

KATERINA GEORGIU

Lawrence Research Fellow
Lawrence Livermore National Laboratory

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RESEARCH INTERESTS

Biogeochemistry • Soil Carbon Modeling • Microbial Dynamics • Numerical Methods • Chemical Kinetics

EDUCATION

2018 Ph.D. in Chemical and Biomolecular Engineering, **University of California, Berkeley**
Designated Emphasis in Computational Data Science and Engineering
Advisors: Margaret S. Torn, John Harte, William J. Riley

2012 B.S. in Chemical Engineering, **University of Minnesota, Twin Cities**
Minors in Mathematics and Chemistry, *Summa Cum Laude with Distinction*
Advisor: Efrosini Kokkoli

RESEARCH EXPERIENCE

2020 – present **Lawrence Postdoctoral Research Fellow** | Lawrence Livermore National Laboratory
Mentor: Jennifer Pett-Ridge

2018 – present **Affiliate Scientist** | Climate Sciences, Lawrence Berkeley National Laboratory

2018 – 2020 **USDA NIFA Postdoctoral Research Fellow** | Earth System Science, Stanford University
Mentor: Robert B. Jackson

2017 – 2018 **DOE SCGSR Graduate Fellow** | Climate Sciences, Lawrence Berkeley National Laboratory
Advisor: William J. Riley

2014 – 2017 **NSF GRFP Graduate Fellow** | Chemical & Biomolecular Engineering, UC Berkeley
Advisors: Margaret S. Torn, John Harte

2012 – 2013 **Graduate Student Researcher** | Chemical & Biomolecular Engineering, UC Berkeley

2010 – 2012 **Research Assistant** | Chemical Engineering & Material Science, University of Minnesota

2008 – 2009 **Research Assistant** | Biological Physics & Synthetic Biology, University of Minnesota

2007 – 2008 **Research Assistant** | Cytokine Reference Laboratory, Pediatrics, University of Minnesota

TEACHING EXPERIENCE

Fall 2016 **Graduate Instructor:** *Transport Process (CBE 250A; graduate-level course)* | UC Berkeley
* Awarded the *Outstanding Graduate Student Instructor Award*

Spring 2014 **Graduate Instructor:** *Fluid Dynamics & Heat Transfer (CBE 150A; undergrad)* | UC Berkeley
* Awarded the *Outstanding Graduate Student Instructor Award*

Fall 2012 **Graduate Instructor:** *Intro to Chemical Engineering Design (CBE 40; undergrad)* | UC Berkeley

ACADEMIC HONORS & AWARDS

2020 – 2023	Lawrence Postdoctoral Research Fellowship, <i>Lawrence Livermore National Laboratory</i>
2020 – 2023	REWIRE Fellowship (Marie-Curie Co-fund), <i>University of Vienna, Austria</i> (declined)
2018 – 2020	USDA NIFA Postdoctoral Fellowship, <i>Stanford University</i>
09/2017	Best Overall Student Oral Presentation, <i>6th International Symposium on SOM, Harpenden, UK</i>
03/2017	Graduate Division Travel Grant, <i>University of California at Berkeley</i>
2017	DOE Office of Science Graduate Student Research Fellowship, <i>Lawrence Berkeley National Lab</i>
12/2016	Outstanding Graduate Student Instructor (<10% of instructors), <i>UC Berkeley</i>
05/2015	Graduate Division Travel Grant, <i>University of California at Berkeley</i>
05/2014	Outstanding Graduate Student Instructor (<10% of instructors), <i>UC Berkeley</i>
2013 – 2018	NSF Graduate Research Fellowship, <i>UC Berkeley</i>
2011 – 2012	Cargill Chemical Engineering Award and Scholarship, <i>University of Minnesota</i>
2010 – 2012	Paula Zoromski Memorial Scholarship, <i>University of Minnesota</i>
2010 – 2011	H. Ted Davis Chemical Engineering Award and Scholarship, <i>University of Minnesota</i>
2010 – 2011	Ruth Jones Chemical Engineering Scholarship, <i>University of Minnesota</i>
2008 – 2012	College of Science and Engineering (CSE) Merit Scholarship, <i>University of Minnesota</i>

