



Forecasting for the Future: Weather and Climate Change with Johanna Wagstaffe

Nerdin' About Podcast Transcript, Season 1 Episode 7

Michael

Hey everyone! Welcome to Nerdin' About! I'm Space Michael, and with me as always is my Buffy the Vampire co-host who is walking me through all of the trauma that all of these high school kids are going through every week, like a new kid is dying every episode. Like what kind of high school is this Kaylee?

Kaylee

They're certainly living a unique existence, that's for sure.

Michael

Yeah, no, I'm really enjoying it. I'm now into season two, and I was telling you Kaylee that this must be like the residual theme of the entire thing, that terrible things happen to you, some worse than others, and obviously for these kids, the worst possible things in the world are happening to them that will have repercussions for their entire lives.

Kaylee

Well, yeah at some point we're going to have to have a Buffy episode, because definitely the symbolism in Buffy is that these vampires, and all these horrible things represent other truths of growing up in high school. I'm very excited for you that you get to experience it for the first time, and I'm also very excited for me because: one I get to experience it with you; but two, we have a podcast that we're doing today and today we are joined by Johanna Wagstaffe, who is the on air meteorologist, seismologist, and scientist for CBC News. She's been covering national, and international weather, and science stories since the summer of 2007. She's hosted three award winning CBC Vancouver podcasts: "Faultlines," "2050: Degrees of Change", and the one that I have listened to and thoroughly enjoyed, "Uncover: Bomb on Board". Thanks for joining us, Johanna!

Johanna

Thanks for having me.

Kaylee

Let's start off. When I was thinking about meteorology, I was actually thinking about being in junior high, and doing like a meteorology unit and talking about weather and clouds. Is that how you got into meteorology? Was it a grade seven thing? Did I just miss out on an alternative future for myself?

Johanna

That actually is a great question. I really got into being interested in the science of how the Earth works in my high school science classes. It was the geography, and geology classes where we learned all the cycles of the Earth's processes, and how they all fit together. It was just sort of like a puzzle piece coming together, and I was particularly interested in the extreme events, you know, learning about the hurricanes, and the tornadoes, and the earthquakes, and that was always



in the back of my mind. So I stuck with the science, and then when I learned you could actually study that in university, and maybe even make a career out of it, I was in. There's so many facets to severe weather, and the earth sciences, so there's a lot to choose from, and you never really get tired.

Kaylee

Okay, I'm curious because something that I think about a lot when I think about the weather, and probably as somebody who wants to go camping, and is staring at the weather forecast days in advance, is it's famously unpredictable. How do you deal with that unpredictability when trying to track these systems?

Johanna

The unpredictability is really exciting, but also meteorologists get a bad rap when it comes to how unpredictable the weather is, and it's changing at warp speed. I mean, even just a few decades ago, the old jokes that people would come up with, and I'm only going to say this term once "the weather girl and the weatherman", the joke that they're allowed to get the weather wrong 50% of the time. I mean that's really changing, the science is becoming more precise as our models and data are becoming more precise. That being said, the intricacies of it means that we're always going to have variability when you really scale down, and we're talking scales of meters rather than kilometers. When you're talking very precise locations, like someone's backyard or where they're going camping versus an entire city. So yes there always will be variability. I think it's just really important, especially now with our audiences, getting smarter, and understanding those variabilities more, I think people are generally understanding variability in science more. So I think as long as we're transparent about those variabilities, and about those uncertainties, and we communicate it in a way that people understand, then we won't get slurpees thrown in our faces, basically.

Kaylee

Oh, my gosh, slurpees in your face doesn't sound particularly good. I'm curious, because you were mentioning the data: we have so much more data. Who's compiling that data? Where does the data come from that you get to deal with?

Johanna

This is one of my favorite topics in meteorology. Big data is such a huge part of meteorology and climatology, and we're only as good as the data we have. We're getting data from a lot of traditional sources like weather observatories around the world, and it's amazing that meteorology is one of the first scientific fields to really share that data across borders. The United Nations created a meteorological sector to share all of this data. So a lot of the observations come from airports, stations that will tell you on an hourly basis, about the temperature, the pressure, the winds, precipitation, but that's just at one particular point. So then we got satellites, and that was a huge game changer, you know, about 50 years ago, when we were able to actually see the data from outer space or the clouds from outer space. Radar is an added layer, and also upper air soundings. We used to get all of our data from releasing balloons high up in the atmosphere a few times a day, and now we're actually adding sensors to aircraft as they're taking off, and getting more and more data. The future is incredible, we're very close to actually getting data from people's cell phones, and from umbrellas. Basically, the more



information we have about what the weather is doing now, anywhere at any point in the earth, the better our forecast will be moving forward.

