

Xiaonan Tai

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EDUCATION

2007 – 2011 Wuhan University, B.S.
2011 – 2018 University at Buffalo, Ph.D.
2018 – 2020 University of Utah, Postdoctoral Fellow

PROFESSIONAL APPOINTMENT

2020 – present Assistant Professor, Department of Biological Sciences,
New Jersey Institute of Technology

RESEARCH INTERESTS

Ecohydrology, Forest mortality and disturbance, Hydrologic and ecosystem modeling, Remote Sensing, GIS

GRANTS

Principle Investigator, MSA: Integrating multi-scale remote sensing and mechanistic modeling to assess riparian ecosystem dynamics and feedbacks to hydroclimate variability. NSF, 09/01/2021-08/31/2024, \$299,600.
Co-Principle Investigator, Groundwater-supported vegetation refugia as a mechanism of forest recovery in a Rocky Mountain watershed impacted by wildfire. DOE, 09/01/2022-08/31/2025, \$1,000,000.
Principle Investigator, Influence of Spatial Heterogeneity in Plant Traits and Environments on Ecosystem Water Fluxes. NJIT Faculty Seed Grant, 07/01/2021-06/30/2022, \$10,000.

PUBLICATIONS

1. Thomas, A., Kolb, T., Biederman, J., Venturas, M.D., Ma, Q., Yang, D., Dore, S. and **Tai, X.**, 2024. Mitigating drought mortality by incorporating topography into variable forest thinning strategies. *Environmental Research Letters*.
2. Ma, Q., Su, Y., Niu, C., Ma, Q., Hu, T., Luo, X., **Tai, X.**, Qiu, T., Zhang, Y., Bales, R.C. and Liu, L., 2023. Tree mortality during long-term droughts is lower in structurally complex forest stands. *Nature communications*, 14(1), p.7467.
3. Atkins, J.W., Bhatt, P., Carrasco, L., Francis, E., Garabedian, J.E., Hakkenberg, C.R., Hardiman, B.S., Jung, J., Koirala, A., LaRue, E.A., ..., **Tai, X.**, ... and Oh, S. (2023). Integrating forest structural diversity measurement into ecological research. *Ecosphere*, 14(9), p.e4633.
4. **Tai, X.**, Trugman, A. T., & Anderegg, W. R. L. (2023). Linking remotely sensed ecosystem resilience with forest mortality across the continental United States. *Global Change*

