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Simulations of phytoplankton species and elemental cycles at BATS: Model configuration and biogeochemical dynamics

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The primary objective of this research is to investigate the phytoplankton community dynamics and the mechanisms controlling the elemental cycles in the Sargasso Sea. To address this objective, a one-dimensional multi-component lower trophic level ecosystem model that includes detailed algal physiology as well as nutrient cycles is used at the Bermuda Atlantic Time-series Study (BATS, 31°40'N, 64°10'W) site. In this model autotrophic growth is represented by three algal groups and the cell quota approach is used to estimate algal growth and nutrient uptake. This model is tested and evaluated for year 1998 using the bimonthly BATS cruise data. Results show that phosphorus and dissolved organic matter (DOM) are necessary compartments to correctly simulate organic elemental cycles at the BATS site. Model results show that autotrophic eukaryotes and cyanobacteria (i.e. $Prochlorococcus$ and $Synechococcus$) are the most abundant groups and are responsible for 63 and 33% of carbon production in the region, respectively.