But Why: A Podcast for Curious Kids

Can snowstorms make thunder?

February 23, 2024

Jane 00:20
This is But Why: A Podcast for Curious Kids, from Vermont Public. I'm Jane Lindholm. On this show, we take questions from curious kids just like you and we find answers.

Emmy 00:30
Hi, But Why. My name is Emmy. I'm 10 years old and I live in Yerevan, Armenia. My question is: why is snow fluffy, soft white? And why is it shiny? Okay, bye. I love your show!

Jane 00:46
I have lived all over the world. But something I once took for granted was just how beautiful Vermont looks when it snows. We were lucky to get some snow here recently, and it was breathtaking. The fallen snow glittered like a blanket of crystals on the ground. The wind, while it was snowing, blew the snowflakes into the trees--but only on one side. So, after the snowstorm, each tree trunk looked like it was split down the middle, gray brown on one side and white on the other. Living here during my childhood and again as an adult, I have developed an appreciation for snow. But maybe still not quite as much appreciation as our guests today have!

Jane 01:26
Later in the episode we're going to hear from one of the meteorologists--people who study and predict the weather--who spend the winter at the top of Mount Washington in New Hampshire. Mount Washington is the highest mountain in the northeastern United States, and it's famous for its extreme weather conditions.

Jane 01:43
But first, we're going to tackle a bunch of your questions about winter weather with Seth Linden. Seth works for the National Center for Atmospheric Research, and he's based in Boulder, Colorado, another place that gets a lot of snow.

Seth Linden 01:56
I'm definitely a self proclaimed weather nerd, and I am a lover of snow.

Jane 01:59
Seth's job includes creating weather models. That allows computers to make predictions of what the weather will be based on the conditions we're seeing in the atmosphere.

Seth Linden 02:10
So a forecast model is actually a combination of mathematical equations at its base, basically, physics related equations. And so when you put in the different equations that govern the atmosphere, you can actually model what's going to happen in the atmosphere in terms of when the storms are going to come. So it, it takes the current conditions, and it applies mathematical equations, and then it can basically predict the weather into the future,

Jane 02:32
Right. Because for anybody who needs to know what they're going to wear tomorrow, it's not helpful to say, "Hey, it snowed a foot yesterday." Everybody can tell that. You need to be able to tell people, "Hey, this is what we think is going to happen, where you live, or where you work. And here's what you need to do to get prepared." So having a forecast or a prediction is really important. But it's also kind of hard, because you don't know what's going to happen in the future exactly. So your models are able to help understand what is likely to happen given weather patterns and conditions. Right?

Seth Linden 03:06
Correct. Exactly. It's to predict the future. So it's hard. And the weather is a chaotic system. So you basically use a bunch of equations that can govern how the weather works, and still get a pretty reasonable, you know, answer as to what's going to happen tomorrow or the next day. And of course, the farther that you go out in time, because there's chaos in the system, the less accurate the forecast can be.

Jane 03:25
So to be a meteorologist, do you have to be good at math? Or do you just have to be good at knowing how to be a computer programmer and let the computer do the math?

03:33
No, actually, math is the basis for being a meteorologist. You know, all atmospheric science is really it based in physics, which is really based on math, mathematical equations. You need a good background in math, and then also earth sciences and understanding of things you know, that govern the atmosphere, like gravity, and how the earth spins around and creates forces on this atmosphere that sits above the ground. Math and physics is the basis for atmospheric science.

Jane 03:58
At this time of year in the Northern Hemisphere, we are all experiencing winter. And depending on where you live, winter might be warm or cold. But for a lot of people, winter weather in their heads means snow, and we have a lot of snow questions from kids.

04:15
My name is Felix. I'm five and a half years old. I live in Limerick, Ireland. How is snow made?

Xavier 04:26
My name is Xavier. I live in Sydney, Australia. I'm 10 years old. And my question is: how is snow made and why does it fall from the clouds?

