Mingfei CHEN, Ph.D.

Lawrence Berkeley National Laboratory, Earth and Environmental Sciences Area
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EDUCATION

Ph.D., Geology, University of Illinois at Urbana-Champaign **May 2022**
Advisor: Jessica Conroy
Title: Microbial-biogeochemical interactions in tropical lacustrine environments

Bachelor of Science, Geology (*major*)/Biology (*minor*), Peking University **July 2017**

ACADEMIC APPOINTMENTS

Postdoctoral Research Fellow, Lawrence Berkeley National Laboratory **2022-present**
Graduate Research Assistant, University of Illinois at Urbana-Champaign **2018-2022**

RESEARCH INTERESTS

Environmental microbiology: microbe-mineral interactions, microbes in extreme environments, bioinformatics, bioremediation, enrichment and isolation of rarely cultivated microbes
Synthetic microbiology: AI-driven selection of microbial consortia for practical use (e.g., mining of critical minerals, degradation of contaminated plastics, plant growth promoting)

PUBLICATIONS

^ equal contribution, # mentored undergraduate students

1. Yu, H., Lv, W., Ding, D., Hu, N., Zhang, H, **Chen, M.**, Wang, C., Yan, Q., Deng, Y., He, Z., Carlson, H. Hu, R. Arsenite-Oxidizing Chemolithooautotrophic Prokaryotes Underpin Inorganic Carbon Fixation and Arsenic Detoxification in Deep Underground Uranium Mining Layers. Journal of Hazardous Materials (under review).
2. Novak, V., Andeer, P.F., King, E., Calabria, J., Fitzpatrick, C., Kelm, J.M., Wippel, K., Kosina, S.M., Daum, C., Zane, M., Yadav, A., **Chen, M.**, et al. International reproducibility study establishes replicable methods for studying plant-microbiota in fabricated ecosystems EcoFAB 2.0. Plos Biology (under review). (BioRxiv: https://doi.org/10.1101/2024.10.02.615924)
3. Yadav, A.^, **Chen. M.**^, Acharya, S.M., Yang, Y., Zhao, T.Z., Chakraborty, R. A stable 15-member bacterial SynCom promotes Brachypodium growth under drought stress. Plant, Cell & Environment (in revision). (BioRxiv: https://doi.org/10.1101/2024.09.10.612297)
4. Finley, B.K., Enalls, B.C., de Raad, M., Al Said, M.#, **Chen, M.**, Joyner, D.C., Hazen, T.C., Northen, T.R., Chakraborty, R. (2025) Unraveling the Influence of Microbial Necromass on Subsurface Microbiomes: Metabolite Utilization and Community Dynamics. ISME Communications. https://doi.org/10.1093/ismeco/ycaf006
5. **Chen, M.**, Trotter, V.V., Walian, P.J., Chen, Y., Lopez, R.#, Lui, L.M., Nielsen, T.N., Malana, R.G., Thorgersen, M.P., Hendrickson, A.J., Carion, H., Deutschbauer, A.M., Petzold, C.J., Smith, H.J., Arkin, A.P., Adams, M.W.W., Fields, M.W., Chakraborty R. Molecular mechanisms and environmental adaptations of flagellar loss and biofilm growth of *Rhodanobacter* under environmental stress. The ISME journal. https://doi.org/10.1093/ismejo/wrae151
6. **Chen. M.,** Acharya, S.M., Mon, Y.O., Cabugao, K.G., Chakraborty, R. Developing stable, simplified, functional consortia from Brachypodium rhizosphere for microbial application in sustainable agriculture (2024) Frontiers in Microbiology. https://doi.org/10.3389/fmicb.2024.1401794
7. **Chen. M.**, Conroy, J.L., Sanford, R.A., Wyman, A.D., Chee-Sanford, J.C., Connor, L.M. (2023) Lacustrine sediment microbial community response to an extreme El Niño event. Scientific Reports. https://doi.org/10.1038/s41598-023-33280-2

8. **Chen, M.**, Conroy, J.L., Geyman, E.C., Sanford, R.A., Chee-Sanford, J.C., Connor, L.M. (2022) Stable carbon isotope values of syndepositional spherules and micrite record spatial and temporal changes in photosynthesis intensity. Geobiology. https://doi.org/10.1111/gbi.12509
9. **Chen, M.**, Conroy, J.L., Sanford, R.A., Chee-Sanford, J.C., Connor, L.M. (2020) Interpreting lacustrine bulk sediment $\delta^{15}N$ values using metagenomics in a tropical hypersaline lake system. Journal of Paleolimnology. https://doi.org/10.1007/s10933-020-00157-7
10. Schmitt, S., Conroy, J.L., Flynn, T.M., Sanford, R.A., Higley, M.C., **Chen, M.**, Fouke, F.W. (2019) Salinity, microbe and carbonate mineral relationships in brackish and hypersaline lake sediments: a case study from the tropical Pacific coral atoll of Kiritimati. The Depositional Record. https://doi.org/10.1002/dep2.71

