

# PIETER AUKES

Postdoctoral Fellow, WLU

## CONTACT INFORMATION

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## EDUCATION

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### **Doctor of Philosophy – Earth Sciences (Water)** 2013 - 2019

*University of Waterloo, Waterloo, ON*

- Thesis: 'Dissolved Organic Matter in the Canadian Arctic & Sub-Arctic: Importance of DOM Quality & Quantity in a Warming Climate'
- Supervisors: Dr. Sherry Schiff, Dr. Michael English
- Multidisciplinary approach to water issues via the 'Collaborative Water Program'

### **Master of Science – Hydrogeology & Geochemistry** 2010 - 2012

*University of Waterloo, Waterloo, ON*

- Thesis: 'Characterization of Dissolved Organic Matter Using a Liquid Chromatography – Organic Carbon Detection from a Variety of Surface and Ground Water Environments'
- Supervisor: Dr. Sherry Schiff

### **Bachelor of Science (Hons.) – Environmental Science (Geosciences)** 2006 - 2010

*University of Calgary, Calgary, AB*

- Thesis: 'Groundwater Connection between an Alpine Lake and a Spring Complex and the Transport of Copepods'
- Supervisor: Dr. Masaki Hayashi

## TEACHING INTERESTS

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- Using a multidisciplinary approach to environmental science instruction by combining field, laboratory, and lecture techniques
- Utilizing active based learning through the use of large, open-access databases to connect students with data
- Creating a sense of community within the class

## TEACHING EXPERIENCE

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### **Senior Instructor**

*Catchment & Global Biogeochemistry (GG387), Wilfrid Laurier University* 2021

- Remote delivery of introductory biogeochemical concepts and climate change to 15 students
- Use of Case Studies to link biogeochemical concepts to actual experiments and changes in environmental policy
- Challenged students to develop communications skills using different writing, visualization, and presentation techniques

### **Guest Lecturer**

*Introduction to Geology, Geography & Environmental Studies (GL102), Wilfrid Laurier University* 2020

- Series of lectures for an undergraduate course of 80 students on structural geology & plate tectonics
- Demonstrated stratigraphic layers, folds, and faults using open-sourced web applications
- Implemented 'Think-Pair-Share' activities for students to practice geologic concepts of strike and dip

*Geochemistry (EARTH221), University of Waterloo* 2019

- Taught introductory lectures for an undergraduate course of 40 students
- Used prompting and in-class polling to engage students with material & direct lecture to aspects that weren't clear
- Focused on the how the beginnings of the Universe, abundance of different elements, and origins of life

*Stable Isotopes in Geochemistry (EARTH622), University of Waterloo* 2018 - 2020

- Graduate level course of 25 students that discussed examples of using stable isotopes in environmental sciences
- Introduced how to use stable water isotopes to calculate a water balance for high arctic ponds

*Under-Ice Lake Sampling, Nunavut Arctic College* 2016

- Demonstrated field-based winter limnological sampling to a group of 20 students outside of Iqaluit, NU
- Used 'I Do We Do You Do' to demonstrate specific field techniques
- Discussed proper sampling technique and pitfalls of improper data collection

### **Teaching Assistant**

*Field Methods in Hydrogeology (EARTH671), University of Waterloo* 2018; 2019

- Intensive 3-week field school demonstrating key introductory concepts and field techniques to 30 students
- Created an approachable and friendly community by using humour, positive reinforcement, and patience
- Responsible for organization of multiple field-based demonstrations, health and safety, and student concerns

*Sedimentology & Stratigraphy (EARTH235), University of Waterloo* 2010; 2011

- Conducted tutorials to practice key introductory concepts and principles to a class of 60 students
- Aided students in conceptualizing geological maps, 3-D visualization, and creation of cross-sections
- Sought higher order thinking from students while explaining material

## **RESEARCH INTERESTS**

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- Quantify climate-driven changes to water geochemistry
- Use of geochemical and isotopic tools to further process-based knowledge
- Combine meaningful community engagement with climate change science to produce a framework for lasting community-driven research
- Open source, accessible, and reproducible science

## **RESEARCH EXPERIENCE**

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**Postdoctoral Fellow** 2019 - Present

