Karianne J. Bergen, Ph.D.

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PROFESSIONAL EXPERIENCE

2021 – **Assistant Professor**, Brown University, Providence, RI
Data Science Institute and Department of Earth, Environmental and Planetary Sciences
Department of Computer Science, by courtesy
Institute at Brown for Environment and Society, faculty affiliate

2020 **Visiting Assistant Professor**, Brown University, Providence, RI

2018-20 **Harvard Data Science Initiative Postdoctoral Fellow**, Harvard University, Cambridge, MA
Department of Computer Science, School of Engineering and Applied Sciences
Department of Earth and Planetary Sciences, Faculty of Arts and Sciences

2009-11 **Assistant Technical Staff (Data Scientist)**, MIT–Lincoln Laboratory, Lexington, MA
Biological and Chemical Defense Systems Group

EDUCATION

2018 **Ph.D. in Computational and Mathematical Engineering,** Stanford University, Stanford, CA
Thesis: Big Data for Small Earthquakes: Detecting Earthquakes over a Seismic Network with Waveform Similarity Search

2015 **M.Sc. in Computational and Mathematical Engineering,** Stanford University, Stanford, CA

2009 **B.Sc. in Applied Mathematics**, Brown University, Providence, RI
Study abroad: University of Edinburgh, UK, Spring 2008

PUBLICATIONS

[$^{++}$trainee (primary advisor), †trainee (co-supervised), *equal contribution]

Preprints / Under review

- **P. Van Katwyk**$^{++}$ and **K. J. Bergen**. HybridFlow: Quantification of Aleatoric and Epistemic Uncertainty with a Single Hybrid Model. (under review)
- **P. Van Katwyk**$^{++}$, B. Fox-Kemper, S. Nowicki, H. Seroussi, and **K. J. Bergen**. ISEFlow (v1.0.0): A Flow-Based Neural Network Emulator for Improved Sea Level Projections and Uncertainty Quantification. EGUsphere [preprint, under review for *Geoscientific Model Development*] DOI: 10.5194/egusphere-2025-870

Journal Publications (Peer Reviewed)

1. **M. L. Rocha**†, A. Lynch, and **K. J. Bergen** (2025). Enhancing Sea Ice Concentration Resolution in a Northern Sea Route Strait using a Generative Adversarial Network. *JGR: Machine Learning and*

Computation. DOI: 10.1029/2024JH000281

2. **P. Van Katwyk**[++], B. Fox-Kemper, H. Seroussi, S. Nowicki, and **K. J. Bergen** (2023). A variational LSTM emulator of sea level contribution from the Antarctic ice sheet. *Journal of Advances in Earth Systems Modeling,* 15(12). DOI: 10.1029/2023MS003899
3. H. Wang, […], **P. Van Katwyk**[++]**, K. Bergen**, et al. (2023). Scientific discovery in the age of artificial intelligence. *Nature*. DOI: 10.1038/s41586-023-06221-2
4. S. J. Arrowsmith, J. MacCarthy, D. Trugman, **K. J. Bergen**, D. Lumley & B. Magnani (2022). Big Data Seismology. *Reviews of Geophysics*, 60(2). DOI: 10.1029/2021RG000769.
5. **K. J. Bergen**, P. A. Johnson, M. V. de Hoop & G. C. Beroza (2019). Machine learning for data-driven discovery in solid Earth geoscience. *Science*, 363(6433). DOI: 10.1126/science.aau0323. Reprinted (in Chinese) in *Translated World Seismology*, 1, 1-21, 2020.
6. C. E. Yoon, **K. J. Bergen**, K. Rong, H. Elezabi, W. L. Ellsworth, G. C. Beroza, P. Bailis & P. Levis (2019). Unsupervised large-scale search for similar earthquake signals. *Bulletin of the Seismological Society of America*, 109(4): 1451-1468. DOI: 10.1785/0120190006.
7. **K. J. Bergen** & G. C. Beroza (2018). Detecting Earthquakes over a Seismic Network using Single-Station Similarity Measures. *Geophysical Journal International*, 213(3), 1984-1998. DOI: 10.1093/gji/ggy100. Winner: Geophysical Journal International 2018 Student Author Award.
8. **K. J. Bergen** & G. C. Beroza (2018). Earthquake fingerprints: Extracting waveform features for similarity-based earthquake detection. *Pure and Applied Geophysics* 176(3). DOI: 10.1007/s00024-018-1995-6
9. C. E. Yoon, O. O'Reilly, **K. J. Bergen**, & G. C. Beroza (2015). Earthquake Detection Through Computationally Efficient Similarity Search. *Science Advances* 1(11). DOI: 10.1126/sciadv.1501057. Reprinted (in Chinese) in *Translated World Seismology*, 6, 496-516, 2017.