PUBLICATIONS IN PREPARATION (AT WRITING STAGE)

1. Yang, Y., Gushgari-Doyle, S., **Chen, M.**, Mon, Y.O., Chakraborty, R. Is everything truly everywhere and the environment selects? The effects of initial community versus substrate amendment on community structure and function.
2. **Chen, M.**, Alvarez-Navarrete, R.M. [#], Zinke, N.M. [#], De Raad, M., Walian, P.J., Finley, B.K., Zeng, L., Northen, T.R., Chakraborty, R. Synthetic Sediments: Mimicking Microbial Microhabitats.

GRANTS & FUNDINGS

- Discovery Program: "High-throughput characterization of attachment phenotypes using microfluidic system and genotype-ecotype correlations" (Oct 2022 – Dec 2023)
    - Amount: $150,676, awarded by ENIGMA Science Focus Area (funded by U.S. Department of Energy)
    - Lead Investigator: Mingfei Chen (co-PI: Romy Chakraborty, Adam Arkin, Matthew W. Fields, Adam Deustechbauer)
- GSA Graduate Research Grant (2020)
    - Amount: $1,375; Agency: U.S. Geological Society of America
- UIUC Dept. of Geology Wanless Fellowship (2017)
    - Amount: $24,438

HONORS & AWARDS

- 1st Place, BioEPIC Research SLAM, Lawrence Berkeley National Laboratory (2023)
- Spot Award, Lawrence Berkeley National Laboratory (2022)
- R. James Kirkpatrick Award for Outstanding Graduate Research in Geology, funded by the College of Liberal Arts and Sciences, University of Illinois at Urbana-Champaign (2022)
- Teaching Assistant Ranked as Excellent by Students (2021 Fall, 2019 Fall)
- 2nd Place Geology Poster, SESE Research Review, University of Illinois at Urbana-Champaign (2021)
- Outstanding Student Presentation Award, AGU Fall Meeting (2019)
- Wanless Fellow, University of Illinois at Urbana-Champaign (2017)
- Outstanding Bachelor Graduate, Peking University (2017)
- Model Student of Academics, Peking University (2014, 2016)
- "Triple-A" Outstanding Student, Peking University (2015)
- Lee Wai Wing Scholarship (2 out of 50), Peking University (2015)

MEETING PRESENTATIONS

1. **Chen, M.**, Trotter, V.V., Deutschbauer, A.M., Walian, P.J., Elisabeth, N.H., Arkin, A.P., Fields, M.W., Chakraborty, R. Uncovering the Secrets of Rhodanobacter Biofilm Formation Under Environmental Challenges. 2024. American Society for Microbiology, Atlanta, GA.
2. Chakraborty, R., Enalls, B.C., Alsaid, M., **Chen, M.**, Lopez, R., De Raad, M., Northern, T. Harnessing Microbial Necromass: Unlocking Subsurface Microbial Diversity and Functionality. 2023. American Geophysical Union Fall Meeting, San Francisco, CA.
3. Yadav A., Acharya, S.M., **Chen, M.**, Chakraborty, R. Construction and Characterization

of Brachypodium Rhizosphere-derived 15-membered Synthetic Community (SynCom). 2023. American Geophysical Union Fall Meeting, San Francisco, CA.

