

The Children's Hour, "At The Bottom Of The Sea"

Kid 1: What lies at the bottom of the ocean and twitches?

Kids: I don't know, what?

Kid 1: A nervous wreck!

[LAUGHTER fades into: "It's time for The Children's Hour, Kids' Public Radio!]

[MUSIC, "At The Bottom Of The Sea", Ralph's World]

Introduction Segment:

[02:11] **Katie Stone:** That's Ralph Covert, the title track from his Bottom of the Sea release. You're listening to the Children's Hour. I'm Katie Stone. I'm here with some great kids online. Who's with us today?

Kids: Hi, it's Xavier.

Hi, it's Thorfin.

Hi, it's Max.

Hi, it's Illuminata.

Hello, It's Amadeus.

Hi, it's Thaniel.

It's Genevieve.

Hello, it's Cade.

Hi, it's Beth.

Katie Stone: Well, thanks you all so much for being here with us. I'm pretty excited about today's show. We're online because we're online with an actual ship in the ocean right now. It's called the JOIDES Resolution. You can see a picture of it at childrenshour.org. And we're going to be talking with folks at the JOIDES Resolution in just a minute. We're going to get a tour and learn all about it, so we're going to the bottom of the sea today on the Children's Hour. This is Claudia Robin Gunn.

[MUSIC, "Glow In The Dark Sharks", Claudia Robin Gunn]

[06:25] Katie Stone: You're listening to The Children's Hour, and today is a very special show. We're actually going to be joining a ship in the middle of the ocean. Well, it's actually almost on the coast of Portugal, and it is a ship called the JOIDES Resolution, and with us from the ship is Amy Mayer and Saray Sanchez. Welcome to the Children's Hour.

Amy Mayer: Thank you, welcome aboard.

[MUSIC under narration]

Katie Stone: And before we actually interviewed them, Amy and Sarah wanted to show us all around their ship, including the map, showing all the places it's been to to do scientific research.

Amy Mayer: Each of those spots represents a place where this ship, or the one that came before it, have done scientific ocean drilling. So what do I mean by that?

I mean, a ship goes out in the ocean. with a group of scientists and there's a hole in the bottom of the ship and they drop a drill pipe through that hole. It's really long, really heavy, takes many people, heavy cables, big machines to put it through the ship all the way through the water to the bottom of the sea floor. And then once the equipment is sitting on the sea floor, they pushed it down farther. And the point of all this is to bring those sediment cores back up to the ship, and then they get brought into the labs, and the scientists get to work studying Earth's history by looking at different aspects of the sediments.

Katie Stone: Amy says researchers have been drilling into the ocean for around 50 years. This particular expedition started in Lisbon, Portugal.

Amy Mayer: We came out here about, about 100 miles off the coast, spent a couple weeks at this dot, and then we went to the second and the third one, and

now we're at this last spot. So now we're quite close to the coast. And these four spots were chosen because the sediments that we can pull up from the ocean at these places don't just contain information about the ocean here -- but those sediment records actually recorded -- they correlate, they match up very nicely with what we know about the climate of the past at the Arctic and the Antarctic.

Katie Stone: This research area is called paleoclimatology. That's the study of past climates.

Amy Mayer: So years ago, a scientist from Great Britain, whose name was Nick Shackleton, drilled a short core here called a Piston Core. And when he looked at isotopes of the sediment record, he saw a pattern that looked familiar to him. And he went back and looked at data that other scientists had taken from ice cores that were drilled in Greenland and in Antarctica. And they matched. So it indicated that you could estimate the climate at the poles from sediment cores drilled here. One of the main objectives of this expedition is to create a high resolution history of that climate here, which will also help scientists to understand better what the climate at the poles was like in those time periods. And in addition to recording Ocean conditions because we're so close to the continent, we also report a lot about what the climate was like on land. So this is a unique place in the world's oceans, and that's why the two co-chief scientists put together this expedition. It took them about 13 years to go from idea to actually being out here on the water with all of us.

Intercom Voice: Core on deck!

Amy Mayer: Okay, core on deck. That means It's time to go outside.

[INDUSTRIAL NOISES fade into narration]

Katie Stone: Before interviewing Amy and Sarah, we got to see some of the ship's machinery in action, like the drilling machinery used to extract samples from the bottom of the ocean.

Amy Mayer: The ship is about 144 meters long. It was built in the 1970s as an oil exploration vessel, and then in 1985 it was converted to be full time for science use.

Katie Stone: On this expedition, Amy told us there were 117 people on board. About half of them were scientists, and the other half worked the drills to collect the specimens. There's also a full time catering staff. They make all the food.

Amy Mayer: Each expedition has its own scientific objectives, and although they all relate to bringing material up from underneath the bottom of the ocean, They can be really different. So this one, like we were explaining is paleo climate, but when we get off the ship, the next expedition that leaves from Spain is going to be just off the coast of Greece, and they're doing a hard rock expedition that's focused on volcanoes and other undersea geohazards. So it's, it's really different

Katie Stone: Coming up, we've got so many questions for our guests today about what they've learned so far on the JOIDES Resolution. You're listening to The Children's Hour.