- Biology, 29(4), pp.1096-1105.
5. Fu, P., Hu, L., Ainsworth, E. A., **Tai, X.**, Myint, S. W., Zhan, W., . . . Bernacchi, C. J. (2021). Enhanced drought resistance of vegetation growth in cities due to urban heat, CO₂ domes and O₃ troughs. *Environmental Research Letters*, 16(12), 124052.
 6. Brooks, P. D., Gelderloos, A., Wolf, M. A., Jamison, L. R., Strong, C., Solomon, D. K., . . . , **Tai, X.**, Arens, S. (2021). Groundwater-Mediated Memory of Past Climate Controls Water Yield in Snowmelt-Dominated Catchments. *Water Resources Research*, 57(10), e2021WR030605.
 7. **Tai, X.**, Venturas, M. D., Mackay, D. S., Brooks, P. D., & Flanagan, L. B. (2021). Lateral subsurface flow modulates forest mortality risk to future climate and elevated CO₂. *Environmental Research Letters*, 16(8), 084015.
 8. **Tai, X.**, Anderegg, W. R. L., Blanken, P.D., Burns, S.P., Christensen, L., Brooks, P.D., (2020). Hillslope hydrology influences the spatial and temporal patterns of remotely sensed ecosystem productivity. *Water Resources Research*.
 9. Christensen, L., Adams, H., **Tai, X.**, Barnard, H., Brooks, P.D., (2020). Increasing plant water stress and decreasing summer streamflow in response to a warmer and wetter climate in seasonally snow covered forests. *Ecohydrology*.
 10. Sperry, J. S., Venturas, M. D., Todd, H. N., Trugman, A. T., Anderegg, W. R., Wang, Y., & **Tai, X.** (2019). The impact of rising CO₂ and acclimation on the response of US forests to global warming. *Proceedings of the National Academy of Sciences*.
 11. **Tai, X.**, Mackay, D. S., Ewers, B. E., Beverly, D., Speckman, H., Parsekian, A., Brooks, P.D., Anderegg, W. R. L. (2019). Plant hydraulic stress explained tree mortality and tree size explained beetle attack in a mixed conifer forest. *Journal of Geophysical Research - Biogeosciences*.
 12. Bagchi-Sen, S., Schunder, T., **Tai, X.** (2019). An analysis of industry-occupation shifts for residents and migrants. *Growth and Change: A Journal of Urban and Regional Policy*.
 13. Baker, K., **Tai, X.**, Miller, M., & Johnson, D. (2019). Six co-occurring conifer species in northern Idaho exhibit a continuum of hydraulic strategies during an extreme drought year. *AoB PLANTS*, plz056, <https://doi.org/10.1093/aobpla/plz056>.
 14. Mackay, D. S., Savoy, P. R., Grossiord, C., **Tai, X.**, Pleban, J. R., Wang, D. R., McDowell, N. G., Adams, H., & Sperry, J. S. (2019). Conifers depend on established roots during drought: results from a coupled model of carbon allocation and hydraulic. *New Phytologist*. doi:10.1111/nph.16043
 15. Love, D. M., Venturas, M. D., Sperry, J. S., Brooks, P. D., Pettit, J. L., Wang, Y., Anderegg, W. R. L., **Tai, X.**, & Mackay, D. S. (2019). Dependence of Aspen Stands on a Subsurface Water Subsidy: Implications for Climate Change Impacts. *Water Resources Research*, 55.
 16. **Tai, X.**, Mackay, D. S., Sperry, J. S., Brooks, P.D., Anderegg, W. R., Flanagan, L. B., Rood, S., & Hopkinson, C. (2018). Distributed Plant Hydraulic and Hydrological Modeling to Understand the Susceptibility of Riparian Woodland Trees to Drought-Induced Mortality. *Water Resources Research*, 54, 4901–4915.
 17. **Tai, X.**, Mackay, D. S., Anderegg, W. R., Sperry, J. S., & Brooks, P. D. (2017). Plant hydraulics

improves and topography mediates prediction of aspen mortality in southwestern USA. *New Phytologist*, 213(1), 113-127.

18. **Tai, X.**, & Wang, L. (2014). Develop an Ensemble Support Vector Data Description method for improving invasive tamarisk mapping at regional scale. *International journal of remote sensing*, 35(19), 7030-7045.

FELLOWSHIPS & AWARDS

- 2023 Convergence Research (CORE) Institute Fellowship
- 2022 Golden Compass fellowship, sponsored by the UCGIS-TRELIS program, American Association of Geographers, and University of Northern Colorado.
- 2022 TRELIS Fellow (Training and Retaining Leaders in STEM - Geospatial Sciences). Selected through a competitive process to participate in an intensive program of professional development for academic women in the geospatial sciences. Program funded by the US National Science Foundation (Award #1660400).
- 2020 NSF Travel Award, NSF funded workshop on “Forest Structural Diversity” (\$1000)
- 2019 NSF Travel Award, University Consortium for Geographic Information Science (UCGIS) Symposium and Summer School (\$1000)
- 2019 CUASHI Travel Award (\$500)
- 2019 Postdoctoral Travel Award (\$500, University of Utah)
- 2017 CUASHI Pathfinder Fellowship. Award amount: \$5000
- 2017 Abrahams/Woldenberg Field Scholarship Recipient – Award given annually to a graduate student in the University at Buffalo Geography Department (\$900)
Finalist – three-minute Ph.D. Dissertation Competition (University at Buffalo)
- 2016 Charles H.V. Ebert Scholarship Recipient – Award given annually to a graduate student in the University at Buffalo Geography Department (\$900)
- 2015 GSEU Professional Development Award – funding for conference travel through the New York State Graduate Student Employees Union Professional Development Award (\$300)
- 2014 Graduate retention award (\$300)
- 2013 Third Place of Student Honor Illustrative Paper Competition, Remote Sensing Special Group (RSSG) of the Association of American Geographers (AAG) Annual Meeting in Los Angeles, 2013 (\$150)
- 2012 Graduate Student Association Conference Travel Award – awarded by the University at Buffalo to support travel to the 2013 AAG meeting in Los Angeles (\$500)
- 2011-2015 University at Buffalo Presidential Fellow – Doctoral fellowship granted by the College of Arts and Sciences to recruit outstanding graduate students. Award amount: \$24,000.