Kaylee

That's incredible, and that highlights for me, I was actually trying to figure out the average temperature, and the amount of precipitation total for a year about a decade ago. I was looking here in Vancouver, and I noticed that there were a number of stations collecting data, but some places were doing it daily, some places were doing it monthly, some places just had yearly, and then the dates were all different. I was like, where do I get it from?

Johanna

Oh yeah, that can get very confusing. This could come after a Buffy episode, and then we could do a very obscure weather station in Vancouver through the years episode.

Kaylee

Or weather in the Hellmouth. The weather in the Hellmouth is very odd. Sometimes it snows out of nowhere, and it makes no sense.

Johanna

Yes, that is true. So I mean, we can dig deep when it comes to weather stations, there are some fascinating stories. I mean, most of them were operated by humans up until even just a decade ago, and now they've all gone automatic, which definitely, you know, comes with its caveats. So the world of weather data is changing sometimes for the better, but also, sometimes for the worse.

Michael

Let's take this back a bit with you, Johanna and you studied meteorology, you started to nerd out about all of this data, and then have now transitioned into being a broadcaster, and being a public face communicating all of the science. Could you maybe tell us a bit about that story of what interested you to get into this field?

Johanna

Yeah, I mean, I was always interested in how enthusiastic I was about the science that I was learning, and from a pretty early age, science was my favorite subject in high school, and then doing a geophysics undergrad, and then a meteorology post grad, I was getting the fullest picture of the Earth processes that I could. I was always more interested in trying to communicate the things that I found so exciting to my non-science friends. So I realized that science communication is somewhere that I wanted to go. I wasn't sure if it would be working for a university, or a journal, but I wanted to help people understand why science can be so exciting. It was after my undergrad in geophysics when I actually got a summer intern job, which was probably the coolest intern job in my opinion, at the Ontario Storm Prediction Centre. So Environment Canada's summer severe weather forecasting office where we're actually forecasting for tornadoes, severe thunderstorms. I mean, it was like the James Bond summer of weather, and that's when I realized how important getting the message out to the public was, and I really enjoyed that aspect of the job. So while I was doing my meteorology, CBC was looking for a behind-the-scenes meteorologist, I was just finishing my certificate when they were looking



for somebody behind-the-scenes, and I was working the 4am shift until about noon, and then rushing off to York University campus to finish my exams. So they were pretty intense long days, but after about six months, they asked me if I wanted to try being on TV, they gave me the 2am shift, so that nobody would notice when I completely froze up. I've really enjoyed all the opportunities that CBC has allowed me to have, and allowed me to expand that role from meteorologist to science communicator for the station.

Michael

Yeah, with the podcasts that Kaylee talked about you should be really proud of them, I mean, they're really great. So tackling probably Earth's biggest problem right now: Climate change. Obviously, is one of our biggest issues, which you've gone into with your podcasts. Then last year, of course, a big moment for you, you decided to go on maternity leave, have a baby, and you're still just at the end of that mat leave now, and there's been some events in the world. Could you maybe tell us a little bit about your mindset now that you have taken this break from being a public science communicator, and this pandemic now, and now just about to go back into being a broadcaster, what you're feeling right now?

Johanna

That kind of hits the nail on the head for what has sort of been all encompassing for me, other than, you know, the joy of my little son Wesley, I've been thinking so much about this new world that we're in, and having this time to be with my son, and just sort of be away from my job. I mean this is, if anyone else listening has children, the hardest job there is compared to the one that I was doing. Thinking about the world that I will return to has made me emotional at times. I mean, yes, we are dealing with a global pandemic, and we're coming back to a bit of a question mark. In fact, I think I can be coming back to shooting from my own home, I'll be doing my broadcast from here, but on a much bigger scale we've seen the world come together for this pandemic. We've had a glimpse at what the world can look like when we come together, and make sacrifices, and that's exactly what we need for climate change. So I come back with hope that we will all see what we can do when we work together, and make these sacrifices because we will get through the other side of this pandemic. I'm hoping that we'll sit back after that and ask ourselves, well, what can we do next all together? Even more hopeful, I think is the spotlight that has been shone on science, and the fact that for the most part, it's the scientists that are delivering the messages, and it's the scientists that the politicians are looking to for guidance, and it's the scientists that we're getting to know by name, and looking to for information. I'm hoping that that spotlight will continue to be shone on scientists when it comes to climate change. I don't want to be too naively optimistic, I do understand that climate change has taken a bit of a back burner, and that does mean a lot of projects, and incentives are being put on hold, but personally having this little guy in my life now has really added this extra layer emotionally for me. I was sort of angry before about the way things were going, and our lack of speed, and responding to climate change, but now there's also a level of sadness and wanting to get this done for Wesley. As cheesy as that sounds it really is true.

