ONE-YEAR TIME SERIES OF FLUORESCENCE AND DYNAMICAL PARAMETERS IN THE ALGERIAN BASIN FROM SUMMER 1997 TO SUMMER 1998 (ELISA EXPERIMENT).

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Abstract

The ELISA (Eddies and Leddies Interdisciplinary Study off Algeria, 1997-1998) experiment was dedicated to study, in the eastern part of the Algerian Basin, the mesoscale (anticyclonic) Algerian Eddies (AEs), and their consequences on hydrodynamical and biological phenomena. It involved continuous monitoring of AEs with satellite images, 4 main cruises, and a network of 9 moorings. One of the moorings was equipped, besides currentmeters, with 4 autonomous CTD/Fluorometers probes (CTDF) between ~40 and 80m. The one-year CTDFs time series analysis allow to describe and explain most of the phytoplankton biomass variability, relating it either to AEs or to seasonal cycle.

Keywords: Algerian Basin, instruments and techniques, mesoscale phenomena, phytoplankton, time series

In the Algerian Basin the instability of the Algerian Current generates eddies [1, 2]. Only anticyclonic eddies can develop, hereafter called Algerian Eddies (AEs). Diameters range from 50 to 250km, vertical extents from few 100s of meters down to the bottom, lifetimes from few weeks to nearly 3 years, and their general trajectory is a counter-clockwise circuit in the eastern part of the Algerian Basin [3]. AEs impact on biological phenomena is important, as shown for a typical Algerian Current instability [4]. As well, in an old (>15 months) AE located close to the Algerian slope primary production values were found lower than those commonly accepted for the Eastern Mediterranean [5]. The AE location (alongslope/offshore) during the season also seems to be an important factor for the biological response [6].

The aims of the ELISA (Eddies and Leddies Interdisciplinary Study off Algeria) experiment (www.com.univ-mrs.fr/ELISA) were to study:

1) the general circulation of the water masses,

2) the origin, structure and trajectories of Algerian Eddies,

3) the biological response associated with mesoscale dynamical phenomena, and

4) the biological consequences of the mesoscale activity on the functioning of the Algerian Basin.

The means combined continuous satellite monitoring of AEs with NOAA/AVHRR infrared images, and between summers 1997 and 1998, 4 main cruises guided in near-real with NOAA/AVHRR images and a 9-mooring network. In order to properly describe the biological variability associated with the mesoscale dynamical phenomena over the whole year, we equipped one mooring (mooring E8, ~100km off the Algerian coast) with 4 CTD/fluorescence (CTDF) autonomous probes (SBE16 + Wetstar). We had the SBE16 specifically modified in order to ensure a representative fluorescence value by recording the mean of 5 consecutive fluorescence measurements (burst mode). A pumped system ensured that new water parcel was presented, and antifoulant-impregnated rings preserved from biofouling signal degradation. CTDF nominal immersions were 40, 50, 60 and 80m. However, when the mean current was strong, its combination with inertial oscillations would cause the mooring head to sink and behave like a vertical profiler (period ~19h30'), exploring the layer ~40-110m. Sampling rate was 1/15min (currentmeters: 1/1h). The CTDF were deployed from July 1997 to July 1998, recovered and cleaned twice in-between. Unfortunately, data return was not fully satisfying, especially since a design problem resulted in leaks and short circuits. However, the available CTDF data allow to clearly identify and describe the biological signature of an AE called 96-1 (see [3]), which stayed over the mooring for 3 months, as well as those of the propagating AEs 97-1 and 98-2. The maximum of fluorescence was recorded from early January till mid-February, and corresponded to the seasonal bloom.

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