P-I21

An unusual phytoplankton bloom in the open South Adriatic waters

D. VILICIC*, Z. VUCAK**, A. SKRIVANIC*** and Z. GRZETIC**

* Biological Institute, Dubrovnik (Yugoslavia)
** Hydrographic Institute of Yugoslav Navy, Split (Yugoslavia)
*** Institute "Ruder Boskovic", Center for Marine Research, Zagreb (Yugoslavia)

Summary. Exceptionally high phytoplankton cell density and volume biomass values, along with low Secchi disc transparencies and dark green water colour were registered in the south Adriatic, in April 1987

In the 14th to 29th April 1987 period, the oceanographic research was performed along 37 stations in the central and south Adriatic by RV "Andrija Mohorovičić" (Fig. 1). Temperature, salinity, transparency, water colour, concentration of oxygen and nutrients (P-, N-, Si-salts), as well as microphytoplankton (cells > 20 μm) and nanophytoplankton (cells 2 - 20 μm) population density and biomass (biovolume) were measured. Physical and chemical parameters were measured on board. Phytoplankton cell counts and cell morphometry were performed by means of inverted microscopy within two months after the cruise.

Unusually high cell density and volume values (9.0 x 10^3 to 9.7 x 10^5

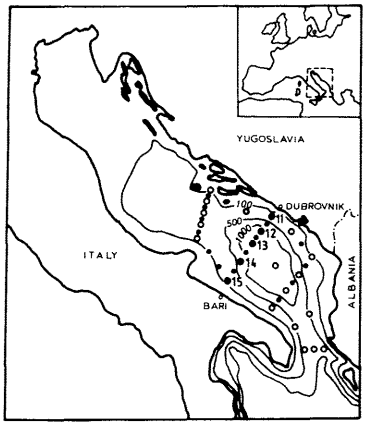

Fig. 1. Location of stations

cells l^{-1}, 1.2 x 10^7 to 5.9 x 10^9 μm^3 l^{-1} of microplankton; 1.1 x 10^5 to 1.5 x 10^6 cells l^{-1}, 5.0 x 10^6 to 3.7 x 10^8 μm^3 l^{-1} of nanoplankton) were recorded in the Dubrovnik - Bari profile, and the Strait of Otranto (in the 0 to 100 m layer). Maximum phytoplankton quantity was determined at Station 13 (Fig. 2), in the central area of Dubrovnik - Bari profile, in the layer between 20 and 50 m (9.7 x 10^5 cells l^{-1}, 5.90 x 10^9 μm^3 l^{-1} of microplankton; 5.98 x 10^9 μm^3 l^{-1} of total phytoplankton). Such an intensive phytoplankton bloom in the open south Adriatic waters has not been registered to date. Secchi disc transparencies ranged from 8 to 14 meters, presenting values nearly three times lower than the multiannual spring mean. Water colour values (according to Forel - Ule scale) ranged between IV and VII (from blue green to dark green colour), while the

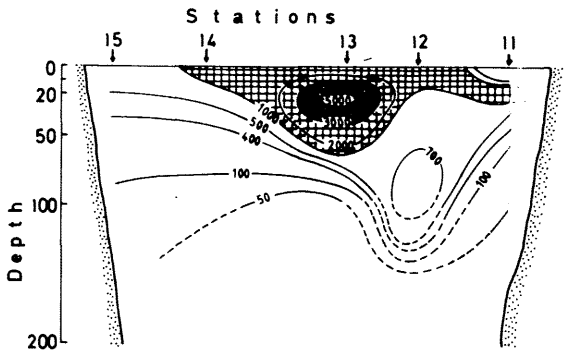

Fig. 2. Distribution of phytoplankton biomass (microplankton + nanoplankton volume, 10^6 μm^3 l^{-1}) at the Dubrovnik - Bari profile, April 1987.

multiannual spring mean did not exceed III. Surface stream-lines estimated on the basis of drift-card distribution, as well as the distribution of nutrient concentrations, showed a strong incoming current from the Ionian Sea throughout the whole transversal profile, excepting the narrow Italian coastal zone. A considerably strong transversal (south-westward) circulation in the Dubrovnik - Bari and Vis - Mt. Gargano profiles was observed as well. Such a dynamics of water masses resulted in a marked increase in salinity (S > 38.7 x 10^{-3}). According to the frequency distribution analysis of all disposable data, the April 1987 nutrient concentrations were slightly decreased, but in the range characteristic for southern Adriatic open sea waters.