RESEARCH GRANTS & FUNDING (approx. \$1.2M as PI; \$3.4M as collaborator)

2020	LLNL Lawrence Fellowship (PI) – \$550K
2020	REWIRE University of Vienna Fellowship (PI) – \$300K (declined)
2020	Precourt Institute for Energy Seed Grant (contributor) – \$100K
2018	USDA NIFA Fellowship (PI) – \$170K
2017	UC Berkeley Travel Grant – \$1.5K
2017	DOE TES SFA at LBNL (contributor) – \$3.3M
2017	DOE SCGSR (fellowship; PI) – \$40K
2015	UC Berkeley Travel Grant – \$1.5K
2013	NSF GRFP (fellowship; PI) – \$120K

PUBLICATIONS (h-index = 10 and citations = 800 from Google Scholar)

17. Billings S. A., Lajtha K., Malhotra A., Berhe A. A., de Graaff M.-A., Earl S., Fraterrigo J., **Georgiou K.**, et al. Soil organic carbon is not just for soil scientists: Measurement recommendations for diverse practitioners. *Ecological Applications*, e2290 (2021).
16. Abramoff R. Z., **Georgiou K.**, Guenet B., Torn M. S., Huang Y., Zhang H., Feng W., Jagadamma S., Kaiser K., Kothawala D., Mayes M. A., Ciais P. How much carbon can be added to soil by sorption? *Biogeochemistry*, 1-16 (2021).
15. Walker A. P., Bastos A., De Kauwe M. G., **Georgiou K.**, McMahon S., et al. Integrating evidence for CO₂ fertilization of the terrestrial carbon sink. *New Phytologist*, 229:2413-2445 (2020).
14. Wieder W. R., Pierson D., Earl S., Lajtha K., Baer S., Ballantyne F., Berhe A. A., Billings S., Brigham L. M., Chacon S. S., Fraterrigo J., Frey S. D., **Georgiou K.**, et al. SoDaH: the SOils DAta Harmonization database, an open-source synthesis of soil data from research networks, version 1.0, *Earth System Science Data Discuss.*, 1-19 (2020).
13. Dwivedi D., Tang J., Bouskill N. J., **Georgiou K.**, Chacon S., & Riley W. J. Abiotic and biotic controls on soil organo-mineral interactions: Developing model structures to analyze why soil organic matter persists. *Reviews in Mineralogy and Geochemistry*, 85 (1), 329-348 (2019).
12. Abramoff R. Z., Torn M. S., **Georgiou K.**, Tang J., Riley W. J. Spatial gradients can hide temperature sensitivity of soil organic matter stocks. *Global Biogeochemical Cycles*, 33 (6), 761-776 (2019).

