

# Brianna J. Rick

PHD CANDIDATE · DEPARTMENT OF GEOSCIENCES

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## Education

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### Colorado State University

Fort Collins, CO

#### PHD GEOSCIENCES

2018 - present

- Advisor: Dr. Daniel McGrath
- Dissertation: Cryogeohazards in a warming climate: geophysical, hydrological, and remotely sensed investigations of glacial lake outburst floods and rock glaciers

### University of Montana

Missoula, MT

#### MS GEOGRAPHY, GIS AND CARTOGRAPHY CERTIFICATE

2016 - 2018

- Advisor: Dr. Anna Klene
- Thesis: Greening of the Arctic: Plot-scale analysis of interactions between climate, vegetation, and permafrost on the Alaskan North Slope (1995-2017)

### Carleton College

Northfield, MN

#### BA GEOLOGY, *Magna cum laude*

2010 - 2014

- Research advisor: Dr. Cameron Davidson
- Thesis: Provenance of the Chugach-Prince William terrane through U/Pb dating of detrital zircons, Baranof Island, SE Alaska

## Professional Experience

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- 2019-2022 **NSF Graduate Research Fellow**, Dept of Geosciences, Colorado State University
- 2018-2019 **Graduate Research Assistant**, Dept of Geosciences, Colorado State University
- 2017-2018 **Graduate Research Assistant**, Dept of Geography, University of Montana
- 2016 **Graduate Teaching Assistant**, Dept of Geography, University of Montana
- 2014-2015 **Fulbright Research Fellow**, Dept of Geography, University of Fribourg, Switzerland
- 2013-2014 **Undergraduate Research Assistant**, Keck Geology Consortium, Carleton College
- 2012 **Undergraduate Lab Assistant**, Dept of Geology, Carleton College

## Awards, Fellowships, & Grants

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- 2021-2022 **Students Advancing Permafrost Research Fellowship**, US Permafrost Association  
**Sustainability Leadership Fellowship**, School of Global Environmental Sustainability, CSU  
*Competitive program for early career scientists to learn effective media and public science communication, build professional development skills and techniques, and incorporate engagement and interdisciplinarity into meaningful careers*
- 2019 **Best Student Poster Presentation**, Southern Conference on Permafrost  
**Travel Award for SouthCOP (Queenstown, NZ)**, CSU Graduate Student Council  
**Student Research Grant**, Geological Society of America  
**Research Grant**, American Alpine Club  
**Kleinkopf Geophysics Scholarship**, Tobacco Root Geological Survey
- 2018 **Travel Award for AGU (Washington, D.C.)**, US Permafrost Association  
**Travel Award for EUCOP (Chamonix, France)**, Permafrost Young Researchers Network

2017 **Graduate Research Fellowship**, National Science Foundation  
**Bertha Morton Fellowship (Top 3 Graduate Students)**, University of Montana  
**Best Poster Presentation**, Intermountain GIS Conference

2014 - 2015 **Fulbright Research Fellowship**, University of Fribourg, Switzerland

2013 - 2014 **Mortar Board**, National College Senior Honor Society

2011 - 2014 **Joe Martin Scholarship**, Bank of America

## Publications

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### PEER REVIEWED

Hengst, A., Armstrong, W., **Rick, B.**, and McGrath, D. 2021. Short-term variability in Alaska ice-marginal lake area: Implications for long-term studies. *Remote Sens.* 2021, 13, 3955. <https://doi.org/10.3390/rs13193955>

### DATASETS

**Rick, B.** and D. McGrath. 2021. Multi-decadal Glacial Lake Inventory in the Alaska Region between 1984 and 2019. Arctic Data Center. doi:10.18739/A2MK6591G.

### IN REVIEW

**Rick, B.**, McGrath, D., Armstrong, W., and McCoy, S. 2021. Dam type and lake position characterize ice-marginal lake area change in Alaska and NW Canada between 1984 and 2019. *The Cryosphere Discuss. [preprint]*, <https://doi.org/10.5194/tc-2021-143>

### NON-PEER REVIEWED

**Rick, B.** 2015. Pilgrimage (Map). In: Vier Pilger- ein Ziel: Zu Fuss nach Jerusalem, p. 8-11.

### ABSTRACTS

**Rick, B.**, Delaloye, R., Barboux, C. and Strozzi, T. 2015. Detection and inventorying of slope movements in the Brooks Range, Alaska using DInSAR: a test study. In Proceedings of the GEOQuébec 2015: 68th Canadian Geotechnical Conference and 7th Canadian Permafrost Conference, Quebec City Convention Centre, Québec, QC, Canada, 8 p.

