Qian(Chan) Yuan

Computational Earth and planetary scientist
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PROFESSIONAL APPOINTMENTS

Assistant Professor	Texas A&M, Department of Geology and Geophysics	2025.7 –
O.K. Earl Prize Postdoctoral Fellow	California Institute of Technology, Division of Geological and Planetary Sciences	2022.8 – 2025.6
Postdoctoral Researcher	Arizona State University, School of Earth and Space Exploration	2022.5–7

EDUCATION

PhD	Computational Geodynamics, Arizona State University	2018 – 2022
EngD	Economic Geology and Geochemistry, China University of Geosciences	2011 – 2016
Visiting Student	University of Liège, Belgium	2014 – 2016
Bachelor of Science	China University of Geosciences	2007 – 2011

GRANTS, FELLOWSHIPS, AND AWARDS

NSF EAR-2330810 *The thermal blanketing effect of supercontinents on the formation of Proterozoic anorthosites (*$362,323*,* ***main proposal contributor but not listed as Co-I due to postdoctoral associate status****)* 2024 – 2026

NASA ICAR *The Dawn of Life on Early Earth: From the Sun to the Planetary Surface* ***($5,762,000, co-I, pending)*** 2025 – 2030

XSEDE/ACCESS *Supercomputing Allocations ($1,000,000, Computational models of subduction and mantle flow,* ***contributing investigator****, PI: M. Gurnis)* 2022 – 2025

O.K. Earl Prize Postdoctoral Fellowship (Caltech–$140,000, **Accepted**) 2022
Distinguished Postdoctoral Fellowship (UT-Austin–$150,000, Declined) 2022
School of Earth and Space Exploration Postdoctoral Fellow (ASU–$213,000, Declined) 2022
AGU 2021 Outstanding Student Presentation 2021

RESEARCH FOCUS

Geodynamics and planetary habitability; High performance computation and machine learning; Evolution of planetary interiors and its coupling with surface geological processes.

PEER-REVIEWED PUBLICATIONS (GOOGLE SCHOLAR)

First author

1. Yuan, Q., Gurnis, M., Asimow, P. D., & Li, Y. (2024). A giant impact origin for the first subduction on Earth. ***Geophysical Research Letters***, 51(9), e2023GL106723. Link [Editor's highlight on Eos] [The Washington Post] [New York Times]
2. Yuan, Q. (2024). Numerical Modeling of Melting Processes During Slab Break-off: Insights Into Tectonic Setting for Massif-Type Anorthosites. ***Lithosphere***, 2024(1), lithosphere_2023_344. Link
3. Yuan, Q., Li, M., Desch, S.J., Ko, B., Garnero, E., Gabriel, T.S., Kegerreis, J.A., Miyazaki, Y., Eke, V., Asimow, P.D. (2023). Moon-forming impactor as a source of Earth's basal mantle anomalies. ***Nature***, 623, 95-99 (2023). (Cover paper). Link [News article on Science] [News article on Nature] [New York Times] [The Times]

4. Yuan, Q., & Li, M. (2022). Instability of the African large low-shear-wave-velocity province due to its low intrinsic density. ***Nature Geoscience***, 15(4), 334-339. Link [BBC news]
5. Yuan, Q., & Li, M. (2022). Vastly different heights of LLVPs caused by different strengths of historical slab push. ***Geophysical Research Letters***, 49(17), e2022GL099564. Link
6. Yuan, Q., Zhang, C., Cheng, F., Cao, X., Needham, E., Zheng, H., & Lü, X. (2022). In-situ U–Pb dating of zircon coronas, Sr–Nd–Hf isotopes and petrological constraints of the Daxigou anorthosite complex, NW China. ***Gondwana Research***, 105, 96-116. Link
7. Yuan, Q., Namur, O., Fischer, L. A., Roberts, R. J., Lü, X., & Charlier, B. (2017). Pulses of plagioclase-laden magmas and stratigraphic evolution in the Upper Zone of the Bushveld Complex, South Africa. ***Journal of Petrology***, 58(8), 1619-1643. Link
8. Yuan, Q., Cao, X. F., Lu, X. B., Yang, E. L., Wang, X. D., Liu, Y. G., ... & Mohammed-Abdalla-Adam, M. (2014). Petrology and zircon U-Pb dating combined with Hf isotope study of granitic rocks from the Kuluketage Block (Tarim Craton, NW China). ***Journal of Geosciences***, 59(3), 275-291. Link

In process

9. Yuan, Q., Gurnis, M., Asimow, P. D., & Antoshechkina, P. Enabling large-scale geodynamic-geochemical modeling via neural network acceleration. In prepare, 90% complete
10. Yuan, Q., Gurnis, M., & Asimow, P. D. A long-lived supercontinent, Nuna-Rodinia: insights from plagioclase composition in Proterozoic massif-type anorthosites. In prepare, 90% complete
11. Yuan, Q. Impact-driven evolutionary divergence of Earth and Venus. In work.

