

## Cretaceous High Arctic paleoenvironmental and paleoclimate change

## Research objectives and rationale

This project is a continuation of research that was previously submitted to the community of Grise Fiord before the 2014 field season. Exceptional sediment exposures of Cretaceous age (144 – 66 Million years ago) on the central to southern part of Axel Heiberg Island and Devon Island provide a unique window on the Cretaceous Arctic paleoenvironment and climate history of the past. Cretaceous temperatures ranged from relatively cool conditions of the early Cretaceous into the peak warmth about 94 Million years ago, one of the warmest periods in Earth history. These temperatures of the geological past are well understood for low latitude regions, but only few paleontological, paleobotanical and organic geochemistry data are known from the Arctic. The Glacier Fiord locality on Axel Heiberg Island is of great scientific importance since it exposes a nearly complete section of Cretaceous sedimentation documenting paleoenvironmental changes of the Sverdrup Basin over an entire geological period that was highly influenced by a greenhouse climate.

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1. How did Arctic environments react to the massive volcanic eruptions and their gas emissions that took place during the Cretaceous in the High Arctic, called the High Arctic Large Igneous Province?
2. How warm was the Arctic region during the Cretaceous and how small was the temperature gradient between low and high latitudes during that time?
3. How did the Cretaceous polar marine ecosystem react to climate changes, weathering patterns and associated runoff into the ocean? For example, how was marine plankton affected by those changes?
4. What biotic crises took place in the Cretaceous Arctic Ocean and how did life recover?

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