

Ajay B. Limaye

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Education

Ph.D. Planetary Science, California Inst. of Technology, 2014, Adviser: Michael P. Lamb,
Dissertation: Valley evolution by meandering rivers
B.A. Geophysics (honors), Univ. of California, Berkeley, 2007

Appointments

Associate Professor, Dept. of Environmental Sciences, Univ. of Virginia, 2025-present
Assistant Professor, Dept. of Environmental Sciences, Univ. of Virginia, 2019-2025
Postdoctoral Fellow, School of Earth and Space Exploration, Arizona St. Univ., 2018-2019
Postdoctoral Associate, St. Anthony Falls Laboratory, Univ. of Minnesota,
Adviser: Chris Paola, 2014-2018

Honors

Tice Prize for Faculty Excellence, Dept. of Environmental Sciences, Univ. of Virginia, 2024
Outstanding Researcher Award, Office of Vice President of Research, Univ. of Virginia, 2024
National Science Foundation Faculty Early Career Development (CAREER) Award, 2023-2028
Exploration Postdoctoral Fellowship, Arizona State University, 2018-2019
American Geophysical Union (AGU) *Eos* Research Spotlight, *Journal of Geophysical Research: Earth Surface*, 2015 and 2016
National Center for Earth-surface Dynamics 2 Postdoctoral Fellowship, 2015-2016
Honorable Mention, Outstanding Oral Presentation, SEPM Society for Sedimentary Geology Research Symposium, 2015
Community Surface Dynamics Modeling System (CSDMS) Student Modeler Award, 2014
National Defense Science and Engineering Graduate Fellowship, 2010-2013
NASA Student Travel Grant, Mars Polar Science and Exploration Conference, 2011
NASA Student Travel Grant, Mars Sedimentology and Stratigraphy Conference, 2010
Keck Institute for Space Studies Graduate Fellowship, 2009-2010
NSF Research Experiences for Undergraduates Fellowship, 2006 (US Geological Survey Astrogeology Team, Flagstaff, Arizona; Adviser: Kenneth Tanaka)
UC Berkeley Library Prize for Undergraduate Research, 2005
National Merit Scholar, 2003

Publications

(*UVA student or postdoctoral researcher)

Submitted

*Wang, Y., Ganti, V., Limaye, A. B., and Straub, K. M., submitted, Variations in external forcing extend the compensational timescale by increasing regional surface roughness in fluvio-deltaic systems.

Prakash*, M., McKenzie*, M., Storrar, R., Frydrych, M., Miller, L., Limaye, A. B., submitted, Comparison with terrestrial eskers implies glacial origin for high-latitude sinuous ridges on Mars.

*Ackerman, A. M., Copenheaver, C. A., Richardson, J. B., and Limaye, A. B., revised and in review, Effects of debris flow disturbance on vegetation, soils, and topography in a steep landscape in central Virginia.

