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Vivek Srikrishnan



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research interests

Climate risk management
Coupled natural-human systems
Complex system dynamics
Decision-making under uncertainty
Uncertainty characterization

appointments

Assistant Professor, Department of Biological & Environmental Engineering, Cornell University, 2021–present
Visiting Assistant Professor, Department of Biological & Environmental Engineering, Cornell University, 2020–2021
Assistant Research Professor, Earth & Environmental Systems Institute, Pennsylvania State University, 2019–2021
Postdoctoral Scholar, Earth & Environmental Systems Institute, Pennsylvania State University, 2018–2019

education

Ph.D., Energy & Mineral Engineering, Pennsylvania State University, 2018
M.S., Energy & Mineral Engineering, Pennsylvania State University, 2015
B.S., Mathematics, University of Illinois at Urbana-Champaign, 2004
B.A., Philosophy, University of Illinois at Urbana-Champaign, 2004

publications

Peer-Reviewed Journal Articles

- Wan, H., Yoon, J., **Srikrishnan, V.**, Daniel, B., and Judi, D. 2023. "Landscape Metrics Regularly Outperform Other Traditionally-Used Ancillary Datasets in Dasyetric Mapping of Population." *Computers, Environment and Urban Systems* **99**, 101899. DOI: [10.1016/j.compenvurbsys.2022.101899](https://doi.org/10.1016/j.compenvurbsys.2022.101899).
- Reed, P. M., Hadjimichael, A., Moss, R. H., Brelsford, C., Burleyson, C. D., Cohen, S., Dyreson, A., Gold, D. F., Gupta, R. S., Keller, K., Konar, M., Monier, E., Morris, J., **Srikrishnan, V.**, Voisin, N., and Yoon, J. 2022. "Multisector Dynamics: Advancing the Science of Complex Adaptive Human-Earth Systems." *Earth's Future* **10** (3), e2021EF002621. DOI: [10.1029/2021EF002621](https://doi.org/10.1029/2021EF002621).
- Srikrishnan, V.**, Guan, Y., Tol, R. S. J., and Keller, K. 2022. "Probabilistic projections of baseline 21st century CO₂ emissions using a simple calibrated integrated assessment model." *Climatic Change* **170**, 37. DOI: [10.1007/s10584-021-03279-7](https://doi.org/10.1007/s10584-021-03279-7).
- Srikrishnan, V.**, Lafferty, D. C., Wong, T. E., Lamontagne, J. R., Quinn, J. D., Sharma, S., Molla, N. J., Herman, J. D., Sriver, R. L., Morris, J., and Lee, B. S. 2022. "Uncertainty Analysis in Multi-Sector Systems: Considerations for Risk Analysis, Projection, and Planning for Complex Systems." *Earth's Future* **10** (8), e2021EF002644. DOI: [10.1029/2021EF002644](https://doi.org/10.1029/2021EF002644).
- Wong, T. E., Rennels, L., Errickson, F., **Srikrishnan, V.**, Bakker, A., Keller, K., and Anthoff, D. 2022. "MimiBRICK.jl: A Julia package for the BRICK model for sea-level change in the Mimi integrated modeling framework." *Journal of Open Source Software* **7** (76), 2556. DOI: [10.21105/joss.04556](https://doi.org/10.21105/joss.04556).

