EMMA "MICKEY" MACKIE

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ACADEMIC APPOINTMENTS

University of Florida, Gainesville FL   *2021 - Present*
Assistant Professor
Department of Geological Sciences

EDUCATION

Stanford University, Stanford CA   *2017 - 2021*
Ph.D. in Geophysics
Advised by Dustin Schroeder
Thesis title: *Modeling the Subglacial Environment with Geostatistics*

Harvard University, Cambridge MA   *2013 - 2017*
B.A. in Earth and Planetary Sciences, with High Honors
Advised by Francis Macdonald
Senior Thesis: *Cryogenian Stratigraphy of Northeastern Washington: A Glacial and Tectonic History*

MANUSCRIPTS IN REVIEW

*Graduate researcher, **Undergraduate researcher

[2] **MacKie, E.**, Millstein, J., Serafin, K. 47 Years of Large Antarctic Calving Events: Insights from Extreme Value Theory.

[1] Chudley, T. R., Howat, I. M., King, M. D., **MacKie, E**. Increased crevassing across accelerating Greenland Ice Sheet margins.

PUBLICATIONS

*Graduate researcher, **Undergraduate researcher

[21] J. MacGregor, W. Colgan, G. Paxman, K. Tinto, B. Csatho, M. Fahnestock, T. Kokfelt, **E. MacKie**, M. Morlighem, O. Sergienko. (2024). Geologic provinces beneath the Greenland Ice Sheet from geophysical data synthesis. *Geophysical Research Letters*. 51(8). https://doi.org/10.1029/2023GL107357.

[20] Karlsson, N. B., Schroeder, D. M., Srensen, L. S., Chu, W., Dall, J., Andersen, N. H., ... **MacKie, E. J.** ... Skou, N. (2024). A Newly Digitised Ice-penetrating Radar Data Set Acquired over the Greenland Ice Sheet in 19711979. *Earth System Science Data Discussions*, 16(7), 3333-3344. https://doi.org/10.5194/essd-16-3333-2024

[19] Schoedl, N.**, **MacKie, E.J.**, Field, M.*, Stubbs, E.A., Zhang, A.**, Gravey, M. (2023). A Python multiprocessing approach for fast geostatistical simulations of subglacial topography. *Computing in Science & Engineering*. https://doi.org/10.1109/MCSE.2023.3317773

[18] **MacKie, E. J.**, Field, M.*, Wang, L., Yin, Z., Schoedl, N.**, Hibbs, M.**, Zhang, A.** (2023). GStatSim V1. 0: a Python package for geostatistical interpolation and conditional simulation. *Geoscientific Model Development*, 16(13), 3765-3783, https://doi.org/10.5194/gmd-16-3765-2023.

[17] Law, R., Christoffersen, P., **MacKie, E.**, Cook, S., Haseloff, M., Gagliardini, O. (2023). Complex motion of Greenland Ice Sheet outlet glaciers with basal temperate ice. *Science Advances*, 9(6), eabq5180, https://www.science.org/doi/10.1126/sciadv.abq5180.

[16] McKenzie, M. A., Miller, L. E., Slawson, J. S., **MacKie, E. J.**, Wang, S. (2023). Differential impact of isolated topographic bumps on ice sheet flow and subglacial processes. *The Cryosphere*, 17(6), 2477-2486, https://doi.org/10.5194/tc-17-2477-2023.

[15] Wang, L., Peeters, L., **MacKie, E. J.**, Yin, D. Z., Caers, J. (2023). Unraveling the uncertainty of geological interfaces through data-knowledge-driven trend surface analysis. *Computers & Geosciences*, 105419, https://doi.org/10.1016/j.cageo.2023.105419.

[14] Frémand, A. C., Fretwell, P., Bodart, J., Pritchard, H. D., Aitken, A., Bamber, J. L., ... **MacKie, E.J.**... & Zirizzotti, A. (2023). Antarctic Bedmap data: Findable, Accessible, Interoperable, and Reusable (FAIR) sharing of 60 years of ice bed, surface and thickness data. *Earth System Science Data*, 15(7), https://doi.org/10.5194/essd-15-2695-2023.