11. Sulman B., Moore J., Abramoff R. Z., Averill C., **Georgiou K.**, Kivlin S., Sridhar B., Hartman M., Wang G., Wieder W., Bradford M., Luo Y., Mayes M., Morrison E., Riley W. J., Salazar A., Schimel J., Tang J. Classen A. Multiple models and experiments underscore large uncertainty in soil carbon dynamics. *Biogeochemistry*, 141(2), 109-123 (2018).
10. **Georgiou K.**, Harte J., Mesbah A., Riley W. J. A method of alternating characteristics with application to advection-dominated environmental systems. *Computational Geosciences*, 22(3), 851-865 (2018).
9. Castanha C., Zhu B., Hicks Pries C. E., **Georgiou K.**, Torn M. S. The effects of heating, rhizosphere, and depth on root litter decomposition are mediated by soil moisture. *Biogeochemistry*, 137:267 (2018).
8. **Georgiou K.**, Abramoff R. Z., Harte J., Riley W. J., Torn M. S. Microbial community-level regulation explains carbon responses to long-term litter manipulations. *Nature Communications*, 8: 1223, 1-10 (2017).
* Highlighted in Complex Systems Research Collection: Ecology and Evolution
7. Rammensee S., Kang M. S., **Georgiou K.**, Kumar S., Schaffer D. V. Dynamics of Mechanosensitive Neural Stem Cell Differentiation. *Stem Cells*, 35, 497-506 (2017).
6. Luo Y., Ahlström A., Allison S., Batjes N., Bonan G., Brovkin V., Carvalhais N., Chappell A., Ciais P., Davidson E., Finzi A., **Georgiou K.**, Hararuk O., Harden J., et al. Towards More Realistic Projections of Soil Carbon Dynamics by Earth System Models. *Global Biogeochemical Cycles*, 30, 40-56 (2016).
5. Wieder W., Allison S., Davidson E., **Georgiou K.**, Hararuk O., He Y., Hopkins F., Luo Y., Smith M., Sulman B., Todd-Brown K., Wang Y. P., Xia J., Xu X. Explicitly Representing Soil Microbial Processes in Earth System Models. *Global Biogeochemical Cycles*, 29, 1782-1800 (2015).
4. **Georgiou K.**, Koven C., Riley W. J., Torn M. S. Towards improved model structures for analyzing priming: potential pitfalls of using bulk turnover time. *Global Change Biology*, 21, 4298-2302 (2015)
3. Koven C., Chambers J., **Georgiou K.**, Knox R., Negron-Juarez R., Riley W. J., Arora V., Brovkin V., Friedlingstein P., Jones C. Controls on terrestrial carbon feedbacks by productivity versus turnover in the CMIP5 Earth System Models. *Biogeosciences*, 12, 5211-5228 (2015).
2. Pangburn, T.O., **Georgiou, K.**, Bates, F.S., and Kokkoli, E. Targeted Polymersome Delivery of siRNA Induces Cell Death of Breast Cancer Cells Dependent upon Orai3 Protein Expression, *Langmuir*, 28, 12816-12830 (2012).
1. **Georgiou K.** and Georgiou T. T. Graceful switching in hybrid models. *IEEE Conference on Decision and Control*, 3882-3884 (2009).

PRESENTATIONS & CONFERENCE CONTRIBUTIONS (selected; ** denotes mentored student)

- **Georgiou K.** *Machine learning emulators reveal divergence in soil carbon controls between observations and process-based models.* CLAND Workshop on Machine Learning for Climate, 2020 (Invited Oral).
- **Georgiou K.**, Malhotra A., Ennis J. H.**, Wieder W. R., Hartman M. D., Sulman B. N., Berhe A. A., Grandy A. S., Kyker-Snowman E., Moore J., Pierson D., Jackson R. B. *Biome- to global-scale controls on soil carbon storage: divergence between observations and process-based models.* AGU Virtual Meeting, 2020 (Oral).
- **Georgiou K.** *Machine learning emulators reveal divergence in soil carbon controls between observations and process-based models.* DOE RUBISCO Meeting, 2020 (Invited Oral).
- Malhotra A., **Georgiou K.**, Todd-Brown K. E., Earl S., Harden J., Wieder W., Jackson R. B. *Heterogeneity in soil carbon stocks: Data-based or database-based?* ESA Virtual Annual Meeting, 2020 (Invited Oral).
- Jackson R. B., **Georgiou K.**, Piñeiro G., Terrer C., Villarino S. *Roots, Soil Carbon, and Negative Emissions.* Salk Institute Drawdown Workshop, 2020 (Invited Oral).
- **Abramoff R.**, Georgiou K., Guenet B., Torn M., Huang Y., Zhang H., Feng W., Jagadamma S., Kaiser K., Kothawala D., Mayes M., Ciais P. *How much more carbon can be sorbed to soil?* EGU Virtual 2020 (Oral).
- Pellegrini A., Caprio T., **Georgiou K.**, Finnegan C., Hobbie S. E., Hatten J., Jackson R. B. *Limited carbon cost of fire management in Californian forests: compensatory responses may buffer against long-term soil carbon losses.* AGU Fall Meeting, 2019 (Oral).