*Wilfrid Laurier University, Waterloo, ON*

- Part of the Sub-Arctic Metals Mobility Study led by Dr. Brent Wolfe, Dr. Jason Venkiteswaran, & Dr. Michael English
- Assess the impact of climate change on the transport of legacy-based pollutants among the sub-arctic taiga shield
- Quantify the importance of organic matter quantity and quality and how it affects metal transport in these systems

**Field & Laboratory Research Assistant** 2012 - 2019

*University of Waterloo, Waterloo, ON*

- Determine how differences in land use (agriculture & urbanization) impact river health over all seasons using geochemical and stable isotopes
- Responsible for numerous wet chemistry and stable isotopic techniques needed for analysis
- Taught use of analytical equipment to students using hands-on approaches

**Hydrogeology Summer Research Assistant** 2008 – 2010

*University of Calgary, Calgary, AB*

- Supported geophysical and hydrological research projects at Lake O'Hara
- Conducted routine hydrological measurements for snow and hot spring discharge in Banff National Park
- Responsible for data collection, organization, and input into electronic databases

## **SERVICE EXPERIENCE**

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### **Academic**

Co-Supervisor to Science BSc & Work Co-op students 2019 - Present  
*Wilfrid Laurier University / University of Waterloo*

- Mentored seven undergraduate students on concept design to scientific writing of a thesis or work-term report

## PIETER AUKES CV

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- Collaborated and guided 10 graduate students (MSc and PhD) through field sampling, scientific proposals, scientific writing, and mental well-being
- Demonstrated field planning and field-sampling techniques using one-on-one mentorship to graduate students
- Worked collaboratively with students to advance overall scientific findings of the research lab

President, Earth Science Graduate Association (ESGA) 2011 - 2012  
*University of Waterloo*

Executive, Environmental Science Students Association (ESSA) 2009 - 2010  
*University of Calgary*

### SCHOLARSHIPS & AWARDS

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Ontario Graduate Scholarship (\$15,000) 2011 - 2012; 2017 - 2018  
*Government of Ontario*

President's Scholarship (\$10,000) 2011 - 2012; 2017 - 2018  
*University of Waterloo*

W. Garfield Weston Award for Northern Research – Doctoral (\$50,000) 2015 - 2017  
*W. Garfield Weston Foundation*

Golder Associates Graduate Scholarship in Water (\$5,000) 2016  
*Golder Associates, Waterloo*

Queen Elizabeth II Graduate Scholarship in Science & Technology (\$15,000) 2014 - 2015  
*University of Waterloo*

Provost Graduate Entrance Scholarship (\$15,000) 2013 - 2014  
*University of Waterloo*

Best Poster: Arctic Sciences - Water Institute Research Symposium (\$500) 2015  
*Water Institute, University of Waterloo*

Best Oral Presentation – Due North: Next Generation Arctic Research & Leadership (\$300) 2015  
*ACUNS 2015 Student Conference, Calgary, AB*

International Association of Geochemistry – Student Research Award (\$1,000) 2013  
*International Association of Geochemistry*

Jason Lang Scholarship (\$1,000) 2008 - 2009  
*University of Calgary*

### PUBLICATIONS

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#### Peer-Reviewed Articles

Aukes, P. J. K., S. L. Schiff, J. J. Venkiteswaran, R. J. Elgood, & J. Spoelstra. 2020. Size-Based Characterization of Freshwater Dissolved Organic Matter finds Similarities within a Water Body Type across Different Canadian Ecozones. *Limnology & Oceanography Letters*. doi: 10.1002/lol2.10180.

St Pierre, K. A., V. L. St. Louis, S. L. Schiff, I. Lehnerr, P. G. Dainard, A. S. Gardner, P. J. K. Aukes, & M. J. Sharp. 2019. Proglacial freshwaters are significant and previously unrecognized sinks of atmospheric CO<sub>2</sub>. *Proceedings of the National Academy of Sciences* 116(36): 17690-17695. doi: 10.1073/pnas.1904241116.

Aukes, P. J. K., S. L. Schiff, & W. D. Robertson. 2019. Evolution of Dissolved Organic Matter Along a Septic System Plume: Evidence of Sustained Biogeochemical Activity in the Groundwater Zone. *Journal of Geophysical Research: Biogeosciences* 124. doi: 10.1029/2018JG004758.

