

Nicolas Leroux

658 Av. Mercille, Saint Lambert, QC, J4P 2M2
nicolas.r.leroux@gmail.com * +1 (403) 707-6230

Github : nleroux3

CURRENT POSITION

Department of Earth and Atmospheric sciences, Université du Québec à Montréal, Montréal, QC
Nov. 2019 - present
Postdoctoral Fellow

EDUCATION

Ph.D. in Hydrology Sept. 2013 - May 2018
Department of Geography and Planning, University of Saskatchewan, Canmore, AB
Dissertation: Mass and Energy Flow through Snowpacks

Master of Engineering, Hydraulics and Fluids Dynamics
ENSEEIH, INP Toulouse, Toulouse, France 2010 - 2013

Classes Préparatoires aux Grandes Ecoles, Physics and Engineering Science
Lycee Descartes, Tours, France 2008 - 2010

RESEARCH INTERESTS

Environmental processes and modelling
Snowfall trajectory modelling and accuracy of measurement
Physics of unsaturated and saturated flow dynamics in porous media
Energy fluxes between snow and atmosphere

GRANTS and AWARDS

Second prize best student poster, CCRN Final Meeting, Saskatoon, Canada March 2018
Best student paper, Wiesnet Medal, Eastern Snow Conference, Sherbrooke, QC June 2015
Dean's scholarship, University of Saskatchewan Sept. 2013 - Aug. 2016
Saskatchewan Innovation and Opportunity Scholarship June 2014

COURSE WORK

5th Snow Science Winter School Feb. 2019
Snow measurement techniques on sea ice
Understanding snow - sea ice interactions and modelling
Hailuoto, Finland

NASA International Snow Working Group Remote Sensing Jan. 2016
 Three-day winter snow school on performing and analysing snow measurements
 Fraser Experimental Forest, Fraser, Co, USA

Principles of Hydrology March 2014
 Ten-day course on the physical principles and processes that govern hydrology
 University of Saskatchewan, CWRA, Canadian Society for Hydrological Sciences
 Kananaskis, AB, Canada

Queen's University of Belfast Winter - Spring 2012
 Exchange semester in the School of Mechanical and Aerospace Engineering
 Belfast, UK

RESEARCH EXPERIENCE

Centre ESCER, Department of Earth and Atmospheric Sciences, Université du Québec à Montréal, Montreal, QC Nov. 2019 - present
Postdoctoral Fellow

- Wind simulation in complex terrain using a computational fluid dynamics model
- Development of a Lagrangian particle trajectory model in Fortran
- Simulation of snow particle trajectory during winter storms in complex terrain
- Analysis of atmospheric data in Python

Centre for Hydrology, University of Saskatchewan Aug. 2018 - Nov. 2019
Postdoctoral Fellow

- Simulation of preferential flow paths in 2D, coupled with heat transfer
- Multiphase flow simulations in tomographic images of snow samples
- Field studies of interaction between atmospheric and snow surface
- Snow model intercomparison

Centre for Hydrology, University of Saskatchewan Sept. 2013 - May 2018
Ph.D. Researcher

- Investigate the formation and impact of preferential flow paths on snowmelt
- 2D numerical modelling of snow melting, coupling of water and heat fluxes
- Field studies to measure snow properties and snowmelt runoff in the alpine

Centre for Hydrology, University of Saskatchewan Apr. - Aug. 2013
Visiting Graduate Researcher

- 2D windflow modelling over mountain terrain using the CFD model "WindSim".