Co-author

12. Deng, J., Miyazaki, Y., Yuan, Q., Du, Z. (2024). Formation of deep mantle heterogeneities through basal exsolution contaminated magma ocean. In review at ***Nature Geoscience***. Link
13. Chen, W., Lü, X., Yuan, Q., Huang, C., Gao, X., Lu, Y., & Cao, X. (2023). Petrogenesis and metallogenesis of the Qieganbulake carbonatite-related phosphate deposit associated with the mafic–ultramafic–carbonatite complex in the Kuluketage block, northeastern Tarim Craton. ***Geological Magazine***, 160(4), 685-711. Link
14. Chen, W., Lü, X., Yuan, Q., Huang, C., & Cao, X. (2022). Petrogenesis and metallogenesis of the Kawuliuke Fe-P-Ti oxide-rich intrusive complex in the Kuluketage Block, northeastern Tarim Craton. ***Precambrian Research***, 379, 106816. Link
15. Fischer, L. A., & Yuan, Q. (2016). Fe-Ti-V-(P) resources in the upper zone of the Bushveld complex, South Africa. ***In Papers and Proceedings of the Royal Society of Tasmania***, 150 (1), 15-22. Link
16. Cisse, M., Lü, X., Algeo, T. J., Cao, X., Li, H., Wei, M., Yuan, Q & Chen, M. (2017). Geochronology and Geochemical characteristics of the Dongping ore-bearing granite, North China: Sources and implications for its tectonic setting. ***Ore Geology Reviews***, 89, 1091-1106. Link
17. Lü, X., Yuan, Q., Cao, X., Liu, H., Yang, E., Wu, C., ... & Liu, W. (2015). Geochronology and Hf isotopes of detrital zircons from Lower Proterozoic magnetite quartzites, NE Tarim, NW China: Constraints on the Precambrian evolution of central Asia. ***Geochemical Journal***, 49(4), 425-442. Link
18. Cao, X., Lü, X., Yuan, Q., Wang, X., Liu, H., & Shen, W. (2014). Neoproterozoic granitic activities in the Xingdi plutons at the Kuluketage block, NW China: Evidence from zircon U–Pb dating, geochemical and Sr–Nd–Hf isotopic analyses. ***Journal of Asian Earth Sciences***, 96, 93-107. Link

CONFERENCES PAPERS (*1ST AUTHOR ONLY*)

Yuan, Q., Gurnis, M., Asimow, P.D., Antoshechkina, P. (2024). Enabling large-scale geodynamic-geochemical modeling via neural network acceleration. *AGU Fall Meeting Abstracts*. [TBD]

Yuan, Q., Gurnis, M., Asimow, P.D. (2023). A Giant Impact Origin for the First Subduction on Earth. *LPI Contributions*, 2806, 2723. [Oral presentation]

Yuan, Q., Li, M. (2022). Vastly different heights of LLVPs caused by different strengths of historical slab push. *AGU Fall Meeting Abstracts*. [Invited talk]

Yuan, Q., Li, M., Garnero, E., Shim, S.H., Ko, B. (2021). Investigating the dynamics of ultra-high velocity zones above Earth's core-mantle boundary. *AGU Fall Meeting Abstracts*. [Oral presentation]

Yuan, Q., Li, M. (2021). Vast different height of the LLSVPs caused by catastrophic slab avalanching at the 660-km discontinuity. *AGU Fall Meeting Abstracts*. [Poster presentation]

Yuan, Q., Li, M., Desch, S., Ko, B. (2021). Giant Impact Origin for the Large Low Shear Velocity Provinces. *LPI Contributions*, 2548, 1980. [Oral presentation] (Media coverage: Science, Discover Magazine, Sky & Telescope)

Yuan, Q., Li, M., Desch, S., Ko, B. (2020). Giant Impact Origin for the Large Low Shear Velocity Provinces. *AGU Fall Meeting Abstracts*. [Poster presentation]

Yuan, Q., Hervig, R., Bose, M., Jin, Z.L. (2020). Lithium Isotope Variations in the Palabora Carbonatite Complex: A Tale of Two Humites. *GSA Annual Meeting* [Oral presentation]

Yuan, Q., Namur, O., Fischer, L., Roberts, R.J., Lü, X.B., Charlier, B. (2019). Multiple pulses of plagioclase-laden magmas and stratigraphic evolution in the Upper Zone of the Bushveld Complex, South Africa. *GSA Annual Meeting* [Oral presentation]

