Dr. Derrick R. Vaughn – Assistant professor at Utah State University

Department of Geosciences | Utah State University | derrick.vaughn@usu.edu
4505 Old Main Hill, Logan, UT, 84322 Telephone: +1 (765) 412-9882

RESEARCH INTERESTS

The carbon cycle along the land-sea continuum, particularly with how carbon cycling is impacted by current and past changes in climate as well as anthropogenic activity. This research includes looking at natural methods for carbon sequestration and climate mitigation. Current research works to improve carbon budgets in coastal wetlands (i.e. Blue Carbon), including estimating organic carbon (OC) burial in coastal wetlands, lateral export of organic (e.g. dissolved organic carbon/matter) and inorganic (e.g. alkalinity) carbon fluxes, and greenhouse gas (CO_2, CH_4, N_2O) emissions. Also seeks to understand the controls of terrestrial carbon delivery to the coast by analyzing dissolved organic matter (DOM) from upland streams and greenhouse gas emissions from estuaries to understand the influence of anthropogenic land-use change on organic matter export and processing, as well as modeling the influence of sea-level cycles on the filling (sediments, carbon) of incised coastal river valleys. Using an array of analytical, experimental and model techniques to answer questions regarding organic matter sources and processing, including: stable isotopes (^{13}C, ^{15}N), geochronological proxies (^{210}Pb, ^{137}Cs, ^{14}C), elemental and biochemical compositions (e.g. amino acids, lignin phenols), and ultra-high resolution mass spectrometry (FT-ICR MS). Currently developing a new blue carbon network (Blue Carbon Timescale Network; https://bctn.research.yale.edu) to better understand long-term carbon burial and carbon stocks in blue carbon environments globally using a newly acquired Mini Carbon Dating System (MICADAS) at Yale University.

PROFESSIONAL PREPARATION

University of Florida	Ph.D. Geology	2015-2019
Iowa State University	M.Sc. Geology	2013-2015
University of Miami	B.Sc. Marine Science/Biology	2008-2012

APPOINTMENTS

Assistant Professor, Department of Geosciences, Utah State University, Utah, U.S.A., **2024- Present**

Postdoctoral Associate, Yale Center for Natural Carbon Capture, School of the Environment, Yale University, Connecticut, U.S.A. **2022 - 2024**

Dean's Postdoctoral Scholar, Department of Earth, Ocean, & Atmospheric Science, Florida State University, Florida, U.S.A. **2019 – 2022**.

PUBLICATIONS (IN REVIEW/PREP)

Vaughn, D.R., J. Rosentreter, C. Doughty, S-E. Tsao, J. Gewirtzman, B. Poulter, S.P. Charles, D. Lagomasino, P.R. Raymond (In Review). Seasonal variability of lateral dissolved carbon and water-air greenhouse gas flues from mangrove-fringed rivers in the Florida Everglades. *Estuarine, Coastal, and Shelf Science.*

Vaughn, D.R., M. Lyman, P. Vlahos, M. Norton, and P.A. Raymond (In Prep). West-to-East gradient in greenhouse gas concentrations and fluxes from surface and deep waters in the Long Island Sound.

PUBLICATIONS (IN PRINT)

Humphries, M., K. Prior, A. Green, & **D.R. Vaughn** (2024). A 6000 year high-resolution compose record of El Niño-related drought in southeast Africa, *Quaternary Science Reviews*, 344. https://doi.org/10.1016/j.quascirev.2024.108992.

Steinmuller, H.E., J.L. Breithaupt, A.S. Rovai, K.M. Engelbert, J.M. Smoak, L.G. Chambers, K.R. Radabaugh, R.P. Moyer, A. Chappel, **D.R. Vaughn**, T.S. Bianchi, R.R. Twilley, P.R. Pagliosa, M. Cifuentes-Jara, & D. Torres (2024). Using loss-on-ignition to estimate total nitrogen content of mangrove soils, *Geoderma*, 448, 116956. https://doi.org/10.1016/j.geoderma.2024.116956.

