TRANSCRIPTION – 6: SEA ICE

This is a podcast about the sea.
Because I, Threes Anna, love that sea.
But I'm also worried and sometimes even scared.
What actually happens in, with, on and under the water?
Just listen.

I live on the island of Texel, where the sea provides a wonderfully temperate maritime climate. When the whole of the Netherlands is suffering from a heat wave, we still have a sea breeze. And in winter, it's never cold. We heat our house with a heat pump, and I remember the installer saying that if it got colder than minus ten degrees Celsius, the heater wouldn't be able to cope.
Yes, minus ten degrees Celsius! The climate is warming, so minus ten degrees Celsius will probably never be reached again.
And then I heard about the driving force of the Gulf Stream, the AMOC. Because it's the Gulf Stream that gives us such a wonderful climate here in Western Europe. Not too hot, not too cold, not too wet, not too dry. And that engine seems to be malfunctioning. And that could mean the Gulf Stream is stalling—stopping. And then we'll have a new ice age here.

Episode six. Sea ice.

René: Well, the AMOC, or the AMOC in English.
Threes: This is climate scientist René van Westen.
René: It's an abbreviation. It stands for Atlantic Meridional Overturning Circulation.
Threes: I'm speaking to him at Utrecht University, where he's researching the AMOC.
René: Atlantic, that's pretty easy, and Meridional, meaning in the south-north direction.
Femke: And Overturning Circulation.
Threes: And this is Femke de Jong, a senior scientist at NIOZ who has been researching the AMOC at sea for years.
Femke: Overturning is something that goes from top to bottom.
Threes: I'm speaking to her at home in Den Helder.

VO: I went to visit them because I want to know what it will be like. Will it be as hot as Saint Tropez or as cold as Hawk Bay? That's north of Newfoundland, exactly on the same latitude as Texel. Nothing grows there and the winters last from November to April.

René: The AMOC is a sea current, or should I say ocean circulation. It's a kind of conveyor belt that gives us a very mild climate. We get a lot of warm water from the Gulf of Mexico, which all comes our way and then flows further north. It then reaches Greenland, where it is very cold and very salty, and there the water sinks. It then flows south again at great depth.
Femke: Yes, the AMOC is actually a kind of central heating system. The water heats up in the tropics. The water is transported northwards. That heats up our latitudes here and eventually the water flows further north and cools down again and flows back to the central heating boiler in the deep ocean.

René: Yes, indeed. It is one big circulation of heat and salt.
VO: And researching this turns out to be complicated.

Femke: It is an enormous, massive thing. It is a gigantic, heavy container of water.
René: It is, yes, infinite, so to speak. So, so big.
Femke: Well, the ocean is actually incredibly inaccessible. There are better detailed maps of Mars and the moon than there are of the sea floor.

Threes: So you've never seen the AMOC in real life.
René: No. But no one can really see it, because it's underwater.
Femke: You can't see what's happening at the bottom. You need very specialised instruments for that.

Threes: You scientists talk and write about the possibility of the AMOC coming to a standstill.
René: Yes. The AMOC is driven by temperature and salt differences. But the warming climate is changing that, it also causes...
Threes: To put it very briefly. It's getting warmer, the Greenland ice sheet is melting, which makes the ocean sweeter and reduces the salt differences.
René: ... Well, those two ingredients cause the AMOC engine to start faltering.
Threes: How many of those engines are there on the planet?
René: Actually, just one.
Threes: Is the AMOC the only one? Oh my goodness, I'm getting... I didn't know that.
René: Yes. And at a certain point, you can reach the tipping point, which causes the engine to stall.
Threes: That really keeps me awake at night. What is the tipping point?
René: Well, we don't really know.
Femke: Well, the ocean is an enormous volume of water, and water can store a tremendous amount of heat. If you hold a flame under a container of air or a container of water, that water heats up very slowly. And it takes a very long time for such a heavy system to react. But once it does react, it keeps going. It's like an elephant suddenly charging at you, and you can't stop it. And then very quickly, on a climate timescale, it can happen very quickly. In a few decades, it can go from on to off.
René: Indeed, a few decades.
Femke: So that could happen before I retire. Yes.
Threes: It gives me goose bumps when you say that. Oh, that makes me feel completely... Yes, it could happen before you retire.
Femke: And that makes it worrying, yes.
René: Yes. This is a global tipping point. From then on, the process we have set in motion will be unstoppable. And then the consequences of an AMOC collapse will become increasingly visible. And, uh, you'll also see a lot of changes.
Threes: What kind of changes, for example?
René: A whole lot.

