



Expedition: The B.I.G. - Before It's Gone North Pole Expedition

Summary: After war broke out in the Ukraine, Felicity Aston's 2022 expedition to the North Pole was no longer an option. A 2014 WINGS Fellow, Felicity took her fourth WINGS flag on a data collection and training expedition in Svalbard, Norway. Although a modified version of her original plan, the expedition proved to be a scientific success and a crucial training experience for next year's journey to the North Pole. Flag #27 has once again returned from the ice and snow.

THE EXPEDITION

Having flown to Longyearbyen, the largest settlement on the islands of Svalbard, we spent a few days in Longyearbyen in preparation before being transported by boat to Barentsburg, a small but historic coal mining settlement, from where we would start our ski journey.

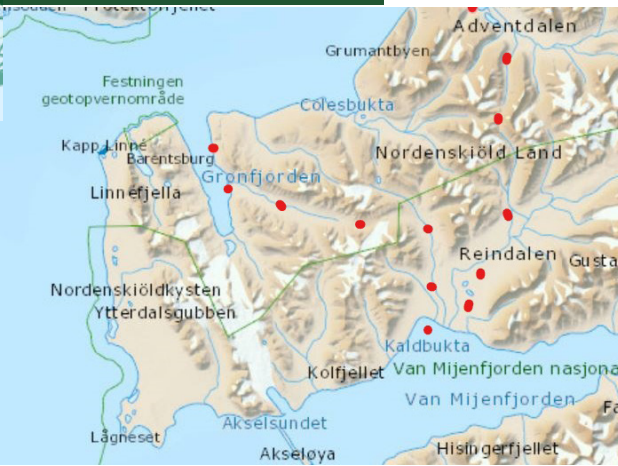
Spending the first night camped on the far outskirts of Barentsburg, we made our way to the shores of Gronfjorden and ventured out on to the sea ice of the frozen fjord to collect snow, ice and water samples, which will later be analysed as part of a study investigating airborne microplastics and heavy metals deposited on Arctic sea ice.

We then headed away from the fjord along Grondalen, which narrowed down into a canyon-like pass to access the neighbouring valley of Semmeldalen. It was here that we encountered a lot of snowmobile traffic due to guided tour groups coming from Longyearbyen and also where we experienced much warmer weather than expected with rain and wet snow conditions. It took us a couple of days of skiing to make our way to the shore of Van Mijenfjorden, where we found very good sea ice cover. We spent a day camped on sea ice in the fjord in order to collect snow, ice and water samples as well as full background/supporting data in this second fjord location.

Now with our sledges heavy with an additional 80kg of samples, we turned back towards Longyearbyen, making our way along Reindalen until we came to a narrow pass in the mountains through Gangdalen along a frozen river bed. Our last day was spent making hard-earned progress along the tortuously uphill valley through beautiful scenery towards our collection point at Fritham. We were then returned to



Felicity and her team in Svalbard,
Norway



WHO: Felicity Aston

WHAT: Data collection, training and preparation for her 2023 expedition to the North Pole.

WHEN: April 12- 20, 2022

WHERE: Svalbard, Norway

WHY: Gaining valuable experience as a team in both polar ski travel and scientific sampling.

Longyearbyen via Adventdalen by snowmobile.

Periodically along the expedition route we stopped to take additional snow samples, which will be analysed as part of a black carbon study by Dr. Ulyana Horodyskyj, our scientific advisor, or to collect air quality, arctic cloud, albedo and snow condition/character data for various studies and/or datasets.

Each evening we completed a multiple choice questionnaire, which will form part of a psychological study into resilience, and on one occasion we created a 'tent lab' in which we melted collected snow samples and passed them through filters, which will be analysed for black carbon by Dr. Horodyskyj.

EXPEDITION GOALS

The goal of the expedition was to complete a journey by ski from Barentsburg to Longyearbyen in Svalbard, completing several scientific objectives along the way:

- Collecting snow surface samples that would be passed through filters to be later analysed for black carbon by Dr. Horodyskyj at the University of Colorado.
- Collecting snow surface samples to remain frozen to be later analysed for black carbon by Dr. Horodyskyj at the University of Colorado.
- Collecting snow, ice and water samples to be later analysed for atmospherically deposited anthropogenic pollution, such as microplastics and heavy metals (lead), by Felicity Aston at the National Oceanography Centre/University of Southampton in the UK.
- Collecting Arctic Cloud data via a citizen science app developed by NASA.
- Collecting snow thickness, density and characteristics data via a citizen science app to contribute to global open resource datasets.
- Gathering air quality data using a newly developed mobile air quality monitor prototype – part of a campaign to make air quality monitoring more accessible.
- Contributing to a psychological study of resilience led by Paul Bugrum at the University of Durham.

