CURRICULUM VITAE

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Research Interests

Seismology; Earth structure; Machine learning

Education

2017 – 2022	**Ph.D., Geophysics** University of Texas at Dallas, TX, USA Advisor: Prof. David E. Lumley
2012 – 2015	**M.S., Geological engineering** Nanjing University, China Advisor: Prof. Changhong Yan
2008 – 2012	**B.S., Geological engineering** Nanjing University, China Advisor: Prof. Changhong Yan

Employment

2025 − present	**Rice University, USA** Research Associate (Dept of Earth, Environmental and Planetary Sciences) Mentor: Prof. Brandon Schmandt
2023 − 2024	**University of New Mexico, USA** Postdoctoral Fellow (Dept of Earth and Planetary Sciences) Mentor: Prof. Brandon Schmandt
2021 – 2022	**Los Alamos National Laboratory, USA** Graduate Research Internship Mentor: Dr. Lianjie Huang
2017 – 2021	**University of Texas at Dallas, USA** Teaching/Research Assistant (Dept of Geosciences) Mentor: Prof. Randy Griffin, Prof. David E. Lumley
2016	**Itasca Consulting Group Inc., China** Geophysicist Mentor: Dr. Peter Zhu

Honors and Awards

[6] Anton Hales Geophysics Fellowship, 2022.
[5] Bob & Margie Rutford Scholarship − UT-Dallas, 2022.
[4] Outstanding Graduates of Nanjing University − Nanjing University, 2015.
[3] Outstanding Graduate Student Award of Nanjing University − Nanjing University, 2014.
[2] National Scholarship for Graduate Students − China's Ministry of Education, 2013.
[1] First prize of Renmin scholarship (2009, 2010); Second prize of Renmin scholarship (2011) – Granted by Nanjing University.

Publications

Peer-reviewed journal papers

[8] Chenglong Duan, Brandon Schmandt, Ross Maguire, Ruijia Wang, Qingkai Kong. (2025). "Differential seismic phase detection probability as a potential discriminant of explosions and earthquakes", **The Seismic Record**. https://doi.org/10.1785/0320250015

[7] Chenglong Duan, Wenkai Song, Brandon Schmandt, Jamie Farrell, David Lumley, Tobias Fischer, Lindsay Worthington, Fan-Chi Lin. (2025). "A sharp volatile-rich cap to the Yellowstone magmatic system", **Nature**. https://doi.org/10.1038/s41586-025-08775-9

[6] Chenglong Duan, Lianjie Huang, Michael Gross, Michael Fehler, David Lumley, Stanislav Glubokovskikh. (2024). "Monitoring subsurface fracture flow using unsupervised deep learning of borehole microseismic waveform data", **IEEE Transactions on Geoscience and Remote Sensing**, 62, 1-12. https://doi.org/10.1109/TGRS.2024.3369577

[5] Chenglong Duan, David Lumley, Hejun Zhu. (2022). "Microearthquake location and uncertainty analysis using a Kirchhoff wavefront imaging method: A comparison with traveltime inversion and full wavefield imaging methods", **Geophysics**, 87(5), KS147-KS167. https://doi.org/10.1190/geo2021-0699.1

[4] Chenglong Duan, David Lumley, Hejun Zhu. (2021). "Estimation of micro-earthquake source locations based on full adjoint P and S wavefield imaging", **Geophy. J. Int.** 226(3), 2116-2144. https://doi.org/10.1093/gji/ggab203

[3] Chenglong Duan, Changhong Yan, Baotian Xu, Yinkang Zhou. (2017). "The Field Experiment and Data Interpretation of Crosshole Seismic CT for Karst Caves in the Deep Foundation." **Engineering Geology**, 228, 180-196. https://doi.org/10.1016/j.enggeo.2017.08.009

