Ruohan Li

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ACADEMIC APPOINTMENTS

- **Postdoctoral Research Associate**, Department of Geographical Sciences, University of Maryland, College Park, Aug. 2024 – Present. Advisors: Dr. Yiqun Xie

EDUCATION

- Ph.D., Geographical Sciences, University of Maryland, College Park, Sept. 2019 - May. 2024
- B.S., Honours Geomatics with Math Minor, University of Waterloo, Canada, Sept. 2017 - Jun. 2019
- B.E., Remote Sensing Science and Technology, Wuhan University, China, Sept. 2015 – Jun. 2019

RESEARCH INTERESTS

- Developing high-quality satellite products and AI-ready geoscience datasets.
- GeoAI for Earth system process emulation and spatiotemporal forecasting.
- Uncertainty-aware, physics-consistent AI for discovering new patterns in surface–atmosphere interactions.

PUBLICATIONS

AI/Computer Science Conference Proceedings (Peer-Reviewed)

** In AI research, premier peer-reviewed conferences serve as primary archival venues and are often more selective and higher-impact than journals (National Academies Press, Computing Research Association). Accordingly, many seminal deep-learning methods and frameworks (e.g., ResNet, Transformer, and U-Net) were first introduced in top conferences.*

[1] **Li, R.**, Wang, Z., Jia, X., Mai, G., Ma, L., Hurtt, G., Shen, Q., Li, Z., Xie, Y.(2025). EcoDiffusion: Uncertainty-Aware Emulation of Ecosystem Processes with Conditional Diffusion for Long Sequences with Single-Step Initialization. *Accepted by The 40th AAAI Conference on Artificial Intelligence for Social Impact*. (acceptance rate: 21%)

[2] **Li, R.**, Xie, Y., Jia, X., Mai, G., Hou, S., Wang, Z., Li, Z. (2025). Scenario-Based Evaluation of Probabilistic Time Series Forecasting for Solar Energy. *ACM SIGSPATIAL International Conference on Advances in Geographic Information Systems*.

[3] **Li, R.**, Xie, Y., Jia, X., Wang, D., Li, Y., Zhang, Y., Wang, Z., Li, Z. (2024). SolarCube: An Integrative Benchmark Dataset Harnessing Satellite and In-situ Observations for Large-scale Solar Energy Forecasting. *The 38th Conference on Neural Information Processing Systems, Datasets and Benchmarks Track*. (acceptance rate: 25%)

[4] Wang, Z., Ma, L., Hurtt, G., Jia, X., Li, Y., **Li, R.**, Li, Z., Xu, S., Xie, Y. (2025). CarbonGlobe: A Global-Scale, Multi-Decade Dataset and Benchmark for Carbon Forecasting in Forest Ecosystems. *The 39th Conference on Neural Information Processing Systems, Datasets and Benchmarks Track*. (acceptance rate: 25%)

[5] Li, Z., Cheng, Q., **Li, R.**, Zhu, F., Jia, X., Xie, Y. (2025). IsoSim: A Long-term Benchmark Dataset for Water Isotope Emulation in Global Climate Models. *ACM SIGSPATIAL International Conference on Advances in Geographic Information Systems.*(acceptance rate: 26%)

Journals (Peer-Reviewed)

[6] **Li, R.**, Wang, D., Wang, Z., Liang, S., Xie, Y., & He, J. (2025). Transformer approach to nowcasting solar energy using geostationary satellite data. *Applied Energy*. (impact factor: 11.0)

[7] **Li, R.**, Wang, D., Devadiga, S., Sarkar, S., Román, M. O. (2024). MCD18 V6. 2: A New Version of MODIS Downward Shortwave Rad (2024). MCD18C62: A new version of MODIS Downward Shortwave Radiation and Photosynthetically Active Radiation products. *IEEE Geoscience and Remote Sensing Letters*. (impact factor: 4.4)

[8] **Li, R.**, Wang, D., & Liang, S. (2023). Comparison between deep learning architectures for the 1 km, 10/15-min estimation of downward shortwave radiation from AHI and ABI. *Remote Sensing of Environment*. (impact factor: 11.4)

[9] **Li, R.**, Wang, D., Wang, W., and Nemani, R. (2023). A GeoNEX-based high-spatiotemporal-resolution product of land surface downward shortwave radiation and photosynthetically active radiation, *Earth Syst. Sci. Data*. (impact factor: 11.2)

[10] **Li, R.**, Wang, D., Liang, S., Jia, A., & Wang, Z. (2022). Estimating global downward shortwave radiation from VIIRS data using a transfer-learning neural network. *Remote Sensing of Environment*. (impact factor: 11.4)

[11] **Li, R.**, Wang, D., & Liang, S. (2021). Comprehensive assessment of five global daily downward shortwave radiation satellite products. *Science of Remote Sensing*. (impact factor: 5.2)

[12] Cheng, F., Li, Zhan., Yang, Z., **Li, R.**, Wang, D. Jia, A., Li, K., Zhao, B., Wang, S., Yin, D., Li, S., Xue, W., Cribb, M., Wei J. (2024). First retrieval of 24-hourly 1-km-resolution gapless surface ozone (O3) from space in China using artificial intelligence: diurnal variations and implications for air quality and phytotoxicity. *Remote Sensing of Environment*. (impact factor: 11.4)

[13] Xu, S., Wang, D., Liang, S., Jia, A., **Li, R.**, Wang, Z., Liu, Y. (2024). A novel approach to estimate land surface temperature from landsat top-of atmosphere reflective and emissive data using transfer-learning neural network. *Science of The Total Environment*. (impact factor: 8.0)

[14] Wang, D., Liang, S., **Li, R.**, & Jia, A. (2021). A synergic study on estimating surface downward shortwave radiation from satellite data. *Remote Sensing of Environment*. (impact factor: 11.4)

[15] Farrell, S. L., Duncan, K., Buckley, E. M., Richter-Menge, J., & **Li, R.** (2020). Mapping sea ice surface topography in high fidelity with ICESat-2. *Geophysical Research Letters*. (impact factor: 4.6)

Preprints

[16] Xie, Y., Wang, Z., Chen, W., Li, Z., Jia, X., Li, Y., Wang, R., Chai, K., **Li, R.** & Skakun, S. (2024). When are Foundation Models Effective? Understanding the Suitability for Pixel-Level Classification Using Multispectral Imagery. *arXiv preprint arXiv:2404.11797*.

