

Transcript of “Colleen Iversen, Senior Staff Scientist in the Environmental Sciences Division and in the Climate Change Science Institute at Oak Ridge National Laboratory”

Clear Skies Ahead: Conversations about Careers in Meteorology and Beyond

May 12, 2020

Kelly Savoie:

Welcome to the American Meteorological Society’s podcast series on careers in the atmospheric and related sciences. I’m Kelly Savoie and I’m here with Rex Horner, and we’ll be your hosts. Our podcast series will give you the opportunity to step into the shoes of an expert working in weather, water, and climate sciences.

Rex Horner:

We are excited to introduce today’s guest, Colleen Iversen, a Senior Staff Scientist in the Environmental Sciences Division and in the Climate Change Science Institute at Oak Ridge National Laboratory in Tennessee. Welcome, Colleen. Thanks so much for joining us.

Colleen Iversen:

Thanks for having me.

Kelly:

Colleen, could you tell us a little bit about your educational background and what sparked your interest in science?

Colleen:

Sure. I think I would first talk about what sparked my interest in science, and that would be to go way back in time to when I was a kid. Both of my parents were geologists, so I spent a lot of my summer vacation sort of pulled over on the side of the road looking at road cuts and rock strata, and so I don’t study rocks now for a living. I’m interested more in biology. I saw too many rocks when I was a kid. So I was always interested in the things that were living. So what I did with rocks as a kid was turned them over to dig around in the soil and find worms and to figure out where plants were going below ground, and that kind of love for biology came with me through school. So I got my undergraduate degree at Hope College in Michigan in biology, and then I got my master’s degree in wetland ecology at the University of Notre Dame, and then I kept going further South. So then I got my PhD at the University of Tennessee in ecology and evolutionary biology.

Rex:

And tell us what was next after you had moved through those different degrees and honed in on your specific place within biology and then moving more specifically?

Colleen:

Yeah, so I did my dissertation work on a nearby forest where we were adding extra carbon dioxide to a stand of trees to see if the trees grew more when they had extra carbon dioxide to take out via photosynthesis, and we found that the trees did grow more, but the most interesting part was instead of growing more wood, getting thicker, or getting taller, the trees use the extra carbon they took up in photosynthesis to make more roots below ground, and that's because since the trees had extra carbon, they needed extra water and extra nutrients to make more bits of tree. So that's where I got interested in what was happening below ground, and that was also where I found out what a national laboratory was. I had no idea before I moved to Tennessee that as a nation we had national laboratories, let alone that there was one right next door to where I was doing my dissertation work, and so I met a scientist from the lab and that's how I ended up ... he ended up getting approved to direct dissertation work and I was his first graduate student and ended my PhD work at the national laboratory.

Kelly:

So how did you find out that there were national labs? Did you just do some research or did somebody let you know about that?

Colleen:

Yeah, it was a personal connection. So the person who I'd come to Tennessee to do dissertation work with was collaborating with a scientist at the national laboratory, and I met him and we started talking and we found out that we had lots of interests that were overlapping in terms of nutrient cycling and ecosystem ecology, so understanding the interactions between the living and nonliving parts of the ecosystem, and so he asked me to come do my dissertation work there to help him to ask new questions in a new way. So it was totally an accident, and I find that often scientific research is sort of that way. It's all about who you get to meet and sort of the partnerships that you make in that way.

Rex:

Were there any other opportunities that you think might have been advantageous as you were moving into finding out about the national laboratory? Other things in your profession that you did, activities you took part in that gave you any additional insights into what path you might take?

Colleen:

Yeah. So I think, for me, I know I have a lot of sort of students and interns that I work with and they're always worried that they have to have their whole career planned out, and that's not how it was for me, and I think that's not how it is for a lot of my colleagues. It's sort of always about the next thing. So you make a connection, you meet somebody who's doing interesting things. You work with them for awhile, then you make another connection and you do interesting things, and so that's kind of how it worked for me. I was lucky in that when I finished my dissertation work, the experiment that I was working on, which was called the free air CO₂ enrichment experiment, so a FACE experiment where you add extra carbon dioxide, it was going to be wrapping up in the next year, and so I was planning to go and do a postdoc elsewhere. Usually that's what people do. They sort of do a dissertation and then they do a postdoc

somewhere else and get a job somewhere else, and my advisor said, "If you stay you can help us dig up the experiment," and that was sort of really exciting for me because -

Kelly:

Oh, wow.

