

New system for marine coastal monitoring in real time configuration (SEPTR): application in a marine protected area (Portofino, Italy)

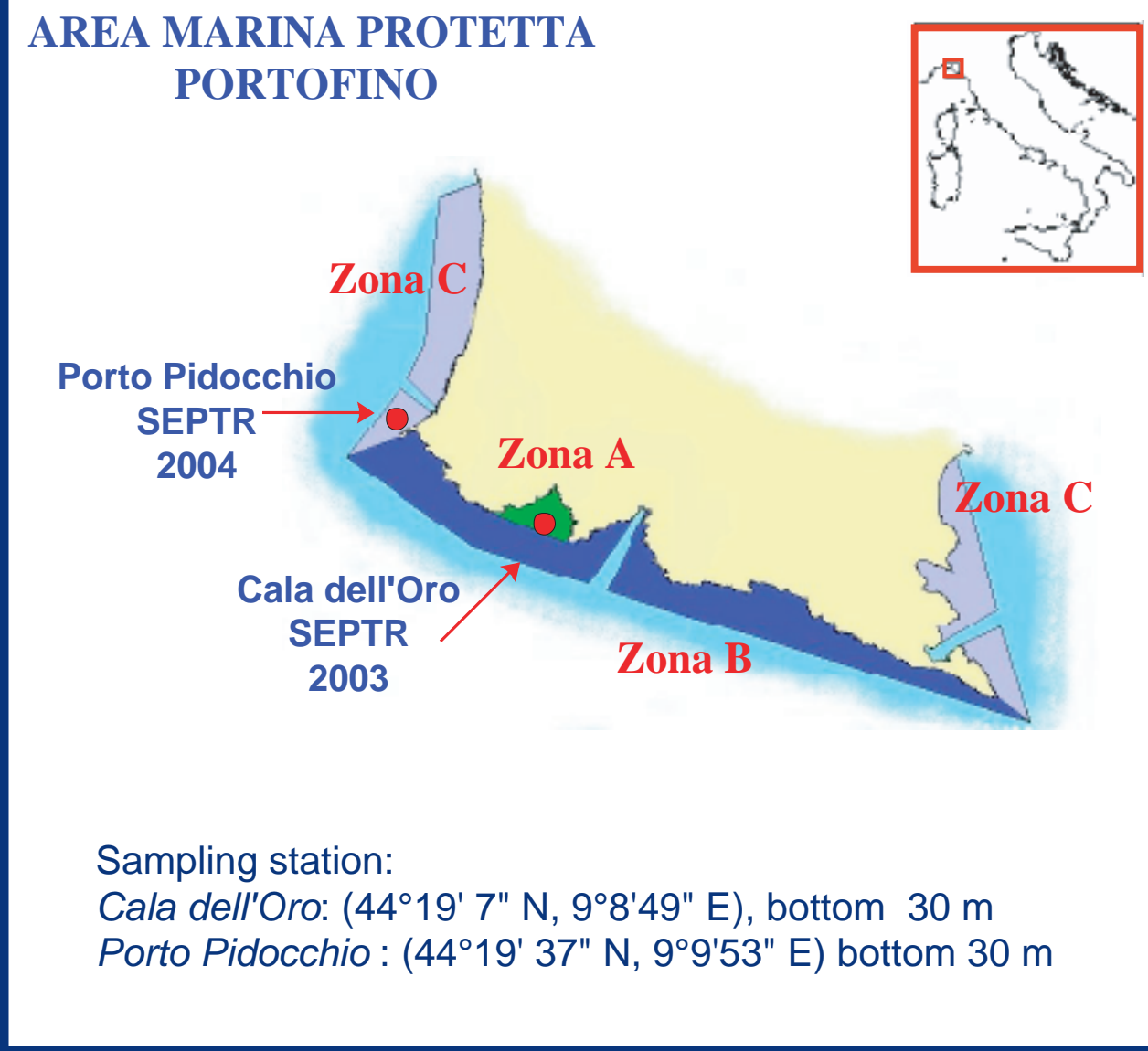
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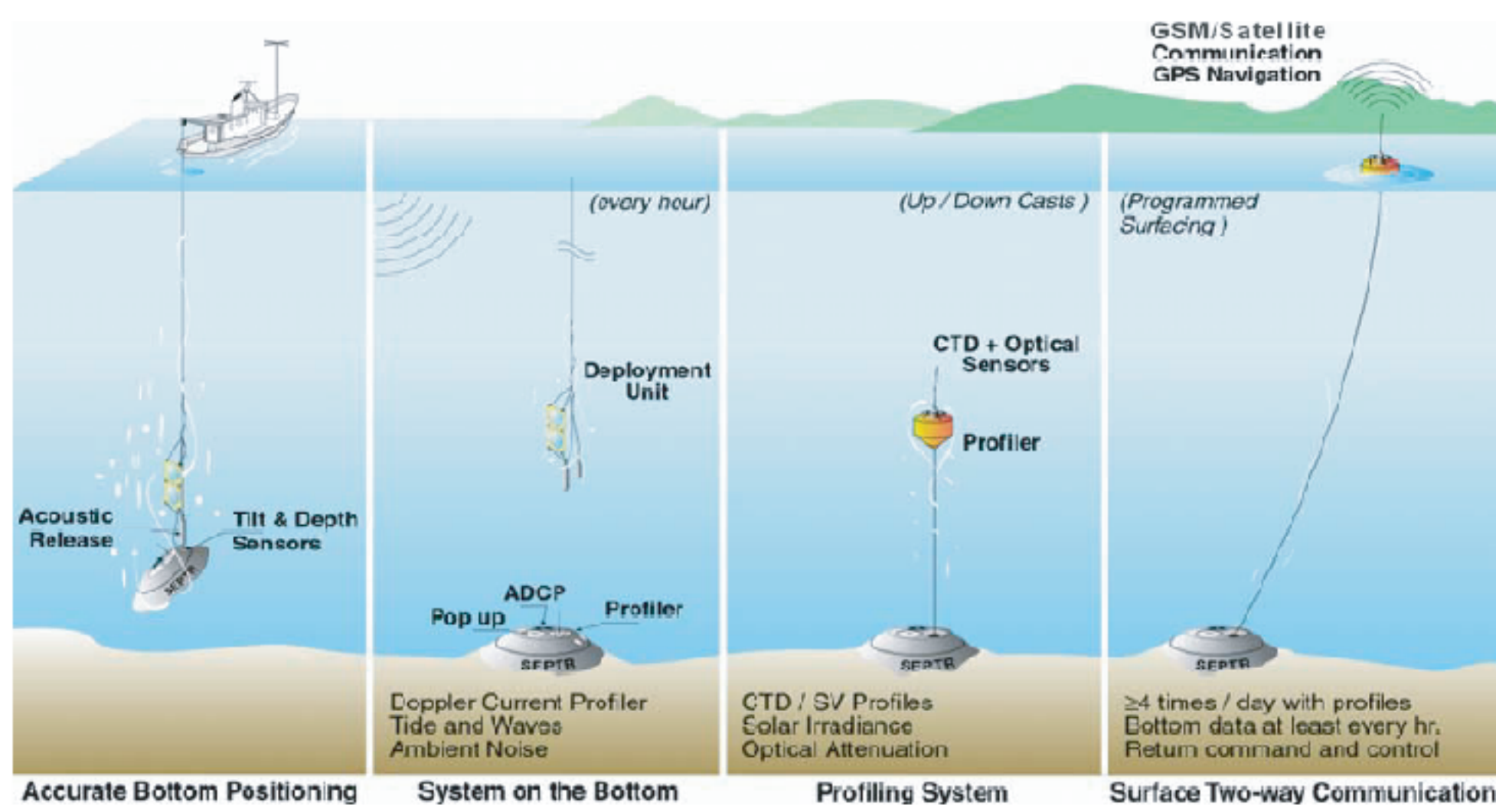
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The in situ SEPTR (Shallow water Environmental Profiler in Trawl-safe Real-time configuration) experiment in Cala dell'Oro, a protected marine coastal area near Portofino Promontory began in summer 2003, within the framework of a cooperation between DIPTERIS (Genoa University), Engineering Technology Department of SACLANT Undersea Research Centre and AMP-Portofino. This experiment has been carried on during summer 2004 in Porto Pidocchio, situated on the west side of the Portofino Promontory, where a southwest ward recirculation has been observed, suggesting the existence of an attached anticyclonic eddy. This circulation pattern could have an important effect on the ecology of this coastal area, especially related to nutrients and organic matter transport.

