

Transcript of “Rob Cifelli, Research Scientist and Lead of the Hydrometeorology Modeling and Applications Team at NOAA's Physical Sciences Laboratory in Boulder, Colorado”

Clear Skies Ahead: Conversations about Careers in Meteorology and Beyond

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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:

We are excited to introduce today's guest, Rob Cifelli, Research Scientist, and lead of the Hydrometeorology Modeling and Applications team at NOAA's Physical Sciences Laboratory in Boulder, Colorado. Welcome, Rob. Thanks so much for joining us.

Rob Cifelli:

Hi, thanks for having me.

Kelly:

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

Rob:

Sure. So, I come from a family . . . we're a bunch of geologists, and so it seemed natural at an early age to just get involved with science because my parents spent a lot of time doing field studies and so forth. And so, I got interested in rocks at a pretty early age. And so I went on to get an undergraduate degree at University of Colorado in geology. That was about the time when I graduated the early '80s that the oil market had just, well, previous to what's happened right now, but it had fallen out. And so oil companies, which were a traditional hire for people that were majoring in geology just weren't hiring. And I did what a lot of people typically do when they don't know what else to do: I went to graduate school.

Rob:

So, I studied groundwater—hydrogeology. I was really interested in that at the time and got a master's degree doing that. And then I came out and worked for a few years and also had a passion for weather. That passion built over time, I think for various reasons. I got very curious about how much energy is in these clouds and where do they come from and how are they made? And being a geologist, I also thought a lot about the field of paleoclimate like what was earth's climate like a long time ago and back before history was kept and how has it changed over time?

Rob:

So, I ended up going back to school and that was quite an effort because to study atmospheric science, I needed a lot more math and physics than I had had as a geologist. And quite frankly, I had been—at this point—I had been out of school for eight years or so, and my math and physics were a little hazy at that point. So I was really determined to do this. So I bought back textbooks, I dug up old course notes and basically tried to reteach myself things like calculus and physics, and then started going to community college.

Rob:

I was still working at the time, so I was trying to slip in classes when and where I could. I eventually got to the point where I worked out a deal that I could work part-time and I went back to the University of Colorado as a student just taking classes in more math and physics. And then finally I was ready to apply for a doctoral program in atmospheric science at Colorado State. So, I ended up doing that and got a degree in atmospheric science. So I guess I bounced around a little bit, but always enjoyed the field work.

Rex:

What was that first job you mentioned after your second degree that you took, and then tell us a little bit about those part-time jobs—the jobs that you were working on while you were continuing your atmospheric science degree and how they took you along—and then what came after the atmospheric science degree that led you to the position you're in now and how did those jobs translate one to the next?

Rob:

Yeah, so that's a really good question. So, my job was as a consultant. When I first came out, I got a master's degree in hydrogeology and I was at West Virginia University where I got my degree, but I'd moved back to Colorado and was working as a consultant. What we did were things like when a state or some municipality or a private company wants to permit, say a landfill or something, we would write a groundwater monitoring plan and we would do testing and things like that. I had stayed with that company when I went back, started taking classes, they allowed me to just work part-time for them. So, that's really what I was doing before I got into atmospheric science.

Rob:

And then, as a student, my career in atmospheric science took a completely different direction than what I thought. Like I said, I was thinking, well, geology, right? So of course I'm going to study paleoclimate because I'm a geologist, but it didn't work out that way at all. An opportunity came up to do some field work, doing weather radar out in the West Pacific Ocean as part of really big field campaign in the early '90s. Its acronym is TOGA COARE, Tropical Ocean Global Atmosphere, Coupled Ocean Atmosphere Response Experiment, blah, blah, blah.

Rob:

Anyway, what it meant is I got to spend about a month—five weeks—on a ship operating radar in very intense tropical storms and working with a lot of different people like we're on a ship, right? So, it's not just radar that's going on, there's all this cool oceanography stuff that I didn't really understand what was happening, but it sounded really interesting. So, I met a lot of people doing that and got to launch

balloons, these soundings that you send up in the atmosphere to collect temperatures humidity and wind information. So, it was really great. And that shaped a lot of what I did after coming out of school, because I knew that the field work stuff was really fun.

