PROCESSES AND PARAMETERIZATION OF HYDROLOGICAL CONNECTIVITY IN NORTHERN LANDSCAPES

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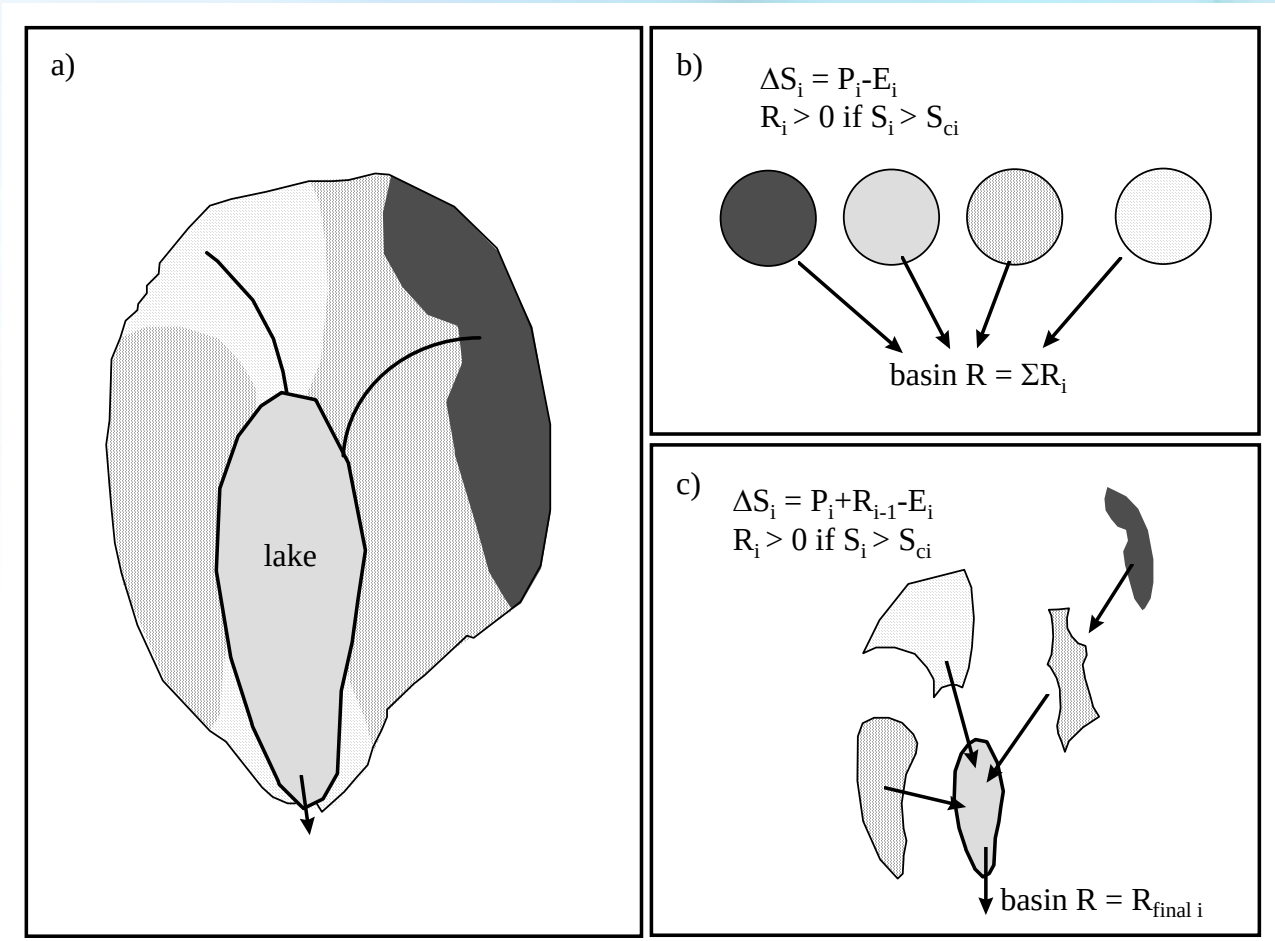
Heterogeneous northern catchments

