KEXIN SONG

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RESEARCH INTEREST

Satellite data fusion, time series analysis, and AI/ML applications in geospatial science, forest health and ecosystem resilience, and global environmental change.

EDUCATION

University of Connecticut, United States

Ph.D.	Department of Natural Resources and the Environment (GPA: 4.0/4.0)	2025
	Dissertation (with distinction): *Satellite Remote Sensing for Investigating Forest Disturbance and Resilience* (Advisor: Dr. Zhe Zhu)	

University of Miami, United States

M.S.	Department of Meteorology and Physical Oceanography (GPA: 3.89/4.0)	2020
	Thesis: *Accuracy Assessment of Summertime Reanalysis and Passive Microwave Sea-ice Concentration Products in the Central Arctic* (Advisor: Dr. Peter Minnett)	

Ocean University of China, China 2018

B.S.	Department of Marine Technology (GPA: 3.65/4.0)

APPOINTMENT

2026	Postdoctoral associate (upcoming), School of Environment, Yale University
2020 - 2025	Research assistant, Department of Natural Resources and the Environment, University of Connecticut
2023	Teaching assistant, Department of Natural Resources and the Environment, University of Connecticut

HONORS & AWARDS

2025	Best Poster Award (Eversource Energy Center) | $250
2024	USGS Landsat Science Team Proposal – Contribution on satellite image fusion part (Submitted)
2024	Graduate Student Travel Grant (University of Connecticut) | $750
2023	Eversource Energy Center Clean Energy and Sustainability Innovation Proposal ("A Real-time Behind the Meter PV Generation Forecasting System") | $2,500
2022	Eversource Energy Center Proposal – Contributed to proposal drafting and development | PI: Zhe Zhu, Co-I: Shi Qiu | $88,000

2019	OceanHackWeek, University of Washington, WA, USA | Travel grant
2019	NASA JPL Summer School on Satellite Observations and Climate Models, California Institute of Technology, CA, USA | Travel grant
2018	RSMAS New Student Fellowship (University of Miami) | $12,180
2018	Outstanding graduate (Ocean University of China)
2017	Undergraduate Research Fellowship (Chinese Academy of Sciences) | ~$1500

ACADEMIC PUBALICATIONS AND PRESENTATIONS

PEER-REVIEWED JOURNAL ARTICALS (* corresponding author)

In Revision

2. [In Revise] **Song K***, Zhu Z*, Knighton J, Qiu S, Yang X, Suh JW, Tavares J, Liu Y, Tai X, Fahey R, Neigh CRS, Callahan R, Hong F, Li T, Grinstead A, Ren W, Witharana C, Hedges SB, Yang Z, Leite R. The Physiological Key to a Satellite-derived Forest Resilience Indicator. ***Nature Ecology & Evolution***.

1. [In Revise] Li T*, Zhu Z*, Wang Z, Kyba C, Seto K, Yang Y, Qiu S, Kuester T, Fragkias M, Chen X, Meyer T, Rittenhouse C, Tai X, Cullerton M, Hong F, Grinstead A, **Song K**, Suh JW, Yang X, Kalb V, Deng C, Román M. Increasing Volatility in Human Nighttime Activity Revealed by Daily and High-Resolution Satellite Imagery. ***Nature***.

Published

5. **Song K***, Zhu Z*, Qiu Shi, Olofsson P, Neigh CRS, Ju J, Zhou Q, (2025). TIF: A Time-series-based Image Fusion Algorithm. ***Remote Sensing of Environment***. DOI: https://doi.org/10.1016/j.rse.2025.115035 (IF: 11.4, Q1)

4. Qiu S*, Zhu Z*, Yang X, Woodcock C, Fahey R, Stehman S, Zhang Y, Cullerton M, Grinstead A, Hong F, **Song K**, Suh JW, Li T, Ren W, Nemani R, (2025). A Shift from Human-directed to Undirected Wild Land Disturbances in the USA. ***Nature Geoscience***. DOI: https://doi.org/10.1038/s41561-025-01792-3 (IF: 16.1, Q1)