- Errickson, F. C., Keller, K., Collins, W. D., **Srikrishnan, V.**, and Anthoff, D. 2021. "Equity is more important for the social cost of methane than climate uncertainty." *Nature* **592** (7855), 564–570. DOI: [10.1038/s41586-021-03386-6](https://doi.org/10.1038/s41586-021-03386-6).
- Helgeson, C., **Srikrishnan, V.**, Keller, K., and Tuana, N. 2021. "Why Simpler Computer Simulation Models Can Be Epistemically Better for Informing Decisions." *Philos. Sci.* **88** (2), 213–233. DOI: [10.1086/711501](https://doi.org/10.1086/711501).
- Keller, K., Helgeson, C., and **Srikrishnan, V.** 2021. "Climate Risk Management." *Annu. Rev. Earth Planet. Sci.* **49** (1), 95–116. DOI: [10.1146/annurev-earth-080320-055847](https://doi.org/10.1146/annurev-earth-080320-055847).
- Srikrishnan, V.** and Keller, K. 2021. "Small increases in agent-based model complexity can result in large increases in required calibration data." *Environmental Modelling & Software* **138**, 104978. DOI: [10.1016/j.envsoft.2021.104978](https://doi.org/10.1016/j.envsoft.2021.104978).
- Wan, H., Yoon, J., **Srikrishnan, V.**, Daniel, B., and Judi, D. 2021. "Population Downscaling Using High-Resolution, Temporally-Rich U.S. Property Data." *Cartography and Geographic Information Science*, 1–14. DOI: [10.1080/15230406.2021.1991479](https://doi.org/10.1080/15230406.2021.1991479).
- Zarekarizi, M., **Srikrishnan, V.**, and Keller, K. 2020. "Neglecting uncertainties biases house-elevation decisions to manage riverine flood risks." *Nature Communications*. DOI: [10.1038/s41467-020-19188-9](https://doi.org/10.1038/s41467-020-19188-9).
- Ruckert, K. L., **Srikrishnan, V.**, and Keller, K. 2019. "Characterizing the deep uncertainties surrounding coastal flood hazard projections: A case study for Norfolk, VA." *Sci. Rep.* **9** (1), 11373. DOI: [10.1038/s41598-019-47587-6](https://doi.org/10.1038/s41598-019-47587-6).
- Srikrishnan, V.**, Alley, R., and Keller, K. 2019. "Investing in science to improve climate risk management." *Eos* **100**. DOI: [10.1029/2019eo131077](https://doi.org/10.1029/2019eo131077).
- Morris, J., **Srikrishnan, V.**, Webster, M., and Reilly, J. 2018. "Hedging strategies: Electricity investment decisions under policy uncertainty." *The Energy Journal* **39** (1). DOI: [10.5547/01956574.39.1.jmor](https://doi.org/10.5547/01956574.39.1.jmor).
- Wong, T. E., Klufas, A., **Srikrishnan, V.**, and Keller, K. 2018. "Neglecting model structural uncertainty underestimates upper tails of flood hazard." *Environmental Research Letters* **13** (7), 074019. DOI: [10.1088/1748-9326/aac3d](https://doi.org/10.1088/1748-9326/aac3d).
- Oddo, P. C., Lee, B. S., Garner, G. G., **Srikrishnan, V.**, Reed, P. M., Forest, C. E., and Keller, K. 2017. "Deep uncertainties in sea-level rise and storm surge projections: Implications for coastal flood risk management." *Risk Analysis*. DOI: [10.1111/risa.12888](https://doi.org/10.1111/risa.12888).
- Srikrishnan, V.**, Young, G. S., and Brownson, J. R. S. 2017. "Skill and skill prediction of cloud-track advection-only forecasting under a cumulus-dominated regime." *Journal of Applied Meteorology and Climatology* **56** (3), JAMC-D-16-0224.1. DOI: [10.1175/JAMC-D-16-0224.1](https://doi.org/10.1175/JAMC-D-16-0224.1).
- Wong, T. E., **Srikrishnan, V.**, Hadka, D., and Keller, K. 2017. "A multi-objective decision-making approach to the journal submission problem." *PLoS One* **12** (6), e0178874. DOI: [10.1371/journal.pone.0178874](https://doi.org/10.1371/journal.pone.0178874).
- Srikrishnan, V.**, Young, G. S., Witmer, L. T., and Brownson, J. R. S. 2015. "Using multi-pyranometer arrays and neural networks to estimate direct normal irradiance." *Solar Energy* **119**, 531–542. DOI: [10.1016/j.solener.2015.06.004](https://doi.org/10.1016/j.solener.2015.06.004).

