

Postdoctoral Researcher at Dartmouth College | Polar Engineer/Glaciologist  
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## EDUCATION

### Doctor of Philosophy

Aug 2021 - Sep 2025

Dartmouth College, Hanover, NH

Thesis: *Greenland Ice Sheet Surface Processes with a New, Low Cost GNSS Instrument Array*

Hardware and software designs of low-power, scientific-grade GNSS: [github.com/glaciology/OGRE](https://github.com/glaciology/OGRE)

Advisor: Dr. Robert L. Hawley

- Lead for various GNSS field projects, including validating NASA laser altimetry measurements, studying crevasse formation, improving firn densification models, and improving space-based ice velocity estimates.
- Designed OGRE (Open GNSS Research Equipment), a field-deployable GNSS instrument for polar research, reducing costs by 44-90% compared to commercial alternatives
- Optimized OGRE for extreme environments, achieving best-in-class low power consumption, minimizing battery requirements for long-term, over-winter autonomous deployments in remote field settings.
- Developed an autonomous radar technique for monitoring snow surface roughness, enhancing the temporal and spatial resolution of data in understudied polar regions.
- Deployed and supported over 100 OGRE units across Greenland, the USA, and Antarctica as part of 7+ funded research projects, supporting studies in geophysics, hydrology, crevassing, and ice sheet dynamics.
- Accumulated over 52 weeks of field experience in Arctic and Antarctic environments, demonstrating expertise in remote field operations, instrument deployment, and extreme environment logistics.

### Bachelor of Arts in Physics - Applied Track

June 2020

Pomona College, Claremont, CA

Thesis: *Computer Vision Software Development for an Explosive Seed Pod Trap Camera*

Engineering Capstone: *Position Determination from Star Tracker Earth Observations*

University of Cambridge, Cambridge U.K. (2019): *Characterizing Chemical Abundances of Select A-type Stars*

## PUBLISHED PAPERS

- [5] **Pickell, D. J.**, R. L. Hawley, J. C. Good. ICESat-2 surface elevation assessment with kinematic GPS and static GNSS near the ice divide in Greenland. *The Cryosphere*. 2026.
- [4] **Pickell, D. J.**, R. L. Hawley, Adam Lewinter. Spatiotemporal patterns of accumulation and surface roughness in interior Greenland with a GNSS-IR network. *The Cryosphere*. 2025.
- [3] Joel A Wilner, Bailey J Nordin, Alexander Getraer, Rowan M Gregoire, Mansa Krishna, Jiawen Li, **Derek Pickell**, Emma R Rogers, Kalin T McDannell, Marisa C Palucis, C Brenhin Keller. Limits to timescale dependence in erosion rates: Quantifying glacial and fluvial erosion across timescales. *Science Advances*. 2024.
- [2] Shfaqat A Khan, Mathieu Morlighem, Shivani Ehrenfeucht, Helene Seroussi, Youngmin Choi, Eric Rignot, Angelika Humbert, **Derek Pickell**, Javed Hassan. Inland summer speedup at Zachariæ Isstrøm, northeast Greenland, driven by subglacial hydrology. *Geophysical Research Letters*. 2024.
- [1] **Pickell, D. J.**, R. L. Hawley. Performance characterization of a new, Low-cost multi-GNSS instrument for the cryosphere. *Journal of Glaciology*. 2024.

## PAPERS IN REVIEW & MANUSCRIPTS

- *In preparation.* **Pickell, D. J.**, R. L. Hawley. Surface mass balance and ice velocity in the interior of the Greenland Ice Sheet: A single instrument approach. Planned submission: early 2026.

- *In preparation.* **Pickell, D. J.**, J. Scott. Detailed lake surface dynamics and phenology with GNSS-IR. Planned submission: mid 2026.
- *In preparation:* **Pickell, D. J.** Increasing surface roughness on the Greenland Ice Sheet follows pervasive melt. Planned submission: mid 2026.

