



Illustration by Fred Reibin

# “You Can Do It”

## Drone pilot mentoring on Rocky Mountain glaciers

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Standing on the deck of the research icebreaker CCGS Amundsen in the middle of Hudson Bay during the spring of 2018, I realised I was hooked on drones – and ice. I was working on my Master’s research that used a combination of passive microwave scans, drone imagery, and ice samples to determine how melt water on the ice surface influences ice concentrations derived from satellite data. The sea ice team was lowered onto an ice floe off the side of the ship, and while the rest of the team gathered samples to characterise ice properties, I flew the drone overhead to create detailed maps of the ice surface.

By 2022, I had become part of the Global Water Futures research team at the Cold Water Lab in Canmore, suddenly surrounded by mountains, lakes and glaciers. Capturing the ebb and flow of the glaciers – the mountain ice that feeds the rivers of Western Canada – became my focus. My work involved long days of capturing around 4000 images and high resolution lidar scans of the surface elevation on the ice, bringing them back to Canmore, and creating composite maps that showed the scientists what was happening.

Living in the location where I conduct research is something that I had never experienced before. When people I met in town found out what I was doing, the question always came: “Are the glaciers really melting? Should we be worried?” I was both happy and unhappy to tell them that they are, and yes, we should be.

The drone piloting experience I had gained on Hudson Bay’s open waters and Manitoba’s gentle prairie landscapes was challenged by soaring snow-covered rock faces. I had to learn a whole new way of seeing, with new obstacles and unique wind patterns to navigate. Although we always programmed the drone’s flight plan carefully, my poor depth perception tricked me into seeing the drone fly straight into the headwall, making for an exhausting first few flight days out there.

Researcher Dr. Phillip Harder came to my rescue more than once, building my confidence in the field and helping me develop problem solving on the fly. A prairie scientist himself, he understood the challenge of adjusting to piloting a drone in a mountain environment.

When we were out on Peyto Glacier mapping the glacial retreat with the drone, we were relegated to landing the drone on a small patch of glacial till – a combination of large rocks and fine sands that provides no structural integrity as a landing pad for the thin legs of the drone. My nerves were shot, imagining the drone sinking into the till and tipping, which would ultimately damage the propellers. I didn’t think I was experienced enough to handle this challenge, and was ready to turn the landing over to Phillip. His response – ‘I can take over the landing if you really want, but I believe that you can do it.’ After a couple of approaches, I successfully landed the drone, and a huge rush of both relief and pride came over me.

Throughout my academic career, I have been surrounded by mentors who have taught me not only how to look at science through a lens of curiosity, but have instilled in me a sense of courage and pride that has allowed me to excel in the field today. It is these relationships that form the foundation of successful science, whether it’s in the Rockies flying drones, or in the lab processing hours of data.

Find out more:

Harder, P., Pomeroy, J. W., and Helgason, W. D.: “Improving sub-canopy snow depth mapping with unmanned aerial vehicles: lidar versus structure-from-motion techniques”, *The Cryosphere*, 14, 1919–1935, <https://doi.org/10.5194/tc-14-1919-2020>, 2020.