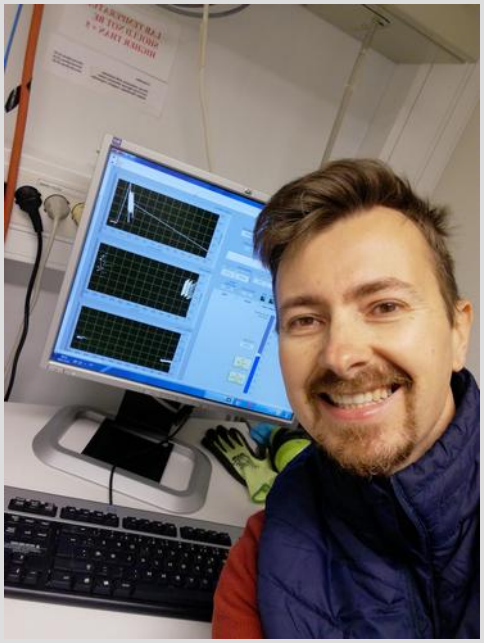


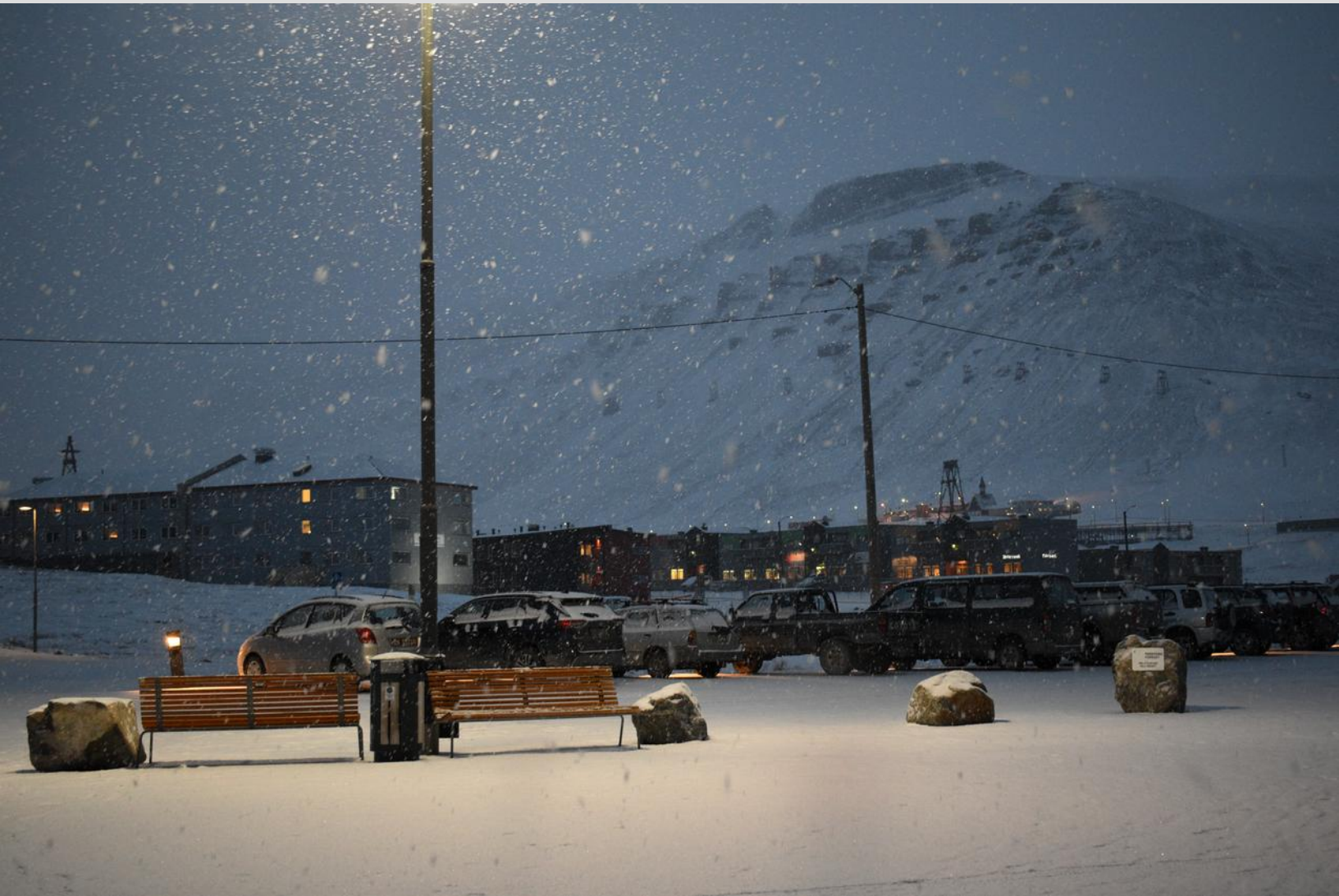
**Igor Gribanov**

**Birthplace:** Novosibirsk, Russia
**University:** Memorial University of Newfoundland
**Thesis:** Numerical Investigation of Fracture of Polycrystalline Ice under Dynamic Loading
**Supervisors:** Rocky Taylor, Robert Sarracino
**Education:** Pima County Community College; Novosibirsk State University

Visiting UNIS between October 23, 2019 and November 25, 2019

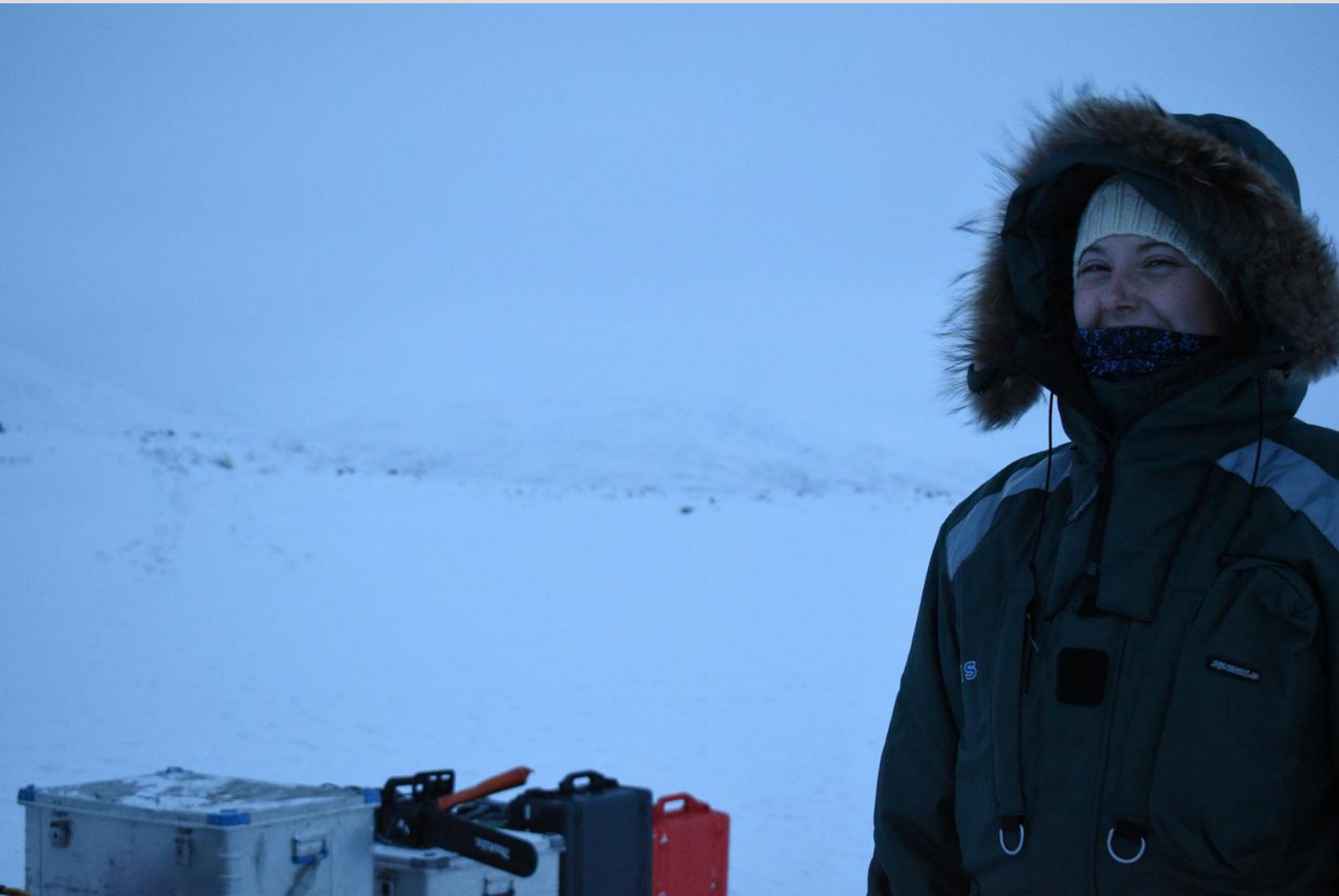
The suggestion to visit Longyearbyen came spontaneously from my research supervisor, about eight months before the trip. There was a small amount of funding available from Mitacs, a Canadian organization that supports research projects and international collaborations. The financing would barely cover my flight tickets and living expenses, and required a three-month stay in one of the designated countries – a list that included Norway. The eligibility requirement was participation in a small research project, which included fieldwork, laboratory work, or theoretical analysis. Being a Ph.D. student in ice mechanics, some fieldwork experience would be advantageous. Based on the stories from other students who attended UNIS, I had very high expectations about their on-site testing program – expectations that were entirely met later on. But first, I had to somehow get involved with their work.