DATA PRODUCT CONTRIBUTIONS

- MODIS/Terra+Aqua Surface Radiation Daily/3-Hour (MCD18)
  https://www.earthdata.nasa.gov/data/catalog/lpcloud-mcd18a1-062
- AHI/ABI Surface Radiation Hourly (GeoNEX DSR/PAR)
  https://data.nas.nasa.gov/geonex/geonexdata/GOES16/GEONEX-L2/DSR-PAR/
  https://data.nas.nasa.gov/geonex/geonexdata/HIMAWARI8/GEONEX-L2/DSR-PAR/
- Suomi-NPP VIIRS Surface Radiation Daily/3-Hour (VNP18A1)
  In process
- SolarCube
  https://doi.org/10.5281/zenodo.11498739

GRANT WRITING EXPERIENCE

- Co-PI for Climate Change AI Innovation Grants Program 2024, shortlist of the top 20% proposals

TEACHING EXPERIENCE

- Instructor
  - GEOG 276: "Principles of Python Programming and Geocomputing", UMD
    Winter 2024, Fall 2025
- Teaching Assistant
  - GEOG 330: "As the World Turns: Society and Sustainability in a Time of Great Change", UMD
    Winter 2021, Winter 2020, Fall 2019
  - GEOG 301: "Advanced Geographical Environmental Systems", UMD
    Spring 2020
  - GEOG 472: "Remote Sensing: Digital Processing and Analysis", UMD
    Spring 2024, Guest lecture

MENTORING EXPERIENCE

- Sohpia Hou, Thomas Jefferson High School for Science and Technology
  - Outcome: Co-author on **Li, R.**, Xie, Y., Jia, X., Mai, G., **Hou, S.**, Wang, Z., Li, Z. (2025). *Scenario-Based Evaluation of Probabilistic Time Series Forecasting for Solar Energy.* ACM SIGSPATIAL International Conference on Advances in Geographic Information Systems.

SERVICE

- Session Chair, NH42B: Transforming Natural Hazard Monitoring and Understanding: Advances in Artificial Intelligence and Earth Observation Technologies II, American Geophysical Union Fall Meeting, Washington, D.C., December 2024
- Program Committee Member, GeoIndustry2025: The 4th International Workshop on Spatial Big Data and AI for Industrial Applications, 2025
- Research Faculty Representative, Department of Geographical Sciences, University of Maryland, 2025
- Journal Reviewers: *Remote Sensing of Enviroment, JGR- Atmospheres, Earth System Science Data, Transactions on Geoscience and Remote Sensing, Agricultural and Forest Meteorology, Science of Remote Sensing.*

CONFERENCES

Environment

- Scenario-Based Evaluation of Probabilistic Time Series Forecasting for Solar Energy. **Lightning Talk**, ACM SIGSPATIAL, Minneapolis, MN, November 2025.
- Transformer approach to nowcasting solar energy using geostationary satellite data. **Oral**, American Geophysical Union Fall Meeting, Washington, D.C., December 2024

- Comparison between deep learning architectures for the 1 km, 10/15-min estimation of downward shortwave radiation from AHI and ABI. **Poster**, American Geophysical Union Fall Meeting, Washington, D.C., December 2024
- Comparison between deep learning architectures for the 1 km, 10/15-min estimation of downward shortwave radiation from AHI and ABI. **Poster**, MODIS Science Team Meeting, College Park, MD, May 2023
- Comprehensive assessment of five global daily downward shortwave radiation satellite products. **Poster**, American Geophysical Union Fall Meeting, New Orleans, LA, December 2021

SKILLS

- Programming languages: Linux, Python, C/C++, MATLAB, R, JavaScript, Fortran
- Data analysis and model constructions: Cloud computing, Tensorflow, PyTorch, SQL, Scikit-learn
- Spatial analysis: Google Earth Engine, ArcGIS, QGIS, ENVI

MULTI-DISCIPLINARY PREPARATION

- **Artificial Intelligence & Machine Learning:** representation learning; self-supervised learning; generative modeling; deep neural networks (CNNs, transformers); foundation models
- **Remote Sensing:** optical multispectral (MODIS/VIIRS, Sentinel-2, Landsat, Planet); geostationary imagery (Himawari-8, GOES-16); SAR (Sentinel-1); LiDAR (GEDI, ALS)
- **Earth System Science:** surface energy balance; renewable energy; radiative transfer; ecosystem processes; land cover and land use change; atmospheric composition and air quality

HONORS AND AWARDS

- SIGSPATIAL Travel Award, NSF, 2025
- Ann G. Wylie Dissertation Fellowships for AY 2023-24, UMD, 2023
- Graduate School's Outstanding Graduate Assistant (OGA) Awards, UMD, 2023
- Excellence in Graduate Research Award, Department of Geographical Sciences, UMD, 2022 & 2023
- Jacob K. Goldhaber Travel Grant, UMD, 2021
- Distinguished Academic Achievement Award, University of Waterloo, 2019
- The Department of Geography and Environmental Management Scholarship, University of Waterloo, 2018
- National Scholarship (top %2), China, 2017