Rob:

And so, when I came out, I had a position called a post-doc where I came back to the University of Colorado and worked with somebody here in Boulder on some problems using vertically pointing radars. There was no field work involved and it was a great position, but then, because when I was working as a student, my advisor and his whole group had a very close relationship with NASA and one of their satellite programs. I was actually offered two different positions at the Goddard Space Flight Center in Maryland. They were both through a cooperative institute where I was actually an employee of the University of Maryland, but working at Goddard Space Flight Center. And it was great. I participated in five field campaigns over the course of two years. So I was out on ship, I was in land. I was in Brazil in the trop, in the jungle out in Amazonia, where else was I? I was on ship twice. I was in the Central Pacific, and then I was in the South China Sea. I was in Florida. And it seems like I'm missing another one in there. Anyway, loads of field work.

Rob:

But the downside of that is we were out in the field a lot, but we didn't have time to really look at the data that we were collecting in any really detailed sense. So then I moved on from there. I looked for a position back in Colorado, back at Colorado State where I got my atmospheric science degree. Back with my former advisor, but now as a research scientist. And surprise, I did a lot more field work with NASA and through other projects. That took me all over the world and opportunities to meet all kinds of people, either through the field work itself or through workshops, conferences, there's a whole lot of networking going on. So, that took me up until about 2009. And at that point, I was writing a lot of papers—I was doing that research thing.

Rob:

I guess I was looking for something that was a little bit more applied in terms of how it made a difference in people's lives. One of my networking connections that I had met in some field campaign that I can't remember worked at NOAA here in Boulder and said, "Hey, we're really looking for somebody who's good at coordinating field work and field research and can help us with the planning and deploying instruments and so forth." And so, I jumped at that opportunity because I knew at NOAA, the National Oceanic and Atmospheric Administration, that the research is really . . . it's got more of a mission towards trying to improve people's lives and protect lives and property from weather and so forth. So I was excited at that, and I've been at NOAA for, I guess, about 10 years now and really enjoy it. So I don't know if I answered your question or not.

Rex:

I think you did it. So it sounds like you used Colorado State University as a springboard to come back to at certain times and then network there to find the next set of field campaigns. And so, it was a good central place in your career even after the postdoc and your degree.

Rob:

That's right. I think that's a good way to characterize it. In meteorology or atmospheric science, typically, if you're going to do research, you're either involved with observations like I was—where in this case it

was radar data—or you're doing more theoretical stuff, you're doing modeling, forecast models and so on. And often you don't . . . the two groups don't intersect as much as they could. And I felt like with the position that I had at Colorado State, I was able to walk into both worlds and understand the challenges from different perspectives and I found that extremely helpful.

Kelly:

So with the field work it's almost like you don't even need an internship to figure out what you like and what you don't like, because I'm assuming that the field work, you get paid for those positions to do that for several weeks or months.

Rob:

Yeah. So, we're talking about graduate student salaries here, but then you're right, whatever position I had at NASA, or then as a research scientist at CSU, I'm just making my regular salary. But yeah, I'm getting all this experience and like I say, meeting all these people and looking at things much more holistically, because I think like I had described for TOGA COARE, a lot of these experiments involved, not just radar, but it was all about say, okay, we want to learn why these thunderstorms form and as are intense as they are, but we also want to understand how the rain that they produce feeds back on the land surface.

Rob:

So, we've got all this cool stuff going on to study things like evapotranspiration or soil moisture and—if we're back on the ocean—it's like, well, how warm is the sea surface temperature? And gosh, when it rains, guess what? It changes the whole buoyancy of the ocean surface. So how does that influence where it's going to rain tomorrow? You start thinking about these things from very different points of view. And I felt like that was really, really informative and helped me out a lot.

Rex:

You had mentioned catching up on some of the math and the physics that went with the atmospheric science component and that was something you hadn't had earlier in your bachelor's or your master's. Can you think of other classes maybe even outside of math and science that were helpful to you or things you searched out either initially or later on that gave you some extra support or helpful context going into your career?

Rob:

So, one thing I would say about that is I took a technical writing class at some point that really helped me learn how to communicate, if you're going to write papers and journals and so forth. I would say that that was critical. And in the position I am now, I see the need for that more and more, especially for people where English may be their second language. To me, it's amazing that anybody could write a journal article in a second language, but, we have all these awesome scientists that are able to do that, but they still need to learn those skills to communicate not only written but oral communication.

Rob:

And for me, the latter—the oral communication—really came from just going to workshops and conferences and having to make presentations all the time. And gradually over time, I guess you learn just by doing that, oh, that was a lousy presentation, I really should have focused on this. And over time

you get a little more comfortable with it and it starts to flow easier. I think another class other than the technical writing that would have helped me a lot would have been some sort of speaking class.

