# Kimberly V. Lau

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## APPOINTMENTS

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| Assistant Professor, Department of Geosciences, Penn State University | 2020-present |
| Assistant Professor, Department of Geology and Geophysics, University of Wyoming | 2019-2020 |
| Agouron Geobiology Postdoctoral Fellow, Department of Earth Sciences, UC Riverside | 2017-2018 |

## EDUCATION

**Stanford University**, Ph.D. in Geological Sciences, completed 2016, degree conferred 2017
**Yale University**, B.S. in Geology & Geophysics, with Honors, 2009

## EXPERIENCE

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| Laboratory Research Assistant, ICP-MS/Clean Lab Facility, Stanford University | 2012-2014 |
| Graduate Student Researcher, Department of Geological Sciences, Stanford University | 2011-2016 |
| Environmental Consultant/Geologist, Roux Associates, Inc., Woburn, Massachusetts | 2009-2011 |
| Undergraduate Thesis Research, Department of Geology & Geophysics, Yale University | 2008-2009 |
| Research Assistant, Payne Paleobiology Lab, Stanford University | 2007 |

## AWARDS AND FELLOWSHIPS

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| Scialog Fellow, Signatures of Life in the Universe | 2020 |
| Geological Society of America Doris M. Curtis Outstanding Woman in Science Award | 2019 |
| Agouron Institute Geobiology Postdoctoral Fellowship | 2017-2019 |
| Outstanding Graduate Student Award – for achievement in teaching, research, and mentoring in the Department of Geological Sciences, Stanford University | 2017 |
| AAPG Grants-in Aid, David Worthington Named Grant | 2015 |
| GSA Research Grant, Gretchen L. Blechschmidt Award | 2015 |
| ARCS Foundation Fellowship (covers tuition and stipend) | 2014-2016 |
| Certificate of Achievement in Mentoring in the School of Earth Sciences, Stanford University | 2014 |
| Distinction in the Major, Yale University | 2009 |

## PROFESSIONAL ACTIVITIES

- Associate Editor, American Journal of Science (2020-present)
- Society Memberships: AGU, GSA, SEPM, NAGT, ESWN
- Proposal reviewer for NSF, NASA Exobiology, ACS-PRF, NSERC, SSRL
- Panelist for NASA
- Journal reviewer for *American Journal of Science; Chemical Geology; Earth and Planetary Science Letters; Earth-Science Reviews; Geobiology; Geochemistry, Geophysics, Geosystems; Geochimica et Cosmochimica Acta; Geology; Global Biogeochemical Cycles; Gondwana Research; Nature; Nature Geoscience; Nature Communications; Palaegeography, Palaeoclimatology, Palaeoecology; Paleoceanography; PLOS One; Precambrian Research; Proceedings of the National Academy of Sciences*

**2020:**

- Convener, AGU Fall Meeting, *Global Geochemical Cycles and Earth's Climate over Geologic Time*
- Convener, GSA Annual Meeting, *Rare Earth Elements: The Behavior of Critical Minerals in Sedimentary, Magmatic, and Magmatic-Hydrothermal Systems*

- Panelist, Stanford Earth Diversity, Equity & Inclusion Virtual Panel on Asian American representation in the Geosciences
- SEPM Nominating Committee, Early Career Representative
- Convener, Goldschmidt Honolulu Session 14b, *Multi-Proxy Approaches for Paleoredox Reconstruction in the Carbonate Record*
- Workshop co-leader, Ocean Chemistry and Carbonate Sediment Production, International Sedimentary Geosciences Congress 2020/International SEPM Congress, Flagstaff, Arizona. Conference postponed due to COVID-19, to be rescheduled.

