CGU Hydrology Section Committee Reports 2009

Erosion and Sedimentation Committee

Chair: Peter Ashmore, Department of Geography, University of Western Ontario, London, ON, N6A 5C2
Email: pashmore@uwo.ca

Members: Dr. Dirk DeBoer, University of Saskatchewan; M. Conly, Environment Canada (CWS), Saskatoon; Dr. M. Church, University of British Columbia; Dr. A. Roy, Université de Montréal

Dirk DeBoer is Secretary of the IAHS-International Commission on Continental Erosion Secretary and ICCE Canadian Delegate

Objectives: the scientific advancement and practical application of knowledge of erosion, transport and deposition of sediment in fresh water systems - topic coverage similar to that of the IAHS Commissions on Continental Erosion some aspects of Water Quality.
i) communication of current research via discussion, meetings, conferences and publications;
ii) identification and promotion of high priority research topics in the Canadian context;
iii) promotion and encouragement of the transfer of knowledge and technology in the field of interest.

Meetings & Activities

- Continued representation at CGU-HS sessions.
- Reciprocal membership arrangement and affiliation between CGU and Canadian Geomorphology Research Group has resulted in several sessions at other national conferences jointly between the two groups, including several joint sessions at 2008 CGU conference (for the first time) including a full day special session on sediment transport and landform dynamics with several invited speakers. Ashmore was a member of the program committee and helped coordinate sessions between the two organizations.
- Ashmore led the preparation of a summary of recent Canadian research in fluvial sedimentation for IAHS-CNC, with co-authors Pascale Biron (Concordia), Colin Rennie (Ottawa) and Brett Eaton (UBC). Now in press in CWRA Journal.
- Active participation at Joint Meeting in Toronto (May 2009) including: CGU sponsored session on *Binational Principle and Practices in Stream Restoration*, and Hydrology section sessions on *Models and Measurement of Sediment Transport* and *Advances in Measurement of Sediment Transport*. Ashmore is participating (invited) in GAC session on fluvio-glacial sediment transport and landforms.
- We anticipate some renewal of Committee membership over the next 1-2 years to bring in active, new researchers interested in developing committee activities.

Glaciers and Environment Committee

Chair: Michael N. Demuth, P. Eng., P. Geo., Head, Glaciology Section, Geological Survey of Canada, Natural Resources Canada, 601 Booth Street,

Ottawa, ON KIA 0E8,
Mike.Demuth@NRCan.GC.CA
Vice-Chair: Gwenn E. Flowers, Canada Research Chair, Glaciology, Simon Fraser University, gflowers@SFU.CA
Past-Chair: D. Scott Munro, University of Toronto

Advisory Members: Sarah Boon, University of Lethbridge; Shawn Marshall, University of Calgary; Brian Menounos, Univ. of Northern British Columbia; D. Scott Munro, University of Toronto; John W. Pomeroy, University of Saskatchewan; Jeffrey Schmok, P. Geo., Golder Associates Ltd.; Martin J. Sharp, University of Alberta.

Mandate and Objectives

a. Assist the CGU and its executive in promoting glaciological research that is relevant to hydrological and environmental problems.
b. Provide CGU members with information about glaciological research activity, and identify opportunities for collaboration among individuals and groups.
c. Provide CGU members with information about the scope and extent of glaciological data, and promote efforts to improve accessibility to such data.
d. Influence research development by establishing lines of communication with other working groups in snow and ice, such as the Cryospheric System (CRYSYS) to monitor global change in Canada and identify personnel training opportunities.
e. Identify and promote opportunities for educating other members of the scientific community and the general public about glaciers and their role in the environment.

Meetings and Activities

(a) *Evolution of the Cold Water Collaborative*

In December of 2008 a landmark workshop organised by the Western Watershed Climate Research Collaborative and supported by various government, academic and private sector institutions concerned with water security, was held in Canmore, Alberta. The workshop process reviewed the status of water monitoring and modeling in western Canadian watersheds, and charted a course towards enabling sustainable observations and improved prediction, in particular as it concerns elevation biases in most observation series relevant to prediction at a number of scales.

