Christine Yifeng Chen

Postdoctoral Researcher
Nuclear and Chemical Sciences Division
Lawrence Livermore National Laboratory
7000 East Ave, Livermore, California, USA

cychen@llnl.gov
+1 (925) 422-8008

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Research Bio

I am a geologist and geochemist broadly interested in applications of radiochronometry to terrestrial paleoclimatology and nuclear forensics. At LLNL, I am developing radiochronometry methods for nuclear materials and investigating radiogenic isotopic fractionation processes in the nuclear fuel cycle. I also research applications of uranium-series geochronology to lacustrine carbonates to reconstruct past changes in Earth's hydrological cycle. This work has involved field mapping and characterization of paleoshorelines and porous carbonate build-ups called tufas in the high-altitude central Andes and western United States, two presently water-limited areas where my work will inform our understanding of past climate change impacts on water availability.

Employment

2021– Postdoctoral Researcher. Cosmochemical and Isotopic Signatures Group, Nuclear and Chemical Sciences Division, Lawrence Livermore National Laboratory.

2020–2021 O.K. Earl Postdoctoral Scholar Research Associate. Geological & Planetary Sciences, California Institute of Technology (Caltech).

2013–2019 Research and Teaching Assistant/Fellow. Earth, Atmospheric & Planetary Sciences, Massachusetts Institute of Technology (MIT).

Education

2020 Ph.D., Geology.
MIT and the Woods Hole Oceanographic Institution, Joint Program.
Thesis: *U-Th Dating of Lacustrine Carbonates*

2013 A.B., Geosciences, *summa cum laude*.
Princeton University.
Thesis: *Revisiting the deformed high shoreline of Lake Bonneville*

Awards & Recognitions

2022 Presidential invitation to the White House for the CHIPS & Science Act signing ceremony.
2021 LLNL Excellence in Publication, Physical and Life Sciences Directorate.
2019 Caltech O.K. Earl Postdoctoral Fellowship.
2019 MIT Larry G. Benedict Leadership Institute Award.
2018 Best Student Oral Presentation Award (1 of 2 awarded total), IPA–IAL Meeting.
2017 MIT Martin Family Society of Fellows for Sustainability.
2017 MIT Office of Graduate Education Wellington and Irene Loh Fund Fellowship.
2016 MIT Dept. of Earth, Atmospheric, and Planetary Sciences Award for Excellence in Teaching.
2013 MIT Office of Graduate Education Ida M. Green Fellowship.
2013 NSF Graduate Research Fellowship.
2013 Princeton Arthur F. Buddington Award.
2012 Princeton Benjamin F. Howell Junior Independent Work Prize.
2012 Princeton Sigma Xi Scientific Research Society.

Research Grants

2016 Geological Society of America (GSA) Charles A. & June R. P. Ross Research Award.
2016 GSA Farouk El-Baz Student Research Grant for Desert Research.
2016 The Explorers Club Exploration Fund, Mamont Scholars Program.
2016 American Philosophical Society, Lewis and Clark Field Research Fund.
2015 **National Geographic Society Young Explorers Grant**.
2015 Woods Hole Oceanographic Institution Ocean Ventures Fund.
2012 Princeton Stanley J. Seeger Research Fellowship for Hellenic Studies.

Peer-Reviewed Publications

Google Scholar: https://scholar.google.com/citations?user=q8QN6bMAAAAJ

[16] **Chen, C.Y.**, Higginson, M.A., Kayzar-Boggs, T.M., et al. (2023) Separation of protactinium from uranium-niobium alloys for ^{231}Pa-^{235}U radiochronometry in nuclear forensic investigations. *J. Radioanal. Nucl. Chem.* doi: 10.1007/s10967-023-08928-y

[15] Stroup, J.S., Olson, K.J, ..., **Chen, C.Y.**, Lund, S. P., McGee, D. (2023) A >200 ka U-Th based chronology from lacustrine evaporites, Searles Lake, CA. *Geochemistry, Geophysics, and Geosystems*, 24:3, e2022GC010685. doi: 10.1029/2022GC010685

[14] Engel, J.R., Denton, J.S., Lamont, S.P., ..., **Chen, C.Y.**, Steiner, R., Kayzar-Boggs, T.M. (2023) A chromatography chemistry for purifying Pa from U-Nb metal alloys. *J. Radioanal. Nucl. Chem.*, 332, 369–376. doi: 10.1007/s10967-022-08747-7

