Xiaoxuan Li

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EDUCATION

George Mason University | Fairfax, VA, USA   Sep 2019 - Dec 2023
Ph.D. (GPA: 4.0/4.0) Earth Systems & Geoinformation Sciences
- Dissertation: Space-based LiDAR for Estimating Vegetation Structure

University of Texas at Dallas | Richardson, TX, USA   Sep 2016 - Jun 2018
M.S. (GPA: 3.9/4.0) Geospatial Information Sciences
- Thesis: Combining Water Fraction and DEM-Based Methods to Create a Coastal Flood Map: A Case Study of Hurricane Harvey

Liaoning Technical University Fuxin | Liaoning, China   Sep 2016 - Jun 2018
B.S. (GPA: 3.2/4.0) Surveying & Mapping Engineering (Remote Sensing & Photogrammetry)
- Thesis: Decade of Forest Change Analysis using Landsat Time Series Data in Tieling City

WORK EXPERIENCE

George Mason University | Fairfax, VA, USA   Sep 2019 - Present
Research Assistant
- Calibrate and validate large-scale spaceborne LiDAR datasets (e.g. GEDI and ICESat-2) using airborne LiDAR, GEDI simulator and field measurements
- Develop SAR-based biomass models using machine learning and generalized linear models and propagate model uncertainty using Monte Carlo simulation
- Monitor a decade of vegetation changes using airborne LiDAR and ALOS-2 PALSAR-2 in African Savannas
- Evaluate the relationship between GEDI structural metrics and bird and mammal species in Amazon rainforest
- Design and develop web-based GIS applications (Mapbox, CartoDB, JS, etc.)
- Assess the impacts of natural hazards (floods, wildfires, etc.) using predictive modeling and machine learning methods

SKILLS

- **Programming Languages:** Python (advanced), R (advanced), MATLAB, VB, JavaScript, SQL
- **Tools:** ArcGIS products (ArcMap, ArcGIS Pro), LAStools, SeaDAS, ERDAS, ENVI, eCognition, CloudCompare, Global Mapper, Linux, Prism
- **Coursework:** Advanced GIS, Advanced Remote Sensing, Advanced Earth Data Analysis, GIS Programming, Science Data Mining, Quantitative Methods, Web-based GIS, 3D Data Capture and Ground LiDAR, Data Management

PROJECTS

NASA's Carbon Monitoring System (PI: John Armston, UMD)   Jan 2020 - Present
Savanna-Bio: Biomass estimation with new spaceborne missions for MRV in Dry Forests and Savannas
- Validated and improved large amounts of spaceborne LiDAR (GEDI and ICESat-2) estimates of structure and biomass for dry forests and savannas
- Developed prototype structure and biomass maps for international pilot sites using spaceborne LiDAR and SAR (ALOS-2 PALSAR-2) datasets
- Used independent field and airborne LiDAR data to validate biomass products and evaluate the uncertainty following the CEOS Land Product Validation protocol for biomass
- Worked with stakeholders to quantify the impacts of woody degradation and regrowth on aboveground biomass and carbon stock change with reference to existing MRV activity data

The Hydrosphere Final Project   Jan 2021 - Apr 2021
Prediction of Drought Index Based on Machine Learning Algorithms
- Implemented Random Forest (RF) algorithm to predict drought conditions in the US and identify important factors that affect droughts the most. Several data sources were used, such as MODIS, gridMET, and TerraClimate
- Compared RF with other machine learning algorithms (SVM, ANN, GLM, RPART) and mapped droughts across the US
- RF is the best model compared to others in terms of highest $R^2 > 0.9$

Independent Study   Jan 2021 - Apr 2021
Spatio-temporal Crime Cluster Analysis and Machine Learning Based Classification in San Francisco City
- Detected anomalous clusters in spatial and temporal crime data

- Predicted which category of crime events may occur given a specific time, location, and demographic information using multiple machine learning algorithms (e.g. ANN, RPART, KNN, RF, etc.)
- RF was regarded as the most suitable prediction model due to its relatively high accuracy and low logloss values

