who now have a long-term lens into atmospheric data.

"The scanner will allow us to essentially send a laser beam upward through the lower atmosphere, often several kilometers up in favorable conditions, so that we can build a three-dimensional picture of how the air moves through the valley and over the mountains, something we have not previously been able to capture with continuous, high-resolution observations," Broccolo explained.

"This has been a long time dream in the making," he continued. "It's exciting to have made it to this point."

Adding to the comprehensive data collected by the Observatory's summit station and Mountain Washington Regional Mesonet (a network of automated stations continuously collecting weather data) the scanning Doppler LiDAR will enable reliable monitoring of atmospheric parameters from a unit situated at ~1,600 feet in elevation, offering a "full wind picture" with

comprehensive wind maps and data.

The Science Behind the Scanning Technology

The Windcube's doppler imaging plays a critical role across industries including wind power, aviation, and air quality and risk, among others. For weather and climate monitoring, it not only unlocks continuous wind data, but also hyperlocal atmospheric insights and climate modeling with long- range, 360-degree, 3-dimensional awareness.

“This doppler scanner is monumental for our wind, cloud, and general lower-atmosphere studies, especially regarding the boundary layer, which heavily influences Mount Washington's uniquely extreme weather,” Broccolo said.

surface, where winds, temperature, and turbulence respond to surface heating, cooling, friction, and terrain on timescales of minutes to hours.

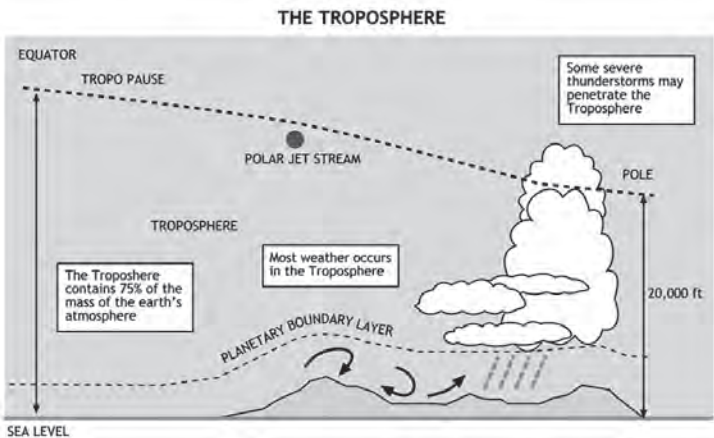
The scanning LiDAR unit collects boundary layer data by emitting short pulses of infrared laser light into the atmosphere, hitting aerosol particles in the air. The light then reflects back to the sensor, measuring the frequency change in the returned light (the Doppler shift). A programmable rotating head creates 3D, spherical, or vertical scans with modes including:

PPI (Plan Position Indicator)

Provides a wide horizontal “slice” or map of wind speed and direction for identifying horizontal wind variations across a large area.

RHI (Range Height Indicator)

Generates a vertical cross-section of the atmosphere for studying the vertical structure of the boundary layer or analyzing wind flow over complex terrain.