Articles Under Review or Forthcoming

- Helgeson, C., Keller, K., Nicholas, R. E., **Srikrishnan, V.**, Cooper, C., Smithwick, E. A. H., and Tuana, N. "Integrating values to improve the relevance and inclusiveness of climate-risk research." In review.

- Huang, X., **Srikrishnan, V.**, Lamontagne, J., Keller, K., and Peng, W. “Pricing carbon emissions reduces health inequities from air pollution exposure.” Resubmitted.
- Yoon, J., Wan, A., Daniel, B., **Srikrishnan, V.**, and Judi, D. “Structural model choices regularly overshadow parametric uncertainty in agent-based simulations of household flood risk outcomes.” In revision.
- Maragoni, G., Mauri, M., **Srikrishnan, V.**, Keller, K., and Tavoni, M. 2023. “Robust Solar Radiation Management Strategies for Well-below 2°C Strategies.” In review.
- Ye, H., Nicholas, R. E., **Srikrishnan, V.**, and Keller, K. 2023. “Emulation Methods and Adaptive Sampling Increase the Efficiency of Sensitivity Analysis for Computationally Expensive Models.” In review. arXiv: [2302.12738 \[stat\]](https://arxiv.org/abs/2302.12738).

Reports

- Reed, P. M., Hadjimichael, A., Moss, R. H., Monier, E., Alba, S., Brelsford, C., Burleyson, C., Cohen, S., Dyreson, A., Gold, D., Gupta, R., Keller, K., Konar, M., Macknick, J., Morris, J., **Srikrishnan, V.**, Voisin, N., and Yoon, J. 2022. “MultiSector Dynamics: Scientific Challenges and a Research Vision for 2030.” A Community of Practice Supported by the United States Department of Energy’s Office of Science. DOI: [10.5281/zenodo.5825890](https://doi.org/10.5281/zenodo.5825890).

Books

- Reed, P. M., Hadjimichael, A., Malek, K., Karimi, T., Vernon, C. R., **Srikrishnan, V.**, Gupta, R. S., Gold, D. F., Lee, B., Keller, K., Thurber, T. B., and Rice, J. S. 2022. “Addressing Uncertainty in Multisector Dynamics Research.” Zenodo. DOI: [10.5281/zenodo.6110623](https://doi.org/10.5281/zenodo.6110623).

Conference Proceedings

- Srikrishnan, V.**, Brownson, J. R. S., and Young, G. S. 2014. “The All-Seeing Eye: Using Multi-Pyranometer Arrays and Neural Networks to Estimate Direct Normal Irradiance.” In: *43rd ASES National Solar Conference 2014, SOLAR 2014, Including the 39th National Passive Solar Conference and the 2nd Meeting of Young and Emerging Professionals in Renewable Energy*. American Solar Energy Society, pp.511–518.

Conference Presentations

- Lucash, M. S., Huang, J., **Srikrishnan, V.**, Keller, K., Klippel, A., Scheller, R. M., Nicholas, R., and Smithwick, E. 2019. “Using robust decision-making and virtual reality to analyze management tradeoffs under climate change.” *International Association of Landscape Ecologists World Congress*. Milan, Italy.
- Srikrishnan, V.** 2015. “Validity of Taylor’s hypothesis across time scales: Implications for solar forecasting.” 44nd American Solar Energy Society Meeting. State College, PA, USA.
- Srikrishnan, V.** 2014. “The All-Seeing Eye: Using multi-pyranometer arrays and neural networks to estimate direct normal irradiance.” 43rd American Solar Energy Society Meeting. San Francisco, CA, USA.

Conference Posters

- Bhaduri, P., Yoon, J., Wan, H., Daniel, W. B., Judi, D., and **Srikrishnan, V.** 2022. “Risk Information Contamination from Levees as an Explanation of the Levee Effect.” American Geophysical Union Fall Meeting 2022. Chicago, IL, USA.

