

# Samuel Lukens Goldberg

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*Assistant Professor*

Department of Marine Geosciences  
Rosenstiel School of Marine, Atmospheric, and Earth Science  
Core Faculty Member, Frost Institute for Data Science and Computing  
University of Miami, Miami FL

## EDUCATION

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**Massachusetts Institute of Technology, Cambridge MA** *September 2021*  
*Ph.D. in Geology*  
Thesis title: Tectonic and climatic controls on continental river systems

**Harvard University, Cambridge MA** *May 2016*  
*A.B. in Earth and Planetary Sciences, secondary field in Physics*  
Thesis title: Sea Level Change Since Last Glacial Maximum

## PROFESSIONAL APPOINTMENTS

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**University of Miami**  
**Frost Institute for Data Science and Computing**  
*Core Faculty Member* *January 2023-present*

**Department of Marine Geoscience**  
**Rosenstiel School of Marine, Atmospheric, and Earth Science**  
*Assistant Professor* *January 2023-present*  
*NSF Postdoctoral Fellow* *July 2022 - December 2022*  
*Postdoctoral Associate* *November 2021 - June 2022*

**Massachusetts Institute of Technology**  
**Department of Earth, Atmospheric, and Planetary Sciences**  
*Postdoctoral Researcher* *September 2021 - October 2021*  
*Graduate research and teaching assistant* *September 2016 - August 2021*

## PUBLICATIONS

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### *Submitted*

**Goldberg SL**, Schmidt MJ, et al. Remote sensing reveals widespread extent of Amazonian dark earth. *In review*.

### *Published*

**Goldberg SL**, Holt AF (2024). Characterizing the complexity of subduction zone flow with an ensemble of multiscale global convection models. *Geochemistry, Geophysics, Geosystems*, 25(2), e2023GC011134.

Schmidt MJ, **Goldberg SL**, et al (2023). Intentional creation of carbon-rich dark earth soils in the Amazon. *Science Advances*, 9(38), eadh849.

Stokes MF, Kim D, Gallen SF, Benavides E, Keck B, Wood J, **Goldberg SL**, Larsen IJ, Mollish JM, Simmons J, Near TJ, Perron JT (2023). Erosion of heterogeneous rock drives diversification of Appalachian fishes. *Science*, 380(6647), 855-859.

Stokes MF, Larsen IJ, **Goldberg SL**, McCoy SW, Prince PP, Perron JT (2023). The erosional signature of drainage divide motion along the Blue Ridge escarpment. *JGR Earth Surface*, 128(1), e2022JF006757.

Pan L, Milne GA, Latychev K, **Goldberg SL**, Austermann J, Hoggard MJ, Mitrovica JX (2022). The Influence of Lateral Earth Structure on Inferences of Global Ice Volume During the Last Glacial Maximum. *Quaternary Science Reviews*, 290, 107644.

**Goldberg SL**, Schmidt MJ, Perron JT (2021). Fast response of Amazon rivers to Quaternary climate cycles. *JGR Earth Surface*, 126(11), e2021JF006416.

**Goldberg SL**, Present TM, Finnegan S, Bergmann KD (2021). A high-resolution record of early Paleozoic climate. *Proceedings of the National Academy of Science*, 118(6) e2013083118.

Bernasconi SM,... **Goldberg SL**,... et al. (2021). InterCarb: A community effort to improve inter-laboratory standardization of the carbonate clumped isotope thermometer using carbonate standards. *Geochemistry, Geophysics, Geosystems*, 22(5), e2020GC009588.

Stokes M, **Goldberg SL**, Perron JT (2018). Ongoing river capture in the Amazon. *Geophysical Research Letters*, 45(11), 5545-5552.

**Goldberg SL**, Lau HCP, Mitrovica JX, Latychev K (2016). The timing of the Black Sea flood event: Insights from modeling of glacial isostatic adjustment. *Earth and Planetary Science Letters*, 452, 178-184.

#### *In preparation*

**Goldberg SL**, Stokes MF, Perron JT. Climate modulates the influence of rock type on bedrock river incision. *In prep.*

## GRANTS AND FELLOWSHIPS

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2022-2024	NSF Postdoctoral Fellowship (\$180,000)
2018-2021	NASA Graduate Student Fellowship (NESSF) (\$135,000)
2017-2018	Patrick Hurley Fellowship
2016-2017	MIT Praecis Presidential Fellowship
2015	Harvard University Center for the Environment Summer Research Grant

## AWARDS

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2022	USAF/MIT AI Accelerator Challenge Award
2020	EAPS Teaching Award
2016	Thomas Temple Hoopes Prize for Outstanding Senior Thesis

## INVITED TALKS

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University of Miami, Department of Marine Geosciences (May 2, 2022)  
University of Miami Geotopics Seminar (August 27, 2021)

## TEACHING EXPERIENCE

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GSC 110 The Earth System (University of Miami) - 2023-present. Introductory comprehensive geology course required for geoscience and marine science majors.

