

2014 – 2015 Academic Year

**WHAT IS THE PROBLEM OR QUESTION THAT YOU WILL INVESTIGATE DURING YOUR INTERNSHIP AND HOW IS IT RELEVANT TO YOUR EARTH SYSTEMS INTERESTS?**

This research will consist of evaluating multiple stressors for the West Equatorial Pacific warm pool and how they affect coral reefs. These stressors include ocean acidification, increasing temperatures, and perturbations to the height of the sea surface. Ultimately, through our evaluations we hope to be able to predict future changes in the warm pool and how coral reefs will respond, give our current data. This internship would not only foster my growth greatly as a Earth Systems Oceans major, but be an integral step in my environmentalism career. I am extremely interested in working with coral reefs upon graduation, because not only do I find the beautiful, but an extremely important species in understanding climate change.

**WHAT METHODS WILL YOU USE FOR YOUR ANALYSIS?**

This research does not involve laboratory measurements or field work. The focus is primarily on modeling and analysis of data using computers and software such as Matlab or Python. Through these models, we will use the data provided to help us predict future changes in the warm pool, and how coral reefs will react. The data provided is compiled from years of research in the West Equatorial Pacific.

**HOW WILL YOUR WORK FIT INTO THE OVERALL WORK OF YOUR ORGANIZATION?**

My work will assist Professor Sarmiento in developing an ecosystem models for predicting photosynthetic uptake of carbon in the surface ocean, as well as studying the biological responses to climate change and ocean acidification, specifically in coral reefs. This will further assist in the group's major collaborative effort to develop a new earth system model that will predict climate change and the global carbon cycle simultaneously.

**STUDENT:**

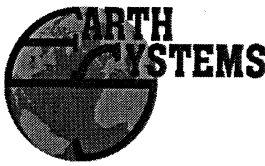
Signature: \_\_\_\_\_ Date: 2/27/2015

*Your request will be approved by the faculty Director of the Earth Systems Program. If there are questions about your proposal, someone may contact you for clarification.*

**EARTH SYSTEMS APPROVAL:**

Printed name: \_\_\_\_\_

Signature: \_\_\_\_\_ Date: \_\_\_\_\_



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**EARTH SYSTEMS PROGRAM  
INTERNSHIP PROPOSAL AND REQUEST FOR APPROVAL**

This form should be used to request approval for an internship that you have secured to count for your Earth Systems internship requirement. *Note: you should request approval for your internship prior to starting work.*

Please follow this procedure:

- Visit the Earth Systems website to learn more about the internship requirements:  
<https://earth.stanford.edu/programs/esys/academics/undergraduate-program/internships>
- Complete this form with all relevant information about your proposed internship.
- Turn in the form to Kristin Tewksbury via e-mail ([ktewks@stanford.edu](mailto:ktewks@stanford.edu)) or in person at Y2E2 Room 127.

Student name: \_\_\_\_\_ E-mail address: \_\_\_\_\_ @stanford.edu

**PLEASE PROVIDE BACKGROUND INFORMATION ON THE GROUP/COMPANY/PROGRAM WITH WHOM YOU PLAN TO WORK:**

The internship that I will use the Volpert scholarship for involves conducting research with Princeton's Professor Jorge L Sarmiento of the Geosciences and Geological Engineering Department. His research aims to improve our understanding of the fundamental processes controlling the ocean-atmosphere distribution of climatically important chemicals, in particular the greenhouse gas carbon dioxide, and how these have changed through time. The research covers a wide span of processes such as ocean chemistry, biology, and circulation in the past, present and projected future and includes the effects of anthropogenic perturbations. The approaches Professor Sarmiento uses include analysis of a variety of observations, many of which he obtains from oceanographic cruises, as well as the development of sophisticated process models to incorporate in global general circulation models of both the ocean and atmosphere. We have developed general circulation models of the ocean constrained with tracers of ocean circulation and oceanic observations of dissolved inorganic carbon to estimate uptake of anthropogenic CO<sub>2</sub>. We have used atmospheric general circulation models constrained with atmospheric CO<sub>2</sub> observations to estimate transport of CO<sub>2</sub> in the atmosphere and carbon uptake by the terrestrial biosphere as well as the ocean. We are working in conjunction with ocean biologists to develop ecosystem models for predicting photosynthetic uptake of carbon in the surface ocean, as well as remineralization of organic matter in the deep ocean. We have used coupled atmosphere-ocean models of climate warming to study the impact of anthropogenic climate warming on the ocean carbon cycle, and are presently engaged in a major collaborative effort to develop a new earth system model that will predict climate change and the global carbon cycle simultaneously. We have participated in the scientific planning and execution of most of the large-scale oceanic observational programs of the last two decades and have contributed to national and international plans for studies of the global carbon cycle.

**WHO WILL BE YOUR MENTOR FOR YOUR INTERNSHIP AND WHAT IS THEIR ROLE IN THE ORGANIZATION?**

My mentor will be Professor Sarmiento's Research Post Doc, Ivy Frenger. She assists Professor Sarmiento in his research endeavors and hiring research interns.