Our contact at UNIS is Aleksey Marchenko, a renowned professor in ice mechanics, and a relentless researcher. Earlier this year, he acquired the Micro-SHM acoustic emission monitoring system, designed to record high-frequency sounds, which are produced by fracturing objects. We were excited to apply this measurement technique in the area of ice mechanics. When measuring ice strength, most of the experiments lead to the fracture of the tested sample. We were going to record the sounds of the breaking ice!



By the time I collected all necessary signatures for the Mitacs application, all available funds were already distributed. Formally, I did not miss the deadline, but de facto they had no money left for new applicants. After I give up all hope, my supervisor mentioned that he would find the funding for a shorter trip. And I needed a lot – in addition to traversing the ocean from St.John's to Longyearbyen, I had to apply for the visa first and buy some winter clothing for the trip.

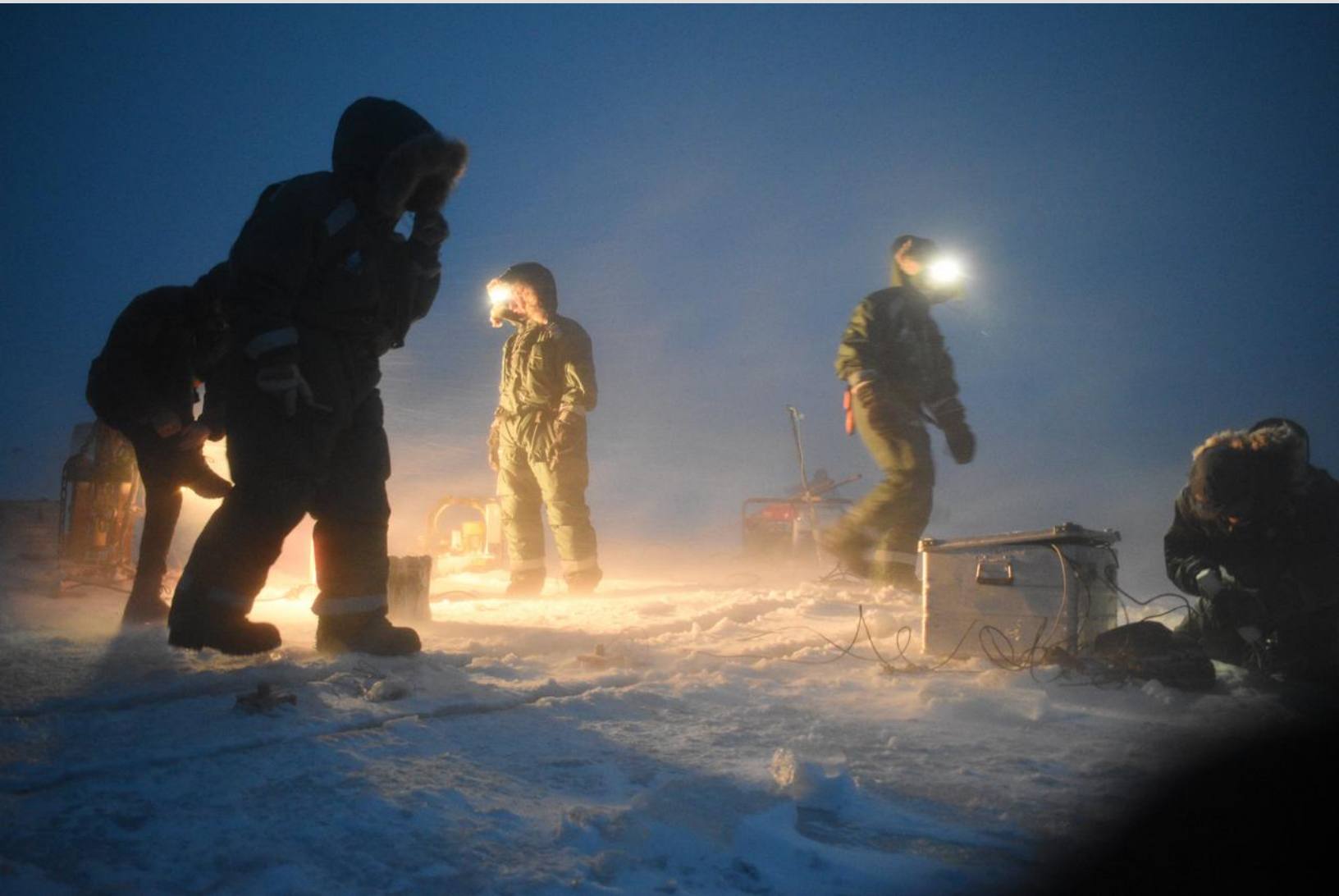
Longyearbyen is "the largest settlement and the administrative center of Svalbard, Norway," says Wikipedia. By the Svalbard Treaty of 1920, Norway has sovereignty over the Svalbard archipelago. Still, the treaty "allows citizens of any signatory country to conduct commercial activities and live in town." The treaty also limits Norway's rights to collect taxes. From a practical perspective, the stores in Longyearbyen are tax-free. One may find the prices quite high anyway. For example, it is common to come across a pair of sport pants offered for 3,000 Krones (US$330). Everyday food items are also expensive. Still, there are many unusual foods to try, available mostly in Norway, such as the famous Norwegian crispbread, or Knekkebrød, as they call it. My companion from MUN, Amy, refused to try persimmons and figs, as they were too unusual for her North American taste.



The selection of winter clothing on the island is huge – one less problem for travelers. Sports outfits are common everywhere – that is, professors wear them in classrooms, salespeople wear them in the stores, and even the restaurant visitors wear them for dinner. Many people wear reflective vests when walking outside to be visible during the polar night. There is no dress code in this town!

Another consequence of the special treaty status is that Svalbard is not in the Schengen zone. If you don't want to get stuck in Longyearbyen forever, then make sure that your visa allows multiple entries (or at least double entry). Citizens of Russia and other signatory countries can visit and live in Longyearbyen. Still, to arrive there, one travels through Oslo and exists the Schengen zone when boarding a flight to Longyearbyen. On the way back, the traveler re-enters the Schengen zone; hence, the double-entry is needed! Of course, if you are a citizen of the US, Canada, or one of the EU countries, that is one less problem on your list.

