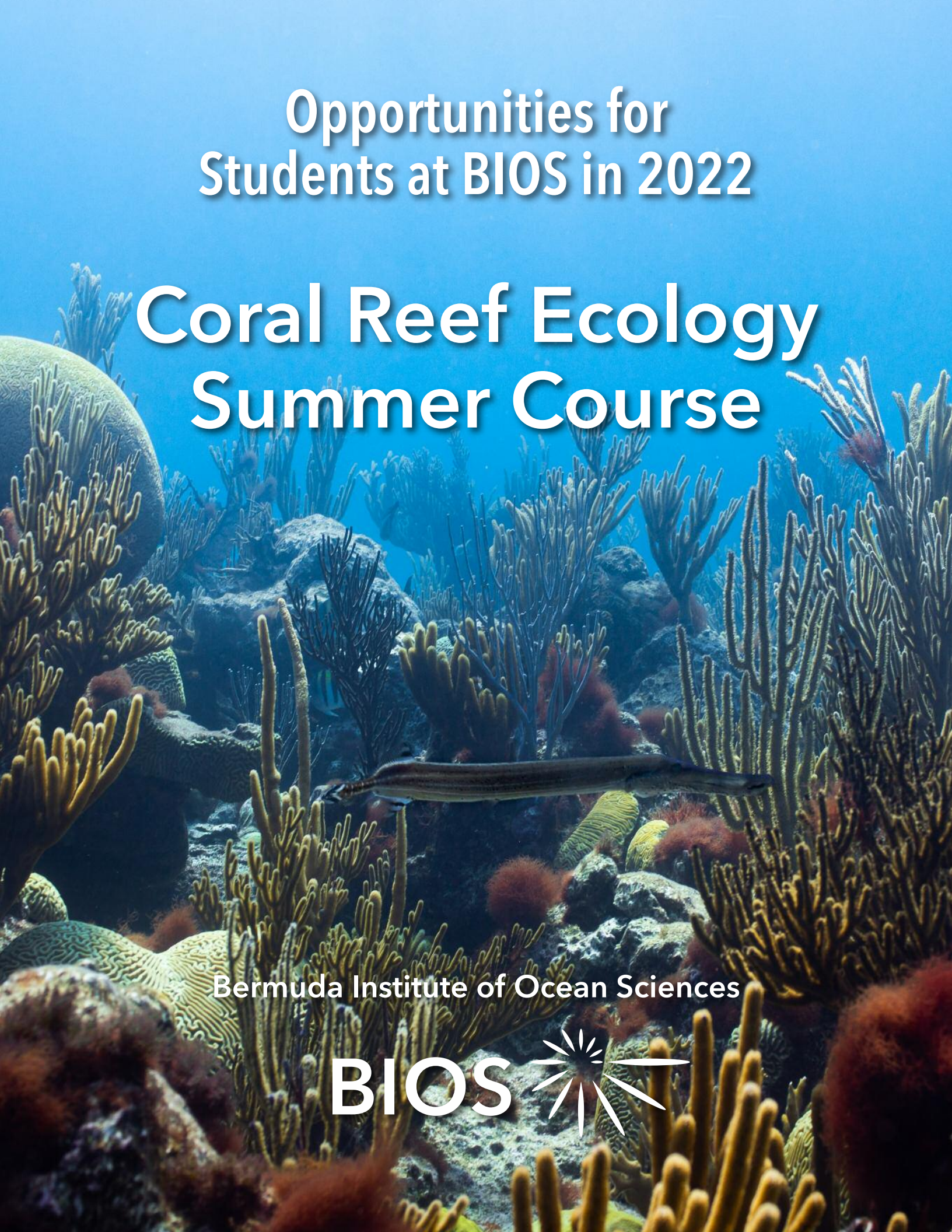
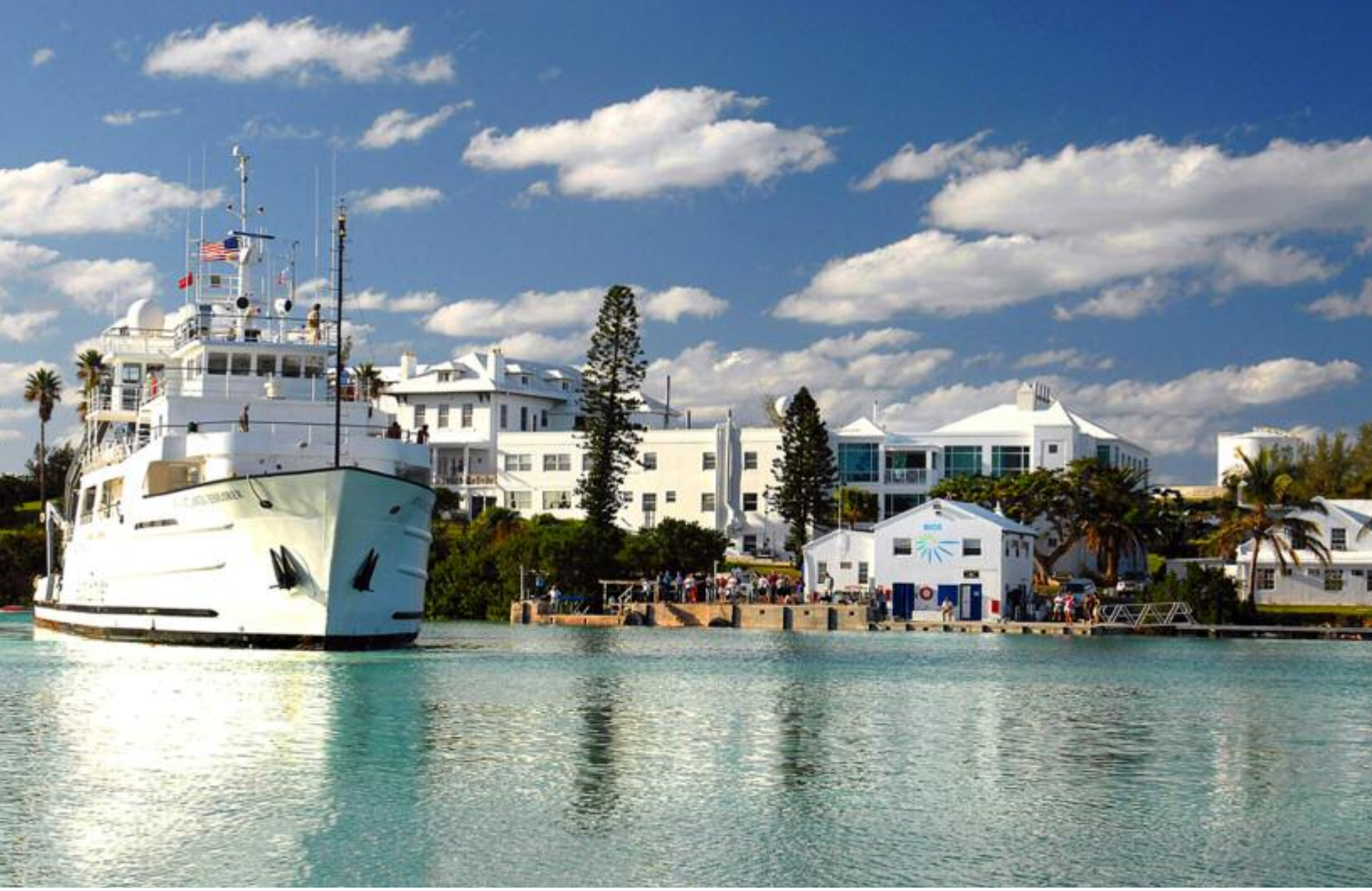
Opportunities for Students at BIOS in 2022