Breithaupt, J.L., H.E. Steinmuller, Rovai, A.S., K. Engelbert, J.M. Smoak, L.G. Chambers, Harttung, S.A.,, K. Radabaugh, R.P. Moyer, A. Chappel, **D.R. Vaughn,** T.S. Bianchi, R.R. Twilley, P. Pagliosa, M. Cifuentes-Jara, & D. Torres (2023). An improved framework for estimating organic carbon content of mangrove soils using loss-on-ignition and coastal environmental setting, *Wetlands*, 43,57. https://doi.org/10.1007/s13157-023-01698-z.

Poulter, B., F.M. Adams-Metayer, C. Amaral, A. Barenblitt, A. Campbell, S.P. Charles, R.M. Roman-Cuesta, R. D'Ascanio, E. Delaria, C. Doughty, T. Fatoyinbo, J. Gewirtzman, T. Hanisco, M. Hull, S. R. Kawa, R. Hannun, D. Lagomasino, L. Lait, S. Malone, P. Newman, P. Raymond, J. Rosentreter, N. Thomas, **D.R. Vaughn**, G.M. Wolfe, L. Xiong, Q. Ying, Z. Zhang (2023). Multi-scale observations of mangrove blue carbon fluxes; the NASA Carbon Monitoring System BlueFlux field campaign, *Environmental Research Letters*, 18, 7. https://doi.org/10.1088/1748-9326/acdae6.

Vaughn, D.R., A.M. Kellerman, K.P. Wickland, R.G. Striegl, D.C. Podgorski, J.R. Hawkings, J.H. Nienjuis, M.M. Dornblaser, E.G. Stets, & R.G.M. Spencer (2023). Landcover Impacts on Dissolved Organic Matter Biolability – Implications from the Upper Mississippi River Basin, *Water Research*, 229. https://doi.org/10.1016/j.watres.2022.119357

Cui, X., T.S. Bianchi, D. He, **D.R. Vaughn**, E.K. Williams, C. Wang, C. Smeaton, K. Koziorowska-Makuch, J.C. Faust, A. Mucci, C.A. Wright, J.M. Jaeger, A.F. Plante, & B.E. Rosenheim (2022). Global fjords as a transitionary reservoir of labile organic carbon, *Science Advances*, 8(46). https://doi.org/10.1126/sciadv.add0610

Vaughn, D.R., A.M. Kellerman, K.P. Wickland, R.G. Striegl, D.C. Podgorski, J.R. Hawkings, J.H. Nienjuis, M.M. Dornblaser, E.G. Stets, & R.G.M. Spencer (2021). Anthropogenic Landcover Impacts on Fluvial Dissolved Organic Matter Composition in the Upper Mississippi River Basin, *Biogeochemistry*. https://doi.org/10.1007/s10533-021-00852-1

Vaughn, D.R., T.S. Bianchi, T.Z. Osborne, W.F. Kenney, and M.R. Shields (2021). Blue Carbon Soil Stock Development and Estimates Within Northern Florida Wetlands, *Frontiers in Earth Science*, 9:552721. https://doi.org/10.3389/feart.2021.5527121.

Breithaupt, J.L., J.M. Smoak, T.S. Bianchi, **D.R. Vaughn**, C.J. Sanders, Kara R. Radabaugh, M.J. Osland, Laura C. Feher, J.C. Lynch, D.R. Cahoon, G.H. Anderson, K.R.T. Whelan, B.E. Rosenheim, R.P. Moyer, and L.G. Chambers (2021). Reply to Comment by R. Parkinson on "Increasing Rates of Carbon Burial in Southwest Florida Coastal Wetlands", *Journal of Geophysical Research: Biogeosciences*, https://doi.org/10.1029/2021JG006245.

Ware, S., B.E. Hartman, D.C. Waggoner, **D.R. Vaughn**, T.S. Bianchi, and P.G. Hatcher (In Press, 2021). Molecular evidence for Significant Export of Terrigenous Organic Matter to the North Gulf of Mexico by Solid-State 13C NMR and Fourier Transform Ion Cyclotron Resonance Mass Spectrometry of humic acids, *Geochimica et Cosmochimica Acta*.

Vaughn, D.R., T.S. Bianchi, M.R. Shields, W.F. Kenney, and T.Z. Osborne (2020). Increased Organic Carbon Burial in Northern Florida Mangrove-Salt Marsh Transition Zones, *Global Biogeochemical Cycles*, 34, e2019GB006334. https://doi.org/10.1029/2019GB006334.

