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Spatial and temporal patterns of microbial dynamics in the Northwest Atlantic

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Processes occurring within the microbial food web influence the remineralization of biogenic carbon, air-sea CO2 flux and carbon export. Despite their potential importance in biogenic carbon cycling, comprehensive analyses of microheterotrophic processes in the World Oceans are quite incomplete. As part of the Canadian Surface Ocean Lower Atmosphere Study, we measured the seasonal and spatial patterns in the abundance, distribution and rates of growth and loss of heterotrophic bacteria in six biogeochemical provinces of the Northwest Atlantic. These data are combined with a meta-analysis of similar variables for the North Atlantic and are used to test critical hypothesis about the regulation of microbial processes and microbial mediation of biogenic carbon cycling in the upper ocean. We find strong seasonal signals in all parameters and divergent trends in bacterial biomass, growth and respiration with respect to latitude and temperature. These patterns have a important implications for understanding the response of the upper ocean biogeochemical cycles to climate forcings.