[MUSIC, 11:19, Suburban Legends, “Under The Sea”, Esther Crow, “Oceans”]

[19:00, Underwriting Break]

[MUSIC 20:00, Karan Casey, “The Waves Down Into The Ocean”]

Katie Stone: That's a clip from "Seal Maiden: A Celtic Musical" by Karan Casey. You heard Ketsa over the break, and before that, "Ocean" was Esther Crow from All Together Now. Suburban legends brought us "Under The Sea". You're listening to the Children's Hour. Our guests today are live on a ship in the ocean. They're just off the coast of Portugal on the JOIDES Resolution. Amy Mayer and Saray Sanchez are scientific educators and communicators as well as a scientist. And we are learning about what they do on this ship collecting core samples from the bottom of the ocean.

Kids: So, what kind of research are you doing off the coast of Portugal?

Saray Sanchez: Thank you, good question. So specifically what I'm doing is that I am taking the little microfossils that are within the sediment and actually measuring the chemistry of them. So what the chemistry will tell me is actually the past temperature of the ocean. So I'm looking to reconstruct past ocean temperatures specifically from when Earth had ice ages. So when Earth ice ages melted, the ocean temperatures are very important to look at because they can tell us a lot about how fast the ice ages were melting and we can always use that information for the future.

So we've drilled, we've drilled at four different sites right now. The first site was about four kilometers or 400,000 meters in the ocean. At this current site we're

at about 1,300 meters in the ocean, so water wise, and within the sediment I believe the deepest we went into the ocean floor was 500 meters.

The depth that we're going to currently is about 350 meters within the ocean floor. The oldest mud that we've gotten is about 15 million years old.

Kids: What are some of your most interesting discoveries from your core samples?

Saray Sanchez: Yeah. So right now, what we were expecting was to just find and drill that gray mud that you saw upstairs. But actually, in one of the first sites, we drilled deep enough and we found layers of sand. Which like I was saying earlier, we don't really expect sand layers in the deep ocean. But that might indicate that in the past, there were very strong earthquakes that moved sand down to the bottom of the ocean or some other tectonic event that brought sand to that location. So I think that was probably the most interesting thing that we found within the core.

Kids: What are some cool life forms you have found down there?

Saray Sanchez: Ooh, some cool life forms. So, some of the microfossils that we find are a little bit bigger, and they're called ostracods. And typically, these fossils, just like a human skeleton, are very smooth. But actually, one of the microfossils that we found earlier was hairy which is very gross, but very interesting. It's just a specific type of species. So yeah, I think that was probably the most interesting. I had never seen one like that before.

Katie Stone: A hairy microfossil!

Saray Sanchez: A hairy microfossil, yeah. And I believe it actually wasn't hair follicles, but the microfossil had these tiny spikes that were thin enough to look like hairs.

Katie Stone: I have a question about the core samples. When you dig down, one would expect as you dig underneath the ocean that everything would be just so wet. But it doesn't actually look that wet. I don't understand how the bottom of the ocean isn't wet.

Saray Sanchez: Yeah, so there is water at the bottom of the ocean, just to clarify. But you're totally right. As sediment continues to build up, and build up, and build up, the weight of everything from the top pushes down on the bottom. And that means that sediment will begin to compact, and water that was within

the sediment at once will start to come out or come back up. So that means that the sediment can then further compress as it's lower into the ocean floor. So you're totally right.

Kids: Is the bottom of the sea all around the world the same or is it different?

Saray Sanchez: That's a really good question, and that's actually one of the main questions that we're trying to answer with scientific drilling. So, at least in the Atlantic, and where we currently are in the North Atlantic, we know that in the past, the ocean has not been the same. Sometimes it's dominant by Antarctic water, and sometimes it's dominant by water from the North Pole. So even over time, the ocean everywhere isn't the same. Good question. Yeah. Yeah, that's correct. And that's specifically because when conditions align, North Atlantic deep water can, instead of sinking, can stay at the surface, which means that water from Antarctica will start to fill in the basin of the North Atlantic.

Katie Stone: We're talking with scientist Sarah E. Sanchez. She's on the JOIDES resolution and science educator, Amy Mayer, they're with us right now from the ship that is engaged in research off the coast of Portugal. You're listening to the Children's Hour.

[MUSIC 28:04 Caspar Babypants, "Be In The Sea", Beth and Scott, "Baby Shark", Ken Nesbitt, poem, "Deep Sea Dance"]

Katie Stone: Ken Nesbitt from Poetry for Kids. It's a website. We use that with permission from the author. And before the poem, you heard "Baby Shark" done by Beth and Scott. And way back when, Caspar Baby Pants out of Seattle gave us "Be in the Sea". In the background, it's Mr. Smith with "Happy [00:12:00] Dance". We're going under the sea today with our guests who are on a scientific research ship that's in the Atlantic Ocean exploring the ocean floor. We have a lot more with our guests on board the JOIDES Resolution right after a sing along with Dan Zanes right here on The Children's Hour.

