FloodNet NSERC

flash FloodNet

Volume 1 - August 2016

A vehicle for a concerted nation-wide effort to enhance flood forecasting and management capacity in Canada

From the Director

Dear FloodNet Team Member

Lets welcome our Newsletter *flash* **FloodNet** Vol.1!

Now that the FloodNet Research Program is moving on smoothly in different corners of the Country, we should start sharing News, Progress, Findings! Our *flash* **FloodNet** is a great platform for updating each other on how research and networking activities are going.

On behalf of the Research Management Committee, I invite all FloodNet students and post-doctoral fellows to use *flash* **FloodNet** upcoming issues to share work progress, findings and any news you wish to share with others. This is **your** Newsletter and you should own it!

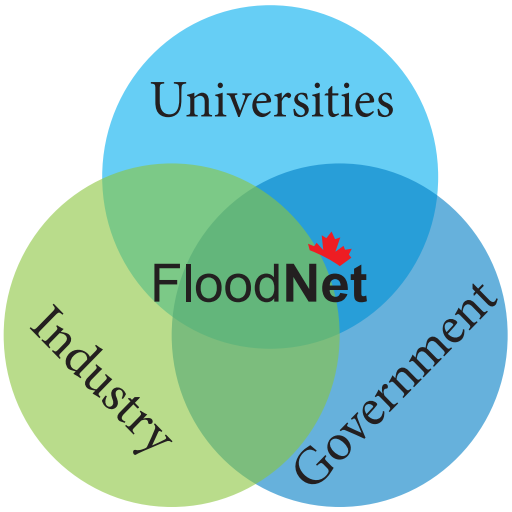
I also take this opportunity to inform you all that the FloodNet Server is operational and hosting data from some of the research sites. For precision on which datasets are available, check with the FloodNet Manager.
A research progress template was emailed to all FloodNet students and post-doctoral fellows. Please complete and return the form if it is not done yet. This information will be posted on our website.

FloodNet partners and investigators are invited to share news, updates and information via *flash* **FloodNet**. In the upcoming issues, we wish to have a section of *flash* **FloodNet** dedicated to update on networking with partners.

Thanks to all who contributed to this first issue!

Enjoy the reading!

Professor Paulin Coulibaly
FloodNet Scientific Director



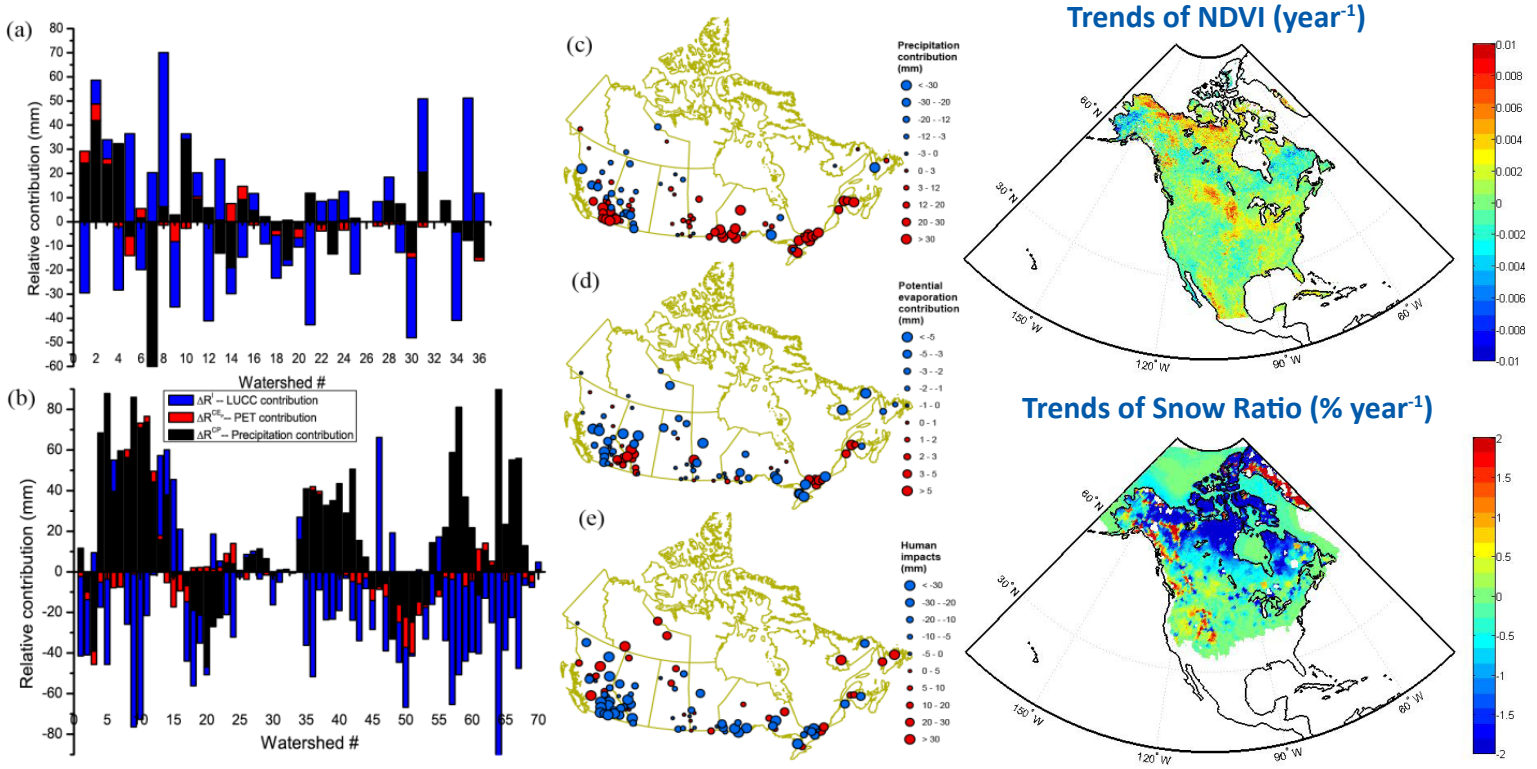
Human or Nature?

