

## **CGU-HS Committee on Isotopic Tracers Annual Report (2016-17)**

### **Committee Directorship**

Trish Stadnyk (Chair), University of Manitoba

Jean Birks (past Chair), Alberta Innovates- Technology Futures, University of Waterloo

Tom Edwards, University of Waterloo

John Gibson, Alberta Innovates- Technology Futures, University of Victoria

Claude Hillaire-Marcel, GEOTOP-UQAM

Bernhard Mayer, University of Calgary

Fred Michel, Carleton University

Brent Wolfe, Wilfrid Laurier University

### **Background:**

The CGU - HS Committee on Isotopic Tracers was originally established in 1997 to support and facilitate information exchange between isotope specialists and hydrologists both within Canada and internationally, and to address issues of importance to isotopic investigations including integration within broadly-based hydroscience research programs. In 2014, CGU Hydrology Section dissolved all sub-committees, and re-established only those who were active, including the Isotope Tracer Committee. Recognizing and supporting promising applications of isotopic tracers, promoting cooperative research, providing information resources, and articulating research and educational needs to government agencies, universities, and the general hydrology community are the fundamental aims of the Committee.

### **Objectives and Activities:**

The long-term objectives of the committee are to:

- promote and advance the understanding and application of isotopic tracer techniques in hydrology and related sciences
- initiate and participate in research and education programs, maintain contact with relevant organizations, report on national and international research activities, information sources, isotope monitoring networks, and databases
- establish working groups and/or subcommittees to assess specific, high-priority topics for research, monitoring and/or development, and
- disseminate current research and important findings to the scientific community via discussion, meetings and conferences, and publications

### **Progress on Issues and Objectives:**

Tracer committee members continue to be active in the promotion and advancement of the understanding and application of isotopic tracer techniques in hydrology and related sciences. Some highlights from 2016-17 include:

#### ***National: Water Survey of Canada Isotope Network***

The Water Survey of Canada, in cooperation with the University of Manitoba, University of Victoria, and Alberta Innovates Technology Futures, continues to support the national pilot of an operational isotope network in conjunction with their hydrometric network, similar the existing isotope-hydrometric network in the United States. The goal is to demonstrate the value in systematic collection of river discharge in tandem with analysis for oxygen-18 and deuterium across Canada.

Stable water isotope collection across Canadian hydrometric gauges wraps up this year (2017) and concludes with a final report (due September 2017) (Figure 1). The goal was to utilize water isotopes to gain insight into the sources of streamflow (rain, snow, groundwater, wetlands, glaciers etc.) and their spatio-temporal variability, to characterize open-water evaporation losses and to partition evapotranspiration, to assist in parameterization of isotope-capable hydrological models such as isoWATFLOOD, and to assist in water quality, ecological studies, and net primary productivity estimation. The activities form part of Canada's contribution to the Global Network of Isotopes in Rivers, a network coordinated by the International Atomic Energy Agency. For further information please contact John Gibson, [jjgibson@uvic.ca](mailto:jjgibson@uvic.ca)



Figure 1. Water Survey of Canada Isotope Network: A contribution to the Canadian Network for Isotopes in Rivers

***International: Isotope Tracing of Human Impacts on Water Balance and Nutrient Dynamics of Large Canadian River Basins***

A team of members of the Isotope Tracer Committee of the Canadian Geophysical Union is participating in an International Atomic Energy Agency (IAEA) Coordinated Research Project (CRP F33021) entitled: Application and Development of Isotope Techniques to Evaluate Human Impacts on Water balance and Nutrient Dynamics of Large River Basins. The Canadian project, initiated in April 2014 and entitled *Isotope Tracing of Human Impacts on Water Balance and Nutrient Dynamics of Large Canadian River Basins*, is Coordinated by Jean-François Hélie (Geotop-UQAM) and supported by John Gibson (University of Victoria & AITF). Six teams from across Canada support this Canadian CRP and are led respectively by Jean-François Hélie (Eastern), John Gibson (Western), Trish Stadnyk (Prairies), Ian Clark (Northern), Fred Longstaffe (Great Lakes) and David Soto (Maritimes). The CRP aims at coordinating Canadian efforts in assessing human impacts on large river systems using isotope tracers. Now that almost all the respective networks are operational, we hope to expand from tier 1 to tier 2 sampling in the coming months for some targeted sites. We also hope to strengthen the interactions between the teams by organizing an informal meeting and create a database of published Canadian river isotopic data.

