

# OPERATIONAL OBSERVATORY OF THE CATALAN SEA (OOCs)

**Cruzado, A., Bahamon, N., Bernardello, R., \*Ahumada, M.A., Donis, D., Cardoso, G.**

**Centre d'Estudis Avançats de Blanes (CSIC)**

**Carrer accés Cala St. Francesc, 14. 17300 Blanes, Spain Tel. +34972336101 Fax +34972337806**

**E-mail (corresponding author): bahamon@ceab.csic.es**

**\*Present address: Universidad del Mar, Instituto de Recursos, Puerto Angel, Oaxaca, Mexico.**

*Abstract – The Operational Observatory of the Catalan Sea (OOCs) recently created by the Operational Oceanography Group at CEAB-CSIC is presented. The OOCs aims at performing observations of the marine environment in the Catalan Sea and beyond, assessing, modelling and forecasting the hydrodynamic and biogeochemical processes of the region. Some of the biogeochemical variables available in the models and forecast are phytoplankton, zooplankton and nutrients. Although OOCs is expected to be fully operational in 2011, some of its services are already available to the public through a dedicated webpage <http://www.ceab.csic.es/~simob/>.*

*Keywords – Operational observatory, oceanographic buoy, numerical modelling, ocean forecast, NW Mediterranean Sea.*

## I. INTRODUCTION

Observation and modelling of biological, physical and geochemical properties of the ocean are essential to assess present and past of the ecosystem functioning, and to predict upcoming changes in environmental patterns. At present, the observing systems at global, regional and local scales, such as environmental satellites and moored and drifting buoys, provide information for short and long term monitoring of the ocean. In the Catalan coast, a number of buoys, meteorological stations and tide gauges provide information to public and contribute, together with numerical models, to atmosphere and surface ocean forecasts. Existing services provide little information on the sea conditions below the surface. Furthermore, no instruments measuring biological and geochemical properties of water are available and therefore no forecasts of those environmental variables are provided.

The Operational Observatory of the Catalan Sea (OOCs), <http://www.ceab.csic.es/~simob/>, a component of project OAMMS funded by the Spanish Ministry of Science and Innovation, started operations in January 2009. The OOCs is maintained by the Group on Operational Oceanography at CEAB-CSIC, taking advantage of the facilities available at the CEAB. The OOCs aims at performing observations of the marine environment in the Catalan Sea and beyond and also assessing, modelling and forecasting the hydrodynamic and biogeochemical processes of the. Biogeochemical variables available in the models are phytoplankton, zooplankton, detritus, nitrate, orthophosphate and silicate. The observatory is expected to be fully operational in 2011. Much of the work that should integrate the observatory is already done in the framework of research project MERIS-ENVISAT CAL/VAL.

## II. COMPONENTS

The following components constitute the basis of the Observatory:

### 2.1 Multiparametric Oceanographic Buoy

The buoy system is being outfitted at CEAB's facilities. It is composed by a doughnut-type float with an emerging structure containing a full set of meteorological sensors, the central data-logging facility and the real-time communications system. In addition, the buoy has underwater instruments measuring, at various depths, oceanographic and ecological magnitudes, including currents (ADCP), temperature, salinity, dissolved oxygen, fluorescence, turbidity, and photosynthetically active radiation. Data are collected continuously and averaged over 30 minute periods before they are transmitted to the base in the CEAB. Pre-deployment on a shallow, near shore mooring site, is expected to take place in July 2009 and final deployment is planned for September 2009. The buoy system was operated in a pilot study for three months back in 2005 with relatively satisfactory results.

### 2.2 Complementary Sampling and Infrastructure Maintenance

Fortnightly CTD/Niskin casts started in March 2009 on board the CEAB's vessel DOLORES. An autonomous rosette water sampler with twelve 5 L Niskin bottles and a SeaBird 19+ CTD with fluorescence, PAR and turbidity sensors will be used. Six-monthly visits from the R/V GARCIA DEL CID will be performed at the mooring site and at a grid covering parts of the Catalan Sea. On-deck inspection and maintenance of the instrumentation on the buoy will be carried out.

### 2.3 Real-time Modelling and Forecast

Two models developed by Group members are available: 1DV [1] and 3D coupled hydrodynamic-biogeochemical [2, 3] models for NW Mediterranean Sea. They are both being adjusted to assimilate data obtained from the OOCs observing system as well as from remote sensing. Forcings from the European Centre for Medium-Range Weather Forecasts are being used to produce real time operational forecasts. At present, 7-days forecast of the biogeochemical and oceanographic conditions are provided and available to public (see <http://www.oceans.cat/forecast/June 2009/>).

### 2.4 Historical Data

Oceanographic cruises carried out by the team in the last four decades in the study area providing historical information of hydrographic and biogeochemical conditions will soon be accessible on-line. Relevant features on these conditions can be found in several doctoral theses i.e. [4, 5]. Data are under quality control processing at NOAA.

Development and implementation of a Quality Control Program for all the components of the Observatory are part of the project activities.

## III. OUTREACH

The Observatory, through its web page, will disseminate results and data sets but will also advertise the willingness of the scientists in the CEAB to lecture in colleges, high schools and other communities which might be interested in knowing firsthand the experiences of the day-to-day work. Once the system will be consolidated it is expected to become an Operational Observatory providing services for local and regional meteorological and marine climate change projections.

The OOCs is currently a part of the consortium MOON: Mediterranean Operational Oceanography Network. The future of the OOCs, after the end of the project OAMMS in 2011, will depend upon the support provided by the CSIC, the Ministry and/or any other potential source of funding. The Observatory aims at becoming a service for the scientific community and general public.

## REFERENCES

1. Bahamon, N., Cruzado, A., 2003. Modelling nitrogen fluxes in oligotrophic marine environments: NW Mediterranean Sea and NE Atlantic. *Ecological Modelling* 163(3):223-244.
2. Ahumada, M.A., Cruzado, A., 2007. Modeling of the circulation in the Northwestern Mediterranean Sea with the Princeton Ocean Model. *Ocean Science* 3:77-89.
3. Bernardello, R., Ahumada, M.A., Bahamon, N., Cruzado, A. Quantitative validation of a 3D coupled hydrodynamic biogeochemical model of the NW Mediterranean Sea (submitted).
4. Velázquez, Z., 1997. Fitoplancton en el Mediterráneo Noroccidental. Ph.D. Thesis, Universitat Politècnica de Catalunya, Barcelona. 271
5. Segura, M. 2007. Relació entre la distribució de nutrients i oxigen dissolt i la composició elemental del fitoplàncton a la Mar Catalana (N-O Mar Mediterrània). Ph.D. Thesis, Universitat Politècnica de Catalunya, Barcelona 287.