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Sherbrooke, June 11th 2022

Richard Dwyer
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Object: Requesting approval for the use of waters and/or deposit of waste without a licence for project "Geological study and mapping of hydrothermal deposits and gossans at Expedition Fiord, Axel Heiberg Island, Nunavut, as analogues for Mars" (NIRB 22YN015, NPC 149716)

Mr Dwyer,

The research project to be undertaken by the Université de Sherbrooke's entitled "Geological study and mapping of hydrothermal deposits and gossans at Expedition Fiord, Axel Heiberg Island, Nunavut, as analogues for Mars" has completed its screening by the NIRB (22YN015) and NPC (149716). I am hereby requesting, on the behalf of my research team, an approval for the use of waters and/or deposit of waste without a licence by the Nunavut Water Board. Please find below the project summary in English and in Inuktitut, and please find attached the application form, filled to the best of my knowledge.

Project summary (English)

Gossans are surficial deposits that form through the chemical and physical weathering of bedrock. They can be preserved for thousands of years in the permafrost. In the Expedition Fiord area of Axel Heiberg Island, Nunavut, gossans are associated with ancient hydrothermal deposits that contain minerals also found on Mars. These minerals can preserve traces of microbial life but the way they formed is still unknown. Importantly, gossans in the Expedition Fiord area could be part of a network of fractures through which hydrothermal fluids have been circulating for millions of years. It is possible that these gossans have been formed through the interaction between the metal-rich bedrock and ancient deposits formed in a hydrothermal system. If such, this would have important implication in the search for life on Mars. It is highly probable that hydrothermal systems were active on Mars billions of years ago. These systems are key places to look for signs of ancient microbial life on Mars.

Our main objective is to study gossans in the Expedition Fiord area as indicators of ancient hydrothermal systems on Mars at various spatial scales in the context of current and future Mars exploration missions. The specific objectives are as follows: 1. Map the Expedition Fiord area and detect gossans using satellite imagery. 2. Investigate the spectral signature, composition, and potential biosignatures in the gossans and hydrothermal deposits. 3. Conduct detailed spectroscopic, compositional, and biological studies on the returned samples in our university laboratories.

The research will be conducted from a base camp located a few kilometers north of the McGill Arctic Research Station, near Expedition Fiord, Axel Heiberg Island. Fieldwork will take place for a period of 17 days from July 8 to 24, 2022.

The field crew will travel by foot traverse to local outcrops. They will use geological hammers to collect samples. They will also use portable scientific instruments to collect data directly from the outcrops.

The fieldwork will not impact local wildlife in this uninhabited region of northern Nunavut.

The data will be stored on portable computers. The data and results will be published in open files and journal articles.

Project summary (Inuktitut)