Coral Reef Ecology Summer Course

Bermuda Institute of Ocean Sciences

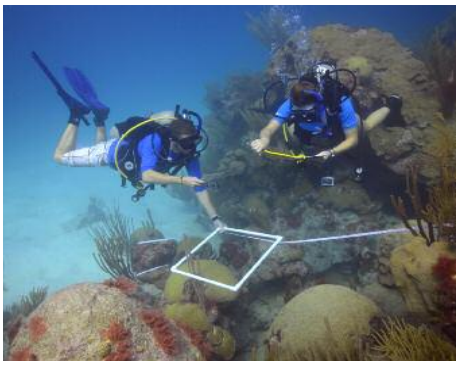
BIOS

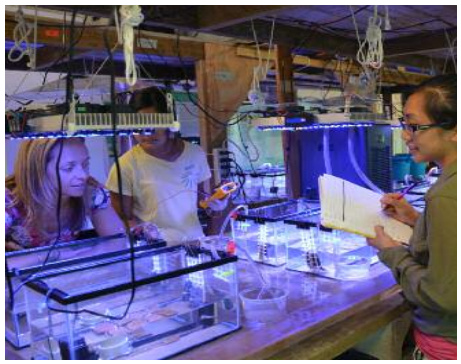


INSTITUTIONAL BACKGROUND

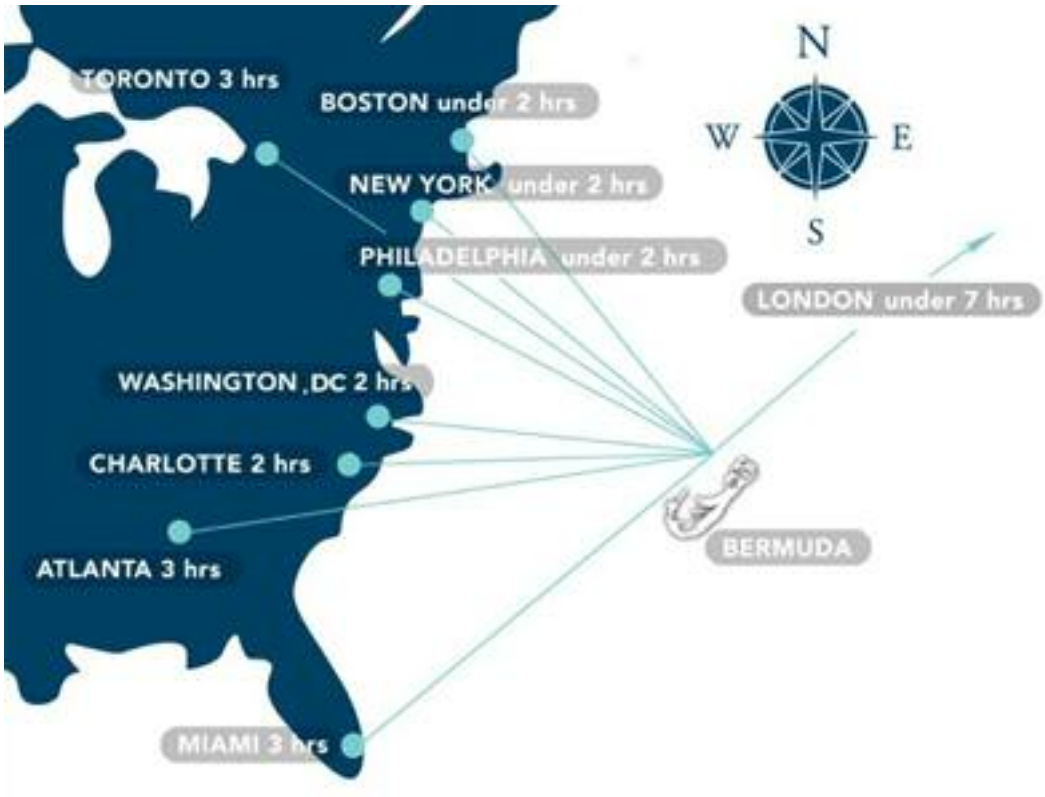
The Bermuda Institute of Ocean Sciences (BIOS) is a United States oceanographic research institution based in Bermuda. Founded in 1903, BIOS gained prominence after 1927 when the US National Academy of Sciences appointed the Lillie Commission to assess the needs of the US oceanographic research community. Bermuda was selected as a key "substation" because it is "truly oceanic in location" and therefore in "the best situation in the North Atlantic for investigation into the phenomena that are fundamentally characteristic of the ocean basins."

