PHYSICAL PROPERTIES AND NUTRIENT DYNAMICS IN COASTAL WATERS OF SOUTH TYRRHENIAN SEA (CAMPANIA REGION)

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Abstract
Seven coastal sites along the Campania Region (Southern Tyrrhenian Sea) were sampled biweekly from June 2001 till May 2005 for physical and chemical properties. As expected due to very different riverine and anthropic influences, notable differences in hydrographical and chemical properties occurred but still common patterns in temperature, salinity and nutrients were observed.
Keywords : Coastal Systems, Tyrrhenian Sea, Monitoring.

Introduction
The coastal zone is one of the most valuable areas of Earth from a human perspective. More than half population resides within 100km from the coast and this proportion is expected to increase in the future. Large perturbations related to human activities on land have contributed to severe degradation of water quality and alterations of marine food webs and community structure. Trying to evaluate the response of coastal waters to human perturbations and climate changes is the challenge of the worldwide monitoring coastal water programs. This study is conducted in the framework of the Italian monitoring coastal ecosystems project. The physical properties and the nutrient dynamics of seven sampling sites, distributed along the coasts of the Campania Region (South Tyrrhenian Sea), were analysed. The stations differ for their environmental conditions from strongly eutrophic (influence of large urbanized areas, proximity of river outlets) to oligotrophic (in a Marine Protected Area).

Materials and Methods
The sampling was carried out biweekly from June 2001 till May 2005. Temperature and salinity profiles were acquired by a SBE 19 Plus of Sea - Bird Electronics. Nutrient analyses of surface samples were performed with a TECHNICON II autoanalyser.

Results
Temperature profiles showed a clear seasonal pattern (thermal stratification during summer and winter mixing) and a strong interannual variability. In winter, a progressive temperature decrease was observed in all the sampling stations. The minimum temperature, integrated over the water column, was 1.4°C lower in 2005 as compared to the 2002 value. Highest temperatures were recorded in the surface layers in summer 2003 (28.4 $\pm$ 0.5 °C). Due to freshwater inputs, local hydrodynamic conditions and water column depth, salinity showed a pronounced spatial variability. The lowest salinities were recorded in the proximity of rivers and the highest occurred in the Marine Protected Area. Despite the very different properties observed, a decrease in salt content was noticed in all the sampling sites during the spring - summer period from 2001 till 2004.
Nutrient concentrations showed a very wide range of variability. The average concentrations of dissolved inorganic nitrogen (TIN) were two orders of magnitude greater in polluted areas (e.g. 18.3 μM off the Volturno River as compared to the Marine Protected Area 0.5μM). Each sampling site presented a specific N:P ratio. This ratio was higher than the Redfield value [1] near the river mouths (>40), close to the typical western Mediterranean ratio [2, 3] near the city of Naples (18), and lower for the Marine Protected Area (10). However, the N:P ratio always presented a bimodal distribution strongly linked to seasonality. The minimum values were recorded in the period from May to September, mainly due to a relevant decrease in TIN. Phosphates, total phosphorous and total nitrogen did not show a clear seasonal signal.

Discussion
The sampling sites presented different hydrographical and chemical properties related to their environmental conditions. In particular, the northern part of the Campania coastal area resulted more influenced by human activities. Despite these strong differences, common patterns in temperature, salinity and nutrients were observed. The different N:P ratios in summer and in winter was opposite to that observed in the western Mediterranean open waters (Dyfamed time-series station) [4]. However, a preliminary analysis suggests that the different phytoplankton communities (prymnesiophytes in Dyfamed, diatoms in Campania coastal waters) might explain these differences in nutrient dynamics.

References
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