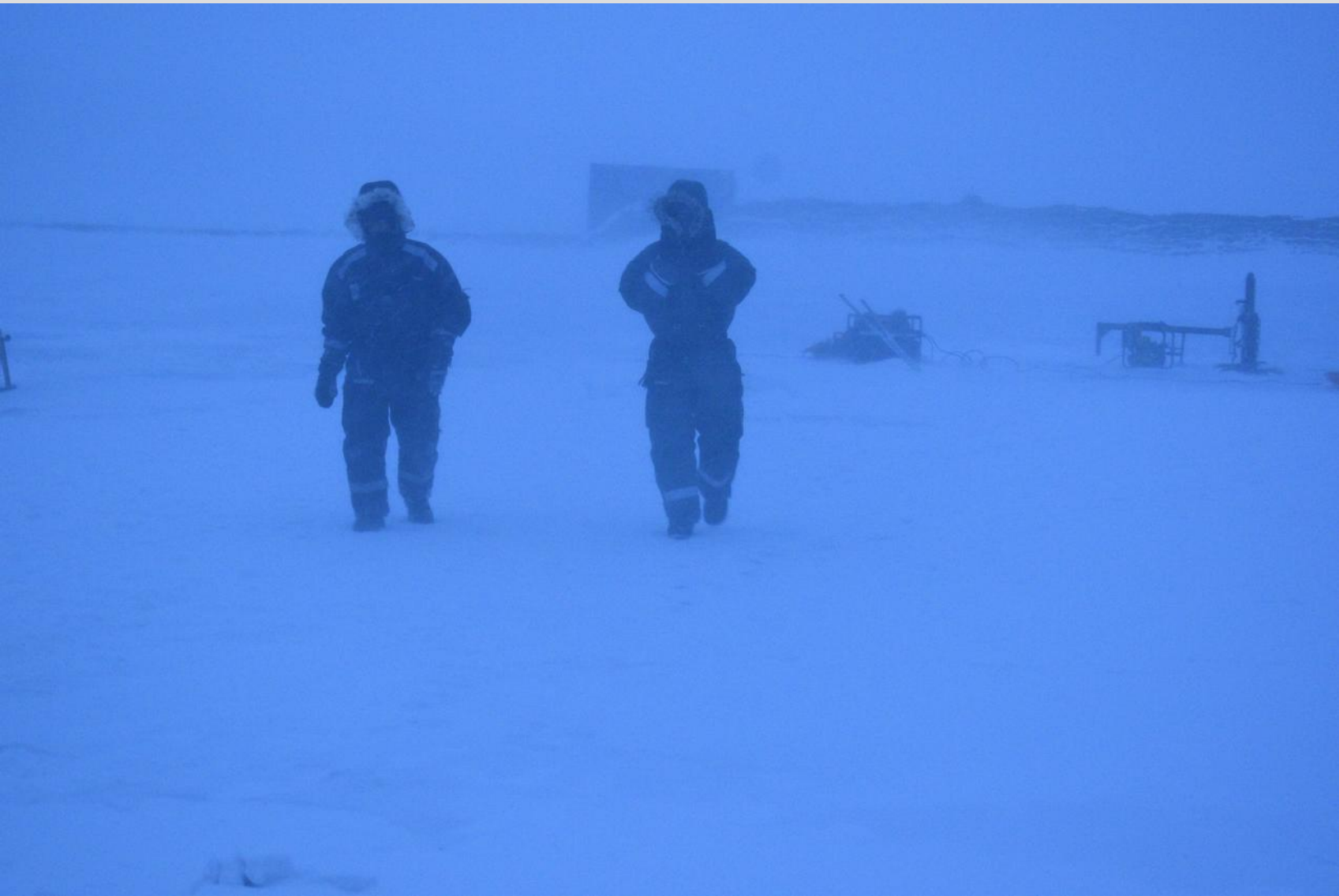
The second-largest settlement in Svalbard is Barentsburg, "almost entirely made up of ethnic Russians or Ukrainians," Wikipedia says. As much as I wanted to visit Barentsburg, there is no road connecting it to Longyearbyen. In Summer, there are regular boat tours, and in the Winter, one can go on a snowmobile. It may seem that going by boat is more comfortable than riding a



snowmobile, but think twice – the boat ride takes five hours, and it is a shaky and bumpy ride. Boat ride resembles a horse trot where the rider is jolted up and down in the seat. Unfortunately, I did not have enough courage for such a trip, so looking at the postcards at souvenir shops had to suffice. It is practically impossible to travel to Barentsburg directly, without crossing Longyearbyen. But there are stories of reaching it as a stowaway on a Russian supply ship.

