Phytoplankton Biomass and Primary Production in the South Eastern Mediterranean off the Egyptian Coast.

Naim M. DOWIDAR and Hesham M. MOSTAFA
Department of Oceanography, Faculty of Science, Alexandria University, Alexandria, Egypt.

Abstract: The chlorophyll standing crop of phytoplankton and C^{14} primary productivity of the S.E. Mediterranean off the Egyptian coast were studied during four seasons. Chlorophyll values varied between 0.5 mg chl a/m^3 in the oceanic water and 6.0 to 7.0 mg chl a /m^3 in the inshore neritic zone. The rate of C^{14} assimilation varied between 0.05 to 0.1 mg c/m^3/h in the offshore waters and 6.0 to 8.0 mg c/m^3/h in the neritic inshore water.

Introduction:

Since the construction of the Aswan High Dam and the subsequentcurtailed outflow of the Nile, dramatic changes have taken place in the south Eatern Mediterranean waters. The primary production is greatly reduced and the seasonal regularity of the phtoplankton blooms, used to develop in the area as a result of the nutrient-rich flood water has been altered both in time and magnitude. This paper describes the levels and distribution of the phytoplankton biomass in terms of chlorophyll a and the C^{14} primary production in the surface waters of the S.E. Mediterranean off the Egyptian Coast.

Material and Methods :

Throughout the period from August 1981 to August 1982, four seasonal cruises were made to the Egyptian Mediterranean waters between El-Agami to the west (Long. 29 45') and El-Arish to the east (Long. 33 45'). In each cruise 10-12 sectors comprising 20 to 35 stations were sampled.As a rule three stations were occupied in each so as to cover the inshore neritic water less than 50 m depth, the offshore neritic water at depths 75 to 100 m and the oceanic water at the edge of the continental shelf.
At each station, surface and discrete samples were taken for spectrophotometric determination of chlorophyll a and C^{14} primary productivity using deck incubator method (Steemann Nielsen, 1952) together with temperature, salinity and nutrient salts (Strickland & Parsons, 1965).
This paper entails the results of surface distribution of chlorophyyl a during four seasons and C^{14} primary productivity during summer and winter seasons. Results are shown in figures 1 to 7.

Discussion:

The present study clearly demonstrates the oligotrophic nature of the oceanic water of the S.E. Mediterranean. In the oceanic water of the study area the chlorophyll standing crop of phytoplankton hardly exceeded 0.5 mg/m^3 in nearly all seasons except in August 1982. The values of primary production varied between 0.05 and 0.1 mg c/m^3/h in August and December 1981 respectively, the assimilation number was always leass than 0.3. The concentration of dissloved inorganic phosphorous was

very low and with insignificant seasonal variations, high values rarely exceeded 0.05 ug-at/l. The concentration of inorganic nitrate was relatively high ranging between 0.08 and 3.1 ug-at/l; the high values were generally recorded in winter. It appears therefore that phytoplankton development in the oceanic waters of the S.E. Mediterranean is mostly limited by the low concentration of available inorganic phosphorous. On the other hand, the chlorophyll content of the onshore neritic water was 5-14 times higher than that of the oceanic water; maximum values (4-7 mg chl a /m^3) were recorded in the coastal area between Damietta and Port-Said. Primary production was also higher reaching 6.03 mg c/m^3/h off Lake Manzalah in August 1981 and 8.029 mg c/m^3/h in Gulf of Tena in December 1981. It is important to note that the neritic water off the Nile Delta still receives variable amounts of fresh and/or brackish water from the Nile and the brackish water Delta Lakes. The discharged water is usually rich in nutrient salts and growth-promoting substances capable of supporting high phytoplankton crop. During the period of study the average concentration of inorganic phosphorous of the outflowing water from Lake Manzalah through El-Gamil outlet was about 3.9 ug-at/l varying between 6.4 in January and 0.2 ug-at/l in April. In addition to the allochthonous supply, the role of autochthonous regeneration of nutrients can not be neglected, both sources are however more effective in the inshore zone than in the offshore waters. The offshore boundary of the fertile coastal zone may be placed roughly between 50 and 75 m depth.