For information contact Jean Francois Hélie ([helie.jean-francois@uqam.ca](mailto:helie.jean-francois@uqam.ca)).

***Regional Research Initiatives***

The Geotop-UQAM research group has specifically been developing new approaches for groundwater recharge, including: (1) The Research facility on Groundwater recharge (IRRES) see at <http://www.geotop.ca/en/laboratories/liste-complete-des-laboratoires/10-labo/1387-infrastructure-de-recherche-sur-la-recharge-des-eaux-souterraines-irres.html>, and (2) The Laboratory of Water Resources geochemistry (<http://www.geotop.ca/en/laboratories/liste-complete-des-laboratoires/10-laboratoires/1172-laboratoire-de-geochimie-des-eaux.html>), a laboratory dedicated to groundwater dating (SF6 and CFC's analyses), recharge quantification, GW contamination and discharge quantification. For more information, please contact Florent Barbecot ([barbecot.florent@uqam.ca](mailto:barbecot.florent@uqam.ca)).

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From McMaster, research using stable isotopes of water to examine plant-water-stream linkages in Wolf Creek, Yukon is on-going. This includes sampling of vegetation, soils, groundwater and streams for their isotope composition throughout the entire year. The objective of the program is to contribute to the European Research Council's VeWa projects (Vegetation effects on water flow and mixing in high-latitude ecosystems) led by Dr. Doerthe Tetzlaff. An overarching goal is to establish how plant water use will possibly alter signals of climate change. The second project is to use stable isotopes to track sources of water in a reclaimed oil sands wetland. Oil sands process affected water has a distinct isotope signature associated with extraction process, and we are using this signature to help track the movement of water in the reclaimed wetland to identify areas where this water is influencing overall chemistry. For more information, please contact Sean Carey ([careysk@mcmaster.ca](mailto:careysk@mcmaster.ca)).

The Wilfrid Laurier team continues to employ isotope tracers in water ( $\delta^{18}\text{O}$ ,  $\delta^2\text{H}$ ), dissolved inorganic carbon ( $\delta^{13}\text{C}$ ) and sediment ( $\delta^{13}\text{C}_{\text{organic matter}}$ ,  $\delta^{15}\text{N}$ ,  $\delta^{18}\text{O}_{\text{cellulose}}$ ) of lakes and rivers in northern lake-rich thermokarst landscapes to identify the consequences of climate change and increasing avian populations on aquatic ecosystems. Research centers on ecologically-significant regions of northern Yukon Territory (Old Crow Flats / Vuntut National Park) and northern Manitoba (Wapusk National Park). Parks Canada has adopted the use of water isotope tracers into their aquatic ecosystem monitoring program for Vuntut National Park (since 2012) and Wapusk National Park (since 2016), building upon previously obtained 5- and 6-year datasets, respectively. Conclusion of the NSERC Discovery Frontiers program ADAPT (*Arctic development and adaptation to permafrost in transition*) generated several isotope-related publications, several of which will appear in a special issue of *Arctic Science*. Water isotope tracers were used to assess high arctic runoff processes [Lamhonwah et al. 2017ab], thermokarst lake hydrology in Nunavik [Narancic et al. 2017], and past and present hydrological and limnological conditions in Old Crow Flats [Balasubramaniam et al. 2017; Tondou et al. 2017]. Synthesis papers include synopses of recent paleolimnological studies of thermokarst lakes in Canada, Alaska and Siberia [Bouchard et al. 2017] and meta-analysis of water isotope data from 376 thermokarst lakes across subarctic North America [MacDonald et al. 2017]. Water isotope tracers are also being used as a foundational hydrological monitoring tool for research in the Peace-Athabasca Delta (PAD), northern Alberta. The PAD is a large freshwater landscape world-renowned for its ecological, historical and cultural significance, yet is threatened by multiple potential stressors including climate change, hydroelectric development and oilsands production. Supported by an NSERC CRD, research aims to 1) track relations among climate, river flow and lake hydrological conditions in the delta, and 2) link the spatial distribution of contaminants (polycyclic aromatic compounds, metals) and their toxicity characteristics in the delta with hydrological pathways and limnological conditions. Knowledge gained will be used to generate an accurate risk assessment and establish the foundation of a state-of-the-art monitoring framework for the delta. For more information, please contact Brent Wolfe ([bwolfe@wlu.ca](mailto:bwolfe@wlu.ca)).

