



Image 1. Swedish icebreaker Oden.

Frozen Obsession documentary follows URI team studying climate change in the Arctic

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Frozen Obsession captures a once-pristine Polar ecosystem eroding at an alarming and accelerating rate. The PBS documentary by Emmy Award-winning filmmaker **DAVID CLARK** chronicles the Northwest Passage Project (NPP) expedition studying the effects of climate change in the Canadian Arctic. A team at the University of Rhode Island (URI) Graduate School of Oceanography (GSO) and its Inner Space Center, an international research and education hub, developed the project.

Aboard the Swedish icebreaker *Oden*, (**Image 1**), the expedition departed from the U.S. Thule Air Base in Greenland in July 2019, on a 2,000-mile voyage through the Northwest Passage (**Figure 1**). During a pre-release viewing of the film, followed by a ZOOM panel discussion, planners and participants shared their experiences during the 18-day mission.

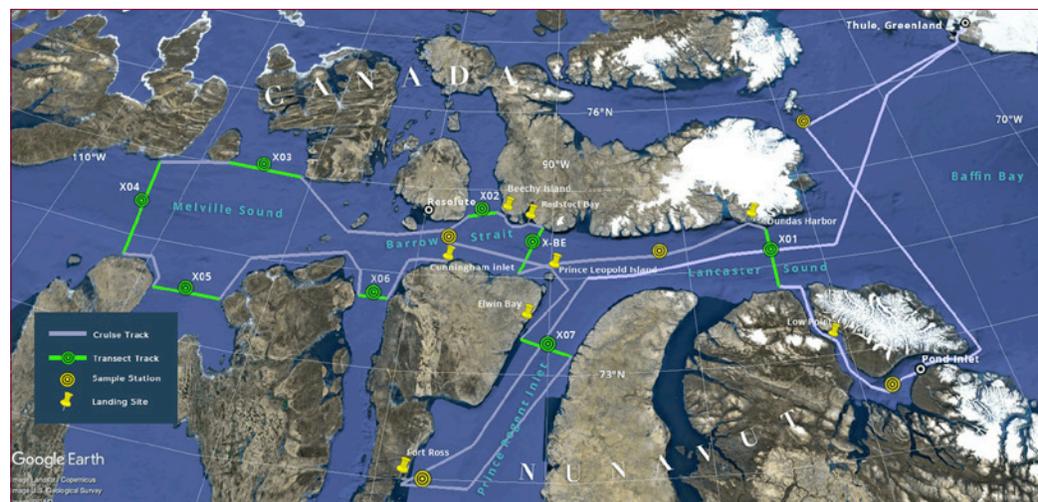
URI Associate Professor of Oceanography **BRICE LOOSE, PhD**, the project's chief scientist, described the Arctic as “a melting pot. The old Arctic is disappearing. I feel like we are watching a tragedy unfolding.” He noted the dramatic shifts in the climate record. “Humans were not

on the planet the last time there was a major change in the climactic pattern like the one we are experiencing today. Previously it has been over the course of several thousand to a hundred thousand years. What we are seeing today is a profound change because of the speed with which it is unfolding. It is not even a matter of decades now, but years.”

Loose described the NPP research as “basic science, data collection. It was an

opportunity to peer into a complex system and start to understand it for the first time.” Clark’s documentary offers fascinating glimpses into this; one scene depicts Loose and a small group helicoptered to sea ice floes, where they drilled into six-foot thick ice to collect core samples (**Image 2**). What they found was disturbing – plastics of different types, sizes and colors. “There was so much plastic that you could look at it with your naked

Figure 1. Map of the Northwest Passage Project Expedition.



Q&A with oceanographer Brice Loose, PhD, NPP project lead scientist

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Q. What kind of routine medical screenings were done for the pre-COVID Northwest Passage Project (NPP) and what is taking place now on research expeditions?

A. Participants have to go through a fairly rigorous medical screening with certification from their physician and dentist that the likelihood of needing emergent care is low within the next 3-6 months. People are sometimes disqualified for heart and eye conditions, for example.

