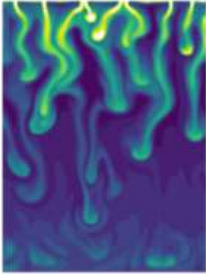




Programme

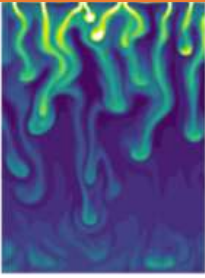
*23rd Annual International Workshop on
Physical Processes in Natural Waters*

*July 18-22, 2022
Vancouver, Canada*



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Vancouver, Canada
July 18 - 22, 2022



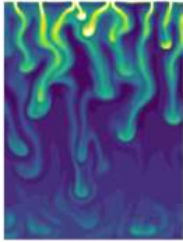
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*25th Annual International Workshop on Physical
Processes in Natural Waters*

FINAL PROGRAMME

*July 18 - 22, 2022
Vancouver, Canada*



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Vancouver, Canada
July 18 - 22, 2022

Message from the Chair



Jason Olsthoorn, Ph.D.

Chair, PPNW 2022

Assistant Professor

Department of Civil Engineering

Queen's University

Welcome to Vancouver, Canada!

On behalf of the entire PPNW organizing committee, I would like to welcome you to the **Physical Processes in Natural Waters Workshop 2022**.

Researchers from around the world have gathered to share their recent research on the physical processes occurring the world's inland waters. This research is crucial as we tackle challenges related to shrinking water supplies and understanding how our world is changing in a warming climate.

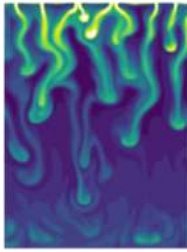
I would like to thank all the authors who have submitted their abstracts and have made the trip to join us at this workshop! I hope that you will find these sessions engaging and informative as we explore a range of ground-breaking research; from biology to gas transport.

The entire organizing committee has worked very hard to make this meeting a reality. I would like to thank Dr. Greg Lawrence, Dr. Roger Pieters, and Dr. Ted Tedford for their tireless support in putting this meeting together.

I look forward to a productive week of collaboration and celebration. Welcome to **PPNW 2022!**

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Local Organizing Committee

Jason Olsthoorn (Chair)

