

## High Frequency pCO<sub>2</sub> Monitoring in the Mediterranean Coastal waters.

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**Abstract** –Monitoring the Air-Sea pCO<sub>2</sub> variability in the coastal areas is a priority due to the effect of the biological and biogeochemistry process on this process. The Northwestern Mediterranean Sea is an oligotrophic area in a semi-closed basin, therefore the changes on the surface waters properties take place faster than in other seas. This work focuses in the establishment of a pCO<sub>2</sub> monitor system and other related sensors at the OBSEA surface buoy.

**Keywords** –Air-Sea pCO<sub>2</sub>, Development, OBSEA, Surface buoy, pCO<sub>2</sub>.

### I. INTRODUCTION

The ocean waters had absorbed approximately 30% of anthropogenic CO<sub>2</sub> emissions [1]. This processes contributed to the global carbon cycle, changing the ocean chemistry. The coastal areas play an important role on this system due to the physics and biogeochemistry processes can resist or amplify the effect of the increased CO<sub>2</sub> partial pressure.

The Mediterranean Sea is a semi-closed basin [2] with a surface ocean circulation of Atlantic water which produce baroclinic instability and eddies. The biogeochemistry studies shown high variations on distribution and concentrations of nutrient in surface waters, even so is generally considered an oligotrophic area [3].

Due to its structure, processes occurring on a global scale can be approximated to smaller time and space scales. The aims of this study are:

1. Characterizing the carbon system in the Northwestern Mediterranean Sea and the Temporal evolution of the Air-Sea fluxes
2. Evaluate the effects of nearness coast areas on the Air-Sea pCO<sub>2</sub>.
3. Estimate the inter-annual, seasonal and diary variations on the partial pressure of CO<sub>2</sub> and the processed that control it.

### II. METHODOLOGY

The OBSEA seafloor observatory was selected for deployment the Battelle pCO<sub>2</sub> sensors in order to monitorize this area. A coastal site has been selected in

order to consider the advantages of the remote and real time control.

Connected to the main buoy of the OBSEA platform, a structured with the 3 systems was installed (FIG. 1).

1. Autonomous Battelle Seaology pCO<sub>2</sub> Monitoring System. Provides time series measurements of ocean and atmospheric carbon dioxide and air-sea exchange. This equipment is set to provide values each 3 hours (00, 03, 06...) (Fig.2).
2. Oxygen Optode 4835, measuring the oxygen concentration and air saturation each 30 seconds (Fig.3).
3. Sea-Bird Microcat to determinate the sea surface temperature and salinity with a 10 seconds interval measure (Fig.4).

The data for all the equipment is receive in real time and every last data is published at the OBSEA web (<http://www.upc.edu/cdsarti/OBSEA/data/co2.php>).

In order to study the carbonate system variables, discrete samples for total Alkalinity and total dissolved inorganic carbon measurements will be collected.



Figure 1. OBSEA buoy and the Systems Structure after the deployment on 28th of June 2016.

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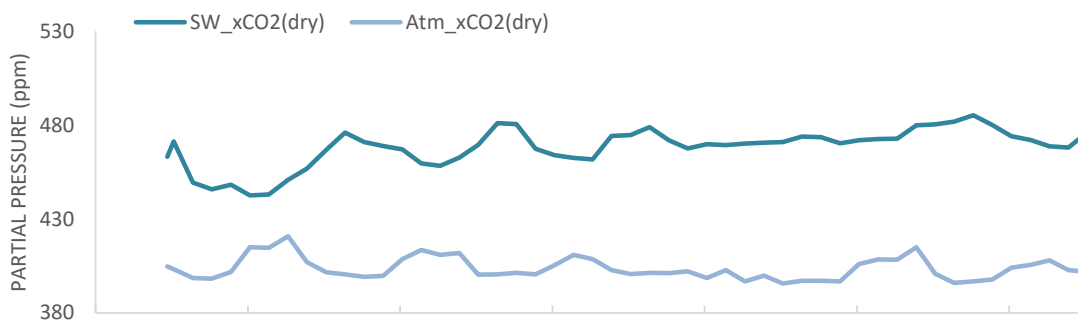


Figure 2. Data collected from the CO<sub>2</sub> Monitor System 29/06 – 5/07

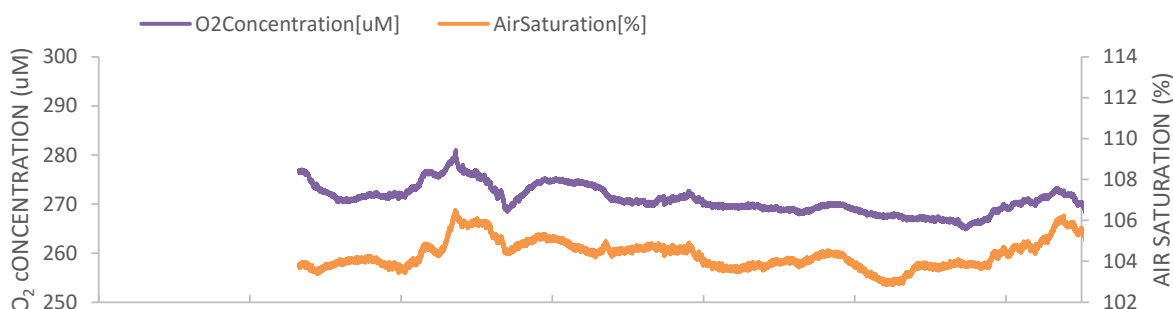


Figure 3. Data collected from the Oxygen Optode 30/06 – 5/07

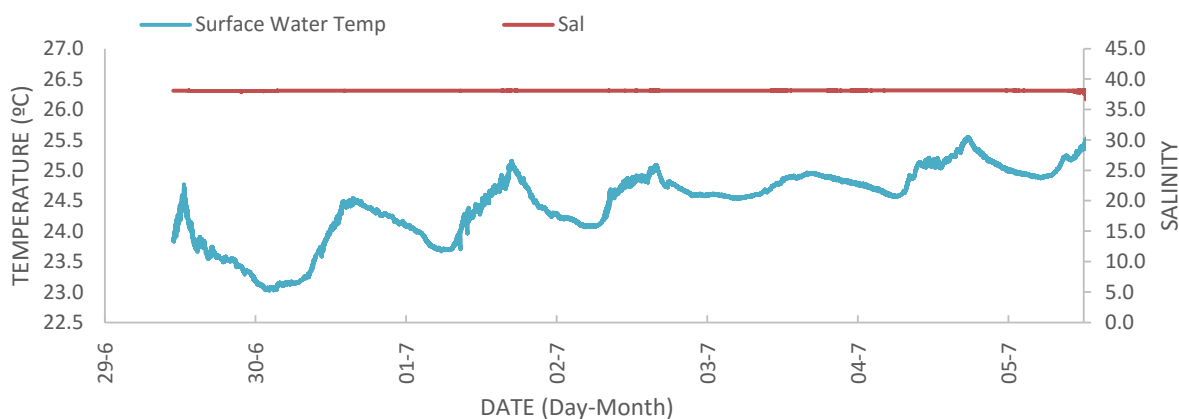


Figure 4. Data collected from the Microcat 29/06 – 5/07