[13] Yin, Z., C. Zuo, **E.J. MacKie**, J. Caers (2022). Mapping high-resolution basal topography of West Antarctica from radar data using non-stationary multiple-point geostatistics.*Geoscientific Model Development*, https://doi.org/10.5194/gmd-15-1477-2022.

[12] Bienert, N.L., D.M. Schroeder, S.T. Peters, **E.J. MacKie**, E.J. Dawson, M. Siegfried, R. Sanda, P. Christoffersen (2022). Post-Processing Synchronized Bistatic Radar for Long Offset Glacier Sounding. *IEEE Transactions on Geoscience and Remote Sensing*, https://doi.org/10.1109/TGRS.2022.3147172.

[11] Schroeder, D.M., A.L. Broome, A. Conger, A. Lynch, **E.J. MacKie**, A. Tarzona (2021). Radiometric analysis of digitized Z-scope records in archival radar sounding film. *Journal of Glaciology*, https://doi.org/10.1017/jog.2021.130.

[10] **MacKie, E.J.**, D.M. Schroeder, C. Zuo, Z. Yin, J. Caers (2021). Stochastic Modeling of Subglacial Topography Exposes Uncertainty in Water Routing at Jakobshavn Glacier. *Journal of Glaciology*. https://doi.org/10.1017/jog.2020.84.

[9] **MacKie, E.J.,** D.M. Schroeder, G. Steinbrügge, R. Culberg (2021). Quantifying Spatial Relationships in Ice Penetrating Radar Measurement Uncertainty through Clutter Simulation. *2021 IEEE International Geoscience and Remote Sensing Symposium IGARSS*. https://doi.org/10.1109/IGARSS47720.2021.9553045.

[8] Teiesberg, T.O., D.M. Schroeder, **E.J. MacKie** (2021). A Machine Learning Approach to Mass-Conserving Ice Thickness Interpolation. *2021 IEEE International Geoscience and Remote Sensing Symposium IGARSS*. https://doi.org/10.1109/IGARSS47720.2021.9555002.

[7] Schroeder, D.M., N.L. Bienert, R. Culberg, **E.J. MacKie**, T.O. Teisberg, W. Chu, D.A. Young (2021). Glaciological Constraints on Link Budgets for Orbital Radar Sounding of Earth's ICE Sheets. *2021 IEEE International Geoscience and Remote Sensing Symposium IGARSS*. https://doi.org/10.1109/IGARSS47720.2021.9553237.

[6] Bartlett, O.T., S.J. Palmer, D.M. Schroeder, **E.J. MacKie**, T.T. Barrows, A.G. Graham (2020). Geospatial simulations of airborne ice-penetrating radar surveying reveal elevation under-measurement bias for ice-sheet bed topography. *Annals of Glaciology*. https://doi.org/10.1017/aog.2020.35.

[5] **MacKie, E.J.**, D.M. Schroeder, J. Caers, M.R. Siegfried and C. Scheidt (2020). Antarctic Topographic Realizations and Geostatistical Modeling Used to Map Subglacial Lakes, *Journal of Geophysical Research: Earth Surface.* https://doi.org/10.1029/2019JF005420.

[4] Zuo, C., Z. Yin, Z. Pan, **E.J. MacKie**, J. Caers (2020). A tree-based direct sampling method for stochastic surface and subsurface hydrological modeling, *Water Resources Research.* https://doi.org/10.1029/2019WR026130.

[3] **MacKie, E.J.**, D.M. Schroeder (2020). Geostatistically simulating subglacial topography with synthetic training data. *IGARSS 2020-2020 IEEE International Geoscience and Remote Sensing*

Symposium. https://doi.org/10.1109/IGARSS39084.2020.9324563.

[2] Schroeder, D.M., **E.J. MacKie**, T.T. Creyts, J.B. Anderson (2019). A subglacial hydrologic drainage hypothesis for silt sorting and deposition during retreat in Pine Island Bay, *Annals of Glaciology.* https://doi.org/10.1017/aog.2019.44.