Contributions to Changes in Streamflow in Canada

Xuezhi Tan & Thian Yew Gan

Research Summary

Climate change exerts great influence on streamflow by changing precipitation, temperature, snowpack and potential evapotranspiration (PET), while human activities in a watershed can directly alter the runoff production and indirectly through affecting climatic variables. However, to separate contribution of anthropogenic and natural drivers to observed changes in streamflow is non-trivial. Here we estimated the direct influence of human activities and climate change effect to changes of the mean annual streamflow (MAS) of 96 Canadian watersheds based on the elasticity of streamflow in relation to precipitation, PET and human impacts such as land use and cover change. Elasticities of streamflow for each watershed are analytically derived using the Budyko Framework. We found that climate change generally caused an increase in MAS, while human impacts generally a decrease in MAS and such impact tends to become more severe with time, even though there are exceptions. Higher proportions of human contribution, compared to that of climate change contribution, resulted in generally decreased streamflow of Canada observed in recent decades. Furthermore, if without contributions from retreating glaciers to streamflow, human impact would have resulted in a more severe decrease in Canadian streamflow.



Tan, X. & Gan, T.Y., 2015, Contribution of human and climate impacts to changes in streamflow in Canada, Nature, Sci. Reports, DOI: 10.1038/srep17767.

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Possible Impact of Climate Change on Future Extreme Precipitation Events of Southern Alberta

Mesgana Gizaw & Thian Yew Gan

Research Summary

It is argued that the increase in the water holding capacity of the atmosphere due to climate change induced increase in temperature (about 7% increase in water holding capacity per K° rise in temperature), increases the possibility of occurrence of more intensive storms. The South Saskatchewan River Basin (SSRB) being an agricultural heartland and home for major metropolitan areas of Alberta, changes in the frequency and intensity of extreme precipitation events could have profound socio-economic consequences in this region during the mid and late 21st century. To analyze changes in the intensity and frequency of extreme precipitation events in this region under the impact of climate change, the Oldman (ORB), Bow, (BRB) and Red Deer (RRB) River Basins of southern Alberta, Canada were chosen as study sites and six extreme climate indices derived from 9-km resolution SRES A2 and A1B climate scenarios of four CMIP3 GCMs dynamically downscaled by a regional climate model, MM5 were assessed for May-August (MJJA) period (Table 1 and Figure 1).

The results show that R95p of the three study sites showed an increase of 4% for the 2050s (2041-2070) and 10% for the 2080s (2071-2100) period where as R99p increased by 39% (2050s) and 42% (2080s) which suggest a projected increase in the volume of precipitation expected in future very wet and particularly extremely wet days (Figure 2). Similarly, R20mm, P30yr, RX1day and RX5day are also projected to increase by about 15% by the mid- and late 21st century in the three study sites. However, compared to BRB and RRB, ORB located in the southernmost part of the study site is projected to undergo a relatively higher increase in both temperature and precipitation intensity, which is assessed in terms of indices such as P30yr, RX1day and RX5day. On the other hand, RRB and BRB are projected to experience higher increase in R20mm which suggest a relatively higher increase in the number of very heavy precipitation days projected for these two basins. Overall, these results suggest that in the 2050s and 2080s, southern Alberta will be expected to experience more frequent and severe intensive storm events in the MJJA season that could potentially increase the risk of future flooding in this region.

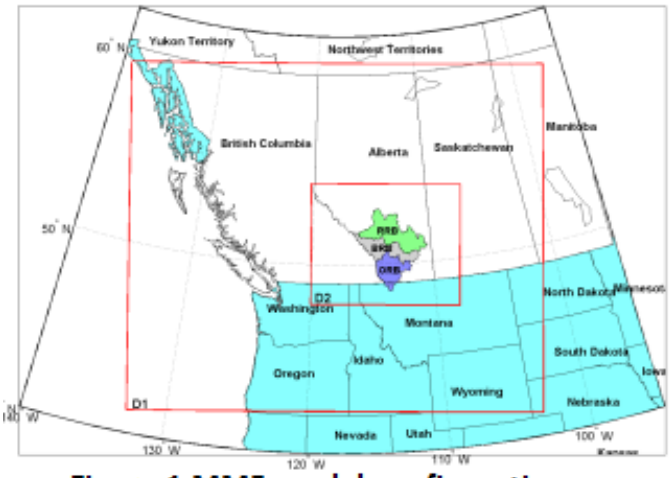

Figure 1 MM5 model configuration

Table 1: Extreme Precipitation Indices

Label	Index Name	Unit
R20mm	Very Heavy Precipitation Days	days
P30yr	30 Year Return Period Rainfall	mm/d
R95p	Very Wet Days	mm
R99p	Extremely Wet Days	mm
RX1day	Max 1 Day Precipitation	mm
RX5day	Max 5 Day Precipitation	mm

