

Laboratory Studies of Coral Bleaching

Graduate Student Mentor: Andrea Gomez
Supervising Faculty: Prof. Kyle McDonald
Department of Earth and Atmospheric Sciences
HIRES 2016 Project Description

Background:

Coral reefs cover less than 1% of the ocean floor yet contain a tremendous amount of biodiversity, providing habitat for over 25% of all known marine fish species. In addition, they are one of our planet's most diverse and economically valuable biomes, with at least 94 countries and territories benefitting from reef tourism. Tragically, at least 75% of Earth's coral reefs are currently threatened by natural and anthropogenic impacts. Around the world, climate change, land-based pollution, and fishing impacts are recognized as the most concerning risks to these ecosystems.

Coral bleaching can occur when the coral and symbiotic algae experience stress (such as an increase in temperature), and their mutualistic relationship shifts from being a beneficial association to a harmful one; consequently the coral may expel their symbiotic algae, leaving their calcium carbonate skeleton exposed, giving them their white, bleached appearance. Already, coral bleaching outbreaks have increased in frequency and intensity over the past 30 years. The first major coral bleaching event was documented in 1997/98, and was associated with the strong El Niño. During that bleaching event, about 16% of the world's corals died. Currently, the third global coral bleaching event is taking place. This bleaching event, which started back in 2014, is expected to last until 2017, making it the longest bleaching event on record. The ability to utilize remote sensing techniques, offers a non-invasive way to survey corals regionally to globally.

Description of Project:

Students will learn about coral bleaching, and how remote sensing can be used to help monitor coral health. Students will engage in designing and implementing a stress-induced (e.g. temperature, pH) laboratory experiment using the Caribbean coral *Porites furcata*. Students will learn how to use the Ocean Optics USB2000+ spectrometer to take fluorescence and reflectance measurements of the coral. In addition, students will also learn basic coral husbandry, and be in charge of taking care of the coral's aquarium during their internship. Students will also learn how to perform some basic statistical tests using the computer software R.

Outcomes:

At the end of the project, the students will have a good understanding of what coral bleaching is, how to design and implement an experiment, and how remote sensing can be used to monitor corals.