

## Transcript

Martine Lizotte (ML): Welcome to Arctic Minded, a podcast where we discuss life, work and research in the Arctic. Arctic Minded is produced by ArcticNet, a Network of Centers of Excellence of Canada that brings together scientists, engineers, and other professionals in the human health, natural and social sciences with partners from Inuit organizations, northern communities, federal and provincial agencies, as well as the private sector, to study the impacts of climate and socio-economic change in the Canadian North. From coast to coast to coast, we recognize that our work reaches across the ancestral and unseeded territories of all the Inuit, Métis and First Nations people that call these lands home and who have been protectors of and share connections with these lands since time immemorial.

ML: My name is Martine Lizotte. I am the Training and Knowledge Mobilization Coordinator at ArcticNet and your host for today's episode, during which we will be celebrating 20 years of research on the Canadian Coast Guard Ship Amundsen. If you've never heard of the Amundsen icebreaker, you might be surprised to discover that it's actually featured on our Canadian \$50 polymer bank notes. If you have a 50 in your wallet, check it out. That's the Amundsen. So why is this vessel so renowned and so significant that it should be featured on our bills? Well, that's exactly what we're going to explore in a two-part episode featuring guests that will share with us the stories behind the Amundsen and the ways it's shaped Arctic research and leadership in Canada's northern frontier. Many scientists, including the late Louis Fortier and the late David Barber, described the Amundsen as an incubator of science for us to understand the Arctic and how it works. As you'll learn today, the Amundsen icebreaker has had, and continues to have, significant impact in the scientific world. In fact, in the last 20 years, the Amundsen has been pivotal in revitalizing Canada's research effort in the study of the changing Arctic Ocean. Every year the research icebreaker accommodates hundreds of researchers, all sorts of experts and students participating in innovative programs that address a multitude of disciplines including physical oceanography, chemistry, biology, ice atmosphere, you name it.

ML: In this first part of the episode, we'll talk with Dr Alexandre Forest. He is the executive director of Amundsen Science, a not-for-profit corporation, responsible for the management of the scientific mandate of the research icebreaker Amundsen. Doctor Forest received his PhD in oceanography from Université Laval in 2009 and spent no less than 520 days in the Arctic on the Canadian Coast Guard Ship Amundsen, and other vessels, since 2003 as part of various scientific expeditions. At Amundsen Science Dr. Forest manages a team of 17 highly qualified technicians, logistics, administrative coordinators, who work in support of the annual scientific expeditions of the Amundsen. He also links with senior management at the Coast Guard and he ensures that the strategic vision and the objectives developed by the Amundsen Science Board of Directors are appropriately implemented. Dr. Forest is a specialist of Arctic shelves and an expert in carbon fluxes and obviously passionate about research vessels, oceanography instruments and the Arctic Ocean in general. He has authored numerous scientific reports and more than 35 peer reviewed publications. And he shares with us today the intriguing story of how the Amundsen icebreaker came to be.

Dr. Alexandre Forest (AF): The Amundsen has been built in 1979, and initially it was named the Sir John Franklin. So for over more than 20 years, the ship just sailed as a regular ice breaker, you know, in the ice in the Saint-Lawrence estuary, for example. And then in the early 2000, what was really intriguing is the federal government, which was trying to reach the 0 deficit at the time, just said that there was one

Coast Guard icebreaker that was in "surplus", you know, there was one too much ice breaker. So they decided to declassify the icebreaker just to bring it to the graveyard somehow. And then for more than two years, the ship didn't have any name, it did not sell it, it was just becoming rusty in Newfoundland, close to St. John's, serving as, you know, as a platform also for some workers, you know, before boarding another. So, in the early 2000, at the same time, Canada was really lacking research vessels in Canada, like of course today, but at the time it was even more obvious and there was one big program which was named the Canadian Arctic Shelf Exchange Study, which has been just financed by the NSERC program. But they were lacking an icebreaker, so at the same time as they were lacking an icebreaker, a new program from the CFI had just come to life, which was the International Joint Venture program. And then, Louis Fortier had this brilliant idea, at the time, to bring back the Sir John Franklin back to life to actually serve the Canadian Arctic Shelf Exchange Study program. And this is when the Amundsen was born. So, for over 2 years, the ship has been completely refitted. All the laboratories inside were built and many transformations from the inside, so it was a true collaboration at the time between the Coast Guard, universities... And it was even before ArcticNet. So, it was really just to serve this first program. So, bringing back the Sir John Franklin to life and rechristening the icebreaker as the Amundsen.