- Huang, X., **Srikrishnan, V.**, Lamontagne, J., Keller, K., and Peng, W. 2022. "Pricing carbon emissions reduces health inequities from air pollution exposure." American Geophysical Union Fall Meeting 2022. Chicago, IL, USA.
- Wong, T. E., Rennels, L., Errickson, F. C., **Srikrishnan, V.**, Anthoff, D., and Keller, K. 2022. "Sensitivity of Coastal Adaptation Costs and Decisions to Sea Level and Socioeconomic Uncertainties." American Geophysical Union Fall Meeting 2022. Chicago, IL, USA.
- Srikrishnan, V.**, Guan, Y., Tol, R. S. J., and Keller, K. 2019. "Fossil fuel resources, decarbonization, and economic growth are key drivers of feasibility to achieve Paris climate targets." American Geophysical Union Fall Meeting 2019. San Francisco, CA, USA.
- Srikrishnan, V.**, Guan, Y., Tol, R. S. J., and Keller, K. 2019. "Fossil fuel resources, decarbonization, and economic growth are key drivers of feasibility to achieve Paris climate targets." Society for Decision-Making Under Deep Uncertainty 2019 Workshop. Delft, Netherlands.
- Wong, T. E., **Srikrishnan, V.**, Vega-Westhoff, B., Errickson, F., and Ledna, C. 2019. "Probabilistic projections for timing of global sea-level thresholds." American Geophysical Union Fall Meeting 2019. San Francisco, CA, USA.
- Srikrishnan, V.** and Keller, K. 2018. "Can we calibrate and identify agent-based models of flood risk adaptation?" American Geophysical Union Fall Meeting 2018. Washington, DC, USA.
- Steinke, I., **Srikrishnan, V.**, and Keller, K. 2018. "Implications of radiation management for coastal flooding risks — A case study of New Orleans." European Geophysical Union General Assembly 2018. Vienna, Austria.
- Spence, C., Salazar, J., Quinn, J., **Srikrishnan, V.**, Koszuta, M., Reed, P. M., and Keller, K. 2017. "Quantifying the deep uncertainties surrounding climate impacts on water systems." Society for Decision-Making Under Deep Uncertainty 2017 Workshop. Oxford, UK.
- Srikrishnan, V.**, Wong, T. E., Garner, G. G., and Keller, K. 2017. "Combining remote and local observations in a direct policy search for coastal flood defense under deep uncertainty." Society for Decision-Making Under Deep Uncertainty 2017 Workshop. Oxford, UK.
- Srikrishnan, V.** and Keller, K. 2016. "Identifying signposts for adaptive flood risk management strategies." Society for Decision-Making Under Deep Uncertainty 2016 Workshop. Washington, DC, USA.
- Srikrishnan, V.**, Young, G. S., and Brownson, J. R. S. 2015. "The error from Taylor's hypothesis for solar forecasting." Penn State Initiative for Sustainable Electric Power Systems Workshop on Power Systems and Markets. State College, PA, USA.

invited talks

- "How Uncertainties Can Impact Climate Risk Management", Earth and Atmospheric Sciences Seminar, Cornell University. Ithaca (NY), USA. Feb. 2023.
- "An Introduction to Climate Risk Management", Climate Change Seminar, Cornell University. Ithaca (NY), USA. Jan. 2023.
- "Challenges and Opportunities for Uncertainty Analysis in Multi-Sector Systems", American Geophysical Union Fall Meeting 2022 (invited), American Geophysical Union. Chicago (IL), USA. Dec. 2022.
- "Identifying Challenges and Opportunities for Uncertainty Analysis in MultiSector Dynamics Research", Community Webinar, MultiSector Dynamics Community of Prac-

tice. remote. Oct. 2022 (with Jonathan Lamontagne).

“Considerations for Uncertainty in MultiSector Systems”, Cornell Energy Systems Institute Seminar, Cornell University. Ithaca (NY), USA. Oct. 2022.

“Climate Risk, Uncertainty, and Coupled Energy Systems”, New Energy Series, Irving Institute, Dartmouth College. Remote. Jan. 2022.

