Memorandum

To: Mosha Cote, Manager of Research Liaison, Nunavut Research Institute

From: Kathryn McWilliams, SuperDARN Canada, University of Saskatchewan

CC: Marissa Alcaron, SuperDARN Canada, University of Saskatchewan

Date: July 29, 2024

RE: **2023 Non-Technical Summary SuperDARN Radars - Nunavut**

SuperDARN Canada Radars – Clyde River and Rankin Inlet

The SuperDARN Canada research group from the University of Saskatchewan operate radars near Clyde River and Rankin Inlet. These radars are part of a worldwide network of radars that monitor "space weather," which is important in the appearance and liveliness of the Northern Lights. Space weather also affects satellite navigation and communication, passengers and crews on polar flights, power grids, pipelines, astronauts on the space station, and other technologies Canadians rely on.

Three members from the SuperDARN Canada operations team visited the Clyde River site from July 18 to 24, 2023, and the Rankin Inlet site from July 25 to August 1, 2023, to perform site maintenance and to upgrade the radar systems. They successfully installed new computers and set up Starlink internet, as a backup to internet service from Qiniq. The improvements should enhance system reliability, reducing downtime, and increase data transfer speeds. The radars maintained a remarkable 93.6% (Clyde River) and 96.3% (Rankin Inlet) operational uptime in 2023. SuperDARN Canada staff members visit radar sites every two years. The next site visits in Nunavut are scheduled for 2025.

While in Clyde River, we collaborated with Shari Fox from Ittaq Heritage and Research Centre to organize a public tour of the radar site. We promoted the event through social media and on-site signage. On Sunday, July 23, 2023, from 3 to 5 pm, nine community members visited the site. We provided a tour of the facility and answered questions. We held a draw for three $100 gift cards. The radar site building and antennas were in good condition, enabling us to prioritize computer and network upgrades. During this visit, we installed a camera to remotely monitor the radar site.

The Rankin Inlet radar structures required significant attention during our visit. The towers' support cables were damaged, and the building's temperature had reached unsafe levels for the electronics and computers due to a broken ventilation system. Additionally, climbing equipment was missing from the site. We are grateful to the generous local residents who provided us with the necessary

gear needed to complete our work. Similar to the Clyde River site, we upgraded the Rankin Inlet radar's computer and network systems. We also installed a new camera to remotely monitor the site's condition from Saskatoon. We hired Todd McKay as our new site custodian. During our 2023 site visit, we identified several priorities to address following the trip. Our site custodian successfully completed two of these tasks in 2024: installing a replacement battery backup system on April 9 and replacing the extraction fan on July 4. The priority for an improved guy-wire system or stronger support cables has not yet been implemented, but it is a priority for the next planned site visit in 2025.

The data collected by the Clyde River and Rankin Inlet radars are shared with researchers around the world. In 2023, nearly 250 researchers in 16 countries published scientific research papers using SuperDARN data. The research helps to explain what causes the aurora and magnetic disturbances on Earth. The international SuperDARN collaboration investigates space weather events, such as magnetic storms, which produce both captivating aurora displays and disruptions to technological systems including GPS, radio communications, and satellite operations.

There have been significant changes in personnel at SuperDARN Canada in 2023. The two most senior engineers, Kevin Krieger and Adam Lozinsky, left for other employment opportunities in the private sector. Fiona Haynes, SuperDARN's full-time coordinator, departed to pursue another position on campus. Theo Kolkman, holding bachelor degrees in engineering physics and computer science, has been serving as the acting head Engineer-in-Training since Krieger's departure. Remington Rohel is working alongside Kolkman as a part-time Radar Engineer-in-Training while completing a master's degree in physics. In July 2023, Draven Galeschuk transitioned from part-time to full-time employment with SuperDARN Canada. Saif Marei joined the team, splitting his time between SuperDARN and the ICEBEAR VHF radar system operated by Professor Glenn Hussey at the University of Saskatchewan. This joint appointment fosters a beneficial collaboration between the two radar research groups.

In 2023 we began a new round of operational funding for the SuperDARN Canada radar facility. The funding period is six years–from 2023 to 2029, and the funding supports all five radars we operate. The radars are supported by the Canada Foundation for Innovation, the Canadian Space Agency and Innovation Saskatchewan. There have been no significant changes to the project, and the SuperDARN radars will continue to operate in 2024.

Data and information about the project can be found on our website: https://superdarn.ca/