



Carbon export algorithm advancements in models

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The rate at which anthropogenic CO₂ is absorbed by the oceans remains a critical question under investigation by climate researchers. Construction of a complete carbon budget, requires better understanding of air-sea exchanges and the processes controlling the vertical and horizontal transport of carbon in the ocean, particularly the biological carbon pump. Improved parameterization of carbon sequestration within ecosystem models is vital to better understand and predict changes in the global carbon cycle. Due to the complexity of processes controlling particle aggregation, sinking and decomposition, existing ecosystem models necessarily parameterize carbon sequestration using simple algorithms. Development of improved algorithms describing carbon export and sequestration, suitable for inclusion in numerical models is an ongoing work. Existing unique algorithms used in the state-of-the-art ecosystem models and new experimental results obtained from mesocosm experiments and open ocean observations have been inserted into a common 1D pelagic ecosystem model for testing purposes. The model was implemented to the timeseries stations in the North Atlantic (BATS, PAP and ESTOC) and were evaluated with datasets of carbon export. Targetted topics of algorithms were PFT functional types, grazing and vertical movement of zooplankton, and remineralization, aggregation and ballasting dynamics of organic matter. Ultimately it is intended to feed improved algorithms to the 3D modelling community, for inclusion in coupled numerical models.