

HARRIET C.P. LAU

ADDRESS

Department of Earth, Environmental & Planetary Sciences
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CONTACT

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POSITIONS

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| 2023 – present | Assistant Professor, Department of Earth, Environmental and Planetary Sciences Brown University. Providence, RI. USA |
| 2019 – 2023 | Assistant Professor, Earth and Planetary Science. University of California Berkeley. Berkeley, CA. USA |
| 2017 – 2019 | Junior Fellow, Society of Fellows. Harvard University. Cambridge, MA. USA |
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EDUCATION

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| 2012 – 2017 | Harvard University, USA Ph.D. in Earth and Planetary Sciences Thesis Advisor: Prof. Jerry X. Mitrovica |
| 2008 – 2012 | Imperial College London, UK Master of Science in Geophysics (First Class Honors) Thesis Advisors: Drs Saskia Goes & Rhodri Davies |
| 2010 – 2011 | Massachusetts Institute of Technology, USA Visiting student, Department of Earth, Atmospheric, & Planetary Sciences Academic Advisor: Prof. Daniel Rothman |
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AWARDS

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| 2023 | CIG (Computational Infrastructure for Geodynamics) Distinguished Lecturer |
| 2022 | Packard Fellowship (David and Lucile Packard Foundation) |
| 2022 | Jason Morgan Early Career Award (AGU) |
| 2022 | Hellman Fellowship (UC Berkeley) |
| 2016 | <i>Graduate Research Award</i> for Study of the Deep Earth Interior Section (AGU) |
| 2016 | Harvard Graduate School of Arts and Sciences <i>Merit Research Fellowship</i> |
| 2015 | <i>Best Student Author Award</i> (Geophysical Journal International) |
| 2015 | <i>Shaler Teaching Award</i> (Earth and Planetary Sciences, Harvard University) |
| 2013 – 2017 | <i>Certificate for Distinction in Teaching</i> (2013-2015, 2017) |
| 2013 | <i>Outstanding Student Paper Award</i> for oral presentation (AGU) |
| 2012 | <i>Student Centenary Prize for outstanding Masters Thesis</i> (Imperial College London) |
| 2008 – 2012 | <i>Ash Music Scholarship</i> (Royal College of Music) |
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TEACHING

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| 2024 | Dynamic Earth (Brown University) |
| 2023 | Sea Level Rise (and Fall) (Brown University) |
| 2019 – 2022 | Lecturer for <i>The Planet Earth</i> (UC Berkeley) |
| 2021 | Lecturer for <i>Geodynamics</i> (UC Berkeley) |
| 2020 – | Founding member of <i>GeoContext</i> , an open-source online resource for lecture material on the historical context of topics within Earth science. |
| 2013 – 2017 | Teaching Fellow for undergraduate courses <i>Global Geophysics</i> and <i>A Brief History of Earth</i> (Harvard) |
| 2014 | Volunteer Virtual Teaching: Remote lessons in natural disasters at Spring Hill Elementary School, Austin, TX |
| 2011 – 2012 | Teaching Assistant for undergraduate course in Statistics/Computing (Imperial) |
| 2009 – 2010 | Volunteer science teacher at elementary schools in disadvantaged areas in London (Pimlico Connection) |
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INVITED CONFERENCE TALKS

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| AGU (Chicago) | Dec 2022 | “The Mechanical Mysteries of Lithospheric Thickness” (Abstract no: MR11A-01) |
| AGU (New Orleans) | Dec 2021 | “Weighing TUZO and JASON individually” (Abstract no: DI13A-05) |
| AGU (New Orleans) | Dec 2021 | “Contributions of Transient Rheology to Geophysical Deformation: Examples from the Deep to Shallow Earth” (Abstract no: DI41A-01) |
| EGU (Vienna) | Apr 2021 | “Frequency Dependent Mantle Viscoelasticity via the Complex Viscosity: cases from Antarctica and North America” (Abstract no: EGU21-1869) |
| AGU (virtual) | Dec 2020 | “Reconciling estimates of viscoelastic mantle structure using transient rheology—Glacial Isostatic Adjustment across North America and Antarctica” (Abstract no: T013-06) |
| AGU (virtual) | Dec 2020 | “How much and where? Exploring Excess Density within the LLSVPs by reconciling Stoneley Mode and Earth Tide Observations” (Abstract no: DI009-03) |

