Updated: September 16, 2025

2016

2016

# Xiyuan Bao

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Department of Earth and Planetary Sciences, Harvard University

EDUCATION	Ph.D. in Geophysics, University of California, Los Angeles	2018-Mar 2024
	M.S. in Geophysics, University of California, Los Angeles	2018-2020
	B.S. of Geophysics with Honors, University of Science and Technology of China	2014-2018
	Minor in Computer Science , University of Science and Technology of China	2014-2018
EXPERIENCE	Reginald A. Daly Postdoctoral fellow, Harvard University	Oct 2024-
	Postdoctoral Scholar, University of California, Los Angeles	Mar 2024-Sep 2024
	Graduate Research Assistant, University of California, Los Angeles	Sep 2018-Mar 2024
	Hotspots from Top to Bottom (Advisor: Carolina Lithgow-Bertelloni)	
	<b>Undergraduate Research Assistant</b> , University of Science and Technology of Chi Benchmark on CitcomToEllipsis: Spontaneous subduction towards free surface (Ad	• •
	Visiting Undergraduate, University of Illinois, Urbana-Champaign	Jun-Aug 2017
	Constraining the Nature of the LLSVPs Using Geoid and Dynamic Topography (Ad	C
	Constraining the Mature of the BESTI's Osting George and Dynamic Topography (110	ivisor. Eijun Eiu)
Honors &	• Reginald A. Daly Postdoctoral Research Fellowship, Harvard University	2024
AWARDS	• Study of the Earth's Deep Interior Section Award for Graduate Research, AGU	2023
	<ul> <li>Computers and Geosciences Research Scholarship, IAMG</li> </ul>	2022
	<ul> <li>Jiuzhang Zhao Talent Program in Earth and Space Sciences, USTC</li> </ul>	2015-2018
	<ul> <li>Award from National Undergraduate Innovation Training Program, USTC</li> </ul>	2017-2018
	<ul> <li>Earth Science Climbing Scholarship, USTC</li> </ul>	2015, 2017

• First Prize of Physics Innovation Research Experiment Thesis Competition, USTC

• Silver Scholarship for Outstanding Students, USTC

#### **PUBLICATIONS**

- [6] **Bao, X.** & Lithgow-Bertelloni, C. R. Self-correction of the optical distortion effect of thermal plumes in particle image velocimetry. *Physics of Fluids*. https://doi.org/10.1063/5.0233759 (2024).
- [5] **Bao, X.** Giant impact and Earth's mysterious blobs: An interdisciplinary revelation. *Science Bulletin* **69**, 293–294 (2024).
- [4] **Bao, X.,** Mittal, T. & Lithgow-Bertelloni, C. R. Determining Mid-Ocean Ridge Geography from Upper Mantle Temperature. *Earth and Planetary Science Letters* **641**, 118823 (2024).
- [3] Zhang, X., Brown, E. L., Zhang, J., Lin, J., **Bao, X.** & Sager, W. W. Magmatism of Shatsky Rise controlled by plume-ridge interactions. *Nature Geoscience*. https://www.nature.com/articles/s41561-023-01286-0 (2023).
- [2] Li, S., Li, J., Ferrand, T. P., Zhou, T., Lv, M., Xi, Z., Maguire, R., Han, G., Li, J., **Bao, X.**, *et al.* Deep geophysical anomalies beneath the Changbaishan Volcano. *Journal of Geophysical Research: Solid Earth*, e2022JB025671. https://agupubs.onlinelibrary.wiley.com/doi/full/10.1029/2022JB025671 (2023).
- [1] **Bao, X.,** Lithgow-Bertelloni, C. R., Jackson, M. G. & Romanowicz, B. On the relative temperatures of Earth's volcanic hotspots and mid-ocean ridges. *Science* **375**, 57–61. ISSN: 0036-8075. https://www.science.org/doi/10.1126/science.abj8944 (2022).

## **MANUSCRIPTS SUBMITTED**

- [4] Lucas, E., Richards, F., Cederberg, G., Bao, X., Hoggard, M. J., Tsuji, S. R. J., Latychev, K., Tsuji, L. J. S. & Mitrovica, J. Emergence of Antarctic mineral resources in a warming world. Revision Under review in Nature Climate Change.
- [3] Cai, R., Bao, X., Foley, S. F., Giuliani, A., Jiang, S., Pearson, D. G. & Liu, J. Evidence for a highly fusible fundamental constituent in the convective mantle. submitted.
- [2] Bao, X., Wamba, M. D. & Stracke, A. A deep-mantle geochemical zoning map beneath East Africa and Indian Ocean. Under review in Science.
- [1] Bao, X. & Lithgow-Bertelloni, C. R. End-to-End workflow for 4-dimensional flow measurements and analysis in viscous Rayleigh-B 'enard Convection submitted.