Articles

32. *Li, Y., and Limaye, A. B., 2025, Coherent motion of channel threads in the braided Brahmaputra-Jamuna River, *Journal of Geophysical Research: Earth Surface* 130(6), [doi:10.1029/2024JF008196](https://doi.org/10.1029/2024JF008196).
31. *Wang, Y., *Li, Y., and Limaye, A. B., 2025, Bridging gaps in satellite observations of river and delta landscapes using image warping, *Water Resources Research* 61(5), [doi:10.1029/2024WR039854](https://doi.org/10.1029/2024WR039854).
30. Limaye, A. B., 2025, A geometric algorithm to identify river meander bends: 1. Effect of perspective, *Journal of Geophysical Research: Earth Surface* 130(3), [doi:10.1029/2024JF007908](https://doi.org/10.1029/2024JF007908).
29. Limaye, A. B., 2025, A geometric algorithm to identify river meander bends: 2. Test for characteristic shapes, *Journal of Geophysical Research: Earth Surface* 130(3), [doi:10.1029/2024JF007909](https://doi.org/10.1029/2024JF007909).
28. Lai, S. Y. J., Liu, H.-Y., Foreman, B. Z., and Limaye, A. B., 2024, Response of submarine braided channels to varying inflow hydrographs: Geomorphic experiments and stratigraphic implications, *Sedimentology* 72(1), [doi:10.1111/sed.13236](https://doi.org/10.1111/sed.13236).
27. Zhao, F., Ganti, V., and Limaye, A. B., 2024, Scour depth variability controls channel-scale stratigraphy in experimental braided rivers, *Journal of Sedimentary Research* 94 (3), 302–312, [doi:10.2110/jsr.2023.118](https://doi.org/10.2110/jsr.2023.118).
26. *Wang, Y., Limaye, A. B., and Chadwick, A. J., 2024, Topography-based particle image velocimetry of braided channel initiation, *Water Resources Research* 60(4), [doi:10.1029/2023WR035229](https://doi.org/10.1029/2023WR035229).
25. *Li, Y., and Limaye, A. B., 2024, Timescale of the morphodynamic feedback between planform geometry and lateral migration of meandering rivers, *Journal of Geophysical Research: Earth Surface* 129(2), [doi:10.1029/2023JF007413](https://doi.org/10.1029/2023JF007413).
24. Huang, S. Y. J., Lai, S. Y. J., Limaye, A. B., Foreman, B. Z., and Paola, C., 2023, Confinement width controls the morphology and braiding intensity of submarine braided channels: Insights from physical experiments, *Earth Surface Dynamics*, [doi:10.5194/esurf-2023-6](https://doi.org/10.5194/esurf-2023-6).
23. Khosronejad, A., Limaye, A. B., Zhang, Z., Kang, S., Yang, X., and Sotiropoulos, F., 2023, On the morphodynamics of a wide class of large-scale meandering rivers: Insights gained by coupling LES with sediment-dynamics, *Journal of Advances in Modeling Earth Systems* 15(3), [doi:10.1029/2022MS003257](https://doi.org/10.1029/2022MS003257).
22. Kozarek, J. L., Limaye, A. B., and Arpin, E., 2023, Linking turbulent flow and bank erosion with controlled experiments in a field-scale meandering channel, *Geological Society of London Special Publication* 540(1), [doi:10.1144/SP540-2023-17](https://doi.org/10.1144/SP540-2023-17)†
21. Limaye, A. B., Adler, J. B., Moodie, A. J., Whipple, K. X., and Howard, A. D., 2023, Effect of standing water on formation of fan-shaped sedimentary deposits at Hypanis Valles, Mars, *Geophysical Research Letters* 50(4), [doi:10.1029/2022GL102367](https://doi.org/10.1029/2022GL102367).