Independent Study May 2020 - Sep 2020
Spatial-temporal Sea Surface Salinity Retrieval and Analysis in the Gulf of Mexico
- Extracted and processed daily NASA MODIS/Aqua level-2 data products using Linux-based SeaDAS Graph Processing
- Implemented multiple methods such as multiple nonlinear regression, cubist model, Random Forest (RF), and Support Vector Machine (SVM) to predict Sea Surface Salinity (SSS) using the processed MODIS data products

Web-based GIS Final Project Sep 2019 - Dec 2019
A Web Viewer for Visualizing Crime Data in Fairfax County
- Developed a GIS-based web application for county level crime visualization and analysis
- Generated dynamic charts, information window, geospatial markers, and multiple layers controls in the web interface
- Tools and technologies used: Google Geocoding API, CartoDB, HTML, CSS, JavaScript, and Leaflet

Intermediate Quantitative Methods Final Project Jan 2019 - Apr 2019
A Quantitative Analysis of ENSO-induced Impacts in Rainfall Erosivity over South America
- Developed predictive models to estimate rainfall erosivity using climate zones and 1-hourly Global MERRA-2 datasets
- Examined the relationship between rainfall erosivity and multiple ENSO indices (Southern Oscillation Index (SOI), Niño 3.4 Sea Surface Temperature (SST), and Multivariate ENSO Index (MEI)) (Best results: $R^2 = 0.7$)

GIS and Hazard Final Project Oct 2018 - Dec 2018
Integrated Vulnerability Analysis: Case Studies of Tropical Storm Allison and Hurricane Harvey
- Processed and assessed NEXRAD Level II Radar reflectivity data to make flood exposure maps
- Conducted an inductive socioeconomic vulnerability method to analyze flood vulnerability and hazard exposure
- Developed integrated vulnerability index using flood zone maps, exposure maps and SVI scores

Advanced Geographic Information System Final Project Jan 2017 - May 2017
Kernel Density Estimation Selection over Inhomogeneous Backgrounds for Plano Crime Analysis
- Discussed and introduced four kernel density estimators based on bandwidth and location characteristics
- Implemented four kernel density models and evaluated their performances on the crime data of Plano city
- Identified the best model for solving the inhomogeneous background problems

Advanced Remote Sensing Final Project Apr 2017 - May 2017
Object-based Classification Based on Hyperspectral AVIRIS Data
- Preprocessed AVIRIS data and applied forward and inverse MNF transformations including FLAASH processing, no-calibrated bands removal and conversion of DNs to at-sensor radiance
- Developed an object-based classification method using eCognition and evaluated the result of object-based classification and compared it with pixel-based classification results (Overall accuracy: 0.9)

AWARDS

- George Mason University Summer Presidential Scholar Research Fellowship, 2020 - 2023
- George Mason University Presidential Scholarship, 2019 - 2023
- University of Florida Open Access Publishing Fund, May 2019
- University of Florida Department of Geography Travel Award, Feb 2019

PUBLICATIONS

- Qu, Y., Zheng, G., Xu, C., Ma, X., **Li, X.** (2024). Characterizing savanna canopy heights using GEDI and spatially continuous spectral and backscattering information in a landscape level. (Under review, **Remote Sensing of Environment**).
- **Li, X.,** Wessels, K., Armston, J., Duncanson, L., Urbazaev, M., Naidoo, L., Mathieu R., & Main, R. (2024). Evaluation of GEDI Footprint-level Biomass Models in Southern African Savannas using ALS and Field Measurements. (Under review, **Science of Remote Sensing**).
- **Li, X.,** Wessels, K., Armston, J., Hancock, S., Mathieu, R., Main, R., ... & Scholes, R. (2023). First validation of GEDI canopy heights in African savannas. **Remote Sensing of Environment**, 285, 113402.
- Wessels, K., **Li, X.**, Bouvet, A., Mathieu, R., Main, R., Naidoo, L., ... & Asner, G. P. (2023). Quantifying the sensitivity of L-Band SAR to a decade of vegetation structure changes in savannas. **Remote Sensing of Environment**, 284, 113369.
- Wang, Z., **Li, X.**, & Xu, H. (2022). 3D Digital City Structure Model Based on Image Modeling Technology. In **Computer Graphics International Conference** (pp. 381-392). Cham: Springer Nature Switzerland.
- **Li, X.**, Cummings, A. R., Alruzuq, A. R., Matyas, C. J., & Amanambu, A. C. (2019). Combining Water Fraction and DEM-Based Methods to Create a Coastal Flood Map: A Case Study of Hurricane Harvey. **ISPRS International Journal of Geo-Information**, 8(5), 231.

