- I've had some very pivotal and just crazy supportive mentors in my life. I think when I was looking back at all of them, it made me think about in my journey and how when I first left Hawaii, I was the first in my family to leave my island for a college education. So when I encountered these people where I felt like I could trust them to give me guidance and to support me in these varying career stages or decisions, they've really been the family and support that I really needed.

- [Narrator] You're listening to Further Together: The ORAU Podcast, join Michael Holtz and his guests for conversations about all things ORAU. They'll talk about ORAU’s storied history, our impact on an ever-changing world, our innovative, scientific and technical solutions for our customers and our commitment to the communities where we do business. Welcome to Further Together: The ORAU Podcast.

- Welcome to Further Together: The ORAU Podcast. Recently I had the opportunity to speak with several NASA Postdoctoral Program research fellows about the amazing work that they're doing. And I gotta tell you, I think you'll agree with me, their work is amazing and it's very interesting, if you're a space junkie like I am, you're gonna nerd out on these conversations. Enjoy. So, Dr. Kelly Luis, talk to me a little bit about who you are, your current role with NASA NPP Fellows program, and a little bit about your background. How did you get to where you are?

- Sure. So my name is Kelly Marico Luis, and I'm an aquatic remote sensing scientist and born and raised on the island of Maui, Hawaii. I'm currently an NPP fellow in the Water and Ecosystems Group at JPL. And really, I came to aquatic remote sensing science because I fell in love with this concept of studying the color of water. You'll hear me maybe say ocean color moving forward. But the idea is that the color of water can tell us a lot about what's in the water, can extend to what we think about aquatic health and the function of aquatic ecosystems. And really when I learned that we had satellites that actually use this concept of color to understand primary production across the ocean. So water quality, I was just like, this is so cool. Growing up in Hawaii, just knowing that like the color I see is something that's a science objective of NASA's. It was really my hook.

- Okay. And I have to imagine that growing up in Hawaii and being around water had to be part of firing that interest. I mean, were you always, was science something that was natural to you that you were always interested in? Or was this something that came to you later in life?

- Funny enough, later in life, if you were to ask any of my siblings, they would like, that was not the sister we expected.

- Oh really?

- Yeah, i had brothers that were watermen, dive, fish and it just wasn't really my thing. I would read books on this, like while they were doing their thing. And when I left Hawaii for college, I was actually really interested in being a political science and economics major. And after the first year, I went and did an internship on The Hill for a congressional member from Hawaii. And interns are generally tasked with the task, with like listening to constituents and dealing with correspondence. And during that summer I learned a lot of constituents from Hawaii cared about environmental issues. And I was like, wow, people are making the time to call about these issues. And if I'm gonna address them one day, if I continue down this route, I should know the scientific underpinnings behind these issues. So the following semester I went back to college and I took an introductory earth science course. And remember like coming from a social sciences background, I'm like one of few women of color in the class. So I'm just completely out of my depth, like super uncomfortable. But then there was this day where they were giving a lecture on the types of lava flows, and for me, like being somebody that like felt really like this wasn't my thing and I didn't look like I belonged there. Like I was just soaking everything in, writing everything down. And then they were talking about the two types of lava flows that scientists use. One is called pahoehoe, which is a smooth and broken lava. And then the second one is a'a, which is I guess stony rough lava. And those are two Hawaiian words. And that's the Hawaiian words, and then that has been used in volcanism since the 1880s to describe the states of lava. There's a lot to like save up all of that historically in all of that. But I kinda remember being in that moment and being like, look at a part of my culture is within this STEM world and I never would've expected it. And I think that for me was a moment where I was just like, oh, I, well some of my languages here and maybe STEM could be for me. There are many other things that happened that got me there, but I remember that was kind of the moment where I was, oh, I might be in, I could be in STEM, like my language is here, so.

- Right, that's really a cool moment though when you hear the two types of lava flow being described in your language, in your, you know, from your culture. So I can see how that would sort of ping, you know, inside you sort of this oh my goodness.

- Right. And it was just so out of place given everything I told you about being in a college setting and all these like geological terms and then you are these two Hawaiian words that have just have been there.

- And where were you in college at that point?

- It was at Columbia College. So city.

- Gotcha.

- Very far from home.

- All the way literally across the country.

- Yeah. That's another joke my family makes. So of course you chose the school, the farthest.

- Right, the farthest way you can get.

- Yeah.

- Really, really cool. So far as a NASA NPP fellow, how has your experience impacted your career?