Queen's University

Gregory Lawrence

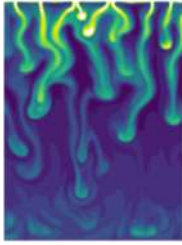
University of British Columbia

Edmund Tedford

University of British Columbia

Roger Pieters

University of British Columbia



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Conference Sponsors



Hoskin Scientific <https://www.hoskin.ca/>



Nortek <https://www.nortekgroup.com/>



RBR <https://rbr-global.com/>



Rockland Scientific <https://rocklandscientific.com/>



University of
British Columbia <https://www.ubc.ca/>

Conference at a Glance

Monday, July 19th, 2022 @ Nest UBC

6133 University Blvd., UBC Campus, Vancouver, BC V6T 1Z1

17:00-21:00 **Conference Registration**

17:00-21:00 **RBR Welcome Reception**

Tuesday, July 19th, 2022 @ Ponderosa Ballroom

1Z2, 6445 University Blvd, Vancouver, BC V6T 1Z2

08:15--08:30 **Opening Remarks and Welcome to Vancouver**

08:30--09:15 **Invited Lecture: Sally MacIntyre**

09:15--10:15 **Session 1: Gas Emissions**

10:15--10:45 **Coffee Break**

10:45 -- 12:45 **Session 2: Large and Deep Lakes**

12:45--14:00 **Lunch**

14:00--14:15 **Sponsor Introductions**

14:15--15:15 **Session 3: Large and Deep Lakes**

15:15--15:45 **Coffee Break**

15:45--16:45 **Session 4: Tracer Transport**

End of Day

**Wednesday, July 20th, 2022 @ Ponderosa Ballroom
172, 6445 University Blvd, Vancouver, BC V6T 1Z2**

08:30--09:15 **Invited Lecture: Eddy Carmack**

09:15--10:15 **Session 5: Winter Limnology**

10:15--10:45 **Coffee Break (10:15-10:45)**

10:45--12:45 **Session 6: Winter Limnology**

12:45--14:00 **Lunch**

14:00--15:00 **Session 7: Winter Limnology**

15:00--15:30 **Coffee Break**

15:30--16:30 **Session 8: Ice Physics**

End of Day

18:00-22:00 **Banquet at Sage**

**Thursday, July 21st, 2022 @ Ponderosa Ballroom
172, 6445 University Blvd, Vancouver, BC V6T 1Z2**

08:30--09:15 **Invited Lecture: Rich Pawlowicz**

09:15--10:15 **Session 9: Mixing**

10:15--10:45 **Coffee Break**

10:45--12:45 **Session 10: Mixing**

12:45--14:00 **Lunch**

14:00--15:00 **Session 11: Gravity Currents**

15:00--15:30 **Coffee Break**

15:30--16:30 **Session 12: Gravity Currents**

End of Day

Friday, July 22nd, 2022 @ Ponderosa Ballroom
172, 6445 University Blvd, Vancouver, BC V6T 1Z2

08:30--09:15 Invited Lecture: Johny Wüest

09:15--10:15 Session 13: Warm Water Limnology

10:15--10:45 Coffee Break

10:45--12:45 Session 13: Physics and Biology

12:45--13:00 Closing Remarks

End of PPNW2022!

Invited Speakers



Professor Sally MacIntyre

University of California, Santa Barbara

Sally MacIntyre attended Duke University (B.A. in Zoology, Ph.D. in Zoology with a minor in Mechanical Engineering), held a National Needs Postdoctoral Fellowship at UCSB in 1981, and was a Professional Researcher from 1982 -2004. In 2004 she joined the faculty at UCSB in the Department of

Ecology, Evolution and Marine Biology. During her career, she has studied lakes from the tropics to the poles and participated in research cruises in coastal California and Antarctica.



Professor Eddy Carmack

Department of Fisheries and Oceans

Professor Eddy Carmack is a Senior Research Scientist Emeritus for the Department of Fisheries and Oceans in Sidney, British Columbia. His research involves systems-level relationships between oceanography, marine ecosystems and climate. Over his 50

year career he has participated in over 90 field investigations in high-latitude rivers, lakes and seas spanning from the Antarctic to the Arctic and from the Yukon to Siberia, from which he has published over 220 peer-reviewed scientific articles. In retirement, he has returned to field studies in Northern Canada, including the central region of the Northwest Passage and deep lakes in the Northwest Territories of Canada; locally, he 'captains' his 34' troller-conversion R/V Wicklow to demonstrate values of small boat oceanography.



Professor Rich Pawlowicz

University of British Columbia

Prof. Rich Pawlowicz is a physical oceanographer interested in small-scale physical processes like internal waves and double diffusion, the physical properties of seawater and other natural waters, and in the regional oceanography of the NE Pacific coast. He

has written and continues to support a number of software products for tidal analysis, mapping, and the electrical conductivity of natural waters and was on the development team for the current official description of the physical properties of seawater, the Thermodynamic Equation of Seawater 2010 (TEOS-10). Currently, he is the chair of the Joint SCOR/IAPSO/IAPWS Committee on the Properties of Seawater (JCS).



Professor Alfred Johnny Wüest

EPFL Lausanne

Prof. Alfred Johnny Wüest is head of the Physics of Aquatic Systems Laboratory (Margaretha Kamprad Chair) at EPFL Lausanne and member of the Eawag Directorate. His research focuses on small-scale processes such as turbulent mixing, boundary layer fluxes and double-diffusion. Applied research and

expert services refer to lake management (nutrients, turbidity, heat use, hydropower). Within this research portfolio, A Wüest published more than 140 peer-reviewed articles and 22 book chapters. The goals of larger and interdisciplinary projects are to assess anthropogenic effects on physical and biogeochemical processes in stratified lakes and reservoirs. Major studies concerned Lakes Ohrid, Baikal and Kivu.