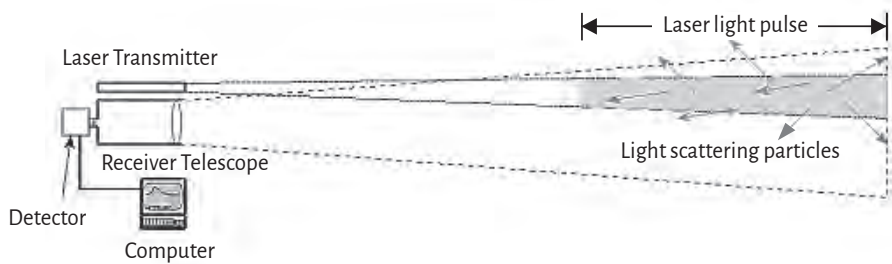


Graphic: <https://skybrary.aero/articles/planetary-boundary-layer>

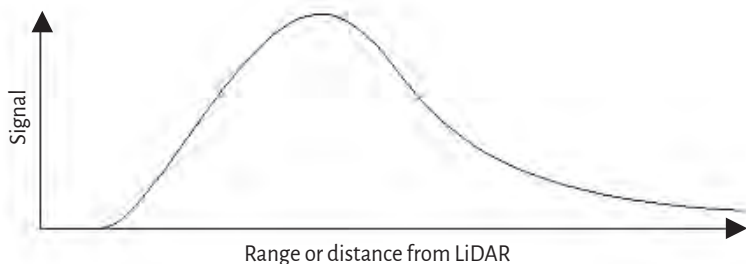
The boundary layer (PBL, Planetary Boundary Layer), also referred to as the Atmospheric Boundary Layer (ABL), is the lowest part of the atmosphere, directly influenced by the Earth's

Reconstructs a vertical wind profile directly above the unit, providing standard meteorological data on wind speed, direction, and turbulence at multiple heights up to 12 km.

DBS (Doppler Beam Swinging)



(a) Basic components of LiDAR



(b) Typical LiDAR signal as a function of range

Basic components of LiDAR. Graphic by NOAA.

LOS (Line of Sight) Measures radial wind speed continuously along a single specific path for targeting specific features, such as the wake behind a single turbine or a narrow mountain pass. (Vaisala, 2024)

For a closer look at the WindCube's capabilities in action, visit Vaisala's video linked in the QR code.



Implications for Research

The benefits of this data are far-reaching, from enhanced forecasts and safety for visitors, to scientific advancements to better understand one of the most unique environments on Earth. For example, the WindCube will make it possible for the Observatory

and its research partners to study how the height of the boundary layer changes with different weather patterns, and what the wind field looks like before it interacts with the Presidential Range terrain.

"This information has direct operational and research value," Broccolo said. "Improved understanding of wind structure and boundary layer height can enhance forecasting for high-elevation weather, support recreation safety, and contribute to national mesonet data streams. It also positions the Observatory to contribute more meaningfully to broader discussions about mountain meteorology and boundary layer dynamics."

The installation contributes to the



Director of Technology Keith Garrett (left) and Director of Weather Operations Jay Broccolo during the WindCube installation at Bretton Woods.

Observatory's role as a world-class destination for research and increases accessibility of data for researchers and the public, as the team prepares to share the real-time data and insights on mountwashington.org.

The project is made possible by a Congressionally Directed Spending request by U.S. Senator Jeanne Shaheen, with generous installation support by Bretton Woods Ski Area/Omni Mount Washington Resort.

Resource: Vaisala. (2024). WindCube Scan: Long-range scanning LiDAR for wind energy and meteorology [Product brochure]. vaisala.com

Additional Resources:

.....
<https://www.vaisala.com/en/products/windcube-scan-meteorology>

<https://www.vaisala.com/sites/default/files/documents/WEA-ERG-eBook-ScanningLidar-B212128EN-public.pdf>

<https://docs.vaisala.com/api/khub/documents/V4KtyrOYr8oCiZtXtLm49A/content>

<https://csl.noaa.gov/groups/csl3/instruments/dial/lidar.html>

<https://skybrary.aero/articles/planetary-boundary-layer>

Summer Learning on the Summit

BY BRIAN FITZGERALD

A busy school year has come to an end; however, summer learning opportunities are in full swing on the summit of Mount Washington and beyond. At the time of publishing, approximately 1,000 K-12 students and teachers will have visited the mountain this past school year as Mount Washington Observatory (MWOBS) educators welcomed more than 30 field trip groups. Roughly two dozen schools worked with MWOBS educators as “School Members” throughout the school year whereby schools can choose a mix of programming that best serves their needs, with most schools culminating their learning with a field trip to the mountain. While the demand for educational programming has continued to increase over the last several years, so too has the financial need in many schools. In total, more than half of the schools that MWOBS work with require at least some amount of financial support, and in particular field trip transportation costs that can be a major barrier for kids visiting the mountain. We’re happy to report that thanks in large part to incredibly generous donors, grants from several foundations, and online T-shirt fundraisers, MWOBS was able to provide financial aid and scholarships to many of our school partners as we work to make Mount

Washington an accessible resource for students and teachers in our region.