**2019:**

- Invited speaker, *Icehouse Collapse and Extreme Environments—Paleoclimate of the Continental Permian*, AGU, San Francisco, CA
- Invited speaker, 2nd Geobiology Society Conference, Banff, Canada
- Invited keynote speaker, *A look into the future of energy and sustainability using the sedimentary record* research symposium, SEPM/AAPG ACE Meeting, San Antonio, TX
- Convener, Goldschmidt Barcelona Session 9h, *Geobiological Controls on Critical Zone Evolution and Weathering, Past, Present and Future*
- SEPM student poster judge, SEPM/AAPG ACE Meeting, San Antonio, TX
- Poster judge, Rocky Mountain Geobiology Symposium, University of Colorado, Boulder

**2018:**

- Invited poster, Session PP33F *Trace Metals as Recorders of Biogeochemical Cycling in Modern and Ancient Settings*, AGU Fall Meeting, Washington, D.C.
- Convener, Goldschmidt Boston Session 7c, *Seafloor Diagenesis, Hydrothermal Processes, and Biogeochemistry: Implications for the Earth System through Time*
- Co-editor, *Early Earth and the Rise of Complex Life* Special Issue in *Emerging Topics in Life Sciences* (with Profs. Tim Lyons, Mary Droser, and Susannah Porter)

**Prior to 2018:**

- Invited keynote, *New Voices in Geobiology* session, GSA Annual Meeting, Seattle, WA
- Convener, GSA, *High-resolution investigations of the Permian-Triassic transition*
- Convener, Goldschmidt Paris Session 14d, *Phanerozoic mass extinctions and the biogeochemical co-evolution of the Earth-ocean system*
- Invited talk (with Honorarium), ARCS Symposium, The Tech Museum of Innovation, San Jose CA

## PUBLICATIONS AND INVITED BOOK CHAPTERS (all peer reviewed)

20. Zhang, F., del Rey, A., Planavsky, N.J., Chen, X., Dahl, T.W., Lenton, T.M., Clarkson, M.O., Li, Z., Romaniello, S.J., **Lau, K.V.**, Algeo, T.J., Anbar, A.D. (2020) Uranium isotopes in marine carbonates as a global ocean paleoredox proxy: A critical review. *Geochimica et Cosmochimica Acta* 287, 27-49.
19. Kelley, B.M., Lehrmann, D.J., Yu, M., Jost, A.B., **Lau, K.V.,** Schaal, E.K., Meyer, K.M., Payne, J.L. (2020) Controls on carbonate platform architecture across the Paleozoic to Mesozoic transition: a high-resolution analysis of the Great Bank of Guizhou. In press in *Sedimentology*.
18. Gussone, N., Ahm, A-S.C., **Lau, K.V.**, Bradbury, H. (2020) Calcium isotopes in Deep Time: Potential and Limitations. *Chemical Geology* 544, 119601.
17. **Lau, K.V.**, Lyons, T.W., Maher, K. (2020) Uranium reduction and isotopic fractionation in reducing sediments: Insights from reactive transport modeling. *Geochimica et Cosmochimica Acta* 287, 65-92.
16. Fantle, M.S., Barnes, B.D., **Lau, K.V**. (2020) The Role of Diagenesis in Shaping the Marine Carbonate Record. *Annual Reviews in Earth and Planetary Sciences* 48, 549-583.
15. Brüske, A., Weyer, S., Zhao, M.-Y., Planavsky, N.J., Wegwerth, A., Neubert, N., Pierau, N., Dellwig, O., **Lau, K.V.**, Lyons, T.W. (2020) Correlated molybdenum and uranium isotope signatures in modern anoxic sediments. *Geochimica et Cosmochimica Acta* 270, 449-474.

