Karin E. Lehnigk

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Education

2016-present **University of Massachusetts Amherst**, Amherst, MA
Enrolled in MS/PhD program—anticipated degree completion Spring 2022
MS Conferred May 2019, PhD candidacy achieved March 2021
GPA: 3.90

2012-2016 **College of William and Mary**, Williamsburg, VA
B.S. in Geology with minor in Mathematics
Summa Cum Laude
GPA: 3.80 (Major GPA: 3.92)

2009-2012 **Thomas Jefferson High School for Science and Technology (TJHSST)**
Alexandria, VA

Research Interests

- Creating numerical models of geomorphic processes constrained by field observations and exposure dating
- Predicting geologic hazards and change from surface history
- Identifying spatial patterns in surface geologic data to determine rates and characteristics of geologic processes

Honors and Awards

Andrew D. Wise Memorial Scholarship (2020, 2018), Leo M. Hall Scholarship (2019)
- Awarded by UMass faculty in recognition of outstanding achievement in Geoscience

National Science Foundation Graduate Research Opportunities Worldwide (2019)
- Funds an 8-month research stay, including fieldwork, to work on proposed project "Reconstructing the incision of Hellemobotn Canyon, Northern Norway"

Geological Society of America Graduate Student Research Grant (2019)
- Proposal awarded funding: The incision history of the Palouse Falls region, Channeled Scablands, eastern Washington

National Science Foundation Graduate Research Fellowship (2017)
- Awarded in the category Geomorphology for proposal: "Megaflood incision of the Grand Coulee, Channeled Scablands of eastern Washington"

William and Mary Alumni Association Prize in Geology (2016)
- One of 2 students selected from the William and Mary geology department by the faculty on the basis of outstanding achievement and engagement in the field of geology

John Mather Nobel Scholar at NASA Goddard Space Flight Center (2015)
- One of 20 students selected from all Goddard interns on the basis of exceptional research and academic achievement to receive conference funding

William and Mary Monroe Scholar (2013-2015)

- Selected on the basis of exceptional academic achievement and research proposal

3rd place in the American Geophysical Union's student video contest (2013)

- Created an educational video about sedimentary rock descriptions
- "A Sedimentary Rock's Tale"

3rd place (senior division) in the DuPont Challenge (2010)

- National science writing competition
- "A Stirring Discovery: Is Biogenic Mixing Combating Global Warming?"

Research Experience

Graduate Research with Dr. Isaac Larsen at the Univ. of Massachusetts (2016-present)

- Quantifying the paleohydrology of and landscape response to Pleistocene glacial lake flooding in the Channeled Scablands of eastern Washington through numerical flood modeling and cosmogenic nuclide exposure dating
- 1 paper submitted for publication, 2 papers in prep

Intern at the Smithsonian National Air & Space Museum with Dr. Sharon Purdy & Dr. John Grant (2021)

- Topographic reconstruction and hydraulic modeling in Ares Valles, Mars

Graduate Research with Dr. Rannveig Skoglund and Dr. Svein Olaf Dahl at the Univ. of Bergen, Norway (2020)

- Describing the subglacial and subaerial erosion history of Hellmobotn Canyon, Norway, using field mapping, hydraulic modeling, and exposure dating
- 1 paper in prep

Senior Honors Thesis with Dr. Brent Garry at NASA Goddard Space Flight Center (2015-2016)

- Title: "The Formation of Fluvial Channels on Alba Mons, Mars"
- Mapped channels on Alba Mons in ArcMap, calculated channel volumes from altimetry and stereo imagery, analyzed channel network geometry and channel features
- Awarded High Honors

Lab Technician for Dr. Thomas Cronin at USGS Reston (2011-2014)

- Prepared Arctic sediment cores and performed microfossil assemblage analysis
- Retrieved sea ice, grain size, and ocean temperature data for GIS use

Publications and Presentations

Lehnigk, K. E., Larsen, I. J. (2021). The magnitude of canyon-forming floods in Grand Coulee, Channeled Scablands, USA. Submitted to *JGR: Earth Surface*.

Pico, T., David, S., Larsen, I., Mix, A., ***Lehnigk, K.,*** Lamb, M. P. (2021). Glacial isostatic adjustment directed incision of the Channeled Scabland by ice-age megafloods. Submitted to PNAS.

Waitt, R. B., Atwater, B. F., ***Lehnigk, K. E.,*** Larsen, I. J, Bjornstad, B. N., Hanson, M. A., O'Connor, J. E. (2021). Upper Grand Coulee: New views of a channeled scabland megafloods enigma. *GSA Field Guides, 62*, 245-300. https://doi.org/10.1130/2021.0062(07)

Fischer, M., ***Lehnigk, K. E.,*** Lützow, N., Brettin, J., Veh, G., Larsen, I., Korup, O., Walz, A. Himalayan Hazard Cascades – Lessons from Pokhara, Nepal. In prep.