[1] Schroeder, D.M., J. Dowdeswell, M. Siegert, R. Bingham, W. Chu, **E.J. MacKie**, M.R. Siegfried, K. Vega, J. Emmons and K. Winstein (2019). Multi-Decadal Observations of the Antarctic Ice Sheet from Archival Radar Film, *Proceedings of the National Academy of Sciences.* https://doi.org/10.1073/pnas.1821646116.

SOFTWARE AND DATA PRODUCTS

GStatSim (1.0). **E.J. MacKie**, M. Field, L. Wang, Z. Yin, N. Schoedl, M. Hibbs (2022). Zenodo. https://doi.org/10.5281/zenodo.7274640.

Subglacial Topography Training Image Database. **E.J. MacKie**, Z. Yin, C. Zuo, J. Caers. (2021). Zenodo. https://doi.org/10.5281/zenodo.5083715.

HONORS AND AWARDS

University of Florida Pioneering Research with HiperGator Award	*2024*
University of Florida AI Rising Star Award	*2024*
Graham Cogley Award from the International Glaciological Society	*2023*
Exceptional Thesis Award from the Stanford Department of Geophysics	*2022*
Best Student Oral Presentation at IGS Symposium on Glacial Erosion and Sedimentation	*2019*
Flash Freeze Cryosphere Innovation Award (oral presentation)	*2018*
Harvard College Research Program grant awarded for senior thesis research	*2016*

GRANTS AND FUNDING

UF/NVIDIA Artificial Intelligence and Complex Computational Research ($90,132)   *2024*
Title: *Mapping Antarctica's Underworld*
PI: E.J. MacKie
Period: July 2024 - January 2026

NSF Geosciences Open Science Ecosystem ($253,946)   *2023*
Title: *Enhancing the accessibility of novel geostatistical inversion workflow for cryosphere research*
PI: E.J. MacKie
Period: August 2023 - August 2025

Earth Science Information Partners GeoSMART award ($4,000)   *2022*

Achievement Rewards for College Scientists (ARCS) Scholarship Award ($50,000)   *2020*

TEACHING EXPERIENCE

AI in a Changing Climate, University of Florida (Instructor)	*2024*
Introduction to Machine Learning in the Geosciences, University of Florida (Instructor)	*2023*
Arctic Seismology, University Center in Svalbard, Norway (Guest Lecturer)	*2022, 2023*
Arctic Seismology, University Center in Svalbard, Norway (Teaching Assistant)	*2020*
Introduction to the Foundations of Contemporary Geophysics, Stanford (Teaching Assistant)	*2019, 2020*

INVITED TALKS

UF Water, Wetlands, and Watersheds Seminar (Gainesville, FL)	*2024*
University of Texas Austin Geophysics Department Seminar (Austin, TX)	*2024*
Berkeley AI Research seminar series (virtual)	*2024*
Florida Undergraduate Research Leadership Summit (Gainesville, FL)	*2024*
International Glaciological Society seminar series (virtual)	*2024*
Maths on Ice seminar (virtual)	*2024*
Winter Conference on Applications of Computer Vision (Waikoloa Village, HI)	*2024*
American Geophysical Union (San Francisco, CA)	*2023*
University of Tasmania, Ice and Oceans seminar (Hobart, Tasmania)	*2023*
Lamont-Doherty Marine Geology, Geophysics, Seismology, Geology, and Tectonophysics seminar (virtual)	*2023*
University of Florida Data Science and Informatics Symposium (Gainesville, FL)	*2023*
Data management and data assimilation keynote at Antarctic RINGS workshop in Norway (Tromso, Norway)	*2022*
Compute Antarctic seminar series at University of Tasmania (virtual)	*2022*
University of Florida Data Science and Informatics Symposium (Gainesville, FL)	*2022*
Stanford Geophysics Brown Bag Seminar (Stanford, CA)	*2020*
Data Science Keynote, International Thwaites Glacier Collaboration Meeting (UK)	*2019*
Aarhus Department of Geoscience (Aarhus, DK)	*2019*

