C-III14

Nutrient distributions and cycling in the Rhone Estuary

Antonio CRUZADO

Centre d'Estudis Avançats de Blanes,
P.O.Box 150,
17300 Blanes (España)

The River Rhone is one of the largest flowing into the Mediterranean Sea and certainly the largest of the Western Mediterranean. The fertilizing effect carried out by this river over the Gulf du Lion and the western Mediterranean is extremely important since the amount of dissolved and particulate nutrients is very large.

During a series of cruises, the nutrient concentrations in a number of stations located within and just outside the Gulf du Lion, have been analysed. Concentrations of Nitrate, Nitrite, Ammonia, Phosphate and Silicate have been routinely measured in the dissolved inorganic form.

The preliminary results obtained show a large area influenced by the water flowing from the Rhone as a large plume a few meter thick. The extent and thickness of the plume vary strongly with the changes in meteorological conditions however, it always shows large vertical as well as horizontal gradients at the boundaries between the river water and the sea water.

The present paper discusses the mixing processes in the near field of the river plume, comparing the mixing processes that takes place at small scales across the boundary frontal zones with those taking place at large scale between the mouth of the river and the outer reaches of the plume.

Another important phenomenon may be the effect of the proximity of the bottom sediments on the fertilization of the water column. Although this does not seem to be a strong effect, a subtle increase in some of the concentrations has been noticed at great depths probably due to the resuspension at the shelf edge and in the canyons of sediments with a release of interstitial water.

C-III15

Nutrient dynamics in oligotrophic Mediterranean areas

A. CRUZADO, R. VARELA and Z.R. VELASQUEZ

Centre d'Estudis Avançats de Blanes,
P.O.Box 150,
17300 Blanes (España)

Large areas of the Mediterranean Sea are, particularly in summer, highly oligotrophic. Surface concentrations of chlorophyll a are very often =< 0.1 ug/l. This is due to the restricted flow of nutrients from the richer deep waters in absence of strong vertical velocities. Banse (1987) has discussed some of the processes that take place in the highly oligotrophic areas of the oceans which give rise to the Deep Chlorophyll Maximum (DCM) a feature often found in such places as the North Pacific Gyre or the Sargassos Sea.

The same processes take place in the Mediterranean areas which have a vertical flux of nitrate due to eddy diffusion only about twice as large as the values computed for the oceanic areas mentioned.

The present paper is an attempt at comparing the validity of the principles hypothesized for the oceans in the Mediterranean environment.

Other important processes with regard to the production of phytoplankton biomass may be the inflow of nutrients from the atmosphere. Much data are now available on the contents of nutrients in aerosol and rain water which should allow a reliable estimate of the nutrient inputs by this mechanism.

Remineralization of nutrients from living and decaying particles through the action of bacteria but also of microheterotrophs (ciliates, tintinnids, etc.) seems to play an important role in the upper 800 m of the column and especially in the 200-300 m. Particles do not seem to settle at the velocities mentioned previously (Karl et al., 1988), therefore making eddy diffusion one of the most important mechanisms for exporting organic matter from the euphotic layer into the lower parts of the column.

REFERENCES

Banse, K. (1987). Clouds, chlorophyll maxima and the nutrient supply to the mixed layer of stratified water bodies. J. Plankton Research, 9(5):1031-1036.

Karl, D.M., B.A. Knauer, J.H. Martin (1988). Downward flux of particulate organic matter in the ocean: a particle decomposition paradox. Nature, 332:438-441.