

Project Title: **Provenance of clastic sediments in the Sverdrup Basin, Canadian Arctic Islands**

Permit Number: 3BC-PRO0914

Principal Investigator: Smyth, H.R. (Dr.)

Research Team:        Rippington, Steve (Dr.)  
                              Slidel, Daniel (Mr.)  
                              Hachkowski, Christopher (Mr.)

Fieldwork Dates: 21 June to 26 July

Fieldwork Location: Raanes Peninsula, Ellesmere Island

Field Activities / Accomplishments:

For the past four years, CASP has been studying the deposition of ancient sedimentary rocks in the Canadian Arctic Islands. We are particularly interested in sandstone, a rock made of sand grains that have been buried and cemented together to create a solid rock. Through study of the composition and age of the mineral grains in the sandstone, we can identify from where they were originally derived, which helps us to understand how they were transported to their site of deposition. These mineral grains may have been transported many hundreds of kilometers, and locating the different sediment source areas and patterns of sediment transport is therefore essential to our understanding of the entire Arctic.

During the summer of 2010 we studied rocks on the Raanes Peninsula, Ellesmere Island (Figure 1). Fieldwork involved walking through the area examining and photographing the rocks, and collecting small pieces of rock exposed at the ground surface. Despite a period of inclement weather, we collected a large volume of data thanks to the excellent and varied geological exposure (Figure 2), and the logistical support provided by the PCSP.

The Raanes Peninsula data will be combined with data collected by CASP, in 2007 (Bukken Fiord, Axel Heiberg Island), 2008 (Slidre Fiord, central Ellesmere Island) and 2009 (Lake Hazen, northeast Ellesmere Island), to supply us with information to help understand the sedimentary history of the Canadian Arctic Islands. This data will be compared with data from other Arctic areas such as Svalbard and North Greenland.

The main data collected are as follows:

- 16 stratigraphic sections ranging in age from Ordovician to Devonian and Carboniferous to Cretaceous were measured.
- 7 structural traverses were completed across the field area.
- Samples were collected for a variety of purposes, including analysis of sandstone mineral chemistry, isotopic dating of igneous and metamorphic rocks, and a study of uplift.
- Two undergraduate students accompanied the expedition. Copies of both student theses will be supplied to NRI upon completion.

Logistics were provided by PCSP, the team were transported by Twin Otter from the PCSP headquarters at Resolute Bay, Cornwallis Island, to the airstrip at Eureka, Ellesmere Island. From Eureka the team was transported to the Raanes Peninsula by helicopter. For the first part of the season, the field team was

based along southern Troid Fiord (78.19377°N, 85.2404°W). Once work had been completed in the southern field area, the entire team moved by helicopter to the northern Field area (78.6797°N, 84.40732°W). A wide variety of geology is accessible on foot in the vicinity from both camps. At the end of the season, the helicopter returned the team to Eureka, Ellesmere Island, prior to departure by Twin Otter for Resolute Bay.

Preliminary Results: Samples are currently being prepared for analysis after their arrival in Cambridge and no results are available so far.

Extended abstracts documenting some of the recent findings of our research in Nunavut have recently been presented by CASP geologist at GEOCANADA Convention (Calgary, May 2010), abstracts are attached:

- *"The Ellesmerian Orogeny: fact or fiction?"* by Rippington, S., Scott, R.A., Smyth, H., Bogolepova, O.K. and Gubanov, A.P.
- *"Evolution of the Sverdrup Basin: new insights from field studies, integrated biostratigraphy & sediment provenance analyses"* by Smyth, H., Morton, A.C., Scott, R.A., Omma, J.E., Kelly, S.R.A., Rippington, S., Braham, B., Gregory, J. and Jolley, D.
- *"Chronostratigraphic framework and environmental setting of Upper Jurassic-Paleogene strat: a multi-national project to address large-scale integrated correlations and paleogeographic reconstructions of the Canadian Arctic"* by James W. Haggart, Schröder-Adams, Kelly, S.R.A., Smyth, H.R., Williams, G.L., Fensome, R.A., Galloway, J.M., and Herrle, J.O.