# MANUSCRIPTS IN PREP

- [5] Coulson, S., Lloyd, A., Bao, X., Mitrovica, J. X., Dangendorf, S., Pan, L., Valencic, N., Tamisea, M. E., Al-Attar, D. & Heathcotte, D. Inverting Sea Surface Height Data for Greenland Ice Mass Changes (1993-2019): A Proof of Concept
- [4] Bao, X., Coulson, S., Valencic, N., Mitrovica, J., Dangendorf, S., Mousavi, M. & Lloyd, A. Inverting Sea Level Fingerprints for Ice Mass Changes Using Neural Operators: How Much Can We Recover and How Unique Is It?
- [3] Bao, X., Cao, Z., Gourley, K. C., Gutierrez, S., Liang, Y., Zhou, D., Buffett, B. A., Mittal, T., Li, J., Pierrehumbert, R., Schaefer, L., Orman, J. V. & Foley, B. J. Coupled Evolution of Earth's Hydrogen Distribution and Thermal History.
- [2] Wang, W., Zhang, X., Lin, J., Cheng, Z., Bao, X., Zhang, F., Kelley, K. A., Chen, L. & Chu, F. Ultra-depleted mantle supporting the Marion Rise: implications for ocean rise dynamics
- [1] **Bao, X.,** Lithgow-Bertelloni, C. R. & Cagney, N. *Interaction and evolutionary pathways of laminar* thermal plumes revealed by 4-dimensional velocity measurements and analysis: Application to mantle plumes

#### ORAL

- PRESENTATIONS [16] Invited: Deep Provenance of East African and Indian Ocean Hotspots through Tomography, Graph Theory, and Geochemical Cross-validation Special Seminar (Princeton University, Princeton, NJ, Nov. 2025).
  - [15] Invited: Deep Provenance of East African and Indian Ocean Hotspots through Tomography, Graph Theory, and Geochemical Cross-validation Geophysics Hour (Arizona State University, Tempe, AZ, Nov. 2025).
  - [14] Invited: Plumes over LLSVPs: Supercharging multi-scale flow resolution with hybrid experimentaladjoint digital twins Geophysics Seminar (Brown University, RI, US).
  - [13] Plumes over LLSVPs: Supercharging multi-scale flow resolution with hybrid experimental-adjoint digital twins BiSEPPS Seminar (Harvard University, MA, US, Nov. 2024).
  - [12] Invited: A Song of Ice and Fire: Operator Learning for Viscous Flow from Mantle Convection to Ice Dynamics Daly Special Seminar (Harvard University, MA, US, Feb. 2024).
  - [11] Invited: Hotspots from Top to Bottom Geophysics Seminar (University of Science and Technology of China, Anhui, China, Jan. 2024).

- [10] *Invited:* Illuminating Mantle Convection: Unraveling Plume Dynamics over LLSVPs in the Laboratory AGU Fall Meeting 2023 (San Francisco, CA, US, Dec. 2023).
- [9] *Invited:* Hotspots from Top to Bottom Earth Sciences Seminar (University of Southern California, CA, US, Oct. 2023).
- [8] *The plume zoo of thermal LLSVPs* AGU Fall Meeting 2022 (Chicago, IL, US, Dec. 2022), V26A–02.
- [7] Coupled Evolution of Earth's Hydrogen Distribution and Thermal History AGU Fall Meeting 2022 (Chicago, IL, US, Dec. 2022), MR33A–06.
- [6] *Invited:* Hotspots from Top to Bottom Seismo Lab Seminar (California Institue of Technology, CA, US, Nov. 2022).
- [5] *Invited:* Are hotspots hotter than ridges? IGCP 648 Virtual Seminar Series (Curtin University, Australia, Nov. 2022), Series 5, Seminar 5. https://www.youtube.com/watch?v=30B21c7NGIY.
- [4] Experimental Investigation of Purely Thermal LLSVPs UCLA EPSS Seismology and Tectonics Seminar (UCLA, CA, US, May 2022).
- [3] Accurate Prediction of Ocean Basins Using Upper Mantle Potential Temperatures AGU Fall Meeting 2021 (New Orleans, LA, US, Dec. 2021), DI34A–05.
- [2] Accurate Prediction of Ocean Basins Using Upper Mantle Potential Temperatures UCLA EPSS Geology/Geophysics Seminar (UCLA, CA, US, Oct. 2021).
- [1] Correlation of geochemical signals with MORB and OIB temperatures UCLA EPSS Geocheminar (UCLA, CA, US, Oct. 2019).

### POSTER

PRESENTATIONS [11] Bao, X. & Lithgow-Bertelloni, C. R. in. AGU Fall Meeting 2024 (Washington DC, US, Dec. 2024).