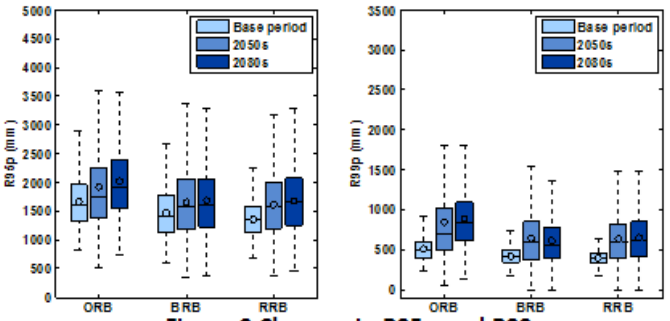

Figure 2 Changes in R95p and R99p

Gizaw, M., & Gan, T.Y., 2015, Possible Impact of climate change on future extreme precipitation of the Oldman, Bow and Red Deer River Basins of Alberta, Int. J. Climatology, DOI: 10.1002/joc.4338

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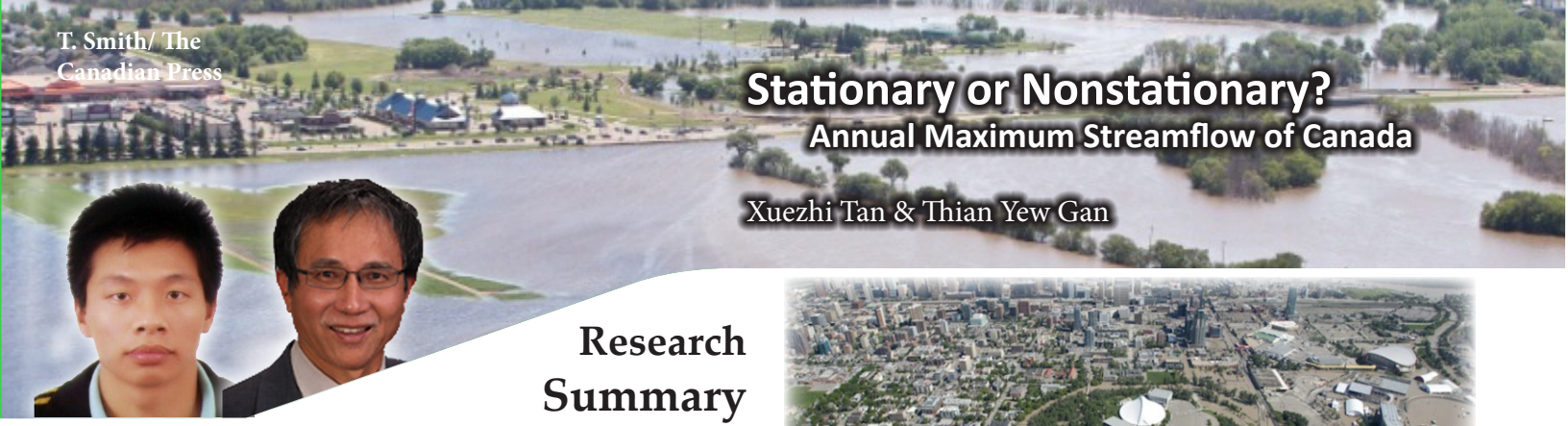
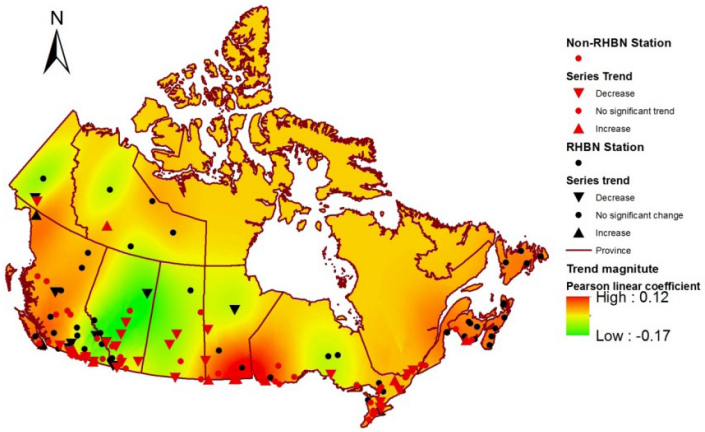


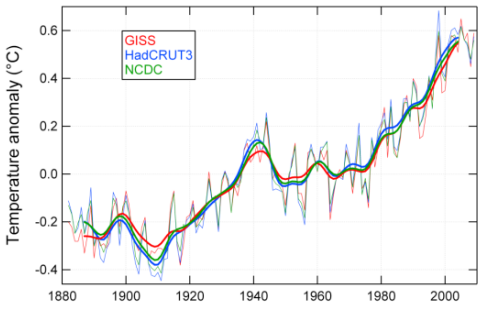
Stationary or Nonstationary?
Annual Maximum Streamflow of Canada

