

## Distribution of the microbial lineages within the oxygen minimum zone of the mesopelagic Sargasso Sea and the relative contribution of chemoautotrophs

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Marine Bacteria and Archaea communities are recognized for their importance in global biogeochemical transformations. The Deltaproteobacter SAR324 has recently been identified as significant contributor to chemoautotrophic carbon fixation in the dark ocean while *Thaumarchaeota*, an archaeal lineage recently separated from the *Crenarchaeota*, are chemolithoautotrophic ammonia oxidizers. The northwestern Sargasso Sea is the home of the Bermuda Atlantic Time-series Study (BATS) a biogeochemical time-series program that has been in operation since 1988. In this study, samples for abundances of Bacteria lineages SAR11, SAR202, SAR324, and Archaea *Thaumarchaeota* were collected seasonally at BATS (2014 -2015) throughout the water column and enumerated by fluorescence *in situ* hybridization (FISH), and catalyzed reporter deposition FISH (CARD-FISH). Total prokaryotic abundance was sampled at high resolution within the oxygen minimum zone (OMZ) at BATS, forming a previously unresolved secondary peak within the upper oxycline (400-700m). The Alphaproteobacter SAR11 dominated the prokaryotic distribution in the euphotic zone and OMZ at relative contributions of ~30 and 14%, respectively. The relative contribution the Chloroflexi clade SAR202 represented ~ 6% in the BATS OMZ prokaryotic assemblage. *Thaumarchaeota* reached maximum abundance in the upper oxycline comprising ~12% of the prokaryotic assemblage while SAR324 reached its maximum contribution at ~12% in the lower oxycline (~1000 m). Genes for archaeal ammonia oxidation (*amoA*), sulfur metabolism (*aprA*), and carbon fixation (*cbbM* and *cbbL*) were amplified using polymerase chain reaction and found to be present within the BATS OMZ, suggesting that the metabolic potential for autotrophic carbon fixation, sulfur metabolism and nitrification within this depth horizon.

Keywords: Nitrification, carbon fixation, Thaumarchaeota, CARD-FISH, BATS, SAR324, *amoA*