- Oh, it has been really incredible for me because I've had this opportunity to work on projects and develop skills across multiple projects, which I think when I was first envisioning what a postdoc looked like, it looked like you were going to like further develop a specific skill or like background around a topic that you've come to gain expertise on. Or it was something that's gonna be complimentary but a little outside of that wheelhouse. And I think when, especially we're at a place like JPL where there're a lot of different projects and like I work a lot on airborne projects and when I think about ocean color measurements, one of the things that I'm really passionate about is thinking about how a measurement on the ground or something that you can measure with an instrument on a boat or see with your eye how that color actually gets represented by an instrument on an airplane. And then how that extends to a satellite perspective. Because all of those scales of information, they say very different things. They can see something about the point or an individual point, maybe over a coral reef. And then if you go to an airplane view, you can get not just an individual area of coral, you can get, it's like community at whole. And then when you go up to a satellite, you can start mapping out not only the reefs that are on your island, but reefs are on other islands or on the globe. So it's just that scaling for me is just tremendous. And then when you come to a place like JPL and you're supported by an NPP, you can kind of be a part of thinking about those individual measurements, thinking about how it relates to aircraft instruments, and then also mission planning and how it relates to future satellites. So when you have an NPP, you just have that flexibility to see all of those connections across scales and yeah, I feel really fortunate, it's a real gift.

- Awesome. Can I dive into your research, your work little bit in terms of you, you talked about how the color of water is an indication of the health of that water. What's the difference? What's the, is it like the bluer, the greener the water?

- Yeah, so this is, so when we think about water, like it always depends on where you grew up. So, you know, like did you grow around, grow up or like spent time around a particular water body?

- So I grew up off the shores of Lake Michigan.

- Oh, okay. So Lake Michigan. And for me when ago in Hawaii, I never saw green water. That wasn't a a thing. But then when you grow up with people who are familiar with lakes and you see that bright green water, you come accustomed to knowing that that might be an powerful algal bloom or not healthy to swim in or be in, then you might encounter people like in other areas where there's lots of river flow and sediment coming in. And that in itself tells you something different about the ecology and ecosystem. And for me, I like kind of seeing when I move from Hawaii and then I met all these people who were like, we all have very different relationships with water just based on how we look at it.

- Blue doesn't happen here.

- Yeah, blue is like, what is that deep blue thing that we only see in postcards or in the movies.

- Right, right.

- And then I felt the same when I saw a green lakes or things I saw in movies. But I think one of the cool things that connects all of those perspectives is the field I work in connects the biology and the physics behind what explains those different colors. And that greener waters might be related to something like a phytoplankton or some type of photosynthesizing microscopic grouping that's kind of extended itself into aquatic water body. And some can produce toxins. In the blue realm, it can be really like healthy, pretty blue water. But there's also other creatures that live within that. In addition, like I said, coral reefs, like all of those have different, like, relationships within the water column and the things that live in it. So yeah, I just, I think it's a really visually, biologically and physically cool subdiscipline to be in.

- Right, right. It sounds really interesting. How does that relate to NASA and working for, you know, why is water color, water quality important to NASA?

- So NASA's been measuring ocean color, I think it's technically since the seventies with the costal zone . So that was the first instrument that could go around the coast and measure the color of the ocean. And then they were able to relate that to different type of properties. I was talking about like what does the greenness mean? How does that relate to biological activity? And then in 2002 or late 1900, late nineties, early two thousands, we have all of these sensors that are able to make these measurements and they actually can provide really important information about how do photosynthesizing materials in the ocean contribute to the global carbon cycle. How does this relate to general temperature changes we may be seeing with climate change, et cetera. So that's how, and NASA's been doing this mapping since nineties, early two thousands.

- Sure, okay.

- So it extends to present days that we have new sensors that are gonna be going up, that's gonna continue that work, but also have more advanced technology on, I think this is a really nice analogy I heard from somebody at Godard where, so all of these satellites in the past, you know, I was mentioning there's different colors to map the ocean. Like we've been measuring color or we've had essentially like five crayons to color the planet to infer its health about the ocean. But to these advanced sensors, we're not only at five, you can have hundreds of colors and like all of those colors can tell you more specific information about what's happening in aquatic ecosystems. So that for me is really exciting about being an NPP and at NASA to see that development and to figure out how my questions are, what I'm interested in is gonna support those larger missions.

- That sounds really, really interesting. I know as a NASA NPP fellow, you're in a mentor research experience, you're collaborating with other scientists. How has your mentor been beneficial to you? And then talk about the collaborative process and just some of the other kinds of scientists that you get to work with.

- Oh yeah. Well I can say that I've had some very pivotal and just crazy supportive mentors in my life. I was thinking about this question and I'm so tempted to name 20 people right now.

