Kelsee Bratley

685 Commonwealth Ave, Boston, MA 02215
kbratley@bu.edu | http://kelseebratley.github.io

Education

Ph.D. in Earth and Environment 09/2019 – *Expected 07/2025*
Boston University, Department of Earth and Environment *Boston, MA*

Advisor: Dr. Curtis E. Woodcock
Dissertation Title: Mapping and Monitoring Agricultural and Ecosystem Dynamics Using Remote Sensing and Statistical Frameworks

M.A. in Remote Sensing and GIS 09/2018 – 05/2019
Boston University, Department of Earth and Environment *Boston, MA*

B.Sc. in Environmental Science 08/2014 – 05/2018
University of North Carolina Wilmington, Department of Environmental Sciences *Wilmington, NC*

Advisor: Dr. Eman Ghoneim
Honor's Thesis: Modeling Urban Encroachment on the Agricultural Land of the Eastern Nile Delta Using Remote Sensing and a GIS-Based Markov Chain Model

Work Experience

Doctoral Researcher 09/2019 – Present
Boston University, Department of Earth and Environment *Boston, MA*

- Evaluated and mapped agricultural dynamics across Egypt and Ghana using time-series algorithms (LandTrendr & CCDC) and machine learning, analyzing spatio-temporal land cover changes to identify agricultural expansion and loss.
- Applied fixed-effects regression modeling and Landsat panel data to quantify the impact of ecological treatments on invasive species within Saguaro National Park, providing data-driven insights to support ecosystem management strategies.
- Conducting a comprehensive review of remote sensing applications for agricultural mapping in Sub-Saharan Africa, explores the historical developments, current state, persistent challenges, and future opportunities for scalable agricultural monitoring.

Research Contractor & Collaborator 03/2023 – 12/2024
International Monetary Fund *Maputo, Mozambique*

- Developed and applied advanced remote sensing methodologies, including machine learning classification and uncertainty quantification, to map agricultural extent in Mozambique.
- Collaborated with multidisciplinary experts from the UN World Food Programme, Digital Earth Africa, and the Mozambique Ministry of Agriculture and Rural Development to support data-driven agricultural policy and resource management.
- Communicated research outcomes through technical presentations to international stakeholders and trained local university students and faculty on remote sensing methodologies while ensuring knowledge transfer to strengthen local capacity.
- Initially contracted for six months, with continued collaboration throughout the following year, leading to a co-authored white-paper publication and further contributions to research initiatives.

Research Assistant 09/2018 – 08/2019
Boston University *Boston, MA*

- Digitized agricultural field data using QGIS, collecting training data points to support land-cover classification across diverse global environments.

Skills

Remote Sensing Methods: Change detection, land cover classification, area estimation, machine learning (Random Forest, SVM, Gradient Boosting, K-means clustering), design- and model-based statistical inference, fixed-effects regression, big data management

Programming: Python (rasterio, shapely, sickit-learn, etc.), GDAL, R, JavaScript for Google Earth Engine, High performance computing (Linux)

Applications: ArcGIS, QGIS, ENVI, Microsoft Suite

Teaching Experience

Teaching Fellow, Boston University Spring 2020 & Spring 2025
Course: Digital Image Processing (Graduate Level)

- Taught computer lab sessions to teach advanced image processing techniques, focusing on BASH, Python, and GEE.

Instructor of Record, Boston University Fall 2024
Course: Remote Sensing of the Environment

- Designed and managed all aspects of an undergraduate Remote Sensing course, including developing curriculum, delivering lectures, facilitating class discussions, and providing detailed feedback to enhance student understanding of remote sensing principles and applications.

Teaching Fellow, Boston University Fall 2019
Course: Geographic Information Systems (GIS) (Graduate Level)

- Taught GIS lab sessions focused on spatial analysis, geoprocessing, and cartographic visualization using tools such as ArcGIS and QGIS.