Rob:

Communication in our field, across the American Meteorological Society . . . you have to be able to communicate your science and to do that effectively for all different kinds of audiences, whether we're talking researcher to researcher where we're getting into the weeds, or researcher to what I guess I would call a stakeholder, who wants to potentially use the information that you're talking about, but doesn't need all of the detail and really just needs to know the high level of like, well, what is the take-home message here? You have to be able to communicate at those different levels and that takes a lot of practice. And I think whether you're in atmospheric science or hydrology or whatever it is, you need to have good communication skills.

Kelly:

So you mentioned that you had some faculty advisors that helped you find some field work. Did you have any other mentors along your career that provided you with guidance?

Rob:

Yeah, I did. So during that period, I was back at Colorado State working as a research scientist. It turned out another faculty in another department that I had worked with this person for a number of years on projects. He became a mentor. When this opportunity at NOAA presented itself, I spent a lot of time with him bouncing around the advantages and disadvantages of what this position could offer compared to what I was currently doing, and he provided tremendous advice. And I think I owe him a lot for helping me make the decision to come to NOAA. As it turns out we're now collaborating even more, so that really worked out well.

Rex:

So where you are now at the Physical Sciences Laboratory, let us know what it's like coordinating—I think you were saying—some of the field work that you're doing, working with various stakeholders and other people in the field, in your office. What's a typical day on the job like? What's a typical week on the job like?

Rob:

Yeah. So, that's a great question. So I've been really fortunate since I came to NOAA to get involved with NOAA's mission and from various aspects. So like we said, when I started out I was doing a lot of field work coordination, but that changed over time. A position opened up that moved me to a federal position, which was a great opportunity and for better or worse, I ended up in a leadership position. And I say for better or worse, because on the plus side that has opened up new opportunities for me in leadership, strategic planning, trying to develop a team to do the best work we can to make what I would call a center of excellence in precipitation research, what we do in Boulder.

Rob:

But the downside is that it really took me away from firsthand writing papers, writing code, going out in the field, so to speak. So now I lead a group of people and we are a team and we try, and ultimately our goal is to improve precipitation forecasts, especially in mountainous areas where it's really hard to even measure precipitation, let alone forecast it. So it's a big challenge and we have a very diverse group of

people. So, now in the world we're living with, it's a bit different because most of us are working at home. And so, we interact via video conference, but a typical day, two months ago would have been that I spent a lot of time walking the halls talking to people about what they're working on and trying to help them overcome whatever challenge it is that they're having on whatever project.

Rob:

So, I sit in this world where I'm overseeing projects on the one hand and working with leadership to do strategic planning about where do we want to see this group be in three to five years and what are the opportunities that will help us get to that? So, involved at that, I guess more leadership side of things too. And the science for me now really comes to working with people who are—they're the ones that are doing the science—going out in the field and so on and I'm there to try and mentor the best I can. So that's how I'm living the science now.

Kelly:

What do you like most about your job?

Rob:

I guess there are two things. First, I think what NOAA does is awesome. Our organization is really diverse, most people think of the Weather Service, right?

Kelly:

Right.

Rob:

But there's also the Ocean Service. There's the National Marine Fisheries. There's the whole satellite group that deals with environmental information from space. And then the group I work with is the research side of NOAA. We have a two-pronged goal. One is to support what we call operations, so the Weather Service, they need something now or in the short term, and we can help them if it's a tool or whatever it is. But more importantly for us is to get out ahead of the Weather Service—where they're at now—and look at where the Weather Service needs to be in 10 or 15 years to deliver NOAA's future. And that's the stuff I really like about our job or our mission, I guess I should say.

Rob:

The other thing I really like about my job are the people. People are dedicated. These are not, you think, oh, you're just a bunch of government workers, you guys sit around and read comics all day, right? No, no, no, these are dedicated scientists who are coming in. Right now, they're not coming in, but you go to our parking lot on the weekend before the virus and the parking lot's half full because people they're not getting paid to work on weekends, they're just very dedicated and they want to get their work done. And, if we have a government shutdown, the hard part is getting people to stop doing their work because they know it's important for the people of this country. So, there's a real sense of dedication, and the people, it's just energizing to be around a group like that.

Rex:

What might be the most challenging part of your job?

Rob:

The challenging part from my perspective is that we are living in a time where our congressional representatives are having a very difficult time coming to any agreement about any issue. And how that manifests down to me is that we are living from budget to budget, year to year. So, often we don't even know what our budget for this year is going to be until we're six months into the fiscal year. And that makes it really hard to plan for the future from anything like, "Okay, well, what are we going to focus on?" "What project are we going to really aim our attention at?" to "Are we going to be able to hire somebody to increase capacity and make us better at what we're doing?"