- [10] **Bao, X.** & Lithgow-Bertelloni, C. R. in. 2024 Ada Lovelace Workshop on Modelling Mantle and Lithosphere Dynamics (University of California, Berkeley, CA, US, Sept. 2024).
- [9] **Bao, X.** in. AGU Fall Meeting 2023 (San Francisco, CA, US, Dec. 2023).
- [8] **Bao, X.** & Lithgow-Bertelloni, C. R. in. 2023 Gordon Research Seminar: Interior of the Earth (Mount Holyoke College, MA, US, June 2023).
- [7] **Bao, X.** & Lithgow-Bertelloni, C. R. in. Seismo Lab Centenial (California Institue of Technology, US, Nov. 2022).
- [6] Bao, X. & Lithgow-Bertelloni, C. R. in. 2022 Ada Lovelace Workshop on Numerical Modelling of Mantle and Lithosphere Dynamics (Hévíz, Hungary, Aug. 2022).
- [5] **Bao, X.** & Lithgow-Bertelloni, C. R. in. CIDER2022 (University of California, Berkeley, CA, US, July 2022).
- [4] **Bao, X.,** Lithgow-Bertelloni, C. R. & Jackson, M. G. in. AGU Fall Meeting 2020 (San Francisco, CA, US, Dec. 2020), DI007–0006.
- [3] Wang, Y., Liu, L. & **Bao, X.** in. AGU Fall Meeting 2020 (San Francisco, CA, US, Dec. 2020), DI005–0005.
- [2] **Bao, X.,** Lithgow-Bertelloni, C. R. & Jackson, M. G. in. AGU Fall Meeting 2019 (San Francisco, CA, US, Dec. 2019), DI41D–0028.

[1] Bao, X. & Lithgow-Bertelloni, C. R. in. 2019 Gordon Research Seminar: Interior of the Earth (Mount Holyoke College, MA, US, June 2019).

### PROFESSIONAL SERVICE

- Guest Editor for PNAS Nexus, 2025 Call for Papers in Machine Learning and Geosciences
- Advances in Machine Learning for Solid Earth Geoscience, Primary Session Convener and Chair, AGU Fall Meeting 2025
- Advances in Deep Earth-Surface Interactions, Primary Session Convener and Chair, AGU Fall Meeting 2024
- The Structure and Composition of the Lower Mantle, Discussion Leader, Gordon Research Seminar
- Advances in Mantle Convection and Planetary Evolution, Primary Session Convener and Chair, AGU Fall Meeting 2022
- Reviewer for Nature Geoscience; Journal of Geophysical Research: Solid Earth; Geophysical Journal International; Planetary Science Journal; Physics of Fluids; Earth and Planetary Physics; Frontiers in Earth Science
- Reviewer for National Science Foundation, Geophysics Program

OTHER SERVICE • Committee Member of UCLA EPSS Family Mentorship Program (EFMP)

#### OUTREACH

- Rheology, Plate Tectonics with Food Saturday Science Academy, UCLA/Charles R. Drew University Mar 2023
- Why Hawaii is a volcano? How do Alaskan volcanos differ? EYU, UCLA Nov 2022
- Media Interview about our cold hotspots, e.g. ScienceNews, New Scientist<sup>1,2</sup> Popular Science, and Deutschlandfunk Jan 2022
- Invited Outreach Article Rocks beneath volcanic hotspots can be surprisingly cool Jan 2022
- The sweet smell of Earth's mantle: Why is Hawaii a volcano? EYU, UCLA Nov 2020, 2021
- Lab visit from Tokyo Tech. UCLA

Feb 2020

• Why is Hawaii a volcano? Explore Your Universe, UCLA

Nov 2019

# TEACHING EXPERIENCE

• Blue Planet: Introduction to Oceanography, Teaching Assistant, UCLA

Spring 2020

• Earthquakes, Teaching Assistant, UCLA

Spring 2019, Fall 2021

# MENTORING **EXPERIENCE**

- Jade Wight, undergrad, Modeling Mantle Plumes and Their Effect on Dynamic Topography, won 2020 Deane Oberste-Lehn Scholarship, UCLA Oct 2019 - Jun 2021
- Wan Ki (Arthur) Lo, undergrad, Dynamics of Adjacent Mantle Plumes through Physical and Computer Simulations, won 2021 Harold and Mayla Sullwold Scholarship, UCLA Jan 2020 - Jun 2022
- Kavya Agarwal, undergrad, Compositional and thermodynamical effect on mantle plumes; Critical plume merge distance with shadowgraph, IIT Sep 2021 - Aug 2022

#### REFEREES

- Carolina Lithgow-Bertelloni (clb@epss.ucla.edu) Office Phone: 310-267-4719 Department of Earth, Planetary, and Space Sciences, University of California, Los Angeles 595 Charles E Young Dr E, Geology 1810, Los Angeles, CA 90095
- Jerry Mitrovica (jxm@eps.harvard.edu) Office Phone: 617-496-2732 Department of Earth and Planetary Sciences, Harvard University 20 Oxford St, Cambridge MA 02138
- Jonathan Aurnou (jona@epss.ucla.edu) Office Phone: 310-825-2054 Department of Earth, Planetary, and Space Sciences, University of California, Los Angeles 595 Charles E Young Dr E, Geology 5638, Los Angeles, CA 90095

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