

## Kevin Pierce

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### SUMMARY

I am a recent PhD graduate from the department of Geography at the University of British Columbia in Vancouver, Canada. In my research I apply statistical and computational physics techniques to model landscape evolution and sediment transport in river channels, and I conduct laboratory experiments to guide model development and quantify the relevant processes. My educational background is in physics, with a special emphasis on the role of variability in physical systems. Apart from research, the majority of my work experience is in education, with a special emphasis on developing course content using emerging educational technologies. My goal is to continue advancing through a career as an Earth Science researcher and educator.

### EDUCATION

*Doctor of Philosophy*, Physical Geography  
University of British Columbia, Vancouver, Canada (Fall 2016 – Fall 2021)  
**THESIS: The stochastic movements of individual streambed grains**

*Master of Science*, Condensed Matter Physics.  
University of British Columbia, Vancouver, Canada (Fall 2014 – Spring 2016)  
**THESIS: Magnetic structure of chiral graphene nanoribbons**

*Bachelor of Science*, Physics. Minor in mathematics.  
West Virginia University, Morgantown, WV, USA (Fall 2010 – Spring 2013)  
**THESIS: Physics of random phenomena**  
**AWARDS: Outstanding Physics Senior (2013)**

*Associate of Science*, Physics.  
Southern West Virginia Community College, Logan, WV, USA (Spring 2008 – Spring 2010)

### PUBLICATIONS

**Pierce, K.**, Hassan, M. A., & Ferreira, R. M. L. (2021). Mechanistic-stochastic derivation of the bed load sediment flux. In Preparation.

**Pierce, K.**, Hassan, M. A., & Ferreira, R. M. L. (2021). Collisional Langevin model of bedload sediment velocity distributions. In Preparation.

**Pierce, K.**, & Hassan, M. A. (2020). Back to Einstein: Burial-Induced Three-Range Diffusion in Fluvial Sediment Transport. *Geophysical Research Letters*, 47 (15), 1-10. doi: 10.1029/2020GL087440

**Pierce, K.**, & Hassan, M. A. (2020). Joint Stochastic Bedload Transport and Bed Elevation Model: Variance Regulation and Power Law Rests. *Journal of Geophysical Research: Earth Surface*, 125 (4), 1–15. doi: 10.1029/2019JF005259

Rowley J. D., **Pierce K.**, Brant A. T., Halliburton L. E., Giles N. C., Schunemann P. G., and Bristow A. D. (2012). Broadband terahertz pulse emission from  $ZnGeP_2$ . Optics Letters, 37 (5), 788-790. doi: 10.1364/OL.37.000788

## CONFERENCE PRESENTATIONS

**Pierce, K.**, & Hassan, M. A. (2021). Mechanistic-stochastic description of the bedload sediment flux, AGU General Assembly Conference Abstracts.

**Pierce, K.**, & Hassan, M. A. (2020). Collisional Langevin approach to bed load sediment velocity distributions, EGU General Assembly Conference Abstracts, EGU21-8148

**Pierce, K.**, & Hassan, M. A. (2020). Particle shape dictates critical shear stresses for sediment motion, AGU Fall Meeting Abstracts, EP013-0007

Ferreira, R. M. L., Aleixo, R. F., Ricardo, A. M., **Pierce, K.**, Hassan, M. A. (2020) Turbulence in open-channel flows over mobile beds of high hydraulic conductivity, AGU Fall Meeting Abstracts, EP003-0002

**Pierce, K.**, Hassan, M.A. (2019). Back to Einstein: how to include trapping processes in fluvial diffusion models?, AGU Fall Meeting Abstracts, EP51B-02

**Pierce, K.**, Ferreira, R. M. L., Hassan, M. A. (2019). Three-dimensional resolution of bedload transport with binocular computer vision, AGU Fall Meeting Abstracts 2019, EP51F-2185

**Pierce, K.**, Affleck, I. (2016). Edge magnetism of chiral graphene nanoribbons, Cifar Conference in Quantum Materials.