Graydon 04:29
My name is Graydon. I'm four, and I live in Victoria, Canada. And I want to know how does snow get made?

Hank 04:50
I am Hank. I'm five and a half years old. I live in Granite Bay, California and my question is: what is snowwwwww made out of?

05:07
What snow basically is is it's just water vapor that freezes into ice crystals in the atmosphere when the temperature is below freezing. And so typically, in terms of how snow is made, what happens is, is that you usually have little ice crystals that start to form around, typically, a little particulate matter.

Jane 05:24
Like a piece of dust or a piece of pollen.

Seth Linden 05:26
Right, piece of dust, piece of pollen, piece of smoke. Very invisible. But the bottom line is, is you need two factors: you need cold temps near or below freezing, it doesn't have to be right at freezing, but below and then you need sufficient water vapor. And then the ice crystals basically start to form on a particle and then other ice crystals start to form on those ice crystals and the ice crystals grow into actual flakes that become heavy enough, the flakes will fall through the clouds and hit the ground as snow.

Jane 05:49
And so you need those conditions. You need some humidity, some moisture in the atmosphere and you need it to be cold up there. So it's not like rain that falls through the sky and then just become snow at the very end right before it hits the ground. It's formed as snow up in the clouds.

06:06
Right. Typically, even when we have rain, a lot of times in the upper parts of the atmosphere, what's going to happen because it's below freezing, is as you get, you know, snowflake formation again by ice crystals start building upon each other and then bumping into other ice crystals that didn't form flakes, and it starts to fall through. Now if the atmosphere warms up as you get near the ground, the snowflakes eventually melt and then fall into rain. Of course there's situations where you can have rain falling near the ground, but then as cold air comes in, via a cold front, then that starts to change the rain near the surface back to snow because you have freezing temperatures and the water starts to change back into ice crystals. So it's not uncommon to have rain, snow, you know, and then back to snow again near the surface.

Anna 06:48
My name's Anna. And I'm five, and I live in Denver, Colorado. And I want to know, why do snowflakes look different?

Ben 07:02
Hi. I'm Ben. I'm five years old. My sister's three; her name is Margo. We are from Potterville, Pennsylvania. Why are some snowflakes bigger than the others?

Jane 07:11
Most kids have heard that there are no two snowflakes that are alike. But there are some common kinds of snowflakes. What are the different types of snowflakes that people might see that are maybe not exactly alike but all similar?

07:25
Yeah, there are basically four basic types of snowflakes. You have what they call a hexagonal plate. That's in the shape of a hexagon. You have little needles and you have ones that look like columns, like three dimensional needles. And then the one that are most common, that people really associate with flakes, are called dendrites. Those are like plates that have branches on them just from attracting ice crystals in a certain way. And it's very temperature dependent. That's the key. Temperature in the layer that the snowflake forms determines whether or not it's going to be just a little teeny needle or column or if it's really going to be like a dendrite, which are the big flakes that we like to see that create the fluffy snow.

Sophie 08:01
Hi, my name is Sophie. I am eight years old. I live in Fairbanks, Alaska. My question is: why snow white?

Jona 08:10
Hi, my name is Jona, and I live in Carlisle, Massachusetts. I have a five and a half. And I want to know why is snow white?

PJ 08:21
My name is PJ. I'm seven years old. I'm from Westbury, New York. And my question is, why does snow fall and why is snow white?

Lila 08:30
My name is Lila. I'm 11 years old and I live in Nelson, BC, Canada. And my question is why is snow white when water is clear?

Oliver 08:38
And my name is Oliver. I'm four and a half years old. My question is why is snow white, even though it's made out of water?

08:51
Because it's made out of water and water is clear, it's actually translucent because it's made up of ice crystals. But basically, the ice crystals reflect light. And so it's reflecting all of the colors in the spectrum

and when you have something that reflects all of the colors, to our eye that looks white and can look you know, shiny and kind of sparkly.

