NWB Project Description, Summer 2012
Glacier-Climate Studies on the Prince of Wales Icefield, Ellesmere Island

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This is a research project that will take place on the southwest margin of the Prince of Wales Icefield, Ellesmere Island. The outlet glacier here is unofficially named 'Humphrey Glacier', and access to the site will be via an abandoned air strip nearby (twin otter from PCSP-Resolute). We will be a party of four travelling by foot and ski for two 2-week visits: May 15-28, 2012 and July 20-Aug 2, 2012.

Project Description

As glaciers retreat, they expose bare land that heats up during the summer months, providing a source of heat that can increase melt rates for adjacent glacier ice. Past studies by my research group on the Prince of Wales (POW) Icefield, Ellesmere Island, record these influences, but we have not systematically studied them; in summer 2012 I propose to set up a transect of weather stations on the southwestern margin of the POW Icefield and carry out a series of tethersonde ('weather kite') measurements of the atmospheric boundary layer, to ~300 m height, to measure the atmospheric structure, energy balance processes, and heat transfer to the icefield. The proposed research will further understanding of glacier-climate processes and glacier response to climate change. We will also be measuring meltwater runoff from the glacier, which will contribute to understanding of high Arctic hydrology.

Our work will be carried out within 10 km of our base camp at the toe of the glacier, and anticipated travel will be on foot and ski (from base camp up onto the icefield). I have been to the site twice before and it is not conducive to snowmobile travel. We will set up a temporary camp (4 sleeping tents, 1 gear tent, 1 kitchen tent). All equipment and gear will be removed on completion of the project (August, 2012).

Methodology

Automatic weather stations will be deployed along a vertical transect on the icefield. These instruments will be installed in May and taken out in August, recording 30-minute data for the study period. Measurements of cloud conditions and lower-atmosphere humidity and temperature profiles will be made while in the field, using a small weather balloon anchored to the ground, with up to 8 radiosonde instruments rigged to measure wind, temperature, pressure and humidity at different atmospheric heights. This instrument will be deployed two to four times daily from our camp on the glacier forefield, adjacent to the icefield margin. We will also measure meltwater runoff from the icefield, via discharge-area profiles and salt injection.

Data

Weather and hydrological data collected will be available on request and publicly available through publication(s).

Reporting

Publications in scientific journals are anticipated (e.g., *Journal of Glaciology*, *Hydrological Processes*). Reports will be provided to PCSP and NRI, and our group would be delighted to speak on Arctic climate change with any interested communities (e.g. Grise Fiord, Resolute). Final reporting can be copied to NWB, or we are happy to provide a formal final report on the research, on request.