Elizabeth Spitzer

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Summary

Coastal geologist specializing in Great Lakes coastal and nearshore dynamics. Highly experienced in applying drones (sUAS), remote sensing, and geospatial analysis to monitor coastal changes from water-level fluctuations, storm impacts, and human activity. Dedicated to translating science into actionable insights for coastal management and policy, while advocating for equity and inclusion in STEAM.

Skills

- Field and Geospatial Methods: sUAS-based surveys, RTK-GPS surveying, single-beam sonar surveys, ground-penetrating radar surveys, vibracoring & sediment analysis; hydrographic & topographic survey design, crewed-vessel operations; FGDC & ISO-compliant metadata standards.
- Software: ArcGIS Pro and ArcGIS Online, Agisoft Metashape, Trimble Geospatial, MATLAB, Adobe Creative Suite, Microsoft Office, Golden Software.
- Other: Team leadership, project & database management, public speaking, scientific & technical writing, stakeholder engagement and outreach.

Certifications

- US Coast Guard Auxiliary Boat America Safety Course - 2022
- FAA Remote Pilot Certification – 2021 (renewed every 2 years)

Experience

Illinois State Geological Survey
Champaign, IL
Coastal Geologist
2021 - Current

- Progressed from field technician to leading integrated coastal mapping projects along the Illinois Lake Michigan Coast.
- Manage all sUAS/drone operations, from flight planning and FAA compliance to piloting, training, and data processing, improving efficiency and safety of aerial surveys.
- Serve as Co-Principal Investigator on federally funded projects, contributing to proposal development, budgeting, and execution.
- Lead and support field operations using integrated technologies (sUAS, RTK-GPS, single-beam sonar, GPR, vibracoring), and process and analyze resulting data to produce coastal datasets (e.g., topobathymetric maps, shoreline positions) used for geomorphic change analysis and management decisions.
- Author and co-author technical reports, peer-reviewed publications, conference abstracts, and outreach materials (e.g., ArcGIS StoryMaps), communicating results to scientific, management, and public audiences.
- Mentor and train colleagues in field operations, metadata standards, data processing and management, and safe field practices, expanding team technical capacity.
- Develop standardized data management workflows (naming conventions, backup protocols) that improve efficiency and ensure long-term usability of coastal datasets.

- Represent the program at interagency, fieldtrip, stakeholder, and conference meetings (e.g., Sand Management Working Group, IAGLR), increasing visibility of research outcomes.

Michigan State University
East Lansing, MI
Research Assistant
2020-2021

- Conducted field RTK-GPS surveys of and GIS-based analysis on bluff erosion rates along the Lake Michigan coast of Michigan.
- Assisted with various coastal erosion and mapping projects utilizing remote sensing technologies (e.g., sUAS, RTK-GPS and single-beam sonar) for creating coastal datasets.
- Authored and co-authored technical reports, conference abstracts, and graduate-level grant proposals.
- Represented research lab through public outreach events such as conferences and news interviews.

Michigan State University
East Lansing, MI
Teaching Assistant
2019-2021

- Authored lecture material, exams, and assignments on topics in geography.
- Corresponded daily with students through inter-campus communication via email, D2L, and Zoom.
- Graded assignments, class participation, and exams.
- Educated students, maximized learning capabilities, and sharpened classroom interest through effective instructional techniques.

Milwaukee Metropolitan
Sewerage District
Milwaukee, WI
Land Surveying Intern
2019

- Conducted high-precision topographic surveys for construction projects using Trimble RTK-GPS technologies, ensuring accuracy through QA/QC protocols.
- Accurately located and marked utility lines for residential and commercial properties.
- Read and interpreted legal documents, construction drawings, and maps to complete surveys.
- Worked closely with team members to deliver project requirements, develop solutions, and meet deadlines.

Wisconsin Geological and
Natural History Survey
Milwaukee, WI
Project Geologist
Technician
2018-2019

- Assisted on Quaternary mapping projects throughout Wisconsin, primarily focused on the Driftless Area.
- Prepared and completed analyses of sediment core samples for grain size analysis by laser diffraction.
- Assisted in collecting, processing, and describing sediment cores.
- Maintained sediment core and sample databases.

Education

Michigan State University
East Lansing, MI
Master of Science in Geography
2021
Thesis title: *Evaluating the Relationship of Bluff Recession to Morphological and Hydrodynamic Variables at Seventeen Bluff Sites along the Michigan Coast of Lake Michigan.*

University of Wisconsin - Milwaukee
Milwaukee, WI
Bachelor of Science in Conservation and Environmental Science and Geosciences, Biological Sciences minor
2018

Funding

- **Coastal Management Program, Programmatic Projects (FY26).** *State of Illinois Department of Natural Resources / NOAA.* Role: Co-PI. $304,756. 2025–2026.