- **Georgiou K.**, Malhotra A., Ennis J. H.^{**}, Wieder W. R., Hartman M. D., Sulman B. N., Grandy A. S., Moore J., Jackson R. B. *Leveraging model-generated hypotheses and cross-network observations to understand biome-to global-scale controls on soil organic matter stocks*. AGU Fall Meeting, 2019 (Poster).
- Harden J., Sulman B., Hugelius G., Loisel J., Vinduskova O., Malhotra A., **Georgiou K.**, Ahlstrom A., Jackson R. *The role of soil research, databases, and soil indices in the drawdown of CO₂*. EGU Meeting, 2019 (Oral).
- **Georgiou K.**, Jackson R. B., Feng W., Harden J., Abramoff R. Z., Riley W. J., Torn M. S. *The mineralogical capacity of soils to store carbon: sequestration and vulnerability in a changing climate*. EGU Meeting, Vienna, Austria, 2019 (Oral).
- **Georgiou K.**, Feng W., Abramoff R. Z., Riley W. J., Jackson R. B., Torn M. S. *The role of mineral content and composition on the capacity of soils to store carbon*. AGU Fall Meeting, Washington DC, 2018 (Oral).
- **Georgiou K.**, Abramoff R. Z., Riley W. J., Torn M. S. *Representing organo-mineral associations in soil carbon models: implications for carbon storage and vulnerability*. ESS PI Meeting, Potomac, MD, 2018 (Poster).
- **Georgiou K.**, Abramoff R. Z., Harte J., Riley W. J., Torn M. S. *Microbial community-level regulation explains carbon responses to long-term litter manipulations*. ESS PI Meeting, Potomac, MD, 2018 (Poster).
- Nico P., Porras R., **Georgiou K.**, Brodie E. L., Tas N., Abramoff R. Z., Riley W. J., Hicks Pries C., Torn M. S. *LBNL TES SFA on Belowground Biogeochemistry: Highlights on long-term stabilization*. ESS PI Meeting (Poster).
- Soong J. L., Hicks Pries C., Castanha C., Porras R. C., Abramoff R. Z., **Georgiou K.**, Torn M. S. *Four years of warming the whole soil profile*. ESS PI Meeting, Potomac, MD, 2018 (Poster).
- **Georgiou K.**, Abramoff R. Z., Riley W. J., Torn M. S. *Representing organo-mineral associations in soil carbon models: implications for carbon storage and vulnerability*. EGU Meeting, Vienna, Austria, 2018 (Oral).
- **Georgiou K.**, Abramoff R. Z., Riley W. J., Torn M. S. *The role of organo-mineral interactions on the capacity of soils to store carbon*. AGU Fall Meeting, New Orleans, LA, 2017 (Poster).
- Li Z.^{**}, **Georgiou K.**, Torn M. S. *The effect of long-term changes in plant inputs on soil carbon stocks*. AGU Fall Meeting, New Orleans, LA, 2017 (Poster).
- Abramoff R. Z., **Georgiou K.**, Riley W. J., Torn M. S. *Controls on SOC across space and time: Models with different acclimation schemes make similar spatial predictions but divergent warming predictions*. AGU Fall Meeting, New Orleans, LA, 2017 (Poster).
- **Georgiou K.**, Abramoff R., Harte J., Riley W. J., Torn M. S. *Microbial community-level regulation explains carbon responses to long-term litter manipulations*. SOM Symposium, Harpenden, UK, 2017 (Oral).
- ***Awarded Best Student Oral Presentation in Session & Overall**
- **Georgiou K.**, Abramoff R., Harte J., Riley W. J., Torn M. S. *Density-dependent microbial turnover improves soil carbon model predictions of long-term litter manipulations*. EGU Meeting, Vienna, Austria, 2017 (Oral).
- Abramoff R., Harden J., **Georgiou K. (presenting author)**, Tang J., Torn M. S., Riley W. J. *Managing for soil carbon sequestration: a modeling framework for decision-making*. EGU Meeting, Austria, 2017 (Oral).
- Riley W. J., **Georgiou K.**, Abramoff R., Tang J., Torn M. S. *Modeling the vulnerability of soil C stocks to warming with a focus on minerals and microbes*. ESS PI Meeting, Potomac, MD, 2017 (Poster).
- Classen A., Sulman B., Moore J., Kivlin S., Averill C., Abramoff R. Z., Wieder W., **Georgiou K.**, Sridhar B. *Microbes, Meta-analysis, Mountains, Models, and Mechanics: Exploring Ecosystem Function under Global Change*. ESS PI Meeting, Potomac, MD, 2017 (Oral).
- **Georgiou K.**, Abramoff R., Harte J., Riley W. J., Torn M. S. *Density-dependent microbial turnover improves soil carbon model predictions of long-term litter manipulations*. Seminar in Rob Jackson's Lab, Stanford University, CA, 2016 (Invited Oral).
- **Georgiou K.**, Abramoff R., Harte J., Riley W. J., Torn M. S. *(A)biotic processes control soil carbon dynamics: quantitative assessment of model complexity, stability and response to perturbations for improving ESMs*. AGU Fall Meeting, San Francisco, CA, 2016 (Oral).
- **Georgiou K.**, Abramoff R., Koven C. D., Riley W. J., Torn M. S. *Soil carbon vulnerability to land-cover change and implications for the global carbon cycle*. AGU Fall Meeting, San Francisco, CA, 2015 (Poster).
- Koven C., Chambers J., **Georgiou K.**, Knox R., Negron-Juarez R., Riley W. J., Arora V., Brovkin V., Friedlingstein P., Jones C. *Productivity and Turnover Controls on Terrestrial Carbon Feedbacks in the CMIP5 ESMs*. ESA Annual Meeting, Baltimore, MD, 2015 (Oral).