ML: So in 2003, 20 years ago, the Canadian Coast Guard Ship, Amundsen, rose from the decommissioned hull of the vessel formerly known as the Sir John Franklin, now equipped with state-of-the-art, scientific equipment and ready to start its inaugural yearlong voyage. So, what did that ship now look like?

AF: So the Amundsen is a full university building at sea, so it's like going into any kind of engineering faculty building; you will have all the labs and the facilities to do research. So, it's completely different than any other Coast Guard Ice Breakers or any smaller research vessels in Canada. It's fully equipped and actually the main objective is to serve objectives of any kind of research study. So, from geology, marine biology, it could be glaciology, it could be atmospheric sciences and so on. So, it's really a multidisciplinary platform. Even over the time, it's served as a clinic, as a floating clinic, for some of the Inuit health studies, which are now conducted from land, but some of them have been conducted from the Amundsen and actually started the cycle of Inuit health studies that continue today. So, it's really a versatile platform. A student that will come on board won't find himself or herself completely lost, because it's exactly like a lab in any university, so it's not different. So, we have all the facilities. In addition, you have everything actually to make your life easier... you have the, you know, cafeteria very close, you can go on deck, you have a space also to relax and so on. You will meet new friends and it's like having a mini village at sea, a mini university at sea, I would say.

ML: A floating university faculty, equipped with its own helicopter in the middle of the Arctic Ocean. But would you be surprised to know that the ship actually has a huge hole in the middle of its hull? You know, the normally watertight body of the ship? As you will hear from Alexandre, this hole is called a moonpool, an opening in the base of the hull, giving access to the water below, allowing researchers to lower tools, lower instruments, ROVs and small submersible crafts to enter and leave the water easily in a protected environment.

AF: So, the hole in the hull is called a moonpool. So, it's quite useful when you have sea ice around the ship to sample the ocean, and this has happened at many times over the course of the history of the ship. For example, during the overwintering programs, the CASES program, as was mentioned, but also the CFL, the Circumpolar Flaw Lead program, that took place over 2007-8. And even more recently, with

some of the programs that we've conducted in St-Lawrence estuary. So, this hole in the hull is really useful when the ship needs to go in some places where there's too much ice, and then you need to access the ocean to sample water, plankton and even sediments. And it has been used also for many years to deploy our remotely operated vehicle. But now we have a bigger one, which cannot be deployed from the moonpool, so we deploy it from the outside. But nevertheless, it's a really useful instrument and even some of the international collaborators that we have, they were inspired by this moonpool and they are now designing new vessels in their country on the template of what we've been doing for the Amundsen.

ML: Not only has the ship been an inspiration for other countries in terms of its pool of equipment and instruments, as well as its scientific vocation and management, it has over the past 20 years achieved significant milestones.

AF: In terms of milestones, of course, the first year was quite ambitious, you know. At the time, it was the most ambitious expedition ever undertaken by humans in in the Arctic Ocean. So more than a year with an icebreaker, having all those international teams coming on board with the collaboration of the Inuit communities because they were there actually since Day 1. So, it's really important to underscore that. The second milestone was really when ArcticNet took over the management of the ship in 2004. Because at the same time, you know, we had this big infrastructure and there was a need to start some monitoring program, long-term time series of the ocean, variability of biological activity and so on. And the Amundsen really served this purpose. So, bringing ArcticNet to a stage where there's enough data to really understand, you know, climate change and so on, in collaboration with, you know, Northerners and also from people from abroad. So then after that in the early 2010s, I would say there was a big momentum by the federal government to explore the Arctic Ocean for oil and gas. And at that time, the Amundsen had been used to collect baseline data for, you know, oil and gas exploration. That might seem a bit brutal, but the conclusion of all that we need to remember is that this led to the fact that there's a moratorium now on oil and gas exploration and exploitation in the Canadian Arctic, and those baseline studies that had been conducted at the time, although they were made from the Amundsen, truly served the purpose of preserving and protecting the North. And further on, if we continue in time in the late 2010s, around 2017-18, we got funded by the Major Science Initiatives program from the CFI, and this provided an opportunity to even more, you know, diversify the userbase of the Amundsen. Because as you could understand, for almost 10 to 15 years, the Amundsen was really under the management of ArcticNet. And then when the funding framework changed, the MSI program came on board and then the userbase has been truly diversified with many calibrations, many other programs, and now, you know, it's really a multidisciplinary and multi program platform. So, it's welcoming new programs that have been led in the early days by ArcticNet students that are now professors and so on. It's really, I think, a big milestone. And the fact that the ship is still fully used every year is really a sign that this kind of infrastructure is needed in Canada because we cannot really underscore enough how much we can achieve with a ship like that, you know, which is a faculty building at sea, and welcoming people from abroad, from the North, from universities and so on. And then I think in the last few years, this consolidation of the fact the Amundsen is now a very accessible platform, that we can facilitate new programs that we encourage collaborations, I think it's really a big milestone in my opinion, because the it's not only dedicated to one single program or one single objective, it's really diversified completely.

