ABSTRACT

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Organic matter in the marine environment is a ubiquitous phenomenon, the amount of dissolved natural organic material in the ocean is on the same level as the amount of carbon dioxide in the atmosphere. Since dissolved organic matter is a pool of labile substances, in the sense that they are readily available, they will have a large effect on the marine environment. Traditionally, large parts of this pool have been considered to be refractory and that they reside in the water phase for long periods of time. However, dissolved organic matter is a group of substances that are extremely varying and it is not in any way evident that they should even be referred to as a single group but rather several.

In the present thesis, fluorescence properties of organic matter in the marine environment have been studied and it can be seen that there are dissimilarities in these spectroscopic properties dependent on the origin of the material. Recent material produced in connection to primary production has different characteristics than older material that has been transported long ranges. The old material is circulated through the marine environment and is responsible for a background signal that is on the order of 40-50 μM, expressed as the total concentration of organic carbon (TOC). In association to blooms and primary production this concentration can increase several orders of magnitude.

To increase the knowledge of the carbon cycling and other processes that occur in connection to and in association with organic carbon, fluorescence properties of dissolved organic matter (fluorescent dissolved organic matter, FDOM) can be used to trace long range transported material of terrestrial origin by investigating the spectra of water samples. These spectra can also be used to separate the influence from the different pools on the sum parameter, TOC. By scanning both excitation and emission wavelengths, a full excitation-emission matrix (EEM) is obtained and this is subsequently analysed by multivariate methods.

KEY WORDS: organic carbon, multivariate analysis, chemometrics, PCA, PARAFAC, PLS, DOM.

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