Lehnigk, K. E., Larsen, I. J., Lamb, M. P., David, S. R. Predicting rates of bedrock canyon incision by megafloods, Channeled Scabland, USA. In prep.

Lehnigk, K. E., Larsen, I. J., Quirk, B. J. The timing of outburst flood discharge from glacial Lake Columbia: Implications for the formation of Grand and Moses Coulees, USA. In prep.

Lehnigk, K. E., Larsen, I. J., Quirk, B. J., David, S. R. (2021). The timing of Missoula floods on the Columbia Plateau: Implications for the age of Grand Coulee, abstract 370084, poster.

Lehnigk, K. E., Larsen, I. J. (2021). Pleistocene megaflood discharge in upper Grand Coulee, Channeled Scabland, USA, AGU Fall Meeting, abstract EP45F-1562, poster.

Lehnigk, K. E., Larsen, I. J., (2021). Pleistocene megaflood discharge in upper Grand Coulee, Channeled Scabland, USA, AGU Fall Meeting, abstract 859518, poster.

Lehnigk, K. E., Larsen, I. J., David, S. R., Lamb, M. P. (2020). Quantifying outburst flood incision of bedrock canyons by coupling erosion, discharge, and sediment transport, AGU Fall Meeting, abstract EP012-0023, poster.

Lehnigk, K. E., Larsen, I. J., Lamb, M. P., David, S. R. (2019). Quantifying erosion caused by catastrophic outburst floods: Channeled Scablands, eastern Washington, USA, AGU Fall Meeting, abstract EP53I-2252, poster.

Lehnigk, K. E. (2019) Constraining discharges and erosional effects of glacial outburst floods in the Channeled Scablands of eastern Washington, Graduate Climate Conference, Woods Hole MA, talk.

Lehnigk, K. E., Larsen, I. J. (2018). Constraining the megaflood discharge responsible for the formation of Grand Coulee: Channeled Scablands of Eastern Washington, USA, AGU Fall Meeting, abstract EP11E-0407, poster.

Lehnigk, K. E., Larsen, I. J. (2017). Constraints on megaflood discharge through Upper Grand Coulee in the Channeled Scabland of Eastern Washington, GSA Fall Meeting, abstract 301204, poster.

Lehnigk, K. E. (2016). Assessing emplacement models of Devils Tower through weathering modeling, GSA Fall Meeting, abstract 282228, poster.

Lehnigk, K. E. (2016) The Formation of Fluvial Valleys on Alba Mons, Mars, *Undergraduate Honors Theses.* Paper 934. https://scholarworks.wm.edu/honorstheses/934.

Lehnigk, K. E. (2016). The formation of fluvial channels on Alba Mons, Mars, William & Mary Undergraduate Research Symposium, talk.

Lehnigk, K. E., Garry, W. B. G. (2015). The formation of fluvial channels on Alba Mons, Mars, AGU Fall Meeting, abstract EP53A-0949, poster.

Lehnigk, K. E., (2015). The formation of fluvial channels on Alba Mons, Mars, GSA Fall Meeting, abstract 266518, poster.

Lehnigk, K. E., Garry, W. B. G. (2015). The formation of fluvial channels on Alba Mons, Mars, NASA GSFC Intern Conference, poster.

Field Experience

Co-leader of GSA field trip 421: Upper Grand Coulee (October 2021)

- Trip leader for three-day field trip to upper Grand Coulee, Eastern Washington
- Presented modeling results from Grand Coulee

Northern Norway fieldwork (Summer 2020)

- Geomorphic, geologic, and bathymetric mapping, characterized sediment and fracture dimensions, and sampled bedrock and boulders for cosmogenic nuclide surface exposure dating in Hellmobotn Canyon, Norway
- Field assistant for UiB PhD student Sunniva Due: collected peat samples for 14C dating and measured lichen to date retreat of Svartisen Glacier, Norway

UMass Geomorphology Research Group (Sept. 2016, May 2017, Sept. 2018, Aug. 2019)

- Sampled bedrock and boulders for cosmogenic nuclide surface exposure dating in the Channeled Scablands of eastern Washington, USA
- Characterized boulder, talus, and column dimensions

Friends of the Pleistocene Northwestern Cell field trip co-leader (Summer 2018)

- Trip leader for three-day field trip to the Channeled Scablands, Eastern Washington
- Presented modeling results from upper Grand Coulee

NASA Field Assistant (Aug. 2015)

- FINESSE program (Field Investigations to Enable Solar System Science and Exploration) at Craters of the Moon National Park, Idaho
- Assisted with DGPS measurements, DEM drone flights, hand sampling, field FTIR, LIDAR, and field XRD/XRF (PI: Dr. Scott Hughes, Idaho State University)

Regional Field Geology Course in California (May 2015)

- Geomorphology focus, with tectonic and hydrogeology components
- Mapping and relative dating of terraces, moraines, alluvial fans, and debris flows

