

Leila Character
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BACKGROUND SUMMARY: Ph.D. with academic and professional experience using machine learning, remotely sensed data, and GIS to address complex real-world problems, including DOD-funded geospatial intelligence projects.

EDUCATION

2022 Ph.D. University of Texas at Austin

Department of Geography and the Environment

2018 M.A. University of Texas at Austin

Department of Geography and the Environment

2011 B.S. Sewanee: The University of the South

Major in Geology, Minor in Anthropology/Archaeology

PROFESSIONAL AND RESEARCH POSITIONS

2025-present Assistant Professor, Department of Geography, Texas A&M University

2025-present Affiliated Faculty, School of Marine Science & Policy, University of Delaware

2024-2025 Assistant Professor, Department of Environmental and Geosciences, Sam Houston State University

2022-2024 Postdoctoral Fellow, School of Marine Science & Policy, University of Delaware
(DOD-funded Underwater Innovation Study in Computing and Robotics)

- Integrated deep learning into current approach for detection of underwater WW2 aircraft wrecks that may contain the remains of missing-in-action service members using autonomous underwater vehicles with sidescan sonar and magnetometer data
- Participated in fieldwork, including remote sensing data collection with autonomous underwater vehicles and American Academy of Underwater Sciences (AAUS) scuba diving
- Used Python and ArcGIS Pro for deep learning, data preprocessing, and data visualization

2020-2021 Head of Research and Strategy, Third Insight Artificial Intelligence

- Completed DOD-funded project to develop and implement methodology for multi-team drone-borne hyperspectral imagery pine beetle detection project using machine learning at the Air Force Academy in Colorado Springs
- Operated sensors during hyperspectral and multispectral imagery collection by drone

- Completed spatial analyses, data visualization, and modeling in Python, ENVI, and ArcGIS Pro
- Applied for and was awarded as co-PI DOD-funded project focused on anti-submarine warfare using machine learning, remotely sensed data, and other sensor data
- Applied for and was awarded as co-PI DARPA-funded project focused on collaborative autonomy in high-risk decision-making using machine learning and remotely sensed data

2020 Graduate Researcher, Naval Research Enterprise Internship Program, US Navy Office of Underwater Archaeology

- Implemented deep learning methodology to identify shipwrecks in lidar and multibeam sonar using Python and ArcGIS Pro
- Data visualization in ArcGIS Pro

2018-2020 Graduate Research Assistant, Department of Geography and the Environment, University of Texas at Austin

- Managed two soils and geoarchaeology labs, running lab analyses and daily lab operation
- Supervised and mentored five undergraduate research assistants each semester, including guiding them through the process of using QGIS to label features in remotely sensed data

2014-2016 Environmental Specialist, Tennessee Department of Environment and Conservation Office of Sustainable Practices

2012-2014 Geologist, Arcadis environmental consulting

- Completed technical reporting, including creation of contour maps, cross sections, and conceptual site models using ArcGIS Desktop

2011-2012 Offshore Deepwater Mudlogger, Baker Hughes oilfield services

2011 Geologist, Alaska Earth Sciences

2010 Archaeology Intern, Great Smoky Mountains National Park

- Completed extensive cross-park archaeological site assessments and associated GIS mapping
- Led archaeology workshops for Cherokee students

2009-2010 GIS Research Assistant, Landscape Analysis Lab, Sewanee: The University of the South

- Contoured and mapped sewer influence of watersheds on Sewanee campus using ArcGIS Desktop
- Created map showing land permeability types for Sewanee campus using GIS

2009 Archaeology Research Assistant, Sewanee Archaeological Field School, Sewanee: The University of the South

- Completed extensive survey and mapping of archaeological sites using survey equipment and ArcGIS Desktop

TEACHING EXPERIENCE

Summer 2024, 2025 Summer program faculty, School of Marine Science and Policy, University of Delaware
Undergraduate Environmental Internship/Research Experience in Micronesia (material covered includes machine learning, robotics, remote sensing, Python, and data analysis)

