Transcript of "Rosimar Rios-Berrios, Research Meteorologist at the National Center for Atmospheric Research 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, **Clear Skies Ahead: Conversations about Careers in Meteorology and Beyond**. I'm Kelly Savoie and I'm here with Rex Herbst-Horner, and will be your host. We're excited to give you the opportunity to step into the shoes of an expert, working in weather, water, and climate sciences.

Rex Herbst-Horner:

We're happy to introduce today's guest, **Rosimar Rios-Berrios**, a Research Meteorologist at the National Center for Atmospheric Research—NCAR, for short—in Boulder, Colorado. Welcome, Rosimar. Thanks very much for joining us.

Rosimar Rios-Berrios:

Thank you very much for having me.

Kelly:

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

Rosimar:

Sure. So, I can not speak about this without mentioning that I am originally from Puerto Rico. I grew up there. And for those of you that know where Puerto Rico is located at, you may relate it with hurricanes. So I like to say that Puerto Rico is right in the middle of hurricane highway. So every year, growing up, we were always wondering, "Will there be any hurricanes coming towards us this year? And if so, are they going to be strong? Are they going to be weak?" Also, with Puerto Rico being such a small island, even if the hurricanes didn't come straight at us, they could still impact us. And so there was always a question of, "Will it rain? Will there be strong winds?" And it was those questions, year after year, that made me wonder, "Why can't we predict the atmosphere? Why can't we tell for sure if a hurricane is going to come or not?"

Rosimar:

And it was that question about, can we improve weather forecast? That sparked my interest. I originally thought, "I will just become a broadcast meteorologist. I'm going to be the person giving you the most perfect forecast on TV." But little did I know how complex the atmosphere is and how difficult it can be to predict weather. So with that goal in mind of originally wanting to become a broadcast meteorologist,

I went on to get a bachelor's degree in physics at the University of Puerto Rico, in Mayaguez, which also offered a curricular sequence, which is more or less equivalent to a minor, in meteorology.

Rosimar:

And when I was there, I did get to try a little bit of broadcast meteorology, and I quickly realized I didn't like it. So then, I went on to do summer internships and I realized, "Oh, I really like this behind the scenes, where you're doing research and cranking up code and writing up computer code to try to answer questions." And then I realized, "Oh, I like this track a lot better." So I went on to then get a PhD in atmospheric sciences from the University at Albany, SUNY, trying to follow more of a research track, not anymore a broadcast meteorology track.

Rex:

So, how did you find that broadcast meteorology experience as an undergrad? How did you have the opportunity and then what about it really clicked that this wasn't exactly what you wanted to do?

Rosimar:

Yeah, so that broadcast meteorology practice was something that we did through the AMS local chapter, that we had at the University of Puerto Rico at Mayaguez. Our chapter, amongst other things, had a committee in charge of recording weather forecasts with a very homemade chroma screen and everything. And so it was through those activities, thanks to an AMS student chapter, that I got to practice, I got to be the student forecaster for some time. And what I found about it was that it required a lot of coordinating pieces at the same time, and I just thought, "You know what? Maybe this is not for me." Maybe I cannot coordinate what I'm saying with what I'm doing with my hands, versus the limited time as well. So, needless to say, I have a lot of respect for all of the broadcast meteorologists out there and for the hard work they do.

Rex:

For sure.

Kelly:

Yeah. I've done that too, just for fun. And it's really hard to know which direction to point in and everything. So I can definitely understand why you'd have a little bit of difficulty.

Rosimar:

Right.

Rex:

So you made it to your PhD work at the University of Albany. Did you turn your attention to hurricane highway, in terms of your research focus?

Rosimar:

That's correct. So with the goal of mine still of improving weather forecast, the research topic that I pursued during my PhD was about how hurricanes become strong when we don't expect them to. And let me explain that a little bit more. So we know that hurricanes like certain things in order to become very strong; for example, warm ocean temperatures. That's why they happen in the summer, to begin

with. But there are other factors like moisture in the atmosphere, also wind currents that do not vary much with height, that's called vertical wind shear. And so we know those conditions are generally favorable for hurricane formation and intensification. But sometimes hurricanes do form when some of those conditions are not in place.

Rosimar:

And in my PhD work, in particular, I was focusing on tropical cyclones that intensify when there is moderate to strong vertical wind shear. That is when the winds near the surface are flowing one direction, but if you go high in the atmosphere, they are blowing in an opposite direction. And that's usually bad. But through my PhD work, I studied how hurricanes can become very powerful, even when those conditions exist. And I found that it's not just all about the winds, there is also other variables like the water vapor, how much there is and how it is distributed around the tropical cyclone, that can factor in whether a tropical cyclone can intensify or not. So that's, in a nutshell, the work that I did for my PhD.