From the University of Manitoba Water Resources Engineering (Hydrology) group, our work on North American isoscapes concluded with the recent publication of a study comparing isotope in precipitation forcing and uncertainties related to isotope-enabled hydrologic modelling (Delavau et al, 2017). Regional isotope monitoring is on-going in lower Nelson River basin, with >3,200 samples collected to date (2010-present) and analyzed for  $\delta^{18}\text{O}$  and  $\delta^2\text{H}$ , along with precipitation and groundwater sources, all of which will be made available through the IAEA GNIR project database. Development work on isotope-enabled catchment process-based hydrologic models continues (Smith et al., in preparation). Most recently,  $\delta^2\text{H}$  was added to isoWATFLOOD enabling the simulation of continuous in time isotopic frameworks at the regional scale (Holmes, 2016). We are also advancing the application of iso-hydrologic modelling tools in the areas of evapotranspiration partitioning and transit time distribution modelling (Smith et al., in preparation). For more information, contact Trish Stadnyk ([tricia.stadnyk@umanitoba.ca](mailto:tricia.stadnyk@umanitoba.ca)).

This year was the first year the Isotope Tracers in Catchment Hydrology course, designed and offered by Jeff McDonnell from University of Saskatoon, ran Nov 7-10 2016 at the Global Institute for Water Security / National Hydrology Research Centre. The course was well attended by

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students and had over 30 online participants, mostly from the USGS. We plan to offer the course again this coming fall 2017, and it is available to graduate students from outside U of S via the Western Canadian Dean's Agreement (<http://wcdgs.ca/western-deans-agreement.html>). For more information, or if you are interested, contact Jeff McDonnell ([jeffrey.mcdonnell@usask.ca](mailto:jeffrey.mcdonnell@usask.ca)).

### Recent (2016-17) Publications noted by Committee membership:

Arnoux, M., Barbecot, F., Gibert-Brunet, E., Gibson, E., Noret, 2017. Impacts of changes in groundwater recharge on the isotopic composition and geochemistry of seasonally ice-covered lakes: insights for sustainable management. Accepted to HESS

Arnoux, M., Barbecot, F., Gibert-Brunet, E., Gibson, J., Rosa, E., Noret, A., Monvoisin, G., 2017. Geochemical and isotopic mass balances of kettle lakes in southern Quebec (Canada) as tools to document variations in groundwater quantity and quality. *Environmental Earth Sciences* 76 (3), art. no. 106.

Saby, M., Larocque, M., Pinti, D., Barbecot, F., Gagné, S., Barnetche, D., Cabana, H., 2017. Regional assessment of concentrations and sources of pharmaceutically active compounds, pesticides, nitrate, and *E. coli* in post-glacial aquifer environments (Canada). *Science of the Total Environment* 579, 557-568.

Delbart, C., Valdés, D., Barbecot, F., Tognelli, A., Couchoux, L., 2016. Spatial organization of the impulse response in a karst aquifer. *Journal of Hydrology* 537, 18-26.

Meyzonnat, G., Larocque, M., Barbecot, F., Pinti, D.L., Gagné, S., 2016. The potential of major ion chemistry to assess groundwater vulnerability of a regional aquifer in southern Quebec (Canada). *Environmental Earth Sciences* 75 (1), art. no. 68, 1-12.

Saby, M., Larocque, M., Pinti, D.L., Barbecot, F., Sano, Y., Castro, M.C., 2016. Linking groundwater quality to residence times and regional geology in the St. Lawrence Lowlands, southern Quebec, Canada. *Applied Geochemistry* 65, 1-13.

Balasubramaniam AM, AS Medeiros, KW Turner, RI Hall and BB Wolfe. 2017. Biotic responses to multiple aquatic and terrestrial gradients in shallow subarctic lakes (Old Crow Flats, Yukon, Canada). *Arctic Science (ADAPT special issue)* (in press).

Bouchard F, LA MacDonald, KW Turner, JR Thienpont, AS Medeiros, BK Biskaborn, J Korosi, RI Hall, R Pienitz and BB Wolfe. 2017. Paleolimnology of thermokarst lakes: a window into permafrost landscape evolution. *Arctic Science (ADAPT special issue)* (in press).

Lamhonwah D, MJ Lafreniere, SF Lamoureux and BB Wolfe. 2017a. Evaluating the hydrological and hydrochemical responses of a High Arctic catchment during an exceptionally warm summer. *Hydrological Processes* (in press).