4. **Chen, M.**, Trotter, V.V., Deutschbauer, A.M., Walian, P.J., Elisabeth, N.H., Arkin, A.P., Fields, M.W., Chakraborty, R. Uncovering the Secrets of Rhodanobacter Biofilm Formation Under Environmental Challenges. 2023. American Geophysical Union Fall Meeting, San Francisco, CA.
5. **Chen, M.**, Trotter, V.V., Deutschbauer, A.M., Walian, P.J., Elisabeth, N.H., Arkin, A.P., Fields, M.W., Chakraborty, R. Uncovering the Secrets of Rhodanobacter Biofilm Formation Under Environmental Challenges. 2023. Ecological Society Annual Meeting, Portland, OR.
6. **Chen. M.,** Acharya, S., Mon, Y.O., Cabugao, K.G., Chakraborty, R. Root biogeography driven development of reduced complexity model consortia. 1st Northern California Geobiology Symposium, Stanford, CA.
7. Chakraborty, R., Acharya, S., **Chen, M.**, Yee, M.O., Cabugao, K.G., Diamond, S., Andeer, P.F., Baig, N.F., Carlson, H.K., Deutschbauer, A.M., Banfield, J.F., Northern, T. Understanding Rhizosphere Spatial Heterogeneity in Fabricated Ecosystems using Cultivation-independent and Enrichment Approaches. 2022. American Geophysical Union Fall Meeting, Chicago, IL.
8. Conroy, J.L., Wyman, A.D., Osburn, M.R., Atwood, A.R., Higley, M.C., **Chen, M.**, Oeste, Ryan. Common Era Hydroclimate Variability in the Central Tropical Pacific. 2022. American Geophysical Union Fall Meeting, Chicago, IL.
9. Conroy, J.L., Wyman, A.D., **Chen, M.**, Higley, M.C., Osburn, M.R., Atwood, A.R., Sanford, R.A., Flynn, T.M., Fouke, B.W., Chee-Sanford, J.C., Connor, L.M. Kiritimati Lakes: Windows into Past Atoll Hydrology, Microbial Community Dynamics, and Central Pacific Climate. 2021. American Geophysical Union Fall Meeting, New Orleans, LA.
10. **Chen, M.**, Conroy, J.L., Geyman, E.C., Sanford, R.A., Chee-Sanford, J.C., Connor, L.M. Stable carbon isotope values of syndepositional ooids and micrite record spatial and temporal changes in photosynthesis intensity. 2021. American Geophysical Union Fall Meeting, New Orleans, LA.
11. **Chen. M.**, Conroy, J.L., Sanford, R.A., Wyman, A.D., Chee-Sanford, J.C., Connor, L.M. Lacustrine sediment microbial community response to an extreme El Niño event. 2021. American Geophysical Union Fall Meeting, New Orleans, LA.
12. **Chen, M.**, Conroy, J.L., Fouke, B.W. The distribution of organic matter in aragonite spherules: Insights into potential biotic mechanisms of spherule formation. 2020. American Geophysical Union Fall Meeting, San Francisco, CA. (*invited*)
13. **Chen, M.**, Conroy, J.L., Fouke, B.W. The distribution of organic matter in aragonite spherules: Insights into potential biotic mechanisms of spherule formation. 2020. Geological Society of America Connects Online.
14. **Chen, M.**, Conroy, J.L., Sanford, R.A., Chee-Sanford, J.C., Connor, L.M. Interpreting lacustrine bulk sediment $\delta^{15}N$ values using metagenomics: A case study from a hypersaline lake system. 2019. 8th Midwest Geobiology Symposium, St. Louis, MO.
15. **Chen, M.**, Conroy, J.L., Sanford, R.A., Chee-Sanford, J.C., Connor, L.M. Interpreting lacustrine bulk sediment $\delta^{15}N$ values using metagenomics: A case study from a hypersaline lake system. 2019. American Geophysical Union Fall Meeting, San Francisco, CA.
16. **Chen, M.**, Conroy, J.L., Sanford, R.A., Chee-Sanford, J.C., Connor, L.M., Sivapalan, V.S. Microbially mediated nitrogen isotope fractionation in hypersaline lakes. 2018. American Geophysical Union Fall Meeting, Washington, DC.
17. Casar, C., Karbelkar, A.A., Vinnichenko, G., **Chen, M.**, Osburn, M. R., Orphan, V.J., Fischer, W.W., Session, A.L., The 2018 International Geobiology Course Participants. Transformation of ancient organic carbon in exposed organic-rich black shale of the Monterey Formation, Naples Beach, CA. 2018. American Geophysical Union Fall Meeting, Washington, DC.

INVITED TALKS AND SEMINARS

"Adaptation Strategies of Environmental Microorganisms to Metal Stress: Biofilm Formation, Flagellar Changes, and Beyond", American Society of Microbiology (2025 June)

"Harnessing Microbes for Sustainable Agriculture and Environmental Solutions", Texas A&M University (2025 April)

"ENSO, Biofilms, and Microbial Resilience in Aquatic Systems", Florida International University (2025 April)
"Microbial Timekeepers: Decoding Environmental Shifts in Tropical Lakes", University of Colorado, Boulder (2024 March)
"Microbial Timekeepers: Decoding Environmental Shifts in Tropical Lakes", Texas A&M University (2024 February)
"Biofilms and Brine: The Secrets of Microbial Persistence in Harsh Realms", Sonoma State University (2023 October)
"Microbial-biogeochemical interactions in tropical lacustrine environments", Southern University of Science and Technology (2023 October)
"Microbial-biogeochemical interactions in tropical lacustrine environments", Peking University (2023 October)