Publications

Journal Articles

- Mattheus, C. R., **Spitzer, E.**, Rosario, L., Pearce, K. *Storm Deposits in Context of Seasonal through Decadal Water-Level Variances and Beach Geomorphic Change, Southwestern Lake Michigan*. Journal of Coastal Research 2025; doi: https://doi.org/10.2112/JCOASTRES-D-25-00013.1
- Mattheus, C. R., Pearce, K., Rosario, L., **Spitzer, E.** *Water-Level Changes and Beach Morphodynamics: Insights from Topobathymetric Monitoring of a Receding Shoreline, Illinois Beach, Lake Michigan. Journal of* Coastal Research 2025; doi: https://doi.org/10.2112/JCOASTRES-D-25-00014.1

Conference Abstracts and Talks

- Mattheus, C. R., Brown, S., Pearce, K., Rosario, L., **Spitzer, E. (presenting author)**. *Impacts of breakwaters on littoral sand-transport patterns and shoreline morphodynamics, Illinois Beach State Park.* 2025 International Association for Great Lakes Research conference.
- Mattheus, C. R., Barklage, M. E., Brizzee, A., Diggins, T., Hout, S., Pearce, K., Rosario, L, **Spitzer, E.** *Ridge-plain Promontories of the North American Great Lakes as Depositional Archives of Changing Littoral Dynamics.* 2025 Northcentral Section Meeting of the Geological Society of America.
- Mattheus. C. R., Barklage, M. E., **Spitzer, E.**, Pearce, K., Rosario, L. *Offshore Geological Mapping and Topobathymetric Monitoring of Illinois Shoreline Environments: Parameterizing Coastal Resiliency for Regional Stakeholder Groups.* 2025 Northcentral Section Meeting of the Geological Society of America.
- **Spitzer, E.**, Rosario, L., Mattheus, C. R., Pearce, K. *Storm Impacts on Coastal Geomorphology & Stratigraphy: Topographic and GPR Assessment, Illinois Beach, Lake Michigan*. 2024 International Association for Great Lakes Research conference.
- Pearce, K., **Spitzer, E.**, Rosario, L., Brown, S. E., Mattheus, C. R. *Topobathymetric Monitoring to Study Breakwater Impacts at Illinois Beach State Park, SW Lake Michigan.* 2024 International Association for Great Lakes Research conference.
- Buffo, J., Hughes, E., Barklage, M., Brown, E. K., Pontefract, A., **Spitzer, E.**, Nichols, F., Osburn, M. R., Plattner, T., Hunsaker, A., Jacobs, J. M., Fleming, A. *Multiscale Characterization of Brine-Rich Planetary Analog Environments.* 2024 Astrobiology Science Conference.
- **Spitzer, E.**, Rosario, L., Mattheus, C. R., Pearce, K. *Capturing the Total Impact of Storm Events on Lake Michigan Beaches Using Aerial Drones and Ground Penetrating Radar.* 2024 Prairie Research Institute Symposium.
- **Spitzer, E.** *Crossing the White Ribbon: Measuring, Monitoring, and Mapping the Illinois Lake Michigan Coast from Land, Sea, and Air.* 2023 University of Wisconsin-Milwaukee Geosciences Department Colloquium Series.
- Barklage, M. Rosario, L., **Spitzer, E.**, Pearce, K., Theuerkauf, E. J., Braun, K. *GPR Integration with Topographic Monitoring Data as Coastal Reconstructive Tool: Examples from Natural and Urban Shoreline Regions in Illinois.* 2023 Northcentral Section Meeting of the Geological Society of America.
- Diggins, T., Mattheus, C. R., **Spitzer, E.**, Pearce, K., Rosario, L. *Geomorphic and Vegetation Dynamics Along a Great Lakes Ridge Plain: Assessing the Utility of Coastal Junipers as Dendrochronological Proxies of Lake-Level Change.* 2023 Northcentral Section Meeting of the Geological Society of America.
- Mattheus, C. R., Hout, S., Barklage, M., Theuerkauf, E. J., Braun, K., Dwyer, K., Phillips, A., **Spitzer, E.**, Pearce, K. *Stratigraphic Reconstruction of the Late Holocene Zion Beach-Ridge Plain, SW Lake Michigan:*

Targeting Overwash Sands for OSL Dating. 2023 Northcentral Section Meeting of the Geological Society of America.

