

Tom Kierein Demystifies Weather Forecasting

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Much of the U.S. continues to dig out from a massive snowstorm that snarled traffic and travel plans. When the forecast is bleak, or a promised storm never shows, weathermen often take the blame. NBC meteorologist Tom Kierein explains just how accurate a forecaster can be.

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REBECCA ROBERTS, host:

But now, if you live anywhere from North Carolina to New England, you might still be digging out from the storm that dumped up to two feet of snow on us this weekend. Snarling roads, air traffic, Christmas shopping, and for many of you your holiday travel plans, even if you don't live anywhere near the East Coast.

The weather forecasters had it right this time. The Washington Post on Saturday simply said, it will snow all day. But predicting winter weather is a tricky science, and when a promised storm doesn't happen - or worse, when one blows in without warning - the local weatherman often takes the blame. So how accurate could a weather forecast actually be?

In a moment, Tom Kierein, meteorologist for Washington, D.C.'s NBC affiliate, joins me to talk about the science behind our favorite complaint: the weather report.

But then we want your stories. If you were stuck in an airport yourself or waiting for a parent or sibling or crawling along an interstate, and are you now way behind on your holiday shopping, how did the big storm change your holiday plans? Call us: 800-989-8255 800-989-8255. Or you can drop us an email - from the airport if you need to: talk@npr.org.

On the line with me now from his home in Maryland is Tom Kierein. I know you've had a very long weekend, Tom, so thanks for being on TALK OF THE NATION.

Mr. TOM KIEREIN (Meteorologist): Oh, happy to do it. I love snow. And this is certainly been, nearly an historic event for Washington. It was an historic event. The snow we had on Saturday was the most snow we've had from a single December storm since we've been keeping records way back in the late 1880s.

ROBERTS: So, did you get it right? What was your forecast on Friday?

Mr. KIEREIN: On Friday, I was saying we were going to get a foot, but we ended up with about double that. So the - and it all depends on the track of the area of low pressure that brought in the moisture off the Atlantic, not only the track, but how deep that pressure system got. And the track just changing 50 miles one way or another can make a dramatic difference in the amounts of snow. So the track of that storm was actually about 50 miles closer to the coastline than we had anticipated on Thursday night and into Friday when I was doing my forecast. So that's why things changed.

And in addition, Rebecca, it had to do with the size of the snowflakes, believe it or not, you know? And snowflakes are so beautiful, if you've ever seen one under a microscope, you know, you wonder how could something so exquisitely beautiful cause so much trouble? But actually, these were tiny, little, dry snowflakes, almost like the powder that you get in the Colorado Rockies, you know, that's great skiing type of snow.

And we rarely get that type of snow here. So when it did pile up, it piled up very quickly. I mean, normally, we're used to these snowflakes the size of dinner plates that just kind of...

ROBERTS: Right.

Mr. KIEREIN: ...plop down and land and sort of stack up on each other and press down to the ground. But this sort of just, sort of, very gently built on top of each other. It was half air, I think, when we were taking measurements.

ROBERTS: Yeah. It was terrible snowman snow.

Mr. KIEREIN: Yeah. Oh, yeah. And not good for, yeah, right - snowball fights or any of that. It - but it has sort of turned that way. In fact, the depth of the snow now is about half of what it was on Saturday. That's how fluffy and dry it was. It all just sort of compressed on down, and it has been melting.

ROBERTS: So why does it seem that weather predictions are less accurate in the winter?

Mr. KIEREIN: Well, winter is the most challenging time to do a weather forecast. And, well, first of all, at the outset, no one can predict the future. We can't...

ROBERTS: Isn't that your job?

(Soundbite of laughter)

Mr. KIEREIN: We can only approximate what might happen in the future. And trying to predict what's going to happen in the atmosphere - which, really, is an ultimate wilderness. It's like trying to predict what a wild animal is going to do. But with our advances in our knowledge and the use of all of our wonderful technology, we have actually gotten to the point where we're able to predict the storms, even in the wintertime, with about 70, 80 percent accuracy. So that's just about a nearly passing grade on exam.

But it's because of the unpredictable nature of the movement of low pressure when it encounters ocean air masses and land air masses, and that's where we live on the East Coast. We constantly have this battle between the marine environment, as well as the land environment. Sometimes the land environment will win out and sort of push that low pressure farther to the east. Sometimes the ocean environment wins out and pushes that low pressure farther to the west. So we're looking at some very fine, minute changes that can make an enormous difference in the outcome.

ROBERTS: So when you talk about that 70, 80 percent accuracy, what timeframe do you mean?

Mr. KIEREIN: Well, in a - usually about 48 hours in advance when we have gotten, to this point, certainly, with our advances in the science. That means within 24 to 48 hours in advance that we're within several inches of what we were predicting. So on Friday morning I was saying we were going to get eight to 12 plus. I put a little plus in there and said, well, there is a small chance, if storm track changes, that it would go higher than that.