PROFESSIONAL SERVICE

Organizing Committee: Subice Workshop in Tasmania	*2023*
Guest editor for *Remote Sensing* special issue: Machine Learning and Artificial Intelligence in Remote Sensing Image Understanding	*2022 - 2023*
Organizing Committee: West Antarctic Ice Sheet annual workshop	*2022 - present*
Organizing Committee: Women in Data Science Conference	*2019*
Organizing Committee: International Thwaites Glacier Collaboration Early Career Meeting	*2019*

UNIVERSITY SERVICE

Committee member for UF chapter of Women in High Performance Computing	*2023 - present*
Organizing committee: UF AI Days	*2023*
Member of Graduate Studies committee, UF Department of Geological Sciences	*2022 - present*
Officer for Stanford Women in Mathematics, Statistics and Computational Engineering	*2018 - 2021*
Founder and leader of Ice Break, a glaciology paper discussion group at Stanford	*2018 - 2021*
Officer for Stanford Women in Earth Sciences	*2018 - 2020*
Member of Stanford Geophysics Graduate Student Advisory Committee	*2018 - 2019*
Harvard Undergraduate Geological Society, president and social chair	*2015 - 2017*

FIELD EXPERIENCE

Svalbard - Radar and active source seismology	*2019, 2022-2024*
Greenland - Radar	*2019*
Svalbard - Seismology	*2019*
Washington, Idaho, and British Columbia - Geology	*2016*
Juneau Icefield - Glaciology	*2015*
Death Valley - Geology	*2015*

SELECTED CONFERENCE ABSTRACTS

[17] **Mackie, E.**, Schoedl, N., Field, M., Wang, L., Yin, D. Z., Zhang, A., Gravey, M. (2023). GStat-Sim: a FAIR geostatistics software package in Python. AGU23.

[16] Jaeger, J. M., Greco, N., Forwick, M., **Mackie, E.** (2023). A Quantitative Bayesian Grain Size Model of Glacimarine Sedimentation at IODP Site U1419 Gulf of Alaska: Deconvolving Oceanographic and Glacimarine Controls on Late Pleistocene High-Latitude Sedimentation. AGU23.

[15] Stl, T., Reading, A. M., Cracknell, M. J., Ebbing, J., Halpin, J. A., Kelly, I. D., ...**MacKie, E.**, Whittaker, J. M. (2023). Using information entropy to optimise and communicate certainty of continental scale tectonic models (No. EGU23-4074). Copernicus Meetings.

[14] **MacKie, E.J.**, D.M. Schroeder., C. Zuo, Z. Yin, J. Caers, 2020. Quantifying Subglacial Hydrologic Uncertainty with Stochastic Simulation. *AGU Fall Meeting.*

[13] Teisberg, T., D.M. Schroeder, **E.J. MacKie**, 2020. Dynamically Optimizing Radar Sounder Sampling Based on Estimated Uncertainty in Bed Topography. *AGU Fall Meeting.*

[12] **MacKie, E.J.**, D.M. Schroeder, C. Zuo, Z. Yin, J. Caers, 2020. Geostatistical Simulations of Subglacial Topography: Implications for Water Routing at Jakobshavn Glacier. *WAIS Workshop.*

[11] **MacKie, E.J.**, D.M. Schroeder, 2019. Paleo Observations Used to Geostatistically Simulate the Subglacial Geology of Thwaites Glacier. *AGU Fall Meeting.*

[10] Conger, A., D.M. Schroeder, **E.J. MacKie**, 2019. Radiometric Characterization of Subglacial Lake Floors from Archival Radar Data. *AGU Fall Meeting.*

[9] Schroeder, D.M., **E.J. MacKie**, A. Conger, 2019. Radiometric signature of subglacial conditions in archival radar sounding data recovered from optical film. *AGU Fall Meeting.*