14. **Lau, K.V.**, Romaniello, S. J., Zhang, F. (2019) The Uranium Isotope Paleoredox Proxy. An invited chapter in: *Geochemical Tracers in Earth System Science*, Cambridge Elements, Cambridge University Press.
13. Lefebvre, P., Noël, V., **Lau, K.V.**, Jemison, N.E., Weaver, K.L., Williams, K.H., Bargar, J.R. Maher, K. (2019) Isotopic fingerprint of uranium accumulation and redox cycling in floodplains of the Upper Colorado River Basin. *Environment, Science & Technology* 53(7), 3399-3409.
12. Ibarra, D.E., Caves Rugenstein, J.K., Bachan, A., Baresch, A., **Lau, K.V.**, Thomas, D.L., Lee, J.-E., Boyce, C.K., Chamberlain, C.P. (2019) Modeling the consequences of land plant evolution on silicate weathering. *American Journal of Science* 319, 1-43.
11. Lyons, T.W., Droser, M.L., **Lau, K.V.**, Porter, S.M. (2018) Early Earth and the rise of complex life. *Emerging Topics in Life Sciences* 2(2), 121-124.
10. Zhang, F., Romaniello, S.J., Algeo, T.J., **Lau, K.V.**, Clapham, M.E., Richoz, S., Hermann, A.D., Smith, H., Horacek, M., Anbar, A.D. (2018) Multiple episodes of extensive marine anoxia linked to global warming and continental weathering following the latest Permian mass extinction. *Science Advances* 4:e1602921.
9. Silva-Tamayo, J.C., **Lau, K.V.**, Jost, A.B., Payne, J.L., Wignall, P.B., Newton, R.J., Eisenhauer, A., DePaolo, D.J., Brown, S., Maher, K., Lehrmann, D.J., Altiner, D., Yu, M., Richoz, S., Paytan, A. (2018) Global Perturbation of the Marine Calcium Isotope Cycle During the Permian-Triassic Transition. *GSA Bulletin* 130, 1323-1338.
8. **Lau, K.V.**, Maher, K., Brown, S., Altiner, D., DePaolo, D.J., Eisenhauer, A., Jost, A.B., Kelley, B.M., Lehrmann, D.J., Paytan, A., Silva-Tamayo, J.C., Yu, M., Payne, J.L. (2017) The influence of diagenesis, mineralogy, and seawater changes on calcium isotope variations in Lower-Middle Triassic carbonate rocks. *Chemical Geology* 471, 13-37.
7. Jost, A.B., Bachan, A., van de Schootbrugge, B., **Lau, K.V.**, Weaver, K.L., Maher, K., Payne, J.L. (2017) Uranium isotope evidence for an expansion of marine anoxia during the end-Triassic extinction. *Geochemistry, Geophysics, Geosystems* 18, 3093-3108.
6. Bachan, A., **Lau, K.V.**, Saltzman, M.R., Thomas, E., Kump, L.R, Payne, J.L. (2017) A model for the decrease in amplitude of carbon isotope excursions throughout the Phanerozoic. *American Journal of Science* 317(6), 641-676.
5. Kelley, B.M., Lehrmann, D.J., Yu, M., Minzoni, M., Enos, P., Li, X.W., **Lau, K.V.**, Payne, J.L. (2017) The Late Permian to Late Triassic Great Bank of Guizhou: An isolated carbonate platform in the Nanpanjiang Basin of Guizhou Province, China. *AAPG Bulletin* 101, 553-562.
4. **Lau, K.V.**, Macdonald, F.A., Maher, K., Payne, J.L. (2017) Uranium isotope evidence for temporary ocean oxygenation in the aftermath of the Sturtian Snowball Earth. *Earth and Planetary Science Letters* 458, 282-292.
3. Caves, J.K., Jost, A.B., **Lau, K.V.**, Maher, K. (2016) Cenozoic carbon cycle imbalances and a variable weathering feedback. *Earth and Planetary Science Letters* 450, 152-163.
2. **Lau, K.V.**, Maher, K., Altiner, D., Kelley, B.M., Kump, L.R., Lehrmann, D.J., Silva-Tamayo, J.C., Weaver, K.L., Yu, M., Payne, J.L. (2016) Marine anoxia and delayed Earth system recovery after the end-Permian extinction. *Proceedings of the National Academy of Sciences of the United States of America* 113, 2360-2365.
1. Schaal, E.K., Meyer, K.M., **Lau, K.V.**, Silva-Tamayo, J.C., Payne, J.L. (2015) Oceanic anoxia during the Permian-Triassic transition and links to volcanism. Invited book chapter in: *Volcanism and Global Environmental Change,* Cambridge University Press, p. 275-290.

