

Nathan L. Young
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Academic Positions:

Postdoctoral Research Fellow

2019-Present

Laval University, Québec City, Québec, CA

Supervisors: Dr. Jean-Michel Lemieux and Dr. René Therrien

Project: Integrated modeling of the terrestrial water cycle in degrading permafrost environments. (Modélisation intégrée du cycle de l'eau terrestre dans des environnements en dégradation du pergélisol)

Funding source: 2019 Sentinel North Postdoctoral Fellowship.

Additional Affiliations:

Postdoctoral Research Fellow

2019-Present

Center Northern Studies (Centre d'études nordiques)

Québec City, Québec, CA

Education:

PhD in Geology and Environmental Science (co-majors)

Class of 2019

Iowa State University, Ames, Iowa, USA

Adviser: Dr. Bill Simpkins

Dissertation: An integrated framework for quantifying scale-dependent groundwater flow and solute transport in fractured till using field data and numerical modeling.

- GPA – 3.5
- Selected coursework: Hydrologic Modeling and Analysis, Soil Physics, Laboratory Methods in Soil Physics, Advanced Soil Physics, Environmental Soil and Water Chemistry, Glaciers and Glaciology, GIS for Geoscientists, Quantitative Methods in Geology, Statistical Methods for Spatial Data.

MS in Earth and Environmental Science

Class of 2014

Wright State University, Dayton, Ohio, USA

Adviser: Dr. Robert Ritzi

Thesis: Effect of rivers on groundwater temperature in heterogeneous buried-valley aquifers: extent, attenuation, and phase lag of seasonal variation

- Focus: hydrogeology and mathematical modeling.
- GPA – 3.7
- Selected coursework: Subsurface Fluid Flow, Modeling Subsurface Fluid Flow, Subsurface Hydraulics, Groundwater Contamination, Site Remediation and Management, Geophysical Well Log Interpretation, Applied and Environmental Geophysics.

BA in Geology and Sociology/Anthropology**Class of 2012***Earlham College, Richmond, Indiana, USA*

Advisers: Dr. Cynthia Fadem (thesis), Dr. Andrew Moore (academic)

Senior thesis: An investigation of possible deposition mechanisms for gypsic horizons in Bagratashen, Armenia

- GPA: 3.6 – College honors.
- Selected coursework: Hydrology, Geochemistry, Sedimentology/Stratigraphy, Earth History, Earth Materials, Earth Surface Processes, Geohazards, Oceanography, General Chemistry, Organic Chemistry I.

Published Academic Papers:

Young, N.L., W.W. Simpkins, J.E. Reber and M.F. Helmke. 2019. Estimation of the representative elementary volume of a fractured till: A field and groundwater modeling approach. *Hydrogeology Journal*. DOI: 10.1007/s10040-019-02076-y

Young, N.L., J.E. Reber, and W.W. Simpkins. 2019. FracKfinder: A MATLAB toolbox for computing three-dimensional hydraulic conductivity tensors for fractured porous media. *Groundwater*. DOI: 10.1111/gwat.12837

Academic Papers in Review:

Young, N.L., W.W. Simpkins, and R. Horton. *In review*. Column tracer experiments in fractured till: are the results representative of in-situ field conditions? Submitted *Groundwater* on 1/13/20.

Academic Papers in Preparation:

Young, N.L., W.W. Simpkins, and O.S. Schilling. *In preparation*. Quantitative evaluation of a dual-continuum model for simulation of solute transport in a fractured till. Currently in preparation for submission to *Journal of Hydrology*.

Young, N.L., J-M. Lemieux, H. Delottier, R. Fortier, and P. Fortier. *In Preparation*. A chronosequence-based conceptual model for anticipating the impact of landscape evolution on groundwater recharge in degrading permafrost environments. Currently in preparation for submission to *Geophysical Research Letters*.

Young, N.L., J-M Lemieux, L. Mony, P. Locat, D. Demers and A. Locat. *In Preparation*. Field performance of four piezometer installation methods in Champlain clay. Currently in preparation for submission to *Canadian Geotechnical Journal*.

Germain, A., **N.L. Young**, J.-M. Lemieux, H. Delottier, A. Locat, and L. Mony. *In Preparation*. Hydrogeology of a complex Champlain Sea deposit (Quebec, Canada): Implications for slope stability. Currently in preparation for submission to *Canadian Geotechnical Journal*.

H. Delottier, A. Pryet, J.-M. Lemieux, **N.L. Young**, and A. Dupuy. *In Preparation*. A data worth analysis to improve potential groundwater recharge predictions from a coupled canopy and soil model. Currently in preparation for submission to *Hydrogeology Journal*

Conference Papers:

Young, N.L., W.W. Simpkins, R. Horton and R. McLaren. 2017. Linking FracMan and HydroGeoSphere to simulate watershed-scale nitrate transport in fractured till. *Proceedings of the Modflow and More 2017 Conference*. Pp. 281-284.

