

Overview of River Flood Forecasting Practices in Canada

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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.