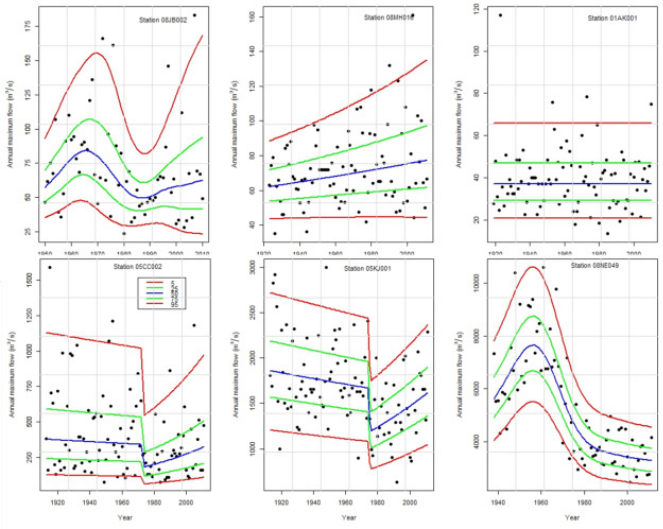
Xuezhi Tan & Thian Yew Gan

Research Summary

Both natural climate change and anthropogenic impacts may cause nonstationarities in hydrological extremes. In this study, long-term annual maximum streamflow (AMS) records from 145 stations over Canada were used to investigate the nonstationary characteristics of AMS, which include abrupt changes and monotonic temporal trends. The nonparameteric Pettit test was applied to detect abrupt changes, while temporal monotonic trend analysis in AMS series was conducted using the nonparameteric Mann–Kendall and Spearman tests, as well as a parametric Pearson test. Nonstationary frequency analysis of the AMS series was done using a group of nonstationary probability distributions. The nonstationary characteristics of Canadian AMS were further investigated in terms of the Hurst exponent (H), which represents the long-term persistence (LTP) of streamflow data. The results presented here indicate that for Canadian AMS data, abrupt changes are detected more frequently than monotonic trends, partly because many rivers began to be regulated in the twentieth century. Drainage basins that have experienced significant land-use changes are more likely to show temporal trends in AMS, compared to pristine basins with stable land-use conditions. The nonstationary characteristics of AMS were accounted for by fitting the data with probability distributions with time-varying parameters. Large H found in almost 2/ 3 of the Canadian AMS dataset indicates strong LTP, which may partly represent the presence of long-term memories in many Canadian river basins. Furthermore, H values of AMS data are positively correlated with the basin area of Canadian rivers. It seems that nonstationary frequency analysis, instead of the traditional stationary hydrologic frequency analysis, should be employed in the future.







Tan, X. & Gan, T.Y., 2015, Nonstationary analysis of annual maximum streamflow in Canada, J. Climate, DOI: 10.1175.JCLI-D-14-00538.1.

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Overview of River Flood Forecasting Practices in Canada

Sanjeev Jha, Zahra Zahmatkesh Aliabadi & Peter Rasmussen

Research Summary

River floods in Canada have severely affected lives, economy, and infrastructure. Theme 3 of the FloodNet project is targeted towards developing advanced tools and methodologies which will help enhance existing flood forecasting systems across the country. Project 3.1 has the specific objective of reviewing currently implemented flood forecasting procedures in each province and identify areas in which FloodNet can contribute. As a first step, site visits were organised in the beginning of spring 2016. Dr. Sanjeev Jha was responsible for the collaboration with the Flood Forecasting Centres (FFCs) in Alberta, British Columbia, Manitoba, and Saskatchewan. Dr. Zahra Zahmatkesh Aliabadi visited FFCs in New Brunswick, Newfoundland and Labrador, Quebec, and three FFCs in Ontario. We prepared a set of questions, mainly inquiring about the role of the FFC, the main tasks of the forecasters throughout the year, details of data and hydrologic models used in the forecasting, the evaluation of forecast products, and the communication with the public and emergency response teams during major flood events. The various FFCs were extremely helpful and happily shared available documentations (reports, manuals, databases, presentations, etc.) and gave us a demonstration of their forecasting tools and procedures. We found that after each major flood event, a detailed report was often prepared by provinces or consultants to summarize what occurred, including how forecasts were produced and used and what aspects of the forecast procedure could be improved. Some of the reports prepared by the consultants for the Alberta FFC had goals similar to ours, namely to compare flood forecasting procedures at the FFCs in Canada as well as in other countries. However, we noticed that those reports did not cover all the FFCs in Canada, and the findings from those reports need to be updated with the latest details on data, models, communications, etc. We are in the process of preparing a report summarizing the information collected during our visits to the FFCs across the country. The report is expected to be available by the FloodNet AGM in 2016.