09:10
Hi, my name is Castle. I live in Huntington, Vermont. And I want to know why snow is sparkly.

09:18
So it's related to sun reflecting off of individual ice crystals within the snow. You know, basically light is is scattered and it bounces off each ice crystal and so as it scatters it's like the prism effect. You see this crystally aspect if you had a piece of glass and it was refracting light, it's scattering the light in different directions and it's bending the light and so when it bends the light as it scatters it back, it produces this sparkly quality and meteorologists refer to this as snow sparkle. So it's just really sun reflecting off of individual crystals within the flake. And that's why it can look so sparkly.

Olivia 09:53
Hi, my name is Olivia. And I'm seven years old and I live in Koken, Minnesota. My question is are the raindrops and snowflakes clean when they fall from the sky?

10:05
Generally speaking, snow and rain are going to start out clean because they are formed from water vapor that's up in the clouds. But of course, as it falls through the atmosphere, it's going to be in areas, let's say near cities, we have pollutants, you know, emissions from cars, we have smoke, we have dust. You know, typically, I still think it's, you know, generally fine eating snow, you know that freshly falls because it's not interacting with anything on the ground, except for the fact that, you know, if you're in a really, let's say, polluted area where the sky is polluted, then you know, you can have polluted snowflakes. Generally, snow is very clean, you know, especially if you're in the mountains with no population center.

Arthur 10:38
My name is Arthur, I'm five years old. My question is: what do snowflakes do when they hit the ground?

10:45
That all depends on snowflake formation and the retention of snow on the ground in terms of snow sticking to the ground, or what happens to it on the ground is basically directly related to the temperatures. If temperatures are above freezing, say 33, 34 degrees, those snowflakes are gonna melt, basically on contact. They're gonna go back to water. But if the ground temperatures are below freezing, below 32 degrees or zero degrees Celsius, then the snow's basically going to lie on the ground and other snowflakes are going to start to pile up on top. And that's how we get the accumulating snow. You know, that occurs where you have really fluffy snow in the first few hours, as you know, and you can pick it up with your hand and blow it away. But if you let that snow sit for a day after its fall, it turns much more into a hard pack snow. It's really dependent on the temperatures, if they're above or below freezing. That's the main answer.

Jane 11:33

And we have a question from Naomi who wants to know, you know, how can it...if we're talking about snow forming and clouds, how can it be both snowing and sunny sometimes at the same time?

11:43
It's the same reason why you can have raindrops falling with sun shining through. What happens typically is that a clump of clouds moves through. It produces some snow showers and right before or after it's sunny in between where it's snowing, but you see the sun shining through because it's coming through an angle where there's a break in the clouds.

Anna 12:00
Hi, my name is Anna. And I want to know why do snowstorms don't have thunder.

Jane 12:09
Anna wonders why snowstorms don't have thunder. But there can be thunder during snowstorms.

12:16
Right! So the way that thunderstorms work is you need very warm air near the surface that rapidly rises into cold air aloft. And we call that convection. And that's the development of thunderstorms that you see during the summer. Thunder is just the sound of lightning breaking the sound barrier, right? And lightning forms when you have air within the cloud moving rapidly upward from the base to the upper part of the cloud. And it separates the charges, right? And so when that happens, there's a release of lightning, and we hear the sound of lightning through thunder. Now, you can have thundersnow when you have an unstable environment, let's say with a lake effect snow squall, because of the temperature contrast between let's say the water in the atmosphere. You do have rapidly rising air columns. And it can provide enough where internally within the cloud there's a little bit of lightning and that produces thundersnow, but it's much, much less common. And especially as you get to temperatures below let's say 30 or 25 degrees, you're not going to have any thunder, it's just too cold to get the vertical motion to separate the charges.

Jane 13:15
So you generally need it pretty close to freezing to get any chance of having thundersnow.