Breithaupt, J.L., J.M. Smoak, T.S. Bianchi, **D.R. Vaughn**, C.J. Sanders, Kara R. Radabaugh, M.J. Osland, Laura C. Feher, J.C. Lynch, D.R. Cahoon, G.H. Anderson, K.R.T. Whelan, B.E. Rosenheim, R.P. Moyer, and L.G. Chambers (2020). Increasing Rates of Carbon Burial in Southwest Florida Coastal Wetlands, *Journal of Geophysical Research: Biogeosciences*, https://doi.org/10.1029/2019JG005349.

Hutchings, J.A., T.S. Bianchi, D.S. Kaufman, A.L. Kholodov, **D.R. Vaughn**, E.A.G. Schuur (2019). Millennial-scale carbon accumulation and molecular transformation in a permafrost core from Interior Alaska, *Geochimica et Cosmochimica Acta*, 253, 231-248, https://doi.org/10.1016/j.gca.2019.03.028.

Vaughn, D.R. and B.E. Caissie (2017). Effects of sea-level, sea-ice extent, and nutrient availability on primary production at the Umnak Plateau, Bering Sea (IODP Site U1339) during Marine Isotope Stage (MIS) 5, *Palaeogeography, Palaeoclimatology, Palaeoecology*, 485, 283-292, https://doi.org/10.1016/j.palaeo.2017.06.020.

TEACHING/MENTORING EXPERIENCE

New Haven Promise Intern Mentor – Yale University, New Haven, CT, 05/23-08/23
Alfia Ansari Summer Intern Project – "Alkalinity export from a New England salt marsh"
Instructor – Florida State University, Tallahassee, Fl, 01/20-05/22
Geomorphology and Geochemistry (3 semesters)
Teaching Assistant – University of Florida, Gainesville, Fl, 08/15-05/19
Physical Geology Lab (1 semester)
Intro to Earth Sciences (1 semester)
Florida Geology Lab (1 semester)
Integrated Principles of Biology II Laboratory (5 semesters)
Undergraduate Mentoring – University of Florida, Gainesville, Fl.
Ann Coican (BS 2018) Undergraduate Research Project – "Estimating Above-Ground Biomass for Northern Florida Wetlands"
Teaching Assistant – Iowa State University, Ames, IA. 08/13-05/15
Intro to Geology Lab (3 semesters)
Intro to Geology Lab coordinator (1 semester)
Geology for Engineers Lab (1 semester)
Oceanography lecture assistant (1 semester)
Energy and the Environment lecture assistant (1 semester)

AFFILIATIONS/MEMBERSHIPS

Member, Society of Wetland Scientists, 2023-present
Member, Association for the Sciences of Limnology and Oceanography, 2021-present
Member, Coastal and Estuarine Research Federation, 2021-present
Member, Southeastern Geological Society, 2017-2019
Member, American Geophysical Union, 2014-present

AWARDS AND HONORS

Best Presentation for Postdoctoral Associate – Fall 2023
Center for Natural Carbon Capture Research Showcase Event – Yale University
5 Minute Research Competition, People's Choice Award – Fall 2021
Office of Postdoctoral Affairs – Florida State University
Postdoctoral Scholar Travel Award – Spring 2021
Office of Postdoctoral Affairs – Florida State University
5 Minute Research Competition, 3rd Place – Fall 2019
Office of Postdoctoral Affairs – Florida State University
Dean's Postdoctoral Scholar Fellow – Fall 2019
Florida State University
Student Research Grant – Fall 2018
Gulf Coast Association of Geological Societies
Graduate Council Travel Grant – Fall 2018
Graduate Student Council – University of Florida

Graduate Student Travel Grant – Fall 2018
Land Use and Environmental Change Institute – University of Florida
Best Graduate Student Poster Award – Spring 2018
North Florida Marine Science Symposium, St. Augustine, Fl
Student Research/Field Work Grant – Fall 2017
Southeastern Geological Society
Graduate Council Travel Grant – Fall 2017
Graduate Student Council – University of Florida
Graduate Student Travel Grant – Fall 2017
College of Liberal Arts and Sciences – University of Florida
Graduate Student Travel Grant – Fall 2017
Land Use and Environmental Change Institute – University of Florida
Outstanding Contributions Award – Spring 2015
Department of Geological and Atmospheric Sciences – Iowa State University

PRESENTATIONS/POSTERS

Vaughn, D.R. (2024). Carbon burial and losses in coastal blue carbon ecosystems. GeoTopics Seminar at the Rosenstiel School of Marine, Atmospheric, and Earth Science. Remote Presentation. 25 March, **Talk (Invited)**.

