

# SYNOPTIC, SEASONAL AND INTERANNUAL VARIABILITY OF THE WARM CORE EDDY SOUTH OF CYPRUS, SE LEVANTINE BASIN

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## Abstract

The general circulation in the SE Levantine Basin have been known since 80s. A more detailed picture of one of the dominant flow features in the area, that of the warm core eddy south of Cyprus has emerged thanks to the CYBO and MFSP projects results, from mid 90s until 2000. These renewed investigations definitive revealed that the anticyclonic eddy south of Cyprus is a permanent one undergoing synoptic, seasonal and interannual fluctuations.

*Keywords: Levantine Basin, mesoscale phenomena, currents, open sea*

## Introduction

The SE Levantine Basin dynamics during 80s [1,2,3] shown a mesoscale flow structure with an anticyclonic eddy activity south of Cyprus. In early 80's Brenner (1989) describes this flow feature to be a persistent one, while in mid 80s the POEM group [2,3] identified it as a non permanent multipole anticyclonic gyre. This gyre encompassed by three anticyclonic eddies with the most northern one to be considered as the Cyprus warm core eddy mentioned previously [1]. From 1995 until 2000 new in-situ experiments were carried out in the SE Levantine Basin, both in the frame of the CYBO-Cyprus Basin Oceanography and MFSP-Mediterranean Forecasting System projects. These renewed investigations made possible to give strong evidences about the existence, the structure and the evolution of the anticyclonic warm eddy south of Cyprus, on a quasi synoptic, seasonal and interannual time scales.

## Results and Discussion

Within the frame of the CYBO project, several seasonal oceanographic cruises were carried out in the SE Levantine Basin during late winter and summer periods, between 1995 and 2000. The cruises were aimed to obtain new deep *in-situ* data, from a telescopic grid of 80 stations. Moreover, in the framework of the MFSP project, a total of 17 XBT cruises were carried out biweekly, between September 1999 and June 2000, along the VOS-Volunteer Observing Ships track Limassol-Port Said. This made possible to collect more than 350 temperature profiles in a quasi synoptic scale.

The overall scientific picture derived from the renewed investigations of the SE Levantine Basin within the CYBO project [4] reveals new mesoscale flow features, such the Cyprus Basin Cyclonic Eddy and the westward coastal current flowing along the SE Cyprus coastline. Moreover, the CYBO results reveal that the dominant flow phenomenon south of Cyprus, in the SE Levantine Basin is the warm core eddy, that is attributed to the Cyprus/Shikmona anticyclonic eddy (Fig.1). The eddy, whose influence extends to depths of about 400m, constitute an intense dynamic feature with velocities as high as 35 cm/s. A seasonal spatial extension, north-south, of the eddy was to occur between 1995-1999, while the baroclinic instability of the MMJ caused the formation of a secondary smaller eddy west of the Cyprus anticyclonic eddy. Both features contribute to an even more complicate meandering flow bath of the MMJ in the Cyprus Basin.

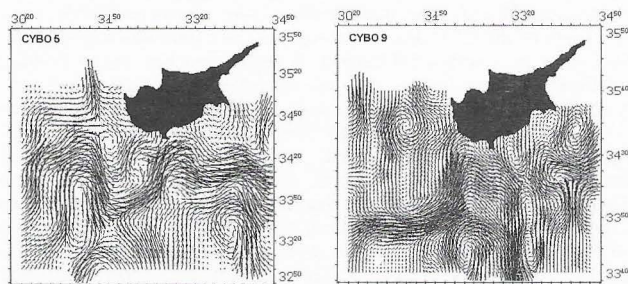


Fig.1 Circulation in October 1997 (CYBO-5) and May 2000 (CYBO-9)

The analysis of the XBTs transects show a well stratified surface water column down to 40-60 m depth, during autumn 1999 and early summer 2000. The in-situ SST from as high as 27-28.5°C in September 1999 (are higher comparable to the MEDATLAS climatology) was decreased to 17-18°C in February and March 2000. The surface cooling and the mixing processes in winter 2000, initiated a rapid increase of the upper homogenous water layer, from 100 m down to

320m, from January to March 2000, with temperature as low as 17-17.5°C (Fig.2). From April 2000 until the end of June 2000 the heating of the sea surface waters gradually re-established the stratification of the surface water, with temperature as high as 25°C. The temperature depression found along the above tracks is strongly associated with the Cyprus/Shikmona eddy. This is verified from the CYBO results, as well from the NRT operational forecasting experiments of

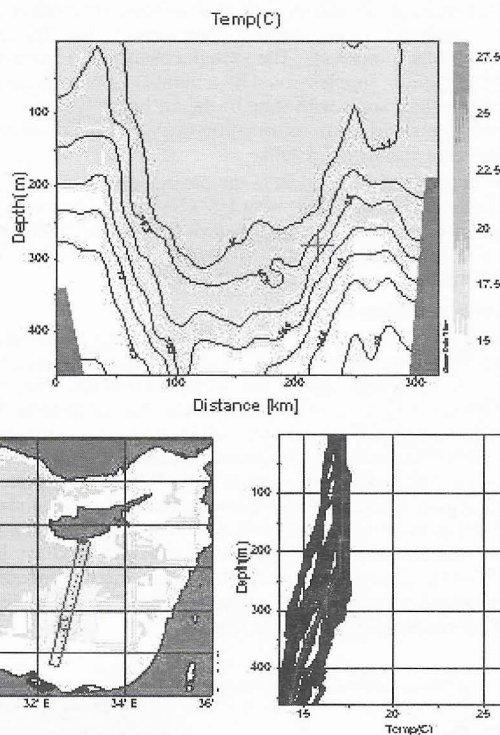


Fig. 2. Temperature section and composite profiles of along the XBT track Limassol-Port Said, MFSP-VOS, March 2000.

the MFSP.

Both studies give strong evidences that during 2000 the location of the Cyprus/Shikmona anticyclonic eddy was shifted for about 40-60 nm to the west comparable with the CYBO results obtained between 1995-1999 and those derived in 80s [1].

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