Kaylee

What do you think is one of the big challenges in actually enacting change? Like you said, we actually do need global efforts, and there have been initiatives, and some more successful than others, but what do you think is the biggest challenge moving forward?



Johanna

I think it has to come down to huge large scale changes, it has to be a systems change. I think that means buy-in from every single individual, every single business, every single community, but we are talking about a systems change, you know, flipping what we know, on its head as far as how we operate on a daily basis. I think, for some people, that change will come when they're personally affected by a severe weather event, or an event brought on by climate change. For other people it's when friends and family are affected, or when they see something happening in the news, again, my hope is that we've all seen what we can do when we come together, and you know, pause our emissions, our greenhouse gas emissions, we're already seeing the impacts of that on our carbon emissions for the first time ever since the Industrial Revolution, we've seen that pause show up in the data. I hope that's the push for us to make those big systematic changes.

Kaylee

Okay, so you mentioned greenhouse gas emissions, what are some other contributors to climate change? Are there other things on the radar? Or are greenhouse gas emissions the number one thing, and that's just where we should be putting all our focus?

Johanna

Yeah that's a good question. I mean, greenhouse gases is certainly the biggest driver of climate change, and the human caused input of that into our environment, but it goes hand in hand with this big bubble, this system science. I think when we think about reducing our greenhouse gas emissions, and we think about reducing our carbon footprint that also goes hand in hand with all of the other things that are impacting our environment in the natural world. So things like urbanization, and thinking about how we interact with the natural world around us, and thinking about how we manage things like forest fires, and ecosystems. So carbon isn't everything but you know, if we think about fixing that problem, a lot of the solutions means that we fix a lot of the problems.

Michael

I think one of the concerns I have Johanna, and thinking where we might be next, because the argument against how to tackle climate change has largely been around whether it's humans that are the cause, or if it's just a natural process. There's that small segment of people that acknowledge there is some change happening, but it's not the humans that are at fault. So what may happen after this pandemic, if the numbers don't bear that out? Is there a danger of that narrative being pushed through?

Johanna

I think the idea of the other side, or the climate deniers having a loud voice in this world with fake news is definitely a real problem when it comes to figuring out the truth to any story. I think that is something we have to consider. I'm not worried about the data not telling the story, as we're already seeing some early publications, even just after a few months, showing that drop. What's interesting is scientists all around the world are able to work together on this accidental experiment in a way that we've never been able to do before. We're all seeing this drop around the world, and scientists are communicating in a new way. So I think we will see some pretty telling papers, and studies and conversations come out over the next few months. I think the



question about how to address people who don't believe in the science, or aren't getting the right information when it comes to the science, is something that I've been thinking about for years. I go back and forth on the right way to address that. Even for me, you know, for every climate story I tell, I get a tweet from somebody trying to tell me that that wasn't right, and linking me to a YouTube channel with the other side of it. For me, it's: Do I engage that person? Do I come back at them with the science? I think it all comes down to whether or not that person is willing to engage. I want to be somebody that is open to having a conversation, but if it becomes political, and if there is no hope of engagement there, then I think it's best to just focus on getting the message out to the right people. I do believe that more and more people are unfortunately being affected by severe weather, and are really, truly believing that climate change is an issue that is affecting everyone, because everyone is getting affected.

Kaylee

When you're thinking about telling that story, and sharing that information, and all the different audiences that you can engage with. How does that look in comparison to when you're preparing to talk on the CBC versus developing a podcast? What is your approach? Do they differ? Is it the same? Just a different way you tell your story?

Johanna

Yeah, I think about this a lot, and CBC thinks about this a lot, on how to connect with the different audiences that we have on the many different platforms that are now involved in a day. It's not just the six o'clock news that we're working towards, this one way conversation, it's constant communication on a two way level throughout the day on social media, it's radio, it's podcasts, it's digital. Every different platform comes with sort of a slightly different demographic, and we also have our mandate that we're trying to deliver on as the Canadian Public Broadcasting Service. So we do think about this a lot. I think it does drive some of our decisions, but I think the most important thing is getting the facts out. We do want to tell both sides of the story always, and talk about the people who are being negatively affected by this massive shift in our energy, there are always two sides of the story. I think for me, as a scientist, and a science communicator, making sure to stick to the facts, and not making it political, is probably the most important thing that I can do.

