



Illustration by Fred Reibin

Both Eyes on the Ice

Investigating a hazard on the Slave River

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We were snowmobiling along the Northwest Territories' Slave River. It was the end of January, the coldest week of the year at -60 Celsius. I had to duct tape my forehead and cheeks around the eyes to protect my face from the freezing wind while driving my snowmobile. My guide, a Métis elder and trapper, cruised ahead of me on his own machine. We were on our way to the Slave River to investigate a phenomenon that makes winter travel treacherous and sometimes fatal. When we reached the river, my guide took out a small diameter ice drill, swept the ice cover clear of snow and began drilling. It didn't take long for him to punch through the ice and strike an air pocket. A burst of air was released. When he kicked snow over the hole it immediately shot up, demonstrating immense pressure under our feet. He said to me, "These pockets are dangerous, especially on a cloudy day when you can't pick them out from the snowpack due to lack of contrast." Trappers and other local residents have been known to crash through on their way across.

This was my first encounter with air pockets and double layers of ice (slush sandwiched between two intact ice layers) in rivers. After returning from the field, I called up river engineers across the country to learn more, but no one had heard of air pockets. These phenomena appeared unique to the Slave River.

Over the course of four years of field trips my guide shared with me his knowledge of the river, and the challenges of living and working on this land. The Indigenous Knowledge he shared was invaluable as we investigated the formation of the air pockets. He told me that this is a new hazard for his community. Before the 1980s, local residents and migrating caribou traveled the icy river corridor confidently, like a highway. His words prompted me to look up historical river flows. Maybe this piece of knowledge would help explain why air pockets form.

By looking closely at the records we could see that the variability in the river flow at freeze up increased around the 1980s. In the 1970s, a dam was built upstream of the elder's community, regulating the rise and fall of the river. It made sense to us then. With large river flow fluctuations, air gets trapped and sandwiched between sheets of ice and slush. I suddenly had so many questions. Even after many years of studying Slave River ice phenomena, it became clear to me that we still have much to learn about the impacts of dams on northern rivers. The priority however, was to find the safest routes for people to cross. We needed a better picture.

Next we acquired remote sensing imagery and calibrated it based on in-person observations from local Indigenous community members. This team effort allowed us to see 400 km of air pocket distributions along the Slave River. From the sky these pockets dot the river's main channel in a multitude of bulges and dents. This project since ended but we connect with the community through a multi-stakeholder network called Delta Dialogues.

This guide and I had developed a trust toward each other's ways of knowing. Listening to Indigenous Knowledge showed me a new river ice feature, and trusting it allowed me to investigate safely. Likewise, my guide -now research partner- has become increasingly trusting of remote sensing imagery. With it he can plan safe routes around ice pockets, travelling farther than before to access remote trap lines and follow the caribou. To me, this was a good example of two-eyed seeing. Looking with Indigenous Knowledge through one eye, and western science through another, allows us to better focus on solutions with clearer vision.

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