3. **Song K** and Minnett PJ* (2024). Evaluation of Summertime Passive Microwave and Reanalysis Sea-Ice Concentration in the Central Arctic. ***Earth and Space Science***, 11(1), 2023EA003214. DOI: https://doi.org/10.1029/2023EA003214

2. Worthley T, Bunce A, Morzillo A, Witharana C, Zhu Z, Cabral J, Crocker E, Cranmer N, DiFalco S, Hale D, Joshi D, Kloster D, Marek N, Parent J, Rogers J, Rudnicki M, **Song K**, Volin J, Ward J, Wedagedara H, Fahey R*, (2024). Stormwise: Innovative Forest Management to Promote Storm Resistance in Roadside Forests. ***Journal of Forestry***, fvae011. DOI: https://doi.org/10.1093/jofore/fvae011

1. Wang D*, Huang D, Liu H, Hu Y, **Song K**, and Liu R, (2017) Establishment and Application of Marine Remote Sensing Satellite Database. *Meteorological, Hydrological and Marine Instruments. (In Chinese).*

Manuscript In Preparation/On-going Work

3. **Song K**, Suh JW, Zhe Z et al. Resilient or At Risk? A Global Assessment of Changing Forest Resilience and Its Drivers. (*Targeting journal*: *Nature)*

2. **Song K**, Zhe Z et al. Landscape-Scale Insect Disturbance in New England from 2013-2024: Patterns, Hotspots, and Timing. (*Targeting journal*: *Remote Sensing of Environment)*

1. **Song K**, Zhu Z et al. From Trees to Outages: Assessing Roadside Tree Failure Risk for Power Grid Resilience and Reliability with AI and PlanetScope Time Series. *(Targeting journal: IEEE Transactions on Power Systems)*

ORAL PRESENTATION presenter

5. **Song K** and Zhu Z (2024) Can Autocorrelation Reveal Forest Ecosystem Resilience to Drought? ***Annual Meeting of American Geophysical of Union (AGU)***. December, Washington, D.C., United States.

4. **Song K** and Zhu Z (2024) Unveiling Forest Resilience Changes in Response to Insect Disturbance: A Comprehensive Analysis Using PlanetScope Time Series. ***Annual Meeting of American Association of Geographers (AAG)***. April, Honolulu, HI, United States.

3. **Song K**, Haoyi Wang, and Paul Zambrzycki (2023) Solar Forecasting: Behind the Meter PV Generation Forecasting System. ***Sustainable Clean Energy Summit***. October, Storrs, CT, United States.

2. **Song K** and Zhu Z (2022) Improved Subtle Change Detection Using Landsat and Sentinel-2 Data Fusion: A Study of Spongy Moth Outbreaks in New England Forests, ***Annual Meeting of American Geophysical of Union (AGU)***. December, Chicago, IL, United States.

1. **Song K** and Zhu Z (2021) Forest Disturbance Monitoring at 10 m Spatial Resolution Using Sentinel-2 Time Series, ***Annual Meeting of American Geophysical of Union (AGU)***. December, Virtual Session.

TEACHING/RESEARCH/MENTORING EXPERIENCE

TEACHING ASSISTANT/LAB INSTRUCTOR

2023 Fall — *NRE 3535: Remote Sensing of Environment*

Instructor for weekly lab sessions on remote sensing data analysis using ENVI. | Delivered guest lectures on *Multispectral Remote Sensing.* | Organized group discussions and coordinated student presentations. | Graded assignments and provided constructive feedback to support student learning.

