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Into the White: A Scientist's Journey to the Antarctic Ice Sheet

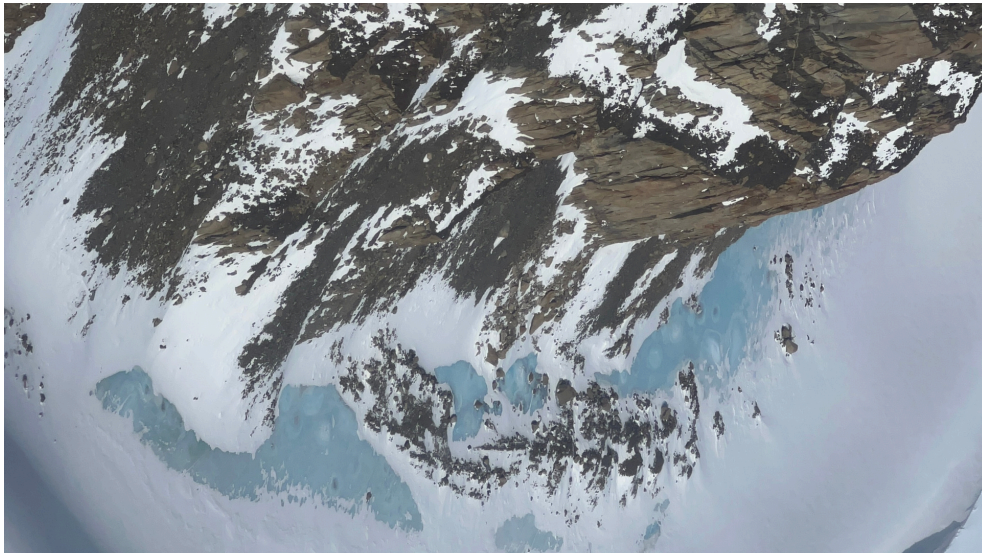


Photo: Daan Van den Broek, © PNRA

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Exploring an Invisible Arctic World

A year ago, I learned that I would join the POLARIN-funded Whitelce expedition to the Mario Zucchelli Station in the Antarctic. One year later, and an extraordinary adventure richer, I look back on a chaotic and exciting year.

It was late March 2026 when Whitelce's PI, Roberta Pirazzini, announced that she needed someone to join her Whitelce project. As going to the Antarctic has been a lifelong dream of mine, I immediately expressed my interest to help out. Not long after, I got the confirmation: I would be part of the Whitelce team and do field measurements on the Nansen Ice Sheet in Antarctica, starting in November 2025!

Immediately, my work-related plans for the year got turned upside down. From then on, everything revolved around preparing for this campaign. Being a meteorologist and atmospheric scientist by training, I firstly had to read up on our research aims and the latest science related to our upcoming expedition, as part of it was outside of my expertise.



Whitelce Project in a nutshell:

The aim of the Whitelce campaign is to increase our understanding of the “surface scattering layer” (SSL, also known as “white ice” or “weathering crust”). This is a white layer of ice that forms during intense melting on the sea ice in the Arctic and some glaciers in the Antarctic. Whereas ice surfaces typically get darker as melt onsets, these regions can instead see a substantial increase in albedo, which is important for the surface energy budget. The SSL is not well-represented in climate models, and improving our understanding of it can therefore help us improve climate projections.

The Nansen ice sheet is one of the places where the SSL forms during the melting period. To monitor its formation and development, the plan was to install temporary, but continuously monitoring weather- and radiation stations on the ice sheet. In addition, we would conduct drone surveys and do many more manual measurements.

The following months consisted almost exclusively out of preparations for the expedition. Packing our material and instruments (which needed to be shipped already 2 months before the expedition), doing countless medical and fitness exams, first aid and safety training, drone training, and much more.

At times, especially around deadlines for shipping our material, the preparations would get hectic, and the workdays long. And during the field campaign, and especially around travels, flexibility is required. In my case, our departure was unexpectedly pulled forward by one day, as the flight from New Zealand to the Antarctic was rescheduled to depart one day earlier than planned. Similarly, when we changed into our gear and were ready to board on the 20th of November, our flight to the Antarctic got cancelled last minute due to bad weather there.



Daan van den Broek ©PNRA

One day later, however, on the 21st of November, it was finally time. The flight from Christchurch to the Mario Zucchelli Station took about 6 hours. The flight was on a military plane, which means that there are few windows, and not many opportunities to look outside. Still, after about 4 hours of flying, people took turns looking out of the window: we reached the Antarctic sea ice! Although the surface is largely just white, the combination of the sea ice, ice bergs and sporadic open water was stunning and fascinating.

*A couple of hours later, we landed on the sea ice close to the Mario Zucchelli Station: **an absolute dream coming true.** The view I had when stepping out on the sea ice, with snow-covered mountains and glaciers on one side, and endless ice on the other, was a view I will never forget. But thanks to the nature of our expedition, most of the unforgettable views were still to come.*



Given that our field location on the Nansen Ice Sheet was 30 km away from the Mario Zucchelli Station with mountain ranges in between, our field location was only reachable by helicopter.

During every trip from the station to our field location we got to enjoy the breathtaking landscape from above. Massive ice shelves, sea ice, sharp mountain peaks, nunataks and open water; it's really a uniquely beautiful part of the world.

On our first field day, we installed two weather and radiation stations on the ice sheet. During the field days after that, we retrieved the data from these stations, and continued with our other measurements. It's good to realise that during fieldwork, things rarely perfectly follow the plan. Research and expedition plans are generally ambitious, but time and resources limited. However well one prepares, challenges undoubtedly will come up. In our case: the melt onset started earlier than we expected, which means we lost part of the run-up to the formation of the SSL. Nonetheless, we luckily managed to gather loads of valuable information!

During field days, it's easy for your focus to shift to 'work-mode' - time is limited, a lot of work is planned, and problems may suddenly arise and must be solved quickly. At the same time, one has to realise that there's a limited number of things you can control, and one should not forget to enjoy being in such a fantastic, remote part of the world. I tried to do this by just standing and looking around for a minute every time before stepping into the helicopter to fly back. That way, the view from the Nansen Ice Sheet will be stuck in my head forever.



After 3.5 weeks at the Mario Zucchelli Station, it was time for the long trip back home. Our flight back to New Zealand departed from the American McMurdo station. I had the extreme luck that we needed to stop by Concordia for logistical reasons, meaning that we got a half-hour break at one of the most remote stations at over 3 km altitude on the Antarctic Ice Sheet!

A week after I left, Roberta Pirazzini and Anja Mödl arrived, and continued the expedition. Despite some challenges, it was a tremendous experience, in which we managed to gather lots of valuable data and learn a lot.

A special thanks goes out to the people at Mario Zucchelli Station. Without their logistic support, our field campaign would not have been possible. Thanks to them, the time spent in and around the station will also be memorable.

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