As the last of the snow begins to melt in the White Mountains, the Sherman Adams Visitor Center located within Mount Washington State Park is open to the public once again allowing the visiting public to enjoy tours of MWOBS’s weather station, hiker resources, transportation via the Cog and Auto Road, and the Observatory’s Extreme Mount Washington museum. Weather station tours remain a free benefit of membership and are available to not-quite-yet members of MWOBS on a daily basis throughout the summer (with the exception of Wednesdays). In addition to touring the weather station, visitors will have the opportunity to engage with volunteer docents once again. Following a successful pilot of this program last summer, a small but mighty group of enthusiastic volunteers will be sharing their knowledge of Mount Washington and beyond to the visiting public within the Observatory’s museum space as well as the out of doors on nicer days. Volunteers are trained by MWOBS’s staff to provide general information, offer table-top learning experiences, and even develop their own floor programs that bring past, present, and future of Mount Washington to life. For

the first time this summer, we're also happy to announce that MWOBS and Mount Washington State Park will share a seasonal Summit Interpreter position that will help coordinate our docent volunteers and provide educational programming for both entities. Be sure to look for our new staff and docent volunteers on the mountain this summer!

Even more educational opportunities await this summer for the public, youth, and teachers. The MWOBS education team look forward several workshops for formal and nonformal educators including a "Powering Up" workshop with Vermont and New Hampshire Energy Education Program (VEEP/NHEEP) in North Conway this July, our summer overnight "Peak Perspectives" program in July and August, and a NASA-sponsored heliophysics education workshop in mid-August. For younger learners, "Storm Scouts" extreme weather camp returns for its third summer, with an added week-long session for seventh through tenth graders.

Last but certainly not least, we're excited to announce that for those of you who aren't able to visit the mountain, or perhaps are preparing for one, our new virtual tour of Mount Washington's summit is now available on the Observatory's website. In partnership with students from Worcester Polytechnic Institute (WPI), and with support from



WPI PROJECT TEAM members Nathan Craiglow (Interactive Media & Game Design), Jeffrey Ponce Lopez (Electrical & Computer Engineering), Evan Cadell Williams (Mechanical Engineering), and Evans Minot Wood (Computer & Data Science), with project advisors, sponsors, MWOBS leaders, and WPI President Grace Wang on the summit of Mount Washington. Photo Courtesy WPI.

summit partners, a first version of the tour is now available for virtual visitors to explore the Rockpile and learn about the natural history of the mountain, the work of summit partners, and enjoy the sights and sounds of the mountain in 360 degrees. A re-worked and expanded version of this virtual tour is in the works for this fall on the mountain, so stay tuned for future upgrades to the experience, including a touchscreen exhibit at the Cog Railway's Base Station museum and beyond.

As always, if you are looking for ways to learn more about the work of Mount Washington Observatory, engage with science behind of weather and climate, and explore the heritage of the White Mountain Region, don't hesitate to reach our educators at education@mount-washington.org. Happy Learning!

The Cog Railway

Browsing through comments on our recent April Fool's Day Facebook post (the one about the robotic train crew), we found one that stood out from the rest:

"Keep the steam, junk the diesel and do it the old way... the coal smoke is what makes the train magic..."

We hear comments like that all the time, and obviously, we love steam trains too. But we do feel the need to correct that statement: *Coal smoke is what makes the train move. Innovation is what makes the train magic.* Because we are forever mindful of our history, we will always be driven by innovation.

In many ways, the working philosophy at the Railway today feels much like it must have when the first Cog train arrived at the summit on July 3, 1869. Back when, in Andrew Carnegie's words, the "*labor of the world performed by heating cold water*" represented the absolute peak of energy innovation, Yankee ingenuity applied to the emerging technologies of the Industrial Revolution ushered in promising new ways of living and working.



