

SEARCH TERM: Data or Dataset or Database (and synonyms) – 29 projects

Southern Forest Water Futures

- Provision of long-term high-quality **data** of water, carbon and energy flux, meteorological, hydrological and biometric **data** sets in different-age and species of southern temperate forests for research and model development by research from Canada and across the world
- We have continued our energy, water and carbon flux and meteorological **data** measurements. We use eddy covariance systems, weather stations, sapflow probes, rain gauges and plant physiological and remote sensing sensors. These **data** are being archived at the GWF Central **Data** System with the help from GWF Core **Data** Management team at McMaster University.
- High quality water, carbon and energy flux, meteorological, hydrological and biometric **data** sets for research and model development by research from Canada and across the world

Artificial Intelligence (Cryptosporidium)

- Mining DNA **databases** to determine the feasibility of using identified DNA sequences. (HSchellhorn)

Boreal Water Futures 2

- Developing partnership with Parkland County to provide **data** for future objectives
- Analysis of field carbon flux **data** from Parkland County study sites and combination with literature **data** to build post-fire ecosystem trajectory and evapotranspiration partitioning

Co-Creation of Indigenous Water Quality Tools

- Discussed with Digital Democracy (re: Terrastories) and the Grand River Conservation Authority for potential integration of **databases** and opportunities for collaboration.
- Reviewed the Nunaliit system for potential integration of **databases**.
- Finalized the system diagram and tech stack for database development and hired a research assistant to start building the **database** using sample data.
- Created a **data** catalog template to start collecting project **data** to be included in the **database**.
- Further developing the Indigenous map via a citizen science and grassroots 'Train the Trainer' methodology leveraging free and open-access tools - **data** collection software (Mapeo) and mapping platform (Terrastories).
- Improving sensor network so that **data** can be reliably collected
- Reconciling **data** sources and sets

- Installation and continuous **data** collection from 4 sensor modules along the McKenzie Creek

eDNA

- Collection of eDNA **data** for genomic baseline of boreal ecosystems (North Saskatchewan River and ELA lakes)
- Development and maintenance of weekly updates to public Dashboard with **data**
- **Data**-analyses and paper writing: impact of selenium exposure and diluted bitumen spill on whole lake ecosystems
- **Data**-analyses and paper writing: eDNA-based bio-survey of irrigation systems (South Calgary, Alberta Province) to find out the relationship between plankton communities and nutrient availability, eDNA indicators for agriculture chemical stressors

FISHNET

- Collaboration with the Food, Environment, Health and Nutrition of Children and Youth (FEHNCY) team, including a **data** sharing agreement.
- In collaboration Mushkegowuk Council, Fort Albany First Nation, and consultation with the (FEHNCY) team, we developed a survey to collect **data** on food behaviour and perceptions of adults (household food insecurity, impact of wild-harvested fish on food security, risk perception, changes to food security and fish health over time and related to climate, relationships between fish health and human consumption).

FORMBLOOM

- Larsen ML, Venkiteswaran JJ. 2019. **Data** for "Extreme midsummer rainfall event drives early onset cyanobacterial bloom". figshare. **Dataset**. <https://doi.org/10.6084/m9.figshare.7811963.v1>
- Kehoe MJ, Ingalls BP, Venkiteswaran JJ, Baulch HM. Successful forecasting of harmful cyanobacteria blooms with high frequency lake **data**. bioRxiv 674325 doi: 10.1101/674325.

Geogenic Contamination of Groundwater

- The research team is compiling groundwater, surface water, and permafrost geochemical analyses to build up the **dataset** that will be the foundation of this project. This includes compiling analyses of new samples collected in 2021 and submitted to various analytical facilities this fall.
- The research team is holding ongoing conversations with YG to create the Yukon groundwater geochemical **database** that will form the backbone of Grunsky's MSc.
- Production and analysis of a Yukon groundwater geochemical **database** to assess interactions between (hydro)geology, permafrost, and trace element concentrations in groundwater.

