

KATHERINE ALYSE ANARDE

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Department of Civil, Construction, and Environmental Engineering
North Carolina State University · 915 Partners Way, Raleigh, NC, 27695-7908

EDUCATION

- Ph.D.** August 2019
Civil & Environmental Engineering, Rice University
Advisor: Dr. Philip B. Bedient
Dissertation: Transformation & morphological impact of low-frequency waves during hurricane attack
- B.A.** May 2011
Geology, University of Colorado Boulder
Emphasis in Geophysics, Minor in Mathematics

PROFESSIONAL EXPERIENCE

- Assistant Professor** 2021-present
Department of Civil, Construction, and Environmental Engineering, North Carolina State University
Faculty Affiliate at the Southeast Climate Adaptation Science Center
Research Affiliate at the University of North Carolina at Chapel Hill
- Project Manager** 2020-2022
NSF CoPe RCN: Collaboratory for Coastal Adaptation Over Space & Time (C-CoAST)
- Postdoctoral Researcher**
Department of Earth Sciences, University of North Carolina at Chapel Hill 2019-2021
Department of Ocean Engineering, Texas A&M University 2019
- Graduate Research & Teaching Assistant** 2014-2019
Department of Civil & Environmental Engineering, Rice University
- Associate Geologist** 2011-2014
ENVIRON International Corporation, Houston, TX & Irvine, CA

RESEARCH INTERESTS

Coastal hazards, coupled human-natural systems, chronic coastal flooding, coastal geomorphology, nearshore wave transformation, storm impacts, climate adaptation, signal processing

HONORS & AWARDS

- National Academies (NASEM), Gulf Research Program, Early Career Award 2022
Dr. Kirk W. Dotson Endowed Graduate Fellowship, Rice University 2018
Link Ocean Engineering & Instrumentation Ph.D. Fellowship 2016
NSF Graduate Research Fellowship Program, Honorable Mention 2016
NSF PIRE International Research Fellowship 2016
Jack F. Maddox Fellowship, Rice University 2014
“Pick Award” - Undergraduate Student of the Year, Rocky Mountain Assoc. of Geologists 2011
“Marks Award” - Outstanding Geoscience Undergraduate Student, University of Colorado 2010
NSF REU: Scripps Institution of Oceanography 2010

PUBLICATIONS

Peer-Reviewed Journal Articles (Published or Accepted), *denotes student or postdoc supervised/mentored

1. *Gold, A., **Anarde, K.**, Grimley, L., Neve, R., Srebnik, E. R., Thelen, T., Whipple, A., & Hino, M (2023). Data from the drain: a sensor framework that captures multiple drivers of chronic coastal floods. *Water Resources Research*, 59, e2022WR032392. <https://doi.org/10.1029/2022WR032392>
2. Goldstein, E. B., Buscombe, D., Lazarus, E. D., Mohanty, S. D., Rafique, S. N., **Anarde, K. A.**, ... & Williams, H. E. (2021). Labeling poststorm coastal imagery for machine learning: Measurement of inter-rater agreement. *Earth and Space Science*, 8(9), e2021EA001896. <https://doi.org/10.1029/2021EA001896>
3. Reeves, I. R. B., Moore, L. J., Murray, A. B., **Anarde, K. A.**, & Goldstein, E. B. (2021). Dune dynamics drive discontinuous barrier retreat. *Geophysical Research Letters*, 48(13), e2021GL092958. <https://doi.org/10.1029/2021GL092958>
4. Reeves, I. R. B., Goldstein, E. B., **Anarde, K. A.**, & Moore, L. J. (2021). Remote bed-level change and overwash observation with low-cost ultrasonic distance sensors. *Shore & Beach*, 89(2), 23-30. <https://doi.org/10.34237/1008923>
5. **Anarde, K.**, Cheng, W., Tissier, M., Figlus, J., & Horrillo, J. (2021). Meteotsunamis Accompanying Tropical Cyclone Rainbands During Hurricane Harvey. *Journal of Geophysical Research: Oceans*, 126(1), e2020JC016347. <https://doi-org.libproxy.lib.unc.edu/10.1029/2020JC016347>
6. **Anarde, K. A.**, Figlus, J., Sous, D., & Tissier, M. (2020). Transformation of infragravity waves during hurricane overwash. *Journal of Marine Science and Engineering*, 8(8), 545. <https://doi.org/10.3390/jmse8080545>
7. Ebad Sichani, M., **Anarde, K. A.**, Capshaw, K. M., Padgett, J. E., Meidl, R. A., Hassanzadeh, P., ... & Bédient, P. B. (2020). Hurricane Risk Assessment of Petroleum Infrastructure in a Changing Climate. *Frontiers in Built Environment*, 6, 104. <https://doi.org/10.3389/fbuil.2020.00104>
8. **Anarde, K.**, Kameshwar, S., Irza, J.N., Nittrouer, J.A., Lorenzo-Trueba, J., Padgett, J.E., Sebastian, A., & Bédient, P.B. (2017). Impacts of Hurricane Storm Surge on Infrastructure Vulnerability for an Evolving Coastal Landscape. *Natural Hazards Review*, 19(1), p.04017020. [https://doi.org/10.1061/\(ASCE\)NH.1527-6996.0000265](https://doi.org/10.1061/(ASCE)NH.1527-6996.0000265)

