Update on research findings

Following several expeditions on Ellesmere Island (Slidre Fiord/Eureka 2008, Lake Hazen 2009 and Raanes Peninsula 2009) and Axel Heiberg Island (2007, NRI license but not with PCSP support) we are now beginning to build up a sediment provenance data framework. The analysis of samples is still ongoing from recent field seasons (2009 and 2010), but analysis from the 2007 and 2008 field seasons nears completion and the results are currently being prepared for publication. They have recently been presented at international conferences (abstracts filed with PCSP Science Liaison Coordinator and NRI). If the NWB would like copies of these publications they can be provided.

The most complete story we have to date is for the Slidre Fiord (Eureka) area of the Fosheim Peninsula, Ellesmere Island. In this area we identify at least 4 different sand-types (based on mineral composition), and we can place time constraints on when the sands entered the Sverdrup Basin. The mineral composition of the sands can help us trace them back to a source region (e.g. a landmass such as the Canadian Shield or Greenland or a specific mountain range).

At Slidre Fiord the sand-types are:
Type 1: Triassic (Norian and older) and mid Jurassic sandstones; they are sublitharenites and subarkoses (contain quartz, rock fragments and feldspar grains) with abundant apatite and Permo-Triassic detrital zircons
Type 2: At the Triassic-Jurassic boundary there is a pulse of mature sandstone (quartz-rich), lacking in apatite and Permo-Triassic detrital zircons.
Type 3: Early Cretaceous mature (quartz-rrich) sandstones have a different signature to the underlying units, containing abundant Proterozoic-Archean detrital zircons
Type 4 Late Cretaceous-Paleogene sandstones contain kyanite (high-pressure metamorphism) and volcanic debris

We also observe a change in the metamorphic grade of the sedimentary source area during the mid Jurassic; this suggests unroofing history, different or possibly deeper source.

Many of the provenance signatures we see on the southeastern margin also occur on the opposing, northern margin of the basin, in the Bukken Fiord region of Axel Heiberg. The challenge is now to correlate the sands to other areas of the basin, to do this we need to expand our field sites and continue with our analytical programme. The Wolf Valley/Sawtooth Range on the Fosheim Peninsula is an ideal location as it will enable us to correlate from the Raanes Peninsula to Slidre Fiord and northwards towards Lake Hazen.

The data from this on-going study provide a framework on which we can base models of sediment provenance and transport, therefore constraining palaeogeographic

reconstructions. In order to expand the database we need to undertake additional fieldwork.

We are also beginning to trace key biostratigraphic horizons across the Sverdrup Basin with the Hazen Nodule Bed (Late Aalenian in age) being identified along the shores of Lake Hazen and also correlated with strata identified close to Eureka along a tributary of Black Top Creek.

CASP and GSC (Geological Survey of Canada) are currently drawing up a Memorandum of Understanding (MOU) which provide all CASP internal reports (relating to PCSP supported fieldwork or analysis of material collected during PCSP supported fieldwork) to the GSC under a confidentiality agreement. In addition, under the terms of the MOU, CASP geologists will be able to publish some of their data through the GSC using Open File Reports, Current Research or Bulletins. This document is currently being drafted by Jim Haggart (GSC Vancouver).

Additionally, two undergraduate theses resulting from the 2010 field season to the Raanes Peninsula have recently been completed and have been posted to PCSP offices in Ottawa (as well as the Nunavut Research Institute), additional copies for the NWB Library can be made available on request.

Slidel, D., 2011: "Sedimentological evolution of the Ordovician-Devonian strata of the Franklinian Basin, Ellesmere Island", MSci Thesis, Royal Holloway University of London, United Kingdom.

Hachkowski, C., 2011: "Geochemistry and Isotopic analysis of mafic dykes from the Raanes Peninsula, Ellesmere Island, Nunavut, Canada". BSc Thesis, Carleton University, Canada.

Working on the Fosheim Peninsula in 2012 will help us begin to tie the data obtained from fieldwork on the Raanes Peninsula to that with other parts of Ellesmere Island.