Caroline Aubry-Wake

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EDUCATION

2017-22 Ph.D. Centre for Hydrology, Department of Geography and Planning, University of Saskatchewan. Thesis: *From processes to predictions in alpine glacierized basins*. Advisor: Dr. John W. Pomeroy

2014-16 M. Sc. Department of Earth and Planetary Sciences, McGill University. Thesis: *Ground-based thermal infrared imagery for tropical glaciers: insights from the Cordillera Blanca, Peru*. Advisor: Dr. Jeffrey M. McKenzie

2011-14 B. Sc., Earth System Science, McGill University. Thesis: *Influence of evaporation on glaciated basins water budget*. Supervisor: Advisor: Dr. Jeffrey M. McKenzie

AWARDS AND FELLOWSHIPS

2022-24 Postdoctoral Fellowship, Natural Science and Engineering Research Council of Canada (NSERC), 90,000$ (declined)
2022-24 Banting Postdoctoral Fellowship, Government of Canada, $140,000
2020 Michael Smith Foreign Study Supplement, NSERC, $6,000
2020 Stan Paterson Scholarship in Canadian Glaciology, Canadian Geophysical Union, $ 2,500
2019 Graham Cogley Award for best presentation, International Glaciological Society, $1,500
2018 Student Innovation Award, American Geophysical Union-Cryosphere, $1,200
2018-21 Vanier Canada Graduate Scholarship, $150,000
2018-21 Doctoral Scholarship, NSERC, $105,000 (declined)
2017-20 Dean's Scholarship, University of Saskatchewan, $66,000 (declined 2018 onward)
2015 Master's Scholarship, Fond de Recherche du Québec – Nature et Technologies, $15,000
2014 Earth System Science Award, McGill University, $1000
2013 Undergraduate Summer Research Award, University of Alaska Fairbanks $5,000
2013 Earth System Summer Research Award, McGill University, 1,000$
2013 GEOTOP-UQAM-McGill University Undergraduate Scholarship, 1,000$
2012-13 Undergraduate Research Conference, Earth System, 1st place, McGill University, $600

EXPERIENCE

Postdoctoral Research Fellow, 2022-present
Utrecht University, Department of Physical Geography
Assessing the importance of snow and ice melt to recharge groundwater at varying scales using a combination of field data and integrated numerical modelling of groundwater, surface water and glacier systems to project the impact of climate change on water resources in the Nepal Himalaya.

Doctoral Researcher, 2017-2022
University of Saskatchewan, Centre for Hydrology, Canmore, AB.
Combined field experiments and data collection with computer modelling (Cold Region Hydrological Model) to gain an understanding of the hydrological processes in headwater glacierized basins in Western Canada under current and future climates.

Lead Science Instructor, Jul-August 2020-2022
Girls* on Ice Canada and Inspiring Girls Expeditions, online and in Glacier National Park, BC.
Developed and instructed programs for high-school girls to discover the connection between natural science, exploration and art through guided discussions and hands-on activities, both in an online setting (2020-21) and in a remote mountain environment (2022). Lead the participants through a research project from defining the research question and data collection to final presentations to their peers.

Research Assistant, 2017
Coldwater Laboratory, Centre for Hydrology, Canmore, AB
Assisted in conducting field-based investigations of cold regions' hydrological phenomena, installing and maintaining a network of hydrometeorological stations and collecting field data in alpine settings

Snow Safety, 2016
Castle Mountain Resort, Pincher Creek, AB
Analyzed the changes in snowpack and mountain weather to assist with avalanche risks forecast, and assisted in avalanche control.

Undergraduate Research Assistant, 2013
Geophysical Institute, University of Alaska Fairbanks, Fairbanks, AK
Studied glacier mass balance and runoff modelling of Susitna Basin, including the installation of a glacier automated weather station and setting up and running a temperature index model for the studied glacier.