Spring 2025 Geospatial Machine Learning (Graduate Course), Department of Environmental and Geosciences, Sam Houston State University
Field Studies, Department of Environmental and Geosciences, Sam Houston State University
Intro to GIS, Department of Environmental and Geosciences, Sam Houston State University

Fall 2024 Real-World Problem-Solving with Geospatial Analysis Using ArcGIS Pro (Online Graduate Course), Department of Environmental and Geosciences, Sam Houston State University
Intro to GIS, Department of Environmental and Geosciences, Sam Houston State University

2016-2018 Graduate Teaching Assistant, Department of Geography and the Environment, University of Texas at Austin
Lower-division physical geography, human geography: independent lab instruction
Upper-division soils, geomorphology: assisted with smaller lecture class

PUBLICATIONS

2025 **Character, L.**; Moline, M.; Breece, M.W.; White, E.; Davis, D., Colbourn, C. “Deep learning for detection of underwater aircraft wrecks from US Conflicts.” *Journal of Computer Applications in Archaeology* 8(1): 139-155.

2024 Moline, Mark A.; Breece, M.W.; Colbourn, C.; Pietruszka, D.; **Character, L.**; Davis, D.; White, E.; Terrill, E.; Hess, R. “Operation Hailstone: A case example for locating and documenting aircraft associated with U.S. service members missing in action. *Journal of Marine Archaeology* 19: 695-729.

2024 **Character, L.**; Beach, T.; Inomata, T.; Garrison, T.; Luzzadder-Beach, S.; Baldwin, J.D.; Cambranes, R.; Pinzón, F.; Ranchos, J.L. “Broadscale deep learning model for archaeological feature detection in the Maya area.” *Journal of Archaeological Science* 159: 106022.

2023 **Character, L.D.**; Beach, T.; Luzzadder-Beach, S.; Cook, D.; Schank, C.; Valdez, Jr., F.; Mallner, M. (2023) “Machine learning for cave entrance detection in a Maya archaeological area.” *Physical Geography* 45(4): 416-438.

2021 **Character, L.**; Ortiz JR, A.; Beach, T.; Luzzadder-Beach, S. “Automatic identification of shipwrecks using lidar, sonar, and deep learning.” *Remote Sensing* 13(9): 1759.

2018 Cook, D.; Garrison, T.; **Donn, L.**; Baldwin, D. Identificando entradas de cuevas en un paisaje kárstico forestal utilizando elevaciones del Lidar: Resultados preliminares de El Zottz, Guatemala. In, *Proyecto Arqueológico El Zottz Informe No. 13 Temporada 2018*. Ministerio de Cultura y Deportes, Instituto de Antropologías e Historia, Asociación Tikal, Guatemala City, 317-322.

In-Preparation:

Character, L.; Pan, C.; Eshleman, S.; Block, G.; Snider, J. “Evaluation of UAS hyperspectral imagery and machine learning for early detection of bark beetle damage at the individual tree level within a large forest.” To be submitted to *Journal of Remote Sensing*.

Character, L.; Rabinowitz, A.; Peters, S.; Sandric, B. “Deep learning approach for detecting ancient Romanian burial mounds using custom vegetation index and natural color imagery.” To be submitted to *Journal of Archaeological Method and Theory*.

GRANTS & FUNDING

2025 Naval Air Warfare Center Aircraft Division as Principal Investigator:
Target Detection and Identification using Multimodal Imagery and Machine Learning
(\$250,000; tentatively awarded pending government funding approval)

2025 Sam Houston State University as Principal Investigator: Building Community-Based Student Research Experiences in Waipio Valley, Hawaii (\$25,000)

2025 Sam Houston State University Student-Faculty Research Collaboration funding awarded to student with L. Character as mentor for summer fieldwork in Belize (\$1,600)

2022 University of Texas at Austin Graduate Dissertation Writing Fellowship (\$18,000)

2021 Department of Defense Navy Small Business Technology Transfer Phase I as Principal Investigator for project awarded to Third Insight (\$250,000)