Grants:

- 2019 Sentinel North Postdoctoral Fellowship – 35,000 CAN
Project: Integrated modeling of the terrestrial water cycle in degrading permafrost environments.
- 2018 Morehouse Merit Graduate Student Summer Fellowship, Iowa State University
Department of Geological and Atmospheric Sciences – 3,000 USD
- 2017 Iowa State Graduate College Travel Funding for Interdepartmental Graduate Students
- 800 USD
- 2017 Geological Society of America Research Grant - 1,850 USD (First tier, full funding)
- 2017 Iowa Water Center Graduate Student Research Grant - 5,000 USD
- 2016 Geological Society of America Research Grant - 2,500 USD (First tier, full funding)

Total grant money received: \$13,150 USD
\$35,000 CAN

Scholarships, Awards, and Honors:

- 2019 John Lemish Award for Research Excellence, Iowa State University Department of Geological and Atmospheric Sciences
- 2018 Second Place, Graduate Student Research Talks. Iowa State University Department of Geological and Atmospheric Sciences
- 2017 Second Place, Student Oral Presentations. Modflow and More 2017
- 2016 GSA Hydrogeology Division Research Grant Award
- 2014 Iowa State University Bowen Graduate Fellowship for Geology
- 2014 Iowa State University Environmental Science Recruitment Fellowship (one of two fellowships awarded for the 2014-15 academic year)
- 2012 Wright State University Early Start Fellowship (one of three fellowships awarded for the 2012-2013 academic year)

Presentations:

- Young, N.L.,** J.M. Lemieux, H. Delottier, and P. Fortier. 2020. Anticipating the Impact of Landscape Evolution on Groundwater Recharge in Degrading Permafrost Environments. Poster presentation, Sentinel North research showcase for the Tri-Agency Programs Secretariat, Québec City, QC, CA. 1/22/2020.
- Young, N.L.,** W.W. Simpkins, J.E. Reber, R. Horton, O.S. Schilling, and M.F. Helmke. 2019. Upscaling Groundwater Flow and Solute Transport in Fractured Till Using Field Data and Numerical Modeling. Poster presentation, Minnesota Groundwater Association Spring Meeting, Minneapolis, Minnesota. 4/25/2019
- Young, N.L.,** W.W. Simpkins, O. Schilling, and R. Therrien. 2018. Simulating Nitrate Transport in Fractured Till Including Tile Drainage: Preliminary Results (**Invited Oral Presentation**). Geological Society of America's Annual Meeting, Indianapolis, Indiana. 11/4/2018.
- Young, N.L.,** W.W. Simpkins, J.E. Reber, R. Horton, R. McLaren, and R. Therrien. Integrating Till Fractures Into Nutrient Transport Models at Plot and Watershed Scales: A Dual-Continuum Approach. Oral Presentation, North-Central Regional Meeting, Geological Society of America, Ames, Iowa. 4/16/2018.
- Young, N.L.,** W.W. Simpkins, J.E. Reber, R. Horton, R. McLaren, and R. Therrien. A Discrete Fracture Network/Dual-Continuum Approach to Simulation of Mass Transport in Fractured Till. Oral Presentation, ISU Geology Graduate Seminar. 3/3/2018 – *Second place, Graduate Student Research Talks*.
- Young, N.L.,** W.W. Simpkins, R. Horton, and R. McLaren. Using Discrete Fracture Network Models to Compute Equivalent Porous Media Parameters for Fractured Till. Oral Presentation, Geological Society of America's Annual Meeting, Seattle, Washington. 10/25/2017.
- Young, N.L.,** W.W. Simpkins, R. Horton and R. McLaren. Linking FracMan and HydroGeoSphere to Simulate Watershed-Scale Nitrate Transport in Fractured Till. Oral Presentation, Modflow and More 2017, Golden, Colorado. 5/22/2017 – *Second place, Student Oral Presentations*.
- Young, N.L.** and W.W. Simpkins. Upscaling Nitrate Transport in Till Fractures from Core to Watershed Scale. Poster Presentation, Minnesota Groundwater Association Fall Meeting, Minneapolis, Minnesota. 11/15/2017.
- Young, N.L.** and W.W. Simpkins. Assessing the Impact of Fractures in Till on the Transport of Nutrients in a Watershed-Scale, Fully-Coupled Hydrologic Model. Poster Presentation, Iowa Water Conference, Ames, Iowa, 3/21/2017.
- Young, N.L.,** W.W. Simpkins, R. Horton and R. McLaren. A Representative Elementary Volume/Equivalent Porous Medium Approach for Modeling Groundwater Nitrate Transport at the Watershed Scale. Oral Presentation, ISU Geology Graduate Seminar. 3/4/2017.