Lamhonwah D, MJ Lafreniere, SF Lamoureux and BB Wolfe. 2017b. Multi-year impacts of permafrost disturbance and thermal perturbation on High Arctic stream chemistry. *Arctic Science (ADAPT special issue)* (in press).

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- MacDonald LA, BB Wolfe, KW Turner, L Anderson, CD Arp, SJ Birks, F Bouchard, TWD Edwards, N Farquharson, RI Hall, I McDonald, B Narancic, C Ouimet, R Pienitz, J Tondu and H White. 2017. A synthesis of thermokarst lake water balance in high-latitude regions of North America from isotope tracers. *Arctic Science (ADAPT special issue)* (in press).
- Narancic B, BB Wolfe, R Pienitz, H Meyer and D Lamhonwah. 2017. Landscape-gradient assessment of thermokarst lake hydrology using water isotope tracers. *Journal of Hydrology* 545: 327-338.
- Tondu JME, KW Turner, JA Wiklund, BB Wolfe, RI Hall and I McDonald. 2017. Limnological evolution of Zelma Lake, a recently drained thermokarst lake in Old Crow Flats, Yukon, Canada. *Arctic Science (ADAPT special issue)* (in press).
- Delavau, C., Stadnyk T.A. (accepted). Simulating Oxygen-18 throughout the hydrologic cycle utilizing isoWATFLOOD with time series  $\delta^{18}\text{O}_{\text{ppt}}$  forcing. Submitted to *Hydrol. Earth Sys. Sci.* 2016-539.
- Smith, A., T.A. Stadnyk (2016). Assessment of a lumped coupled flow-isotope model in data scarce Boreal catchments. Accepted by *Hydrol. Processes*. doi: 10.1002/hyp.10835.
- Holmes, 2016. Assessing the Value of stable water isotopes in hydrologic modelling: a dual-isotope approach. M.Sc. Thesis, department of Civil Engineering, University of Manitoba. 200p. <http://hdl.handle.net/1993/31724>



## Committee on River Ice Processes and the Environment (CGU-HS)

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May 1<sup>st</sup>, 2017

Barret Kurylyk  
Member-at-Large  
CGU-Hydrology Section

### **RE: CRIPE 2017 ANNUAL REPORT TO THE CGU-HYDROLOGY SECTION**

Dear Dr. Kurylyk,

The Committee on River Ice Processes and the Environment is pleased to submit our annual CRIPE report to the CGU Hydrology Section.

#### CRIPE OBJECTIVES

The main objectives of CRIPE are:

- To organize biennial workshops in Canada in order to share the most recent research and practical advancements in river ice engineering and cold regions hydrology
- To facilitate information dissemination and exchange of ideas on river ice among practitioners, researchers, and resource managers
- To promote the undertaking of research programs on high-priority river ice topics
- To support the education of future experts, engineers and scientists, in cold regions river

#### RECENT AND FUTURE ACTIVITIES

The last biennial CRIPE workshop was hosted in Quebec City in 2015 (85 participants, 32 papers and 12 posters). In May 2016, the annual CRIPE Meeting (administrative and technical discussions among members) was held in Ann Arbor, MI, USA concurrently with the 23<sup>rd</sup> IAHR Ice Symposium. A number of CRIPE members also actively participated to the CGU Meeting in Fredericton, NB.

The next CRIPE Workshop and Meeting will be held in Whitehorse, YK, in July 2017, with 42 papers and 10 posters. CRIPE recognizes the importance of student involvement in our workshops both as a way to bring new research to the ice engineering community but also as a way to transfer knowledge (which may not be documented in technical papers and articles) from the more experienced members. As the ice engineering community is relatively small, our biennial workshops are an excellent opportunity for students to network with experienced, nationally renowned researchers and engineers in a very personalized setting. To encourage more student attendance and involvement at our workshop, CRIPE offers significantly discounted registration fees for all students and provides a \$500 travel grant for students who are presenting and are the first author of a paper or poster. At each workshop, there are also student awards for the best student paper and poster.

CRIPE also presents awards (Michel Award, Davar Award) for a significant contribution in the field of river ice engineering and research. The best paper of each Workshop is also decorated by the prestigious Gerard Medal.