Colleen:

- it was a 12 year long experiment and we had to be very careful kind of about what we could dig up and what we could be destructive in our sampling, and so I stayed because I wanted to dig giant soil pits is how it worked, and then the next year after that, in 2010, the Department of Energy was moving us towards the next series of experiments, and so I actually got hired as staff at the national laboratory in 2010. So I didn't really go anywhere after my dissertation work. I just stayed at the national lab.

Kelly:

Well that's really lucky of you. You did work there and then you managed to get a full time salaried position.

Colleen:

Yeah.

Kelly:

That was just excellent timing.

Colleen:

It worked out very well and I really enjoyed it. I think when I first was starting my sort of graduate career, I wasn't really sure ... I'd never thought really about being a professor, or if I did think about being a professor, I thought about teaching at a small liberal arts school, like where I went to college, but I found that at a national laboratory where we don't have teaching duties, I get to focus a lot on the science, which I really like, and I get to focus a lot on mentoring. So instead of sort of standing up in the front of the room and talking at people, I get to talk with students who are working with us and sort of hands-on and helping us answer questions and I really liked that part of it.

Kelly:

So speaking of mentoring, did you also have some mentors that helped guide you through your career and where you are today?

Colleen:

Yeah, I think mentors are so important to anybody's success in whatever they're doing. I was lucky in that my dissertation advisor was an excellent mentor. He had an open door policy, and I don't know if this affected you guys, but I have imposter syndrome. I worry that one of these days someone's going to show up to my office and say, "You've done a really good job of

fooling everybody that you know what you're talking about, but now it's time for you to go home. You're not fooling anyone anymore."

Rex:

I think it's a universal syndrome.

Colleen:

Yeah.

Kelly:

Yeah.

Colleen:

So I have that, and it's very helpful to have someone to talk things through with when you're feeling like an imposter. I would say also I'm very lucky, the technician who worked with me during my dissertation, I'm now her supervisor and she has been an amazing mentor to me, sort of as I've gotten further along in my career. She's someone who can say, "Hey, you really need to pay attention to this thing." It's nice to have somebody who can tell you that, and then I have a mentor in a project that I'm working on in the Arctic who's been an amazing ally and advocate for women in science, for scientists with families and a two-body problem, and also sort of for changing the culture of science and making it inclusive and sort of making sure we listen to people that come after us. So I've had a lot of great mentors.

Rex:

So switching gears just a little bit back to your life at the lab, we'd be interested to know what a typical day on the job would be like, and of course we also should acknowledge that we're in the midst of the global response to the coronavirus, and so a typical day is not a day that has happened recently, and so we'd also be interested if you could share maybe what adjustments your job has taken in the current moment. So it's a two-part question for you.

Colleen:

So I would say I talk a lot through the Skype a Scientist program to students all over the country in classrooms, and they always ask me this too, "What's a typical day for a scientist?" And I always say my favorite thing about science is that there's no typical day. So I get to do a lot of different things. Some of those things are traveling to Alaska, where we look at how permafrost thaw is effecting vegetation communities, we travel to Minnesota, where we have a warming by elevated carbon dioxide experiment in a bog, and I get to travel all over the world, to Germany or Australia to meet with scientists who do similar things but in different places. I spend a lot of time on a computer writing papers or looking at data, and I spend time in the laboratory too. So some of what I do is to sample vegetation and soils and bring it back to the laboratory where we would do chemical analyses, or I've spent a lot of time wearing jeweler's glasses with my head face down and looking at a bowl of roots and figuring out who belongs to who and who their fungal partners are.

Colleen:

And so there's always something different to be done, and I think the nice thing about it is the common thread is through all of those different things, I'm trying to answer a question, and the overarching question I have is how ecosystems are responding to a changing climate, but it's interesting to me that there's so many different parts of that that are important to do to answer that question. In terms of the second part of the two-part question, how have things changed? So we're in the middle of this sort of global pandemic now, and to be safe, Oak Ridge National Laboratory where I work has suggested that most of us work from home, and so since Monday of this week ... it's Thursday right now, I've been working in my home office, brand new home office. I have a window, which is amazing, and I've been doing a lot of working on data and papers, which is really nice for me. I'm able to do that because my husband Jim is a stay at home dad and is taking care of all of the childcare duties of our two boys. I have a nine year old and an almost three year old. Next week he'll be three, and so that's keeping him very -

Rex:

Happy early birthday.

