A seasonal diary of phytoplankton in the North Atlantic

In recent years new biological and physical controls have been suggested to drive phytoplankton bloom dynamics in the North Atlantic. A better understanding of the mechanisms driving primary production has potentially important implications for the understanding of the biological carbon pump, as it has for prediction of the system in climate change scenarios. However, the scientific discussion regarding this topic has generally failed to integrate the different drivers into a coherent picture, often rendering the proposed mechanisms exclusive to each other. We feel that the suggested mechanisms are not mutually exclusive, but rather complementary. Thus, moving beyond the “single mechanism” point of view, here we present an integrated conceptual model of the physical and biological controls on phytoplankton dynamics in the North Atlantic. Further we believe that the acclimation of physiological rates can play an important role in mediating phytoplankton dynamics. Thus, this view emphasizes the occurrence of multiple controls and relates their variations in impact to climate change.