[13] **Chen, C.Y.**, Kahanamoku, S.S., Tripati, A., Alegado, R.A., Morris, V.R., Andrade, K., Hosbey, J. (2022) Systemic racial disparities in funding rates at the National Science Foundation. *eLife* 11:e83071. doi: 10.7554/eLife.83071

[12] Higginson, M., Kayzar-Boggs, T.M., **Chen, C.Y.**, et al. (2022) Establishing discordance as a radiochronometric signature for nuclear forensic investigations: a multi-laboratory intercomparison exercise. *J. Radioanal. Nucl. Chem.*, 331:12, 4799–4815. doi: 10.1007/s10967-022-08428-5

[11] Rodbell, D.T., Hatfield, R.G., Abbott, M.B., **Chen, C.Y.**, et al. (2022) 700,000 Years of Tropical Andean Glaciation. *Nature*, 607. doi: 10.1038/s41586-022-04873-0

[10] Fendrock, M., **Chen, C.Y.**, Olson, K.J., Lowenstein, T.K., McGee, D. (2022) A computer vision algorithm for interpreting lacustrine carbonate textures at Searles Valley, USA. *Computers and Geosciences*, 105142. doi: 10.1016/j.cageo.2022.105142

[9] De Cort, G., Chevalier, M., Burrough, S., **Chen, C.Y.**, Harrison, S.P. (2021) An uncertainty-focused database approach to extract spatiotemporal trends from qualitative and discontinuous lake-status histories. *Quaternary Science Reviews*, 258:106870. doi: 10.1016/j.quascirev.2021.106870 [EarthArXiv]

[8] Cooperdock, E.H.C., **Chen, C.Y.**, Guevara, V.E., Metcalf, J.R. (2021) Addressing Systemic Bias In the Lab, Field, and Classroom. *AGU Advances*. 2:1, e2020AV000353. doi: 10.1029/2020AV000353

[7] Woods, A., Rodbell, D.T., Abbott, M.B., Hatfield, R.G., **Chen, C.Y.**, et al. (2020) Andean drought and glacial retreat tied to Greenland warming during the last glacial period. *Nature Communications*, 11:5135. doi: 10.1038/s41467-020-19000-8 [EarthArXiv]

[6] **Chen, C.Y.**, McGee, D., et al. (2020) U-Th dating of lake sediments: Lessons from the 700 ka sediment record of Lake Junín, Peru. *Quaternary Science Reviews*, 244:106422. doi: 10.1016/j.quascirev.2020.106422 **Invited research article.** [EarthArXiv]

[5] Hatfield, R.G., Stoner, J.S., Solada, K., Morey, A.E., Woods, A., **Chen, C.Y.**, McGee, D., Abbott, M.B., Rodbell, D.T. (2020) Paleomagnetic constraint of the Brunhes age sedimentary record from Lake Junín, Peru. *Front. Earth Sci.*, 8:147. doi: 10.3389/feart.2020.00147

[4] Austermann, J., **Chen, C.Y.**, Lau, H.C.P., Maloof, A.C., Latychev, K. (2020) Constraints on mantle viscosity and Laurentide ice sheet evolution from pluvial paleolake shorelines in the western United States. *Earth and Planetary Science Letters*, 532:116006. doi: 10.1016/j.epsl.2019.116006

[3] Hatfield, R.G, Woods, A., Lehmann, S.B., Weidhaas IV, N., **Chen, C.Y.**, Kück, J., Pierdominici, S., Stoner, J.S., Abbott, M.B., Rodbell, D.T. (2019) Stratigraphic correlation and splice generation for sediments recovered from a large-lake drilling project: an example from Lake Junín, Peru. *Journal of Paleolimnology*, 1–18. doi: 10.1007/s10933-019-00098-w

Peer-Reviewed Publications (cont.)

[2] **Chen, C.Y.** and Maloof, A.C. (2017) Revisiting the deformed high shoreline of Lake Bonneville, *Quaternary Science Reviews*, 159, 169–189. doi: 10.1016/j.quascirev.2016.12.019 [pdf]

[1] Husson, J.M., Maloof, A.C., Schoene, B., **Chen, C.Y.**, Higgins, J.A. (2015) Stratigraphic expression of Earth's deepest $\delta^{13}C$ excursion in the Wonoka Formation of South Australia, *American Journal of Science*, 315, 1–45. doi: 10.2475/01.2015.01

Other Publications, Writing, and Resources

Pico, T., **Chen, C.Y.**, et al. (2021) GeoContext: A social and political context for geoscience education. doi: 10.6084/m9.figshare.14158457.v1

Chen, C.Y. (2020) Asian Americans & Pacific Islanders in Geosciences: Introductory Remarks at the 2020 AGU Fall Meeting Meet-Up. [Medium]

Chen, C.Y. (2020) Diversity and Inclusion in Quaternary Sciences. *Quaternary Times*, 42(2).