## PROFESSIONAL EXPERIENCE

Varsity Teams Academic Coach: *UBC Athletics* (Fall 2015 – Fall 2016)

- Conducted one-on-one and group tutorial lessons on calculus, chemistry, physics, and statistics for at-risk student athletes.
- Mentored students in problem solving and academic goal setting.
- Prepared and distributed problem sets and example problems to students to build student familiarity and experience with exam material.
- Delivered academic skills workshops to groups of student athletes on topics ranging from presentation skills to time management.

Online Course Content Developer: *UBC Geography Department* (Spring 2020 – Summer 2021)

- Produced a 45 minute video documentary of a geomorphology field trip in collaboration with a professor and an audio-visual specialist for use in a 4th year undergraduate fluvial geomorphology course. This film educates the viewer on processes relevant to mountain river channel stability and dynamics.
- Developed five laboratory assignments for a first year undergraduate geomorphology course. A virtual field trip to the Tacoma watershed of Mount Rainier is presented to students using Tapestry, while datasets and assignments from the watershed are provided for students in Canvas. Using these datasets, students analyze hillslope stability, volcanic processes, river morphology, climate change, and glacial processes in a real watershed.
- Delivered several video explanations of ecological ideas for a first year geography course on climate and ecosystems. These videos were produced on site to provide students a virtual tour of the relevant ecosystems.

- Constructed five laboratory assignments for students in a third year undergraduate "Statistics in Geography" course. Students obtain the assignment packet from Github. Students conduct inferential statistics analyses on large datasets using R in Jupyter notebooks hosted on a Cloud Computing server. Students make conclusions on real-world pollution, ecology, climate, and social problems during the assignments as they learn R programming and statistical analysis techniques.

Teaching Assistant: *UBC & WVU*

(Fall 2012 – Summer 2021)

- Produced assignments and exams, marked student work, delivered lectures, conducted tutorials, performed classroom demonstrations, hosted office hours, facilitated group-work sessions, led field trips, managed educational technology tools (Tapestry, Canvas, Blackboard, Github, Syzygy, Zoom, Slack), and calculated student marks for **20 courses** totalling more than **3600 hours** of contracted hourly work. Topics spanned all levels of physics and geography courses from 1st year to graduate level.
- Received the UBC Geography "Outstanding TA" award in 2020 in recognition of my work in moving the department courses online during the pandemic.
- Completed information security, inclusive teaching, classroom climate, and workplace violence prevention training workshops as requirements for these roles.

## COMPUTER SKILLS

Experienced in Python, R, Matlab, and Bash. Intermediate ability in C and C++. Special proficiency in statistical analysis, Monte Carlo simulation, and image analysis problems. Broad capabilities in machine learning and many-particle physics simulations. Well-acquainted with high-performance computing, working on compute clusters, and job submissions using SLURM. Linux enthusiast with strong problem-solving abilities.

## WORKSHOPS AND OUTREACH

Earth Surface Processes Institute: *University of Colorado, Boulder*

(Summer 2021)

- Completed an eight day immersive workshop on Earth Science modeling. Topics included numerical methods, best programming practices, open source software development, collaborative coding and version control, Landlab and pygmt, high performance computing, and model uncertainty quantification.
- Produced a final course project which is now hosted as an example on the CSDMS website. This project calculated the impact of wildfires on sediment delivery and landscape evolution in watersheds over a millennial timescale.

Instructional Skills Workshop: *UBC*

(Summer 2020)

- Completed an three day workshop on teaching models, strategies to foster active learning in students, inclusive teaching, lesson planning, and applying emerging technologies in interactive lessons.
- Delivered three peer-reviewed lessons in the course of this workshop aimed at identifying and improving on weak points in my own teaching methods.

Science 101: *UBC*

(Summer 2021)

- Volunteered as an educator for Science 101, a community outreach program at UBC designed to introduce traditionally-excluded communities and older adults to scientific ideas.
- Mainly I led discussions on lectures from invited professors, although I also delivered lessons on plate tectonics and volcanism, identifying reliable sources, and distinguishing different plant species.

Books for Me!: Vancouver, BC

(Fall 2017 – Fall 2019)

- Volunteered at a non-profit to encourage literacy among disadvantaged children in Vancouver's downtown East side.
- Joined a team to secure book donations, then host events at elementary schools to distribute books to children for free.