Q. Was the medical team on the ship from New England?

A. Typically, the medical personnel are employed by the ship operator. In this case, the Swedish Polar Research Secretariat had a staff physician aboard.

Q. It did not sound like there were any medical emergencies, but if there were, would a patient be helicoptered out?

A. Yes, the helicopters are critical in this respect. They can rapidly transfer someone to a town with a hospital or with airline service to larger towns. In the Northwest Passage, we were often less than one day away from a community that was accessible by helicopter. These townships are serviced by two Canadian airlines, so the field setting was not as remote as it can be.

Q. Are there research findings from the Project you would like to highlight?

A. For NPP, the other results are preliminary and still in progress, but we see the influence of terrestrial glaciers affecting the distribution of plankton and microbes, and potentially even the production and degradation of greenhouse gases. Despite the extended daylight, we found very little exchange of nutrients between land and sea. That, combined with the enhanced freshwater on top of seawater, meant that very little plant nutrient was available in the surface ocean to fuel plankton growth by primary production. In these respects, extended summer melt is really transforming the region.

I'd also like to make you aware of the **MOSAIC project**: <https://mosaic-expedition.org>. In total there were four URI members who participated in MOSAIC during the course of the year-long drift. We had some serious logistical hurdles to transfer personnel during the spring crew changes, but a protocol was developed so that COVID never made it out to the vessel.

Q. Is there follow-up research to the NPP taking place in the Canadian Arctic?

A. We are in collaboration with Canadian Dept. of Fisheries and Wildlife that have long-term monitoring in this area. Their work is ongoing. One of our graduate students has been journeying to the Canadian Arctic and the NWP almost every summer for several years. ❖



eye and see all of the beads, fibers and filaments just sitting there in the bottom of the containers," Loose said.

Previous European research has shown the trajectory of plastics, determining it lofts through air masses, descends on Arctic islands, and flows with ocean currents. Some of the sea ice collected during the 2019 expedition is believed to have started in the Central Arctic, moved east through the Nares Strait by Greenland, and then into the Northwest Passage's Lancaster Sound.

Analyses into the data collected during the NPP project is ongoing; for example, identifying the state of weathering on the ice samples and trying to determine the degradation of the plastics, and potentially tracing its source to the manufacturer.

"It is important for people everywhere on Earth to see and understand how this region affects all of us," said NPP principal investigator and project director **GAIL SCOWCROFT**. "The region's meltwater, water circulation, and exchange of greenhouse gases between the ocean and the

Image 2. Dr. Brice Loose, at right, chief expedition scientist with the Northwest Passage Project and research team collecting samples from ice cores in the Arctic.

[COURTESY NORTHWEST PASSAGE PROJECT/
CAMERA: DUNCAN CLARK]



Image 3, 4. Polar bear and iceberg in the Canadian Arctic waters.
[COURTESY OF THE NORTHWEST PASSAGE PROJECT.]

atmosphere are causing wide-scale environmental and climatic changes, which increasingly affects people and wildlife diversity around the world." (Images 3, 4)

However, she pointed to encouraging signs, with the United States rejoining the Paris climate agreement this year, and also stressed the urgency for individuals to act. "We can, as citizens, reduce

our own carbon footprint and encourage our governments to move towards a zero-emissions economy."

On the voyage, GSO microbiology graduate student **JACOB STROCK** supervised the observation and collection of plankton samples, "to understand what is in the water and how susceptible these 'small but mighty' microscopic

organisms might be to climate change. Many small organisms can have a large effect. What impact will it have on the Arctic as a whole?" he pondered during the panel discussion.

Filmmaker Clark said he hoped the film's takeaway for viewers would be to "believe the science, and see that climate change is real. We look to the next generation of young scientists and decision-makers; they are the ones who are going to save us."

Frozen Obsession also explores the maritime history of the Northwest Passage, and the history and effects of climate change on indigenous populations. The latter perspective was compelling, given by student participant **MIA OTOKIAK**, Inuit scientist and community liaison.

The NPP was supported with major funding from the U.S. National Science Foundation and additional support from the Heising-Simons Foundation.

For further information on the project and how to view the documentary, visit <https://northwestpassageproject.org>.