Remotely Sensed Monitoring of Northern Lake Ice

- Coding and initial testing of threshold algorithms using Sentinel-1 SAR **data** on Google Earth Engine.
- Retrieval of ice cover on Northern Lakes using Synthetic Aperture Radar **data** and Convolutional Neural Networks (CNNs).
- Algorithm testing for threshold-based intra-lake and North America-scale ice phenology on Google Earth Engine (Figs 4 & 5).
 - Development of algorithm validation using thermodynamic ice model with ERA-5 **data** as input.
- Building **database** of RCM **data** – troubleshooting opening SLC **data** (RCM user forum discussed difficulty opening Single-Look-Complex RCM **data** products using industry standard remote sensing software).
- Collecting in-situ **data** of lake surface temperature and ice thickness on selected lakes in Northwest Territories (in progress - Figs 1, -3).
- Retrieval of lake ice cover from SAR using CNNs with uncertainty estimates
- Comparison of methods for bias correction of climate **data** (Bayesian approach vs quantile mapping)
- Development of a validated and calibrated ice thickness model and lake surface temperature and ice thickness **data** (NetCDF format) for verification of spatial details of ice phenology and thickness (1984 – 2021).

Climate related precipitation extremes

- Analyzed HAILCAST output, forced with CONUS I CTRL and PGW **data**, which has been used to estimate future changes in the occurrence and severity of hail over the Canadian Prairies and United States Northern Plains and to illustrate some projected reductions in future hail occurrence through enhanced melting aloft
- Applied object-based tracking of precipitation systems in western Canada and determined the temporal resolution of source **data** required to establish the statistical characteristics of MCSs
- Utilizing hourly CONUS I and II historical **information** to determine the occurrence of near 0°C temperatures and associated hazardous precipitation in Manitoba and NB

We Need More than Just Water

- Sediment transport modeling; validation with empirical **data**

Integrated Modelling Program for Canada

- **Water quality and river ice** (Dr. Lindenschmidt's team): WASP Sediment transport model set up for the lower South Saskatchewan River in preparation for coupling with water management models (MODSIM). Also developed a novel framework for identifiability and identification analyses for cold region integrated models and performed an analysis on water quality models in the Prairies. In terms of river ice research, team developed a graphical-user-interface (GUI) for the RIVICE hydrodynamic model for Monte-Carlo Analysis (MOCA) and **data**/result visualization in the Athabasca River and Saint John River. MESH-RIVICE was also tested successfully in the Athabasca River in Fort McMurray.
- **Improving Modelling and forecasting capacity**: Dr. Li's team has recently been evaluating the impacts of surface coupling strength on regional climate simulation using Fluxnet site observations and the continental scale 4-km WRF CONUS simulations, along with assessment of the uncertainty for the coupled simulations of future climate. Dr. Papalexiou's team is actively performing detailed statistical analysis of gridded products based on the available in situ and gridded observation **data** over Canada and all available CMIP6 simulations (both historical and future for four SSPs) for precipitation, max and min temperature.
- **Visualization tool development & user evaluation**: Dr. Gutwin's team is concurrently developing two web-based tools with direct and iterative collaborator and user feedback aimed at maximizing utility of these tools as sources of **information** to help multi-stakeholder dialogues and water management decision-making: (1) Knowledge-Support-System (Previously, Decision-Support-System, or DSS) tool infrastructure is being expanded from its pilot phase to include MODSIM integrated model results (15 select scenarios, as described above); (2) EBC Flow Visualization tool to respond to place-based community questions, as well as work as a 'boundary object' to assist in multistakeholder facilitation processes between SaskPower, Water Security Agency, Cumberland House residents (and other delta stakeholders) to work towards collective stewardship goals of the delta.

Integration of next-generation hydrological and land surface models to address changing cold region processes:

- Detailed statistical analysis based on the available in situ and gridded observation **data**, as well as CMIP6 projections; comparison between observation and projections. Downscaled CMIP6 precipitation projections for target regions along with quality assessment of the downscaled products.
- Complete pan-Canadian high resolution (4-km) atmospheric modelling of historical climate and future warming, the CONUS II simulation; post-processed WRF output; sensitivity test of land-atmosphere feedbacks using existing coupled atmosphere - land surface model. Conduct inter-model comparisons with the ECCC MESH/CLASS modelling system for cold region land surface schemes by collaborating with the core modeling and the ECCC MESH groups. Conduct scenario runs for the assessment of land-atmosphere feedbacks using WRF-MESH/CLASS coupled modeling system to provide additional context of model and scenario uncertainty.

