Arctic Snow School 2023 – Canadian High Arctic Research Station, Iqaluktuuttiaq (Cambridge Bay, Nunavut, Canada)

Snow-covered sea ice in the Dease Strait, Northwest Passage.

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In 2023, I was awarded the Doctoral School Research Award, allowing me to successfully apply for the Arctic Snow School in the Canadian Arctic Archipelago. My PhD focuses on the climatic effect that oil pollution has on Arctic sea ice (Redmond Roche and King, 2022) and how decreasing sea ice and snow may affect primary production and carbon budgets in the Arctic Ocean (Redmond Roche and King, 2024), so attending this school was fundamental for me to learn more about the physical properties of snow.

In short, snow plays a critical role in both the Arctic and global climate. However, Arctic snow cover challenges most sophisticated models, as they were initially developed to describe snow in temperate alpine regions. The formation, accumulation, and metamorphism processes of Arctic snow are specific to polar regions and the quality of spatial and temporal datasets are limited, primarily owing to the difficulty and expense of operating there. Knowledge of these processes must be improved to better understand how climate change may affect the surface energy balance of polar regions, the delicate ecosystems of the region, and the day-to-day lives of indigenous peoples throughout the Arctic.

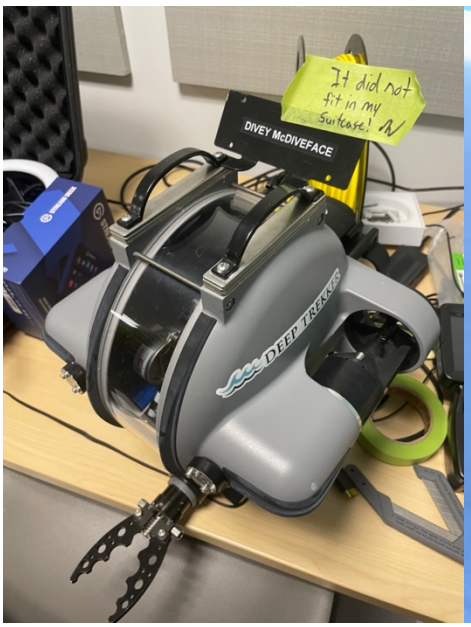
After flying from Heathrow to Calgary, we flew to the capital of the Northwest Territories, Yellowknife, and finally chartered a plane to fly to the hamlet of Iqaluktuuttiaq. The field school provided advanced hands-on training utilising state-of-the-art instruments (e.g., ultraviolet to microwave sensing spectrometers) to assess the dynamic and thermodynamic processes controlling snow cover. It also provided advanced lectures with world-renowned cryospheric scientists and enabled us to have exchanges and roundtables with Inuit elders and community leaders.

Spectral albedo measurements of sea ice.

Staying warm is essential – seal skin gloves help!

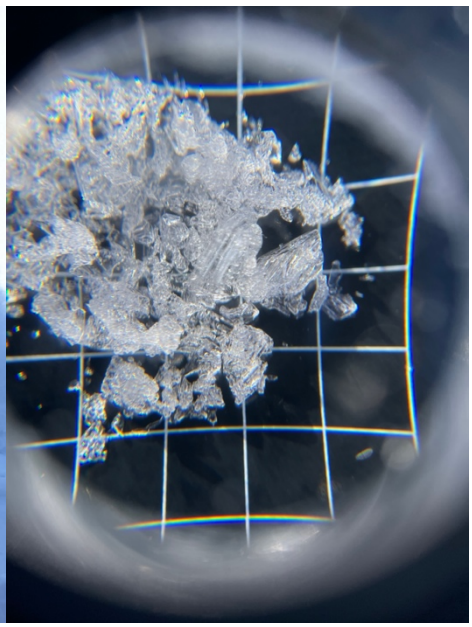
The course was an invaluable experience, allowing me to gain significant quantities of data to analyse in the modelling for my thesis and ultimately helped me form some crucial relationships with fellow researchers. Aside from the hard science, I also learned of the importance of the caribou to the people of Nunavut. Increasing rainfall in the Arctic leads to ice crusts forming at the base of snowpacks (*rain on snow events*), hindering caribou from feeding on vegetation beneath the snow and devastating populations. By using ground-based data collection techniques (Ka- and Ku bands), it is hoped that our capacity to track and analyse these events with remote sensing equipment will improve. We also bumped into Chris and Julie Ramsey from *Pole to Pole EV* on their way back down from the magnetic North Pole and en route to the South Geographic Pole in their electric Nissan Ariya – an amazing 27,000 km achievement showcasing the potential of modern technology. It was an exceptionally cold (wind-chill -45º!), beautiful, and remote once-in-a-lifetime place. I consider myself very lucky to have been fortunate enough to visit. I bought handsewn sealskin gloves from a local elder to commemorate my trip – thank you, Mary Kaotalok!

I would like to thank the Doctoral School and Royal Holloway, via their GeoNetZero CDT Studentship, for their financial support in this venture, without whom it would not have been possible to attend. I would also like to say an enormous thanks to the Canadian High Arctic Research Station for hosting me and to the joint initiative of the Sentinel North program at Université Laval and the GRIMP Laboratory at Université de Sherbrooke for organising everything. I would also like to say *Nakurmiik* to the Inuit elders who were present at the course. It was a privilege to learn about your culture and way of life; your role as timeless custodians of nature has never been more critical. (*Aljazeera* & *Guardian articles on the 2023 Arctic Snow School*)



A present from BAS: Divey McDiveface.

Snow pit showing the different strata.



'Windslab' snow grains <2 mm.