Michael

All right, let's get to some audience questions. Our first question comes from probably our furthest listener, Mike, all the way from Abu Dhabi, who wants to know about the endangered animals, and how they've been affected during the pandemic.

Johanna

You know, we've probably all seen the social media move where people are posting #naturereturns, and you know, dolphins and whales in harbours, and we've visually and colloquially have seen nature make a comeback, but as far as endangered species I don't know a lot about the specifics, but I do know that it's not all good news. I mean, this is just a very short pause. In fact, as we're returning to the streets, and returning to work and looking for that new normal, this isn't going to have a lasting effect on that return. This is where we do have to make these big changes based on what we've seen we can do together. Unfortunately, I know there is



some concern that a lot of the policies and treaties that were being worked on when it comes to protecting endangered species are now put on hold. So there is some concern there, but hopefully people have seen what taking a small pause, and a little sacrifice can end up meaning for nature in general, and ultimately have a positive outcome.

Kaylee

Next question is from Kim, who asks, "Will winter eventually be completely phased out? Or will we always have snow to some degree?"

Johanna

Great question. Well, just thinking about the next you know, few centuries, we will always have some kind of a winter, and we will have snow somewhere around the world. I mean, climate change is changing our weather at speeds never seen before in the history of our planet, but it is changing them not all uniformly. When we talk about global warming, it doesn't mean that the whole earth is getting warmer, it is shifting those temperature contrasts, and making them more extreme. Generally, as the global average temperature gets warmer, that will remain true, but the impact that it has on severe weather events are different all around the world. So in some cases, we might actually have more snow, and bigger snow events. Generally for the sort of mid-latitude levels all around the world, it means we will have less snow, and maybe some years where parts of the world who used to have snow won't see any snow at all. For example, here in Vancouver, you know, our local mountains even in the next 30 years are not likely to get any snow, there will definitely be years where we won't see any snow, and eventually we'll just remember the days, and look back at archival footage which will be a sad thing. There will always be severe weather events, and most of the snow we get will come all at once, and probably as bigger storms. Bigger blizzards that have a bigger impact, but we just won't see them as often.

Kaylee

So at first I was gonna make a joke - because I'm from Edmonton - that folks in Edmonton would be rejoicing, but a lot of the precipitation in Edmonton comes from snow. So what will that mean for those places that really rely on snow?

Johanna

This is a topic that I thought I had a pretty good understanding of the relationship between weather and climate change before making my 2050 podcast, but one of the biggest takeaways for me is that climate change's impact on snow is probably the number one driver of the changes we will see here in Canada, because so much of our precipitation that is locked up in the mountains, and ends up slowly releasing through the months, and keeping our rivers and streams at a temperature that can keep fish alive, and that can keep our saltwater at bay. I mean the repercussions of not seeing that snow are huge, and getting that precipitation in more rain events, and in more severe flooding events where most of it gets washed away, it means also lower water levels, which means sea levels can rise on the other side of things. So snow, and the lack of it that we will be seeing, there is nothing more important for Canadians, and whether you're listening from British Columbia, or Alberta, or Ontario, these places all get their freshwater from



snow at higher latitudes, whether it is the mountains or just higher sections of the province. So that is going to be probably the biggest factor when it comes to our changing weather.

Michael

Should we do a segment?

Kaylee

Let's do a segment!

Michael

So we'll start with you Johanna, what have you been nerding out about?

Johanna

You know, we've all we've all had our binge worthy shows during this time. I have become obsessed with this TV show Devs. Have either one of you seen it?

Michael

It's on my "to watch" list.

Johanna

Okay, so it's by the director of Annihilation (Alex Garland). I'm a huge science fiction fan, Devs is sort of like Annihilation meets, let's see something more character building - the characters are amazing. But the science! I have gone down so many rabbit holes, including multiverse, and deterministic theories, and a lot of it ties into weather forecasting. There's sort of this old school way of weather forecasting, which is called the deterministic way where you have one set of initial conditions, you have all of the data points that you see around you, you plug it into a weather model, it moves it forward through time, and you interpret the results. So that's the deterministic way, this multiverse or ensemble forecasting takes, you know, thousands and thousands of slight iterations of that same model run, and you end up looking at this sort of spaghetti plot or ensemble of answers, and that's part of the reason why forecasting has become so much more precise, and so much better really just in the past decade. So to see it play out in a science fiction TV show, and I don't want to give away the ending, but researching some of these theories, and realizing that maybe I can predict the future, not just for weather was kind of cool. So if you want to totally nerd out on a great science fiction TV show, and think about meteorology in the process, I would recommend Devs.

Kaylee

I want to see it!

Johanna

What do you guys got?