CONFERENCE PRESENTATIONS

Tai, X. Tree mortality as a lens to investigate lateral groundwater flow. June 5, 2023, CUASHI Biennial

- Tai, X., Trugman, T., Anderegg, W.R., Linking remotely sensed ecosystem resilience with forest mortality across the continental United States. European Geophysical Union (AGU); 2022
- Tai, X., Jin, H. Hydroclimate drivers underlying the spatial-temporal dynamics of riparian ecosystem. American Association of Geographers Annual Meeting; 2022
- Tai, X., Venturas, D.M., Mackay, D. S., Brooks, P. D., Flanagan, L. B.. Lateral flow mediates forest mortality risk to future climate and elevated CO₂. Ecological Society of America; 2021
- Tai, X., Anderegg, W. R., Litvak, M., Brooks, P. D.. Relative importance of vegetation and topography in explaining ecosystem response to fire disturbance. American Geophysical Union (AGU); 2019
- Tai, X., Anderegg, W. R., Konings, A., Brooks, P. D.. Topographic complexity influences ecosystem resilience to drought. Gordon Conference – Catchment Science; 2019
- Tai, X., Brooks, P. D., Anderegg, W. R.. Topography mediates ecosystem response to climate variability. American Geophysical Union (AGU); 2018
- Tai, X., Mackay, D. S., Ewers, B. E., Parsekian, A., Sperry, J. S., Beverly, D., Speckman, H.. Topographic variations of water supply and plant hydraulics in a mountainous forest. American Geophysical Union (AGU); 2017
- Tai, X., Mackay, D. S., Sperry, J. S., Flanagan, L. B., Rood, S. B., and Hopkinson, C. How does groundwater mediate plant water supply when rainfall is variable. Ecological Society Association (ESA); 2017
- Tai, X., Mackay, D. S.. Topography mediates plant water stress: coupling groundwater flow and rhizosphere-xylem hydraulics. American Geophysical Union (AGU); 2016
- Tai, X., Mackay, D. S.. Plant Survival and Mortality during Drought Can be Mediated by Co-occurring Species' Physiological and Morphological Traits: Results from a Model. American Geophysical Union (AGU); 2015
- X. Tai. Can scaling effects in spatial regression reveal the structure of physical process? Association of American Geographers (AAG); 2015
- Tai, X., Mackay, D. S., Anderegg, W. R., Sperry, J. S., Influence of Lateral Flow on the Predisposition of Aspen Mortality during Drought. American Geophysical Union (AGU); 2014
- X. Tai, Patterns of employment allocation of migrants to the declining city Buffalo, 1996-2000 and 2006-2010. Association of American Geographers (AAG); 2014
- X. Tai, L, Wang. Develop an Ensemble Support Vector Data Description Method for Improving Invasive Tamarisk Mapping at Regional Scale. Association of American Geographers (AAG); 2013
- Tai, X. Introduction to Biogeography. Lecture given to graduate-level Geography Introduction class at the University at Buffalo, September 2, 2014.