Finally CRIPE takes on special initiatives:

- In 2013, the committee published a book entitled “River Ice Formation” edited by CRIPE member Spyros Beltaos,
- In 2017, the committee will support the publication of a special issue in Water on the topic of river ice and the environment with a specific focus on water quality and habitat,
- CRIPE has three active Working Groups on relevant river ice topics: (1) ice-induced flood risk delineation (3 papers published and more to come), (2) river ice safety (1 paper published), and (3) impact of climate change on river ice processes (many papers to come).

### CRIPE MEMBERSHIP

CRIPE currently has 16 Canadian members from various universities, hydroelectric agencies and government organizations, as well as 3 international members and 9 affiliate members:

#### Members

Mike Morris, (Chair) Manitoba Hydro  
Shawn Clark, (Vice-Chair) University of Manitoba  
Martin Jasek, (Treasurer) BC Hydro  
Benoit Turcotte, (Secretary) Université Laval  
Robyn Andrishak, AMEC Earth & Environmental  
Amir Ali Khan, Gov't of Newfoundland and Labrador  
Brian Burrell, Amec Foster Wheeler Env. & Infrastructure  
Nadia Kovachis, Government of Alberta  
Karl-Erich Lindenschmidt, Univ. of Saskatchewan  
Karen Dow, University of Manitoba  
Mark Loewen, University of Alberta  
Joe Groeneveld, Hatch Energy  
Yuntong She, University of Alberta  
Dan Healy, Northwest Hydraulic Consultants  
Bernard Trevor, Government of Alberta  
Yves Gauthier, INRS

#### International Members

Knut Alfredsen, Norwegian Univ. of Science and Tech.  
Mikko Huokuna, Finnish Environment Institute  
Edward Kempema, University of Wyoming

#### Affiliate Members

Faye Hicks, retired from University of Alberta  
Spyros Beltaos, Environment Canada  
Brian Morse, Université Laval  
Steven Daly, retired from ERDC/CRREL  
Hung Tao Shen, Clarkson University  
Rick Carson, KGS Group  
Evan Friesenhan, Government of Alberta  
Terry Prowse, Environment Canada  
Chris Katopodis, Katopodis Ecohydraulics Ltd.

The membership is updated during each annual meeting and members are asked to commit for a 2 year or a 4 year period.

I hope this communication will satisfy the requirement of our 2017 committee report and CRIPE's status as a committee on the CGU-Hydrology Section will be extended.

Yours truly,



Michael Morris, M.Sc., P.Eng  
CRIPE Chair

**Northern Research Basins Committee**  
***J R. Janowicz, Canadian Chief Delegate***  
***Water Resources Branch***  
***Yukon Department of Environment***  
***Whitehorse, YT***

The main activities of the CGU-HS Northern Basins Committee during the last year have been focused on preparing for the 21<sup>st</sup> Northern Research Basins Symposium and Workshop in Yakutsk, Russia, August 05 - 12, 2017. The main theme of the 20th NRB is “Cold-region hydrology in non-stationary world”. Details of the meeting can be found at: [NRB2017.ru](http://NRB2017.ru). As outlined in the NRB Mandate and the Canadian NRB Terms of Reference, Canadian delegates are invited by the Chief Canadian Delegate and approved by the CGU-HS Executive. The 2017 delegation represents a diversity of expertise in cold regions hydrology. The delegation includes representatives from the Yukon Territorial Government, McMaster University, Wilfred Laurier University and York University. Delegates also include one PhD student which contributes to ensuring the long term viability of Canadian participation in the NRB.

The Canadian delegation to the 21<sup>st</sup> NRB in Yakutsk, Russia are listed below.  
J Richard Janowicz, Canadian Chief Delegate, Yukon Department of Environment  
Bill Quinton, Canadian Deputy Chief Delegate, Wilfred Laurier University  
Ming-ko Woo McMaster University  
Kathy Young, York University  
Geoff Kershaw, Wilfred Laurier University

The working group on Measurement of Solid Precipitation which has been active since the 17<sup>th</sup> NRB, has recently had the paper, Measuring Winter Precipitation and Snow on the Ground in Northern Polar Regions, accepted for publication. The paper authors include NRB members from Canada, United States, Norway and Finland. Input from all NRB nations was provided.

Information on the NRB and Canadian participation in the NRB can be found on the following site: [NB2017.ru](http://NB2017.ru). Contact Richard Janowicz at [Richard.janowicz@gov.yk.ca](mailto:Richard.janowicz@gov.yk.ca) for more information about the 21<sup>st</sup> NRB.



