

3.1 Biome-scale Representation of Snow Cover Development and Ablation in Boreal and Tundra Ecosystems

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1. Objectives

- ◆ Define mass and energy fluxes governed by the land surface processes of snow interception, redistribution, sublimation and ablation.
- ◆ Formulate process-based algorithms that represent snow cover development and ablation in boreal, alpine and arctic regions.
- ◆ Integrate these algorithms in distributed basin, continental and global-scale hydrometeorological models.

2. Progress and Collaborations

2.1 Field Work

Intensive measurement of snow accumulation and ablation was made at two locations:

- a) Trail Valley Creek, NWT (TVC) with Gray, Marsh and Schuepp
- b) Granger Catchment, Wolf Creek, Yukon (GC) with Gray, Granger and Woo

Snow accumulation measurements concentrated at TVC until the end of April with an eddy correlation and blowing snow system installed at the CAGES site. The purpose of the TVC measurements was to provide an evaluation of blowing snow model performance in an Arctic environment. Snow ablation measurements were conducted in complex terrain at GC from mid April to late May. Ablation measurements consisted of a transect of eddy correlation/energy balance systems from north facing to valley bottom to south facing slopes, snow ablation measurements (1 m resolution), snow covered area and occasional tethersonde atmospheric profile measurements. The purpose of the GC measurements was to provide areal measurements of melt energetics in complex terrain as an aid to upscaling snow ablation calculations. Because of budget cuts, forest snow hydrology sites at Waskesiu (Prince Albert National Park, Saskatchewan) were abandoned and dismantled.

2.2 Collaborations

Strong collaborations exist in research conducted at Wolf Creek Research Basin between Pomeroy, Woo, Gray, Granger and Janowicz. A proceedings of the Wolf Creek Workshop has been published by NWRI with recommendations for GEWEX research in this region. Collaborations have been initiated with the Canadian Forestry Service with regard to using snow processes as hydrological indicators of climate change and with the Northern Rivers Ecosystem Initiative to develop distributed, process-based hydrological models.

3. Scientific Results

An early examination data from the field campaign of snow accumulation and ablation patterns in complex terrain (GB) showed widely differing patterns of accumulation and ablation fluxes with slope and evidence for control of winter accumulation patterns on spring melt volumes on hillslopes. The spring energy balance over this area is also extremely heterogeneous, with net radiation in early May on north facing slopes never exceeding 100 W m^{-2} , while that on south facing slopes and valley bottoms exceeding 800 W m^{-2} in mid-day.