Conference Proceedings (Peer Reviewed)

9. **A. Narayanan**[++] and **K. J. Bergen** (2024). Prototype-based Methods in Explainable AI and Emerging Opportunities in the Geosciences. *International Conference on Machine Learning (ICML) Workshop on AI for Science: Scaling in AI for Scientific Discovery*. DOI: https://arxiv.org/abs/2410.19856
10. **H. Sit**[++], B. Keith, and **K. J. Bergen** (2024). Improving Explainability of Softmax Classifiers Using a Prototype-Based Joint Embedding Method. *International Joint Conference on Artificial Intelligence (IJCAI) Workshop on Explainable Artificial Intelligence.* DOI: https://arxiv.org/abs/2407.02271
11. K. Rong, C. E. Yoon, **K. J. Bergen**, H. Elezabi, P. Bailis, P. Levis & G. C. Beroza (2018). Locality-Sensitive Hashing for Earthquake Detection: A Case Study of Scaling Data-Driven Science. *Proceedings of the Conference on Very Large Data Bases (VLDB),* 11(11): 1674–1687. DOI: 10.14778/3236187.3236214
12. **K. Bergen**, C. Yoon, & G. Beroza (2016). Scalable Similarity Search: A New Approach for Large-Scale Earthquake Detection. Proceedings of the International Conference on Similarity Search and Applications (SISAP), *Lecture Notes in Computer Science*, Vol. 9939. DOI: 10.1007/978-3-319-46759-7_23

Technical Reports

13. D. Reiter, V. Napoli, S. Arrowsmith*, **K. Bergen***, G. Beroza*, C. DeGroot-Hedlin*, M. Hedlin*, K. Koper*, A. Mueen*, N. Nakata*, K. Pankow*, Z. Peng*, S. Ravela*, W. Rodi*, B. Stump*, J. Williams* & S.-H. Yoo* (2021). Machine Intelligence for Nuclear Explosion Monitoring: A Strategic Plan to Guide Research and Development Through 2025. *White Paper*, prepared for the Air Force Research Laboratory.
14. F. El-Masri*, **K. Bergen***, O. Addai*, P. Liu*, S. Chowdhury*, X. Huang*, M. Wolff, & K. Lopiano (2014). Analysis of Self-Reported Health Outcomes from Web Based Media Sources. CRSC Technical Report TR14-11, *Twentieth Mathematical and Statistical Modeling Workshop for Graduate Students,* P. Gremaud, I.C.F. Ipsen, & R. Smith.

Other Publications

15. S. J. Arrowsmith, D. T. Trugman, **K. Bergen**, and B. Magnani (2022). The Big Data Revolution Unlocks New Opportunities for Seismology. *Eos*, 103. DOI: 10.1029/2022EO225016. Published on 9 June 2022.
16. **K. J. Bergen***, T. Chen* & Z. Li* (2019). Preface to SRL Special Focus Section on Machine Learning in Seismology. *Seismological Research Letters* 90(2A): 466-480. DOI: 10.1785/0220190018.
17. J. J. Braun, **K. Bergen**, & T. J. Dasey (2011). Inner Rehearsal Modeling for Cognitive Robotics. *Proceedings of SPIE*, Vol. 8064, 80640A. DOI: 10.1117/12.888000
18. J. J. Braun, A. Hess, Y. Glina, E. C. Wack, **K. Bergen**, T. J. Dasey, R. M. Mays, & J. Strawbridge (2010). Information fusion of standoff and other information for biodefense decision support. *Proceedings of SPIE*, Vol. 7665, 76650C. DOI: 10.1117/12.852817
19. J. J. Braun, A. Hess, Y. Glina, E. C. Wack, **K. Bergen**, T. J. Dasey, R. M. Mays, & J. Strawbridge (2010). Approaches to information fusion with spatiotemporal aspects for standoff and other biodefense information sources. *Proceedings of SPIE*, Vol. 7710, 771003. DOI: 10.1117/12.852862

Trainee Publications

- H. Seroussi, […], **P. Van Katwyk**$^{++}$, et al. (2023). Insights on the vulnerability of Antarctic glaciers from the ISMIP6 ice sheet model ensemble and associated uncertainty. *The Cryosphere*, 17, 5197–5217. DOI: 10.5194/tc-17-5197-2023.

Code Repositories

- Ice Sheet Emulator (ISE) for ISMIP6 Emulation of Sea Level Rise (released 2023). `https://brown-sciml.github.io/ise/ise.html`. DOI: 10.5281/zenodo.10416634.
- FAST: End-to-end earthquake detection pipeline via efficient time series similarity search (released 2019). `https://github.com/stanford-futuredata/FAST`

PRESENTATIONS [# virtual]

Invited Talks (Colloquia, Conferences & Workshops)

Northern California Earthquake Hazards Workshop, US Geological Survey (2025$^{\#}$). *Beyond the Buzzwords: What Every Earth Scientist Should Know Before Using AI*.