[MUSIC, Dan Zanes & Festival Five Folk, "Mermaid"]

[39:37 Underwriting Break]

[MUSIC 40:00, Mike Mennard, "I Saw A Ship A-Sailin'"]

[41:25] **Katie Stone:** This is the Children's Hour. I'm Katie Stone, and you just heard Mike Mennard from "When Mother Goose Laid an Egg". We're going under the ocean today with our guests, Amy and Saray from the ship called the

JOIDES Resolution. It's a research vessel that is right now at Sea in the Atlantic off the coast of Portugal. JOIDES takes core samples from the bottom of the ocean floor to better understand our planet. Many different researchers are on board doing different kinds of research. The kids crew still have a lot more questions for our guests.

Kids: You mentioned earlier that some of the samples that you've gotten have gone back to at least 15 million years in date. Theoretically, how far back could you get samples from?

Saray Sanchez: Theoretically, I believe you can go back pretty far. It really depends on the type of material that we get. So for example, right now, we're getting a lot of soft sediment, so we can go as far back as around like 20 million years or 30 million years. But if you are drilling down into hard rock, hard rock is a lot older than soft sediment, so you can go back, like, 300 million years on hard rock. However, it's a lot harder to sample the climate from hard rock.

Kids: You talked about finding animal fossils at the bottom of the ocean. Have you ever found any plant fossils?

Saray Sanchez: We don't have, I would say very nice fossils of plants preserved, but what we do have is the lipids or the fats that are within leaf waxes. So some scientists actually use the leaf waxes and use chemistry to figure out past ocean temperature, similar to how I would use fossils.

Amy Mayer: And there are also studies and places where people study pollen that is something that's washed off the land, goes into the ocean, and then settles down to the bottom. So we don't have a pollen person on this expedition, but that is another marker that people use.

Kids: How expensive is your work, and like, how do you get the funding for this project?

Saray Sanchez: Yeah, so from what I heard earlier, just to have this two month long ocean expedition is about 10 million dollars. So it takes about 10 million dollars just to get the sediment that we have right now, and then in addition to that, once we have the samples we have to run them through instruments and we have to pay for our lab use and that can be anywhere from 50,000 to 100,000 dollars, so it can get fairly expensive, but currently this is a National Science Foundation funded project. So, the NSF pays for a lot of the funding, and then for me, in my personal research, I get a few grants from the National Science Foundation, but also from the Evolving Earth Foundation.

Amy Mayer: It's an international program, so NSF is what funds the American component of it. There are also IODP organizations in Europe, China, Japan, India, and Australia, New Zealand. So the science funding agencies in those countries pay for what happens out of those countries and in our science group, we have representatives from most of those places.

Kids: What's it like living on a ship?

Saray Sanchez: That's a great question. So honestly the first few weeks were a little bit hard because your life is entirely dependent on the ship, but over time I got really comfortable with the ship. So we have a gym on board. We have a movie theater room. We have a little place to play games a full cafeteria-like area. Currently, behind me, the scientists have set up a ping pong table. So we find ways to make sure that we still feel like we're living a relatively normal life out at sea.

Amy Mayer: Yeah, and I'll just add that all the scientists work a 12-hour shift and the ship is working all around the clock, so we don't have weekends. It's 12 hour shifts every day that we're out here, which is 61 days. And so, although there are these other things we can do, we are mostly working and sleeping and the scientists share cabins to people to a cabin. And when you leave for your 12 hour shift, you don't go back during that 12 hours because that's when your roommate gets the room. So you don't actually ever see your roommate. And generally the two-people rooms share a bathroom with another two people room, so four people sharing a bathroom, generally. And we have a terrific catering crew, they make great food, and there's plenty of it. All of the water that we drink is desalinated from the ocean. There's a whole part of the ship down below where the engineers and the electricians and welders and mechanics all manage all that stuff. There's also a crane and there's a helideck on the back in case of a medical emergency, a helicopter could come and take somebody off the ship. And every Sunday we have "abandon ship" drills where we all have to put on our life jackets, hard hats, and safety glasses. And then we gather at our assigned lifeboats.

Katie Stone: That's Amy Mayer and Saray Sanchez. They're aboard the JOIDES Resolution. Thanks to Amy for collecting that audio for us. We've got photos and more posted for today's show. See what the JOIDES looks like, including those core samples and lots more. Find it at childrenshour.org. Look for this episode, "At The Bottom of The Sea".

[MUSIC 47:11, David Landau, "Hole In The Bottom of The Sea", Flor Bromley, "The Ocean", Asheba, "Ah Sailor"]

[54:01] **Katie Stone:** That was Asheba from "In the Kids' Zone", Floor Bromley and Lori Berkner, before that from Floor Bromley's Pachamama CD. David Landau, before that, Music for Kids with "A Hole In The Bottom of The Sea". You're listening to the Children's Hour. We've been thinking about the bottom of the sea today with our friends from the JOIDES Resolution.

Connect with us, we'd love to hear from you. Visit childrenshour.org and leave us a voicemail or send us a note, or just listen to hundreds of our podcasts. Go to childrenshour.org. We're going to go out with one more. This is Recess Monkey, right here on the Children's Hour. We'll catch you next time.

[MUSIC, Recess Monkey, "Seahorse"]

[Credits]