12.163/12.463 Geomorphology (MIT) – Teaching assistant, Fall 2019 (received EAPS teaching award). Advanced undergraduate and graduate course covering quantitative geomorphology and Earth surface dynamics. Taught lab sections, organized class field trip, mentored students with research projects, delivered class lectures.

MIT Teaching and Learning Lab – Teaching Certificate (includes three separate programs):

- Teaching Practice Certificate, Summer 2020. Four-week program in teaching methods, active learning, and class design.
- Subject Design Certificate, Fall 2020. Three-week program in subject design and assessment.
- Inclusive Teaching Certificate, Spring 2021. Two-week program in inclusive teaching and creating a welcoming classroom climate.

DEAPS Yellowstone (2017-2019) – Teaching assistant and co-organizer for a week-long trip to Yellowstone and Grand Tetons National Parks, as an introduction to geology and field experience for first-year students.

## FIELD RESEARCH

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Southern Appalachians (NC and VA) – Collected river sediment samples for cosmogenic nuclide measurements and measured channel geometry and sediment properties.

White Mountains, New Hampshire – Collected photographs for structure-from-motion photogrammetry of channel bed and bank morphology.

Newfoundland – Collected Paleozoic carbonates and Neoproterozoic siliciclastic samples for laboratory analysis.

Death Valley/Mojave Desert – Measured stratigraphy and collected samples from Cambrian carbonate strata for laboratory analysis.

## STUDENTS MENTORED

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Luiz Leal Gomes (MSRP 2019 research intern, summer research program for underrepresented students). *Remote detection of anthropogenic dark earths using fully convolutional neural networks*. Currently Supplier Quality Analyst at Embraer.

Joshua Himmelstein (Spring 2020 research assistant). *Classification and segmentation of remote sensing imagery for detection of land use and vegetation patterns in the Amazon*. Currently Ph.D. student at UNC.

Pratistha Timilsina (Fall 2021 research assistant) *Applications of artificial intelligence to remote sensing and archaeology*.

## DEPARTMENT/UNIVERSITY SERVICE

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Rosenstiel School IT Committee (2023-present)

MGS Academic Committee (2023-present)

MSRP Application Reviewer (2019-2021) – Reviewed applications for an MIT summer research program for underrepresented undergraduate students from other universities.

EAPS Student Advisory Council (ESAC) Representative (2019-2021).

Department field trip (2018) – Co-organized department-wide fall weekend field trip to western Massachusetts.

Department field trip (2017) – Co-organized department-wide weeklong field trip to Newfoundland.

## OUTSIDE OUTREACH

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Frost Museum of Science, Miami (2021-present) – Assisted with content development for new exhibit about the ice age history of Florida. Presented hands-on outreach activities at Earth Day celebration.

National Center for Science Education (2018-2021) – Volunteered with development and testing of informal science activities for climate change and evolution.

Duck and Hover (2017-2019) – Served as mentor for teams of high school students tackling an engineering design challenge in an annual day-long event at the Boston Museum of Science.

Boston area science festivals (2016-2021) – Public outreach and engagement at a number of events in the greater Boston area.

## PRESS

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“The Nature of Mantle Flow May Depend on the Type of Slab Subducting”. *EOS*, February 23 2024.

“Ancient Amazonians created mysterious ‘dark earth’ on purpose.” *Science*, September 20 2023.

“Ancient Amazonians intentionally created fertile ‘dark earth’”. *MIT News*, September 20 2023.

“‘Dark earth’ made by Amazon farmers stores carbon for centuries.” *New Scientist*, September 20 2023.

“The Nutrient-Rich Legacy in the Amazon’s Dark Earths.” *Eos*, March 23 2022.

“How climate change shaped the Amazon’s land and life.” *Eos*, January 28 2022.

“Geologists Have a New Tool for Reconstructing the Ancient Climate.” *Eos*, March 15 2021.

“Geologists produce new timeline of Earth’s Paleozoic climate changes.” *MIT News*, February 1 2021.

“Rivers Run Through It.” *EAPS Scope*, December 20, 2018.

“Amazon pirating water from neighboring Rio Orinoco.” *AGU Geospace*, August 15, 2018.

## CONFERENCE ABSTRACTS

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### *First/presenting author*

**Goldberg SL**, Holt AF. Characterizing the Complexity of Subduction Zone Flow with an Ensemble of Multiscale Global Convection Models. AGU Fall Meeting 2023 (poster).

**Goldberg SL**, Schmidt MJ, Heckenberger M, Franchetto B, Fausto C, Watling J, Moraes B, Lima H, Dorshow W, Kuikuro A, Perron JT. Remote sensing and machine learning reveal abundance and patterns of Amazonian dark earth. AGU Fall Meeting 2021 (oral).