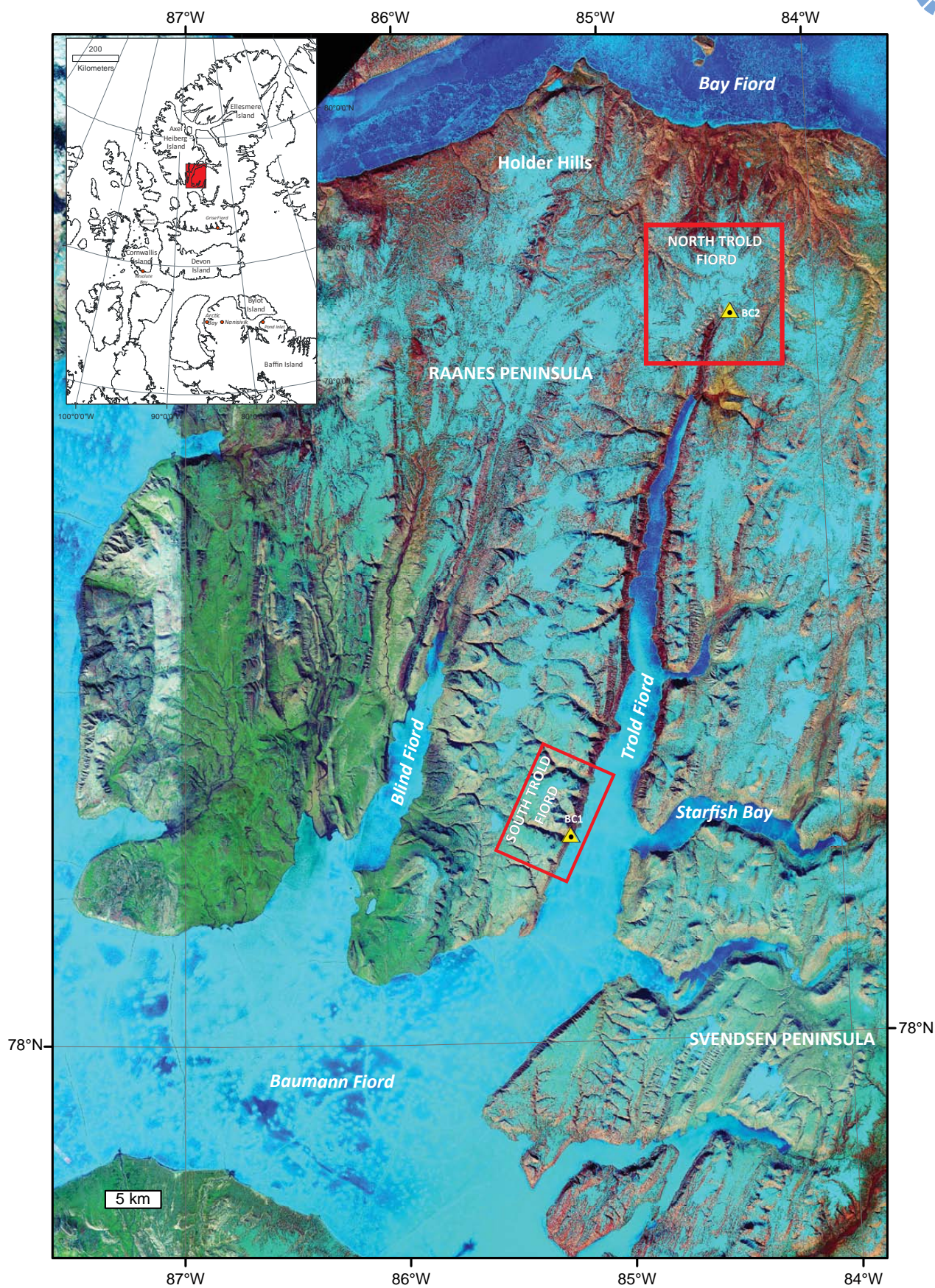
Details of student projects:

- Daniel Slidel is a 4<sup>th</sup> year is a 4<sup>th</sup> year MSci student from Royal Holloway University of London (RHUL), UK. The focus of Dan's thesis will be the evolution of the Franklinian Basin succession exposed on the Raanes Peninsula. Dan will be supervised by Dr. Dan le Heron and Dr. Gary Nichols (RHUL).
- Chris Hachkowski (CH) is a 4<sup>th</sup> year BSc student from Carleton University, Ottawa, Canada, and also has volunteer status with the Geological Survey of Canada (GSC). Chris collected data for his project "Magmatic history of the Raanes Peninsula, Ellesmere Island, Canadian High Arctic". The analytical work which Chris will undertake in Ottawa will be co-supervised by Prof. Brian Cousens (Carleton University) and Dr. Marie-Claude Williamson (GSC). The planned analytical work includes mineralogy, geochemistry and Argon/Argon dating.

