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 Research Scientist 2: Applied Geosciences
 The Water Institute
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EDUCATION

Tulane University	New Orleans, LA	Earth and Environmental Sciences	Ph.D., 2017
University of New Orleans	New Orleans, LA	Earth and Environmental Sciences	MS, 2011
Rutgers	New Brunswick, NJ	Mathematics & Physical Oceanography	BS, 2004

RESEARCH INTERESTS

Floodplain morphology; sediment transport in channel networks; morphological modeling ; sediment transportation in vegetation; coastal zone land use and infrastructure policy, dredging, wetlands, remote sensing.

PROFESSIONAL EXPERIENCE

The Water Institute	Research Scientist 2: Applied Geosciences	2021–Present
	Research Scientist 1: Applied Geosciences	2019–2021
	Post Doctoral Research Scientist: Water Resources	2016–2019
Tulane University	Adjunct Professor of Earth and Environmental Sciences	2017–Present
	Teaching and Research Assistant	2011–2016
Conoco Phillips	Geomodeling Intern	2012, 2013
University of New Orleans	Research Assistant	2009–2011
Public High Schools	Math/Environmental Education Teacher	2004–2009

PROFESSIONAL SOCIETY MEMBERSHIPS

- American Geophysical Union
- Coastal & Estuarine Research Federation

AWARDS AND HONORS

- Vokes Fellowship for Outstanding Ph.D. Candidate in Earth and Environmental Sciences, 2015
- Outstanding Graduate Student Research Award, Department of Earth and Environmental Sciences, Tulane University, 2014
- Outstanding Graduate Student Teaching Award, Department of Earth and Environmental Sciences, Tulane University, 2013
- McWilliams Scholarship, Department of Earth and Environmental Sciences, Tulane University, 2011
- University Earth Science Award, New Orleans Geological Society, 2010
- Undergraduate Research Fellow, Institute for Marine and Coastal Sciences, 2002
- Dean’s List, Rutgers, The State University of New Jersey
- National Merit Scholar Program Finalist

TEACHING EXPERIENCE

Classroom lecture, high school math and science (2004–2009); teaching assistant, sedimentology and stratigraphy (2012, 2013) and intro to earth and environmental sciences (2011, 2012); short course, Delft3D modeling short course (2017); field course, leader/designer or instructor for field lessons throughout the Mississippi River Delta, Wyoming, Florida Keys—Trips pitched to middle schoolers through senior academics (2008–present).

COMMUNITY SERVICE

Working Group on Building Connections Between Secondary, Post-Secondary, and Workforce Development	Louisiana Environmental Education Commission
Coastal Advisory Board	Nunez Community College
Coastal Habitats Subcommittee	North Carolina Natural and Working Lands (NWL)
Steering Committee	Gulf Coastal Solutions Workshop
Research Manager Outreach	
NSF	CoPe (Coastlines and People)
Session Chair	CERF, AGU, EP43, GSA South Central, State of the Coast
Journal Reviewer	J. Geophys. Res. Earth Surf., Nature Geosciences, Geophys. Res. Lett., Geomorphology, Mar. Geol., Estuar. Coast. Shelf Sci., Earth Surf. Process. Landf., Earth Surf. Dyn., Catena

NOTABLE PROJECTS

PI/Digital Elevation Models and Data Support for Retrospective Marsh Modeling Current

The Water Institute

High quality Digital Elevation Models (DEMs) do not exist in coastal wetlands prior to the widespread use of aerial LiDAR surveying beginning in the early 2000's. This makes it difficult to develop models that capture the historical evolution of specific coastal marshes, creating a challenge in communications between the modeling community and wetland managers who seek to understand model outputs in the context of their experience, observations, history of management decisions, and perception of risk. The project team is working with managers at four coastal wetlands to advance a method that will fill this data gap using historical remotely sensed imagery.

PI/The Bay Denesse Living Lab

Current

The Water Institute

The Bay Denesse Living Lab Initiative is a physical site in Louisiana coastal wetlands where scientific research is combined with active restoration. By facilitating collaborations between researchers and restoration project managers, the Living Lab will improve the science behind wetlands restoration and enable land managers to design optimized strategies to be address the environmental challenges facing our coast.