- Hout, S., Mattheus, C. R., **Spitzer, E.**, Phillips, A. *Water-Level Changes and Terrain Evolution Along the Illinois Lake Michigan Coast: Developing A Geochronology for the Zion Beach-Ridge Plain.* 2022 Northcentral Section Meeting of the Geological Society of America.
- **Spitzer, E.**, K., Pearce, Mattheus, C. R., Theuerkauf, E. J., Barklage, M. *Evaluating the Impacts of a Dynamic Nearshore Ice Complex on a Shallow Engineered Coastal Embayment along a Wave-dominated Beach Shoreline of Southwestern Lake Michigan.* 2022 American Geophysical Union Meeting.
- Barklage, M., Mattheus, C. R., Brown, S. E., **Spitzer, E.**, Rosario, L., Phillips, A. *Sub-bottom Investigation of Chicago, Illinois's Coastal Marine Environment Using Near-Surface Geophysical Imaging Techniques.* 2022 American Geophysical Union Meeting.
- Mattheus, C. R., Barklage, M, Hout, Sebastian, Theuerkauf, E. J., **Spitzer, E.**, Braun, K. *GPR and OSL-based Insights into the Depositional Architecture and Age Composition of a Migrating Great Lakes Beach-ridge Plain (with Paleoclimate Implications), SW Lake Michigan.* 2022 Association of American Geographers Meeting.
- Rosario, L., Barklage, M., Mattheus, C. R., **Spitzer, E.**, K. Pearce. *Measuring Sand Volumes of Chicago Beaches Using Ground Penetrating Radar.* 2022 Association of American Geographers Meeting.
- **Spitzer, E.**, Theuerkauf, E.J. Arbogast, A.F., and Lusch, D.P. *Are bluffs along the Great Lakes eroding faster now than ever before? A case study of modern and historical rates and drivers of bluff retreat along Lake Michigan in Western Michigan., U.S.* 2020 Association of American Geographers Online Meeting.
- **Spitzer, E.** and Theuerkauf, E.J. *Using Drone and Nearshore Buoy Data to Predict Erosion and Overwash at a Lake Michigan Beach: Application of the USGS Storm-Impact Scale Model to the Great Lakes.* 2020 Northcentral Section Meeting of the Geological Society of America.
- **Spitzer, E.**, Theuerkauf, E.J. Arbogast, A.F., and Lusch, D.P. *Modern Bluff Recession Rates and Processes along the Eastern Shore of Lake Michigan.* 2020 American Association of Geographers Annual Meeting.
- **Spitzer, E.**, Gulbranson, E. *Refining Crop Yield Estimates via Isotopic Analysis of Plant Water*. 2018 UW-Milwaukee Undergraduate Research Symposium, Abstracts with Program, page 67.

Other Publications

- Mattheus, C. R., Brizzee, A., Pearce, K., Rosario, L., & **Spitzer, L.** (alphabetical after first). 2025. *Geological Field Guide to Illinois Beach State Park*. Association of Environmental and Engineering Geologists Special Publication 33, 73 p.
- **Spitzer, E.,** Barklage, M., Brown, S., Mattheus, R., Pearce, K., & Rosario, L. (alphabetical after first). *In the Flow: Capturing Coastal Change and Human Impact along the Illinois Lake Michigan Coast.* ArcGIS StoryMap. Illinois State Geological Survey, 2025. https://arcg.is/0O4aOq0**.**
- Gannon, K., Bechle, A., **Spitzer, E.,** Rosario, L., Mattheus, C. R., & Peterson, S. *Impacts of Breakwaters at Illinois Beach State Park.* ArcGIS StoryMap. Wisconsin Sea Grant & Illinois State Geological Survey, 2025. https://arcg.is/9GuKK0**.**

Outreach

- *Chicago Tribune*. (2025, July 13). "Can artificial reefs in Lake Michigan slow erosion and boost fish population? Researchers aim to find out." Feature included **Elizabeth Spitzer**, Illinois State Geological Survey.
- *WOOD TV8.* (2020, August 13). MSU surveying erosion damage at lakeshore. Feature includes **Elizabeth Spitzer**, Illinois State Geological Survey. https://www.youtube.com/watch?v=6bPxn9CAu88

Awards

- *2023 Outstanding Collaboration Award*, Prairie Research Institute, awarded to interdisciplinary team of scientists for collaborative work along the Lake Michigan coast.