An additional goal of the expedition was to provide a specialised training experience

for the team in preparation for the ski journey to the North Pole planned for April 2023.

EXPEDITION RESULTS

We achieved all the goals of the expedition, safely completing our planned journey and gaining a great deal of knowledge, experience and confidence as a team along the way.

We successfully collected the intended number of samples for the black carbon studies – plus all associated data - and avoided any melting of the frozen samples, which have now been safely transported to a university freezer.

We collected a complete set of samples for the airborne pollutant studies in two separate locations on sea ice in two different fjords plus all the background and associated measurements planned for. This represents some 80kg of samples now safely stored in refrigerators at the university awaiting analysis.



Data Collection, Svalbard

We contributed dozens of data points via two different digital platforms as well as the psychological study via written notebooks. Most importantly, we had a lot of fun and created shared memories that will stay with us all for a very long time.

CHALLENGES AND LESSONS LEARNED

After the invasion of Ukraine in March 2022 caused our original plan to ski to the North Pole to be cancelled, we had to rapidly make a plan that would provide for our scientific goals as well as our need as a team to undertake testing for the purposes of training and experience – and yet was still within the remit of our equipment and previous preparation.

We decided to revert to Svalbard, but with just under a month to go until departure we had already missed many permit and permission deadlines, and we were severely restricted where we could go and what we could do. Thinking imaginatively and with an open mind, we managed to conceive a route that answered all our expedition goals and still represented an exciting and interesting journey for us as a team.

Having missed the deadline for applying for our own firearm permit (obligatory to carry for polar bear protection), we also faced the challenge of finding someone with the appropriate permissions and availability to join our team at the last minute. We were very fortunate to be contacted by Rene Olsson, who joined us in Svalbard and rapidly became part of our expedition family.

Travelling in a polar environment such as Svalbard in winter conditions carries many challenges, but of particular note was the unexpected challenge of dealing with wet and relatively warm weather. Our equipment and clothing were designed for extreme cold conditions, but on several days we experienced snowfall that was almost rain and

very dense, wet snowpack that clotted onto the bottom of our skis. As climates become more unpredictable in the Arctic, we learned that in future we would think about preparing for wet as well as cold conditions.

Regarding the science work, it was always our intention that the expedition would be an opportunity to test both methodology in the sampling as well as the equipment used – and we did both! We found particularly that the sampling on sea ice took far longer than we had thought, and it became clear that as a result we will need to rethink our sampling expectations for future expeditions. We were able to test various tools for sampling and successfully learned which were more reliable or efficient and now have a greater degree of confidence in the selection of fewer tools in future – and the advisable spares to pack!

EXPEDITION FUNDING

Rolex, Moncler, The White Feather Foundation, Environment Journal, The Lancashire Foundation, Evotech Air Quality, Dapa Interiors, Acent Investments, Kebbell, Knight Frank.

ABOUT THE FLAG CARRIER

Felicity Aston is a British polar explorer and research scientist who has spent more than 20 years creating and leading expeditions across the Arctic and Antarctica. In 2012 she became the first woman to ski across Antarctica alone, a 1744km/1084 mile journey that took her 59 days to complete and earned her a place in the Guinness Book of World Records. She has also led record-making international teams of women to both the North and South Poles. Felicity began her Polar career as a Meteorologist posted at Rothera Research Station for three years with the British Antarctic Survey and is now at the National Oceanography Centre in Southampton (UK) researching airborne anthropogenic pollution on Arctic sea ice. Felicity has written four books (with a fifth on the way) and has been recognised by the Queen for services to polar exploration.



Felicity Aston

CONTACT INFORMATION:

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Supporting Members:

Annabel Jackson Prow, Andrea Fawell, Sadie Whitelocks, Kalyani Lodhia, Emma Ranger, Rene Olsson.

Scientific advisor:

Dr. Ulyana Horodyskyj

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