R•I•T College of Science
Chester F. Carlson Center for IMAGING SCIENCE
Seminar Series

Imaging Technologies for Aquatic Environments

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Auditorium of the Center for Imaging Science

Imaging - at both microscopic and large scales - represents a powerful approach to the study of the ocean environment. By employing new and emerging technologies, including imaging and optical instrumentation, we can probe aquatic environments both at higher resolution and over relevant spatial scales to begin to more accurately identify the patterns and drivers of primary production, elucidate the key interactions among and within trophic levels, and understand the impacts of these processes on biogeochemical cycling in the oceans.

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Abstract
Marine primary production accounts for approximately half of global photosynthesis, most of which is accomplished by unicellular algae that possess rapid turnover rates, exhibit great biological diversity, and occur at relatively dilute concentrations. The form and function of microorganisms both reflect and exert a profound influence over nutrient cycles and food web structure in the ocean, yet the vast nature of the ocean realm imposes significant challenges for observing changes in assemblage structure or physiology. Chronic undersampling of marine environments has precluded a better understanding of the factors that govern primary production or carbon flow through food webs, and traditional sampling methods (ie. shipboard sampling) render the acquisition of truly synoptic pictures nearly impossible. Imaging - at both microscopic and large scales - represents a powerful approach to the study of the ocean environment. Through the near-time acquisition of images (accomplished by combining fluidics and optics), a wealth of information regarding species assemblage structure can be gained at much higher frequency than traditional methods allow. Further, by combining imaging and in situ sensors we can begin to relate environmental characteristics directly with biological responses. At the other end of the spectrum, satellite remote sensing is revolutionizing our understanding of meso- and large-scale ocean processes such as ocean mixing. By employing new and emerging technologies, including imaging and optical instrumentation, we can probe aquatic environments both at higher resolution and over relevant spatial scales to begin to more accurately identify the patterns and drivers of primary production, elucidate the key interactions among and within trophic levels, and understand the impacts of these processes on biogeochemical cycling in the oceans.

Speaker Bio
Tawnya Peterson received a B.Sc. in Biology from Mount Allison University in New Brunswick, Canada. After working as a research technician at the Louisiana Universities Marine Consortium studying the ecology of harmful algal blooms, she went on to receive a Ph.D. in Oceanography at the University of British Columbia, Vancouver, Canada in 2005. She is presently an NSERC postdoctoral scholar working with Dr. Raphael Kudela at the University of California, Santa Cruz where she studies the role of unicellular algae in biogeochemical cycles in marine environments ranging from the subarctic to the tropics.