

# WE ARE ETH – Episode 35

## With Sandra Hermann, Geologist, Paleontologist and a Member of NASA's Analog Astronauts.

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**[00:00:00] Sandra Hermann:** Cohesion and one big goal is one of the main drivers for all the cruises and expeditions I've ever been on and for any other scientific mission, the analog astronaut mission was the same thing. We set out to accomplish a certain goal and there needs to be good leadership in place that reminds people when they drift off, which is just natural.

**[00:00:27] Susan Kish:** In this episode, I'm talking with ETH alumna, Sandra Herrmann, geologist, paleontologist, and a member of NASA's Analog Astronauts. This is the We Are ETH podcast, and I'm Susan Kish, your host.

So Sandra, first question above all, what exactly is an analog astronaut? I mean, I didn't know there were digital astronauts and analog astronauts, and what is this? It sounds super cool, by the way.

**[00:01:02] Sandra Hermann:** Hi Susan, it is indeed one of the coolest experiences I've ever had in my life. An analog astronaut is an astronaut that is basically doing the same tasks that the ISS astronauts do just on earth in a capsule in a hangar that's situated at the NASA's Johnson Space Center in Houston.

**[00:01:22] Susan Kish:** Oh my gosh, so you actually went into a space capsule, I'm sure they had videos outside, so it looked as if you were in space. (Sandra: That's

right.) And how long were you in this capsule, and why does NASA run these kind of programs?

[00:01:36] **Sandra Hermann:** I was in there for 45 days, so six weeks, a little bit more than six weeks and NASA runs those experiments to better understand how stressed out humans, humans are. It's all about research of behavior and to find out what protocols can be made better how they can prepare the astronauts better, what could happen in the crew one on one behaviors when certain accidents happen, or when there is stress that the astronauts are under because of some emergency or some other situation that's unforeseen and that's pretty much what we were exposed to in the capsule and they had cameras everywhere except for one or two private areas where there was enough, no camera, but other than that, yeah, we were, Big Brother was watching us all the time.

[00:02:32] **Susan Kish:** I was about to say it does sound like one of those reality TV shows, and it was for women if I understand.

[00:02:38] **Sandra Hermann:** That's right, yes.

[00:02:39] **Susan Kish:** Uh, and what kind of, did they have you simulate certain emergencies or was sort of like every day exactly the same?

[00:02:47] **Sandra Hermann:** Not every day is the same, there is a certain schedule that we work by just like on the ISS. We used similar, uh, methodology and similar break times and in between there were some announced and some unannounced events. And we had to work through those with SOPs that we had, standard operating procedures, and then some of them, we just had to come up with solutions that we thought were the best.

[00:03:16] **Susan Kish:** And if I understand correctly, this was simulating a trip to one of the moons of Mars?

[00:03:21] **Sandra Hermann:** That's correct.

[00:03:22] **Susan Kish:** Phobos or something (like that)

[00:03:23] **Sandra Hermann:** Phobos. Yes, that's (right)

[00:03:24] **Susan Kish:** Wasn't sure how.

[00:03:25] **Sandra Hermann:** Yeah, that's a perfect pronunciation.

[00:03:27] **Susan Kish:** And how does one become an analog astronaut? I know you have a PhD, I know you've been working in scientific areas for years and years and we'll talk about all that, but how does that happen?

Could I apply?

[00:03:40] **Sandra Hermann:** I am sure you could. Do you have a scientific background? The first thing, all right, the first one is that they want astronaut like people to apply, which means they would like to have somebody that has a scientific background, a master's, a PhD, and has worked in science or STEM careers for a while and that is one of the biggest ones that they're looking for because they want people that are analog astronauts to react similar to how real astronauts would react. And so that was a great background that I had and then I met somebody that was an analog astronaut and I heard about that and I asked the same questions. What is it? Why did you do that? How was it? Did you like it? And how can I become one?

Because this might be fun. And so I went down that rabbit hole and I talked to her for quite a while and it was really interesting to me and on a whim, I'm like, okay, let me just apply and see where this goes. If it doesn't go anywhere, at least I tried and if it does, we'll see how far I get and maybe this could be a thing that, that I'm doing.

