

Ian R. McGregor, Ph.D.

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EDUCATION

- North Carolina State University**, Center for Geospatial Analytics *Raleigh, NC*
August 2023
- PhD Geospatial Analytics
 - Dissertation: Advancing Near Real-time Deforestation Monitoring via Multi-source Remote Sensing Data, Landscape Processes, and End-user Contributions
 - NASA Future Investigator in Earth and Space Science and Technology
- University of Oxford**, School of Geography and the Environment *Oxford, UK*
September 2017
- MSc Environmental Change and Management
 - Dissertation (Distinction): Fire in the Savannah – Assessing the Applicability of Modelling in Lopé National Park, Gabon
- University of California, Berkeley**, College of Natural Resources *Berkeley, CA*
May 2015
- BSc Conservation and Resource Studies, Society and Environment
 - Dean's Honors

RESEARCH EXPERIENCE

- Cary Institute for Ecosystem Studies** *Millbrook, NY*
Postdoctoral Research Associate Aug. 2023 – present
Fellow – Smithsonian Tropical Research Institute Feb. 2024 - present
- Contribute to pan-tropical research project (Gigante) focusing on biodiversity impacts from lightning strikes and characterizing change detection signals from near and remote sensing data
 - Build protocol and workflow in Python/R for processing lightning detection data into usable maps for field validation and further analysis, as well as develop lightning risk model for tropical forests.
 - Develop coding pipeline in Python/R for drone flight planning, execution, and processing point clouds and orthomosaics using drone photogrammetry to identify structural and spectral forest gaps.
 - Drive the development and maintenance of explicit protocol and metadata documentation for different projects across multiple institutions while collaborating with colleagues using GitHub.
 - Processing conducted in Agisoft Metashape, R, Python, Windows batch, Mac bash scripting
- North Carolina State University** *Raleigh, NC*
Ph.D. student with Dr. Josh Gray Aug. 2019 – July 2023
Dissertation
- Developed a near real-time change detection method to identify deforestation quickly and accurately in a tropical dry forest (Myanmar) via the aggregation of Landsat-8, Sentinel-2, and Sentinel-1 data
 - Incorporated landscape characteristics to change detection estimates using a novel Bayesian approach
 - Integrated adaptive capacity into the change detection model by iteratively updating detection estimates using simulated, field-based validation data such that the model continuously improves
 - Conduct research using a mix of R, Python, GitHub, GDAL, Google Earth Engine Javascript, and Linux-based High-Performance Computing (HPC)

Research Assistantship

- Contributed code and analysis for phenology research comparing ground-based eddy-covariance flux tower data with satellite (MODIS) data.
- Obtained primary footage and B-roll for National Park Service communications project at New River Gorge National Park

Smithsonian Conservation Biology Institute
Research Analyst, Ecosystems and Climate Change Lab

Front Royal, VA
Sep. 2018 – Aug. 2019

- Managed a long-term ecological forest study consisting of field dendrology surveys and data analysis
- Established dendrological research methods in R and GitHub for the lab
- Developed independent research project quantifying tree drought responses under climate change

ForestGEO Technician, Ecology Lab and Conservation Ecology Center

Mar. – Sep. 2018

- Collaborated with field crew in surveying the Forest Global Earth Observatory (ForestGEO) study plot via the application of standardized protocols
- Created field maps for Smithsonian animal survey projects, and assisted with eMammal camera trap deployments

Graduate student with Drs. Imma Oliveras and Yadvinder Malhi

May – Aug. 2017

- Developed research project assessing the effect of fuel gradients in central Gabon for prescribed fire policy via both field work and data analysis in R
- Submitted findings and recommendations to staff of Lopé National Park for management of savannah-rainforest mosaic biome.

SKILLS and EXPERTISE

- **Programming:** R, Python, QGIS, GDAL, PROJ, Google Earth Engine, GitHub, Agisoft Metashape, High-Performance Computing (HPC) in a Linux environment
- **Geospatial analysis:** Near real-time monitoring; landscape-scale processing using photogrammetry, LiDAR, Digital Elevation Models (DEMs), and vector data; time series analyses; operational workflows
- **Research:** Project management, data maintenance, protocol development, qualitative and quantitative analyses
- **Field:** Botanical identification, data collection, field surveying, following and establishing protocols
- **Certifications:** Certified Remote Pilot under FAA Part 107
- **Communications:** Presenting research (conference, public, etc), environmental education with guided tours, collaborate with international team members, mentoring local students
- **Language:** English [native], Spanish [intermediate], Arabic [intermediate]

LEADERSHIP

Cary Institute of Ecosystem Studies

Millbrook, NY

Member, Committee on Computing Resources

Feb. 2024 – present

- Designed and sent out survey to assess computing needs at the Cary Institute
- Kept detailed notes from monthly meetings and helped set agendas for future meetings
- Collaborated with the President and colleagues to determine how Cary should adapt to computing and storage challenges in short- and long-term scenarios.