Peer-Reviewed Journal Articles (Under Review & In Preparation)

1. **Anarde, K.**, Moore, L.J., Murray, A.B., & Reeves, I.R.B (2023). The Future of Developed Barrier Systems: Pathways Toward Uninhabitability, Drowning, and Rebound. *Earth's Future*. <https://doi.org/10.31223/X5P947> (*in review*)
2. *Van Blunk, L., **Anarde, K.**, Murray, A. B., Moore, L. J., & Sherwood, C. Outwash accelerates barrier retreat. (*in prep*)
3. *Thelen, T., **Anarde, K. A.**, Dietrich., C., & Hino., M. Data-model comparisons of chronic coastal flooding. (*in prep*)
4. **Anarde, K. A.**, *Gold, A., Buscombe, D., Goldstein, E., Kemberling, A., Smith, C., & Wellman, E. Detecting flooded roadways with CamML: A flexible open source framework for crowd labeling and ML prediction from real-time webcam imagery. (*in prep*)

Conference Proceedings

1. **Anarde, K.**, Figlus, J., Cheng, W., Horrillo, J., Tissier, M., Lynett, P., & Shi, Fengyan (2020). Data-model comparisons of storm processes during Hurricane Harvey. In the Coastal Engineering Proceedings, 2020.

2. **Anarde, K.**, & Figlus, J. (2017). Tilt current meters in the surf zone: benchmarking utility in high frequency oscillatory flow. In Proceedings of Coastal Dynamics, 2017. Helsingor, Denmark.