- We've got time.

- But, I think when I was looking back at all of them, it made me think about in my journey and how when I first left Hawaii, I was the first in my family to leave my island for a college education. So when I encountered these people where I felt like I could trust them to give me guidance and to support me in these varying career stages or decisions, they've really been the family and support that I really needed. When I felt like that support system was literally like a very long distance away. And I think over time when I think about being mentor, being a mentor, becoming a mentor, and being a team member, it really all comes down to creating the, like a community that you wanna be a part of, you wanna give back to. And I think I've been very fortunate with that. And kind of how this plays for me into collaboration and teamwork. I learned like within a community you learn a lot about, especially in the science realm about what you can contribute. Like what are the things that make you passionate about that you wanna share with others in different collaborations, but also the things you don't know and you need to ask for help on. I think you learn that really well in community. I'll give you like a very specific example. I just got back from sea. I was at offshore San Francisco for a month on a research vessel for NASA's S mode campaign, some meso scale ocean dynamics experiment. And this is a cruise that has scientists that are working on many different realms of physical oceanography from atmosphere, winds, currents, vertical exchange into the water, ocean color. So you're on this boat with all of these people, with these different expert like incredible backgrounds. And when I go on, I, you know, have the confidence in myself, like I know what I can say about electric color data, but also I don't know the very basics of the person who might be in the same bunk as me.

- Right.

- Or room, not same bunk. But yeah, so when I was on this cruise, it was really nice reflection on when it comes to working in teams and in community knowing, like when it's okay to ask for help and how you wanna ask for help. Sometimes I noticed early in my career I'd be like, oh, like I'm happy to help in any way I can. And then I'm like, I should be a little more specific. So to kind of help people like realize where I can come in and contribute. I'm trying to be better.

- Now I can help you, yeah.

- Yeah. I think that's my spiel on community and-

- Awesome.

- Teams.

- What element of STEM have you found most empowering? I know you talked earlier about you know, being in that early science class and you know, there weren't people who looked like you. There were, you know, it seems that the NASA NPP program is very, you know, diverse. There's, you know, diversity not only of thought but of people and all of that. Has that been empowering? What other aspects of science has been empowering for you?

- Yeah, this is a really good question, and for me it really, when I think about JPL and NPP, the community I've like, just the people I've met have been, have been incredible people and have also gone out of their way to make sure I'm okay to support and empower me. I think about with that, with the first person I, my friend Mandy who just interviewed with her, before she even went on, she sent me a text. It was like, you got this, you're gonna kill it. So it's in the personal moments like that. But I think that when kind of me reconciling with this feeling of, you know, academia is a really already pretty lonely place and then given my intersecting identities and then to be in a space where there's like really strong mentorship and people around me, for me that's just been probably one of the most empowering things to meet people and be like, wow, like, I get to work like next to you, with you. It's humbling I think at the end of the day for me.

- And I belong here.

- Yeah. Yeah. And yes. I dunno why I'm underlining what you're saying.

- That has to be an amazing experience. To feel that in the work that you're doing, and you know, to have that experience when maybe you didn't feel that in that classroom or in other experiences.

- Yeah, no, I can list many times where I did not feel included, like I like belong. They're like very specific instances. But when I think about the people in my life and you know, I like I have to actively work on building my confidence and checking on myself. I feel like now I've encountered more people that really care about making sure that personally you're doing okay because a happy Kelly does incredible work, and apply that to many people. So yeah, I mean this is something I work on with friends, I work on regularly with my therapist, like you name it, growing in this.

- That's great. Can you tell me about about, here's the job interview question. Can you tell me about a time when you faced a sizable obstacle in your work and how you overcame it?

- Hmm. I think my broad abstract one is sometimes like myself can be an obstacle, 'cause I think this is a field in which it's very easy to over critique what you're producing, to weigh the opinions and thoughts of a lot of people in one space. And that can just take up a lot of mental emotional like physical space on your behalf. So I think like that's for me my abstract one and like that's something I work on by making sure I'm connected, connected with my community and like working on myself. And for me that kind of extends to a really specific instance where I was on this vessel and I was working with an instrument that I thought where the electronics in it was in a waterproof box, one year in 20 foot seas that went out. It didn't work out, it wasn't waterproof at one point.

- Oh no.