Bibliography:

Steemann Nielsen, 1952: The use of radioactive carbon (C^{14}) for measuring organic production in the sea.-J. Cons. Int. Explor. Mer. 18: 117-140.

Strickland J.D.H. and Parsons T.R., 1965: A Manual of Sea-Water Analysis. Bull. Fish. Res. Bd., Canada, No. 125, p. 311.

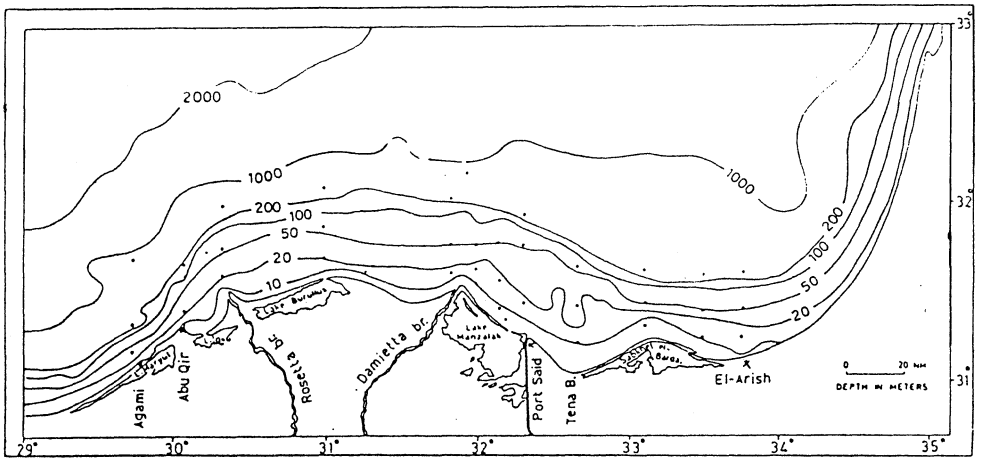

Fig. 1- showing the investigated area and the sampled stations.

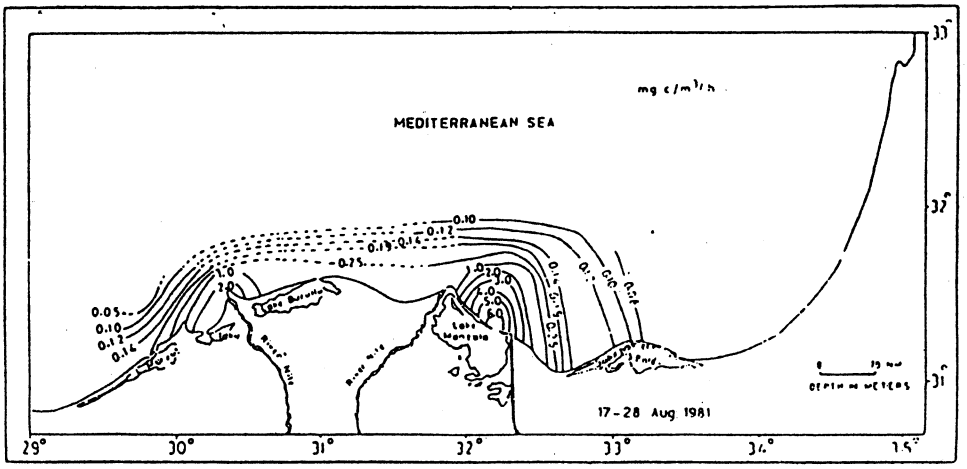

Fig. 2- Distribution of C^{14} primary productivity during summer in $mgC/m^3/h$.

