PROGRESS REPORT on 2015 FIELD ACTIVITIES
Glacier Mass Balance Studies in the Canadian High Arctic
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1. INTRODUCTION

Knowledge of the mass balance of ice caps and glaciers in the Canadian high Arctic provide important insight into understanding patterns of climate change, and validating current estimates of global sea-level contributions from this region. Through continuation of the long-term time series (~50 years) of annual surface mass balance measurements for the Northwest Devon ice cap, Meighen ice cap, Melville ice cap, and Agassiz ice fields, this project contributes towards the fulfillment of NRCan's mandate and ESS strategic outcomes through activities in the ESS Climate Change Geoscience Programme (CCG) – Essential Climate Variables (ECV). Output from this project delivers towards Departmental SO #3 under the PA3.1.3 in order that *Science and knowledge are used to help Canada adapt to a changing climate* – in particular, *the impact of climate change on Canada's landmass is assessed, and strategies are developed to adapt to these changes*. In addition, aspects of community infrastructure and sustainable northern resource development including transportation and energy mix, will be supported by information on Cryosphere system change.

2. RESULTS

Glacier Mass Balance Measurements – Spring, 2015

All mass balance measurements on South Melville, Meighen, Agassiz (Drambuie), and Devon (NW) ice caps, and the Grise Fiord glacier were successfully acquired. Data collected in 2014 and 2015 give mass balance results for the 2013-2014 balance year. While the annual long-term average mass balance value for the 3 reference glaciers (Meighen, Melville, and Devon ice caps) is negative (see Table 1), the Meighen ice cap experienced a positive balance values of 7 cm w.e. in the 2013-2014 balance year. Mass balance for the South Melville ice cap (2013-2014) of -15 cm w.e. was only slightly less negative than the long-term average of –27 cm w.e while the Devon ice cap thinned by more than two times the long term average. Associated water equivalent volume change for the Devon(NW), Meighen, and South Melville ice caps was -0.47, 0.0042, and -0.006 Gt respectively resulting in a net ***positive*** contribution to global sea-level rise from these 3 sites for the 2013-2014 balance year. Overall, the average of the 2013-2014 mass

balance values for the Queen Elizabeth Islands reference glaciers (-11 cm w.e.) was similar in magnitude to the long term average (-14 cm w.e.), but about 5 times less negative than the post-2005 average (-52 cm w.e.).

Table 1.

Ice Cap	*Long Term (1960-2014) Net Mass Balance (cm w.e.)*	*Net Mass Balance for 2013-2014 (cm w.e.)*	*Total Mass Change in 2013-2014 (Gt)*
Devon (NW)	-13	-28	-0.47
Meighen	-1.6	7	+0.0042
Melville	-27.5	-15	-0.006

3. WORK PROPOSED FOR SPRING 2015

We propose to continue the glacier mass balance measurements over the Devon, Agassiz, Meighen, and Melville ice caps, and the Grise Fiord Glacier. This work involves maintenance and data retrieval from the Automatic Weather Stations (AWS), and pole measurement and replacement (or extension) as required. There are no significant changes to the work planned for 2016 relative to the activities performed in 2015.

4. LOGISTICS

Transportation to field sites will be provided by the Polar Continental Shelf Program. All work on site will be performed out of a permanent hut that exist on the Melville ice cap, tents on the Agassiz and Devon ice caps, and Meighen Ice Cap, and the Co-op Hotel while in Grise Fiord. Transportation at each site will be by snowmobile.