As a mountain & Arctic watershed science, research and information group, it was proposed that a "Cold Water Collaborative" be formed that would, in part, serve the technical needs of the Western Water Stewardship Council. The WWSC identifies key inter-jurisdictional water issues and immediate work plan priorities needed to serving the common water resources management interests of western and provinces and adjacent northern territories.

Conceived as a user-driven scientific collaboration, the Cold Water Collaborative would develop, direct, harness and interpret science in support of the WWSC work plans. It is envisioned that the collaborative will be composed of already existing expertise and institutional capacity, including western and northern water and climate science initiatives that are presently collecting data or undertaking science for the public good. For further details please contact John.Pomeroy@

USask.CA or Robert Sanford at sandford@telusplanet.net

(b) ***Interaction between the CFCAS research networks: Improved Processes, Parameterizations and Prediction in Cold Regions (IP3) and Western Canadian Cryospheric Network (WC2N)***

Several joint meetings between IP3 and WC2N have resulted in enhanced co-operation and opportunities for knowledge advancement and the training of HQP through these hydrologically thematic and regional research networks. In addition there has been the joint development of an Outreach Co-ordinator position that will serve to connect community and school groups with network members. For more information please see: http://www.usask.ca/ip3/

(c) "***State and Evolution of Canada's Glaciers" collaborative WWW Workspace and data portal at NRCan/GSC***

The State and Evolution of Canada's Glaciers initiative provides information and data products produced by the Federal Government's National Glacier-Climate Observing System (monitoring, assessment and data portal) and related freshwater vulnerability research in western and northern Canada.

The Glacier-Climate Observing System is delivered through an integrated monitoring and research collaborative comprised of Natural Resources Canada-Geological Survey of Canada (lead agency), Geomatics Canada-Canada Centre for Remote Sensing, Environment Canada-National Water Research Institute and Water Survey of Canada, Parks Canada Agency, C-CORE PolarView, and numerous academic partners.

An effort to renew access to basic data describing the mass balance of Canadian glaciers and ice caps is currently underway through the data portal of the State and Evolution of Canada's Glacier collaborative Workspace WWW site. At this time, the data comprise net mass balance time series for Canada's current reference network of mass balance glaciers. More detailed data on seasonal balances and specific variation by elevation are available through peer-to-peer collaboration. There is also a utility with which to submit new data on glacier fluctuations. These are compiled by the Canadian National Correspondent to the World Glacier Monitoring Service (WGMS) and periodically contributed to the WGMS on behalf of the observer/PI and Canada.

The Workspace also provides for the posting of announcements on new research results, publications and related events and news concerning Canadian glaciers. Please see: http://pathways.geosemantica.net/WSHome.aspx?ws=NGP_SECG&locale=en-CA

Other Correspondence:

(a) ***Legal Status of Glaciers in Canada***

Numerous institutions across Canada concerning themselves with glaciers have been contacted by officials from Chile, asking whether glaciers had any specific legal status in Canada (viz. Argentina has declared glaciers as "protected").

Considerable discussion has been had internally and amongst Canadian institutions that perhaps the CGU-HS Committee on Glaciers and Environment consider developing a position paper that would investigate and clarify the status

of glaciers in Canada as it concerns the legal and resource attributes of perennial snow and ice masses.
With the exception of their status in protected areas such as National Parks (which is clear), it would be instructive to convene a sub-committee comprised of technical, natural resource policy and legal experts to examine their disposition as it concerns private and crown lands, aspects of First Nations and jurisdictional limits concerning surface and sub-surface resources. Further it is worthy to examine to what extent, within practical human adaptation planning horizons, glaciers are to be considered a renewable resource. This has clear implications for regional energy mix considerations and carbon trade and cap.

(b) ***Citation of Canadian mass balance data***
There is a persistent problem arising whereby data collected and analysed by Canada's National Glacier-Climate Observing System (NG-COS) at NRCan/GSC is either not being cited or acknowledged; or reference is given to third-party compilations which: i) contain errors, and ii) do not acknowledge the PIs and institutions who work tirelessly to maintain long-term monitoring and assessment programs.
The co-ordinator of NG-COS has discussed this with the Director of the WGMS and other National co-ordinators, concluding that this lack of acknowledgment will only lead to the further decline of support for long-term mass balance study in member nations contributing to the UNFCCC process through WMO's Global Terrestrial Network for Glaciers (a component of the Global Climate Observing System).

