Multi-model Intercomparison Project on the Saskatchewan-Nelson-Churchill River Basin (Nelson-MiP project)

Monthly meeting - 11 March 2020

Agenda

1. Selection of natural gauge stations for calibration/validation for Phase 0 & Phase 1
2. Decision on time periods for model calibration/validation
3. Discussion on a standardized meteorological forcing data: WFDEI-GEM-CaPA vs ERA5
4. Discussion on routing scheme and geophysical input data
5. Deliverables for next meeting

Selection of gauge stations for calibration/validation (Phases 0 & 1)

- **Search criteria:**

Station == Natural

Data Period == 1970 to 2016

Total Years >= 35

Drainage area >= 200 km^2

+

Stations submitted but not meeting search criteria

- 291 (natural) gauge stations identified + 11 stations added

Selection of natural gauge stations for calibration/validation (Phases 0 & 1)

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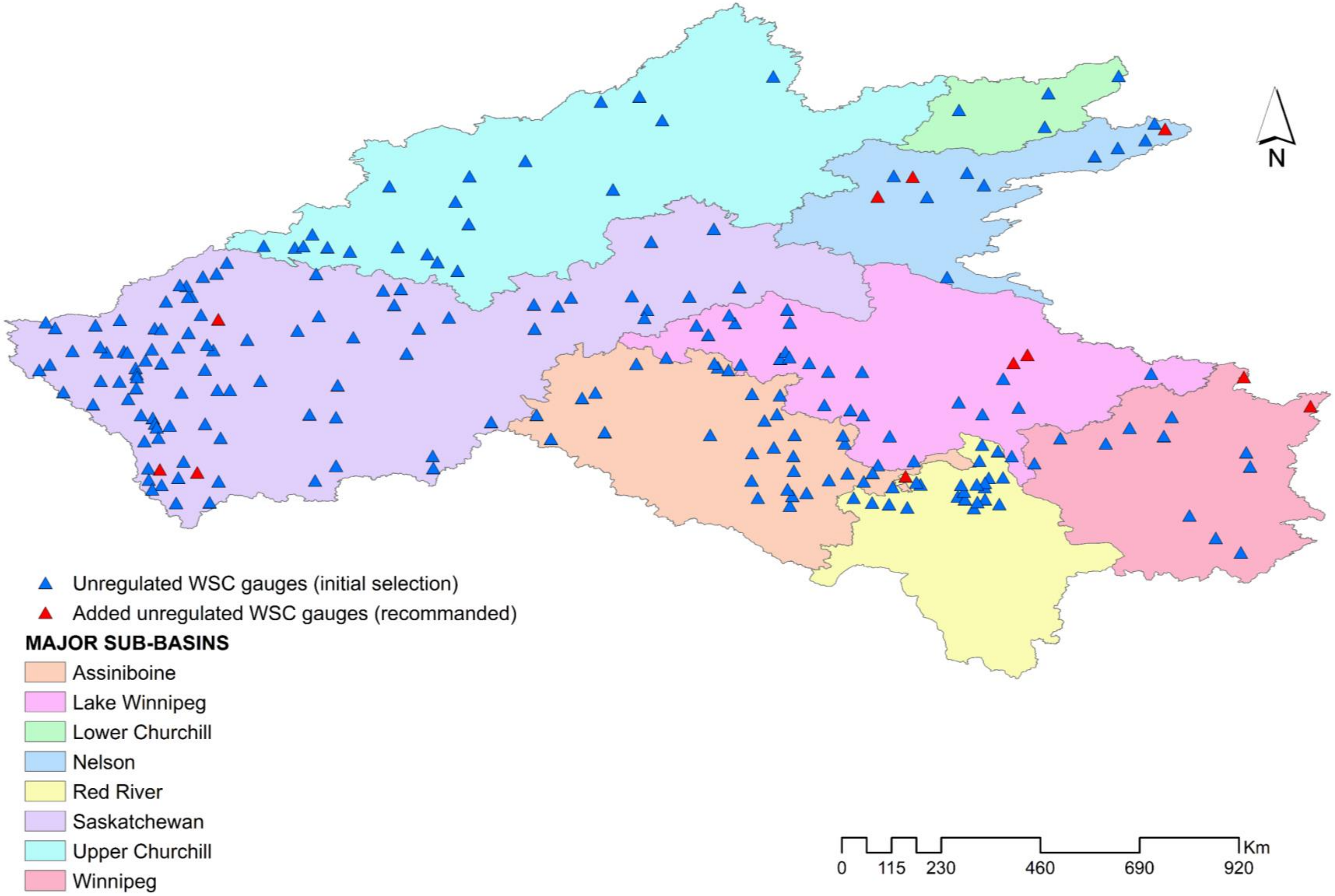

