

MADISON M. DOUGLAS

CONTACT INFORMATION California Institute of Technology
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EDUCATION

Assistant Professor Starting July 2024
Department of Earth and Planetary Science, University of California, Berkeley

Postdoctoral scholar July 2023-June 2024
Department of Earth, Atmospheric and Planetary Science, Massachusetts Institute of Technology

PhD in Geology June 2019-June 2023
Division of Geological and Planetary Sciences, California Institute of Technology

Masters of Geology September 2017-June 2019
Division of Geological and Planetary Sciences, California Institute of Technology

Bachelors of Science September 2012-June 2016
Major: Earth, Atmospheric and Planetary Science (EAPS)
Minor: History
Massachusetts Institute of Technology

RESEARCH EXPERIENCE

California Institute of Technology, Graduate Student Researcher September 2017-Present
Thesis: *Mechanics of River Erosion and its Effects on Floodplain Biogeochemistry*
Advisor: Michael P. Lamb

US Geological Survey Menlo Park, CA September 2016-June 2017
Advisors: Jonathan Stock, Corina Cerovski-Darriau

Fermat Capital Management, Catastrophe Bond Analyst June-August 2016

MIT Geomorphology Group, Undergraduate Researcher January 2013-June 2016
Advisors: J. Taylor Perron, Dino Bellugi, Kimberly Huppert
Senior Thesis: *Constraints on Passive Margin Escarpment Evolution from River Basin Reorganization in Brazil*

NASA Goddard Spaceflight Center Summer Intern June-August 2015
Advisor: Lynn Carter
Operated the Arecibo Radio Observatory to observe Venus in August 2015

Department of Petrology University of Salamanca, Spain June-August 2014
Advisors: Antonio Álvarez-Valero, Adelina Geyer

MIT Geochronology Lab Summer Intern July-August 2011
Advisor: Samuel Bowring

PUBLICATIONS

- Douglas, M.M.**, Lamb, M.P. *The intermittency of bedrock river incision*. In review.
- Douglas, M.M.**, Miller, K.L., Schmeer, M.M., Lamb, M.P. *Frozen flume experiments indicate rapid permafrost riverbank erosion depends on bank roughness*. In review.
- Kemeny, P.C., Li, G., **Douglas, M.M.**, Berelson, W., Chadwick, A., Dalleska, N., Lamb, M.P., Larsen, W., Magyar, J., Rollins, N., Rowland, J., Smith, I., Torres, M., Webb, S., Fischer, W., West, A.J. *Evaluating the Sulfur-Carbon-Climate Permafrost Weathering Feedback in the Koyukuk River Catchment, AK*. In review.
- Rowland, J.R.**, Schwenk, J., Sheler, E., Muss, J., Ahrens, D., Stauffer, S., Piliouras, A., Crosby, B., Chadwick, A., Douglas, M.M., Kemeny, P., Lamb, M.P., Li, G.K., Vulis, L., 2023. *Scale-dependent influence of permafrost on riverbank erosion rates*. *Journal of Geophysical Research: Earth Surface*, 128 (7), e2023JF007101.

