Project Title: Geological Framework of the Northern Rae Province on Eastern Devon and Southeastern Ellesmere Islands

Researcher's Name and Affiliation: Dr. Gordon Osinski, University of Western Ontario

Project Location: Dundas Harbour, Devon Island (74° 31.910' N, 82° 23.471' W)

Timeframe: From June 29, 2018, to July 12, 2018

Project Description and Objectives:

The objectives of this project are to: 1) Provide new age, thermal, and pressure constraints related to the crustal architecture of units exposed on eastern Devon and southeastern Ellesmere Islands; and 2) Evaluate the usage of remote sensing images and spectral data to predict the bedrock geology of eastern Devon Island and southeastern Ellesmere Islands.

The Canadian Shield of eastern Devon Island and southeastern Ellesmere Islands consists mainly of Precambrian metamorphic rocks. However, very little work has been done on these rocks since an 1983 11-page Geological Survey of Canada Paper by T. Frisch entitled "Reconnaissance geology of the Precambrian shield of Ellesmere, Devon and Coburg islands, Arctic Archipelago: A preliminary account". There are conflicting accounts of whether these rocks are part of the Rae Province, which extends south through Baffin Island and the Canadian mainland, or whether this region of the Canadian Shield represents some other tectonic domain.

Activities and Preliminary Results:

The 2018 field season was conducted at Dundas Harbour, Devon Island from June 29th to July 12th. During this time, the Precambrian geology was mapped along the coast for ~25 km in the Dundas Harbour area. Transportation along the coast was done by Zodiac boat and on foot. Traverses inland were made on foot for up to 8 km from the coast. During this time, 75 hand samples were collected along with >300 field photos and 194 structural measurements from of all the observed units.

This project is utilizing samples collected over many previous field seasons (years: 1999, 2000, 2010, 2016). At the start of the project in 2017, a helicopter assisted mission on Devon Island allowed for the collection of 20 new bedrock samples. The 2018 field season was conducted at Dundas Harbour, Devon Island from June 29th to July 12th. During this time, the Precambrian geology was mapped along the coast for ~25 km in the Dundas Harbour area, along with traverses tens of kms inland. 75 hand samples were collected along with >300 field photos and 194 structural measurements from of all the observed rock types. From the field seasons thus far, our total bedrock sample count has reached 137 samples from across Devon Island. Of all these samples many have been made into thin sections which are then analyzed to determine lithology, the pressure, temperature and timing of formation, and their geochemistry.

Geochemical analyses of bulk rock and mineral compositions have been collected with the goal of geochemically characterizing the rocks and performing monazite geochronology. Additional analyses planned for the samples are radiometric age dating and further geochemical measurements. These measurements will be used to generate an updated geologic map of the area based on the new geochemical, geochronological, and structural measurements.