**Rick, B.** 2014. U/Pb dating of detrital zircons, Baranof Island, SE Alaska. In Varga, R.J., ed. Keck Geology Consortium Undergraduate Research Symposium, 27th (South Hadley, MA, 2014), Proc., 6 p.

### THESES

**Rick, B.** 2018. Greening of the Arctic: Plot-scale analysis of interactions between climate, vegetation, and permafrost on the Alaskan North Slope (1995-2017). University of Montana Graduate Student Theses, Dissertations, Professional Papers. 11262.

**Rick, B.** 2014. Provenance of the Chugach-Prince William terrane through U/Pb dating of detrital zircons, Baranof Island, SE Alaska. Carleton College Senior comprehensive exercises: Geology, 1972-present.

## Presentations

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<sup>+</sup> mentored undergraduate

### INVITED TALKS AND SEMINARS

Oct 2021. *Ice-marginal lake evolution in Alaska*. Global seminar: International Glaciological Society.

Mar 2021. *Intro to Google Earth Engine*. Guest lecture: Remote Sensing of the Earth System.

Fall 2019. *The Ice Beneath our Feet: Alpine and Arctic Permafrost*. Invited talk: CSU Geosciences Club, Fort Collins, CO.

### CONTRIBUTED PRESENTATIONS

**Rick, B.** and D. McGrath. 2021. Lake Agnes rock glacier as a climate resilient cold-water reservoir within the Colorado Front Range. Poster: Regional Conference on Permafrost, virtual.

- Rick, B.**, McGrath, D., McCoy, S., Hengst, A., and Armstrong, W. 2020. Ice-marginal Lake Evolution in Alaska (1970 to 2019) and Associated Glacial Lake Outburst Flood (GLOF) Hazard. Poster: American Geophysical Union Annual Meeting
- Hengst, A., Armstrong, W., **Rick, B.**, and McGrath, D. 2020. Sub-Annual to Annual Dynamics of Alaskan Ice-Marginal Lakes from Automated Image Classification Using Google Earth Engine. Poster: American Geophysical Union Annual Meeting
- Rick, B.** 2020. Lake Agnes rock glacier as a climate resilient cold-water reservoir. Oral presentation: GeoSlam 2020, Fort Collins, CO.
- Rick, B.** and D. McGrath. 2019. Rock glaciers as climate resilient cold-water reservoirs in alpine basins within the Colorado Rocky Mountains. Poster: Southern Hemisphere Conference on Permafrost, Queenstown, NZ.
- Tremblay, F., **Rick, B.**, and McGrath, D. 2019. Glacial lake evolution from 1971 to present in south-central Alaska. Poster: Celebrate Undergraduate Research and Creativity Symposium, Colorado State University, Fort Collins, CO.
- Rick, B.** 2019. Semi-automatic delineation of glacial lakes in Alaska for glacial lake outburst flood (GLOF) risk assessment. Oral presentation: GeoSlam 2019, Fort Collins, CO.
- Rick, B.**, Klene, A., and Shiklomanov, N. 2018. Plot-scale analysis of interactions between climate, vegetation, and permafrost at Toolik Lake, Alaska (1995 - 2018). Poster: American Geophysical Union Annual Meeting, Washington, D.C.
- Rick, B.**, Klene, A., and Shiklomanov, N. 2018. Modern photogrammetric methods to assess vegetation change in relation to air and soil temperature and ALT trends (1995 – 2017), Toolik Lake, Alaska, USA. Poster: 5th European Conference on Permafrost, Chamonix, France.
- Nyland, K., Nelson, F. Queen, Q., and **Rick, B.** 2018. Nivation and Cryoplanation: Linking Two Century-Old Hypotheses. Poster: 5th European Conference on Permafrost, Chamonix, France.
- Reynald, D., Barboux, C., Bodin, X., Brenning, A., Hartl, L., Hu, Y., Ikeda, A., Kaufmann, V., Kellerer-Pirklbauer, A., Lambiel, C., Liu, L., Marcer, M., **Rick, B.**, Scotti, R., Takadema, H., Trombotto Liaudat, D., Vivero, S., and Winterberger, M. 2018. Rock glacier inventories and kinematics: a new IPA action group. 5th European Conference on Permafrost, Chamonix, France.
- Rick, B.** and Klene, A. 2018. Using modern photogrammetric methods to assess vegetation change, Toolik Lake, Alaska (1995-2017). Poster: American Association of Geographers Annual meeting, New Orleans, LA.
- Rick, B.**, Klene, A., and Shiklomanov, N. 2017. Greening of the Arctic: Comparison of trends in measured soil-surface and air temperature data and satellite-based trends of vegetation change on the Alaskan North Slope (1995-2016). Poster: Intermountain GIS: Innovating in a Mobile World, West Yellowstone, MT.
- Rick, B.**, Delaloye, R., Barboux, C., and Strozzi, T. 2015. Detection and inventorying of slope movements in the Brooks Range, Alaska using DInSAR: a test study. Oral presentation: GEOQuebec 7th Canadian Permafrost Conference, Quebec City, CA.
- Rick, B.** 2014. U/Pb dating of detrital zircons, Baranof Island, SE Alaska. Oral presentation and poster: Keck Geology Consortium, 27th Annual Symposium Volume, South Hadley MA.
- Rick, B.**, Frett, B., Davidson, C., and Garver, J. 2014. U/Pb dating of detrital zircon from Seward and Baranof Island provides depositional links across the Chugach-Prince William terrane and southeastern Alaska. Poster: Cordilleran Tectonics Workshop, University of British Columbia – Okanagan, CA.