[00:04:51] **Susan Kish:** Fantastic. I can't imagine. But I would expect, and let me rephrase this differently, it sounds like you have a lot of experience in being away from home for big chunks of time to do research on that ship. So can you tell us exactly what it is you, what your job was on as an oceanographer or on that ship taking care of the scientific instruments, because it sounds like you'd keep going out for 60 day trips, which has to be slightly analogous with 120 or whatever people versus four, but must've been in some ways, good preparation for your experience as an analog astronaut.

[00:05:31] **Sandra Hermann:** That's right. And I wanted to share that experience that I had from, from over a decade as a seagoing research support person. I've worked on a lot of different roles and I thought I'd, I'd be a good fit to be an analog astronaut and share my experience with the out of three that are coming into the capsule and help them, um, along, and it, it turned out that my experience from the ships that I've sailed on, which you're right, 60 day expeditions were, were a regular occurrence, um, that helped really being an analog astronaut.

I, I tended to go out on, on expeditions for the international ocean discovery program, IODP, and it was a drill ship with an international crew and an international science party and on that ship, I went through several different laboratories that I supported because it's just wonderful and interesting and challenging at the same time to learn new things to support a different lab to, to help people along to accomplish research that then is seen in nature and science published and to be part of helping them along is a passion of mine.

And so on the ship, I supported the microscope lab, the core description lab, the imaging lab with microscopes and a scanning electron microscope and I was assistant lab officer for a while where you deal more with shipping and making sure that the samples that they're taking on the ship get home to them safely and also stocking the ship up front and talking to the chief scientist on what the research might be and making sure with the scientists two, three months up front that we

know what they need and that's on the ship for that expedition so that they can do all the things that they set out to do and it was it was challenging every time. And here you could see when there was a scientist coming on that's never seen the ship and never been on there, how lost they are at the beginning and then I loved the feeling of seeing them grow together as a research team, and as friends, and, and, become a little family over those two months because nobody has their family and we might go through Christmas and New Year's or Thanksgiving together and everybody misses the same things from at home and we support each other and then it just, you, you organically grow together, there's no way that people can't get close in an environment like that.

[00:08:08] **Susan Kish:** We're such a social creatures.

[00:08:10] **Sandra Hermann:** We are.

[00:08:12] **Susan Kish:** One of your interviews, you said that the three things that helped or that contributed to success were cohesion around admissions, a specific goal, sleep, and hobbies. Can you talk through those three things and why, why they had such an important role in terms of getting people through what is an unique kind of experience?

[00:08:37] **Sandra Hermann:** Cohesion and one, one big goal is one of the main drivers for all the cruises and expeditions I've ever been on. And for any other scientific mission, the analog astronaut mission was the same thing and we, we set out to accomplish a certain goal and there needs to be good leadership in place that reminds people when they drift off, which is just natural that people sometimes lose track and to pull those people back in and make them get back on their path is, is one of the important things to accomplish a, a goal as a team, because a team is only a team if everybody pulls on the same string, that is a great way to to accomplish big things, otherwise it's not happening. And sleep is super important to be able to concentrate and to stay safe, especially on a ship when weather comes in and the ship moves a lot and it rocks left and right and up and down and forward and backward, one needs to hold on, one needs to make sure that the chemicals are stowed away in a safe area that one plays with and that one works with all the safety gear that one needs for the certain location that one is on and that one has an eye on everybody else around because they're not, they might not be used to it as much and reminding people what's needed in certain areas is important. And sleep is essential to, to be able to concentrate.

And then hobbies.

[00:10:04] **Susan Kish:** But getting sleep on a ship, do you get seasick by the way? I forgot to ask that question.

[00:10:11] **Sandra Hermann:** A little bit here and there. It depends on what I'm doing, but I have my ways to get through it and sometimes the ways are just okay, I need to get a coffee and I need to stand outside on deck for five minutes and just look at the horizon and get some fresh air and then I'm good or I just need to eat a

little bite so my stomach has something to do, but I, I, I'm fortunate that I don't get too seasick, not some scientists that I've seen that unfortunately needed additional aid, but yeah.

[00:10:43] **Susan Kish:** I can imagine. And then hobbies.