Integrating river ice processes into hydrological modelling for improved operation and flood forecasting:

- Implement a validated MESH-GeoSpace-RIVICE natural and regulated river systems in a platform which allows **data** streaming and flood warning issuances (Saint John River).

Warming Estuaries, Closing Gates

- Compare drone-based (point in time) and fiber-optic based (continuous in time/space) water temperature **datasets** with **data** from conventional water temperature loggers (point in space) installed at multiple depths within the water column and in inter-tidal springs – fall/winter 2021-2022
- New **datasets** from five coastal watersheds – including water temperature at all sites and hydrology/weather **data** at selected sites (all under DMP).

Lake Futures

- Developed a machine learning model for all watersheds across the Great Lakes Basin that can predict seasonal concentrations and loads of nitrate, total nitrogen, soluble reactive phosphorus and total phosphorus (**dataset**, including daily concentration and load **data** published in the CUAHSI archive, and paper in review at Earth’s Future)
- Developed a machine learning model to predict chlorophyll-a concentrations in large lakes (Kheyrollapour et al. 2021, in prep). Corresponding **dataset** published in Adam et al (2021, in review)
- Analyzed streamflow **data** across North America to show how human interventions are amplifying and dampening seasonal streamflow patterns (Singh and Basu, 2021)
- Organization of a 2-day workshop in December 2020, in collaboration with The Gordon Foundation, on “**Data** Needs in the Great Lakes”

Managing Urban Eutrophication Risks

- Collected spatial and temporal **data**, conducted **data** quality-control, and produced land cover, sewer network, and meteorological **data** in forms usable by the model.
- Verified monitoring **data** (runoff time series in summer 2012 and recent **data** since 2020) to be used for model calibration.
- Built PCSWMM for the project’s study areas: Pickering, Ajax, Whitby, and Oshawa watersheds. Collected and verified calibration **data**: stormwater management network, land cover, and meteorological **data**. Collected TSS and phosphorus (P) **data** from literature and technical reports to be used in the water quality component of PCSWMM.
- Hourly **data** of water currents and temperature of Lake Ontario since March 2016 till present were obtained from the Great Lakes Operational Forecast System. Note: these **data** are real-time predictions from the Princeton Ocean Model (POM), a 3-dimensional hydrodynamic circulation model.
- Collected **data** on response (i.e., price of lakefront properties) and predictor variables (i.e., population and dwelling density as proxies for urban input to aquatic systems) in the study area to be used in regression models.
- Scale up the PCSWMM model for the entire study area by incorporating more detailed GIS layers of land cover and soil **data**.

- Define the nearshore and offshore segments of WLO based on the water residence time of the segments, the degree of shoreline development, and the resolution of the available **data** of water currents (5 km in horizontal direction).
- Collect and archive **data** on historical (i) chlorophyll (*chl-a*) concentrations from publicly available Moderate Resolution Imaging Spectroradiometer (MODIS) daily **data** (and other remote sensing sources), and (ii) additional open access water quality (P concentrations, temperature, meteorological **data**) and demographic plus socio-economic (census) **data**.
- Validate the algorithm for the satellite-derived nearshore Chl-a and *Cladophora* concentrations with in situ **data**.
- Calibrate the nearshore algal growth model with the remote sensing **data** algorithm

Mountain Water Futures

- Examined the occurrence of precipitation transition regions in the current and future climate using CONUS I **information** and found that occurrences and average elevations increase more in interior regions than near the coast under PGW conditions.
- Collected precipitation amount and type **information** in relation to documented atmospheric rivers in the Nechako watershed during September and October 2021.
- Archiving in a public **data** repository of VIC-GL simulation output.
- Determination of near-0°C conditions at Terrace and nearby regions and expected changes using observational **datasets** and CONUS II **information**.