Sub-basins	Number of WSC natural stations
Assiniboine	32
Lake Winnipeg	28
Winnipeg river	13
Upper Churchill	20
Lower Churchill	4
Saskatchewan river	94
Red River	23
Nelson river	12

Selection of natural gauge stations for calibration/validation - continuous vs seasonal

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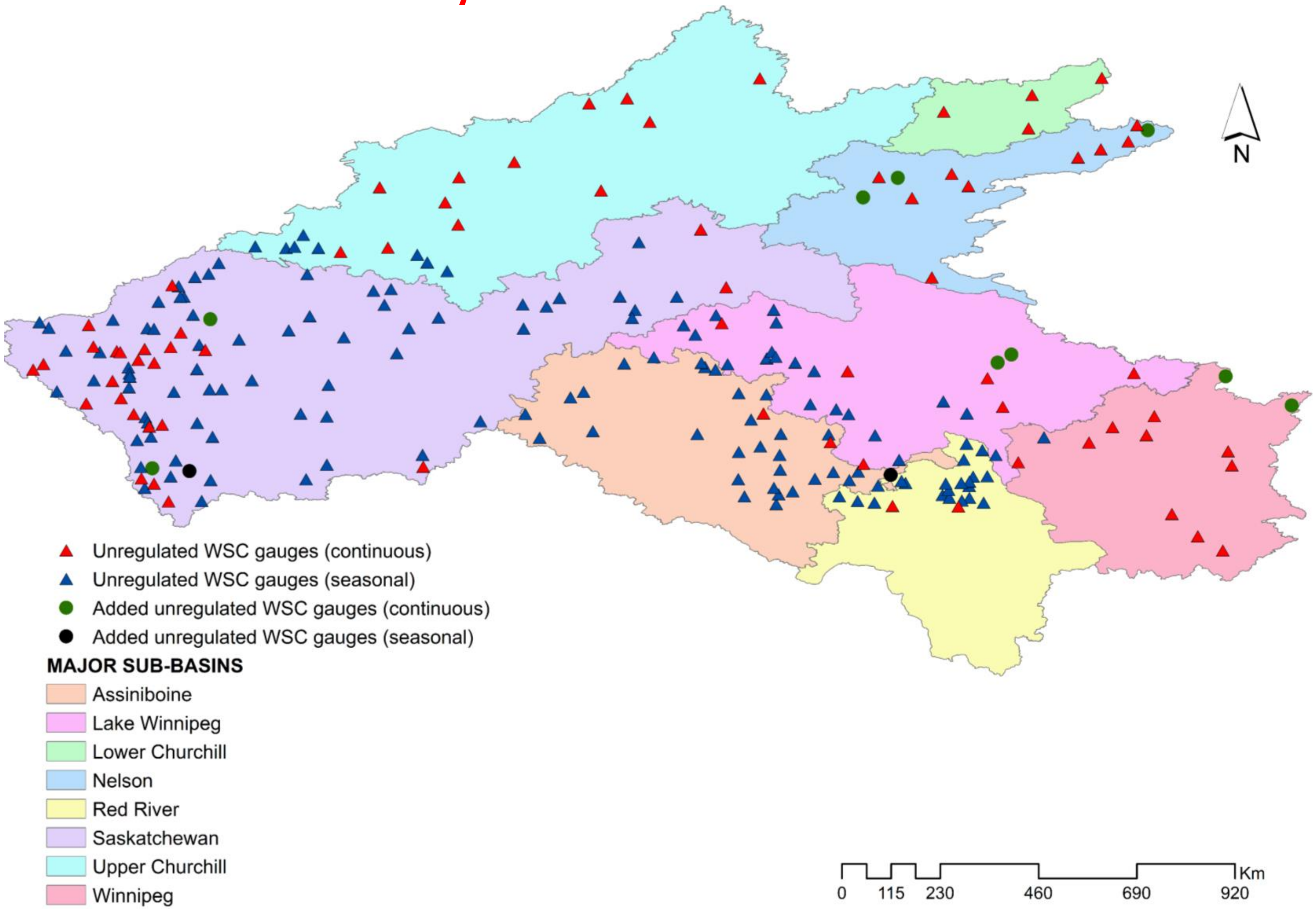