While the human population of Svalbard is about 3,000 (or so), people share it with 4,000 polar bears. There is a slight but realistic possibility of encountering one while hiking in the proximity of the town. The chance of meeting a bear while walking to a grocery store was an annoying thought. As my fellow student, Aleksandra, noticed, “you will be lucky if you see one.” After a brief pause, she added: “...or not.”

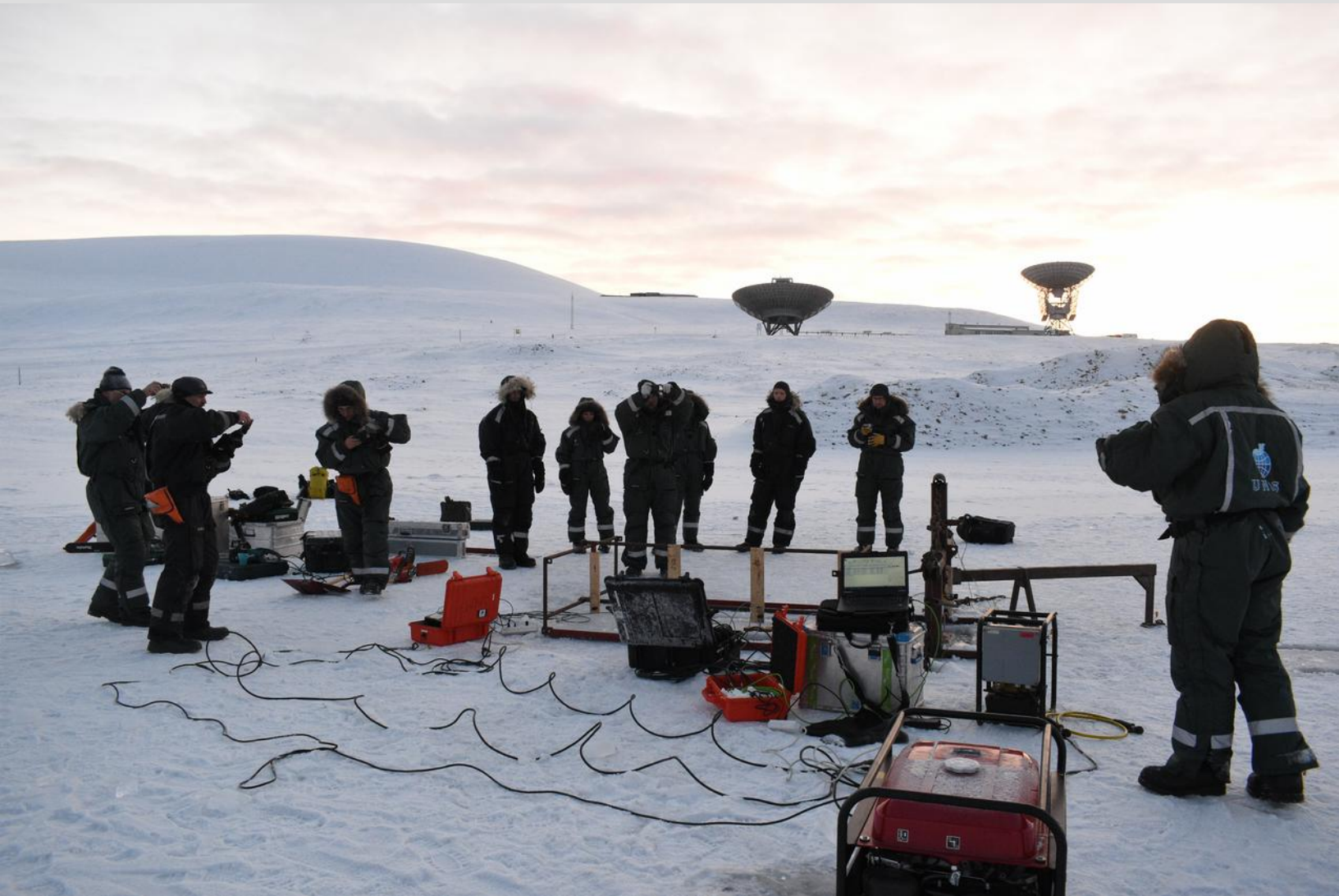
The last operating coal mine in Spitsbergen, Mine 7, is located on the side of a small mountain. The elevation is about 500 meters, and the distance from UNIS is about 15 km. The mine has a technical water reservoir, which suits perfectly for various ice experiments. It has the size of a tiny pond, but Aleksey gently refers to it as “The Lake.” There is a larger and more accessible lake in the proximity of UNIS, but no fieldwork is allowed there, as the lake provides the drinking water for the town. Contamination of water is a real possibility during fieldwork, as the students tend to



