



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

Field Study: Polar Exploration and Research

Summary: WINGS 2014 Courage Fellow, research scientist and polar explorer Felicity Aston led her third expedition as a WINGS Flag Carrier (Flag #27), this time to Drangjokull, Iceland, to complete a ski traverse of the glacier, collect surface snow and ice samples for analysis, and contribute to the long-term study of human psychology in extreme conditions. When the original plan to ski 145km across the Arctic to the Geographic North Pole was postponed due to unforeseen and unavoidable circumstances, Felicity's all-women B.I.G. (Before It's Gone) North Pole Expedition Team nimbly pivoted to this Drangajokull Expedition and another unique opportunity to make important contributions to the study, exploration and conservation of our Polar Regions.

THE EXPEDITION

Drangajokull is the northernmost glacier in Iceland, located on a remote and almost uninhabited peninsula jutting out into the Greenland Sea. It lies on the very edge of Arctic circulatory systems of air and sea, being just south of the Arctic Circle. It is the only glacier in Iceland to be entirely at an altitude less than 1000m above sea level (the summit reaches 935m) and yet remains relatively stable in comparison to other, higher situated glaciers in the country.

Driving to the end of a very rough coastal road, the expedition team accessed Drangajokull via Unadsdalur, a valley stretching 20km from the sea to the outer edge of the glacier. Skiing with equipment in sledges and camping on the ice, the team made a traverse of the glacier travelling from its southeast corner up to the summit of Jokullbunga (935m) and then maintaining the line of roughly 830m altitude along the central ridge to the glaciers eastern summit (870m).

Along the traverse, snow samples were taken roughly every kilometer as well as at significant



Felicity Aston and the B.I.G. Expedition Team with Flag #27. Drangajokull, Iceland



Drangajökull, Iceland

points - such as the summit of the glacier. We later melted these samples in our rudimentary 'tent lab' and filtered the meltwater following instructions from scientific advisor Dr Ulyana Horodyskyj, who will later analyse the filters in the US for black carbon content.

At five separate locations along the traverse, a suite of snow samples were collected that will later be analysed for microplastic and heavy metal content by Felicity Aston at the National Oceanography Centre / University of Southampton in the UK. The sampling methodology and, in particular, the precautions taken to prevent samples being contaminated with material deposited by the team and its equipment, was developed from the B.I.G. North Pole Expedition (Svalbard) which took place in 2022 and proved to be a highly successful improvement.

At each sampling location, we took background and supporting data such as snow depth, snow density and temperature, weather observations, arctic cloud and albedo. These data will be used in various citizen science datasets as well as in support of the sample analysis studies.

Each evening the team filled out psychology 'diaries' that will be used as data in an ongoing study into resilience and the impact of the relationship with nature on resilience being carried out at the University

WHO

Felicity Aston

WHAT

A science and exploration expedition across the Drangajökull Glacier

WHEN

April 8 - 18, 2023

WHERE

Drangajökull Glacier,
Iceland

WHY

To complete a ski-traverse of the Drangajökull Glacier, collect snow and ice samples for analysis, and contribute to psychological studies



Andrea Fawell working in the team's 'tent lab.'

of Durham. With the outwards traverse and science complete, it only remained for the expedition to travel back across the glacier from east to west. It was necessary to rendezvous with a vehicle pick-up on the western edge of the glacier due to the fact that the snow cover in the access valley (which had been minimal at the outset) was now gone!



Felicity Aston, Drangajokull, Iceland.

Our return journey across the glacier was in bad visibility with high winds and warm/wet conditions, which provided a great navigation training exercise! At times the skier at the back of the group could not see the skier at the front when travelling in single file. Visibility was generally bad throughout the expedition, with low cloud cover constantly drifting in and out. We also had one day stormbound in the tents, digging in to protect ourselves from the high winds. We were fortunate that Drangajokull - being a coastal glacier - receives plenty of precipitation, so there was over 1m of snow throughout the traverse, despite the surface being firm for easy skiing.

On a handful of occasions, we were treated to a clear view across the Westfjords from Drangajokull, including from the summit, Jokullbunga. It was possible to gaze down onto sea in three out of four directions - the mighty Isafjardardjup to the south, Jokullfjordur to the west and the Greenland Sea / Arctic Ocean to the North. Such expansive and impressive views demonstrated graphically the uniqueness (and remoteness) of Drangajokull's position on the northernmost reaches of Iceland and the very edge of the Arctic Circle.