Hutchins, R. H. S., P. J. K. Aukes, S. L. Schiff, T. Dittmar, Y. T. Prairie, & P. A. del Giorgio. 2018. The Optical, Chemical, and Molecular Dissolved Organic Matter Succession Along a Boreal Soil-Stream-River Continuum. *Journal of Geophysical Research: Biogeosciences* 122: 289-2908. doi: 10.1002/2017JG004094.

### Submitted Publications

Aukes, P. J. K. and S. L. Schiff. 2020. Composition Wheels: Visualizing dissolved organic matter using common composition metrics across a variety of Canadian Ecoregions. Submitted to: *PLOS ONE*.

### In-Prep. Publications

Aukes, P. J. K., S. L. Schiff, & J. J. Venkiteswaran. Dissolved organic matter quality over quantity when assessing disinfection by-products formation from three sub-arctic sites in Northwest Territories, Canada. In-prep for *Water Research X*.

Aukes, P. J. K., M. C. English, J. Leathers, M. Schultz, R. J. Elgood, J. J. Venkiteswaran, & S. L. Schiff. Wet and Dry Years Have Distinct Changes to DOM Concentration and Composition in Canadian Sub-Arctic Taiga Shield Lakes. In prep for *Science of the Total Environment*.

### Non-refereed Publications

Aukes, P. J. K., Venkiteswaran, J. J., Schiff, S. L., English, M. C., & Municipal and Community Affairs, NT. 2020. History of DOM & DBP In Drinking Water Sources across the Northwest Territories. Summarizing infographic and dataset. DOI: 10.5683/SP2/4E6LGS.

Aukes, P. J. K., S. L. Schiff, M. Palmer, & R. Staples. 2020. Trends in Water Quality from Three Rivers in the North Slave Region from 30+ Years of Monitoring. For: *NWT State of the Environment Report 2020*.

### CONFERENCES

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#### Conference Proceedings

Aukes, P. J. K., Schiff, S. L., English, M. C., Staples, R., & M. Palmer. Water Quality Trends in Three Rivers near Yellowknife, NT, Canada. 22nd International Northern Research Basins Symposium and Workshop. Yellowknife, NT, Canada. Aug. 18-24.

#### Presentations (bold indicates presented)

**Aukes, P. J. K.**, Judas, R., Hutchins, R., Elgood, R. J., Leathers, J., Schultz, M., Venkiteswaran, J., English, M. C., & S. L. Schiff. 2021. Using small lakes across the Northwest Territories to predict changes to carbon chemistry with a warming climate. CCFRR – SCL 2021 Annual Conference (Online).

**Aukes, P. J. K.**, English, M. C., Venkiteswaran, J. J., Schiff, S. L., & R. J. Elgood. 2019. Using DOM to understand terrestrial-aquatic linkages among sub-arctic taiga shield lakes. Cold Regions Research Center Annual Symposium. Wilfrid Laurier University, Waterloo, ON.

**Aukes, P. J. K.** 2019. Looking at Dissolved Organic Matter in the Northwest Territories. Cold Region Research Centre Invited Talk, Waterloo, ON.

**Aukes, P. J. K.**, Schiff, S. L., English, M. C., Staples, R., & M. Palmer. 2019. Water Quality Trends in Three Rivers near Yellowknife, NT, Canada. Plenary Talk at 22<sup>nd</sup> Northern Research Basin Symposia/Workshop – Partners in Learning, Yellowknife, NT.

**Aukes, P. J. K.**, Venkiteswaran, J. V., Schiff, S. L., & M. C. English. 2019. Examining the Relationship between Dissolved Organic Matter & Disinfection By-Products in the Northwest Territories. Global Water Futures Annual Scientific Meeting, Saskatoon, SK.

**Aukes, P. J. K.**, Dainard, P., Schiff, S. L., & English, M. C. 2017. How measures of dissolved organic matter quality change from Yellowknife NT to Lake Hazen NU. ArcticNet Annual Scientific Meeting, Quebec City, QC.

Dainard, P., Schiff, S. L., Aukes, P. J. K., Elgood, R. J., St. Pierre, K., St. Louis, V. L., English, M. C. & I. Lehnerr. 2017. Dissolved organic and inorganic carbon dynamics in glacial river systems of the Canadian high arctic. ArcticNet Annual Scientific Meeting, Quebec City, QC.