## CONFERENCE ABSTRACTS & PRESENTATIONS

- [9] Joel Wilner, Bailey Nordin, Alexander Getraer, Rowan Gregoire, Mansa Krishna, Jiawen Li, **Derek Pickell**, Emma Rogers, Kalin McDannell, Marisa Palucis, C Brenhin Keller. Global quantification of glacial versus fluvial erosion rates: limits to timescale dependence. *EGU General Assembly 2025*.
- [8] Anja Løkkegaard, William Colgan, Shfaqat Abbas Khan, Dominik Richard Fahrner, Max Polzin, Josie Hughes, Eigil Yuichi Lippert, and **Derek Pickell**. Brittle landscapes: A case study of crevasse development in firn, *EGU General Assembly 2025*.
- [7] **Pickell, D. J.**, R. L. Hawley. Spatio-temporal patterns of surface accumulation and surface roughness in the interior region of Greenland with a novel GNSS network, *AGU Fall Meeting 2024*.
- [6] Michael Gallagher, Von Patrick Walden, Matthew Shupe, Heather Guy, Andrew Martin, Anne Sledd, Claire Pettersen, Ryan Neely, Hans-Peter Marshall, Robert L Hawley, Erik Olson, Kyle Stephen Mattingly, Catherine Hebson, William D Neff, **Derek Pickell**, Michael S Town. How Greenland melts: high fidelity observations of the coupled climate system in Southwestern Greenland from summer 2024, *AGU Fall Meeting 2024*.
- [5] **Pickell, D. J.**, R. L. Hawley. Surface Mass Balance and Elevation Change in Greenland with a Network of Low-Cost GNSS Stations, *AGU Fall Meeting 2023*.
- [4] J. Good, R. L. Hawley, **D. J. Pickell**. Advancing Snow Surface Roughness Observations of the Greenland Ice Sheet Using Down-Looking Laser Distance Meters, *AGU Fall Meeting 2023*.
- [3] **Pickell, D. J.**, R. L. Hawley. Altimetry Validation and Snow Surface Monitoring with an On-Ice Array of Open Source Multi-GNSS Instruments, *AGU Fall Meeting 2022*.
- [2] **Pickell, D. J.**, R. L. Hawley. An On-ice GNSS Research Experimental Network for Greenland (OGRENet), *Northeastern Glaciology Meeting 2021*.
- [1] **Pickell, D. J.**, R. L. Hawley. An On-ice GNSS Research Experimental Network for Greenland (OGRENet), *AGU Fall Meeting 2021*.

## PUBLISHED DATASETS

- [3] Hawley, R. L., **Pickell, D. J.**, McConnell, J. R., Neumann, T. A., Felikson, D. & Dorsi, S. W. Weekly snow stake array measurements, Summit Station, Greenland (IS2SSAGCV, Version 1). Boulder, Colorado USA. NASA National Snow and Ice Data Center Distributed Active Archive Center. 2026.
- [2] **Pickell, D. J.**, Hawley, Robert L., Brunt, Kelly M., Burkhart, John F., Dorsi, Samuel W., McConnell, Joseph R., Neumann, Thomas A., Pettit, Joe. ICESat/ICESat-2 traverse: monthly GPS surface elevation data at Summit Station, Greenland. Dartmouth Dataverse 2025.
- [1] **Pickell, D. J.**, R. L. Hawley. An East-West Network of Twelve Global Navigation Satellite System (GNSS) Stations in the Summit Region of Greenland: RINEX Data, 2022-2025. Arctic Data Center. 2024.

## SIGNIFICANT FIELD EXPERIENCE

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|--|------------------|
| • McMurdo/Ross Ice Shelf Shear Zone, <i>Expedition Member</i> , ground penetrating radar, 4 weeks          | 2025             |
| • Qaanaaq, Greenland, <i>Expedition Member</i> , GNSS instrument deployment, 3 weeks                       | 2025             |
| • Summit, Greenland, <i>Expedition Lead</i> , snow and ice dynamics, 2 weeks                               | 2025             |
| • Athabasca Glacier, Canada, <i>Team Instructor/Leader</i> , glaciology field education program, 1 week    | 2022, 2024, 2025 |
| • Leverett Glacier, Antarctica, <i>Radar Engineer + Mountaineer Safety</i> , Crevasse mapping, 4 months    | 2024             |
| • Mega-crevasse Zone, Ilulissat, Greenland, <i>Expedition Member</i> , GNSS instrument deployment, 2 weeks | 2024             |
| • Point 660, Greenland, <i>Educational Lead</i> , ice dynamics and mapping, 3 weeks                        | 2024             |

- Summit, Greenland, *Expedition Lead*, snow and ice dynamics, 2 weeks 2024
- Summit, Greenland, *Science Technician*, meteorology, geodesy, glaciology, 9 months 2021, 2023
- North East Greenland Ice Stream, Greenland, *Expedition Member*, ice dynamics, 1 week 2023
- Summit, Greenland, *Expedition Lead*, snow and ice dynamics, 2 weeks 2023
- Summit, Greenland, *Expedition Member*, surface processes/instrument deployment, 2 weeks 2022
- Wilderness First Responder training 2016, 2022, 2025

## TEACHING, MENTORSHIP & OUTREACH

- EARS46 - Earth Science Field Study Program, Athabasca Glacier Fall 2024
  - Led GNSS, glacier flow, and glacier travel/safety exercises in the Columbia Ice Field*
- Joint Science & Education Project Graduate Teaching Fellow, Greenland Summer 2024
  - 3 week Arctic field school in Greenland for Danish, American and Greenlandic high school students*
  - Taught basic glacier dynamics and mass balance module and supervised student project on radar and GNSS ice measurements*
- 'Geolunch' Weekly Science Seminar Coordinator Fall 2022
- EARS46 - Earth Science Field Study Program Spring 2022
- EARS01 - How the Earth Works Fall 2021

## MENTORSHIP

- Evan Barrett, *Thesis Committee Member*
- Maia Crichlow, *Advisor, Senior Capstone Project*
- Jacob Gordon, *Advisor, Senior Capstone Project*
- Laura Wilson, *Mentor/Field Lead, Summit Greenland*
- Jadin Scott, *Advisor, Research Assistant*

