Bio-optical Gliders and Profiling floats in the Mediterranean

INTRODUCTION
Recent development of miniaturized low-energy sensors capable of retrieving several bio-geochemical parameters (i.e., chl a, POC, CDOM, Oxygen) has allowed their integration onto autonomous platforms.

At the emerging Operational Oceanography Observatory in Villefranche-sur-mer, some of these sensors are being integrated into two different autonomous systems: gliders and profiling floats.

Some of these platforms will be deployed in the NW Mediterranean, where a physical and biological sampling station has been active since 1991 (DYFAMED) and a bio-optical buoy has been in operation since 2003 (BOUSSOLE).

OBJECTIVES
The main objective of the bio-optical observatory is the acquisition of high temporal and spatial resolution bio-geochemical data and their derivatives for the purpose of:

- establishing an operational monitoring system of the bio-geochemical dynamics of the area,
- evaluating the feasibility of an ARGO-like system for bio-geochemical studies,
- calibrating and validating Ocean Color satellite data,
- and determining the link between vertical distribution of some biogeochemical properties and their surface signature, as observed from space.

DATA

THE OBSERVATION SYSTEMS

BIO-OPTICAL PROFILERS

- 4 PROVOR floats equipped with:
  - CTD
  - Radiometer Ed/(a)
  - Transmissometer c(660)

BIO-OPTICAL GLIDERS

- Mass = constant; Volume = Fixed + 200g;
  D = M / V

- 1000 m Glider equipped with:
  - Seabird CTD
  - 2 Wetlabs BB2F sensors measuring Chla a & CDOM Fluorescence and backscatter (Red, Green, Blue)
  - Upwelling Radiance meter

MEASURED PARAMETERS

BIO-OPTICAL GLIDERS
- Spectral diffuse attenuation coefficient (kd)
- Backscattering coefficient (at 440 and 660 nm)
- Oxygen Concentration
- Chlorophyll - Fluorescence
- CDOM - Fluorescence
- Temperature
- Salinity

BIO-OPTICAL PROFILERS
- Spectral diffuse attenuation coefficient (kd)
- Backscattering coefficient
- Chlorophyll Fluorescence
- Upwelling radiance at nadir (Ls)
- Attenuation coefficient

PLANNED STUDIES

- Study of the secondary jet-front circulation and associated biological production
- Small scale temporal and spatial variability of the mixed layer (mesoscale and sub-mesoscale)

- Diurnal cycles of bio-geochemical properties by performing continuous missions from Villefranche observatory to DYFAMED/BOUSSOLE sampling station

- Improving interpretation of BOUSSOLE bio-optical data in terms of:
  - CAL/VAL ocean color activities
  - impact of physical and biological forcing on bio-optical variations

BOUSSOLE

"Buoy for the acquisition of a long-term (bio)optical series"

A deep sea mooring, collecting data on a "continuous" basis, since 2003

- Surface irradiance (E0)
- Downwelling irradiance (Ed)
- Upwelling irradiance (Eq)
- Temperature
- Salinity
- Chlorophyll Fluorescence
- Backscattering coefficient

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2- LCEAN-IPSL (ex LODYC), Paris, France