Member, Alliance for Tropical Forest Systems Drone Working Group

Feb. 2024 – present

- Reviewed and contributed to a survey design for understanding drone data usage across the Tropics, with the goal of creating a standardized metadata, protocol, and data sharing platform.

North Carolina State University

Raleigh, NC

Secretary, Geospatial Graduate Student Organization

May 2020 – May 2022

- Supported geospatial student body, keep organized minutes
- Coordinated Lunch and Learn Seminar Series, including planning, securing speakers, advertising, hosting in-person and virtual events, and moderating panel discussion
- Led graduate student feedback sessions to provide advice for department leadership
- Assisted with coordinating speaking and outreach events for GIS Week

Secretary, International Society for Tropical Forestry club

Jun. 2020 – May 2022

- Supported group agenda and keep notes; send weekly emails; host guest speakers
- Co-led diversity, equity, and inclusion workshop for the 2021 ISTF Annual Meeting

Spatial Analysis and Ecosystems Lab

Aug. 2021 – July 2023

- Helped create the research lab's website, and coordinated the posting of research blogs and project updates

CONFERENCES

- **McGregor, I.R.**, Burchfield, J.C., Gutierrez, C., Chmielewski, M.W., Muller-Landau, H.C., Bitzer, P.M., Yanoviak, S.P., Gora, E.M. 2025. Quantifying forest turnover and the role of lightning using an integrated sensor approach. *Ecological Society of America Annual Meeting, 11-15 Aug., Baltimore, MD* [oral presentation]
- **McGregor, I.R.**, Burchfield, J.C., Gutierrez, C., Chmielewski, M.W., Muller-Landau, H.C., Bitzer, P.M., Yanoviak, S.P., Gora, E.M. 2025. Assessing the impact of lightning on regional disturbance regimes across a tropical forest gradient. *European Geophysical Union Annual Meeting, 27 April – 2 May, Vienna, Austria.* [oral presentation]
- **McGregor, I.R.**, Burchfield, J.C., Gutierrez, C., Chmielewski, M.W., Muller-Landau, H.C., Bitzer, P.M., Yanoviak, S.P., Gora, E.M. 2024. Quantifying the contributions of lightning to regional disturbance regimes across multiple tropical forests. *Ecological Society of America Annual Meeting, 4-9 Aug., Long Beach, CA.* [oral presentation]
- **McGregor, I.R.** & Gray, J. 2022. ASAP or AAAP? The importance of tradeoffs between detection time and accuracy for multisource deforestation monitoring. *American Geophysical Union Annual Meeting, 12-16 Dec., Chicago, IL.* [poster presentation]
- **McGregor, I.R.** & Gray, J. 2022. Beyond the binary – improving near real-time deforestation monitoring by understanding trade-offs between latency and accuracy. *Forest Disturbance and Ecosystem Dynamics Symposium, 19-22 Sep., Berchtesgaden, Germany.* [poster presentation]
- **McGregor, I.R.** & Gray, J. 2022. Tortoise or hare? Leveraging trade-offs in multi-source, near real-time deforestation monitoring to benefit resource managers. *Ecological Society of America Annual Meeting, 14-19 Aug., Montreal, Canada* [oral presentation]
- **McGregor, I.R.** & Gray, J. 2021. We Can't Have It Both Ways – Accepting the Trade-off of Detection Time and Accuracy in Multi-Source, Near Real-time Deforestation Monitoring. *American Geophysical Union Annual Meeting, 12-17 Dec., New Orleans, LA.* [virtual, oral presentation]
- **McGregor, I.R.** & Gray, J. 2021. Leveraging multi-source data to improve near real-time forest disturbance monitoring. *North Carolina Space Symposium, 16 Apr., Raleigh, NC.* [virtual, lightning talk]
- **McGregor, I.R.**, Gao, X., Gray, J. 2020. Satellite vegetation phenology reliably captures timing of carbon fluxes. *Ecological Society of America Annual Meeting, 3-8 Aug., Salt Lake City, UT.* [virtual, poster]
- **McGregor, I.R.**, Gao, X., Gray, J. 2020. The Correspondence of MODIS Land Surface Phenology and GPP. *International Association for Landscape Ecology North America, Toronto, Canada.* [virtual, poster]