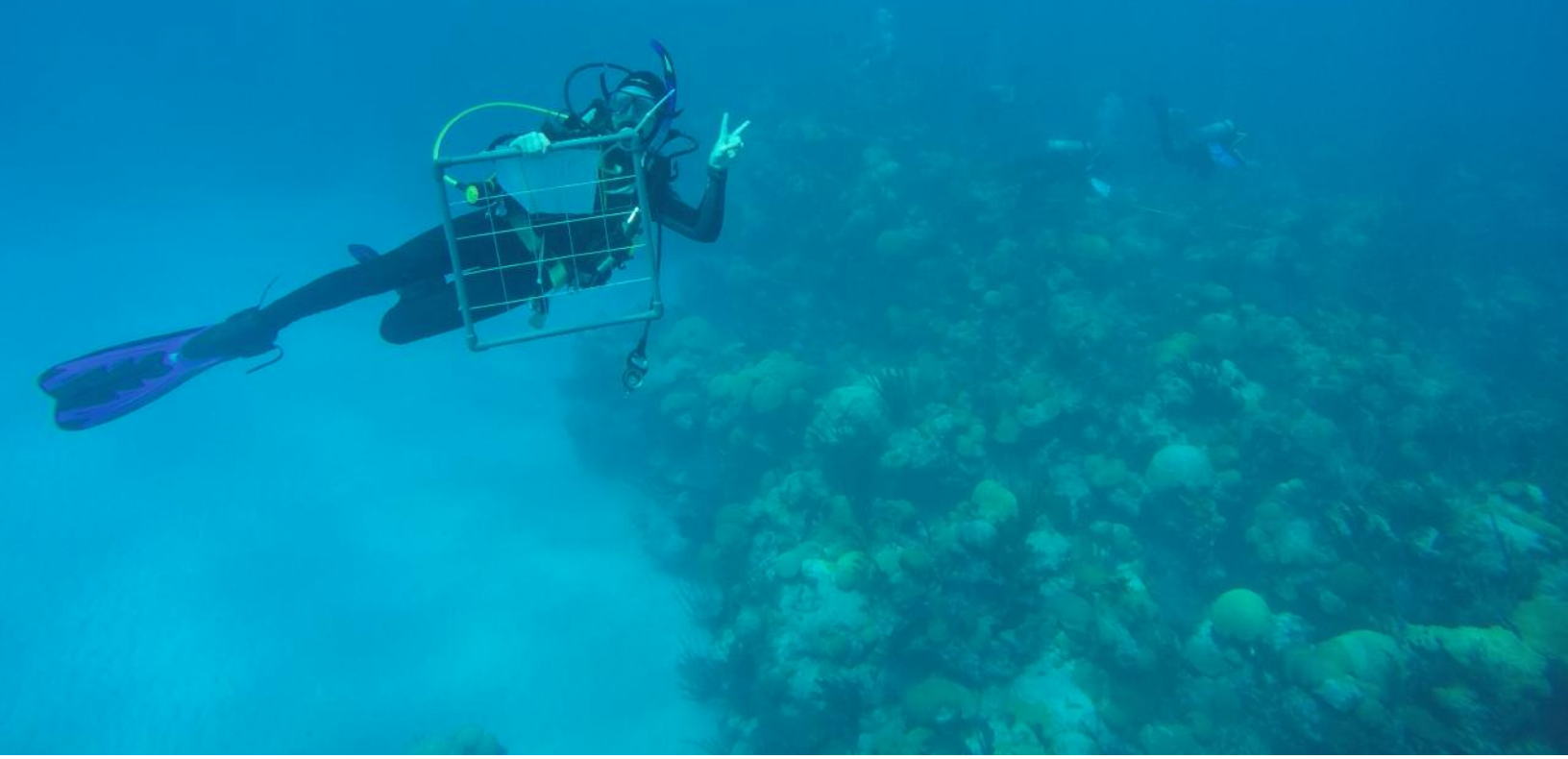
Today, BIOS continues to conduct state-of-the-art oceanographic research with an emphasis on the North Atlantic Ocean and the coral reef platform of Bermuda. Because Bermuda is in the path of major ocean currents and in a region of significance with respect to climate change, BIOS's research portfolio has global relevance. BIOS also leverages its core research to create unique educational programs at all levels—grade school through graduate school—many in collaboration with US universities (Princeton University, Furman University, Lehigh University, University of Rhode Island, Roger Williams University).





Bermuda is located in the sub-tropical Atlantic Ocean, some 600 miles from the coast of the USA. Located in the middle of the North Atlantic Ocean, Bermuda is uniquely situated to serve as a base for research on a variety of inland, coastal, and deep water issues of both local, national and global interest. From here, BIOS scientists can easily venture into the surrounding Sargasso Sea, one of the world's most diverse open-ocean ecosystems. Bermuda is also home to some of the world's most northern coral reefs, allowing researchers from around the globe an opportunity to study corals outside tropical waters.