Participants

Last Name	First Name	Country
Aguayo	Gabriel	Chile
Austin	Jay	United States
Boehrer	Bertram	Germany
Carmack	Eddy	Canada
Chang	Yun	United States
Doda	Tomy	Switzerland
Duarte	Barbara	Brazil
Everard	Kelsey	Canada
Fung	Samantha	United States
Goldberg	Judah	Canada
Grace	Andrew	Canada
Graves	Kelly	Canada
Harrison	Hannah	Canada
Henderson	Stephen	United States
Ing	Lauren	Canada
Jansen	Joachim	Sweden
Kirillin	Georgiy	Germany
Larrieu	Kenneth	United States
Laval	Bernard	Canada
Lawrence	Gregory	Canada
Lenters	John	United States
MacIntyre	Sally	United States
Masoud	Mina	Canada
Nelson	Daniel	Canada
Ness	Jeremiah	United States
Olsthoorn	Jason	Canada
Pawlowicz	Rich	Canada
Pieters	Roger	Canada
Rahmani	Mona	Canada
Robb	Dan	Canada
Rookes	Carley	Canada
Sepulveda Steiner	Oscar	Switzerland

Last Name	First Name	Country
Sharifi	Fatemeh Sadat	Germany
Spank	Uwe	Germany
Sumka	Mark	Canada
Tedford	Edmund	Canada
Ulloa	Hugo	United States
Valbuena	Sergio	United States
Wolk	Fabian	Canada
Wüest	Alfred	Switzerland
Yang	Adam Jiankang	Canada
Yonemitsu	Noboru	Canada
Zhao	Kai	Canada
Zhou	Wencai	United States

Presentation List

Tuesday

Session 1: Gas Emissions

9:15--9:45

Methane ebullition regulated by atmospheric pressure variation

Zhao, Tedford, and Lawrence

9:45--10:15

Noble Gas Thermometry in Lake Kivu Deep Water

Schwenk, Negele, Freundt, Balagizi, Aeschbach and Boehrer

Session 2: Large and Deep Lakes

10:45--11:15

Wind, waves, and currents on the Great Lakes: Expanding the observational network via small, scalable "Spotter" buoys

Lenters and Lenard

11:15--11:45

Observations and predictions of deepening of the surface mixed layer during Autumnal turnover in a small, deep, temperate lake with seasonal ice-cover

Graves and Laval

11:45--12:15

TBA

12:15--12:45

The Influence of the Coriolis Force During Upwelling in Lakes of Moderate Size

Valbuena, Bombardelli, Cortés, Largier, Roberts, Forrest, Schladow

Session 3: Large and Deep Lakes

14:15--14:45

Sponsor Introductions

14:45--15:15

A tale of two reservoirs

Pieters and Lawrence

Session 4: Tracer Transport

15:45--16:15

Short-term patterns of summer arsenic cycling in a temperate, polymictic lake

Fung, Horner-Devine, and Neumann

16:15--16:45

Epilimnetic turbidity in a glacier-fed reservoir

Robb, Pieters, and Lawrence

Wed.

Session 5: Winter Limnology

9:15--9:45

The comparison between cylindrical and gaussian bathymetry in ice-covered lakes

Sharifi, Hinkelmann, and Kirillin

9:45--10:15

Convection under lake ice: turbulent kinetic energy budget and mixing anisotropy

Kirillin, Bogdanov, and Volkov

Session 6: Winter Limnology

10:45--11:15

Weakening of inverse stratification in northern lakes

Jansen, Woolway, and Tan

11:15--11:45

Thermal circulation in an arctic pond

Henderson, and Sally MacIntyre

11:45--12:15

Characterizing radiatively-driven convection in a deep freshwater lake

Austin

12:15--12:45

Flow Structure and Scaling of Radiatively Driven Convection in a Freshwater Lake

Chang, and Scotti

Session 7: Winter Limnology

14:00--14:30

Salt-Exclusion and Salt-Plumes

Olsthoorn, Bluteau, Tedford, Lawrence

14:30--15:00

Penetrative Convection in Ice-covered Lakes

MacIntyre, Schwefel, and Cortés

Session 8: Ice Physics

15:30--16:00

CT scans of lake ice

Tedford, Zhao, London, Pieters, and Lawrence

Thursday

Session 9: Mixing

- 9:15--9:45 **Effects of Spatial Hetero. and Temporal Variability of Met. Variables on the Mass and Energy Exchange of Inland Waters**
Spank, Hehn, Mauder, Koschorreck, and Bernhofer
- 9:45--10:15 **Holmboe instabilities in an arrested salt wedge**
Yang, Tedford, Olsthoorn, and Lawrence