Northern Water Futures

- Enhanced safety of harvesters (supported fire/permafrost vulnerability **data** management).
- Compilation of **data** supporting cross-site analysis of ecohydrological change and additional **data** collection as needed to complete this **dataset**
- Integrate spatial **datasets** to create hazard probability maps for key climate-related land hazards (thermocarst, severe burning)
- Synthesize **data** on patterns of post-fire forest regeneration across the North American boreal to evaluate patterns and drivers (Baltzer et al., 2021)
- Connect ground-based vegetation recovery measures with scalable land cover **information** through high resolution hyperspectral **data** acquired for our sites by NASA ABoVE
- Apply spatial modeling framework to develop thermocarst vulnerability maps for the region and couple with harvester safety **information**
- Connect permafrost **data** from Inuvik-Tuk highway and food security **data** in Tuktoyaktuk

Old Meets New

- Compiled a **database** of groundwater chemistry for deep, saline aquifers in western Canada

Prairie Groundwater

- Obtained Saskatchewan groundwater well **database**
- Starting correlation analysis between streamflow and baseflow trends with GRACE/GRACE-FO **data**
- Integration of geological, hydrogeology, geochemical **data**, numerical models and statistical analyses to develop conceptual models of representative groundwater systems in the Canadian Prairies

Saint John River Experiment

- To obtain the spatial variability of precipitation across the region, around 20 CoCoRaHS stations were installed and volunteers collected precipitation amounts and snow depth each day. **Data** are available through the CoCoRaHS network.
- **Data** collected from the CoCoRaHS volunteer network are similar to the automatic measurements, however, more precipitation was recorded west (upstream), with a greater amount of liquid phase precipitation in the Edmundston area, near the precipitation phase observatory.
- External **data** covering the Saint John River basin (ERA5/ERA5 land, hydrological **data**, DEM **data**, etc.) have been extracted for analysis, modelling, and GIS use.
- Organizing the collected **data** and uploading them to an open-access repository, in conjunction with drafting a manuscript detailing the resulting **dataset**.
- Analyzing precipitation types using **data** from the optical-disdrometer, manual observations, and the Multi-Angle Snowflake Camera (MASC).
- Open access **database** of meteorological conditions, including precipitation phase, types, and macrophotography

Sub-Arctic Metal Mobility Study

- Leclerc É, Couture R-M, Venkiteswaran JJ. 2021. **Data** for: Quantifying arsenic post-depositional mobility in lake sediments impacted by gold ore roasting in sub-arctic Canada
- Jasiak I, Wolfe BB, Hall RI, Venkiteswaran JJ. 2021. **Data** for: Evaluating spatiotemporal patterns of arsenic, antimony, and lead deposition from legacy gold mine emissions using lake sediment records. Scholars Portal Dataverse, doi: 10.5683/SP2/TNYTQL.

Saskatchewan Private Wells

- **Data** agreements with Saskatchewan Water Security Agency
- Hard copy **data** digitized for complete water quality **database**

Paradigm Shift in Downscaling Climate Model Projections

- **Database** comprising CMIP6 simulations for precipitation, average minimum and maximum temperature at monthly and daily scales.
- **Database** of gridded and station observations.
- Bias-corrected climate model maximum and minimum temperature simulations using EMDNA **dataset** for Canada. A total of 652 simulations each (maximum and minimum temperature) are bias-corrected at daily scale for the time period 2021-2100 at spatial resolution.
- Bias-correcting climate model precipitation simulations using EMDNA **dataset** for Canada. The Semi-Parametric Quantile Mapping (SPQM) method is developed to bias-correct the simulations at daily scale for the time period 2021-2100 and tested for a couple of grids across Canada. A total of 759 simulations are used for bias-correcting.
- A **database** of climate model simulations for precipitation, average minimum and maximum temperature at monthly and daily scales, and several observation **datasets**.