INVITED LECTURES

*virtual

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| TedX New England | Sept 2024 | TBC |
| National Academy of Sciences | May 2024 | Committee of Solid Earth Geophysics Glacial Isostatic Adjustment meeting |
| University of Arizona | Apr 2024 | Geosciences Colloquium (<i>CIG Distinguished Speaker Lecture</i>) |
| New Mexico Tech | Mar 2024 | EES Department Seminar (<i>CIG Distinguished Speaker Lecture</i>) |
| Columbia University | Nov 2023 | Earth Science Colloquium Series |
| Rutgers University | Nov 2023 | Earth and Planetary Science Colloquium (<i>CIG Distinguished Speaker Lecture</i>) |
| University of Wisconsin Madison | Oct 2023 | Weeks Lecture Seminar |
| University of Rhode Island | Oct 2023 | Department of Geoscience Lecture |
| Gordon Research Conference | Jun 2023 | Interior of Earth Plenary Speaker |
| MIT | Mar 2023 | COG3 Seminar |
| UC San Diego (virtual) | Oct 2022 | Institute of Geophysics and Planetary Physics Seminar |
| UC Berkeley | Sep 2022 | Earth and Planetary Science Seminar |
| Brown University | May 2022 | Department of Earth, Environmental and Planetary Sciences Colloquium |
| University of Washington | Mar 2022 | Department of Earth and Space Sciences Colloquium |
| UC Santa Barbara* | Jan 2022 | Department of Earth Sciences Colloquium |
| Kiel University* | Sep 2021 | 4D Deep Dynamic Earth Science Meeting |
| Universität Bonn* | Feb 2021 | Institut für Geodäsie und Geoinformation Seminar |
| Australian National University* | Feb 2021 | Research School of Earth Sciences Seminar |
| University of Chicago | Jan 2021 | Department of Geophysics Seminar |
| Stanford University* | Oct 2020 | Geophysics Seminar |
| Caltech Institute of Technology | Mar 2020 | Seismological Laboratory Seminar |
| UCLA | Jan 2020 | Earth, Planetary, and Space Science Colloquium |
| UCSC | Jan 2020 | Whole Earth Seminar |
| SAGE/GAGE Meeting, Portland (OR) | Oct 2019 | Plenary Speaker on Earth Rheology and Structure: New Approaches, Applications and Implications for Dynamics |
| Yale University | Feb 2019 | Department of Earth and Planetary Science Colloquium |
| Johns Hopkins University | Nov 2018 | Bromery Lecture |
| University of British Columbia | Sep 2018 | Department of Earth, Ocean, and Atmospheric Sciences Colloquium |
| Study of Earth’s Deep Interior Conference, Edmonton, Canada | Jul 2018 | Zatman Lecture |
| University of Michigan | Mar 2018 | Smith Lecture |
| McGill University | Feb 2018 | Earth and Planetary Sciences Department GEOTOP Lecture |
| Massachusetts Institute of Technology | May 2017 | Earth, Atmospheric, and Planetary Sciences Lecture |
| UC Berkeley | Mar 2017 | Department of Earth and Planetary Science Colloquium |
| Brown University | Feb 2017 | Lunch Bunch Geophysics Seminar |
| Princeton University | Oct 2016 | Geophysics Brown Bag Seminar |
| Columbia University | Apr 2016 | Lamont-Doherty Earth Observatory Marine Geology and Geophysics, Seismology, Geodesy, and Tectonics Seminar |

AWARDED GRANTS

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| Packard Fellowship (David and Lucile Packard Foundation) (Primary Investigator) | 2022 – 2027 | “Bridging Solid Earth Geophysics to Earth’s Climate: A more Holistic Consideration of Earth System Science”. \$875,000. |
| Frontier Research in Earth Sciences (NSF 2311897) (co-Investigator) | 2022 – 2027 | “Collaborative Research: Towards a new framework for interpreting mantle deformation: integrating theory, experiments, and observations spanning seismic to convective timescales”. \$499,824. |
| NASA SSW (80NSSC22K1379) (co-Investigator) | 2023 – 2025 | “Ocean-to-surface pathways on Enceladus”. \$53,652.00 |
| Hellman Fellowship (UC Berkeley) | 2022 – 2023 | “Solid Earth Dynamics across the Pleistocene”. \$57,000. |
| Geophysics (NSF 1923865) (Primary Investigator) | 2019 – 2024 | “Constraints from Multiple Low Frequency Data on the Long Wavelength Density Structure in the Deep Mantle”. \$595,689. |

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| SERVICE | 2023 – | Department Graduate student admissions committee |
| | 2023 – | AGU SEDI Canvassing committee |
| | 2023 – | Earthscope Innovation & Integration Advisory Committee |
| | 2022 – | Computational Infrastructure for Geodynamics (CIG) Science Steering Committee |
| | 2020 – 2022 | Louderback Committee member (UC Berkeley) |
| | 2020 – 2023 | Global Seismic Network Standing Committee (Incorporated Research Institutions for Seismology) |
| | 2019 – | Member of the International Association of Geodesy’s Joint Study Group |
| | 2019 – 2022 | Ramsden Committee (UC Berkeley) |
| | 2019 – 2021 | Member of department’s Diversity, Equity, Inclusion and Accessibility Committee (UC Berkeley) |