## Research Experience

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### Colorado State University - Dept of Geosciences

*Fort Collins, CO*

ADVISOR: DR. DANIEL MCGRATH

*Aug. 2018 - Present*

- Project 1: Use novel remote sensing and modeling techniques to map the evolution of glacial lakes in Alaska and document lake drainage events for glacial lake outburst flood (GLOF) hazard assessment
- Project 2: Investigate the hydrologic contribution of rock glaciers in alpine catchments within the Colorado Rocky Mountains using remote sensing, geophysical, hydrochemical and in-situ measurements

### University of Montana - Dept of Geography

*Missoula, MT*

ADVISOR: DR. ANNA KLENE

*2016-2018*

- Project: Used modern photogrammetric techniques to assess vegetation change on a 1-ha plot on the Alaskan North Slope (1995-2017), incorporating 20 years of air temperature, ground surface temperature, and active-layer thickness measurements

**University of Fribourg - Dept of Geography***Fribourg, Switzerland*

ADVISOR: DR. REYNALD DELALOYE

*2014-2015*

- Project 1: Used geophysical techniques (refraction seismics, electrical resistivity), GST data, photogrammetry and Differential GPS measurements to investigate the stability and changing dynamics of rock glaciers and permafrost in the Swiss Alps
- Project 2: Detected and categorized mass land movements in the Brooks Range, Alaska using Differential InSAR (DInSAR)

**Sogn og Fjordane University College***Sogndal, Norway*

ADVISOR: DR. MATTHIAS PAETZEL

*Fall 2012*

- Project: Investigated the relationship between glacial moraines of the Austerdalsbreen glacier and climate proxies in Sogndalsfjord sediment cores.

**Carleton College - Dept of Geology***Northfield, MN*

ADVISOR: DR. CAMERON DAVIDSON

*2012-2014*

- Project: Performed U/Pb detrital zircon dating on sandstones collected in southeastern Alaska to investigate the tectonic evolution of the Chugach-Prince William Terrane on Baranof Island. Keck Consortium of Geology.

**Relevant Skills**

- Programming: R, Python (including ArcPy package), Google Earth Engine (Javascript)
- GIS and Cartography (ESRI suite, Adobe Illustrator)
- Photogrammetry (Agisoft Metashape)
- Extensive fieldwork and backcountry experience (Alaska, Montana, Colorado, Switzerland, Norway, Yukon)

**Outreach & Professional Development****SERVICE AND OUTREACH**

2021 **Education and Community Engagement Advisory Committee**, UNAVCO, Student Rep.  
**Geosciences Graduate Student Peer Mentoring Program**, Peer Mentor

2020, 2021 **NSF GRFP Application Workshop**, Volunteer Editor for CSU Graduate School

2019 **Southern Hemisphere Conference on Permafrost**, Student Volunteer  
**Colorado State University Geosciences**, Undergraduate Mentor

2018 **Montana Science Fair**, Judge in Physical Sciences (7th grade)  
**Gender, Diversity, and Communication Workshop**, Missoula Club Ultimate Frisbee,  
 Organizing Committee

2017 **University of Montana Department of Geography**, Student Evaluation Committee

**DEVELOPMENT AND WORKSHOPS****Karthus Summer School***Karthus, South Tyrol, Italy*

GLACIERS AND ICE SHEETS IN THE CLIMATE SYSTEM

*Sept 2019*

- 10-day course for PhD students on the dynamics of glaciers and ice sheets with a focus on ice-climate interactions. A combination of lectures, problem sets, and modeling projects. Topics included: continuum mechanics, sliding and hydraulics, numerical modelling, polar meteorology, ice-ocean interaction, ice cores, and interaction of ice sheets with the solid earth.

