MULTIPARAMETRIC MARINE MONITORING FROM AUTOMATIC COASTAL PLATFORMS

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Abstract
New devices were developed in the framework of the Italian MIUR Cluster 10 programme to fulfil the need for low-cost, reliable, automatic systems for coastal marine monitoring. The main device is a system acquiring and transmitting in real time physical, chemical and physico-chemical parameters of seawater together with meteorological observations, able also to control an automatic water multisampler for off-line bacteriological determinations. Measuring systems are hosted in seven platforms, moored in selected Sicilian and Apulian sites, which are affected by anthropic, urban or industrial inputs. Some data acquired by two of these platforms are here presented.

Keywords: Monitoring, coastal area, Mediterranean Sea

Introduction

Improvement in the technological instrumentation and equipment for coastal monitoring represents the challenge for future development in the field of environmental assessment. In the last decade, advanced devices have recently been designed to be used as components in networks of multiparametric observation systems (1).

The paper describes two examples of application of our automatic monitoring platforms, showing their capability to evaluate both the trophic condition of a coastal site, as performed in a Tyrrhenian ecosystem, and the anthropic input in a semi-enclosed area, as in Messina harbour.

Materials and methods

Measured Parameters

Measurements were performed by two platforms (2), hosting a system that pumps water samples from five depths into a measurement chamber where a IM50 CTDO probe with fluorometer and turbidimeter is fitted; the same water is also used to feed a Systea Nutrient Probe Analyser and a bacteriological multisampler expressely designed to store and fix eight 250 ml samples. The temperature at the sampling depths was measured by five SBE39 in *situprobes. A meteorological station equipped with temperature,* pressure, solar radiance, wind direction and speed sensors completed the equipment present in all platforms.

Messina platform also included an IM50 probe for in situ subsurface measurements and an Aquadopp 600 ADCP.

All the measuring operations were controlled by an expressely designed data acquisition and transmission system, fully manageable and reprogrammable via GSM and SMS, transmitting the acquired data via e-mail in real time.

Studied area

The Gulf of Milazzo is a coastal Tyrrhenian area receiving consistent continental out?ow and is characterised by an anticyclonic water circulation. Due to its past tendency towards the eutrophy, this area was monitored for the main hydrological parameters (temperature, conductivity, dissolved oxygen, nutrients) driving biological processes (3). The Straits of Messina, a transition area between Ionian and Tyrrhenian waters, are characterized by two main alternating currents, called "montante", from the Ionian Sea northwards, and "scendente", from the Tyrrhenian Sea southwards. Water circulation is affected by this continuous water mass exchange; microbial pollution was monitored in this area, where different sewages are discharged along the shoreline (4).

Results

Nutrient measurements performed on subsurface samples using the NPA in Milazzo Platform are reported in Fig. 1. During the period examined, no significant variations were found; ammonia, nitrites and orthophosphates showed low concentrations, while substantially high nitrates values were measured.

Total bacterioplankton counts by DAPI staining (Fig. 2), obtained in surface samples collected in Messina harbour by the automatic multisampler, showed a quite regular course, with repeated peaks at 6.00 a.m. on the first sampling days, and then shifted 6 hours later in the successive days. This might be explained by the arrival of high amounts of organic matter, such as those drawn from the alternating "scendente" and "montante" currents, that stimulated bacterial growth.

Discussion

The systems here described proved to be reliable tools for the monitoring of coastal environment; their real time capability enables to use them in the management of natural resources and protection of environmental quality level (nowcasting and early warning). The ability to acquire long-term time series allows the development of forecasting models.

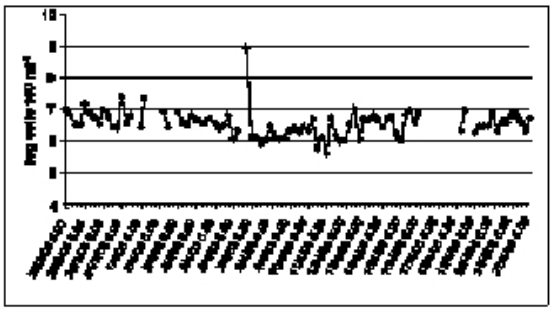

Fig. 1. Nutrients in Milazzo Gulf

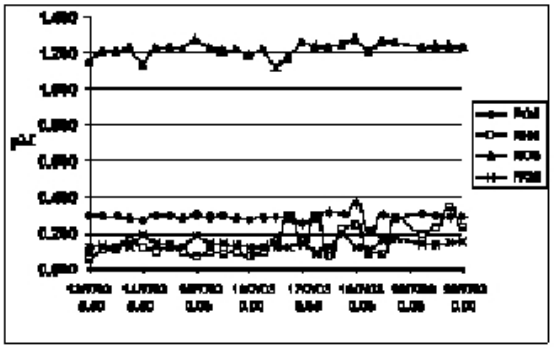

Fig. 2. Bacterioplankton density in Messina harbour

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