PI/Transport Thresholds for Fine Sediment in Vegetation, Louisiana

Current

The Water Institute

Sea-level rise poses a serious challenge to natural resource managers as they work to retain and restore coastal marshes. Sediment transported to a marsh by a river or tides can play an important role in mitigating the effects of sea-level rise by increasing land surface elevation. At present, there are no standardized data collection techniques that can be used to monitor sediment transport into and within vegetated regions, limiting abilities to measure and predict the influence of restoration efforts. This project, developed in close collaboration with coastal restoration practitioners, aims to establish a standardized data collection methodology for monitoring sediment transport within coastal wetland vegetation. Restoration practitioners will be able to use this methodology to improve predictions of marsh sustainability and better assess the effectiveness of restoration efforts.

Research Scientist/Mid-Barataria Engineering Modeling Support, Louisiana

Current

The Water Institute

To address these issues, higher-resolution models focusing on specific outfall regions are needed to capture relevant physical processes of the outfall channels and their interaction with the receiving basins. The main questions being addressed with this work is will the diversion channel be self-sustaining or will dredging be necessary; what the major hydrological and morphological changes in the receiving basins near the diversion are, and what are the adequate dimensions of the outfall channel to convey the desired amount of water.

Research Scientist/Partnership for Our Working Coast, Louisiana

Current

The Water Institute

Partnership for Our Working Coast is working to identify beneficial, nature-based solutions for this material to contribute to Louisiana's coastal sustainability efforts, protect coastal communities, and support America's Working Coast.

PUBLISHED WORKS

Peer-Reviewed Publications

- Baustian, M. M., Jung, H., Liu, B., Foster-Martinez, M., Esposito, C. R., Georgiou, I. Y., Bregman, M., Di Leonardo, D., McMann, B., Hemmerling, S. A., & Miner, M. D. (in review). Current and future potential net greenhouse gas sinks and sources of existing, converted, and restored marsh and mangrove forest habitats. *Restoration Ecology*.
- Dietrick, A., Ralston, D. K., Baustian, M. M., Esposito, C. R., Beltrán-Burgos, M., & Nepf, H. M. (accepted, in press). Vegetation-generated turbulence does not impact the erosion of natural cohesive sediment. *Geophysical Research Letters*.
- Beltran-Burgos, M., Esposito, C. R., Nepf, H. M., Baustian, M., & Di Leonardo, D. (2023). Vegetation-driven seasonal sediment dynamics in a freshwater marsh of the Mississippi River Delta. *Journal of Geophysical Research: Biogeosciences*, 128(4).
- Xu, Y., Esposito, C., Beltran-Burgos, M., & Nepf, H. (2022). Competing effects of vegetation density on sedimentation in deltaic marshes. *Nature Communications*, 13(1).
- Cox, J. R., Paauw, M., Nienhuis, J. H., Dunn, F. E., van der Deijl, E., Esposito, C. R., Goichot, M., Leuven, J. R. F. W., van Maren, D. S., Middelkoop, H., Naffaa, S., Rahman, M., Schwarz, C., Sieben, E., Triyanti, A., & Yuill, B. T. (2022). A global synthesis of the effectiveness of sedimentation-enhancing strategies for river deltas and estuaries. *Global and Planetary Change*, 214, 103796.
- Yuill, B., Wang, Y., Allison, M., Meselhe, E., & Esposito, C. (2020). Sand settling through bedform-generated turbulence in rivers. *Earth Surface Processes and Landforms*, 45(13), 3231–3249.
- Esposito, C. R., Georgiou, I. Y., & Straub, K. M. (2020). Flow loss in deltaic distributaries: Impacts on channel hydraulics, morphology, and stability. *Water Resources Research*, 56(5), e2019WR026463.
- Esposito, C. R., Di Leonardo, D., Harlan, M., & Straub, K. M. (2018). Sediment storage partitioning in alluvial stratigraphy: The influence of discharge variability. *Journal of Sedimentary Research*, 88(6), 717–726.
- Nienhuis, J. H., Törnqvist, T. E., & Esposito, C. R. (2018). Crevasse splays versus avulsions: A recipe for land building with levee breaches. *Geophysical Research Letters*, 45(9), 4058–4067.
- Esposito, C. R., Shen, Z., Törnqvist, T. E., Marshak, J., & White, C. (2017). Efficient retention of mud drives land building on the Mississippi Delta plain. *Earth Surface Dynamics*, 5(3), 387–397.
- Esposito, C. R., Georgiou, I. Y., & Kolker, A. S. (2013). Hydrodynamic and geomorphic controls on mouth bar evolution. *Geophysical Research Letters*, 40(8), 1540–1545.
- Straub, K. M., & Esposito, C. R. (2013). Influence of water and sediment supply on the stratigraphic record of alluvial fans and deltas: Process controls on stratigraphic completeness. *Journal of Geophysical Research: Earth Surface*, 118(2), 1–14.