ᐅᔭᖅᑲᐃᑦ ᒪᓃᑦᑐᑦ ᓄᓇᐅᑉ ᖄᖓᓃᑦᑐᑦ ᐅᔭᖅᑲᕈᖃᑦᑕᖅᑐᑦ ᐃᓗᓕᖕᒋᓐᓄ ᖃᓄᐃᓕᖓᓂᖕᒋᓐᓄᑦ ᐊᒻᒪ ᐆᓇᖅᓯᑎᑕᐅᓂᖓ ᖁᐊᖑᐃᓐᓇᖅᑐᖅ. ᐱᐅᖅᓱᐊᖅᑕᐅᔪᓐᓇᓐᓇᖅᑐᑦ ᑕᐅᓴᖕᒋᓐᓃᑦᑐᓄᑦ ᐊᖅᖀᒍᓄᑦ ᖁᐊᖑᐃᓐᓇᖅᑐᒥᑦ. ᐅᕙᓂ Expedition Fiord ᖃᓂᒋᔭᖓᓂ ᐅᒥᖕᒪᑦ ᓄᓈᑦ, ᓄᓇᕗᑦ, ᐅᔭᖅᑲᐃᑦ ᒪᓃᑦᑐᑦ ᐊᑦᑐᐊᓂᓖᑦ ᐅᐊᑦᑎᐊᕈᐊᓗᒃ ᐆᓇᖅᑐᒧ ᐃᒥᕐᒧᑦ ᐃᓗᓕᐅᖅᑲᐅᑐᓂ ᓇᓂᔭᐅᒻᒥᔪᑦᑕᐅᖅ ᒫᔅᒥᑦ. ᑖᒃᑯᐊ ᓄᓇᒦᖔᖅᑐᑦ ᖃᐅᔨᔭᔅᓴᐅᑎᑦᑎᔪᓐᓇᖅᑐᑦ ᒥᑭᔫᑎᕋᓛᓂᑦ ᐆᒪᔪᓂᑦ ᑭᓯᐊᓂ ᖃᓄᐃᓕᖓᓕᕐᓂᖕᒋᓐᓄᑦ ᐋᖅᑭᔅᓯᒪᓂᖕᒋᑦ ᖃᐅᔨᒪᔭᐅᖕᒋᑦᑐᑦ. ᐱᒻᒪᕆᐅᔪᒥᓪᓚ, ᐅᔭᖅᑲᐃᑦ ᒪᓃᑦᑐᑦ Expedition Fiord–ᒥ ᐃᓚᒋᔪᓐᓇᖅᑕᖓ ᑲᑎᖕᖓᔪᓂᑦ ᓄᑎᓐᓂᐅᔪᓂᑦ ᐆᓇᖅᑐᓄᑦ ᐃᒥᕐᒧᑦ ᐃᖕᒋᕋᖃᑦᑕᖅᓯᒪᓂᕆᔭᖕᒋᓐᓄᑦ ᒥᓚᐊᖕᒋᓐᓃᑦᑐᓂᑦ ᐊᖅᖀᒍᓂᑦ. ᑖᒃᑯᐊ ᐅᔭᖅᑲᐃᑦ ᒪᓃᑦᑐᑦ ᑕᐃᒪᐃᑦᑐᕈᖅᑎᑕᐅᓯᒪᔪᑦ ᖃᓄᐃᓘᖃᑦᑕᐅᑎᓂᖕᒋᓐᓄᑦ ᓴᕙᕋᔭᔅᓴᖅᑲᐅᑦᑎᐊᖅᑐᑦ ᖁᐊᖑᐃᓐᓇᖅᑐᖅ ᐊᒻᒪ ᐅᐊᑦᑎᐊᕈᐊᓗᒃ ᖄᖓᓃᑕᖅᑐᒥᓃᑦ ᐆᓇᖅᑐᒥᑦ ᐃᒥᕐᒧ ᐃᖕᒋᕋᓂᖃᖅᑎᑎᓪᓗᑎ. ᑕᐃᒪᐃᒃᑯᓂ, ᐱᒻᒪᕆᐅᔪᒥᑦ ᖃᓄᐃᓕᓂᖃᖅᑎᑦᑎᔪᓐᓇᖅᓴᓚᐅᖅᑐᖅ ᕿᓂᓂᕐᒧᑦ ᐆᒪᔪᓂᑦ ᒫᔅᒥ ᐱᐊᖕᒋᓐᓃᑦᑐᓂᑦ ᐊᖅᖀᒍᓯᒪᓕᖅᑐᓂᑦ. ᑖᒃᑯᐊ ᓇᒦᓐᓂᓪᓗᐊᑕᐅᔪᑦ ᕿᓂᕐᓗᓂ ᐅᐊᑦᑎᐊᕈᐊᓗᒃ ᒥᑭᔫᑎᕋᓛᓂᑦ ᐆᒪᔪᖅᑕᖅᑲᕐᓂᖓᓄᑦ ᒫᔅᓯᒥᑦ.

ᑐᕌᒐᓪᓗᐊᑕᕆᔭᕗᑦ ᖃᐅᔨᓴᕐᓗᒋᑦ ᐅᔭᖅᑲᐃᑦ ᒪᓃᑦᑐᑦ Expedition Fiord–ᒥ ᓇᓗᓇᐃᖅᓯᒍᓃᑦ ᐅᐊᑦᑎᐊᕈᐊᓗᒃ ᐆᓇᖅᑐᒧᑦ ᐃᒪᖃᖅᓂᖓ ᒫᔅᓯᒥ ᑕᕝᕙᓂᔅᓴᐃᓐᓇᐅᖕᒋᑦᑐᓂᑦ ᐃᓱᒪᒋᓪᓗᒍ ᒫᓐᓇᐅᔪᒥᑦ ᐊᒻᒪ ᓯᕗᓂᔅᓴᒥ ᒫᔅᓯᒥ ᕿᓂᖅᓂᖅ. ᓇᓗᓇᐃᖅᓯᒪᔪᑦ ᑐᕌᒐᖏᑦ ᐃᒪᐃᓕᖓᔪᑦ: 1. ᓄᓇᖑᐊᓕᐅᖅᓗᒍ Expedition Fiord ᖃᓂᒋᔭᖓ ᐊᒻᒪ ᖃᐅᔨᓗᒋᑦ ᐅᔭᖅᑲᐃᑦ ᒪᓃᑦᑐᑦ ᐊᑐᖅᓗᑎ ᖁᓪᒧᐊᑦᑎᑕᐅᓯᒪᔪᒃᑯᑦ ᐊᔾᔨᙳᐊᓂᑦ. 2. ᖃᐅᔨᓴᖅᓗᒍ ᓇᓗᓇᐃᒃᑯᑕᕆᔫᔭᖅᑕᖓ, ᐃᓗᓕᖕᒋᑦ, ᐊᒻᒪ ᐱᑕᖃᕈᓐᓇᖅᓂᖕᒋᓐᓄᑦ ᐆᒪᔪᓄᑦ ᓇᓗᓇᐃᖅᓯᒍᓃᑦ ᐅᔭᖅᑲᐃᑦ ᒪᓃᑦᑐᓂᑦ ᐊᒻᒪ ᐆᓇᖅᑐᒧ ᐃᒥᕐᒧᑦ. 3. ᐱᓕᕆᓂᖃᖅᓗᑎ ᓇᓗᓇᐃᔭᖅᓯᒪᔪᓂᑦ spectroscopic, ᓴᓇᓯᒪᓂᖃᖅᑐᑦ ᐊᔾᔨᒌᖕᒋᑦᑐᓂᑦ, ᐊᒻᒪ ᐆᒪᔪᓂᑦ ᖃᐅᔨᓴᖅᓂᐅᔪᖅ ᐅᑎᐅᔾᔭᐅᔪᓂᑦ ᖃᐅᔨᓴᕋᔅᓴᓂᑦ ᓯᓚᑦᑐᓴᕐᕕᒃᔪᐊᒧᑦ ᖃᐅᔨᓴᕐᕕᖕᒋᓐᓄᑦ.