PRESENTATIONS & POSTERS

Oral Presentations, *denotes student or postdoc supervised/mentored

1. Moore, L. J., **Anarde, K. A.**, Reeves, I. R. B., Murray, A. B., Goldstein, E. B., & Zinnert, J. Dune-storm interactions, shrubs, and management decisions drive coastal barrier behavior and affect future habitation. *Coastal Sediments*, New Orleans, April 11, 2023. (Invited)
2. *Franklin, B., Moore, L. J., Barksdale, M. B., Hein, C. J., Kirwan, M. L., **Anarde, K. A.**, & Reeves, I. R. B. Calculating blue-carbon fluxes from barrier-island migration. *AGU Fall Meeting*, Chicago, Dec. 16, 2022.
3. *Thelen, T., **Anarde, K. A.**, Hino, M., McCraw, H., & Dietrich, C. Data-model intercomparisons of roadway flooding due to sea-level rise. *AGU Fall Meeting*, Chicago, Dec. 16, 2022.
4. *Van Blunk, L., **Anarde, K. A.**, Murray, A. B., Moore, L. J., & Sherwood, C. Modeling the effects of outwash events on barrier island evolution. *AGU Fall Meeting*, Chicago, Dec. 16, 2022.
5. *van Wiechen, P., Rutten, J., Tissier, M., De Vries, S., Mieras, M., & **Anarde, K. A.** Field observations of dune erosion with two artificially created dunes. *International Conference of Coastal Engineering*, Sydney, Dec. 5, 2022.
6. *Thelen, T., **Anarde, K. A.**, Hino, M., McCraw, H., & Dietrich, C. Community-focused analysis and communication of chronic coastal flooding events. *National Adaptation Forum*, Baltimore, Oct. 24, 2022.
7. **Anarde, K. A.** Simulating linkages between landscape evolution and coastal real estate markets with the CoASTal Community-lAnDscape Evolution (CASCADE) model (*Keynote*). *Community Surface Dynamics Modeling System Annual Meeting*, Boulder, CO, May 18, 2022.
8. **Anarde, K. A.** & Hino, M. Measuring the Causes and Impacts of Sunny Day Flooding in Coastal Communities. *North Carolina Beach, Inlet & Waterway Associations 2022 Spring Meeting*, Emerald Isle, May 5, 2022.
9. *Thelen, T., Gold, A., Hino, M., **Anarde, K. A.**, Whipple, A., & Neve, R. Data from the Drain: Assessing drivers of chronic coastal flooding. *Environmental, Water Resources, and Coastal Engineering Research Symposium*, North Carolina State University, February 26, 2022.
10. Moore, L.J., **Anarde, K. A.**, Corbett, D.R., Gopalakrishnan, S., Luettich, R., McNamara, D., Mullin, M., Murray, A.B., Smith, M., & Watzin, M. Enabling Convergent, Co-produced, Coupled Human-Natural Dynamics Research to Support Coastal Resilience: Building the Collaboratory for Coastal Adaptation over Space and Time (C-CoAST). *AGU Ocean Sciences Meeting 2022*, Virtual Conference, February 28, 2022.
11. *Gold, A., Hino, M, **Anarde, K. A.**, Whipple, A, & Neve, R. Assessing drivers of chronic coastal flooding using a low-cost sensor network. *AGU Ocean Sciences Meeting 2022*, Virtual Conference, February 28, 2022.
12. **Anarde, K. A.**, Moore, L.J., Murray, A.B., Reeves, I.R.B., & Franklin, B. Pathways to barrier drowning arising from coastal management of the nearshore to the back barrier (*Invited*). *AGU Fall Meeting 2021*, New Orleans, Dec. 14, 2021.

13. **Anarde, K. A.**, Reeves, I.R.B., Murray, A.B., & Moore, L.J. A coupled model framework for simulating barrier island and coastline response to climate change and land use. *AGU Fall Meeting 2020*, Virtual Meeting.
14. **Anarde, K. A.**, Cheng, W., Tissier, M., Figlus, J., & Horrillo, J.J. Field and numerical assessment of meteotsunamis associated with tropical cyclone rainbands in the Gulf of Mexico. *AGU Ocean Sciences Meeting 2020*, San Diego, February 21, 2020.
15. **Anarde, K. A.** & Figlus, J. On the importance and origin of very low-frequency waves in the nearshore during Hurricane Harvey. *AGU Fall Meeting 2018*, Washington D.C., Dec. 10, 2018.
16. Figlus, J., **Anarde, K. A.**, Dellapenna, T., & Bedient, P.B. COASTRR: COAstal STorm Rapid Response Measurements of Hurricane Harvey Impact and Recovery on Two Texas Barrier Islands. *ICCE 2018*, Baltimore, Maryland, July 30, 2018.
17. **Anarde, K. A.**, Figlus, J., Fang, N., Dellapenna, T., & Bedient, P.B. Hurricane Harvey rapid response: field measurements of hydrodynamic forcing and morphological evolution on Matagorda Peninsula and Follets Island, TX. *AGU Ocean Sciences Meeting 2018*, Portland, Oregon, Feb. 12-16, 2018.
18. **Anarde, K. A.**, Figlus, J., Dellapenna, T., & Bedient, P.B. Hurricane Harvey rapid response: observations of infragravity wave dynamics and morphological change during inundation of a barrier island cut. *AGU Fall Meeting 2017*, New Orleans, Louisiana, Dec. 11-15, 2017.
19. Swanson, T., Lorenzo-Trueba, J., **Anarde, K.**, Odezulu, C., Anderson, J., & Nittrouer, J. Exploring the morphodynamic response of coastal barriers to sea-level rise along the Texas Gulf Coast. *AGU Fall Meeting 2017*. New Orleans, LA, Dec. 11-15, 2017.
20. **Anarde, K. A.** & Figlus, J. Tilt current meters in the surf zone: benchmarking utility in high-frequency oscillatory flow. *Coastal Dynamics 2017*, Helsingør, Denmark, June 12-16, 2017.

