UNIVERSITY OF MIAMI
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University of Miami, Physics Department Colloquium

Date: Wednesday, November 20th, 2024
Time: 4:00 pm – 4:30 pm
Location: Wilder Auditorium – Room 112, Knight Physics Building

Physicochemical dynamics of substrates increase early-stage coral settlement, growth and survivorship in laminar flows

Dr. Melissa Ruszczyk
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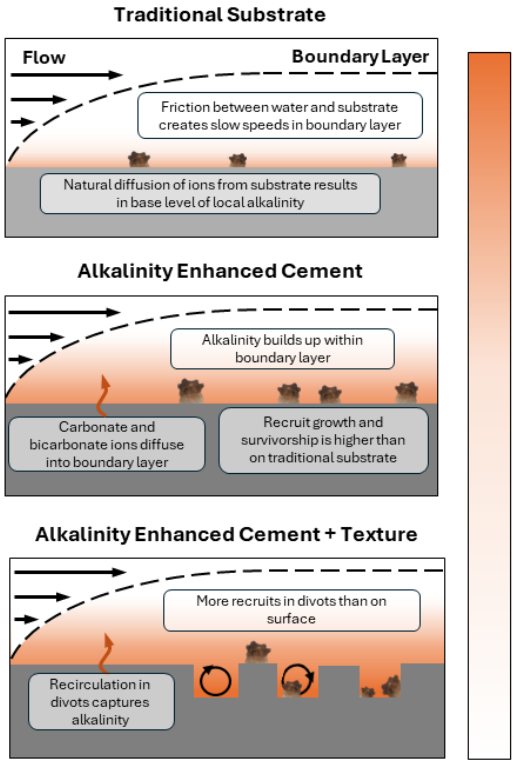
Abstract: Ocean acidification is currently threatening coral reefs, contributing to the global decay and decline of heathy reefs. Hybrid reef structures integrate artificial and biological components to combat reef loss and restore reef structures along coastlines. Two design elements of hybrid reefs which can be tuned to aid coral are the substrate's chemical composition and surface topography. Alkalinity enhanced (AE) cement tiles with different chemistries and topographies are tested to determine the optimal substrate to increase coral settlement, growth, and survivorship. First, I will discuss a novel, modular flume apparatus designed for chemical, fluid dynamic, and biological experiments which simulates laminar flow conditions in the physical boundary layer around corals (Re = 100-1000). I will then describe the physicochemical environment resulting from these AE tiles in flow conditions, and how chemistry and topography interact to create different hydrodynamic environments on short (hr) and long (d) time scales. Finally, I will present biological data of newly-settled *Orbicella faveolata* grown on AE tiles in flow conditions for 139 d, which speak to the efficacy of this type of intervention.



Biography: Dr. Melissa Ruszczyk's research focuses on the interactions between an organism's physical environment and its resulting morphology and ecology, particularly in planktonic organisms. In 2017, she received her B.S. in Biology and Music from Allegheny College (Meadville, PA), and in 2022, received her Ph.D. in Ocean Science and Engineering with a minor in Applied Mathematics from the Georgia Institute of Technology (Atlanta, GA). She is currently a postdoctoral researcher at the University of Miami in Prof. Vivek N. Prakash's lab. Outside of the lab, Melissa can be found in a concert hall – either attending a show or performing with the Greater Miami Symphonic Band.