Kelly:

That's really interesting. So you must have had some experience witnessing these things, obviously, living in Puerto Rico. And when you did this PhD research, did you get to do field work as well, where you were able to actually witness some of these things and report on that?

Rosimar:

Yeah, thanks for that question. So most of the work that I did was based on output from computer models, but I did get the chance to do a little bit of field work. I got to fly in hurricane mission that was around Hurricane Sandy, when it was heading for the center of the East Coast. And I also did get to forecast the weather for a field campaign called SHOUT that was flying uncrewed aircraft around and into hurricanes. And that little bit of field work supported my PhD and gave me the exposure again to the reality of forecasting the weather, but also the kind of observations we can obtain in order to improve weather forecasts.

Kelly:

Now that must have been really cool.

Rosimar:

It was super cool, especially when we had the uncrewed aircraft, that I was just in the same room where the pilots were piloting aircraft. It was thousands of miles away from us. It was a very neat experience.

Rex:

And what was it like being on the plane, observing Hurricane Sandy?

Rosimar:

It was really amazing. It was a nine hour mission, departing from Tampa and returning to Tampa. So first of all, it was extremely exhausting. So again, lots of respect for the people that do these on a daily basis during the hurricane season. But it was really incredible to be there and be the first witness of what the atmosphere was doing. I remember that at that time we were wondering, "What is Sandy? Is it a tropical cyclone? Is it extratropical? Is it a combination?"

Rosimar:

And just to be there in the middle of the action, just observing the data, as it was coming directly to the aircraft, was really just a very eye-opening experience. And also something that I remember clearly was that we were flying very high up in that atmosphere at 40,000 feet. And I could still see down below very tall waves and that was not near the center of the hurricane—that was around it. So it made me wonder, "Imagine how tall the waves are. If I can see them with the bare eye from here, imagine how tall they are near the center of the cyclone, where the strongest winds are."

Rex:

And were you experiencing turbulence in the plane or any other physical manifestations of the hurricane forces?

Rosimar:

Not in the aircraft that I was, because it was a Gulfstream IV aircraft, which flies very high up. But other aircraft that fly into the hurricanes may feel more of that turbulence.

Kelly:

So what other opportunities did you pursue inside and outside of school once you knew that you really wanted to secure a job in meteorology?

Rosimar:

So I made an effort to get summer internships as an undergraduate. I had seen that other more senior undergraduates in my university had done summer internships, and they had realized, "Oh, I really like this job, or I really don't like it. Or..." Anyway, I had seen those other senior students doing summer internships and come back with some knowledge additional to what the classes gave, but also what they wanted to do. So I made it truly an effort to try to do summer internships. And I was very fortunate that I got to do three summer internships as an undergraduate. Two of them were through NOAA, what used to be called the Educational Partnership Program, which is similar to the Hollings scholarship. That one offered me the opportunity of doing a summer internship at the Hurricane Research Division, in Miami, Florida, and that was my first exposure to hurricane research.

Rosimar:

The other internship was through the SOARS program. SOARS stands for Significant Opportunities in Atmospheric Research and Science. And that program is hosted at my current job at NCAR. And that again was another exposure to hurricane research, but it also was an exposure to a research laboratory, in the middle of the country, and I thought, "I don't think I can live here, far from the ocean." But I actually really, really like the job that gets done here, because during the summer internship, I was not only doing my research, but I also got to talk to students that visited and the public, when they visited NCAR. So I really, really enjoyed that. And that was my first hint that I really wanted to work at NCAR. So, in short, I did summer internships during my undergraduate years, and I believe those really set me up to get not only my PhD, but also the job I have right now.

Rex:

So I have it on good authority that you enjoy public speaking. I read that on your website. It's one of your favorite aspects of science. And I was thinking of this when you were talking about your PhD and

your dissertation. I know you have to defend your dissertation. I also know that you most likely did lots of presentations on the research you were conducting during your dissertation and during your research altogether. Why is public speaking one of your favorite parts of being a scientist?

Rosimar:

That's a really good question. As a scientist, I tend to spend a lot of time behind a computer, writing computer code. Or if I get to go to the field, I spend very long days launching instruments or gathering data. And sometimes, when you're doing that for a very long time, it can be very difficult to connect the dots on, "How is this work that I'm doing today—writing this computer code, launching this weather balloon—going to help me with my grand objective, which is to improve weather forecasts?" And that's one of the reasons why I really like the public speaking aspect of science, because that's when we really need to not only think about how we communicate our findings, but also how does it all come together? It's a really exciting way for me to present my findings, but also to just connect the dots and also to hear what people have to say about it.