Vaughn, D.R. (2024). Carbon burial and losses in coastal blue carbon ecosystems. Biology and Paleo Environment Seminar, Lamont-Doherty Earth Observatory. 18 March, **Talk (Invited)**.

Vaughn, D.R., D. Lagomasino, S.P. Charles, B. Poulter, and P.A. Raymond (2023). Seasonal variations in lateral carbon and greenhouse gas fluxes from Everglades tidal rivers. AGU 2023 Fall Meeting, San Francisco, 11-15 Dec., **Talk**.

Vaughn, D.R. (2023). Using radiocarbon (^{14}C) to improve our understanding of blue carbon stocks globally. International Soil Radiocarbon Database Workshop, Palo Alto, 8 Dec., **Talk**.

Vaughn, D.R. (2023). Using radiocarbon (^{14}C) to improve our understanding of blue carbon stocks globally. Yale Center for Natural Carbon Capture Research Showcase Event, New Haven, 6 October, **Talk**.

Vaughn, D.R., D. Lagomasino, S.P. Charles, B. Poulter, and P.A. Raymond (2023). Lateral carbon and greenhouse gas fluxes from Everglades tidal rivers. The 6th International Mangrove Macrobenthos and Management Meeting, Cartagena, 24-28 July, **Poster**.

Vaughn, D.R., D. Lagomasino, S.P. Charles, B. Poulter, and P.A. Raymond (2023). Lateral carbon and greenhouse gas fluxes from Everglades tidal rivers. Society of Wetland Scientists 2023 Annual Meeting, Spokane, 27-30 June, **Talk**.

Vaughn, D.R., P.A. Raymond, M. Norton (2023). Blue Carbon Timescale Network (BCTN). Yale Climate Day 2023, New Haven, 4 May, **Poster**.

Vaughn, D.R., Hull, M., Raymond, P.A., (2022). Constraining Lateral Carbon Fluxes from a Connecticut Salt Marsh over Multiple Tidal Cycles, AGU 2022 Fall Meeting, Chicago, 12-16 Dec., **Poster**.

Vaughn, D.R., (2022). Tackling Uncertainties in Blue Carbon Storage. Confluence Research Seminar, Yale University. 10 Nov., **Talk**.

Vaughn, D.R., A.M. Kellerman, K.P. Wickland, R.G. Striegl, D.C. Podgorski, J.R. Hawkings, J.H. Nienjuis, M.M. Dornblaser, E.G. Stets, & R.G.M. Spencer (2021). Anthropogenic Landcover Impacts Fluvial Dissolved Organic Matter Composition in the Upper Mississippi River Basin, AGU 2021 Fall Meeting, Remote Presentation, 16 Dec., **Poster.**

Vaughn, D.R., J. Nienhuis, R.G.M. Spencer 2021. Global Incised Valley Filling During the Holocene Sea-Level Highstand – Implications for Carbon Burial, AGU 2021 Fall Meeting, Remote Presentation, 13 Dec., **Talk.**

Vaughn, D.R., T.S. Bianchi, T.Z. Osborne, W.F. Kenney, and M.R. Shields, 2021. Historical Blue Carbon Burial with Holocene Wetland Development and Modern Mangrove Expansion, Coastal and Estuarine Research Federation 26th Biennial Conference, 9 Nov., **Talk**.

Vaughn, D.R., 2021. Once Upon a Time: The Story of Carbon, 5 Minute Research Competition, Florida State University, 23 Sep., **Talk**.