Session 10: Mixing

- 10:45--11:15 **Glider-based turbulence measurements in Lake Geneva**
Sepúlveda Steiner, Forrest, McInerney, Fernández Castro, Wüest, and Bouffard
- 11:15--11:45 **Bottom boundary layer mixing, strain-induced periodic stratification, and lateral advection, driven by internal waves in a small lake**
Nielson, and Henderson
- 11:45--12:15 **Schmidt Stability formulation of mixing energetics in lakes.**
Laval, Olsthoorn, Graves, and Wang
- 12:15--12:45 **Radiatively driven convection plumes in a deep, unstratified lake**
Larrieu, Forrest, McInerney, Friedrichs, and Austin

Session 11: Gravity Currents

- 14:00--14:30 **Gravity Currents in the Cabeling Regime**
Grace, Stastna, Lamb, and Scott
- 14:30--15:00 **Penetrative convection modifies the dynamics of a gravity current**
Doda, Ulloa, Ramón, and Bouffard

Session 12: Gravity Currents

- 15:30--16:00 **Lock exchange induced by cooling below the temperature of maximum density**
Everard and Lawrence
- 16:00--16:30 **A rotational gravity current in the Strait of Georgia**
Masoud and Pawlowicz

Friday

Session 13: Warm Water Limnology

9:15--9:45

High-resolution Hydrodynamic Measurements and Simulations in an Amazon Floodplain Lake

Zhou, Melack, and MacIntyre

9:45--10:15

Assessment of climate change impacts over the thermal behaviour of a small-polimitic-tropical lake

Duarte, Scarati, Amorim, Magalhães, and Bernardino

Session 13: Physics and Biology

10:45--11:15

Microswimmers colonizing an obstacle immersed in a Stokes flow

Ulloa, Faúndez, Espinoza, Soto, and Guzmán-Lastra

11:15--11:45

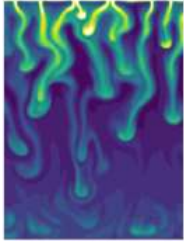
Vertical fluctuations induced by active carpets

Aguayo, Guzmán-Lastra, and Mathijssen

11:45--12:15

Aggregation of microplastic and biogenic particles in upper-ocean turbulence

Rahmani, Gupta, Jofre



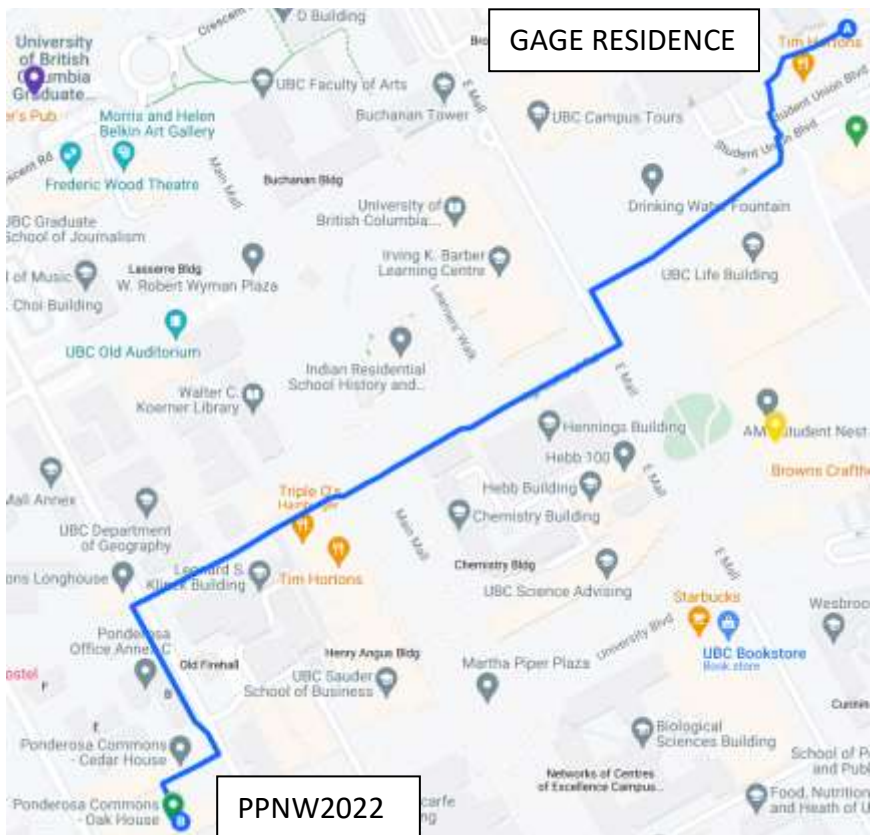
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Maps