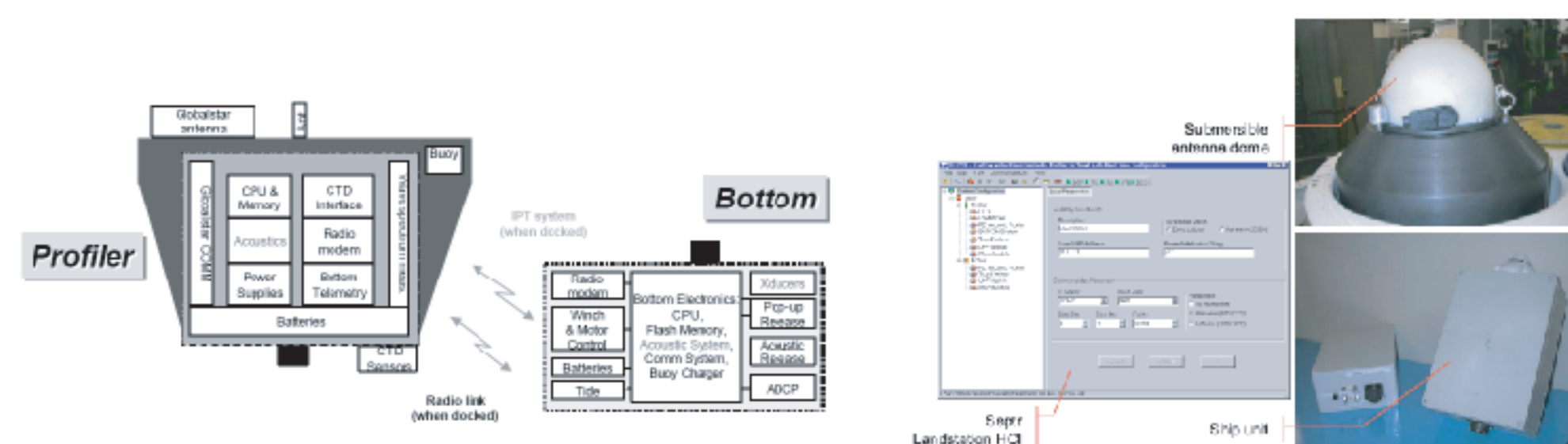


SEPTR
Shallow water Environmental Profiler in Trawl-safe Real-time

Underwater activities



SEPTR operational scenario: deployment and operations



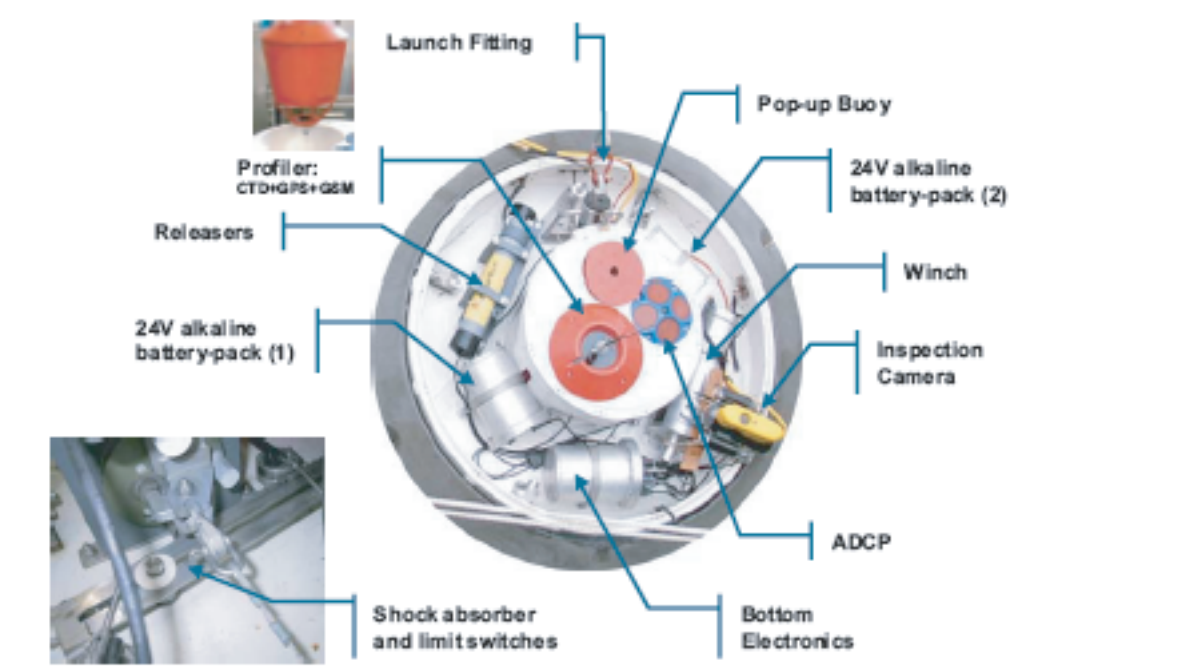
SEPTR block diagram: profiler and bottom subsystems

Worldwide coverage satellite data communications capabilities
- point to point communication