Bermuda Institute of Ocean Sciences

BIOS

Summer Course

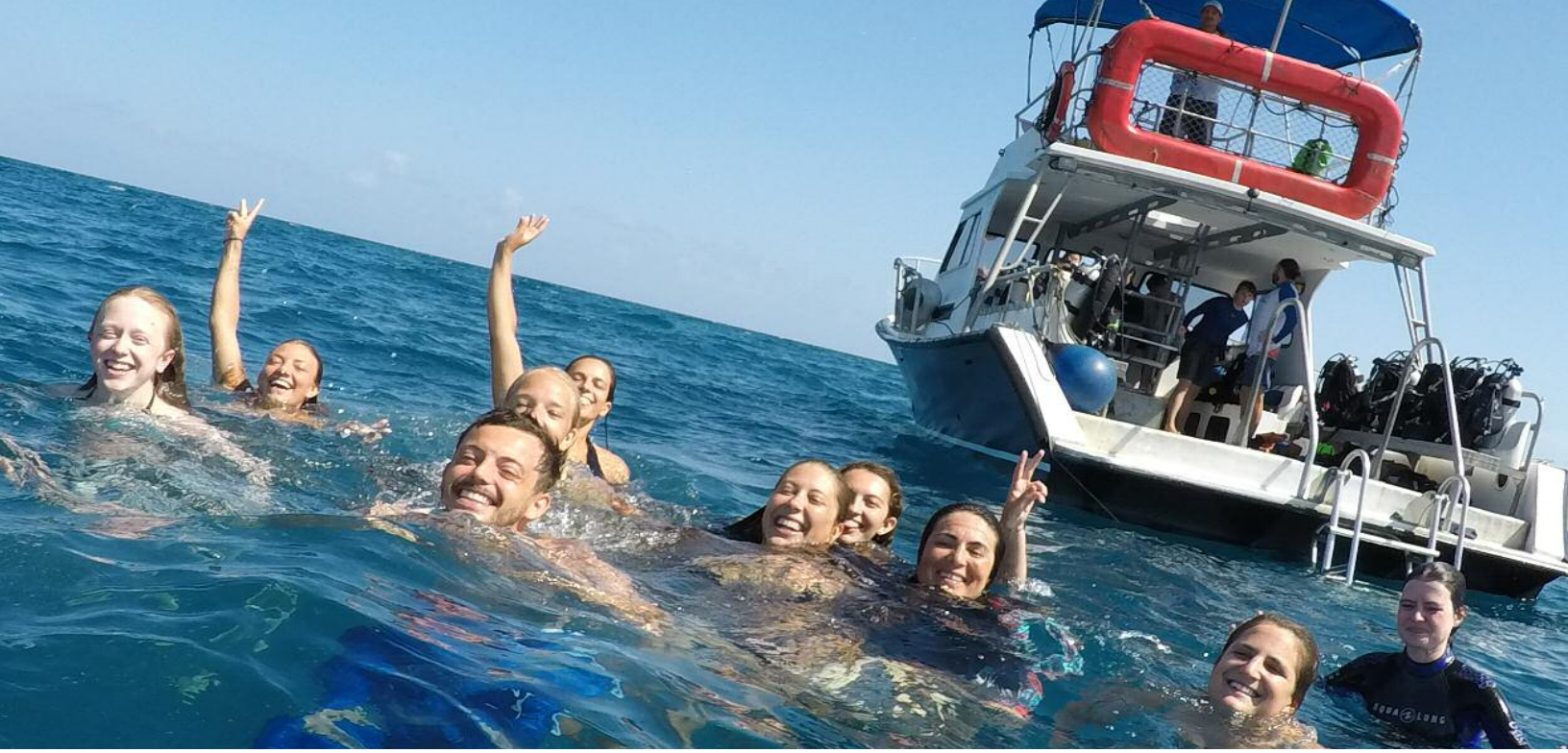
Coral Reef Ecology: Functional Ecology of Coral Reefs

Course Syllabus

subject to change

July 4 – 22, 2022
August 8 – 26, 2022

Instructors: Dr. Eric Hochberg (BIOS) and Dr. Yvonne Sawall (BIOS)