ᖃᐅᔨᓴᕐᓂᖃᓂᐊᖅᑐᑦ ᓇᔪᖅᑕᐅᔪᒦᑦᑐᑎ ᐅᖓᓯᓐᓂᖃᖅᑐᖅ ᑭᓚᒦᑕᒐᓚᓐᓂᑦ ᐅᐊᓐᓇᖓᓂ ᒪᑭᐅᓪ ᐅᑭᐅᑕᖅᑐᒥ ᖃᐅᔨᓴᕐᕕᒃ, ᖃᓂᒋᔭᖓᓂ Expedition Fiord, ᐅᒥᖕᒪᑦ ᓄᓈᑦ. ᖃᐅᔨᓴᓂᕐᒧᑦ ᐃᖅᑲᓇᐃᔭᕐᓂᖃᓂᐊᖅᑐᑦ 17 ᐅᓪᓗᓂᑦ ᐱᒋᐊᕐᓗᓂ ᔪᓚᐃ 8 ᑎᑭᓪᓗᒍ 24, 2022.

ᖃᐅᔨᓴᖅᑏᑦ ᐃᖅᑲᓇᐃᔭᖅᑏᑦ ᐱᓱᓐᓂᐊᖅᑐᑦ ᐅᔭᖅᑲᓄᑦ. ᐊᑐᕐᓂᐊᖅᑐᑦ ᐅᔭᖅᑲᓂᑦ ᖃᐅᔨᓴᖅᑎᓄᑦ ᐅᔭᕋᑦᑎᐊᖕᒋᓐᓂ ᓄᐊᑦᑎᓗᑎ ᖃᐅᔨᓴᕋᔅᓴᓂᑦ. ᐊᑐᕐᓂᐊᕐᒥᔪᑦ ᖃᐅᔨᓴᖅᑎᓄᑦ ᖃᐅᔨᓴᐅᑎᖕᒋᓐᓂᑦ ᑐᑭᓯᒋᐊᕈᑎᖕᒋᑦ ᐱᔭᐅᓗᑎ ᐅᔭᖅᑲᓃᖕᒑᑦᑕᐅᑎᒋᔪᓂᑦ.

ᖃᐅᔨᓴᓂᕐᒧᑦ ᐃᖅᑲᓇᐃᔮᖕᒍᔪᖅ ᐊᑦᑐᐃᓂᖃᔾᔮᖕᒋᑦᑐᖅ ᐆᒪᔪᓂᑦ ᓇᔪᖅᑕᐅᖕᒋᑦᑐᒦᑦᑐᒥᑦ ᐊᑯᑦᑐᖅᓯᒪᔪᒥᑦ ᐅᐊᓐᓇᖕᒐᓂ ᓄᓇᕗᑦ.

ᖃᐅᔨᓴᕈᑎᒥᓃᑦ ᑐᖅᑯᖅᑕᐅᓂᐊᖅᑐᑦ ᖃᕋᓴᐅᔭᕐᒧᑦ. ᖃᐅᔨᓴᕈᑎᒥᓃᑦ ᐊᒻᒪ ᖃᓄᐃᓐᓂᕆᔭᖕᒋᑦ ᓴᖅᑭᖅᑎᑕᐅᓛᖅᑐᑦ ᒪᑐᐃᖕᒐᔪᓂᑦ ᑎᑎᕋᖅᓯᒪᔪᓂᑦ ᐊᒻᒪ ᐅᖃᓕᒫᒐᕐᓂᑦ.

Sincerely,

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