OTHER TALKS

- *Cary Institute of Ecosystem Studies Lunch Bunch Seminar Series, Nov. 2024.* Fall colors: what we know, what we don't know, and why that matters [talk]
- *Cary Institute of Ecosystem Studies Biological Research Experience for Teachers, July 2024.* Data visualization workshop [workshop lead]
- *Harvard Forest Seminar Series, Mar. 2024.* Lightning and Near Real-time Deforestation: Using remote sensing to better understand tropical forests [invited talk]

- *Cary Institute of Ecosystem Studies Seminar, Nov. 2023.* Fallen trees and coding dreams, or near real-time deforestation monitoring [invited talk]
- *International Society of Tropical Forestry 2021 Annual Meeting, Inclusivity Starts with our Design! Participatory Design Workshop for Inclusion, Diversity, Equity, and Accessibility (IDEA) in Tropical Forestry and Natural Resources* [workshop co-lead]
- *Research Triangle Institute, International (RTI) Brown Bag Lunch Seminar Series, Jan. 2021.* Near real-time monitoring of forest disturbance using multi-source imagery [invited talk]

FUNDING

NASA

Future Investigator in NASA Earth and Space Science and Technology 2020 – 2023

- \$135,000

North Carolina Space Grant Research Fellow 2020 – 2021

- \$10,000

United States Geospatial Intelligence Foundation

Doctoral Scholarship 2020 – 2021

- \$5,000

International Association for Landscape Ecology, North America

Annual Meeting Student Travel Award Spring 2020

- \$700

North Carolina State University

Center for Geospatial Analytics Travel Award Spring 2020

- \$800

PROFESSIONAL CERTIFICATIONS

- Certified Remote Pilot under FAA Part 107

PROFESSIONAL MEMBERSHIP

- Ecological Society of America
- European Geophysical Union

PUBLICATIONS

- **McGregor, I.R.**, Reich, B.J., Sills, E.O., Gray, J.M., 2025. Improving near real-time deforestation monitoring using environmental contexts. *Remote Sensing of Environment* (*in prep*).
- **McGregor, I.R.**, Gray, J.M., 2025. A new method for continuous validation of near real-time deforestation detections. *Environmental Research Letters* (*in prep*).
- Rubio, V.R., **McGregor, I.R.**, Mori, G.B., Gutierrez, C., Arauz, F., Guevara, M., ..., Esquivel-Muelbert, A., Gora, E.M., 2025. The Gigante project: Toward a deeper understanding of the mortality dynamics of giant trees. *Methods in Ecology and Evolution* (*in prep*).
- Gora, E.M., **McGregor, I.R.**, Muller-Landau, H.C., Burchfield, J.C., Cushman, K.C., Rubio, V.E., Mori, G.B., Sullivan, M.J.P., Chmielewski, M.C., Esquivel-Muelbert, A., 2025. Storms are an important driver of change in tropical forests. *Ecology Letters* 28, e70157. [DOI](#)
- **McGregor, I.R.**, Connette, G., Gray, J.M., 2024. A novel, multi-source change detection algorithm supporting user customization and near real-time deforestation detections. *Remote Sensing of Environment* 308, 114195. [DOI](#)
- Gao, X., **McGregor, I.R.**, Gray, J.M., Friedl, Mark, Moon, Minkyu, 2023. Observations of satellite land surface phenology indicate that maximum leaf greenness is more associated with global vegetation productivity than growing season length. *Global Biogeochemical Cycles* 37, e2022GB007462. [DOI](#)