- And I don't have, I don't have like a hardcore set of skills when it comes to electronics in this way. And for me, this also comes back to what I was saying. I was just like, I could be really lost in my head right now where I was just like, I messed up and I should have thought X, Y, Z thing. But then this is again where you kind of loop back to thinking about the team you're with, how to ask for help, all of these things. And for me I was like, well I know I do, this might be a part of the instrumentation I brought, but I need help. Like I need to find people that have been seagoing, have dealt with things like this. And fortunately they're two different people with very different perspectives but were both complimentary to helping me learn a whole bunch of seagoing electronics like in the moment. And I look back on it and I was just like, I remember being highly stressed. I dunno like how much did I break? So rough.

- How expensive was that?

- Yeah, I mean it was super duper rough, and fortunately it was actually the box itself was not as expensive as you would think it is 'cause it was a DIY kit, but it was stressful 'cause it was also like a first time I brought this particular instrument to sea, but then to be with people that were like, okay, I can help with like cleaning the electronics and like this is my background and what happened. And then other people are like, you got this, you want me make you food while you work on this? Things like that. And you're like, stress in the moment, when I look back on it and I was just like, I learned so much from all of these people around me. I know it's because I mean, I recognize that sometimes I can get in my head and I need to ask for help and, it's gonna be confident in what I need. So, yeah.

- Very cool. What advice, Dr. Luis, would you give to an up and coming scientist who may wanna follow in your footsteps?

- Ooh. I've been, you know, I'm gonna, I saw this question from you and I was just thinking something like very elegant and podcast-y and I was just like, I really should tell the advice I've been telling a lot of people recently, and I boil it down to, it's really be kind to people in your life, but most importantly be kind to yourself. I used to just say be kind to people a lot, but only in this past year I've been learning that, you know, this can be a really challenging career path and it's, you're not gonna, sometimes you're not gonna feel like you're enough with all of these expectations that just seem to surmount. But really being kind and enough for yourself and trying to be gentle. It's a practice like I, it's so easy to be like, this is terrible writing or why didn't you do this? But like I know that when I'm actively practicing that or just taking a moment to be aware that I'm unnecessarily beating myself up or being too self critical about something. I think having, working on that muscle really helps you with extending that to others when it's difficult for other people in your life, or even if everything's going great for people in your life, creating this community which people are like, I wanna be a part of that. I wanna follow my dreams and feeling like I'm a great person and like chasing my wildest dreams at the same time. Like, why not be a part of that? Why extend yourself in any other way?

- Right.

- Kinda cheesy, but it seems like that's the advice I'm giving these days.

- Cheesy is okay, we'll take that all day. Why would you recommend the NASA Fellowship NASA NPP Fellowship to others?

- Great, great question. Outside of the very just simple things of having funding.

- That's a big deal.

- Yeah, I know when I was making the grad student transition, I was terrified of applying to a bunch of things and feeling like a sense of rejection and you know, there's this incentive to look forward to. But I think one of the things I look back on when I applied was I remember putting together my application and it was actually an idea that got rejected from being for the NISF, the NASA graduate student fellowship. And for me, I take it as an opportunity to be like, I wanna take some feedback and write down an idea that like I love and I'm proud of, and see how it does. And I think a lot of the times with these types of amazing opportunities where there's flexibility and all of these things, kind of remembering why you're a scientist and loving to follow your ideas and seeing if a place like NASA like, and support that and like imagining that like that for me, like, it, yes, it takes time and space and all of these things, but if you have the capacity for it, like why not practice this idea and contribute it to NASA, you know?

- Love it.

- Start with NASA scientist and follow you wildest dream.

- Right. Love it. Last question for you Dr. Luis. What brings you joy?

- What brings me joy? Oh. Well, it seems too cheesy to say science. What brings me joy. I really think for me, these moments where I find a lot of joy outside of my cats and my plants and all of those personal things in my family and all of this is, I really love seeing interconnect. Like I love seeing interconnections between fields, scientists and like when you see that point where they were able to create something new, whether it's like a new method or like a new way of thinking about a problem, like for me that's like instantaneous joy. Like you co-created that together to find something new, and like oof.

- I love it. Love it. Thank you so much for sharing these this time with me. I really appreciate the opportunity to speak with you.

- I did too. Thank you so much for making this space, and this is my first time to do something like this, so I really enjoyed it. Thank you.

- Well good. You did a great job. So thank you so much.

- Appreciate it, thanks.

- Thank you. Have a great day.

- Bye, you too.

- [Narrator] Thank you for listening to Further Together: The ORAU Podcast. To learn more about any of the topics discussed by our experts, visit www.orau.org. You can also find us on Facebook, Twitter, and LinkedIn @ORAU and on Instagram @ORAUTogether. If you like Further Together: The ORAU Podcast, we would appreciate you giving us a review on your favorite podcast platform. Your reviews will help more people find the podcast.