Minhui Li

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Current Appointment

School of the Environment, Yale University — United States

Postdoctoral associate — *Supervisor:* Peter Raymond — *2025.01 - today*

Education

Department of Hydraulic Engineering, Tsinghua University — China

Ph.D. — *Supervisor:* Xudong Fu & Baosheng Wu — *2018.08 - 2024.06*

Dissertation Topic: "Controls on Stream Networks and Drainage Basin Shapes"

Department of Environmental Systems Science, ETH Zurich — Switzerland

Visiting Ph.D. student — *Supervisor:* James Kirchner — *2021.12 - 2023.11*

College of Harbor, Coastal and Offshore Engineering, Hohai University — China

B.S. — *2014.09 - 2018.06*

Past Experiences

Department of Environmental Systems Science, ETH Zurich — Switzerland

Postdoctoral researcher — *Supervisor:* James Kirchner — *2024.08 - 2024.12*

Scientific assistant — *Supervisor:* James Kirchner — *2023.12 - 2024.07*

Research Interests

Geomorphology, Hydrology and Biogeochemistry

- Hydrological controls on stream network expansion and contraction and their implications for carbon dynamics and their implications for riverine carbon dynamics
- Continental- to Global-Scale morphological analysis of stream networks and watersheds
- Dynamic connectivity between landscapes and stream networks and their controls on hydrologic response across different climates

Research Projects

Stream network dynamics and their influence on carbon emissions — *2025.01 - present*

- Estimating the global surface area dynamics of stream networks by incorporating the scaling relationships between the flowing network length-discharge, and river width-discharge
- Exploring the impact of stream network extension and contraction on greenhouse gas emission patterns

Effects of hillslope-channel network connectivity on hydrologic response — *2024.05 - 2025.05*

- Applied a conceptual framework to quantify the impact of hillslope and channel dynamics on rainfall-runoff response across diverse catchments across the US

- Assessed the effects of stream network extension and contraction on the rainfall-runoff response
- Investigated how hillslope and channel celerities influence the distribution of runoff responses

Climatic and landscape controls on hydrologic response *2024.05 - 2025.02*

- Quantified the timing and magnitude of streamflow response to rainfall in 516 catchments across the continental United States using ensemble rainfall-runoff analysis
- Reveal how the interrelated roles of climate, topography, and subsurface properties shape rainfall-runoff response at continental scale

Stream network topology *2023.08 - 2024.04*

- Examined self-similarity of all 5^{th}-order real-world stream networks across the contiguous United States using the high-resolution National Hydrographic Dataset (NHDPlus-HR)
- Explored the interrelations between stream network geometry (i.e., branching angles) and topology (characterized by Tokunaga parameters)
- Revealed that climate dependence of network topology, observed in previous studies, is mainly mediated through the climate dependence of topographic and geometric metrics

Shapes of watersheds *2022.12 - 2023.07*

- Mapped global patterns of basin shapes (indicated by width-to-length ratios) based on HydroBASINS database
- Revealed how topography (indicated by regional slope and surface roughness) and climate influence basin shapes globally

Stream network branching geometry *2021.12 - 2022.11*

- Mapped spatial patterns of stream network branching angles on the eastern Tibetan Plateau
- Revealed the joint influence of tectonic forcing and climate on stream network branching

Classification of river networks *2020.08 - 2021.11*

- Developed methods of river network classification using parameters such as drainage texture, flow direction, and aspect ratios
- Revealed relationships between river network attributes, topography, and climate in the Yellow River source zone

Publications

Peer-reviewed journal papers

6. **Li, M.**, Seybold, H., Wu, B., Chen, Y., Fu, X., & Kirchner, J.W. (2024). Global analysis of topographic and climatic controls on drainage basin shapes. *Geophysical Research Letters, 51*(8), e2023GL105804.

5. **Li, M.**, Seybold, H., Wu, B., Chen, Y., & Kirchner, J.W. (2023). Interaction between tectonics and climate encoded in the planform geometry of stream networks on the eastern Tibetan Plateau. *Geophysical Research Letters, 50*(14), e2023GL104121.

4. **Li, M.**, Wu, B., Chen, Y., & Li, D. (2022). Quantification of river network types based on hierarchical structures. *Catena*, *211*, 105986.

3. Zhang, B., Wu, B., Zhang, R., Ren, S., & **Li, M.** (2021). 3D numerical modelling of asynchronous propagation characteristics of flood and sediment peaks in Three Gorges Reservoir. *Journal of Hydrology*, *593*, 125896.

2. Chen, Y., Wu, B., Xiong, Z., Zan, J., Zhang, B., ... **Li, M.,** & Li, B. (2021). Evolution of eastern Tibetan river systems is driven by the indentation of India. *Communications Earth & Environment*, *2*(1), 256.

1. Qin, C., Wu, B., Wang, Y., Fu, X., Xue, Y., ... **Li, M.,** & Zhang, Y. (2020). Dynamic variability of at-a-station hydraulic-geometry for mountain rivers in the southeast Qinghai-Tibet Plateau: The cases of Yalong River and upper Jinsha River. *Catena*, *194*, 104723.