Engineer Caleb Gross and Railway Chairman Wayne Presby brief NH Governor Kelly Ayotte on Project EV1.

But make no mistake about it— The Cog is a working railroad operating in the 21st century, not the 19th. While we have a museum, we don't identify as one. Because we will never disavow our wood and coal-fired heritage, we still operate two vintage steam locomotives in the warmer months – MW2, built in 1875, and MW9 (1908). The past is always present here, and we think we negotiate the delicate balance between innovation and preservation fairly well.

The future, however, is electric. So for us, the past, present and future have never literally overlapped more than they do right now. Tucked away in a back corner of our modern new main-

tenance shop, behind several of our current biodiesel workhorses being readied for the season, two high-priority projects are taking shape within a few feet of each other. MW9 is being fitted with a new boiler, its first in nearly 40 years, and EV1's chassis sits on a section of track nearby. With dual electric motors and hydraulic brakes already installed, the next chapter in the Cog's technological history is quietly awaiting its batteries and crew cab.

When it enters service next year, EV1 will become the first "multi-purpose battery-electric track vehicle" in the world. It is designed to move track and maintenance crews quickly up to a work zone or disabled locomotive. It will provide a rapid response option for transporting search and rescue personnel to assist lost or injured hikers. And powered by a state-of-the-art solar



Lead Fabricator Liam Scales and Engineer Caleb Gross inspect EV1's up-mountain motor.

energy system currently being installed at the shop, it will operate off the grid, sustainably.

Most importantly, EV1 represents the Cog's first tangible step toward the eventual electrification of our locomotive fleet. We never met the guy, but we're pretty sure that Sylvester Marsh, our 19th century founder and innovator-in-chief, would approve.

EV1 is the result of an unprecedented collaboration between the Cog Railway, led by our resident Mechanical Engineer Caleb Gross assisted by Lead Fabricator Liam Scales, and students from the University of New Hampshire's Mechanical Engineering Department under the supervision of Professor Ivo Nedyalkov.



Pictured left: MW9's new boiler.

Mt. Washington Auto Road Guided Tours: Then & Now



1908 - '11 - A changing era as the Carriage Road slowly became the Auto Road. Guy Shorey photo courtesy of the Mount Washington Observatory.

Since its opening in 1861, the Mt. Washington Auto Road has offered a guided journey to the summit—making today's tours part of a tradition more than 160 years in the making. What began as horse-drawn stage rides up the original Carriage Road has evolved into a one-of-a-kind alpine experience, where exploration, storytelling, and mountain culture come together.

In those early days, travelers relied on skilled drivers and sturdy wagons to navigate the rugged terrain. That same spirit lives on today, just with a smoother ride. Modern guided tours transport guests up the iconic route in our stage coach vans, led by knowledgeable drivers who share the rich history, extreme weather, and natural wonders of Mt. Washington along the way.

From 19th-century stagecoaches to today's comfortable guided experiences, one thing remains unchanged: the journey to the summit has always been best shared. *This Summer & Fall, let the Auto Road do the driving!* Learn more about tour offerings & book: mt-washington.com

- **2-Hour Guided Tour** - 7 Days a week, weather permitting

- **Sunset Guided Tour** - July 11, August 22, and September 5.
- **Sunrise Guided Tour** - Sunday, July 19 & Sunday, August 30
- **Mt. Washington Discovery Tour** (3 hours) - July 3 & 23, Aug 11 & 29, Sept 12



Earl Libby, a stage driver in the 1960's, waiting for his passengers at the summit.