PEER-REVIEWED PUBLICATIONS

Published and In Press

(17) Pomeroy, J.W., Brown T., Fang, X., Shook, K.R., Pradhananga, D., Armstrong, R., Harder, P., Marsh, C., Costa, D., Krogh, S.A., **Aubry-Wake, C.**, Annand, H., Lawford, P., He, Z., Kompanizare, M., Lopez-Moreno, J.I. (in press). The Cold Regions Hydrological Modelling Platform for hydrological diagnosis and prediction based on process understanding. *Journal of Hydrology.* Manuscript ID*:* HYDROL46207R1

(16) **Aubry-Wake, C.**, Pradhananga, D., & Pomeroy, J. W. (2022c). Hydrological process controls on streamflow variability in a glacierized headwater basin. *Hydrological Processes*, 36(10), e14731. DOI:10.1002/hyp.14731

(15) **Aubry-Wake, C.**, Lamontagne-Hallée, P., Baraer, M., McKenzie, J.M., Pomeroy, J.W. (2022b). Using ground-based thermal imagery to estimate glacier debris thickness: fieldwork considerations to improve effectiveness. *Journal of Glaciology*, 1-17. DOI:10.1017/jog.2022.67

(14) **Aubry-Wake, C.**, Bertoncini, A., & Pomeroy, J. W. (2022a). Fire and Ice: The Impact of Wildfire-Affected Albedo and Irradiance on Glacier Melt. *Earth's Future*, *10*(4). DOI: 10.1029/2022EF002685

(13) Bertoncini, A., **Aubry-Wake, C.**, & Pomeroy, J. W. (2022). Large-area high spatial resolution albedo retrievals from remote sensing for use in assessing the impact of wildfire soot deposition on high mountain snow and ice melt. *Remote Sensing of Environment*, *278*, 113101. DOI: 10.1016/J.RSE.2022.113101

(12) Fyffe, C. L., Potter E, Fugger, S., Orr, A., Fatichi, S., Loarte, E., Medina, K., Hellström, R.Å., Bernat, M., **Aubry-Wake, C.**, Gurgiser., Baker Perry, L., Suarez, W., Quincey, D.J. Pellicciotti, F. (2021). The energy and mass balance of Peruvian glaciers. *Journal of Geophysical Research: Atmospheres*, *126*, *e2021JD034911.* DOI: 10.1029/2021JD034911

(11) Pradhananga, D., Pomeroy, J. W., **Aubry-Wake, C.**, Munro, D. S., Shea, J., Demuth, M. N., Kirat, N. H., Menounos, B., and Mukherjee, K. (2021). Hydrometeorological, glaciological and geospatial research data from the Peyto Glacier Research Basin in the Canadian Rockies. Earth System Science Data, 13(6), 2875–2894. DOI:10.5194/essd-13-2875-2021

(10) Sadika B, Soubry I, Kleiboer B, **Aubry-Wake, C.**, Toop F, Leonhardt R, Lindsay R, Massie M. 2021. The First Year Research Experience (FYRE): Through the Eyes of Research Coaches. Perspectives on Undergraduate Research & Mentoring 10 (1): 1–17

(9) **Aubry-Wake, C.**, Somers, L.D., and 30 others. (2020), A new flow for Canadian young hydrologists: Key scientific challenges addressed by research cultural shifts. *Hydrological Processes*, 34: 2001-2006. DOI:10.1002/hyp.13724

(8) Bliss, A., Hock, R., Wolken, G., Whorton, E., **Aubry-Wake, C.**, Braun, J., Gusmeroli, A., Harrison, W., Hoffman, A., Liljedahl, A., and Zhang, J. (2020) Glaciers and Climate of the Upper Susitna Basin, Alaska, *Earth Syst. Sci. Data*, DOI:10.5194/essd-2018-155

(7) Baker, E.A., Lautz, L.K., McKenzie, J.M., **Aubry-Wake**, **C.** (2019) Improving the accuracy of time-lapse thermal infrared imaging for hydrologic applications, *Journal of Hydrology*, 571, 60–70. DOI: 10.1016/J.JHYDROL.2019.01.053

(6) Langendijk, G., **Aubry-Wake, C.**, Osman, M., Gulizia C., and 18 others (2019) Three Ways Forward to Improve Regional Information for Extreme Events: An Early Career Perspective. *Front. Environ. Sci.* 7:6. DOI: 10.3389/fenvs.2019.00006