Publications in Chinese

3. **Li, M.,** Wu, B, & Chen Y (2022). Planform geometry and controlling factors of river networks in the Yellow River source zone. *Acta Geographica Sinica*, 77(11): 2878-2889.

2. **Li, M.,** Chen Y., & Wu, B**.** (2020). Analysis of features and factors controlling typical drainage networks in the Tibetan Plateau. *Journal of Tsinghua University* (*Science and Technology*), *60*(11), 951-957.

1. Chen, Y, Wu, B., & **Li, M.** (2022). Chemical weathering to climatic variations in the Yellow River source region. *Journal of Tsinghua University* (*Science and Technology*), *62*(12), 1945-1952.

In progress

3. **Li, M.,** Seybold, H., Fu, X., Wu, B., Raymond, P., & Kirchner, J.W. (2025). Climate's influence on topography encoded in stream network topology and geometry. *Nature Communications.* (*Under Review*)

2. **Li, M.,** Seybold, H., Beria, H., Floriancic, M.,Fu, X., Raymond, P., & Kirchner, J.W. (2025). Controls on the magnitude and timing of runoff response to rainfall across the continental US. *Environmental Research Letters.* (*Under Review*)

1. **Li, M.,** Beria, H., Seybold, H., van Meerveld, I., Kirchner, J.W., & Raymond, P. (2025). Effects of Hillslope-network connectivity on rainfall-runoff response. (*In preparation*)

Conferences

- **Li, M.,** Beria, H., Seybold, H., van Meerveld, I., Kirchner, J.W., & Raymond, P. Effects of Hillslope-network connectivity on rainfall runoff response. *American Geophysical Union Fall Meeting*, New Orleans, United States, December 2025.
- **Li, M.,** Seybold, H., Beria, H., Floriancic, M.,Fu, X., Raymond, P., & Kirchner, J.W. Controls on the magnitude and timing of runoff response to rainfall across the continental US. *Gordon Research Conference on Catchment Science*, Andover, New Hampshire, United States, June 2025 (poster).
- **Li, M.,** Controls on stream network and drainage basin shapes, Hohai University, Nanjing, China, May 2024 (***invited talk***).
- **Li, M.,** Seybold, H., Fu, X., Wu, B., & Kirchner, J.W. Climatic controls on stream network topology. *European Geosciences Union General Assembly*, Vienna, Austria, April 2024 (talk).
- **Li, M.,** Seybold, H., Wu, B., Chen, Y., Fu, X., & Kirchner, J.W. Topographic and climatic controls on global patterns in drainage basin shape. *American Geophysical Union Fall Meeting*, San Francisco, United States, December 2023 (talk).
- **Li, M.,** Controls on stream network and drainage basin shapes, Department of Earth and Planetary Sciences, ETH, Zurich, Switzerland, October 2023 (***invited talk***).
- **Li, M.,** Seybold, H., Wu, B., Chen, Y., & Kirchner, J.W. Interaction between tectonics and climate encoded in the planform geometry on the Tibetan Plateau. *European Geosciences Union General Assembly*, Vienna, Austria, April 2023 (talk).
- **Li, M.,** & Wu, B. Planform geometries and controlling factors of river networks in the Yellow River source zone. *European Geosciences Union General Assembly*, Vienna, Austria, May 2022 (talk).
- **Li, M.**, Wu, B., & Chen, Y. Features and controlling factors of drainage networks in the Tibetan Plateau. *European*

Geosciences Union General Assembly, online, May 2020 (talk).

- Seybold, H., **Li, M.,** & Kirchner, J.W. Runoff controls on stream network branching. *American Geophysical Union Fall Meeting*, San Francisco, United States, December 2023 (talk).
- Allen, G., **Li, M.,** & Go, D. Variability of stream and river inundation across scales. *American Geophysical Union Fall Meeting*, New Orleans, United States, December 2025.
- Brinkerhoff, C., Raymond, P., Shrestha, B., & **Li, M**. Informing non-perennial stream models with in-situ sensing. *American Geophysical Union Fall Meeting*, New Orleans, United States, December 2025.

Skills

Program

- Proficient in geospatial data analysis using Python and ArcGIS
- Experienced in working with Linux operating system and HPC
- Expertise in working with MATLAB and R

Language

- Chinese: Native.
- English: Fluent. Certificate: Level 5 of the Public English Test System (PETS5)

Honors and Awards

2022.12	The Second Prize Scholarship (Tsinghua University)
2021.04	Best Paper Award (Tsinghua University)
2019.12	The Second Prize Scholarship (Tsinghua University)
2018.06	Outstanding Graduate (Hohai University)
2017.04	Meritorious Winner in Interdisciplinary Contest In Modeling
2016.08	First Prize in the 13th Mathematics Competition
2016.07	Second Prize of National Mathematic Modeling Competition
2015.11	Academic Excellence Scholarship (Hohai University)