2017-May-19

Urban Hydrology Committee Report 2016-2017

Prepared by Claire Oswald

The urban hydrology committee of the CGU-HS was formed at the 2015 annual meeting in Montreal with the goal of promoting urban hydrological research in Canada. Initial membership on the committee includes the following individuals:

Dr. Claire Oswald (Department of Geography and Environmental Studies, Ryerson University)

Dr. Carl Mitchell (Department of Physical and Environmental Sciences, University of Toronto Scarborough)

Dr. Christopher Wellen (Great Lakes Institute of Environmental Research, University of Windsor until June 30<sup>th</sup> 2017 then Department of Geography and Environmental Studies, Ryerson University)

Dr. Tim Duval (Department of Geography, University of Toronto Mississauga)

The activities of the committee in 2016-17 have been mainly focused on the organization of a session on '**Catchment hydrological and biogeochemical behaviour in human-dominated landscapes**' for the 2017 joint CGU-CSFAC conference in Vancouver. This session is being co-convened by Claire Oswald, Christopher Wellen and Merrin Macrae. To improve upon our low abstract submission numbers from last year's conference, we purposefully broadened the focus of this session to include research on urban, urbanizing and agricultural (i.e. human-dominated) landscapes. We also placed a focus on coupled hydro-biogeochemical studies. These changes resulted in a doubling of our total abstract submission compared to last year. At the 2017 conference we will have 10 oral presentations in 2 slots and 2 posters. Of the 10 oral presentations, 6 are from students. We were also very fortunate to have Dr. John Richardson accept our invitation for an invited talk in the session.

The committee will be meeting at the Vancouver meeting to discuss new initiatives and opportunities to grow their membership in 2017-18. Once possible way to grow the committee may be to have it cross-listed to the Biogeosciences section and/or to broaden the focus from just urban to urban, urbanizing and agricultural landscapes.

## **Hydroecology Committee**

### **Chairs:**

Daniel Peters (Environment Canada, University of Victoria) and Wendy Monk (University of New Brunswick).

### **Background:**

Established May 2015 to support and facilitate information exchange, as well as work towards bridging multidisciplinary research carried out by aquatic ecologists and hydrologists within Canada and internationally.

### **Objective:**

To promote and advance the understanding of linkages between hydrology and ecology in wetland, lake and river systems across Canada.

### **Activities:**

The Hydroecology committee continued to be active in the promotion and advancement of understanding the linkages between aquatic ecology, water quality and hydrology. Engagement of multidisciplinary scientists was achieved via a Special Session entitled “Advances in Hydroecology in Canada” at the 2016 CMOS-CGU Joint Meeting in Fredericton, NB. The Special Session included a range of presentations on environmental flows, water quality, river habitat conditions, water temperature, and wetlands. Of note, the 2016 Woo Lecture by Daniel Cassie (Department of Fisheries and Oceans) was an excellent synthesis of “Recent Advances in River Temperature Research and Modelling” and a great example of the Committee goal.

A special issue entitled “Floods in Canada” published in Canadian Water Resources journal (Burn et al 2016) included hydroecological related overview papers authored by Peters et al. entitled “Ecological Aspects of Floods in Canada” and by St-Hillaire et al. entitled “Floods and Water Quality in Canada: A Review of the Interactions with Urbanization, Agriculture and Forestry”.

The Hydroecology committee will continue to be active via hosting a Special Session at the 2017 CGU-CSAFM Joint Annual Scientific Meeting in Vancouver, BC.

### **Select Recent Publications:**

Burn D, D Cassie, DL Peters, S Renzette, A St-Hillaire and P Whitfield. 2016. Preface to the Special Issue on Floods in Canada. Canadian Water Resources Research, 41: 2-6.

Peters DL, D Cassie, W Monk, S Rood, and A St-Hillaire. 2016. An Ecological Aspect of Floods in Canada. Canadian Water Resources Research, 41: 288-306.

Shrestha R, M Schnorbus and DL Peters. 2016. Assessment of a Hydrologic Model’s Reliability in Simulating Flow Regime Alterations in a Changing Climate. Hydrological Processes, 30: 2628-2643.

## **Hydro-climatic Impacts and Adaptation Committee**

### **Chairs:**

Rajesh Shrestha, Yonas Dibike, Daniel Peters (Environment and Climate Change Canada, University of Victoria).