RESEARCH ASSISTANT

2025 – present — **BoCP-Implementation: Estimating the Extinction Risk of Biodiversity with a Time-based Dynamic System** (**NSF**, UConn-PI: Zhe Zhu, Temple U-PI: S. Blair Hedges)

- Built machine learning (ML) and deep learning (DL) models for Caribbean primary forest mapping using optical time series, spaceborne LiDAR, and SAR imagery.
- Applied Google AlphaEarth embeddings for land cover mapping.

2024 - 2025 — **Improvements of QA Band and New Science Data Layers Proposed for the NASA Harmonized Landsat and Sentinel-2 Products** (**NASA**, PI: Zhe Zhu)

- Developed a novel Time-series-based Image Fusion (TIF) algorithm for operational 30-m Landsat and 10-m Sentinel-2 fusion.
- Evaluated TIF's performance with state-of-the-art algorithms including weight-function based, convolutional neural network (CNN), and hybrid approaches.

2023 **Solar Forecasting - Behind the Meter PV Generation Forecasting System (UCONN-Eversource Energy Center,** PI: Junbo Zhao)

- Developed ML (i.e. random forest) and DL (i.e. U-net) models for rooftop solar PV mapping in Connecticut using very-high resolution aerial imagery.
- Utilized GIS, weather data, and regression models for predictive modeling of electricity generation, providing strategic insights on clean energy growth to industry experts.

2023 - 2024 **Estimating Roadside Tree Risk to Grid Resilience and Reliability Using PlanetScope Time Series (UCONN-Eversource Energy Center**, PI: Zhe Zhu)

- Improved ML models for site-level infrastructure vulnerability prediction using 3-m PlanetScope time series, NAIP imagery, and LiDAR products.

2020 - 2023 **Near Real-time Assessment of Forest Risk to Infrastructure Using Satellite Time Series (UCONN-Eversource Energy Center**, PI: Zhe Zhu)

- Conducted forest disturbance detection and disturbance agent classification using COntinuous Land disturbance Detection (COLD) and object-based ML models.
- Developed predictive tools for infrastructure vulnerability and outage risk assessment.

MENTORING

- Grinstead, A. (PhD student, University of Connecticut)
- Cullerton, M. and Henderson, A. (Master students, University of Connecticut)
- Ma Z. (Undergrad, University of Connecticut)

SERVICES

Reviewer

- *Remote Sensing of Environment* (13 papers)
- *Science of Remote Sensing* (5 papers)

Representative

- RSMAS Graduate Student Representative (University of Miami)

Scientific Tools/GitHub sources

- TIF (Time-series-based Image Fusion, Creator): An operational approach for global, 10 m NASA Harmonized Landsat and Sentinel-2 fusion. (GitHub: https://github.com/GERSL/TIF)
- UCONN HPC Handbook (Regular Contributor): A collaboratively developed user guide for high-performance and parallel computing.
- Isopy: A python package for calculating isosurfaces and extracting variables along isopycnals from 3D datasets. (GitHub: https://github.com/oceanhackweek/DataAccess/tree/master/isopy YouTube: https://www.youtube.com/watch?v=fSQjuTAZK-c)

MEDIA COVERAGE

- Diagnosis from the Sky: Catching Insect Infestations within Forests Before It's Too Late, *UConn Today*
- Six UConn Teams Innovating Decarbonization this Summer through Unique Eversource Partnership Program, *UConn Today*

- Clean Energy & Sustainability Innovation Program Submission Finalists, *UConn Today*

TECHNICAL SKILLS

- Remote Sensing: Optical (Landsat, Sentinel-2), SAR (Sentinel-1), LiDAR, ArcGIS, Google Earth Engine
- Programming & Automation: Python (Numpy, Spark, Pandas, Xarray, GDAL), R, Matlab, SQL, JavaScript
- High-Performance Computing & Cloud: Linux, HPC clusters (SLURM), Azure, Google Cloud, AWS
- Machine Learning & AI: Scikit-learn, TensorFlow, PyTorch, XGBoost
- Data Engineering: ETL pipelines, Time-series modeling, Relational Databases