Poster Presentations

1. **Anarde, K.**, Goldstein, E., Bolewitz, J., McCune, R., Gold, A., & Hino, M. On-device machine learning for identifying the spatial extent of chronic coastal floods. *International Conference of Coastal Engineering*, Sydney, Dec. 5, 2022.
2. Palermo, R., Wallace, E.J., Joshi, S., **Anarde, K.**, Ashton, A., Brideau, L., Cortes, I., Evans, R., Gillen, M., Goldstein, E., Gostic, M., Housego, R., & Kinsman, N. Anti-Racism in Women in Coastal Geoscience and Engineering. *AGU Fall Meeting 2021*, New Orleans, LA, Dec. 15, 2021.
3. **Anarde, K.**, Kameshwar, S., Irza, J.N., Lorenzo-Trueba, J., Nittrouer, J.A., Padgett, J.E. Extreme storms, sea level rise, and coastal change: implications for infrastructure reliability in the Gulf of Mexico. *AGU Fall Meeting 2016*, San Francisco, CA, Dec. 12-18, 2016.
4. *Do, C., **Anarde, K.**, Prouse, W., & Figlus, J. UAS photogrammetry for rapid response characterization of subaerial coastal change. *AGU Fall Meeting 2016*, San Francisco, CA, Dec. 12-18, 2016.
5. *Myres, B.H., **Anarde, K.**, & Figlus, J. Tilt current meter field validation in the surf zone. *AGU Fall Meeting 2016*, San Francisco, CA, Dec. 12-18, 2016.
6. **Anarde, K.**, & Laske, G. A joint Rayleigh and Love wave analysis for the Hawai'ian PLUME Project. *AGU Fall Meeting 2010*, San Francisco, CA, Dec. 13-17, 2010.

Other Invited Lectures or Research Presentations (not listed above)

1. Seminar: Water, Wetlands, and Watersheds Webinar, University of Florida (2023). The future of developed barrier systems. April 5, 2023.

2. Seminar: Department of Geological and Environmental Sciences, Appalachian State University (2023). The future of developed barrier systems. February 24, 2023.
3. Seminar: Department of Marine, Earth, and Environmental Sciences, University of North Carolina at Chapel Hill (2022). *Cascading feedbacks arising from coastal management*. February 18, 2022.
4. Guest Lecture: Department of Civil, Construction, and Environmental Engineering, North Carolina State University. Introduction to Coastal Engineering (2021). *Storm Impacts and Development*. March 31, 2021.
5. Seminar: University of North Carolina at Chapel Hill, Collaboratory for Coastal Adaptation Over Space and Time (C-COAST) (2021). *Disciplines 101: Storm Impacts and Development*. April 8, 2021.
6. Panelist: 2021 Workshop on SHared Operational REsearch Logistics In the Nearshore Environment (SHORELINE21): Uniting field and lab research across disciplines to reduce hurricane impacts to the built and natural environment (2021). *The Nearshore Extreme Events Reconnaissance Organization*. April 26, 2021.
7. Seminar: US Naval Research Laboratory, Sediment Dynamics Section (2019). *Transformation and morphological impact of low-frequency waves during hurricane attack*. June 7, 2019.
8. Seminar: Department of Civil and Environmental Engineering, University of Delaware (2018). *Nonlinear evolution and morphological impact of low-frequency waves during hurricane-induced overwash*. October 23, 2018.