But - and you've probably heard us talk about models, which are nothing more than the solutions to mathematical equations that we can use to actually model the atmosphere. And we plug in all the numbers into the equations, and then the computers do all the calculations. And we have several different models that have different biases and such that we look, OK, at a whole ensemble of different models and say, all right, let's take the average or one of, you know - some of them have a certain bias to the east or some have a certain bias to the west.

So it's a matter of really looking at, OK, is the general consensus of all the model output putting the storm in this position? And then we sort of go with that.

ROBERTS: So is there an advance in modeling or technology or research that would make forecasts more accurate? Or is it just so inherently changeable and chaotic that there's going to be a point beyond which you can't possibly know?

Mr. KIEREIN: Well, that's a great question. We only got samplings of what the atmosphere is doing once per hour at several hundred sites around the United States and some isolated ocean sites. So we only get, like, one freeze frame per hour of what the atmosphere is doing. Of course, the atmosphere is

constantly moving and changing. So it's like looking at one frame of a movie and trying to decide what the whole movie is about.

So if we could get constant samplings of the atmospheric conditions real time, all of the time and then plug those numbers in running calculations of the models all the time - see, we can run the models every six hours. If we could run them, say, every 20 minutes, then we could reach a point where we could get very, very good with accuracy. But we're still, I think, years away from that. And certainly, it's feasible to do it, sampling from space, and we have the technology. It's a matter of spending the money to do it.

ROBERTS: We've talked about don't blame the weatherman for the bad weather, but I imagine in your years of experience, you have taken a fair amount of flack.

Mr. KIEREIN: Oh, absolutely. It comes with the job, and I completely understand it because so many plans are disrupted. And people plan their lives based on what the forecast is going to do for outdoor events and weddings and trips and vacations. And I totally understand that. And so that comes with the job.

ROBERTS: OK. Tom, can you hang on and answer a quick question from Steve in Provo, Utah?

Mr. KIEREIN: Sure.

ROBERTS: Steve, you're on the air.

STEVE (Caller): Hi. Thanks. There's an old saying around here: big snow, little snow, little snow, big snow, meaning that if the flakes are small, you get a lot of snow. If the flakes are big, you get a little bit of snow. Seems to work, except that sometimes it starts out with big flakes and then goes to little flakes. I'm wondering if there's any meteorological explanation for this.

Mr. KIEREIN: Well, it has to do with the amount of available moisture in the atmosphere. Usually, of course, you get the smaller flakes when the atmosphere is very dry. And, of course, you have that in mountain environments. Of course, Provo is a spectacular place for that kind of powder. And you usually have dry conditions there on the lee side of Sierra Nevada and all the way, you know, to the western slopes of the Rockies. You get pockets of some very dry air. They're, of course, sort of a semi-arid region, anyway.

So whenever you get that moisture coming in off of the Pacific Ocean, what - a lot of times, most of it will sort of precipitate out over the Sierra Nevada. By the time it crosses the mountains and gets into the desert regions, in the arid regions to the east of Sierra Nevadas, a lot of that moisture's gone. But there - sometimes, there's so much moisture coming in from the Pacific that it eventually does make it all the way

there. And there, with the dry air in place, that moisture falls into to the dry air and it makes those flakes much smaller.

Now, if you've got a storm that is coming from farther to the south of where you're located, and maybe that storm will pick up some moisture of the Gulf of Mexico, then it's going to be a wetter storm, and that's when you get sort of - some of those bigger, fatter flakes. So it maybe, initially, it may start as big, fat flakes, because there is sort of more moisture. But eventually, that moisture is sort of zapped out of that particular storm system. And then it's -only that gets left is some of the, you know, lighter amounts of moisture in the upper elevations of the atmosphere. Then you get the smaller flakes on top of the big ones.

ROBERTS: Tom Keirien is a meteorologist for NBC's Washington, D.C. affiliate. He joined us from his home in Maryland. Thank you so much for being with us.

Mr. KIEREIN: Sure. Happy to do it. Stay warm.

ROBERTS: Yeah. Good luck shoveling.

Mr. KIEREIN: All right.

ROBERTS: Of course, you don't actually have to be digging snow to be feeling the pain of this storm. Passengers flying in and out of the East Coast are backed up for days. Go ahead and tell us your story. How has this weather affected your holiday plans? 800-989-8255 800-989-8255. Or send us email: talk@npr.org.

Let's hear from Linda in Tucson, Arizonan. Linda, you're not in snow country.

LINDA (Caller): No. I sure am not. I do work in reservations for an American-based airline.

ROBERTS: Oh. So you were busy this weekend?

LINDA: Oh, yeah, we were busy. And we just want to let you now that when our planes get backed up and we can't get them out, we do really work our hardest at getting the people out on the flights that we have. And we take no joy in getting delayed. We really want to get to where they're going.

But I talked to a lady yesterday, an older lady who had been delayed and been going from one gate to another gate to another gate to try to get New York. And if I could have gone to Chicago and bring her home with me, I would have done that because she was just so exhausted.

ROBERTS: Well, how - that's an excellent question. How do you figure out -especially at a time of year like this where so much travel is heavily booked, who can get the few remaining seats if you've got a whole, you know, hundreds of people stuck and such a limited supply?

LINDA: Right. As soon as a seat comes open, I grab it.