Yuan, Q., Li, M. (2019). What controls the morphology of Large Low Shear Velocity provinces? *AGU Fall Meeting Abstracts*. [Poster presentation]

ACTIVITIES & SERVICE

Invited talks:

University of Southern California, U.S. (2024, 10)
Stanford University, U.S. (2024, 2)
University of Arizona, U.S. (2024, 2)
ETH Zurich, Zürich, Switzerland. (2023. 12)
Southwest Research Institute, Boulder, U.S. (2023, 2)
University of Maryland, College Park, U.S. (2023, 2)
University of California, Los Angeles, U.S. (2023. 1)
AGU Fall Meeting, Chicago, U.S. (2022, 12)
Curtin University, Australia (2022, 10)
Seismological laboratory, California Institute of Technology, U.S. (2022, 10)
Macau University of Science and Technology, Macau, China. (2022, 05)
University of Houston, U.S. (2022, 03)

Activities:

Chair of AGU session: *To the Moon: A New Era of Lunar Science—Geology and Geophysics VI* Oral, 2024
Chair of AGU session: *Exploring complex mantle dynamics with observations, laboratory experiments and computer models*, 2023
Co-chair of AGU session: *Exploring Earth's Mantle Heterogeneities through Imaging, Modeling, Geochemistry, and Experiments*, 2023
2023 Interior of the Earth: Discussion Leader, Gordon Research Seminar, 2023, MA, United States
Chair of AGU Union Session: *The formation and early evolution of the Earth and the Moon, 2022 Materials of the Universe*, workshop, 2019
Machine Learning and Deep Learning for Environmental and Geosciences, AGU, 2020
Envisioning the Future of Geophysics: Centennial Celebration, Caltech Seismolab, 2022

Teaching:

4-month Earthquake Fellow program, Caltech (total hours ≃ 330; total number of students ≃ 220)	Summer 2023
SES 494/598: Exploring Data with Python, Arizona State University	Spring 2022
Economic Geology, China University of Geosciences, Wuhan	Spring 2013, 2014
Introduction to ore petrology, China University of Geosciences, Wuhan	Fall 2012, 2013

Mentoring:

Juan D. Hernandez, graduate student at Caltech (co-advise with Paul Asimow), *investigate the evolution of mantle temperatures on Mars*	May, 2023– now
Surya Donath, 11th grade, Walnut High School (main advisor), *quantify the interactions of subducted oceanic crust and LLSVPs*	May, 2024– now

Appearance In/ Media coverage (Selected):

***Estimated reach of over 5 billion views. Over 1000 news outlets**

Science: Interviewed for, and quoted in the news article: *Ancient crystals point to a surprisingly early start for plate tectonics* (2024), Link

The Washington Post: Interviewed for, and quoted in the news article: *Mysterious blobs inside Earth triggered plate tectonics, study suggests* (2024), Link

Nature: Interviewed for, and quoted in the news article: *Strange blobs in Earth's mantle are relics of a massive collision (2023),* Link

The Washington Post: Interviewed for, and quoted in the news article: *Mysterious blobs inside Earth triggered plate tectonics, study suggests* (2024), Link

New York Times: Interviewed for, and quoted in the news article: *A 'Big Whack' Formed the Moon and Left Traces Deep in Earth, a Study Suggests* (2023), Link

The Times: Interviewed for, and quoted in the news article: *Space crash that created moon left 'alien blobs' under our feet.* (2023), Link

The Guardian: Interviewed for, and quoted in the news article: *Blobs near Earth's core are remnants of collision with another planet, study says*. (2023), Link

CNN: Interviewed for, and quoted in the news article: *Scientists say they've finally found remnants of Theia, an ancient planet that collided with Earth to form the moon*. (2023), Link

Reuters: Interviewed for, and quoted in the news article: *Relics of huge primordial collision reside in Earth's deep interior*. (2023), Link

Caltech Media: On-camera appearance: 'The Remains of an Ancient Planet Lie Deep Within Earth (2023)', Link

National Geographic: Interviewed for, and quoted in the news article: *4.5 billion years ago, another planet crashed into Earth. We may have found its leftovers* (2023), Link

BBC news: *Why are there continent-sized 'blobs' in the deep Earth?* (2022), Link

Science: Interviewed for, and quoted in the news article: *Remains of Moon-forming impact may lie deep in Earth (2021),* Link

Discovery Magazine: Interviewed for, and quoted in the news article: *There Might Be Remnants of an Ancient Planet Buried Inside Earth? (2021),* Link

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Last updated: Oct., 2024