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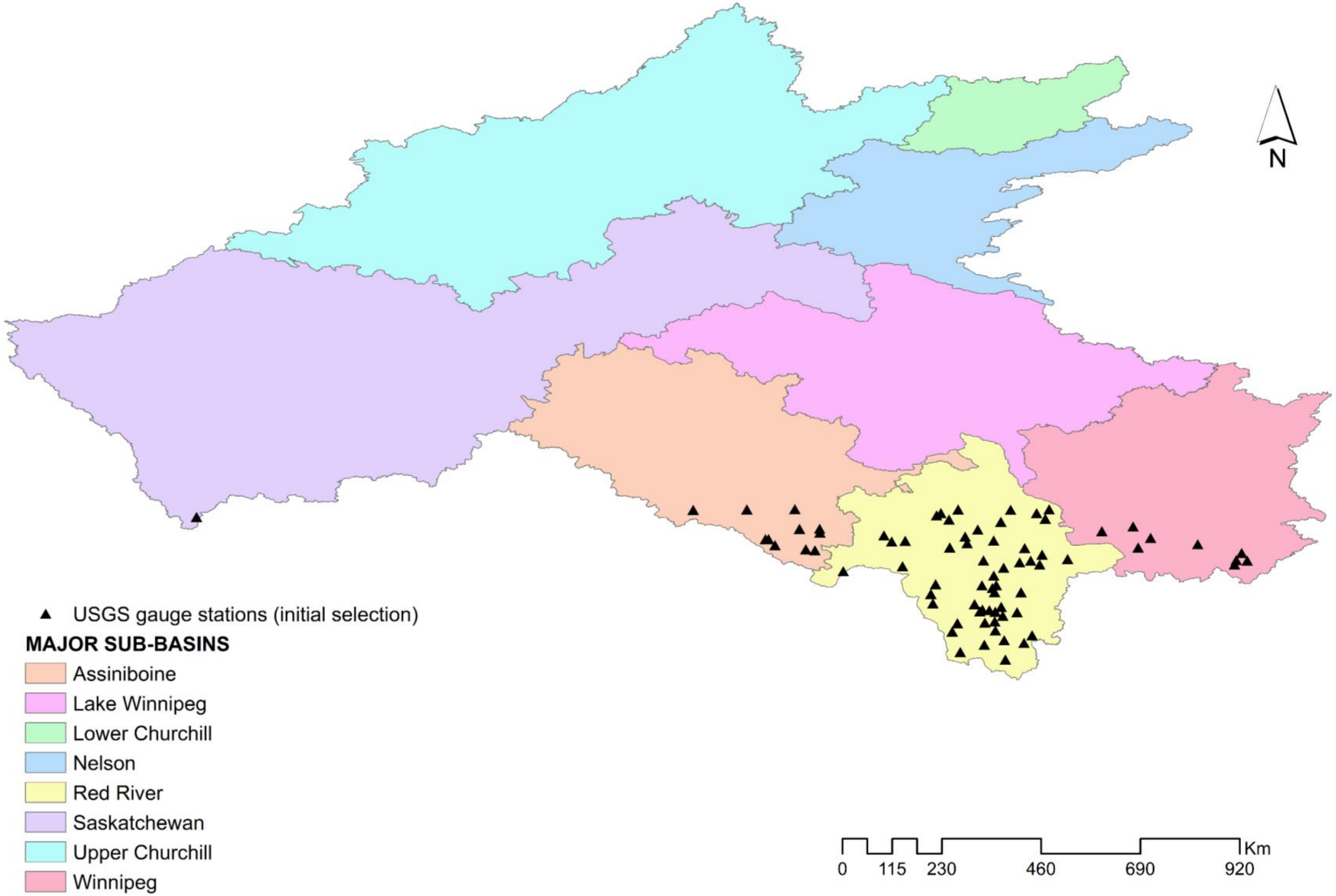