University of Concepcion, Department of Geophysics, Concepcion, Chile June - Sept. 2012
Visiting Graduate Researcher

- Hydrological study of the lake Fagnano, Argentina/Chile, and its watershed
- Development of a hydrological model

REFEREED PUBLICATIONS

Theriault, J.M., **N.R. Leroux**, and R. Rasmussen (2020), Improvement of solid precipitation measurements using a hotplate precipitation gauge, Journal of Hydrometeorology, under review

Leroux, N.R., Theriault, J.M., and R. Rasmussen (2020), Improvement of Snowgauge Collection Efficiency

through a knowledge of Hydrometeor Fallspeed, Journal of Hydrometeorology, under review

Leroux, N.R., Marsh, C.B. and J.W. Pomeroy (2020), Simulation of Preferential Flow in Snow with a 2D Non-Equilibrium Richards Model and Evaluation against Laboratory Data, Water Resour. Res., under review

Aubry Wake, C, Somers, LD, Alcock, H, et al. A new flow for Canadian young hydrologists: Key scientific challenges addressed by research cultural shifts. Hydrological Processes. 2020; 1 6. <https://doi.org/10.1002/hyp.13724>

Leroux, N.R. and J.W. Pomeroy (2019), Simulation of capillary pressure overshoot in snow combining trapping of the wetting phase with a non-equilibrium Richards equation model, Water Resour. Res., 54, doi:10.1029/2018WR022969

Leroux, N.R. and J.W. Pomeroy (2017), Modelling capillary hysteresis effects on preferential flow through melting and cold layered snowpacks, Adv. in Water Res., 107, 250-264, doi:<https://doi.org/10.1016/j.advwatres.2017.06.024>.

Musselman, K., J.W. Pomeroy, R. Essery and **N. Leroux** (2015), Impact of windflow calculations on simulations of alpine snow redistribution and ablation, Hydrological Processes, 29(18), 3983-3999, doi:10.1002/hyp.10595.

CONFERENCE PROCEEDINGS

Leroux, N.R., J.W. Pomeroy, and W.D. Helgason (2018), Impact of heat convection induced by topography-driven air ventilation on snow surface temperature, ESC proceedings 2018, College Park, MD, USA.

Leroux, N.R. and J.W. Pomeroy (2015), A dual pathway heterogeneous flow through snow model, ESC proceedings 2015, Sherbrooke, QC, Canada.

ORAL and POSTER PRESENTATIONS

Leroux, N.R., Chalifour, O., Desroches-Lapointe, A., and J.M. Theriault (2020). Estimation of snowfall deposition in mountainous terrain using a CFD model with a stochastic Lagrangian particle tracking model, virtual presentation, 19th Conference on Mountain Meteorology Virtual Meeting.

Leroux, N.R., Desroches-Lapointe, A., and J.M. Theriault (2020). Snowflake particle trajectory in complex terrain using a computational fluid dynamics model, iPoster, 3rd GWF open science meeting.

Desroches-Lapointe, A., Theriault, J.M., Mariani, Z., and **N.R. Leroux** (2020). Investigation of the linkage between precipitation characteristics and local wind field over complex terrain: case study at Fortress Mountain, Alberta, iPoster, 3rd GWF open science meeting.

Desroches-Lapointe, A., Theriault, J.M., Mariani, Z., and **N.R. Leroux** (2020), Flow field and distribution of precipitation over Fortress Mountain, Alberta, oral presentation at the 54th CMOS congress, virtual conference.

Leroux N.R., Clark, M.P., Marsh,C.B. and J.W. Pomeroy (2019), Simulation of preferential flow in snow with a 2D non-equilibrium Richards equation and comparison to laboratory data, oral presentation at IUGG 2019, Montreal, QC, Canada.

Leroux N.R., Marsh C.B. and J.W. Pomeroy (2019), Simulation of preferential flow in snow with a 2D Richards equation model, poster presentation at the 2nd GWF annual science meeting, Saskatoon, SK, Canada.

Leroux N.R. and J.W. Pomeroy (2018), Improving the simulation of capillary pressure in snow with a non-equilibrium Richards equation model, 2nd International Workshop in Snow Physics, Blowing Snow and Avalanche, invited speaker, Niseko, Japan.

Leroux N.R., J.W. Pomeroy, W. Helgason (2018), Impact of heat convection induced by topography-driven air ventilation on snow surface temperature, oral presentation at the 75th Easter Snow Conference, College Park, MD, USA.

Leroux N.R., J.W. Pomeroy (2018), Simulation of capillary overshoot in snow with a non-equilibrium Richards equation model combined with a trapping model for the water phase, oral presentation at the EGU Annual meeting, Vienna, Austria.