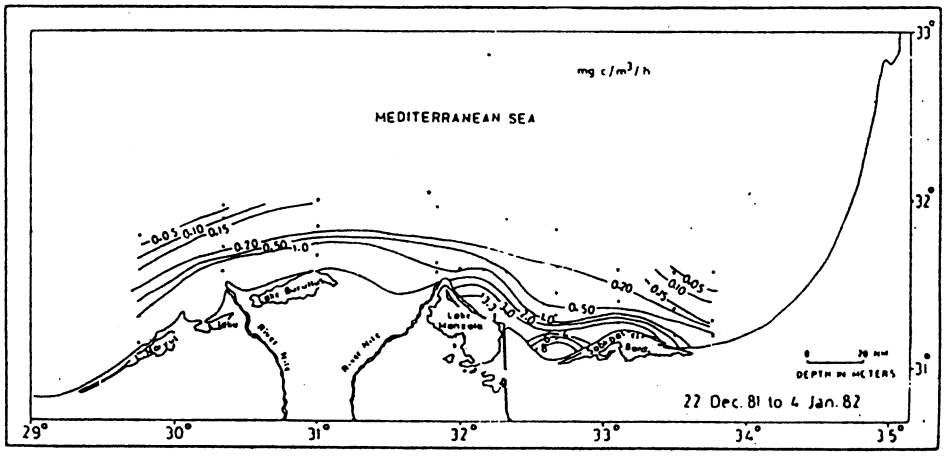

Fig. 3- Distribution of C^{14} primary productivity during winter in $mgC/m^3/h$.

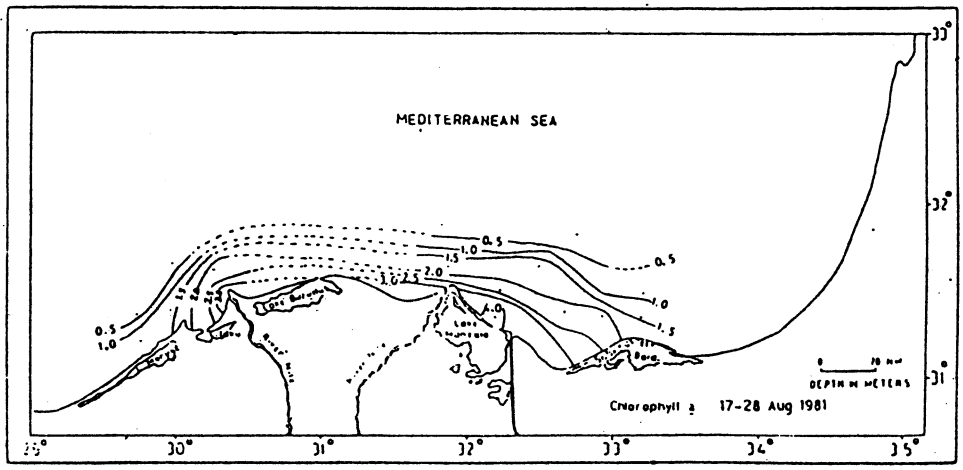

Fig. 4- Distribution of surface chlorophyll during summer 1981 in mg/m^3.