[2] Chenglong Duan, Changhong Yan, Baotian Xu, Huanran Wu, Mingyang Zou. (2013). "The Application of Cross-hole Seismic CT Method in the Karst Cave Exploration of metro Engineering Construction," **Geological Review**, 59(6), pp. 1242-1248. (in Chinese) https://www.geojournals.cn/georev/georev/article/abstract/20135906023?st=search

[1] Yinkang Zhou, Changhong Yan, Anh Minh Tang, Chenglong Duan, Shengshi Dong. (2019). "Mesoscopic prediction on the effective thermal conductivity of unsaturated clayey soils with double porosity system." **International Journal of Heat and Mass Transfer**, 130, 747-756. https://doi.org/10.1016/j.ijheatmasstransfer.2018.11.001

Conference proceedings

[6] Chenglong Duan, Brandon Schmandt, Jamie Farrell, David Lumley, Tobias Fischer, Lindsay Worthington, Fan-Chi Lin. "Seismic reflections identify a sharp top to the Yellowstone magma reservoir". **AGU Fall Meeting Abstracts**. 2023.

[5] Chenglong Duan, Brandon Schmandt, Qingkai Kong, Ross Maguire. "Testing transportability of seismic classification of local distance earthquakes and explosions". **AGU Fall Meeting Abstracts**. 2023.

[4] Chenglong Duan, Lianjie Huang, Michael Gross, Michael Fehler, David Lumley. (2022) "Real-time hydraulic fracturing monitoring using deep learning clustering of microseismic data". **Second International Meeting for Applied Geoscience & Energy**. 1526–1530. https://doi.org/10.1190/image2022-3751111.1

[3] Chenglong Duan, David Lumley. "Imaging Induced Seismicity Locations and Updating Seismic Velocity Models with Wave-equation Methods for a Large-N Nodal Array Dataset in Northern Oklahoma, USA". **AGU Fall Meeting Abstracts**. 2022.

[2] Chenglong Duan, David Lumley, Hejun Zhu. "Source Location Estimation and Uncertainty Analysis for Induced Earthquakes Using Large-N Seismic Arrays: A Comparison of 3D Traveltime, Kirchhoff, and Wave Equation Methods". **AGU Fall Meeting Abstracts**. 2020, 2020: S011-0012.

[1] Chenglong Duan, David Lumley. "Estimation of micro-earthquake source locations and source mechanisms based on adjoint wave-equation imaging, with uncertainty analysis". **AGU Fall Meeting Abstracts**. 2019, 2019: S53D-0477.

PhD Dissertation

Chenglong Duan (2022): "Micro-earthquake source characterization with full-wavefield imaging, uncertainty analysis, and deep-learning".
https://hdl.handle.net/10735.1/9728
Committee members: Profs David Lumley, Hejun Zhu, John Ferguson, Mortaza Pirouz

Patent

Baotian Xu, Changhong Yan, Yang Xu, Chenglong Duan. (2013). "An underground karst cave investigation device based on cross-hole seismic CT detection and tomography," Patent No.: ZL2012 2 0540340.X, Patentee: Nanjing University.

Grants

NSF grants EAR-1950328, $238,699, PI: Brandon Schmandt

- Controlled source seismic investigation of the top of the Yellowstone magmatic system
  - C. Duan provided the scientific rationale for the proposal and carried out the research.

U.S. Air Force contract FA9453-21-02-0024, $819,472, UNM/Penn State/Uppsala University

- Nuclear explosion monitoring
  - C. Duan contributed to the discrimination between explosions and earthquakes.

