Paleoenvironmental reconstruction of the Haughton impact structure and surrounding terrains over the past 39 Million years

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Haughton impact crater, Devon Island, NU**,** July 13th – August 6th, 2010

Project Description: Meteorite impact events have played an important role throughout Earth's history, shaping the geological landscape and affecting the evolution of life. This research focuses on understanding processes that occurred after the formation of the Haughton impact structure (HIS), from its immediate aftermath 39 million years ago to the present-day. This research focuses on 4 main areas:

1) Impact processes: When meteorites or other objects impact a planetary surface they alter the target material on a microscopic level through "shock metamorphism". *Objectives:* The main focus of this field season is detailed outcrop-scale mapping with subsequent follow-up laboratory work. The goal is to quantify this increase by correlating the measured decrease in density with shock level as determined by petrographic study.

2) Impact craters as habitats for life: Impact events, while initially sterilizing an area, have the ability to provide refuge for microorganisms, especially in extreme environments like the Arctic. *Objectives:* collect samples of impact-shocked gneiss from the HIS, for analysis of microorganisms.

3) Intra-crater sedimentary deposits: The post-impact sediments of the HIS (Haughton Fm.) is the only known deposit that preserves the remains of flora and fauna, including vertebrates, from the early Miocene Arctic. *Objectives:* Reconstruct the depositional history of the Haughton Fm., as well as to identify possible fossil layers. We anticipate the continued emergence of fossil bones in the area as a result of active layer processes. Ground Penetrating Radar (GPR) will be tested for its suitability in locating fossil occurrences.

4**) Recent climate history and change:** The HIS today lies in a polar desert environment. It is notable that the extent and history of glaciation on Devon Island remains poorly understood. *Objectives:* Detailed mapping of unconsolidated Quaternary deposits within the HIS; GPR studies within the HIS and in Thomas Lee Inlet to delineate massive ice deposits. Access to the two weather stations is required in order to download data.

Travel to the field area will be by Twin Otter aircraft. Helicopter support will be used to access the remote Thomas Lee Inlet site. No permanent structures will be erected.

Methodology: Fieldwork will involve geological mapping and sampling of the various sites. Rock and mineral samples will be collected by hand, using standard geological equipment such as hammers and shovels.

Data: This data will form the basis for the theses of several students, and will be published in scientific journals and presented at scientific conferences. This will ensure a widespread dissemination of scientific data.

Reporting: As noted above, this research will be published in scientific journals and presented at conferences. Copies of this research and data will be distributed to northern communities and research organizations. In addition, these results will be communicated to schools and community groups in Grise Fiord, Resolute Bay, and other northern communities.