1
René: It's getting colder. We have a fairly mild maritime climate here. When you think of Canada, what comes to mind?
Threes: Snow?
René: Snow,
Threes: Ice, cold.
René: Exactly. Cold. And what's really funny is that it's at the same latitude as southern Canada. But that climate is about ten degrees cooler than ours. That's because we receive a lot of heat from the AMOC. But once the AMOC stops, we can calculate how much colder it will become here. And then you see that on an annual basis, our climate will become about five to ten degrees cooler and the winter months will become much colder. That means it will become about fifteen degrees colder. That's really substantial.
Femke: Yes, that has very big effects.

2
René: Well, if the AMOC collapses, then the sea ice could move all the way south. In our simulations, it reaches as far as southern England.

Threes: So basically, just like in the old ice ages, everything will be covered in ice.
René: Yes, our North Sea, but also parts of the Atlantic Ocean. We'll just have sea ice in the winter months. Rotterdam is one of the busiest ports. Well, that's not possible with a layer of sea ice, of course. Off the coast of the Netherlands in the winter months

3
René: It also becomes a lot drier, so you can imagine that the combination of colder temperatures and less precipitation is really problematic for farming. Try being a farmer there...
Threes: ...being a farmer.
René: Yes, being a farmer.

4
René: And it causes more sea level rise. The sea level is not flat, there are all kinds of slopes, and when the AMOC stops, those slopes will also change. And that will cause almost a metre of sea level rise off the coast of the Netherlands. And that is on top of the current expectations we already have.

5
Femke: When the AMOC stops, the warm water will no longer flow north, but will remain in the tropics. The tropics will heat up faster and it will cool down here. But the temperature difference between the two will also increase.
René: And that will cause the Amazon rainforest to completely reverse its seasonal cycle.
Threes: Where will that go?
René: Where it is now the rainy season, it will suddenly become the dry season. And during the dry season, it will suddenly become the wet season.

6
René: Yes, a lot of marine life depends on how much oxygen enters a particular area, and if that is disrupted at some point, marine life will also adapt to that. One of my colleagues here is also researching what happens to certain fish species.

Threes: I'll call Amper Boot, my colleague, but the line is bad.
Amber: And if the AMOC stops, most fish species will show a decline.
Threes: It varies by region, for example in the Atlantic Ocean at our latitude. She predicts a 30% decline in fish stocks.
Amber: And there are definitely fish species that are doing a lot worse.

Threes' thought: So hunger, cold and flooding
Breakthrough in sound

Threes: Of course, we have had climate change before. Right?
René: Yes, it has been much warmer in earlier climates. It has also been much colder in earlier climates. But that happened naturally. So the changes we see are that the climate warmed by about five degrees over a period of 20,000 years, for example. But what we are doing now in a hundred years is sometimes twenty or twenty-five times faster. That has never happened before in the history that we can reconstruct, at least. And then, with an AMOC collapse, it will be five times faster. We simply cannot adapt to that.
Femke: Yes, that's what worries us. That it can happen so quickly. That we may be closer to the point where it happens, but that we as a society just carry on as usual.
Threes: Yes.

Threes' thoughts: I think of the mini ice age that I know from paintings from the 14th and 15th centuries. Back then, we used to skate on the canals and rivers here. There is even a painting depicting a fair on the Zuiderzee.
But that period turns out not to have been so pleasant after all. There were many crop failures and the ice often caused the dykes to break. And it was only one and a half degrees colder. Not even a real ice age. If the AMOC stops, it will be 5 to 10 or even 15 degrees colder here. In winter, we will be able to walk from Texel to Den Helder across the ice. Our house will be freezing cold, because that stove hasn't worked for a long time. It's so hard to imagine.

Threes: Uh, what kind of world do you envision if that happens?
René: Uh, Europe is sometimes called the so-called breadbasket, the world where an enormous amount of food is grown. Well, that could potentially come to a standstill. Parts of it would become inaccessible. Will we give up certain parts of where we live now? Uh, you'll have a kind of climate refugee. Actually, nowadays it's from south to north. And maybe it will even be reversed. Uhm, and uh. The taken-for-grantedness we now have of a certain regularity in the climate. That it will literally be disrupted.
Threes: That it will literally be disrupted?
René: Disrupted.
Threes: Disrupted, yes.

Ice crash.
Femke: Well, we woke up because there was a huge crash and a tear, and the whole ship was vibrating from the impact. And then another crash, and then you look out the window and see the sea ice. It had been Offshore Wind, and the ice had come towards us.
Uh. We went there with scientists to take ice samples, so that's three to four meters of thick ice you're standing on. Um, yes, it's very beautiful, and you see all those, uh, those bluish patches. Those are bits that melted in the summer and refrozen. And in between is the white snow, which is quite hard. It's real ice, and it's an incredibly bumpy, lunar landscape.