These data culture concerns were also discussed during the inaugural Canadian meeting introducing the Global Cryosphere Watch initiative. Critical was the need to recognize the aspect of "reprocessing" in the data chain, and that periodic reassessments and reviews of past data may affect the provision of data according to academic or operational schedules.

In the lab and field:
(a) During 2008, several Journal Special Issues concerning the implication of glacier and cryosphere diminution on hydrology and eco-hydrology were published. Notably these international perspectives included some of the work conducted by numerous Canadian glaciologists and hydrologists:

(i) Terra Glacialis: Special Issue – Mountain Glaciers and Climate Changes of the Last Century (L. Bonardi, Editor)

(ii) Hydrological Processes 21(1): Special Issue – Hydrologic Effects of a Shrinking Cryosphere (T.D. Prowse, Editor)

(iii) Canadian Water Resources Journal 34(2): Recent Advances in Canadian Hydrology. (JW Pomeroy and RD Moore, Editors). Canadian Glacier Hydrology 2003-2007 (Boon, Flowers and Munro)

(b) Canadian International Polar Year project GLACIODYN, funded by NSERC's IPY program and focused on Arctic tidewater glacier response to climate change, is completing work this year. See http://people.uleth.ca/~sarah.boon/IPY_page for details.

(c) The Western Canadian Cryospheric Network (WC2N) has made significant advances on constructing contemporary glacier inventories for Alberta and British Columbia and conducting change detection studies relative to glacier morphometry and small glacier contribution to sea level rise.

(d) As part of WC2N, UBC researchers continue to define the effects of glacier contraction on streamflow regionally including studies of future contributions from glacierized catchments as glacier contraction continues.

(e) GSC Glaciology Section and NWRI have completed a detailed contemporary inventory of Rocky Mountain eastern slope glaciers (Nelson River System) and related inferred volume changes to streamflow volumes as a function of glacier cover fraction. This and related work points to small-glacier diminution dominating this leeward slope continental setting and evidence of declining streamflow contributions from glaciers in late summer.

(f) GSC Glaciology Section has engaged PCA mountain block and northern bioregion National Parks in regards to developing glacier indicator measures for Ecosystem Integrity Monitoring and State of the Park Reporting. GSC, Jasper, Banff and Yoho Parks will be installing mass balance programs on the Athabasca, Saskatchewan and Yoho Glaciers to augment current work by the GSC at Peyto and Ram River. Laser altimetry will continue to feature in these measurements through GSC collaboration with C-CLEAR and NASA-Wallops. In some cases the expanded activity in the mountain block Parks involves partnerships with academic investigators (e.g., Illecillewaet Neve, Glacier/Mount Revelstoke National Park and the University of Calgary).

(g) GSC Glaciology Section with support from PCA Nahanni National Park Reserve has completed a detailed inventory of glaciers in the Greater Nahanni Ecosystem and with it conducted change detection and glacier morphometric studies spanning LIAmax-1949-1982-1999-2008. The changing influence of glacier cover on flows in the Flat and S. Nahanni Rivers will be studied using WSC-RHBN historical streamflow data and a hydrological model.

Details pertaining to these and other advances can be found under the *Announcements* link of the NRCan Pathways Collaborative Workspace "*State and Evolution of Canada's Glaciers*": http://pathways.geosemantica.net/

Northern Research Basins Committee

Chair and Canadian Chief Delegate:
Kathy L. Young, Geography Department, York University

One of the main activities of the CGU-HS Northern Basins Committee during the last year has been the organization of the 17th NRB meeting. Canada will be hosting the 17th International Northern Research Basins (NRB) Symposium & Workshop in the Eastern Canadian Arctic **August 12-18, 2009.** The symposium/workshop will be held on an Inuit owned expedition ship which will travel from Iqaluit to Pangnirtung and then onto Kuujjuaq. The conference theme is **Managing Hydrological**

