Annual Report 2017: Dynamics and Change of the Devon Ice Cap, Nunavut

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Martin Sharp, Department of Earth and Atmospheric Sciences, University of Alberta

Our goal is to document and explain the dynamics and recent changes of ice caps in the Canadian Arctic, and evaluate their impact on global sea level. Fieldwork on Devon Ice Cap in 2016 involved Professor Martin Sharp and PhD students Ashley Dubnick and Luisa Fernandes. The following activities were completed:

(i) Maintained and retrieved data from 3 automatic weather stations and 5 continuously recording GPS stations that are monitoring the rate of bedrock uplift rate around the ice cap. These GPS stations were installed in 2014 and 2015 on bedrock adjacent to glaciers with different flow rates to see whether uplift rates are linked to glacier dynamics. Bedrock uplift records the response of the bedrock to changes in glacier mass. The crust sinks if glacier mass increases and rises if it decreases. Two of the three weather stations on the ice cap were decommissioned and materials were returned to Resolute Bay.

(ii) Completed ground based radar surveys and collected shallow ice cores from the upper 5-10m of the ice cap to describe the extent/thickness of ice bodies formed by refreezing of meltwater in the snow and firn. The presence of such ice bodies may increase the fraction of meltwater that runs off to the ocean since they prevent meltwater from draining into the snow and firn where it can refreeze and instead promote horizontal drainage. Results confirmed that ice bodies in the firn are present and extensive and are likely formed due to freezing of large water bodies (such as supraglacial lakes) followed by burial by winter snowfall, rather than by gradual and continuous refreezing of meltwater in the snow and firn.