accidentally drop the equipment in the wells that they drill. This time we had no lost items, aside from the USB drive plastic cap, but in the past, there were lost saws, screws, and various small tools.

October 29 was the second day of the fieldwork, and on that day, a group of UNIS students joined us to perform the experiments. A small bus, operated by “Svalbard Buss og Taxi,” took us close to the test site, but the driver refused to go on a steep snow-covered road leading up to the pond. The last 200 meters we had to cover on foot, carrying heavy equipment. About halfway to the top, one of the students noted that none of us had a rifle. Being 15km away from town, there was a possibility of a polar bear encounter, and even thinking about one was scary enough. So we waited for Aleksey to catch up with the group, as he was armed with a rifle. Only then we finished our way up, well-protected. Another group of researchers was already working on-site, some armed with pistols, others with knives. Thankfully, there was no need to use firearms that day. Even if a polar bear shows up, the standard procedure is to tranquilize it and take it to the opposite side of the island by helicopter. Shooting is the last resort.

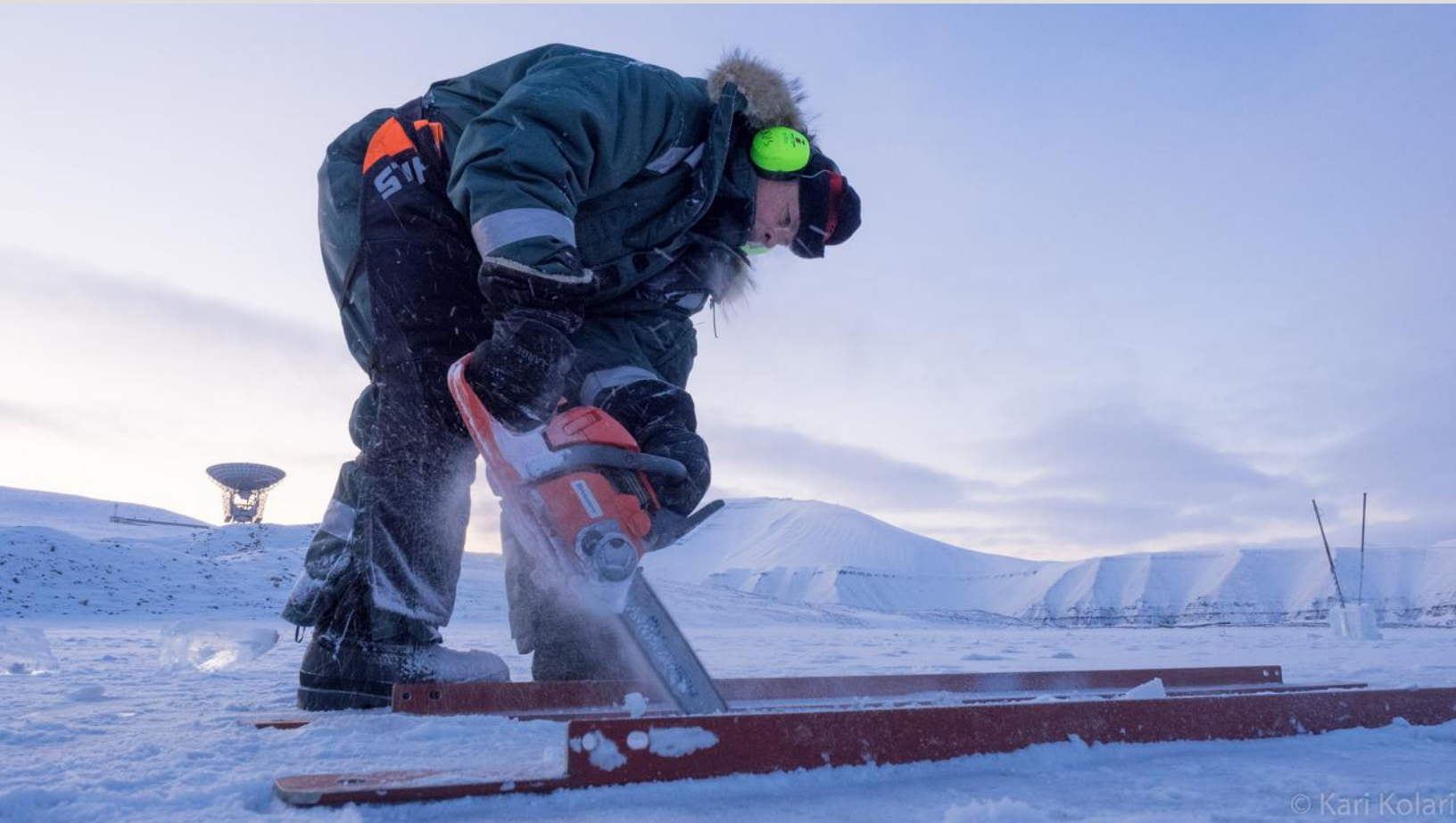
Next to our testing site, there are two ginormous parabolic antennae. They belong to EISCAT (European Incoherent Scatter Scientific Association) - an organization that studies the “interaction