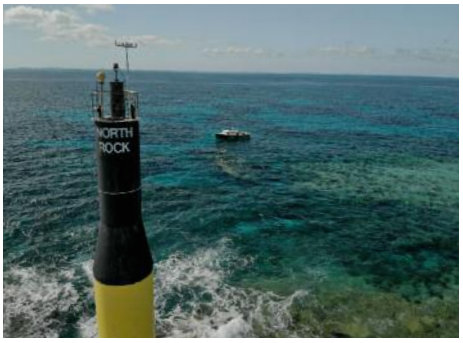
Course Overview
The overall aim of this course is to study how environment impacts reef benthic communities and the fundamental processes of photosynthesis, respiration, and calcification. Production of organic and inorganic carbon underpins growth and maintenance of the reef ecosystem. These processes are strongly influenced by environmental parameters including water chemistry, hydrodynamics, light availability/capture, and temperature, as well as the taxonomic composition of the community itself. Reef geomorphological and ecological zonation demonstrates that benthic communities have adapted to (and influence) their prevailing environmental conditions. At the same time, conditions are never static, and communities must acclimate to short- and long-term changes in their environment. A vitally important question is how global change will impact this baseline of reef function. This course provides fundamental background in reef functional ecology, as well as training in the measurement and interpretation of reef processes and environmental parameters.

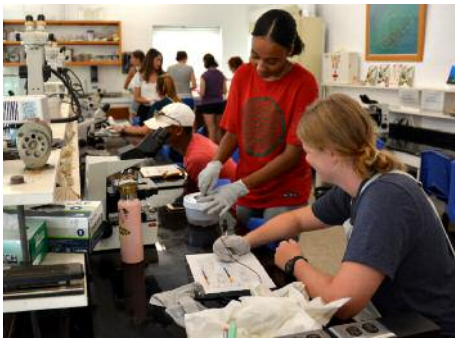
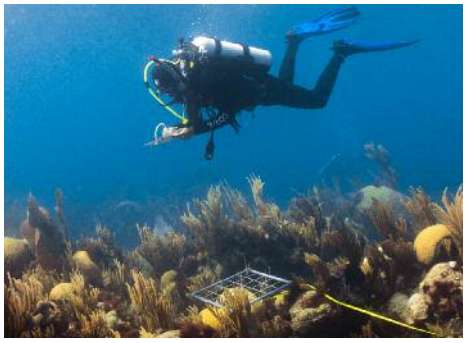
This is an intensive course, aimed at upper-level undergraduate students, graduate students, and postdocs. Course logistics include readings, lectures, discussions, presentations, and extensive laboratory and field work. Next to gaining a solid understanding of coral reef ecology and reef functional processes, students gain hands-on experience with state-of-the-art instrumentation and techniques for collecting and analyzing reef community and environmental data, including building underwater photomosaics, measuring current profiles, characterizing the underwater light field, characterizing water quality, and quantifying rates of primary production, respiration, and calcification using traditional and advanced approaches.

Reading Material
Instructors will provide readings from the primary scientific literature.

Prerequisites
- University-level Biology and Ecology; marine science and oceanography desirable.
- The course will require boat work and the ability to work comfortably in the water with a mask and snorkel. Those who are SCUBA certified* will be able to undertake fieldwork underwater and learn scientific diving skills.

**After notification of acceptance in this course, students are required to complete the BIOS Student Diving Information Packet and submit to our Dive Safety Office prior to arrival at BIOS.*



Course Structure

The course has the following components:

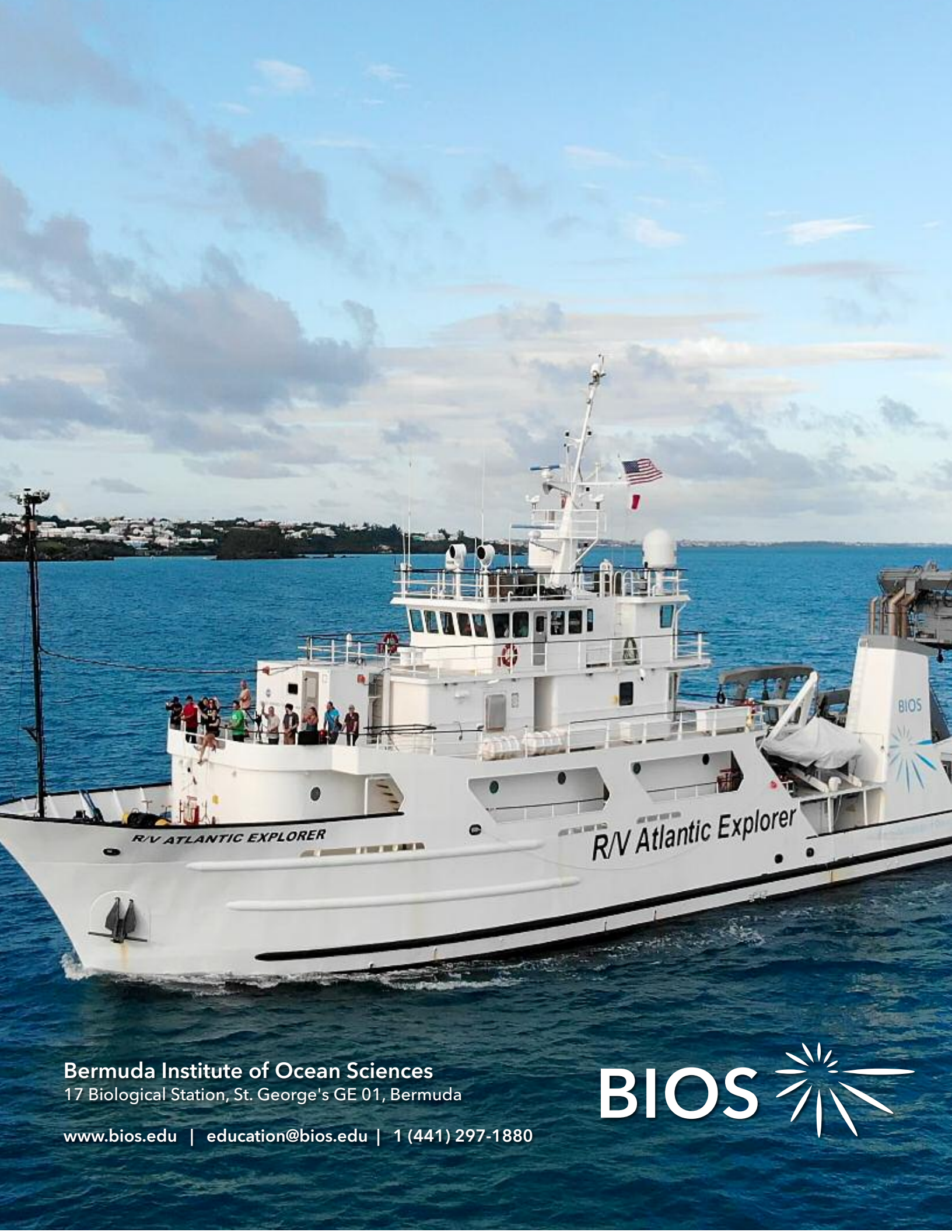
- 9 lectures (approx. 1 hour long),
- 9 boat (snorkel/SCUBA) trips (3-4 hours each) conducting coral reef surveys and water quality assessment
- a 10-day-long laboratory experiment (flume mesocosm),
- 2 3-day-long field experiments (reef community metabolism)
- several precepts (0.5-1 hour each) to discuss background and methods for field and laboratory work,
- several periods for guided laboratory analytical activities (e.g., water quality) and data analysis,
- a morning of oral presentations to present the results of the group field and lab experiments.

Lecture Topics

- Physical Reef Environment—Waves, Currents, light
- Chemical Reef Environment
- Reef Corals 1—Biology
- Reef Corals 2—Metabolism
- Reef Algae & Sediments
- Reef carbon cycling
- Reef Zonation & Trophics
- Coral reefs – past, present & future
- Guest lecture: TBD

Field and Laboratory Activities

- Field: Reef surveys—Transects, quadrats, photomosaics
- Field: Reef community metabolism & calcification via gradient flux (GF)
- Field: Collecting algae for laboratory experiments
- Field: Measuring the underwater light field & collect water for water quality analysis
- Laboratory: Coral and algae community photosynthesis and respiration via flow respirometry (flume mesocosms)
- Laboratory: Water quality analysis (chlorophyll-a, particulate matter, [inorganic nutrients])
- Laboratory: Demo of total alkalinity measurements required for calculating calcification rates



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