ARCHIVED SOFTWARE AND DATASETS

1. **Anarde, K. A.**, & Moore, L. J., Murray, A. B., & Reeves, I. R. B. (2023). Simulations for “The Future of Developed Barrier Systems: Pathways Toward Uninhabitability, Drowning, and Rebound”. figshare. <https://doi.org/10.6084/m9.figshare.22295413.v1>
2. *Reeves, I. R. B., **Anarde, K. A.**, & Moore, L. J. (2022). Record of storm events and associated water levels for the Virginia Coast Reserve, 1980-2013. Virginia Coast Reserve Long-Term Ecological Research Project Data Publication. <https://www.vcrlter.virginia.edu/cgi-bin/showDataset.cgi?docid=knblter-vcr.352.1>
3. Figlus, J. & **Anarde, K.** (2019). COAstal STorm Rapid Response (COASTRR): in-situ hydrodynamic and sediment transport measurements during Hurricane Harvey on two Texas barrier islands. PRJ-2537. DesignSafe-CI. <https://doi.org/10.17603/ds2-m0bc-n829>

WORKSHOP & CONFERENCE PLANNING

1. *Community Surface Dynamics Modeling System (CSDMS) 2024 Annual Meeting*. Montclair State University, NJ. May 2024. *Scientific Program Committee*.
2. *Nearshore Processes*. AGU Fall Meeting, Chicago, IL. December 12-16, 2022. *Session Co-convener*.
3. *Coastal Geomorphology and Morphodynamics*. AGU Fall Meeting, New Orleans, LA. December 13-17, 2021. *Session Convener*.

GRANTS

Awarded (all amounts are direct)

1. Hino, M., Anarde, K., & Dietrich, C. Evaluating coastal adaptation strategies in the face of chronic and extreme events. Department of Homeland Security, Coastal Resilience Center, 07/01/2023-06/30/2024, \$154,798 (Anarde \$92,054).

2. Nelson, N., Harris, A., & Anarde, K. Characterizing Water Quality Impacts of Tidal Floods on NC Communities. NC Policy Collaboratory, 07/01/2023-06/30/2024, \$49,979 (Anarde \$13,045).
3. Anarde, K & Sciaudone, B. Shoreline Monitoring at Oregon Inlet Terminal Groin. North Carolina Department of Transportation, Research Program FY2022, 08/16/2022-08/15/2025, \$534,252.
4. Nelson, N., Carr, M, Harris, A, & Anarde, K. Characterizing fecally-associated bacteria in tidal floodwaters and associated risks to pedestrians. North Carolina Sea Grant, Minigrant, 01/01/2022-01/31/2023, \$9,999 (Anarde \$487).
5. Anarde, K. 2022 Early-Career Research Fellowship: Environmental Protection and Stewardship (Track Two). National Academies of Science and Engineering, Gulf Research Program, 09/01/2022-08/31/2024, \$76,000 (Anarde \$76,000).
6. Hino, M., Anarde, K., & Frankenburg, E. The effects of chronic flooding on coastal migration. National Science Foundation, Human, Environmental, and Geographical Sciences (HEGS)/CAS-Climate, 10/01/2022-09/30/2025, \$399,622 (Anarde \$76,315).
7. Goldstein, E., Anarde, K., & Sciaudone, B. Evaluation of Road Network Resilience to Natural Hazards using Network Analysis. North Carolina Department of Transportation, Research Program FY2022, 08/01/2022-07/31/2024, \$207,923 (Anarde \$149,055).
8. Anarde, K., Hino, M., Gold, A., & Dietrich, C. Identifying the drivers of chronic coastal flooding: a community-centric approach. North Carolina Sea Grant, 2022-2024 Biennial Competitive Research Call, 02/01/2022-01/31/2024, \$119,411 (Anarde \$87,522).
9. Mieras, M. & Anarde, K. Distributed wireless sensors for real-time measurement of waves and water levels during hurricane impact. North Carolina Sea Grant. Minigrant, 12/01/2020-11/31/2022, \$9,947 (Anarde \$1,100).