[8] **MacKie, E.J.**, D.M. Schroeder, 2019. Geostatistically Simulating the Topography and Geology of the Amundsen Sea Embayment. *WAIS Workshop.*

[7] **MacKie, E.J.**, D.M. Schroeder, 2019. Geostatistical simulations of subglacial topography used to study paleo and modern bed conditions in the Amundsen Sea sector. *IGS Symposium on Five Decades of Radioglaciology.*

[6] **MacKie, E.J.**, M. Murray, A. Pollack, D.M. Schroeder, 2019. Producing multi-decadal observations of grounding line change in East Antarctica with archival radar data, *IGS Symposium on Five Decades of Radioglaciology.*

[5] **MacKie, E.J.**, D.M. Schroeder, 2019. Using radar and geostatistical simulations to compare paleo and modern bed morphology in Pine Island Bay *IGS Symposium on Glacial Erosion and Sedimentation.*

[4] Schroeder, D.M., **E.J. MacKie**, T.T. Creyts, J.B. Anderson, 2019. A subglacial hydrologic switching hypothesis for silt sorting and deposition during ice sheet retreat in the in the Amundsen Sea Embayment. *IGS Symposium on Glacial Erosion and Sedimentation.*

[3] **MacKie, E.J.**,C. Scheidt, J. Caers, D.M. Schroeder, 2018. A new model for Antarctic Subglacial Lakes, *AGU Fall Meeting.*

[2] **MacKie, E.J.**,C. Scheidt, J. Caers, D.M. Schroeder, 2018. Simulating Antarctic bed topography to quantify uncertainty in subglacial water storage, *WAIS Workshop.*

[1] **MacKie, E.J.**, D.M. Schroeder, J.A. Dowdeswell, K.I. Vega, M.R. Siegfried, W. Chu, R.G. Bingham, 2018. Digitization and Analysis of the SPRI-NSF-TUD Radar Data Archive, *SCAR/IASC Open Science Conference.*

GRADUATE MENTORING

Michelle Babcock, Geological Sciences, University of Florida - primary advisor	*2022 - present*
Niya Shao, Geological Sciences, University of Florida - primary advisor	*2022 - present*
Michael Field, Geological Sciences, University of Florida - primary advisor	*2022 - present*
Theo Richardson, Astronomy, University of Florida - committee member	*2022 - present*
Nicole Greco, Geological Sciences, University of Florida - second project mentor	*2022 - 2024*
Briar Conger, Scripps, UC San Diego - second project mentor	*2021 - 2022*
Franklyn Dunbar, Computer Science, University of Montana - second project mentor	*2020*

UNDERGRADUATE MENTORING

Aidan Burrowes, University of Florida	*2023 - present*
Alisha Jithesh, University of Florida	*2023 - present*
Nate Schoedl, University of Florida	*2022 - present*
Allan Zhang, University of Florida	*2022 - present*
Caleb Koresh, University of Florida	*2022 - 2024*
Caroline Riggall, University of Florida	*2021 - 2024*
Matthew Hibbs, University of Florida	*2021 - 2023*
Carson Ward, University of Florida	*2022*
Angela Wang, University of Florida	*2022*
Stella Moore, University of Florida	*2022*
Jack Magalsky, University of Florida	*2022*
Samuel Williams, University of Florida	*2021*
Angelo Tarzona, Dickinson College	*2020*
Ha Tran, Stanford University	*2020*
Connery Wood, Stanford University	*2019*
Kathy Vega, Fullerton Community College	*2017 - 2018*

OUTREACH

Instructor for Scientist in Every Florida School (SEFS)	*2022 - present*
Stanford Ask A Scientist	*2018 - 2019*
GeoKids instructor. Taught geology to second graders	*2018*
Stanford Splash teacher. Educational outreach for local high school students	*2018*

PROFESSIONAL AFFILIATIONS

Institute of Electrical and Electronics Engineers, Member	*2020 - Present*
International Glaciological Society, Member	*2019 - Present*
American Geophysical Union, Member	*2017 - Present*