ML: Productive and fruitful collaborations developed over the years, which underscore the instrumental role of the Amundsen in supporting Arctic research in Canada and at the international level. As a mobile

laboratory, the icebreaker has connected different communities, including government and academic researchers, as well as extending to local Indigenous communities, and external partners. The Amundsen also boasts international partnerships with its inclusion in the Arctic Research Icebreaker Consortium, ARIC, alongside other flagship vessels, such as the German research vessel, Polarstern.

AF: For the international community, Canada is seen, is still seen, as a leader in Arctic oceanography and marine sciences in general. And actually, the Amundsen was really key to bring this leadership, you know, at the cutting edge of what should be done in terms of international research initiatives. And what we could see is people abroad, you know, coming on the ship, researchers trying to mimic a bit the same kind of, you know, framework that we've been doing with multidisciplinary programs, collaborations and so on. And this is why we are now part of what is called polar research icebreaker consortium, So it's ARICE, Arctic Research Icebreaker Consortium. And this is just beginning to be kind of a little family of infrastructure that can be shared among people from abroad. So, Europeans will come or from other countries, on the ship and then people from Canada could go on other ships from elsewhere. And I think this kind of international collaboration is really important. Sometimes in Canada we forget that there's something else outside of Canada, and I think with the Amundsen, it's so important to see that, you know, Canada has a role to play, not only internally because we have the diversity of different objectives and so on, but internationally, we do have a role and it's really important to keep this role attached completely. For example, we have, I would say, an idea that in the next few years to bring other icebreakers from abroad into a very large program with the other vessels from other countries. So, this is potentially coming to light, we'll see, but this is the kind of idea that we have these days.

ML: One of the things I've found compelling about the scientific missions on the Amundsen is the increased space created over the years for learning, training, but also the acknowledgement of several ways of knowing and the recognition that diversity is a key component of excellence.

AF: We just had recently the first Inuit chief scientist aboard the vessel to lead a very ambitious program in the Labrador Sea in Baffin Bay. We have new collaborations directly serving, you know, communities. We are hiring, also, Inuit as trainees on board the ship. At some point you know everything is merging and it's really working as a true community and you can really feel it when you're aboard the vessel and, you know, I think this is really the way to go, working together. And because there's no limitations, you know, the ocean is there, the coast is there, the land is there. When you understand it from a holistic perspective, this is how Arctic science, in my opinion, should be. So, there's no other alternative than just bringing everyone together to understand the same environment. We support students from every horizon. So, everyone that would like to come on board through a program, of course there's a need to be attached to some program, we will try to facilitate, accommodate, and try to find a way to make sure that any given student would, and even, for example, even with disabilities could come on board and make his or her science. That's no problem at all. Of course, in terms of international diversity, of course that's there, but in terms of diversity of programs, diversity of participants, it's just increasing, you know, we developed over the years a diversity index just to showcase to the Canada Foundation for Innovation that we were reaching this goal and it's just increasing... diversity of participants, diversity of user programs, diversity of research objectives and this is a bit difficult to calculate, but we're getting there. But, this is just an example of what we were trying to achieve. I think the diversity into science is the sign of excellent science. So, this is more than what we believe, you know, this is our main objective.

ML: Holistic science that makes ample room for diverse voices. That's an important objective of all the expeditions being conducted on the Amundsen. This year, in 2023, the ship left its home port of Quebec City on July 8th for a 111-day journey across the Arctic. Alexandre tells us about the diverse scientific programs being deployed this year, including many ArcticNet funded projects.