Teaching Fellow, Boston University Spring 2019
Course: Introduction to Climate and Earth System Science

Teaching Fellow, Boston University Fall 2018
Course: Biology 1

Publications

Peer-Reviewed

Bratley, K. H. & Woodcock, C. E. (2024). Estimating the expansion and reduction of agricultural extent in Egypt using Landsat time series. International Journal of Applied Earth Observation and Geoinformation, 133, 104141. https://doi.org/10.1016/j.jag.2024.104141

Tang, X., Barrett, M. G., Cho, K., Bratley, K. H., Tarrio, K., Zhang, Y., Gu, H., Rasmussen, P., Bosch, M., & Woodcock, C. E. (2024). Broad-area-search of new construction using time series analysis of Landsat and Sentinel-2 data. Science of Remote Sensing, 9, 100138. https://doi.org/10.1016/j.srs.2024.100138

Tang, X., Bratley, K. H., Cho, K., Bullock, E. L., Olofsson, P., & Woodcock, C. E. (2023). Near real-time monitoring of tropical forest disturbance by fusion of Landsat, Sentinel-2, and Sentinel-1 data. Remote Sensing of Environment, 294, 113626. https://doi.org/10.1016/j.rse.2023.113626

Pasquarella, V. J., Arévalo, P., Bratley, K. H., Bullock, E. L., Gorelick, N., Yang, Z., & Kennedy, R. E. (2022). Demystifying LandTrendr and CCDC temporal segmentation. International Journal of Applied Earth Observation and Geoinformation, 110, 102806. https://doi.org/10.1016/j.jag.2022.102806

Bratley, K. H. & Ghoneim, E. (2018). Modeling Urban Encroachment on the Agricultural Land of the Eastern Nile Delta Using Remote Sensing and a GIS-Based Markov Chain Model. Land (Basel), 7(4), 114. https://doi.org/10.3390/land7040114

Forthcoming

Bratley, K. H., & Woodcock, C. E. (2025). Mapping agricultural extent in Africa: Progress, past challenges, and future opportunities. In preparation.

Bratley, K. H., Kaufmann, R., Foley, F., Grissom, P., Nolte, C., Cho, K., Woodcock, C. E. (2025). Evaluating Treatment Efficacy on Invasive Buffelgrass (Cenchrus ciliaris) in Saguaro National Park Using Landsat Time-Series and Fixed Effects Regression Modeling. In preparation.

Non-Peer-Reviewed

Bratley, K. H., & Meyer-Cirkel, A. (2025). Understanding Agricultural Output in Mozambique: Using Remote Sensing to Initiate a Discussion on Development. White Paper, International Monetary Fund.

Conference Presentations

Bratley, K. H., Nolte, C., Kaufmann, R., Cho, K., & Woodcock, C. E. (2024, December). Evaluating treatment efficacy on invasive buffelgrass (Cenchrus ciliaris) in Saguaro National Park using Landsat time-series and fixed effects panel regression [Poster presentation]. AGU Fall Meeting, Washington, D.C.

Bratley, K. H., & Woodcock, C. E. (2022, December). Mapping multiple kinds of agricultural land-cover change in Egypt using a LandTrendr time series temporal segmentation approach [Poster presentation]. AGU Fall Meeting, Chicago, IL.

Bratley, K. H., & Woodcock, C. E. (2022, October). Mapping multiple kinds of agricultural land-cover change in Egypt using a LandTrendr time series temporal segmentation approach [Oral presentation]. Pecora Conference, Denver, CO.

Bratley, K. H., & Ghoneim, E. (2019, March). Modeling urban encroachment on the agricultural land of the Eastern Nile Delta using remote sensing and a GIS-based Markov chain model [Poster presentation]. International Scientific Research Conference on Renewable Energy and Water Sustainability, Sharm El-Sheikh, Egypt.

Bratley, K. H., & Ghoneim, E. (2018, April). Urban encroachment on the Nile Delta [Poster presentation]. Association of American Geographers Annual Meeting, New Orleans, LA.

Invited Lectures & Talks

Bratley, K. H. (2024, June). Mapping Agricultural Extent in Mozambique [Invited speaker]. Digital Earth Africa.

Bratley, K. H. (2020–2025, Spring). Quantifying Spatial and Temporal Agricultural Trends: A Guide to Using LandTrendr [Guest lecture]. Boston University, Digital Image Processing.

Bratley, K. H. (2022, Fall). Assessing Multiple Kinds of Agricultural Land-Cover Change in Egypt Using LandTrendr [Guest lecture]. James Madison University, Introduction to Remote Sensing.