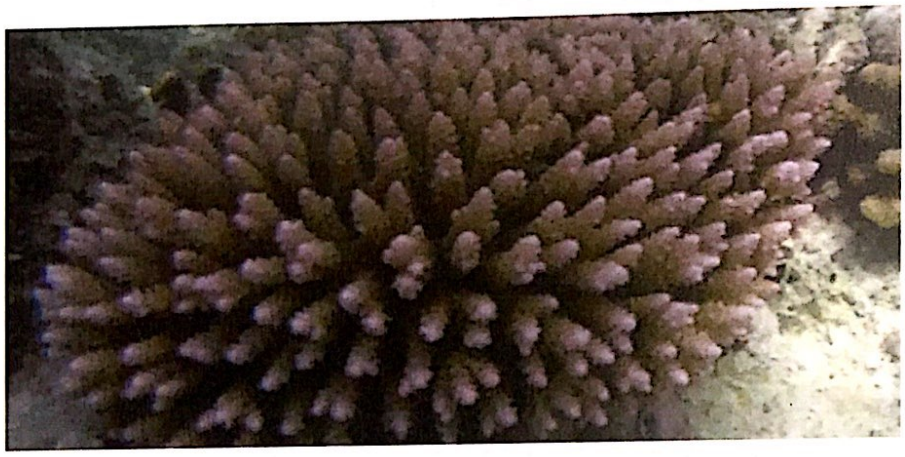
Studying The Effects Of Ocean Acidification On A Pristine Coral Atoll

SCHOOL OF OCEANOGRAPHY, UNIVERSITY OF WASHINGTON

Known as the "rainforests of the sea," coral reefs display the beauty, diversity, and complexity of the ocean, while also exhibiting the ocean's sensitivity to environmental changes. In particular, coral reefs are sensitive to ocean acidification, the result of increased atmospheric carbon dioxide levels. As the ocean acidity increases and coral growth slows, reefs are in danger of disappearing completely.

Tetiaroa is ideally situated to monitor and study this decline in coral growth and the ocean chemistry that is driving it. The lack of development on the atoll provides pristine coral reefs on which a long-term monitoring site can be established, free from the effects of local pollution, runoff, and commercial activities that make many tropical reef locations unsuitable for such a study.

