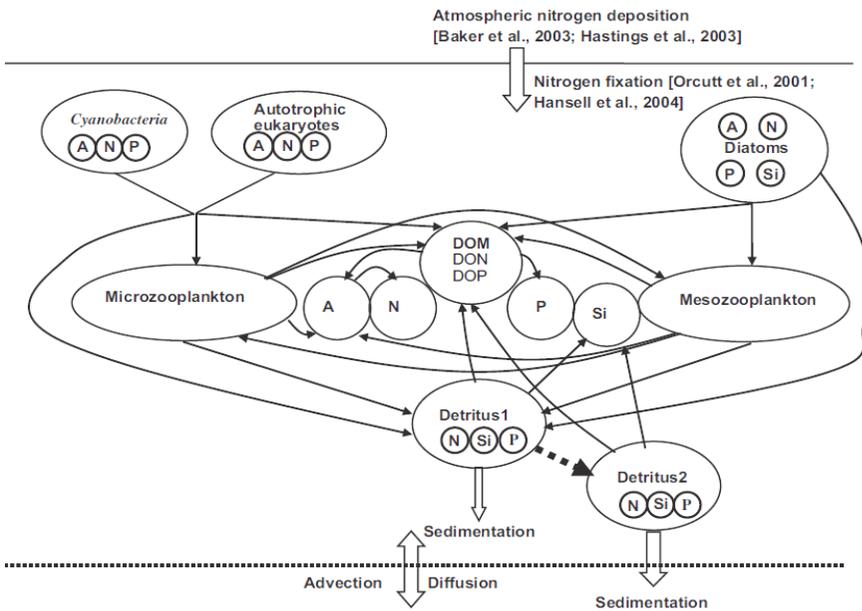


Influence of nutrient utilization and remineralisation stoichiometry on phytoplankton species and carbon export: A modeling study at BATS

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The primary objective of this research (MERSEA project) is to understand the underlying mechanisms of the time-varying flux of carbon 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 (**Figure 1**), 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 (**Figures 2 and 3**) show that phosphorus and dissolved organic matter (DOM) are necessary compartments to correctly simulate organic elemental cycles at BATS site. Nutrient uptake and remineralisation stoichiometry can play an important role in determining the surface ocean nutrient distribution. Model results suggest phosphate limitation even during the spring bloom.

Figure 1: Schematic of the cell quota ecosystem model. Abbreviations used: A- Ammonium; N- Nitrates; P-Phosphate; DOM-dissolved organic matter, DON-dissolved organic nitrogen; DOP-dissolved organic phosphorus.