- **Georgiou K.**, Riley W. J., Torn M. S. *Response of Soil Carbon Storage to Temperature and Carbon Input Variability in Earth System Models*. CFCC, Paris, France, 2015 (Poster).
- **Georgiou K.**, Koven C., Tang J., Riley W. J., Torn M. S. *Towards Improved Model Structures for Analyzing Soil Response to Changes in Plant Inputs*. ECOSS meeting, Northern Arizona University, Flagstaff, AZ, 2015 (Invited Oral).
- Riley W. J., Dwivedi D., **Georgiou K.**, Tang J., Torn M.S. *Explicitly Representing Microbes, Enzymes, Mineral Interactions, and Tracer Transport to Better Predict Depth-Resolved SOM Stocks and Turnover Under Warming*. ESS PI Meeting, Potomac, MD, 2015 (Poster).
- **Georgiou K.**, Riley W. J., Tang J., Torn M. S. *Emergent Responses of Soil C Dynamics to Seasonal Variability in Nonlinear SOM-microbial Models*. ESS PI Meeting, Potomac, MD, 2015 (Poster).
- **Georgiou K.**, Tang J., Riley W. J., Torn M. S. *Characterizing Feedback Control Mechanisms in Nonlinear Microbial Models of Soil Organic Matter Decomposition by Stability Analysis*. AGU Fall Meeting, San Francisco, CA, 2014 (Poster).
- **Georgiou K.**, Koven C., Riley W. J., Torn M. S. *First-order Models of Soil Organic Matter Decomposition Exhibit a Bias in Response to Elevated CO₂: Implications for Representing Soil Priming in Earth System Models*. Graduate Climate Conference, Seattle, WA, 2014 (Poster).
- **Georgiou K.** *Targeted Delivery of Polymer Vesicles to Breast Cancer Cells: Colocalization and siRNA Delivery*. Honors Thesis Presentation, University of Minnesota, Minneapolis, MN, 2012 (Oral).
- **Georgiou K.** and Escalante D. *Stochastic Simulation of the Fission Yeast Cell Cycle with a Minimal CDK Control Network*, Presentation in Biomedical Engineering, Univ. of Minnesota, Minneapolis, MN, 2011 (Oral).