ROBERTS: And who do you determine gets it if you got a whole line of people wanting it?

LINDA: I am working with the person that I'm on with - the phone with. When a flight is delayed - anytime a flight is delayed, a passenger needs to get on the phone and call reservations because we can help them better than the gate agents or the people at the airport. We - not that we can help them better, but we can help them faster sometimes.

ROBERTS: So even if they're standing in the airport, they should call the 800 number?

LINDA: Yes, they should. They should. Because we can go ahead and look for a new flight for them, a new solution for them. We try to work with them and try to get them to maybe a different airport as close to their destination as we can get them to. We really try to bend over backwards and try to get them there because we understand their situation, and it's really important to get them there.

ROBERTS: Linda, thank you so much for calling in and for the advice.

LINDA: Thank you.

ROBERTS: You're listening to TALK OF THE NATION from NPR News.

Let's hear from Robert in Charlotte, North Carolina. Robert, welcome to TALK OF THE NATION.

ROBERT (Caller): Hello. How are you doing?

ROBERTS: Good.

ROBERT: That's good. First of all, I just wanted to thank the weatherman because I thank God that he forecasted right there on the nose. I thank God for the state troopers that was out there on 81 southbound in Virginia.

ROBERTS: Oh, you were on the road?

ROBERT: Yes. I was on at that time. And I thank God for the paramedics came out, and I thank God for the National Guard. They came out, because it was a crisis.

ROBERTS: Did you see a lot of wrecks?

ROBERT: Oh, yes. It was a crisis. It was - I've been driving 12 years and, you know, when I - my wife called me and said, honey, you better come on and get home. I was in Vermont at the time, and I was traveling down 81 south, when I finally got on 81. And I said, well, there's no problems, you know. I ran through snow, you know, it's no problem, you know? On 43,000 pounds. I can make it. And, boy, I tell you, when I got - and past Winchester, Virginia, it started getting dark, started getting all cloudy, and I got worried. You know, I was like this stuff is really coming. And I got on in past the - well, what you call Shenandoah Valley. That's when it started coming down and...

ROBERTS: Oh.

ROBERT: ...and I got a little ways on down. And this was like a blizzard. This stuff was coming down so fast it covered the road in less than an hour and a half, I'd say, two hours. The whole road...

ROBERTS: Oh, Robert, I do not envy you.

(Soundbite of laughter)

ROBERT: And there was thousands and thousands of cars backed up - thousands. There was UPS trucks running off the roads. There was FedEx trucks running off the roads. They couldn't get out - they couldn't get up the hills and the mountains. You know, on 81, they got these little valleys, and you go up and you go down, you go up and you go down.

ROBERTS: Right.

ROBERT: And there were so many cars getting stuck. And we were in traffic just like - just waiting in traffic for hours.

ROBERTS: Well, stay safe out there, Robert. Thank you so much for calling in. Let's take a call from Andy in Baltimore. Andy, how are the roads where you are?

ANDY (Caller): Hi. Actually, we did really well. We had family fly in from around the country. They came in midweek. We all piled in the vehicles on Saturday or early evening, and all of our family lives pretty close to the highways. And Maryland State Highway Administration did a killer job with the roads. They were great. There was one passable lane on the highway that was, you know, down with the black top in the evening. I mean, the snow is still falling, but they were on top of it. We got 22 and a quarter inches at our house. So - and they were able to keep up with it. They did an excellent job. It took a little longer than normal, but we made it. No problem.

ROBERTS: I'm glad to hear it. Thanks, Andy. Let's take a quick call from Dana in Yarmouth, Massachusetts.

DANA (Caller): Hi.

ROBERTS: Hi, Dana.

DANA: Hi. Well, in answer to your question, how it affected my holiday plans...

ROBERTS: Yup.

DANA: ...it soured me even more on Christmas.

(Soundbite of laughter)

ROBERTS: Bah humbug to you, Dana.

DANA: Absolutely.

(Soundbite of laughter)

DANA: Well, I think Scrooge would love Christmas these days, but that's beside the point. My - you know, I mean, it made me wish it was the Fourth of July instead of Christmas that was coming up. It just seems like, you know, when all you can do is wiping off the cars, shovel the driveway, you know, struggle what the plow did - well, I do appreciate plow work, though. I do appreciate them making the roads passable. But it's just a pain. I don't know. I just am sour on this time of year, and if I could, I'd move to Costa Rica or California.

(Soundbite of laughter)

DANA: I'll...

ROBERTS: Well, try to find some Christmas cheer up there in Massachusetts, Dana. Thank you for calling in. We have an email from Tim in Charlottesville, who says, we've grown so accustomed to wrong weather predictions, we were caught off guard. He didn't pay attention to the weather predictions, but was stunned and happy to see 22 to 28 inches building up.

Thank you everyone for calling and writing. And we couldn't get to all of your stories, but dig yourselves out or fix your travel plans if you need to.

And tomorrow, Neal Conan is back with a look inside Iran, their nuclear ambitions and their continuing political protests.

This is TALK OF THE NATION from NPR News. I'm Rebecca Roberts in Washington.