2021 Department of Defense Navy Small Business Innovation Research Phase I as Principal Investigator for project awarded to Third Insight (\$250,000)

2019 University of Texas at Austin Karl W. Butzer Fellowship (\$2500)

2019 University of Texas at Austin Graduate Fellowship (\$5000)

2019 Petzl USA (\$350)

2019 American Philosophical Society Lewis and Clark Fund for Exploration and Field Research (\$2800)

2019 Conference of Latin American Geographers Field Study Award (\$1500)

2018 University of Texas at Austin Donald D. Brand Pre-Dissertation Fellowship (\$300)

2018 Planet Texas 2050, awarded to T. Beach, L. Character, et al. (\$7500)

2017 Association of America Geographers Latin American Specialty Group Fieldwork Grant (\$500)

2017 Geologic Society of America Claude C. Albritton Jr. Award (\$1000)

2017 University of Texas at Austin Veselka Grant (\$550)

INVITED LECTURES

2024 International Coastal Forum, Emirate of Sharjah, United Arab Emirates. *Deep learning with sonar for underwater object detection.*

2023 National Tsing Hua University, Taiwan. *Deep learning for shipwreck detection using lidar and sonar.*

2023 Virtual lecture at the Costacciaro International Speleology Meeting in Italy. *Machine learning for cave entrance detection using lidar.*

2022 Virtual lecture for East Tennessee Geological Society. *Archaeological machine learning: Using remotely sensed imagery to find and map archaeological features.*

2021 Virtual lecture at Puerto Rico Forward Innovation Summit hosted by Puerto Rico Science, Technology, and Research Trust. *Automatic Identification of Shipwrecks Using Digital Elevation Data and Deep Learning*.

2021 Lecture at Air Force Innovation Summit in San Antonio, TX. *Evaluation of Unmanned Aerial Systems Technology for Tree Disease and Degeneration Detection*.

2021 Virtual lecture at LeMoyne College Department of Anthropology, Criminology, and Sociology. *Machine Learning Applications for Identification of Archaeological Features in Airborne Imagery*.

2021 Virtual lecture for Travis County, TX, Historical Society. *Machine Learning Applications in Geoarchaeology: Using remotely sensed imagery to model locations of archaeological features*.

CONFERENCE PRESENTATIONS

2024 Character, L.; Fleming, H.; Mazza, A.; Breece, M.; Davis, D.; Moline, M. *Deep learning using sidescan sonar for detection of underwater aircraft wrecks from U.S. conflicts*. Presentation at Computer Applications and Quantitative Methods in Archaeology conference in New Zealand.

2023 Rabinowitz, A.; Character, L.; Peters, S. *Machine learning approaches to the identification of ancient burial mounds in Romanian Dobrogea from aerial and satellite imagery*. Presentation at the Archaeological Institute of America Annual Meeting in New Orleans, Louisiana.

2023 Character, L.; Beach, T.; Inomata, T.; Garrison, T.; Luzzadder-Beach, S.; Baldwin, J.D.; Cambranes, R.; Pinzón, F.; Ranchos, J.L. *Deep Learning for Broadscale Archaeological Feature Detection Across the Maya Area*. Presentation at the Society for American Archaeology Annual Meeting in Portland, Oregon.

2022 Character, L.D., Beach, T., Schank, C., Inomata, T., Ortiz JR, A., Rabinowitz, A., Luzzadder-Beach, S., Garrison, T. *Archaeological Machine Learning: Using Machine Learning to Supplement Field Mapping*. Presentation at the American Association of Geographers Annual Meeting (virtual).

2021 Character, L.; Beach, T.; Schank, C.; Inomata, T.; Garrison, T. *Machine learning applications to predict locations of natural and cultural features in the Maya Lowlands*. Presentation at the Society for American Archaeology Annual Meeting (virtual).

2021 Character, L.; Ortiz JR, A. *Automatic identification of shipwrecks using digital elevation data and deep learning*. Presentation at the Society for American Archaeology Annual Meeting (virtual).