AF: So ArcticNet is, of course, a slew of different projects. So, for us we are supporting all those different projects. They could be studying Arctic kelps, of course geology with the Arctic sea floor program. They they will get of course, as much as they would like this year studying some areas close by to glaciers. We have the biogeochemical programs which is really important, a lot of attachments with the Foxe program, which is a program focusing on the Foxe Basin taking place next October. We have, I would say, the long-term NTRAIN program, which was called in in in the early days, the nutrient and carbon fluxes program and I think this is exactly in this kind of project that you can find actually the value of those long-term time series. You know, it's not only one year, it's now 15 and 20 years of data. The kind of publications that you can do with that will go, you know, above what anything else in Arctic science can go because we have been building the long-term time series in the Arctic science, almost, maybe a for some exceptions, but in terms of synaptic activities... That's really when you see footprint of the Amundsen in the Canadian Arctic with all those data, you know, you should not see that as a, you know, a presence, but, you know, it's really a scientific knowledge that has been acquired and this is thanks to all those different projects that continue these days. So we have also, the Red-AO project focusing on the Nares Strait and Lincoln Sea areas, which are typically not reachable, but we'll try this year to go and even next year with an expanded program in collaboration with France. And of course we have the contaminant program which is another example of a project within ArcticNet which has been there since the early days and is continuing, and, you know, collecting data that are really, really precious to understand the variability and this feeds again into social projects, medical projects and all those connections. You know, at the beginning you cannot really feel how much you will gain with one dot but when you accumulate those dots and you begin to connect the dots and then you connect those dots with other webs after that in terms of disciplines, you can really feel that the value of, you know, the effort that has been undertaken to collect even one data or one sample... Of course, when you take it, you know, by itself, there is not much value, but when you kind of, you begin to build those long-term time series and expand them with other disciplines and other objectives, I think this is really a major milestone of ArcticNet over the years, connecting the dots and, you know, going beyond the given the disciplines to connect with what is useful for humans and for the society in the North.

ML: The Amundsen is now 44 years old and has recently undergone a complete refit to extend its life for more than 10 years. The repairs equipped the ship with new instruments to support both Canadian Coast Guard missions and scientific data acquisition. But beyond this life extension, will the vessel itself need to be replaced at some point? What are the options to make sure that we maintain our strong seagoing polar research capabilities and sustain productive national and international networks?

AF: So, the Amundsen should be, you know, fully useful and operational at least the late 2030s. So, this is something that we know, you know, with the status of the ship. And there's another vessel life extension plan around 2029. So we should reach the late 2030s, but the big issue in Canada is that it takes ages before building new vessels and we need to think now about the, you know, the strategy for the future. And this is where we're trying to invest efforts because we believe that Canada should have actually, at least one, fully dedicated research icebreaker that will be kind of the equivalent of the CHARS station in the North. An ice breaker that could welcome international collaborators, continue

with a dedicated research mandate, increasing studies with respect to community-based objectives and this kind of environment and actually training the next generation, you know, the other one that will follow us in the future. Because the Canadian Arctic is as much land as it is oceans. And in some places, of course, you can go with small vessels, coastal studies and this is all needed, you know, there's a place for everyone – a true research icebreaker dedicated to science. There's no way that Canada can avoid that in the future. But it's a bit challenging because the Coast Guard has some other views on the future of the ice breakers that are going to be built in the next few years, with more multidisciplinary mandate which is, for us, a bit challenging to face and trying to being heard, but it's, you know, I think we'll need to rally as a community and make sure that our voice is heard and this is where we're going to be investing efforts, and actually now in the short term. So, the way is we need to develop a new dedicated research ice breaker for Canada that will follow up on what the Amundsen has been undertaking because there is no equivalent. You know, if we build those, you know, versatile modular icebreaker in the future, of course they will still be fully operational and so on, but we will be missing the integration that we can do with the Amundsen, you know the integration of people, the integration of science, the integration of disciplines, of research objectives... And when you don't have a current program driving all that, you lose the essence of what should be Canada in terms of Arctic science leadership. So, I think we'll keep our place, but we need to fight hard because, you know, from a federal or governmental perspective, it's a bit challenging. But we're getting there.

ML: Integration of people, science disciplines and goals - that has been at the center of initiatives and projects deployed on the Amundsen over the past 20 years. If, like me, you found the story of the Amundsen fascinating, I invite you to listen to the second segment of this two-part episode, which features Dr. Maxime Geoffroy, an early career scientist who started as a Masters student on the Amundsen 14 years ago, and who is now leading his own research group at Memorial University of Newfoundland. Before we say goodbye, I want to invite those of you who are interested in learning more about Amundsen Science and ArcticNet research to consult the show notes where you'll find links to different websites. To everyone, take care.

Show notes

[Amundsen Science](#)

[ArcticNet funded projects aboard the CCGS Amundsen in 2023](#)