5. **Douglas, M.M.**, Dunne, K.B.J., Lamb, M.P., 2023. *Sediment Entrainment and Slump Blocks Limit Permafrost Riverbank Erosion*. Geophysical Research Letters, 50 (11), e2023GL102974.
6. **Douglas, M.M.**, Li, G., Lamb, M.P., Rowland, J.C., Kemeny, P.C., West, A.J., Schwenk, J., Piliouras, A., Chadwick, A.J., Fischer, W.W., 2022. *Organic carbon storage and cycling by river meandering in discontinuous permafrost*. Earth Surface Dynamics, 10, pp.421–435.
7. **Douglas, M.M.**, Lingappa, U.F., Lamb, M.P., Rowland, J.C., West, A.J., Li, G., Kemeny, P.C., Chadwick, A.J., Piliouras, A., Schwenk, J. and Fischer, W.W., 2021. *Impact of river channel lateral migration on microbial communities across a discontinuous permafrost floodplain*. Applied and Environmental Microbiology, pp.AEM-01339.
8. **Douglas, M.M.**, Stock, J.D., Bishaw, K.E., Cerovski-Darriau, C. and Bedford, D.R., 2018. *Dust on a Hawaiian volcano: A regional model using field measurements to estimate transport and deposition*. Earth Surface Processes and Landforms, 43 (13), pp.2794-2807.
9. **Douglas, M.M.**, Geyer, A., Álvarez-Valero, A.M. and Martí, J., 2016. *Modeling magmatic accumulations in the upper crust: Metamorphic implications for the country rock*. Journal of Volcanology and Geothermal Research, 319, pp.78-92.
10. Álvarez-Valero, A.M., Okumura, S., Arzilli, F., Borrajo, J., Recio, C., Ban, M., Gonzalo, J.C., Benítez, J.M., **Douglas, M.**, Sasaki, O. and Franco, P., 2016. *Tracking bubble evolution inside a silicic dike*. Lithos, 262, pp.668-676.

AWARDS

Award for Academic Excellence in Research	2023
Caltech Division of Geology and Planetary Science	
Resnick Sustainability Fellow	Sept 2021-June 2023
Caltech Resnick Sustainability Institute	
Outstanding Student Paper Award (OSPA) Honorable Mention	2020
AGU Fall Meeting, Earth and Planetary Surface Processes Section	
Outstanding Student Paper Award (OSPA)	2019
AGU Fall Meeting, Earth and Planetary Surface Processes Section	
National Center for Airborne Laser Mapping (NCALM) Student Seed Project	2017
40 sq. km of LIDAR flown in Death Valley, California	
National Defense Science and Engineering Graduate Fellowship	2017
W. O. Crosby Award for Sustained Excellence	2016
MIT Department of Earth, Atmospheric and Planetary Science	
Outstanding Student Paper Award (OSPA)	2015
AGU Fall Meeting, Planetary Science Section	
John Mather Nobel Scholarship	2015
\$3000 grant for selected NASA Goddard interns to present research at scientific conferences	
EAPS Achievement Award	2015
MIT Department of Earth, Atmospheric and Planetary Science	
ExxonMobil Recruiter Nominated Grant	2014
\$5000 award used for research funding and conference travel	

TEACHING EXPERIENCE

Ge121a: Advanced Field Geology Teaching Assistant	Fall 2021
Organized a 9-day field trip to Carrizo Plain, California to instruct and assist students in surveying channels and hillslopes offset and uplifted by the San Andreas Fault	

- Ge125: Geomorphology** Teaching Assistant *Fall 2020*
 Assisted students in lab activities to predict landslide hazard in the Chino Hills using an infinite-slope model and assess terrace formation due to long-term climatic change in the San Gabriel River
- Ge121a: Advanced Field Geology** Teaching Assistant *Fall 2019*
 Organized a 9-day field trip to Wax Lake Delta, Louisiana to collect hydraulic datasets, suspended sediment, and sediment cores and assisted students in subsequent labwork and data processing
- Ge136abc: Regional Geology of the Southwest United States** Teaching Assistant
Fall 2018, Winter and Spring 2019
 Planned and led 3-4 day field trips to Owens Valley, Southern Nevada and Utah to introduce students to local geology

RESEARCH
 MENTORING

- Vincent Soldano** Project Mentor *Summer 2022*
 Caltech WAVE Fellow
Comparing Permafrost Floodplain Deposits of Varying Relative Age of Using LIDAR
- Sarah Preston** Project Mentor *Summer 2022*
 High School Research Volunteer
Analyzing Ephemeral Channels in Death Valley Using LIDAR
- Grace Knuth** Project Mentor *September 2021-May 2022*
 High School Research Volunteer
Sediment Transport Rates in Thaw- versus Entrainment-Limited Frozen Flume Experiments
- Maria Schmeer** Project Mentor *Summer 2021*
 Caltech Summer Undergraduate Research Fellowship
Using Temperature Sensors to Track the Thaw and Erosion Fronts in an Experimental Permafrost Riverbank

