CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY

Name(s)

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Project Number

S1516

Project Title

Emiliania huxleyi Response to Euphotic Zone Temperature Gradients

Abstract

Objectives/Goals

The purpose of the experiment was to study the effect of temperature on the growth of Emiliania Huxleyi under high-light intensity, mimicking conditions of stratified ocean waters in the euphotic zone. The hypothesis stated that if temperature gradients are established mimicking the Bering Sea (2 degrees Celsius), the Portuguese coast (20 degrees Celsius) and projected ocean temperatures (25 degrees Celsius) with standard light intensity, both warm and cold strains of Emiliania Huxleyi will experience no trend toward increased metabolic activity and biomass in conditions of projected ocean temperatures.

Methods/Materials

Prior to experimentation, a growth media for E. Hux to simulate seawater was produced at a marine biology lab. Two differing strains of base cultures of E. Hux (warm water and cold water) were placed in tanks with the produced media. These tanks were then placed into three baths maintaining three different temperatures. Over 4 to 5 days, samples from each tank were mounted daily on a wet plate and counted under a microscope. These numbers were recorded and photos from the microscope were collected as well. These procedures were repeated twice more for a total of three trials.

Results

Growth was experienced in all baths, and the warmest bath did not appear to be the ideal condition for all E. Hux, based off its lack of trend toward more growth in the warmest waters.

Conclusions/Discussion

The results would suggest that temperature is not a significant factor causing coccolithophore blooms. Instead they could be explained by more important factors, including increasing nitrate levels, mixed layer irradiance, and low silicate levels. Temperature has been ruled out of causing the blooms primarily because E. Hux are eurythermal species. Temperature gradients seemed to instead coincide with other more influential factors, such as water stability, and the presence of diatoms in larger quantities. This experiment may lead to a better understanding of the niche phytoplankton have in their ecosystem. From our results, a greater understanding of how E. Hux would respond to changing water conditions due to global warming and increased anthropogenic carbon dioxide levels could be developed. The data may also aid scientists understanding the causation of yet unexplained and seemingly random E. Hux blooms.

Summary Statement

We experimented to assess the role of varying temperature on oceanic blooms of the coccolithofore Emiliania Huxleyi.

Help Received

Obtained cultures and growth medium from Romberg Tiburon Laboratory, from graduate students Roy Bartel and Andrew Kalbach, completed experimentation in school chemistry lab.