between the Sun and the Earth as revealed by disturbances in ionosphere and magnetosphere." The view of the antennae is impressive and gives you the feeling of being a part of a sci-fi movie. Conspiracy theorists and UFO seekers would be excited with that view!

Once the fieldwork was done, our tasks became more mundane. We were analyzing the obtained data, preparing ice samples, and running small uniaxial tests in the lab. Eventually, our results will be presented, or, perhaps, compiled into a publication. While we spent hours working in the lab, life in Longyearbyen became full of other exciting events. On one beautiful day, a boat named Pangea moored in Longyearbyen harbor. The ship belongs to a professional explorer and adventurer Mike Horn, who decided to cross both poles of our planet... on foot and alone. He already passed the South Pole and is currently on the way to the North Pole. The boat takes him across the planet as far as it can go by sea but eventually reaches the solid ice cover. Mike disembarks onto the shore and continues his journey on foot, while the boat waits in the nearest port. This time the port is Longyearbyen.

The crew of Pangea consists of various professionals – sailors, mechanics, photographers, and others. While most of the team prefers to go onshore and spend a few days in the nearby hotel, the photographer Dmitry Sharomov stays on board. Even with the connected electric heater, the boat is quite cold. Dmitry was kind to invite us for the short tour of Pangea and retell the story of his exciting voyage across the globe. While staying in Longyearbyen, he made several public talks that gathered over a hundred attendees.



Longyearbyen is a fantastic town where, despite the polar night, life is very vibrant. There are amenities for a comfortable lifestyle, numerous festivals, and exciting visitors. In summer, tourists arrive on cruise ships, but traveling on your own may be quite expensive. I feel very lucky to visit Longyearbyen as a student, being able to use UNIS amenities, office space, and the labs. I stay in the comfortable and moderately-priced student housing. During this month, I was able to fully experience the local lifestyle, and even became used to this magical northern place. Tourists who stay in the hotel pay several times more for their visits, and I would not be able to afford that. But I see why they are so attracted to this town on the edge of the world!

I would like to express my gratitude to UNIS and the AOCEC project (Arctic offshore and coastal engineering in changing climate) for this opportunity and the valuable fieldwork experience that I acquired.