Chen, C.Y. (2020) Growing Healthy Labs. *figshare*. doi: 10.6084/m9.figshare.12660077.v2

Invited Talks

2023 **Graduate Climate Conference.** Marine Biological Laboratory. *Keynote.*
2023 **Natl. Org. of Research Development Professionals Annual Conference.** *Opening Keynote.*
2023 **Columbia University**, Lamont-Doherty Earth Observatory. *Lamont Earth Science Colloquium.*
2023 **Columbia University**, Columbia Climate School. *Emerging Voices in Geosciences and Society.*
2022 **Univ. of Wash., Seattle**, School of Oceanography. *Banse Early Career Scholar Seminar.*
2021 **University of Geneva**, Department of Earth Sciences.
2021 **Universität Bern**, Institute of Geological Science.
2021 **University of Nevada Las Vegas**, Department of Geoscience.
2021 **Univ. of Wash., Seattle**, Earth & Space Sciences. *Distinguished Lecture Series.*
2021 **Univ. of Victoria**. *School of Earth & Ocean Sciences Seminar.*
2020 **Vanderbilt Univ.**, Earth & Environmental Science. *EES Seminar Series.*
2020 **Lawrence Livermore National Laboratory**, Nuclear & Chemical Sciences Division.
2020 **WHOI**, Dept. of Marine Geology & Geophysics. *Paleoclimate Seminar.*
2020 **Caltech**, Division of Geological and Planetary Sciences. *Geology Club Seminar.*
2019 **Brown Univ.**, Earth, Environ. & Planetary Sciences. *Climate & Environment Lunch Bunch Series.*
2019 **MIT**, EAPS. *Chemical Oceanography, Geology, Geochemistry, and Geobiology Seminar.*
2019 **USGS, Menlo Park**. *Informal Brown Bag Seminar.*
2018 **SUNY Binghamton**, Dept. of Geological Sciences. *Invited Speaker Seminar.*
2018 **Lamont-Doherty Earth Observatory**, Columbia University. *Biology & Paleo-Environment Seminar.*
2018 **Harvard University**, Earth & Planetary Sciences. *Solid Earth & Planetary Science Seminar.*

Conference Talks **Invited.*

2022 International Conference on Methods and Applications of Radioanalytical Chemistry.
2019 *American Geophysical Union (AGU) Fall Meeting, invited speaker for *Carbonate Sediments Through Time.*
2019 AGU Fall Meeting, speaker for *Advances and Applications in Quaternary Geochronology* session.
2019 *EGU General Assembly, invited speaker for *Limnogeology: Reading the Geological Record of Lakes* session.
2019 Northeast Section Geological Society of America Meeting.
2019 Pacific Climate Workshop (PACLIM). Pacific Grove, CA, USA.
2018 *Utah Geological Survey, Utah Dept. of Natural Resources, *Lake Bonneville Geological Conference.*
2018 Goldschmidt. Boston, MA.
2018 IPA-IAL Joint Meeting (×2). Stockholm, Sweden.
2015 AGU Fall Meeting. San Francisco, CA, USA.

In the Media

- Asian Researchers Face Disparity With Key U.S. Science Funding Source. *The New York Times*. January 2023. Similar coverage in *Daily Bruin*.
- NSF grant decisions reflect systemic racism, study argues. *Science Magazine*. July 2022. Similar coverage in *Chemical & Engineering News*, *The Chronicle of Higher Education*, *Physics Magazine*, *Eos*, and *Nature*.
- Impact of changing climate on Andean glaciers in sync with polar ice. *ScienceDaily*. July 2022.
- Seven Ways PIs Can Counteract Systematic Bias Now. *Eos*. 2021.
- Teaching Geoscience History in Context. *Eos*. 2021. Similar coverage in *Princeton Alumni Weekly*.
- An Ice Sheet's Footprint on Ancient Shorelines. *Eos*. February 2020.
- Featured scientist in *National Geographic Kids Almanac 2020*. May 2019.
- James Hansen's legacy: Scientists reflect on climate change in 1988, 2018, and 2048. *Salon*. 2018.
- What Natural 'Bathtub Rings' Teach Us About Climate Change. *National Geographic*, Facebook video. March 2017. Cumulative 1.8 million views.
- Scientists Politely Troll Bill Nye The Science Guy, Bill Responds Brilliantly. *IFLScience*. 2017.
- Telltale 'Bathtub Rings' Reveal Ancient Rainfall, *Oceanus Magazine*, Vol. 52, No. 1, Summer 2016.

