Project Title: ***Mars Exploring through Analog-site Drilling (MEAD)***

Researcher's name and affiliation: Dr. Brian Glass, NASA Ames Research Center, Moffett Field, CA 94035, USA.

Location: Haughton Impact Structure on Devon Island, Nunavut (75.403° N, 89.747° W), 175 km from Resolute Bay, the nearest community.

Time Frame: From 1 August 2025, to 12 August 2025. **Number of people involved:** 6

Project Description:

The Haughton Impact Structure (HIS) is a 22 km wide crater on Devon Island, NU, formed by a meteor impact 31 million years ago. It has conditions similar to Mars, including icy ground, a cold desert climate, and signs of ancient and present life. Co-investigator Sapers is studying how meteor impacts affect microbes that grow afterward. The MEAD project will drill shallow holes (less than 1 meter) to search for tiny life signs using a special tool called SOLID. Another tool, ARIA, will test how well it can detect minerals and organic changes in crater rocks. MEAD will also test new drilling imaging methods to avoid hazards and find underground targets. These studies will help scientists look for life under the surface of Mars in the future.

We are planning for our base camp to be at an existing camp location in the Haughton River Valley, accessible by Twin Otter flights to an existing landing strip near the camp. Transportation of people and equipment to scientific sites within the crater will rely on All Terrain Vehicles (ATVs), trailers, and walking, staying on existing trails where possible. ATV fuel will be safely stored within a spill-secured platform a safe distance from our camp tents. Propane will be used for cooking.

MEAD is a new project, but its leader Brian Glass has been known by many members of the Resolute Bay community since the late 1990s. MEAD will reach out and contact both the Resolute and Grise Fiord communities and ask for their concerns or requests. we are aware of the following possible concerns expressed during previous consultations and discussions. The Haughton Crater site is located far from protected areas and parks. Nevertheless, wildlife may be present, such as polar bears, foxes or migratory birds. If found or sighted, nests, dens or animals of any type will not be disturbed nor interacted with. No archeological sites are known to be located in the area – if we find a site, the location will be recorded and communicated to proper authority for further investigation. If using ATV's and an animal is sighted, alternative paths will be used.

Most field supplies will be brought up from the south, but others such as ammunition and fresh food will be bought at the Tudjaat Co-op store at Resolute. Water for camp use (approx. 0.1 m3 per day) will be collected from the nearby Haughton River. Solid waste will be backhauled to Polar Continental Shelf or approved (landfill) facilities for disposal. Following our deployment at the Haughton site, the campsite area and study sites will be restored to their condition upon arrival.

Methodology:

Our objectives this year are to test a twin of a 1m lunar flight sampling drill (TRIDENT) with advanced fault detection and executive controls on the impact breccia inside Haughton. We wish to use a portable ground-penetrating radar (earlier versions have been used at Haughton) to map the shallow subsurface layering near the drill, and compare with the similar results from a new design of geophone (Geode). Clean drilled samples will be provided to ARIA and SOLID to study tiny biological signs and map the distribution of microbes above and below the frozen boundary (active layer).