Uncertainty in High Latitude Environments. Planned sessions include: *Prediction of Precipitation in Ungauged Northern Basins*; *Northern Lake Systems*; *Hydrology & Ocean Interactions*, *Climate*, *Cryosphere*, *Hydrosphere* and *Arctic Hydrology & Uncertainty*. The 17th NRB has invited two guest speakers: Dr. Larry Hinzman, International Arctic Research Institute, University of Alaska, Fairbanks, and Dr. Robbie Macdonald, Department of Fisheries & Oceans, Environment Canada. The 17th NRB delegation will also meet with community members in Iqaluit and Kuujjuaq and will hold an Open House/Workshop in the hamlet of Pangnirtung. Similar to previous NRB meeting, time will be set aside for field trips and cultural events. To date we have 60 scientists registered from **ALL** circumpolar countries and about 10 guests making this one of the biggest NRB meetings. Full details of the meeting can be found at www.northernresarchbasins.com/17NRB

As outlined in the NRB Mandate and the Canadian NRB terms of Reference, the Canadian participation in the NRB meeting is limited to 10 delegates appointed by the Canadian Chief Delegate (and approved by the CGU-HS Executive) to represent Canadian interest in the hydrology of northern areas. Given that Canada is hosting this event in 2009, it is also allowed to invite other Canadian scientists as observers and their names and affiliation can be found on the website posted above. The Canadian Chief Delegate to the 17th NRB meeting will be Kathy Young, York U. Chris Spence, Environment Canada will be the Deputy Chief Delegate. While a slate of 10 Canadian Delegates was submitted to the CGU-HS for approval in Jan.'09, only nine have since registered, and they are as follows:

Dr. Terry Prowse, University of Victoria: cold regions hydrology with special focus on river ice, lake ice and snow. Terry also holds a Canada Research Chair.
Dr. Chris Spence, NWRI: sub-arctic hydrology and Deputy Delegate, Canadian NRB
Mr. Richard Janowicz, Yukon Gov't: cold regions hydrology and operational water resources, member of the 17th NRB organizing committee
Dr. Kathy L. Young, York University: high arctic environments and Chief Delegate, Canadian NRB
Dr. Scott Lamoureux, Queen's University: watershed hydrology and geomorphology, high arctic environments, P.I. of an ArcticNet project.
Dr. Faye Hicks, Water Resources Engineering, University of Alberta: northern river ice jams and break-up. Faye is a Full Professor and engineer. She was recently involved in the MAGS project.
Dr. Michael (Mike) Demuth, Glaciology, NRCan: Head of Glaciology, NRCan, glacier mass balance, Northern Canada climate change and human impacts.
Dr. Sean Carey, Carleton University: runoff processes in sub-arctic environments, member of the 17th NRB organizing committee
Dr. William (Bill) Quinton, Wilfrid Laurier University: sub-arctic hydrology. Bill holds a Canada Research Chair, and is a member of the 17th NRB organizing committee

Information about Canadian NRB activities can be found at

www.canadiannrb.com or contact Kathy L. Young for more details: klyoung@yorku.ca.

Forest Hydrology Committee

Major activities related to forest hydrology in 2008-2009 revolved around the participation of Canadian forest hydrologists in a number of hydrology-related workshops:

1. Discussion Session: Potential Effects of Climate Change on Watershed Processes, Cranbrook, BC, October 8, 2008. A discussion session was organized by the BC MFR (Robin Pike) to gather experts to discuss potential climate change implications on watershed processes. This meeting was part of the BC MFR's Future Forest Ecosystems Initiative (FFEI), and was attended by around 20 watershed scientists.

2. Field workshop at Cotton Creek Experimental Watershed, Cranbrook, BC, October 9, 2008. The aim of the workshop was to present results to date on the effects of forest harvesting on watershed processes. The workshop was attended by industry, government and private sector consultants, with 34 total participants.

3. Workshop on "Mountain Pine Beetle and Water Management", June 2, 2009, Kelowna, BC. This workshop (102 participants) had 11 presentations and a panel discussion on topics related to implications of the current MPB infestation for water providers in BC. The workshop handbook will be available on the FORREX website (www.forrex.org) in July, and a summary article will be published in Streamline (http://www.forrex.org/publications/streamline/streamline.asp) in Fall 2009.