Advising & Mentoring

- Maya Morris '22 (UC Merced), Summer 2021. National Nuclear Security Administration Minority Serving Institution Partnership Program.
- Valeria Torres-Olivares '22 (Princeton), Pace Center for Civic Engagement RISE (Recognizing Inequities and Standing for Equality) Initiative, Summer 2020.
- Ruth Tweedy '20 (MIT), 2019–2020 Senior Thesis. *Tufas from Salar del Huasco, northern Chile.*
- Zixuan "Crystal" Rao '18 (USTC, China), Summer 2017, Spring 2018 Senior Thesis. *Tufas from Lagunas Miscanti, Miñiques, and Pampa Varela.* (Now at Princeton for Ph.D.)
- A.J. Iversen '20 (MIT), Spring 2018–2019 and 2020 Senior Thesis. *GIS-based reconstructions of paleolake area and volumes in the western United States and central Andes.* Poster presentation at Northeastern Section GSA Meeting, March 2019.
- Jade Fischer '21 (MIT) and A.J. Iversen '20 (MIT), Winter 2018 (participation in fieldwork). Project: *Testing heliotropism of columnar tufas in Searles Lake basin, California.*
- Jasmine Jin '19 (MIT), Summer 2017.
- Ashling Neary '16 (MIT), Fall 2014.
- Kaylee Brent '17 (MIT), 2015 Grad-Undergrad Mentorship Program.

Leadership

- Chair, Workforce and Communications Committee, Physical & Life Sciences, LLNL. 2023–present.
- Co-founder of Asian Americans and Pacific Islanders in Geosciences. 2021.
- Panelist for AGU's Cultivating Leadership for Change and Justice in the Geosciences: "Progress and lessons learned after one year of anti-racism efforts in the geosciences." May 2021.
- Panelist for "Sitting Down with Uncomfortable Things in the Caltech Archives," part of the institute-wide *Critical Intersections: Conversations on History, Race, and Science* seminar series organized by the Division of Humanities and Social Sciences. October 2020. [`LA Times`]
- Panelist for session on *Diversity and Inclusion in the Quaternary Sciences*, American Quaternary Association (AmQua) 50th anniversary meeting. June 2020.
- AmQua Ad-hoc Diversity Committee, member. 2020.
- MIT EAPS Resource for Easing Friction and Stress (EAPS REFS), 2017–2019. Serving as a trained graduate student mediator to provide low barrier, confidential peer-to-peer coaching, listening, de-escalation, informal mentoring and mediation for the department.
- Creator and facilitator, Growing Healthy Labs: Effective Leadership of Research Groups workshop.
- Princeton Undergraduate Geosciences Society, Co-founder and President, 2011–2013.

Service

- AGU Diversity and Inclusion Advisory Committee, 2022–present.
- Panelist for *Earth Science Women's Network Careers Outside Academia*, November 2021.
- Invited facilitator for workshop on remote mentoring of summer undergraduate researchers, hosted by Society for Women in Marine Science, June 2020.
- Community Partner for Princeton Pace Center for Civic Engagement's RISE (Recognizing Inequalities and Standing for Equality) Initiative. 2020.
- Legal Observer, National Lawyers Guild, Los Angeles chapter. 2020.
- Panelist for *Professional and Graduate School Panel Discussion*, hosted by MIT Office of Undergraduate Advising and Academic Programming and Office of Graduate Education. April 2018.
- Science Planning Meeting, NSF Continental Scientific Drilling Coordination Office. Nov 2016.

Peer Review

- Reviewer for *Nature Geoscience*, National Science Foundation, *Geology*, *Geosphere*, *Geobiology*, *Journal of Quaternary Science*, National Geographic Society, American Chemical Society.