Exploring System Dynamics in the Natural World with AI, University of Oslo, Norway (2024). *From Polar Ice to Rising Seas: Advancing Climate Science with Machine Learning.*

University Research Series, Naval Undersea Warfare Center, Newport, RI (2024). *Pioneering AI-Human Partnerships to Advance Science and Technology: SciAI in Earth and Climate Science.*

Modeling Talk Series, Alphabet/Google (2024$^{\#}$). *Machine learning in Geosciences: Earthquakes, Ice, and XAI.*

National Academies Committee on Solid Earth Geophysics Fall 2023 Meeting (2023$^{\#}$). Artificial Intelligence and Machine Learning in Geophysics: Are We Beyond the Black Box? *Machine Learning for data-driven discovery in geosciences: progress and opportunities.*

School of Earth and Space Exploration, Arizona State University, Tempe, AZ (2023$^{\#}$). *Machine Learning for data-driven discovery in geosciences: progress and challenges ahead.*

Computability in Europe (CiE), Computational Science Session, Batumi, Georgia (2023$^{\#}$). *Earthquake monitoring: Big data, deep learning and explainable AI.*

Women in Data Science Conference: Data Science in Crises Management, American University of Beirut, Lebanon (2023$^{\#}$). *Earthquakes, Big Data and Explainable AI.*

Ground-Based Nuclear Explosion Monitoring Seminar, Sandia National Laboratory, Albuquerque, NM (2023[#]). *Explainable AI in Seismology: An interpretable convolutional neural network for earthquake detection.*

NSF AI Institute for Data-Driven Discovery in Physics Seminar, Carnegie Mellon University, Pittsburgh, PA (2022[#]). *Earthquake monitoring, Deep Learning and Explainable AI.*

Earthquake Science Seminar, US Geological Survey, Menlo Park, CA (2022[#]). *Big data for small earthquakes: Data mining, deep learning and explainable AI.*

International Symposium: Frontier of Understanding Earth's Interior and Dynamics, Tohoku University, Sendai, Japan (2022[#]). *Big Data Analysis in Geoscience.*

Symposium on Artificial Intelligence and Earthquake Engineering, Earthquake Engineering Research Institute (EERI) San Diego Chapter, CA (2022[#]). *Explainable AI in Seismology: An interpretable convolutional neural network for earthquake detection.*

Njord Center Seminar, University of Oslo, Norway (2022[#]). *Big data for small earthquakes: Data mining, deep learning and explainable AI.*

Geoscience Seminar, University of Montana, Missoula, MT (2022[#]). *Big data for small earthquakes: Data mining, deep learning and explainable AI.*

Scientific Computing and Numerics Seminar, Cornell University, Ithaca, NY(2021[#]). *Big data for small earthquakes: Data mining, deep learning and explainable AI.*

Department of Earth, Atmospheric and Planetary Sciences, MIT, Cambridge, MA (2021). *Big data for small earthquakes: Data mining, deep learning and explainable AI.*

Brazilian Seismology Symposium, International Congress of the Brazilian Geophysical Society, Rio de Janeiro, Brazil (2021[#]). *Explainable AI for Seismology: An interpretable convolutional neural network for earthquake detection.*

Department of Geology and Geophysics, University of Utah, Salt Lake City, UT (2021[#]). *Big data for small earthquakes: Data mining, deep learning and explainable AI.*

Geological Society of Washington, DC (2021[#]). *Advancing solid Earth geoscience with machine learning.*

Michigan Institute for Data Science Consortium for Researchers in Training, University of Michigan, Ann Arbor, MI (2020[#]). *Shaking up Earthquake Science in the age of Big Data.*

Distributed Acoustic Sensing Virtual Workshop and Tutorial, Incorporated Research Institutions for Seismology (IRIS) (2020[#]). *DAS and big scientific data analysis.*

Life on Planet Earth: Above and Below Workshop, Mathematical Biosciences Institute, The Ohio State University, Columbus, OH (2020[#]). *Event detection in big sensor data: Applications in earthquake seismology and beyond.*

Data Science Institute and Department of Computer and Information Sciences, University of Delaware, Newark, DE (2020[#]). *Big data for small earthquakes: Computational challenges in large-scale earthquake detection.*

Faculty of Computing and Data Science, Boston University, Boston, MA (2020[#]). *Big data for small earthquakes: Computational challenges in large-scale earthquake detection.*

Department of Electrical and Computer Engineering, University of California, Santa Barbara, CA (2020). *Big data for small earthquakes: Computational challenges in large-scale earthquake detection.*

Department of Earth, Ocean and Atmospheric Sciences, University of British Columbia, Vancouver, Canada (2020). *Big data for small earthquakes: Computational challenges in large-scale earthquake detection.*