Kelly:

Yeah. Well, that must be exciting. You do all this research and you have all this data, and you're just dying to let people know how important it is and what the end goal is. So that's great that you do like public speaking, because a lot of people don't.

Rosimar:

Right. Yeah. Just not to say that I don't get nervous. Of course, I get nervous, but I see it as the culmination of the efforts, but also as an excellent opportunity to just show the world, "Here's what we found. Here's what we can't answer yet. Tell me your thoughts about it." And so I'm very, very grateful that the American Meteorological Society gave me many opportunities as a student to present. At this student poster session, for example, that's where I first started presenting science, and also at the annual meeting in general talks. I got a lot of feedback, especially for my PhD work, when I was like, "What does this mean?" or like "What should I do? I can't solve this problem." But then people were like, "Oh, that's an interesting finding. And we think it means this and that." So yeah, the public speaking part, the presentations, I see it as the culmination of the efforts and putting everything together.

Rex:

That's a great way to summarize it. So we know that you found out of about NCAR as a student and we know that you're at NCAR now. What was your first job in the field? And then how did you end up where you are now at NCAR?

Rosimar:

So, my first official job, right after grad school was, I guess I would say, was my postdoc. Some people think that's a transition job. I will say that was my first job. It was also at NCAR. It was through the Advanced Study Program. And it was a two-year postdoctoral fellowship, in which I got to become a bit more independent and explore new ideas following my PhD. And quickly after that, I transitioned to the job I have now, in which I am officially on paper what is called a ladder-track scientist, which means that I mostly do research at NCAR. And it's following a similar track to what an assistant professor and other faculty do at the research universities, where you go through essentially steps, climbing up the ladder.

Kelly:

Right. So could you walk us through a typical day on the job at NCAR? What do you usually do? What's your routine?

Rosimar:

Sure. I love routines. They help me stay focused. And on most days, I start my job with my bullet journal. So, a bullet journal is a combination of a to-do list, a journal, and a calendar. But you get to do a little bit of art with it, so I like that aspect as well. So I start my day with my bullet journal. I like to write at least two to three things that I really, really would like to try to get done in the day. And I would like to emphasize *try to get done* because science is not linear. Some days I plan to get three things done in the day and I do five. Other days I would like to really get one done and I get nothing done, because that's just how science works.

Rosimar:

So I try to start always my day writing down, "What do I really want to accomplish that day?" Then I try to do a little bit of writing. During my graduate school years, I learned from another grad student about the importance of doing daily writing, because as scientist, we tend to do a lot of research and then the writing gets thrown towards the end. And that friend taught me about the importance of doing a little bit of writing every day and how it can help to produce papers, not only faster, but also help to feedback onto the research. So during my day, I do college journaling first, then I try to do daily writing. And then most of the times, if I don't have meetings right away, I get to write computer code for most of the day. I do have several meetings in which I get to mentor postdocs at NCAR or grad students or undergraduates that are visiting NCAR.

Rosimar:

And then I have other meetings that are more collaborative in which I talk to colleagues at NCAR, or elsewhere around the world, any other person doing science and similar topics as me, and we get to have meetings to discuss research. And for the rest of the day, it depends on the task that I have. Sometimes I have papers that I will review for publication, or I am writing my own papers, or I am preparing perhaps a presentation. But for the most time, I do write a lot of code and spend a lot of my day writing code. And then I end my day with... I try to have something at the end of the day so it forces me out of work. So whether that's working out, going for a run, or picking up my little one from daycare right away, that's something I have at the end of the day as a clear end to my work day.

Kelly:

So what do you like most about your job?

Rosimar:

I love the freedom that I have to explore science questions. Especially, given that I'm very interested in improving hurricane forecast, and sometimes when there is a hurricane happening during hurricane season, that hurricane—how it's behaving, how the forecasts are evolving—it might trigger some science questions. And I love that in my job I get to both feed that curiosity that I have, but also try to find ways that would benefit society by improving our scientific understanding and improving the prediction of weather forecasts. So I absolutely love that as a scientist, I get to ask questions, design methods and just try them. Sometimes it can be so frustrating and I would tell those who are listening,

"It can be so frustrating that your code is not working, that you're not getting the answers that you want. But once you get them, it's so satisfying." So I really, really enjoy the aspect of my work in which I get to ask questions, design methods, write computer code. I absolutely that part and then get to an answer, if I can get to an answer.

Kelly:

So, you mentioned sometimes it's frustrating for a code not to work. Is that the biggest challenge you face or do you think there's a bigger challenge working in the field of atmospheric sciences?