INVITED TALKS

- GeoCLaSH Cryosphere Session** *May 2023*
- Southern California Geomorphology Symposium** *April 2023*
- Southern California Geomorphology Symposium** *April 2022*
- Resnick Sustainability Institute Research Seminar** *April 2022*
- UC Berkeley EPS Department Seminar Series** *February 2022*
- USC Paleoenvironmental Seminar Series** *October 2021*
- Southern California Geomorphology Symposium** *May 2019*
- Caltech Geoclub Seminar** *November 2019*
- Geology, Minerals, Energy and Geophysics Seminar** *April 2017*
 US Geological Survey, Menlo Park, CA

CONFERENCE
 PRESENTATIONS

1. **M. Douglas**, K.L. Miller, M.P. Lamb (2022), *Monitoring Flow and Erosion Along an Unvegetated Meandering River in Death Valley*, Abstract EP53A-05 presented at 2022 AGU Fall Meeting, Chicago. (Talk)
2. **M. Douglas**, K.L. Miller, M. Schmeer, M.P. Lamb (2021), *Permafrost Riverbank Erosion in Frozen Flume Experiments*, Abstract EP51B-06 presented at 2021 AGU Fall Meeting, New Orleans. (Talk)
3. **M. Douglas**, K.L. Miller, M. Schmeer, M.P. Lamb (2021), *Permafrost Riverbank Erosion in Frozen Flume Experiments*, Abstract EP51B-06 presented at 2021 AGU Fall Meeting, New Orleans. (Talk)

4. **M. Douglas**, M.P. Lamb, G. Li, J.C. Rowland, A.J. West, P.C. Kemeny, J. Schwenk, A. Piliouras, A.J. Chadwick, W.W. Fischer (2021), *Organic carbon burial by river meandering offsets bank-erosion carbon fluxes in discontinuous permafrost*, Abstract EP35A-07 presented at 2021 AGU Fall Meeting, Online. (Invited eLightning)
5. M. Schmeer, **M. Douglas**, K.L. Miller, M.P. Lamb (2021), *Using Temperature Sensors to Track the Thaw and Erosion Fronts in an Experimental Permafrost Riverbank*, Abstract EP55C-1130 to be presented at 2021 AGU Fall Meeting, New Orleans. (Poster)
6. **M. Douglas**, M.P. Lamb, G. Li, J.C. Rowland, A.J. West, P.C. Kemeny, J. Schwenk, A. Piliouras, A.J. Chadwick, W.W. Fischer (2020), *Floodplain architecture and organic carbon storage in discontinuous permafrost*, Abstract U016-09 presented at 2020 AGU Fall Meeting, Online. (Invited Talk)
7. **M. Douglas**, M.P. Lamb, G. Li, J.C. Rowland, A.J. West, J. Schwenk, A. Piliouras, P.C. Kemeny, A.J. Chadwick, Woodward W. Fischer (2020), *Floodplain architecture governs organic carbon storage for a meandering river in discontinuous permafrost*, Abstract EP020-0003 presented at 2020 AGU Fall Meeting, Online. (Poster)
8. **M. Douglas**, M.P. Lamb, J.C. Rowland, G. Li, P.C. Kemeny, A.J. West, A. Piliouras, J. Schwenk, A.J. Chadwick, W.W. Fischer (2020), *Quantifying organic carbon mobilization and storage due to bank erosion in discontinuous permafrost*, Abstract 359406 presented at 2020 GSA Meeting, Online. (Talk)
9. K. Karlstrom, L. Crossey, G. Humphreys, D. Shuster, K. Whipple, et al. Fieldtrip booklet for GSA Grand Canyon Thompson Field Forum I, *Age and Carving of Grand Canyon: Towards a resolution of 150 years of debate*. September 14-21, 2019. (Talk)
10. **M. Douglas**, M.P. Lamb, J.C. Rowland, G. Li, P.C. Kemeny, A.J. West, A. Piliouras, J. Schwenk, A.J. Chadwick, W.W. Fischer (2019), *Quantifying organic carbon mobilization and storage due to bank erosion in permafrost-dominated river floodplains*, Abstract EP42A-04 presented at 2019 AGU Fall Meeting, San Francisco, CA. (Talk)
11. J. Schwenk, A. Piliouras, Y. Zhang, M. Fratkin, J.C. Rowland, **M. Douglas**, A.J. Chadwick, M.P. Lamb (2019), *Permafrost control on river migration along the Koyukuk River, AK*, Abstract EP42B-06 presented at 2019 AGU Fall Meeting, San Francisco, CA. (Talk)
12. **M. Douglas**, J.C. Rowland, G. Li, P.C. Kemeny, A.J. West, A. Piliouras, J. Schwenk, A.J. Chadwick, M.P. Lamb, W.W. Fischer (2018), *Quantifying organic carbon mobilization and storage in permafrost river floodplains*, Abstract C53A-06 presented at 2018 AGU Fall Meeting, Washington, DC. (Talk)
13. **M. Douglas**, M.P. Lamb, W.W. Fischer (May 5, 2018), *Quantifying organic carbon transport and storage by migrating Arctic rivers*, SoCal Geomorphology Symposium, California Institute of Technology, Pasadena, CA. (Poster)
14. **M. Douglas**, J. Stock, C. Cerovski-Darriau, K. Bishaw II, D. Bedford (2017), *Field Measurements and Modeling of Dust Transport and Deposition on a Hawaiian Volcano*, Abstract A33F-2418 presented at 2017 AGU Fall Meeting, New Orleans, LA. (Poster)
15. **M. Douglas**, J.T. Perron, N. Fernandes, L. Silva (2016), *Constraints on Passive Margin Escarpment Evolution from River Basin Reorganization in Brazil*, Abstract EP51A-0863 presented at 2016 AGU Fall Meeting, San Francisco, CA. (Poster)
16. **M. Douglas**, L.M. Carter (2015), *Analysis of Volcanic Deposits on Venus Using Radar Polarimetry*, Abstract P51C-2068 presented at 2015 AGU Fall Meeting, San Francisco, CA. (Poster)