(5) **Aubry-Wake, C.**, Zéphir, D., Baraer, M., McKenzie, J.M., Mark, B.G. (2018). Importance of longwave emissions from adjacent terrain on patterns of tropical glacier melt and recession. Journal of Glaciology, 1-12. DOI:10.1017/jog.2017.85

(4) Somers, L., Gordon, R.P., McKenzie, J.M., Lautz, L.K., Wigmore, O., Glose, A., Glas, R., **Aubry-Wake, C.** Mark, B.G., Baraer, M., T. Comdom, T (2016), Quantifying groundwater-surface water interactions in a proglacial valley, Cordillera Blanca, Peru. Hydrol. Process., 30: 2915–2929. DOI: 10.1002/hyp.10912

(3) **Aubry-Wake, C.**, Baraer, M., McKenzie, J.M., Mark, B.G., Wigmore, O., R. Å. Hellström, L. Lautz and L. Somers (2015), Measuring glacier surface temperatures with ground-based thermal infrared imaging, Geophys. Res. Lett., 42. DOI:10.1002/2015GL065321

Manuscripts in Review

(2) **Aubry-Wake, C.**, J.W. Pomeroy. (in review). Exploring the predicted hydrological changes of a small alpine glacierized catchment and its sensitivity to landscape evolution and meteorological forcings. *Water Resources Research*. Manuscript ID: 2022WR033363

(1) **Aubry-Wake, C.**, G. Sentlinger, E. Courtin, G. Galloway, R. Heavens, J.W. Pomeroy. (in review). Salt dilution streamflow measurements and uncertainty in a remote dynamic proglacial landscape: A case study at Peyto Glacier Research Basin. *Canadian Water Resource Journal*. Manuscript ID: TCWR-2022-0048

INVITED PRESENTATIONS

(O = oral presentation, P = poster)

[2022-O] **Aubry-Wake, C**., Nicholson, L., Prinz, R., Pomeroy, J. W., A tale of two catchments: Disappearing Glaciers and Changing Flows, Invited Seminar, Hydrology department, *University of Freiburg*, 1 Feb. 2022.

[2021-O] **Aubry-Wake, C.**, Education and community: The path to a sustainable society, *Grand Challenge American Geophysical Meeting Fall 2020*, (remote), Dec.14, 2021.

[2021-O] **Aubry-Wake, C**., Nicholson, L., Prinz, R., Pomeroy, J. W., Diagnosis of the current and future hydrological behaviour of a small glacierized basin in the Canadian Rockies, Interdisciplinary seminar: Climate change on long and short timescales, *Universität Innsbruck*, 11 Nov. 2021.

[2020-O] **Aubry-Wake, C.**, Pomeroy, J. W., Hydrological and landscape changes in the Canadian Rockies headwaters, *American Geophysical Meeting Fall 2020*, (remote), Dec. 8, 2020.

[2020-O] **Aubry-Wake, C.**, Bertoncini, A., Pomeroy J.W., The compensatory impacts of smoke and soot on glacier melt in the Canadian Rockies, Ice + Climate Seminar Series, *Thayer School of Engineering at Dartmouth College (remote)*, June 19, 2020.

[2019-O] **Aubry-Wake, C.**, The importance of mountain observations: An early-career perspective. *World Meteorological Organization High Mountain Summit*, Geneva, Switzerland, 30 Oct. 2019.

SELECTED CONFERENCE PRESENTATIONS

(First author, last 5 years. 10 listed of 25 total first and co-authored presentations, O = oral presentation, P = poster)

[2022-O] **Aubry-Wake, C.**, Nicholson, L., Prinz, R., Pomeroy, J.W., Variation in the streamflow response to climate change between glacierized headwater mountain basins in the Canadian Rockies and the Austrian Alps. *International Mountain Conference,* Innsbruck, Sep. 14. 2022.

[2021-P] **Aubry-Wake, C.**, Pomeroy, J. W., Retreating glaciers and changing hydrological function in a Canadian Rockies Alpine Headwaters Basin, *American Geophysical Meeting Fall 2021*, virtual, Dec. 14, 2021.