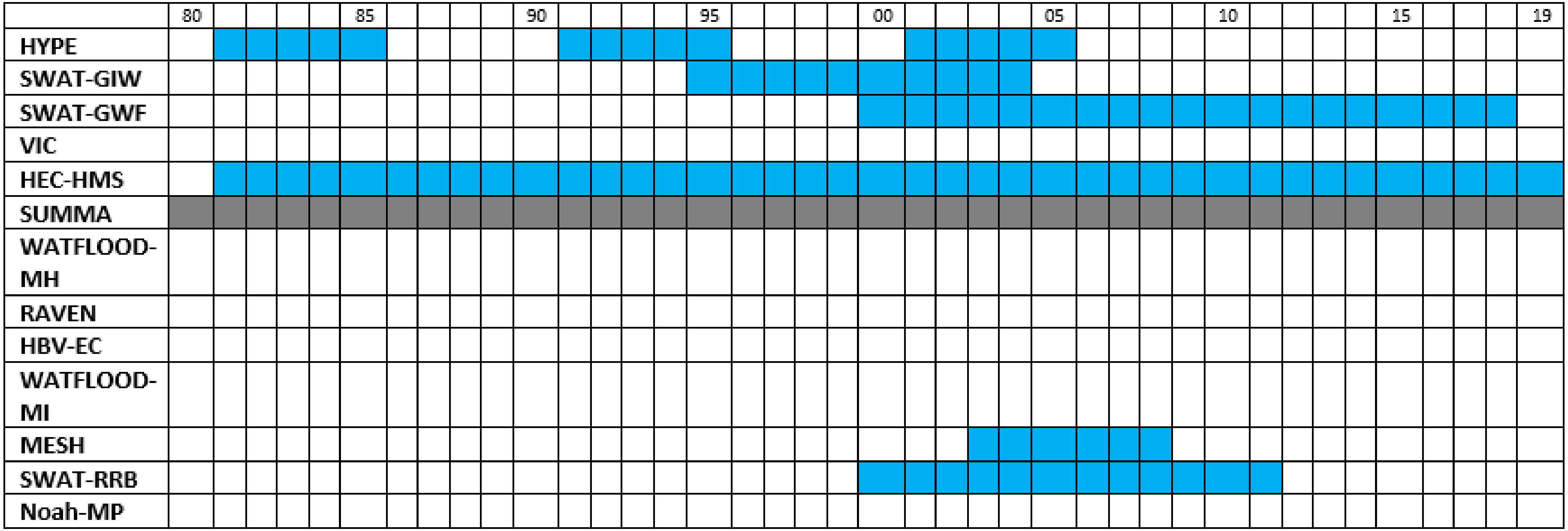
Selection of natural gauge stations for calibration/validation (Phases 0 & 1)