- data-rate: 9600 baud

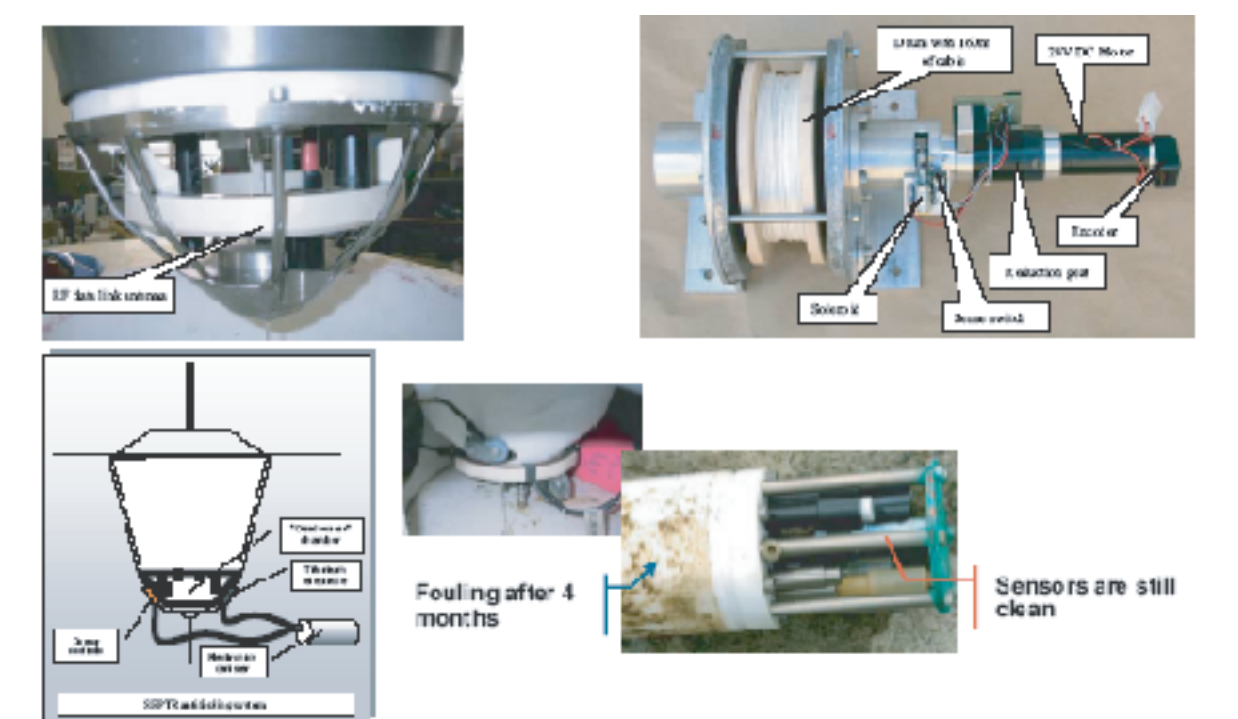
The SEPTR is an underwater platform developed at SACLANTCEN to help oceanographic modelling and rapid environmental monitoring research programs. Its trawl-safe shape structure lets it work in marine coastal areas, with fishing activities, where, normally, other self-recording instruments with different designs would be easily damaged.

