NEWSLETTER

Improved Processes and Parameterisation for Prediction in Cold Regions

JUNE 2009

Welcome to the first newsletter dedicated to the IP3 users community!

This newsletter will be published approximately bimonthly and is meant to share the latest research developments from the IP3 research network as well as any new items of interest including workshop reports, upcoming workshop notifications and other outreach activities. The format for the newsletter will evolve over the next few months to better represent requested input from both scientists and users—please feel free to offer any suggestions, bricks or bouquets as this endeavor moves toward a meaningful publication for all!

Workshop Report

Coldwater Collaborative

In December of 2008, a major workshop was held in Canmore, Alberta on *Improving Water Security through Improved Observation and Prediction Networks.* Enhanced hydrological and meteorological monitoring and research at upper elevations in the mountains of the West were deemed essential in improving our understanding of climate change effects on glaciers, snowpack, and streamflow. The key outcome from the workshop proposed the creation of a new collaboration to develop, direct and interpret science in support of the Western Water Stewardship Council, which was recently formed by the Premiers of the western provinces and northern territories. This new collaboration is ***The Coldwater Collaborative:*** *The Mountain & Arctic Watershed Science, Research and Information Group*. The aim of this network will be to achieve synergy by sharing knowledge and building upon current initiatives through existing resources at partner institutions. This will allow participants to join together several water and climate science initiatives currently collecting data to be used in addressing water stewardship issues. The Coldwater Collaborative has a basic endorsement from the Western Water Stewardship Council and has approached GEO, the Group of Earth Observations, regarding establishment of a Rocky Mountain Observing System for enhanced observations and prediction of snow, ice, water and weather. The collaborative will be discussing a variety of options for future deployment of IP3 and WC2N technology and approaches with various partners.

High elevation monitoring site
Masaki Hayashi

Coldwater Collaborative Goals

The goals of the Coldwater collaborative are to:

1. Work with existing institutions, agencies, and private sector interests to *determine where new monitoring capacity should be established at upper elevations* in the western mountains, what new monitoring stations should be measuring, what new remote sensing technologies can be employed to do that monitoring, and how collected data will be stored and ultimately transferred into useful information that can be shared among users.
2. Support *improved watershed planning and integrated watershed management* by contributing to the assessment of the long term sustainability of western and northern Canadian water resources.
3. Enhance our collective ability to *assure water and related energy and food security* in this region by improving, understanding and sharing information to prepare for water supply changes from cycles of drought and excess precipitation.
4. Support *more efficient use of water* by providing new information on water resources that can underpin decision-making and policy development in western and northern Canada.

IP3 is offering a training course on CHRM, the Cold Regions Hydrological Model, in Winnipeg on Monday, 15 June 2009. Openings are available for 28 people interested in using process modelling to predict the hydrological cycle, primarily in cold regions. Registration or questions can be emailed to ip3.network@usask.ca

Coldwater Collaborative Objectives

Specific objectives to achieve the goals of the collaborative are to:

1. Generate comprehensive information on the state of western and northern water supply from existing information such as surface observations, satellite images, and model outputs using interactive databases and watershed-based assessments, predictions and analyses.
2. Predict and assess short and long term changes in water supply and streamflow due to drought, precipitation excess, deforestation, land use change, glacier retreat, permafrost thaw, groundwater depletion, and climate change through a series of watershed-based studies on water and climate interactions.
3. Communicate scientific findings, and develop and provide training and professional upgrading on advanced hydrological methods useful to governments, communities, and industry.

Coldwater Collaborative Proposed Structure

The Coldwater Collaborative is based on a partnership of western Canadian universities, industry and government agencies that share an interest in common goals. Early interest is identified in pooling science capacities from the University of Saskatchewan Centre for Hydrology, University of Regina Prairie Adaptation Research Collaborative, and University of Calgary Biogeoscience Institute. Other partners will be identified and invited to join the collaborative by contributing applied science, research capacity, and expertise through participating in jointly funded research and outreach. For more information on this initiative — please contact Bob Sandford at : *email* sandford@telusplanet.net or *phone* 403-678-4488

Coldwater Collaborative Initial Action Plan

The objectives will be addressed by the following action plan:

1. Improve the reliability of strategic information and its collection in support of water stewardship through pure and applied research on hydrology, glaciology, climatology, and ecosystem interactions in mountain and northern headwater watersheds, and critical downstream environments.

a) Improve the understanding and description of the governing factors for mountain and northern water supply through intensive process studies in representative research basins.

b) Analyze current observational arrays and supplement these in collaboration with government agencies.

c) Demonstrate the value of observations in supporting predictive capacity.

d) Enhance the use of earth observation by providing a mountain test site for development of Group on Earth Observations (GEO) water, snow, glacier, and climate products.

e) Advance observation methods and best practices for monitoring through research, development and testing of new instrumentations, methods, informatics, and application of existing technology for water and climate observation.