Michael

Well, so we are recording this June 2, and of course, there's a lot of protests going on in the States at the moment. So I've been really looking into trying to amplify some Black



astrophysicists, because there actually aren't that many, and what I've been finding is some really, really interesting voices, and one I came across was Dr. Jedidah Isler. I first heard about her because she gave a Ted Talk in Vancouver about blazars, and blazars is just a cool word to say, but they're these super powerful jets that come out of black holes. Then I realized that she has this whole other passion that's all about Black stem advocacy, and she gave this second TED Talk, which I found really fascinating where she advocates for more Black people in physics specifically, and talks about intersections. There is a really beautiful metaphor about physical intersections being places where new ideas and new people come together. She talked about the Arc de Triomphe in France, and even the intersection in Ferguson, Missouri where there's been protests there and they're places of change, and then even in the cosmos, where gas and matter come together to form stars. Physics right now is lacking a lot of these diverse voices, and she wrote this op-ed piece in The New York Times, basically advocating specifically for more Black people in physics, because then we'll actually start to find some of the real change that we need in the world right now. So I'm making this post that's going to be on my Instagram very soon to learn all about Dr. Jedidah Isler on my Instagram, @michaeljohnunger, and I'll post all of the links to her two TED talks, and to her New York Times op-ed.

Kaylee

That sounds great. I'm really excited to see those.

Michael

Kaylee, what have you been nerding about?

Kaylee

Well, now, I'm not much of a birder. My eyesight is, as you know, Michael, not particularly great. Honestly, if it's not like a chickadee, or a lilac-breasted roller, I probably have no idea what bird it is that I'm looking at. This week, I've been nerding out about a series organised by a group of Black birders called Black Birders Week, and the initiative was started in response to racism Black birders face just trying to get out and enjoy nature, and the series is raising not only awareness of the challenges that Black birders face, but it's also sharing so much joy, knowledge and honestly so many birds. So we're three days in to Black birds week, and the first day focused on sharing the pictures and stories of Black folks in nature, and the second day was focused on posting pictures, and facts about birds. So you can go scroll through #postabird, I learned a lot about a lot of different birds. Today there's a Q&A called Ask a Black Birder, and I'm actually waiting anxiously to see if my question about what the nerdiest bird is, is actually answered. So my recommendation is that if you don't already follow @BlackAFinSTEM, head over there now, and even though Black birders week will be over by the time this airs, you can go and check out the daily hashtags, and follow the people contributing to the series. Beyond that series, follow @BlackAFinSTEM anyway, because I'm sure that all their future initiatives are going to be equally fantastic. So that's my nerd out this week, I might even be a little inspired to find my old pair of binoculars, and search out what the hell bird keeps singing outside my bedroom window every morning at 5am, it's driving me a little bonkers.

Johanna

I also want to know the answer to what is the nerdiest bird.



Kaylee

A lot of people have opinions on like, what is the hashtag best bird? But, I would really like to know what the nerdiest bird is, is there any that look like they have glasses? Is it some owl? I imagine it's gotta be some owl.

Johanna

I know, or they're like really peculiar about studying an area before they roost in it. It's probably crows, honestly,

Michael

Or birds that like making lists.

Kaylee

That would probably be crows.

Johanna

Yeah. Well, I'm gonna stay tuned for that.

Michael

Awesome. Well, thank you so much, Johanna for joining us on Nerdin' About. You're about to go back on air. When can people see you back on the television?

Johanna

Start of July. I am back June 29th. It's very nice that CBC thought I deserved a refresher, because my first day on I would probably just be changing diapers, instead of showing rotational system directions. So yeah, beginning of July, I'll be back on from my home. I am looking forward to it. Maybe they'll be some cameos from my little guy running around screaming in the back.

Michael

Yeah, and do you have any more projects that you'd like to plug, any more podcasts that you have brewing, or books?

Johanna

Oh, always stuff brewing. I do just have a new children's book out. It just came out last month actually called "The Little Cloud". I did not write this for the record on maternity leave, because I've been unable to even finish a hot coffee. I wrote this just before Wesley arrived, and it just came out last month, and it's the story of a little cumulus who always dreamed of becoming a hurricane, and the illustrations are amazing. So I'm really happy with that, and looking forward to pop quizzing Wesley later.

Kaylee

That sounds adorable.

Johanna

Thank you.

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Kaylee

So you can go follow Johanna @cbcJohanna on Instagram, @JWagstaffe on Twitter, you can read her book and you can also follow us on Twitter, Instagram, and Facebook @NerdNiteYVR, or go to our website vancouver.nerdnite.com. We'll be back in two weeks and until then, keep your eyes on the skies, and on the data.

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