Schiff, S. L., Muir, D. C. G., Aukes, P. J. K., Dainard, P., Elgood, R. J., St. Louis, V. L., & I. Lehnerr. 2017. Are young fish 14C “old” in the northern most great lake: Lake Hazen in the high arctic?. ArcticNet Annual Scientific Meeting, Quebec City, QC.

**Aukes, P. J. K.**, Schiff, S. L., English, M. C., & R. J. Elgood. 2016. Dissolved Organic Matter, Disinfection Demand, and Northern Drinking Water. ArcticNet Annual Scientific Meeting, Winnipeg, MB.

- Dainard, P., Schiff, S. L., Aukes, P. J. K., English, M. C., St. Louis, V., Lehnherr, I., Elgood, R. J., & K. St. Pierre. 2016. Cycling of Dissolved Organic Matter in Permafrost and Glacial Melt Water Impacted Freshwater Systems of the Canadian Arctic. ArcticNet Annual Scientific Meeting, Winnipeg, MB.
- Aukes, P. J. K.**, Schiff, S. L., English, M. C., & R. J. Elgood. 2015. Using Photolytic and Microbial Degradation Experiments to Understand the Quality of Dissolved Organic Matter around Yellowknife, Northwest Territories. ArcticNet Annual Scientific Meeting, Vancouver, BC.
- Hickman, J., English, M. C., Aukes, P. J. K., & S. L. Schiff. 2015. Seasonal Evolution of active layer formation in subarctic peat plateaux and implications for dissolved organic matter composition and transfer. ArcticNet Annual Scientific Meeting, Vancouver, BC.
- Schiff, S. L., Aukes, P. J. K., English, M. C., St. Louis, V. L., Lehnherr, I., Elgood, R. J., & K. A. St. Pierre. 2015. Lake Hazen Watershed: A surrogate for assessing changes in terrestrial inputs to the nearshore marine coastal zone in the high arctic. ArcticNet Annual Scientific Meeting, Vancouver, BC.
- Aukes, P. J. K.**, Schiff, S. L., English M. C., & R. J. Elgood. 2015. Comparing Dissolved Organic Matter Quality from a High Arctic (Lake Hazen, NU) and Subarctic (Yellowknife, NWT) Environment. ACUNS Student Conference, Calgary, AB.
- Aukes, P. J. K.**, Schiff, S. L., English M. C., & R. J. Elgood. 2015. Dissolved Organic Matter and the Warming North – DOM quality from an area with discontinuous permafrost. AGU-CGU Joint Assembly, Montreal, QC.
- Aukes, P. J. K.**, Schiff, S. L., & M. English. 2014. How Different is Dissolved Organic Matter in a Discontinuous Permafrost Area around Yellowknife, NWT?. Arctic Change 2014 Conference, Ottawa, ON.
- Refereed Poster**
- Aukes, P. J. K., English, M. C., Leathers, J., Schultz, M., Elgood, R. J., Venkiteswaran, J. J., & S. L. Schiff. 2020. Wet and Dry Years Have Distinct Changes to DOM Concentration and Composition in Canadian Sub-Arctic Taiga Shield Lakes. Global Water Futures 3<sup>rd</sup> Annual Open Science Meeting.
- Aukes, P. J. K., Schiff, S. L., English, M. C., & I. Lehnherr. 2017. Can water isotopes be used to determine photolytic history of dissolved organic matter in high arctic ponds?. ArcticNet Annual Scientific Meeting, Quebec City, QC.
- Wisniewski, V., Lehnherr, I., Schiff, S. L., Aukes, P. J. K., & J. L. Kirk. 2017. Impacts of a warming arctic on freshwater ecosystem productivity, processes, and resources. ArcticNet Annual Scientific Meeting, Quebec City, QC.
- Aukes, P. J. K., Schiff, S. L., English, M. C., & R. J. Elgood. 2016. Geochemical Trends over 30 Years in Three Rivers near Yellowknife, NWT. ArcticNet Annual Scientific Meeting, Winnipeg, MB.
- Lehnherr, I., St. Louis, V., Schiff, S. L., Venkiteswaran, J. J., St. Pierre, K., Emmerton, C., Aukes, P. J. K., & V. Wisniewski. 2016. Comparative Limnology of Lakes and Ponds in the Lake Hazen Watershed during Ice-covered and Ice-free Seasons: What are the implications of climate change for the carbon and nutrient cycles in freshwater ecosystems? ArcticNet Annual Scientific Meeting, Winnipeg, MB.
- Schiff, S. L., Aukes, P. J. K., Dainard, P., English, M. C., Elgood, R. J., Zheng, X., St. Louis, V., Lehnherr, I., & K. St. Pierre. 2016. Lake Hazen Watershed in the high arctic: Using tritium and natural abundance stable isotopes of sulfate to partition changing inputs from glacial rivers. ArcticNet Annual Scientific Meeting, Winnipeg, MB.
- Wisniewski, V., Lehnherr, I., Schiff, S. L., Aukes, P. J. K., & J. Kirk. 2016. The metabolism of Skeleton Lake, Northern Ellesmere Island, Nunavut: Understanding the effects of climate change in the Canadian high arctic by quantifying biological processes. ArcticNet Annual Scientific Meeting, Winnipeg, MB.
- Aukes, P. J. K., Schiff, S. L., English, M. C., & R. J. Elgood. 2015. High Arctic Experiments: Photolytic and Microbial Degradation of Dissolved Organic Matter. ArcticNet Annual Scientific Meeting, Vancouver, BC.
- Lehnherr, I., Venkiteswaran, J. J., St. Louis, V., Schiff, S. L., Emmerton, C., St. Pierre, K., Wong, C., Aukes, P. J. K., & R. J. Elgood. 2015. Ecosystem metabolism in high arctic ponds in the Lake Hazen Watershed, Quttinirpaaq National Park (Nunavut). ArcticNet Annual Scientific Meeting, Vancouver, BC.
- Aukes, P. J. K., Hutchins, R. S., Elgood, R. J., & S. L. Schiff. 2014. Characterization of Dissolved Organic Matter Composition and Quality along the Grand River. International Association for Great Lakes Research (IAGLR).
- Aukes, P. J. K., Schiff, S. L., & M. C. English. 2014. Characterization of Dissolved Organic Matter from Discontinuous Permafrost Areas. Canadian Conference for Fisheries Research – Society of Canadian Limnologists.

