2011 NOAA-MPOWIR Internship Descriptions

NOAA-PMEL: Ocean Climate Stations Program - Seattle, WA
Primary supervisor: Meghan Cronin

I would be very pleased to mentor an MPOWIR intern on a project using data from the Ocean Climate Stations or tropical Pacific TAO archives. Ideally, this project would contribute the intern's PhD dissertation. Within the tropical Pacific, there are more than 68 TAO/TRITON moorings, many of which carry enhanced instrumentation for monitoring air-sea heat, moisture and momentum fluxes and upper ocean variability (www.pmel.noaa.gov/tao/). The NOAA PMEL Ocean Climate Stations Program (www.pmel.noaa.gov/OCS/) I lead also maintains two heavily equipped OceanSITES reference stations in the Kuroshio Extension recirculation gyre and at the Station Papa site in the Gulf of Alaska. The TAO and OCS data can be used to analyze air-sea interactions that can occur on diurnal to interannual time scales. As the mentor, I would help the intern see connections between the database and field operations, and between the science questions and time series analyses. My goal would be to help the intern complete her dissertation and gain skills that would lead to a fulfilling post-graduate career.

NOAA-AOML: Climate and Hurricane Program - Miami, FL
Primary supervisor: Chunzai Wang

Scientists at NOAA/AOML are conducting observational, numerical modeling, and theoretical studies of ocean-atmosphere interaction, climate variability, large-scale atmospheric and oceanic circulation, global warming and their impact on hurricane activity. In particular, we are interested in climate phenomena of the El Niño-Southern Oscillation, the Pacific Decadal Oscillation, the Atlantic Niño, the North Atlantic Oscillation, the tropical Western Hemisphere warm pool, global warming, and investigating how and why climate affects hurricane activity in the North Atlantic and the eastern North Pacific. Any of these activities would benefit a student whose dissertation is related or would like to include, the above described topics.

NOAA-AOML: Western Boundary Time Series Program - Miami, FL
Primary supervisors: Christopher Meinen and Molly Baringer

The NOAA Western Boundary Time Series project is one of the key long-term programs for studying ocean currents and water mass changes, with more than 25 years of data collected. The
program is designed to measure and analyze the Florida Current and Antilles Current, which carry the warm upper limb of the global Meridional Overturning Circulation (MOC), as well as the Deep Western Boundary Current, which carries the cold deep limb of the MOC. Numerous technologies are used, including submarine cables, inverted echo sounders, bottom pressure gauges, dropsondes, conductivity-temperature-depth profilers, and acoustic Doppler current profilers (both hull-mounted and lowered). The WBTS program also serves as the cornerstone of a major international experiment to measure the complete MOC flow between Florida and Africa. As part of the WBTS program we undertake two major 2-3 week cruises each year, as well as four 2-3 day cruises and ten single day cruises. Each cruise collects different types of data for the study of various segments of this important climate system.

An intern candidate is invited to spend 8-10 weeks working on this exciting program at the NOAA Atlantic Oceanographic and Meteorological Laboratory in Miami, Florida. The scheduling of the internship visit would be designed to allow the candidate to participate in one of the two major cruises and possibly some of the shorter cruises

as well. The candidate would learn about different aspects of physical oceanographic field work and would develop a scientific analysis project utilizing data from some aspect of the WBTS program in consultation with Dr. Chris Meinen, one of the principal investigators of the program. Further information about this opportunity can be obtained by contacting Dr. Meinen via email at Christopher.Meinen@noaa.gov.

NOAA-AOML: Analysis and interpretation of Argo data - Miami, FL
Primary supervisor: Claudia Schmid

Our group at AOML maintains the US Argo DAC and uses the collected data for studies of the ocean and climate. We are offering an internship for the analysis of this data within the framework of a project you are interested in.

NOAA-GFDL: Isopycnal model studies of ocean climate - Princeton, NJ
Primary supervisor: Robert Hallberg

We have a number of on-going ocean modeling activities, any one of which would benefit by the participation of an energetic intern. Many of these opportunities would stem from the analysis of our recently completed coupled climate model with an isopycnal-coordinate ocean. Given that this appears to have a very different representation of the effects of many oceanic processes than traditional Z-coordinate ocean climate models, sensitivity studies with this model (and its Z-coordinate counterpart) related to the candidate's prior research interests should be highly informative. Additionally, we are developing high-resolution (1/8-degree and finer) global ocean models for century-scale simulations of such phenomena as ocean / ice-shelf interactions, effects of mesoscale eddies in regulating ocean heat storage, and open ocean / coastal exchanges. These simulations could be used (or modified) to study the long-term evolution of oceanographic phenomena that are of interest to a candidate.

NOAA-GFDL: Atlantic Meridional Overturning Circulation - Princeton, NJ
Primary Supervisor: Rong Zhang

My current research interests focus on the role of ocean circulation in climate. For example, changes in the Atlantic Meridional Overturning Circulation (AMOC) have a profound impact on global and regional climate. My area of research includes the understanding of AMOC variability using fully coupled climate models. Some examples include identifying AMOC fingerprints that can be used to reconstruct past AMOC variations when no direct observations were available and detect future AMOC variations, and investigating the meridional connectivity of AMOC variations with potential implications for designing the monitor systems for variations. I also study the impact of AMOC variations on global and regional climate, such as Sahel and Indian summer monsoon rainfall, Atlantic hurricane activities, and Arctic climate.

NOAA-GFDL: Numerical simulation of ocean mixing – Princeton, NJ
Primary Supervisor: Sonya Legg

This project would best suit a student whose dissertation research is focused on observational, theoretical and/or laboratory studies of ocean mixing processes such as internal wave breaking, dense overflows, or deep convection, and who now wants to complement that approach using numerical simulation. The student would learn to configure and run the MITgcm to focus on the phenomenon of her choice, and develop a series of numerical experiments to test

hypotheses concerning the mixing. Where relevant parameterizations of these mixing processes are available in the GFDL ocean climate models, the student may also explore the use of high resolution numerical simulations to calibrate these parameterizations in different regimes.

NOAA-GFDL: Ocean circulation, ecosystems and biogeochemical cycles - Princeton, NJ
Primary supervisor: John Dunne

My research focuses on physical and biogeochemical controls on ocean ecosystems and their response to climate variability, anthropogenic climate change and ocean acidification. Areas where I am currently interested in hosting a student include: 1) nutrient supply to the surface ocean, 2) coupled circulation-ecosystem controls on the biological pump, and 3) anthropogenic carbon and heat uptake. Students would most likely focus their project on analysis of GFDL's Earth System Model simulations of preindustrial, historical and projected climate, though detailed comparisons with field and satellite observations and idealized modeling frameworks.