13:20
Exactly. So thundersnow is much more common, let's say in the fall or the spring.

Alton 13:24
Hi, my name is Alton. I'm nine years old and I live in Missoula, Montana. And my question is: why is there such thing as snow squalls? We had one in a town the other day when we were driving home from Bozeman and it was really scary.

Jane 13:44
Maybe you can define what a squall is and why we use that word sometimes in place of other words like snowstorm.

13:50
Basically, a snow squall is a winter thunderstorm without the thunder. But those can happen due to a variety of reasons like along a cold front, where the leading edge of the cold air is interacting with warmer air get out ahead of it. And so right underneath that little small group of clouds, you can get heavier snow showers. And then behind that, where there's not as many clouds, you get no snow. So it forms a very distinct squall line. What separates a snow squall from a normal snowstorm is that it's moving through as if it's like a summer thunderstorm, but it's producing heavy snow and right behind that there's a break in the clouds. And the difference between like a snow squall and a major snowstorm is, is that a major snowstorm you have a wide area of clouds producing snow continuously and there's no breaks, so if there's no breaks in the snow, you're not going to typically see much of a snow squall.

Jane 14:39
I didn't realize squall had such a specific definition. Does flurry have an equally specific definition?

14:45
Oh yeah. Every type of adjective for snow and descriptions of snow mean something entirely different. So obviously flurries we use to describe when it's very light snow versus heavy snow and there's graupel and there's there's lots of different types of snow.

Jane 14:59
Graupel is kind of like snow popcorn. It just looks like light little balls of snow. Graupel is kind of a cool little thing, too. Given everything that you, Seth, have just told us, I bet a lot of kids who are listening can now understand and guess the answer or know the answer to Liam's question.

Liam 15:17
I am six and three quarters years old. And I live in the Philippines. My question is, why isn't there snow in tropical places?

Jane 15:28
Why isn't there snow in tropical places? And you've been telling us about the temperature conditions needed for snow to form. And so the snow can't form in places where it's very, very warm all the time, right?

15:42
Yeah, it all has to do with temperature. And so but it's a misnomer, right, that you can't have snow in tropical regions. It just has to do with at what level in the atmosphere are you going to hit the freezing temperatures. Take for instance, areas in you know, South America, Peru, Ecuador, they sit near the equator, right? The equator itself, right, is generally very hot. That's what we call the tropics. But of course, we know there's parts of the world, like in Peru, where the mountains themselves go up to 20,000 feet. So all of the cities that are at lower elevations, you know, near near sea level are gonna always be too warm for snow. But as you go up the mountain where it is cold enough, where the atmosphere itself is below freezing, and then you get ice crystal formation and snow. So but in areas,

you know, that are lower down in the tropics, it's just the air column itself, even above the ground is just way too warmfor snow to form.

Avery 16:36
I name is Avery, and I am six years old. I live in Perth, Australia. And my question is, why doesn't it snow in some places?

Jane 16:49
Are there other reasons, other than just temperature, why it might not snow very much somewhere?

16:54
So in areas that don't get snow, even if they are below freezing, it's typically because you have a lack of moisture and storms. So that has a lot to do with where is the jet stream, which brings in our weather, in relationship to you know, the mountains or valleys. Because of the mountains and the downward moving air. Remember, you need upward moving air to produce rain and snow. If you have a lot of downward moving air, let's say in a mountain valley, or a valley or some area that's adjacent to the mountains, it basically kills all the precip. And there's no moisture left for precip to form. So there are definitely areas of the world that are cold enough that just never get snow because all of the moisture is gone. So remember for snow you need temps below freezing and you need sufficient moisture in the atmosphere. If the moisture isn't there, you'll never get snow formation.

Dane 17:40
Hi, my name is Dane. I'm almost seven. I live in Calabasas, California. And I want to know why is [unclear] in the mountains?