Colleen:

Oh yeah, thank you. I think this is a good birthday because he's not expecting a big party. I think if we have a cake that'll be okay. So we got lucky, and I also spend a lot of time worrying about my people, and so I have technicians and college graduates and undergraduate interns who all work with me and who usually do the hands-on work in the laboratory, and so making sure that they have things that are productive to do as we sort of weather this current crisis is something that I spend a lot of time worrying and thinking about.

Kelly:

I think it's good that we have the technology that we have. I can't imagine if something like this happened 40 years ago, and it's nice to be able to FaceTime with friends or family, just to kind of get that socialization and to be able to work from home and be able to remote desktop into your computer. I just can't imagine how difficult it would be if we didn't have these technologies in place to be able to get us through this.

Colleen:

I think about that a lot too. I mean I have to travel quite a lot for my job and it's a little hard to be a mom and to do so much traveling, and I think ... I'm so grateful for FaceTime and Skype, because when my kids were babies, it wasn't like they were going to pick up the phone and talk to me, and they still don't love it. "Mommy, can I push the red button?" But at least I get to see them running around like I normally would, even when I'm in China or Germany or Alaska.

Kelly:

So you mentioned you're doing a lot of paper writing. What are some of the journals that you submit papers to?

Colleen:

Yeah, so I'm actually an editor at a journal. It's called *New Phytologist*. It's one of my favorite journals because it's not for profit, and so they put all of their profits back into hosting symposia

for scientists and hosting workshops and that sort of thing, which I really like. So that's one of the main journals in our field where I think of it as a virtual town square for people to come and talk about below ground things that I'm interested in, like roots and fungi and soils, but other journals would be *Global Change Biology* or *The Proceedings of the National Academies of Science*, and then of course your *Nature* and your *Science* family of journals, and also sort of plant and soil and ecosystems journals.

Kelly:

You talked a lot about doing field work. Is that what you like most about your job or is there something else that you like more?

Colleen:

I do like the field work. Like I said, it's hard for me to be a way, but I always, when I'm away, try to be grateful for the things that I have gotten to see by being a scientist that I wouldn't have otherwise. Getting to see musk oxen on the Arctic tundra has been pretty amazing. Just getting to see the tundra in general where the plants are sort of just hugging the ground and there are no trees.

Kelly:

That must have been amazing.

Colleen:

Yeah, it's just a frozen lake shore. Getting to travel the world, I appreciate those things too, but honestly, the part that I like most about my job is getting to tell a story. I like gathering together all the pieces of a puzzle to answer a question, and then I like to tell that story by writing about it or by talking about it. That's my favorite thing is to sort of tell people about how cool the world is.

Rex:

And on the flip side, do you have any insight in what might be the most challenging part of your job?

Colleen:

Yeah, the most challenging part of my job I think is the further along you get, I think people don't realize sort of all of the extra administrative duties that you have. People go into science because they get to be in the lab and they get to be in the field, and then as you get further and further along you're organizing and you're sort of running a small business and there's a lot of email that comes with that. So I would say if at home for these next several weeks, if I could just turn off my email and never answer it again, it would be ideal.

Rex:

That makes sense.

Kelly:

When you were in school, you had to take all the typical math and science courses, but now that you're in the working world, are there other courses that you think would be useful that you'd advise students to take if they wanted to get a job in your field?

Colleen:

Absolutely. I would say the things we do most often, the further along you get into being a principal investigator are related to business. So I would say anything in sort of business or management, any classes like that would be super useful, and the other thing I would say is anything related to communication. So I don't know if your audience would know who Alan Alda is. He was Hawkeye on M.A.S.H. a long time ago, but after he finished that he went around the country interviewing scientists about what they do and he wrote a book called *If I Understood You, Would I Have This Look On My Face?* after that decade, and now he runs a school for science communication, and so I came to Oak Ridge and I took their class and they use improv to help scientists to be more spontaneous, to listen to their audience, to better communicate what they do, and that has been so helpful, both in talking to other scientists, but also talking to sort of the next generation of scientists and the public about what I do, and so anything related to communication, including writing and public speaking.

Kelly:

I had no idea that Alan Alda had done that, and I'm old enough to know who Alan Alda is. I'm not sure about some of these other people on the call, but -

Colleen:

I always feel badly when I ask if people know who he is and I just get blank stares. It makes me feel old.

Rex:

Well, the story still resonates nonetheless.

Kelly:

Does your job allow for a good work/life balance? I know you said you had to travel a lot, but is that not that often enough that it would be a problem?

