

## PRIMARY PRODUCTION IN THE GULF OF NAPLES: WINTER-SPRING 1980

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Primary production was measured at two stations in the Gulf of Naples from 19 XII 79 to 19 V 80. The inshore station had surface values  $> 100 \text{ mg C}\cdot\text{m}^{-3}\cdot\text{d}^{-1}$  and integrated production of  $55.1 \text{ g C}\cdot\text{m}^{-2}$  for the water column during the winter-spring period. The offshore station had lower values,  $< 111.9 \text{ mg C}\cdot\text{m}^{-3}\cdot\text{d}^{-1}$  and total integrated production of  $31.39 \text{ g C}\cdot\text{m}^{-2}$  for the same period of time. Nutrients, as inorganic nitrogen and silicon were always detectable while phosphate was undetectable during the later months at the offshore station.

La production primaire a été mesurée à deux stations dans le Golfe de Naples du 19 XII 79 au 19 V 80. A la station près de la côte, les valeurs de surface dépassaient  $100 \text{ mg C}\cdot\text{m}^{-3}\cdot\text{jour}$  et la production pour la colonne d'eau entière était de  $55.1 \text{ g C}\cdot\text{m}^{-2}$  pour la période hiver-primtemps. Les valeurs à la station au large de la côte étaient plus faibles,  $< 111.9 \text{ mg C}\cdot\text{m}^{-3}\cdot\text{jour}$  pour une production totale intégrée de  $31.39 \text{ g C}\cdot\text{m}^{-2}$  pour la même période. Les sels nutritifs, tels l'azote inorganique et la silice, étaient toujours présents aux deux stations, pendant que le phosphate n'était pas détecté durant les derniers mois à la station du large.

Bimonthly measurements of primary production were conducted at two stations in the Gulf of Naples. Mergellina, the coastal station, had a depth of 50 meters while L-20 (Carrada, et al. 1979a), the offshore station, had a depth of 300 m. Samples were taken from the surface, 25 and 50 m at Mergellina and at depths corresponding to 100, 50, 25, 10 and 1% incident photosynthetically active radiation as measured *in situ* with a Lycor Underwater Quantum sensor. Productivity was measured using the  $^{14}\text{C}$  technique, incubated with natural light attenuated to give ambient intensities of collection. In addition to production, measurements of Chlorophyll *a* and observations of species composition and abundance were made. Physical-chemical measurements included temperature, salinity and inorganic nutrients as nitrite, nitrate, ammonia, phosphate and silicate.

Production values at Mergellina varied between 2.4 and 630.5 mg

$\text{C}\cdot\text{m}^{-3}\cdot\text{d}^{-1}$  at various depths in the water column. Surface values were normally  $> 100 \text{ mg C}\cdot\text{m}^{-3}\cdot\text{d}^{-1}$  and diminished with depth. Integrated values at this station varied from 0.62 to 8.2  $\text{g C}\cdot\text{m}^{-2}\cdot\text{d}^{-1}$  representing a total of 55.1  $\text{g C}\cdot\text{m}^{-2}$  for the winter-spring period. Light intensities at 50 m were rarely below 10% of incident surface intensities. Chlorophyll a values between 0.21 and 5.76  $\text{mg Chl a}\cdot\text{m}^{-3}$  were found at Mergellina. Surface and 25 m values usually exceeded 1.0  $\text{mg}\cdot\text{m}^{-3}$  while lower values persisted at depth. Total inorganic nitrogen ( $\Sigma \text{NO}_2, \text{NO}_3, \text{NH}_4$ ) varied between 1.85 to 7.33  $\mu\text{g-at}\cdot\text{l}^{-1}$  and all forms were detectable throughout the sampling period. Inorganic phosphate was less abundant (0.04-0.54  $\mu\text{g-at}\cdot\text{l}^{-1}$ ) but detectable throughout this period. Silicate values  $> 1.51 \mu\text{g-at}\cdot\text{l}^{-1}$  occurred with a maximum of 10.2 in January.

Production offshore varied between 1.4 and 111.9  $\text{mg C}\cdot\text{m}^{-3}\cdot\text{d}^{-1}$  with maximal values occurring at surface and 50% light levels. Integrated production varied from 0.33 to 5.7  $\text{g C}\cdot\text{m}^{-2}\cdot\text{d}^{-1}$  giving a total of 31.39  $\text{g C}\cdot\text{m}^{-2}$  for the winter-spring period. The 1% light level occurred consistently between 100 and 150 m. Chlorophyll a values between 0.11 and 1.77  $\text{mg}\cdot\text{m}^{-3}$  occurred in surface waters and  $> 0.61 \text{ mg}\cdot\text{m}^{-3}$  were observed for all but one sampling. At depth,  $< 1.14 \text{ mg}\cdot\text{m}^{-3}$  Chl a was observed. Total inorganic nitrogen varied between 0.59-7.12  $\mu\text{g-at}\cdot\text{l}^{-1}$  and was detectable in all forms measured. Phosphate was present at  $< 0.20 \mu\text{g-at}\cdot\text{l}^{-1}$  and was undetectable during April and May. Silicate occurred between 1.5 and 10.2  $\mu\text{g-at}\cdot\text{l}^{-1}$  throughout the sampling period.

The two areas studied differed with consistently higher values for production, nutrients and chlorophyll at the Mergellina station. The offshore station, however, having a deeper euphotic zone often had similar production despite the lower chlorophyll content. Phosphate was the only nutrient absent and may be important in limiting the production in this area. These findings are consistent with the Carrada et al. (1979b) view of two horizontal subsystems for the Gulf of Naples. Further studies are in progress to define the dynamics of primary production in the Gulf of Naples.

#### REFERENCES

- Carrada, G.C., D. Marino, M. Modigh and M. Ribera d'Alcala. 1979a. Observations on the annual cycle of Utermöhl phytoplankton at a fixed station in the Gulf of Naples. *Rapp. Comm. int. Mer. Med.* 25/26:75-76.
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