Young, N.L. Adventures in FracLand! Excavating Fractured Till Cores in Three Dakota Access Pipeline Trenches in Walnut Creek Watershed, Fall 2016. ISU Geology Brown Bag Seminar, 11/17/2016.

Young, N.L. and W.W. Simpkins. Modeling Groundwater Nitrate Transport in Fractured Till: Upscaling from Core Scale to Watershed Scale. Oral Presentation, ISU Geology Graduate Seminar. 3/5/2016.

Young, N.L. and W.W. Simpkins. Understanding the Role of Till Fractures in Water and Nutrient Flux at the Watershed Scale. Poster Presentation, Geological Society of America's National Meeting, Denver, Colorado. 11/2/2016.

Young, N.L. and R. Ritzi. Investigating the Extent, Attenuation, and Phase Lag of Seasonal Variation in River Temperature on Groundwater Temperature in Heterogeneous Aquifers. Oral Presentation, ISU Geology Graduate Seminar. 3/7/2015.

Young, N.L. and R. Ritzi, Examining Groundwater Temperature at the Intake of Open-Loop Geothermal Wells as Impacted by Stream-Induced Seasonal Variation. Poster Presentation, Geological Society of America's National Meeting, Denver, Colorado. 10/30/2013.

Fadem, C.M., **N.L. Young** and Carus, C.M. Geoarcheology of the Northern Debed River Valley, Armenia: Preliminary Results. Poster Presentation, Geological Society of America's National Meeting, Minneapolis, Minnesota. 10/10/2011.

Conference Sessions Chaired:

Agricultural Impacts on Hydrology and Water Quality in the Midwest.

W.W. Simpkins, M. Burkhart, and **N.L. Young**. 2018. North-Central Regional Meeting, Geological Society of America, Ames, Iowa. 4/16/2018

Professional Service and Co-Curricular Activities

Teaching Assistant, Iowa State University (2017-2019)

Taught lab sections, graded, and provided homework assistance for introductory and upper-level geology and environmental science courses, including Hydrogeology, Groundwater Modeling, and Glaciers and Glaciology.

Newsletter Editor, Iowa State University Department of Geological and Atmospheric Sciences (Jan 2018-December 2018)

Hydrogeology Instructor, Ames High School Science Olympiads (October-April 2016, October-April 2017)

I taught the fundamentals of hydrogeology and groundwater contamination to local high school students participating in the Science Olympiads academic competition. In both years I participated, the Ames High School Science Olympiad team finished second in the state-level

competition in the hydrogeology event. The 2016 team would go on to compete in the National Tournament.

Environmental Science Graduate Student Organization, Iowa State University (member: 2014-2019)

Elected Positions:

Treasurer (2016-2017)

As treasurer, I was responsible for managing the budget of the Environmental Science Graduate Student Organization. Most significantly, this involved creating a budget for, and writing a university allocations request to fund, the day-long Research Symposium that the Organization holds each spring.

Geology Graduate Student Organization (GGSO), Iowa State University (member: 2014-2019)

Elected Positions:

President (2017-2018)

Social Chair (2016-2017)

Treasurer (2015-2016)

As treasurer, I was responsible for managing the GGSO budget and writing funding requests for GGSO-sponsored events. This included successfully writing a university allocations proposal for \$2,000 to fund a GGSO field trip to Baraboo, Wisconsin. In the fall of 2016, I lobbied for the creation of the social chair position in order to better organize social events for the graduate students, as well as to facilitate better grad student-faculty social interactions. As social chair, I was responsible for organizing weekly social events, as well as a large potluck-style party at the end of each semester. As president of GGSO I was responsible for organizing club meetings and setting the overall mission of the GGSO for the 2017-2018 academic year. Along with my treasurer and secretary, I created an operations manual to streamline the planning of GGSO field trips and outreach events.

Dayton Environmental Advisory Board, Student Associate Member, City of Dayton, Ohio (2012-2014)

Served on an extra-governmental committee that oversaw the wellhead protection program for the city of Dayton, as well as a number of local superfund sites. I also served on a committee responsible for the coordination of environmental outreach programs involving recycling and water conservation.

Tutor, Wright State University (2014)

Provided extra instruction for students taking introductory-level geology and environmental science courses.

Teaching Assistant, Wright State University, Dayton, Ohio (2012-2014)

Taught lab sections, graded, and provided homework assistance for introductory and upper-level geology courses, including hydrogeology and groundwater modeling.

Earlham College Geology Club (member: 2009-2012)

Elected Positions:

President (2011-2012)

Co-President (2010-2011)

Planned field trips, social events, and rock sales to encourage interest in the geology department.