The next step in FloodNet Project 3.1 is to identify, in collaboration with the FFCs, specific tasks where FloodNet can make a useful contribution within the given time constraints of the project. This will be beneficial not only for Project 3.1 but also for other research groups in FloodNet who may have relevant expertise to work on the challenges faced by the FFCs. Some of the challenges in terms of data collection and processing include relying on data from multiple sources to determine antecedent soil moisture, estimating snow-water equivalent, uncertainty in the precipitation forecast, and relying on the accuracy of streamflow forecast at upstream locations in neighbouring provinces or US states. In terms of hydrologic and hydraulic modelling, some FFCs use in-house developed models, while others use commercial off-the-shelf models. The hydrologic modelling of the Prairie region, characterized by a high percentage of non-contributing areas due to potholes, and the presence of urban and rural areas in the same watershed are some examples of challenges for the modellers at the FFCs. Most of the FFCs are still developing in-house tools for the automated and integrated real-time forecast system.

Two major challenges faced by the FFCs in the Western Canada are already being investigated under Project 3.1. In collaboration with Australian experts, Dr. Sanjeev Jha is looking into reducing the uncertainty in the precipitation forecast data. Mr. Ameer Mohammed, a Ph.D student at the University of Manitoba, is developing methods for better representation of geographically isolated wetlands in the hydrologic models of the Prairie region in Saskatchewan and Manitoba. We would like to invite graduate students and senior researchers to contact us (Sanjeev.jha@unmanitoba.ca, Zahra.ZahmatkeshAliabadi@umanitoba.ca) and discuss how their research may fit into the needs of the FFCs and how we can facilitate the collaboration with specific FFCs.

Recapping the FloodNet Annual General Meeting

Marc D'Alessandro

Commentary

The FloodNet Annual General Meeting (AGM) provided students with an opportunity to learn about research topics that are being studied by FloodNet members that are highly regarded in their area of study. During the AGM there were presentations, meetings and a poster session where FloodNet members were able to interact with one another to develop their knowledge and understanding of research being conducted within the FloodNet project. Furthermore, it was interesting to see how research topics that were being studied under different themes within FloodNet were related to one another; for example, I noticed that the research that I was conducting under Theme 1 was not only related to other research topics being studied in Theme 1, but also related to topics in Theme 3 and Theme 4. The AGM concluded with an excellent presentation from DHI Canada where FloodNet members were able to ask questions regarding the application of different modelling software that could be applied to research that is currently being conducted within FloodNet.

The AGM was also an excellent opportunity for students to showcase their research results during the poster session. Researchers and professors from different universities throughout Canada asked questions and provided valuable advice with regards to emerging techniques and methodologies that would be useful for the research that we are conducting. Additionally, interacting with industry partners during the AGM was very beneficial for students. It was a great opportunity to see the direct application of our research and how it is utilized by various agencies and companies. Discussing research methodologies and techniques with industry partners enabled students to see what methods are commonly employed by different municipalities and organizations. As a result we were able to have great conversations with partners to ensure that the techniques that are being used in our research are aligned with the vision of industry partners.

"interacting with industry partners during the AGM ... was a great opportunity to see the direct application of our research and how it is utilized"

Furthermore, the AGM provided FloodNet members with an opportunity to meet with colleagues that they had previously been corresponding with via email as they have been working on projects with one another for multiple months. During the AGM meetings occurred where members of each theme met in large groups to discuss research results and methodologies that have been commonly utilized for individual study areas throughout Canada. It was great to see the progress that was being made under each theme and there was a lot of enthusiasm and excitement regarding the final results. Overall the AGM was a success and I am looking forward to the next AGM, especially to see how the results for each research topic have progressed. To conclude, it was a great opportunity to interact with all members of FloodNet and to learn about research topics being studied within the different themes. The next AGM will be sure to provide a similar experience as the last.

Marc D'Alessandro is a M.Sc. student at McMaster University with Dr. Paulin Coulibaly

Joining the Catastrophe Industry

Kurt C. Kornelsen

Commentary

C4 2016
CatIQ's Canadian Catastrophe Conference

I recently had the privilege of discussing the science and potential of the FloodNet research program in a panel discussion at the CatIQ Conference on Canadian Catastrophes (C4) 2016 in Toronto. This conference was particularly interesting as it brought together representatives in both the private and public sectors who deal with catastrophes. Speakers included representatives from federal agencies such as the Meteorological Service of Canada and Public Safety Canada, the insurance and re-insurance industries including the Insurance Bureau of Canada (IBC), several companies who specialize in risk management and disaster recovery and even some academics. The diversity brought about many interesting discussions that do not emerge at typical academic conferences, particularly around the subject of water. According to the IBC "payouts from extreme weather have more than doubled every five to 10 years since the 1980s" (IBC, 2015), of which water claims represent the largest contributor. Therefore, it is not surprising that much of the discussion at the conference revolved around water related disasters.

"many Canadians are remarkably unaware or significantly underestimate the potential risks that they face from water and climate"

My particular panel was discussing "Floods: Where do we Stand and What's Next?" During this panel Craig Stewart, the Vice President of Federal Affairs for the IBC, announced that they had recently received results from a project for insurers which indicated that 20% of Canadian households were at high risk for flooding and 10% (1.8 Million) were at 'very high risk'. During the subsequent discussion and many others over the two day conference it became readily apparent that the ongoing research in FloodNet is both timely and could carry significant economic importance in Canada, particularly as overland flood insurance enters the Canadian market. For example, a homeowner's relative flood risk could influence insurance rates and therefore their home value, particularly if banks begin to require flood insurance as a condition of a mortgage, as suggested during the conference.

