SFP 2004 - Seagrass Derived Dissolved Organic Matter in Florida Bay: Molecular Biogeochemistry and Microbial Bioavailability.

Rudolf Jaffé, Southeast Environmental Research Center and Department of Chemistry, Florida International University, Miami, FL 33199
Joseph N. Boyer, Southeast Environmental Research Center, Florida International University
James W. Fourqurean, Southeast Environmental Research Center and Department of Biological Sciences, Florida International University
Nagamitsu Maie, Southeast Environmental Research Center, Florida International University

Abstract:

Surface water samples from Florida Bay exhibit an elevated amount of non-humic, protein-like material compared to the freshwater Everglades waters. Our previous chemical characterization efforts in Florida Bay (funded by NOAA to Jaffé) clearly show that a significant portion of the DOM in Florida Bay is not associated with freshwater inputs from the Everglades. This suggests that a much of the bioavaible, protein-like materials in Florida Bay are derived from autochthonous sources. We believe the source of this autochthonous DOM is most likely to originate from the seagrass/benthic community. The exact source, source strength and bioavailability of this autochthonous DOM in Florida Bay need to be determined in order to assess the potential contribution to the microbial loop.

This research project will focus on determining the importance of autochthonous DOM production by providing (1) molecular descriptions of DOM over both spatial and temporal domains in the bay, (2) detailed characterizations of the DOM contributed by seagrass beds, and (3) evaluations of the bioavailability of the DOM produced by the seagrass communities in Florida Bay.

We will use field enclosures to directly measure the rate of release of DOM and nutrients from the seagrass community, the chemical characteristics, and the bioavailability of this DOM. We will measure the release rates from both healthy seagrass communities and from areas of recent sulfide-induced seagrass mortality. During the second year we will induce seagrass mortality by dosing the enclosures with sulfide and measure release and processing of the DOM.

This study will produce the first complete data set regarding the molecular composition and bioavailability of DOM (DOC and DON) of Florida Bay and an assessment of the production rate of such materials from local seagrass beds. We will also estimate the contribution of seagrass die-off in the 1980's to DOM and nutrient flux from seagrass communities. As such, this study will be a significant contribution to the better understanding of the biogeochemical processes that control the dynamics of DOM and to what extend this autochthonous DOM fuels the microbial loop in sub-tropical, seagrass-dominated estuaries.