

## A SUB-REGIONAL COASTAL FORECASTING AND OBSERVING SYSTEM IN THE LEVANTINE BASIN

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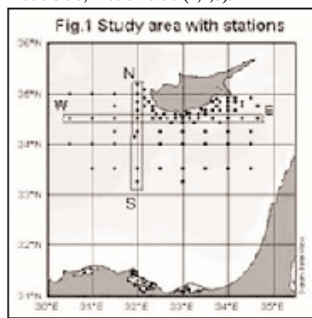
### Abstract

The countries surrounding the Mediterranean Sea have joined together in several multinational initiatives to conduct long-term, integrated, operational oceanographic observations and modelling of this important region. An operational high resolution oceanographic forecasting and observing system has been developed in Cyprus and has been operational since early 2002. The system is called CYCOFOS-Cyprus Coastal Ocean Forecasting and Observing System and is a component of the Global Ocean Observing System (GOOS), and its European (EuroGOOS) and Mediterranean (MedGOOS) modules. CYCOFOS at present consists of several operational modules, among them ?ow and offshore waves forecasts, satellite remote sensing, coastal monitoring stations and end-user-derived applications. This sub-regional operational system provide regular near-real-time information, both to local and sub-regional end users throughout the Eastern Mediterranean Levantine Basin.

**Keywords :** operational oceanography, forecasting, monitoring, Levantine Basin

### Preface

The development and promotion of the operational forecasting activities in the Mediterranean and European seas is carried out in the framework of several European Union funded research projects and international activities, which include MFSPP, MFSTEP, MAMA, MERSEA-Strand-1, EuroGOOS, MedGOOS, MedGLOOS (1,2,3).



The Cyprus coastal ocean forecasting and observing system was first developed within the framework of the above EU research projects(4). At present CYCOFOS provides near-real-time operational forecasts of sea currents, water temperature, salinity, sea level, significant wave height and direction, as well operational *in situ* observations of sea water temperature, sea level, and satellite remote sensing of sea surface temperature in the sea areas around Cyprus and in the Levantine Basin. CYCOFOS

consists of forecasting (?ow and sea state), observing (in-situ and remote sensing) and end-users modules :

#### The MFS Cyprus Near Real Time Ocean Forecasts in the NE Levantine

The CYCOM, a high-resolution (2.5 km) ?ow model based on the POM model, is in use for operational ?ow simulations in the coastal and open sea areas in the NE Levantine Basin. It has two open boundaries and is nested operationally into the coarse grid of the MFSTEP basin model. The CYCOM ?ow model provides weekly forecast for the forthcoming week, daily forecasts of currents, sea temperature, salinity and sea level.

#### The Cyprus Offshore Wave Forecasts in the Levantine Basin

The CYWAM wave model, which is a version of the WAM model, is in use for offshore wave forecasts in the Levantine Basin. The fine resolution Levantine CYWAM model is nested in a coarse Mediterranean CYWAM model. CYWAM provides operationally high-resolution forecasts of significant wave height and wave direction. The CYWAM model initially used the ECMWF wind forcing, while at present uses the 3-hourly winds from the 72-hour SKIRON weather forecasting system.

#### The coastal MedGLOSS Paphos Station

Within the framework of the Mediterranean network of Global Sea Level Observing System, a sea level station was set up in September 2001 at Paphos Harbor, on the western coast of Cyprus. The station's primary aim is to collect long-term systematic measurements, monitoring the sea level rise, which may be caused by melting of polar ice as a result of global warming. At present hourly sea level, water temperature and atmospheric pressure are provided by this coastal observing system. Expansion of the Cyprus MedGLOSS in the near future will include similar stations on the south and east coasts of Cyprus.

#### The CYCOFOS Satellite Ocean Remote Sensing

The CYCOFOS satellite ground receiving station has been providing regular daily high resolution (1 km) remote sensing SST images of the Levantine Basin since 2001. An HRPT (High Resolution Picture Transmission) SmartTech Professional Researcher model engine is operated by the CYCOFOS team. Depending upon the satellite's orbit, it is capable of covering in one single capture the Eastern Mediterranean and Black Seas up to 2-3 times per day.

#### The CYCOFOS Ocean Observatory

As part of the MAMA/MedGOOS initiative, and to promote deep sea

operational *in situ* observations, the CYCOFOS Ocean Observatory is currently under preparation for deployment in the Levantine Basin, off the southern coast of Cyprus. The CYCOFOS Ocean Observatory is scheduled for deployment jointly with Harris Maritime Communication Services, USA. A similar Ocean Observatory was deployed in 2003 in the Western Mediterranean, off the coast of Sardinia.

#### The end-users derived applications

To provide the scientific basis for any user-derived application that tries to manage either the exploitation or the protection of the marine environment, it is necessary to offer an efficient and quality-controlled estimate of marine state variables. In view of the above, additional components of CYCOFOS, MEDSLIKoil spill model and the MEDPOL general dispersion model, were developed specifically for end-user-derived applications, employing the MFSTEP, CYCOFOS and SKIRON products.

#### CYCOFOS products on the Internet

The near-real-time operational forecasting and observing products from the above CYCOFOS modules, such as daily ?ow forecasts for the NE Levantine Basin on a weekly basis, 3-hourly sea state forecasts for the Levantine Basin on a 60 hours basis, daily remote sensing sea surface temperature for the Levantine Basin and hourly in-situ sea level and water temperature at certain coastal sea stations are available to the end-users at the web page [www.ucy.ac.cy/cycocean](http://www.ucy.ac.cy/cycocean).

#### Recent CYCOFOS developments

The MFS Cyprus ?ow model used in CYCOFOS was downloaded to 1.8 km, while the area of the processed satellite remote sensing SST was extended as far west as the strait of Sicily and as far north as the Aegean Sea. Moreover, weekly CYCOFOS forecasting data are provided at the CYCOFOS web page for the end-users derived application, both to suite operationally that of the MEDSLIK oil spill model and that of the MEDPOL general dispersion model.

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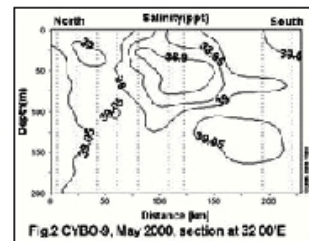


Fig.2 CYCO-9, May 2000, section at 32 00'E