### **Background:**

Established in May 2016 to provide a platform for researchers engaged in hydro-climatic, hydrologic and hydro-ecological impacts and adaptation, and promote the development of new methods and tools to address the challenges.

### **Objective:**

To advance the development of methods and tools for better understanding of the hydrologic and aquatic ecosystem impacts of climate variability and change, and developing adaptation measures to mitigate the potential impacts.

### **Activities:**

The **Hydro-climatic Impacts and Adaptation** committee is active in the advancement of knowledge on the implications of climate variability/change on planning, allocation and operations of water resources, and adaptation/mitigation measures that address the potential impacts. Engagement of multidisciplinary scientists includes organizing a Special Session entitled “**Hydro-climatic Impacts and Adaptation**” at the 2017 CGU-CSAFM Joint Annual Scientific Meeting in Vancouver. The Special Session attracted presentations on a wide range of topics including historical hydro-climatic variability and change, projected future impacts on water quality and quantity, and adaptation measures. The committee is also engaged internationally, and in collaboration with partners in the US, has proposed a special session at the 2017 AGU-Fall meeting, New Orleans on “**Blue and Green Water in the Mountains: Water Supply, Extreme Events, and Ecological Responses in Snow and Glacier-fed Catchments**” .

The committee is also working towards preparing state-of-the-science reviews, and a review paper on “Hydro-climatic variability and change in the Western Canadian Watersheds” is currently in progress. The committee will continue promoting similar reviews on related topics and other regions of Canada in the future. The committee welcomes all interested parties to contact us to get involved.

### **Select Publications 2016-2017:**

**Dibike, Y.**, T. Prowse, B. Bonsal, L. and Linton, H. 2016. Implications of Future Climate on Water Availability in the Western Canadian River Basins, International Journal of Climatology, 1-18

Eum, H-I, **Dibike, Y.**, Prowse, T. 2016. Comparative evaluation of the effects of climate and land-cover changes on hydrologic responses of the Muskeg River, Alberta, Canada, Journal of Hydrology: Regional Studies 8, 198 – 221.

Eum, H-I, **Dibike, Y.**, Prowse, T. 2017. Climate-Induced Alteration of Hydrologic Indicators in the Athabasca River Basin, Alberta, Canada, *Journal of Hydrology* 544, 327-312.

**Shrestha RR**, M Schnorbus and **DL Peters**. 2016. Assessment of a Hydrologic Model's Reliability in Simulating Flow Regime Alterations in a Changing Climate. *Hydrological Processes*, 30: 2628-2643.

# Canadian Young Hydrologic Society 2017 Annual Report

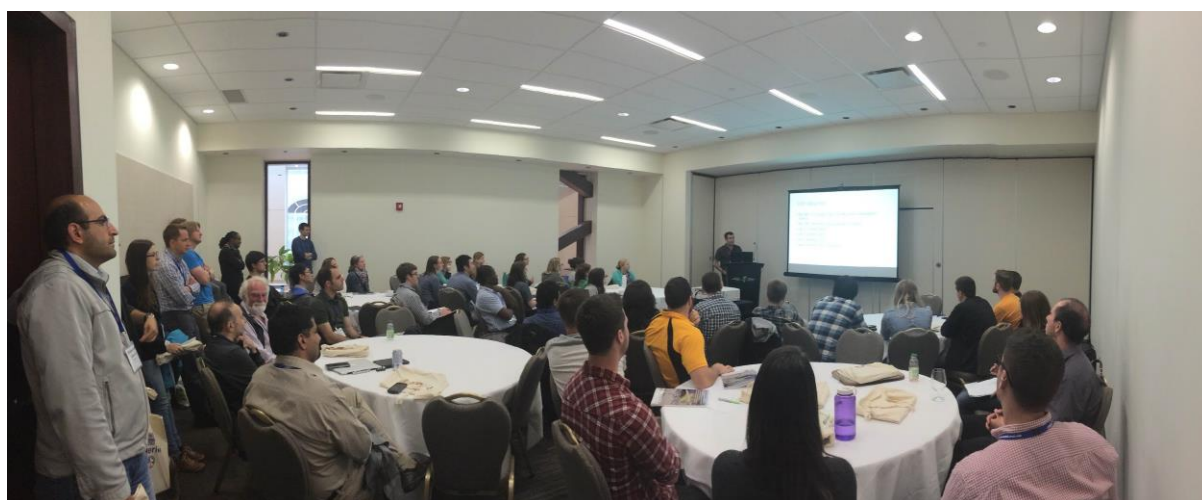
## Executive Summary

The Young Hydrologic Society (YHS) is an international initiative that facilitates the interaction of young hydrologists within the hydrological community. These activities include pop-up sessions at large national conferences, seminars, and social nights.