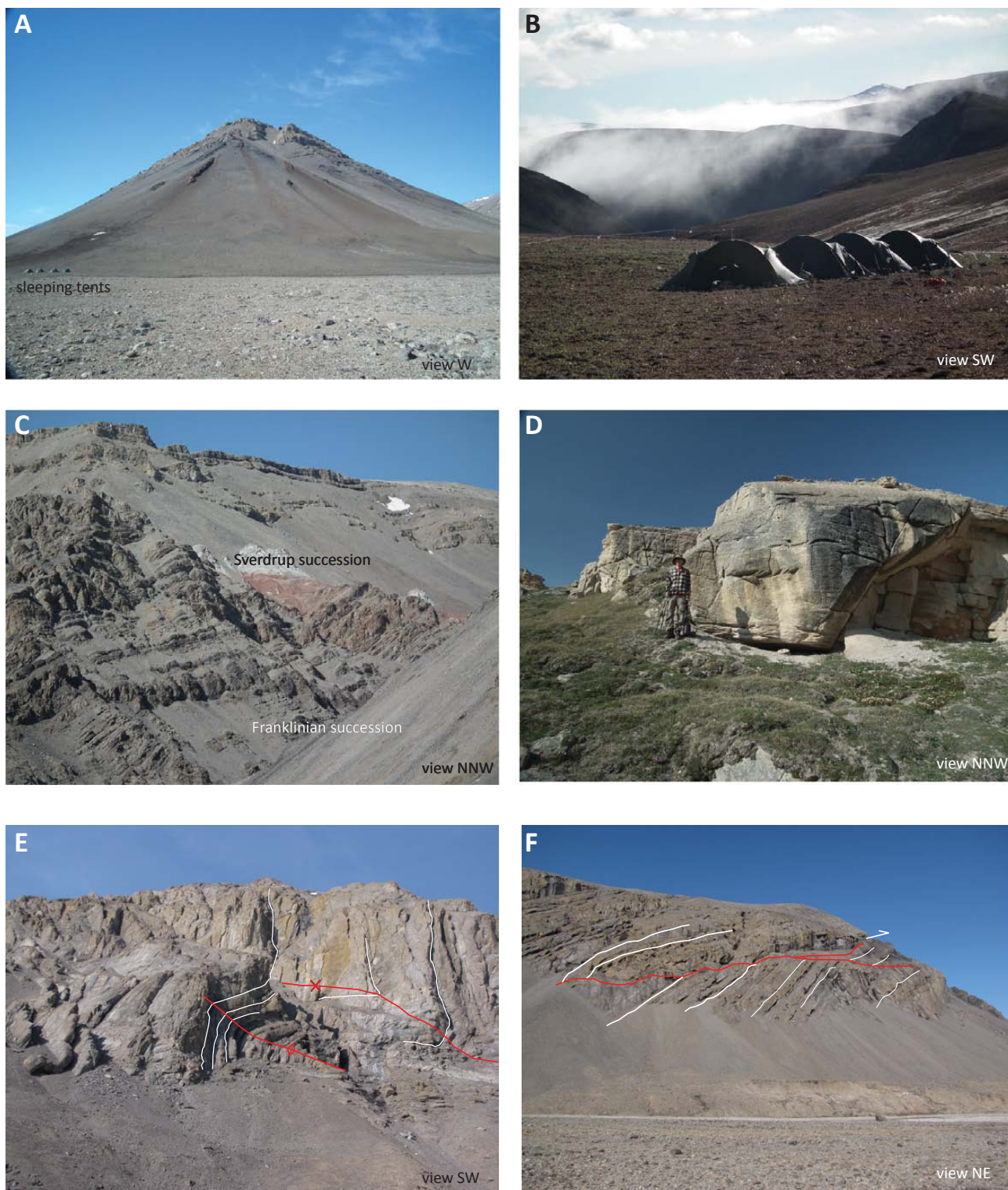
Figure captions:

Figure 1. Landsat image of the Raanes Peninsula showing the extent of the field areas (red box). The inset map shows the location of the field area (red filled box) within the eastern Canadian Arctic.

Figure 2. Selection of photographs from the Raanes Peninsula, Ellesmere Island. A. View of Base Camp 1, Southern Troid Fiord. B. View of Base Camp 2, Northern Troid Fiord. C. View towards the NNW showing deformed Franklinian succession (grey/brown) unconformably overlain by red (sandstones and conglomerates) and white (anhydrite) sediments of the Sverdrup Basin. D. View of the shallow marine Cretaceous sandstones of the Isachsen Formation. E-F. Views of the deformation styles observed in the Franklinian succession, folding (E) and thrusting (F).



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