BIOMINERALIZATION AND DISSOLVED ORGANIC MATTER IN THE SEA : IMPLICATIONS FOR MARINE BIOEGEOCHEMICAL MODELS

Venugopalan ITTEKKOT

Institute of Biogeochemistry and Marine Chemistry, University of Hamburg
Bundesstrasse 55, 20146 Hamburg, Germany

A

There are still large uncertainties in the size and turnover times of dissolved organic matter (DOM) in the sea, which represents one of the largest pools of organic carbon on the earth (DEGENS & ITTEKKOT, 1983). The uncertainties in the size of the DOM-pool are mostly related to problems associated with the methods involved in its determination. Two of the most widely employed techniques are wet oxydation and high temperature combustion (HTC) techniques. Concentration of dissolved organic carbon (DOC) measured with HTC techniques are higher than those measured by the wet oxydation techniques. More recently, the introduction of high temperature catalytic oxydation (HTCO) appeared to confirm the higher concentrations, although subsequent work has failed to provide any conclusive evidence for such high concentrations (KIRCHMAN *et al.*, 1993). Interesting, however, was the possibility that the marine DOM had a large component which had high molecular weight and which was chemically stable, but biologically labile.

Because of the size of the DOM and of the possible variabiliy in the production and turnover times of its various fractions (BILLEN *et al.*, 1980; ITTEKOT, 1982), a better understanding of the processes controlling its nature, production and fate is a prerequiste for modelling the role of the DOM in marine carbon cycle.

The DOM-problem is examined here from the geochemist's viewpoint. Attention will be focussed on the role of biominerals in the formation of marine DOM. Biominerals consist of an organic and an inorganic phase whose nature and interaction with each other determine the type of biomineral formed (DEGENS, 1976). Biogenic opal is an example of such a biomineral forming the frustules of diatoms, which are the major group of CO_2-fixing organisms in the sea. The aim of the presentation is to show the importance of diatom mediated biogeochemistry of silicon in the sea as the major controlling factor in the production and recycling of marine DOM and, consequently, in the marine carbon cycle.

REFERENCES

BILLEN G. *et al.*, 1980. Concentration and microbial utilization of small organic molecules in the Scheldt Estuary, the Belgian Coastal Zone of the North Sea and The English Channel. *Est. Coast. Mar. Sci.*, 11 : 279-294.

DEGENS E. T. & V. ITTEKKOT, 1983. Dissolved organic carbon - an overview. Mitt. geol. Paléontol. Inst. Univ. Hamburg, 55 : 21-38.

DEGENS E. T., 1976. Molecular mechanisms on carbonate, phosphate and silica deposition in the living cell. *Topics in Current Chemistry*, 64 :1-112.,

ITTEKKOT V., 1981. Variations of dissolved organic matter during a plankton bloom: qualitative aspects based on sugar and amino acid analyses. *Mar. Chem.*, 11 : 143-158.

KIRCHMAN D. L. *et al.*, 1993. Dissolved organic matter in biogeochemical models in the ocean, *In* : Towards a Model of Ocean Biogeochemical Cycles, (Eds) G. T. EVANS & M. J. R. FASHAM, NATO-ARI Series, Springer-Verlag, Berlin, pp 209-225.