*Manuscripts in revision, in review, or submitted*

**Lau, K.V.**, Hancock, L.G., Severmann, S., Kuzminov, A., Cole, D.B., Behl, R.J., Planavsky, N.J., Lyons, T.W. Insights into local controls on the uranium isotope signatures of black shales from the Miocene Monterey Formation.

Kelley, B.M., Lehrmann, D.J., Yu, M., **Lau, K.V.**, Li, X., Minzoni, M., Payne, J.L. Causes of along-strike variability in margin architecture on an isolated carbonate platform: the Great Bank of Guizhou, South China.

Nana Yobo, L., Brandon, A.D., Holmden, C., **Lau, K.V.**, Eldrett, J. Changing inputs of continental and

submarine weathering sources of Sr to the oceans during OAE 2.

Hülse, D., **Lau, K.V.**, van de Velde, S.J., Arndt, S., Meyer, K., Ridgwell, A. Temperature-driven nutrient recycling and subsurface euxinia as a marine mass extinction mechanism.

**RECENT CONFERENCE ABSTRACTS**

Mentees are underlined; *invited presentation

**2020:**

Romaniello, S.J., **Lau, K.V.**, Sabbatino, M., Parente, M. A Revised Paradigm for the Interpretation of $\delta^{238}U$ During Periods of Calcite Seas. AGU Annual Meeting.

Kukla, T., Ibarra, D.E., Caves Rugenstein, J.K., **Lau, K.V.** Energy budget constraints on the runoff and silicate weathering response to changing atmospheric $CO_2$. AGU Annual Meeting.

Pimental-Galvan, Payne, J.L., **Lau, K.V.**, Maher, K. Duration and Intensity of End-Permian Marine Anoxia. AGU Annual Meeting.

Hülse, D., **Lau, K.,** Arndt, S., van de Velde, S. J., Meyer, K., Ridgwell, A. A dynamic biological pump controlled the global redox landscape during the end-Permian extinction. Goldschmidt meeting (virtual).

*Ibarra, D.E., **Lau, K.V.**, Caves Rugenstein, J.K. Evidence for a variable silicate weathering feedback. Goldschmidt meeting (virtual).

*Chappaz, A., Donard, O.F.X., Hlohowskyj, S.R., Brennan, C.J., **Lau, K.V.**, Gregory, D.D., Lalonde, S.V. Trace element molecular geochemistry: A new approach for investigating the past. Goldschmidt meeting (virtual).

Nana Yobo, L., Brandon, A.D., **Lau, K.V.**, Holmden, C., Eldrett, J. Changing inputs of continental and submarine weathering sources of Sr to the oceans during OAE2. Goldschmidt meeting (virtual).

**2019:**

***Lau, K.V.**, Ibarra, D.E., Kukla, T., Caves Rugenstein, J.K. Extreme Climate, Carbon, and Continents: Quantifying Earth system feedbacks in the late Paleozoic. AGU Fall Meeting [invited presenter].

Minzoni, M., White, S., Bhattacharjee, S., Lehrmann, D. J., Li, X., Kelley, B., **Lau, K.**, Yu, M., Payne, J., Enos, P. Anatomy of a Prograding Lower Triassic Giant Ooid-Microbial Carbonate Shelf Margin, Nanpanjiang Basin, South China. GSA Annual Meeting.

Choumiline, K., Andersen, M.B., **Lau, K.V.**, Romaniello, S.J., Aguirre-Bahena, F., Shumilin, E., Silverberg, N., Lyons, T.W. Using uranium isotopes to disentangle biotic from abiotic processes in marine snow aggregates. Goldschmidt meeting.

***Lau, K.V.** Reconstructing anoxia in Phanerozoic oceans: insights from paleoredox proxies. Geobiology Society Conference.

***Lau, K.V.**, Hardisty, D.S., Gill, B.C., Lyons, T.W. Tracking Anoxia in Ancient Oceans: Potential and Limitations of Paleoredox Proxies in Carbonate Rocks. AAPG Annual Convention/SEPM Symposium.

