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004 EPA STAR Graduate Fellowship Conference *Next Generation Scientists—Next Opportunities*

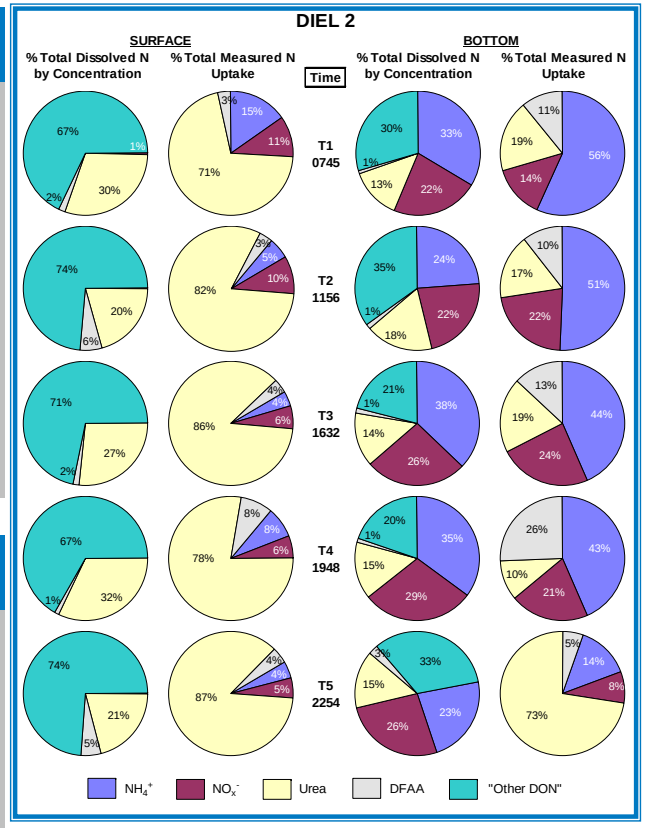
take of Inorganic and Organic Nitrogen by Plankton Over Two Diel Periods in the Mid-Atlantic Bight

nvironmental Issue

rogen inputs to coastal waters often ve distinct consequences with spect to ecosystem health and nction. Delivered to estuaries and the astal ocean via rivers, land runoff, d groundwater discharge, nitrogen mulates phytoplankton growth and ds to eutrophication, which quently results in harmful algal ooms, depletion of oxygen, and loss habitat. Therefore, knowledge of the e of nitrogen in coastal ecosystems essential to understanding how ose inputs will influence productivity d health.

roject Overview

e characterized ambient nutrient ncentrations and measured uptake es for dissolved inorganic nitrogen IN: ammonium, nitrate and nitrite) d dissolved organic nitrogen (DON: ea and amino acids) at the Long- rm Ecosystem Observatory (LEO-) on the New Jersey continental elf. During two diel sampling periods m July 20-22, 2002, concentrations d rates were measured every 3-5 urs in both surface and bottom aters.



Acknowledgements:

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Scientific Approach

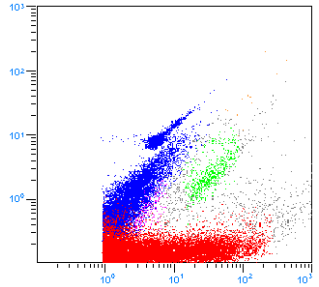
We used wet chemical techniques to measure ambient concentrations of ammonium, nitrate, nitrite, urea, amino acids, and bulk DON from surface and bottom water at each time point. Phytoplankton versus bacterial uptake rates were measured using the traditional size fractionation (filtration) approach. Rates were also measured using a method I am refining that employs flow cytometric sorting to distinctly separate phytoplankton from bacteria. We hypothesize that the sorting approach using flow cytometry will produce more accurate uptake rates for the phytoplankton fraction.

Beckman Coulter's Epics Altra Flow Cytometer

Results and Impact

Preliminary results indicate that the water column was highly stratified, with surface waters devoid of inorganic nitrogen. Consequently, about 83% of the nitrogen utilized in surface waters was organic, primarily urea. In the bottom waters, DIN comprised approximately 58% of all dissolved nitrogen and was the primary source of nitrogen to plankton.

This research is important in coastal environments where the fate of nitrogen loads in estuaries often determines the extent of eutrophication. A better understanding of the autotrophic or heterotrophic fate of specific nitrogen forms entering estuaries would help managers target load reductions more efficiently by being able to predict the outcome of such nitrogen additions.



Example of the output from a flow cytometer. Each point represents a cell or particle in water collected from the York River, VA on 14 July 2004. Different colors correspond to distinct groups of phytoplankton.

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