Rob:

So, we have to spend a lot of time at making our research agenda. It doesn't matter what administration is in, everybody wants to know things about the example in water resources for me is people want to know about floods and drought. It doesn't matter whether you're a Republican or Democrat, these are really important things. So, we're fortunate that we do have the congressional support behind us to help us do our mission. It's just that the way that we get the support, I guess, is challenging to do planning in the long run.

Kelly:

So, as far as your job goes and your position at NOAA, what's the work-life balance? Do you have set schedules, set hours? How does it work?

Rob:

Okay. So, like I was alluding to before, the mission that we have is it just doesn't stop at the end of the day, right? So what that means is that you have to really work at turning it off to say, I am done for today. I got a bazillion things that I did not get done, but I've just got to say stop. And I think, for researchers in probably any field, it's the same challenge where you love what you do and the work doesn't necessarily stop at the end of the day, but you need to, to make that transition between your job and family, and that's tough.

Rob:

And it is especially tough right now for people that may be at home with their spouse. You and your spouse are both trying to work and you've got small kids in the house and you're constantly going back and forth between, okay, I'm working and now I'm not working. Being here at home, unlike now, when I started out, we had a full house and I was actually having to work in my bedroom, which was really a drag that was not good, but now I've got a spare bedroom that's full of Legos, but at least I can set up the computer there and I can close that door. At the end of the day. I can say, okay, I've done as good as I can, now time to transition, time to do dishes or whatever it is. But you know what I mean? You've got to really work at it though.

Kelly:

So it sounds like it's really flexible then, it's flexible, but yet just doing the job that you're doing, you're probably working maybe even more than somebody who just has that nine to five job. You basically just work when you feel like you need to work and get a project done. Is that how it is? There's no real set, "I have to start at 8:00 AM and clock out at 5:00 PM" type deal?

Rob:

That's actually a complicated question. I mean, depending on . . . for me, I'm a federal worker, so we do have set hours, we call core hours where it's like need to be working during these core hours or you need to account for that, like you're taking time off or whatever. If you're somebody who's employed say by the university, but works for NOAA, there's a little more flexibility in how that's all done. But you're right, that's another thing that's really nice about this job is we do have some flexibility about when we can get something done. So, you have to account for your hours as a federal worker, but that part's easy. That's not the problem. It's actually, like you said, it's many of us are working more than the forty hours. So we need to find that work/home life balance.

Rex:

Rob, do you think you could pinpoint a most exciting part of your career? I know you spoke with some enthusiasm about some of the travel and the locations you went to on your field work. Was it one of those expeditions or something else that might have really felt quite thrilling or stood out?

Rob:

Yeah, the field work was really exciting and there've been many instances where . . . because I've had opportunities to do that. It's exciting not only to go to places like where you might never see that place again and very few people will ever get a chance to be in that particular place, but the people you're with you tend to form bonds with. When you're working in the field, you're not working nine to five, you're usually working ridiculous hours because you've got to collect all this data. So, you're working a lot. And the people you work with, you become very good friends with and you get to know each other very, very well.

Rob:

So, I would say that the field work, especially, I would say one of the most exciting pieces of field work I did was going on a Chinese ship in the South China Sea. I was out there for about a month. There were a lot of good things and bad things associated with that, but it was very exciting to be on a foreign research ship and doing that. We could spend a whole other hour talking about that one. But anyway, I would say in terms of the field work, that was probably it. And then the other most, I guess, exciting thing was just making this transition to NOAA. I'm not trying to sound like a salesman for NOAA, but I really do. For me, this was a big change in my career focus and it's been all good.

Kelly:

Is there anything you wish you had done differently in your career now that you are where you are now and you think back, would you have made any changes to how you went about gaining employment or pursuing positions?

Rob:

I would say no because where I am now, I'm at this intersection between hydrology (water on the ground) and meteorology (water in the sky)—hydro meteorology—and where I started out was with rocks and water in the ground and some on the surface. So in a way I've come full circle and it's given me a broader perspective, which I think has helped me out a lot in terms of the way I collaborate with people and the opportunities that I'm looking for. I guess I would say that to anybody young, who's trying to think about their career is, think about opportunities that might take you outside your comfort

zone. And that can end up being a very positive thing for somebody, even though the short-term, it may be a little stressful, in the long run I think it opens up doors that you never thought might be there.

Rex:

Speaking of opportunities, what sort of professional development do you pursue to keep current or what do you recommend?