Skills:

Software, Data Analysis, and Modeling:

3DViz X-Ray CT Viewing Software, ArcMap 10, AlgoMesh, FracMan, Grapher, GridBuilder, HydroGeoSphere, Illustrator, MATLAB, Microsoft Office, MODFLOW, MT3DMS, PEST, Python, QGENRECON X-Ray CT Reconstruction Software, R, TecPlot, TPROGS.

Analytical Instruments:

AutoSizer, CAMSizer, X-Ray Computed Tomographic Interface, X-Ray Diffractometer.

Other:

PADI Advanced Open Water Diver SCUBA certification, intermediate Spanish, functional French.

Trainings:

HydroGeoSphere Training at Laval University, 2017

Start date: July 24, 2017

End date: August 10, 2017

At the invitation of Dr. René Therrien, I visited Laval University for a 2-week training in plot- and watershed-scale modeling with HydroGeoSphere. Under the direction of Dr. Therrien and one of his postdoctoral researchers, Dr. Oliver Schilling, I learned the fundamentals of delineating model domains with digital elevation maps (DEMs), how to properly map rivers into the mesh in order to avoid unrealistic ponding, and how to identify and correct areas in the mesh that could cause numerical errors. Furthermore, Dr. Schilling was able to instruct me on how to approach debugging a large, complex model, through the use of visualization programs (Tecplot), output logs, and information provided by the solver.

HydroGeoSphere and PEST Training at Laval University, 2018

Start date: September 6, 2018

End date: September 11, 2018

At the invitation of both Dr. René Therrien and Dr. Oliver Schilling, I returned to Laval University for a five-day training on integrating HydroGeoSphere with the parameter estimation code PEST. Using one of my coupled surface water-groundwater models as a test case, Dr. Schilling instructed me on how to set up the required control files for PEST, as well as how to utilize the parallel processing functions in order to achieve a faster model calibration.

Field Experience:

Iowa State University-Owned Farmland

September-October 2016

Excavated 17 six-inch by six-inch undisturbed till cores from three separate roadside boring trenches associated with the construction of the North Dakota Access Pipeline. Trench walls were photographed in order to digitize fracture distributions. Cores were photographed, described for color, subsampled to determine grain size distribution, and prepared for bromide tracer tests. Additional hand samples were collected along with each core for CT scanning.

Iowa State University Animal Resource Station, Ames, Iowa

August 2016

Used a hollow-stem auger drill rig with both three- and four-inch samplers to collect two 20-foot till cores for X-ray computed tomography analysis and laboratory core-flow studies. Cores were photographed, described for color, and subsampled to determine grain size distribution.

Bagratashen, Armenia

June-July 2011

Assisted Dr. Cynthia Fadem on the Lori Depression Paleoanthropology Project. Conducted extensive mapping of excavation area with a DGPS to help determine local prehistoric drainage network. Identified soil horizons, material, structures, and colors. Sampled soil profiles for XRD analysis to determine composition of soils and pedogenic minerals.

Graduate Students Mentored:

At Laval University:

Philippe Fortier '21 (Supervised by Jean-Michel Lemieux)

During his master's, I assisted Philippe with Python programming, figure creation, and structuring journal papers for submission to academic journals.

Undergraduates Mentored:

At Iowa State University:

Ian McGhee '16 (Now at Tervita Corporation, Edmonton, Alberta, CA)

Ian assisted me with till core excavation in the fall of 2016. He also helped construct the columns for my bromide tracer experiments in the laboratory. I also helped him with organizing his resume and composing emails to potential employers.

Kathleen Staebell '17 (Now US Army Corps of Engineers, Vicksburg, MS)

Kathleen was a lab assistant for me in the spring of 2017. She set up and ran bromide tracer experiments and recorded bromide concentrations in core effluent.

Jayesh Karani '18 (Now at Environmental Consultants Inc., San Mateo, CA)

Jayesh was a lab assistant for me in the fall of 2017. She set up and ran bromide tracer experiments and recorded bromide concentrations in core effluent. I also helped him with organizing his resume and composing emails to potential employers.

Brittany Theilen '18 (Now a graduate teaching assistant at UC Santa Barbara)

Brittany did a senior research project with my adviser, Dr. Bill Simpkins in the spring of 2018. I assisted her with interpreting the hydraulic head data she gathered in the field, instructed her in the use of the plotting software Grapher 10, and helped her construct the poster she presented at North Central GSA in March 2018. I also tutored Brittany in writing as part of her GRE prep.

Professional Organizations:

International Association of Hydrogeologists—student member (2017-2019), member (2019-present)

Awarded a U.S. Chapter-sponsored membership for 2017.

National Groundwater Association—student member (2016-2019)

Sigma Gamma Epsilon—Delta Epsilon Chapter, member (2012-present)

Geological Society of America – Member (2011-present)