Data Science Initiative and Department of Earth, Environmental and Planetary Sciences, Brown University, Providence, RI (2020). *Big data for small earthquakes: Computational challenges in large-scale earthquake detection.*

Department of Geophysics, Colorado School of Mines, Golden, CO (2020). *Big data for small earthquakes: Computational challenges in large-scale earthquake detection.*

Oden Institute for Computational Sciences and Engineering and Department of Statistics and Data Science, University of Texas at Austin, TX (2020). *Big data for small earthquakes: Computational challenges in large-scale earthquake detection.*

Department of Computational Mathematics, Science and Engineering, Michigan State University, East Lansing, MI (2020). *Big data for small earthquakes: Computational challenges in large-scale earthquake detection.*

Women in Data Science at Stanford Earth Workshop, Stanford University, CA (2019). *Earthquake monitoring in the age of Big Data: Challenges and opportunities.*

Microsoft Research New England, Cambridge, MA (2019). *Shaking up seismology: Improving earthquake detection capabilities with locality-sensitive hashing.*

National Academies Committee on Seismology and Geodynamics Fall Meeting, Washington, DC (2019). *Machine learning for data-driven discovery in solid Earth geosciences.*

Department of Geosciences, Princeton University, Princeton, NJ (2019). *Earthquake monitoring in the age of Big Data: Challenges and opportunities.*

Department of Applied Mathematics, University of Washington, Seattle, WA (2019). *Big data for small earthquakes: a data mining approach to large-scale earthquake detection.*

Congressional briefing, hosted by the Seismological Society of America, Washington, D.C (2019). *Machine Learning in Seismology: Using AI to Improve Earthquake Monitoring.*

Machine Learning in Solid Earth Geoscience Conference, Santa Fe, NM (2019). *Data mining for earthquake detection: Lessons for data-driven geoscience.*

Lamont-Doherty Earth Observatory, Columbia University, Palisades, NY (2019). *Big data for small earthquakes: a data mining approach to large-scale earthquake detection.*

Conference on Neural Information Processing Systems (NeurIPS), Workshop on Machine Learning for Geophysical and Geochemical Signals, Montreal, Canada (2018). *Towards data-driven earthquake detection: Extracting weak seismic signals with locality-sensitive hashing.*

Department of Earth, Environmental and Planetary Sciences, Brown University, Providence, RI (2018). *Big data for small earthquakes: a data mining approach to large-scale earthquake detection.*

Earth Resources Laboratory, MIT, Cambridge, MA (2018). *Big data for small earthquakes: a data mining approach to large-scale earthquake detection.*

Data Science and Cyber Analytics Group, Sandia National Laboratory, Livermore, CA (2018). *Big data for small earthquakes: a data mining approach to large-scale earthquake detection.*

IRIS Workshop: Foundations, Frontiers & Future Facilities for Seismology, Albuquerque, NM (2018). *Improving earthquake detection with data mining and machine learning.*

Institute of Mathematical and Computational Engineering, Pontificia Universidad Católica de Chile, Santiago, Chile (2018). *Scalable Similarity Search for Earthquake Detection.*

Invited Panelist

Dynamic Data Driven Applications Systems (DDDAS) Workshop, MIT, Cambridge, MA (2022[#]). *Seismic and Nuclear Explosion Monitoring Panel.*

Conference on Neural Information Processing Systems (NeurIPS) (2021[#]). Workshop Panel, *AI for Science: Mind the Gaps*.

Seismological Society of America Annual Meeting (2021[#]). Plenary Panel, *Machine Learning in Seismology: Where are we now and where are we going?*

Invited Talks (Collaboration Meetings)

LunaSCOPE Collaboration Meeting, Brown University (August, 2024). *Building Trustworthy AI for EEPS.*

SciAI Center Collaboration Meeting, Cornell University (June 2024). *Emulators for Science and the Science of Emulators.* (June, 2024). *Building Trustworthy AI for Earth and Climate Science: Data, Domain Expertise and Interpretability.*

MINEM Technical Interchange Meeting, Air Force Research Laboratory (Feb 2021[#]). *What is the right way to use black box models in scientific or decision-support applications?*

Trainee Presentations [[++]trainee (primary advisor), [†]trainee (co-supervised)]

American Geophysical Union (AGU) 2024 Fall Meeting (Dec 2024). *Spatiotemporal Reasoning using Prototype-based Explainable AI for Geoscientific Learning Tasks*. Poster presentation by A. Narayanan[++].

AGU 2024 Fall Meeting (Dec 2024). *Gender Representation among NSF-GRFP Awardees in Geoscience Disciplines.* Oral presentation by A. Narayanan[++].

