Dynamics of particulate organic composition, microbial community, and zooplankton contributions in an oligotrophic water column

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The downward flux of organic matter in the ocean is a major carbon cycle component, contributing both to the sequestration of atmospheric carbon and to the diets of animals in the deep ocean. Microbial and metazoan heterotrophy are the primary agents acting on organic matter to reduce or enhance its downward flux through the water column, through both chemical and physical transformations of particles. Recent work [1] has demonstrated that the nitrogen and carbon isotopic analysis of amino acids can differentiate patterns in particulate organic matter that are indicative of their net heterotrophic processing by microbes and zooplankton. Here we apply this method to four size fractions of sinking and suspended particles spanning from the surface to 500 m depth at the Bermuda Atlantic Time Series (BATS) site. Using the previously developed framework [1], we estimate the proportions of phytodetritus, microbially hydrolyzed material, fecal pellets, and bacterial biomass within particles. In tandem, we characterize the microbial community contributing to biomass and active metabolism within these particles using 16S rRNA. We find that microbial community composition varies strongly across particle size classes and depth in the water column, and we examine how these variations correlate with changes in particle composition, including the introduction of large, dense fecal aggregates.

[1] Close H, Grabb K, Hannides C, Drazen J, McCarthy M & Popp B (2018) *Goldschmidt Abstracts*, **2018** 450