Public Engagement

- Active Twitter for science communication (`@earth2christine`), 4,000+ followers. 2012–present.
- Speaker for Exploring By The Seat of Your Pants, video broadcast into classrooms. 2019.
- Speaker for CafeSci Boston at the Boston Public Library, "Decoding the Climate from Ancient Lakes and Caves," hosted by NOVA and WGBH Educational Foundation. 2019.
- "Resident Geologist" of HBO's *Westworld* (TV series) on Reddit, author of a post explaining the tufa towers of the Trona Pinnacles in Searles Valley, a major filming site for the series. 13k views. Picked up by *Harper's Bazaar* and YouTube channel *Alt Shift X*.
- Letters to a Pre-Scientist, Pen Pal. 2016–2018.
- Created a science booth on how geologists reconstruct past rainfall patterns, presenting at MIT Museum Girls Day (March 2018), MIT Environmental Solutions Initiative Earth Day Celebration (April 2018), Cambridge Science Festival (2016, 2017, 2018), MIT Open House (2017), and the annual John H. Carlson Lecture at the New England Aquarium (2015, 2016).
- 8th grade Earth science class from Dana Hall School, final field trip assistant. 2017.
- Northeast Regional Middle School Science Bowl Competition, Moderator. 2017.
- Science Club for Girls, K–1st After School Program, Mentor Scientist (5 hrs/wk). 2016.
- National Geographic Young Explorers Workshop, Washington D.C., USA. 2016.
- Project Scientist, STEM Superstar for Charlotte, North Carolina. 2016.
- Princeton Community House After School Academy, tutor and mentor, 2009–2011.
- Science blog about experience as a geologic field assistant in South Australia. Summer 2010.
- Kopernik Observatory Science Center (Vestal, NY), Senior Intern, 2006–2009.

Teaching

- Contributor and co-organizer of GeoContext, a project dedicated to creating educational materials that provide social and political context for the geosciences. `https://geo-context.github.io/`
- Teaching Assistant for International Geobiology Course, 3-day petrography unit, 2018 & 2019. Lead instructor: Kristin Bergmann.
- MIT Kaufman Teaching Certificate Program, Summer 2017.
- Guest lecturer for Massachusetts Maritime Academy *Oceanography* course, Spring 2017.
- Teaching Assistant for MIT *The History of Earth's Climate*, Spring 2017.
  Overall TA Rating: 7.0/7.0 [`Evaluations`]. Lead instructor: David McGee.
- Teaching Assistant for MIT *Climate Science*, Fall 2016.
  Overall TA Rating: 6.9/7.0 [`Evaluations`]. Lead instructors: Kerry Emanuel & Edward Boyle.
- Teaching Assistant for MIT *Sedimentology in the Field: Precambrian Environments*, Spring 2016.
  Overall TA Rating: 6.7/7.0 [`Evaluations`]. Lead instructor: Kristin Bergmann.

- Teaching Assistant for University of Arizona *Summer Field Geology Camp*, Summer 2015, half term (2.5 weeks). Lead instructor: Jay Quade.
- Teaching Assistant for Princeton *Earth's Environments and Ancient Civilizations*, Fall 2012. Lead instructors: Adam Maloof & Frederik Simons.

Field Work & Other Field Experience

2020	Death Valley & Searles Lake, CA (**PI for 2 weeks**): Tufas and paleoshorelines
2018	Searles Lake, CA (**PI for 4.5 weeks**): Tufas and paleoshorelines of Searles Valley
2017	Searles Lake, CA (10 days): Continental drilling of lake sediments from Searles Lake bed
2016	Altiplano and Atacama, Chile (**PI for 4 weeks**): Central Andes paleolake levels
2016	Van Horn, Texas (9 days, teaching assistant): Precambrian sedimentology
2015	Lake Junín (Chinchaycocha), Peru (one month): ICDP drilling of lake sediments
2015	Western U.S., University of Arizona Summer Field School (2.5 weeks, student TA)
2015	Altiplano and Atacama, Chile (**PI for 5 weeks**): Central Andes paleolake levels
2014	Utah, Nevada (2 weeks, field assistant): Lake Bonneville lake and cave carbonates
2014	Utah, New Mexico (9 days, class assistant): 3D drone mapping of ancient landscapes
2012	Utah, Idaho, and Nevada (**PI for 9 weeks**): Lake Bonneville shoreline features
2012	Cyprus (10 days, class TA): Geophysical survey of Polis Chrysochous archeology site
2011	South Australia (8 weeks, field assistant): Ediacaran carbonates, Shuram anomaly

Other Skills

Proficient: MATLAB, LaTeX, ArcGIS, Adobe Illustrator and Photoshop
Intermediate: Git, Python, C++, C, Java, HTML
Tier 3 Conflict Management Training (40 hours), Conflict Management@MIT, Spring 2017.