20. *Li, Y., and Limaye, A. B., 2022, Testing predictions for migration of meandering rivers: Fit for a curvature-based model depends on streamwise location and timescale, *Journal of Geophysical Research: Earth Surface* 127, [doi:10.1029/2022JF006776](https://doi.org/10.1029/2022JF006776).
19. Tejedor, A., Schwenk, J., Kleinhans, M., Limaye, A. B., Vulis, L., Carling, P., Kantz, H., and Fofoula-Georgiou, E., 2022, The Entropic Braiding Index (eBI): a robust metric to account for the diversity of channel scales in multi-thread rivers, *Geophysical Research Letters* 49 (16), [doi:10.1029/2022GL099681](https://doi.org/10.1029/2022GL099681).
18. Zhang, X., Limaye, A. B., and Khosronejad, A., 2022, Three-dimensional realizations of flood flow in large-scale rivers using the neural fuzzy-based machine-learning algorithm, *Computers and Fluids* 246, [doi:10.1016/j.compfluid.2022.105611](https://doi.org/10.1016/j.compfluid.2022.105611).
17. Zhang, X., Flora, K., Kang, S., Limaye, A. B., and Khosronejad, A., 2022, Data-driven prediction of turbulent flow statistics past bridge piers in large-scale rivers using convolutional neural networks, *Water Resources Research* 58, [doi:10.1029/2021WR030163](https://doi.org/10.1029/2021WR030163).
16. Li*, Y., Wang, Y. P., Zhu, Q., Limaye, A. B., and Wu, H., 2021, Roles of sediment advection and resuspension in the turbidity maximum zone of the Changjiang Estuary, China, *Continental Shelf Research* 229, [doi:10.1016/j.csr.2021.104559](https://doi.org/10.1016/j.csr.2021.104559).
15. Limaye, A. B., Lazarus, E. D., Li*, Y., and Schwenk, J., 2021, River sinuosity describes a continuum between randomness and ordered growth, *Geology* 49 (12), 1506–1510, [doi:10.1130/G49153.1](https://doi.org/10.1130/G49153.1).
14. Scheingross, J. S., Limaye, A. B., McCoy, S. W., and Whittaker, A. C., 2020, The shaping of bedrock landscapes by internal dynamics, *Nature Reviews Earth and Environment*, [doi:10.1038/s43017-020-0096-0](https://doi.org/10.1038/s43017-020-0096-0).
13. Limaye, A. B., 2020, How do braided rivers grow channel belts?, *Journal of Geophysical Research: Earth Surface* 125(8), [doi:10.1029/2020JF005570](https://doi.org/10.1029/2020JF005570).
12. Limaye, A. B., Grimaud, J.-L., Lai, S. Y. J., Foreman, B. Z., Komatsu, Y., and Paola, C., 2018, Geometry and dynamics of braided channels and bars under experimental density currents, *Sedimentology*, [doi:10.1111/sed.12453](https://doi.org/10.1111/sed.12453).
11. Torres, M. A., Limaye, A. B., Ganti, V., Lamb, M. P., West, A. J., and Fischer, W. W., 2017, Model predictions of long-lived storage of organic carbon in river deposits, *Earth Surface Dynamics* 5, 711-730, [doi:10.5194/esurf-5-711-2017](https://doi.org/10.5194/esurf-5-711-2017).
10. Limaye, A. B., 2017, Extraction of multi-thread channel networks with a reduced complexity flow model, *Journal of Geophysical Research: Earth Surface* 122, [doi:10.1002/2016JF004175](https://doi.org/10.1002/2016JF004175).
9. Clubb, F. J., Mudd, S. M., Milodowski, D. T., Valters, D. A., Slater, L. J., Hurst, M. D., and Limaye, A. B., 2017, Geomorphometric delineation of floodplains and terraces from objectively defined topographic thresholds, *Earth Surface Dynamics*, [doi:10.5194/esurf-2017-21](https://doi.org/10.5194/esurf-2017-21).
8. Lai, S. Y. J., Hung, S. S. C., Foreman, B. Z., Limaye, A. B., Grimaud, J. L., and Paola, C., 2017, Stream power controls the braiding intensity of submarine channels similarly to rivers, *Geophysical Research Letters* 44, [doi:10.1002/2017GL072964](https://doi.org/10.1002/2017GL072964).
7. Limaye, A. B. S., and Lamb, M. P., 2016, Numerical model predictions of autogenic fluvial terraces and comparison to climate change expectations, *Journal of Geophysical Research: Earth Surface* 121, [doi:10.1002/2014JF003392](https://doi.org/10.1002/2014JF003392).
6. Limaye, A. B. S., and Lamb, M. P., 2014, Numerical simulations of bedrock valley evolution by meandering rivers with variable bank materials, *Journal of Geophysical Research: Earth Surface* 119, [doi:10.1002/2013JF002997](https://doi.org/10.1002/2013JF002997).

5. Limaye, A. B. S., and Lamb, M. P., 2013, A vector-based approach to bank-material tracking in coupled models of meandering and landscape evolution, *Journal of Geophysical Research: Earth Surface* 118, [doi:10.1002/2013JF002854](https://doi.org/10.1002/2013JF002854).
4. DiBiase, R. A., Limaye, A. B., Scheingross, J. S., Fischer, W. W. and Lamb, M. P., 2013, Deltaic deposits at Aeolis Dorsa: Sedimentary evidence for a large body of water in the northern plains of Mars, *Journal of Geophysical Research: Planets* 118, 1285-1302, [doi:10.1002/jgre.20100](https://doi.org/10.1002/jgre.20100).
3. Limaye, A. B. S., Aharonson, O., and Perron, J. T., 2012, Detailed stratigraphy and bed thickness of the Mars north and south polar layered deposits, *Journal of Geophysical Research: Planets* 117 (E06009), [doi:10.1029/2011JE003961](https://doi.org/10.1029/2011JE003961).
2. Lamb, M. P., Scheingross, J. S., Amidon, W. H., Swanson, E., and Limaye, A., 2011, A model for fire-induced sediment yield by dry ravel in steep landscapes, *Journal of Geophysical Research: Earth Surface* 116 (F03006), [doi:10.1029/2010JF001878](https://doi.org/10.1029/2010JF001878).
1. Hubbard, B., Milliken, R. E., Kargel, J. S., Limaye, A., and Souness, C., 2011, Geomorphological characterisation and interpretation of a mid-latitude glacier-like form: Hellas Planitia, Mars, *Icarus* 21, 330-346, [doi:10.1016/j.icarus.2010.10.021](https://doi.org/10.1016/j.icarus.2010.10.021).