[00:10:45] **Sandra Hermann:** Hobbies are important to take the mind off of just working all day every day. It's important to drift away and to read a good book or to go to the gym and get some of that potential frustration that stows up because a glass vial broke and one of the important samples disappeared in the drain.

To get that frustration out and to just start over new and say, okay, I'll get another sample and it'll be okay.

[00:11:12] **Susan Kish:** Outstanding. So with those three sort of key observations, did you find that also true as an analog astronaut?

[00:11:20] **Sandra Hermann:** Yes, absolutely. It was something that I brought into the capsule and I pulled my crew members sometimes over into that side when I felt that they're getting frustrated or bored or overwhelmed. I was like, hey, we want to do a dance party we got some music here on the laptop. You want to, I want to, in this hour that we have off, you want to like, just wiggle it out a little bit oh

[00:11:48] **Susan Kish:** Do you really? What, do you have a Spotify playlist that you've downloaded?

[00:11:52] **Sandra Hermann:** We had some, some music on, on our Surface Pros, yes.

[00:11:57] **Susan Kish:** That's ()

[00:11:57] **Sandra Hermann:** So we, we had a little 80s dance party, yep.

[00:12:00] **Susan Kish:** Fantastic. Would you go back to sea and do more missions on sea? And would you go back to being an analog astronaut should the occasion opportunity arise?

[00:12:10] **Sandra Hermann:** Yes to all. I am now working in a job that I am still going to see and I'm really happy about that, I don't think I could, could live without going somewhere and exploring and still being out on the water is just wonderful and analog astronaut, real astronaut if I have the opportunity, I would love to do this again, and I would love to go into real space and help pushing boundaries there, yeah.

[00:12:39] **Susan Kish:** So we'll see you on a mission to Mars or its moons. Sandra, I'm assuming that when you go on these missions, I don't know if mission's the right

term for it, but on these voyages that you're also involved in what the underlying experiments are and what they're trying to prove or understand or whatever, which ones of these do you find, are there any of the research projects that you've found especially inspiring or really interesting in your years on these ships?

[00:13:11] **Sandra Hermann:** You know, Susan, it's always a pull since we as IODP, we support the scientists, we help them set up their experiments and we help them troubleshoot the instruments, but we're not really there to do the research so sometimes when paleontologists sit on a microscope and look at their samples, of course, I walk by because I know how it's going and I look at the microscopes and I was like, oh, you wanna try this setting or that? Can I help you with something? And what are you seeing? And they tell me, oh, there's Amelia Huxley eye, or there's a disco aster, I'm like, oh, the stars I love those. And they look at me and I'm like, yeah, I'm a paleontologist, they're like, oh wow.

Okay come on, have a seat. I wanna show you stuff. And it's great I can look at stuff and we can talk and then they show me what they found and once they know, we talk about it a little bit here and there and it's nice to be part of it like that and to see their knowledge about the area grow but, um, I'm per se, not part of it because it's like, it would almost be too much to be involved in that part too cause I want to make sure that they get all their technical instrumentation figured out and that all of that is lined up for them. I I can only do so much, unfortunately, I'd love to do more, I'd love to have the day, have more hours, but I don't so I need to,

[00:14:37] **Susan Kish:** It's its scarcest commodity is your time and

[00:14:40] **Sandra Hermann:** (Isn't) it? Yeah, I agree.

[00:14:42] **Susan Kish:** And you have to leave time for those important dance parties.

[00:14:45] **Sandra Hermann:** That's Right.

[00:14:46] **Susan Kish:** In terms of your academic background, if I understand correctly, you studied geology and paleontology at the TU Berg Akademie Freiburg and got a master's there as well.

And then you came to the ETH in Zurich, which is the first time you had been out of Germany. So what caused you to choose the ETH and what did you study there? What did you do your PhD around?

[00:15:12] **Sandra Hermann:** At the ETH, I was fortunate to be the last, one of the last PhD students of Hans Thierstein, Professor Hans Thierstein, who is a big name in the field of paleontology and at that time, I didn't even realize that I saw at the end of my master's, I thought, what would I want to do? I would really like to do a PhD and I saw this position announced and I applied because I had, I wanted to get out of my comfort zone and going to a different country would be that step and even though

Zurich and Switzerland is not very far from Germany, it was still a different culture. It's very different. And him inviting me to, to be with the group and have an interview and talking to everybody was already mind blowing and seeing the ETH for the first time and working with this group it came out to be going to the ETH with Hans was a portal to the world.