Jane 17:52
Dane wants to know why it's so snowy in mountains, specifically. And some of the snowiest places on Earth are mountains.

17:59
The reason being is is that mountains force the air to rise. So for all precipitation and even cloud formation, the basic concept is is you need air to rise, right? You need a parcel of air that's near the surface that's forced to move upward because as air moves upward, what happens in that column of air as it cools down, and water vapor begins to condense out of the atmosphere from, you know, an invisible phase to droplets. So mountains themselves, right, we have you know, the wind blowing against the mountains. It hits the mountains, let's say you know, in Colorado, you know, across the US we have the general Jetstream flowing from west to east, right? So they'll the air will move in and it'll hit the mountains, let's say in Colorado, the Rocky Mountains. And it's it's forced to quickly rise. And so as it rises, it cools and the moisture condenses out of the atmosphere. So the main thing is is that mountains force the air to rise and rising air is what you need to form clouds, rain and snow.

Jane 19:00
One other question from kids that we got that is not really your area of expertise necessarily, but I suspect you know the answer, is:

Jaime 19:06
Why does salt melt snow? My name is Jaime. I'm from Silverdale, Washington.

Rushi 19:14
Hi, my name is Rushi and I am from Katy, Texas. And my question is, why does salt melt snow and ice?

Molly 19:21
Hi, my name is Molly. I'm seven years old. I live in Pelham, New York. And my question is, why do we salt our roads when it's snowy? And how does it work?

19:31
The reason that we salt roads or put chemical down on the road is is that if it's snowing and it's below freezing, right, the snow is not going to melt and it's going to get compacted and form ice on the roads. And we know that ice on the roads cause car to slip. Now, salt for instance, right? It lowers the freezing temperature of water and so when you put salt on the snow, it's going to cause those ice crystals to go back into a water phase without it freezing. Basically the salt changes the ice back to water and then you reduce you know the slippage from from cars driving on the road.

Jane 20:04
Do you ever get tired of having to pay attention to the weather or is it always fascinating to you?

20:10
To me, it's endlessly fascinating. And it's a great question for me because aside from working in NCAR, I have a big weather report for Colorado that's online on Facebook called Seth's Weather Report. And it's a passion project. It's just based on forecasting. And I, as a meteorologist, that's why I got into work for NCAR was because of snow. I would watch the weather channel to see when it was going to snow at the ski area. And the ability to forecast snow in Colorado, for instance, where there's a lot of mountains and it's complicated, is treasured. People really want to know, "Hey, how much is it going to snow at my ski area and when?" You know, timing and amounts. And every storm is unique and different. And because every storm is unique and different, you constantly have to look at all the situations: what's the wind direction relative to the terrain? Where's the storm coming from? So I don't ever get sick of looking at the weather.

Jane 21:01
A few minutes ago, Seth explained why mountains tend to have a lot of snow, more than the amount we have down lower closer to sea level. Next, we're going to learn what it's like to live on the top of a very cold mountain during the winter. In fact, this mountain gets as cold as Mars!

BREAK 21:18
BREAK

Jane 21:19

This is But Why: A Podcast for Curious Kids, from Vermont Public. I'm Jane Lindholm and today we've been learning all about snow and how it's formed. Let's take our new knowledge with us as we journey to the top of a very, very cold mountain and learn what it's like to be a meteorologist living in severe weather conditions.

Jane 21:40
Mount Washington in New Hampshire is famous for having some of the world's worst weather. Although I guess I shouldn't call it worst weather. That's all relative. Some people might think it's the best weather, including our next guest. But let's see what you think: winds up at the summit--the top--get up to 100 miles per hour or more. During the winter months, the wind combined with the cold makes it as chilly as Mars. And Mount Washington is at the junction where three storm systems collide, creating these severe weather conditions. So average snowfall up there is more than 23 feet. One year, it even got twice that. You might think no one would want to spend the winter up there, given all that I just told you. But in fact, there's a team of meteorologists and interns who keep track of all the weather data at an observatory. We asked one of the team members there this winter to tell us a little bit about what it's like. Alex Branton is both an educator and a meteorologist.