Participating in C4 2016 also allowed me to connect with a representative from Standards and Poor's Rating Agency, where I discovered environmental risk is an emerging concern. In the near future economic entities from countries to individual businesses could see their financial ratings altered, mostly negatively, as a result of their exposure to climate and flood related risks. Unfortunately, data and experience show that many Canadians, along with citizens of other countries, are remarkably unaware or significantly underestimate the potential risks that they face from water and climate.

As science, the economy and policy makers continue to wrestle with the challenges presented by a changing climate and dynamic conditions in the hydrosphere, it is more critical than ever that economic and policy decisions around flood related issues be made with robust and defendable science. The coming years will see many results, recommendations and guidelines emerge from FloodNet. My experience at C4 2016 was a direct reminder of the importance of connecting FloodNet research outcomes to the broader community.

NSERC Strategic Network Enhancement Initiative

Programs

The NSERC Strategic Network Enhancement Initiative (SNEI) is a program designed to provide additional support to existing networks that:

- Build on the Network's existing training program and support enriched training opportunities
- Enhance the knowledge/technology transfer activities with existing partners and reach out to new partners; and
- Further the goals of NSERC's international strategy.

FloodNet was very pleased to recently announce that our application for SNEI funds has been fully funded for a period of three years. The programs and projects put forth in the proposal meet each of the above objectives, will provide novel training opportunities for researchers and HQP, support knowledge transfer to our partners and increase the international reach of FloodNet research. To gain the maximum benefits out of SNEI funds, most of the activities proposed are cross-cutting and will satisfy more than one of the stated FloodNet objectives as well as multiple FloodNet SNEI goals. These goals are:

1) Enhanced HQP Training in Practical Water Resources Management and Knowledge Translation

2) Enhanced Knowledge Dissemination to End-Users

3) Enhanced Linkages with International Research Groups

SNEI 1.1: Enhanced FloodNet Internship Program

The internship program allows HQP to gain real-world experience while facilitating knowledge transfer to FloodNet partners. SNEI funds will support 8 interns in its first year, 5 in the second and 3 in the third and is built around a (flexible) 4 month internship period. Internships will be unpaid by FloodNet, but HQP will be able to claim a maximum of $1000/month to support the cost of living in a different city (i.e. rent/flight).

Partner organizations will offer the opportunity for an internship position, which will include workspace and local staff support. Positions will be posted on the FloodNet website and candidates can apply for a position. The work project is determined in collaboration with the partner and the HQP supervisor. Details on the Internship Program Procedures can be found at http://www.nsercfloodnet.ca/opportunities.

SNEI 3.1: International Exchange

Similar to SNEI 1.1 this program will allow one HQP per year the opportunity for an internship at an international partner organization with the same level of funding and conditions as SNEI 1.1.

SNEI 3.2: IMPREX Workshop Attendance

IMproving PRedictions and management of hydrological EXtremes (IMPREX) is a E.U. 2020 research network to produce hydrological risk outlooks incorporating dynamic hydro-climatic and socio-economic processes. SNEI funds will allow 4 investigators to attend an IMPREX workshop and build collaboration between networks.

SNEI 2.1: UNU-INWEH Policy Bridging Workshop

FloodNet is privileged to include the UNU-INWEH amongst its partners. UNU-INWEH's mission is to "help resolve pressing water challenges that are of concern to the United Nations, its Member States, and their people". The staff and faculty at UNU-INWEH are experts in knowledge synthesis, translating cutting-edge research for policy makers and communication to the public at large.

SNEI funds will be used to implement a unique training program for FloodNet investigators and HQP with the support of UNU-INWEH focusing on research-policy bridging. This workshop is planned for year 4 of the Network and will be designed by UNU-INWEH and the PIs as a hands-on exercise in which data and information directly generated from FloodNet research activities is utilized to create policy-relevant outputs. In addition, the workshop final documents will be used to create online and distance-learning modules that will be posted and maintained by UNU-INWEH as part of their free distance-learning module.

SNEI 2.2: FloodNet Toolbox Development

A significant hurdle to effectively planning for and mitigating floods across Canada is a lack of national guidelines and tools for flood frequency analysis. These guidelines will be an outcome of Theme 1 of FloodNet. As part of this theme, FloodNet investigators will be systematically comparing and improving multiple methods for updating IDF curves and conducting flood frequency analysis. With SNEI funds FloodNet will hire a professional software developer to turn the research outputs of Theme 1 into a user friendly 'Flood Regime Toolbox'. The toolbox will include multiple analysis methods and the ability to intercompare them and will be made available for use to FloodNet partners and others.

SNEI 2.3: Hosting FloodNet Toolbox Workshop

This SNEI project builds directly upon SNEI 2.2 and will facilitate the updake of toolbox by partners. FloodNet will host a training workshop where practitioners can bring their own datasets and to be trained on the use of the 'Flood Regime Toolbox'. The workshop will also serve as a good beta testing environment.