Rosimar:

Yeah, I would say that one of the biggest challenges is that I am a scientist, but sometimes I also feel that I am doing job that is typically done by a computer scientist, right? But I don't have the skills of a computer scientist necessarily. So it can be very challenging and frustrating. Especially, now that I'm working with big data, that I have to write code to essentially do engineering, whether it is to shrink down the data so that I can just run my code fast, or sometimes what I'm trying to write in my code, it's not working, and I cannot understand why, because I think I'm doing everything right, but it's not giving me the answers I have. So yes, definitely, one of the biggest challenges, especially right now in the era of big data, is writing computer code that works efficiently.

Rosimar:

And most importantly, that it works.

Kelly:

Right.

Rosimar:

Yeah. And I would say, another big challenge is that some of the biggest and most interesting and intriguing questions in science are very difficult to answer. That's why I have a job. But it can be very, very challenging, that day through day, I am just trying to tackle this question and I'm wondering, "When am I going to answer? When is it going to end?" And the reality of research is that, yes, you may end some aspects of it, but some science questions get answered and others just spend even more science questions. But sometimes on a day to day basis, it can be very frustrating and challenging not to know, is this question answerable? Or am I getting to the answer? Yes or no?

Rex:

Is there a particular weather event that you experienced in your research or outside of research, that stands out to you in terms of what it taught you or how it influenced your future research?

Rosimar:

Yeah. So growing up in Puerto Rico, I was exposed to many hurricanes, but one, very memorable one, was Hurricane Georges. It happened in 1998. I was in elementary school then. And I just remember that the day before the hurricane, I saw the most beautiful sky that I had ever seen. It was just beautiful, high clouds, beautiful colors, beautiful sunset. And I was wondering like, "How can nature evolve so fast? I'm just seeing the most beautiful sunset, yet there is something they call a hurricane, with very strong winds, coming to our place."

Rosimar:

And I remember that hurricane also because it caused a lot of destruction and some of my friends in school lost their houses. Luckily, we didn't have major damages, but we did lose a roof from a garage, and a tree that was very special to us. It produced mangoes. All of our losses were really minor in comparison to everybody else, but the aftermath was really hard. We spent two full months without power or water in my hometown, which at the time I thought it was bizarre. But then after Hurricane Maria, I didn't live in Puerto Rico anymore, but my family spent exactly 100 days without power and even longer without water.

Kelly:

Oh. So what do you do when that happens? Did you have to just go to a local shelter or... I can't even imagine that much time without water or electricity.

Rosimar:

People get very creative under extreme circumstances. And for us, that creativity was finding ice. Sometimes we had to make an hour long line just to get one bag of ice at the store. And we would use that to just keep essential perishables, like milk and cheese and other edibles, to keep them cold and good for a day or two. We also limited what we had. Instead of buying whole gallon of milk, maybe we bought a quarter gallon or half gallon. And yeah, for water, we were very fortunate. The city provided drinking water, but we had to go to somewhere to get the water, bring it home and then really be careful with it. And we also used rain water. We collected rain water back then for things like laundry and cleaning.

Kelly:

Yeah. You just do what you got to do, right? Wow.

Rosimar:

Yeah. But Hurricane Georges, it just sticks in my mind a lot, because it was just very powerful hurricane. I guess even though I had experienced some other hurricanes before, it was probably when I was really conscious of what was going on. And also the destruction and the aftermath was just very difficult and very extreme.

Kelly:

So, getting back to your job at NCAR, what advice do you have for students interested in pursuing careers there? You talked a lot about how there's coding. Are there certain computer languages that you suggest that they take inside of school or outside of school or anything else that would benefit them if they wanted a job there?

Rosimar:

Sure. Definitely, I recommend to anybody interested in atmospheric science research, they definitely should try to learn computer coding. I would like to argue that once you learn what it means to write computer code, you can adapt to different languages. But if I had to pick a single language to recommend, I would recommend Python. It's becoming very versatile. It's becoming widely used in our field. And it's a language that you can also use not only if you continue to pursue career in atmospheric science, but also if your career path changes and you end up doing data analysis for X or Y company,

which I know of my colleagues and former grad students have done. I also would like to encourage students interested in pursuing atmospheric science careers to try to get some experience out there. It doesn't matter if it's a summer internship. It doesn't matter where. Just try to get some practice.