Sub-basins	Number of USGS stations
Assiniboine	11
Lake Winnipeg	-
Winnipeg river	9
Upper Churchill	-
Lower Churchill	-
Saskatchewan river	1
Red River	55
Nelson river	-

Time periods for calibration/validation

- **Calibration**



No calibration for SUMMA

Time periods for calibration/validation

- **Validation**

	80					85					90					95					00					05					10					15				19
HYPE																																								
SWAT-GIW																																								
SWAT-GWF																																								
VIC																																								
HEC-HMS																																								
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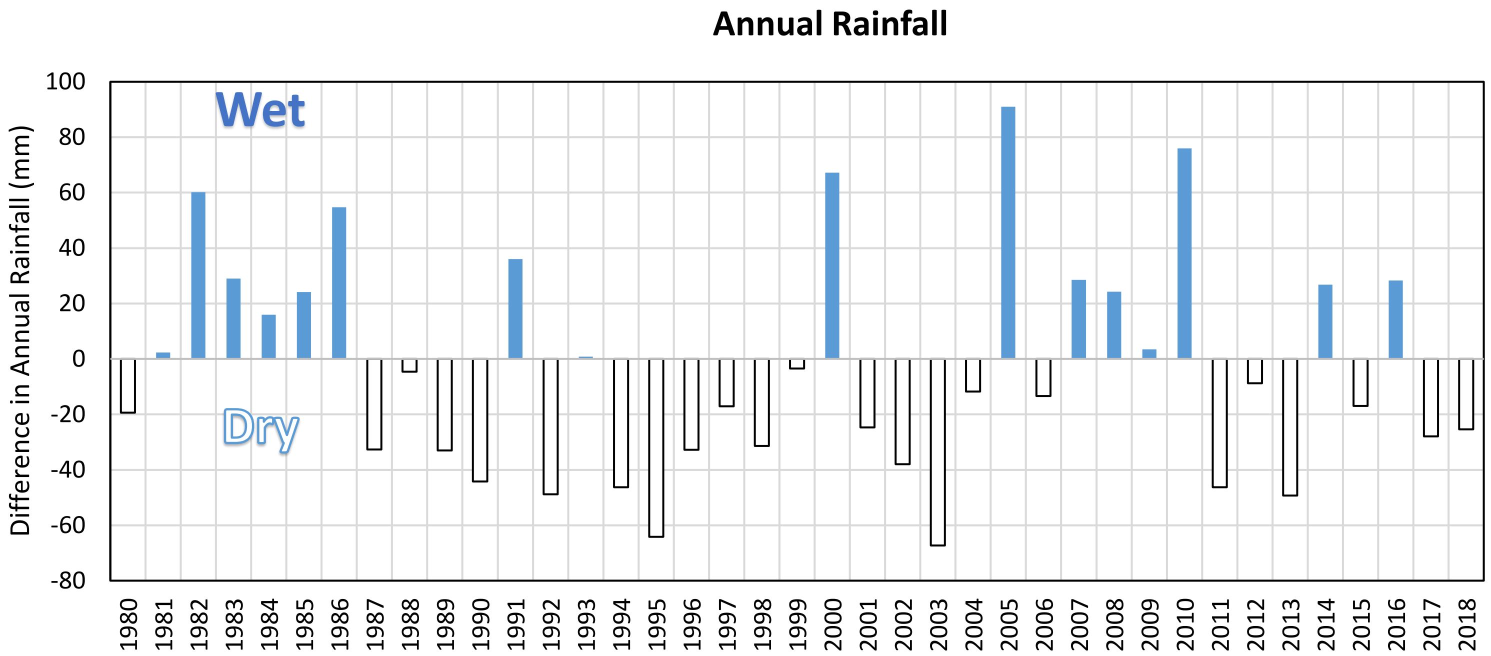
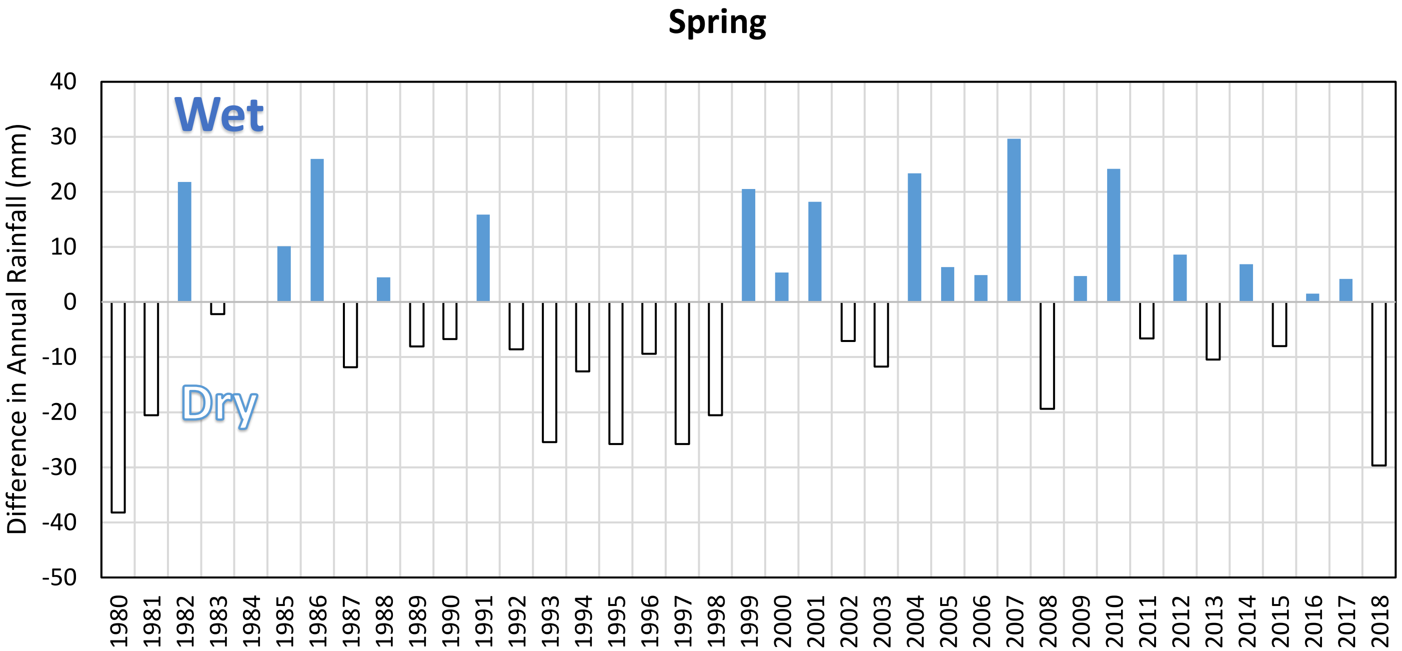
Time periods for calibration/validation