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| MEMBERSHIPS | 2012 – | Member of the European Geosciences Union |
| | 2012 – | Member of the American Geophysical Union |
| | 2012 – | Associate of the Royal School of Mines |

PUBLICATIONS (†PhD student advised by Lau; ‡Postdoc advised by Lau; *yet to be published)

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| [**] 2024* | Lau, H.C.P. and Al-Attar, D. “Putting Jason and Tuzo on the scales: The Weight of the Individual LLSVPs”, <i>in prep</i> |
| [**] 2024* | Lau, H.C.P. “Evolving Solid Earth Dynamics across the Mid Pleistocene Transition”, <i>in prep</i> |
| [**] 2024* | Coonin†, A., Lau, H.C.P. , and Coulson, A. “Fingerprinting Meltwater Pulse 1A Reveals Pole-to-Pole Cascade of Ice Loss”, <i>submitted</i> . |
| [31] 2024 | Al Asad†, M., and Lau, H.C.P. “Coupled Fates of Earth’s Mantle and Core: Early Sluggish-Lid Tectonics and a Long-lived Geodynamo”, <i>in press in Science Advances</i> |
| [30] 2024 | Hermosillo Ruiz, A., Lau, H.C.P. , and Murray-Clay, R. “Randomness and Retention: Using Weak Resonances to Constrain Neptune’s Late-Stage Migration”, <i>Monthly Notices of the Royal Astronomical Society</i> , 531(1), 1613-1629 |
| [29] 2024 | Adourian‡, S., Dursun†, M., Lau, H.C.P. , and Al-Attar, D. “Adjoint Sensitivity Kernels for Free Oscillation Spectra”, <i>Geophysical Journal International</i> , 238(1), 257-271. |
| [28] 2024 | Lau, H.C.P. “Surface Loading on a Self-gravitating, Linear Viscoelastic Earth: moving beyond Maxwell”, <i>Geophysical Journal International</i> , 237(3), 1842-1857 |

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- [27] 2023 Al Asad†, M., **Lau, H.C.P.**, Crowley, J.W., and Lenardic, A. “Modes of Mantle Convection, Their Stability, and What Controls Their Existence”, *Journal of Geophysical Research: Solid Earth*, 128(10), e2023JB027274
 - [26] 2023 **Lau, H.C.P.** “Transient Rheology in Sea Level Change: Implications for Meltwater Pulse 1A”, *Earth and Planetary Science Letters*, 609, 118106
 - [25] 2023 Paxman, G.J.G., **Lau, H.C.P.**, Auermann, J., Holtzman, B.K., Havlin, C. “Inference of the Timescale-Dependent Apparent Viscosity Structure in the Upper Mantle Beneath Greenland”, *AGU Advances*, 4(2), e2022AV000751
 - [24] 2023 Richards, F., Hoggard, M., Ghelichkhan, S., Koelemeijer, P., and **Lau, H.C.P.** “Geodynamic, geodetic, and seismic constraints favour deflated and dense-cored LLVPs”, *Earth and Planetary Science Letters*, 602, 117964
 - [23] 2023 **Lau, H.C.P.**, and Schindelegger, M. “Solid Earth Tides”, In Green, M. and Duarte, J. (Eds), *A Journey Through Tides* (Chapter 15, 365-387)
 - [22] 2022 Ringler, A., ..., **Lau, H.C.P.**, et al. “Achievements and Prospects of Global Broadband Seismographic Networks After 30 Years of Continuous Geophysical Observations”, *Reviews of Geophysics*, 60(3), e2021RG000749
 - [21] 2022 Kim, A.J., Crawford, O., Al-Attar, D., **Lau, H.C.P.**, Mitrovica, J.X., and Latychev, K., “Ice age effects on the satellite-derived J₂ datum: Mapping the sensitivity to 3D variations in mantle viscosity”, *Earth and Planetary Science Letters*, 581, 117372
 - [19] 2021 Daher, H., ..., **Lau, H.C.P.**, et al. “Long-term Earth-Moon evolution with high-level orbit and ocean tide models”, *Journal of Geophysical Research: Planets*, doi: 10.1029/2021JE006875
 - [18] 2021 †Robson, A., **Lau, H.C.P.**, Koelemeijer, P.K., and Romanowicz, B. “An analysis of core-mantle boundary Stoneley mode sensitivity and sources of uncertainty”, *Geophysical Journal International*, ggab448
 - [17] 2021 **Lau, H.C.P.**, Auermann, J., Holtzman, B.K., Book, C., Havlin, C., Hopper, E., and Lloyd, A. “Frequency Dependent Mantle Viscoelasticity via the Complex Viscosity: Cases From Antarctica”, *Journal of Geophysical Research: Solid Earth*, 126, e2021JB022622, doi: 10.1029/2021JB022622
 - [16] 2021 **Lau, H.C.P.**, and Al-Attar, D. “Sensitivity kernels for body tides on laterally heterogeneous planets based on adjoint methods”, *Geophysical Journal International*, ggab254
 - [15] 2021 **Lau, H.C.P.**, and Romanowicz, B. “Constraining Jumps in Density and Elastic Properties at the 660 km discontinuity Using Normal Mode Data via the Backus-Gilbert Method”, *Geophysical Research Letters*, 48(9), e2020GL092217.
 - [14] 2020 **Lau, H.C.P.**, Holtzman, B.K., and Havlin, C. “Towards a Self-consistent Characterization of Lithospheric Plates Using Full-spectrum Viscoelasticity”, *AGU Advances*, 4(1): e2020AV000205
 - [13] 2020 Auermann, J., Chen, C.Y., **Lau, H.C.P.**, Maloof, A.C., and Latychev, K. “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
 - [12] 2019 **Lau, H.C.P.** and Holtzman, B.K. “ ‘Measures of dissipation in viscoelastic media’ extended: Towards continuous characterization across very broad geophysical time scales”, *Geophysical Research Letters*, 46(16): 9544-9553
 - [11] 2019 **Lau, H.C.P.** and Faul, U. “Anelasticity from Seismic to Tidal Timescales: Theory and Observations”, *Earth and Planetary Science Letters*, 508: 18-29
 - [10] 2018 **Lau, H.C.P.**, Auermann, J., Mitrovica, J.X., Crawford, O., Al-Attar, D., and Latychev, K. “Inferences of Mantle Viscosity based on Ice Age Datasets: The Bias in Radial Viscosity Profiles due to the Neglect of Laterally Heterogeneous Viscosity Structure”, *Journal of Geophysics: Solid Earth*, 123: 7237-7252
 - [9] 2018 Crawford, O., Al-Attar, D., Tromp, J., Mitrovica J.X., Auermann, J., and **Lau, H.C.P.** “Quantifying the sensitivity of post-glacial sea level change to laterally varying viscosity”, *Geophysical Journal International*, 214(2): 1324-1363.