**CLIMBING TO THE
TOP OF NEW ENGLAND
SINCE 1869**



From the Edmands Col Emergency Shelter

BY **PETER CRANE**

THIS BUILDING LIGHTNING PROTECTED
AVOID CONTACT WITH METAL
DURING STORMS

In 1956 the U.S. Forest Service built a survival shelter in Edmands Col, the dip in the northern Presidential Range between Mount Adams and Mount Jefferson. The location is about halfway between the Appalachian Mountain Club Madison Hut and the summit of Mount Washington, and is a wide-open spot, just shy of 5000 feet in elevation, well above the treeline, and is exposed to the regular sweep of the west and northwest winds. The construction was doubtless occasioned in part by some close calls to hikers in the vicinity. As a brief article in *Appalachia* noted that year, “Many experienced mountaineers have long considered this region one of the most potentially hazardous in the White Mountains.”

The emergency shelter, a small, steel Quonset hut, served the public-in-need for

several decades. Doubtless it was of great importance to hikers who were suddenly trapped by adverse weather, with cold, wet winds blasting across this alpine area. But as time went on, it appeared that perhaps the little hut could be a lure, encouraging hikers to continue upward in harsh conditions with the dubious promise of shelter, when those hikers would have been better served by a determined descent. Plus the Forest Service observed that not all users of the shelter were thoughtful ones, leaving trash, and worse, in the shelter and nearby. The concentration of hikers in the area also led to damage to alpine vegetation.

And so in 1982, the shelter was removed. Forest Service Ridgerunner Keith Kidder helped clean up the remains of the shelter,

including one of the signs which was attached to it. The sign advised hikers, “THIS BUILDING LIGHTNING PROTECTED avoid contact with metal during storms.” Recognizing the historic value of this discarded signage, Keith saved the sign and later donated it to the Observatory’s White Mountains collection.



Emergency Shelter, Edmands Col c.1979.

Our Volunteer Community in Action

BY **WENDY ALMEIDA**

Volunteering at the Observatory is an eclectic mix of programs and projects across the valley and on the summit. It might mean tending a garden, preparing a meal on the summit, serving as a museum docent, supporting a membership mailing, or stepping in to tackle a special project that's been on the back burner for our staff but needs attention. This past year, more than 300 volunteers chose to give their time to support our work. The projects highlighted below are just a few of the many ways volunteers help support the Observatory.

Valley in Bloom

At the valley office, the gardens are once again vibrant thanks to longtime volunteers **Bill Ofsiany, Barbara Althen,** and **Donna Gray**. Year after year, they bring steady care and attention to these spaces—planting and keeping the landscape thriving from spring through fall. If you find yourself in North Conway this summer or fall, take a moment to walk the grounds and see what they've been cultivating this season.

Valley Weather Observations

In North Conway, volunteers also support the Observatory's NCON3 weather observation site, part of the National Weather Service cooperative network. Working alongside staff, these volun-

teers help ensure consistent, reliable observations that contribute to a broader understanding of local weather patterns.

Special thanks to **Ed Boyle, Mark Bunker, Hank Dresch, Jeff Hayes, Marie Kapsar,** and **Karen Moore** for their continued support of this work.

Summit Deep Cleaning

Some summit cleaning tasks don't always make it to the top of the weekly to-do list so a small but dedicated crew tackled deep cleaning and a special project in the summit living quarters between the busy winter and summer seasons. Cabinets and pantry shelves were cleaned and lined with new shelf liner giving the kitchen and pantry a nice refresh. The work also included cleaning out drains, shampooing rugs, cleaning every corner and crevice of the bunkrooms, along with installing a new reverse osmosis water filtration system in the kitchen. We're grateful for the time and care this group brought to get the living quarters ready for the busy summer season.

Special thanks to **Mike and Sue Zlogar, Hank and Linda Dresch, Karen Moore,** and **Erik Rider** for the cleaning work.

By the Numbers

Mount Washington Observatory volunteers contributed about 4,700 hours of



Sue Zlogar (left) and Linda Dresch working in the pantry during the summit deep clean.

service this past year. Those hours show up in the daily rhythm of the Observatory—meals prepared, spaces maintained, visitors welcomed, and special projects completed.