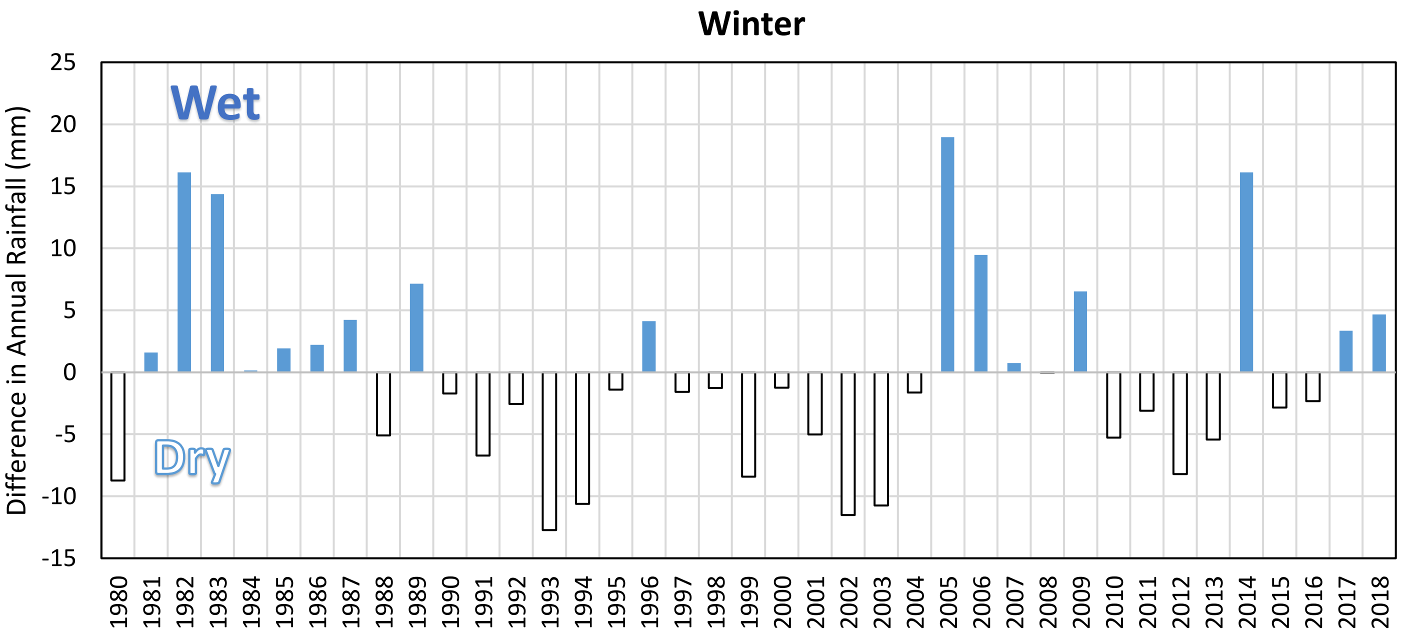


Calibration	Validation
1981-1985 (wet)	1986-1990 (Dry)
1991-1995 (Dry)	1996-2000 (wet and Dry)
2001-2005 (Wet and Dry)	2006-2010 (Wet)
2011-2018 (Wet and dry)	

The wet and dry years selection is based on precipitation fields derived from the HydroGFD met. forcing product

Time periods for calibration/validation





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Standardized meteorological forcing data

	ERA5	WFDEI-GEM-CaPA	NCEP-CFRS	Standard MiP data
HYPE	X			X
SWAT-GIW		X	X	
SWAT-GWF				
VIC				
HEC-HMS	X			X
SUMMA	X			
WATFLOOD-MH				
RAVEN				
HBV-EC				
WATFLOOD-MI				
MESH		X		
SWAT-RRB		X		X
Noah-MP				

- We have to choose between WFDEI-GEM-CaPA and ERA5
- WFDEI-GEM-CaPA (https://doi.org/10.5194/essd-2018-128) ➔ 3-hourly, 0.125° ~ 10 km, 1979-2016 (variables are: huss, pr, ps, rlds, rsds, sfcWind, tas)
- ERA5 (https://www.ecmwf.int/en/forecasts/datasets/reanalysis-datasets/era5) ➔ 1-hourly, ~31km-grid, 137 levels from surface up to 0.01hPA (~ 80 km), 1979-near real time

Hydrologic routing scheme

- We should decide on using a standardized routing scheme or not.
- All groups were tasked to consider offline routing advantages/ disadvantages
- Bryan Tolson's group (UWaterloo) offers to produce a routing scheme (including lakes) if all modelers will use it.
- If Bryan idea is accepted, we should also decide whether the routing scheme shall be derived using HydroSHEDS 3-arc sec DEM (~90m) (https://hydrosheds.cr.usgs.gov/dataavail.php) or MERIT Hydro 3-arc sec data products (https://doi.org/10.1029/2019WR024873).