Vaughn, D.R., J. Nienhuis, R.G.M. Spencer, J.J. Middelburg, G.A. Milne, 2021. Global Incised Valley Filling During the Holocene Sea-Level Highstand – Implications for Carbon Burial, CSDMS 2021 Annual Meeting, Remote Presentation, 17 May, **Poster/Talk.**

Vaughn, D.R., J. Nienhuis, R.G.M. Spencer, W.J. van Hoek, G.A. Milne, 2020. Global Incised Valley Filling during the Holocene Sea-Level Highstand – Implications for Carbon Burial, AGU 2020 Fall Meeting, Remote Presentation. **Poster.**

Vaughn, D.R., 2020. Fingerprinting Human Impacts on Streams, 5 Minute Research Competition, Florida State University, 18 Sep., **Talk**.

Vaughn, D.R., T.S. Bianchi, T.Z. Osborne, W.F. Kenney, and M.R. Shields, 2019. Modern and Millennial-Scale Development of Blue Carbon Pools in Northern Florida Coastal Wetlands, Abstract B43H-2543 presented at the 2019 Fall Meeting, AGU, San Francisco, 9-13 Dec., **Poster**.

Vaughn, D.R., T.S. Bianchi, T.Z. Osborne, W.F. Kenney, and M.R. Shields, 2019. Blue Carbon Burial in Northern Florida Intertidal Wetlands, Utrecht University, Utrecht, Netherlands, 28 Nov., **Talk (Invited Seminar)**.

Vaughn, D.R., T.S. Bianchi, T.Z. Osborne, W.F. Kenney, and M.R. Shields, 2019. The Importance of Carbon Within Northern Florida Wetlands, 5 Minute Research Competition, Florida State University, 20 Sep., **Talk**. https://www.youtube.com/watch?v=VRER6ugkCco

Vaughn, D.R., T.S. Bianchi, T.Z. Osborne, W.F. Kenney, and M.R. Shields, 2018. Blue Carbon Sequestration Within Northern Florida Intertidal Wetlands – Response to Climate Change and Holocene Climate Variability, Abstract B41D-08 presented at the 2018 Fall Meeting, AGU, Washington, D.C., 10-14 Dec. **Talk**.

Vaughn, D.R., T.S. Bianchi, T.Z. Osborne, M.R. Shields, and W.F. Kenney, 2018. Blue Carbon Sequestration in Florida Coastal Wetlands – Response to Climate Change and Holocene Climate Variability, International Workshop on Organic Carbon Cycling in Marine Environments: Estuarine to Open Ocean Systems, Qingdao, China, 13-16 Oct, **Poster**.

Vaughn, D.R., T.S. Bianchi, T.Z. Osborne, M.R. Shields, and W.F. Kenney, 2018. Blue Carbon Sequestration Within a Northeastern Florida Intertidal Wetland – Response to Climate Change and Holocene Climate Variability, 9th International Conference on Asian Marine Geology, Shanghai, China, 11-12 Oct, **Talk**.

Vaughn, D.R., T.S. Bianchi, T.Z. Osborne, M.R. Shields, and W.F. Kenney, 2018. Blue Carbon Sequestration Within a Northeastern Florida Intertidal Wetland – Response to Climate Change and Holocene Climate Variability, 12th International Symposium on Biogeochemistry of Wetlands, Coral Springs, Fl., 23-26 Apr., **Talk**.

Vaughn, D.R., T.S. Bianchi, T.Z. Osborne, M.R. Shields, and W.F. Kenney, 2018. Blue Carbon Sequestration Within a Northeastern Florida Intertidal Wetland – Response to Climate Change and Holocene Climate Variability, Southeastern Biogeochemistry Symposium, Tallahassee, Fl., 06 Apr., **Poster**.

Vaughn, D.R., T.S. Bianchi, T.Z. Osborne, M.R. Shields, and W.F. Kenney, 2018. Blue Carbon Sequestration Within a Northeastern Florida Intertidal Wetland – Response to Climate Change and Holocene Climate Variability, Graduate Student Research Day, University of Florida, Gainesville, Fl., 03 Apr., **Poster**.