Datasets and other publications

13. *Ackerman, A., Limaye, A. B., Copenheaver, C., Richardson, J., Frye, E. A., & Peterson, J., 2025. Supporting data for effects of landslide disturbance on soil and vegetation in a steep landscape in central Virginia [Data set]. Zenodo. [doi:10.5281/zenodo.15305176](https://doi.org/10.5281/zenodo.15305176).
12. *Li, Y., and Limaye, A. B. (2025), Natural river data and analysis code for the correlation of channel threads of the Brahmaputra-Jamuna River (v2) [Data set]. Zenodo. [doi:10.5281/zenodo.15366220](https://doi.org/10.5281/zenodo.15366220)
11. Limaye, A. B., 2025, Code and data for mapping and classification of meandering river bends on the Beaton River, Canada (1.1), [Data set]. Zenodo. [doi:10.5281/zenodo.14991479](https://doi.org/10.5281/zenodo.14991479).
10. Wang, Y.*, Li, Y., and Limaye, A. B., 2024, Data and code for reconstructing river and delta landscape evolution using image warping, [Data set]. Zenodo. [doi:10.5281/zenodo.13169843](https://doi.org/10.5281/zenodo.13169843).
9. *Wang, Y., Limaye, A. B., and Chadwick, A. J., 2023, Binary images and Particle Image Velocimetry data and code for mapping channel thread migration in laboratory braided rivers, <https://doi.org/10.18130/V3/EIBDZC>, University of Virginia Dataverse, V1.
8. *Li, Y., and Limaye, A. B., 2023, Numerical model and natural river data for the timescale analysis of meandering channel migration (1.0.0) [Data set]. Zenodo. <https://doi.org/10.5281/zenodo.8222638>
7. Limaye, A. B., Adler, J. B., Moodie, A. J., Whipple, K. X., and Howard, A. D., 2023, Numerical model and geospatial data for fan-shaped deposits at Hypanis Valles, Mars, University of Virginia Dataverse, V2, [doi:10.18130/V3/E0EGOC](https://doi.org/10.18130/V3/E0EGOC).
6. *Li, Y. and Limaye, A. B., 2022, Geospatial data for natural channel centerlines across the continental US, Univ. of Virginia Dataverse, [doi:10.18130/V3/IUMGS7](https://doi.org/10.18130/V3/IUMGS7).
5. Limaye, A. B., 2021, Sinuosity data for numerically modeled and natural channels, Univ. of Virginia Dataverse, [doi:10.18130/V3/TRTTIS](https://doi.org/10.18130/V3/TRTTIS).
4. Limaye, A. B., 2020, Geospatial data for experimental and natural channel belts, Univ. of Virginia Dataverse, [doi:10.18130/V3/XBYWYO](https://doi.org/10.18130/V3/XBYWYO).
3. Limaye, A. B., Grimaud, J.-L., Lai, S. Y. J., Foreman, B. Z., Komatsu, Y., and Paola, C., 2018, Topography, image, and flow model data for experimental density currents, St.

Anthony Falls Laboratory, 2015-2017, Data Repository for the University of Minnesota, [doi:10.13020/D6R088](https://doi.org/10.13020/D6R088).