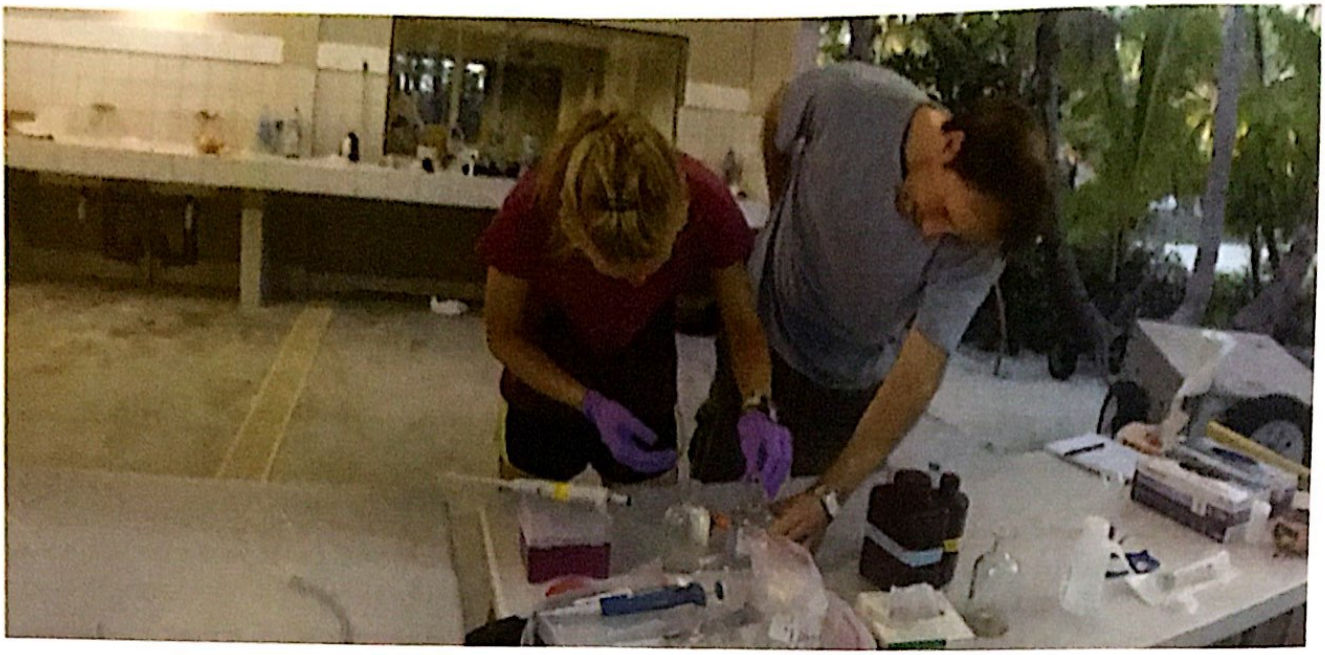


PROJECT DESCRIPTION:

This study focuses on the coral reef surrounding Tetiaroa, where the research team has been establishing a baseline understanding of current reef growth. These measurements will provide the framework necessary to determine how a thriving coral reef ecosystem, largely untouched by development and pollution, responds to increasing acidity of the ocean. As part of this study, the following measurements will be performed for a period of at least five years.

- **Understanding the water chemistry**

Sensors have been placed on the reef to continuously measure water acidity, oxygen, salinity, temperature, and pressure every 30 minutes. In addition, water samples are collected weekly for the measurement of carbon content, alkalinity, nitrate, phosphate, ammonium, and siliceous acid. Collectively, these measurements of water chemistry will allow us to determine the rate at which coral are growing and dissolving.



- **Assessing the reef biodiversity**

As biodiversity is a key indicator of the health of an ecosystem, a reef survey will be performed every three months in order to assess the health and diversity of key reef constituents on Tetiaroa, such as hard coral, macroalgae, coralline algae, fish, and giant clams.

- **Analyzing past climate change**

In order to place the recent and future changes in water acidity and temperature into a historical context we will measure the isotopes of oxygen and the boron concentration of corals that have lived on Tetiaroa for more than 100 years.

WHY IT'S IMPORTANT:

Although reef systems compose less than 0.1% of the marine environment, they support 25% of known marine species, the most important of which is the coral. But coral reefs don't only support marine life, but human life as well. Over 850 million people, one eighth of the human population, live within close proximity to coral reefs and benefit directly from the numerous resources they provide. Reef systems supply a protein source for coastal residents, a livelihood for local fisherman, and also form a natural defense against storms by buffering the land from wave impact. In addition, they are valued aesthetically, culturally, and economically by offering opportunities for tourism, a significant source of income for many countries. Understanding the impact acidification has on our reef system can help us to predict and plan for life with a changing marine environment.

PRINCIPAL INVESTIGATOR:

- Dr. Julian Sachs is a professor of chemical oceanography at the University of Washington. He uses chemical measurements in seawater, coral and sediment to reconstruct changes in climate during the last millennium.
- Dr. Alex Gagnon is an Assistant Professor of Oceanography at the University of Washington. He studies how changing ocean conditions will impact skeletal growth in marine organisms of all sizes, from reefs to plankton.

RESEARCH SCIENTISTS:

- Dr. Josh Gregersen is an analytical chemist at the University of Washington. His specialty is deploying, maintaining and analyzing data from oceanographic instruments and sensors.
- Lauren Brandkamp is a graduate from the School of Oceanography at the University of Washington. She is the on-site field researcher for the project on Tetiaroa.

SUPPORT RESEARCH ON TETIAROA:

This research is sponsored in part by Tetiaroa Society, a non-profit organization established to help protect Tetiaroa, promote sustainable activities, and support scientific research targeted at understanding and protecting delicate island ecosystems.

We invite you to experience the life of a scientist in the field and better understand our work by joining investigators studying on the atoll. If you are interested, please contact one of our scientists on the atoll or the concierge at The Brando.

We also invite you to make a financial contribution to Tetiaroa Society to support the world-class science taking place on the atoll. Your donation will support us in our mission and the next phase of this project. If you want your funds to be used exclusively for this research project, please note this when you donate. Donations can be made online at www.tetiaroasociety.org or added to your hotel invoice. Thank you for your generosity, participation, and support.

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