Alex Branton 22:37
The summit of Mount Washington is at an elevation of 6288 feet. So while it is the tallest mountain in the northeast, it's not the tallest mountain in the country, let alone the world. It's actually a very small mountain. But Mount Washington experiences much more extreme weather. That is one of the biggest reasons as to why we have a research center up here to study the weather. It's also unique to have human weather observers on the summit of Mount Washington. Most weather stations across the world are automated, meaning they have instruments that work by themselves automatically reporting the weather. That doesn't work, though, on Mount Washington, because the weather conditions are so extreme that instruments would not be able to withstand the conditions outside if we were to just leave them alone. So that's why Mount Washington observatory continues to have human observers and meteorologists on the summit, actually manually recording the weather using manual instruments and forecasting the weather.

Alex Branton 22:37
The Mount Washington Observatory is a very unique laboratory in the clouds. We get to be inside of the thing that we're researching, the thing that we're studying, which is the weather. So not only do we get to forecast the weather and research the weather, but we actually get to experience visually and we get to feel the weather that we're observing, that we're studying. So that's that's really special. And it gives us just a really unique opportunity.

Jane 24:05
It may be extreme, but that's actually one of the reasons Alex loves it.

24:10
There's a lot of things that I really love about working here. We have some pretty incredible views all the time from our office window. So that's really nice. But my favorite part about working at Mount Washington Observatory as a meteorologist is actually getting to experience the weather that I'm

forecasting for. Usually when you're a meteorologist, you forecast for a large region of different places that can have different weather that you may not get to experience or actually visually see. At the Mount Washington Observatory, we can see the storm systems coming across the horizon. And then once they arrive, we're inside the cloud that's producing the snow, the rain, the thunderstorm, whatever it might be, and that's a really great opportunity to have. As a meteorologist, qe like extreme weather. We like to experience the bad weather. So working on Mount Washington is kind of like storm chasing, in a sense, except we don't have to do any actual chasing. The storm comes to us. So we just kind of sit here and wait, which usually it doesn't take that long for a storm system to come through New England.

Jane 25:17
For meteorologists on Mount Washington, going outside in winter requires a lot of preparation. Like, it may take a lot of preparation if you live in a snowy place to go out for recess or playtime, but imagine having to put on up to 10 different pieces of winter clothing, and protective gear and having no skin exposed, just to go outside for maybe five minutes.

25:40
I always make sure that I have on a few layers, because layering is key in the cold weather, especially in the high winds. So I'm always wearing a wool baselayer, pants and shirt. And then if it's really cold outside, I'll wear a midlayer like fleece sweat pants, and a puffy jacket, and then an outer shell. So that would be snow pants and a windproof insulated coat. In addition to all of that clothing, I'm also wearing a balaclava, which is something that goes over your head and it covers your neck and your chin and your forehead. And then if it's really really cold, I'll put on a hat over that balaclava. And then it's really important to cover your eyes in those conditions. It's also important to wear ski goggles especially when the when the winds are really high. Because in those types of conditions, the wind chills get very, very low. So when chill is a metric that we use to describe the heat loss from your skin, based on the temperature outside, and the wind. It's similar to the phenomenon you might experience whenever it's a warm summer day and you jump into a swimming pool. And then you get out of the swimming pool, you feel really cold. It's because you've gotten out of that water, your skin is wet. And now all of a sudden you have wind blowing across your skin and you then feel colder. So that's what wind chill is it accelerates the heat loss from your skin. So you need cold temperatures and high winds in order for those wind chills to become at a dangerous level. So for example, in February of 2022, we had a historic cold weather event on the summit of Mount Washington, where we matched our record lowest temperature ever recorded on the summit in observatory history of 47 degrees below zero. And our winds at the time were 121 miles per hour. So that put wind chill values at 110 degrees below zero, so negative 110 degrees. So in those types of conditions, we have to actually look in a mirror before we go outside to make sure we don't have any skin exposed. And that's where the ski goggles come in. That area right around where your ski goggles cover your eyes, where they meet the balaclava that you're wearing, those are the most frequently missed spots. So that's why the mirror is important. So we can look to make sure we have no exposed skin. And we're never going out for more than about 10 minutes or so at a time unless it's by choice.