Threes' Thought: I try to imagine climbing up the dike and seeing the sea ice. I'm wearing a thick coat, hat, and scarf. There's no one there. They're inside, and all the young people have left. I climb down from the dike and onto the ice. I know I don't have to be afraid of falling through, and yet it's scary. Below me, the deep gully of the Marsdiep, between Texel and Den Helder. On my back, an empty backpack, just as empty as the shelves in the shops or the cupboard in the kitchen.

René: We won't experience that. Because, of course, it will be several decades before all those effects develop, but we might be able to experience the beginning. But for the generations after us, that's when it suddenly becomes the harsh reality. So, the current expectations, or the latest insights, that say it's possible from the second half of this century.

Threes: Do you have children?
Femke: No, I don't.
Threes: Would you like children?
René: Uhm. Well, I don't know. My wife happens to be pregnant. Hahaha. Yes.
Threes: Oh my gosh. Gosh. How exciting for you. Do you think differently then? About it? About the world?
René: Yes, that's for sure, but I actually already had that before. You're always concerned with the generations after you, aren't you? Because the climate doesn't stop. It doesn't stop. Our entire society, which we've built over the past ten thousand years, flourished precisely because the climate was so stable. And now we're changing the climate at fifth gear. And then we'd go to sixth gear if the

Earth were to collapse. And then I think, if the climate of 2100 were to be like that, how it's being portrayed now, would I want to live there? Well, I don't think so.
Threes: No, I don't either.
And in that AMOC, is it already slowing down, or not?

Femke: That's a huge point of discussion in the field. Um, the direct measurements? Really, the measurements of the currents themselves? Those are actually still too short to say that. But there are increasing signs that it's already decreasing, but we're not completely sure yet.

Threes: Yes, of course, it's always so difficult with science. Scientists never say 100%.
René: No, nuance is our best friend in the council.
Threes: I understand that, because otherwise you can do it. You. You're working on something very carefully, and deep down you're afraid?
Femke: Yes, I don't need to be nuanced about that.
René: No. Because, uh, I. I'm quite an optimist anyway, but something really needs to be done, because more warming will cause more problems. You could start printing all the scientific material. You'd have a huge pile of papers all showing: The more climate change, the more disastrous the livability of our world would become. And then, on top of that, there are tipping points. We have to act now instead of in thirty or fifty years. And, uh, when I think about that, I understand perfectly well why people get really, uh, depressed. But the fact that we can still control it, as in, we can avert the worst consequences.
Threes: Mmm, is that so?
René: Yes, because on the one hand, it doesn't matter if you go completely vegan and no longer have an impact, because if 8 billion people run in the other direction, well, that's not even a drop in the ocean, but a kind of sigh in the ocean. But if all 8 billion of us suddenly make the transition to, for example, a plant-based diet, or use fewer things, less energy, and so on, and so on, then it will have a major impact. But I also know, very realistically, that we all have to do it together. We can't do it alone. But together we can. Because all the warming we can prevent does help to keep the Earth's temperature a little lower.

Music: Ria Zee. Are you friend or foe?

René: I think that without the ocean and the sea, life on Earth wouldn't be possible. So it's definitely our friend. And also the fact that the sea and the ocean are such huge climate buffers. They absorb so much extra heat, which is why temperatures haven't actually risen that much so far, because all that heat disappears into the ocean. But a quarter of our emissions are also absorbed by the ocean. So it could have been even worse without the ocean. A very good friend, indeed. And we must keep it as a friend.

VO: These days, every bad news story ends with a positive spin, as we're used to from Hollywood movies. So we don't lose heart and maintain hope. But no matter how I've tried, I can't seem to put a real spin on it and reassure you. Because while I'm editing this, it's been revealed that Europe is warming about twice as fast as the global average.
And what if that AMOC stops and everything reverses? And what if we get a higher gear instead of a warmer and colder climate? How are we supposed to adapt to that? Birds and fish move, they go to areas where it's better for them, but we and all the animals that aren't free can't just move. There are fences and borders everywhere.
My fear hasn't diminished after this conversation with these scientists. Because the changes we're facing are so immense that we don't seem to see them. Like the ant that doesn't see the shoe falling down, it just keeps getting darker.

Listeners have told me my podcasts can be quite somber. That's true. I'm going to try to make a cheerful one next time; I'll really do my best.

Sea Ice was the sixth episode in the "zee" series. Until now, I've been making a new podcast every two months, but that's too much if you're doing everything on your own, so from now on, a new podcast will be released every quarter. If you'd like to hear them, subscribe, and they'll appear automatically in your podcast app. You can also follow me on Instagram. All credits and more information can be found in the show notes. And if you found this story beautiful, despite its somberness, please spread the word.
Thank you for listening.