The SEPTR system is made by two units linked together with a tiny cable: a micro-controller based bottom platform, the "bottom unit", firmly anchored to the sea bottom through a reinforced concrete ballast, which houses an ADCP, a wave/tide gauge, an ambient noise sensor array, and a messenger. The messenger is a water column profiler buoy system that houses CTD sensors and performs autonomous vertical CTD profiles at depths down to 100m, with a maximum of 360 profiles, (up to 12 per day). Acquired data are sent at regular intervals through a two-way communication system using GSM network or a satellite connection (GLOBALSTAR). The typical mission is intended for 3-6 month. The SEPTR measures 2m in diameter, 50cm height, 680 kg weight and has the possibility to be easily stocked in standard containers.

Recovery of the entire system is accomplished through acoustic releaser that send messenger buoy on the surface or release the ballast. Two ways data communication allows water profile results in near-real time, and they allow to broadcast both operational commands and profile schedules to multiple units.



SEPTR components: an open view of the system showing the internal components

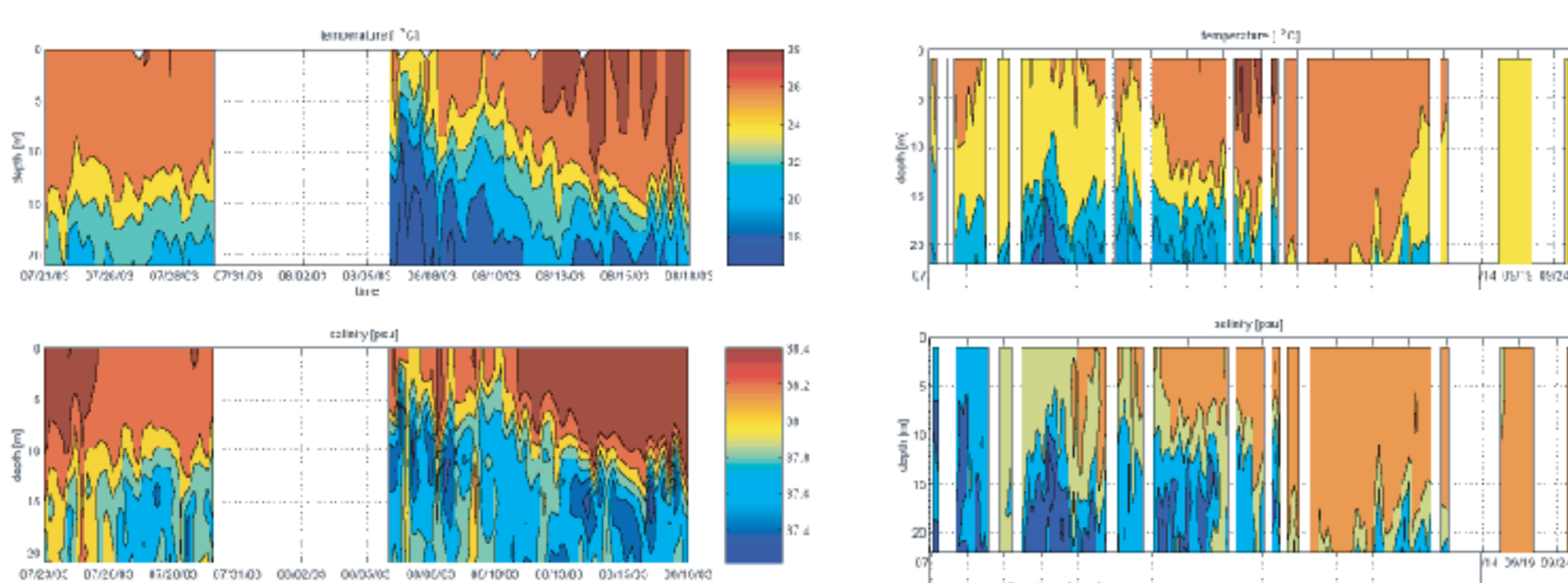


Advanced technologies:
- RF underwater data link: communications between bottom unit and profiler
- Intelligent winch system
- SEPTR antifouling system

Continuous ctd data acquisition in different hours of the day provides a very detailed description of the main environmental parameters of the area. For example, the data set registered in July and August 2003 highlighted the evolution of thermic anomaly in the surface layer of the investigated marine coastal, even