INVITED SEMINARS

- Tai, X. “Biotic and abiotic controls over ecosystem responses to climate change”. May 16, 2023, Universidad Politécnica de Madrid, Spain

Tai, X. “Understanding spatial variations in ecosystem responses to climate variability”. May 10, 2023, IPSL, France

Tai, X. “How hydrology controls ecosystem responses to climate change”. May 4, 2023, Juelich Research Center, Germany.

Tai, X. Biotic and abiotic controls over ecosystem response to climate variability. April 4, 2023. Rutgers University–Newark.

Tai, X. Hydrological controls over ecosystem response to climate variability. February 22, 2023. Rutgers University–New Brunswick Seminar Series.

Tai, X. Spatial variations in drought-induced forest mortality. Peking University, July 28, 2022

Tai, X. Hydrological controls over ecosystem response to climate variability. University of Wyoming Distinguished Lecture Series. March 28, 2022.

Tai, X. Spatial variations of tree water stress and mortality: Integrating plant hydraulics and groundwater. Oak Ridge National Laboratory, February 26, 2018

Tai, X. Coupling ParFlow to a plant physiological model. Colorado School of Mines, August 1, 2017

Tai, X. Integrating plant hydraulics and groundwater helps understanding the spatial variations of forest mortality. University of Wyoming, May 31, 2017

TEACHING EXPERIENCE

2022 Spring	Instructor (BIO375) Conservation Biology
2021 Fall	Instructor (BIO498/698) Introduction to GIS
2020 Fall	Instructor (BIO200) Concepts in Biology
2014 Fall	Instructor (GEO483/553) Introduction to Remote Sensing
2014 Summer	Instructor (GEO 481/506) Introduction to GIS
2012 -2013	Teaching Assistant (GEO 481/506) Introduction to GIS Laboratory
2011	Teaching Assistant (GEO 380) Cartography Laboratory

SYNERGISTIC ACTIVITIES

2022	OSPA judges for AGU annual meeting
2022	Panelist for UCGIS symposium “AI in Spatial Decision Support”
2020-present	Ad-hoc reviewer and panelist for Nation Science Foundation
2020	Participant, Forest Structural Diversity workshop at NEON headquarter in Boulder, CO. Along with 70 other participants, we discussed the direction of future research on structural diversity in forest ecology.
2019	Conference convener for session “Addressing Spatial-Temporal Variation, Plasticity and Acclimation of Key Hydraulic and Photosynthetic Plant Traits for Predicting Forest Responses to Climate Change” at American Geophysical Union Fall Meeting, Dec. 2019.
2019	Participate UCGIS summer school on ‘Reproducible Problem Solving with CyberGIS and Geospatial Data Science’, Urbana Champaign, IL (2019). Along with

35 other participants from universities across U.S., we investigated the challenges and promising tools to support reproducible problem solving and open science and sharing.

- 2019 Participant, CUAHSI-NCAR Training Workshop ‘The Community WRF-Hydro Modeling System’ National Center for Atmospheric Research, Boulder, CO (2019).
- 2017 Conference convener for session “Understanding plant and ecosystem function across scales through the lens of plant hydraulics” at American Geophysical Union Fall Meeting, Dec. 2017.
- 2017 Session Presider, “Climate Change: Plants V.” Ecological Society of America, Aug. 2017
- 2014-present Reviewer for multiple journals including Plant and Soil, Scientific Report, International Journal of Remote Sensing, Climate Change, Hydrological Processes, Science of the Total Environment, Catena, Earth’s Future, Ecosystems, Biogeosciences, New Phytologist, Water Resources Research
- 2013 Geography Department Website Maintenance, University at Buffalo
- 2012 Panelist: Mark Diamond Research Foundation Grant, University at Buffalo
- 2011 Senator: Geography Graduate Student Association, University at Buffalo