**Goldberg SL**, Stokes MF, Perron JT. Climate Modulates Lithologic Control of River Incision. AGU Fall Meeting 2020 (oral).

**Goldberg SL**, Schmidt MJ, Deal E, Perron JT, Heckenberger M, Dorshow WB, Kuikuro A, De Oliveira P, Sawakuchi AO. Climatic influence on late Quaternary entrenchment of Amazon rivers. AGU Fall Meeting 2019 (oral).

**Goldberg SL**, Perron JT. Perspectives on Drainage Reorganization at Convergent Plate Boundaries from Modeling and Topographic Analysis. AGU Fall Meeting 2018 (poster).

**Goldberg SL**, Stokes M, Perron JT. Ongoing River Capture in the Amazon via Secondary Channel Flow. AGU Fall Meeting 2017 (poster).

*Other*

Holt AF, **Goldberg SL**, Royden LH. Slab dips as constraints on upper mantle pressure. AGU Fall Meeting 2023.

Holt AF, **Goldberg SL**. Unraveling links between upper mantle pressure, flow, and dynamic topography using global subduction models. AGU Fall Meeting 2022.

Schmidt MJ, **Goldberg SL**, et al. Intentional Creation of Carbon-Rich Dark Earth Soils in the Ancient Amazon. AGU Fall Meeting 2022.

Pan L, Milne GA, Latychev K, **Goldberg SL**, Austermann J, Hoggard MJ, Mitrovica JX. The Influence of Lateral Earth Structure on Inferences of Global Ice Volume During the Last Glacial Maximum. AGU Fall Meeting 2022.

Schmidt MJ, **Goldberg SL**, Perron JT, et al. Estimating Soil Carbon in Southern Amazon Late Holocene Anthropogenic Landscapes Containing Archaeological 'Dark Earth' Anthrosols. AGU Fall Meeting 2020.

Stokes MF, Larsen IJ, McCoy SW, **Goldberg SL**, Perron JT. A Tale of Three Divides: Investigating the erosional signature of divide motion along the Blue Ridge Escarpment. AGU Fall Meeting 2020.

Zhang F, Stockey R, Planavsky N, Fan J, Li N, Finnegan S, Edwards C, **Goldberg SL**, Saltzman M, Dahl T, Bergmann K, Sperling E, Zhang H, Wang X, Shen S-Z. The Great Ordovician Biodiversification Event was Promoted by Persistent Deep Oceanic Anoxia. Goldschmidt Conference 2020.

Bergmann K, **Goldberg SL**, Anderson N, Jost A, Gilbert P, Myers C. Formation temperature of biomaterials through geologic time. APS March Meeting 2020.

\*Leal LF, Schmidt MJ, **Goldberg SL**, Perron JT, Hosler D, Heckenberger M, Dorshow WB, Moraes B, Tamahana EK, Waura K, Kuikuro W, Kuikuro A. Finding Anthropogenic Dark Earth in the Amazon Basin Using Fully Convolutional Networks. AGU Fall Meeting 2019.

Bergmann K, **Goldberg SL**, Boekelheide N. Earth's climate system over the last billion years: Insights from oxygen isotopes. AGU Fall Meeting 2019.

Present T, **Goldberg SL**, Kast E, Bergmann K, Finnegan S, Rae JWB, Burke A, Johnson D, Fike DA, Fischer WW, Cummins R, Adkins JF. Stability of Upper Ordovician to middle Silurian marine sulfur isotopes recorded in brachiopod carbonate-associated sulfate. AGU Fall Meeting 2019.

Schmidt MJ, Perron JT, Heckenberger M, Dorshow WB, Moraes B, Watling J, Neves E, Hosler D, **Goldberg SL**, \*Leal LF, Waura K, Kuikuro H, Kuikuro W, Kuikuro A. How Much Carbon is Stored in Ancient Amazonian Anthrosols? AGU Fall Meeting 2019.

Bergmann K, Boekelheide N, Cantine M, Jost A, Mackey T, **Goldberg SL**, Wilcots J, Anderson N. A 1.2 Billion Year Record of Earth's Temperature History. AGU Fall Meeting 2018.

Bergmann K, Jost A, Mackey T, **Goldberg SL**, Anderson N, Cantine M, Wilcots J. Can you Reconstruct Paleoclimate in Carbonate Rocks Before the Advent of Biomineralization? Goldschmidt Conference 2018.

Perron JT, Black B, Stokes M, McCoy S, **Goldberg SL**. Disruption of river networks in nature and models. AGU Fall Meeting 2017.

Bergmann K, Jost A, Mackey T, **Goldberg SL**, Boekelheide N, Finnegan S, Fischer W, Grotzinger J, Eiler J. Climatic Extremes at the Dawn of Animal Life. Goldschmidt Conference 2017.