- Sun, H. and **Li, X.** (2016). A Fast Classification Algorithms for High-dimensional Remote Sensing Images. **Science of Surveying and Mapping**, No. 8.

PRESENTATIONS AND CONFERENCE PAPERS

- **Li, X.** (2023). Space-based LiDAR for Estimating Vegetation Structure in Savannas, University of Washington, May 18th, Seattle, WA.
- Urbazaev, M., Armston, J. D., **Li, X.,** Wessels, K. J., Duncanson, L., Bhogapurapu, N., & Siqueira, P. (2023). Improving the applicability of canopy structure measurements from GEDI and ICESat-2 to global savannas. American Geophysical Union Annual Meeting, December 11th, San Francisco, CA.
- Bhogapurapu, N., Siqueira, P. R., Armston, J. D., Urbazaev, M., **Li, X.,** Wessels, K., & Duncanson, L. (2023). Forest canopy height estimation using C-and L-band InSAR coherence over savannas and dry forests. American Geophysical Union Annual Meeting, December 11th, San Francisco, CA.
- Urbazaev, M., Armston, J., **Li, X.,** Wessels, K., Duncanson, L., Bhogapurapu, N., Siqueira, P. (2023). The Efficacy of GEDI and ICESat-2 for Estimation of Vegetation Cover and Height in Savannas, ESA POLINSAR & BIOMASS Workshops 2023, June 21st, Toulouse, France.
- Bhogapurapu, N., Siqueira, P., Armston, J., **Li, X.,** Urbazaev, M., Wessels, K., Duncanson, L. (2023). Large-Scale Canopy Height Estimation using C-band InSAR Correlation, ESA POLINSAR & BIOMASS Workshops 2023, June 21st, Toulouse, France.
- **Li, X.,** Wessels, K., Armston, J., Duncanson, L., Urbazaev, M., Hancock, S., Mathieu, R., Main, R., Naidoo, L., & Erasmus, B. (2022). Comparison of GEDI and ICESat-2 Terrain and Canopy Height Estimates in African Savanna Vegetation, American Geophysical Union Annual Meeting, December 15th, Chicago, IL.
- Bhogapurapu, N., Siqueira, P., Armston, J., **Li, X.,** Urbazaev, M., Wessels, K., Duncanson, L. (2022). Temporal analysis of C-band InSAR decorrelation for canopy height mapping over dry forests and tropical savannas, American Geophysical Union Annual Meeting, December 15th, Chicago, IL.
- **Li, X.,** Wessels, K., Armston, J., Hancock, S., Mathieu, R., Main, R., Naidoo, L., Erasmus, B., & Scholes, R. (2021). First Validation of GEDI Canopy Height in African Savannas, American Geophysical Union Annual Meeting, December 13th, New Orleans, LA.
- **Li, X.,** Wessels, K., Armston, J., Hancock, S., Mathieu, R., Main, R., Naidoo, L., Erasmus, B., & Scholes, R. (2020). First Validation of GEDI Vegetation Structure Metrics in South African Savannas, American Geophysical Union Annual Meeting, December 8th, online.
- **Li, X.** (2019). Integrated Vulnerability Analysis: Case Studies of Tropical Storm Allison and Hurricane Harvey, Association of American Geographers Annual Meeting, April 4th, Washington D.C.
- **Li, X.** (2018). Combining Water Fraction and DEM-based Methods to Create a Storm Surge Map: A Case Study of Hurricane Harvey, 73rd Association of American Geographers Southeast Division Annual Meeting, December 5th, Johnson City, TN.

REFERENCES

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