Piedmont Research Group (July 2014)

- Structural and mineralogical mapping of the Howardsville quadrangle on the Piedmont-Blue Ridge boundary of VA
- Traverses on foot and down the James River by canoe

Regional Field Geology Course in Big Bend National Park, Texas (May 2014)

- Mineralogy and petrology focus, with sedimentary and structural geology components
- GPS, Brunton compass, mapping, and rock description techniques

Teaching Experience

Teaching Assistant at UMass Amherst (2016-2017)

- Geomorphology (GEO/GEOG 560), Spring 2021
- Introductory oceanography (GEO 103), Fall 2020, Spring 2021
- Sedimentary geology (GEO 445), Fall 2016
- Introductory geology (GEO 101), Spring 2017

Geoscientists-in-the-Parks/GeoCorps/National Parks Service Astronomy Interpreter at Devils Tower National Monument (Summer 2016)

- Presented 20-minute geology talks, 2-hour night sky tours, and 2-hour guided hikes
- Developed geology and astronomy curriculum targeted to a broad public audience
- Engaged with visitors to facilitate emotional and intellectual connections with the park

Teaching Assistant at William & Mary (2013-2016)

- Introduction to Geology (GEO 160) lab
- Prepared laboratory materials, answered student questions, and held review sessions

Grader at William & Mary (2013-2016)

- Grade student assignments in Physical Geology (GEO 101), Physical Geography (GEO 110), and Planetary Geology (GEO 307)

Synergistic, Outreach, and Other Activities

Unlearning Racism in Geoscience (URGE) pod member (2020-2021)

- Discussing the impacts of systemic racism and developing concrete solutions to implement at the pod level (UMass Amherst pod and AGU EPSP pod)

UMass Geoscience Department Campus Climate Committee member (2019-present)

- Envisioning and implementing department-wide solutions to campus-wide diversity, education, and inclusion goals and improving workplace climate

Volunteer with Big Brothers Big Sisters of Hampshire County (2016-present)

- One-on-one mentoring of a student from an underserved local community for three hours each week

Session Chair, GSA 2021 meeting

- 46 T127. Advances in Geomorphology: Understanding How Interactions among Climatic, Tectonic, Fluvial, and Hillslope Processes Drive Topographic Change I & II
- With Adrian Bender (Alaska Science Center, U.S.G.S.), Sean Gallen (Colorado State University), and Charles Shobe (Department of Geology and Geography, West Virginia University)

UMass Geoscience Graduate Student Organization (GGSO) co-founder and President (2021)

- Support graduate students in the Department of Geosciences by improving the physical, intellectual, and social environment in our department

UMass Geoscience faculty meeting graduate student representative (2021)

- Take notes during faculty meetings for dissemination to UMass Geoscience graduate student body, hold office hours to solicit comments and concerns from graduate students, and communicate these to faculty during meetings

Virtual Science Fair judge (2021)

- TJHSST Science Fair 2021, Western Mass Science Fair (middle school & high school) 2021

Research Abroad Pen Pals blog (2020)

- Co-writing a blog with a fellow UMass geoscience graduate student on our experiences doing extended international research

Skype a Scientist (2020-present)

- Discuss science with K-12 students over video chat (8 sessions, 1 hour each)

Letters to a Prescientist (2019-2020)

- Exchange letters with a K-12 student to help them connect with science and scientists

NSF GRFP Peer Mentor (2017, 2019, 2020)

- Provided one-on-one writing support and feedback for GRFP applicants at UMass
- Hosted brown bag sessions on elements of the GRFP for prospective applicants

Eureka! With Girls, Inc. of Holyoke (Summer 2017, 2018, 2019, 2020, 2021)

- Developed and ran field activities on the local geology of Amherst, focusing on glacial history and geologic change, sediment transport, and sediment properties, as part of a day camp for middle school girls from local underserved communities

Virtual Trivia (2020)

- Write/host a weekly trivia game on Zoom for the UMass Geoscience Dept. and others

Fairfax County Park Authority Volunteer (2020-present)

- Maintenance and habitat restoration, ~1 hour/week

Summer Institute on Earth-Surface Dynamics (Summer 2018)

- Selected for and participated in a ten-day intensive course on quantitative methods and modeling techniques in geomorphology, run by the National Center for Earth-surface Dynamics at the University of Minnesota

UMass Graduate Mentor (Fall 2017)

- Grad student-run group mentoring undergraduates in the UMass geosciences department
- Met one-on-one with mentee throughout the semester and presented federal job/internship information in group meetings

Member of: UMass Graduate Women in Science, Association for Women Geoscientists, Sigma Gamma Epsilon Geology Honors Society, the American Association for the Advancement of Science, the American Geophysical Union, and the Geological Society of America

CPR and First Aid certified (2017), NOLS Wilderness First Aid certified (2017), Amherst Community Emergency Response Team member (2018)