[2021-P] **Aubry-Wake, C.**, Pomeroy, J. W., How will retreating glaciers and changing weather patterns modify the hydrological processes in an alpine headwater catchment? Insights from Peyto Glacier, Canadian Rockies. *Global Water Futures Fourth Annual Open Science Meeting,* virtual, June 18, 2021.

[2021-O] **Aubry-Wake, C.**, Pomeroy, J. W., Exploring the future hydrology of a Canadian Rockies glacierized catchment and its sensitivity to meteorological forcings, *European Geophysical Union Annual Assembly*, virtual, May 29, 2021.

[2020-O] **Aubry-Wake, C.**, Pomeroy, J. W. Disappearing glaciers and water resources in Western Canada, Romanowski Lecture Early-Career panellist, *Royal Society of Canada (remote)*, Nov. 24, 2020.

[2019-P] **Aubry-Wake, C.**, Process-based diagnosis of recent variations in streamflow in an alpine glacierized catchment). *American Geophysical Union Fall Meeting*, San Francisco, CA, 9-13 Dec 2019.

[2019-P] **Aubry-Wake, C.**, Pomeroy, J. W. Predicted changes in the hydrology of a headwater glacierized catchment: Peyto Glacier, Canadian Rockies, *International Mountain Conference 2019*, Innsbruck, Austria, 8-12 Sep. 2019.

[2019-O] **Aubry-Wake, C.**, Bertoncini, A., Pomeroy J.W. Fire and Ice: The impact of forest fires on glacier melt. *27th International Union of Geodesy and Geophysics General Assembly*, Montreal, 8-18 July 2019.

[2018-O] **Aubry-Wake, C.**, Pomeroy, J. W. What are the causes of inter-annual variability in streamflow in an alpine glacierized catchment? *American Geophysical Union Fall Meeting*, Washington, DC, 10-14 Dec 2018.

[2018-O] **Aubry-Wake, C.**, Pradhananga, D., Pomeroy, J. W. Impacts of snowpack accumulation and summer weather extremes on alpine glacier hydrology, *GEWEX 8th Open Science Meeting*, Canmore, AB, 3-11 May 2018.

TEACHING

2020-22 **Guest Lecturer**
Department of Geography and Planning, University of Saskatchewan, Saskatoon, SK
Glacier Hydrology module, GEOG 827 Principles of Hydrology, (Fall 2021)
Surface energy balance of glaciers, GEOG 827 Principles of Hydrology (Winter 2020)

Department of Canadian Studies, University of Innsbruck, Innsbruck, AT.
Water Security in Canada's western mountains, Environment and Care lecture series (Spring 2022)

2015-21 **Teaching Assistant**
Department of Geography and Planning, University of Saskatchewan. Saskatoon, SK
GEOG 120 Introduction to Global Environmental Systems (Research Coach)
GEOG 827 Principles of Hydrology

Department of Earth and Planetary Sciences, McGill University, Montreal, QC
EPSC 549 Hydrogeology (Spring 2015)
EPSC 185 Natural Disaster (Fall 2015)

2015-16 Undergraduate Supervision
Department of Earth and Planetary Sciences, McGill University, Montreal, QC
Patterns of Temperature Distribution at the toe of the Yanamarey Glacier, Peru - Renee Torrie (Spring 2016)
Obtaining surface temperature from Landsat Imagery - Sanghyun Chang (Spring 2015)

SERVICE ACTIVITIES

Committee Membership

2021-current President, Girls* on Ice Canada, June 2021-current (volunteer since 2018)
2019-20 Chair, Canadian Young Hydrologic Society (CYHS) (member-at-large since 2017)
2017-18 External liaison, Global Water Future Young Professionals

Workshop and fieldtrips

2022 Co-coordinator, Fortress Mountain technical tour, *Canadian Water Resource Association Annual Meeting*, Canmore, June 9, 2022, Canmore, AB, CA.

2019 Co-chair, Joint ECR-AGU-WCRP workshop, 2019, *Water Cycle in a 1.5°C warmer world: interdisciplinary approaches*, Dec. 7, 2019, San Francisco, CA, USA.