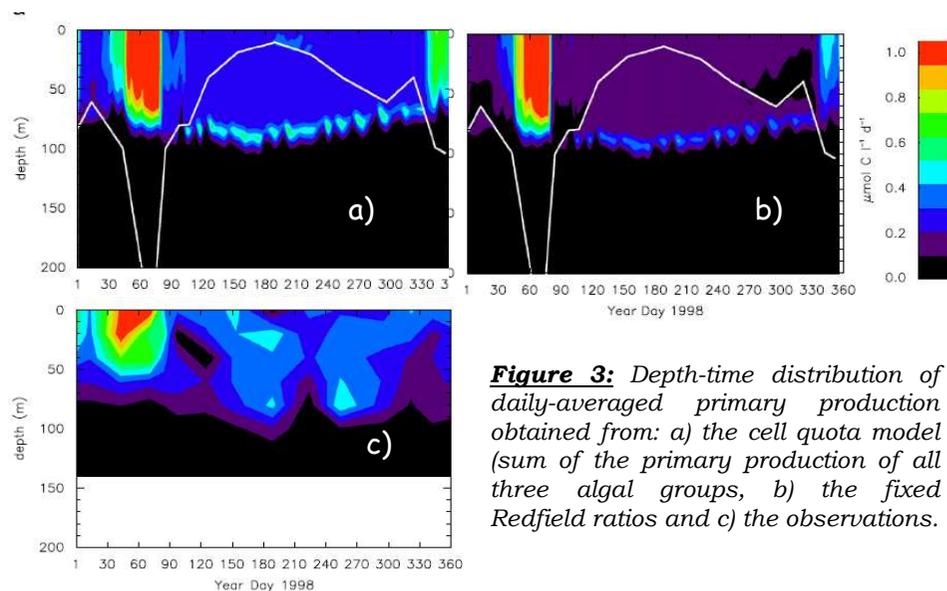


Figure 3: Depth-time distribution of daily-averaged primary production obtained from: a) the cell quota model (sum of the primary production of all three algal groups), b) the fixed Redfield ratios and c) the observations.

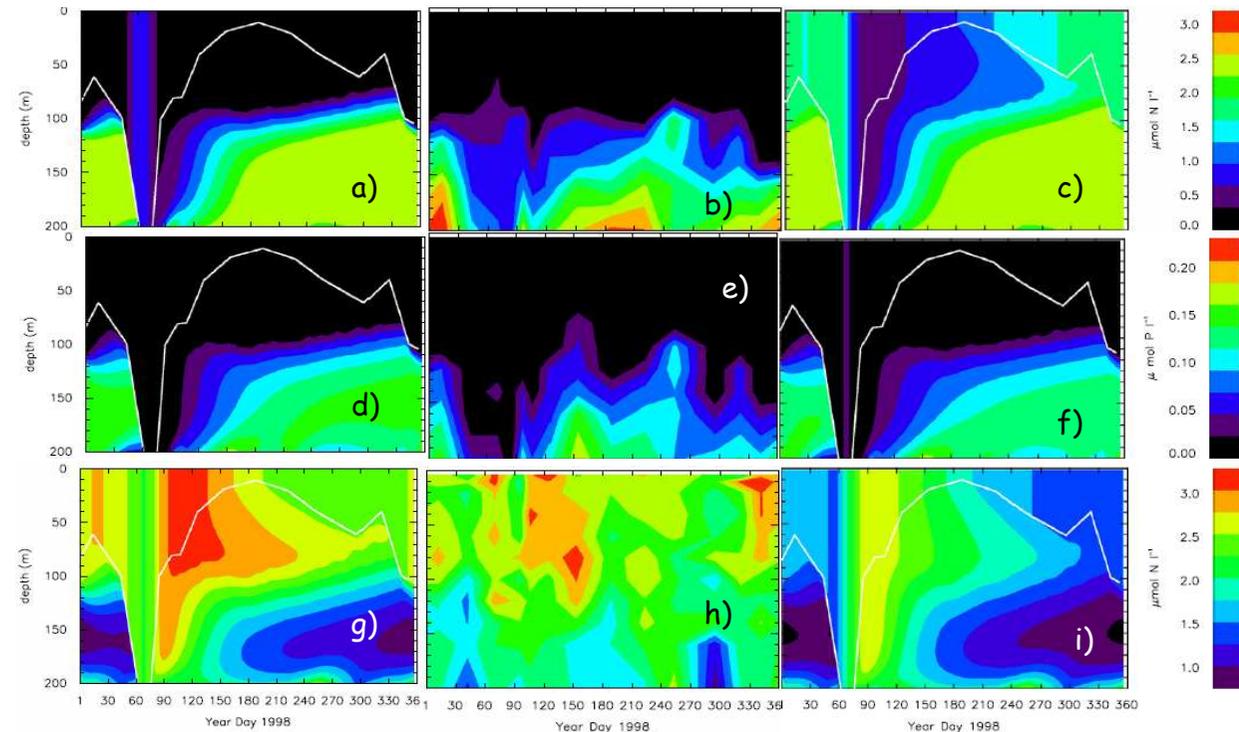


Figure 2: Depth-time distribution of concentrations: of nitrates a) simulated with the cell quota model, b) observed, c) simulated ratios close to Redfield ratio, of phosphate d), e) and f) same as a), b) and c), of DON g), h) and i) same as a), b) and c).