Over 300 volunteers supported summit and valley projects and programs this past year. On the summit, volunteers contributed over 3,500 hours, including about 2,000 hours preparing meals for guests and staff while supporting a full schedule of trips this past year. They also spent time cleaning, assisting with facilities projects, and engaging with museum visitors to help keep operations running smoothly while welcoming people from around the world to our mountain home on the summit.

In the valley, volunteers contributed over 1,200 hours to support the Observatory's work and community—from membership mailings and Seek the Peak to caring for our gardens, writing thank-you cards, NCON3 weather observation

Observatory volunteers come from **230 different zip codes across 20 states**. Together, they form a wide-reaching community connected through time spent contributing to the work on the summit and in the valley.

reporting, and lending specialized skills to a range of projects.

Taken together, these thousands of hours mean that nearly every day of our operations includes volunteer support. What stands out is not just the total, but a steady kind of commitment that reflects the strength of a community of people who give their time to the Observatory.

Thank you to all our volunteers. We're grateful for all that you do.

Sandy and Joan Kurtz

BY **MWOBS STAFF**

Sandy and Joan Kurtz have been active supporters of Mount Washington Observatory for almost five decades. After visiting North Conway in 1980, they fell in love with the town and became members of the Observatory that same year. Among their many contributions, they have become synonymous with Seek the Peak, the Observatory's largest fundraiser.

In 2006, the Kurtz's moved to Intervale and became more involved—this was during Seek the Peak's early years, and Sandy and Joan were among the trailblazers who helped grow its roots. Though they have both hiked Mount Washington and the surrounding White Mountains, their work as volunteers for the event is how they describe most enjoying Seek the Peak—you may recognize them from the registration table at the Après Hike Celebration!

"You get to see the children, who are hiking, as they grow up every year, so that's a lot of fun," shares Joan.



Sandy Kurtz (left) with MWOBS Development Officer Wendy Almeida at the 2025 Seek the Peak Après Hike Celebration.



Joan Kurtz (right) with Wendy Almeida at the 2024 Après Hike Celebration.

Joan and Sandy have also played instrumental roles in the week leading up the event, helping

sort t-shirts, vouchers, and taking care of other preparations with Observatory staff and board members.

As for their participation, they have graced the leaderboard many times over the past 20+ years of the event—most recently as Joan winning the Top Fundraiser award in 2024. Sandy was also among the top three fundraisers last year for the 25th Anniversary event.

We'd like to extend our sincerest appreciation for all that Joan and Sandy have done for the Observatory over the years, and all they continue to do to make Seek the Peak so special year after year.

From Summit Shifts to Family Traditions: Ten Years of Membership

BY **WENDY ALMEIDA**

Over the past ten years, Sandra Conklin's membership with Mount Washington Observatory has deepened through time on the summit, meaningful connections with staff and fellow volunteers, and an appreciation for what the Observatory does each day.

Her experiences on the summit reflect just how varied those moments can be. She's been there during weeks when changing conditions meant staying days longer than her scheduled shift, and during extreme weather events, including winds reaching 139 miles per hour when debris struck the A-Frame. She has rung in the New Year at the summit, tracked memorable weather moments across seasons in her journal, and built a collection of experiences that continue to grow with each visit.

Still, it's not only the dramatic conditions that stand out.

"I love, love, love, New Hampshire," a sentiment that runs through her connection to the Observatory and the White Mountains more broadly. Each trip brings new interactions with staff, interns, other volunteers, and overnight guests and reinforces what she values most about being there, the people she meets who care about the Observatory and its work.



Sandra Conklin.

Volunteering has been a meaningful part of Sandra's membership over the years. Through her time on the summit, she has supported daily operations in hands-on ways, from cooking and cleaning to helping guests settle into their temporary living quarters. She approaches the work with a sense of enthusiasm that others quickly notice. Over time, she has even taken on the challenge of adapting recipes to high-altitude conditions, working through multiple attempts to perfect her summit recipe for butterscotch brownies.

The notes she wrote in a well-used summit cookbook remain, in her words, “my mark on the kitchen.”