“Uncertainty and Climate Risk Management”, Center for Applied Mathematics Colloquium, Cornell University. Ithaca (NY), USA. Nov. 2021.

“A Systems Approach to Climate Risk Management”, Ezra’s Round Table, Cornell University. Ithaca (NY), USA. Sep. 2021.

“How Likely Are the Most Extreme CO₂ Emissions Scenarios?”, MIT Joint Program on the Science and Policy of Global Change Seminar, Massachusetts Institute of Technology. Remote. Aug. 2020.

“How Likely Are the Most Extreme CO₂ Emissions Scenarios?”, Energy and Environmental Economics and Policy Seminar, Pennsylvania State University. University Park (PA), USA. Feb. 2020.

“Climate Risk Management: A Decision-Centered Approach”, Tufts Civil and Environmental Engineering Seminar, Tufts University. Medford (MA), USA. Nov. 2019.

“Adaptive Multi-Objective Robust Decision-Making”, Carnegie Mellon-Penn State Workshop on Multi-Objective Robust Decision-Making, Pennsylvania State University. University Park (PA), USA. Aug. 2019.

“From Earth-System Science to Coastal Hazards and Back”, Environmental and Sustainability Seminar, Carnegie Mellon University. Pittsburgh (PA), USA. May 2019 (with Klaus Keller).

“Agent-Based Models: The New ‘Plastic’ or the Emperor’s Clothes?”, Program on Coupled Natural-Human Systems Research Seminar, Pennsylvania State University. University Park (PA), USA. Mar. 2019 (with Klaus Keller).

“From Earth-System Science to Coastal Hazards and Back”, Pacific Northwest National Laboratory. Richland (WA), USA. Mar. 2019 (with Klaus Keller).

“From Earth-System Science to Coastal Hazards and Back”, Joint Global Change Research Institute. College Park (MD), USA. Feb. 2019 (with Klaus Keller).

“Can We Avoid a (Rational) Route to Collapse?”, Workshop on Managing Natural Resource Risk in the Modern and Prehistoric World, Santa Fe Institute. Santa Fe (NM), USA. Oct. 2018 (with Klaus Keller).

“Hedging Strategies for Electricity Investment Decisions Under Policy Uncertainty”, Energy and Mineral Engineering Graduate Seminar, Pennsylvania State University. University Park (PA), USA. Mar. 2016.

**workshops
organized**

Carnegie Mellon-Penn State Workshop on Multi-Objective Robust Decision-Making. University Park (PA), USA. Aug. 2019.

**grants and
contracts**

Co-PI, “Addressing Deep Uncertainty in Hydropower Futures”. PI: Patrick Reed. NREL, \$15,053 (total: \$75,000). 2022–2023.

Investigator, Institutional Lead, “Understanding Multistressor and Multiscale Drivers of Feedbacks, Cascading Failures, and Risk Management Pathways within Complex MSD Systems”. PI: Karen Fisher-Vanden. DOE (BER), \$533,922. 2021–2026.

Co-PI, “Health Effects of Decarbonization (HEALED)”. PI: Wei Peng. NSF, \$50,001 (total: \$399,472). 2021–2024.

Investigator, “Integrated Multi-Scale Multi-Sector Modeling (IM3)”. PI: Jennie Rice. DOE (BER), \$25,000. 2019–2020.

Investigator, Task Lead, “Integrated Coastal Modeling (ICoM)”. PI: Ian Kraucunas. DOE (BER), \$334,610. 2019–2023.

**networks and
projects**

Project on Coupled Human and Earth Systems (PCHES-ADAPT). Senior Personnel. PI: Karen Fisher-Vanden, Robert Nicholas, and John Weyant. Department of Energy, Biological and Environmental Research. 2021–current.

Integrated Coastal Modeling (ICoM). Task Lead. PI: Ian Kraucunas. Department of Energy, Biological and Environmental Research. 2019–current.

Visualizing Forest Futures (ViFF). Participant. PI: Erica Smithwick. National Science Foundation. 2019–2021.