Vaughn, D.R., T.S. Bianchi, T.Z. Osborne, M.R. Shields, and W.F. Kenney, 2018. Blue Carbon Sequestration Within a Northeastern Florida Intertidal Wetland – Response to Climate Change and Holocene Climate Variability, North Florida Marine Science Symposium, St. Augustine, Fl., 25-26 Jan., **Poster**.

Vaughn, D.R., T.S. Bianchi, T.Z. Osborne, M.R. Shields, and W.F. Kenney, 2017. Blue carbon sequestration in Florida coastal wetlands – Response to recent climate change and Holocene climate variability, Abstract B43D-2150 presented at the 2017 Fall Meeting, AGU, New Orleans, LA., 11-15 Dec. **Poster**.

Vaughn, D.R. and B.E. Caissie, 2015. Primary productivity and sea ice extent at the Umnak Plateau, Bering Sea (IODP Site U1339) during Marine Isotope Stage (MIS) 5 – A multiproxy approach, Graduate Student Research Day, University of Florida, 27 Oct. **Poster**.

Vaughn, D.R. and B.E. Caissie, 2015. Marine Isotope Stage (MIS) 5 on the Umnak Plateau, Bering Sea (IODP Site U1339): A multi-proxy approach. Presented at the 27th Annual Geology Graduate Student Seminar, Department of Geological and Atmospheric Sciences, Iowa State University, 07 Mar. **Talk**.

Vaughn, D.R. and B.E. Caissie, 2014. Marine Isotope Stage (MIS) 5 on the Umnak Plateau, Bering Sea (IODP Site U1339): Using diatom taxonomy, grain size and nitrogen isotopic composition of marine sediments as proxies for primary productivity and sea ice extent. Abstract PP21A-1282 presented at the 2014 Fall Meeting, AGU, San Francisco, Calif., 15-19 Dec. **Poster**.

Vaughn, D.R. and B.E. Caissie, 2014. Marine Isotope Stage (MIS) 5 on the Umnak Plateau, Bering Sea: Using diatom taxonomy, grain size and nitrogen isotopic composition of marine sediments as proxies for primary productivity and sea ice extent. Presented at the 26th Annual Geology Graduate Student Seminar, Department of Geological and Atmospheric Sciences, Iowa State University, 08 Mar. **Talk**.

SYNERGISTIC ACTIVITIES

- Leading the development of a new blue carbon network (Blue Carbon Timescale Network; https://bctn.research.yale.edu) with the aims to better constrain blue carbon stock ages and burial rates globally. Currently have worked with twelve collaborators (mostly early career scientists) from five different continents (N. and S. America, Europe, Asia, and Africa) who have sent core samples to be measured for radiocarbon (^{14}C) on a newly acquired Mini Carbon Dating System (MICADAS).
- Performed several outreach activities during Ph.D. and postdoctoral programs, including local school outreach events and Skype a Scientist. Judged the Capital Regional Science and Engineering Fair during postdoctoral fellowship at Florida State University (Spring 2022). Additionally conceptualized, organized, and secured funding for a public film screening on climate change at a local brewery with a panel of experts (Fall 2017).
- Served on the Diversity and Inclusion Committee in the Earth, Atmospheric, and Ocean Sciences Department at Florida State University. Developed a departmental climate survey that was used to assess DEI efforts in Summer 2022 and improved the department's diversity webpages. Recently elected to the School of the Environment's Graduate Student and Postdoctoral Scholar Committee at Yale University, working to improve working and learning conditions for all students and postdoctoral scholars.
- Participated in a postdoctoral 5-minute research competition at Florida State University in 2019 (in-person), 2020 (virtually), and 2021 (hybrid) disseminating results of Ph.D. work and recent postdoctoral work to a broad audience. Vaughn made the finals all three years, placed third in 2019, and won People's Choice Presentation in 2021.
- Manuscript reviewer including for Biology Letters, Biogeochemistry, Climate of the Past, Environmental Research Letters, Environmental Science and Technology, Estuaries and Coasts, Frontiers in Earth Science, Geoderma, Global Biogeochemical Cycles, Journal of Geophysical

Research: Biogeosciences, Journal of Marine Science and Engineering, Limnology and Oceanography, Limnology and Oceanography Letters, Marine Chemistry, PLOS ONE, Sustainability, Science of the Total Environment, and Water Research.