17. K. Huppert, J.T. Perron, **M. Douglas** (2015), *Climatic and tectonic influences on ocean island erosion inferred from a global dataset*, Abstract EP41A-0898 presented at 2015 AGU Fall Meeting, San Francisco, CA. (Poster)
18. **M. Douglas**, A. Álvarez-Valero, A. Geyer (2014), *Predicting Equilibrium Mineral Assemblages in Contact Metamorphism By Integrating Thermodynamic and Numerical Models of Magma Chamber Cooling*, Abstract V31E-4801 presented at 2014 AGU Fall Meeting, San Francisco, CA. (Poster)
19. **M. Douglas**, D. Bellugi, J.T. Perron, J. Coe, K. Schmidt (2013), *Root Cohesion Controls on Shallow Landslide Size, Shape and Location*, Abstract NH33A-1639 presented at 2013 AGU Fall Meeting, San Francisco, CA. (Poster)

PROFESSIONAL
SERVICE

- Caltech GO Outdoors** *Spring 2022*
 Developed classroom activities on debris flows in the San Gabriel Mountains and conducted outreach in a 4th grade classroom in San Marino
- Session Convener for American Geophysical Union Fall Meeting** *December 2020*
 "Geochemical and Sedimentological Insights on Floodplain Development through Space and Time"
- Virtual Pod Host at American Geophysical Union Fall Meeting** *December 2020*
 "Permafrost Geomorphology Party"
- Organizer for Caltech Geoclub Seminar Series** *September 2019-August 2020*
- Organizer for Lamb Geomorphology Group** *Spring 2018-Winter 2023*
 Organize reading groups, plan social events, manage listserv

PROFESSIONAL
ORGANIZATIONS

- American Geophysical Union (AGU) *2013-Present*
 Geological Society of America (GSA) *2014-Present*
 US Permafrost Association (USPA) *2019-Present*
 Permafrost Young Researchers Network (PYRN) *2019-Present*