Madeline C. Hayes

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EDUCATION:

Master of Science in Remote Sensing and Geospatial Sciences　　　　　　**May 2022**
Boston University, Boston, MA

Bachelor of Science in Environmental Sciences　　　　　　**May 2019**
University of Vermont, Burlington, VT
Concentration: Environmental Analysis and Assessment | **Minor**: Geospatial Technologies

Honors and Awards:
Presidential Scholar, University of Vermont　　　　　　**Aug 2015 - May 2019**
Dean's List, University of Vermont　　　　　　**Fall 2018 - Spring 2019**

PROFESSIONAL EXPERIENCE:

Senior Associate Consultant, GIS　　　　　　**Jun 2022 - Present**
ERM, Boston MA

- Generate, edit, and curate spatial data products for clients on complex multiyear projects in over 15 industries, including oil and gas, manufacturing and pharmaceutical, and chemical.
- Develop and deploy Python, R, and SQL geoprocessing scripts and tools to optimize data-driven processing workflows, delivering an average annual operational cost saving of $130k.
- Publish and maintain 50+ web-based map servers and applications, including ArcGIS Web Apps and PowerBI dashboards.
- Engineer and execute a comprehensive data management system utilizing SQL and EQuIS for analytical, geological, and geographical data from 20,000+ field samples.

Research Assistant, NASA MEaSUREs　　　　　　**Jan 2022 – Mar 2023**
Boston University, Center for Remote Sensing

- Collected training and validation data for global annual land cover mapping, achieving an initial model accuracy of 77% through comprehensive satellite imagery analysis, advancing crucial environmental research objectives.
- Conducted in-depth research on land cover information to ensure detailed characterization and accuracy.

Remote Sensing Analyst and Researcher　　　　　　**Dec 2019 - Aug 2021**
Duke University, Marine Robotics and Remote Sensing Lab

- Executed drone operations to collect high-resolution imagery for structure from motion processing, resulting in the creation of detailed 3D models and orthomosaics, supporting environmental monitoring studies and land management initiatives.
- Developed deep learning models for detection and enumeration of seabirds from drone imagery with 92% average accuracy.
- Created a method to monitor turbidity from multispectral drone imagery, resulting in a forecasting model with high accuracy and reducing manual labor and costs by 80%.

GIS Team Lead and Drone Pilot　　　　　　**Jun 2018 - Nov 2019**
University of Vermont, Spatial Analysis Lab

- Directed drone operations, leading flight planning, data acquisition, processing, and GIS integration for multifaceted projects in agriculture, transportation, construction, and conservation, resulting in streamlined workflows and enhanced project outcomes.
- Developed and integrated geospatial data layers to refine high-resolution land cover data for Vermont, advancing landscape analysis capabilities with a dataset 900 times more detailed than previously available data.
- Trained and mentored a team of 20 technicians and drone pilots.

RESEARCH EXPERIENCE:

Remote Sensing for Water Quality Research   Jul 2020 - Jul 2021
Duke University, Marine Robotics and Remote Sensing Lab
- Collaborated with the North Carolina Department of Environmental Quality to determine utility of drone technology for water quality assessment
- Conducted multispectral drone flight operations before, during, and after dredging events
- Created a Python programming workflow to extract turbidity measurements from raw images, including radiometric calibration and georeferencing of imagery
- Generated turbidity heat maps and image mosaics for comparison to in-situ measurements

Artificial Intelligence for Seabird Population Monitoring Research   Jan 2020 - May 2021
Duke University, Marine Robotics and Remote Sensing Lab
- Processed drone imagery collected by the Wildlife Conservation Society in Argentina to generate orthorectified maps with photogrammetric techniques
- Built, trained, validated, and deployed a convolutional neural network for the automated detection and enumeration of seabirds in the Falkland Islands, Argentina
- Ran inference on entire seabird colony areas to generate automated detections
- Evaluated geostatistical techniques for breeding pair and active nest analysis

PRESENTATIONS

Hayes, M.C. (April 2021). "Deep learning and drones to automate seabird population counts," ESRI Imagery and Remote Sensing Educators Summit.

Hayes, M.C. (March 2021). "Deep learning and drones to automate seabird population counts," Drones in the Coastal Zone Workshop.

Hayes, M.C. (November 2019). "Mapping water chestnut from above," North American Lake Management Society Symposium, Burlington, VT.

Hayes, M.C. (April 2019). "Mapping water chestnut from above," University of Vermont Student Research Conference, Burlington, VT.

PAPERS

Hayes, M.C., P.C. Gray, G. Harris, W.C. Sedgwick, V.D. Crawford, N. Chazal, S. Crofts, and D.W. Johnston (2021). Drones and deep learning produce accurate and efficient monitoring of large-scale seabird colonies. *Ornithological Applications, 123*, 1-16. DOI: 10.1093/ornithapp/duab022

Hayes, M.C., B. Puckett, C. Deaton, J.T. Ridge (2021). Estimating dredge-induced turbidity using drone imagery. *Preprints, 2022010424*. DOI: 10.20944/preprints202201.0424.v1

TEACHING EXPERIENCE:

Teaching Fellow, Crises of Planet Earth   Jan 2022 - May 2022
Boston University, College of Arts and Sciences

Teaching Fellow, Introduction to Climate and Earth System Science   Sep 2021 - Dec 2021
Boston University, College of Arts and Sciences

Teaching Assistant, Intro to GIS   Aug 2018 - Dec 2018
University of Vermont, Rubenstein School of Environment and Natural Resources

SKILLS AND CERTIFICATIONS:

ESRI (ArcGIS Pro, ArcGIS Online, ArcGIS Server, ArcSDE), Python, SQL Server, R, Pix4D, EQuIS
FAA Part 107 Licensed Remote Pilot, 100+ flight hours