AGU 2024 Fall Meeting (Dec 2024). *Machine Learning Emulator for Localized Sea Level Prediction and Forecasting.* Poster presentation by H. Sit[++].

AGU 2024 Fall Meeting (Dec 2024). *ISEFlow: Emulating Sea Level Rise using a Hybrid Flow-Based Neural Network Architecture*. Poster presentation by P. Van Katwyk[++].

IJCAI Workshop on Explainable AI, Jeju Island, South Korea (Aug 2024[#]). *Improving the Explainability of Softmax Classifiers Using a Prototype-Based Joint Embedding Method.* Oral presentation by H. Sit[++]**.**

ICML Workshop on AI for Science, Vienna, Austria (July 2024). *Prototype-based Methods in Explainable AI and Emerging Opportunities in the Geosciences.* Oral and poster presentation by A. Narayanan[++].

SciAI Center Collaboration Meeting, Cornell University (June 2024). *Prototype-based XAI for Spatiotemporal Data: An MJO Example.* Oral presentation by A. Narayanan[++].

SciAI Center Collaboration Meeting, Cornell University(June 2024). *Improving the Explainability of Softmax Classifiers Using a Prototype-Based Joint Embedding Method.* Oral presentation by H. Sit[++].

Research Matters: Celebrating New Ideas and Discoveries, Brown Graduate School (April 2024). *Understanding and Improving Sea Level Projections with AI.* Oral presentation by P. Van Katwyk[++].

Climate & Environment (C&E) Lunch Bunch, DEEPS, Brown University (Mar 2024). *Variational LSTM Emulators of sea level contribution from the Antarctic and Greenland Ice Sheets.* Oral presentation by P. Van Katwyk[++].

C &E Lunch Bunch, DEEPS, Brown University (Feb 2024). *Enhancing Resolution of Sea Ice Concentration with Machine Learning in the Northern Sea Route.* Oral presentation by M. L. Rocha[†].

Arctic Modeling and the Early Career Communities: Student Presentations. Interagency Arctic Research Policy Committee (Jan 2024[#]). *Enhancing Sea Ice Concentrations with Machine Learning in the Northern Sea Route.* Oral presentation by M. L. Rocha[†].

AGU 2023 Fall Meeting (Dec 2023). *Enhancing CMIP6 Model's Sea Ice Concentration with Machine Learning on the Northern Sea Route.* E-Lightning poster presentation by M. L. Rocha[†·]

AGU 2023 Fall Meeting (Dec 2023). *Variational LSTM emulators of sea level contribution from the Antarctic and Greenland ice sheets.* Poster presentation by P. Van Katwyk[++].

International Liège Colloquium on Ocean Dynamics: Machine Learning and Data Analysis in Oceanography, University of Liège, Belgium (May 2023). *Emulation of ISMIP6 Antarctic sea level contribution and ensemble distributions using time series neural networks*. Oral presentation by P. Van Katwyk[++].

SAGE/GAGE Community Science Workshop, Pittsburgh, PA (June 2022). *Normalizing flows for density estimation and uncertainty quantification in Earth Data.* Poster presentation by P. Van Katwyk[++].

TEACHING EXPERIENCE

Brown University -- Instructor

- Data Detectives: How to Think Like a Data Scientist (DATA 0150, First Year Seminar)
  Fall 2024 [in-person format]: total enrollment 16 students (first year undergrads)
- Tackling Climate Change with Machine Learning (EEPS 1720 / DATA 1720)
  Spring 2024 [in-person format]: total enrollment 9 students (5 undergrad, 4 graduate)
  Spring 2023 [in-person format]: total enrollment 17 students (15 undergrad, 2 graduate, 3 auditors)
- Machine Learning for the Earth and Environment (EEPS 1340 / EEPS 1960D / DATA 1340)
  Spring 2025 [in-person format]: total enrollment 25 students (19 undergrad, 6 graduate)
  Fall 2023 [in-person format]: total enrollment 27 students (20 undergrad, 7 graduate)
  Spring 2022 [in-person format]: total enrollment 24 students (14 undergrad, 10 graduate)
  Spring 2021 [virtual format]: total enrollment 22 students (12 undergrad, 10 graduate, 1 auditor)
- Probability, Statistics and Machine Learning (DATA 1010)
  Fall 2021 [hybrid/remote-accessible format]: total enrollment 48 students (1 undergrad, 47 graduate)

Stanford University

Instructor of Record

- Introduction to Machine Learning (CME 250)
  Winter 2015, Spring 2015, Fall 2015, Winter 2016 (total enrollment: 301 students).

Instructor

- Introduction to Machine Learning, AY 2016-2017
  Developed syllabus and recorded lectures in studio for online course offered by Stanford Foundations in Data Science Affiliates Program by the Stanford Center for Professional Development.