[00:16:18] **Susan Kish:** Hmm.

[00:16:18] **Sandra Hermann:** And being there and organizing my own PhD project and being completely responsible for everything was a big step after the masters where it led to that direction but the PhD at the ETH and in this melting pot of, of science and of the greatest minds in the world and going there and being part of this and seeing them walk by in the morning and say, hey, publish, have you published yet today? And this, whoa,

[00:16:52] **Susan Kish:** No, I have to have my cup of coffee first and then I'll publish.

[00:16:55] **Sandra Hermann:** That's right, that's right. So it was to me, the ETH coming there and being allowed to be in this place that, that made so many great people and then there's little Sandra there and almost like, is this really, I need to like be my best here and do my best and to also make them proud of having picked me and it was a great experience being there. I'm still blown away as you can hear and being under Hans was such an honor.

[00:17:25] **Susan Kish:** And what did you actually, what was the topic of your dissertation?

[00:17:28] **Sandra Hermann:** I worked on phytoplankton called Coccolithophorus and I worked on their remains, their paleontology biological remains those are coccolith. You can imagine coccolithophores as single celled organisms, and they have tiny, tiny little platelets around them out of calcite. And they move them in and out for buoyancy, and that's how they travel through the water column, and get to light or sink further down.

And they are also dependent on nutrients and I studied how dependent they are on light and nutrients and temperature in relationship to the size of those coccolith platelets and to find out, is there a relationship? And how is this relationship traced over time? Does it change? Is it the same? And I took certain slices of time and investigated these parameters and looked at parallels.

[00:18:29] **Susan Kish:** How did you get from the ETH in Zurich to working on Chips at the IODP and, and talk about challenging yourself, moving from Germany to Switzerland is probably not as significant as moving from Switzerland to California.

[00:18:47] **Sandra Hermann:** It is growing into it. So I got to sail on one of the IODP expeditions as scientists because Hans Thierstein, he was one of the people that sailed on those expeditions before and we had another person in our group that, that



just went out just after I started and went on a ship to get samples and the samples that I worked on came from those expeditions.

And of course I was naturally curious, where does it come from? How does this work? How do they retrieve (them?)

[00:19:17] **Susan Kish:** That's so cool.

[00:19:18] **Sandra Hermann:** And then I asked Hans, do you think, would it be okay if I can go on one of those expeditions? I looked at one and I'm really interested in it and it would be a great addition to my PhD. And he's like, oh, if you can prove that you can still do your PhD in time and you can do this expedition, I need to see a plan and then we can talk about it. And so I started working on a plan and on a, on an application and he okayed that and I applied and they, I was fortunate that they took me on as a scientist.

[00:19:54] **Susan Kish:** Well, you do seem to have a pattern of applying for things out of the blue with fabulous experience and being surprised that you're accepted but that sounds great. How did your time at the ETH prepare you for what you're doing now?

[00:20:05] **Sandra Hermann:** It was, as I mentioned, a melting pot of different cultures and different people coming from all sorts of walks of life and working with them and recognizing that there are different patterns and that there are differences in life and in people how they work prepared me tremendously for everything that I'm, I have done so far.

[00:20:27] **Susan Kish:** Very (cool)

[00:20:27] **Sandra Hermann:** And yeah.

[00:20:29] **Susan Kish:** It sounds like you continue to challenge yourself if I read correctly, you just got your commercial FAA checkride pilot license.

[00:20:38] **Sandra Hermann:** I did.

[00:20:39] **Susan Kish:** What does that actually mean? Mm

[00:20:41] **Sandra Hermann:** I am now a commercial pilot, I can fly people for money pretty much. Before I was a private pilot and then I got my instrument rating, which means you can fly through the clouds just based on instruments or through fog, or when the weather is not good, you can poke through the clouds and get on top and then after that, I started working on my commercial license, which is a lot more flying hours and a lot more experience. Certain flights have to be accomplished, certain times have to be accomplished, and certain precision standards that are much higher than for private pilots have to be accomplished.



And then there is a test flight for a lot of these things and a knowledge test that needs to be done, and then now I'm a commercial pilot.