P-I22

Photosynthetic assimilation ratios at the surface microlayer

L. IGNATIADES and R.A. ABDUL-JAPAR

National Research Center "Demokritos", Aghia Paraskevi, Athens (Greece)

The relationship between photosynthetic rate (P) and chlorophyll a concentration (B), namely the P/B ratio, has been considered as a realistic index for characterizing the productive capacity of a phytoplankton population (Platt, 1975). Existing data on many aspects regarding this ratio are mainly collected from subsurface sea water whereas the surface microlayer has been received little attention (Hardy and Apts, 1984).

In this work, an attempt has been made to assess the variability in photosynthetic assimilation ratios at the surface microlayer (upper 3 mm) and associated subsurface water depths in the Saronicos Gulf, Aegean Sea.

Eighteen (18) experiments were performed during the period November-December 1987. Surface microlayers (upper 3 mm) were collected with a newly designed sampler (Ignatiades, 1987) and subsurface samples (1,10, 20, 30 and 40 m depth) with Van Dorn samplers. Photosynthetic productivity was measured by the ^{14}C-technique (Strickland and Parsons,1968) and incubation was made in situ for 2 hours. Spectrophotometric chlorophyll a estimations were also performed for each sampling depth.

Photosynthetic assimilation ratios (P/B) as a function of depth are shown in Fig. 1. The results fall in the range from 0.01 to 10.97 $mgC.mgChla^{-1}.h^{-1}$. All profiles follow the same pattern although the absolute values are different and they indicate the following:

1. Inhibition of assimilation ratios at the surface microlayer. Range of values: 0.46-9.00 $mgC.mgChla^{-1}.h^{-1}$.
2. Optimum photosynthetic capacity at 1 m depth. Range of values:2.63-10.97 $mgC.mgChla^{-1}.h^{-1}$.
3. Depretion of assimilation ratios at the lower light-limited depths. Range of values: 0.01-5.90 $mgC.mgChla^{-1}.h^{-1}$.

The pronounced surface inhibition of photosynthetic capacity occured regardless of the uniform quantitative vertical distribution of chlorophyll a and it was associated with the depression of photosynthetic rate at the surface microlayer. This depression might be due to the extracellular release of ^{14}C (Hardy and Apts, 1984) or injury of phytoplankton cells by the high levels of UV radiation (Calkins and Thordardottir (1980).

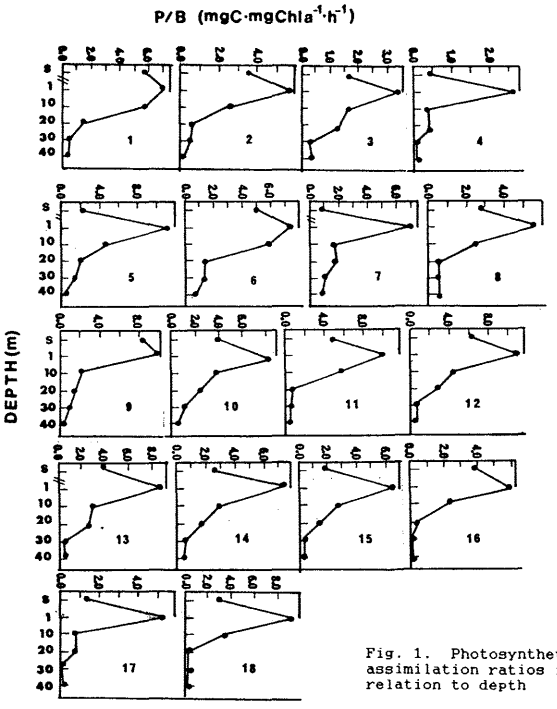

Fig. 1. Photosynthetic assimilation ratios in relation to depth

REFERENCES

CALKINS,J. and THORDARDOTTIR T. (1980).- Nature , 283 :563-566
HARDY,J.T. and APTS C.W. (1984).- Mar. Biol. , 82 :293-300
IGNATIADES,L. (1987).- Mar. Ecol. Progr. Ser. , 39 :207-208
PLATT,T. (1975).- J. exp. mar. Biol. Ecol. , 18 :99-109
STRICKLAND, J.D.H. and PARSONS T.R.(1968).- Bull. Fish. Bd. Can. No 167