2021 Character, L; Beach, T.; Schank, C.; Inomata, T.; Ortiz JR, A. *Machine learning applications in geoarchaeology: Using digital elevation data to model locations of natural and cultural features*. Presentation at the American Association of Geographers Annual Meeting (virtual).

2020 Character, L; Beach, T.; Schank, C.; Inomata, T.; Ortiz JR, A. *Machine learning applications for landscape management and conservation: Using digital elevation data to model locations of natural and cultural features*. Lighting presentation at the American Geophysical Union Annual Meeting (virtual).

2019 Donn, L.; Beach, T. *New machine-learning computer program to identify unmapped cave entrances using Python, GIS, and LiDAR imagery: an automated approach to cave conservation and resource management*. Presentation at the Geological Society of America Annual Meeting in Phoenix, Arizona.

2019 Donn, L.; Beach, T.; Luzzadder-Beach, S.; Yaeger, J. *Long-Term Human Impact on a Neotropical Fluvial System in the Belize-Guatemala Transboundary Area Using Lidar and Geoarchaeological Methods*. Presentation at the American Association of Geographers Annual Meeting in Washington D.C.

2018 Donn, L.; Beach, T.; Luzzadder-Beach, S.; Yaeger, J. *Long-Term Human Impact on a Neotropical Fluvial System in the Belize-Guatemala Transboundary Area*. Presentation at the Geological Society of America Annual Meeting in Indianapolis, IN.

2018 Donn, L. Beach, T.; Luzzadder-Beach, S.; Yaeger, J. *Long-Term Human Impact on a Neotropical Fluvial System in the Belize-Guatemala Transboundary Area*. Presentation at the American Association of Geographers Annual Meeting in New Orleans, LA.

PROFESSIONAL MEMBERSHIPS AND ACTIVITIES

Professional Memberships

Association of American Geographers
Society for American Archaeology

Professional Activities

Reviewer for Scientific Reports
Reviewer for The Leakey Foundation

Science Communication and Media

2024 Appeared in Discovery Channel's Expedition Unknown Season 12 Episode 6: America's MIA Heroines

2023 Appeared in Discovery Channel's Expedition Unknown Season 12 Episode 2: Finding the Lost Pilots of WW2

2021 Axios: *Archaeologists dig into digital data*

2021 The Conversation: *AI spots shipwrecks from the ocean surface – and even from the air*

2020 Royal Geographical Society's Geovisualisation Series: *Machine learning to find Maya sites in Belize and Guatemala*

2019 American Association of Petroleum Geologists Explorer: *Machine learning reveals hidden geology*

2019 Massive Science: *Out in the jungle, looking for a cave? Machine learning and lasers can help*

2019 Appeared in National Geographic's Lost Treasures of the Maya, Episode 2 - Secrets of the Underworld

MENTORSHIP, SERVICE, & OUTREACH

Present Advise 2 graduate students in the Department of Environmental and Geosciences at Sam Houston State University
Graduate Program Committee

2022-2023 Mentor NSF REU student on data pre- and post-processing for archaeological machine learning project

2020 – 2021 Plan and coordinate 12-week high school archaeology GIS class project based around Romanian burial mound deep learning work

2017 – 2020 Undergraduate mentor and research supervisor (approximately 30 students total)

SKILLS

Software and technology

ArcGIS Pro and QGIS
Corning microHSI SHARK hyperspectral sensor
Python, including TensorFlow, Keras, PyTorch, Scikit-Learn
ERDAS Imagine
ENVI
Garmin GPS
Geometrics MFAM magnetometer
Inkscape

Marine Sonic Technology Sea Scan ARC Scout
MicaSense RedEdge multispectral sensor
REMUS100 autonomous underwater vehicle (AUV) operation
SonarWiz

Certifications

American Academy of Underwater Sciences (AAUS) scuba diver

Language

English (first language)
French (fluent)
Spanish (beginner)