For Sandra, the people and the work are closely connected. Guests are often quick to thank volunteers, and for her, those moments highlight the value of the Observatory’s work and her role in supporting it.

Her connection to the Observatory also extends beyond her own time on the summit. Through the annual Seek the Peak hike-a-thon, Sandra has encouraged her children and their friends to take part, helping them build their own connection to the mountains and creating a shared

family tradition around the event.

After ten years of membership, Sandra’s story reflects a simple but lasting truth: support for the Observatory takes many forms, and over time, it creates a deeper connection to both the work and the community behind it. “I just love doing it,” a sentiment that captures both her experience and the spirit of those who help sustain the Observatory’s work.

To all our 10-year members, thank you for your continued support. Like Sandra, you have found your own way to stay connected to the Observatory and its mission. Thank you for being part of our community.

MEMBER MILESTONES 10 YEARS

Gary Alicandro

Derek Allard

Jean Angell

John R. Bell

Raymond Berthiaume

David Bjorklund

Ellen Blanchard

Linda Bliss

Jan Brabant

John Bravman

Jonathan Brisebois Sherwood

William Brochu

Richard G Brouillard

David M. Brown

Elisabeth L Bryan

Elizabeth Burton

Chris Caley

Jeff Cantlin

Kevin Cavanaugh

Sandra Conklin

Terrence Cummings

Charles A. de Geofroy

William M. Dearborn

Fred DeCicco

Nancy Decourcey

Deb Della Selva

Philip DerBoghossian

Robert Dowling

Jason A Dubrow

Rand Duncan

Donna Dunn

James Eagleton

Nancy Eastman

Richard Eichhorn

Greg Englund

Alex Felton

Kevin J. Fitzgerald

Pamela Flaim

James Fogg

Samuel Fox

Karen S. Franke

Adam Fritzsche

Roger Gagne

Keith Garrett

Adam Gill

Robert Gillette

Steve Goldsmith

Clifford Gordon

Jeff T. Gould

Joe Gray

Cynthia Gray

Larry Greenberg

Marge Gulyas

Henry Gunning

Brian Hall Guck

Bruno Hancock

Ruth E Harlow

Christopher Harwood

Frank Hauck

Daniel Hayes

Thomas Hepburn

O'Malley

Christopher Hess

James Humphrey

Jean Humphreys

Ninon Hutchinson

Melissa Hyde

Dean E. Jackson

Linda Jensen

David Kandel

Dianne Kane

Andy Keegan

Steven Kendall

Dorothy Kenyon

Courtney Keys

Nancy Kluck
Doug Koski
Amy Koski Laquerre
Edward Kranich
Rosalind Kraus
Richie Kremer
Douglas Krupp
Regina Lalumiere
Milton Lapon
Ryan Lawhorne
Lily Lawhorne
John Leask
Joel B. Lee
Catherine Lovequist
Sharon Maas
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Trevor MacDonald
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Ben Middleton
Jack Middleton Jr.
Bruce Miller

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Donna Trow
Pamela Turnbull
Amanda M. Twaddle
Denise Vaillancourt
Pamela Van Hoven Clark
Douglas Voss
Eustis Walcott
Laurel White
Carol Zagrodny

UPCOMING EVENTS

Join us on July 18th, 2026 from 4 to 7pm for the 26th Annual Seek the Peak Après Hike Celebration! As always, we encourage participants to seek their peak anytime, anywhere this summer and come together in a culminating community gathering. This year, the celebration is at **Wildcat Mountain**, where participants will have the opportunity to take the Wildcat Express chairlift to the summit of Wildcat

Mountain and enjoy sweeping views of the Presidentials (and Mount Washington), as well as enjoy a BBQ feast, listen to live music, have a drink in our beer garden with Tuckerman Brewing, and gather with hiking friends to share the summer. Visit **seekthepeak.org** to sign up (Après Hike Celebration tickets are also available if you don't plan to hike).