## FUNDING, GRANTS & AWARDS

- Evans Family Cluster Funding: *OGREs for Open GNSS* (2025) \$23,000.00
- Navigating the New Arctic (NNA) Arctic Observing Technologies Research Award (2025) \$1690.00
- Joint Science and Education Program (2024) \$4000.00
- The Arthur L. Irving Institute for Energy & Society Independent Research Grant (2024) \$3000.00
- Dartmouth College Guarini Graduate Fellowship (2021 - 2025) \$88,164.00/yr

## CONSULTING

- Summit Station Science Coordination Office (SCO) 2024 - present
  - Member of 5 person SCO, which advises the National Science Foundation and Arctic logistics contractors on various ongoing projects in Greenland in which science operations and research is a stakeholder.*
- Faculty Search Committee Fall 2024
- Reviewer, *Journal of Glaciology*

## WORK EXPERIENCE

**Greenland Science Technician, Polar Field Services** Jan 2023 - Jun 2023; Apr 2021 - Jun 2021

- Ensured continuous operation of 15+ scientific instruments in an extreme polar environment, enabling uninterrupted atmospheric and geophysical monitoring for global research initiatives.
- Led field operations for 7 NASA ground data collection traverses to validate the NASA Ice, Cloud, and land Elevation Satellite (ICESat-2), directly contributing to improved satellite-based ice sheet mass balance models.

- Upgraded UNAVCO GPS infrastructure, improving precision of geodetic measurements used for tectonic studies and glacier movement tracking.
- Developed and executed action plans to support field research teams and maximize ground-time efficiency, including radio neutrino installation, ice core drilling, and space probe testing.

### **Loon (Google X) Flight Assembly Specialist, Polar Field Services**

August 2020 - February 2021

- Carried out assembly, integration, software/electrical testing and quality control of Loon flight systems at field operations facilities, leading to 30+ balloon launches in a three month period.
- Wrote test plans, performed outgoing preflight certification checks and executed launches with launch team.
- Triaged flight system test failures with engineering team while documenting bugs and process improvements.

### **Research Engineer: Millennium Space Systems**

September 2019 - May 2020

- Led a technical trade study on optical-based positioning methods as part of a Harvey Mudd College Clinic team, identifying system improvements to enhance satellite navigation and autonomy.
- Developed and implemented image-processing algorithms and software that expanded the satellite star tracker's capabilities, enabling multi-source navigation using Earth features, increasing operational time of star trackers to 100% when not viewing the sun.

### **Structural & Field Engineer Intern: Kiewit**

May - August 2018, June - August 2019

- Designed supporting structures for large-scale infrastructure projects in Seattle and Los Angeles, utilizing 3D modeling software to optimize designs for cost, efficiency, and constructibility.
- Led the transition to a streamlined CAD review system, improving design accuracy and reducing time-to-build by 1-2 weeks, contributing to faster project approvals and cost control.
- Performed structural calculations and load analyses to assess new and existing formwork, ensuring compliance with engineering standards and safety regulations.
- Designed critical safety and mechanical systems, including fall protection and formwork, enhancing worker safety and structural integrity on active construction sites.
- Assisted in managing a 20+ person construction crew by developing engineering-based work plans and hands-on training programs, ensuring successful implementation of design modifications in the field.

## **TECHNICAL SKILLS**

- **Electronics:** PCB manufacturing & DC circuit design (Eagle CAD), bench top debugging (oscilloscope, multimeter).
- **Programming/Software:** Python, C/C++, bash/CLI. Focus on scientific/data analysis scripting, embedded firmware, and software-defined radio (SDR) radar.
- **Spatial analysis:** GNSS reflectometry, GNSS Field Surveying/Data processing (RTK, PPK, PPP), ArcGIS/QGIS (data processing and visualization), ENVI (remote geospatial data processing).
- **Mathematical/analytical tools:** Matlab, Mathematica, Excel, LabView.
- **3D modeling:** Autodesk, SketchUp and Microstation.
- **Media processing & creation:** Machine Shop (CNC router, 3D printing, lathe, etc.), Advanced proficiency in Adobe Suite.
- **Piloting:** 120+ hours as private pilot, tailwheel and seaplane endorsements.
- **Foreign languages:** Advanced in Spanish, proficient in Portuguese, elementary Mandarin.

## **ACTIVITIES**

- **Outdoor education/exploration:** Wilderness First Responder, Pomona College outdoors club trip leader. Selected summits include El Capitan (via The Nose) and Mt. Rainier (Emmons-Winthrop Route, DC Glacier Route).
- **Vans RV-7 aircraft build:** Assisted the building of an experimental class aircraft with Harvey Mudd College students.

## REFERENCES

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**Robert Hawley**

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**Mathieu Morlighem**

[mathieu.Morlighem@dartmouth.edu](mailto:mathieu.Morlighem@dartmouth.edu)

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