COURSEWORK & TECHNICAL SKILLS

Additional Training:

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| 2015 | Community Land Model (CLM) Tutorial Training (1-week workshop)
National Center for Atmospheric Research, USA |
| 2012 | Pedagogy: Teaching and Learning in Higher Education (15-week course)
University of California, Berkeley, USA |

Field Experience: Blodgett Forest CA (2016, 2017, 2018, 2019), Hopland CA (2016, 2017), Sequoia CA (2017)

Other Certifications:

- WASI Scuba Certification (2007)
- Yoga Alliance 200hr Teacher Certification (2017)
- AIARE Level 1 Avalanche Safety Certification (2020)

Courses: *Biochemistry, Applied linear algebra, Diffusion and transport phenomena, Biomolecular engineering, Chemical reaction kinetics, Numerical methods, Cell engineering, Process control, Probability and statistics, Mathematical modeling, Polymers, Thermodynamics, Statistical mechanics, Environmental fluid mechanics, Air quality engineering, Modeling ecological and meteorological phenomena, Carbon cycle dynamics, Scalable spatial analytics, Statistical models: theory & application*

Teaching: *Introduction to Chemical Engineering Design (undergraduate level), Transport Process: Fluid Dynamics and Heat Transfer (undergraduate level), Transport Process (graduate level)*

Software and Programming: Python, R, MATLAB, Mathematica, LaTeX, Excel, Stat-Ease, Aspen HYSYS, COMSOL Multiphysics, Git, HTML, PostGIS & PostgreSQL

Languages: fluent in English and Greek, intermediate Spanish, beginner French and Italian

SERVICE & OUTREACH

Peer Reviewer: Nature Ecology & Evolution, Nature Geosciences, Nature Communications, Global Change Biology, New Phytologist, Biogeosciences, Biogeochemistry, Journal of Geophysical Research: Biogeosciences

Review Editor: Frontiers in Forests and Global Change

Conference Organizer/Convener:

AGU Fall Meeting 2020 Session: B104: Soils in the Anthropocene: Mechanisms of Stabilization and Change. (Co-conveners: Xiaoqin Wu, Amrita Bhattacharyya, Kate Lajtha, Avni Malhotra, Nancy Cavallaro)

EGU General Assembly 2019 Session: SSS11: Upscaling detailed models to landscape for long-term predictions and integration in Earth System Models. (Co-conveners: Stefano Manzoni, Claudia Cagnarini, Artem Vladimirov, Rose Abramoff)

AGU Fall Meeting 2017 Session: B41C: Microbial-Mineral Regulation of Soil Organic Matter: Mechanisms, Experimental Approaches, and Models II. (Co-conveners: Kevin Geyer, Caitlin Hicks-Pries, Rose Abramoff, Jeffrey Bird, Karin Block, Alain Plante)

AGU Fall Meeting 2016 Session: B24D: Soil Carbon Dynamics: Models and Experiments Investigating Controls on Soil Organic Matter Vulnerability in Dynamic Landscapes. (Co-conveners: Caitlin Hicks-Pries, Rose Abramoff, Asmeret Berhe, Jennifer Dungait)

CBE Student Symposium 2017: 2nd Annual UC Berkeley Chemical & Biomolecular Engineering (CBE) Symposium with poster and oral presentations. (Organizer)

Media Interviews:

Interviewed for **Nature Careers Feature:**

Baker, Monya. Scientific computing: Code alert, *Nature*, 541, 563-565 (2017).

Interviewed for **BBC Radio Feature:**

Episode on *Carbon Farming*, hosted by Taylor Kate Brown (interviewed Nov. 5th 2018).

Volunteering:

Bay Area Science Festival & Stanford Science Festival 2018, 2019
Science fairs to educate children and parents about careers in STEM with interactive presentations.

Bay Area Scientists in Schools (BASIS) 09/2012 – 05/2018
Elementary and middle school lessons with fun science presentations and real-world STEM experiences.

Engineers Without Borders (EWB) 09/2008 – 05/2012
Uganda Project and Fundraising: Water treatment, sanitation, and groundwater distribution for a school in Kyetume, Uganda, in collaboration with Uganda Rural Fund, a non-government organization.