TIME RELATIONSHIP BETWEEN PHYSICO-CHEMICAL AND BIOLOGICAL PROPERTIES OF PHYTO-PLANKTON BLOOMS IN THE INNER PART OF THE GULF OF NAPLES, SUMMER 1983

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Summary. The dynamics of phytoplankton blooms alongshore in the Gulf of Naples during summer 1983 are discussed.

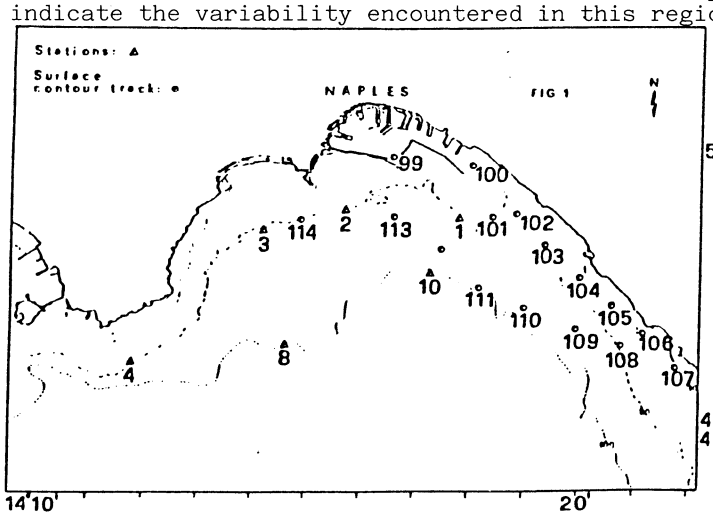
Resumé. On décrit la dynamique des poussées phytoplanctoniques dans la zone cotière du Golfe de Naples pendant l'été 1983.

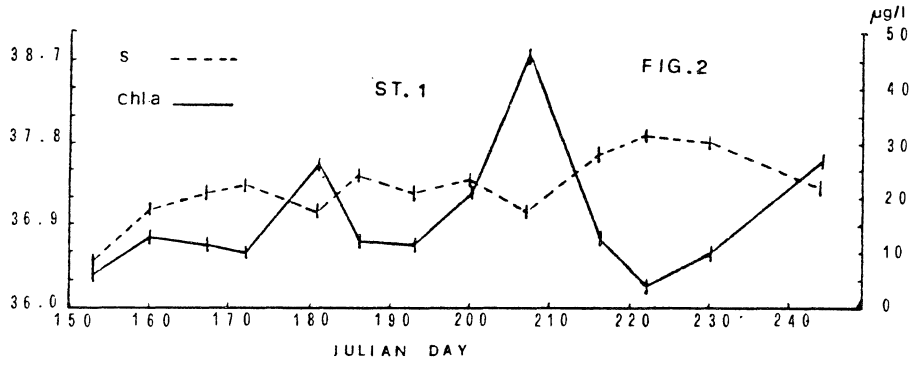
A research program aimed at the identification of key areas of eutrophication and their importance for the onset and spreading of phytoplankton blooms in the Gulf of Naples was carried out in the summer 1983. Thirteen one-day cruises were conducted on a weekly basis in the inner part of the gulf.

Salinity, nutrients (NO_2, NO_3, PO_4, Sio_4), photosynthetic pigments and phyto- and zooplankton samples were collected at three depths (0,25,50 m) at six stations. After the fifth cruise, additional surface contour tracks were added to the sampling program to increase resolution in the most eutrophic area. This area extends from Naples harbour to the port of Torre del Greco and the sampling area was located within three miles from the coast extending to the 100 m isobath (Fig. 1).

This presentation will consider physico-chemical and chlorophyll a data from surface samples. Biological data for phyto- and zooplankton will be discussed in presentations to follow (Zingone et al., Ianora et al. this volume).

Nutrients were always detectable over the entire area studied. Stations 1 and 99 to 105 showed a wide range of variation. Total Inorganic Nitrogen (TIN) (0.42 ÷ 33.15, $\bar{x}$=9.08±10.30) and PO_4 (0.19÷21.32, $\bar{x}$=3.30±7.28) indicate the variability encountered in this region. Stations 106 to 113, some of which are situated less than one mile from the former sampling sites, showed much less variation (TIN: 0.26÷6.38, $\bar{x}$=2.06±1.76; PO_4: 0.18 ÷0.96, $\bar{x}$=0.44±0.15). Nutrient fluctuations for the stations 2 to 10 and 114 fell within the range recorded for this latter group of stations. Therefore,





nutrient enrichment seemed mainly limited to a narrow area alongshore in the eastern part of the Bay. Salinity showed low, fluctuating values at coastal stations, having a mean of 37.220±0.476 with values ranging from 35.821 to 38.011 and higher less variable values for stations 106 to 113 with a mean of 37.678±0.238 (36.089÷38.056).

Heterogeneous and very high chl.a values were observed for the eastern part of the basin. While an onshore-offshore gradient in chl.a extends throughout the basin, major accumulation of this pigment showed patterns parallel to the coast and in a SE direction with maximum values at the outlet of the harbour. An interesting feature is the correlation in time in the peaks of chl.a which developed and declined to background values of about 1 ug l^{-1} during two to four week periods at all sites, simultaneously or with one week delay. It should be noted that the definition of "peak" is relative for each site. Absolute values ranged from 2 to 46 ug l^{-1}.

Variations in chl.a values often showed a negative correlation with salinity (Fig. 2). A major driving factor producing rapid changes in chl.a values, as well as the rapid dispersion-dilution of nutrient plumes as described above, seems to be the presence of offshore waters that periodically enter the inner part of the embayment. Such events appear to have oscillation times of two to four weeks and might be coupled with the circulation patterns outside the Gulf as described by De Maio et al. The frequent change in environmental conditions and the removal and dispersion of chl.a i.e. of phytoplankton cells, affects the dynamics of the population and presumably avoids its evolution into an oligospecific community.

REFERENCES

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