Co-chair, CYHS Canadian Early-Career Hydrologist, *Current and future directions of Canadian hydrology from the point of view of Early Career Researchers*, Jul 4-6, 2019, Montreal, QC, CA.

Co-chair, Global Water Future Second Annual Meeting Early Career Workshop, *Digital Storytelling; Writing for the Conversation; Knowledge Mobilization Toolkit for Graduate Students*, May 12, 2019, Saskatoon, SK, CA.

2018 Co-chair, Joint YESS-YHS Early Career Researcher (ECR) Workshop 2018: *Towards Regional Information to Improve Our Understanding on Weather, Water, and Climate Extreme Events*, May 3-5, 2018, Canmore, AB, CA.

Co-coordinator, CYHS Annual Workshop at the Canadian Geophysical Union, *Publishing in Hydrology, How and why; Careers in Hydrology, Options and insights*, June 10, 2018, Niagara Falls, ON, CA.

Session Convener

2022 Emerging hydro-ecological research in deglaciating mountain landscapes, *International Mountain Conference*, Sep. 11-15, 2022, Innsbruck, AT,

2019 Processes On, Within and Around Debris-Covered Glaciers, *American Geophysical Union Fall Meeting*, Dec 7-13, 2019, San Francisco, CA, USA.

2018 Plenary on Early Career Researchers, *GEWEX 8th Open Science Meeting*, May 6-11, 2018, Canmore, AB, CA.

Peer review of journal articles

- Geographiska Annaler, Swedish Society for Anthropology and Geography,
- Journal of Glaciology, Cambridge University Press
- Hydrological Processes, John Wiley & Sons Inc.
- Journal of Geophysical Research: Earth Surface, American Geophysical Union
- Cold Regions Science and Technology

Scientific and professional society memberships

- International Association of Cryospheric Sciences
- Canadian Geophysical Union
- American Geophysical Union
- International Glaciological Society

PROFESSIONAL DEVELOPMENT AND CERTIFICATIONS

2021 Introduction to Online Teaching, University of Saskatchewan, online
4 Seasons of Reconciliations pilot course, University of Saskatchewan, online
Best of Banff Science Communication short course, Telus Spark Science Center, online

2019 Evidence-based science communication workshop, Canadian Foundation for Innovation, Ottawa
Advanced Wilderness First Aid (80 hours), Rocky Mountain Adventure Medic, Canmore

2017-21 CREATE for Water Security, Professional Training for Graduate Students.

2016 Avalanche Operation Level 1, Canadian Avalanche Association, Chic-Chocs

2014 Science Storytelling Video Workshop, American Geophysical Union Fall Meeting
Communicating Climate Science Workshop, American Geophysical Union Fall Meeting

2013 Ski Mountaineering Course, University of Alaska Fairbanks

OUTREACH

Instagram: @cryo.caro (https://www.instagram.com/dr.cryo.caro/)
Twitter: @CryoCaro (https://twitter.com/CryoCaro)

2022 Invited scientist, Wildsight Fire and Ice Hike to Farnham Glacier (https://www.youtube.com/watch?v=lc8rGxXo-Lo&t=2s)

Invited scientist, National Indigenous Peoples Day Sharing Circle, Arts Place, Canmore, 21 June 2022

2021 Glaciers losing their cool, written piece for 51° North magazine (https://www.rmotoday.com/magazine/culture/glaciers-losing-their-cool-4873336)

The Fast-Changing Glacier of Western Canada, webinar for the Association of Canadian Mountain Guides Professional Development Series, 28 May 2021

The Collapse, runner-up photo, From the Field category, 2021 Images of Research Competition, April 2021 (https://research.usask.ca/our-impact/highlights/images-of-research/gallery/2021/the-collapse.php)

2020 Les feux de forêt et les glaciers, presentation at the science festival *Pinte de Science Canada*, 13 May 2020

Water Quality, Climate Change and the Columbia Icefield Webinar, presentation for high school students organized by Guardians of the Ice and Alberta Tomorrow, 27 May 2020

2019 Linking Mountain Glaciers to River, short video for NSERC *Science, Action* Video Contest 2019, received the Special Jury Prize: Research in the North (https://www.youtube.com/watch?v=TmE-2q75DXk)