2. Encourage the greater use of monitoring data through the development and application of enhanced numerical techniques for water resource and related ecosystems, climate assessment and predictions.

a) Integrate surface, subsurface, and remote sensing data into information products.

b) Develop an improved suite of predictive models based upon improved numerical descriptions of processes.

c) Use improved models to predict impacts of land use and climate change on watersheds.

d) Reconstruct past and future climate and land use scenarios for water resource assessments.

e) Predict water resource dynamics in ungauged basins.

f) Predict streamflow and water temperature regimes in relation to aquatic ecosystem requirements.

3. Coordinate a collaborative approach to information collection and application for western and northern water supply issues.

a) Provide science, interpretation, and information sharing support for the Western Water Stewardship Council.

b) Demonstrate water resource applications, improved technology, adaptation strategies and best practices for water assessments and forecasts.

c) Demonstrate both ecosystem and economic services of watersheds under various management scenarios.

d) Coordinate with a broad range of international programmes such as those under the auspices of the World Climate Research Programme and the International Association of Hydrological Sciences.

4. Enhance training, knowledge translation, and communication for students, practitioners, and policy makers.

a) Organize workshops and conferences to promote the sharing of new techniques, research outcomes, and emerging knowledge.

b) Promote the training of students and professional upgrading with university credit courses on advanced cold regions hydrology and water resources techniques through collaboration with the Canadian Water Resources Association.

c) Translate knowledge into concepts that can be readily applied in aid of policy development and sustainable water management.

d) Prepare websites, books, and brochures that interpret hydrology, climatology, and related sciences for students, practitioners and the Canadian public.

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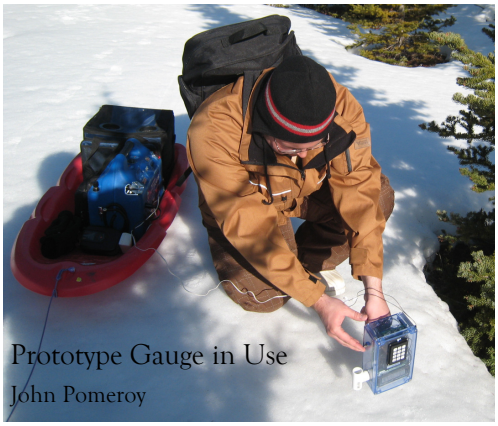
Ongoing Research

Marmot Creek Research uses innovative techniques for measuring snow depth

Nicholas Kinar is a PhD student working within the University of Saskatchewan's Centre for Hydrology, specializing in snow structure and acoustics. Last June, Nicholas won the Campbell Scientific Award for Best Student Paper at the 65th Eastern Snow Conference in Vermont for his paper—"Operational Techniques for Determining Snow Water Equivalent by Sound Propagation through Snow". Nicholas has been working on a method for determining the physical properties of snow using an acoustic wave. A loudspeaker mounted above the surface of the snowpack produces a sound pulse and the reflected wave from the snowpack is captured by a microphone assembly situated at an offset distance to the loudspeaker. Initial trials used a frequency-swept wave as the source signal, whereas more recent research has focused on the use of an acoustic Maximum length Sequence (MLS). This acoustic technique offers two key advantages—the ability to make measurements of physical properties of snow immediately in the field; and the ability to sample the same point multiple times to watch the evolution of changes that the snowpack undergoes—a nondestructive sampling process. To complement this non-invasive procedure, Nicholas is also working on a capacitor-cell device to determine snow properties using electromagnetic principles. The construction of research instrumentation will tentatively be finished at the end of summer 2009. During the snow accumulation season of 2009-2010, the devices will be interfaced to automated weather stations in the Marmot Creek research basin.



Prototype Gauge in Use
John Pomeroy

IP3 and WC²N Joint Workshop will be held in Lake Louise, Alberta, from 14 to 17 October , 2009. All members of the water resource community are welcome to attend. Registration information will be available later in the summer. Please mark your calendars with these dates!

Wolf Creek Field Camp Spring 2009
Sean Carey

IP3 Outreach is available for setting up cold regions model training sessions or meetings between scientists and users for sharing of information. Informational brochures are available for public distribution, including brochures on IP3 research focused in the north, IP3 research in the mountain watersheds, and an overview of the Cold Regions Hydrological Model (CHRM) and its structure and specifications.

Canadian Foundation for Climate and Atmospheric Sciences (CFCAS)
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