Alex Branton 25:59

Alex and her colleagues don't live at the summit all the time. They take shifts up there for several days and then they can go back down to civilization when they're not working. But there is one creature who lives at the observatory year round.

28:33
So Nimbus is our resident summit cat. So he is the only full time resident on Mount Washington. The only time he ever leaves the summit is to go to his annual vet appointment once a year. Nimbus's role at the Mount Washington Observatory is to basically be a companion to the weather observers. They can get kind of lonely up here, especially in the winter when we are in the fog and you can't really see outside, it's dark. And maybe we're the only people up on our shift at a time. So Nimbus is really helpful in keeping us company and providing entertainment because he is a very funny cat. His favorite activity is probably eating food. And if he's not eating food, begging for food. So if you want to be Nimbus's best friend, you just have to give him a treat and he'll love you forever.

Jane 29:25
We asked Alex why she wanted to become a meteorologist. And if she always saw herself studying severe weather,

29:31
From a young age, I was just always interested in meteorology. I'm actually originally from Pensacola, Florida. So being from that area of the country, I got to experience a lot of extreme weather in a different sense from Mount Washington, I got to experience hurricanes, most notably Hurricane Ivan and Hurricane Katrina. I do remember getting two snow days from school in high school and that was because we had sleet and freezing rain. No actual snow, but we did experience in winter weather a couple of times. I was just always captivated by the weather. Whenever I was in middle school and I started thinking about what I wanted to do when I grew up, my mom just randomly said, "You should just be a meteorologist. You like the weather." And I said, "You know, Mom, you're probably right, I should probably do that."

Alex Branton 30:22
I remember a hurricane hunter coming to visit my class. So a hurricane hunter is someone who flies airplanes into a hurricane in order to collect data about them, so that we can better forecast where they're going, how much they're going to strengthen and do research with that data. So a hurricane hunter came and visited my class. And that's when I realized that I could have a career in meteorology that wasn't associated with broadcasting only, being a weather person on TV.

Jane 30:50
There are lots of ways to be involved in weather science, with or without being a TV meteorologist, as both Alex and Seth have demonstrated. Do you like learning about the weather? Well, Seth told us there are lots of ways kids like you can learn more and even contribute to science. There are plenty of books about weather science. So see if your school library has any you could check out. Some people are able to buy weather stations for their home that can give them digital readouts of things like temperature, humidity and barometric pressure. That might be possible for you. And even if not, you can make things like rain gauges or snow gauges to measure how much precipitation you get where

you live. See if there are any citizen science projects near you that collect data about rain and snow from weather observers. And maybe you can be one.

Jane 31:39
Thanks to Seth Linden at the National Center for Atmospheric Research and Alexandra Branton at the Mount Washington Observatory for helping us learn more about snow today. Now if you have a question about anything, have an adult help you record yourself asking it you can have your adult do it on a smartphone using a voice recorder and voice memo app. We want to hear your first name, where you live and how old you are. And try to be in a quiet place without too much background noise unless the background noise is important to your question. Then your adult can email the file to questions@butwhykids.org or you can submit your question directly on our website, butwhykids.org. But Why is produced at Vermont Public and distributed by PRX. Our team includes Melody Bodette, Kianna Haskin and me, Jane Lindholm. Special thanks this week to David Littlefield. Our theme music is by Luke Reynolds. We'll be back in two weeks with an all new episode. Until then, stay curious!