Pending

1. Anarde, K., Hino, M., Amspacher, K., Goldstein, E., Wang, C., & Nelson, N. It is flooding more than we know: climate injustice from floods due to sea level rise. NASA, Interdisciplinary Research in Earth Science, 07/01/2023-06/30/2026, \$1,211,982 (Anarde \$505,509).
2. Hino, M., Shuler, C., Grecni, Z., Anarde, K., & Widlansky, M. Enabling equitable adaptation to changing coastal flood risks through community-engaged modeling in North Carolina and Hawaii. NOAA, Cross-CAP/RISA Program, 09/01/2023-08/31/2026, \$475,000 (Anarde \$44,119).

TEACHING & MENTORSHIP

Primary Instructor

Engineering Aspects of Coastal Processes (CE 583), North Carolina State University	Fall 2022
Introduction to Coastal Engineering (CE 487/587), North Carolina State University	Spring 2022, 2023

Graduate Advisor (university, track)

Roya Sahraei (NCSU, PhD)	2021-present
Ryan McCune (NCSU, PhD)	2021-present
Thomas Thelen (NCSU, PhD)	2021-present
Alexis Van Blunk (NCSU, MS)	2021-2023

Postdoctoral Researchers (university, track)

Christine Baker (NCSU)	2023-present
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Undergraduate Advisor (university)

Harper McCraw (NCSU)	2022-2023
Jasmine Hayden-Lowe (NCSU)	2022
Joe Bolewitz (NCSU)	2022
William Prouse (Texas A&M University)	2018
Connie Do (Rice University)	2016
Hunter Myres (Texas A&M University)	2016

Graduate Committee Member (university, track)

Benton Franklin (UNC-CH, PhD)	2023-present
Jessica Gorski (NCSU, MS)	2022-2023
Sophia Rosenberg (NCSU, MS)	2022-2023
Chris O'Connor (UNCW, MS)	2021-2023
Pegah Gashemi (NCSU, PhD)	2022-2023
Brooke Rumbaugh (NCSU, MS)	2021

PROFESSIONAL DEVELOPMENT WORKSHOPS ATTENDED

Coastal Imaging Research Network Workshop, Duck, North Carolina	2023
NHERI & RAPID Facility Joint Workshop, Corvallis, Oregon	2019
OpenFOAM Training: Essential and Applied CFD, Houston, Texas	2017
Delft Software Days (Delft3D, XBeach), Delft, Netherlands	2016

PROFESSIONAL SERVICE*External*

Task Group Member, NSF NHERI Decadal Visioning Study	2023
Panelist, NSF, Smart and Connected Communities Program	2023
Steering Committee, Young Coastal Scientists & Engineers Conference Americas	2022-present
Technical Reviewer, NSF CAREER Award	2020
Reviewer, Texas Sea Grant Biennial Research Program	2021

Internal

College of Engineering Rep., NCSU Galapagos Research Consortium	2022-present
Member, NCSU CCEE Graduate Programs Committee	2021-present
Panelist, Sea-level Rise Impacts, North Carolina Sea Grant Conference	2022
Member, NCSU CCEE Three Minute Thesis Committee	2022
Member, NCSU CCEE Faculty Search Committee	2022
Faculty Advisor, NCSU ECE Senior Capstone	2022

Manuscript Reviewer

Journal of Geophysical Research - Oceans (3), Journal of Geophysical Research - Earth Surface (1), ASCE Natural Hazards Review (1), and 5 other journals

Professional Affiliation

American Geophysical Union (AGU); American Society of Civil Engineers (ASCE); Women in Coastal Geoscience and Engineering (WCGE)

OUTREACH

Sensor Development Day, Tesla STEM High School, Redmond, Washington	2022
Rice Earth Day, Girl Scouts of San Jacinto Texas	2019
Young Owls Leadership Program, Rice University	2014-2018
Girls STEM Initiative, Rice University	2016-2018
Grad STEM Share, Rice University and Lanier Middle School	2016

SELECTED RECENT MEDIA

2023: Coastal Review, Flooding study reveals factors NOAA forecasts don't include

2022: PBS North Carolina, Why "sunny day" flooding is becoming a problem