Nunavut Research Institute Non-Technical Summary Report
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Project: Climate Change and the Arctic Archaeological Record: An Archaeo-Geophysical Approach to Assess Site Stability and Predict Future Impact
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In 2014, Drs. Brooke Milne (CEOS, University of Manitoba), Robert Park (Anthropology, University of Waterloo), and Ian Ferguson (Geological Sciences, University of Manitoba) executed a short field season of geophysical survey at the LdFa-1 site near Mingo Lake, Southern Baffin Island. Due to unforeseen logistical complications associated with accessing the original site planned for investigation – LbDt-1 on the Hone River – Milne's permit was amended to shift the project's focus to LdFa-1. Much to the team's disappointment, LdFa-1 also could not be reliably or repeatedly accessed via Twin Otter. Therefore, research efforts for 2014 were restricted to a single day (i.e. 8 hours on the ground).

On July 15, 2014, Ferguson along with Landry (PhD Candidate, CEOS, University of Manitoba) conducted a magnetometer/gradiometer survey of Area 5 at LdFa-1. A 20 x 20 m grid with a horizontal line spacing (x-axis) of 0.5 m was set up in this vicinity of the site. This area was chosen specifically to include two test units previously excavated by Park in 2008. The goal was to test the feasibility of the geophysics instrumentation in this Arctic environment and to see if any measurable differences in magnetic levels associated with the disturbances created by the subsurface testing could be detected. Measurements of the magnetic susceptibility were taken every 20 cm along the vertical axis (y-axis) so as to provide greater Y-axis resolution. A local base-station set-up was used to correct for diurnal fluctuations in the Earth's magnetic field along with a vertical gradient to correct for any isolated changes. The corrected results of the survey illustrate gradual/natural changes in soil and bedrock susceptibility from the northwest corner of the grid down to the southeast corner, which is lowest point of elevation in the survey area.

What is of particular interest is the higher levels of magnetic variation observed around the test pits. The magnetic levels in this area may be attributable to two factors. One possibility is that activities relating to burning or cooking may be creating these levels of remnant magnetism (i.e. the original site occupants had a fire of some kind in this location). It is also possible the 2008 test excavations had an effect on the soil in this area since such disruptions can increase or decrease the magnetism at the surface. In all likelihood, both scenarios are correct since excavated faunal remains from the tests yielded evidence of subsistence activities and the test excavations did indeed cause disturbances to the soil.

While our proposed research objectives could not be met as planned due to issues of site access, the results of this small survey are promising for future applications. This survey also determined that the bedrock is amenable to radar survey applications (i.e. ground penetrating radar), which had been planned for the 2014 site investigations but as noted, could not be carried out. Still, this is valuable information for future geophysical surveys at this site and others like it in the interior region of southern Baffin Island.

Photo 1. Ferguson and Landry conducting magnetometer/gradiometer survey in Area 5 of the LdFa-1 site, Mingo Lake, southern Baffin Island (photo credit: R. Park).

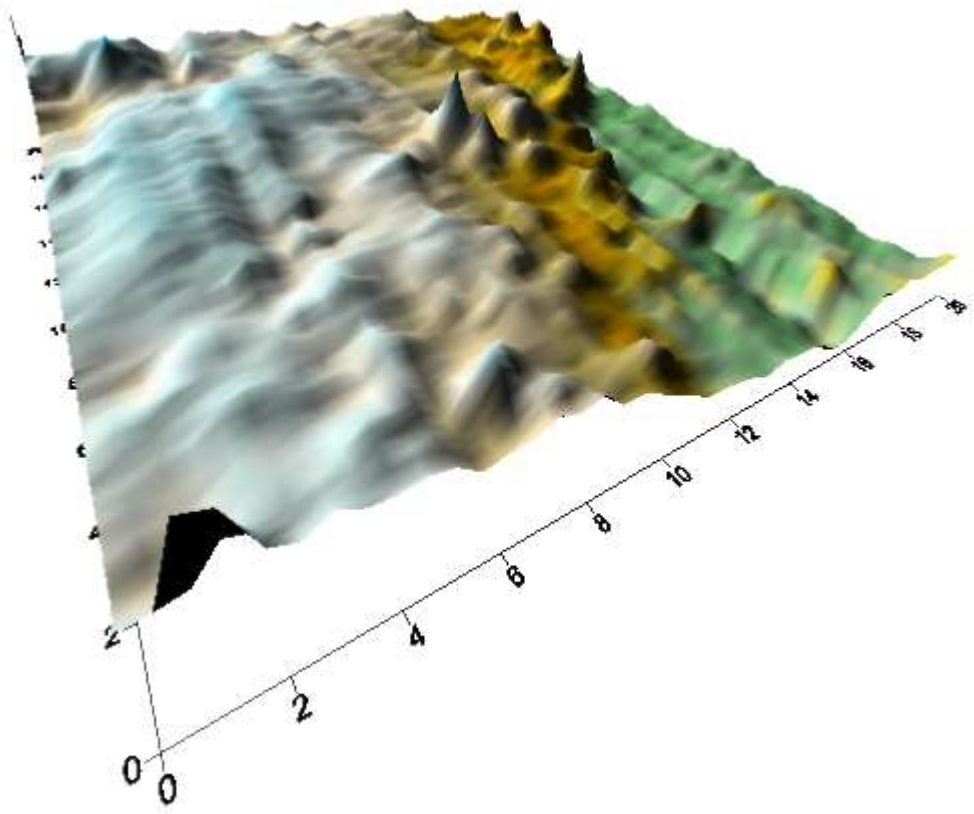

Figure 2. Illustration outlining those locations exhibiting higher levels of magnetic variation within the 20 m x 20 m survey grid in Area 5 at LdFa-1. Those locations with the highest readings are located between 10-14 m on the x-axis and 7-10 m on the y-axis. This is where the 2008 test units are also located (figure from Landry et al. In Review).