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- [8] 2017 **Lau, H.C.P.**, Davis, J.L., Mitrovica J.X., Tromp, J., Al-Attar, D., Latychev, K., and Yang, H.-Y. “Using Tidal Tomography to Constrain Deep Mantle Buoyancy”, *Nature*, 551:321-326
- [7] 2017 Wilmes, S.-B., Mattias Green, J.A., Gomez, N., Rippeth, T.P., and **Lau, H.C.P.** “Global tidal impacts of large-scale ice-sheet collapses”, *Journal of Geophysical Research: Oceans*, 122
- [6] 2017 **Lau, H.C.P.**, Faul, U., Mitrovica, J.X., Al-Attar, D., Tromp, J., and Garapic, G. “Anelasticity across Seismic and Tidal Timescales: a Self-Consistent Approach”, *Geophysical Journal International*, 208(1): 368-384
- [5] 2016 Hay, C.C., **Lau, H.C.P.**, Gomez, N., Austermann, J., Powell, E., Mitrovica, J.X., Latychev, K., and Wiens, D. “Sea-level fingerprints in a region of complex Earth structure: The case of WAIS”, *Journal of Climate*, 30(6): 1881-1892
- [4] 2016 **Lau, H.C.P.**, Mitrovica, J.X., Austermann, J., Crawford, O., Al-Attar, D., and Latychev, K. “Inferences of Mantle Viscosity Based on Ice Age Datasets: I. Radial Structure”, *Journal of Geophysical Research: Solid Earth*, 121: 6991-7012
- [3] 2016 Goldberg, S., **Lau, H.C.P.**, Mitrovica, J.X., and Latychev, K. “The Timing of the Black Sea Flood Event: Insights from Modeling of Glacial Isostatic Adjustment”, *Earth and Planetary Science Letters* 452: 178-184
- [2] 2015 **Lau, H.C.P.**, Yang, H.-Y., Tromp, J., Mitrovica, J.X., Latychev, K., and Al-Attar, D., “A normal mode treatment of semi-diurnal body tides on an aspherical, rotating and anelastic Earth”, *Geophysical Journal International* 202(2): 1392-1406
- [1] 2015 Davies, D.R., Goes S., **Lau, H.C.P.** “Thermally Dominated Deep Mantle LLSVPs: A Review” in “*The Earth’s Heterogeneous Mantle: A Geophysical, Geodynamical, and Geochemical Perspective*”. Khan, A., Deschamps, F. (Eds). Springer International Publishing
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