Abstract

Deriving Biomass by Remote Sensing
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Carbon biomass is an important parameter that should be monitored globally. To measure this parameter *In situ* phytoplankton species are identified and counted using a microscope. Their cell volume is then estimated and converted to biomass using a conversion factor. This method is time consuming and excludes picoplankton from the final value. Due to these difficulties chlorophyll-a concentration is most commonly used as a proxy for biomass. To incorporate biomass into global models a ratio of carbon to chlorophyll-a is used, which is known as P_b^{opt}. This analysis aims to improve the biomass measurement by the use of flow cytomtery to count the smallest fraction of phytoplankton. The relationship between microscope biomass data, flow cytometry data and High Performance Liquid Chromtaography pigment data will be investigated within the Atlantic Ocean between 40^{o}N and 40^{o}S. Robust relationships between carbon and chlorophyll could be used to remotely sense carbon. The data was obtained from the Atlantic Meridional Transect (AMT) cruises 3 and 4 that occurred during the autumn of 1996 and the spring of 1997, respectively. The improved estimate of biomass did not correlate as strongly with chlorophyll-a concentration as the picoplankton biomass (R^2= 84 % for total biomass, R^2= 94,7% for picoplankton biomass). The relationship between total pigment and total biomass was stronger than the relationship between total biomass and chlorophyll (R^2 = 90% for pigments). Picoplankton biomass accounted for up to 80% of the total biomass in both cruises. The multivariate statistical methods Principle Component Analysis (PCA) and Cluster Analysis were used to develop provinces based on phytoplankton parameters. This method resulted in a robust province at the southern latitudes and upwelling areas, characterised by linearly correlated carbon and chlorophyll concentrations (R^2= 97%). The remaining sampling stations were separated into groups of similar chlorophyll concentration. Each group displayed an increasing range of carbon concentrations. The remaining sampling stations were partitioned in relation to known circulation features.