Rob:

Okay, so we talked about the communication stuff early on. For me now, the professional development stuff I do, I try and whenever it's possible, to take courses in leadership. And what I've done also through NOAA is we have these, what are called details. You can rotate a position. So, I did a rotation at the U.S. Bureau of Reclamation for six months in Golden, Colorado. And again, it's the ability to step outside my organization, outside my comfort zone. Reclamation is a big—I guess—consumer of information from NOAA. Think forecasts for water and rainfall and snow and so forth. But to step outside and to get that perspective was unique and very, very valuable to me. So, and within that, I also got some leadership opportunities about higher levels of leading the organization kinds of things. So those are the kinds of opportunities I look for now.

Kelly:

Wow, that's so cool that NOAA allows you to do that. Do you need to have a certain number of years of experience or working at NOAA before you're able to have that option to switch?

Rob:

The program, what was it called? President's Management Council. I don't know that there was a set number of years that you have to have, it could be that you had to be a certain level and it was a thing offered to feds, but your supervisor has to sign off on it. So they, in this case, the person that you're going to work for, so in my case for the Bureau of Reclamation, they have to want you to come. And so, I think indirectly, there's some knowledge of, well, this dude doesn't have any experience and is not really going to be helpful. So we're not going to do that. But, so probably indirectly, I think the experience really plays in.

Rob:

But it would depend on the position. These things can be formal like this President's Management Council, I mentioned, and I've recently done an informal one with the Office of Water Prediction, NOAA's Office of Water Prediction at the National Water Center in Tuscaloosa, Alabama. And again, that was an extraordinary experience, just looking at things from the other side on who's using our research and how can we improve our research to better serve that community?

Kelly:

So neat. So for our listeners who might be finding jobs in your field, if you were hiring someone in your department, what would you look for on a resume?

Rob:

So, one thing, when we look at applicants, we look at the resume and the cover letter together. So, I can't stress enough, don't blow off the cover letter, spend time and make sure it's tailored to the job

you're trying to apply for. It's pretty easy to tell if somebody is sending out a bazillion resumes to find a job and I get that, but because we get a lot of applicants, you really want to hone in on the ones that can demonstrate good writing skills like we talked about earlier, but more than that have an understanding of what NOAA's mission is. So, do your homework about the position that you're applying for, talk to people in advance, if you can, but you can also get a lot of information on the web.

Rob:

And of course, in the work that we're doing, the skillset, the math and physics we talked about, just your expertise, does somebody, do they know how to work in a computer language and things like that? Those are important. But the other thing is we're looking for is, "Is this person going to work well in a team environment and can they also at the same time work well independently?" So, can I ask somebody to look into this topic and come away with a plan on how to do a research project on it? So, I don't know if that helps, but those are kinds of things that we try and read through when we get resumes and cover letters.

Kelly:

It's perfect. That's some really good advice.

Rex:

So Rob, we always ask our guests one last fun question at the end of each podcast. I'd like to ask you, what's your all-time favorite book and wonder if it's that calculus book you talked about digging up.

Kelly:

Probably not.

Rob:

No, it's not. So let me say one thing about the calculus stuff. Math is not my . . . it doesn't come naturally to me, but when you're motivated to do something like the whole meteorology, atmospheric science, I wanted to do that and I'm was going to do whatever it took. I was going to have to learn that calculus this time really well. But anyway, that's not my favorite stuff. I would say my favorite book is *Les Misérables*. I don't know even how you pronounce it in French, but what is it? Victor Hugo.

Kelly:

That's how you do it.

Rob:

That was an epic, I don't know if either of you have read that, but that was quite a novel and I haven't read it in a long time, but I just remember I was like, wow, that was really good.

Rex:

I'm pretty familiar with the musical, but I'm not as familiar with the book itself.

Kelly:

Me neither.

Rex:

Are you a song person? Do you listen to the musical?

Rob:

I did not see the musical or hear the musical, but the thing about the book that I like, and I don't know how well it comes out in a musical is there's this guy, right, and he steals a loaf of bread for good intentions, but he's plagued by being a criminal all his life. There's a lot of these moral issues that are worked out in the book. It is an epic in that you go through, you're looking at post—what is it, French Revolution?—France. You're going through this whole guy's life and all the transitions that he makes, and he's still through his life hounded by this criminal act that he did early on and I guess that was what was interesting to me.

Kelly:

Well, thanks so much for joining us Rob, and sharing your work experiences with us.

Rob:

Oh sure, thanks for the opportunity. Enjoyed talking with you.

Kelly:

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