Ibarra, D., Kukla, T., **Lau, K.**, Caves Rugenstein, J. Moist energy balance constraints on the sensitivity of the silicate weathering feedback during the Phanerozoic. EGU General Assembly.

Ibarra, D., Kukla, T., Oster, J., Winnick, M., Caves Rugenstein, J., **Lau, K.**, Chamberlain, C.P. Energetic constraints on the evolution of the water cycle from endorheic lake basins to continent-scale runoff. EGU General Assembly.

**2018:**

***Lau, K.**, Lyons, T., Maher, K. Early diagenetic reactive transport modeling of uranium concentrations and 'stable' isotopes. AGU Fall Meeting.

Ibarra, D.E., **Lau, K.V.**, Bernard, R.E., Cooperdock, E.G. Improvements in gender parity but not representation among Asian American geoscience PhD graduates. AGU Fall Meeting.

**Lau, K.**, Lyons, T., Maher, K. Modeling insights and a case study of uranium accumulation and isotopic fractionation during early diagenesis of marine sediments. Uranium Biogeochemistry conference.

**Lau, K.**, Lyons, T., Maher, K. Modeling insights into uranium accumulation and isotopic fractionation

during early diagenesis of marine sediments. Goldschmidt Meeting.

Zhang, F., **Lau, K.**, Zheng, W., Romaniello, S., Xiao, S., Anbar, A. Calcium isotope constraints on the terminal Ediacaran rise of calcified animals. Goldschmidt Meeting.

Li, X.W., Adams, N., Stepchinski, L., **Lau, K.V.**, Lehrmann, D.J., Minzoni, M., Yu, M., Payne, J.L. Influence of ocean redox conditions and carbonate saturation state on carbonate factories and platform architecture: examples from the Permian and Triassic Nanpanjiang Basin, South China. AAPG Annual Convention.

**Lau, K.V.**, Hancock, L.G., Maher, K., Severmann, S., Kuzminov, A., Behl, R., Lyons, T.W. Uranium Isotopes in Organic-Rich Shales as a Proxy for Oxygen in the Ancient Oceans: A Case Study from the Miocene Monterey Formation. SEPM Garrison Monterey Research Conference.

**2017:**

Ibarra, D.E., Caves, J.K., Bachan, A., Baresch, A., **Lau, KV.**, Thomas, D.L., Lee, J.-E., Boyce, C.K., Chamberlain, C.P. The evolution of land plants and the silicate weathering feedback. AGU Fall Meeting.

***Lau, K.V.**, Hancock, L.G., Maher, K., Severmann, S., Kuzminov, A., Behl, R.J., & Lyons, T.W. Constraints on uranium isotope fractionation and reconstruction of past marine redox conditions from the Miocene Monterey Formation. GSA Annual Meeting.

Ibarra, D., Caves, J., Bachan, A., **Lau, K.**, Thomas, D., Lee, J.-E., Boyce, K., & Chamberlain, C.P. The Evolution of Land Plants and Silicate Weathering. Goldschmidt Meeting.

**Lau, K.**, Maher, K., Brown, S., Silva Tamayo, J.C., Altiner, D., DePaolo, D., Eisenhauer, A., Lehrmann, D., Paytan, A., Yu, M., Payne, J. The Influence of Diagenesis and Mineralogy on Ca Isotopes in Lower-Upper Triassic Carbonate Rocks. Goldschmidt Meeting.

**Lau, K.V.**, Macdonald, F.A., Maher, K., Payne, J.L. Variable ocean oxygenation during the Cryogenian nonglacial interval and links to the carbon cycle: insights from uranium isotopes. Geobiology Society Conference.

**Lau, K.V.**, Macdonald, F.A., Maher, K., & Payne, J.L. Variable Ocean Oxygenation During the Cryogenian Non-Glacial Interval and Links to the Carbon Cycle: Insights from Uranium Isotopes. AbSciCon.