PROPOSAL STAGE M2 Year 2012/2013	
Transport of biological communities on the inner shelf	
Training Principals:	Professor Margaret Anne McManus
Location of the internship:	Department of Oceanography University of Hawaii at Manoa
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Collaborations:	Dr. John Ryan (Monterey Bay Aquarium Research Institute) Professor Robert Cowen (Rosenstiel School or Marine and Atmospheric Scence, University of Miami)

Presentation of the topic

In June/July and October of 2010 a suite of comprehensive field observations to elucidate and quantify the physical processes in the inner shelf and to directly examine the consequences these processes on inner shelf biological distributions were undertaken.

These field observations included: (1) An array of moored instruments to measure physical, optical and acoustical properties on the inner shelf inclusive of a Seahorse autonomous profiler. (2) Shipboard Surveys equipped with a high-resolution profiler, bottles for direct sampling of nutrients and plankton and underway acoustics. The high-resolution profiler was outfitted with a SeaBird SBE-25 CTD (temperature, salinity, and pressure), a Wet Labs ECO-Puck, a Wet Labs ac-9 (spectral absorption and attenuation at 9 wavelengths between 412 and 715 nm). (3) Autonomous Vehicles including: (3i) An Acrobat towed vehicle outfitted with Sea-Bird FastCAT CTD (temperature, salinity, pressure), and WETLabs ECO-Puck (rhodamine) and ECO-triplet sensors (chlorophyll-a fluorescence, CDOM and backscatter at 660 nm). (3ii) The MBARI AUV Dorado outfitted with a Sea-Bird 25 CTD (temperature, salinity, pressure), a WETLabs ECO-Puck, HOBI Labs HS-2 sensor (optical backscattering at two wavelengths and chlorophyll fluorescence), and an ultraviolet spectrophotometer (ISUS) sensor (nitrate).

To date, our team has made significant progress describing the physical environment and the patterns in the biological organisms that were observed, but we have yet to link processes in the physical environment to the transport of the organisms we observed.

Programmatic context

This work placement is to analyze data collected during a National Science Foundation funded-project “Lateral Mixing and Dispersion on the Inner Shelf”. This project aims to connect physical processes on the inner-shelf with distributions of biological organisms.

This work will provide valuable new insights into the transport and mixing of scalars in the coastal region, particularly at the “intermediate” scales of 10s to 1000s of meters. As such, we anticipate a broad scientific impact, with the results of our work being of particular value to interdisciplinary modeling efforts of the inner shelf where estimates and/or parameterizations of lateral mixing are areas of significant uncertainty. As coastal populations continue to grow, and pressure on our marine ecosystems continues to increase, it will be increasingly important to understand the underlying mechanisms determining transport and/or retention in the nearshore environment. Understanding lateral dispersion in the coastal environment has significant implications not only for the transport/retention of marine larvae, and harmful algal blooms but also for the transport/retention of sewage, desalinization effluent, and other pollutants. The health of both our marine and human populations depends on this understanding. The results of this work will ultimately be fundamental to environmental planners and policy makers and all other stakeholders of nearshore environments and our coastal communities.

Objectives of the course:

The first objective of the course is the familiarization of physical, biological and chemical oceanographic data that were collected in 2010.
The second objective of the course is to create a conceptual model of physical structure and processes occurring in the region during the study.
The third objective of the course is to compare these results with patterns of biological and chemical distributions observed in this same time frame.

Interests and skills:

Knowledge in physical oceanography, biological oceanography and / or hydrodynamic; programming (Matlab, Fortran); teamwork.