Schiff, S. L., Venkiteswaran, J. J., Aukes, P. J. K., & R. J. Elgood. 2013. Dissolved Organic Matter at ELA: Effects of Photolysis on DOM and CO<sub>2</sub> Isotopes and DOM Quality. Canadian Conference for Fisheries Research – Society of Canadian Limnologists.

**Non-Refereed Talks**

Aukes, P. J. K., Dainard, P., Schiff, S. L., & English, M. C. 2016. “Wekweèti & Dissolved Organic Carbon”. Talk given to the community of Wekweèti on updates and progress of research in their community. Wekweèti, NT.

Aukes, P. J. K. 2016. “It Snows or Rains; Then what? – Looking at Water Quality in the Arctic”. Talk given to Grades 6 – 9 at the Alexis Arrowmaker School, Wekweèti, NT.

**Non-Refereed Poster**

Aukes, P. J. K., Schiff, S. L., & M. C. English. 2014. Dissolved Organic Matter and Water Quality in the North – What is the Quality of DOM around Yellowknife, NWT?. World Water Day Symposium – Water Institute. University of Waterloo, Waterloo, ON.

Hickman, J., Aukes, P., English, M. C., Schiff, S., Kokelj, S. V., & C. Spence. 2013. Seasonal Evolution of Active Layer Formation in Peat Plateaus and Implications for Shallow Groundwater Chemistry. Northwest Territories Cumulative Impact Monitoring Program Annual Meeting.

**PROFESSIONAL AFFILIATIONS & DEVELOPMENT**

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**Affiliations**

Society of Canadian Limnologists (SCL) 2019  
Association of the Sciences of Limnology & Oceanography (ASLO) 2019

**Development**

Remote Instruction – *Teaching and Learning, Wilfrid Laurier University* 2021  
Course (Re)Design: Remote Teaching and Course Design – *Teaching and Learning, Wilfrid Laurier University* 2020  
Fundamentals of University Teaching – *Centre for Teaching Excellence, University of Waterloo* 2019

**LANGUAGES**

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- English, Dutch