Technical Reports

- Esposito, C., Courtois, A., Swartz, J., & Miner, M. (2021). Lowermost Mississippi River Management Program: Synthesis and Analysis of LMR Deep Draft Navigation Dredging activities (p. 59). The Water Institute of The Gulf.

Conference Proceedings and Presentations

- Esposito, C.R., Bien, H., Burgos, M.B., Collini, R., D.R., 2024: *Advancing Capacity for Marsh Modeling Retrospective Analysis: Synthetic Historical DEMs for Model Initialization and Validation*, Community Surface Modeling System Conference.
- Esposito, C.R., Bien, H., Burgos, M.B., Collini, R., D.R., 2024: *Advancing Capacity for Marsh Modeling Retrospective Analysis: Synthetic Historical DEMs for Model Initialization and Validation*, GOMCON.

- Esposito, C. (2022). *Human mediated landscapes: Anthro-Geomorphology*. Department of Civil, Construction, and Environmental Engineering-North Carolina University, Raleigh, NC.
- Esposito, C. (2021). *Quantifying dredging as a geomorphic agent in the lowermost Mississippi River*. Coasts, Oceans, Ports, and Rivers Institute-Louisiana State University, Baton Rouge, LA.
- Esposito, C. (2020). *Basin-side sediment diversion considerations in the lowermost Mississippi River*. Sedimentation Strategies in Deltas Workshop, Utrecht, Netherlands.
- Esposito, C. (2020). *Rapidly changing transport conditions in a vegetated marsh*. U.S. Fish and Wildlife Service Hydrology and Aquatic Resources Conservation Seminar.
- Burgos, M., Esposito, C., Baustian, M., DiLeonardo, D., & Nepf, H. (2020). *Accounting for vegetation turbulence in a morphodynamics model of a delta*. American Geophysical Union fall meeting, Virtual.
- Esposito, C., Courtois, A., & Miner, M. (2020). *Dredging as a geomorphic process*. American Geophysical Union, Virtual.
- Esposito, C., Nepf, H., Burgos, M., & Baustian, M. (2019). *Rapidly changing transport conditions in a Mississippi River marsh*. American Geophysical Union fall meeting, San Francisco, CA.
- Tevis, L., Mahon, R., & Esposito, C. (2019). *Flow and sediment dynamics through complex emergent marsh vegetation*. American Physical Union fall meeting, Mobile, AL.
- Esposito, C., Nepf, H., Burgos, M., & Baustian, M. (2019). *Sediment retention processes in coastal marshes*. CERF, Mobile, AL.
- Esposito, C. (2019). *Putting ecogeomorphology into practice: The future of coastal management*. American Geophysical Union: Young Scientists of the Future.
- Esposito, C. (2019). *Rapidly changing transport conditions in deltaic marshes*. Louisiana State University School of the Coast and Environment, Baton Rouge, LA.
- Esposito, C. (2019). *Restoration and monitoring activity in the bay dense wetland restoration planting*. Plaquemines Parish Coastal Zone Advisory Commission, Port Sulfur, LA.
- Esposito, C. (2019). *Dynamic interactions between channels and the overbank environment*. Dauphin Island Sea Lab, Dauphin Island, AL.
- Esposito, C. (2019). *Exchange processes between channels and wetlands: Understanding and application*. Woods Hole Oceanographic Institution, Woods Hole, MA.
- Esposito, C. (2018). *Coastal marsh storage dynamics: The clastics and the carbon*. Plant Genetics and Carbon in Coastal Louisiana, Cocodrie, LA.
- Esposito, C., Meselhe, E., Allison, M., Ramatchandirane, C., DiLeonardo, D., Weathers, H., & Yuill, B. (2018). *A sediment budget for the Calcasieu Lake in southwest Louisiana*. American Geophysical Union, Washington, D.C.
