



EUTROPHICATION AND MICROBIAL PROCESSES IN THE COASTAL OCEAN

11-15 enero 2016

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Overall Topic: Evolving paradigms and challenges in estuarine and coastal eutrophication dynamics in a culturally and climatically stressed world

Coastal watersheds support more than one half of the world's human population and are experiencing unprecedented urban, agricultural and industrial expansion. The freshwater-marine continua draining these watersheds are impacted increasingly by nutrient inputs and resultant eutrophication, including harmful algal blooms, hypoxia, finfish and shellfish kills and loss of higher plant and animal habitat. In addressing nutrient input reductions to stem and reverse eutrophication, phosphorus (P) has received priority traditionally in upstream freshwater regions, while controlling nitrogen (N) inputs has been the focus of management strategies in estuarine and coastal waters. However, freshwater, brackish and full-salinity components of this continuum are connected structurally and functionally. Intensification of human activities has caused imbalances in N and P loading, altering nutrient limitation characteristics and complicating eutrophication control along the continuum by reducing only one nutrient. Climatic changes, including warming and increased hydrologic variability associated with more severe storms and intense droughts interact closely with nutrient loading to modulate the magnitude, timing and geographic extent of eutrophication and algal community responses. The effects of these interactions on phytoplankton production and composition will be examined long the continuum in geographically- and climatically-diverse coastal settings, with an emphasis on developing nutrient management strategies aimed at ensuring long-term sustainability of our coastal ecosystems.

Lecture topics

How do estuaries "work", physically, chemically and biologically?

Estuarine and coastal nutrient cycling and eutrophication: Changing paradigms

Algal bloom dynamics: Interactive effects of nutrients and climate

Managing water and habitat quality and sustainability along the freshwater-marine "continuum" from watersheds to coastal systems: Lessons learned.