Rosimar:

You can volunteer at most NWS offices. You can volunteer at many TV broadcasting stations and you can even volunteer at research institutes. Having that experience, I think, it's very eye-opening and it compliments what you learn in class. So I definitely encourage students to try to get some opportunities, some practice outside school. And yeah, lastly, I would like to encourage students to just pursue their goals and their grades. I know that it can be difficult to see how calculus one or two or differential equations classes will get you to be the meteorologist that you want to be, but it all comes together. And in the end, those classes that we're taking, those difficult classes or the challenges that you may encounter in your education, in the end, they are preparing you to become the best professional that you can be. So, don't give up, just keep it positive. But most importantly, an open minded perspective to learning and preparing yourself to become a professional.

Rex:

Thank you so much, Rosimar. I also wanted to briefly return to talking about the weather in Puerto Rico. I noticed on your website, you have a specific section for forecasts from Puerto Rico with flood threat, thunderstorm threat, rainfall accumulation, and other data. So it looks like you bring that information onto your website every day. And I just wanted to ask, what inspired you to start doing that?

Rosimar:

Sure. So that information is on my website because I happen to have a research project that's taking place in Puerto Rico. So when I was an undergraduate at the University of Puerto Rico at Mayaguez, I knew that I had to absolutely have an umbrella in my backpack, because especially during the warm season there, it can rain very hard. During the afternoon in particular, when I was going to some of my afternoon classes. And it turns out that it's not always raining right there. It can rain a little bit farther north. Sometimes it can be a little bit farther south.

Rosimar:

And so through my work at NCAR, and thanks to a summer intern that I had, also from the University of Puerto Rico at Mayaguez, her name is Angelina, which started studying what kind of factors control, how hard does it rain, and where in Puerto Rico, in Western Puerto Rico in particular. So we have those forecasts up in my website, because we've been monitoring conditions there, but also because just this past August and September, we were right there in Puerto Rico, releasing weather balloons to try to better understand when does it rain very hard over Western Puerto Rico and what kind of factors control that rain.

Rex:

We'll look forward to seeing what your findings are. And best of luck as you continue to research that question.

Rosimar:

Thank you.

Rex:

So before we end the podcast, we always ask our guest one unrelated to meteorology question, off topic and a little fun. We wanted to ask you what your favorite hobby or hobbies might be.

Rosimar:

Picking just one hobby would be hard, but yeah, some of my hobbies are around exercising. So, living in Boulder, it's inevitable not to like hiking and going out in the mountains, whether it's spring, summer, or winter, I always find myself in the mountains when I have a chance. I also enjoy running. But when the weather is cold and I don't really want to go outside, I love sewing. And I like anything from just fixing clothes that may have a hole here or there, to just turning long pants into short pants, or turning a piece of fabric into a napkin or a placemat. Sewing, it's a really great hobby that I like, that gets that creativity out of me. But also it's something that I get to do where I don't have to think too hard, whether I'm doing it right or not.

Kelly:

Oh, when did you learn how to sew? I always wished I could learn to sew.

Rosimar:

So my mom taught me how to sew. I didn't go to daycare. My mom was a stay-at-home mom and she liked to sew as well. So she bought me my own kit and she taught me how to make... I remember, the first thing I made was... what you put in the kitchen when you're cooking...

Rex:

Placemat?

Rosimar:

An apron.

Kelly:

Oh, apron.

Rosimar:

Yeah. The first thing I sewed was an apron, for myself, to help mom clean and cook and also to do art. But then, as a child, I had my own little sewing machine and I would sew dresses for my toys and other things. Yes. It's something that I really enjoy doing with my mom. But then when I went to college and then grad school, I completely forgot about it. But now that I am an adult and have a little bit of extra time to go back to hobbies but I also I have adult responsibilities, like keeping placemats on my table, right?

Kelly:

Yeah. Right.

Rosimar:

Yeah, it just came back. It's really nice to have something that takes my mind away from work and other things, but also where I'm creating something that may or may not get used in the house or in a Halloween costume.

Kelly:

You're right. Halloween costumes, for sure. I can't tell you how many times I've just used glue and pins and how I wished I would be able to sew my son something better than I did. But in the end, it came out okay.

Rosimar:

Yeah. That's what matters, right? That you can put something together that does its function.

Kelly:

Well, thank you so much for joining us, Rosimar, and sharing your work experiences with us.

Rosimar:

Thank you so much for having me.

Rex:

That's our show for today. Please join us next time. Rain or shine. **Clear Skies Ahead: Conversations about Careers in Meteorology and Beyond** is a podcast by the American Meteorological Society. Our show is produced by Brandon Crose and edited by Peter Trepke. Our theme music is composed and performed by Steve Savoie and the show is hosted by Rex Horner and Kelly Savoie. You can learn more about the show online at ww.ametsoc.org/clearskies, and can contact us at skypodcast@ametsoc.org if you have any feedback or if you would like to become a future guest.