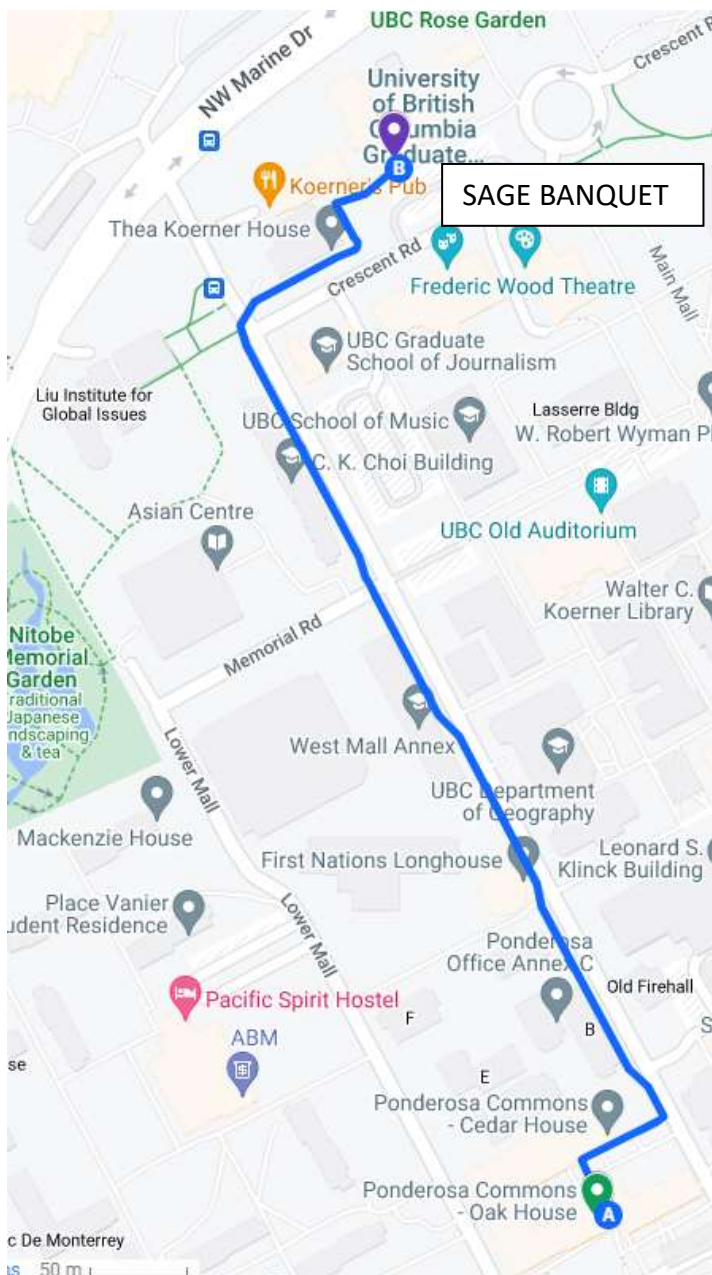
Directions to Gage

Directions from Ponderosa Ballroom to Sage Bistro



Directions to Sage

Directions from Ponderosa Ballroom to Sage Bistro



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Notes



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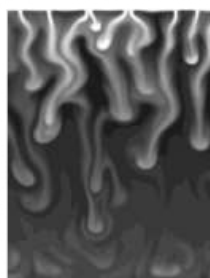


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Notes



Lined area for notes, consisting of numerous horizontal blue lines.



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