IN-KIND GIFTS

Righteous Vices Coffee Roasters
David J. MacKenzie
Carol Haney
Big Dave's Bagels

Mountain Warehouse, Eastern Mountain Sports
Cranmore Mountain Lodge
John G.W. Kelley Ph.D.
Robert Averill

TRIBUTES & MEMORIAL GIFTS

Matthew Mara	In Honor of All present and former SAR members in the NH White Mtns
Pam B. Wood	In Memory of Bob Waldman
Pam Henriquez	In Memory of Dave Furner
Chris DeVries	In Memory of Diane DeVries
Rebecca James	In Honor of Donald Krouse
Evan Gross	In Honor of Happy Birthday Nimbus the Summit Cat!!!
Christine Boutillier	In Memory of Jim Boutillier
John Greene	In Honor of John Gorman
Reid Grayson	In Honor of John Gorman
Nina Knapp	In Memory of Mike - who loved the Summit so, and Kevin - who worked on the Cog.
Rosemary Adams	In Memory of Mike Figgs
Mary Naples	In Honor of Monks Class of 80
Sam Vleck	In Memory of My kitty Peeps
Kathy Houghton	In Honor of Nimbus!!
Karin Hughes	In Memory of Our Spirit Kitty, Prudence
Ann Hart	In Memory of Paul Fitzgerald
Anthony Ferruolo	In Memory of Paul Fitzgerald
Charles Bowler	In Memory of Paul Fitzgerald
Charles Mitchell	In Memory of Paul Fitzgerald
Charles Noyes	In Memory of Paul Fitzgerald
Chip Chase	In Memory of Paul Fitzgerald
Chris Hawkins	In Memory of Paul Fitzgerald
Geoffrey Pedersen	In Memory of Paul Fitzgerald
Irwin Automotive Group	In Memory of Paul Fitzgerald
James StPierre	In Memory of Paul Fitzgerald
Judith Milner	In Memory of Paul Fitzgerald
Karin Albert	In Memory of Paul Fitzgerald
Margaret Sova McCabe	In Memory of Paul Fitzgerald
Newbold LeRoy	In Memory of Paul Fitzgerald
NHDES, Air Resources Division	In Memory of Paul Fitzgerald
Rodney Nelson Dyer	In Memory of Paul Fitzgerald
Watermark Marine Services	In Memory of Paul Fitzgerald
John R Horan	In Memory of Pauline Horan and Linda Horan
Carole Benoit	In Memory of Pierce Beij
Annette Lawlor	In Memory of Robert B Coleman
Sally Pagliuca	In Memory of Salvatore Pagliuca
Jessica Gawel and Ramon Perez	In Memory of Sam Gawel
Joseph Bernstein	In Memory of Sam Gawel
Neil and Amy Emerson	In Memory of Sam Gawel
Sami Lofman	In Memory of Sam Gawel
Norman Silverman	In Memory of Samuel Gawel
Leah Gawel	In Memory of Samuel Gawel for his 25 birthday
Nicholas Sciandra	In Memory of Sebastian
Tor Clark	In Memory of Victor and Debbie Clark
David Langelier	In Honor of William "Cowboy" Tennen

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GREEN FLASH



The summit team on April 15, 2026 during shift change in front of the snow wall located just above Cragway turn on the Mt. Washington Auto Road. Pictured from left to right: Volunteer Sandra Conklin, Weather Observer & IT/Research Specialist Karl Philippoff, Weather Observer & Education Specialist Bailey Nordin, Intern Kathryn Hawkes, Intern Ryan Steinke, Weather Observer Maddie Smith, and Volunteer Tiffany Montgomery.

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GLOBAL + rescue





Just because school is out, doesn't mean we take a break from teaching about weather and climate! Connect with us all year long through our camp programs hosted in North Conway with field trip programs to the summit of Mount Washington. You can also invite our educators to your summer camp, campground, library or function.



Learn more at
mountwashington.org/camp

Pictured: *Storm Scouts Summer Camp*



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