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**GEOLOGICAL SURVEY OF CANADA
OPEN FILE 7702**

**Report of activities for Triassic Source Rock assessment in
the Sverdrup Basin, Western Arctic Islands**

S.E. Grasby

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Foreword

The Geo-mapping for Energy and Minerals (GEM) program is laying the foundation for sustainable economic development in the North. The Program provides modern public geoscience that will set the stage for long-term decision making related to investment in responsible resource development. Geoscience knowledge produced by GEM supports evidence-based exploration for new energy and mineral resources and enables northern communities to make informed decisions about their land, economy and society. Building upon the success of its first five-years, GEM has been renewed until 2020 to continue producing new, publically available, regional-scale geoscience knowledge in Canada's North.

During the summer 2014, GEM's new research program has been launched with 14 field activities that include geological, geochemical and geophysical surveying. These activities have been undertaken in collaboration with provincial and territorial governments, northerners and their institutions, academia and the private sector. GEM will continue to work with these key collaborators as the program advances.

Introduction

As part of the Western Arctic Islands Activity, an assessment is being conducted on the impact of volcanic events on hydrocarbon potential. As well, samples are being examined to determine how major perturbations to global ecosystems in the geologic past may have influenced the formation of hydrocarbon source rock intervals that are responsible for formation of major petroleum systems. A key question being addressed is: do global events form regionally extensive source rocks that can be correlated across Transarctic regions. In the Sverdrup Basin the principle source rock that formed up to 23% of Canada's conventional natural gas reserves is the Middle Triassic Murray Harbour Formation. Given the significance of this interval it was chosen for more detailed assessment for paleo-environmental controls on source rock formation. For the summer 2014 field season detailed sampling was conducted across Middle to Upper Triassic intervals in the Sverdrup Basin (Fig. 1) as part of Collaborative Research being carried out with **Bundesanstalt für Geowissenschaften und Rohstoffe (BGR)**.

Methodology

Given remoteness of the area work was conducted by helicopter based in a field camp established by BGR on eastern Ellesmere Island. Sections were selected for sampling based on previous GSC work which has defined the most suitable areas for sample collection through the Middle to Late Triassic interval. This allows building on previous work that has assessed Early Triassic rocks in the Sverdrup Basin (Grasby et al., 2012, 2013)

In the field two types of samples sets were collected: 1) stratigraphically controlled samples elucidate the geochemical changes through time of major source rock intervals,

and 2) detailed sampling of shales adjacent to igneous sills and dikes to assess thermal influences on source rock maturation. For the first case, samples were collected from outcrops at approximately 3 m stratigraphic intervals. In the field outcrops were first cleaned and narrow defined layers (~ 2cm thick) were isolated for sampling. Samples were then collected and placed into sterile bags for later analyses. In the second case, sill and dike samples were collected as well as samples of shales approximately every one metre away from the intrusion until there was no visual evidence of thermal influence.

Results

During the field season 2 key locations were visited, Holder Hills and NW Blind Fiord on western Ellesmere Island. From these locations more than 400 samples were collected.

Conclusions

At the time of writing, samples collected are in transit on a Sea Lift barge from Resolute Bay. Upon arrival, they will be prepared for analyses. This involves cleaning any weathered surfaces and grinding the samples into a fine powder with an agate mortar and pestle. After being powdered, samples will be split for various types of analyses. Planned analytical work includes, measurement of key source rock parameters through RockEval pyrolysis, as well as geochemical and carbon isotope analyses. Results will allow regional chemostratigraphic correlations of key source rock intervals as well as assessment of paleo-environmental conditions that led to source rock deposition. In addition, results will provide an initial assessment of impact of intrusives on the thermal maturation of source rock intervals.

Acknowledgments

The 2014 field season was only possible through BGR who provided direct support through provision of aircraft time (helicopter and twin otter) as well as base camp support. Logistical support from Polar Continental Shelf Project and project support from Carl Ozyer is greatly appreciated.

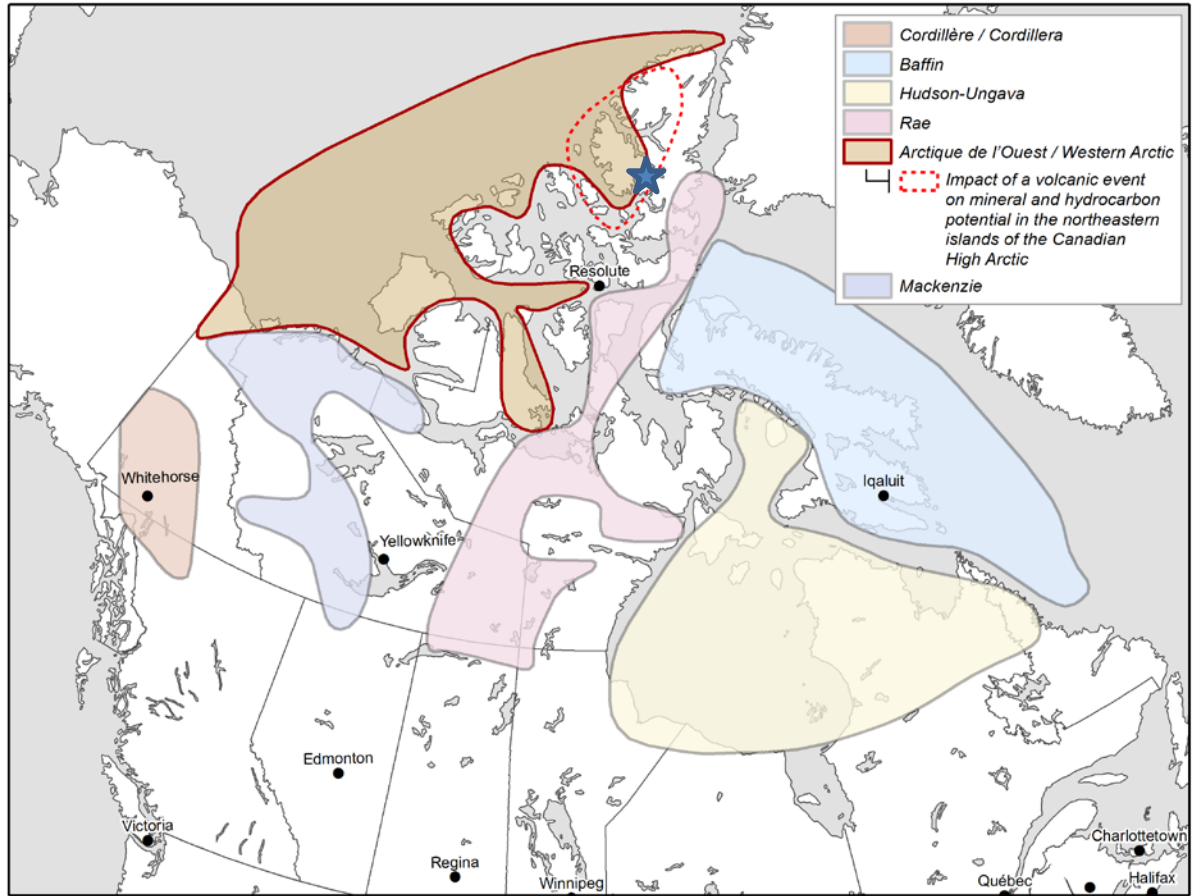


Figure 1. Location map showing areas sampled (blue star).