Invited Talks

[2] 12/2025, AGU Annual Meeting, New Orleans, USA. Title: Controlled-source seismic imaging of a magma reservoir cap beneath Yellowstone caldera (S42B-01)

[1] 05/2016, International Conference on Rock Dynamics and Applications, Suzhou, China. Title: Cross-hole seismic field experiments and imaging for karst caves in deep foundations

Teaching

2017 – 2019: Teaching Assistant for undergraduate course "Physical Geology Lab" (by Prof. Randy Griffin) at UT-Dallas

03/2024: Invited lecturing for graduate course "Computational Seismology" (by Prof. Wei Zhou) at King Fahd University of Petroleum and Minerals (KFUPM), Saudi Arabia. Topic: "Adjoint P and S wavefield method in micro-earthquake source imaging and Earth structure imaging"

08/2024: Joint lecturing the class of "Introductory Geology" (with Prof. Brandon Schmandt) at UNM

Professional Services

Journal Reviewer: Geophysics, Geophysical Journal International, Computational Geosciences, Frontiers in Earth Science, Geophysical Prospecting, IEEE-TGRS, MDPI-Processes
01/2021 – 12/2021 President, SEG student chapter of UT-Dallas

Memberships

American Geophysical Union (AGU), 2019-present
Society of Exploration Geophysicists (SEG), 2017-present
Seismological Society of America (SSA), 2025-present

Field work

[1] 07/10 - 07/15, 2025. Mount Rainier, WA. SmartSolo nodal array deployment.

Selected media report

Headline of Rice University (04/16/2025) − Inside Yellowstone's fiery heart: Rice researchers map volatile-rich cap, offering clues to future volcanic activity
https://news.rice.edu/news/2025/inside-yellowstones-fiery-heart-rice-researchers-map-volatile-rich-cap-offering-clues
BBC (04/16/2025) – Scientists trigger Yellowstone 'earthquakes' to probe volcano's depths
https://www.sciencefocus.com/news/scientists-earthquakes-peer-into-yellowstone-volcano
The Washington Post (04/24/2025) – Scientists made 'tiny earthquakes' to find where Yellowstone's magma begins
https://www.washingtonpost.com/nation/2025/04/24/yellowstone-magma-cap/
CNN (05/01/2025) – Geoscientists discover magma cap beneath Yellowstone
https://www.cnn.com/2025/05/01/science/video/geoscientists-discover-magma-cap-beneath-yellowstone-digvid
U.S. Geological Survey (04/28/2025) – Using custom earthquakes to define the top of Yellowstone's magma reservoir
https://www.usgs.gov/observatories/yvo/news/using-custom-earthquakes-define-top-yellowstones-magma-reservoir
Northeast Public Radio (05/12/2025) – The Best of Our Knowledge: New research provides a deeper look at what's underneath Yellowstone National Park (started at 21:00)
https://www.wamc.org/show/the-best-of-our-knowledge/2025-05-12/studying-yellowstone-and-affectionate-mothering
Physics Today (06/01/2025) – A rumbling truck enables a clearer view of Yellowstone's most active magma chamber
https://pubs.aip.org/physicstoday/article/78/6/14/3347427/A-rumbling-truck-enables-a-clearer-view-of
People (04/24/2025) – Giant 'magma cap' discovered under Yellowstone National Park likely plays critical role in preventing huge volcanic eruption
https://people.com/scientists-discover-magma-cap-yellowstone-national-park-likely-preventing-volcanic-eruption-11721089
FOX (04/24/2025) – How recently discovered giant magma 'cap' helps prevent eruption at Yellowstone National Park
https://www.foxweather.com/earth-space/yellowstone-national-park-magma-cap-volcanic-eruption#google_vignette
ABC (04/23/2025) – Hidden magma cap discovered at Yellowstone National Park

https://abcnews.go.com/US/hidden-magma-cap-discovered-yellowstone-national-park/story?id=121083908
Forbes (04/26/2025) – Natural ‘safety valve’ prevents Yellowstone volcano from blowing up https://www.forbes.com/sites/davidbressan/2025/04/26/natural-safety-valve-prevents-yellowstone-volcano-from-blowing-up/
Discover (04/17/2025) – Yellowstone’s magma reservoir reveals insights into future volcanic activity https://www.discovermagazine.com/yellowstones-magma-reservoir-reveals-insights-into-future-volcanic-activity-47420