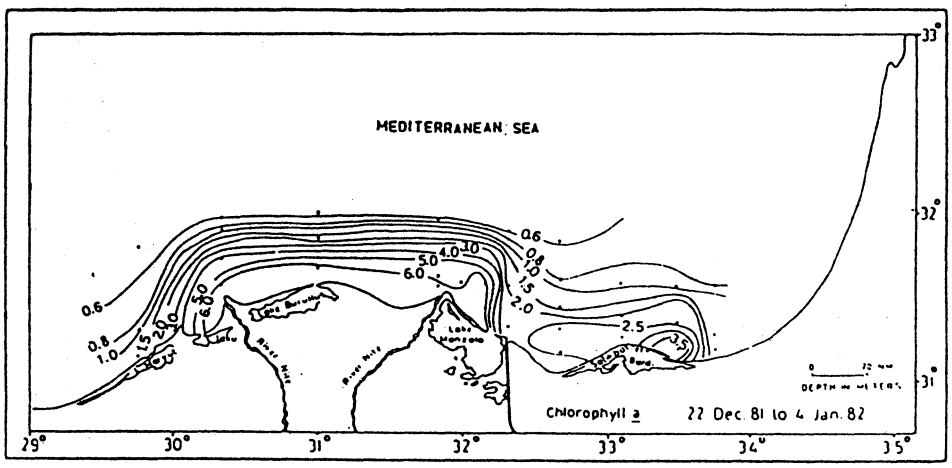

Fig. 5- Distribution of surface chlorophyll in winter in mg/m^3

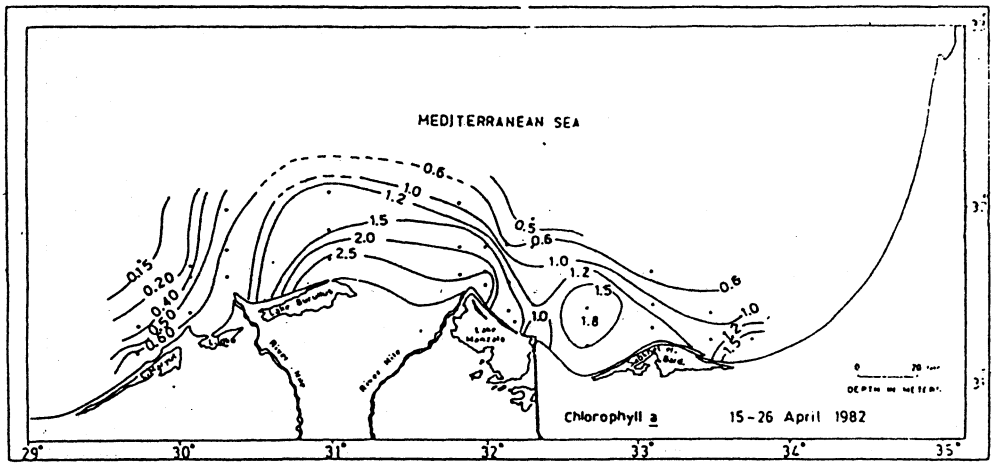

Fig. 6- Distribution of surface chlorophyll in spring in mg/m^3

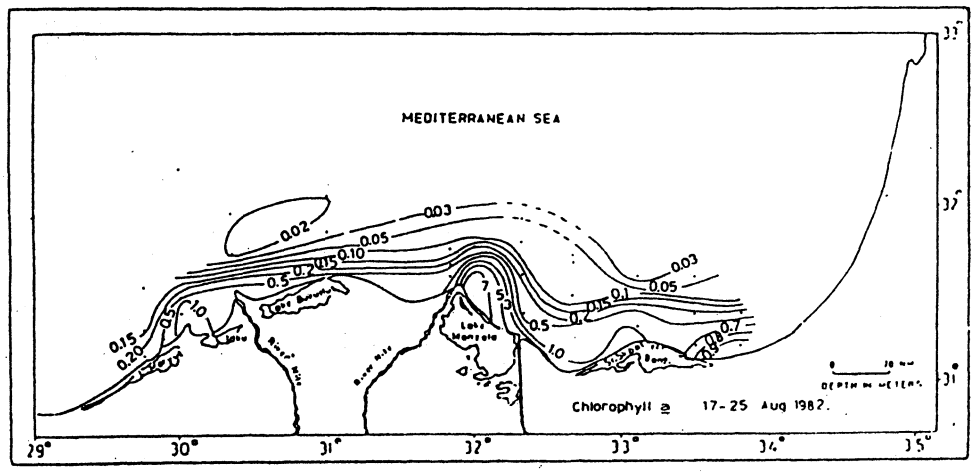

Fig. 7- Distribution of surface chlorophyll in summer 1982 in mg/m^3.