Storms and Precipitation Across the Continental Divide Experiment

- **Data** collected during the field experiment were published in the Federated Research **Data** Repository (FRDR) and are described in a publication in the journal Earth System Science **Data**.
- Open access **database** of meteorological conditions, including precipitation phase, types, and macrophotography

Transformative sensor Technologies and Smart Watersheds

- Advancement in commercial development of interactive and fully programable iWT **data** logging system being produced by Solinst Canada.
- Development of multilayer perceptron neural network (deep learning) for the estimation of phycocyanin from hyperspectral remote sensing **data**, showing potential for development of a globally applicable cyanobacteria measurement approach.
- Development of enhanced Chione acoustic snow measurement signal processing using machine learning for robustness and speed of **data** analysis at deployment locations characterized by wind and motion.
- Incorporation of AI-based hydrologic triggering algorithms into the iWT **data** logging system (coll. Solinst Canada).
- Preparation of novel airborne geophysical survey method utilizing a multi frequency electromagnetic system developed in Canada to be flown in the early summer of 2022 at one of the northern observatories to map discontinuous permafrost. Regular ACRO drone operations at Fortress Mountain Snow Lab during snow accumulation/melt periods to collect **data** on forest-snow interactions.

- Development of algorithms for monitoring lake ice phenology using **data** from GNSS-R constellations of satellites (CYGNSS and coll. Spire).
- Enhanced bi-directional transfer of **data** between field sites used for testing of experimental sensors.
- An increase in the accuracy and precision of **data** collected to quantify flooding, drought and water quality.
- The multiscale **data** streams will be fully integrated into the next generation of numerical models for advanced modeling of permafrost degradation, land subsidence and solute transport.
- Deployment and acquisition of science analysis-ready **data** of the CryoSAR to Ontario, Alberta, Saskatchewan. These **data** will be the first dual frequency Ku and L-band observations in Canada.
- Creation of test science **data** sets in support of the TSM2 satellite mission at ECCC. This dual frequency Ku-concept is novel and the first of its kind in Canada and will support retrieval science for radar observations of terrestrial and lake ice snow accumulation and soil moisture freeze/thaw and content estimates.
- Informing space agencies and partners from space industry, supported by research project findings: 1) optimal wavelengths needed from hyperspectral/multi-spectral instruments and ML/AI algorithms for the monitoring of cyanobacteria (blooms); and 2) optimal configurations/**data** acquisitions from GNSS-R constellations of satellites and algorithms for lake ice monitoring at the global scale.

Visualisation Task Force

- Created APIs for **data** import and manipulation (Spring/Summer 2021)
- Interactive (**Data** Exploration)
- Collaborative (Share visualizations, **data**, programs)
- **Data** Analytics (Visual comparison, derived variables, auto-summarization, scenario analysis, decision making)

Water Good To Drink

- Ethics approval for co-designed draft **data** collection tools

Winter Soil Processes

- We developed machine-learning model and synthesis **data**-driven approaches to determine that changes in soil moisture, temperature, and photosynthesis are the primary drivers of changes in net C flux during the non-growing season (NGS). We projected a 103 per cent increase in Mer Bleue peatland C loss by 2100 under a high radiative forcing scenario, highlighting that the peatland C loss will therefore constitute a strong positive climate feedback loop.

What is Water Worth?

- Draft state-of-the-art non-market valuation guidelines for water practitioners to better **inform** policy and decision-making related to sustainable water use and management.
- Connect the economic valuation of aquatic ecosystem services to available water quality monitoring **data** and policy-relevant biophysical indicators for the water quality challenge in question. Where possible, use will be made of available environmental models to assess changes in baseline water quality conditions due to water quality policy intervention scenarios. In particular, we aim to employ and update the current prototype of the Water Quality Valuation Model developed by ECCC as an integrated environmental-economic water quality modeling framework.
- Set up a geo-referenced national **data** and **information** system for the economic values of relevant aquatic ecosystem services across Canada

Short-duration Extreme Precipitation

- YL: Applied the object-based tracking of precipitation systems in western Canada and discovered the importance of temporal resolution of source **data** in determining the statistics characteristics of the MCSs. ([Lintao Li](#), [Yanping Li*](#), [Zhenhua Li](#), 2020: Object-based tracking of precipitation systems in western Canada: the importance of temporal resolution of source **data**. *Climate Dynamics*, DOI:10.1007/ s00382-020-05388-y)