Hydrologic routing scheme

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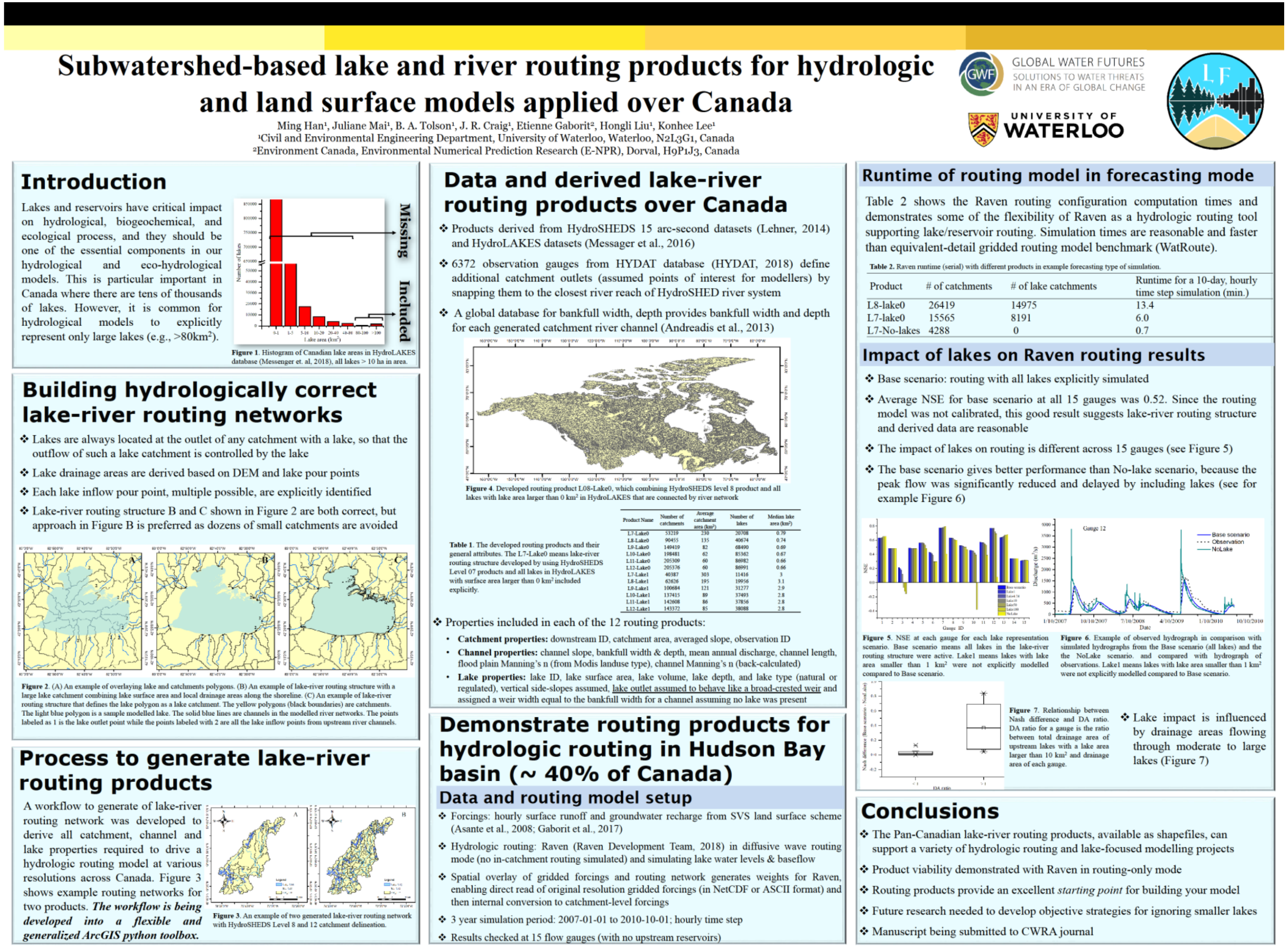

- The discretization methodology can be applied for any user provided DEM
- The resolution of subbasins and lakes represented can be customized
- The outputs of the discretization are a vector-based routing network with complete information needed for lakes and river hydrologic routing
- RAVEN is used to do the routing simulation

Routing scheme and other geophysical inputs

- Land use/ land cover: North American Land Change Monitoring System (NALCMS)
- NALCMS is provided at 250m and **30m** spatial resolution, contains 19 land cover classes, and is publicly available from http://www.cec.org/tools-and-resources/map-files/land-cover-2010-landsat-30m.
- Soil data: Global Soil Dataset for Earth System Modelling (GSDE)
- GSDE is provided at 30 arc-second resolution **(~1km)**, and contains 11 types of soil general information for soil profiles and 34 soil properties for 8 depths up to 2.3 m. It can be downloaded from http://globalchange.bnu.edu.cn/research/soilw#download.

All groups were tasked to explore soil datasets & provide recommendations.

Deliverables & Follow-up

1. All modellers should prepare a 5-min presentation of their model for the next meeting. The 1-3 slides presentation should be sent to Hervé by April 1st 2020 at the latest.
2. Next meeting scheduled for **<u>Wednesday April 8 @10:00AM MST</u>**