Grader/Teaching Assistant

- Introduction to Probability and Statistics for Engineers (CME 106), Summer 2012

Workshop Instructor

- Introduction to Machine Learning
  Fundamentals of Data Science Workshop (Jan 2018), Pontificia Universidad Católica, Santiago, Chile
  ICME Summer Short Courses (Aug 2014, Aug 2015), Stanford University
- Applied Linear Algebra
  ICME Math Refresher Course Series (Sept 2013), Stanford University

Guest Lectures

Data, Ethics, and Society (DATA 0080, Sept 2024), Brown University
Machine Learning across the Earth and Planetary Sciences (EPS 268, Oct 2019), Harvard University
Time Series and Prediction (STAT 131, Nov 2018), Harvard University
Know Your Planet: Big Earth (EARTH 1B, Jan 2017, Jan 2018), Stanford University

Pedagogical Training

TEAM Enhanced Advising and Mentoring, Brown University (AY 24–25)
Sheridan Junior Faculty Teaching Fellows Program, Brown University (AY 22–23)
Data Science Course Design Institute, Brown University (2020)

FUNDING AND AWARDS

Grants (awarded)

Co-PI, *Exploring the Promise of AI to Revolutionize Science and Engineering (Scientific Artificial Intelligence Center)*. Office of Naval Research (2023–2028). $11.3M total, $750,000 Brown. [terminated 02/28/2025]

Co-I, *RII Track-2 FEC: Community-Driven Coastal Climate Research and Solutions (3CRS) for the Resilience of New England Coastal Populations.* NSF EPSCoR (2023–2027).

Collaborator, *Rockfalls on Mars – Indicators of Seismicity, Impacts or Thermal Fatigue.* Mars Data Analysis, NASA (2023).

Co-I, *Lunar Structure, Composition, and Processes for Exploration (LunaSCOPE)*. Solar System Exploration Research Virtual Institute (SSERVI) Cooperative Agreement, NASA (2023–2028).

Co-PI, *Towards the Smart Interconnected Bay – Artificially intelligent detection of harmful algal blooms in Narragansett Bay, Rhode Island.* Rhode Island Science and Technology Advisory Council (STAC) (2021–2023). $30,000.

Subcontractor, *Machine Intelligence Solutions for Nuclear Explosion Monitoring (MINEM).* Air Force Research Laboratory (2020–21). $23,745.

Fellowships

AAAS Science and Technology Policy Fellowship Finalist (2020). *Declined.*

Harvard Data Science Initiative Postdoctoral Fellowship, Harvard University (2018–20). $268,000.

Stanford Graduate Fellowship in Science and Engineering, Stanford University (2011–15). $213,000.

Teaching Awards

Senior Teaching Fellow, ICME, Stanford University (2016)

Short Course Instructor Award, ICME, Stanford University (2015)

Academic and Professional Recognitions

Sleeping Bear Award for good humor at meetings, Geological Society of Washington (2021)

Student Author Award, Geophysical Journal International (2018)

Student Leadership Award, ICME, Stanford University (2018)

Student Presentation Award, Seismological Society of America Annual Meeting (2016, 2017)

Innovative Research Award, ICME Xpo, Stanford University (2016)

Outstanding Student Paper Award, American Geophysical Union Fall Meeting (2015)

Travel/Workshop Grants

Broadening Participation in Data Mining Workshop, ACM SIGKDD Conference, San Francisco, CA. (2016)

Computing Research Association (CRA-W) Grad Cohort Workshop, San Jose, CA. (2014)

Computing Research Association (CRA-W) Grad Cohort Workshop, Boston, MA. (2013)

TRAINEES

Postdoctoral Research Fellows

Hilarie Sit, Provost's STEM Postdoctoral Program, July 2023–present

Ph.D. Student Research

Anushka Narayanan (EEPS), Fall 2023–present
Awards: NSF Graduate Research Fellowship Honorable Mention (2023)
Topic: *Intrinsically interpretable neural network architectures for spatiotemporal data*

Peter Van Katwyk (EEPS), Fall 2021– present
Awards: NSF Graduate Research Fellowship in Geosciences – Artificial Intelligence (2022)
Internship: NASA Ames Research Center, Mountain View CA (Summer 2024)
Topic: *Neural network ice sheet emulators with uncertainty quantification and explainable AI*

Master's Student Research

Qingyan Guo (Data Science), Summer 2021, topic: *out-of-distribution detection*
Yijing Gao (Data Science), Summer 2021, topic: *out-of-distribution detection*
Tianqi Tang (Data Science), Summer 2021, DATA 2050 practicum advisee, topic: *deep scattering networks*
Zhirui Li (Data Science), Summer 2022, topic: *environmental data analysis* (with B. Fox-Kemper, DEEPS)
Selina Xinyue Wang (Data Science), Fall 2022, topic: *ground water time series forecasting*
Dylan Yang Zheng (Data Science), Fall 2022, topic: *ground water time series forecasting*