Drangajokull is a rarely visited glacier, so we are very pleased to have successfully collected such a comprehensive set of samples and data from this hardest-to-reach of Icelandic glaciers. Like all glaciers in the country, it is expected that within decades Drangajokull will be gone, so this most vital of information collected by the expedition is only likely to become more valuable with time.

We'd like to express particular thanks to the Icelandic Institute of Natural History for granting us the permission to carry out our research, sampling and data gathering on Drangajokull and for their support in both this endeavour and our training expedition to Vatnajokull in 2021.

EXPEDITION GOALS

- To make a ski traverse of Drangajokull.
- To collect snow and ice samples for black carbon, microplastic and heavy metal studies.
- To collect data for albedo and arctic cloud studies as well as snow depth and characteristic data.
- To collect data for psychology studies.

CHALLENGES FACED AND LESSONS LEARNED

Our biggest challenge was accessing this remotest of glaciers. Attempts to access Drangajokull the previous year had been hampered by too much snow, causing routes to be impassable. So it was with huge relief that the expedition was able to reach the access valley, Unadsdalur. Our relief was short-lived, however, when we realised just how little snow there was. The peninsula's sole inhabitant - a local sheep farmer - told us that he could not remember so little snow in the 85 years he had lived there. We attempted to move with our skis and sledges up the valley by portaging between larger snow patches, but our efforts were thwarted when we reached a large river swollen with meltwater creating ferocious rapids and waterfalls. Our path was completely blocked, and we needed to think of a new plan.

Luckily, we had spotted an old farm trail on one side of the valley. In Iceland it is illegal to drive off-road, but the observed track meant that we could call on help from local support to transport us in a specialised adapted glacier vehicle to the elevated snow line. We were very fortunate (almost miraculous!) that at that precise moment this support happened to be within 5 hours travel time of our location! Our expedition was saved.



The B.I.G. Expedition Team with boxes of collected snow and ice samples, Drangajokull, Iceland. From left to right: Laura Thomas, Felicity Aston, Andrea Fawell, Edel Kieran.

The experience serves as a vivid demonstration of the difficulties of conducting expeditions in the Arctic region in the way we have been used to for decades. If it is this difficult today to access these areas, what hope is there for the expeditions of tomorrow?

Environmental change in the Arctic is not a hypothetical problem of tomorrow - it is already written in our past, and we are now dealing already with the consequences.

EXPEDITION RESULTS

The expedition achieved all of its goals. The team made a successful return ski traverse of Drangajokull. We returned with 13 filters of snow samples to be analysed for black carbon as well as 50 snow samples to be analysed for microplastic content or heavy metals. Psychology research surveys were completed by all five team members for the duration of the expedition and returned to the University of Durham.

The full legacy of the expedition is not just the research studies and scientific literature that will result in the months and years to come but also in the preparation of the team and the methodologies for future data collection expeditions in the Arctic region.

ABOUT THE FLAG CARRIER

Felicity Aston MBE is a British Polar Explorer, Research Scientist and Author. In 2012 she became the first woman to ski across the Antarctic landmass alone - a 1744km/1084mile journey that took her 59 days to complete and earned her a place in the Guinness Book of World Records. Over a 25-year polar career, she has shown a commitment to diversity in her expeditions, leading international teams of women on record-making expeditions to both North and South Poles, challenging perceptions and plugging data gaps.

Having started out as a meteorologist posted to a British Antarctic Research Station for a continuous period of nearly three years (including two consecutive winters), she is now based at the National Oceanography Centre and the University of Southampton developing research to investigate airborne microplastics in the Arctic. Felicity has written five books and was awarded the Polar Medal in 2015 for services to the Arctic and Antarctica.

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

EXPEDITION TEAM

Felicity Aston (UK) - Expedition Leader and microplastic sampling lead, **An-**

ndrea Fawell (UK) - Expedition Member and black carbon sampling lead, **Julie**

Moniere (France) - Expedition Member and camera-operator, **Edel Kieran** (Ire-

land) - Expedition Member and scientific sampling assistant, **Dr Laura Thomas** (UK) - Expedition

Member and psychology projects lead, **Sadie Whitelocks** (UK) - Home Support, **Bel Jack-**

son-Prow (UK) - Home Support, **Emma Ranger** (UK) - Home Support, **Dr Ulyana Horodyskyj**



The B.I.G Expedition Team on Jokulbunga, the summit of Drangajokull. From left to right: Felicity Aston, Laura Thomas, Andrea Fawell, Julie Moniere, Edel Kieran.

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