Project on Coupled Human and Earth Systems (PCHES-FRAME). Participant. PI: Karen Fisher-Vanden and John Weyant. Department of Energy, Biological and Environmental Research. 2018–2021.

Network for Sustainable Climate Risk Management (SCRiM). Participant. PI: Klaus Keller. National Science Foundation. 2016–2019.

teaching

Cornell University

BEE 6940 — Climate Risk Analysis. Primary Instructor. Spring 2023.

BEE 4750/5750 — Environmental Systems Analysis. Primary Instructor. Fall 2022.

Pennsylvania State University

EME 301 — Thermodynamics in Energy and Mineral Engineering. Teaching Assistant. Fall and Spring 2014, 2015, 2016.

Math 140 — Calculus with Analytic Geometry I. Primary Instructor. Spring 2011.

Math 232 — Integral Vector Calculus. Primary Instructor. Spring 2010.

Math 141 — Calculus with Analytic Geometry II. Primary Instructor. Fall 2009.

Math 411 — Ordinary Differential Equations. Primary Instructor. Summer 2008, 2010.

Math 497 — Symplectic Geometry. Teaching Assistant. Fall 2008.

Math 251 — Ordinary and Partial Differential Equations. Primary Instructor. Fall and Spring 2007, 2008, 2009.

Math 250 — Ordinary Differential Equations. Primary Instructor. Fall 2006.

Math 41 — Trigonometry and Analytic Geometry. Primary Instructor. Fall 2005, 2010.

Math 231 — Calculus of Several Variables. Primary Instructor. Fall and Spring 2004, 2006.

advising

Cornell University

Katerina Tang, Ph.D. Applied Mathematics. Advisor. 2022–present.

Parin Bhaduri, Ph.D. Biological & Environmental Engineering. Advisor, Committee Chair. 2021–present.

Chloe Darnell, M.S. Biological & Environmental Engineering. Advisor, Committee Chair. 2021–present.

Pennsylvania State University

Carl Frederick Aquino, B.S. Geosciences. Co-advisor. 2019–2020.

awards

Graduate Research Fellowship Honorable Mention, National Science Foundation. 2015

Harold F. Martin Graduate Assistant Outstanding Teaching Award, Pennsylvania State University Graduate School. 2011

Charles H. Hoover Memorial Award, Pennsylvania State University Department of Mathematics. 2010

Departmental Teaching Award, Pennsylvania State University Department of Mathematics. 2008

ZZRQ Award, Pennsylvania State University Department of Mathematics. 2006

outreach Taught session on multi-objective robust decision-making, SCRiM Summer School. 2018, 2019.

service Faculty Fellow, Cornell Atkinson Center for a Sustainable Future. .
Co-Organizer, BEE Department Seminar. 2021–present.
Associate Deputy Editor, *Climatic Change*. 2021–present.
Early Career Researcher Board Member, *Oxford Open Energy*. 2022–present.
Co-Chair, MultiSector Dynamics Working Group on Uncertainty Quantification and Scenario Development. 2019–present.
Member, MultiSector Dynamics Community of Practice Scientific Steering Group. 2019–present.
Co-Convener and Co-Chair, AGU Sessions on MultiSector Dynamic and Uncertainty. 2020–2022.
Co-Guest Editor, *Water*. Special Issue on 'Climate Model Projections: Sea-Level Rise and Impacts on Coastal Defense Decision-Making'. .
Panel Reviewer, National Science Foundation (HDBE), Department of Energy (BER). .
Ad Hoc Reviewer, Sloan Foundation, National Science Foundation (DRMS, MG&G). .
Member, Environmental Engineering Program Curriculum Committee. Fall 2022–present.
Member, Biological & Environmental Engineering, Science-Based Solutions to Grand Challenges in Equity and Inclusion Search Committee. Spring 2022.

professional experience Research Assistant, Brownson Solar Research Group, Pennsylvania State University. 2011–2014
Technical Editor, *Journal of Modern Dynamics*. 2008–2010