The Strategic Network Enhancement Initiative will provide welcome and tangible benefits for all members of FloodNet. Its success, particularly the internship program, will depend directly on the willing participation of the FloodNet team. We highly encourage any FloodNet partners who have expressed an interest in hosting an intern to contact the FloodNet Manager to begin making arrangements.

floodnet.manager @ mcmaster.ca

Conferences, Publications & Recent Events

Your Help is Required!

The FloodNet Administration Office endeavours to keep an accurate and up to date record of all recent publications, conferences and events that are taking place within the network. We want to promote your work and help you share your successes but we can't do it without you. Whenever you present at a conference please send a copy of your slides/poster (in pdf format) to us to post on our website. Similarly we are archiving any publications that arise from FloodNet research and will link to the publishers website. Lastly, we want to share your success with the network, so please inform us of any promotions, successful defences, awards or whatever else deserves celebrating. All information can be sent to floodnet @ mcmaster.ca.

Therefore, the list below is complete based on what has been submitted. Future releases will include any new research outcomes sent to us.

Recent Publications

Gizaw, M.S. & T.Y. Gan (2016) Possible impact of climate change on future extreme precipitation of the Oldman, Bow and Red Deer River Basins of Alberta, International Journal of Climatology, 36(1) pp. 208-224.

Song, W. & W. Zhuang (2016) Packet Assignment under resource contstraints with D2D communications, IEEE Network (Accepted)

Tan, X. & T.Y. Gan (2015) Contribution of human and climate change impacts to changes in streamflow of Canada, Nature: Scientific Reports, 17767.

Tan, X. & T.Y. Gan (2016) Nonstationary analysis of annual maximum streamflow of Canada. Journal of Climate, 28(5) pp. 1788-1805.

Thiboult, A. & F. Anctil (2015) On the difficulty to optimally implement the Ensemble Kalman filter: An experiment based on many hydrological models and catchments, Journal of Hydrology, 259(3) pp. 1147-1160.

Thiboult, A., F. Anctil & M.-A. Boucher (2016) Accounting for three sources of uncertainty in ensemble hydrological forecasting, Hydrology and Earth Systems Science, 20 pp. 1809-1825.

Conferences, Publications & Recent Events

Recent & Upcoming Conferences

Muhammad, A., Rasmussen, P., Boluwade, A. & Jha, S. (2016). Parameter and Model Structure Uncertainty in Stream Flow Simulation of Upper Assiniboine River Basin Through Soil Water Assessment, EGU General Assembly, April 2016, Vienna, Austria.

Anctil F. (2015). Réseau pancanadien de recherche sur les inondations. Congrès INFRA 2015, Décember 2015, Québec, Quebéc.

Coulibaly P., Rasmussen, P., Burn, D. & Pietroniro, A. (2015). State of Flood Forecasting in Canada, CGU-AGU Joint Assembly, May 2015, Montreal, Quebec.

Coulibaly, P. (2015). FloodNet Overview, 22nd CSCE Canadian Hydrotechnical Conference, Water for Sustainable Development: Coping with Climate Change and Environmental Changes, April-May 2015, Montreal, Quebec.

Burn, D., Coulibaly, P., Rasmussen, P., Ashkar, F. & Gan, T.Y. (2015). Flood Regimes in Canada: Learning from the Past and Preparing for the Future, 22nd CSCE Canadian Hydrotechnical Conference, Water for Sustainable Development: Coping with Climate Change and Environmental Changes, April-May 2015, Montreal, Quebec.

Nguyen, V.T.V. et al. (2015). Developments of New Methods for Updating IDF Curves in Canada, 22nd CSCE Canadian Hydrotechnical Conference, Water for Sustainable Development: Coping with Climate Change and Environmental Changes, April-May 2015, Montreal, Quebec.

Anctil, F. (2015). Quantifying and Reducing the Predictive Uncertainty of Floods, 22nd CSCE Canadian Hydrotechnical Conference, Water for Sustainable Development: Coping with Climate Change and Environmental Changes, April-May 2015, Montreal, Quebec.

Rasmussen, P. (2015). Evaluation of Flood Forecasting and Warning Systems in Canada, 22nd CSCE Canadian Hydrotechnical Conference, Water for Sustainable Development: Coping with Climate Change and Environmental Changes, April-May 2015, Montreal, Quebec.

Xenopoulos, M. (2015). Risk Analysis of Physical, Socio-Economic, and Environmental Impacts of Floods, 22nd CSCE Canadian Hydrotechnical Conference, Water for Sustainable Development: Coping with Climate Change and Environmental Changes, April-May 2015, Montreal, Quebec.

Zhao, Y. & Song, W. (2016). Socia-Aware Energy-Efficient Data Dissemination with D2D Communications, IEEE VTC, May 2016, Nanjing, China.

Conferences, Publications & Recent Events

Recent & Upcoming Conferences

Wazneh, H. (2016) Identification of hydrological neighbourhoods using statistical depth function, CWRA National Congress, May 2016, Montreal, Quebec.

Kokas, T. (2016) Evaluating the effect of urbanization on flooding in the Black Creek sub-watershed, CWRA National Congress, May 2016, Montreal, Quebec.

