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## **New constraints on the age, geochemistry and environmental impact of High Arctic Large Igneous Province magmatism: Tracing the extension of the Alpha Ridge onto Ellesmere Island, Canada**

**Tiera V. Naber**<sup>1,2</sup>, Steve E. Grasby<sup>1,2</sup>, Jennifer P. Cuthbertson<sup>2</sup>, Nicole Rayner<sup>3</sup>, and Christian Tegner<sup>4</sup>

<sup>1</sup>Geological Survey of Canada - Calgary, Natural Resources Canada, Calgary, Canada

<sup>2</sup>Department of Geoscience, University of Calgary, Canada

<sup>3</sup>Geological Survey of Canada - Northern, Natural Resources Canada, Ottawa, Canada

<sup>4</sup>Centre of Earth System Petrology, Department of Geoscience, Aarhus University, Denmark

The High Arctic Large Igneous Province (HALIP) represents extensive Cretaceous magmatism throughout the circum-Arctic borderlands and within the Arctic Ocean (e.g., the Alpha-Mendeleev Ridge). Recent aeromagnetic data shows anomalies that extend from the Alpha Ridge onto the northern coast of Ellesmere Island, Nunavut, Canada. To test this linkage we present new bulk rock major and trace element geochemistry, and mineral compositions for clinopyroxene, plagioclase, and olivine of basaltic dykes and sheets and rhyolitic lavas for the stratotype section at Hansen Point, which coincides geographically with the magnetic anomaly at northern Ellesmere Island. New U-Pb chronology is also presented.

The basaltic and basaltic-andesite dykes and sheets at Hansen Point are all evolved with 5.5–2.5 wt% MgO, 48.3–57.0 wt% SiO<sub>2</sub>, and have light rare-earth element enriched patterns. They classify as tholeiites and in Th/Yb vs. Nb/Yb space they define a trend extending from the mantle array toward upper continental crust. This trend, also including a rhyolite lava, can be modeled successfully by assimilation and fractional crystallization. The U-Pb data for a dacite sample, that is cut by basaltic dykes at Hansen Point, yields a crystallization age of  $95.5 \pm 1.0$  Ma, and also shows crustal inheritance. The chronology and the geochemistry of the Hansen Point samples are correlative with the basaltic lavas, sills, and dykes of the Strand Fiord Formation on Axel Heiberg Island, Nunavut, Canada. In contrast, a new U-Pb age for an alkaline syenite at Audhild Bay is significantly younger at  $79.5 \pm 0.5$  Ma, and correlative to alkaline basalts and rhyolites from other locations of northern Ellesmere Island (Audhild Bay, Philips Inlet, and Yelverton Bay West; 83–73 Ma). We propose these volcanic occurrences be referred to collectively as the Audhild Bay alkaline suite (ABAS). In this revised nomenclature, the rocks of Hansen Point stratotype and other tholeiitic rocks are ascribed to the Hansen Point tholeiitic suite (HPTS) that was emplaced at 97–93 Ma. We suggest this subdivision into suites replace the collective term Hansen Point volcanic complex.

The few dredge samples of alkali basalt available from the top of the Alpha Ridge are akin to ABAS

in terms of geochemistry. Our revised dates also suggest that the HPTS and Strand Fiord Formation volcanic rocks may be the hypothesized subaerial large igneous province eruption that drove the Cretaceous Ocean Anoxic Event 2.