- Vinod, N., Slot, M., **McGregor, I.R.**, Ordway, E.M., Smith, M.N., Taylor, T.C., Sack, L., Buckley, T.N., Anderson-Teixeira, K.J., 2023. Thermal sensitivity across forest vertical profiles: patterns, mechanisms, and ecological implications. *New Phytologist* 237, 22–47. [DOI](#)
- Kim, A.Y., Herrmann, V., Bareto, R., Calkins, B., Gonzalez-Akre, E., Johnson, D.J., Jordan, J.A., Magee, L., **McGregor, I.R.**, Montero, N., Novak, K., Rogers, T., Shue, J., Anderson-Teixeira, K.J., 2022. Implementing GitHub Actions continuous integration to reduce error rates in ecological data collection. *Methods in Ecology and Evolution*. [DOI](#)
- Dow, C., Kim, A.Y., D’Orangeville, L., Gonzalez-Akre, E.B., Helcoski, R., Herrmann, V., Harley, G.L., Maxwell, J.T., **McGregor, I.R.**, McShea, W.J., McMahan, S.M., Pederson, N., Tepley, A.J., Anderson-Teixeira, K.J., 2022. Warm springs alter timing but not total growth of temperate deciduous trees. *Nature* 608, 552–557. [DOI](#)
- Gao, X., **McGregor, I.R.**, Smith, O., Hinks, I., Shisler, M., 2022. The blsp R package with a Bayesian land surface phenology model. Zenodo. [DOI](#)
- Sedio, B.E., Spasojevic, M.J., Myers, J., Wright, S.J., Person, M.D., Chandrasekaran, H., Dwenger, J.H., Prechi, M.L., López, C.A., Allen, D.N., Anderson-Teixeira, K.J., Baltzer, J.L., Bourg, N.A., Castillo, B.T., Day, N., Dewald-Wang, E., Dick, C.W., James, T.Y., Kueneman, J., Lamanna, J., Lutz, J.A., **McGregor, I.R.**, McMahan, S.M., Parker, G.G., Parker, J.D., Vandermeer, J., 2021. Chemical similarity of co-occurring trees decreases with precipitation and temperature in North American forests. *Front. Ecol. Evol.* 9. [DOI](#)
- **McGregor, I.R.**, Helcoski, R., Kunert, N., Tepley, A.J., Gonzalez-Akre, E.B., Herrmann, V., Zailaa, J., Stovall, A.E.L., Bourg, N.A., McShea, W.J., Pederson, N., Sack, L., Anderson-Teixeira, K.J., 2021. Tree height and leaf drought tolerance traits shape growth responses across droughts in a temperate broadleaf forest. *New Phytologist*, 231, 601-616. [DOI](#)
- Yoshizumi, A., Coffey, M.M., Collins, E.L., Gaines, M.D., Gao, X., Jones, K., **McGregor, I.R.**, McQuillan, K.A., Perin, V., Tomkins, L.M., Worm, T., Tateosian, L., 2020. A Review of Geospatial Content in IEEE Visualization Publications. arXiv:2009.03390 [cs]. [DOI](#)
- Anderson-Teixeira, K., Gonzalez, B., Gonzalez-Akre, E., **McGregor, I.**, Helcoski, R., Herrmann, V., Kim, A.Y., Terrell, A., Dow, C., 2020. forestgeo/Climate: Initial release. Zenodo. [DOI](#)
- Anderson-Teixeira, K.J., Herrmann, V., Cass, W.B., Williams, A.B., Paull, S.J., Gonzalez-Akre, E.B., Helcoski, R., Tepley, A.J., Bourg, N.A., Cosma, C.T., Ferson, A.E., Kittle, C., Meakem, V., **McGregor, I.R.**, Prestipino, M.N., Scott, M.K., Terrell, A.R., Alonso, A., Dallmeier, F., McShea, W.J., 2020. Long-Term Impacts of Invasive Insects and Pathogens on Composition, Biomass, and Diversity of Forests in Virginia’s Blue Ridge Mountains. *Ecosystems* 24, 89–105. [DOI](#)
- Gonzalez-Akre, E., **McGregor, I.**, Anderson-Teixeira, K., Dow, C., Herrmann, V., Terrell, A., Kim, A.Y., Vinod, N., Helcoski, R., 2020. SCBI-ForestGEO/SCBI-ForestGEO-Data: first release with hydraulic traits data. Zenodo. [DOI](#)
- Cardoso, A.W., Oliveras, I., Abernethy, K.A., Jeffery, K.J., Lehmann, D., Edzang Ndong, J., **McGregor, I.**, Belcher, C.M., Bond, W.J., Malhi, Y.S., 2018. Grass Species Flammability, Not Biomass, Drives Changes in Fire Behavior at Tropical Forest-Savanna Transitions. *Front. For. Glob. Change* 1. [DOI](#)

OTHER ENVIRONMENTAL WORK

Cary Institute of Ecosystem Studies

Millbrook, NY

Volunteer

2024

- Led guided ecological walks of public trails at Cary for Cary’s Trail Opening event.
- Led guided trail walks for groups of middle school science classes

Bolsa Chica Conservancy

Huntington Beach, CA

Program and Administrative Coordinator

Jan. – Sep. 2016

- Managed the revision of a botanical guide for the wetland reserve, via field surveying, mapping, and cataloguing species in a new database.
- Edited the quarterly newsletter, drafted science communication articles for local publication, drafted content for social media, supported grant applications.
- Coordinated and led wetland ecology education outreach, service projects with volunteers, and guided public tours of the reserve

Student Conservation Association
Crew Member, Adirondack Corps

Adirondack State Park, NY
May – Aug. 2015

- Led field projects for backcountry trail crew, involving active risk assessment and mitigation, conflict management, and drafting project-specific emergency response plans.
- Partnered with state agency to repair trails, construct bridges, and various tasks using forestry best practices and tools, including certified chainsaw use.