Colleen:

I think that's always a hard question. So I do travel a lot. I think I added it up one year and it was 75 days that I was gone. So it's quite a lot of time away from my family, and I think the work/life balance question is a hard one, because no, it is hard to have a good work/life balance being a scientist, but that doesn't mean you can't. You just have to work at it, and so I recently, several years ago had a friend and a colleague who passed away from ALS, and at his funeral his daughter stood up and said, "It's really been lovely of all of you to tell me how famous my dad was and what a great scientist he was, but when he came home, he was on our time. We didn't know he was a famous scientist, we just knew he was Dad."

Colleen:

And that really resonated with me, and I try very hard when I come home at the end of the day, which now is walking down the stairs, I try very hard to be on my family's time and I try very hard to make it count, and that's how I've made it work by being home when I'm home, and even when I have to be away, trying to stay in contact, and I would say it's not just the travel that makes it difficult. There are expectations within just the sciences in general that might be different for women versus men, and having advocates and allies that will help to try to shape and change that culture from the top has been something that's been very important for me as well.

Kelly:

So what would you say ... if you could have done anything differently in your career, what would it be?

Colleen:

Yeah, I feel like that implies that I had a plan for my career, which I really didn't. I was thinking about this question and I'm not sure if I would have done anything differently. I can think of a lot of things that I would have told my younger self to think more about, and that's things like ... I'm taking a lot of leadership classes now, and just thinking about how everyone has a different communication style and understanding where they're coming from can really help you to interact with them. I would tell myself to think more about that, because science is really about building relationships and better science gets done in teams, and so thinking about what I would want my team to look like, I think is something that I would be more proactive about.

Kelly:

Yeah, I find that too, that there are so many different learners. There's visual learners, there are people who like to just read to get things done and to find out how to do something, and you really have to take that into consideration. I think a lot of us find that in our own jobs, where just because we learn a certain way doesn't mean everyone can learn that way as well, which makes it a little challenging when you're trying to put things together for training materials, but I think that's definitely good advice to be able to be a better communicator.

Colleen:

I think the other thing that I always try to tell even kindergartners or elementary school kids when I talk to them is I used to worry that all of the questions would be taken by the time I got to do science, that everyone would have already answered them and that we should just go home, and I found that to be the opposite, that sort of when you answer one question, there's always a new question that arises from the answer, and so you could spend your whole life, your whole career asking and answering questions without running out of things to think about.

Rex:

What sort of professional development opportunities do you pursue, Colleen, to keep current with the science, the knowledge, your peers in the field?

Colleen:

So I mentioned that I'm an editor for the journal *New Phytologist*, and that really helps me to stay a part of the scientific discourse. It's nice to have an excuse to keep up with the literature and also to sort of have a small hand in shaping the way that a story is told. A lot of my professional development is related to the way I communicate in my science, and that's to children, to other scientists, and to the public, and I mentioned that I'm doing a lot of leadership training now and thinking about how to sort of know the way that I interact with the world so that I can better understand the way that other people interact with the world and thinking about leading teams to do the next set of experiments.

Kelly:

If you were hiring someone in your department, what would you look for in a resume? Do you have any advice for students or early career professionals who are looking to get into that field?

Colleen:

Yeah, so I would say the first two things that I think about when I'm hiring someone is if they're a good team player and a good communicator, and so you might notice that sort of their scientific skillset isn't necessarily at the top of my list, and that's because the people that we have applying for jobs, including internships here at the national lab, are amazing scientists already, but we want people who can also be amazing collaborators, who are eager and motivated to learn, who ask questions, who want to work together to solve problems, because like climate change, a lot of the problems that we have now are really interdisciplinary in nature, and it takes a lot of different people to think about ways to solve those problems, and so I would rather have someone who is an excellent scientist but also an excellent team player come and work with us.

Kelly:

So if somebody was coming out of school or they're in school, in order to get those skills, would you say that you look for people who have had internships or have done other extracurricular type activities where they've been engaged in the community and things like that?

Colleen:

I think that's helpful, although I would say the Department of Energy, who funds a lot of the work we do at Oak Ridge National Laboratory, they have intern programs during the summer where they will fund students to come and work with us, and then we also fund students from our research programs, and I would say I'm happy to teach a student, in particular students, the scientific skills they need to do the kind of science I do. What I would rather have is someone who comes with a sort of natural curiosity about the world around us, who's motivated to show up and learn, and who's really interested in the big picture of what we're studying. Other internships are a bonus, because that means that they would feel more comfortable coming into sort of the professional environment, but they're not required.