Leroux N.R., J.W. Pomeroy (2018), Modelling preferential flow and ice layers in cold snowpacks, poster presentation at the CCRN Final Meeting, Saskatoon, SK, Canada.

Leroux N.R., J.W. Pomeroy (2017), Preferential flow through subfreezing heterogeneous snowpacks with capillary hysteresis, oral presentation at the International Conference in Porous Media, Rotterdam, The Netherlands.

Leroux N.R., J.W. Pomeroy (2015), A new preferential flow pathway model in snow, oral presentation at the American Geophysical Union, San Francisco, CA, USA.

Leroux N.R., J.W. Pomeroy (2015), A dual pathway heterogeneous flow snow model, oral presentation at the CCRN Modelling Workshop, Saskatoon, SK, Canada.

Leroux N.R., J.W. Pomeroy (2015), A dual pathway heterogeneous flow snow model, oral presentation at the 72nd Eastern Snow Conference, Sherbrooke, QC, Canada.

Leroux N.R., J.W. Pomeroy (2014), Snowmelt Modelling in Complex Terrain, oral presentation at the CCRN Modelling Workshop, Saskatoon, Saskatchewan, Canada.

Leroux N.R., J.W. Pomeroy, K.N. Musselman (2014), Wind Flow Modelling over the Canadian Rockies, poster presentation at the Canadian Geophysical Union, Banff, Alberta, Canada.

Musselman, K.N., J.W. Pomeroy, **N.R. Leroux**, R. Essery (2013), Uncertainty in alpine snow mass balance simulations due to snow model parameterization and windflow representation, poster presentation at the American Geophysical Union Annual Fall Meeting, San Francisco, California, USA.

Musselman, K.N., J.W. Pomeroy, **N.R. Leroux**, R. Essery (2013), Simulating snow distribution and melt in alpine and forested terrain, oral presentation at the Davos Atmosphere and Cryosphere Assembly, Davos, Switzerland.

Musselman, K.N., J.W. Pomeroy, **N.R. Leroux**, R. Essery (2013), Evaluation of alpine snow processes simulated by snow and windflow models, oral presentation at the Canadian Geophysical Union, Saskatoon, SK, Canada.

MEDIA and OUTREACH

Science fair in Canmore, AB. Introducing hydrology to high school students.	May 2019
Open house at the Coldwater Laboratory, Canmore, AB.	
Presentation of research to the public.	Apr. 2017
Press article on snow research in the Rocky Mountain Outlook.	June 2016
http://www.rmoutlook.com/article/Snow-studies-examine-causes-of-2013-flood-20160616	
Hosted school group for snow science day, Biogeoscience Institute, University of Calgary.	Jan. 2015
Open House at the Biogeoscience Institute, University of Calgary. Presentation of research done at the Coldwater Laboratory, University of Saskatchewan, to the public.	July 2014

TEACHING

Title: *Principles of flow through snow*
 Guest lecture
 Canadian Society for Hydrological Sciences, Short Course
 Principles of Hydrology, Winter 2019
 University of Saskatchewan Canadian Rockies, Alberta
 Title: *Principles of flow through snow*

Guest lecture
Canadian Society for Hydrological Sciences, Short Course
Principles of Hydrology, Winter 2018
University of Saskatchewan Canadian Rockies, Alberta
Title: *Understanding heat and water flow through cold snowpacks*
Guest lecture
Canadian Society for Hydrological Sciences, Short Course
Principles of Hydrology, Winter 2017
University of Saskatchewan Canadian Rockies, Alberta

SKILLS

Computer: Linux, Matlab, Python, Fortran, C++, OpenFoam
Fieldwork experience: Snow properties measurement, stream and snow surveys, terrestrial laser survey, programming of data loggers
Languages: Native in French and fluent in English

MANUSCRIPT REVIEWER

Review of scientific report for French region
Geophysical Research Letters
Journal of Hydrology
Water Resources Research
Cold Regions Science and Technology

SOCIETY MEMBER

American Geophysical Union
European Geosciences Union
Canadian Geophysical Union
International Society for Porous Media