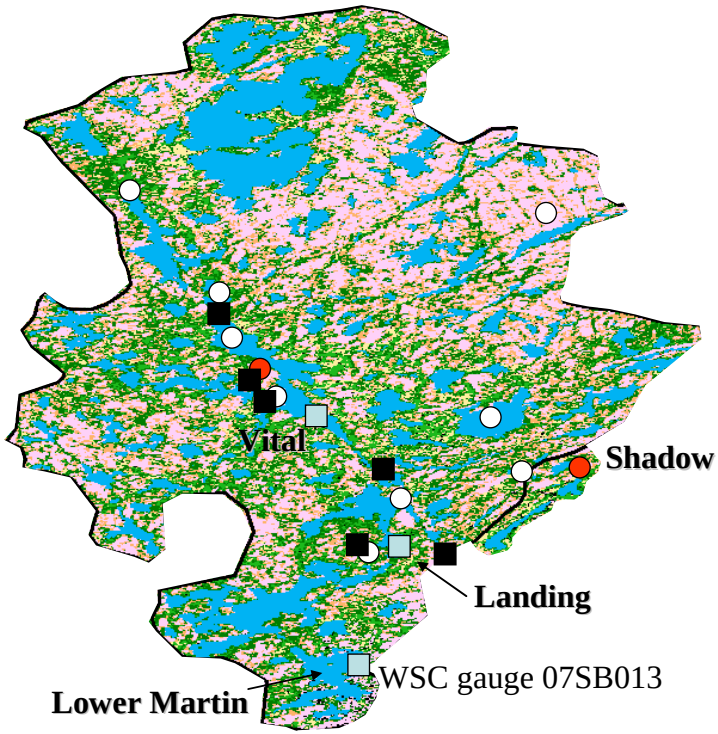
Collaborations

- Sean Carey, Carleton University
- Bill Quinton, Wilfred Laurier University
- Phil Marsh, Environment Canada
- Al Pietroniro, Environment Canada
- Ken Dies, NWT Power Corporation
- Bob Reid, Indian and Northern Affairs Canada

Hydrological connectivity



Research Basin

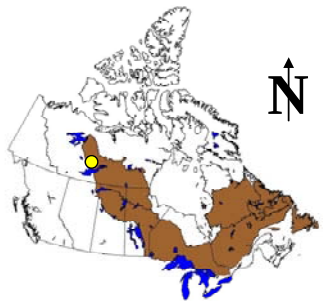


Land cover

- Water
- Conifers
- Mixed woods
- Deciduous forest
- Wetlands
- Tundra
- Exposed bedrock
- Recent burn
- Disturbed

Field instrumentation

- Water level and temperature
- Climate tower
- Snow course
- Well and soil moisture nest



Objectives / Hypotheses – Theme 1

- O1 - Determine the hydrological processes acting in water courses that could affect the streamflow response at the basin scale.
- O2 - Determine how headwater and basin scale processes interact to produce streamflow at the basin scale.
- H1 - Connectivity in the water course influences streamflow processes and patterns at the basin scale.
- H2 - Headwater processes influence basin scale response by controlling contributing areas to the water course.

Methodology

- Hydrological and hydrochemical approaches will be used to discern water sources at the landscape component and basin scales.
- Supplemented with contributing area mapping using satellite imagery (ie, Radarsat).
- These measurements will be used to establish storage – runoff relationships at different scales.

Objectives / Hypotheses – Theme 2

- O3 – Develop numerical representations of the processes identified in Theme 1 responsible for the streamflow regimes at the basin and/or grid scale.
- O4 – Incorporate these algorithms in diagnostic and predictive models
- H3 – Incorporating representation of landscape connectivity at the sub grid scale will improve water cycle simulation by environmental models
- H4 – Incorporating representation of water course connectivity will improve water cycle simulation by environmental models.

Methodology

- MESH and CRHM
- Models parameterized and run with and without new algorithms to determine the influence of the schemes on model simulations.
- Short and long simulations will be generated from which flood and low flow regimes can be generated. These will be compared with calculations of the regime using observed data.

Thank you!