4. Workshop on "Wildfire and Watershed Hydrology", June 3-4, 2009, Kelowna, BC. This workshop (105 participants) had 23 presentations and a panel discussion on topics related to recent process and mitigation research on wildfire effects on hydrology and geomorphology. The workshop handbook will be available on the FORREX website (www.forrex.org) in July, and a summary article will be published in Streamline (http://www.forrex.org/publications/streamline/streamline.asp) in Fall 2009.

Another area of activity was the annual western and eastern graduate student conferences sponsored by the CGU-HS. The western conference was sponsored by the University of Lethbridge and was held on January 31, 2009 at the new Alberta Water and Environmental Science building. The meeting was attended by 36 students, with 20 oral presentations and 1 poster presentation, some of which dealt with aspects of forest hydrology. The eastern conference was sponsored by the University of Toronto and was held on December 6, 2008 at the Frost Centre in Minden, ON. The meeting was attended by 25 students, with 14 oral presentations and 6 poster presentations, some of which involved research into forest hydrological processes and properties.

Canadian National Committee for the IAHS Prediction in Ungauged Basins Initiative (CNC-PUB)

Chair: Christopher Spence, Environment Canada, Saskatoon, SK S7N 3H5, chris.spence @ec.gc.ca
Vice Chair: Paul Whitfield, Environment Canada, Vancouver, BC V6C 3S5, paul.whitfield@ec.gc.ca
CWRA Members at Large: Taha Ouarda, Institut national de la recherche scientifique, Québec
Al Pietroniro, Environment Canada, Saskatoon, SK
CGU-HS Members at Large: John Pomeroy, Centre for Hydrology, University of Saskatchewan (CGU-HS)
Robert Metcalfe, Renewable Energy Section, Ontario Ministry of Natural Resources

Objective and Roles

The objective of CNC-PUB is to coordinate and communicate IAHS's PUB program in Canada.

The roles of the CNC-PUB are defined as follows:

- Liaising with water resource managers and government agencies in the development of programs supportive of the PUB initiative,
- Supporting PUB working group implementation and funding in Canada,
- Supporting outreach of working group scientific progress,
- Encouraging technology transfer from working groups,
- Reporting to CGU-HS and CSHS on Canadian PUB activities and
- Reporting to IAHS on Canadian PUB activities through CNC-IAHS and the PUB SSG.

Progress on Issues and Objectives

The Improved Processes, Parameterization and Prediction in Cold Regions (IP3) initiative is into its final year of funding by the Canadian Foundation for Climate and Atmospheric Sciences. IP3 is registered as a cold regions working group with the international PUB initiative (http://pub.iwmi.org/UI/Images/PUB_WG16_IP3%20in%20Cold%20Regions.pdf). More information on IP3 specifically can be found at www.usask.ca/ip3.

In support of the Canadian water resource community and PUB working group 17, Low Stream Flows and Hydrologic Drought, the proceedings of a prediction of low flows workshop held in Québec City at INRS_ETE in April 2007 were published in the Canadian Water Resources Journal in June 2008. The special issue provided the latest information on low flows practice and research, especially as it pertains to predictions in ungauged basins. The workshop themes included measuring low flows, regional processes of low flow, low flows in practice, predictive approaches, and the future of low flow research.

The Benchmark Assessment of Predictions in Ungauged Catchments is currently in progress. It will contain a review of the current state of hydrological predictions in the absence of data, addressing where we are now, what we have achieved in the past 4 years, and what are the challenges for the remaining years.

An invited paper on Canadian progress with the PUB initiative was presented at the AGU in December 2008.

Future Meetings and Activities

There are some who wish to continue pursing a model intercomparison project as was proposed at the 2007 IUGG. Progress has been slow within CNC-PUB to pursue this idea within Canada, but the Canadian community, especially the practicing hydrologists, has been keen. One possibility is to apply for an NSERC strategic workshop grant to help our community design a research plan.

Some effort should be made to consolidate Canada's contributions to the PUB initiative as we enter the last few years of the programme.