**Arctic Summer Field School***KLRS, Yukon Territory, Canada*

NORWAY-CANADA-USA COLLABORATION

*June 2019*

- 14-day course for graduate students exploring questions related to understanding the cryosphere, cryosphere change, and impacts of change on people and ecosystems. Lectures and exercises used data derived from remote sensing platforms, as well as airborne and ground-based sensors and methods. Objectives included an introduction to and application of cutting-edge approaches and methods in interdisciplinary remote sensing and field-based research.

**AGU Scientific Workshop***Washington, D.C.***MULTITEMPORAL SUPERVISED CLASSIFICATION USING GOOGLE EARTH ENGINE***Dec 2018*

- Hands-on workshop covering an introduction to common parallel processing idioms, temporal compositing, and supervised classification within Google Earth Engine. Users learned how to build, train and validate a multitemporal supervised classification to predict crop-type using multiple datasets.

**CSU Geospatial Centroid***Fort Collins, CO***KEEPING UP WITH GIS TECHNOLOGY WORKSHOP***Oct 2018*

- One-day, hands-on workshop introducing users to open source/free geospatial technologies: QGIS, Spatial SQL with PostGIS, Python, and Big Data Analytics with Manifold.

**Consortium of Universities for the Advancement of Hydrologic Science, Inc.***Laramie, WY***NEAR SURFACE GEOPHYSICS FOR HYDROLOGY WORKSHOP***Sept 2018*

- 3-day, hands-on workshop learning the theory and implementation of various geophysical techniques, including seismic refraction, electrical resistivity, ground penetrating radar, and electromagnetic surveying for near surface purposes.

## Select Work Experience

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**Utah Wild - Western Ultimate League***Salt Lake City, UT***PROFESSIONAL ULTIMATE FRISBEE PLAYER***Spring 2020*

- Utah Wild is the first women's professional ultimate team out of the Rocky Mountain West, with a mission to advance visibility, equity, and high-quality competition for women within the sport of Ultimate.

**University of Montana - Dept of Geography***Missoula, MT***TEACHING ASSISTANT***Fall 2016*

- Assisted in teaching and grading laboratory sections for GPHY 284: Introduction to GIS and Cartography and GPHY 487: Raster GIS and Remote Sensing.

**Adventure Treks***Vancouver, WA***FIELD INSTRUCTOR***Summer 2016*

- As a member of 6-person team, led groups of 24 teenage students on multi-sport adventures in northern California ranging from 19 to 24 days. Taught technical and leadership skills for backpacking, climbing, mountain biking, mountaineering, rafting, and sea kayaking through a combination of backcountry and front country sections.

**YMCA Camp Widjiwagan***Ely, MN***ENVIRONMENTAL EDUCATOR***Spring 2016*

- Combined environmental education and experimental learning to introduce middle school aged school groups to learning in an outdoor environment. Taught courses independently or with a co-instructor, creating curriculum for courses including Freshwater Studies, Wilderness Survival, Teambuilding, Animal Studies, Forest Studies, and Glacial Geology.

**Carleton College Residential Life***Northfield, MN***RESIDENTIAL ASSISTANT***2011-2013*

- Collaborated with peer professionals in student life to develop programs promoting time management and healthy living skills for students. Mediated conflicts between residents through respectful listening and unbiased reasoning, resolved conflicts with compromise, and monitored the safety and security of students and college property.

**YMCA Camp Widjiwagan***Ely, MN***WILDERNESS TRAIL GUIDE***2011-2014*

- Led backcountry canoeing and backpacking trips, ranging from 5 to 25 days for ages 12-18. Taught backpacking, canoeing, and leadership skills, including small group management and teamwork. Wilderness First Responder (WFR) and Life Guard certification.

## Professional Memberships

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American Geophysical Union (AGU)  
Association of Women Geoscientists (AWG)  
American Association of Geographers (AAG)  
Geological Society of America (GSA)  
Permafrost Young Researchers Network (PYRN)  
United States Permafrost Association (USPA)

Association of Polar Early Career Scientists (APECS)  
Gamma Theta Upsilon (GTU)  
Phi Kappa Phi Honor Society  
American Alpine Club (AAC)