Tilmant, A. (2016) Sharing the benefit foregone associated with environmental flos in a multireservoir hydropower system, CWRA National Congress, May 2016, Montreal, Quebec.

Hossain, K. (2016) A comparative study of the flow generation algorithms in MESH hydrological model, CWRA National Congress, May 2016, Montreal, Quebec.

Zadeh, S.M. (2016) Pool flood frequency analysis in Atlantic Canada, CWRA National Congress, May 2016, Montreal, Quebec.

Raja, B. (2016) Integrated flood risk assessment and zonation of a prairie watershed, CWRA National Congress, May 2016, Montreal, Quebec.

Wazneh, H. (2016) Historical spatial and temporal climate trends in Southern Ontario, CWRA National Congress, May 2016, Montreal, Quebec.

Kornelsen, K.C. & Coulibaly, P. (2016) Investigating the relationship between precipitation input and model parameter distribution during calibration: Initial results from 72 Canadian basins, HEPEX 2016, Quebec City, Quebec.

Awol, F.S. & Coulibaly, P. (2016) Comparison of ensemble verification metrics on daily mean flows and monthly peak flows, HEPEX 2016, Quebec City, Quebec.

Abaza, M., Fortin, V., Perreault, L. & Anctil, F. (2016) Exploiting the novel Canadian meteorological ensemble reforecasts for the post-processing of their ensemble forecasts, HEPEX 2016, Quebec City, Quebec.

Thiboult, A., Anctil, F. & Ramos, M.-H. (2016) Investigating quality and value of dissimilar streamflow forecasting systems, HEPEX 2016, Quebec City, Quebec.

Conferences, Publications & Recent Events

Recent Events

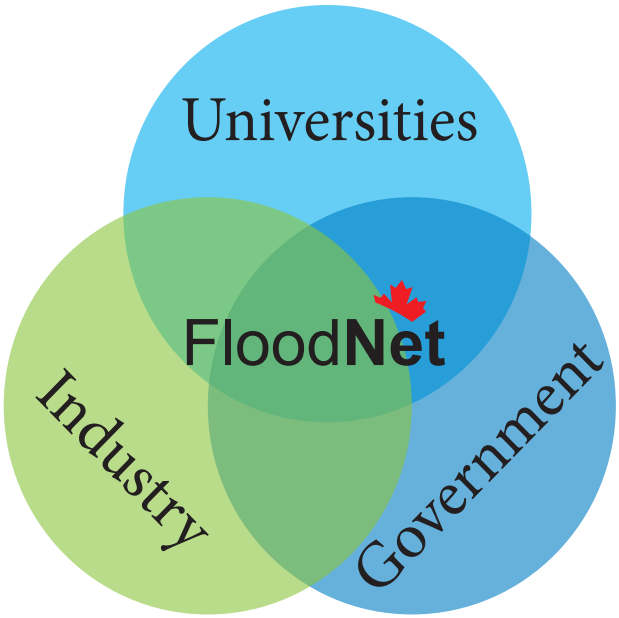
2016 HEPEX Workshop - "Ensemble for better hydrological forecasts"

FloodNet is please to be a sponsor of the 2016 HEPEX Workshop. HEPEX is a "community of research and practice to advance hydrologic ensemble prediction". The goal of HEPEX is to explore ensemble solutions to produce better hydrological forecasts. Not only is the outputs of the HEPEX research community directly relevant and beneficial to many aspects of FloodNet, but membership is free. Check out www.hepex.irstea.fr for details.

Introduction to Implementation and Operation of a Modern Flood Forecasting System - DHI Canada

This past May DHI Canada hosted a workshop and training seminar at McMaster University. They presented to FloodNet HQP and partners their MIKE INFO and MIKE OPERATIONS systems. Following the workshop Pat and Dylan provided training for HQP to develop adapters for this software.

Along with Delft-FEWS, MIKE OPERATIONS is a platform upon which the Canadian Adaptive Flood Forecasting and Early Warning System (CAFFEWS) can be built. This training session and previous one presented by Deltares USA have provided FloodNet HQP invaluable training in the process of developing the components of CAFFEWS and understanding the requirements to connect those components to an operational system.



Congratulations!

Congratulations to Sarah D'Amario at Trent University who was awarded a competitive NSERC Scholarship.

We are pleased to re-announce that since the inception of FloodNet we are privileged to be joined by the International Institute for Sustainable Development (IISD) Experimental Lakes Area (ELA). The IISD-ELA is a world renowned whole ecosystem experiment site who is working with Dr. Xenopolous and other researchers in Theme 4.

Get Involved!

The Venn Diagram above of FloodNet says it all. FloodNet is a NETWORK and a PARTNERSHIP between the individuals involved. We once again encourage others to send us your updates, good news, and anything else. We also want to encourage our partners to join the conversation and consider sending articles to *flash* **FloodNet**, following us on Twitter (@NSERCFloodNet) and joining the FloodNet LinkedIn group (search FloodNet).

FloodNet NSERC

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Volume 1 - August 2016

A vehicle for a concerted nation-wide effort to enhance flood forecasting and management capacity in Canada

Please consider contributing to a future issue of

flash FloodNet.

We encourage submissions from both researchers and partners on a variety of topics including research summaries, recent advances or methodologies, sharing of best practices in the community or commentaries.