Recent Student Research Projects (student's name in italics)

a.

Title: Projecting the Impacts of Climate Change and Identifying Adaptation Options at Wallops Island, Virginia.

Researchers: *Matthias Miziorko*, *Nate Murry*, Dr. Ajoy Kumar

Abstract: This project will use existing data including remote Light Detection And Ranging (LiDAR) data to map the current distributions of important habitats, detail the likely areas of greatest impact from rising sea levels, quantify the rate of habitat change, and identify areas that may become important wetlands as the coastal systems attempt to migrate inland. The data collected includes aerial LiDAR cloud points and in situ location corresponding to the cloud points. These are essential precursors to the effective management of the Chincoteague National Wildlife Refuge site under climate change. The project will also develop management strategies to lessen the impact of climate changes and natural disasters.

Duration: Fall 2010 - Present

References: Kumar, A, N. Murray and M. Miziorko, 2011: LIDAR processing and Analysis. A project status report presented at the NASA-MSC-USFWS meeting at Marine Science Consortium, March 7th, 2011.

Murray, N, A. Kumar and M. Miziorko, 2011: Airborne LIDAR Assessement of Wallops Island, VA. Presented at the Atlantic Estuarine Research Society (AERS) Spring 2011 Meeting, Solomons, MD, April 7-9, 2011.

Kumar, A, N. Murray and M. Miziorko, 2011: Projecting the impacts of Climate Change and Identifying Adaption Options at the Chincoteague National Wildlife Refuge. Presented at the Coastal Zone Research Symposium, Marine Science Consortium, Wallops Island, Va, May 13-14, 2011.

Kumar, A, N. Murray and M. Miziorko, 2011: LIDAR processing and Analysis. A project status report presented at the NASA-MSC-USFWS meeting at Harrisburg, February 5th, 2011.

b.

Title: Coastal Ocean Circulation of Wallops Island, Virginia

Researchers: *Virginia Maroulis* and Dr. Ajoy Kumar

Abstract: The Wallops Island region is dynamic environment consisting of a Barrier Island Ecosystem complete with a classical Tidal Inlet. The dynamic salt marshes are an ideal environment for many species of plants and animals native to the region. The proximity to the Marine Science Consortium (MSC) has allowed a collection of large amount of oceanographic data from this region. What is lacking however is a coherent scientific analysis of this data set to bring out the unique circulation features of this region. Millersville University is a senior full member of the MSC and it is imperative that Ocean Sciences and Coastal Studies (OSCS) students are exposed to modern data analysis and scientific interpretation of the dynamic environment at Wallops Island.

In this study, Virginia will use the data collected from different cruises, assemble them together and analyze the data. She will later combine the results of her analysis with satellite data of temperature, color and surface currents of the region. This exercise will help Virginia to utilize the theory and principles learnt from OSCS courses to then be able to apply these concepts to real oceanographic environments. Eventually, it is expected that this experience will not only enrich her knowledge and skills in oceanographic but also to help her to find a suitable job in the field after graduation.

Duration: Spring 2011 - Present

References: N/A

c.

Title: CODAR observed spatial resolution of tidal dynamics along the lower Delmarva Peninsula.

Researchers: *Alex Davies,* Dr. John Moisan, Dr. Ajoy Kumar

Abstract: A long term coastal ocean observational network is being developed in order to improve our understanding of the dynamics of coastal environments. One aspect of this observing system is the deployment of High Frequency Radar (primarily CODAR) systems that can measure surface coastal ocean currents on hourly time scales up to 200 km off shore and at spatial resolutions of about 10 km. Tidal harmonics were computed using a year of observations from 3 CODAR systems deployed along the Delaware, Maryland, and Virginia coast under support from the NOAA Integrated Ocean Observing System (IOOS). The resulting tidal current estimates were then removed from the raw HF Radar current estimates to render a composite of the mean surface circulation pattern for this coastal ocean region. Tidal currents in this region account for up to 60% of the total current variability, particularly at the mouth of the Chesapeake Bay. Using the tidal harmonics, a year's worth of daily progressive vector diagrams were analyzed in order to ascertain the level of 'jitter' that one could expect from obtaining hourly images from a geostationary hyperspectral ocean color satellite.

Duration: Fall 2009 – Spring 2010

References: Davies, A., A. Kumar, and J. Moisan, 2011. CODAR observed spatial resolution of tidal dynamics along the lower Delmarva peninsula. (*Manuscripts currently under review)*

Gilchrist, J., A. Davies, and A. Kumar, 2011. A simple technique to remove tidal influence from ADCP measurements. (*Manuscripts currently under review)*

A. R. Davies, J. R. Moisan and A. Kumar, "Using HF Radar to Observe Coastal Ocean Tidal Features". International Ocean Sciences Meeting, Portland, OR, Feb. 23-26th, 2010.

d.

Title: A simple technique to remove tidal influence from ADCP measurements

Researchers: *Justin Gilchrist, Alex Davies*, Dr. Ajoy Kumar

Abstract: Acoustic Doppler Current Profiler (ADCP) measured current velocities close to the coast are strongly influenced by the local tides and there lacks a simplistic method of removing this influence from vessel mounted observations. In this study, we demonstrate a new simple technique that allows us to de-tide the observed ADCP

velocities. The technique is based on simple vector differencing method. The first step in the process is to produce tidal velocities of the region using the ROMS model. In the next step, we remove the tidal velocities from the ADCP data using vector differencing at a number of points along the ships track. An extensive error analysis will be carried out to assess the validity of our de-tiding methods. Two sets of points will be used in this study. The first set will contain points that lie inside the model domain and the second set of points that lie on the model boundary. In this way, we can determine the effect of the model boundaries on the above technique. Results will determine the feasibility and accuracy of the technique.

Duration: Spring 2009 – Spring 2011 (*Justin)* & Spring 2009 – Spring 2011 (*Alex*)

References: Davies, A., A. Kumar, and J. Moisan, 2011. CODAR observed spatial resolution of tidal dynamics along the lower Delmarva peninsula. (*Manuscripts currently under review)*

Gilchrist, J., A. Davies, and A. Kumar, 2011. A simple technique to remove tidal influence from ADCP measurements. (*Manuscripts currently under review)*

J. Gilchrist, A.R. Davies and A. Kumar," A simple technique to remove tidal influences from ADCP measurements". International Ocean Sciences Meeting, Portland, OR, Feb. 23-26th, 2010.

e.

Title: . Monitoring the coastal ocean environment for Harmful Algal blooms

Researchers: *Brian. McCormick and Katie. Hoyt*

Abstract: Karenia Brevis is a dinoflagellate that causes a Harmful Algal Bloom (HAB) off the coast of Florida. Karenia causes Neurotoxic Shellfish poisoning (NSP). The goal of this project is to identify the conditions in which the bloom is most likely to occur. We will use both satellite ocean color and temperature parameters along with numerical model outputs to detect the blooms and identify conditions necessary for the onset of the blooms.

Duration: Fall 2007-Spring 2009

References: Kumar A., B. McCormick and K. Hoyt. Monitoring the coastal ocean environment for Harmful Algal blooms. Ocean Sciences Meeting, Orlando, Florida, March 2-7th, 2008.

~Page last updated: May 2011~