Scenic morning briefing, winning photo, Discover Photo Contest, Global Water Futures, June 2019 (https://www.flickr.com/photos/gwf_water/48001179066/in/album-72157708924382597/)

Cold fingers, frozen electronics, winning photo, Research in Action category, 2019 Images of Research Competition, April 2019 (https://research.usask.ca/our-impact/highlights/images-of-research/gallery/2019/cold-fingers,-frozen-electronics.php)

2018 Let's talk about ice, short video for the NSERC *Science, Action* video contest 2018, ranked in the top 75. (https://www.youtube.com/watch?v=_hcOOrFBmwg&t=2s)

SELECTED MEDIA APPEARANCES

2022 Une doctorante trouve un moyen ingénieux de faire comprendre sa thèse à ses proches, *La Libre*, print, 26 Aug. 2022. (https://www.lalibre.be/international/amerique/2022/08/26/une-doctorante-trouve-un-moyen-ingenieux-de-faire-comprendre-sa-these-a-ses-proches-NKOYGL4OTJGWDGUJPW3KYW5WKQ/)

La fonte des glaciers de l'Ouest canadien, *Les Années Lumières*, Radio-Canada Première, audio, 22 May 2022. (https://ici.radio-canada.ca/ohdio/premiere/emissions/les-annees-lumiere/segments/reportage/402328/fonte-glaciers-acceleration-disparition-changements-climatiques)

U of S researcher says smoke from wildfires causes an increase in glacier melt, *Saskatoon Morning with Leisha Grebinski*, CBC, audio, 2 May 2022. (https://www.cbc.ca/listen/live-radio/1-88-saskatoon-morning/clip/15909906-u-s-researcher-says-smoke-wildfires-causes-increase)

Wildfires are contributing to the melting of glaciers, CJWW Radio, print, 26 Apr. 2022. (https://www.cjwwradio.com/2022/04/26/143582/)

Fun facts About Glaciers, *Big Stick Energy Podcast*, Out Of Collective, audio, 14 March 2022. (https://outofpodcast.com/2022/03/14/big-stick-energy-e21-fun-facts-about-glaciers-caroline-aubry-wake/)

2021 Caroline watches snow melt. *We Know Some Stuff Podcast*, audio, audio, 10 Sep. 2021. (https://www.louiscolaruotolo.com/blog/carolineaubrywake)

Featured scientist, *Rockies.Repeat documentary film*, video. (https://www.rockiesrepeatfilm.com/)

Scientists warn glacier in Canadian Rockies is slipping away before their eyes at unprecedented rate, *Global News*, print/video, 31 Aug. 2021. (https://globalnews.ca/video/8155396/nightmare-coming-true-scientists-horrified-by-rate-of-glacial-melt)

What Canada's melting glaciers tell USask researchers, *USask News*, print, 8 Jan. 2021. (https://news.usask.ca/articles/research/2021/what-canadas-melting-glaciers-tell-usask-researchers.php)

2019 Algae blooms to make glaciers melt faster than thought: scientists, *Reuters*, print, 31 Oct. 2019. (https://www.reuters.com/article/us-climate-change-mountainsummit-idUSKBN1XA1WQ)

The importance of glaciers, *BBC News Hours*, radio, 21 Oct. 2019.

Local climate scientist hosts Thunberg at Columbia Icefield, *Rocky Mountain Outlook*, print, 30 Oct. 2019. (https://www.rmotoday.com/canmore/local-climate-scientist-hosts-thunberg-at-columbia-icefield-1777960)

2018 Impact des changements climatiques sur la fonte des glaciers dans les Rocheuses, Radio-Canada Première, *Pour faire un monde*, radio, 27 July 2018. (https://ici.radio-canada.ca/ohdio/premiere/emissions/pour-faire-un-monde/episodes/412301/audio-fil-du-vendredi-27-juillet-2018)

2015 Three miles high: Using drones to study high-altitude glaciers (Project to study the largest repository of ice in the tropics) – *The Ohio State*, print, 15 Dec. 2015.