Interannual variability in stable isotopic signatures of particulate organic matter from Florida Bay and the Florida Reef Tract.

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Recent work with seagrasses in the Florida Keys National Marine Sanctuary (FKNMS) and Florida Bay has demonstrated high seasonal and spatial variability in C and N isotopic signatures of benthic macrophytes. To better understand the sources of temporal and spatial fluctuation in the system, size fractionated POM (particulate organic matter) samples have been collected at 10 locations distributed along the outer reef tract of the FKNMS and within Florida Bay on a quarterly basis since September 2002, with emphasis on examining water column nutrient and stable isotope signal dynamics. Fractions collected include >150µm, 50-150µm, and 0.1-50µm, broadly separating zooplankton, phytoplankton, and bacteria/cyanobacteria, with a component of autochthonous organic detritus included in each size fraction.

Significant spatial and temporal variability is evident in the δ¹³C and δ¹⁵N signatures of all size fractions, however sites fall into three groups: 1) Northern Reef Tract sites; 2) Middle Florida Keys Channel/Western Florida Bay sites; 3) Interior-Northeastern Florida Bay sites. Generally, the three size fractions show similar seasonal trends in their isotopic signals, however the smallest fraction, dominated by bacterial and cyanobacterial components, exhibits the least pronounced seasonality. In the 50-150µm fraction, dominated by diatoms and dinoflagellates, δ¹⁵N values tend to be the most enriched in the late winter/early spring sampling periods (5–7‰), coincident with the most depleted δ¹³C values (-20 to -25‰). Further analyses of the phytoplankton-dominated fraction (50-150µm) comparing molar C/N ratios with corresponding carbon and nitrogen isotopic values suggest that carbon may be a more limiting nutrient in the system, as all locations show a positive enrichment in δ¹³C with increasing C/N ratio, whereas there is a depletion trend in δ¹⁵N. These opposing trends may also imply enhanced productivity levels placing stress on the ambient C pool result from seasonal influxes of an isotopically depleted N-source.