2. Limaye, A. B., 2017, Topography and flow model files for the Platte River, Nebraska, 2016-2017, Data Repository for the University of Minnesota, [doi:10.13020/D6Z39J](https://doi.org/10.13020/D6Z39J).
1. Limaye, A. B. S., 2015, Valley evolution by meandering rivers, Ph.D. thesis, California Inst. of Technology, 254 pp., [doi:10.7907/Z9MG7MFJ](https://doi.org/10.7907/Z9MG7MFJ).

An updated list is available at www.ajaylimaye.com/publications/

Citation metrics: <https://bit.ly/2wE03se>

Invited Talks

- 2025 Yale University, Titan Northeast Workshop; University of Virginia, Department of Civil and Environmental Engineering
- 2024 College of William & Mary, Geology; Virginia Tech, Geosciences; AGU Annual Meeting
- 2023 City College of New York; Los Alamos National Laboratory, Earth and Environmental Sciences
- 2022 Am. Quaternary Assoc. Biennial Meeting
- 2021 EGU Geomorphology section, Landscapes Live; University of Delaware; Johns Hopkins Univ., Bromery Lecture
- 2020 Univ. of Engineering and Technology, Peru; Virginia Tech, CEE Environmental and Water Resources
- 2019 American Association of Petroleum Geologists (AAPG) Annual Meeting
- 2018 Univ. of Michigan; Univ. of Virginia; German Research Center for Geosciences (GFZ)
- 2017 National Taiwan Univ.
- 2016 Sediment Experimentalists Network – Community Surface Dynamics Modeling System Annual Meeting; Geological Society of America Annual Meeting
- 2015 AAPG Annual Meeting; Minnesota Geological Survey; AGU Fall Meeting
- 2014 California Inst. of Technology, The Associates; Community Surface Dynamics Modeling System Annual Meeting; Univ. of Southern California, Lithospheric Dynamics

Teaching

EVGE 5820, Geomorphology	2019, 2021, 2023, 2025
ASTR 3880 / EVSC 4890, Planetary Astronomy/Geology	2020; 2022, 2024
ASTR 3881 / EVSC 4891, Planetary Astronomy/Geology Lab	2022, 2024
EVSC 2800/2801, Fundamentals of Geology and Laboratory	2021, 2023, 2024, 2025
EVSC 4559/7559, Geoscience in the Field	2022
EVSC 4542/7542, Topics in Landscape Evolution	
Debris flows in Virginia	2021
The Appalachians	2023, 2025

Selected Advising

Environmental Sciences Distinguished Major Program (Undergraduate)

Medha Prakash	2021-2023
Victoria Thompson	2022-2024
Julia Lynn	2025-present

Audrey Yin 2025-present

Graduate students

Yuan Li Ph.D., 2019-2024
Jacob Smith M.S., 2020-2022
Ariana Flournoy M.S., 2022-2024
Abigail Ackerman M.S., 2023-2025
Vidushi Sharma Ph.D. candidate, 2022-present
Sophia Wood 2025-present
Gabriela Biradi 2025-present

M.S. thesis committees

Nischal Acharya 2025-present

Ph.D. thesis committees

Matthew Pryal (Astronomy) 2020
Brenden Marshall 2020
Marion McKenzie 2021-2023
Kelsey Schoenemann 2021-2025
Santiago Munevar Garcia 2021-2024
Tyler Barnes 2021-2025
Renato Mazzei (Astronomy) 2024

Postdoctoral researchers

Hongbo Ma 2021
Youwei Wang 2022-2025
Dimitri Bandou 2023-2025

External Service

Journal reviews Nature Communications, Proceedings of the National Academy of Sciences, Geophysical Research Letters, Geology, Geological Society of America Bulletin, Journal of Geophysical Research: Earth Surface, Journal of Geophysical Research: Planets, Icarus, Earth and Planetary Science Letters, Water Resources Research, Earth Surface Dynamics, Earth Surface Processes and Landforms, Geological Society of London, Mathematical Geosciences, Marine Geophysical Letters, AGU Advances

Proposal reviews National Science Foundation, NASA

and panels

Committees Fall Meeting Program Committee, Earth and Planetary Surface Processes Section, American Geophysical Union (2024-2025)

Professional Society Memberships

American Geophysical Union