Colleen:

In fact, some of the interns that we have had in the program are first generation college students or come from community colleges, and so that's not something that would be a deal breaker for me if they didn't have previous internship experience. Working in the broader community, that's also something that I appreciate, but that's not a deal breaker either. I want to be fair about sort

of who gets to do science, and there's students from some backgrounds that have to have a job so they don't have time to do sort of community service or sorts of extracurricular activities, and so really it's about that they know what they want to do and where they want to be, and to me that sort of comes across when you talk to them.

Kelly:

So yeah, I'm guessing that the interview process is really important and that's how you can determine those things.

Colleen:

It's funny, it's so hard, because sometimes you just have one phone call with someone -

Kelly:

Oh, right.

Colleen:

- to figure out how they're a good fit or not, especially for the internship program, for students. Postdocs and stuff are kind of another thing altogether. They would come and give a talk about their science and we would get to meet them and hang out, but for students, sometimes it's just a phone call, and so sometimes it works and sometimes it doesn't, but I often think where it doesn't work can be as valuable for them as where it does. I think that's the nice thing about doing an internship. Before you might decide to go to graduate school, you might come and find you don't really want to do research for a living, you don't want to go on to graduate school, you don't want to write papers, you just want to do the science, and so that's good to know and there are opportunities to do science everywhere without a graduate degree.

Rex:

That's a great insight. Thank you so much. Colleen, we always ask our guests one last fun question at the end of each podcast, and I had heard through the grapevine that you have an all-time favorite book that you might want to tell us about.

Colleen:

This is a really hard question to answer because I like to read. I'm a really fast reader and I usually will read a book before I go to bed at night. I'll read a book, and I like to read -

Rex:

One whole book?

Colleen:

One whole book.

Kelly:

Wow.

Colleen:

No, and I like to read fiction. I feel like I do a lot of nonfiction reading during the day and the news is very real lately, and so I want to escape a little bit. So ever since I was little, I've always really liked science fiction novels. Robert Heinlein was my favorite author when I was a kid, and sort of thinking about what my all-time favorite book was pretty tricky since I've read a lot of them, but I thought one of the ones that really impressed me when I was a kid reading it was a book called *Ender's Game* by Orson Scott Card.

Rex:

Sure.

Colleen:

Yeah. Have you guys heard that one?

Rex:

I have, yeah.

Kelly:

I have not.

Colleen:

It's about a young boy, basically young children who end up going to battle school to help save the world from an alien invasion, and I think the reason that it made such a big impact on me is because it was the first time I thought about how adults don't really have the answers to all the questions and that kids can think about things in new ways, in new important ways, like "the enemy's gate is down," and so I think just thinking about how I could make an impact in the future, that was important to me. I have not read it since I've had children of my own and I think it would be pretty devastating now to think about the situations that those kids were put in, but I do remember it making a big impact when I was that age.

Kelly:

I'm going to have to put that one on my list. I've heard of it and they've probably made a movie out of it -

Colleen:

It is a movie. I haven't watched the movie, yeah.

Kelly:

It's probably nowhere near as good as the book. They never are.

Colleen:

That's usually what happens, yeah.

Rex:

And I also noticed while perusing your website that you had a Tolkien quote pretty prominently displayed at the bottom and that stuck out to me. I mean it was the biggest font on the page after “working at the interface between roots and soil,” and it’s one of my favorite quotes and I was just wondering how that came to you and what made you decide to place it right there on your homepage.

Colleen:

Yeah.

Rex:

I love seeing that literary touch amongst your other information.

Colleen:

I do love Tolkien. I love the *Lord of the Rings*. I love the adventure of it and sort of the comradery and the teamwork of it too, and I’d read them a long time ago before I even started studying plant roots or what was happening below ground, and one of my students one day gave me this in a card to say thank you for sort of teaching her about ecosystem ecology and the below ground world, and I had never thought of it in this light. I’d only ever thought of it as this is about Strider and the next king and that kind of thing.

Rex:

Right.

Colleen:

But the quote is, “All that is gold does not glitter. Not all those who wander are lost. The old that is strong does not wither. Deep roots are not reached by the frost,” and I liked the deep roots part of it. So it’s on my webpage.

Rex:

Some biology hidden amongst fantasy.

Colleen:

I’m famous for seeing roots or root like things everywhere I look. So I have a friend who studies neurons in the brain and she sent me a photograph of them because I said they looked like roots.

Kelly:

Oh, that’s awesome. Well, thanks so much for joining us, Colleen, and sharing your work experiences with us.

Colleen:

Thanks for the opportunity. It was really fun to talk with you.

Kelly:

Well, that's our show for today. Please join us next time, rain or shine.