As the kick-off year for the Canadian Young Hydrologic Society (CYHS), 2015-2016 was a success in establishing the CYHS in the Canadian hydrology community as a national branch of the international YHS. The CYHS was granted the permission from the YHS to be affiliated with, but acting autonomously from the YHS. An executive membership was formed, who organized a series of events targeting young hydrologists at the joint CGU-CMOS conference in Fredericton. The CYHS also established a social media presence, and became an official committee of the CGU - Hydrology Section.

## Fredericton 2016

On May 29th, 2016 the Canadian Young Hydrologic Society (CYHS) held their first official workshop and social event concurrently with the Canadian Geophysical Union (CGU) 2016 Annual Meeting in Fredericton, NB. The workshop event had 37 pre-registered attendees with an estimated 50 total attendees including day-of registrations, while the social event was also a success with an estimated 75 attendees. At the workshop, the first five speakers (Genevieve Ali, Merrin Macrae, Howard Wheeler, Phillip Marsh, and Claire Oswald) gave a diverse set of half-hour talks and discussions under the umbrella of the theme “Challenges and Opportunities in Canadian Hydrology”, followed by an hour-long presentation and discussion by Sean Carey on the progression of one’s scientific career. After the conference icebreaker, the social evening at Brewbaker’s Pub attracted the workshop participants in addition to some other members of the CGU Hydrology section.



Sean Carey speaks on progressing one’s scientific career in Canadian hydrology

## Finances

The financial goals of CYHS were to ensure an affordable scientific workshop and social event at the 2016 Fredericton event. Thanks to the generous support of the Hydrology Section of the CGU through a \$300 contribution, the CYHS was able to provide catering for attendees of the social evening while keeping the workshop event at a reasonable cost of \$10 per registration (this cost collected directly by the CMOS-CGU organizers to offset catering costs at the conference venue).

## Outreach

A Twitter account, Facebook group, and CYHS email were created. The Twitter account (@CanadianYHS) was primarily used to build our network by sharing water related news, events and projects that colleagues have worked on, and to promote the workshop in Fredericton. Twitter was especially active during the Fredericton event, where students and professors posted and re-tweeted pictures from the workshop. The Facebook group ([www.facebook.com/CanadianYHS/](http://www.facebook.com/CanadianYHS/)) was useful for creating pages for events/workshops, and to share CYHS pictures and updates. The email account [canadianyhs@gmail.com](mailto:canadianyhs@gmail.com) was made available for anyone who wishes to contact the CYHS.

## Transition to 2017

At CGU 2016, the current CYHS executive team advertised positions which would become available in 2017. Eligible candidates were chosen based on interest and availability for the 2017 year. These were filled on a voluntary basis, in which all candidates reached a consensus as to which position would be filled by each person. The official transition occurred on December 1, 2016.

### 2016 CYHS Executive:

Chair- Christopher Marsh, PhD, Dept. Geography, University of Saskatchewan

Co-chair- Jordan Harrington, MSc., Dept. Geoscience, University of Calgary

Secretary- Kimberley Murray, MSc., Dept. Geography and Environmental Management, University of Waterloo

Treasurer- Matt Morison, PhD., Dept. Geography and Environmental Management, University of Waterloo

Communications- Catherine Brown, MSc., Dept. Geography and Environmental Management, University of Waterloo

CGU-HS liason- Barret Kurylyk, Post-doc, Dept. Geoscience, University of Calgary

### 2017 CYHS Executive:

Chair- Christopher Marsh, PhD., Dept. Geography, University of Saskatchewan

Co-chair- Matt Morison, PhD., Dept. Geography and Environmental Management, University of Waterloo

Secretary- Sarah Irvine, MSc., Dept. Geography and Environmental Management, University of Waterloo

Treasurer: Aminul Haque, PhD., Dept. Geological Sciences, University of Manitoba

Communications- Kelly Biagi, PhD., School of Geography and Earth Sciences, McMaster University

CGU-HS liason- Nadine Shatilla, PhD., School of Geography and Earth Sciences, McMaster University