- Esposito, C., Meselhe, E., & Liang, M. (2018). *River bar dynamics and sand discharge through diversions*. State of the Coast, New Orleans, LA.
- Meselhe, E., Sadid, K., Jung, H., Messina, F., Esposito, C., & Liang, M. (2017). *Ecologic and morphodynamic analysis of a proposed network of sediment diversions*. American Geophysical Union.
- Esposito, C., Liang, M., Yuill, B., & Meselhe, E. (2017). *Maintaining the link to the floodplain: Scour dynamics in crevasses*. American Geophysical Union.
- Esposito, C., Meselhe, E., & Liang, M. (2017). *Sustainability and operational design of sediment delivering river diversions*. CSDMS, Boulder, CO.
- Fernandes, A., Esposito, C., Kolker, K., Ameen, A., Wang, K., & Chamberlain, E. (2016). *Time-scales of land construction in systems dominated by suspended load*. State of the Coast, New Orleans, LA.
- Esposito, C., Straub, K., & Georgiou, I. (2016). *Gradually varied flow in delta distributary networks*. State of the Coast, New Orleans, LA.
- Esposito, C. R., Shen, Z., Törnqvist, T. E., Marshak, J., & White, C. (2016). *Efficient retention of mud drives land building on the Mississippi Delta plain*. State of the Coast, New Orleans, LA.
- Esposito, C., Tornqvist, T. E., Shen, Z., Marshak, J., & White, C. (2015). *Building the Mississippi River Delta with silt and clay: Texture and sediment retention efficiency of crevasse splays*. Mississippi River Delta Coalition's Diversion Workshop, New Orleans, LA.
- Esposito, C., & Straub, K. (2014). *Observing morphology becoming stratigraphy: The statistical imprint of coastal processes in deltaic stratigraphy*. International Deltas Meeting, Istomino, Russia.
- Esposito, C., & Straub, K. (2014). *Observing morphology becoming stratigraphy: The statistical imprint of coastal processes in deltaic stratigraphy*. SEPM Meeting on Autogenic Dynamics of Sedimentary Systems, Grand Junction, Colorado.
- Esposito, C., & Straub, K. (2013). *The statistical signal of morphological process in stratigraphy*. American Geophysical Union fall meeting, San Francisco, CA.

- Straub, K., & Esposito, C. (2013). *Influence of water and sediment supply on the completeness of the stratigraphic record and the construction of stratigraphic surfaces in alluvial fans and deltas*. Annual Meeting of the American Association of Petroleum Geologist, Pittsburgh, Pennsylvania.
- Esposito, C., Boyd, R., & Straub, K. (2013). *Forward stratigraphic modeling of deltaic deposits using Delft3D*. Annual Meeting of the American Association of Petroleum Geologist, Pittsburgh, Pennsylvania.
- Esposito, C., & Boyd, R. (2012). *Representing stratigraphic time with Delft3D*. Deltares Energy Symposium, Delft, The Netherlands.
- Straub, K., Wang, Y., & Esposito, C. (2012). *Relating the creation and preservation of stratigraphic surfaces to geomorphic surfaces in continental margin environments*. American Geophysical Union, San Francisco, CA.
- Esposito, C., Georgiou, I., & Kolker, A. (2010). *Patterns of sediment transport and deposition during a single flood event in a river dominated wetland*. American Geophysical Union, San Francisco, CA.
- Esposito, C. R. (2010). Delta evolution during a single flood event in a river dominated wetland. *2010 GSA Denver Annual Meeting*, 42, 179.