TEACHING AND ADVISING

Courses TA:
Geology 143: History of Life (Fall 2019, Fall 2021)
Role: Give instructions on lab materials and lead lab discussion

Geology 118: Natural Disasters (Fall 2020, Spring 2021)
Role: Grade homework and lab materials, provide feedback

Geology 100: Planet Earth (Fall 2020, Spring 2021)
Role: Grade homework and lab materials, provide feedback

Geology 111: Emergence of Life (Spring 2019, Spring 2022)
Role: Grade discussion and reflection, provide feedback

Undergraduates advised/mentored:
Grace Kim (UCB)
Christian Vega (UCB)
Rocelia Mary Alvarez-Navarrete (UCB)
Antonette DiGuiseppe (UCB)
Tiffany Zhao (UCB)
Romario Lopez (UCB)
Nina Marie Zinke (San Diego City Community College)
Angel Watts (Berkeley City College)
Hasan Yasini (UCB)
Kimberley Pena Diaz (UCB)
Mariam Alsaid (UCB)
Eunice Tsang (UCB)
Ryan Oeste, Geology (UIUC)
Quinn Greven, Chemistry (UIUC)

FIELD EXPERIENCE

- Caltech International Geobiology course, interdisciplinary field expedition to Mono Lake, Naples Beach and Sulfur Creek, CA (2018)
- Geobiology and paleolimnological coring expedition, Smith Lake, IL (2017)
- Geological fieldwork in Xingcheng, Liaoning (2015)
    - Led a monographic group study to produce a regional geological map of the Mt. Changlong area (20km^2)
    - Conducted independent research on the faults of Mt. Changlong's north ridge to determine the properties and stages of fault evolution
- Geological fieldwork in areas surrounding Beijing (2014)
    - Constructed a stratigraphic column of Paleozoic strata of North China craton

PUBLIC ENGAGEMENT AND PROFESSIONAL SERVICE

Department

- Student member, UIUC Geology Climate Working Group (2021-2022)
- President, UIUC Geology Graduate Student Council (2020-2021)
- Social chair, UIUC Geology Graduate Student Council (2019-2020)
- Member, SESE Research Review Committee, UIUC (2020)

School/University

- Member, IDEA Committee, EESA, Lawrence Berkeley National Lab (2023-present)
- Member, DEI Subcommittee, ENIGMA SFA, Lawrence Berkeley National Lab (2023-present)
- Chair, Early Career Scientist Committee, ENIGMA SFA, Lawrence Berkeley National Lab (2023-present)
- Mentor, BLDAP Data Science Project, Lawrence Berkeley National Lab (2022-2023)
- Early Career Scientist Committee Member, ENIGMA SFA, Lawrence Berkeley National Lab (2022-2023)
- UIUC Undergrad Research Apprenticeship Program (2021 Spring)
- Research poster/oral presentation judge, UIUC undergraduate research symposium (2019, 2021)

Community

- Member, Early Career Subcommittee, Biogeoscience Section, American Geophysical Union (2024-present)
- Session convener, "Carbonate Sediments Through Time: process of deposition and diagenesis", AGU Fall Meeting (2024)
- Session convener, "Carbonate Through Time: process of deposition and diagenesis", AGU Fall Meeting (2023)
- Session convener, "Carbonate Sediments Through Time: Proxies for Process and Planets", AGU Fall Meeting (2022)
- Session primary convener, "Carbonate Formation in Modern Environments", AGU Fall Meeting (2021)

Journal Reviewer: *mSystems; ISME; ISME Communications*; *Soil Biology and Biochemistry*; *Journal of Geophysical Research-Biogeosciences*; *Geochimica et Cosmochimica Acta*; *Microbial Ecology*; *Plos One*; *Holocene*; *Quaternary International*; *Palaeogeography, Palaeoclimatology, Palaeoecology*; *Quaternary Science Review*; *Aquatic Microbial Ecology*; *Scientific Reports*; *Global Change Biology*; *Quaternary Sciences*; *Journal of Applied Pharmaceutical Science*

Professional Affiliations

- Ecological Society of America
- Geological Society of America
- American Geophysical Union
- American Society for Microbiology
- International Society for Microbial Ecology

REFERENCES

Dr. Romy Chakraborty
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Lawrence Berkeley National Laboratory
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Tel: 510-486-4091

Dr. Jessica L. Conroy
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Dr. Adam M. Deustchbauer
Senior Scientist
Lawrence Berkeley National Laboratory
Email: amdeutschbauer@lbl.gov
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