during the day. Temperature profiles in August evidenced a progressive warming of seawater (even >28°C) and a deepening of the thermocline, well shown also by salinity profiles. The better understanding of physical structure gave also clues on chemical and biological processes related to that anomaly.

Current data obtained from the acoustic doppler current profiler (ADCP) evidenced in detail the short-term events affecting the flow structure near the promontory.

During summer 2004, the long in situ permanence of SEPTR, without interruption, allowed to define the main flow direction with a large temporal scale. On the west part of the promontory (Porto Pidocchio) the flow was prevalently directed towards south west, confirming the presence of an eddy, foreseen from a model applied in the same area. ADCP evidenced also shorter time scale phenomena, forced by meteorological or oceanographic events such as wind and storms.

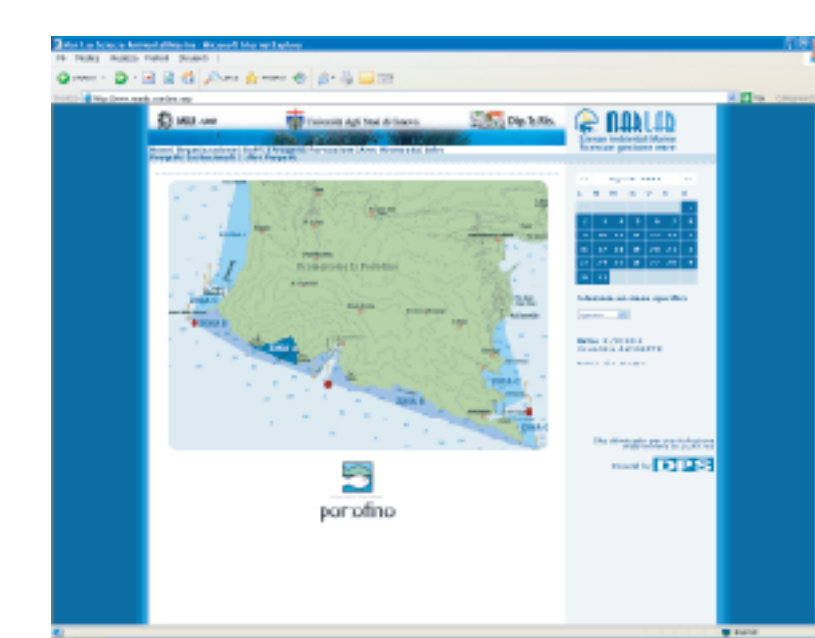


ADCP and CTD SPETRA data 2003

ADCP and CTD SPETRA data 2004

This experimentation has highlighted the SEPTR great potentiality related to marine coastal areas monitoring. The main advantages can be summarised in an easier handling compared to traditional moorings, in less impact for the areas of interest, in an evident reliability, in a reduction of maintenance costs and in the great implementation possibilities.

The encouraging results of this collaboration has been essential for improving the instrument, with the implementation of new acquisition systems (acoustic and optical sensors) and a redesign to allow longer deployments.



The data coming periodically from SEPTR will be available on line (www.marlab.com)