Undergraduate Student Research

Jason Wu (CS/Math), Summer 2023, topic: *data infilling methods for environmental data analysis* (with B. Fox-Kemper, DEEPS)

Isabella Szabo (CS & Spanish), Summer 2024–present, topic: *discovering paleoclimate proxies with machine learning* (with Y. Huang, DEEPS)

Graduate Student and Postdoctoral Committees

Nandita Kumari (EEPS), LunaSCOPE Postdoc Mentoring Committee, 2024–present
Janette (Janie) Levin (EEPS), Ph.D. Preliminary Examination Committee, Spring 2024
Aidan LaBella (CS), Ph.D. Research Comp Committee, 2024–present
Caleb Ukaonu (EEPS), Ph.D. Advisory Committee, 2023–present
Maria Luisa Rocha (EEPS), Preliminary Exam Research Project, 2023–2024
Anson Cheung (EEPS), Ph.D. Dissertation Defense Committee, Spring 2023
Sarah Esenther (EEPS), Ph.D. Preliminary Examination and Thesis Advisory Committee, Fall 2022–present
Carol Hundal (EEPS), Ph.D. Preliminary Examination Committee, Spring 2022
Matt Jones (EEPS), Ph.D. Thesis Advisory Committee, 2022–2023
Ethan Kyzivat (EEPS), Ph.D. Thesis Advisory Committee, 2020–2023

Undergraduate Advising

Senior Honors Thesis Advisor

Anna Lapre (Applied Math-Computer Science), CSCI 1970 Independent Study, AY 24–25.
Title: *Optimizing Carbon Capture via Metal Organic Frameworks using Machine Learning.*

Award: Jerome L. Stein Memorial Award for Undergraduate Excellence

Senior Honors Thesis Reader

Ayushman Choudhury (Applied Math-Computer Science), AY 24–25.

Data Science Fellows Mentor

Benny Smith (Applied Math), DATA 1150 Data Science Fellow, Spring 2021
Nikolai Stambler (History, Data Science fluency), DATA 1150 Data Science Fellow, Fall 2021
Geordie Young (CS-Economics, Political Science), DATA 1150 Data Science Fellow, Fall 2022
Rainy Wortelboer (Neuroscience), DATA 1150 Data Science Fellow, Fall 2023

Data Fluency Certificate Advisor

Christopher Gaw (Economics, AY 2023–25); Amanda Latkany (Environmental Science, AY 2023–25); Keegan Walpole (Economics, AY 2023–25); Rachel Metzger (English, AY 2024–25); Jessica Tuchin (Psychology, AY 2024–25); Seema Yousofi (Economics, AY 2024–26); Pierre Jolin (Public Health, AY 2-24–26); Nazifa Qazizada (Economics, AY 2024–26); Makaya Fofana (Biochemistry, AY 2024–26); Nastasha Wright (International and Public Affairs, AY 2024–26).

Exploratory (First Year) Academic Advisor

Wilfred Allison (AY 2024–25), Pierre Joseph (AY 2024–25), Nina Li (AY 2024–25), Teddy Molner (AY 2024–25), Kevin Pan (AY 2024–25), Sydney Rondeau (AY 2024–25).

PROFESSIONAL SERVICE

Editorial

Guest Editor

Seismological Research Letters – Special Focus Section on Machine Learning in Seismology (2019)

Reviewer

Advances in Geophysics; Bulletin of the Seismological Society of America; Computers and Geosciences; Geophysical Research Letters; Geophysical Journal International; International Conference on Learning Representations (ICLR) workshop papers; IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing; IEEE Transactions on Circuits and Systems for Video Technology; Journal of Geophysical Research: Solid Earth; Journal of Petrology Nature Communications; Science; Science Advances; Scientific Reports

Workshops and Conferences

Co-ambassador and Faculty Chair

Women in Data Science (WiDS) Providence Regional Conference, Brown University. (2024)
Women in Data Science (WiDS) Providence Datathon Workshop, Brown University. (2023)

Session Chair/Co-chair

SAGE/GAGE Community Science Workshop, New Horizons in Observation: Innovative Data Collection and Analysis, Pittsburgh, PA. (2022)
Workshop on AI for Earth and Space Sciences (AI4ESS), ICLR. (2022) [virtual]

Moderator

Session on Artificial Intelligence in Earthquake Science, Southern California Earthquake Center (SCEC) Annual Meeting. (2020) [virtual]
Panel on Interpretable Machine Learning for Earth and Space Science, AI4ESS Workshop. (2022) [virtual]

Student Travel and Research Grant Reviewer

Seismology Section Student Travel Grant, AGU Fall Meeting. (2020)

Student Presentation Judge

Outstanding Student Paper Award (OSPA), AGU Fall Meeting. (2020–2021)

Conference Tutorials

Introduction to Machine Learning Workshop and Advanced Machine Learning Workshop, Seismological Society of America (SSA) Annual Meeting, Bellevue, WA. (2022)

Machine Learning for Seismology Workshop, SSA Annual Meeting, Seattle, WA. (2019)

Unsupervised Learning for Geoscience Applications, Machine Learning in Solid Earth Geoscience Conference, Santa Fe, NM. (2019)

Introduction to Machine Learning, SIAM Geosciences Conference, Stanford, CA. (2015)

Review Panels

Short Call Proposals, Geological Survey Ireland, Ireland (2020).