[00:21:30] **Susan Kish:** So I have to say, if I'm sitting here at NASA and I have somebody who's been an analog astronaut, has all those years of experience doing those kinds of 60 day voyages, has a commercial pilot's license, and a PhD it sounds like you're getting yourself ready to be a very interesting candidate to be an astronaut.

[00:21:54] **Sandra Hermann:** I would not say no. I think I'd still need, I still need my diving license, I believe. I think they're really interested in having a, having that part also accomplished but that's just a week of a course, and then that would be done too so that would not be hard to do.

[00:22:08] **Susan Kish:** No, especially because now you live in San Diego as opposed to in Houston.

[00:22:15] **Sandra Hermann:** That's right.

[00:22:16] **Susan Kish:** Will be following this with intense interest. Sandra, thank you so much that was a great conversation and what a fabulous career. Congratulations and we look forward to hearing what's coming to come next.

[00:22:29] **Sandra Hermann:** Thank you Susan. Time was flying I didn't even once recognized that we're this far in already and it was a pleasure talking to you. Thank you so much.

[00:22:37] **Susan Kish:** Thank you. So a couple questions that we always ask our guests. When you were a little girl, what did you want to be when you grew up?

[00:22:46] **Sandra Hermann:** I wanted to be a veterinarian. I love animals all sorts of animals it doesn't matter what and I wanted to help them.

[00:22:53] **Susan Kish:** Fantastic. And what areas are you curious about now? What are you reading? What are you listening to? What sparks your scientific curiosity?

[00:23:04] **Sandra Hermann:** I am listening to a lot of different podcasts depending on where my interests go listening to how to understand a cat better because I have one and I want to know how to treat him as well as I can I having books here when I'm looking over to the right is Richard

[00:23:20] **Susan Kish:** (What's) the name of your podcast, Sandra? Cause we collect these and we put them on the notes for these things.

[00:23:26] **Sandra Hermann:** You know, I will need to look that up.

[00:23:29] **Susan Kish:** Okay. No worries.

[00:23:31] **Sandra Hermann:** Let me look that up and send that to you.

[00:23:33] **Susan Kish:** Thank you. And what are the books that you're reading?

[00:23:35] **Sandra Hermann:** I'm looking at five levels of leadership. I'm looking at Richard Branson losing my virginity, and the truth about managing people so I'm, I'm looking more into bigger examples and how they let big groups and how they inspired people.

I want to inspire people with all the things that I've done I'm slowly realizing that not everybody is as lucky as me to be able to have all these opportunities and I want to share it and I want to have people stretch their reality and try to just get out of their comfort zone and I want to learn how to inspire people better.

That's why I'm reading a few of those books.

[00:24:21] **Susan Kish:** Fantastic. And you already do inspire people, you push them to do greater things and following your example with that. When you go to Zurich or when you think back to your time in Zurich, what were your favorite places either in the city or at the ETH?

[00:24:37] **Sandra Hermann:** Probably going down to Lake Zurich and sitting on the water and just having my legs dangled there and watch people and look over the water and think about what's, what could be the next good thing to do and just to relax also, to walk away from the PhD for a little while and to relax the mind to be ready for the next week.

[00:24:57] **Susan Kish:** Fantastic.

[00:24:58] **Sandra Hermann:** On, on the lake and then maybe on the terrace in the main building overlooking the city cause it's so gorgeous with the mountains in the

[00:25:07] **Susan Kish:** It really is, no matter the season or the time of day. I completely agree. Sandra, thank you so much. Really appreciate it.

[00:25:15] **Sandra Hermann:** Susan, thank you, this was a pleasure.

[00:25:17] **Susan Kish:** I'm Susan Kish, host of the We Are ETH series, telling the story of the alumni and friends of the ETH Zurich, the Swiss Federal Institute of Technology. ETH regularly ranks amongst the top universities of the world with cutting edge research, science, and people. The people who were there, the people who are there, and the people who will be there.

Please subscribe to this podcast and join us wherever you listen. And if you enjoyed today's conversation, please give us a good rating on Spotify or Apple or YouTube and to close, I'd like to thank our producers at Ellie Media and the ETH alumni, and especially to thank you, our listeners, for joining us today.

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