NSF review panel (2024).

Mentorship Programs

Geosciences Education and Mentorship Support (GEMS) program, National Association of Geoscience Teachers. *Mentee:* Hayley Woodrich at UIUC (AY22–23)

University Service

Brown University

Committee on Honorary Degrees. (2021–2024)

Faculty Mentor, Women in STEM Networking Events, hosted by Women in Physics, Graduate Students of Color in STEM, and Graduate Women in Science and Engineering. (2022, 2024)

Panelist, DSI Commencement Forum, Our Data-Driven World: A Brunonian Vision for Data Science. (2023)

Advisory Team for Creation of an Institute for Sustainable Energy at Brown. (2021)

Harvard University

Panelist, Tales from the Battlefront: Q&A Among Survivors and Casualties of the Academic Job Search, Office of Postdoctoral Affairs. (2020)

Departmental Service

Brown University

Director of Postdoctoral Engagement, DSI. (AY 23–25)

Curriculum Committee, DEEPS (computational courses and concentration). (AY 23–25)

Faculty Judge, Brown Computer Science Undergraduate Research Symposium, CS. (2022, 2023)

Ad Hoc Committee on Criteria and Standards for Reappointments, Promotion and Tenure, DEEPS. (2022)

Computing Committee, DEEPS. (AY 22–24)

Postdoctoral Fellow Search Committee, DSI. (2022, 2023)

Lecturer Search Committee, DSI. (2022)

Harvard University

Volunteer, Graduate School Applications Assistance Initiative, SEAS Office of Diversity, Inclusion and Belonging. (2020)

Selection Committee, HDSI Public Interest Data Science Summer Fellowship. (2019)

Stanford University

ICME Industrial Affiliates Program: Xtrapolate Roundtable Moderator (2017–2018), Foundations in Data Science Course Lecturer (2016), Summer Workshop Instructor (2014–2015).

Student Volunteer, Women in Data Science Conference. (2016–2017).

Student Representative, Institute for Computational and Mathematical Engineering (2011–2013).

Science Communication and Outreach

Presenter, Data Science for Science Teachers Bootcamp, NIH Office of Data Science Strategy. (2020) [virtual]

Presenter, Seismological Society of America briefing on Capitol Hill, Washington, DC. (2019)

Classroom speaker (K-12), Skype a Scientist Program. (2018–2023)

Sam D. Bundy Elementary School, Farmville, NC; Academy of the Sacred Heart, New Orleans, LA; Turtle River Montessori, Jupiter, FL; McIntosh Middle School, McIntosh, SD; Garden Spot Middle School, New Holland, PA; Frank Ward Strong School, Durham, NC.

Professional Development and DEI Training

Early and Mid-Career Mentoring Workshop, Chicago, IL. Computing Research Association Widening Participation (CRA-WP). (2023)

Workshop for Early Career Geoscience Faculty [virtual]. On The Cutting-Edge program, National Association of Geoscience Teachers and National Science Foundation. (2021)

Diversity, Inclusion and Belonging Trainings: Allyship and Calling in vs. Calling out, Harvard School of Engineering and Applied Sciences. (2020)

New England Graduate Women in Science and Engineering Retreat: Empowering Individuals to Foster an Inclusive Campus Climate, Tufts University. (2019)

Media Interviews

TWIML Podcast, Machine Learning for Earthquake Seismology with Karianne Bergen. (Jan 20, 2022)

A Promising Forecast for Predictive Science, *EoS*. (Feb 25, 2021)

Algorithms spot millions of California's tiniest quakes in historical data (Apr 18, 2019). *Nature*

Interview with KRON4 News – Bay Area. (Dec 11, 2015)

Media Coverage

Shazam for Seismologists? How a new data mining technique is shaking up earthquake science (May 12, 2019). *Yale Scientific Magazine*

What can machine learning tell us about the solid Earth? (Mar 21, 2019) Featured in *Stanford News*

Stanford Scientists develop "Shazam for Earthquakes" (Dec 4, 2015). Featured in *Stanford News, IEEE Spectrum, Smithsonian Magazine*, NBC News

ACADEMIC PROFILES

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